Notice of Intent to Develop a Watershed Management Program (WMP) and a Coordinated Integrated Monitoring Program (CIMP) for the Los Cerritos Channel Watershed

Prepared for:

City of Bellflower

City of Cerritos

City of Downey

City of Lakewood

City of Long Beach

City of Paramount

City of Signal Hill

Los Angeles County Flood Control District (LACFCD)

Caltrans

June 27, 2013

RB-AR6612

LOS CERRITOS CHANNEL WATERSHED
NOTICE OF INTENT PACKAGE

TRANSMITTAL LETTER

The Los Cerritos Channel Watershed Group

June 25, 2013

Samuel Unger, Executive Officer
Los Angeles Regional Water Quality Control Board
320 West Fourth Street, Suite 200
Los Angeles, CA 90013

Attn.: Renee Purdy

LETTER OF INTENT TO PARTICIPATE IN THE DEVELOPMENT OF A WATERSHED MANAGEMENT PROGRAM (WMP) AND COORDINATED INTEGRATED MONITORING PROGRAM (CIMP) IN COOPERATION WITH THE LOS CERRITOS CHANNEL METALS TMDL TECHNICAL COMMITTEE

Dear Mr. Unger:

The Los Cerritos Channel (LCC) Metals TMDL Technical Committee now know as the Los Cerritos Channel Watershed Group (LCCWG) is submitting the attached Notice of Intent (NOI) package to your Board on behalf of our members. The LCCWG is comprised of the Cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill, as well as the Los Angeles County Flood Control District, and Caltrans. We are developing a Watershed Management Program (WMP) and a Coordinated Integrated Monitoring Program (CIMP) and intend to comply with the requirements and provisions of Order No. R4-2012-0175.

Attached to this NOI package for the Los Cerritos Channel Watershed are letters of intent from our member cities.

While maintaining the 18-month schedule for development of the WMP and CIMP, we intend to continue to evaluate and consider the Enhanced WMP (EWMP) option. If the group decides prior to December 28, 2013 to develop an EWMP, your office will be notified in a supplemental Notice of Intent, together with revised Letters of Intent from member cities and agencies.

Should you have any questions, please contact one of us at the following numbers: Anthony Arevalo, 562.570.6023; or Steve Myrter, 562.989.7356. Thank you.

Sincerely,
ON BEHALF OF THE LOS CERRITOS CHANNEL METALS TMDLS TECHNICAL COMMITTEE

ANTHONY AREVALO
Co-Chair, Los Cerritos Channel
Metals TMDLs Technical Committee

STEVE MYRTER
Co-Chair, Los Cerritos Channel
Metals TMDLs Technical Committee

LOS CERRITOS CHANNEL WATERSHED
NOTICE OF INTENT PACKAGE

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LOS CERRITOS CHANNEL WATERSHED
NOTICE OF INTENT PACKAGE

LOS CERRITOS CHANNEL WATERSHED NOI

RB-AR6618

Notice of Intent

Watershed Management Program (WMP) and Coordinated Integrated Monitoring Program (CIMP)

Los Cerritos Channel Watershed

SECTION 1

PROGRAM TYPE AND PERMITTEES

The Permittees (listed in Table 1) that are party to this Notice of Intent (NOI) hereby notify the Los Angeles Regional Water Quality Control Board (Regional Water Board) of their intent to develop a Watershed Management Plan (WMP) for the Los Cerritos Channel Watershed. This NOI is being submitted in accordance with Part VI.C.4.b.i of Order R4-2012-0175. Permittees meet the LID and Green Street conditions in Sections VI.C.4.c.i (1) and (2) and VI.C.4.c.iv (1) and (2) and will submit the Draft WMP within 18 months of the effective date of Order R4-2012-0175 (June 28, 2014). Demonstration that the conditions of Part VI.C.4.c.i (1) have been met in greater than 50% of the watershed area is contained in Attachment A that demonstrates that the Cities of Downey, Lakewood, Paramount, and Signal Hill, which together comprise 69.99% of the total portion of the watershed included in the MS4 Permit for the Coastal Watersheds of Los Angeles Except Those Discharges Originating from the City of Long Beach, commenced development of a Low Impact Development (LID) Ordinance and a Green Streets Policy in collaboration with the Gateway Water Management Authority by February 26, 2013. Demonstration that the conditions of Part VI.C.4.c.iv (2) have been met in greater than 50% of the watershed area is contained in the attachments to the letters of intent from the cities of Bellflower, Cerritos, Lakewood, Paramount, and Signal Hill, which together comprise 97.44% of the total portion of the watershed included in the MS4 Permit.

The Permittees (listed in Table 1) that are party to this NOI also hereby notify the Regional Water Board of their intent to develop a Coordinated Integrated Monitoring Program (CIMP). The Permittees intend to follow a CIMP approach for each of the required monitoring plan elements and will submit the CIMP within 18 months of the effective date of Order R4-2012-0175 (June 28, 2014). Caltrans has long participated informally in meetings of the Los Cerritos Channel Watershed Group (formerly Los Cerritos Channel Metals TMDLs Technical Committee), and the Group is currently negotiating formal participation of Caltrans in preparation of both the WMP and CIMP.

While maintaining the 18-month WMP schedule, the Permittees intend to continue to consider Enhanced WMP (EWMP) options. If the Permittees elect to develop an EWMP prior to the December 28, 2013 deadline, the Permittees will notify the Regional Board.

Table 1. Watershed Management Program Permittees

1. City of Bellflower
2. City of Cerritos
3. City of Downey
4. City of Lakewood

5. City of Long Beach[1]
6. City of Paramount
7. City of Signal Hill
8. Caltrans[1]
9. Los Angeles County Flood Control District (LACFCD)

1 The City of Long Beach and Caltrans are Regulated Under Separate MS4 Permits

SECTION 2

TOTAL MAXIMUM DAILY LOADS ESTABLISHED WATER QUALITY BASED EFFLUENT LIMITATIONS

At this time, there are no interim or final Water Quality Based Effluent Limitations (WQBELs) for trash applicable to the Watershed. Rather, the only interim or final WQBELs directly applicable to the Watershed are for the Los Cerritos Channel Total Maximum Daily Loads (TMDLs) for Metals established by the USEPA on March 17, 2010. On June 6, 2013, the Regional Water Board adopted Resolution No. R13-XXX with two attachments. Attachment B specifies an interim compliance date of September 30, 2017, which is after the anticipated approval date for the WMP, but approximately three months prior to the expiration date for Order No. R4-2012-0175. Attachment B also specifies two additional interim compliance dates in 2020 and 2023 and a final compliance date of September 30, 2026. Pursuant to Section VI.E.3 of the Order, the WMP will become the Implementation Plan for the EPA-established Los Cerritos Channel Metals TMDLs.

In addition, the cities of Bellflower, Lakewood, Long Beach, Paramount, and Signal Hill, together with Caltrans and the Los Angeles County Flood Control District (LACFCD) have been named as responsible parties in the Total Maximum Daily Load for Toxic Pollutants in the Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters. This TMDL became effective on March 23, 2012. There are no interim or final WQBELs directly applicable to the Los Cerritos Channel Watershed. However, there are general plan development, monitoring, reporting, and plan implementation requirements that could impact the watershed. Initial work on these tasks is being coordinated by the Regional Monitoring Coalition with which the applicable permittees are coordinating.

Table 2 lists applicable interim, final Water Quality Based Effluent Limitations (WQBELs) limitations established by the Implementation Schedule for the Los Cerritos Channel TMDLs[1] for Metals.

Table 2. Applicable Interim and Final WQBELs occurring before and after Watershed Management Program Approval.

TMDL Order	WQBEL	Interim/Final	Compliance Date
Los Cerritos Channel TMDLs for Metals 2010-2026	Dry Weather[1] 30% of drainage area	Interim	9/30/2017
	70% of drainage area	Interim	9/30/2020

	100% of drainage area	Interim	9/30/2023
	Wet Weather[1] 10% of drainage area	Interim	9/30/2017
	35% of drainage area	Interim	9/30/2020
	65% of drainage area	Interim	9/30/2023
	100% of drainage area	Final	9/30/2026

[1] An Implementation Schedule for the Los Cerritos Channel Metals TMDLs was approved by the Regional Water Board on June 6, 2013 in Attachment B to Resolution No. R13-XXX.

SECTION 3

IDENTIFY TMDL CONTROL MEASURES:

Table 3 identifies the control measures being implemented by each Permittee for each TMDL. The Permittees will continue to implement these measures during the development of the WMP.

Table 3. Control Measures that are and will be Implemented Concurrently with WMP Development

Permit	Program Elements	Control Measures
Continued Implementation of Permit Requirements	Public Information and Public Participation Program	Provide Public Information related to control of metals
	Industrial/Commercial Facilities Program	Track critical sources of metals Inspect critical industrial sources of metals Notify industries identified as potential sources of metals of BMP requirements applicable to their sites
	Planning and Land Development Program	Implement New Development/Redevelopment Project Performance Criteria
	Development Construction Program	Implement Construction Site Inventory Tracking Implement Construction Plan Review and Approval Procedures Conduct Construction Site Inspections
	Public Agency Activities Program	Implement Public Construction Management and Public Facility Inventory Inventory Existing Development for Retrofitting Opportunities Train Employees in Targeted Positions and Contractors

SECTION 4

DEMONSTRATION OF MEETING LID ORDINANCE AND GREEN STREET POLICY REQUIREMENTS

The Permittees that are party to this NOI have LID Ordinances and Green Streets Policies in place or in development. Table 4 summarizes the status of the Permittees' LID ordinances and Table 5 summarizes the status of the Permittees' Green Streets policies. More than 50% of the MS4 watershed area regulated by Order No. R4-2012-0175 that will be addressed by the WMP is covered by LID ordinances and Green Streets policies.

Table 4. LCC: Status of LID Ordinance Coverage of the MS4 Watershed Area Addressed by the WMP [1]

Permittee	LID Ordinance Status	MS4 Watershed Area for which Permittee is Responsible[1] [acres]	MS4 Watershed Area Covered by Permittee's LID Ordinance [acres]	Percentage of Watershed Area
Bellflower	In Place	2,818.43	2,818.43	15.91%
Cerritos	Draft Ordinance	57.60	57.60	0.33%
Downey	In Development	245.0	245.0	1.38%
Lakewood[2]	Draft Ordinance	4,802.77	4,802.77	27.12%
Paramount	Draft Ordinance	1,128.93	1,128.93	6.37%
Signal Hill	Draft Ordinance	530.75	530.75	3.00%
Total LA MS4 City Watershed Area		9,583.48		
Long Beach	In Place	7,535.38	7,535.38	42.55%
Total LA and Long Beach MS4 Watershed Area		17,118.86		
Caltrans[3]	NA	497.97	NA	2.81%
LACFCD[3]	NA	NA	NA	NA
Total Los Cerritos Channel Watershed Area		17,616.83[4]		
Total LA MS4 City Watershed Area Covered By In Place or Draft LID Ordinances			9,338.48[4]	
Total LA and Long Beach MS4 City Watershed Area Covered by In Place or Draft LID Ordinances			16,873.86[4]	
% of LA MS4 City Watershed Area Covered By In Place or Draft Ordinances				97.44%
% of LA and LB MS4 City Watershed Area Covered by LID Ordinances				98.57%

Status Descriptions:

- In Place – Permittee has adopted an LID Ordinance that is in compliance with the requirements of Order R4-2012-0175 for its portion of the watershed.
- Draft Ordinance – Permittee has completed, or will complete by June 28, 2013, the development of a draft LID Ordinance in compliance with the requirements of Order R4-2012-0175 for its portion of the watershed.
- In Development – Permittee initiated development of an LID Ordinance for its portion of the watershed within 60 days of the effective date of the Order in compliance with the requirements of Order R4-2012-0175.

[1] Caltrans is under a separate statewide permit and its acreage is subtracted from city acreage.
[2] Lakewood will adopt a modified version of the County of Los Angeles LID Ordinance.
[3] The properties of Caltrans and LACFCD are not subject to inclusion in an LID Ordinance, nor in a municipal Green Streets Policy.
[4] Not including 95-acre unincorporated County area being addressed separately.

Table 5. LCC: Status of Green Street Policy Coverage of the MS4 Watershed Area Addressed by the WMP [1]

Permittee	Green Street Policy Status	MS4 Watershed Area for which Permittee is Responsible[1] [acres]	MS4 Watershed Area Covered by Permittee's Green Street Policy [acres]	Percentage of Watershed Area
Bellflower	Draft Policy	2,818.43	2,818.43	15.91%
Cerritos	Draft Policy	57.60	57.60	0.33%
Downey	In Development	245.0	245.0	1.38%
Lakewood	Draft Policy	4,802.77	4,802.77	27.12%
Paramount	In Place	1,128.93	1,128.93	6.37%
Signal Hill	In Place	530.75	530.75	3.00%
Total LA MS4 City Watershed Area		9,583.48		
Long Beach	In Development	7,535.38	7,535.38	42.55%
Total LA and Long Beach MS4 City, Watershed Area		17,118.86		
Caltrans[2]	NA	497.97	NA	2.81%
LACFCD[2]	NA	NA	NA	NA
Total Los Cerritos Channel Watershed Area		17,616.83[3]		
Total LA MS4 City Watershed Area Covered By In Place or Draft Green Streets Policies			6,520.05[3]	
Total LA and LB MS4 City Watershed Area Covered by In Place or Draft Green Streets Policies			6,520.05[3]	
% of LA MS4 City Watershed Area Covered By In Place or Draft Green Streets Policies				97.44%
% of LA and LB MS4 City Watershed Area Covered by In Place or Draft Green Streets Policies				54.55%

Status Descriptions:

- In Place – Permittee has adopted a Green Streets Policy that is in compliance with the requirements of Order R4-2012-0175 for its portion of the watershed.
- Draft Ordinance – Permittee has completed, or will complete by June 28, 2013, the development of a draft Green Streets Policy in compliance with the requirements of Order R4-2012-0175 for its portion of the watershed.
- In Development – Permittee initiated development of a Green Streets Policy for its portion of the watershed within 60 days of the effective date of the Order in compliance with the requirements of Order R4-2012-0175.

[1] Caltrans is under a separate statewide permit and its acreage is subtracted from city acreage.

[2] The properties of Caltrans and LACFCD are not subject to inclusion in an LID Ordinance, nor in a municipal Green Streets Policy.

[3] Not including 95-acre unincorporated County area being addressed separately.

SECTION 5

GEOGRAPHIC SCOPE OF WATERSHED MANAGEMENT PROGRAM

The Los Cerritos Channel Watershed encompasses a land area of approximately 17,711 acres (27.7 square miles). It extends from just north of I-105 in Downey to Atherton Street in Long Beach where it discharges into the Los Cerritos Channel Estuary, which, in turn, discharges through Marine Stadium and Alamitos Bay to San Pedro Bay. The watershed includes ten MS4 Permittees regulated under three different MS4 permits. Nine of these Permittees are participating together in development of a WMP and a CIMP. This WMP and CIMP only includes the areas of the participating Permittees within the Los Cerritos Channel Freshwater watershed; it does not include areas directly tributary to the Los Cerritos Channel Estuary, nor areas directly tributary to Alamitos Bay. The WMP and CIMP will also include all LACFCD facilities within the Los Cerritos Channel Watershed, excluding any unincorporated County areas. The total area covered by the WMP includes approximately 17,617 acres. A 95-acre unincorporated County area with a separate WMP will be excluded from the WMP prepared by the Los Cerritos Channel Watershed Group. Table 6 provides a breakdown of the land area within the Los Cerritos Channel Watershed by Permittee.

Table 6. Los Cerritos Channel Watershed Land Area by Permittee.

Permittee	Land Area (Acres)[1,2]	Percent of Total Area
Bellflower	2,818.43	15.91%
Cerritos	57.60	0.33%
Downey	245.0	1.38%
Lakewood	4,802.77	27.12%
Long Beach	7,535.38	42.55%
Paramount	1,128.93	6.37%
Signal Hill	530.75	3.00%
Caltrans	497.97[1]	2.81%
LACFCD	NA[2]	NA

[1] Caltrans average subtracted from city areas.

[2] LACFCD acreage is included in city areas.

SECTION 6

PLAN CONCEPT AND INTERIM MILESTONES AND DEADLINES

If at any point, the Permittees elect to develop an EWMP, the Permittees propose to follow the schedule in Table 7:

Table 7. Enhanced Watershed Management Program Interim Milestones and Target Completion Dates.

Milestone	Target Date
Notify Regional Board on decision to elect to develop an Enhanced WMP instead of WMP	December 2013
Compile technical memorandum of water quality priorities	December 2013
Complete internal draft of EWMP Work Plan	March 2014
Complete draft CIMP	April 2014
Submit final CIMP and final EWMP Work Plan	June 2014
Complete initial RAA based on selected watershed control measures	December 2015
Complete internal draft of EWMP	April 2015
Submit draft EWMP to Regional Water Board	June 2015
Submit Final EWMP to Regional Water Board (revised based on the Regional Water Board comments)	January 2016

SECTION 7

COST ESTIMATE

It is estimated that the cost for the development of the CIMP and WMP will be approximately $650,000. In addition, each Permittee will contribute undefined administrative costs and other in-kind services.

SECTION 8

PERMITTEE MEMORANDA OF UNDERSTANDING

All Permittees to the WMP are committed to the completion of the program development.

A copy of each city's existing MOA is attached to city Letters of Intent. A new MOA is under development. It will be signed by all permittees participating in development of the WMP and CIMP. A copy of the current draft is in Attachment B of this NOI.

SECTION 9

COMMITMENT TO IMPLEMENT A STRUCTURAL BMP OR SUITE OF BMPS

The Permittees listed in Table 8 will implement the identified structural BMP to fulfill the obligations under Part VI.C.b.iii.(5) if the WMP is converted to an EWMP.

Table 8. Structural BMP or Suite of BMPs to be Implemented in the EWMP Watershed.

Watershed	Permittee	Structural BMP or Suite of BMPs to be Implemented	Planned Implementation Date
Los Cerritos Channel	All listed on Table 1	The Permittees are evaluating potential sites within the watershed for installation of a CDS unit, preferably in a location where it could serve as pre-treatment for a future stormwater capture facility.[1,2]	To Be Determined[3]

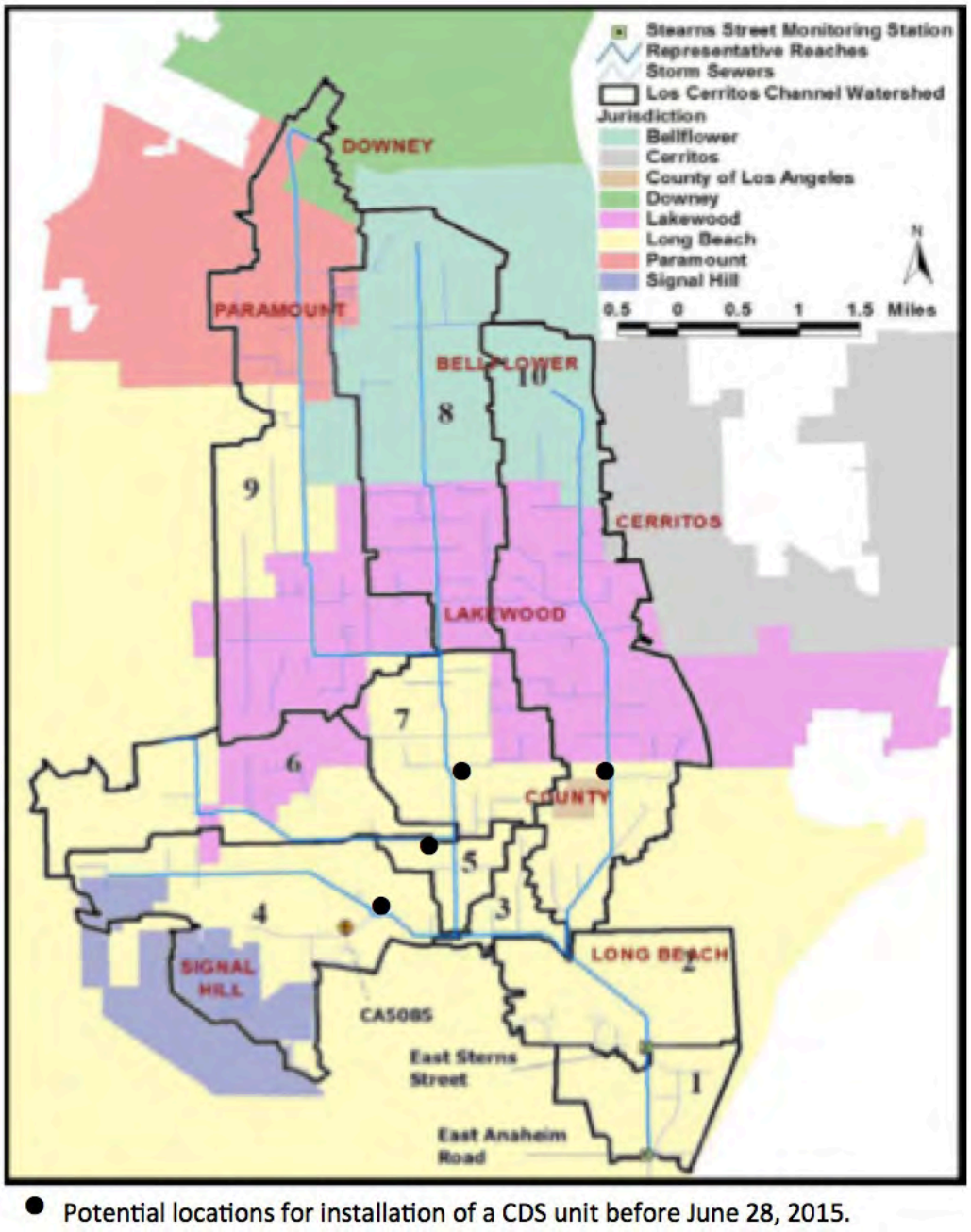
[1] The Los Cerritos Channel Watershed Group has selected a CDS unit as its potential initial structural BMP because these units capture sediment to which metals adhere, as well as trash and debris to address the 303(d) listing of Los Cerritos Channel for Trash.

[2] In addition, five cities in the watershed have applied for a Proposition 84 Integrated Regional Water Management (IRWM) grant for several hundred full-capture inserts for catch basins within the watershed. If this grant application is funded, this suite of BMPs may be implemented instead of a single CDS unit.

[3] Within thirty months of the effective date of this Order R4-2012-0175.

RB-AR6627

Figure 1: Los Cerritos Channel Watershed [1,2]



[1] A 5.05-acre area in the City of Downey drains to the Los Angeles River Watershed. While this area is included in this and other maps related to the TMDL, it has been excluded from TMDL calculations, allocations, and other tables and text (except those presenting model results) for the Los Cerritos Channel Metals TMDLs.

[2] Does not include 95-acre unincorporated County area being addressed separately.

[3] The reference monitoring station for the watershed is located at East Stearns Street.

[4] The reference weather station (CA5085) for the watershed is located at the Long Beach airport.

ATTACHMENT A:

Demonstration of Compliance with Part VI.C.4.c.i (1) and Part VI.C.4.c.iv (1) of Order R4-2012-0175

ATTACHMENT A.1:

GWMA LID ORDINANCE AND GREEN STREETS POLICY TEMPLATE PROGRAM

GATEWAY WATER MANAGEMENT AUTHORITY

Los Angeles Gateway Region
Integrated Regional Water Management
Joint Powers Authority

16401 Paramount Blvd., Paramount, CA 90723 • 562.663.6850 phone 562.634.8216 fax • www.gatewayirwmp.org

*****PLEASE FEEL FREE TO DISTRIBUTE TO YOUR CITY MANAGER AND/OR CONSULTANTS*****

SUMMARY OF GWMA SPECIAL BOARD MEETING HELD ON 2/26/13 REGARDING NEW LA COUNTY MS4 PERMIT WMPs/EWMPs

Dear Gateway Region City:

As you know, the new LA County MS4 Permit is now in effect. This new permit comes with certain deadlines which drive how a city will comply with the permit and how long they have to comply. A major component of the new permit is which of three Watershed Management Program options to select. The first deadline was 2/26/2013 which documented a city's intent to begin work on development of a LID Ordinance and Green Streets Policy. By meeting this deadline, cities could then select from three Watershed Management Program options, each with a different deadline as further described below.

On 2/26/13, GWMA held a Special Board Meeting in Paramount to discuss and consider actions that could help Gateway cities with meeting their WMP/EWMP deadlines.

At this Special Board Meeting, two (2) actions were taken to provide assistance to any or all Gateway Region Cities, regardless of JPA membership, acknowledging that participation was completely voluntary.

ACTION #1

- The Board of Directors of the Gateway Water Management Authority "GWMA" unanimously directed the Executive Officer to develop draft templates for an LID Ordinance and a Green Street Policy which could be utilized and customized by any Gateway region city, regardless of JPA membership.

All Gateway cities were given the option to fill out and sign a notice of "Intent to Participate" with GWMA as the fiduciary agent to procure consultant services for these two programs. Many cities have joined the regional effort by submitting the form to GWMA for collection and documentation.

These signed forms serve as documentation of a city's intent to begin looking at the programs. The Permit requires that this decision had to be made no later than 2/26/13 if they wanted additional time to develop a Watershed Management Plan "WMP" (12 months) or a Watershed Management Program which includes early LID and Green Street Actions (18 months) or an Enhanced Water Management Plan "EWMP" (30months). These forms will accompany each Permittee's Notice of Intent to do a WMP or EWMP which is due no later than June 28, 2013.

Christopher Cash, Board Chair • **Adriana Figueroa**, Vice-Chair • **Charlie Honeycutt**, Secretary/Treasurer • **Kevin Wattier**, Chair Emeritus

Proudly serving Gateway cities and agencies in Southeastern Los Angeles County

Current Members: Artesia · Bell · Bell Gardens · Bellflower ·Central Basin Municipal Water District · Cerritos · Commerce · Downey · Huntington Park· La Mirada · Lakewood · Long Beach · Long Beach Water Department · Lynwood · Norwalk · Paramount · Pico Rivera · Santa Fe Springs · Signal Hill · South Gate · Vernon · Whittier
Ex-Officio Participant: Hawaiian Gardens

MINUTES OF THE GATEWAY WATER MANAGEMENT AUTHORITY
LOS ANGELES GATEWAY REGION
INTEGRATED REGIONAL WATER MANAGEMENT JOINT POWERS AUTHORITY
SPECIAL BOARD MEETING
AT PARAMOUNT, CALIFORNIA
THURSDAY, FEBRUARY 26, 2013

A regular meeting of the Board of Directors of the Gateway Water Management Authority was held on Thursday, February 26, 2013 at 9:30 a.m. at the Progress Park Plaza, 15500 Downey Avenue, Paramount, CA 90723.

Chair Chris Cash called the meeting to order at 9:45 a.m. Roll was called through self-introductions and a quorum of the board was declared present. A Sign-In Sheet was provided to all attendees for sign-in.

BOARD MEMBERS PRESENT:

Chair Christopher Cash	Paramount
Vice-Chair Adriana Figueroa	Norwalk
Charlie Honeycutt	Signal Hill
Carlos Alba	Artesia
Young Park (alternate)	Bell
Chau Vu (alternate)	Bell Gardens
Bernardo Iniguez (alternate)	Bellflower
Gina Nila	Commerce
Desi Alvarez (by proxy)	Huntington Park
Lisa Rapp	Lakewood
Anthony Arevalo	Long Beach
Jose Molina (alternate)	Lynwood
Gladis Deros (alternate)	Pico Rivera
Noe Negrete (alternate)	Santa Fe Springs
Steve Myrter (alternate)	Signal Hill
Scott Rigg (alternate)	Vernon
David Pelser	Whittier

BOARD MEMBERS ABSENT:

Terry Rodrigue	Bell
John Oropeza	Bell Gardens
Deborah Chankin	Bellflower
N/A	Central Basin MWD
Vince Brar	Cerritos
John Oskoui	Downey
James Enriquez	Huntington Park
Thomas Robinson	La Mirada
Jim Glancy	Lakewood
Kevin Wattier	Long Beach Water Dept.
N/A	Lynwood
Art Cervantes	Pico Rivera
Frank Beach	Santa Fe Springs
Bill DeWitt	South Gate
Kevin Wilson	Vernon

EX-OFFICIO PARTICIPANTS:

Ernesto Marquez	Hawaiian Gardens

STAFF AND GUESTS ON SIGN-IN SHEET:

Grace Kast	Executive Officer
Claudia Arellano	Vernon
Chris Lapaz	Montebello
Sarah Ho	Paramount
Konya Vivanti	Lakewood
Aaron Hernandez	Cudahy
Victor Ferrer	Cudahy
Rochelle Paras	LAFCD – GLAC IRWM
Blake Whittington	Council for Watershed Health
Sam Kouri	Montebello

ITEM 3 - ADDITIONS TO THE AGENDA

None.

ITEM 4 – ORAL COMMUNICATIONS TO THE BOARD

None.

ITEM 5 – PRESENTATION – LOS ANGELES COUNTY MS4 PERMIT (GATEWAY CITIES AND WATERSHEDS)

Mr. John Hunter of John L. Hunter and Associates gave a presentation summarizing the newly adopted LA County MS4 Permit. He indicated that several deadlines were being imposed that needed the attention of the cities throughout LA County.

After many questions and answers, cities were invited to sign a green sheet "Intent to Participate" that would satisfy the first deadline on February 26, 2013 indicating a cities intent to initiative their review of a Green Streets Policy and Low Impact Development Ordinance. The documents would be held by GWMA for inclusion with an MOU due by June 28, 2013.

ITEM 6 – DISCUSSION/ACTIONS REGARDING COMPLIANCE WITH LA REGIONAL BOARD'S MS4 PERMIT (WMP/EWMP)

Many representatives of cities and existing watershed groups expressed interest in having GWMA take a lead on the formation of an MOU group to develop a WMP or EWMP for the Gateway region. Participation in the MOU would be voluntary and the end-product (WMP/EWMP) would serve as the umbrella Plan with separate chapters for each watershed in the region. The Chair directed staff to work on a follow-up special board meeting date and time to focus solely on the MS4 Permit WMP/EWMP.

On motion made by Director Alvarez and seconded by Director Figueroa, staff was instructed to develop a standard, customizable LID Ordinance and Green Street Policy for Gateway cities to use if they so choose. The motion passed unanimously.

On motion made by Director Rapp and seconded by Negrete, staff was directed to develop an MOU for discussion and action by the GWMA Board. The motion passed unanimously.

ITEM 7 – DIRECTORS' COMMENTS/REPORTS

None.

The special meeting was adjourned at 12:05 p.m. to a regular meeting of the board on Thursday, March 14, 2013 in the Clearwater Building at Paramount, CA.

Charlie Honeycutt, Treasurer

3-14-13
Date

Intent to Participate

The City of Downey is interested in obtaining assistance with implementation efforts related to the new Green Streets and Low Impact Development programs of the National Pollutant Discharge Elimination System's Municipal Separate Sanitary Storm Sewer (MS4 NPDES Permit).

The GWMA will act as the fiduciary agent to procure consultant services to develop draft templates of the above two programs.

☑ Yes, the City intends to participate along with other GWMA agencies in the development of these programs. Check the three boxes below if applicable to your city.

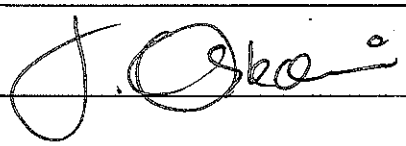
- ☑ The City is already in the process of adopting LID
- ☐ The City is already in the process of adopting Green Streets
- ☐ Already participating in the LA Permit Group effort

☐ No, the City is not interested in participating;

Please sign below and return this form via fax or email to Grace J. Kast, Executive Officer, GWMA (626-485-0338) **no later than Tuesday, February 26th, 2013.**

Name John Oskoui

Title Assistant City Manager/Director of Public Works

Signature 

Date February 26, 2013

Intent to Participate

The City of LAKEWOOD is interested in obtaining assistance with implementation efforts related to the new Green Streets and Low Impact Development programs of the National Pollutant Discharge Elimination System's Municipal Separate Sanitary Storm Sewer (MS4 NPDES Permit).

The GWMA will act as the fiduciary agent to procure consultant services to develop draft templates of the above two programs.

☒ Yes, the City intends to participate along with other GWMA agencies in the development of these programs. Check the three boxes below if applicable to your city.

- ☒ The City is already in the process of adopting LID
- ☒ The City is already in the process of adopting Green Streets
- ☐ Already participating in the LA Permit Group effort

☐ No, the City is not interested in participating;

Please sign below and return this form via fax or email to Grace J. Kast, Executive Officer, GWMA (626-485-0338) **no later than Tuesday, February 26th, 2013.**

Name LISA ANN RAPP

Title DIRECTOR OF PUBLIC WORKS

Signature Lisa Ann Rapp

Date 2/26/13

Intent to Participate

The City of Paramount is interested in obtaining assistance with implementation efforts related to the new Green Streets and Low Impact Development programs of the National Pollutant Discharge Elimination System's Municipal Separate Sanitary Storm Sewer (MS4 NPDES Permit).

The GWMA will act as the fiduciary agent to procure consultant services to develop draft templates of the above two programs.

☑ Yes, the City intends to participate along with other GWMA agencies in the development of these programs. Check the three boxes below if applicable to your city.

- ☐ The City is already in the process of adopting LID
- ☐ The City is already in the process of adopting Green Streets
- ☐ Already participating in the LA Permit Group effort

☐ No, the City is not interested in participating;

Please sign below and return this form via fax or email to Grace J. Kast, Executive Officer, GWMA (626-485-0338) **no later than Tuesday, February 26th, 2013.**

Name Christopher Cash

Title Director of Public Works

Signature

Date 2/26/13

Intent to Participate

The City of SIGNAL HILL is interested in obtaining assistance with implementation efforts related to the new Green Streets and Low Impact Development programs of the National Pollutant Discharge Elimination System's Municipal Separate Sanitary Storm Sewer (MS4 NPDES Permit).

The GWMA will act as the fiduciary agent to procure consultant services to develop draft templates of the above two programs.

☑ Yes, the City intends to participate along with other GWMA agencies in the development of these programs. Check the three boxes below if applicable to your city.

- ☑ The City is already in the process of adopting LID
- ☑ The City is already in the process of adopting Green Streets
- ☐ Already participating in the LA Permit Group effort

☐ No, the City is not interested in participating;

Please sign below and return this form via fax or email to Grace J. Kast, Executive Officer, GWMA (626-485-0338) **no later than Tuesday, February 26th, 2013.**

Name STEVE MYRICK

Title PUBLIC WORKS DIRECTOR

Signature [signature]

Date 2/25/2013

The development of LID Ordinance and Green Streets Policy templates by GWMA was based largely on work done for the City of Signal Hill.

ATTACHMENT A.2:

CITY OF SIGNAL HILL DEVELOPMENT OF LID ORDINANCE AND GREEN STREETS POLICY

CITY OF SIGNAL HILL

2175 Cherry Avenue • Signal Hill, CA 90755-3799

July 10, 2012

AGENDA ITEM

TO: HONORABLE CHAIR
AND MEMBERS OF THE PLANNING COMMISSION

FROM: SCOTT CHARNEY SC
DIRECTOR OF COMMUNITY DEVELOPMENT

SUBJECT: DIRECTOR'S REPORT — DEVELOPMENT OF LOW IMPACT DEVELOPMENT ORDINANCE

Summary:

The Commission will receive a report on the development of an ordinance regarding Low Impact Development (LID).

Recommendation:

Direction as deemed appropriate.

Background:

Stormwater and dry-weather urban runoff from the City of Signal Hill are subject to Waste Discharge Requirements issued by the California Regional Water Quality Control Board. These requirements include numerical effluent limits for pollutants that have been established by Total Maximum Daily Loads (TMDLs) and the Regional Board's Basin Plan. These numerical effluent limits are not likely to be achievable without the installation of stormwater treatment systems that will cumulatively receive drainage from a large portion of the city. Staff is developing new regulations that will be incorporated into the City's existing stormwater and urban runoff regulations contained in Chapter 12.16 of the Signal Hill Municipal Code.

Analysis:

LID is a strategy for improving the quality of runoff by requiring that development projects direct runoff to treatment systems consisting of vegetation and soil. Since 2007, the city has been requiring LID for high priority projects such as:

- Parking lots that are over 5,000 square feet
- Housing development with 10 or more dwelling units

- Auto service facilities
- Retail gasoline outlets and
- Restaurants.

With the establishment and enforceability of TMDLs for metals, bacteria, nutrients and other numerical effluent discharge targets, the number of these treatment systems needs to be increased. These treatment systems, depending upon design, can reduce pollutant levels by as much as 50 to 90 percent from their draining area. The installation of these treatment systems can be low-cost and generally require low-maintenance, often being incorporated into the parcels' landscape theme.

The goals of LID include:

1. Reducing the amounts of pollutants in stormwater and urban runoff
2. Development of specifications for low cost treatment systems that are easy for the property owner to install
3. Encouraging property owners to select treatment systems that are easy to maintain and thus minimizing the need for city enforcement.

Specific elements include:

- Projects under 500 square feet will be exempted from this program

- Residential development for 1-4 units will be able to put city specifications on plans and provide simple calculations showing the treatment surface area is 4 percent of the new impervious area.

- Residential development involving 5 or more dwelling units and those for commercial or industrial development are more likely to have professional engineers and architects involved in the project and will be submit to slightly more complex documentation showing that the treatment system can accommodate runoff for ¾ inch of rainfall.

- Readily approvable treatment systems will include:

    - Flow through planters
    - Bottomless trench drains across driveways
    - Rain Gardens (concave rock and plant areas)
    - Hollywood or other pervious style driveways
    - Vegetative (concave) swales with underdrains

- Where remodeling involves more that 50 percent of the site, runoff from the entire site would have to be treated.

ORDINANCE NO. _____

AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF SIGNAL HILL, CALIFORNIA, AMENDING SIGNAL HILL MUNICIPAL CODE CHAPTER 12.16 ENTITLED STORM WATER/URBAN RUNOFF, TO EXPAND THE APPLICABILITY OF THE EXISTING POLLUTANT SOURCE REDUCTION REQUIREMENTS BY IMPOSING RAINWATER LOW IMPACT DEVELOPMENT (LID) STRATEGIES ON PROJECTS THAT REQUIRE BUILDING, GRADING AND ENCROACHMENT PERMITS.

WHEREAS, the federal Clean Water Act established Regional Water Quality Control Boards in order to prohibit the discharge of pollutants in stormwater runoff to waters of the United States; and

WHEREAS, on December 13, 2001, the California Regional Water Quality Control Board, Los Angeles Region issued Order No. 01-182 (the MS4 permit) establishing Waste Discharge Requirements for Municipal Storm Water and Urban Runoff Discharges within the County of Los Angeles and incorporated cities therein; and

WHEREAS, Order No. 01-182 contains requirements for municipalities to establish a development planning program to minimize the impact from stormwater and urban runoff from new development and to maximize the percentage of pervious surfaces to allow percolation into the ground; and

WHEREAS, the Regional Board has adopted Total Maximum Daily Loads (TMDLs) for many pollutants which are effectively numerical limits that cannot be achieved by implementation of the MS4 permit provisions alone.

WHEREAS, the City has the authority under the California Water Code to adopt and enforce ordinances imposing conditions, restrictions and limitations with respect to any activity that might degrade waters of the State.

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WHEREAS, the City is committed to a stormwater management program that protects water quality and water supply by employing watershed-based approaches that balance environmental and economic considerations; and

WHEREAS, urbanization has led to increased impervious surface areas resulting in increased water runoff and less percolation to groundwater aquifers causing the transport of pollutants to downstream receiving waters; and

WHEREAS, the City needs to take a new approach on managing rainwater and urban runoff while mitigating the negative impacts of development and urbanization; and

WHEREAS, a strategy of Low Impact Development is widely recognized as a sensible approach to managing the quantity and quality of stormwater runoff by setting standards and practices to maintain or restore the natural hydrology of a development site, reduce off site runoff, improve water quality, and provide groundwater recharge; and

WHEREAS, is it the intent of the City to expand the applicability of the existing Pollutant Source Reduction requirements by providing stormwater and rainwater Low Impact Development strategies for all projects requiring city permits and disturbing more than 500 square feet, but that are not otherwise required to develop a Post Construction Mitigation Plan as defined by the MS4 permit, [and as required under Section 12.16.110(D)].

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF SIGNAL HILL, CALIFORNIA, DOES HEREBY ORDAIN AS FOLLOWS:

SECTION 1. Section 12.16.010 of the Signal Hill Municipal Code shall be amended to add the following definitions in alphabetical order, and to renumber all existing definitions accordingly in alphabetical order:

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"Commercial Activity" means any public or private activity involved in the storage, transportation, distribution, exchange or sale of goods and/or commodities or providing professional and/or non-professional services.

"Control" means to minimize, reduce or eliminate by technological, legal, contractual or other means, the discharge or pollutants from an activity or activities.

"Development" means the construction, rehabilitation, or reconstruction of any public or private residential project (whether single-family, multi-unit or planned unit development); industrial, commercial, retail and any other non-residential projects, including public agency projects; or mass grading for future construction.

"Industrial/Commercial Facility" means any facility involved and/or used in either the production, manufacture, storage, transportation, distribution, exchange or sale of goods and /or commodities, and any facility involved and/or used in providing professional and non-professional services. This category of facility includes, but is not limited to, any facility defined by the Standard Industrial Classifications (SIC). Facility ownership (federal, state, municipal, private) and profit motive of the facility are not factors in this Definition.

"Land Disturbing Construction Project" means clearing, grading, or excavating that results in soil disturbance. It does not include routine maintenance to maintain original line and grade, hydraulic capacity, or the original purpose of the facility, nor does it include emergency construction activities required to immediately protect public health and/or safety.

"Low Impact Development" ("LID") means a land planning and engineering design approach to managing stormwater runoff. LID emphasizes conservation and use of on-site natural features to protect water quality.

"Low Impact Development Handbook" ("LID Handbook") means such handbook, as may be amended from time to time, adopted by the Director of Public Works and approved by the City Council. It shall set LID standards and practices, as well as standards for stormwater pollution mitigation, including urban and stormwater runoff quantity and quality control development principles and technologies for achieving the LID standards. It shall also include technical feasibility and implementation parameters, alternative compliance for technical infeasibility, as well as other rules, requirements and procedures as the Director of Public Works and City Council deems necessary.

"Storm Drain System" means any facility or any parts of the facility, including streets, gutters, conduits, natural or artificial drains, channels and watercourse that are used for the purpose of collecting, storing, transporting or disposing of stormwater and are located within the City of Signal Hill.

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"Urban Runoff" means surface water flow produced by storm and non-storm events. Non-storm events include flow from residential, commercial or industrial activities involving the use of potable and non-potable water.

SECTION 2. Section 12.16.130 of the Signal Hill Municipal Code entitled "Low Impact Development Measures for Development Planning and Construction Activities" is hereby added to read, in its entirety, as follows:

12.16.130 LOW IMPACT DEVELOPMENT MEASURES FOR DEVELOPMENT PLANNING AND CONSTRUCTION ACTIVITIES.

A. Purpose. The purpose of this Section is to establish requirements for construction activities and facility operations of Development projects to integrate LID practices and standards for stormwater pollution mitigation, and to maximize open, green and pervious space on all Developments consistent with the City's LID Handbook.

B. Scope. This Section contains requirements for stormwater pollution control measures in Land Disturbing Construction Projects and authorizes the City to further define and adopt stormwater pollution control measures, and to develop LID principles and requirements, including but not limited to the objectives and specifications for integration of LID strategies.

C. LID Requirements. All Land Disturbing Construction Projects that are not defined as a New Development Project in Section 12.16.110(D) shall be designed to manage and capture stormwater runoff, to the maximum extent feasible and shall comply with the standards and requirements of the LID Handbook. Any applicant submitting a plan or permit applicants for a Land Disturbing Construction Project to the City shall submit a LID Plan to the City to comply with the following:

1. Any Development shall implement LID BMP alternatives identified in the LID Handbook and provide documentation to demonstrate compliance on the plans and permit application submitted to the City; and

a. Stormwater runoff will be infiltrated, evapotranspired, captured and used, biofiltrated/biotreated through high removal efficiency Best Management Practices, onsite, through stormwater management techniques that comply with the provisions of the LID Handbook. To the maximum extent feasible, onsite stormwater management techniques must be properly sized, at a minimum, without any storm water runoff leaving the Site for at least the volume of water produced by the quality designed storm event that results from:

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(i) The 85th percentile 24-hour runoff event determined as the maximized capture stormwater volume for the area using a 48 to 72-hour draw down time; or

(ii) The volume of runoff produced from a 0.75 inch storm event.

b. Pollutants shall be prevented from leaving the Site for a water quality design storm event as defined in paragraph (a) unless it has been treated through an approved LID strategy

2. For any Land Disturbing Construction Projects resulting in an alteration of at least fifty percent (50%) or more of the impervious surfaces on an existing developed Site, the entire Site must comply with the standards and requirements of this Section and with the LID Handbook;

3. For any Land Disturbing Construction Projects resulting in an alteration of less than fifty percent (50%) of the impervious surfaces of an existing developed Site, only such incremental Development shall comply with the standards and requirements of this Section and with the Development Best Management Practices Handbook; and

4. When, as determined by the Director, the onsite LID requirements are technically infeasible, partially or fully, the infeasibility shall be demonstrated in the submitted LID Plan, shall be consistent with other City requirements, and shall be reviewed in consultation with the Department of Building and Safety. The technical infeasibility may result from conditions that may include, but are not limited to:

a. Locations where seasonal high groundwater is within ten feet of surface grade;

b. Locations within 100 feet of a groundwater well used for drinking water;

c. Brownfield Development sites or other locations where pollutant mobilization is a documented concern;

d. Locations with potential geotechnical hazards;

e. Locations with impermeable soil type as indicated in applicable soils and geotechnical reports; and

5. If partial or complete onsite compliance of any type is technically infeasible, as determined by the Director, the project Site and LID Plan will be granted a waiver from requirements of this Section and the LID Handbook. If a portion of the project site is deemed technically infeasible, the project applicant may propose an equivalent area within the same project area for LID. The

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Director may permit substitutions of equivalent areas upon request by the project applicant.

6. The Director shall prepare, maintain, and update, as deemed necessary and appropriate, the LID Handbook to set LID standards and practices and standards for stormwater pollution mitigation, including urban and stormwater runoff quantity and quality control development principals and technologies for achieving the LID standards. The LID Handbook shall also include technical feasibility and implementation parameters, alternative compliance for technical infeasibility, as well as other rules, requirements and procedures as the Director deems necessary for implementing the provisions of this Section of the Signal Hill Municipal Code.

7. Any Development that is exempted from LID requirements under Subsection D of this Section has the option to voluntarily opt in and incorporate into the project the LID requirements set forth herein. In such case, the Best Management Practices plan check fee associated with the project shall be waived and all LID related plan check processes shall be expedited.

D. Exceptions to LID Requirements. The provisions of this Section do not apply to any of the following:

1. A Development that only creates, adds or replaces less than 500 square feet of impervious area;

2. A Development involving only emergency construction activity required to immediately protect public health and safety;

3. Infrastructure projects within the public right-of-way;

4. A Development involving only activity related to gas, water, cable, or electricity services on private property;

5. A Development involving only resurfacing and/or re-striping of permitted parking lots, where the original line and grade is maintained;

6. A project involving only exterior movie or television production sets, or facades on an existing developed site.

7. A project not requiring a City building, grading, demolition or other permit for construction activity.

SECTION 3. Section 12.16.140 of the Signal Hill Municipal Code entitled "Low Impact Development Plan Check Fees" is hereby added to read, in its entirety, as follows:

12.16.140. LOW IMPACT DEVELOPMENT PLAN CHECK FEES.

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A. Before review and approval of a set of plans and specifications, the applicant shall pay a LID plan check fee.

B. LID plan check fees will be established by resolution of the City Council.

C. The fee schedule for providing Best Management Practices plan check services for LID Implementation Plan are as follow.

D. All entities, including other public agencies, are required to pay the fees identified in Subsection B of this Section.

SECTION 4. Effective Date. The City Clerk shall certify to the passage and adoption of this ordinance by the City Council of the City of Signal Hill and shall, within 15 days after its final passage, cause the same to be published once in the Signal Hill Tribune, a newspaper of general circulation which is hereby designated for that purpose. This Ordinance shall take effect 180 days after its passage.

SECTION 5. Severability. If any section, subsection, sentence, clause, phrase, or portion of this Ordinance is, for any reason, held to be invalid or unconstitutional by the decision of any court of competent jurisdiction, such decision shall not affect the validity of the remaining portions of this Ordinance. The City Council of the City of Signal Hill hereby declares that it would have adopted this Ordinance and each section, subsection, sentence, clause, phrase, or portion thereof, irrespective of the fact that any one or more sections, subsections, sentences, clauses, phrases, or portions thereof may be declared invalid or unconstitutional.

PASSED, APPROVED, AND ADOPTED at a regular meeting of the City Council of the City of Signal Hill, California, on this _____ day of _____ 2012.

_____
TINA L. HANSEN
MAYOR

ATTEST:

_____
KATHLEEN L. PACHECO
CITY CLERK

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STATE OF CALIFORNIA)
COUNTY OF LOS ANGELES) ss.
CITY OF SIGNAL HILL)

I, KATHLEEN L. PACHECO, City Clerk of the City of Signal Hill, California, hereby certify that Ordinance No. XXXX-XX-XXX was introduced at a regular meeting of the City Council of the City of Signal Hill held on XX of MONTH 2012, and thereafter was adopted by the City Council at a regular meeting held on the _____ day of _____, 2012, and that he same was adopted by the following roll call vote:

AYES:

NOES:

ABSENT:

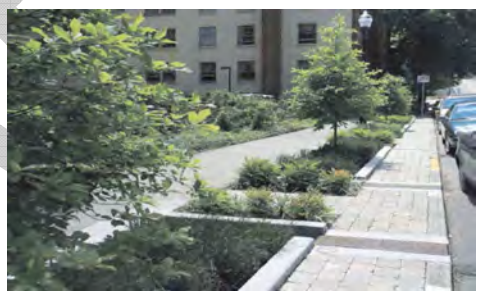
ABSTAIN:

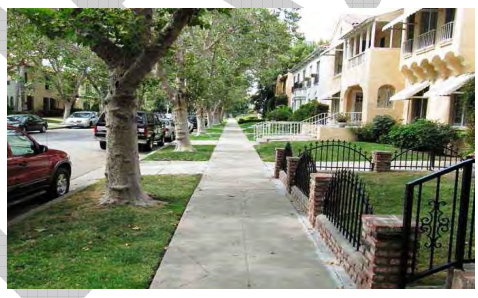
_____
KATHLEEN L. PACHECO
CITY CLERK

Draft

Signal Hill

Green Streets Manual





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February 2013

RB-AR6651

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SECTION 1 – INTRODUCTION

1.1 WHAT ARE GREEN STREETS?

Roads present many opportunities for green infrastructure application. One principle of green infrastructure involves reducing and treating stormwater close to its source. Urban transportation right-of-ways integrated with green techniques are often called "green streets." Green streets provide source controls for stormwater runoff and pollutant loads. In addition, green infrastructure approaches complement street facility upgrades, street aesthetic improvements, and urban tree canopy efforts that also make use of the right-of-way and allow it to achieve multiple goals and benefits. Using the right-of-way for treatment of stormwater runoff links green with grey infrastructure by making use of the engineered conveyance of roads and providing connections to conveyance systems when needed.

Green streets are beneficial for new road construction and retrofits. They can provide substantial economic benefits when used in transportation applications. Coordinating green infrastructure installation with broader transportation improvements can reduce the cost of stormwater management by including it within larger infrastructure improvements. A large municipal concern regarding green infrastructure use is maintenance; using roads and right-of-ways as locations for green infrastructure not only addresses a significant pollutant source, but also alleviates access and maintenance concerns by using public space. Also, right-of-way installations allow for easy public maintenance.

Green streets can incorporate a wide variety of design elements including street trees, permeable pavements, bioretention, and swales. Although the design and appearance of green streets will vary, the functional goals are the same; provide source control of stormwater, limit its transport and pollutant conveyance to the collection system, restore pre-development hydrology to the maximum extent practicable, and provide environmentally enhanced roads. Successful application of green techniques will encourage soil and vegetation contact and infiltration and retention of stormwater.

1.2 WHY ARE GREEN STREETS BEING REQUIRED?

This Green Streets Manual provides guidance to comply with the MS4 Permit (Order Number R4-2012-0175) which requires that jurisdictions in Los Angeles County reduce contaminants in runoff to improve water quality in waterways. These requirements stem from the National Pollutant Discharge Elimination System (NPDES) requirements of the Clean Water Act (CWA).

The MS4 Permit requires Green Streets strategies to be implemented for transportation corridors. Transportation corridors represent a large percentage of the impervious area within Los Angeles and therefore generate a substantial amount of runoff from storm events. The altered flow regime from traditional roadways, increased runoff volume, and high runoff peak flows, are damaging to the environment and a risk to property downstream.

Traditionally, street design has focused on removing water from the street as quickly as possible and transferring it to storm drains, channels, and water bodies. Stormwater can contain bacteria and other pollutants, and are thereby regulated at the state and local level (refer to *Table 1* for a list of pollutants typical of roads). Green Streets will help to transform the design of streets from the conventional method of moving water off-site as quickly as possible to a method of storing and treating water on-site for a cleaner discharge into the waters of the U.S.

Projects which are required to follow this Green Streets Guidance Manual include street and road construction of 10,000 square feet or more of impervious surface area or with a cost of $500,000 or

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more. Street and road construction applies to standalone streets, roads, highways, and freeway projects, and also applies to streets within larger projects.

Table 1: Examples of Stormwater Pollutants Typical of Roads (*Managing Wet Weather With Green Infrastructure Municipal Handbook: Green Streets, 2008*).

Pollutant	Source	Effects
Trash	Littering	Physical damage to aquatic animals and fish, release of poisonous substances
Sediment/solids	Construction, unpaved areas	Increased turbidity, increased transport of soil bound pollutants, negative effects on aquatic organisms reproduction and function
Metals (Copper, Zinc, Lead, Arsenic)	Vehicle brake pads, vehicle tires, motor oil, vehicle emissions and engines, vehicle emissions, brake linings, automotive fluids	Toxic to aquatic organisms and can accumulate in sediments and fish tissues
Organics associated with petroleum (e.g., PAHs)	Vehicle emissions, automotive fluids, gas stations	Toxic to aquatic organisms
Nutrients	Vehicle emissions, atmospheric deposition	Promotes eutrophication and depleted dissolved oxygen concentrations

1.3 PLANNING AND DEVELOPMENT

Ideally, a site would be designed to capture and use or infiltrate the entire runoff volume of a storm, however site and design constraints make it difficult to achieve that goal. This Green Streets Manual is designed to provide guidance with BMP selection based on site constraints typical to street design. Streetscape geometry, topography, and climate determine the types of controls that can be implemented. The initial step in selecting a stormwater tool is determining the available open space and constraints. Stormwater controls should be selected using the hierarchy represented in *Figure 1*, the site guidelines represented in *Table 2*, and the location opportunities listed in *Table 3*.

1.3.1 Site Considerations

Specific elements which should be given special consideration in the site assessment process for applicable Green Streets include:

- **Ownership of land adjacent to right of ways.** The opportunity to provide stormwater treatment may depend on the ownership of land adjacent to the right-of-way. Acquisition of additional right-of-way and/or access easements may be more feasible if land bordering the project is owned by relatively few land owners.
- **Location of existing utilities.** The location of existing storm drainage utilities can influence the opportunities for Green Streets infrastructure. For example, stormwater planters can be designed to overflow along the curb-line to an existing storm drain inlet, thereby avoiding the infrastructure costs associated with an additional inlet. The location of other utilities may limit the allowable placement of BMPs to only those areas where a clear pathway to the storm drain exists.
- **Grade differential between road surface and storm drain system.** Some BMPs require more head from inlet to outlet than others; therefore, allowable head drop may be an important consideration in BMP selection. Storm drain elevations may be constrained by a variety of factors in a roadway project (utility crossings, outfall elevations, etc.) that cannot be overcome and may override stormwater management considerations.

RB-AR6654

- **Longitudinal slope.** The suite of BMPs which may be installed on steeper road sections is more limited. Specifically, permeable pavement and swales are more suitable for gentle grades. Other BMPs may be more readily terraced to be used on steeper slopes.
- **Soil suitability.** Infiltration BMPs require specific types of soil. The site assessment should determine the type of soils on the site and the infiltration rate of the soils if infiltration BMPs are proposed.
- **Potential access opportunities.** A significant concern with installation of BMPs in major right of ways is the ability to safely access the BMPs for maintenance considering traffic hazards. The site assessment should identify vehicle travel lanes and areas of specific safety hazards for maintenance crews and subsequent steps of the Project WQMP preparation process should avoid placing BMPs in these areas.

1.3.2 Design Considerations

The drainage patterns of the project should be developed so that drainage can be routed to areas with BMP opportunities before entering storm drains. For example, if a median strip is present, a reverse crown should be considered, where allowed, so that stormwater can drain to a median swale. Likewise, standard peak-flow curb inlets should be located downstream of areas with potential for stormwater planters so that water can first flow into the planter, and then overflow to the downstream inlet if capacity of the planter is exceeded. It is more difficult to apply green infrastructure after water has entered the storm drain.

Green Streets projects are not required to treat off-site runoff; however treatment of comingled off-site runoff may be used to off-set the inability to treat areas within the project for which significant constraints prevent the ability to provide treatment.

Applicable Green Streets projects should apply the following site design measures to the maximum extent practicable and as specified in the local permitting agency's codes:

- Minimize street width to the appropriate minimum width for maintaining traffic flow and public safety.
- Add tree canopy by planting or preserving trees/shrubs.
- Use porous pavement or pavers for low traffic roadways, on-street parking, shoulders or sidewalks.
- Integrate traffic calming measures in the form of bioretention curb extensions.

1.3.3 BMP Sizing for Applicable Green Streets Projects

An 85th percentile standard design storm should be used to determine the appropriate size, slope, and materials of each facility. After identifying the appropriate stormwater facilities for a site, an integrated approach using several BMPs is encouraged. To increase water quality and functional hydrologic benefits, several stormwater management BMPs can be used in succession. This is called a treatment train approach. The control measures should be designed using available topography to take advantage of gravity for conveyance to and through each facility. All Green Streets designs must be based off of a published design standard.

The following steps should be used to size BMPs for applicable Green Streets projects:

1. Delineate drainage areas tributary to BMP locations and compute imperviousness.

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2. Look up the recommended sizing method for the BMP selected in each drainage area and calculate target sizing criteria.
3. Design BMPs per a published design standard.
4. Attempt to provide the calculated sizing criteria for the selected BMPs.
5. If sizing criteria cannot be achieved, document the constraints that override the application of BMPs and provide the largest portion of the sizing criteria that can be reasonably provided given constraints. If BMPs cannot be sized to provide the calculated volume for the tributary area, it is still essential to design the BMP inlet, energy dissipation, and overflow capacity for the full tributary area to ensure that flooding and scour is avoided. It is strongly recommended that BMPs which are designed to less than their target design volume be designed to bypass peak flows.

1.3.4 Alternative Compliance Options for Applicable Green Streets Projects

Alternative compliance programs should be considered for applicable Green Streets projects if on-site green infrastructure approaches cannot practicably treat the design volume. The primary alternative compliance option for applicable Green Streets projects is the completion of off-site mitigation projects. The proponent would implement a project to reduce stormwater pollution for other portions of roadway or similar land uses when being reconstructed to the project in the same hydrologic unit, ideally as close to the project as possible and discharging to the same outfall.

1.3.5 Infiltration Considerations

Appropriate soils, infiltration media, and infiltration rates should be used for infiltration BMPs. If infiltration is proposed, a complete geotechnical or soils report should be undertaken to determine infiltration rates, groundwater depth, soil toxicity and stability, and other factors that will affect the ability and the desirability of infiltration. At a minimum, the infiltration capacity of the underlying soils shall be deemed suitable for infiltration (0.3 inches per hour or greater), appropriate media should be used in the BMP itself, the groundwater shall be located at a depth of ten feet or greater.

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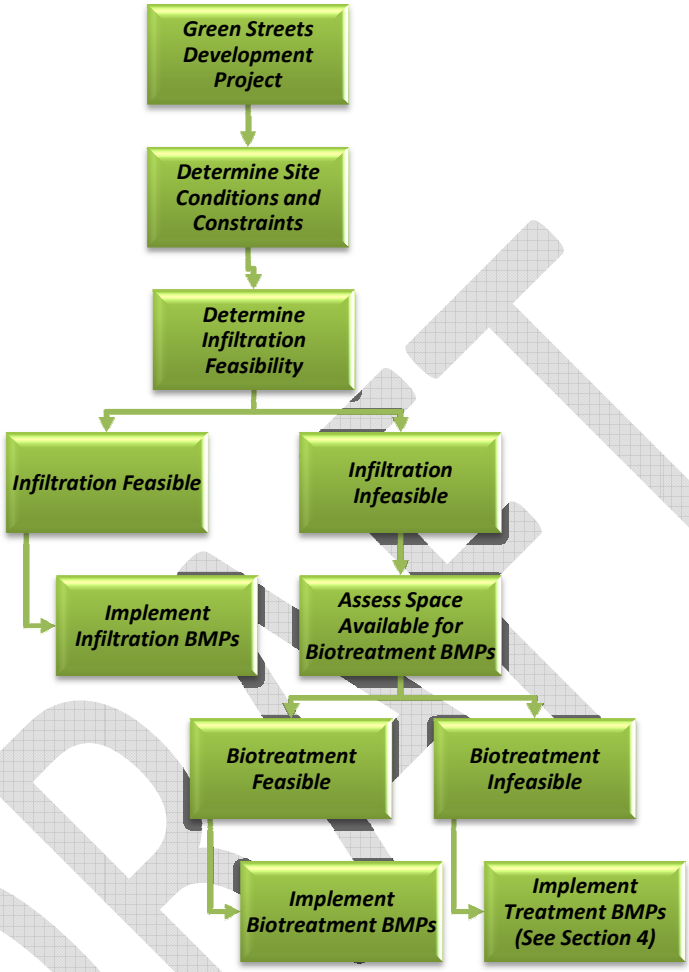

Figure 1: Flow Chart to Determine BMP Selection.

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Table 2: BMP Selection by Street Context (*Model for Living Streets Design Manual, 2011*).

	STREET CONTEXT	BIORETENTION			DETENTION		PAVING	INLET PROTECTIONS		
		Swales	Planters	Vegetated Buffer Strips	Rain Gardens	Infiltration Trenches & Dry Wells	Permeable Pavement	Storm Drain Inlet Screens	Storm Drain Filter Inserts	Pipe Filter Inserts
Commercial	Downtown Commercial		✓			✓	✓	✓	✓	✓
	Commercial Throughway		✓	✓		✓	✓	✓	✓	✓
	Neighborhood Commercial		✓	✓	✓	✓	✓	✓	✓	✓
Residential	Downtown Residential	✓	✓		✓	✓	✓	✓	✓	✓
	Residential Throughway	✓	✓		✓	✓	✓	✓	✓	✓
	Neighborhood Residential	✓	✓		✓	✓	✓	✓	✓	✓
Industrial And Mixed-Use	Industrial	✓	✓		✓	✓	✓	✓	✓	✓
	Mixed-Use		✓	✓	✓	✓	✓	✓	✓	✓
Special	Sidewalk Furniture Zone	✓	✓		✓	✓	✓	✓	✓	✓
	Park Edge	✓	✓		✓	✓	✓	✓	✓	✓
	Boulevard	✓	✓		✓	✓	✓	✓	✓	✓
	Ceremonial (Civic)						✓	✓	✓	✓
Small	Alley		✓			✓	✓	✓	✓	✓
	Shared Public Way		✓			✓	✓	✓	✓	✓
	Walk Street		✓	✓		✓	✓	✓	✓	✓

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Table 3: BMP Location Opportunity Summary.

BMP	Location Opportunity Summary
Bioretention	• Adjacent to traveled way and in frontage or furniture sidewalk zones • Can be located in curb extensions, medians, traffic circles, roundabouts, and any other landscaped area • Suitable for constrained locations
Infiltration Trench/Dry Well	• Can be located under sidewalks and in sidewalk planting strips, curb extensions, roundabouts, and medians
Rain Gardens	• Can be integrated medians, islands, circles, street ends, chicanes, and curb extensions • Can be located at the terminus of swales in the landscape
Permeable Pavement	• Suitable for parking or emergency access lanes • Can be located in furniture zones of sidewalks especially adjacent to tree wells • Cannot be placed in areas with large traffic volume or heavy load lanes • Avoid steep streets • Cannot be placed within 20 feet of sub-sidewalk basements • Cannot be within 50 feet of domestic water wells
Flow-Through Planters	• Above-grade planters should be structurally separate from adjacent sidewalks • At-grade planter systems can be installed adjacent to curbs within the frontage and/or furniture zones
Vegetated Swales	• Can be located adjacent to roadways, sidewalks, or parking areas • Can be integrated into traffic calming devices such as chicanes and curb extensions • Can be placed in medians where the street drains to the median • Can be placed alongside streets and pathways • Should be designed to work in conjunction with the street slope
Vegetated Buffer Strips	• Can be located in multi-way boulevards, park edge streets, or sidewalk furniture zones • Can serve as pre-treatment
Treatment BMPs	• Can be located in a catch basin, manhole, or vault • Can be installed on an existing outlet pipe or at the bottom of an existing catch basin with an overflow • Can be placed on existing curbside catch basins and flush grate openings • Can be installed on the existing wall of a catch basin and on the curb side wall of a catch basin • Minimum set-backs from foundations and slopes should be observed if the BMP is not lined
Street Trees	• Can be placed on sidewalks, in furniture zones, and on medians • Adequate spacing must be provided between trees and street lights, pedestrian lights, accessible parking spaces, bus shelters, awnings, canopies, balconies, and signs

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SECTION 2 – INFILTRATION

Infiltration systems utilize rock, gravel, and other highly permeable materials to on-site infiltration. In these systems, stormwater runoff is directed to the system and allowed to infiltrate into the soils for on-site retention and groundwater recharge. During small storm events, infiltration systems can result in significant or even complete volume reduction of stormwater runoff.

Infiltration should be used to the maximum extent practicable. If infiltration is found to be infeasible due to low infiltration rates, soil instability, high groundwater, or soil contamination biotreatment BMPs can then be considered.

Infiltration BMPs may become damaged by stormwater carrying high levels of sediment, therefore pre-treatment features should be designed to treat street runoff prior to discharging to infiltration features. Media filters, filter inserts, vortex type units, bioretention devices, sumps, and sedimentation basins are several pre-treatment tools effective at removing sediment.

2.1 BIORETENTION

Figure 2: Bioretention system (*Model for Living Streets Design Manual, 2011)*.

Description

Bioretention is a stormwater management process that cleans stormwater by mimicking natural soil filtration processes as water flows through a bioretention BMP. It incorporates mulch, soil pores, microbes, and vegetation to reduce and remove sediment and pollutants from stormwater. Bioretention is designed to slow, spread, and, to some extent, infiltrate water. Each component of the bioretention BMP is designed to assist in retaining water, evapotranspiration, and adsorption of pollutants into the soil matrix. As runoff passes through the vegetation and soil, the combined effects of filtration, absorption, adsorption, and biological uptake of plants remove pollutants.

For areas with low permeability or other soil constraints, bioretention can be designed as a flow-through system with a barrier protecting stormwater from native soils. Bioretention areas can be designed with an underdrain system that directs the treated runoff to infiltration areas, cisterns, or the storm drain system, or may treat the water exclusively through surface flow. Examples of bioretention BMPs include swales, planters, and vegetated buffer strips.

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Location and Placement Guidelines

Bioretention facilities can be included in the design of all street components; adjacent to the traveled way and in the frontage or furniture sidewalk zones. They can be designed into curb extensions, medians, traffic circles, roundabouts, and any other landscaped area. Depending on the feature, maintenance and access should always be considered in locating the device. Bioretention systems are also appropriate in constrained locations where other stormwater facilities requiring more extensive subsurface materials are not feasible.

If bioretention devices are designed to include infiltration, native soil should have a minimum permeability rate of 0.3 inches per hour and at least 10 feet to the groundwater table. Sites that have more than a 5 percent slope may require other stormwater management approaches or special engineering.

2.2 INFILTRATION TRENCHES AND DRY WELLS

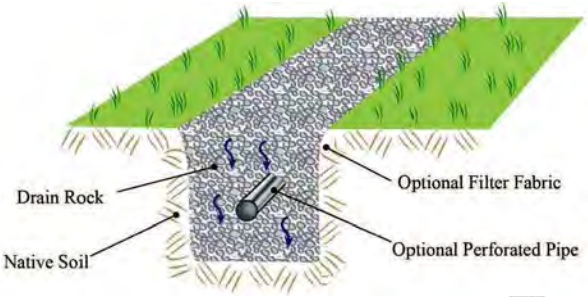

Figure 3: Infiltration Trench (*Model for Living Streets Design Manual, 2011*).

Description

Infiltration trenches are linear, rock-filled features that promote infiltration by providing a high ratio of sub-surface void space in permeable soils. They provide on-site stormwater retention and may contribute to groundwater recharge. Infiltration trenches may accept stormwater from sheet flow, concentrated flow from a swale or other surface feature, or piped flow from a catch basin. Because they are not flow-through BMPs, infiltration trenches do not have outlets but may have overflow outlets for large storm events.

Dry wells are typically distinguished from infiltration trenches by being deeper than they are wide. They are usually circular, resembling a well, and are backfilled with the same materials as infiltration trenches. Dry wells typically accept concentrated flow from surface features or from pipes and do not have outlets.

Infiltration trenches and dry wells are typically designed to infiltrate all flow they receive. In large storm events, partial infiltration of runoff can be achieved by providing an overflow outlet. In these systems, significant or even complete volume reduction is possible in smaller storm events. During large storm events, these systems may function as detention facilities and provide a limited amount of retention and infiltration.

Location and placement guidelines

Infiltration trenches and dry wells typically have small surface footprints so they are potentially some of the most flexible elements of landscape design. However, because they involve sub-surface excavation, these features may interfere with surrounding structures. Care needs to be taken to ensure that

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surrounding building foundations, pavement bases, and utilities are not damaged by infiltration features. Once structural soundness is ensured, infiltration features may be located under sidewalks and in sidewalk planting strips, curb extensions, roundabouts, and medians. When located in medians, they are most effective when the street is graded to drain to the median. Dry wells require less surface area than trenches and may be more feasible in densely developed areas.

Infiltration features should be sited on uncompacted soils with acceptable infiltration capacity. They are best used where soil and topography allow for moderate to good infiltration rates (0.3 inches per hour or better) and the depth to groundwater is at least 10 feet. Prior to design of any retention or infiltration system, proper soil investigation and percolation testing shall be conducted to determine appropriate infiltration design rates, depth to groundwater, and if soil will exhibit instability as a result of infiltration. Any site with potential for previous underground contamination shall be investigated. Infiltration trenches and dry wells can be designed as stand-alone systems when water quality is not a concern or may be combined in series with other stormwater tools.

Perforated pipes and piped inlets and outlets may be included in the design of infiltration trenches. Cleanouts should be installed at both ends of any piping and at regular intervals in long sections of piping, to allow access to the system. Monitoring wells are recommended for both trenches and wells and can be combined with clean-outs. If included, the overflow inlet from the infiltration trench should be properly designed for anticipated flows.

2.3 RAIN GARDENS

Figure 4: Rain garden (*Model for Living Streets Design Manual, 2011)*.

Description

Rain gardens are vegetated depressions in the landscape. They have flat bottoms and gently sloping sides. Rain gardens can be similar in appearance to swales, but their footprints may be any shape. Rain gardens hold water on the surface, like a pond, and have overflow outlets. The detained water is infiltrated through the topsoil and subsurface drain rock unless the volume of water is so large that some must overflow. Rain gardens can reduce or eliminate off-site stormwater discharge while increasing on-site recharge.

Location and Placement Guidelines

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Rain gardens may be placed where there is sufficient area in the landscape and where soils are suitable for infiltration. Rain gardens can be integrated with traffic calming measures installed along streets, such as medians, islands, circles, street ends, chicanes, and curb extensions. Rain gardens are often used at the terminus of swales in the landscape.

2.4 PERMEABLE PAVEMENT

Figure 5: Permeable pavement during a storm event (*Model for Living Streets Design Manual, 2011)*.

Description

Permeable pavement is a system with the primary purpose of slowing or eliminating direct runoff by absorbing rainfall and allowing it to infiltrate into the soil. Permeable pavement also filters and cleans pollutants such as petroleum deposits on streets, reduces water volumes for existing overtaxed pipe systems, and decreases the cost of offsite or onsite downstream infrastructure. This BMP is impaired by sediment-laden run-on which diminishes its porosity. Care should be taken to avoid flows from landscaped areas reaching permeable pavement. Permeable pavement is, in certain situations, an alternative to standard pavement. Conventional pavement is designed to move stormwater off-site quickly. Permeable pavement, alternatively, accepts the water where it falls, minimizing the need for management facilities downstream.

Location and Placement Guidelines

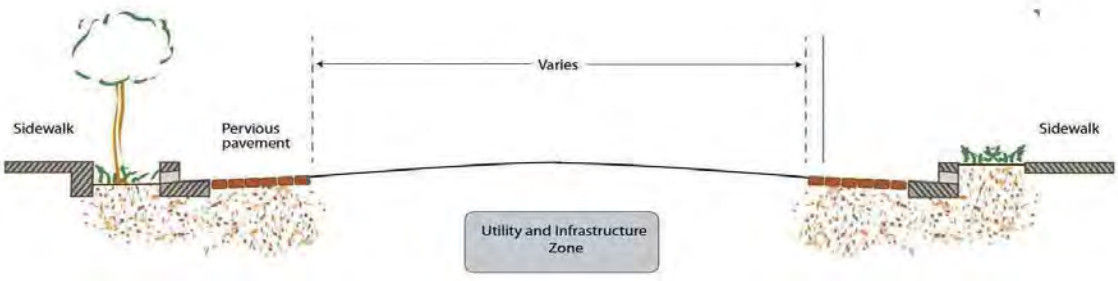

Figure 6: Possible pervious pavement design layout (*Model for Living Streets Design Manual, 2011)*.

Conditions where permeable pavement should be encouraged include:

- Sites where there is limited space in the right-of-way for other BMPs;

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- Parking or emergency access lanes; and
- Furniture zones of sidewalks especially adjacent to tree wells

Conditions where permeable pavement should be avoided include:

- Large traffic volume or heavy load lanes;
- Where runoff is already being harvested from an impervious surface for direct use, such as irrigation of bioretention landscape areas;
- Steep streets;
- Gas stations, car washes, auto repair, and other sites/sources of possible chemical contamination;
- Areas with shallow groundwater;
- Within 20 feet of sub-sidewalk basements; and
- Within 50 feet of domestic water wells.

Material and Design Guidelines

A soil or geotechnical report should be conducted to provide information about the permeability rate of the soil, load-bearing capacity of the soil, the depth to groundwater (10 feet or more required), and if soil will exhibit instability as a result of implementation. Infiltration rate and load capacity are key factors in the functionality of this BMP. Permeable pavement generally does not have the same load-bearing capacity as conventional pavement, so this BMP may have limited applications depending on the underlying soil strength and pavement use. Permeable pavement should not be used in general traffic lanes due to the possible variety of vehicles weights and heavy volumes of traffic.

When used as a road paving, permeable pavement that carries light traffic loads typically has a thick drain rock base material. Pavers should be concrete as opposed to brick or other light-duty materials. Other possible permeable paving materials include porous concrete and porous asphalt. These surfaces also have specific base materials that detain infiltrated water and provide structure for the road surface. Base material depths should be specified based on design load and the soils report.

Plazas, emergency roads, and other areas of limited vehicular access can also be paved with permeable pavement. Paving materials for these areas may include open cell paver blocks filled with stones or grass and plastic cell systems. Base material specifications may vary depending on the product used, design load, and underlying soils.

When used for pedestrian paths, sidewalks, and shared-use paths, appropriate materials include those listed above as well as rubber pavers and decomposed granite or something similar (washed or pore-clogging fine material). Pedestrian paths may also use broken concrete pavers as long as ADA requirements are met. Paths should drain into adjoining landscapes and should be higher than adjoining landscapes to prevent run-on. Pavement used for sidewalks and pedestrian paths should be ADA compliant, especially smooth, and not exceed a 2 percent slope or have gaps wider than 0.25 inches. In general, tripping hazards should be avoided.

Design considerations for permeable pavement include:

- The location, slope and load-bearing capacity of the street, and the infiltration rate of the soil;
- The amount of storage capacity of the base course;

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- The traffic volume and load from heavy vehicles;
- The design storm volume calculations and the quality of water; and
- Drain rock, filter fabrics, and other subsurface materials.

Maintenance Guidelines

Maintenance of permeable pavement systems is essential to their continued functionality. Regular vacuuming and street sweeping should be performed to remove sediment from the pavement surface. The bedding and base material should be tested to ensure sufficient infiltration rates on a regular basis. Additionally, base material may need to be removed and replaced every several years based upon the material manufacturer's specifications.

SECTION 3 – BIOTREATMENT

Biotreatment BMPs are landscaped, shallow depressions that capture and filter stormwater runoff. These types of BMPs are an increasingly common type of stormwater treatment device that are installed at curb level and filled with a bioretention type soil. They are designed as soil and plant-based filtration devices that remove pollutants through a variety of physical, biological, and chemical treatment processes. They typically consist of a ponding area, mulch layer, planting soils, and plants. Stormwater is directed to the system and pollutants are treated as the stormwater drains through the planting soil and either infiltrated or collected by an underdrain and directed to a collection system.

Biotreatment should only be used in cases where infiltration has been proven infeasible due to low infiltration rates, soil instability, high groundwater, or soil contamination.

3.1 FLOW-THROUGH PLANTERS

Figure 7: Flow-through planter (*Model for Living Streets Design Manual, 2011*).

Description

Flow-through planters are typically above-grade or at-grade with solid walls and a flow-through bottom. They are contained within an impermeable liner and use an underdrain to direct treated runoff back to the collection system. Where space permits, buildings can direct roof drains first to building-adjacent planters. Both underdrains and surface overflow drains are typically installed with building-adjacent planters.

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At-grade street-adjacent planter boxes are systems designed to take street runoff and/or sidewalk runoff and incorporate bioretention processes to treat stormwater. These systems may or may not include underdrains.

Location and Placement Guidelines

Above-grade planters should be structurally separate from adjacent sidewalks to allow for future maintenance and structural stability per local department of public works' standards. At-grade planter systems can be installed adjacent to curbs within the frontage and/or furniture zones.

All planters should be designed to pond water for less than 48 hours after each storm. Flow-through planters designed to detain roof runoff can be integrated into a building's foundation walls, and may be either raised or at grade.

For at-grade planters, small localized depressions may be included in the curb opening to encourage flow into the planter. Following the inlet, a sump (depression) to capture sediment and debris may be integrated into the design to reduce sediment loadings.

3.2 VEGETATED SWALES

Figure 8: Vegetated swale (*Signal hill, CA*).

Description

Swales are linear, vegetated depressions that capture rainfall and runoff from adjacent surfaces. The swale bottom should have a gradual slope to convey water along its length. Swales can reduce off-site stormwater discharge and remove pollutants along the way. In a swale, water is slowed by traveling through vegetation on a relatively flat grade. This gives particulates time to settle out of the water while contaminants are removed by the vegetation. Because the vegetation receives much of its needed moisture through stormwater, the need for irrigation is greatly reduced.

Location and Placement Guidelines

Swales can easily be located adjacent to roadways, sidewalks, or parking areas. Roadway runoff can be directed into swales via flush curbs or small evenly-spaced curb cuts into a raised curb. Swale systems can be integrated into traffic calming devices such as chicanes and curb extensions.

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Swales can be placed in medians where the street drains to the median. Placed alongside streets and pathways, vegetated swales can be landscaped with native plants which filter sediment and pollutants and provide habitat for wildlife. Swales should be designed to work in conjunction with the street slope to maximize filtration and slowing of stormwater.

Swales are designed to allow water to slowly flow through the system. Depending on the landscape and design storm, an overflow or bypass for larger storm events may be needed. Curb openings should be designed to direct flow into the swale. Following the inlet, a sump may be built to capture sediment and debris.

3.3 VEGETATED BUFFER STRIPS

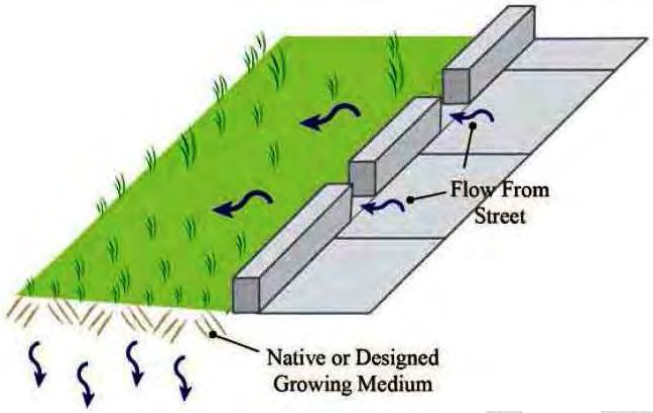

Figure 9: Vegetated buffer strip detail (*Model for Living Streets Design Manual, 2011*).

Description

Vegetated buffer strips are sloping planted areas designed to treat and absorb sheet flow from adjacent impervious surfaces. These strips are not intended to detain or retain water, only to treat it as a flow-through feature. They should not receive concentrated flow from swales or other surface features, or concentrated flow from pipes.

Location and Placement Guidelines

Vegetated buffer strips are well-suited to treating runoff from roads and highways, small parking lots, and pervious surfaces. They may be commonly used on multi-way boulevards, park edge streets, or sidewalk furniture zones with sufficient space. Vegetated buffers can be situated so they serve as pre-treatment for another stormwater management feature, such as an infiltration BMP.

SECTION 4 – TREATMENT BMPS

4.1 STORM DRAIN INLET PROTECTIONS

As described in Section 1 of this Green Streets Manual, it may be infeasible for specific projects to apply infiltration or biotreatment BMPs. In these cases, filter inserts as treatment BMPs can be considered as an alternative. Filter inserts can be designed to prevent particulates, debris, metals, and petroleum-based materials conveyed by stormwater from entering the storm drain system. All treatment BMP units should have an overflow system that allows the storm drain to remain functional if the filtration system becomes clogged during rainstorms.

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Typical maintenance of catch basins includes scheduled trash removal if a screen or other debris capturing device is used. Street sweeping should be performed by vacuum sweepers with occasional weed and large debris removal. Maintenance should include keeping a log of the amount of sediment collected and the data of removal.

The following are examples of acceptable treatment BMPs:

- **Sand Filters:** Sand filters are designed to filter stormwater through a constructed media bed and to an underdrain system. As stormwater flows through the media pollutants are filtered out of the water. The filtered water is conveyed through the underdrain to a collection system. Pretreatment is necessary to eliminate significant sediment load or other large particles which would clog the system. Minimum set-backs from foundations and slopes should be observed if the facility is not lined. Filters should be designed and maintained such that ponded water should not persist for longer than 48 hours following a storm event.
- **Cartridge Media Filters:** Cartridge media filters contain multiple modular filters which contain engineered media. The filters can be located in a catch basin, manhole, or vault. The manhole or vault may be divided into multiple chambers so that the first chamber may act as a pre-settling basin for removal of coarse sediment while the next chamber may act as the filter chamber. Cartridge media filters are recommended for drainage area with limited available surface area or where surface BMPs would restrict uses. Depending on the number of cartridges, maintenance events can have long durations. Locations should be chosen so that maintenance events will not significantly disrupt businesses or traffic. Filter media should be selected to target pollutants of concern. A combination of media may be used to remove a variety of pollutants.
- **Storm Drain Filter Inserts:** Filter inserts should be designed to protect curbside catch basins or inlets within the traveled way. Inlet inserts contain filter cartridges that can be easily replaced. Filters inserts can be installed on the existing wall of the catch basin and can be placed on the curb side wall of catch basins so that during storm events water can overflow around the unit. Inlet inserts should be sized to capture all debris and should therefore be selected to match the specific size and shape of each catch basin and inlet. Systems with lower maintenance requirements are preferred.
- **Storm Drain Inlet Screens:** Inlet screens are designed to prevent large litter and trash from entering the storm drain system while allowing smaller particles to pass through. The screens function as the first preventive measure in removing pollutants from the storm water system. The city's street sweeping department should be consulted to ensure compliance with local specifications and to schedule regular maintenance. Annual inspection of the screen is recommended to ensure functionality.
- **Storm Drain Pipe Filter Insert:** The storm drain outlet pipe filter is designed to be installed on an existing outlet pipe or at the bottom of an existing catch basin with an overflow. This filter removes debris, particulates, and other pollutants from stormwater as it leaves the storm drain system. This BMP is less desirable than a protection system that prevents debris from entering the storm drain system because the system may become clogged with debris. Outlet pipe filters can be placed on existing curbside catch basins and flush grate openings. Regular maintenance is required and inspection should be performed rigorously. Because this filter is located at the outlet of a storm drain system, clogging with debris is not as apparent as with filters at street level. This BMP may be used as a supplemental filter with an inlet screen or inlet insert unit.

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SECTION 5 – STREET TREES

5.1 STREET TREES

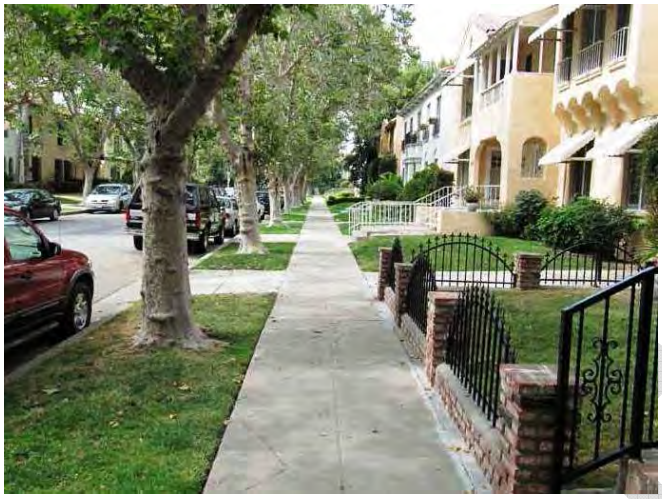

Figure 10: Street trees (*Model for Living Streets Design Manual, 2011)*.

Description

A healthy urban forest is also a powerful stormwater management tool. Leaves and branches catch and slow rain as it falls, helping it to soak into the ground. The plants themselves take up and store large quantities of water that would otherwise contribute to surface runoff. Part of this moisture is then returned to the air through evaporation to further cool the city. As an important element along sidewalks, street trees must be provided with conditions that allow them to thrive, including adequate uncompacted soil, water, and air.

The goal of adding street trees is to increase the canopy cover of the street, the percentage of its surface either covered by or shaded by vegetation. The selection, placement, and management of all elements in the street should enhance the longevity of a city's street trees and healthy, mature plantings should be retained and protected whenever possible.

Benefits to adding street trees include:

- Creation of shade to lower temperatures in a city, reduces energy use, and makes the street a more pleasant place in which to walk and spend time
- Slowing and capture of rainwater, helping it soak into the ground to restore local hydrologic functions and aquifers
- Improving air quality by cooling air, producing oxygen, and absorbing and storing carbon in woody plant tissues

Guidelines

For guidelines on street tree design refer to the Signal Hill Street Tree Ordinance at http://www.cityofsignalhill.org/DocumentCenter/Home/View/774.

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SECTION 6 – DEFINITIONS

Best Management Practice (BMP)
Operating methods and/or structural devices used to reduce stormwater volume, peak flows, and/or pollutant concentrations of stormwater runoff through evapotranspiration, infiltration, detention, filtration, and/or biological and chemical treatment.

Bioretention
Soil and plant-based retention practice that captures and biologically degrades pollutants as water infiltrates through sub-surface layers containing microbes that treat pollutants. Treated runoff is then slowly infiltrated and recharges the groundwater.

Conveyance
The process of water moving from one place to another.

Design Storm
A storm whose magnitude, rate, and intensity do not exceed the design load for a storm drainage system or flood protection project.

Detention
Stormwater runoff that is collected at one rate and then released at a controlled rate. The volume difference is held in temporary storage.

Filtration
A treatment process that allows for removal of solid (particulate) matter from water by means of porous media such as sand, soil, vegetation, or a man-made filter. Filtration is used to remove contaminants.

Furniture Zone
The furniture zone is the area which lies between the curb and pedestrian zones and is intended to house utilities and pedestrian amenities.

Hardscape
Impermeable surfaces, such as concrete or stone, used in the landscape environment along sidewalks or in other areas used as public space.

Infiltration
The process by which water penetrates into soil from the ground surface.

Permeability/Impermeability
The quality of a soil or material that enables water to move through it, determining its suitability for infiltration.

Retention
The reduction in total runoff that results when stormwater is diverted and allowed to infiltrate into the ground through existing or engineered soil systems.

Runoff
Water from rainfall that flows over the land surface that is not absorbed into the ground.

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Sedimentation
The deposition and/or settling of particles suspended in water as a result of the slowing of the water.

Stormwater
Water runoff from rain or snow resulting from a storm.

Transportation Corridor
A major arterial, state route, highway, or rail line used for the movement of people or goods by means of bus services, trucks, and vehicles.

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SECTION 7 – REFERENCES

1. Los Angeles County. *Model for Living Streets Design Manual*. 2011.
2. U.S. Environmental Protection Agency (EPA). *Managing Wet Weather With Green Infrastructure Municipal Handbook: Green Streets*. December 2008.
3. Orange County. *Technical Guidance Document*. May 2011.

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ATTACHMENT B:

DRAFT FINAL MOU

MEMORANDUM OF UNDERSTANDING
BETWEEN THE LOS ANGELES GATEWAY REGION INTEGRATED
WATER MANAGEMENT JOINT POWERS AUTHORITY
AND
THE CITIES OF BELLFLOWER, CERRITOS, DOWNEY, LAKEWOOD, LONG BEACH, PARAMOUNT, SIGNAL HILL, AND THE LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

FOR ADMINISTRATION AND COST SHARING TO PREPARE A WATERSHED MANAGEMENT PROGRAM "WMP" and COORDINATED INTEGRATED MONITORING PROGRAM "CIMP" AS REQUIRED BY THE REGIONAL WATER QUALITY CONTROL BOARD, LOS ANGELES REGION, NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM MUNICIPAL SEPARATE STORM SEWER SYSTEM PERMIT ORDER NO. R4-2012-0175 ("MS4 PERMIT")

This memorandum of understanding ("MOU") is made and entered into as of the date of the last signature set forth below, by and between the Los Angeles Gateway Region Integrated Regional Water Management Joint Powers Authority ("GWMA"), a California Joint Powers Authority, and the Cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill ("Watershed Permittees"), and the Los Angeles County Flood Control District ("LACFCD"):

RECITALS

WHEREAS, the mission of the GWMA includes the equitable protection and management of water resources within its area; and

WHEREAS, the Cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill manage and drain stormwater wholly or partially into the Los Cerritos Channel (see Exhibit A); and

WHEREAS, the LACFCD owns and operates a significant portion of the storm drain system in the Los Cerritos Channel Watershed; and

WHEREAS, for the purposes of this MOU, the term "Watershed Permittees" shall mean the cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill and the LACFCD; and

WHEREAS, several of these Permittees are in multiple watersheds and this MOU shall only pertain to those areas tributary to the Los Cerritos Channel Freshwater Watershed; and

WHEREAS, the Watershed Permittees and the GWMA are collectively referred to as the "Parties"; and

WHEREAS, the MS4 Permit was adopted by the California Regional Water Quality Control Board ("Regional Water Board") on November 8, 2012 and became effective on December 28, 2012 and allows Permittees to prepare a Watershed Management Program ("WMP") or an Enhanced Watershed Management Plan ("EWMP") and a Coordinated Integrated Monitoring Program ("CIMP"), collectively "the Plans," in compliance with certain elements of the MS4 Permit; and

WHEREAS, Section VI.E.3 of the new MS4 permit provides a framework for developing implementation plans for USEPA-established TMDLs by requiring permittees subject to waste load allocations (WLAs) in such TMDLs to propose and implement best management practices (BMPs) that will be effective in achieving compliance with USEPA-established numeric WLAs; and

WHEREAS, the City of Long Beach is regulated under a separate MS4 permit; and

WHEREAS , the California Department of Transportation ("Caltrans") is regulated under a separate MS4 permit and considering entering into a separate MOU with the Watershed Permittees and the GWMA to coordinate preparation of the Plans; and

WHEREAS, if Caltrans enters into an MOU, the Parties contemplate that the payment formula in Table 1 will be modified as appropriate; and

WHEREAS, in 2009, the Watershed Permittees, excluding the LACFCD, created the Los Cerritos Channel Metals TMDLs Technical Committee, consisting of voluntary representatives from each of the Watershed Permittees, for the preparation of watershed Implementation Plans for the Metals TMDLs; and

WHEREAS, at the June 20, 2013 meeting of the Los Cerritos Channel Metals TMDLs Technical Committee, the decision was made to change the name of the group to the Los Cerritos Channel Watershed Group ("Group") ; and

WHEREAS, the Watershed Permittees wish to maintain continuity of the effort to work with the GWMA in coordinating the preparation and submission of the Plans to be presented to the Regional Water Board on behalf of the Permittees; and

WHEREAS, at the April 24, 2013 meeting of the Los Cerritos Channel Metals TMDLs Technical Committee (now Group), the decision was made to prepare a Watershed Management Plan with the option of converting the WMP to an EWMP upon approval by the Group prior to December 28, 2013; and

WHEREAS, there are remaining funds on deposit with the GWMA for use in preparation of an implementation plan and implementation of control measures for the Metals TMDLs in previous MOAs and the Group approved spending the remaining funds for the WMP, for matching funds for the Los Cerritos Channel Watershed Segmentation and LID Planning Proposition 84 project, and other purposes to be determined by the Group; and

WHEREAS, the Watershed Permittees have elected to prepare and adopt the Plans to address certain elements of the MS4 Permit; and

WHEREAS, preparation of the Plans requires administrative coordination for the Watershed Permittees that the GWMA can provide; and

WHEREAS, the Parties desire to collaboratively prepare a final Scope of Work and hire a Consultant or Consultants to assist the Parties with preparation and adoption of the Plans; and

WHEREAS, the Parties have determined that authorizing GWMA to hire a consultant to prepare and deliver the Plans will be beneficial to the Parties; and

WHEREAS, the Parties have determined that the costs of preparing the Plans and other related costs to be incurred by the GWMA should be paid by the Watershed Permittees based on the proportional costs ("Proportional Costs") in accordance with the Cost Sharing Allocation Formula reflected in Exhibit B.

NOW, THEREFORE, in consideration of the mutual covenants and conditions set forth herein, the Parties do hereby agree as follows:

Section 1. Recitals. The recitals set forth above are fully incorporated as part of this MOU.

Section 2. Purpose. The purpose of this MOU is to cooperatively support and undertake preparation of the Plans, necessary environmental documentation, and any additional services agreed to by the Watershed Permittees working through the Los Cerritos Channel Watershed Group and as approved by the GWMA. This MOU does not include services related to the implementation of the Plans and required monitoring; Parties will enter into an amendment to the MOU if they desire to collectively provide such services.

Section 3. Cooperation. The Parties shall fully cooperate with one another to achieve the purposes of this MOU.

Section 4. Voluntary Nature. The Parties voluntarily enter into this MOU.

Section 5. Binding Effect. This MOU shall become binding on GWMA and the Watershed Permittees that execute this MOU.

Section 6. Term. This MOU shall remain and continue in effect through September 30, 2026, on every Party except the LACFCD unless sooner terminated as provided herein. The term with the LACFCD shall expire upon approval of the Plans by the Regional Water Board unless the Parties agree to an amendment to this MOU providing for continuing participation by the LACFCD.

Section 7. Group Representative. The Group shall appoint a Representative ("Representative") and may appoint an Alternate Representative ("Alternate Representative") each of whom shall have the authority to speak on behalf of the Group to the GWMA on decisions to be made by the Group. The Group shall inform the GWMA of the names of the Representative and Alternate Representative in writing. The GMWA may rely on written directions from either the Representative or the Alternate Representative. In the event of conflicting directions from the Representative and the Alternative Representative, the GWMA shall rely on the Representative's direction.

Section 8. Role of the GWMA. The GWMA will contract with and serve as a conduit for paying the Consultants as approved by the Group. The consultant or consultants ("Consultant") shall prepare the Plans and any other plans and/or projects that the Group determines are necessary and the costs of which will be paid collectively by the Watershed Permittees. The Representative and Alternate Representative shall be the means of communication between the Group and the GWMA on the approval of the Consultant and any other work the Group requests and which will be paid by the Watershed Permittees.

Section 9. Financial Terms.

a) Each Watershed Permittee shall pay its Proportional Costs as provided in Exhibit B for Consultant costs approved in Section 8, and costs incurred in preparing the Metals TMDLs, and the LID Planning Proposition 84 project and any other related costs to which the Parties may agree in writing.

b) Each Watershed Permittee shall also pay its proportional share of GWMA's staff time for retaining a Consultant and invoicing the Watershed Permittees, audit expenses and other overhead costs, including reasonable legal fees, ("MOU Costs") incurred by GWMA in the performance of its duties under this MOU. GWMA shall add a percentage not to exceed three percent (3%) to each invoice submitted to each Permittee to cover each Permittee's share of the MOU Costs. The MOU Costs percentage shall be set each fiscal year through a majority vote by the GWMA Policy Board.

c) GWMA shall submit an invoice to each Watershed Permittee upon selection of a Consultant reflecting each Watershed Permittee's estimated Proportional Costs for Consultant services through the following or current fiscal year. Prior to releasing payment to the Consultant, the GWMA shall submit a copy of the Consultant's invoice to the Group for approval. The decision on whether to pay the invoice shall be communicated to the GWMA by the Representative Or Alternate Representative.

d) GWMA shall not be required to incur obligations for its 2013-14 fiscal year in excess of the budget reflected in Table 1 or in excess of any budget approved by the GWMA and the Group unless the Group authorizes the GWMA to expend the additional funds. GWMA may suspend the work of the Consultants if the Group does not provide authorization to incure these additional obligations.

e) Upon receiving the first and each subsequent invoice, each Watershed Permittee shall pay its Proportional Costs to the GWMA within forty-five days (45) days of receipt.

f) Upon execution of this MOU, the Group shall recommend to GWMA a budget for the 2013-14 fiscal year. Each successive year, commencing May 15, 2014, the Group shall recommend to GWMA a budget for the following fiscal year. Within 30 days of the execution of this MOU, GWMA shall consider the recommendation and adopt a budget inclusive of the Group's recommendation for the 2013-14 fiscal year. For each successive year, GWMA shall consider the Group's recommendation and adopt a budget by June 30th inclusive of the Group's recommendation. GWMA will send each Watershed Permittee an invoice during the first month of each fiscal year representing the Watershed Permittee's Proportional Costs of the adopted budget as provided in Table 2. GWMA shall not expend funds nor incur obligations in excess of the budgeted amount without prior notification to and approval by the Group.

g) A Watershed Permittee will be delinquent if the requested payment is within the budgeted amounts or the amounts authorized by the Group and such payment is not received by the GWMA within sixty (60) days after first being invoiced by the GWMA. The GWMA will follow the procedure listed below, or such other procedure that the Group directs to effectuate payment: 1) verbally contact the official of the Watershed Permittee with copies to each other Watershed Permittee to the person and at the address to which notices should be addressed pursuant to Section 13 of the MOU, and 2) submit a formal letter from the GWMA Executive Officer to the Watershed Permittee. If payment is not received within ninety (90) days following the due date, the

GWMA may terminate the MOU unless the City Managers/ Administrators of the Watershed Permittees in good standing inform the GWMA in writing that their respective Watershed Permittees agree to adjust their Proportional Cost allocations in accordance with the Cost Share Formula inTable 1 or such other formula to which the Watershed Permittees shall direct. The terminated Watershed Permittee shall remain obligated to GWMA for its delinquent payments and any other obligations incurred prior to the date of termination.

h) GWMA may suspend all work being performed by any Consultant retained by GWMA if any Watershed Permittee has not paid its invoice within sixty (60) days of receipt unless the City Managers/Administrators of those Watershed Permittees in good standing inform the GWMA in writing that they will pay the delinquent Watershed Permittee's costs once the MOU with the delinquent Watershed Permittee has been terminated.

i) Any delinquent payments by a Watershed Permittee shall accrue compound interest at the then-current rate of interest in the Local Agency Investment Fund, calculated from the first date of delinquency until the payment is made.

j) Funds remaining in the possession of the GWMA at the end of the term of this MOU, or at the termination of this Agreement, whichever occurs earlier, shall be promptly returned to the then remaining Watershed Permittees in good standing and in accordance with the Cost Share Formula in Exhibit B.

k) The Parties previously funded Los Cerritos Channel Metals TMDL Implementation Plans through separate MOAs. This MOU shall not supercede those MOA's, but the Watershed Permittees may expend funds collected for work under one or more of those MOA's for costs incurred under this MOU.

Section 10. Notice of Intent Letter. Pursuant to Section V.C.4.b (page 55) of the MS4 Permit, the Watershed Permittees agree to jointly draft, execute and submit to the Regional Water Board by June 28, 2013, a Notice of Intent ("NOI") letter that complies with all applicable MS4 Permit provisions.

Section 11. Independent Contractor.

a) The GWMA is, and shall at all times remain, a wholly independent contractor for performance of the obligations described in this MOU. The GWMA's officers, officials, employees and agents shall at all times during the Term of this MOU be under the exclusive control of the GWMA. The Watershed Permittees cannot control the conduct of the GWMA or any of its officers, officials, employees or agents. The GWMA and its officers, officials, employees, and agents shall not be deemed to be employees of the Watershed Permittees.

b) The GWMA is solely responsible for the payment of salaries, wages, other compensation, employment taxes, workers' compensation, or similar taxes for its employees and consultants performing services hereunder.

Section 12. Indemnification and Insurance.

a) The GWMA shall include in the agreements with the Consultants an indemnification clause requiring the Consultants to defend, indemnify and hold harmless each of the Watershed Permittees and the GWMA, and their officers, employees, and agents, from and against any and all liabilities, actions, suits, proceedings, claims, demands, losses, costs, and expenses, including legal costs and attorney's fees, for injury to or death of person(s), for damage to property (including property owned by the GWMA or any Watershed Permittee) resulting from negligent or intentional acts, errors and omissions committed by Consultants, their officers, employees, and other representatives and agents, arising out of or related to Consultants' performance under this MOU.

b) Each Watershed Permittee shall defend, indemnify and hold harmless the GWMA and each other Watershed Permittee and their officers, employees, and other representatives and agents from and against any and all liabilities, actions, suits, proceedings, claims, demands, losses, costs, and expenses, including legal costs and attorney's fees, for injury to or death of person(s), for damage to property (including property owned by the GWMA and any Watershed Permittee) for negligent or intentional acts, errors and omissions committed by that Watershed Permittee, its officers, employees, and agents, arising out of or related to that Watershed Permittee's performance under this MOU, except for such loss as may be caused by GWMA's or any other Watershed Permittee's gross negligence or intentional acts or the gross negligence or intentional acts of its officers, employees, or other representatives and agents other than the Consultants.

c) The GWMA shall defend, indemnify and hold harmless the Watershed Permittees, their officers, employees, and other representatives and agents of the Watershed Permittees, from and against any and all liabilities, actions, suits proceedings, claims, demands, losses, costs, and expenses, including legal costs and attorney's fees, for injury to or death of person(s), for damage to property (including property owned by the Watershed Permittees) and for negligent or intentional acts, errors and omissions committed by GWMA, its officers, employees, and agents, arising out of or related to GWMA's performance under this MOU.

d) Consultant's Insurance. The GWMA shall require the Consultants to obtain and maintain insurance throughout the term of their contracts with the GWMA.

e) GWMA makes no guarantee or warranty that the reports prepared by GWMA and its Consultant(s) shall be approved by the relevant governmental authorities. GWMA shall have no liability to the Watershed Permittees for negligent or intentional acts or omissions of GWMA's Consultants. The Watershed Permittees' sole recourse for any negligent or intentional act or omission of the GWMA's Consultant shall be against the Consultant and its insurance.

Section 13. Withdrawal; Termination.

a) A Watershed Permittee may withdraw from this MOU for any reason, or no reason, by giving the other Watershed Permittees thirty (30) days written notice thereof. The effective withdrawal date shall be the thirtieth (30th) day after GWMA receives the withdrawing Watershed Permittee's notice to withdraw from the MOU. The withdrawing Watershed Permittee shall be responsible for its Proportional Costs and proportional MOU Costs, which the GWMA incurred or to which it became bound through the effective date of withdrawal. Such MOU Costs shall include the remaining fees of any Consultant retained by the GWMA through the effective date of withdrawal. Should any Watershed Permittee withdraw from the MOU, the remaining Watershed Permittees' Proportional Cost allocation shall be adjusted in accordance with the Cost Share Formula in Exhibit B. A withdrawing Watershed Permittee shall remain liable for any loss, debt, or liability otherwise incurred while participating in this MOU. If, after paying any such loss, debt, or liability, its Proportional Costs and its proportional MOU Costs incurred through the effective date of withdrawal, a withdrawing Watershed Permittee has any unspent deposit remaining in the possession of the GWMA, GWMA shall promptly return such unspent deposit to the withdrawing Watershed Permittee.

b) The GWMA may, with a two-thirds (2/3) vote of the full Policy Board, terminate this MOU upon not less than thirty (30) days notice, effective on May 1 or December 1 of each year. Any remaining funds not due and payable or otherwise legally committed to Consultant shall be returned to the remaining Watershed Permittees in accordance with the Cost Allocation Formula set forth in Exhibit B.

Section 14. Miscellaneous.

a) Notices. All Notices which the Parties require or desire to give hereunder shall be in writing and shall be deemed given when delivered personally or three (3) days after mailing by registered or certified mail (return receipt requested) to the following address or as such other addresses as the Parties may from time to time designate by written notice in the aforesaid manner:

To GWMA:

Ms. Grace Kast
GWMA Executive Officer
c/o Gateway Cities Council of Governments
16401 Paramount Boulevard
Paramount, CA 90723

To the Watershed Permittees:

Mr. Jeffrey L. Stewart
City Manager
City of Bellflower
16600 Civic Center Drive
Bellflower, CA 90706

Mr. Art Gallucci
City Manager
City of Cerritos
P.O. Box 3130
Cerritos, CA 90703-3130

Mr. Gilbert A. Livas
City Manager
City of Downey
11111 Brookshire Avenue
Downey, CA 90241-7016

Mr. Howard L. Chambers
City Manager
City of Lakewood

5050 Clark Avenue
Lakewood, CA 90712

Mr. Patrick H. West
City Manager
City of Long Beach
333 West Ocean Boulevard, 13th Floor
Long Beach, CA 90802

Ms. Linda Benedetti-Leal
City Manager
City of Paramount
16400 Colorado Ave.
Paramount, CA 90723

Mr. Kenneth C. Farfsing
City Manager
City of Signal Hill
2175 Cherry Avenue
Signal Hill, CA 90755-3799

Mr. Gary Hildebrand
Los Angeles County Flood Control District
County of Los Angeles Department of Public Works
Watershed Management Division, 11th Floor
900 S. Fremont Avenue
Alhambra, CA 91803-1331

b) Separate Accounting and Auditing. The GWMA will establish a separate account to track revenues and expenses incurred by the GWMA on behalf of the Watershed Permittees. Any Los Cerritos Channel Metals TMDLs Permittee may upon five (5) days written notice inspect the books and records of the GWMA to verify the cost of the services provided and billed by GWMA. GWMA shall prepare and provide to the Watershed Permittees annual financial statements and audits, after review and approval by the Los Cerritos Channel Watershed Group.

c) Amendment. The terms and provisions of this MOU may not be amended, modified or waived, except by a written instrument signed by all Parties and approved by all Parties as substantially similar to this MOU.

RB-AR6683

d) Waiver. Waiver by either the GWMA or a Permittee of any term, condition, or covenant of this MOU shall not constitute a waiver of any other term, condition, or covenant. Waiver, by the GWMA or a Watershed Permittee, to any breach of the provisions of this MOU shall not constitute a waiver of any other provision or a waiver of any subsequent breach of any provision of this MOU.

e) Law to Govern: Venue. This MOU shall be interpreted, construed, and governed according to the laws of the State of California. In the event of litigation between the Parties, venue shall lie exclusively in the County of Los Angeles.

f) No Presumption in Drafting. The Parties to this MOU agree that the general rule that an MOU is to be interpreted against the Parties drafting it, or causing it to be prepared, shall not apply.

g) Severability. If any term, provision, condition or covenant of this MOU is declared or determined by any court of competent jurisdiction to be invalid, void, or unenforceable, the remaining provisions of this MOU shall not be affected thereby and this MOU shall be read and construed without the invalid, void, or unenforceable provisions(s).

h) Entire Agreement. This MOU constitutes the entire agreement of the Parties with respect to the subject matter hereof and supersedes all prior or contemporaneous agreements, whether written or oral, with respect thereto.

i) Counterparts. This MOU may be executed in any number of counterparts, each of which shall be an original, but all of which taken together shall constitute but one and the same instrument, provided, however, that such counterparts shall have been delivered to all Parties to this MOU.

j) Legal Representation. All Parties have been represented by counsel in the preparation and negotiation of this MOU. Accordingly, this MOU shall be construed according to its fair language.

k) Agency Authorization. Each of the persons signing below on behalf of the Parties represents and warrants that he or she is authorized to sign this MOU on their respective behalf.

IN WITNESS WHEREOF, the Parties hereto have caused this MOU to be executed on their behalf, respectively, as follows:

DATE:_____ LOS ANGELES GATEWAY REGION INTEGRATED REGIONAL WATER

MANAGEMENT JOINT POWERS AUTHORITY

_____

Christopher S. Cash
GWMA Chair

RB-AR6685

IN WITNESS WHEREOF, the Parties hereto have caused this MOU to be executed on their behalf, respectively, as follows:

DATE: _____

CITY OF BELLFLOWER
Mr. Jeffrey L. Stewart
City Manager
City of Bellflower
16600 Civic Center Drive
Bellflower, CA 90706

_____
Mr. Jeffrey L. Stewart, City Manager

ATTEST:

_____
City Clerk

APPROVED AS TO FORM:

_____
City Attorney

IN WITNESS WHEREOF, the Parties hereto have caused this MOU to be executed on their behalf, respectively, as follows:

DATE: _____

CITY OF CERRITOS
Mr. Art Gallucci
City Manager
City of Cerritos
P.O. Box 3130
Cerritos, CA 90703-3130

_____
Mr. Art Gallucci, City Manager

ATTEST:

_____
City Clerk

APPROVED AS TO FORM:

_____
City Attorney

IN WITNESS WHEREOF, the Parties hereto have caused this MOU to be executed on their behalf, respectively, as follows:

DATE: _____

CITY OF DOWNEY

Mr. Gilbert A. Livas
City Manager
City of Downey
11111 Brookshire Avenue
Downey, CA 90241-7016

_____
Mr. Gilbert A. Livas, City Manager

ATTEST:

_____
City Clerk

APPROVED AS TO FORM:

_____
City Attorney

IN WITNESS WHEREOF, the Parties hereto have caused this MOU to be executed on their behalf, respectively, as follows:

DATE: _____

CITY OF LAKEWOOD
Mr. Howard L. Chambers
City Manager
City of Lakewood
5050 Clark Avenue
Lakewood, CA 90712

_____
Mr. Howard L. Chambers, City Manager

ATTEST:

_____
City Clerk

APPROVED AS TO FORM:

_____
City Attorney

IN WITNESS WHEREOF, the Parties hereto have caused this MOU to be executed on their behalf, respectively, as follows:

DATE: _____

CITY OF LONG BEACH
Mr. Patrick H. West
City Manager
City of Long Beach
333 West Ocean Boulevard, 13th Floor
Long Beach, CA 90802

_____
Mr. Patrick H. West, City Manager

ATTEST:

_____
City Clerk

APPROVED AS TO FORM:

_____
City Attorney

IN WITNESS WHEREOF, the Parties hereto have caused this MOU to be executed on their behalf, respectively, as follows:

DATE: _____

CITY OF PARAMOUNT
Ms. Linda Benedetti-Leal
City Manager
City of Paramount
16400 Colorado Ave.
Paramount, CA 90723

_____
Ms. Linda Benedetti-Leal, City Manager

ATTEST:

_____

_____
City Clerk

APPROVED AS TO FORM:

_____

_____
City Attorney

IN WITNESS WHEREOF, the Parties hereto have caused this MOU to be executed on their behalf, respectively, as follows:

DATE: _____

CITY OF SIGNAL HILL
Mr. Kenneth C. Farfsing
City Manager
City of Signal Hill
2175 Cherry Ave
Signal Hill, CA 90775

_____
Mr. Kenneth C. Farfsing
City Manager

ATTEST:

_____
City Clerk

APPROVED AS TO FORM:

_____
City Attorney

IN WITNESS WHEREOF, the Parties hereto have caused this MOU to be executed on their behalf, respectively, as follows:

DATE: _____

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
County of Los Angeles Department of Public Works
Watershed Management Division, 11th Floor
900 S. Fremont Avenue
Alhambra, CA 91803-1331

By_____
Chief Engineer

ATTEST:

_____

_____
TITLE

APPROVED AS TO FORM:

_____
John F. Krattli
County Counsel

EXHIBIT A

Los Cerritos Channel Freshwater Watershed

Municipalities and Metals TMDL Sub-basins

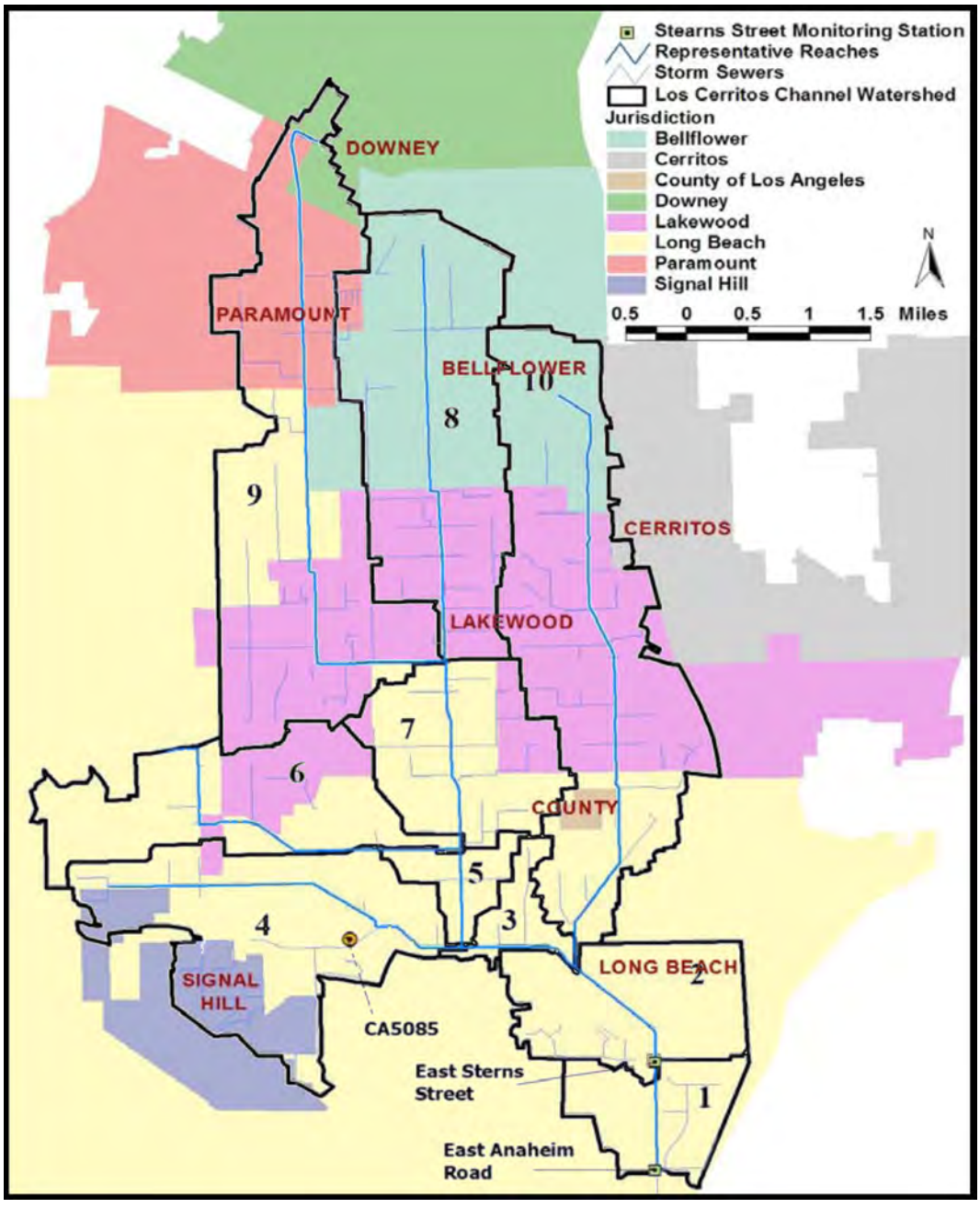


EXHIBIT B
Cost Sharing

The Watershed Permittees agree to pay for the cost of preparation of the WMP (or EWMP if subsequently designated by the parties) and the CIMP. The LACFCD will pay 10 percent (10%) of the cost of the WMP (or EWMP) and CIMP. Each remaining Watershed Permittee will pay according to the cost sharing formula in Table 1. Each Permittee (other than the LACFCD) shall pay an equal share of 35 percent of the cost (flat fee); 65 percent of the costs to be paid based on proportion of the Watershed Permittees' area. If Caltrans determines to participate in the preparation of a WMP (or EWMP) and CIMP, Caltrans will enter into a separate MOU with GWMA and will pay $33,476.21 for FY 13-14.

RB-AR6695

TABLE 1

Cost Sharing Table through submittal of WMP on or before June 28, 2014

Agency Name	Acres in Watershed	% of Total Area	Flat Fee[1]	Share Per Percentage of Watershed[1]	Cost Share Percentage	Total
LACFCD	NA	NA	$65,000	NA	NA	$65,000
Bellflower	2,818.43	16.46%	$25,000	$53,507.64	15.70%	$78,507.64
Cerritos	57.60	0.34%	$25,000	$1,093.53	5.22%	$26,093.53
Downey	245.00	1.43%	$25,000	$4,651.31	5.93%	$29,651.30
Lakewood	4,802.77	28.06%	$25,000	$91,180.15	23.24%	$116,180.15
Long Beach	7,535.38	44.02%	$25,000	$143,058.50	33.60%	$168,058.51
Paramount	1,128.93	6.59%	$25,000	$21,432.63	9.29%	$46,432.63
Signal Hill	530.75	3.10%	$25,000	$10,076.24	7.02%	$35,076.24
Transfer[2]	NA	NA	$85,000	NA	NA	$85,000
Total[3,4]	**17,118.86[5]**	**100.00%**	**$325,000**	**$325,000.00**	**100.00%**	**$650,000.00**

Source: City acreage within watershed from EPA

1. For the municipalities, 35% is based on a Flat Fee and 65% is based on percent of Freshwater Watershed acreage. LACFCD is paying $65,000, 10% of the cost of preparing the WMP and the CIMP.

2 $85,000 will be transferred from funds remaining in a GWMA account for implementing MOAs "for the Administration and Cost Sharing Resulting from Preparation of the Los Cerritos Channel Metals Total Maximum Daily Load Implementation Plan, Monitoring Program, and Special Studies." The amount of this transfer may be reduced if Caltrans participates in the development of the WMP and the CIMP.

3 Based on total budget of $650,000.

4 This estimate does not include Caltrans at this time.

5 The established TMDL indicates that the watershed contains 17,711 acres. The total acreage shown in Table 1 excludes a 95-acre unincorporated County area and 497.97 acres of Caltrans property.

RB-AR6696

TABLE 2

Cost Sharing Formula per $100,000 beginning June 29, 2014 through September 30, 2026

Agency Name	Acres in Watershed	% of Total Area	Share Per Percentage of Watershed[1]	Flat Fee[1]	Cost Share Percentage	Share Per $100,000
LACFCD[2]	NA	NA	NA	NA	NA	NA
Bellflower	2,818.43	16.46%	$10,701.53	$5,000	15.70%	$15,701.53
Cerritos	57.60	0.34%	$218.70	$5,000	5.22%	$5,218.70
Downey	245.00	1.43%	$930.26	$5,000	5.93%	$5,930.26
Lakewood	4,802.77	28.06%	$18,236.03	$5,000	23.24%	$23,236.03
Long Beach	7,535.38	44.02%	$28,611.70	$5,000	33.61%	$33,611.70
Paramount	1,128.93	6.59%	$4,286.53	$5,000	9.29%	$9,286.53
Signal Hill	530.75	3.10%	$2,015.25	$5,000	7.02%	$7,015.25
Total[3,4,5]	**17,118.86**	**100.00%**	**65,000**	**35,000**	**100.00%**	**100,000**

Source: City acreage within watershed from EPA

[1] For the municipalities, 65% is based on percent of Freshwater Watershed acreage and 35% based on a Flat Fee of $5,000 per $100,000.

[2] LACFCD's participation beginning June 29, 2014 will be subject to an amendment to the MOU or equivalent agreement.

[3] The Watershed Group will determine each year a budget for the following fiscal year necessary to comply with Section VI.C of Order No. R4-2012-0175 and the comparable requirements for the new Long Beach MS4 Permit.

[4] This estimate does not include Caltrans at this time.

[5] The established TMDL indicates that the watershed contains 17,711 acres. The total acres shown in Table 2 excludes a 95-acre unincorporated County area and 497.97 acres of Caltrans property.

ATTACHMENT C:

CITY OF BELLFLOWER LETTER OF INTENT AND RELATED MATERIALS

ATTACHMENT C.1:

CITY OF BELLFLOWER
JUNE 26, 2013 LETTER OF
INTENT

The City of Bellflower
Families. Businesses. Futures.
16600 Civic Center Drive, Bellflower, CA 90706
Tel 562.804.1424 Fax 562.925.8660 www.bellflower.org

June 26, 2013

Mr. Samuel Unger
Executive Officer
California Regional Water Quality Control Board
Los Angeles Region
320 W. Fourth Street, Suite 200
Los Angeles, CA 90013

Attn.: Renee Purdy

Re: Letter of Intent to Participate in the Development of a Watershed Management Program (WMP) and Coordinated Integrated Monitoring Program (CIMP) in Cooperation with the Los Cerritos Channel Watershed Group

Dear Mr. Unger:

The City of Bellflower (City) has voluntarily joined the Los Cerritos Channel Watershed Group (LCC Group) in the development of a Watershed Management Program (WMP) and a Coordinated Integrated Monitoring Program (CIMP). We intend to comply with the requirements and provisions of the MS4 NPDES Permit (Order No. R4-2012-0175). The LCC Group is comprised of the following permittees: the Cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill, as well as the Los Angeles County Flood Control District and Caltrans.

The City complied with Part VI.C.4.c.iv (1) through submission of a Notice of Intent letter dated December 27, 2012 (attached). We are complying with Part VI.C.4.c.iv (2) by attaching our Draft Green Streets Best Management Practices Policy and our adopted Stormwater Ordinance (City of Bellflower Ordinance No. 1099), which provides the City with authority to implement the Planning and Land Development Program requirements contained in Order No. R4-2012-0175, including Part VI.D.7.c.i.; Part VI.D.7.c.ii; Part VI.D.7.c.iii; and, if applicable, Part VI.D.7.c.iv, once the L.A. Regional Water Quality Control Board approves the WMP.

Ray Dunton, *Mayor* | Sonny R. Santa Ines, *Mayor Pro Tem* | Dan Koops, *Council Member* | Scott A. Larsen, *Council Member* | Ron Schnablegger, *Council Member*

The City signed a Memorandum of Agreement (MOA) with the Los Angeles Gateway Regional Water Management Joint Powers Authority for the Administration and Cost Sharing Resulting from Preparation of the Los Cerritos Channel Metals Total Maximum Daily Load Implementation Plan, Monitoring Program and Special Studies. This MOA has been used to begin preparation of a WMP, but it will soon be replaced with an MOU specifically for Development of a WMP or Enhanced WMP (EWMP), and a CIMP.

The City recognizes that while maintaining the 18-month schedule for development of the WMP, the LCC Group intends to continue to evaluate and consider the EWMP option. If the LCC Group decides prior to December 28, 2013, deadline to develop an EWMP, your office will be notified in a separate letter.

If you have any questions regarding the City's Letter of Intent, please contact Bernardo Iniguez, Environmental Services Manager, at 562-804-1424, ext. 2233.

Sincerely,

Jeffrey L. Stewart
City Manager

Enclosures

cc: Leo L. Mingle, Jr., Assistant City Manager
Deborah R. Chankin, Director of Public Works
Bernardo Iniguez, Environmental Services Manager

Doc 281718

ATTACHMENT C.2:

BELLFLOWER DECEMBER 27, 2012
NOTICE OF INTENT

The City of Bellflower
Families. Businesses. Futures.
16600 Civic Center Drive, Bellflower, CA 90706
Tel 562.804.1424 Fax 562.925.8660 www.bellflower.org

December 27, 2012

Certified No. 7010 1060 0000 5302 4928
Return Receipt Requested

Mr. Samuel Unger
Executive Officer
California Regional Water Quality Control Board
Los Angeles Region
320 W. Fourth Street, Suite 200
Los Angeles, CA 90013

Re: Notification of Intent to Participate in Development of a Watershed Management Program for the Los Cerritos Channel Watershed

Dear Mr. Unger:

The City of Bellflower (City) hereby notifies the Los Angeles Regional Water Quality Control Board (Regional Board) of our intent to participate in the development of a Watershed Management Program (WMP) for the portion of the City within the Los Cerritos Channel Watershed (Watershed). Since 2010, the City has participated with six other cities in the watershed on the Technical Committee for the Los Cerritos Channel Metals Total Maximum Daily Loads (TMDL's). The Technical Committee has determined that it should immediately begin the development of a Watershed Management Program (WMP) pursuant to Part VI.C of the recently adopted *NPDES Permit CAS004001 for Municipal Separate Storm Sewer System Discharges within the Coastal Watersheds of Los Angeles County, Except Those Discharges Originating from the City of Long Beach* (MS4 Permit).

Since the Cities of the Watershed have already organized and have a revenue sharing mechanism through Memoranda of Agreement that the cities have entered into with the Gateway Water Management Authority, the Technical Committee does not want to lose several months deciding which WMP or Enhanced Watershed Management Program (EWMP) option to choose. Rather, we and the other participating cities would prefer to start immediately on a standard WMP as of December 28, 2012, and concurrently investigate other options.

Dan Koops, *Mayor* | Raymond Dunton, *Mayor Pro Tem* | Randy Bomgaars, *Council Member* | Scott A. Larsen, *Council Member* | Sonny Santa Ines, *Council Member*

If, within six months of the effective date of the MS4 Permit, we can demonstrate that 1) Low Impact Development (LID) ordinances and green street policies were either in effect or under development within 60 days of the effective date of the permit; and, 2) that draft LID ordinances and draft green street policies are in place in greater than 50% of the Watershed; then, we intend to request a completion date of June 28, 2014 for our WMP in order to gather more information and further strengthen the Program. In addition, during the initial months after the effective date of the permit, the Technical Committee intends to investigate the potential applicability of an EWMP for the Watershed. Within the allowed six months after the effective date of the permit, we propose to notify the Regional Board as to whether or not we have elected to collaborate on an EWMP that meets the requirements of Part VI.C.4.c.IV of the Permit.

At this time, there are no interim or final Water Quality Based Effluent Limitations (WQBELs) for trash applicable to the Watershed. Rather, the only interim or final WQBELs applicable to the Watershed are for the Los Cerritos Channel Total Maximum Daily Loads for Metals established by the USEPA on March 17, 2010. The schedule for meeting interim and final WQBELs associated with this TMDL is uncertain at this time because the Regional Board is in the process of developing a Basin Plan Amendment for implementation of the Los Cerritos Channel TMDLs for Metals among others. The Technical Committee and its consultant have met with your staff regarding development of the Basin Plan Amendment and have submitted a draft implementation schedule. Although the draft Basin Plan Amendment has not yet been circulated for public review, we believe that no interim or final WQBEL compliance dates will occur prior to approval of a WMP or EWMP for the Watershed.

With respect to watershed control measures, concurrently with the development of a WMP or EWMP, the City of Bellflower will continue to implement watershed control measures in our existing stormwater management programs to help eliminate non-stormwater discharges through the MS4. We also know that a Proposition 84 Planning and Monitoring Grant received by the Gateway Water Management Authority will be underway, concurrent with the development of a WMP or EWMP. This Grant is designed to determine optimal locations for retrofitting LID and water harvesting measures within the Watershed. In addition, we will continue our participation in the Technical Committee which is analyzing local measures that could be included in the Basin Plan Amendment and implemented concurrently with development of a WMP or a EWMP.

We would appreciate your acknowledgment that you have received this notice and concur with our proposed approach, namely to start immediately with preparation of a WMP while reserving the right to alter our submittal date for a draft program plan depending on the development of LID ordinances and green streets policies within the Watershed and depending on our investigation of the potential applicability of an EWMP to the Watershed.

Please do not hesitate to contact me if you have any questions at (562) 804-1424, ext. 2207.

Sincerely,

Jeffrey L. Stewart
City Manager

cc: Leo L. Mingle, Jr., Assistant City Manager
✓Deborah R. Chankin, Director of Public Works
Bernardo Iniguez, Environmental Services Manager

Doc 271144

ATTACHMENT C.3:

EXISTING CITY OF BELLFLOWER/GWMA MOA

MEMORANDUM OF AGREEMENT (MOA)
BETWEEN
THE LOS ANGELES GATEWAY REGION INTEGRATED REGIONAL WATER MANAGEMENT JOINT POWERS AUTHORITY
AND
THE CITY OF BELLFLOWER

FOR THE ADMINISTRATION AND COST SHARING RESULTING FROM PREPARATION OF THE LOS CERRITOS CHANNEL METALS TOTAL MAXIMUM DAILY LOAD IMPLEMENTATION PLAN, MONITORING PROGRAM, AND SPECIAL STUDIES

This Memorandum of Agreement ("Agreement") is made and entered into as of the date of the last signature, set forth below, by and between the Los Angeles Gateway Region Integrated Regional Water Management Joint Powers Authority ("Gateway Authority"), a California Joint Powers Authority, and the City of Bellflower, a California municipal corporation ("City"); hereinafter referred to as "Party" or "Parties":

RECITALS

WHEREAS, the mission of the Gateway Authority includes the equitable protection and management of water resources within its area; and

WHEREAS, portions of the Gateway Authority cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill, are located within the Los Cerritos Channel Watershed; and

WHEREAS, for the purposes of this Agreement, the term "Watershed Entities" shall include, to the extent that each enters into agreements substantially similar to this Agreement, the Gateway Authority cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill, as well as the California Department of Transportation ("Caltrans"), all of which manage or drain stormwater into at least a portion of the Los Cerritos Channel Watershed; and

WHEREAS, the United States Environmental Protection Agency ("USEPA") established the Los Cerritos Channel Metals Total Maximum Daily Load ("Metals TMDL") on March 17, 2010, with the intent of protecting and improving water quality in the Los Cerritos Channel Watershed; and

WHEREAS, this Metals TMDL will regulate certain discharges from NPDES Permit holders, requiring organization and cooperation among the regulated entities; and

WHEREAS, the Parties recognize that the proposed Metals TMDL is not self-enforcing, but could potentially become legally enforceable through incorporation into future National Pollutant Discharge Elimination System ("NPDES") Permits; and

RB-AR6707

WHEREAS, the Cities of Long Beach and Signal Hill funded technical assistance and studies on behalf of the Watershed Entities that resulted in technical modifications of the TMDL; and

WHEREAS, achieving the objectives of the Metals TMDL will be facilitated through preparation of an Implementation Plan ("IP"), a Monitoring Plan ("MP"), and specific Special Studies, by the Watershed Entities, to demonstrate compliance; and

WHEREAS, preparation of these plans and studies requires administrative and professional coordination services that the Gateway Authority can provide; and

WHEREAS, a Metals TMDL Technical Committee ("TC"), consisting of representatives of the Watershed Entities as well as stormwater experts, has been established to assist the Gateway Authority in coordinating the preparation and submission of the IP, MP, and any Special Studies to the California Regional Water Quality Control Board, Los Angeles Region on behalf of the Watershed Entities; and

WHEREAS, a Metals TMDL Steering Committee ("SC"), consisting of representatives of the Watershed Entities and other persons approved by the Watershed Entities, has been established for the purpose of overseeing administrative and fiscal coordination in support of achieving the Metals TMDL objectives; and

WHEREAS, the SC has determined that the approximately $293,000 spent by the Cities of Long Beach ($136,000) and Signal Hill ($157,000) in TMDL Development costs, along with the costs of preparing the IP, MP, and potential Special Studies and other related costs incurred by the Gateway Authority in administering this Agreement, should be shared by the Watershed Entities based on the cost allocation formula contained in Exhibit A; and

WHEREAS, the Gateway Authority will endeavor to conclude substantially similar agreements with all of the Watershed Entities in order to minimize the cost to each Watershed Entity of complying with the Metals TMDL.

NOW, THEREFORE, in consideration of the mutual covenants and conditions set forth herein, the Parties do hereby agree as follows:

Section 1. Recitals. The recitals set forth above are fully incorporated as part of this Agreement.

Section 2. Purpose. The purpose of this Agreement is to cooperatively support and undertake preparation of the IP, MP, and any Special Studies agreed to by the Parties.

Section 3. Cooperation. The Parties shall fully cooperate with one another to achieve the purposes of this Agreement.

Section 4. Voluntary Nature. The Parties voluntarily enter into this Agreement.

RB-AR6708

Section 5. Term. This Agreement shall remain and continue in effect until completion of the IP, MP, and any Special Studies agreed to by the Parties, or December 31, 2022, whichever occurs first.

Section 6. Role of the Gateway Authority.

a) The Gateway Authority shall endeavor to enter into substantially and materially similar agreements with each of the Watershed Entities.

b) Based on the directions of the TC, the Gateway Authority shall retain a Consultant or Consultants ("Consultant(s)") to prepare the IP, MP, and any agreed upon Special Studies to demonstrate compliance with the Metals TMDL. The Consultant's Scope of Work shall substantially conform to the Scope of Work set forth in Exhibit B to this Agreement.

c) The Gateway Authority shall invoice the Watershed Entities a proportional amount to cover the costs incurred by the Gateway Authority in the performance of its duties under this Agreement. Such costs shall include, but not be limited to, the costs of: the Consultant's fees and costs for the preparation of the IP, MP, and Special Studies; Gateway Authority staff time; legal fees; audit expenses; and administering this Agreement (collectively, the "Agreement Costs"). The Gateway Authority shall invoice the Watershed Entities on an annual basis in an amount based on the Cost Share Formula in Exhibit A.

Section 7. Obligation to Pay Proportional Costs.

a) Upon receiving an invoice, the City shall pay the Gateway Authority its proportionate share of the Gateway Authority's anticipated Agreement Costs in accordance with the Cost Share Formula set forth in Exhibit A.

b) The Agreement shall become effective only if the Gateway Authority is able to execute substantially similar agreements with the cities of Bellflower, Lakewood and Long Beach. The City shall pay the adjusted proportional cost based on the Cost Share Formula set forth in Exhibit A. If the Gateway Authority is unable to execute materially similar agreements with any of the other Watershed Entities, the proportional costs set forth in Exhibit A shall be adjusted.

c) Any over or underpayment of Agreement costs shall be credited or billed to the City during the following period or, if it occurs in the last year of this Agreement, it shall be returned upon termination of this Agreement.

RB-AR6709

Section 8. Invoicing and Payment.

a) Payment to the Gateway Authority is due within sixty (60) days of the invoice date. The first invoice should be expected within sixty (60) days of signing this agreement. Invoices for future Agreement Costs will be billed annually in March, starting in the year 2011.

b) Any payment that is late shall be subject to interest from the due date. For any payment that is made from 1 to 30 days after the due date, the interest rate shall be equal to the Prime Rate in effect on the due date plus one (1) percent (e.g., if the Prime Rate is 5 percent, the interest rate for this Agreement will be 6 percent). For any payment made from 31 to 60 days after the due date, the interest rate shall be equal to the Prime Rate in effect on the due date plus five (5) percent. For payments made over 60 days after the due date, the interest rate shall be the Prime Rate in effect on the due date plus ten (10) percent. The rates shall, nevertheless, not exceed the maximum allowed by law.

c) A Party will be delinquent if payment is not received within 120 days after first being invoiced by the Gateway Authority. The Gateway Authority will follow the procedure listed below, or such other procedure that the Steering Committee directs to effectuate payment: 1) verbally contact the official to whom notices should be addressed pursuant to Section 12 of this Agreement and 2) submit a formal letter from the Gateway Authority Executive Officer to the delinquent Watershed Entity. If payment is not received, the Gateway Authority may terminate the Agreement and recalculate the proportional cost for the remaining Watershed Entities.

d) Any interest accrued on the funds collected per this Agreement shall be applied toward the Agreement Costs. The Gateway Authority shall annually submit a report to the SC on the amount of interest accrued by the Agreement account. Funds remaining at the end of the term of this Agreement shall be returned to the participating Watershed Entities in accordance with the Cost Share Formula in Exhibit A.

Section 9. Independent Contractor.

a) The Gateway Authority is, and shall at all times remain, a wholly independent contractor for performance of the obligations described in this Agreement. The Gateway Authority's officers, officials, employees and agents shall at all times during the Term of this Agreement be under the exclusive control of the Gateway Authority. The Watershed Entities shall not control the conduct of the Gateway Authority or any of its officers, officials, employees or agents, except as set forth in this Agreement. The Gateway Authority, and its officers, officials, employees, and agents shall not be deemed to be employees of the Watershed Entities.

b) The Gateway Authority is solely responsible for the payment of salaries, wages, other compensation, employment taxes, worker's compensation, or similar taxes for its employees performing services hereunder.

Section 10. Indemnification and Insurance.

a) The Gateway Authority shall include an indemnification provision in the agreement with the Consultant requiring the Consultant to defend, indemnify and hold harmless the City and the Gateway Authority, and their officers, employees, and other representatives and agents, from and against any and all liabilities, actions, suits, proceedings, claims, demands, losses, costs, and expenses, including legal costs and attorney's fees, for injury to or death of person (s), for damage to property (including property owned by the Gateway Authority or the City) resulting from negligent or intentional acts, errors and omissions committed by Consultant, its officers, employees, and other representatives and agents, arising out of or related to Consultant's performance under this Agreement.

b) The City shall defend, indemnify and hold harmless the Gateway Authority, its officers, employees, and other representatives and agents of the Gateway Authority, from and against any and all liabilities, actions, suits, proceedings, claims, demands, losses, costs, and expenses, including legal costs and attorney's fees, for injury to or death of person (s), for damage to property (including property owned by the Gateway Authority) and for negligent or intentional acts, errors and omissions committed by City, its officers, employees, and other representatives and agents, arising out of or related to City's performance under this Agreement, except for such loss as may be caused by Gateway Authority's gross negligence or intentional acts or the gross negligence or intentional acts of its officers, employees, or other representatives and agents.

c) Consultant's Insurance. The Gateway Authority shall require the Consultant to provide proof of current Automotive and/or General Liability, Professional (Errors and Omissions) in sufficient coverage amounts, naming the Gateway Authority and each Watershed Entity as an additional insured. Consultant shall also be required to provide proof of current Workman's Compensation insurance, when applicable.

Section 11. Termination of Agreement. Either Party may terminate this Agreement in whole or in part, for any reason, or no reason, by giving the other Party thirty (30) days written notice thereof. The City shall be responsible for Agreement Costs to which the Gateway Authority became bound prior to the date of termination. Such Agreement Costs shall include the remaining fees of any Consultant retained by the Gateway Authority prior to the date of termination. Gateway Authority shall notify in writing all Watershed Entities within fourteen (14) days after receiving written notice from any Watershed Entity that said entity intends to terminate this Agreement. Each

RB-AR6711

Watershed City's proportionate cost allocation shall be reapportioned thereafter in accordance with the Cost Share Formula in Exhibit A.

Section 12. Miscellaneous.

a) Notices. All notices which any Party is required or desires to give hereunder shall be in writing and shall be deemed given when delivered personally or three (3) days after mailing by registered or certified mail (return receipt requested) to the following address or as such other addresses as the Parties may from time to time designate by written notice in the aforesaid manner:

To Gateway Authority:
Ms. Annette Hubbell
Gateway Authority Executive Officer
City of Downey
11111 Brookshire Ave.
Downey, CA 90241

To City of Bellflower:
Michael J. Egan
City Manager
16600 Civic Center Drive
Bellflower, CA 90706

b) Separate Accounting and Auditing. The Gateway Authority agrees to establish a separate account to track revenues and expenses resulting from the Agreement. Annual financial statements and audits will be made available to the participating Parties, after review and approval by the Metals TMDL SC.

c) Binding Effect. This Agreement shall be binding upon and inure to the benefit of each Party to this Agreement and its respective heirs, administrators, representatives and successors.

d) Amendment. The terms and provisions of this Agreement may not be amended, modified or waived, except by a written instrument signed by both Parties.

e) Waiver. Waiver by either Party of any term, condition, or covenant of this Agreement shall not constitute a waiver of any other term, condition, or covenant. Waiver, by any Party, to any breach of the provisions of this Agreement shall not constitute a waiver of any other provision, or a waiver of any subsequent breach of any provision of this Agreement.

f) Law to Govern; Venue. This Agreement shall be interpreted, construed, and governed according to the laws of the State of California. In the event of litigation between the Parties, venue shall lie exclusively in the County of Los Angeles.

RB-AR6712

g) No Presumption in Drafting. The Parties to this Agreement agree that the general rule that an Agreement is to be interpreted against the Party drafting it, or causing it to be prepared, shall not apply.

h) Severability. If any term, provision, condition or covenant of this Agreement is declared or determined by any court of competent jurisdiction to be invalid, void, or unenforceable, the remaining provisions of this Agreement shall not be affected thereby and this Agreement shall be read and construed without the invalid, void, or unenforceable provision(s).

i) Entire Agreement. This Agreement constitutes the entire agreement of the Parties with respect to the subject matter hereof and supersedes all prior or contemporaneous agreements, whether written or oral, with respect thereto.

j) Counterparts. This Agreement may be executed in any number of counterparts, each of which shall be an original, but all of which taken together shall constitute but one and the same instrument, provided, however, that such counterparts shall have been delivered to both Parties to this Agreement.

k) Legal Representation. All Parties have been represented by counsel in the preparation and negotiation of this Agreement. Accordingly, this Agreement shall be construed according to its fair language.

l) Agency Authorization. Each of the persons signing below on behalf of a Party represents and warrants that he or she is authorized to sign this Agreement on behalf of such Party.

IN WITNESS WHEREOF, the Parties hereto have caused this Agreement to be executed on their behalf, respectively, as follows:

DATE: September 13, 2010

CITY OF BELLFLOWER

City Manager Michael J. Egan

ATTEST:

City Clerk Debra D. Bauchop

APPROVED AS TO FORM:

City Attorney Joseph W Pannone

(Refer City of Bellflower Agreement File No. 528)

DATE: _____

LOS ANGELES GATEWAY REGION
INTEGRATED REGIONAL WATER
MANAGEMENT JOINT POWERS AUTHORITY

Gateway Authority Chair

ATTEST:

Gateway Authority Secretary

APPROVED AS TO FORM:

Gateway Authority General Counsel

RB-AR6714

IN WITNESS WHEREOF, the Parties hereto have caused this Agreement to be executed on their behalf, respectively, as follows:

DATE: September 13, 2010

CITY OF BELLFLOWER

City Manager Michael J. Egan

ATTEST:

City Clerk Debra D. Bauchop

APPROVED AS TO FORM:

City Attorney Joseph W. Pannone

(Refer City of Bellflower Agreement File No. 528)

DATE: 9/16/10

LOS ANGELES GATEWAY REGION
INTEGRATED REGIONAL WATER
MANAGEMENT JOINT POWERS AUTHORITY

Gateway Authority Chair

ATTEST:

Gateway Authority Secretary

APPROVED AS TO FORM:

Gateway Authority General Counsel

RB-AR6715

EXHIBIT A

LOS CERRITOS CHANNEL METALS TMDL
COST ALLOCATION

Agency Name	Acres in Watershed[1]	Percent of Watershed Area	Agency Cost Share per $100,000		
			Flat Fee	Area Share	Total
Bellflower	2,818 43	16.00%	$5,000	$9,599	$14,599
CalTrans	497.74	2.83%	$5,000	$1,695	$6,695
Cerritos	57.60	0.33%	$5,000	$196	$5,196
Downey	245.00	1.39%	$5,000	$834	$5,834
Lakewood	4,802.77	27.26%	$5,000	$16,358	$21,358
Long Beach	7,535.38	42 77%	$5,000	$25,665	$30,665
Paramount	1,128.93	6.41%	$5,000	$3,845	$8,845
Signal Hill	530.75	3.01%	$5,000	$1,808	$6,808
JPA MOA Total	17,616.60	100.00%	$40,000	$60,000	$100,000
UNI Los Angeles Co.	94.40				
USEPA TMDL Total	17,711.00				

[1] CalTrans provided acreage values were subtracted from city acreage provided by USEPA.

The City of Long Beach and Signal Hill's annual payments as shown above shall be offset by the credits outlined in the Recitals of the Agreement.

RB-AR6716

ATTACHMENT C.4:

CITY OF BELLFLOWER IN PLACE LID ORDINANCE

CITY OF BELLFLOWER

ORDINANCE NO. 1099

AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF BELLFLOWER AMENDING BELLFLOWER MUNICIPAL CODE SECTION 10-4 TO REVISE THE STORMWATER AND RUNOFF POLLUTION CONTROL ORDINANCE

WHEREAS, on December 13, 2001, the California Water Quality Control Board, Los Angeles Region, adopted a municipal National Pollutant Discharge Elimination System (NPDES) Permit for municipal stormwater and urban runoff discharges within the County of Los Angeles, and the incorporated cities therein, except for the City of Long Beach;

WHEREAS, the City of Bellflower (City) is subject to the municipal NPDES Permit;

WHEREAS, on October 14, 2002, the City Council adopted Ordinance No. 1038 amending Bellflower Municipal Code Section 10-4 relative to stormwater and urban runoff pollution controls; and

WHEREAS, the City seeks to fully comply with the provisions of the most current NPDES Permit.

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF BELLFLOWER DOES ORDAIN AS FOLLOWS:

SECTION 1. Paragraph a. of Subsection 10-4.3 of the Bellflower Municipal Code is hereby amended to read as follows:

"Prohibiting illicit discharges to the municipal stormwater system."

SECTION 2. Bellflower Municipal Code Subsection 10-4.4 is hereby amended is hereby amended by adding thereto a new definition for "MS4 NPDES Permit" and amending the definitions of "illicit discharge" and "industrial activity" to read as follows:

""Illicit Discharge" means the entry of any material other than stormwater into the MS4 unless such discharge is exempted by Regional Board or under the MS4 NPDES Permit or any other NPDES Permit to which the City may be subject."

""Industrial activity" means any of the 10 classifications of industrial facilities specified in 40 Code of Federal Regulations §122.26 (b)(14), defined by Standard Industrial Classification (SIC) and which is required to obtain a NPDES Permit, not including construction activities that cause the disturbance of one (1) acre of soil by clearing, grading, excavation, or a combination thereof."

""MS4 NPDES Permit" means any municipal NPDES Permit adopted by the California Regional Water Quality Control Board, Los Angeles Region, to which the City is subject."

SECTION 3. Bellflower Municipal Code Subsection 10-4.9 is hereby amended as follows:

"10-4.9 Control of Pollutants from Industrial and Commercial Facilities.

a. Certain categories of commercial facilities specified in the municipal NPDES Permit or identified by the City as being significant contributors of pollution, shall implement BMPs prescribed by the Regional Board or its Executive Officer, through programs or actions made pursuant to the municipal NPDES Permit, or by the City's Director of Public Works, to minimize the discharge of pollutants to the MS4.

b. Certain categories of commercial facilities shall be inspected for pollution issues and BMP compliance in accordance with a schedule called for in the municipal NPDES Permit or as often as necessary as determined by the City."

SECTION 4. Bellflower Municipal Code Subsection 10-4.10 is hereby amended by adding a new paragraph "d" to read as follows:

"d. Any industry, whether or not subject to a NPDES General Industrial Activities Stormwater Permit, may be inspected in accordance with a schedule established by the municipal NPDES Permit or as often as necessary as determined by the City for the purpose of determining compliance with BMP requirements or to abate pollution issues."

SECTION 5. Paragraph a. of Subsection 10-4.11 of the Bellflower Municipal Code is hereby amended to read as follows:

"a. No person shall be granted a grading permit or shall commence or continue any construction activity in the City that causes the disturbance of one (1) acre or more of soil by clearing, grading, and excavating without demonstrating to the City that such person has obtained a NPDES General Construction Activity Stormwater Permit from the SWRCB. NPDES construction activity does not include: (i) routine maintenance to maintain original line and grade, (ii) hydraulic capacity, (iii) the original purpose of the facility, or (iv) emergency construction activities required to immediately protect the public health and safety."

SECTION 6. Bellflower Municipal Code Subsection 10-4.12 is hereby amended to read as follows:

"10-4.12 Control of Pollutants from Other Construction Activities

a. No person shall be granted a grading permit for a construction project that is expected to cause a disturbance of less than one (1) acre of soil by grading, clearing, and/or excavation without consenting to implement BMPs prescribed by the City to reduce pollutant discharges to the MS4 associated with construction activities.

b. No person shall be allowed to commence or continue any construction activity in the City that causes the disturbance of less than one (1) acre of soil by grading, clearing, and/or excavating without implementing BMPs prescribed by the City."

SECTION 7. Bellflower Municipal Code Subsection 10-4.13 is hereby amended to read as follows:

"**10-4.13 Control of Pollutants from New Development/Redevelopment Projects**

a. Prior to the construction of any project that is subject to development planning requirements specified in the MS4 NPDES Permit, such project shall be evaluated by the City for its potential to discharge pollutants to the MS4.

b. b. Once a development planning-subject project has been evaluated for its potential to discharge pollutants to the MS4, the City shall require appropriate BMPs, both structural and non-structural, to be implemented on a post-construction basis; and shall require a maintenance agreement to assure the proper performance of such BMPs."

SECTION 8. Bellflower Municipal Code Subsection 10-4.15 is hereby amended to read as follows:

10-4.15 Fees.

"The City Council may establish fees to recover costs for complying with the requirements of this Section, including but not limited to plan checking, cleanup and abatement fees, and industrial and commercial inspection fees, which may be fixed and established from time to time by the City Council by resolution."

SECTION 9. Bellflower Municipal Code Section 10-4 is hereby amended by adding thereto a new Subsection 10-4.16 to read as follows:

"10-4.16 Receiving Water Limitation Exceedances

Any person causing a discharge which exceeds a receiving water limitation shall be required to halt the discharge."

SECTION 10. If any section, subsection, subdivision, paragraph, sentence, clause or phrase of this Ordinance is for any reason held to be unconstitutional or invalid or ineffective by any court of competent jurisdiction, such decision shall not affect the validity or effectiveness of the remaining portions of this Ordinance. The City Council hereby declares that it would have passed each section, subsection, subdivision, paragraph, sentence, clause or phrase of this Ordinance irrespective of the fact that one or more sections, subsections, subdivisions, paragraphs, sentences, clauses or phrases be declared unconstitutional or invalid or ineffective.

SECTION 11. This Ordinance shall take effect thirty (30) days after its adoption. The City Clerk, or her duly appointed deputy, shall certify to the adoption of this Ordinance and shall cause this Ordinance to be posted as required by law.

ORDINANCE NO. 1099 HAD ITS FIRST READING ON OCTOBER 10, 2005, ITS SECOND READING ON OCTOBER 24, 2005, AND WAS DULY PASSED, APPROVED, AND ADOPTED BY THE CITY COUNCIL OF THE CITY OF BELLFLOWER AT ITS REGULAR MEETING OF OCTOBER 24, 2005.

Randy Bomgaars, Mayor

ATTEST:

Debra D. Bauchop, City Clerk

Doc 122486

STATE OF CALIFORNIA)
COUNTY OF LOS ANGELES) SS
CITY OF BELLFLOWER)

I, **Debra D. Bauchop**, City Clerk of the City of Bellflower, California, do hereby certify under penalty of perjury that:

Ordinance No. 1099 had its first reading on October 10, 2005, by the following vote to wit:

AYES: Council Members - Pratt, Smith, King, and Mayor Bomgaars
NOES: Council Member - Larsen

Ordinance No. 1099 had its second reading on October 24, 2005, and was duly passed, approved and adopted by the City Council of the City of Bellflower at its regular meeting of October 24, 2005, by the following vote to wit:

AYES: Council Members - Smith, King, and Pratt
NOES: Council Members - Larsen and Mayor Bomgaars

Ordinance No. 1099 was posted at City Hall, the Clifton M. Brakensiek Library, John S. Simms Park, the Bellflower Sheriff's Substation, and T. Mayne Thompson Park; and the Ordinance, effective date, and vote will be published on Monday, October 31, 2005, in the Local Section of the *Long Beach Press-Telegram*, pursuant to Government Code Section 36933 and City Council action of April 24, 1995.

Dated: October 25, 2005

Debra D. Bauchop, City Clerk
City of Bellflower, California

(SEAL)

ATTACHMENT C.5:

CITY OF BELLFLOWER DRAFT GREEN STREETS POLICY

7.x Green Streets Best Management Practices

1. **Introduction.** The National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer Systems (MS4) permit for the Los Angeles Region, Order No. R4-2012-0175 (MS4 Permit), adopted November 8, 2012, allows Permittees to participate in a Watershed Management Program (WMP) or Enhanced Watershed Management Program (EWMP). The City of Bellflower has elected to participate in two such programs. As such, the MS4 Permit allows the City to demonstrate that 1) there are green streets policies in place and/or 2) commence development of policies that specify the use of green street strategies for significant projects transportation corridors within 60 days of the effective date of the Order, and have a draft policy within 6 months of the effective date of the Order. If greater than 50% of the land area covered by WMP or EWMP meets condition 1 or 2 above, the MS4 Permit allows an additional 6 months for submittal of the draft WMP to the Los Angeles Regional Water Quality Control Board (Regional Board) or submittal of an EWMP to the Regional Board.

2. **Purpose.** This policy fulfills the MS4 Permit's criteria to implement green streets policies within the Los Cerritos Channel Watershed Management Program and the Lower San Gabriel River Watershed Management Program land areas. The City's Public Works Department shall implement feasible green streets best management practices (BMPs) for new and redevelopment street and roadway projects within transportation corridors. Green streets are defined as right-of-way areas that incorporate infiltration, biofiltration, and/or storage and use BMPs to collect, retain, or detain stormwater runoff as well as a design element that creates attractive streetscapes.

3. **Definitions.**

a. "New development and/or redevelopment street project" is defined as a public roadway project which 1) has a valuation over $500,000 and either 2) adds at least 10,000 square feet of impervious surface; or 3) modifies over 10,000 square feet of impervious surface as to line, grade, hydraulic capacity or purpose.

b. "Transportation corridor" is defined as major arterial streets and highways which provide direct access to freeways and extend continuously from city limit to city limit, providing direct access to adjoining cities.

c. "Routine maintenance" is defined as slurry seal, repaving, and reconstruction of the road or street where the original line, grade and hydraulic capacity are maintained.

4. **Application.**

a. The Public Works Department shall require new development and/or redevelopment street and roadway projects within transportation corridors to incorporate feasible green streets BMPs. Routine street maintenance or repair projects and linear utility projects are excluded from these requirements.

b. This policy shall apply to all street projects for which preliminary engineering design is begun after the effective date of this policy.

5. **Amenities.**

a. The Public Works Department shall consider opportunities to replenish groundwater, create attractive streetscapes, and provide pedestrian and bicycle accessibility when designing new development and redevelopment of streets and roadway projects.

b. The Planning and Economic Development Departments shall encourage developers to consider opportunities to replenish groundwater, create attractive streetscapes, and provide pedestrian and bicycle accessibility when designing newly constructed roadways.

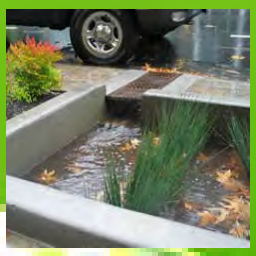
6. **Guidance.** The City of Bellflower shall use the USEPA's *Managing Wet Weather with Green Infrastructure Municipal Handbook: Green Streets*, or an equivalent guidance handbook or manual, for consideration and evaluation in public and private developments.

7. **Training.** The Public Works Department shall incorporate aspects of green streets into the annual MS4 Permit Public Agency Activities staff trainings for staff who participate in street design or approval of street design.

Approved: _____

Jeffrey L. Stewart
City Manager

Doc 281916



Managing Wet Weather with Green Infrastructure

Municipal Handbook

Green Streets

RB-AR6725

Managing Wet Weather with Green Infrastructure

Municipal Handbook

Green Streets

prepared by

Robb Lukes
Christopher Kloss
Low Impact Development Center

The Municipal Handbook is a series of documents
to help local officials implement green infrastructure in their communities.

December 2008

EPA-833-F-08-009

Front Cover Photos
Top: rain garden; permeable pavers; rain barrel; planter; tree boxes.
Large photo: green alley in Chicago

RB-AR6726

Green Streets

Introduction

By design and function, urban areas are covered with impervious surfaces: roofs, roads, sidewalks, and parking lots. Although all contribute to stormwater runoff, the effects and necessary mitigation of the various types of surfaces can vary significantly. Of these, roads and travel surfaces present perhaps the largest urban pollution sources and also one of the greatest opportunities for green infrastructure use.

The Federal Highway Administration (FHA) estimates that more than 20% of U.S. roads are in urban areas.[1] Urban roads, along with sidewalks and parking lots, are estimated to constitute almost two-thirds of the total impervious cover and contribute a similar ratio of runoff.[2] While a significant source of runoff, roads are also a part of the infrastructure system, conveying stormwater along gutters to inlets and the buried pipe network. Effective road drainage, translated as moving stormwater into the conveyance system quickly, has been a design priority while opportunities for enhanced environmental management have been overlooked especially in the urban environment.

Table 1. Examples of Stormwater Pollutants Typical of Roads.[3, 4]

Pollutant	Source	Effects
Trash	---	Physical damage to aquatic animals and fish, release of poisonous substances
Sediment/solids	Construction, unpaved areas	Increased turbidity, increased transport of soil bound pollutants, negative effects on aquatic organisms reproduction and function
Metals • Copper • Zinc • Lead • Arsenic	 • Vehicle brake pads • Vehicle tires, motor oil • Vehicle emissions and engines • Vehicle emissions, brake linings, automotive fluids	Toxic to aquatic organisms and can accumulate in sediments and fish tissues
Organics associated with petroleum (e.g., PAHs)	Vehicle emissions, automotive fluids, gas stations	Toxic to aquatic organisms
Nutrients	Vehicle emissions, atmospheric deposition	Promotes eutrophication and depleted dissolved oxygen concentrations

The altered flow regime from traditional roadways, increased runoff volume, more frequent runoff events, and high runoff peak flows, are damaging to the environment and a risk to property downstream. These erosive flows in receiving streams will cause down cutting and channel shifting in some places and excessive sedimentation in others. The unnatural flow regime destroys stream habitat and disrupts aquatic systems.

Compounding the deliberate rapid conveyance of stormwater, roads also are prime collection sites for pollutants. Because roads are a component of the stormwater conveyance system, are impacted by atmospheric deposition, and exposed to vehicles, they collect a wide suite of pollutants and deliver them into the conveyance system and ultimately receiving streams (See Table 1). The metals, combustion by-products, and automotive fluids from vehicles can present a toxic mix that combines with the ubiquitous nutrients, trash, and suspended solids.

While other impervious surfaces can be replaced, for example using green roofs to decrease the amount of impervious roof surface, for the most part, impervious roads will, for some time to come, constitute a significant percentage of urban imperviousness because of their current widespread existence. Reducing road widths and other strategies to limit the amount of impervious surface are critical, but truly addressing road runoff requires mitigating its effects.

Green Streets achieve multiple benefits, such as improved water quality and more livable communities, through the integration of stormwater treatment techniques which use natural processes and landscaping.

Roads present many opportunities for green infrastructure application. One principle of green infrastructure involves reducing and treating stormwater close to its source. Urban transportation right-of-ways integrated with green techniques are often called "green streets". Green streets provide a source control for a main contributor of stormwater runoff and pollutant load. In addition, green infrastructure approaches complement street facility upgrades, street aesthetic improvements, and urban tree canopy efforts that also make use of the right-of-way and allow it to achieve multiple goals and benefits. Using the right-of-way for treatment also links green with gray infrastructure by making use of the engineered conveyance of roads and providing connections to conveyance systems when needed.

Green streets are beneficial for new road construction and retrofits. They can provide substantial economic benefits when used in transportation applications. Billions of dollars are spent annually on road construction and rehabilitation, with a large percentage focused on rehabilitation especially in urban areas. Coordinating green infrastructure installation with broader transportation improvements can significantly reduce the marginal cost of stormwater management by including it within larger infrastructure improvements. Also, and not unimportantly, right-of-way installations allow for easy public maintenance. A large municipal concern regarding green infrastructure use is maintenance; using roads and right-of-ways as locations for green infrastructure not only addresses a significant pollutant source, but also alleviates access and maintenance concerns by using public space.

In urban areas, roads present many opportunities for coordinated green infrastructure use. Some municipalities are capitalizing on the benefits gained by introducing green infrastructure in transportation applications. This paper will evaluate programs and policies that have been used to successfully integrate green infrastructure into roads and right-of-ways.

Green Street Designs

Green streets can incorporate a wide variety of design elements including street trees, permeable pavements, bioretention, and swales. Although the design and appearance of green streets will vary, the functional goals are the same: provide source control of stormwater, limit its transport and pollutant conveyance to the collection system, restore predevelopment hydrology to the extent possible, and provide environmentally enhanced roads. Successful application of green techniques will encourage soil and vegetation contact and infiltration and retention of stormwater.

Alternative Street Designs (Street Widths)

A green street design begins before any BMPs are considered. When building a new street or streets, the layout and street network must be planned to respect the existing hydrologic functions of the land (preserve wetlands, buffers, high-permeability soils, etc.) and to minimize the impervious area. If retrofitting or redeveloping a street, opportunities to eliminate unnecessary impervious area should be explored.

Implementation Hurdles

Many urban and suburban streets, sized to meet code requirements for emergency service vehicles and provide a free flow of traffic, are oversized for their typical everyday functions. The Uniform Fire Code requires that streets have a *minimum 20 feet of unobstructed width;* a street with parking on both sides would require a width of at least 34 feet. In addition to stormwater concerns, wide streets have many detrimental implications on neighborhood livability, traffic conditions, and pedestrian safety.[5]

Oregon State Code Granting Authority for Street Standards to Local Government

ORS 92.044 - Local governments shall *supersede and prevail over any specifications and standards for roads and streets set forth in a uniform fire code adopted by the State Fire Marshal, a municipal fire department or a county firefighting agency*.... Local governments shall consider the needs of the fire department or fire-fighting agency when adopting the final specifications and standards.

The Transportation Growth and Management Program of Oregon, through a Stakeholder Design Team, developed a guide for reducing street widths titled the *Neighborhood Street Design Guidelines.*[6] The document provides a helpful framework for cities to conduct an inclusive review of street design profiles with the goal of reducing widths. Solutions for accommodating emergency vehicles while minimizing street widths are described in the document. They include alternative street parking configurations, vehicle pullout space, connected street networks, prohibiting parking near intersections, and smaller block lengths.

Figure 1. The street-side swale and adjacent porous concrete sidewalk are located in the High Point neighborhood of Seattle, WA
(Source: Abby Hall, US EPA).

In 1997, Oregon, which has adopted the *Uniform Fire Code,* specifically granted local government the authority to establish alternative street design standards but requires them to consult with fire departments before standards are adopted. Table 2 provides examples of alternative street widths allowed in U.S. jurisdictions.[7]

Swales

Swales are vegetated open channels designed to accept sheet flow runoff and convey it in broad shallow flow. The intent of swales is to reduce stormwater volume through infiltration, improve water quality through vegetative and soil filtration, and reduce flow velocity by increasing channel roughness. In the simple roadside grassed form, they have been a common historical component of road design. Additional benefit can be attained through more complex forms of swales, such as those with amended soils, bioretention soils, gravel storage areas, underdrains, weirs, and thick diverse vegetation.

Implementation Hurdles

There is a common misconception of open channel drainage being at the bottom of a street development hierarchy in which curb and gutter are at the top. Seattle's Street Edge Alternative Project and other natural drainage swale pilot projects have demonstrated that urban swales not only mitigate stormwater impacts, but they can also enhance the urban environment.[8]

Table 2. Examples of Alternative Street Widths

Jurisdiction	Street Width	Parking Condition
Phoenix, AZ	28'	parking both sides
Santa Rosa, CA	30'	parking both sides, <1000ADT
	26'-28'	parking one side
	20'	no parking
	20'	neck downs @ intersection
Orlando, FL	28'	parking both sides, res. Lots<55' wide
	22'	parking both sides, res. Lots>55' wide
Birmingham, MI	26'	parking both sides
	20'	parking one side
Howard County, MD	24'	parking unregulated
Kirkland, WA	12'	alley
	20'	parking one side
	24'	parking both sides – low density only
	28'	parking both sides
Madison, WI	27'	parking both sides, <3DU/AC
	28'	parking both sides, 3-10 DU/AC

ADT: Average Daily Traffic DU/AC: dwelling units per acre

Bioretention Curb Extensions and Sidewalk Planters

Bioretention is a versatile green street strategy. Bioretention features can be tree boxes taking runoff from the street, indistinguishable from conventional tree boxes. Bioretention features can also be attractive attention grabbing planter boxes or curb extensions. Many natural processes occur within bioretention cells: infiltration and storage reduces runoff volumes and attenuates peak flows; biological and chemical reactions occur in the mulch, soil matrix, and root zone; and stormwater is filtered through vegetation and soil.

Figure 2. This bioretention area takes runoff from the street through a trench drain in the sidewalk as well as runoff from the sidewalk through curb cuts
(Source: Abby Hall, US EPA).

Implementation Hurdles

A few municipal DOT programs have instituted green street requirements in roadway projects, but as of yet, specifications for street bioretention have not yet been incorporated into municipal DOT specifications. Many cities do have street bioretention pilot projects; two of the well documented programs are noted in the table. Several concerns and considerations have prevented standard implementation of bioretention by DOTs.

Table 3. Municipalities with Swale Specifications and Standard Details

Municipality	Document	Section Title	Section #
City of Austin[9]	Standard Specifications and Standard Details	Grass-Lined Swale and Grass-Lined Swale with Stone Center	627S
City of Seattle[10]	2008 Standard Specifications for Municipal Construction	Natural Drainage Systems	7-21

Table 4. Municipalities with Bioretention Pilot Projects in the Right-of-Way

Municipality	Bioretention Type	Document
Maplewood, MN	Rain gardens	*Implementing Rainwater in Urban Stormwater Management* [11]
Portland, OR	• Curb extensions • Planters • Rain gardens	*2006 Stormwater Management Facility Monitoring Report* [12]

The diversity of shapes, sizes, and layouts bioretention can take is a significant obstacle to their incorporation with DOT specifications and standards. Street configurations, topography, soil conditions, and space availability are some of the factors that will influence the design of the bioretention facility. These variables make documentation of each new bioretention project all the more important. By building a menu of templates from local bioretention projects, future projects with similar conditions will be easier to implement and cost less to design. The documentation should include copies of the details and specifications for the materials used. A section on construction and operation issues, costs, lessons learned, and recommendations for similar designs should also be included in project documentation. Portland's Bureau of Environmental Services has proven adept at documenting each of its Green Streets projects and making them accessible online.[13]

Utilities are a chief constraint to implementing bioretention as a retrofit in urban areas. The Prince George's County, MD Bioretention Design Specifications and Criteria manual recommends applying the same clearance criteria recommended for storm drainage pipes.[14] Municipal design standards should specify the appropriate clearance from bioretention or allowable traversing.

Prince George's County, MD - 2.12.1.16 Utility Clearance

Utility clearances that apply to storm drainage pipe and structure placement also apply to bioretention. Standard utility clearances for storm drainage pipes have been established at 1' vertical and 5' horizontal. However, bioretention systems are shallow, non-structural IMP's consisting of mostly plant and soil components, (often) with a flexible underdrain discharge pipe. For this reason, other utilities may traverse a bioretention facility without adverse impact. Conduits and other utility lines may cross through the facility but construction and maintenance operations must include safeguard provisions. In some instances, bioretention could be utilized where utility conflicts would make structural BMP applications impractical.

Plants are another common concern of municipal staff, whether it is maintenance, salt tolerance, or plant height with regard to safety and security. Cities actively implementing LID practices in public spaces maintain lists of plants which fit the vegetated stormwater management practice niche. These are plants that flourish in the regional climate conditions, are adapted to periodic flooding, are low maintenance, and, if in cold climates, salt tolerant. Most often these plants are natives, but sometimes an approved non-native will best fit necessary criteria. A municipal plant list should be periodically updated based on maintenance experience, and vegetation health surveys.

Permeable Pavement

Permeable pavement comes in four forms: permeable concrete, permeable asphalt, permeable interlocking concrete pavers, and grid pavers. Permeable concrete and asphalt are similar to their impervious counterparts but are open graded or have reduced fines and typically have a special binder added. Methods for pouring, setting, and curing these permeable pavements also differ from the impervious versions. The concrete and grid pavers are modular systems. Concrete pavers are installed with gaps between them that allow water to pass through to the base. Grid pavers are typically a durable plastic matrix that can be filled with gravel or vegetation. All of the permeable pavement systems have an aggregate base in common which provides structural support, runoff storage, and pollutant removal through filtering and adsorption. Aside from a rougher unfinished surface, permeable concrete and asphalt look very similar to their impervious versions. Permeable concrete and asphalt and certain permeable concrete pavers are ADA compliant.

Implementation Hurdles

Of all the green streets practices, municipal DOTs have been arguably most cautious about implementing permeable pavements, though it should be noted that some DOTs have, for decades, specified open-graded asphalt for low use roadways because of lower cost; to minimize vehicle hydroplaning; and to reduce road noise. The reticence to implement on a large-scale, however, is understandable given the lack of predictability and experience behind impervious pavements. However, improved technology, new and ongoing research, and a growing number of pilot projects are dispelling common myths about permeable pavements.

Figure 3. Pervious pavers used in the roadway of a neighborhood development in Wilsonville, OR
(Source: Abby Hall, US EPA).

The greatest concern among DOT staff seems to be a perceived lack of long-term performance and maintenance data. Universities and DOTs began experimenting with permeable pavements in parking lots, maintenance yards, and pedestrian areas as early as twenty years ago in the U.S., even earlier in Europe. There is now a wealth of data on permeable pavements successfully used for these purposes in nearly every climate region of the country. In recent years, the cities of Portland, OR, Seattle, WA, and Waterford, CT and several private developments have constructed permeable pavement pilots within the roadway with positive results.

Permeable pavement concerns in the roadway often raise concerns of safety, maintenance, and durability. Municipalities can replace impervious surfaces in other non-critical areas such as sidewalks, alleys, and municipal parking lots. These types of applications help municipalities build experience and a market for the technology.

The two typical maintenance activities are periodic sweeping and vacuuming. The City of Olympia, WA has experimented with several methods of clearing debris from permeable concrete sidewalks. Each of the methods was evaluated on the ease of use, debris removal, and the performance pace. The cost analysis by Olympia, WA found that the maintenance cost for pervious pavement was still lower than the traditional pavement when the cost of stormwater management was considered.

Table 5. Municipalities with Permeable Pavement Specifications and Standard Details

Municipality	Document	Section Title	Section #
Portland	2007 Standard Construction Specifications	Unit Pavers (includes permeable pavers)	00760
Olympia	WSDOT Specification	Pervious Concrete Sidewalks	8-30

Freeze/thaw and snow plows are the major concerns for permeable pavements in cold climate communities. However, these concerns have proven to be generally unwarranted when appropriate design and maintenance practices are employed. A well designed permeable pavement structure will always drain and never freeze solid. The air voids in the pavement allow plenty of space for moisture to freeze and ice crystals to expand. Also, rapid drainage through the pavement eliminates the occurrence of freezing puddles and black ice. Cold climate municipalities will need to make adjustments to snow plowing and deicing programs for permeable pavement areas. Snow plow blades must be raised enough to prevent scraping the surface of permeable pavements, particularly paver systems. Also, sand should not be applied.

Table 6. A Study in Olympia, WA Comparison of the cost of permeable concrete sidewalks to the cost of traditional impervious sidewalks[15]

Traditional Concrete Sidewalk		Permeable Concrete Sidewalk	
Construction Cost	Maintenance Cost	Construction Cost	Maintenance Cost
$5,003,000*	$156,000	$2,615,000*	$147,000
Total = $5,159,000 $101.16 per square yard		Total = $2,762,000 $54.16 per square yard	

*The cost of stormwater management (stormwater pond) for the added impervious surface is factored into the significantly higher cost of constructing the traditional concrete sidewalk. Maintenance of the stormwater pond is also factored into the traditional concrete sidewalk maintenance cost.

Sidewalk trees and tree boxes

From reducing the urban heat island effect and reducing stormwater runoff to improving the urban aesthetic and improving air quality, much is expected of street trees. Street trees are even good for the economy. Customers spend 12% more in shops on streets lined with trees than on those without trees.[16] However, most often street trees are given very little space to grow in often inhospitable environments. The soil around street trees often becomes compacted during the construction of paved surfaces and minimized as underground utilities encroach on root space. If tree roots are surrounded by compacted soils or are deprived of air and water by impervious streets and sidewalks, their growth will be stunted, their health will decline, and their expected life span will be cut short. By providing adequate soil volume and a good soil mixture, the benefits obtained from a street tree multiply. To obtain a healthy soil volume, trees can simply be provided larger tree boxes, or structural soils, root paths, or "silva cells" can be used under sidewalks or other paved areas to expand root zones. These allow tree roots the space they need to grow to full size. This increases the health of the tree and provides the benefits of a mature sized tree, such as shade and air quality benefits, sooner than a tree with confined root space.

Figure 4. Trees planted at the same time but with different soil volumes, Washington DC
(Source: Casey Trees)

Table 7. Healthy Tree Volume and Permeable Pavement Specifications and Standard Details

Jurisdictions	Minimum Soil Volume		Section Title	Section #
Prince William County, VA	Large tree Medium tree Small tree	970 cf 750 cf 500 cf	Design Construction Manual (Sec 800)	Table 8-8
Alexandria, VA		300 cf	Landscape Guidelines	II.B. (2)

Implementation Hurdles

Providing an adequate root volume for trees comes down to a trade off between space in the right-of-way and added construction costs. The least expensive way to obtain the volume needed for roots to grow to full size is providing adequate space unhindered by utilities or other encroachments. However, it is often hard to reserve space dedicated just to street trees in an urban right-of-way with so many other uses competing for the room they need. As a result, some creative solutions, though they cost more to install, have become useful alternatives in crowded subsurface space. Structural soils, root paths, and "silva cells" leave void space for roots and still allow sidewalks to be constructed near trees.

Root Paths can be used to increase tree root volume by connecting a small tree root volume with a larger subsurface volume nearby. A tunnel-like system extends from the tree underneath a sidewalk and connects to an open space on the other side.

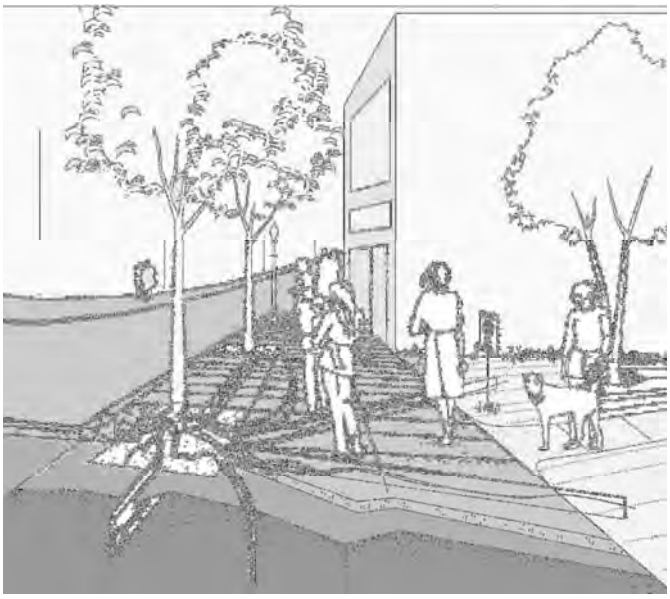


Figure 5. Root Paths direct tree roots under paving and into better soil areas for tree root growth
(Source: Arlington County, VA).

Silva Cells[17] are another option for supporting sidewalks near trees while still providing enough space for roots to grow. These plastic milk crate-like frames fit together and act as a supporting structure for a sidewalk while leaving room for uncompacted soil and roots inside the frame.

Permeable pavement sidewalks are another enhancement to the root space. They provide moisture and air to roots under sidewalks. Soils under permeable pavements can still become compacted. Structural soils[18] are a good companion tree planting practice to permeable pavement. When planting a tree in structural soils an adequate tree root volume is excavated and filled with a mix of stone and soil that still provides void space for healthy roots and allows for sidewalks, plazas or other paved surfaces to be constructed over them.

Case Studies

Portland, OR: Green Street Pilot Projects

Portland, Oregon is a national leader in developing green infrastructure. Portland's innovation in stormwater management was necessitated by the need to satisfy a Combined Sewer Overflow consent decree, Safe Drinking Water Act requirements, impending Total Maximum Daily Load limitations, Superfund cleanup measures and basement flooding. Through the 1990s, over 3 billion gallons of combined sewer overflow discharged to the Willamette River every year.[19] All of these factors plus leadership and local desires to create green solutions and industries compelled the city to implement green infrastructure as a complement to adding capacity to the sewer system with large pipe overflow interceptors. Despite gaps in long-term performance data, Portland took a proactive approach in implementing green infrastructure pilot projects.

Portland's green infrastructure pilot projects have their roots in the city's 2001 Sustainable Infrastructure Committee. The committee, consisting of representatives from Portland's three infrastructure management Bureaus, documented the city's ongoing efforts toward sustainable infrastructure, gathered research on green infrastructure projects from around the country, and identified opportunities for local pilots.[20, 21, 22]

Figure 6. Silva cell structures support the sidewalk while providing root space for street trees
(Source: Deep Root Partners, LP).

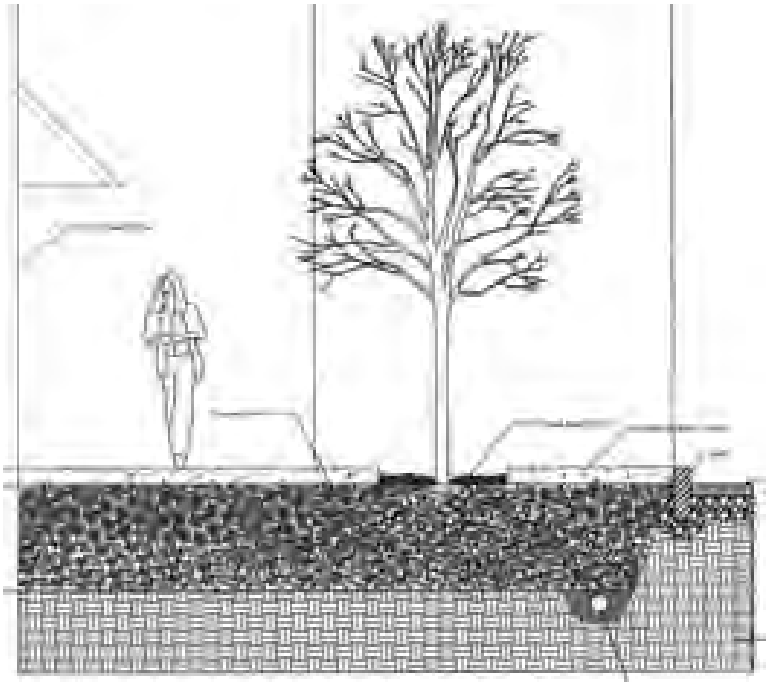


Figure 7. Structural soils provide void space for root growth and load-bearing for sidewalk
(Source: Urban Horticulture Institute, Cornell University).

One of the Bureau of Environmental Services' (BES) earliest green infrastructure retrofit projects within the right-of-way was a set of two stormwater curb extensions on NE Siskiyou Street. Portland had been retrofitting many streets with curb extensions for the purpose of pedestrian safety, but this was the first done for the purpose of treating street runoff. In a simulated 25-year storm event flow test, the curb extensions captured 85% of the runoff volume that would be discharged to the combined sewer system and reduced peak flow by 88%.[23]

Between 2003 and 2007, Portland designed and implemented a variety of Green Street pilots. Funding sources for these projects have come from BES, Portland Department of Transportation, U.S. EPA, and an Innovative Wet Weather Fund. BES combined funds with an EPA grant to create the Innovative Wet Weather Fund. In 2004, nearly $3 million from the Innovative Wet Weather Fund was budgeted for a long list of projects from city green roofs, public-private projects, and a number of pilot projects within the right-of-way.[24] Several pilots have been cost competitive with or less costly than conventional upgrades. The Bureau recognizes that costs will decrease once these projects become more routine. Many of the pilot project costs included one time costs such as the development of outreach materials and standard drawings.

Figure 8: NE Siskiyou Vegetated Curb Extensions
Source: City of Portland – Bureau of Environmental Services

Table 8. Portland, OR - Green Street Pilot Projects

Location	Design	Year Completed	Cost
NE Siskiyou b/w NE 35th Pl. and NE 36th Ave	Stormwater curb extension	2003	$20,000
3 blocks of the Westmoreland Neighborhood	Permeable Pavers in parking lanes and curb to curb	2004	$412,000
SE Ankeny b/w SE 56th and SE 57th Ave.	Stormwater curb extensions	2004	$11,946
NE Fremont b/w NE 131st and 132nd Av	Stormwater curb extension	2005	$20,400
SW 12th Ave b/w SW Montgomery and Mill	Stormwater planters	2005	$34,850
East Holladay Park	Pervious paver parking lot	2005	$165,000
4 blocks of North Gay Avenue b/w N Wygant and N Sumner	Porous concrete in curb lanes and curb to curb; porous asphalt in curb lanes and curb to curb	2005	--
SW Texas	Stormwater wetlands and swales	2007	$2.3 million
Division St. – New Seasons Market	Stormwater planters and swales	--	--
SE Tibbetts and SE 21st Ave.	Stormwater curb extension and planters	--	--

Source: Portland Bureau of Environmental Services, 2008
http://www.portlandonline.com/bes/index.cfm?c=44463&

Each of the pilot projects have been well documented by BES. A consistent format has been used to describe pilot background, features, engineering design, landscaping, project costs, maintenance, monitoring, and, most importantly, lessons learned. These case studies as well as other Green Street documentation can be found on BES's Sustainable Stormwater webpage, http://www.portlandonline.com/BES/index.cfm?c=34598. Due to physical factors (drainage, slope, soil, existing utilities, multiple uses) and development factors (retrofit, redevelopment, and new construction), there will be many variations on Green Streets. As part of the program, a continually updated Green Street Profile Notebook will catalog the successful green street projects. Users can use the Notebook for permitting guidance, to identify green streets facilities appropriate for various factors, but the document is not a technical document with standard details.

The Green Streets Team

The City of Portland, OR is widely acknowledged for long term, forward thinking, and comprehensive transportation and environmental planning. Portland recognized the fact that 66% of the City's total runoff is collected from streets and the right-of-way.[25] The city also saw the potential for transportation corridors to meet multiple objectives, including:

- Comprehensively address numerous City goals for neighborhood livability, sustainable development, increased green spaces, stormwater management, and groundwater protection;
- Integrate infrastructure functions by creating "linear parks" along streets that provide both pedestrian/bike areas and stormwater management;
- Avoid the key impacts of unmanaged stormwater whereby surface waterbodies are degraded, and water quality suffers;
- Manage stormwater with investments citizens can support, participate in, and see;
- Manage stormwater as a resource, rather than a waste;
- Protect pipe infrastructure investments (extend the life of pipe infrastructure, limit the additional demand on the combined sewer system as development occurs);
- Protect wellhead areas by managing stormwater on the surface; and
- Provide increased neighborhood amenities and value.

In a two phased process from 2005 to 2007, the Green Streets Team, a cross agency and interdisciplinary team, developed a comprehensive green streets policy and a way forward for the green streets agenda. Phase 1 identified challenges and issues and began a process for addressing them. Barriers to the public initiation of green street projects included a code and standards that would disallow or discourage green street strategies, long term performance unknowns, and maintenance responsibilities. To address these barriers, the Green Streets Team organized into subgroups focusing on outreach, technical guidance, infrastructure, maintenance, and resources.

Phase 2 of the Green Streets project synthesized the opportunities and solutions identified in Phase 1 into a citywide Green Streets Program. The first priority for this phase was the drafting of a binding citywide policy. The resolution was adopted by the Portland City Council in March 2007.

Prior to the start of the Portland effort, 90% of implemented green street projects were issued by private permits rather than city initiated projects.

Six Approaches to Implementing Green Streets	
Pathway	**Implementation**
City-initiated street improvement projects	City designs, manages, maintains
City-initiated stormwater retrofits	City designs, manages, maintains
Neighborhood-initiated LIDs	
Developer-initiated subdivisions with public streets	Developer designs and builds via City permit and review process, then turns over new right of way to the City after warranty period
Developer-initiated subdivisions with private streets	Developer designs and builds via City permit and review process, and turns over to home-owner association
Developer-related initiated frontage improvements on existing public streets	Developer designs and builds new sidewalks and curbs via City permit and review process, usually because the City required it via a building permit or via a land division

Source: Portland Green Streets, Phase 1

Portland City Council Approved Green Streets Policy

Goal: City of Portland will promote and incorporate the use of green street facilities in public and private development.

City elected officials and staff will:

1. Infrastructure Projects in the Right of Way:

   a. Incorporate green street facilities into all City of Portland funded development, redevelopment or enhancement projects as required by the City's September 2004 (or updated) Stormwater Management Manual. Maintain these facilities according to the May 2006 (or updated) Green Streets Maintenance Policy.

      If a green street facility (infiltrating or flow through) is not incorporated into the Infrastructure Project, or only partial management is achieved, then an off site project or off site management fee will be required.

   b. Any City of Portland funded development, redevelopment or enhancement project, that does not trigger the Stormwater Manual but requires a street opening permit or occurs in the right of way, shall pay into a "% for Green" Street fund. The amount shall be 1% of the construction costs for the project.
      Exceptions: Emergency maintenance and repair projects, repair and replacement of sidewalks and driveways, pedestrian and trail replacement, tree planting, utility pole installation, street light poles, traffic, signal poles, traffic control signs, fire hydrants, where this use of funds would violate contracted or legal restrictions.

2. Project Planning and Design:

   a. Foster communication and coordination among City Bureaus to encourage consideration of watershed health and improved water quality through use of green street facilities as part of planning and design of Bureau projects.
   b. Coordinate Bureau work programs and projects to implement Green Streets as an integrated aspect of City infrastructure.
   c. Plan for large-scale use of Green Streets as a means of better connecting neighborhoods, better use of the right of way, and enhancing neighborhood livability.
   d. Strive to develop new and innovative means to cost-effectively construct new green street facilities.
   e. Develop standards and incentives (such as financial and technical resources, or facilitated permit review) for Green Streets projects that can be permitted and implemented by the private sector. These standards and incentives should be designed to encourage incorporation of green street facilities into private development, redevelopment and enhancement projects.

3. Project and Program Funding:

   a. Seek opportunities to leverage the work and associated funding of projects in the same geographic areas across Bureaus to create Green Street opportunities.
   b. Develop a predictable and sustainable means of funding implementation and maintenance of Green Street projects.

4. Outreach:

   a. Educate citizens, businesses, and the development community/industry about Green Streets and how they can serve as urban greenways to enhance, improve, and connect neighborhoods to encourage their support, demand and funding for these projects.
   b. Establish standard maintenance techniques and monitoring protocols for green street facilities across bureaus, and across groups within bureaus.

5. Project Evaluation:

   a. Conduct ongoing monitoring of green street facilities to evaluate facility effectiveness as well as performance in meeting multiple City objectives for:
      - Gallons managed;
      - Projects distributed geographically by watershed and by neighborhood; and

The second priority for Phase 2 was developing communication and planning procedures for incorporating multi-bureaus plans into the scheduled Portland DOT Capital Improvement Program (CIP). Three timeframes for green street project planning were recommended. In the short term, the CIP Planning Group, backed by the citywide policy directive, will shift to a focus on "identifying and evaluating opportunities to partner." For example, coordinating Water Bureau and BES pipe replacement

projects with DOT maintenance, repair, and improvement projects. The mid-term approach is more proactive and involves forecasting potential green street projects using existing bureau data and GIS tools. As for the long term, green street objectives will be incorporated into the citywide systems plan which guides city bureaus for the next 20 years.

The Green Street Team methodology propelled Portland's early green street pilot projects into a comprehensive, citywide multi-bureau program. The program built on previous efforts by the Sustainable Infrastructure Committee as well as other efforts such as the 2005 Portland Watershed Management Plan, established a City Council mandated policy, and institutionalized green street development. The outcome of this approach is multi-agency buy-in and responsibility for the effort. For instance, because of their knowledge of plant maintenance, Portland Parks and Recreation is responsible for the maintenance of some DOT installations.

Chicago, IL: Green Alleys Program

The City of Chicago, Illinois has an alley system that is perhaps the largest in the world. These 13,000 publicly owned alleys result in 1,900 miles, or 3,500 acres, of impermeable surfaces in addition to the street network. Because the alley system was not originally paved, there are no sewer connections as part of the original design. Over time the alleys were paved and flooding in garages and basements began to occur as a result of unmanaged stormwater runoff. Since the city already spends $50 million each year to clean and upgrade 4,400 miles of sewer lines and 340,000 related structures, the preferred solution to the flooded alleys is one that doesn't put more stress on an already overburdened and expensive sewer system.[26]

In 2003, the Chicago Department of Transportation (CDOT) used permeable pavers and French drain pilot applications to remedy localized flooding problems in alleys in the 48th Ward.[27] These applications proved to be successful and by 2006, CDOT launched its Green Alley Program with the release of the Chicago Green Alley Handbook (Handbook).[28]

The Chicago Green Alley Program is unique because it marries green infrastructure practices in the public right-of-way with green infrastructure efforts on private property. The user-friendly Handbook, which describes both facets of the program including the design techniques and their benefits, is an award winning document. The American Society of Landscape Architects awarded the creators of the Handbook the 2007 Communications Honor Award for the clear graphics and simple, yet effective, message.[29] The Handbook explains to the residents why green infrastructure is important, how to be good stewards of the Green Alley in their neighborhood, and what sorts of "green" practices they can implement on their property to reduce waste, save water, and help manage stormwater wisely.

While the initial impetus behind the Green Alley Program was stormwater management, Chicago decided to use this opportunity to address other environmental concerns as well as reducing the urban heat island effect, recycling, energy conservation, and light pollution.

Green Infrastructure in the Right-of-Way

Chicago's Green Alley Program uses the following five techniques in the public right-of-way to "green" the alley:

1. Changing the grade of the alley to drain to the street rather than pond water in the alley or drain toward garages or private property.

2. Using permeable pavement that allows water to percolate into the ground rather than pond on the surface.

3. Using light colored paving material that reflects sunlight rather than adsorbing it, reducing urban heat island effect.

4. Incorporating recycled materials into the pavement mix to reduce the need for virgin materials and reduce the amount of waste going into the landfill.

5. Using energy efficient light fixtures that focus light downward, reducing light pollution.

Figure 9: Permeable Asphalt Installation Using Ground Tire Rubber.
Source: Chicago Department of Transportation, Sustainable Development Initiatives; Streetscape and Urban Design Program, CDOT Division of Project Development.

Four design approaches were created using these techniques. Based on the local conditions, the most appropriate approach is selected. In areas where soils are well-draining, permeable pavement is used. In areas where buildings come right up to the edge of pavement and infiltrated water could threaten foundations, impermeable pavement strips are used on the outside with a permeable pavement strip down the middle. In areas where soils do not provide much infiltration capacity, the alley is regraded to drain properly and impermeable pavement made with recycled materials is used. Another approach utilizes an infiltration trench down the middle of the alley. Light colored (high albedo) pavement, recycled materials, and energy efficient, glare reducing lights are a part of each design approach.

Green Infrastructure on Private Property
The Handbook also describes actions that property owners can take to "green" their own piece of Chicago. The Handbook describes the costs, benefits, and utility of the following practices:

- Recycling;
- Composting;
- Planting a tree;
- Using native landscape vegetation;
- Constructing a rain garden;
- Installing a rain barrel;
- Using permeable pavement for patios;
- Installing energy efficient lighting; and
- Utilizing natural detention.

By bringing this wide range of "green" practices to the attention of homeowners, the positive impacts of the Green Alley Program spread beyond the boundaries of the right-of-way, increasing awareness and providing practical resources to help community members be a part of the solution.

Chicago Green Alley Cost Considerations
When the program began in 2006, repaving the alleys with impermeable pavement ranged in cost from $120,000 to $150,000, whereas a total Green Alley reconstruction was more along the lines of $200,000 to $250,000.[30] While less expensive conventional rehabilitation options may seem more attractive, they don't provide a solution to the localized flooding issues or the combined sewer system overflow problems. Sewer system connections could be established to solve the localized flooding problem, but it would add to the already overburdened sewer system and increase the cost of the reconstruction to that of the impermeable alley option. Consequently, the higher priced Green Alley option proved to be the best investment as it has multiple benefits in addition to solving localized flooding and reducing flow into the combined sewer system. The additional benefits of the Green Alley Program include not only urban heat

island effect reduction, material recycling, energy conservation, and light pollution reduction, but also the creation of a new market.

In 2006, when the Green Alley Program began, the city paid about $145 per cubic yard of permeable concrete. Just one year later, the cost of permeable concrete had dropped to only $45 per cubic yard. Compared with the cost of ordinary concrete, $50 per cubic yard, permeable concrete may have seemed like an infeasible option in the past to customers wanting to purchase concrete.[31] After the city's initial investment in the local permeable concrete market, the product cost has come down making permeable concrete a more affordable option for other consumers besides the city. This has resulted in an increased application of permeable concrete throughout the region.

Figure 10: Permeable Pavers and Permeable Concrete Chicago Alleys
(Source: Abby Hall, US EPA)

The success of the Chicago Green Alley Program is evident. Not only are the alleys been "greened" as a result of the program, the surrounding properties and even the surrounding neighborhoods are experiencing the positive impacts of the program's implementation.

Conclusions and Recommendations

Incorporating green streets as a feature of urban stormwater management requires matching road function with environmental performance. Enhancing roads with green elements can improve their primary function as a transportation corridor while simultaneously mitigating their negative environmental impacts. In theory and practice many municipalities are not far removed from dedicated green streets programs. Street tree and other greenscaping programs are often identified and promoted along urban transportation corridors. Adapting them to become fully functional green streets requires minor design modifications and an evaluation of how to maximize the benefits of environmental systems.

Portland's green streets program demonstrates how common road and right-of-way elements (e.g., traffic calming curb extensions, tree boxes) can be modified and optimized to provide stormwater management in addition to other benefits. The curb cuts and design variations to allow runoff to enter the vegetated areas are subtle changes with a significant impact and demonstrate how stormwater can be managed successfully at the source. One of the biggest successes of the program was reassessing common design features and realizing that environmental performance can be improved by integrating stormwater management.

Where Portland used vegetation, Chicago's Green Alley Program similarly demonstrates that hardscape elements can be an integral part of a greening program. By incorporating permeable pavements that simulate natural infiltration, Chicago enhances the necessary transportation function of alleys while enhancing infrastructure and environmental management. Portland also contrasts the "soft" and "hard"

elements of green streets by using both permeable pavements and vegetated elements. The green options available demonstrate the flexibility of green infrastructure to satisfy road function and environmental objectives and highlight why transportation corridors are well suited for green infrastructure.

Elements necessary for a successful green streets program:

- **Pilot projects are critical.** The most successful municipal green street programs to date all began with well documented and monitored pilot projects. These projects have often been at least partially grant funded and receive the participation of locally active watershed groups working with the city infrastructure programs. The pilot projects are necessary to demonstrate that green streets can work in the local environment, can be relied upon, and fit with existing infrastructure. Pilot projects will help to dispel myths and resolve concerns.
- **Leadership in sustainability from the top.** The cities with the strongest green streets programs are those with mayors and city councils that have fully bought into sustainable infrastructure. Council passed green policies and mayoral sustainability mandates or mission statements are needed to institutionalize green street approaches and bring it beyond the token green project.
- **Buy-in from all municipal infrastructure departments.** By their nature, green streets cross many municipal programs. Green street practices impact stormwater management, street design, underground utilities, public lighting, green space planning, public work maintenance, and budgeting. When developing green streets, all of the relevant agencies must be represented. Also, coordination between the agencies on project planning is important for keeping green infrastructure construction costs low. Superior green street design at less cost occurs when sewer and water line replacement projects can be done in tandem with street redevelopment. These types of coordination efforts must happen at the long-term planning stage.
- **Documentation.** Green street projects need to be documented on two levels, the design and construction level and on a citywide tracking level. Due to the different street types and siting conditions, green street designs will take on many variations. By documenting the costs, construction, and design, the costs of similar future projects can be minimized and construction or design problems can be avoided or addressed. Tracking green street practices across the city is crucial for managing maintenance and quantifying aggregate benefits.
- **Public outreach.** Traditional pollution prevention outreach goes hand in hand with green street programs. Properly disposing of litter, yard waste, and hazardous chemicals and appropriately applying yard chemicals will help prolong the life of green street practices. An information campaign should also give the public an understanding of how green infrastructure works and the benefits and trade offs. In many cases, remedial maintenance of green street practices will be performed by neighboring property owners; they need to know how to maintain the practices to keep them performing optimally.

As public spaces, roads are prime candidates for green infrastructure improvements. In addition to enabling legislation, and technical guidance, developing a green streets program requires an institutional re-evaluation of how right-of-ways are most effectively managed. This process typically includes:

- Assessing the necessary function of the road and selecting the minimum required street width to reduce impervious cover;
- Enhancing streetscaping elements to manage stormwater and exploring opportunities to integrate stormwater management into roadway design; and
- Integrating transportation and environmental planning to capitalize on economic benefits.

The use of green streets offers the capability of transforming a significant stormwater and pollutant source into an innovative treatment system. Green streets optimize the performance of public space easing maintenance concerns and allowing municipalities to coordinate the progression and implementation of stormwater control efforts. In addition, green streets optimize the performance of both the transportation and water infrastructure. Effectively incorporating green techniques into the transportation network provides significant opportunity to decrease infrastructure demands and pollutant transport.

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ATTACHMENT D:

CITY OF CERRITOS LETTER OF INTENT AND RELATED MATERIALS

ATTACHMENT D.1:

CITY OF CERRITOS JUNE 27, 2013 LETTER OF INTENT

CITY OF CERRITOS

CIVIC CENTER • 18125 BLOOMFIELD AVENUE
P.O. BOX 3130 • CERRITOS, CALIFORNIA 90703-3130
PHONE: (562) 916-1301 • FAX: (562) 468-1095
WWW.CERRITOS.US

Cerritos All-America City 2008

OFFICE OF THE CITY MANAGER
ART GALLUCCI

June 27, 2013

Samuel Unger, Executive Officer
Los Angeles Regional Water Quality Control Board
320 West Fourth Street, Suite 200
Los Angeles, California 90013

LETTER OF INTENT TO PARTICIPATE IN THE DEVELOPMENT OF A WATERSHED MANAGEMENT PROGRAM (WMP) AND COORDINATED INTEGRATED MONITORING PROGRAM (CIMP) IN COOPERATION WITH THE LOS CERRITOS CHANNEL WATERSHED GROUP

Dear Mr. Unger:

The City of Cerritos has voluntarily joined the Los Cerritos Channel Watershed Group in the development of a Watershed Management Program (WMP) and Coordinated Integrated Monitoring Program (CIMP) for the Los Cerritos Channel Watershed. While the City's continued participation in the Los Cerritos Channel Watershed Group is contingent upon the City Council's approval of a Memorandum of Understanding (MOU), the City will comply with the requirements of Order No. R4-2012-0175 (MS4 Permit). The Los Cerritos Channel Watershed Group is comprised of the following permittees: Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, Signal Hill as well as the Los Angeles County Flood Control District and Caltrans.

The City of Cerritos complied with Part VI.C.4.c.i and Part VI.C.4.c.i (2) through submission of a Notice of Intent letter dated December 21, 2012 (attached). We are complying with Part VI.C.4.c.i (2) by attaching our draft Green Streets Policy and our draft LID Ordinance. These documents will be presented to the Cerritos City Council for consideration at an upcoming meeting.

While maintaining the 18-month schedule for development of the WMP, the Los Cerritos Channel Watershed Group intends to continue to evaluate and consider the Enhanced-WMP (EWMP) option. If the group decides to develop an EWMP prior to the December 28, 2013 deadline, your office will be notified in a separate letter prior to any such change.

The City of Cerritos signed a Memorandum of Agreement (MOA) with the Los Angeles Gateway Regional Water Management Joint Powers Authority for the administration and cost sharing resulting from preparation of the Los Cerritos Channel Metals Total Maximum Daily Load Implementation Plan, Monitoring Program and Special Studies in 2010 (attached). This MOA has been used to begin preparation of a Watershed Management Program, but it will soon be replaced with a MOU for development of a WMP or Enhanced WMP (EWMP) and Coordinated Integrated Monitoring Program (CIMP).

The City recognizes that while maintaining the 18-month schedule for development of the WMP, the Los Cerritos Watershed Group intends to continue to evaluate and consider the EWMP option. If the group decides prior to the December 28, 2013 deadline to develop an EWMP, your office will be notified in a separate letter.

The City of Cerritos has developed a draft Green Streets Policy and draft Low Impact Development (LID) Ordinance. These documents will be presented to the Cerritos City Council, along with the Memorandum of Understanding with the Los Cerritos Channel Watershed Group for consideration at an upcoming meeting.

If you have any questions, please contact the City's Environmental Services Manager, Mike O'Grady, at (562) 916-1226.

Sincerely,

Art Gallucci
City Manager

ATTACHMENT D.2:

CITY OF CERRITOS

DECEMBER 21, 2012 NOTICE

OF INTENT

CITY OF CERRITOS

CIVIC CENTER · 18125 BLOOMFIELD AVENUE
P.O. BOX 3130 · CERRITOS, CALIFORNIA 90703-3130
PHONE: (562) 916-1301 · FAX: (562) 468-1095
WWW.CI.CERRITOS.CA.US

OFFICE OF THE CITY MANAGER
ART GALLUCCI

December 21, 2012

Mr. Sam Unger
Executive Officer
Los Angeles Regional Water Quality Control Board
320 W. 4th Street
Los Angeles, CA 90013

RE: NOTIFICATION OF INTENT TO PARTICIPATE IN DEVELOPMENT OF A WATERSHED MANAGEMENT PROGRAM FOR THE LOS CERRITOS CHANNEL WATERSHED

Dear Mr. Unger:

The City of Cerritos hereby notifies the Regional Water Board of our intent to participate in development of a Watershed Management Program (WMP) for the portion of the City within the Los Cerritos Channel Watershed. We have participated with the other cities for the last few years on the Technical Committee for the Los Cerritos Channel Metals TMDL (see attached map for portions of cities within Los Cerritos Channel Watershed). The Technical Committee has determined that we should begin immediately on development of a Watershed Management Program pursuant to Part VI.C of the recently adopted *NPDES Permit CAS004001 for Municipal Separate Storm Sewer System (MS4) Discharges within the Coastal Watersheds of Los Angeles County, Except Those Discharges Originating from the City of Long Beach*.

Since we are already organized and have a revenue source through Memoranda of Agreement that the Cities have entered into with the Gateway Water Management Authority, the Technical Committee does not want to waste several months deciding which Watershed Management Program or Enhanced Watershed Management Program (EWMP) option to choose. Rather, we and the other participating cities would prefer to start immediately on a standard WMP with a December 28, 2013 due date and concurrently investigate other options.

If within six months of the effective date of the permit we are able to demonstrate that LID ordinances and green street policies were either in effect or under development within 60 days of the effective date of the permit and that draft LID ordinances and draft green street policies are in place in greater than 50% of the watershed, we intend to request a completion date of June 28, 2014 for our Watershed Management Program in order to gather more information and further strengthen the Program. In addition, during the initial months after the effective date of the permit, the Technical Committee intends to investigate the potential application of an EWMP for the Los Cerritos Watershed. Prior to six months after the effective date of the permit we propose to notify the Regional Water Board whether or not we have elected to collaborate on an EWMP that meets the requirements of Part VI.C.4.c.IV of the permit.

There are no interim or final trash water quality based effluent limitations (WQBELs) applicable to the Los Cerritos Channel Watershed. The only interim or final WQBELs applicable to the Los Cerritos Channel Watershed are for the Los Cerritos Channel Total Maximum Daily Loads for Metals established by EPA on 17 March 2010. The schedule for meeting interim and final WQBELs associated with this TMDL is uncertain at this time because the Regional Water Board is in the process of developing a Basin Plan Amendment for implementation of the Los Cerritos Channel TMDLs for Metals and the TMDLs for Metals and Selenium for the San Gabriel River and Impaired Tributaries established by EPA on March 26, 2007. The Technical Committee and its consultant have met with your staff regarding development of the Basin Plan Amendment and have submitted two draft implementation schedules. Although the draft Basin Plan Amendment has not yet been circulated for public review, we believe that no final or interim WQBEL compliance dates will occur prior to approval of a WMP or EWMP for the Los Cerritos Watershed.

With respect to watershed control measures that will be implemented by participating agencies concurrently with the development of a WMP or EWMP, we are not entirely sure. We do know that we will continue to implement watershed control measures in our existing stormwater management programs and continue to implement watershed control measures to eliminate non-stormwater discharges through the MS4 that are sources of pollutants to receiving waters. We also know that a Proposition 84 Planning and Monitoring Grant received by the Gateway Water Management Authority to determine optimal locations for retrofitting LID and water harvesting measures within the Los Cerritos Channel Watershed will be underway while a WMP or EWMP is being developed. In addition, the Technical Committee is analyzing local measures that can be included in the Basin Plan Amendment and implemented concurrently with development of a WMP or an EWMP.

We would appreciate receiving an acknowledgment that you have received this notice and concur with the approach that we have proposed to start immediately with preparation of a Watershed Management Program while reserving the right to alter our submittal date for a draft program plan depending on the development of LID ordinances and green streets policies within the watershed and our investigation of the potential applicability of an EWMP for the watershed.

Sincerely,

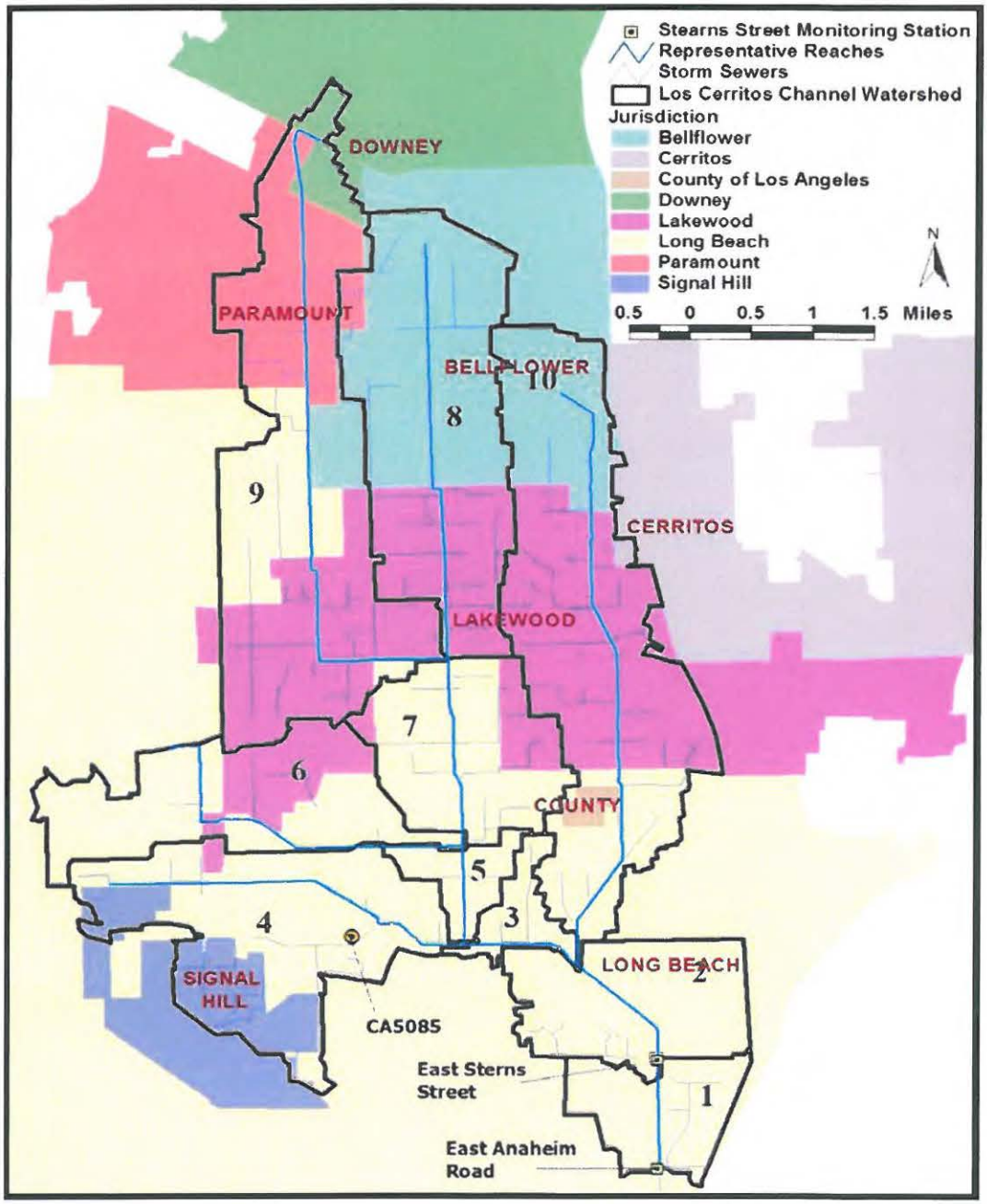
Art Gallucci
CITY MANAGER

cc: Anthony Arevalo, Chair, Los Cerritos Channel Metals TMDL Technical Committee

Attachment

Los Cerritos Channel Freshwater Watershed

Municipalities and Metals TMDL Sub-basins



ATTACHMENT D.3:

EXISTING CITY OF CERRITOS/GWMA MOA

MEMORANDUM OF AGREEMENT (MOA)
BETWEEN
THE LOS ANGELES GATEWAY REGION INTEGRATED REGIONAL WATER MANAGEMENT JOINT POWERS AUTHORITY
AND
THE CITY OF CERRITOS

FOR THE ADMINISTRATION AND COST SHARING RESULTING FROM PREPARATION OF THE LOS CERRITOS CHANNEL METALS TOTAL MAXIMUM DAILY LOAD IMPLEMENTATION PLAN, MONITORING PROGRAM, AND SPECIAL STUDIES

This Memorandum of Agreement ("Agreement") is made and entered into as of the date of the last signature, set forth below, by and between the Los Angeles Gateway Region Integrated Regional Water Management Joint Powers Authority ("Gateway Authority"), a California Joint Powers Authority, and the City of Cerritos, a California municipal corporation ("City"); hereinafter referred to as "Party" or "Parties":

RECITALS

WHEREAS, the mission of the Gateway Authority includes the equitable protection and management of water resources within its area; and

WHEREAS, portions of the Gateway Authority cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill, are located within the Los Cerritos Channel Watershed; and

WHEREAS, for the purposes of this Agreement, the term "Watershed Entities" shall include, to the extent that each enters into agreements substantially similar to this Agreement, the Gateway Authority cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill, as well as the California Department of Transportation ("Caltrans"), all of which manage or drain stormwater into at least a portion of the Los Cerritos Channel Watershed; and

WHEREAS, the United States Environmental Protection Agency ("USEPA") established the Los Cerritos Channel Metals Total Maximum Daily Load ("Metals TMDL") on March 17, 2010, with the intent of protecting and improving water quality in the Los Cerritos Channel Watershed; and

WHEREAS, this Metals TMDL will regulate certain discharges from NPDES Permit holders, requiring organization and cooperation among the regulated entities; and

WHEREAS, the Parties recognize that the proposed Metals TMDL is not self-enforcing, but could potentially become legally enforceable through incorporation into future National Pollutant Discharge Elimination System ("NPDES") Permits; and

Attachment 2

RB-AR6753

WHEREAS, the Cities of Long Beach and Signal Hill funded technical assistance and studies on behalf of the Watershed Entities that resulted in technical modifications of the TMDL; and

WHEREAS, achieving the objectives of the Metals TMDL will be facilitated through preparation of an Implementation Plan ("IP"), a Monitoring Plan ("MP"), and specific Special Studies, by the Watershed Entities, to demonstrate compliance; and

WHEREAS, preparation of these plans and studies requires administrative and professional coordination services that the Gateway Authority can provide; and

WHEREAS, a Metals TMDL Technical Committee ("TC"), consisting of representatives of the Watershed Entities as well as stormwater experts, has been established to assist the Gateway Authority in coordinating the preparation and submission of the IP, MP, and any Special Studies to the California Regional Water Quality Control Board, Los Angeles Region on behalf of the Watershed Entities; and

WHEREAS, a Metals TMDL Steering Committee ("SC"), consisting of representatives of the Watershed Entities and other persons approved by the Watershed Entities, has been established for the purpose of overseeing administrative and fiscal coordination in support of achieving the Metals TMDL objectives; and

WHEREAS, the SC has determined that the approximately $293,000 spent by the Cities of Long Beach ($136,000) and Signal Hill ($157,000) in TMDL Development costs, along with the costs of preparing the IP, MP, and potential Special Studies and other related costs incurred by the Gateway Authority in administering this Agreement, should be shared by the Watershed Entities based on the cost allocation formula contained in Exhibit A; and

WHEREAS, the Gateway Authority will endeavor to conclude substantially similar agreements with all of the Watershed Entities in order to minimize the cost to each Watershed Entity of complying with the Metals TMDL.

NOW, THEREFORE, in consideration of the mutual covenants and conditions set forth herein, the Parties do hereby agree as follows:

Section 1. Recitals. The recitals set forth above are fully incorporated as part of this Agreement.

Section 2. Purpose. The purpose of this Agreement is to cooperatively support and undertake preparation of the IP, MP, and any Special Studies agreed to by the Parties.

Section 3. Cooperation. The Parties shall fully cooperate with one another to achieve the purposes of this Agreement.

Section 4. Voluntary Nature. The Parties voluntarily enter into this Agreement.

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Section 5. Term. This Agreement shall remain and continue in effect until completion of the IP, MP, and any Special Studies agreed to by the Parties, or December 31, 2022, whichever occurs first.

Section 6. Role of the Gateway Authority.

a) The Gateway Authority shall endeavor to enter into substantially and materially similar agreements with each of the Watershed Entities.

b) Based on the directions of the TC, the Gateway Authority shall retain a Consultant or Consultants ("Consultant(s)") to prepare the IP, MP, and any agreed upon Special Studies to demonstrate compliance with the Metals TMDL. The Consultant's Scope of Work shall substantially conform to the Scope of Work set forth in Exhibit B to this Agreement.

c) The Gateway Authority shall invoice the Watershed Entities a proportional amount to cover the costs incurred by the Gateway Authority in the performance of its duties under this Agreement. Such costs shall include, but not be limited to, the costs of: the Consultant's fees and costs for the preparation of the IP, MP, and Special Studies; Gateway Authority staff time; legal fees; audit expenses; and administering this Agreement (collectively, the "Agreement Costs"). The Gateway Authority shall invoice the Watershed Entities on an annual basis in an amount based on the Cost Share Formula in Exhibit A.

Section 7. Obligation to Pay Proportional Costs.

a) Upon receiving an invoice, the City shall pay the Gateway Authority its proportionate share of the Gateway Authority's anticipated Agreement Costs in accordance with the Cost Share Formula set forth in Exhibit A.

b) The Agreement shall become effective only if the Gateway Authority is able to execute substantially similar agreements with the cities of Bellflower, Lakewood and Long Beach. The City shall pay the adjusted proportional cost based on the Cost Share Formula set forth in Exhibit A. If the Gateway Authority is unable to execute materially similar agreements with any of the other Watershed Entities, the proportional costs set forth in Exhibit A shall be adjusted.

c) Any over or underpayment of Agreement costs shall be credited or billed to the City during the following period or, if it occurs in the last year of this Agreement, it shall be returned upon termination of this Agreement.

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Section 8. Invoicing and Payment.

a) Payment to the Gateway Authority is due within sixty (60) days of the invoice date. The first invoice should be expected within sixty (60) days of signing this agreement. Invoices for future Agreement Costs will be billed annually in March, starting in the year 2011.

b) Any payment that is late shall be subject to interest from the due date. For any payment that is made from 1 to 30 days after the due date, the interest rate shall be equal to the Prime Rate in effect on the due date plus one (1) percent (e.g., if the Prime Rate is 5 percent, the interest rate for this Agreement will be 6 percent). For any payment made from 31 to 60 days after the due date, the interest rate shall be equal to the Prime Rate in effect on the due date plus five (5) percent. For payments made over 60 days after the due date, the interest rate shall be the Prime Rate in effect on the due date plus ten (10) percent. The rates shall, nevertheless, not exceed the maximum allowed by law.

c) A Party will be delinquent if payment is not received within 120 days after first being invoiced by the Gateway Authority. The Gateway Authority will follow the procedure listed below, or such other procedure that the Steering Committee directs to effectuate payment: 1) verbally contact the official to whom notices should be addressed pursuant to Section 12 of this Agreement and 2) submit a formal letter from the Gateway Authority Executive Officer to the delinquent Watershed Entity. If payment is not received, the Gateway Authority may terminate the Agreement and recalculate the proportional cost for the remaining Watershed Entities.

d) Any interest accrued on the funds collected per this Agreement shall be applied toward the Agreement Costs. The Gateway Authority shall annually submit a report to the SC on the amount of interest accrued by the Agreement account. Funds remaining at the end of the term of this Agreement shall be returned to the participating Watershed Entities in accordance with the Cost Share Formula in Exhibit A.

Section 9. Independent Contractor.

a) The Gateway Authority is, and shall at all times remain, a wholly independent contractor for performance of the obligations described in this Agreement. The Gateway Authority's officers, officials, employees and agents shall at all times during the Term of this Agreement be under the exclusive control of the Gateway Authority. The Watershed Entities shall not control the conduct of the Gateway Authority or any of its officers, officials, employees or agents, except as set forth in this Agreement. The Gateway Authority, and its officers, officials, employees, and agents shall not be deemed to be employees of the Watershed Entities.

b) The Gateway Authority is solely responsible for the payment of salaries, wages, other compensation, employment taxes, worker's compensation, or similar taxes for its employees performing services hereunder.

Section 10. Indemnification and Insurance.

a) The Gateway Authority shall include an indemnification provision in the agreement with the Consultant requiring the Consultant to defend, indemnify and hold harmless the City and the Gateway Authority, and their officers, employees, and other representatives and agents, from and against any and all liabilities, actions, suits, proceedings, claims, demands, losses, costs, and expenses, including legal costs and attorney's fees, for injury to or death of person (s), for damage to property (including property owned by the Gateway Authority or the City) resulting from negligent or intentional acts, errors and omissions committed by Consultant, its officers, employees, and other representatives and agents, arising out of or related to Consultant's performance under this Agreement.

b) The City shall defend, indemnify and hold harmless the Gateway Authority, its officers, employees, and other representatives and agents of the Gateway Authority, from and against any and all liabilities, actions, suits, proceedings, claims, demands, losses, costs, and expenses, including legal costs and attorney's fees, for injury to or death of person (s), for damage to property (including property owned by the Gateway Authority) and for negligent or intentional acts, errors and omissions committed by City, its officers, employees, and other representatives and agents, arising out of or related to City's performance under this Agreement, except for such loss as may be caused by Gateway Authority's gross negligence or intentional acts or the gross negligence or intentional acts of its officers, employees, or other representatives and agents.

c) Consultant's Insurance. The Gateway Authority shall require the Consultant to provide proof of current Automotive and/or General Liability, Professional (Errors and Omissions) in sufficient coverage amounts, naming the Gateway Authority and each Watershed Entity as an additional insured. Consultant shall also be required to provide proof of current Workman's Compensation insurance, when applicable.

Section 11. Termination of Agreement. Either Party may terminate this Agreement in whole or in part, for any reason, or no reason, by giving the other Party thirty (30) days written notice thereof. The City shall be responsible for Agreement Costs to which the Gateway Authority became bound prior to the date of termination. Such Agreement Costs shall include the remaining fees of any Consultant retained by the Gateway Authority prior to the date of termination. Gateway Authority shall notify in writing all Watershed Entities within fourteen (14) days after receiving written notice from any Watershed Entity that said entity intends to terminate this Agreement. Each

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Watershed City's proportionate cost allocation shall be reapportioned thereafter in accordance with the Cost Share Formula in Exhibit A.

Section 12. Miscellaneous.

a) Notices. All notices which any Party is required or desires to give hereunder shall be in writing and shall be deemed given when delivered personally or three (3) days after mailing by registered or certified mail (return receipt requested) to the following address or as such other addresses as the Parties may from time to time designate by written notice in the aforesaid manner:

To Gateway Authority:
Ms. Annette Hubbell
Gateway Authority Executive Officer
City of Downey
11111 Brookshire Ave.
Downey, CA 90241

To City of Cerritos:
Joseph Cho, PhD.
City Mayor
P.O. Box 3130
Cerritos, CA 90703

b) Separate Accounting and Auditing. The Gateway Authority agrees to establish a separate account to track revenues and expenses resulting from the Agreement. Annual financial statements and audits will be made available to the participating Parties, after review and approval by the Metals TMDL SC.

c) Binding Effect. This Agreement shall be binding upon and inure to the benefit of each Party to this Agreement and its respective heirs, administrators, representatives and successors.

d) Amendment. The terms and provisions of this Agreement may not be amended, modified or waived, except by a written instrument signed by both Parties.

e) Waiver. Waiver by either Party of any term, condition, or covenant of this Agreement shall not constitute a waiver of any other term, condition, or covenant. Waiver, by any Party, to any breach of the provisions of this Agreement shall not constitute a waiver of any other provision, or a waiver of any subsequent breach of any provision of this Agreement.

f) Law to Govern; Venue. This Agreement shall be interpreted, construed, and governed according to the laws of the State of California. In the event of litigation between the Parties, venue shall lie exclusively in the County of Los Angeles.

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g) No Presumption in Drafting. The Parties to this Agreement agree that the general rule that an Agreement is to be interpreted against the Party drafting it, or causing it to be prepared, shall not apply.

h) Severability. If any term, provision, condition or covenant of this Agreement is declared or determined by any court of competent jurisdiction to be invalid, void, or unenforceable, the remaining provisions of this Agreement shall not be affected thereby and this Agreement shall be read and construed without the invalid, void, or unenforceable provision(s).

i) Entire Agreement. This Agreement constitutes the entire agreement of the Parties with respect to the subject matter hereof and supersedes all prior or contemporaneous agreements, whether written or oral, with respect thereto.

j) Counterparts. This Agreement may be executed in any number of counterparts, each of which shall be an original, but all of which taken together shall constitute but one and the same instrument, provided, however, that such counterparts shall have been delivered to both Parties to this Agreement.

k) Legal Representation. All Parties have been represented by counsel in the preparation and negotiation of this Agreement. Accordingly, this Agreement shall be construed according to its fair language.

l) Agency Authorization. Each of the persons signing below on behalf of a Party represents and warrants that he or she is authorized to sign this Agreement on behalf of such Party.

IN WITNESS WHEREOF, the Parties hereto have caused this Agreement to be executed on their behalf, respectively, as follows:

DATE: _____

CITY OF CERRITOS

Mayor

ATTEST:

City Clerk

APPROVED AS TO FORM:

City Attorney

DATE: _____

LOS ANGELES GATEWAY REGION INTEGRATED REGIONAL WATER MANAGEMENT JOINT POWERS AUTHORITY

Gateway Authority Chair

ATTEST:

Gateway Authority Secretary

APPROVED AS TO FORM:

Gateway Authority General Counsel

EXHIBIT A

LOS CERRITOS CHANNEL METALS TMDL
COST ALLOCATION

Agency Name	Acres in Watershed[1]	Percent of Watershed Area	Agency Cost Share per $100,000		
			Flat Fee	Area Share	Total
Bellflower	2,818.43	16.00%	$5,000	$9,599	$14,599
CalTrans	497.74	2.83%	$5,000	$1,695	$6,695
Cerritos	57.60	0.33%	$5,000	$196	$5,196
Downey	245.00	1.39%	$5,000	$834	$5,834
Lakewood	4,802.77	27.26%	$5,000	$16,358	$21,358
Long Beach	7,535.38	42.77%	$5,000	$25,665	$30,665
Paramount	1,128.93	6.41%	$5,000	$3,845	$8,845
Signal Hill	530.75	3.01%	$5,000	$1,808	$6,808
JPA MOA Total	17,616.60	100.00%	$40,000	$60,000	$100,000
UNI Los Angeles Co.	94.40				
USEPA TMDL Total	17,711.00				

[1] CalTrans provided acreage values were subtracted from city acreage provided by USEPA.

The City of Long Beach and Signal Hill's annual payments as shown above shall be offset by the credits outlined in the Recitals of the Agreement.

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EXHIBIT B

SCOPE OF WORK
FOR
DEVELOPMENT OF AN IMPLEMENTATION PLAN FOR AN EPA-ESTABLISHED METALS TMDL FOR THE LOS CERRITOS CHANNEL FRESHWATER WATERSHED

1. Prepare a detailed outline for Metals TMDL Implementation component to accompany the incorporation of the Metals TMDL in the reissued MS4 NPDES Permits, an Implementation Plan for the Los Cerritos Channel Metals TMDL

2. Prepare an Implementation Strategy, including
   a. An adaptive management approach,
   b. Tiered source control measures, and
   c. Tiered treatment control, if necessary

3. Prepare recommended Implementation Actions for
   a. Municipal Stormwater Permittees
   b. Caltrans
   c. Construction Stormwater Permittees
   d. Industrial Stormwater Permittees

4. Draft and Negotiate an Implementation Schedule acceptable to
   a. Municipal permittees
   b. The Los Angeles Regional Water Quality Control Board
   c. USEPA Region IX

5. Coordinate with Monitoring Consultant on Establishment of
   a. Ambient Monitoring Program
   b. TMDL Effectiveness Monitoring
   c. Special Studies, if any

6. Coordinate with Technical Committee and Steering Committee
   a. Attend meetings, as requested
   b. Submit draft materials to Technical Committee for review and approval
   c. Submit draft final materials to Steering Committee for review and approval before submittal to Regional Water Board

7. Coordinate with Regional Water Board staff
   a. Obtain an outline format for a Basin Plan Amendment
   b. Review Implementation Strategy with Regional Water Board staff
   c. Review Implementation Actions with Regional Water Board staff

Note: The Technical Committee may modify details of Scope of Work, if necessary.

RB-AR6762

LOS CERRITOS CHANNEL TMDL AMBIENT MONITORING

OVERVIEW

Ambient monitoring will establish baseline conditions for three major segments of the watershed and provide the necessary groundwork for effectiveness monitoring. The basic monitoring design used in the ambient monitoring effort will be the backbone of the effectiveness monitoring program.

OUTLINE OF MONITORING PROGRAM

Ambient Monitoring Program –Wet Season

Wet season monitoring is intended to provide measurement of trace metal concentrations and loads at the three sites representing each of three major segments of the Los Cerritos Channel storm drain. The following subtasks will be required for the first year of the program. The first two tasks will apply only to the first year.

1. Identify three additional monitoring sites
2. Purchase and install equipment to obtain automated flow-composite samples.
3. Continue monitoring at the City of Long Beach Stearns Street monitoring site.
4. Monitoring at all sites will include:
   - Continuous measurement of flow and rainfall
   - Collection of flow-rated composite samples for six (6) storm events
   - Analyses will include total hardness, TSS and trace metals. Trace metals will include dissolved and total fractions of copper, lead and zinc.

Ambient Monitoring Program –Dry Season

Dry weather flows will need to be monitored continuously throughout the summer dry season (May through September) and sampled to determine metals concentrations and loads. Alternative flow measurement techniques will be necessary during the summer dry season to provide continuous measurement of dry weather flow and more accurate baseline measurements of concentration and loads. Monitoring will be conducted at the same locations used for monitoring storm flows during the winter wet season. Subtasks for the dry weather ambient monitoring effort will include the following:

1. Determine flume sizes. Purchase the flumes, sidewalls (stop logs) for consolidating shallow flows, data loggers and high-precision pressure sensors for each site.
2. Install temporary flumes and electronic packages at the three TMDL monitoring sites and the Long Beach Mass Emission monitoring site during the summer.
3. Provide continuous measurements of summer dry weather flow at each site.
4. Collect grab samples for hardness, TSS and trace metals **4** times during the summer dry weather period and **2** times during winter dry weather period.

Reporting

Annual draft and final report will be submitted after the first full year of monitoring. The dates for submission of these reports will be established once the program is initiated.

* Notes: Details of scope may be modified by Technical Committee, if necessary.

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ATTACHMENT D.4:

CITY OF CERRITOS DRAFT LID ORDINANCE

CITY OF CERRITOS

ORDINANCE NO. TBD

AN ORDINANCE OF THE CITY OF CERRITOS ADDING CHAPTER 6.34 OF THE CERRITOS MUNICIPAL CODE PERTAINING TO LOW IMPACT DEVELOPMENT

THE CITY COUNCIL OF THE CITY OF CERRITOS, CALIFORNIA DOES HEREBY ORDAIN AS FOLLOWS:

SECTION 1. Chapter 6.34 of Title 6 of the Cerritos Municipal Code is hereby added to read as follows:

CHAPTER 6.34
LOW IMPACT DEVELOPMENT

Sections:

6.34.010 Findings
6.34.020 Definitions
6.34.030 Objectives
6.34.040 Scope
6.34.050 Applicability
6.34.060 Effective Date
6.34.070 Specific Requirements
6.34.080 Validity

6.34.010 Findings

(1) The City of Cerritos is authorized by Article XI, Section 5 and Section 7 of the State Constitution to exercise the police power of the State by adopting regulations to promote public health, public safety and general prosperity.

(2) The federal Clean Water Act establishes Regional Water Quality Control Boards in order to prohibit the discharge of pollutants in stormwater runoff to waters of the United States.

(3) The City is a permittee under the California Regional Water Quality Control Board, Los Angeles Region Order No. R4-2012-0175, issued on November 08, 2012 which establishes Waste Discharge Requirements for Municipal Separate Storm Sewer Systems (MS4) Discharges within the Coastal Watersheds of Los Angeles County, Except those Discharges Originating from the City of Long Beach MS4.

(4) Order No. R4-2012-0175 contains requirements for municipalities to establish an LID Ordinance in order to participate in a Watershed Management Program and/or Enhanced Watershed Management Program.

(5) The Regional Board has adopted Total Maximum Daily Loads (TMDLs) for pollutants which are numerical limits that must be achieved effectively through LID implementation.

(6)The City has the authority under the California Water Code to adopt and enforce ordinances imposing conditions, restrictions and limitations with respect to any activity that might degrade waters of the State

(7)The City is committed to a stormwater management program that protects water quality and water supply by employing watershed-based approaches that balance environmental and economic considerations.

(8)Urbanization has led to increased impervious surface areas resulting in increased water runoff and less percolation to groundwater aquifers causing the transport of pollutants to downstream receiving waters.

(9)The City of Cerritos intends to provide stormwater and rainwater LID strategies for all projects for Development and Redevelopment projects as defined under "Applicability."

6.34.020 Definitions

The following words and phrases, for the purpose of this chapter, are defined and shall be construed as hereinafter set out, unless it shall be apparent from the context that they have a different meaning:

(1) "Automotive Service Facility" means a facility that is categorized in any one of the following Standard Industrial Classification (SIC) and North American Industry Classification System (NAICS) codes. For inspection purposes, Permittees need not inspect facilities with SIC codes 5013, 5014, 5511, 5541, 7532-7534, and 7536-7539 provided that these facilities have no outside activities or materials that may be exposed to stormwater (Order No. R4-2012-0175).

(2) "Basin Plan" means the Water Quality Control Plan, Los Angeles Region, Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties, adopted by the Regional Water Board on June 13, 1994 and subsequent amendments (Order No. R4-2012-0175).

(3) "Best Management Practice (BMP)" means practices or physical devices or systems designed to prevent or reduce pollutant loading from stormwater or non-stormwater discharges to receiving waters, or designed to reduce the volume of stormwater or non-stormwater discharged to the receiving water (Order No. R4-2012-0175).

(4) "Biofiltration" means a LID BMP that reduces stormwater pollutant discharges by intercepting rainfall on vegetative canopy, and through incidental infiltration and/or evapotranspiration, and filtration. Incidental infiltration is an important factor in achieving the required pollutant load reduction. Therefore, the term "biofiltration" as used in this Ordinance is defined to include only systems designed to facilitate incidental infiltration or achieve the equivalent pollutant reduction as biofiltration BMPs with an underdrain (subject to approval by the Regional Board's Executive Officer). Biofiltration BMPs include bioretention systems with an underdrain and bioswales (Order No. R4-2012-0175).

(5) "Bioretention" means a LID BMP that reduces stormwater runoff by intercepting rainfall on vegetative canopy, and through evapotranspiration and infiltration. The bioretention system typically includes a minimum 2-foot top layer of a specified soil and compost mixture underlain by a gravel-filled temporary storage pit dug into the in-situ soil. As defined in this Ordinance, a bioretention BMP may be designed with an overflow drain, but may not include an underdrain. When a bioretention BMP is designed or constructed with an underdrain it is regulated by Order No. R4-2012-0175 as biofiltration (Order No. R4-2012-0175).

(6) "Bioswale" means a LID BMP consisting of a shallow channel lined with grass or other dense, low-growing vegetation. Bioswales are designed to collect stormwater runoff and to achieve a uniform sheet flow through the dense vegetation for a period of several minutes (Order No. R4-2012-0175).

(7) "City" means the City of Cerritos.

(8) "Clean Water Act (CWA)" means the Federal Water Pollution Control Act enacted in 1972, by Public Law 92-500, and amended by the Water Quality Act of 1987. The Clean Water Act prohibits the discharge of pollutants to Waters of the United States unless the discharge is in accordance with an NPDES permit.

(9) "Commercial Development" means any development on private land that is not heavy industrial or residential. The category includes, but is not limited to: hospitals, laboratories and other medical facilities, educational institutions, recreational facilities, plant nurseries, car wash facilities; mini-malls and other business complexes, shopping malls, hotels, office buildings, public warehouses and other light industrial complexes (Order No. R4-2012-0175).

(10) "Commercial Malls" means any development on private land comprised of one or more buildings forming a complex of stores which sells various merchandise, with interconnecting walkways enabling visitors to easily walk from store to store, along with parking area(s). A commercial mall includes, but is not limited to: mini-malls, strip malls, other retail complexes, and enclosed shopping malls or shopping centers (Order No. R4-2012-0175).

(11) "Construction Activity" means any construction or demolition activity, clearing, grading, grubbing, or excavation or any other activity that result in land disturbance. Construction does not include emergency construction activities required to immediately protect public health and safety or routine maintenance activities required to maintain the integrity of structures by performing minor repair and restoration work, maintain the original line and grade, hydraulic capacity, or original purposes of the facility. See "Routine Maintenance" definition for further explanation. Where clearing, grading or excavating of underlying soil takes place during a repaving operation, State General Construction Permit coverage by the State of California General Permit for Storm Water Discharges Associated with Industrial Activities or for Stormwater Discharges Associated with Construction Activities is required if more than one acre is disturbed or the activities are part of a larger plan (Order No. R4-2012-0175).

(12) "Control" means to minimize, reduce or eliminate by technological, legal, contractual, or other means, the discharge of pollutants from an activity or activities (Order No. R4-2012-0175).

(13) "Development" means construction, rehabilitation, redevelopment or reconstruction of any public or private residential project (whether single-family, multi-unit or planned unit development); industrial, commercial, retail, and other non-residential projects, including public agency projects; or mass grading for future construction. It does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of facility, nor does it include emergency construction activities required to immediately protect public health and safety (Order No. R4-2012-0175).

(14) "Directly Adjacent" means situated within 200 feet of the contiguous zone required for the continued maintenance, function, and structural stability of the environmentally sensitive area (Order No. R4-2012-0175).

(15) "Discharge" means any release, spill, leak, pump, flow, escape, dumping, or disposal of any liquid, semi-solid, or solid substance.

(16) "Disturbed Area" means an area that is altered as a result of clearing, grading, and/or excavation (Order No. R4-2012-0175).

(17) "Flow-through treatment BMPs" means a modular, vault type "high flow biotreatment" devices contained within an impervious vault with an underdrain or designed with an impervious liner and an underdrain (Order No. R4-2012-0175).

(18) "Full Capture System" means any single device or series of devices, certified by the Executive Officer, that traps all particles retained by a 5 mm mesh screen and has a design treatment capacity of not less than the peak flow rate Q resulting from a one-year, one-hour storm in the sub-drainage area (Order No. R4-2012-0175).

(19) "General Construction Activities Storm Water Permit (GCASP)" means the general NPDES permit adopted by the State Board which authorizes the discharge of stormwater from construction activities under certain conditions (Order No. R4-2012-0175).

(20) "General Industrial Activities Storm Water Permit (GIASP)" means the general NPDES permit adopted by the State Board which authorizes the discharge of stormwater from certain industrial activities under certain conditions (Order No. R4-2012-0175).

(21) "Green Roof" means a LID BMP using planter boxes and vegetation to intercept rainfall on the roof surface. Rainfall is intercepted by vegetation leaves and through evapotranspiration. Green roofs may be designed as either a bioretention BMP or as a biofiltration BMP. To receive credit as a bioretention BMP, the green roof system planting medium shall be of sufficient depth to provide capacity within the pore space volume to contain the design storm depth and may not be designed or constructed with an underdrain (Order No. R4-2012-0175).

(22) "Hillside" means a property located in an area with known erosive soil conditions, where the development contemplates grading on any natural slope that is 25% or greater and where grading contemplates cut or fill slopes (Order No. R4-2012-0175).

(23) "Industrial/Commercial Facility" means any facility involved and/or used in the production, manufacture, storage, transportation, distribution, exchange or sale of goods and/or commodities, and any facility involved and/or used in providing professional and non-professional services. This category of facilities includes, but is not limited to, any facility defined by either the Standard Industrial Classifications (SIC) or the North American Industry Classification System (NAICS). Facility ownership (federal, state, municipal, private) and profit motive of the facility are not factors in this definition (Order No. R4-2012-0175).

(24) "Industrial Park" means land development that is set aside for industrial development. Industrial parks are usually located close to transport facilities, especially where more than one transport modalities coincide: highways, railroads, airports, and navigable rivers. It includes office parks, which have offices and light industry (Order No. R4-2012-0175).

(25) "Infiltration BMP" means a LID BMP that reduces stormwater runoff by capturing and infiltrating the runoff into in-situ soils or amended onsite soils. Examples of infiltration BMPs include infiltration basins, dry wells, and pervious pavement (Order No. R4-2012-0175).

(26) "Low Impact Development (LID)" consists of building and landscape features designed to retain or filter stormwater runoff (Order No. R4-2012-0175).

(27) "Municipal Separate Storm Sewer System (MS4)" means a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains):

(a) Owned or operated by a State, city, town, borough, county parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, stormwater, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States;

(b) Designed or used for collecting or conveying stormwater;

(c) Which is not a combined sewer; and

(d) Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR Section 122.2.

(40 CFR Section 122.26(b)(8)) (Order No. R4-2012-0175)

(28) "National Pollutant Discharge Elimination System (NPDES)" means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under CWA Section 307, 402, 318, and 405. The term includes an "approved program" (Order No. R4-2012-0175).

(29) "Natural Drainage System" means a drainage system that has not been improved (e.g., channelized or armored). The clearing or dredging of a natural drainage system does not cause the system to be classified as an improved drainage system (Order No. R4-2012-0175).

(30) "New Development" means land disturbing activities; structural development, including construction or installation of a building or structure, creation of impervious surfaces; and land subdivision (Order No. R4-2012-0175).

(31) "Non-Stormwater Discharge" means any discharge to a municipal storm drain system that is not composed entirely of stormwater (Order No. R4-2012-0175).

(32) "Outfall" means a point source as defined by 40 CFR 122.2 at the point where a municipal separate storm sewer discharges to waters of the United States and does not include open conveyances connecting two municipal separate storm sewers, or pipes, tunnels or other conveyances with connect segments of the same stream or other

waters of the United Sates and are used to convey waters of the United States. (40 CFR Section 122.26(b)(9)) (Order No. R4-2012-0175).

(33) "Parking Lot" means land area or facility for the parking or storage of motor vehicles used for businesses, commerce, industry, or personal use, with a lot size of 5,000 square feet or more of surface area, or with 25 or more parking spaces (Order No. R4-2012-0175).

(34) "Pollutant" means any "pollutant" defined in Section 502(6) of the Federal Clean Water Act or incorporated into the California Water Code Section 13373 (Order No. R4-2012-0175).

(35) "Project" means all development, redevelopment, and land disturbing activities. The term is not limited to "Project" as defined under CEQA (Pub. Resources Code Section 21065) (Order No. R4-2012-0175).

(36) "Rainfall Harvest and Use" means a LID BMP system designed to capture runoff, typically from a roof but can also include runoff capture from elsewhere within the site, and to provide for temporary storage until the harvested water can be used for irrigation or non-potable uses. The harvested water may also be used for potable water uses if the system includes disinfection treatment and is approved for such use by the local building department (Order No. R4-2012-0175).

(37) "Receiving Water" means "water of the United States" into which waste and/or pollutants are or may be discharged (Order No. R4-2012-0175).

(38) "Redevelopment" means land-disturbing activity that results in the creation, addition, or replacement of 5,000 square feet or more of impervious surface area on an already developed site. Redevelopment includes, but is not limited to: the expansion of a building footprint; addition or replacement of a structure; replacement of impervious surface area that is not part of routine maintenance activity; and land disturbing activity related to structural or impervious surfaces. It does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of facility, nor does it include emergency construction activities required to immediately protect public health and safety (Order No. R4-2012-0175).

(39) "Regional Board" means the California Regional Water Quality Control Board, Los Angeles Region.

(40) "Restaurant" means a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC Code 5812) (Order No. R4-2012-0175).

(41) "Retail Gasoline Outlet" means any facility engaged in selling gasoline and lubricating oils (Order No. R4-2012-0175).

(42) "Routine Maintenance" includes, but is not limited to projects conducted to:

(a) Maintain the original line and grade, hydraulic capacity, or original purpose of the facility.

(b) Perform as needed restoration work to preserve the original design grade, integrity and hydraulic capacity of flood control facilities.

(c) Includes road shoulder work, regrading dirt or gravel roadways and shoulders and performing ditch cleanouts.

(d) Update existing lines* and facilities to comply with applicable codes, standards, and regulations regardless if such projects result in increased capacity.

(e) Repair leaks

Routine maintenance does not include construction of new** lines or facilities resulting from compliance with applicable codes, standards and regulations.

* Update existing lines includes replacing existing lines with new materials or pipes.

** New lines are those that are not associated with existing facilities and are not part of a project to update or replace existing lines (Order No. R4-2012-0175).

(43) "Significant Ecological Areas (SEAs)" means an area that is determined to possess an example of biotic resources that cumulatively represent biological diversity, for the purposes of protecting biotic diversity, as part of the Los Angeles County General Plan. Areas are designated as SEAs, if they possess one or more of the following criteria:

(a) The habitat of rare, endangered, and threatened plant and animal species.

(b) Biotic communities, vegetative associations, and habitat of plant and animal species that are either one of a kind, or are restricted in distribution on a regional basis.

(c) Biotic communities, vegetative associations, and habitat of plant and animal species that are either one of a kind or are restricted in distribution in Los Angeles County.

(d) Habitat that at some point in the life cycle of a species or group of species, serves as a concentrated breeding, feeding, resting, migrating grounds and is limited in availability either regionally or within Los Angeles County.

(e) Biotic resources that are of scientific interest because they are either an extreme in physical/geographical limitations, or represent an unusual variation in a population or community.

(f) Areas important as game species habitat or as fisheries.

(g) Areas that would provide for the preservation of relatively undisturbed examples of natural biotic communities in Los Angeles County.

(h) Special areas (Order No. R4-2012-0175).

(44) "Site" means land or water area where any "facility or activity" is physically located or conducted, including adjacent land used in connection with the facility or activity (Order No. R4-2012-0175).

(45) "Storm Drain System" means any facility or any parts of the facility, including streets, gutters, conduits, natural or artificial drains, channels and watercourse that are used for the purpose of collecting, storing, transporting or disposing of stormwater and are located within the City.

(46) "Storm Water or Stormwater" means runoff and drainage related to precipitation events (pursuant to 40 CFR Section 122.26(b)(13); 55 Fed. Reg. 47990, 47995 (Nov. 16, 1990)).

(47) "Urban Runoff" means surface water flow produced by storm and non-storm events. Non-storm events include flow from residential, commercial or industrial activities involving the use of potable and non-potable water.

6.34.030 Objectives

The provisions of this Section establish requirements for construction activities and facility operations of Development and Redevelopment projects to comply with the current "Order No. R4-2012-0175," lessen the water quality impacts of development by using smart growth practices, and integrate LID practices and standards for stormwater pollution mitigation through means of infiltration, evapotranspiration, biofiltration, and rainfall harvest and use. LID shall be inclusive of new development and/or redevelopment requirements.

6.34.040 Scope

This Section contains requirements for stormwater pollution control measures in Development and Redevelopment projects and authorizes the City to further define and adopt stormwater pollution control measures, and to develop LID principles and requirements, including but not limited to the objectives and specifications for integration of LID strategies, grant waivers from the LID requirements, and collect funds for projects that are granted waivers. Except as otherwise provided herein, the City shall administer, implement and enforce the provisions of this Section.

6.34.050 Applicability

Development projects subject to Permittee conditioning and approval for the design and implementation of post-construction controls to mitigate storm water pollution, prior to completion of the project(s), are:

(1) All development projects equal to 1 acre or greater of disturbed area that adds more than 10,000 square feet of impervious surface area.

(2) Industrial parks 10,000 square feet or more of surface area.

(3) Commercial malls 10,000 square feet or more of surface area.

(4) Retail gasoline outlets with 5,000 square feet or more of surface area.

(5) Restaurants (Standard Industrial Classification (SIC) of 5812) with 5,000 square feet or more of surface area.

(6) Parking lots with 5,000 square feet or more of impervious surface area, or with 25 or more parking spaces.

(7) Streets and roads construction of 10,000 square feet or more of impervious surface area. Street and road construction applies to standalone streets, roads, highways, and freeway projects, and also applies to streets within larger projects.

(8) Automotive service facilities (Standard Industrial Classification (SIC) of 5013, 5014, 5511, 5541, 7532-7534 and 7536-7539) 5,000 square feet or more of surface area.

(9) Projects located in or directly adjacent to, or discharging directly to an Environmentally Sensitive Area (ESA), where the development will:

(a) Discharge stormwater runoff that is likely to impact a sensitive biological species or habitat; and

(b) Create 2,500 square feet or more of impervious surface area

(1) Single-family hillside homes.

(2) Redevelopment Projects

(a) Land disturbing activity that results in the creation or addition or replacement of 5,000 square feet or more of impervious surface area on an already developed site on Planning Priority Project categories.

(b) Where Redevelopment results in an alteration to more than fifty percent of impervious surfaces of a previously existing development, and the existing development was not subject to post-construction stormwater quality control requirements, the entire project must be mitigated.

(c) Where Redevelopment results in an alteration of less than fifty percent of impervious surfaces of a previously existing development, and the existing development was not subject to post-construction stormwater quality control requirements, only the alteration must be mitigated, and not the entire development.

(d) Redevelopment does not include routine maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, original purpose of facility or emergency redevelopment activity required to protect public health and safety. Impervious surface replacement, such as the reconstruction of parking lots and roadways which does not disturb additional area and maintains the original grade and alignment, is considered a routine maintenance activity. Redevelopment does not include the repaving of existing roads to maintain original line and grade.

(e) Existing single-family dwelling and accessory structures are exempt from the Redevelopment requirements unless such projects create, add, or replace 10,000 square feet of impervious surface area.

6.34.060 Effective Date

The Planning and Land Development requirements contained in Section 7 of Order No. R4-2012-0175 shall become effective 90 days from the adoption of the Order (February 6, 2013). This includes Planning Priority Projects that are discretionary permit projects or project phases that have not been deemed complete for processing, or discretionary permit projects without vesting tentative maps that have not requested and received an extension of previously granted approvals within 90 days of adoption of the Order. Projects that have been deemed complete within 90 days of adoption of the Order are not subject to the requirements Section 7.

6.34.070 Specific Requirements

The Site for every Planning Priority Project shall be designed to control pollutants, pollutant loads, and runoff volume to the maximum extent feasible by minimizing impervious surface area and controlling runoff from impervious surfaces through infiltration, evapotranspiration, bioretention and/or rainfall harvest and use.

(1) A new single-family hillside home development shall include mitigation measures to:

(a) Conserve natural areas;

(b) Protect slopes and channels;

(c) Provide storm drain system stenciling and signage;

(d) Divert roof runoff to vegetated areas before discharge unless the diversion would result in slope instability; and

(e) Direct surface flow to vegetated areas before discharge, unless the diversion would result in slope instability.

(2) Street and road construction of 10,000 square feet or more of impervious surface shall follow USEPA guidance regarding Managing Wet Weather with Green Infrastructure: Green Streets (December 2008 EPA-833-F-08-009) to the maximum extent practicable.

(3) The remainder of Planning Priority Projects shall prepare a LID Plan to comply with the following:

(a) Retain stormwater runoff onsite for the Stormwater Quality Design Volume (SWQDv) defined as the runoff from:

(i) The 85th percentile 24-hour runoff event as determined from the Los Angeles County 85th percentile precipitation isohyetal map; or

(ii) The volume of runoff produced from a 0.75 inch, 24-hour rain event, whichever is greater.

(b) Minimize hydromodification impacts to natural drainage systems as defined in Order No. R4-2012-0175.

(c) To demonstrate technical infeasibility, the project applicant must demonstrate that the project cannot reliably retain 100 percent of the SWQDv on-site, even with the maximum application of green roofs and rainwater harvest and use, and that compliance with the applicable post-construction requirements would be technically infeasible by submitting a site-specific hydrologic and/or design analysis conducted and endorsed by a registered professional engineer, geologist, architect, and/or landscape architect. Technical infeasibility may result from conditions including the following:

(i) The infiltration rate of saturated in-situ soils is less than 0.3 inch per hour and it is not technically feasible to amend the in-situ soils to attain an infiltration rate necessary to achieve reliable performance of infiltration or bioretention BMPs in retaining the SWQDv onsite.

(ii) Locations where seasonal high groundwater is within five to ten feet of surface grade;

(iii) Locations within 100 feet of a groundwater well used for drinking water;

(iv) Brownfield development sites or other locations where pollutant mobilization is a documented concern;

(v) Locations with potential geotechnical hazards;

(vi) Smart growth and infill or redevelopment locations where the density and/ or nature of the project would create significant difficulty for compliance with the onsite volume retention requirement.

(d) If partial or complete onsite retention is technically infeasible, the project Site may biofiltrate 1.5 times the portion of the remaining SWQDv that is not reliably retained onsite. Biofiltration BMPs must adhere to the design specifications provided in Order No. R4-2012-0175.

(i) Additional alternative compliance options such as offsite infiltration and groundwater replenishment projects may be available to the project Site. The project Site should contact the City of Cerritos to determine eligibility.

(e) The remaining SWQDv that cannot be retained or biofiltered onsite must be treated onsite to reduce pollutant loading. BMPs must be selected and designed to meet pollutant-specific benchmarks as required per Order No. R4-2012-0175. Flow-through BMPs may be used to treat the remaining SWQDv and must be sized based on a rainfall intensity of:

(i) 0.2 inches per hour, or

(ii) The one year, one-hour rainfall intensity as determined from the most recent Los Angeles County isohyetal map, whichever is greater.

6.34.080 Validity

If any provision of this Ordinance is found to be unconstitutional or otherwise invalid by any court of competent jurisdiction, such invalidity shall not affect remaining provisions of this Ordinance are declared to be severable.

SECTION 2. This ordinance shall take effect thirty (30) days after its final passage and, within fifteen (15) days after its passage, the City Clerk shall cause it to be posted in three (3) public places designated for that purpose.

PASSED, APPROVED and ADOPTED this _____ day of _____, 2013.

ATTACHMENT D.5:

CITY OF CERRITOS DRAFT GREEN STREETS POLICY

CITY OF CERRITOS

RESOLUTION NO.

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF CERRITOS APPROVING A GREEN STREETS POLICY

WHEREAS, the Municipal Separate Storm Sewer System (MS4) Permit (Order No. R-2012-0175) was adopted by the California Regional Water Quality Control Board, Los Angeles Region on November 8, 2012; and

WHEREAS, Green Streets are enhancements to street and road projects to improve the quality of storm water and urban runoff through the implementation of infiltration, bio-treatment, xeriscaping parkways and tree lined streets; and

WHEREAS, Municipalities electing to prepare a Watershed Management Program to comply with this Permit are required to demonstrate that Green Street policies are in place that specify the use of green street strategies for transportation corridors; and

WHEREAS, the Cerritos City Council entered into a Memorandum of Understanding with the Gateway Water Management Authority and twelve other cities on ???TBD??? to develop a Watershed Management Program to comply with the requirements of Order No. R-2012-0175 in the Lower San Gabriel River Watershed; and

WHEREAS, the Cerritos City Council entered into a Memorandum of Understanding with the Gateway Water Management Authority and six other cities on ???TBD??? to develop a Watershed Management Program to comply with the requirements of Order No. R-2012-0175 in the Los Cerritos Channel Watershed.

NOW, THEREFORE, THE CERRITOS COUNCIL DOES HEREBY RESOLVES AS FOLLOWS:

SECTION 1. The Cerritos City Council hereby directs the Director Public Works to implement Green Streets for transportation corridors for publicly owned street and road projects that add 10,000 square feet or more of impervious area. The USEPA's Wet Weather with Green Infrastructure guidance (December 2008 EPA-833-F-08-009) shall be followed to the maximum extent practicable.

SECTION 2. Routine maintenance including but not limited to: slurry seals, grind and overlay and reconstruction to maintain original line are grade are excluded from the Green Street Policy.

PASSED, APPROVED AND ADOPTED this XXth day of XXXX, 2013.

_____

MAYOR

ATTEST:

_____

CITY CLERK

ATTACHMENT E:

CITY OF DOWNEY LETTER OF INTENT AND RELATED MATERIALS

ATTACHMENT E.1:

CITY OF DOWNEY

JUNE 24, 2013 LETTER

OF INTENT

City of Downey

FUTURE UNLIMITED

June 24, 2013

CITY COUNCIL

MAYOR
DN. MARIO A. GUERRA

MAYOR PRO TEM
FERNANDO VASQUEZ

COUNCIL MEMBERS
ROGER C. BROSSMER
LUIS H. MARQUEZ
ALEX SAAB

CITY MANAGER
GILBERT A. LIVAS

CITY CLERK
ADRIA M. JIMENEZ, CMC

CITY ATTORNEY
YVETTE M. ABICH GARCIA

Samuel Unger, Executive Office
Los Angeles Regional Water Quality Control Board
320 West Fourth Street, Suite 200
Los Angeles, CA 90013

Attn: Renee Purdy

Subject: **LETTER OF INTENT TO PARTICIPATE IN THE DEVELOPMENT OF A WATERSHED MANAGEMENT PROGRAM (WMP) AND COORDINATED INTEGRATED MONITORING PROGRAM (CIMP) IN COOPERATION WITH THE LOS CERRITOS CHANNEL METALS TMDL TECHNICAL COMMITTEE**

Dear Mr. Unger:

The City of Downey has voluntarily joined the Los Cerritos Channel Metals TMDL Technical Committee in the Development of the Watershed Management Program (WMP) and a Coordinated Integrated Monitoring Program (CIMP) and intends to comply with the requirements and provisions of Order No. R4-2012-0175. The Los Cerritos Channel Metals TMDL Technical Committee is comprised of the following permittees: the Cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill, as well as the Los Angeles County Flood Control District, and Caltrans.

The City of Downey signed a Memorandum of Agreement (MOA) with the Los Angeles Gateway Regional Water Management Joint Powers Authority for the Administration and Cost Sharing Resulting From Preparation of the Los Cerritos Channel Metals Total Maximum Daily Load Implementation Plan, Monitoring Program and Special Studies. This MOA has been used to begin preparation of a Watershed Management Program, but it will soon be replaced with an MOU for Development of a WMP or EWMP and a Coordinated Integrated Monitoring Program (CIMP).

The City recognizes that while maintaining the 18-month schedule for development of the WMP, the Technical Committee intends to continue to evaluate and consider the Enhanced WMP (EWMP) option. If the group decides prior to the December 28, 2013 deadline to develop an EWMP, your office will be notified in a separate letter and our City will participate in development of the EWMP.

Should you have any questions, please contact Jason Wen at 562-904-7201. Thank you.

Sincerely,

CITY OF DOWNEY

Gilbert A. Livas
City Manager

ATTACHMENT E.2:

CITY OF DOWNEY

DECEMBER 27, 2012 NOTICE

OF INTENT

City of Downey

FUTURE UNLIMITED

December 27, 2012

CITY COUNCIL

MAYOR
Dn. Mario A. Guerra

MAYOR PRO TEM
Fernando Vasquez

COUNCIL MEMBERS
Roger C. Brossmer
Luis H. Marquez
Alex Saab

CITY MANAGER
Gilbert A. Livas

CITY CLERK
Adria M. Jimenez, CMC

CITY ATTORNEY
Yvette M. Abich Garcia

Mr. Sam Unger
Executive Officer
Los Angeles Regional Water Quality Control Board
320 West 4th Street
Los Angeles, CA 90013

Subject: Notification of Intent to Participate in Development of a Watershed Management Program

Dear Mr. Unger:

The City of Downey hereby notifies the Regional Water Quality Control Board of our intent to participate in development of a Watershed Management Program (WMP). For the past years, we have participated with the Technical Committees for:

The San Gabriel River Metals TMDL,
The Los Cerritos Channel Metals TMDL, and
The Los Angeles River (Reach 2) Metals TMDL.

The attached map shows the portions of the city that discharge into the three water bodies. The City is already participating in multi-agency efforts for all the above watersheds and has a revenue source through the cities' Memoranda of Agreement. As per the recently adopted *NPDES Permit and CAS004001 for Municipal Separate Storm Sewer System (MS4) Discharges within the Coastal Watersheds of Los Angeles County, Except Those Discharges Originating from the City of Long Beach*, the City would prefer to begin immediately with the preparation of a standard WMP with a targeted December 28, 2013 due date and concurrently investigate other options. At this time, we are undecided if we will be submitting a single WMP or Enhanced WMP for the entire city or several WMPs or EWMPs for each sub-watershed within the city.

If within six months of the effective date of the permit we are able to demonstrate that LID ordinances and green street policies are either in effect or under development we intend to request a completion date of June 28, 2014 for our Watershed Management Program in order to gather more information and further strengthen our Program. During the initial months after the effective date of the permit, we intend to investigate the potential application of an EWMP for the San

RB-AR6783

Gabriel River Watershed, Los Cerritos Channel and the Los Angeles River Reach 2 Watersheds within the City's jurisdictional areas and/or participation in regional projects as appropriate. Prior to six months after the effective date of the permit we propose to notify the Regional Water Board whether or not we have elected to work towards an EWMP that meets the requirements of Part VI.C.4.c.IV of the permit.

As regards to the US EPA TMDLs of the San Gabriel River Watershed, Reach 1 and Los Cerritos Channel Sub-watersheds, the only interim or final WQBELs applicable are for the TMDLs for Metals. The schedule for meeting interim and final WQBELs associated with these TMDLs is uncertain at this time because the Regional Water Board is in the process of developing a Basin Plan. Although the draft Basin Plan Amendment has not yet been circulated for public review, we believe that no final or interim WQBEL compliance dates will occur prior to approval of a WMP or EWMP for the San Gabriel River Watershed, Reach 1 and/or the Los Cerritos Channel Sub-watersheds.

With respect to watershed control measures that will be implemented concurrently with the development of a WMP or EWMP, we will continue to implement watershed control measures in our existing storm water management programs and continue to implement watershed control measures to eliminate non-storm water discharges through the MS4 that are sources of pollutants to receiving waters.

We would appreciate receiving an acknowledgment that you have received this notice and concur with the approach that we have proposed to start immediately with preparation of a Watershed Management Program while reserving the right to alter our submittal date for a draft program plan(s) depending on our investigation of whether to (1) work individually or as part of a larger regional group and (2) the potential applicability of an EWMP.

Sincerely,

Alex Saab
Council Member

Encl.

ATTACHMENT E.3:

EXISTING CITY OF DOWNEY/GWMA MOA

MEMORANDUM OF AGREEMENT (MOA)
BETWEEN
THE LOS ANGELES GATEWAY REGION INTEGRATED REGIONAL WATER MANAGEMENT JOINT POWERS AUTHORITY
AND
THE CITY OF DOWNEY

RECEIVED
2013 APR 13 AM 9:22
CITY OF PARAMOUNT

FOR THE ADMINISTRATION AND COST SHARING RESULTING FROM PREPARATION OF THE LOS CERRITOS CHANNEL METALS TOTAL MAXIMUM DAILY LOAD IMPLEMENTATION PLAN, MONITORING PROGRAM, AND SPECIAL STUDIES

This Memorandum of Agreement ("Agreement") is made and entered into as of the date of the last signature, set forth below, by and between the Los Angeles Gateway Region Integrated Regional Water Management Joint Powers Authority ("Gateway Authority"), a California Joint Powers Authority, and the City of Downey, a California municipal corporation ("City"); hereinafter referred to as "Party" or "Parties":

RECITALS

WHEREAS, the mission of the Gateway Authority includes the equitable protection and management of water resources within its area; and

WHEREAS, portions of the Gateway Authority cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill, are located within the Los Cerritos Channel Watershed; and

WHEREAS, for the purposes of this Agreement, the term "Watershed Entities" shall include, to the extent that each enters into agreements substantially similar to this Agreement, the Gateway Authority cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill, as well as the California Department of Transportation ("Caltrans"), all of which manage or drain stormwater into at least a portion of the Los Cerritos Channel Watershed; and

WHEREAS, the United States Environmental Protection Agency ("USEPA") established the Los Cerritos Channel Metals Total Maximum Daily Load ("Metals TMDL") on March 17, 2010, with the intent of protecting and improving water quality in the Los Cerritos Channel Watershed; and

WHEREAS, this Metals TMDL will regulate certain discharges from NPDES Permit holders, requiring organization and cooperation among the regulated entities; and

WHEREAS, the Parties recognize that the proposed Metals TMDL is not self-enforcing, but could potentially become legally enforceable through incorporation into future National Pollutant Discharge Elimination System ("NPDES") Permits; and

WHEREAS, the Cities of Long Beach and Signal Hill funded technical assistance and studies on behalf of the Watershed Entities that resulted in technical modifications of the TMDL; and

WHEREAS, achieving the objectives of the Metals TMDL will be facilitated through preparation of an Implementation Plan ("IP"), a Monitoring Plan ("MP"), and specific Special Studies, by the Watershed Entities, to demonstrate compliance; and

WHEREAS, preparation of these plans and studies requires administrative and professional coordination services that the Gateway Authority can provide; and

WHEREAS, a Metals TMDL Technical Committee ("TC"), consisting of representatives of the Watershed Entities as well as stormwater experts, has been established to assist the Gateway Authority in coordinating the preparation and submission of the IP, MP, and any Special Studies to the California Regional Water Quality Control Board, Los Angeles Region on behalf of the Watershed Entities; and

WHEREAS, a Metals TMDL Steering Committee ("SC"), consisting of representatives of the Watershed Entities and other persons approved by the Watershed Entities, has been established for the purpose of overseeing administrative and fiscal coordination in support of achieving the Metals TMDL objectives; and

WHEREAS, the SC has determined that the approximately $250,000 spent by the Cities of Long Beach and Signal Hill in TMDL Development costs, along with the costs of preparing the IP, MP, and potential Special Studies and other related costs incurred by the Gateway Authority in administering this Agreement, should be shared by the Watershed Entities based on the cost allocation formula contained in Exhibit A; and

WHEREAS, the Gateway Authority will endeavor to conclude substantially similar agreements with all of the Watershed Entities in order to minimize the cost to each Watershed Entity of complying with the Metals TMDL.

NOW, THEREFORE, in consideration of the mutual covenants and conditions set forth herein, the Parties do hereby agree as follows:

Section 1. Recitals. The recitals set forth above are fully incorporated as part of this Agreement.

Section 2. Purpose. The purpose of this Agreement is to cooperatively support and undertake preparation of the IP, MP, and any Special Studies agreed to by the Parties.

Section 3. Cooperation. The Parties shall fully cooperate with one another to achieve the purposes of this Agreement.

Section 4. Voluntary Nature. The Parties voluntarily enter into this Agreement.

Section 5. Term. This Agreement shall remain and continue in effect until completion of the IP, MP, and any Special Studies agreed to by the Parties, or December 31, 2022, whichever occurs first.

Section 6. Role of the Gateway Authority.

a) The Gateway Authority shall endeavor to enter into substantially and materially similar agreements with each of the Watershed Entities.

b) Based on the directions of the TC, the Gateway Authority shall retain a consultant or consultants ("Consultant(s)") to prepare the IP, MP, and any agreed upon Special Studies to demonstrate compliance with the Metals TMDL. The Consultant's Scope of Work shall substantially conform to the Scope of Work set forth in Exhibit B to this Agreement.

c) The Gateway Authority shall invoice the Watershed Entities a proportional amount to cover the costs incurred by the Gateway Authority in the performance of its duties under this Agreement. Such costs shall include, but not be limited to, the costs of: the consultant's fees and costs for the preparation of the IP, MP, and Special Studies; Gateway Authority staff time; legal fees; audit expenses; and administering this Agreement (collectively, the "Agreement Costs"). The Gateway Authority shall invoice the Watershed Entities on an annual basis in an amount based on the Cost Share Formula in Exhibit A.

Section 7. Obligation to Pay Proportional Costs.

a) Upon receiving an invoice, the City shall pay the Gateway Authority its proportionate share of the Gateway Authority's anticipated Agreement Costs in accordance with the Cost Share Formula set forth in Exhibit A.

b) The Agreement shall become effective only if the Gateway Authority is able to execute substantially similar agreements with the cities of Bellflower, Lakewood and Long Beach. The City shall pay the adjusted proportional cost based on the Cost Share Formula set forth in Exhibit A. If the Gateway Authority is unable to execute materially similar agreements with any of the other Watershed Entities, the proportional costs set forth in Exhibit A shall be adjusted.

c) Any over or underpayment of Agreement costs shall be credited or billed to the City during the following period or, if it occurs in the last year of this Agreement, it shall be returned upon termination of this Agreement.

Section 8. Invoicing and Payment.

a) Payment to the Gateway Authority is due within sixty (60) days of the invoice date. The first invoice should be expected within sixty (60) days of signing this agreement. Invoices for future Agreement Costs will be billed annually in March, starting in the year 2011.

b) Any payment that is late shall be subject to interest from the due date. For any payment that is made from 1 to 30 days after the due date, the interest rate shall be equal to the Prime Rate in effect on the due date plus one (1) percent (e.g., if the Prime Rate is 5 percent, the interest rate for this Agreement will be 6 percent). For any payment made from 31 to 60 days after the due date, the interest rate shall be equal to the Prime Rate in effect on the due date plus five (5) percent. For payments made over 60 days after the due date, the interest rate shall be the Prime

Rate in effect on the due date plus ten (10) percent. The rates shall, nevertheless, not exceed the maximum allowed by law.

c) A Party will be delinquent if payment is not received within 120 days after first being invoiced by the Gateway Authority. The Gateway Authority will follow the procedure listed below, or such other procedure that the Steering Committee directs to effectuate payment: 1) verbally contact the official to whom notices should be addressed pursuant to Section 12 of this Agreement and 2) submit a formal letter from the Gateway Authority Executive Officer to the delinquent Watershed Entity. If payment is not received, the Gateway Authority may terminate the Agreement and recalculate the proportional cost for the remaining Watershed Entities.

d) Any interest accrued on the funds collected per this Agreement shall be applied toward the Agreement Costs. The Gateway Authority shall annually submit a report to the SC on the amount of interest accrued by the Agreement account. Funds remaining at the end of the term of this Agreement shall be returned to the participating Watershed Entities in accordance with the Cost Share Formula in Exhibit A.

Section 9. Independent Contractor.

a) The Gateway Authority is, and shall at all times remain, a wholly independent contractor for performance of the obligations described in this Agreement. The Gateway Authority's officers, officials, employees and agents shall at all times during the Term of this Agreement be under the exclusive control of the Gateway Authority. The Watershed Entities shall not control the conduct of the Gateway Authority or any of its officers, officials, employees or agents, except as set forth in this Agreement. The Gateway Authority, and its officers, officials, employees, and agents shall not be deemed to be employees of the Watershed Entities.
b) The Gateway Authority is solely responsible for the payment of salaries, wages, other compensation, employment taxes, worker's compensation, or similar taxes for its employees performing services hereunder.

Section 10. Indemnification and Insurance.

a) The Gateway Authority shall include an indemnification provision in the agreement with the Consultant requiring the Consultant to defend, indemnify and hold harmless the City and the Gateway Authority, and their officers, employees, and other representatives and agents, from and against any and all liabilities, actions, suits, proceedings, claims, demands, losses, costs, and expenses, including legal costs and attorney's fees, for injury to or death of person (s), for damage to property (including property owned by the Gateway Authority or the City) resulting from negligent or intentional acts, errors and omissions committed by Consultant, its officers, employees, and other representatives and agents, arising out of or related to Consultant's performance under this Agreement.

b) The City shall defend, indemnify and hold harmless the Gateway Authority, its officers, employees, and other representatives and agents of the Gateway Authority, from and against any and all liabilities, actions, suits, proceedings, claims, demands, losses, costs, and expenses, including legal costs and attorney's

fees, for injury to or death of person (s), for damage to property (including property owned by the Gateway Authority) and for negligent or intentional acts, errors and omissions committed by City, its officers, employees, and other representatives and agents, arising out of or related to City's performance under this Agreement, except for such loss as may be caused by Gateway Authority's gross negligence or intentional acts or the gross negligence or intentional acts of its officers, employees, or other representatives and agents.

c) Consultant's Insurance. The Gateway Authority shall require the Consultant to provide proof of current Automotive and/or General Liability, Professional (Errors and Omissions) in sufficient coverage amounts, naming the Gateway Authority and each Watershed Entity as an additional insured. Consultant shall also be required to provide proof of current Workman's Compensation insurance, when applicable.

Section 11. Termination of Agreement. Either Party may terminate this Agreement in whole or in part, for any reason, or no reason, by giving the other Party thirty (30) days written notice thereof. The City shall be responsible for Agreement Costs to which the Gateway Authority became bound prior to the date of termination. Such Agreement Costs shall include the remaining fees of any consultant retained by the Gateway Authority prior to the date of termination. Gateway Authority shall notify in writing all Watershed Entities within fourteen (14) days of receiving written notice from any Watershed Entity that said entity intends to terminate this Agreement. Each Watershed City's proportionate cost allocation shall be reapportioned thereafter in accordance with the Cost Share Formula in Exhibit A.

Section 12. Miscellaneous.

a) Notices. All notices which any Party is required or desires to give hereunder shall be in writing and shall be deemed given when delivered personally or three (3) days after mailing by registered or certified mail (return receipt requested) to the following address or as such other addresses as the Parties may from time to time designate by written notice in the aforesaid manner:

To Gateway Authority:
Ms. Annette Hubbell
Gateway Authority Executive Officer
City of Downey
11111 Brookshire Ave.
Downey, CA 90241

To City of Downey:
Gerald Caton
City Manager
P.O. Box 7016
Downey, CA, 90241-7016

b) Separate Accounting and Auditing. The Gateway Authority agrees to establish a separate account to track revenues and expenses resulting from the Agreement. Annual financial statements and audits will be made available to the participating Parties, after review and approval by the Metals TMDL SC.

c) Binding Effect. This Agreement shall be binding upon and inure to the benefit of each Party to this Agreement and its respective heirs, administrators, representatives and successors.

d) Amendment. The terms and provisions of this Agreement may not be amended, modified or waived, except by a written instrument signed by both Parties.

e) Waiver. Waiver by either Party of any term, condition, or covenant of this Agreement shall not constitute a waiver of any other term, condition, or covenant. Waiver, by any Party, to any breach of the provisions of this Agreement shall not constitute a waiver of any other provision, or a waiver of any subsequent breach of any provision of this Agreement.

f) Law to Govern; Venue. This Agreement shall be interpreted, construed, and governed according to the laws of the State of California. In the event of litigation between the Parties, venue shall lie exclusively in the County of Los Angeles.

g) No Presumption in Drafting. The Parties to this Agreement agree that the general rule that an Agreement is to be interpreted against the Party drafting it, or causing it to be prepared, shall not apply.

h) Severability. If any term, provision, condition or covenant of this Agreement is declared or determined by any court of competent jurisdiction to be invalid, void, or unenforceable, the remaining provisions of this Agreement shall not be affected thereby and this Agreement shall be read and construed without the invalid, void, or unenforceable provision(s).

i) Entire Agreement. This Agreement constitutes the entire agreement of the Parties with respect to the subject matter hereof and supersedes all prior or contemporaneous agreements, whether written or oral, with respect thereto.

j) Counterparts. This Agreement may be executed in any number of counterparts, each of which shall be an original, but all of which taken together shall constitute but one and the same instrument, provided, however, that such counterparts shall have been delivered to both Parties to this Agreement.

k) Legal Representation. All Parties have been represented by counsel in the preparation and negotiation of this Agreement. Accordingly, this Agreement shall be construed according to its fair language.

l) Agency Authorization. Each of the persons signing below on behalf of a Party represents and warrants that he or she is authorized to sign this Agreement on behalf of such Party.

IN WITNESS WHEREOF, the Parties hereto have caused this Agreement to be executed on their behalf, respectively, as follows:

DATE: 07-14-10

CITY OF DOWNEY

City Manager

ATTEST:

City Clerk

APPROVED AS TO FORM:

City Attorney

DATE: _____

LOS ANGELES GATEWAY REGION INTEGRATED REGIONAL WATER MANAGEMENT JOINT POWERS AUTHORITY

Gateway Authority Chair

ATTEST:

Gateway Authority Secretary

APPROVED AS TO FORM:

Gateway Authority General Counsel

EXHIBIT A

LOS CERRITOS CHANNEL METALS TMDL
COST ALLOCATION

Agency Name	Acres in Watershed[1]	Percent of Watershed Area	Agency Cost Share per $100,000		
			Flat Fee	Area Share	Total
Bellflower	2,818.43	16.00%	$5,000	$9,599	$14,599
CalTrans	497.74	2.83%	$5,000	$1,695	$6,695
Cerritos	57.60	0.33%	$5,000	$196	$5,196
Downey	245.00	1.39%	$5,000	$834	$5,834
Lakewood	4,802.77	27.26%	$5,000	$16,358	$21,358
Long Beach	7,535.38	42.77%	$5,000	$25,665	$30,665
Paramount	1,128.93	6.41%	$5,000	$3,845	$8,845
Signal Hill	530.75	3.01%	$5,000	$1,808	$6,808
JPA MOA Total	17,616.60	100.00%	$40,000	$60,000	$100,000
UNI Los Angeles Co.	94.40				
USEPA TMDL Total	17,711.00				

[1] CalTrans provided acreage values were subtracted from city acreage provided by USEPA.

EXHIBIT B

SCOPE OF WORK
FOR
DEVELOPMENT OF AN IMPLEMENTATION PLAN FOR AN EPA-ESTABLISHED METALS TMDL FOR THE LOS CERRITOS CHANNEL FRESHWATER WATERSHED

1. Prepare a detailed outline for Metals TMDL Implementation component to accompany the incorporation of the Metals TMDL in the reissued MS4 NPDES Permits, an Implementation Plan for the Los Cerritos Channel Metals TMDL

2. Prepare an Implementation Strategy, including
   a. An adaptive management approach,
   b. Tiered source control measures, and
   c. Tiered treatment control, if necessary

3. Prepare recommended Implementation Actions for
   a. Municipal Stormwater Permittees
   b. Caltrans
   c. Construction Stormwater Permittees
   d. Industrial Stormwater Permittees

4. Draft and Negotiate an Implementation Schedule acceptable to
   a. Municipal permittees
   b. The Los Angeles Regional Water Quality Control Board
   c. USEPA Region IX

5. Coordinate with Monitoring Consultant on Establishment of
   a. Ambient Monitoring Program
   b. TMDL Effectiveness Monitoring
   c. Special Studies, if any

6. Coordinate with Technical Committee and Steering Committee
   a. Attend meetings, as requested
   b. Submit draft materials to Technical Committee for review and approval
   c. Submit draft final materials to Steering Committee for review and approval before submittal to Regional Water Board

7. Coordinate with Regional Water Board staff
   a. Obtain an outline format for a Basin Plan Amendment
   b. Review Implementation Strategy with Regional Water Board staff
   c. Review Implementation Actions with Regional Water Board staff

Note: The Technical Committee may modify details of Scope of Work, if necessary.

LOS CERRITOS CHANNEL TMDL AMBIENT MONITORING

OVERVIEW

Ambient monitoring will establish baseline conditions for three major segments of the watershed and provide the necessary groundwork for effectiveness monitoring. The basic monitoring design used in the ambient monitoring effort will be the backbone of the effectiveness monitoring program.

OUTLINE OF MONITORING PROGRAM

Ambient Monitoring Program –Wet Season

Wet season monitoring is intended to provide measurement of trace metal concentrations and loads at the three sites representing each of three major segments of the Los Cerritos Channel storm drain. The following subtasks will be required for the first year of the program. The first two tasks will apply only to the first year.

1. Identify three additional monitoring sites
2. Purchase and install equipment to obtain automated flow-composite samples.
3. Continue monitoring at the City of Long Beach Stearns Street monitoring site.
4. Monitoring at all sites will include:
   - Continuous measurement of flow and rainfall
   - Collection of flow-rated composite samples for six (6) storm events
   - Analyses will include total hardness, TSS and trace metals. Trace metals will include dissolved and total fractions of copper, lead and zinc.

Ambient Monitoring Program –Dry Season

Dry weather flows will need to be monitored continuously throughout the summer dry season (May through September) and sampled to determine metals concentrations and loads. Alternative flow measurement techniques will be necessary during the summer dry season to provide continuous measurement of dry weather flow and more accurate baseline measurements of concentration and loads. Monitoring will be conducted at the same locations used for monitoring storm flows during the winter wet season. Subtasks for the dry weather ambient monitoring effort will include the following:

1. Determine flume sizes. Purchase the flumes, sidewalls (stop logs) for consolidating shallow flows, data loggers and high-precision pressure sensors for each site.
2. Install temporary flumes and electronic packages at the three TMDL monitoring sites and the Long Beach Mass Emission monitoring site during the summer.
3. Provide continuous measurements of summer dry weather flow at each site.
4. Collect grab samples for hardness, TSS and trace metals **4** times during the summer dry weather period and **2** times during winter dry weather period.

Reporting

Annual draft and final report will be submitted after the first full year of monitoring. The dates for submission of these reports will be established once the program is initiated.

* Notes: Details of scope may be modified by Technical Committee, if necessary.

ATTACHMENT F

CITY OF LAKEWOOD LETTER
OF INTENT AND RELATED
MATERIALS

ATTACHMENT F.1:

CITY OF LAKEWOOD
JUNE 26, 2013 LETTER OF
INTENT

June 26, 2013

Samuel Unger, Executive Office
L.A. Regional Water Quality Control Board
320 West Fourth Street, Suite 200
Los Angeles, CA 90013

Attn.: Renee Purdy

LETTER OF INTENT TO PARTICIPATE IN THE DEVELOPMENT OF A WATERSHED MANAGEMENT PROGRAM (WMP) AND COORDINATED INTEGRATED MONITORING PROGRAM (CIMP) IN COOPERATION WITH THE LOS CERRITOS CHANNEL WATERSHED GROUP

Dear Mr. Unger:

The City of Lakewood has voluntarily joined the Los Cerritos Channel Watershed Group in the Development of a Watershed Management Program (WMP) and a Coordinated Integrated Monitoring Program (CIMP) and intends to comply with the requirements and provisions of Order No. R4-2012-0175. The Los Cerritos Channel Watershed Group is comprised of the following permittees: the Cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill, as well as the Los Angeles County Flood Control District and Caltrans.

Our City complied with Part VI.C.4.c.i (1) and Part VI.C.4.c.iv (1) through submission of a Notice of Intent letter dated December 19, 2012 (attached). We are complying with Part VI.C.4.c.i (2) VI.C.4.c.iv (2) by attaching our draft Green Streets Policy and our draft LID Ordinance.

The City of Lakewood signed a Memorandum of Agreement (MOA) with the Los Angeles Gateway Regional Water Management Joint Powers Authority for the Administration and Cost Sharing Resulting From Preparation of the Los Cerritos Channel Metals Total Maximum Daily Load Implementation Plan, Monitoring Program and Special Studies (Attached). This MOA has been used to begin preparation of a Watershed Management Program, but it will soon be replaced with an MOU for Development of a WMP or EWMP and a Coordinated Integrated Monitoring Program (CIMP).

The City recognizes that while maintaining the 18-month schedule for development of the WMP, the Los Cerritos Channel Watershed Group intends to continue to evaluate and consider the Enhanced WMP (EWMP) option. If the group decides prior to December 28, 2013 deadline to develop an EWMP, your office will be notified in a separate letter, and the City of Signal Hill will participate in the development of the EWMP.

At their meeting on June 25, 2012, the City Council authorized the submittal of this letter of intent. In addition, the City Council has approved a draft Green Streets Policy and draft Low Impact Development (LID) Ordinance.

Should you have any questions, please contact me at Konya Vivanti at (562) 866-9771 ext. 2507. Thank you.

Sincerely,

Howard L. Chambers
City Manager

ATTACHMENT F.2:

CITY OF LAKEWOOD

DECEMBER 19, 2012

NOTIFICATION OF INTENT

December 19, 2012

Mr. Sam Unger
Executive Officer
Los Angeles Regional Water Quality Control Board
320 W. 4th Street
Los Angeles, CA 90013

Subject: Notification of Intent to Participate in Development of a Watershed Management Program for the Los Cerritos Channel Watershed

Dear Mr. Unger:

The City of Lakewood hereby notifies the Regional Water Board of our intent to participate in development of a Watershed Management Program (WMP) for the portion of the City within the Los Cerritos Channel Watershed. We have participated with the other cities for the last few years on the Technical Committee for the Los Cerritos Channel Metals TMDL (see attached map for portions of cities within Los Cerritos Channel Watershed). The Technical Committee has determined that we should begin immediately on development of a Watershed Management Program pursuant to Part VI.C of the recently adopted *NPDES Permit CAS004001 for Municipal Separate Storm Sewer System (MS4) Discharges within the Coastal Watersheds of Los Angeles County. Except Those Discharges Originating from the City of Long Beach.*

Since we are already organized and have a revenue source through a Memoranda of Agreement that the Cities have entered into with the Gateway Water Management Authority, the Technical Committee does not want to waste several months deciding which Watershed Management Program or Enhanced Watershed Management Program (EWMP) option to choose. Rather, we

and the other participating cities would prefer to start immediately on a standard WMP with a December 28, 2013 due date and concurrently investigate other options.

If within six months of the effective date of the permit we are able to demonstrate that LID ordinances and green street policies were either in effect or under development within 60 days of the effective date of the permit and that draft LID ordinances and draft green street policies are in place in greater than 50% of the watershed, we intend to request a completion date of June 28, 2014 for our Watershed Management Program in order to gather more information and further strengthen the Program. In addition, during the initial months after the effective date of the permit, the Technical Committee intends to investigate the potential application of an EWMP for the Los Cerritos Watershed. Prior to six months after the effective date of the permit we propose to notify the Regional Water Board whether or not we have elected to collaborate on an EWMP that meets the requirements of Part VI.C.4.c.IV of the permit.

There are no interim or final trash water quality based effluent limitations (WQBELs) applicable to the Los Cerritos Channel Watershed. The only interim or final WQBELs applicable to the Los Cerritos Channel Watershed are for the Los Cerritos Channel Total Maximum Daily Loads for Metals established by EPA on March 17, 2010. The schedule for meeting interim and final WQBELs associated with this TMDL is uncertain at this time because the Regional Water Board is in the process of developing a Basin Plan Amendment for implementation of the Los Cerritos Channel TMDLs for Metals and the TMDLs for Metals and Selenium for the San Gabriel River and Impaired Tributaries established by EPA on March 26, 2007. The Technical Committee and

its consultant have met with your staff regarding development of the Basin Plan Amendment and have submitted two draft implementation schedules. Although the draft Basin Plan Amendment has not yet been circulated for public review, we believe that no final or interim WQBEL compliance dates will occur prior to approval of a WMP or EWMP for the Los Cerritos Watershed.

With respect to watershed control measures that will be implemented by participating agencies concurrently with the development of a WMP or EWMP, we are not entirely sure. We do know that we will continue to implement watershed control measures in our existing stormwater management programs and continue to implement watershed control measures to eliminate non-stormwater discharges through the MS4 that are sources of pollutants to receiving waters. We also know that a Proposition 84 Planning and Monitoring Grant received by the Gateway Water Management Authority to determine optimal locations for retrofitting LID and water harvesting measures within the Los Cerritos Channel Watershed will be underway while a WMP or EWMP is being developed. In addition, the Technical Committee is analyzing local measures that can be included in the Basin Plan Amendment and implemented concurrently with development of a WMP or an EWMP.

We would appreciate receiving an acknowledgment that you have received this notice and concur with the approach that we have proposed to start immediately with preparation of a Watershed Management Program while reserving the right to alter our submittal date for a draft program plan depending on the development of LID ordinances and green streets policies within the watershed and our investigation of the potential applicability of an EWMP for the watershed.

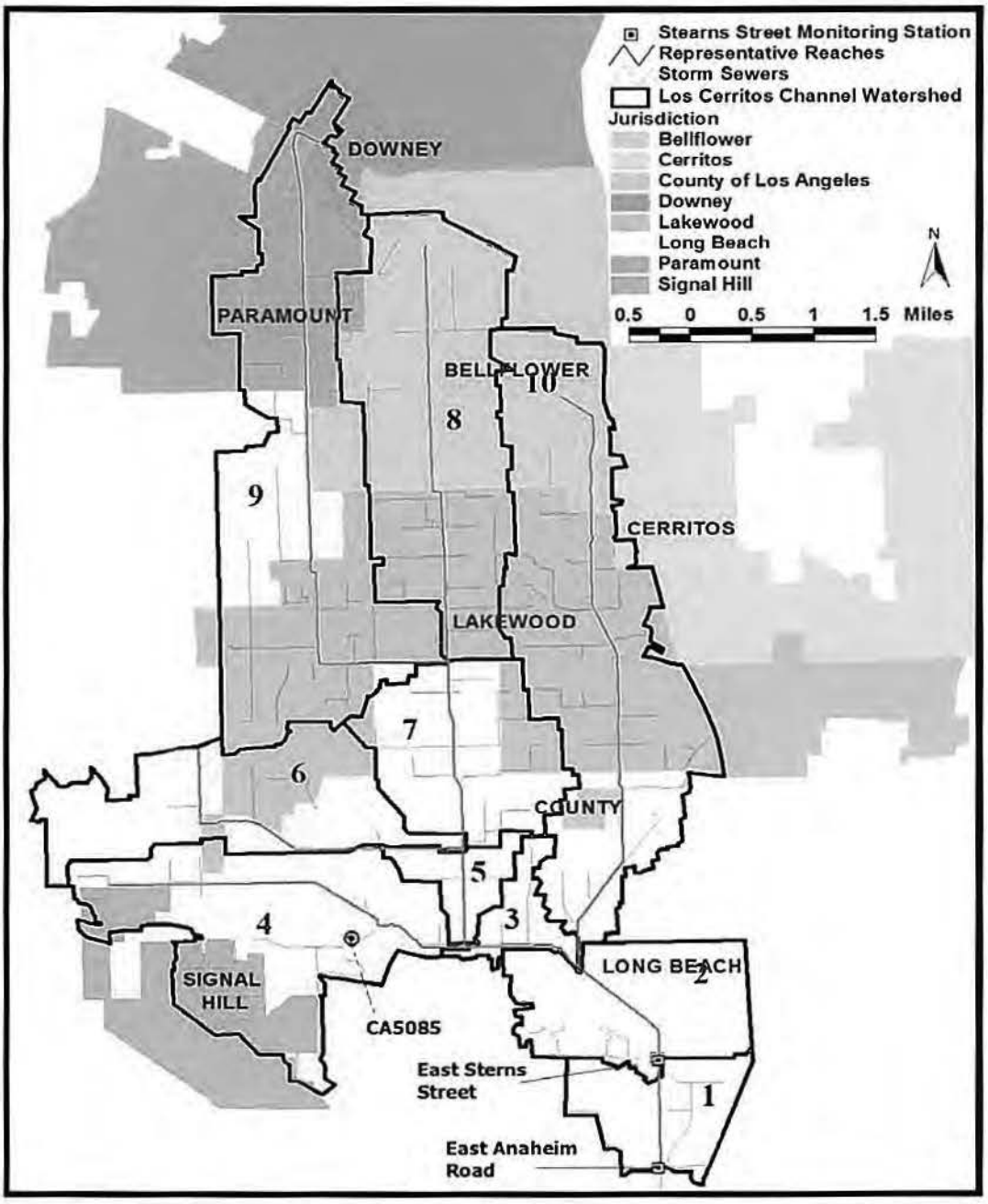
Sincerely,

Howard L. Chambers
City Manager

Attachment

Los Cerritos Channel Freshwater Watershed

Municipalities and Metals TMDL Sub-basins



ATTACHMENT F.3:

EXISTING CITY OF LAKEWOOD/GWMA MOA

ROUTINE ITEMS: Continued

RI-9 Authorization to Release Subdivision Improvement Bonds for Tract Map No. 53949 *T53949*

UPON ROLL CALL VOTE, THE MOTION WAS APPROVED:

AYES: COUNCIL MEMBERS: Rogers, Croft, Wood, DuBois and Van Nostran
NAYS: COUNCIL MEMBERS: None

1.1 • ORDINANCE NO. 2011-3; APPROVING A SPECIFIC PLAN FOR 4900 AND 4970 CLARK AVENUE *501 Specific Plan -4900 & 4970 Clark Ave.*

ORDINANCE NO. 2011-3; AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF LAKEWOOD ADOPTING THE CIVIC CENTER SPECIFIC PLAN was read by title by Mayor Van Nostran.

Mayor Van Nostran opened the public hearing at 7:35 p.m. and called for anyone in the audience wishing to address the City Council on this matter. There was no response.

COUNCIL MEMBER ROGERS MOVED AND COUNCIL MEMBER CROFT SECONDED TO WAIVE FURTHER READING AND ADOPT ORDINANCE NO. 2011-3. UPON ROLL CALL VOTE, THE MOTION WAS APPROVED:

AYES: COUNCIL MEMBERS: Rogers, Croft, Wood, DuBois and Van Nostran
NAYS: COUNCIL MEMBERS: None

3.1 • CONTRIBUTION FOR THE LOS CERRITOS CHANNEL METALS TOTAL MAXIMUM DAILY LOAD (TMDL) *471 Total Maximum Daily Load (TMDL)*

Public Works Director Lisa Rapp displayed slides and gave a presentation based on the report in the agenda. She stated that Lakewood was part of a regional group working through the Gateway Cities Council of Governments (COG) to develop an implementation plan for the Los Cerritos Channel Metals Total Maximum Daily Load (TMDL) to reduce the levels of copper, lead and zinc in the runoff. She advised that the costs for compliance with the TMDL were shared by the seven affected cities and Caltrans, with a payment required at this time. It was the recommendation of staff that the City Council approve a payment for the Lakewood share of the project, to date, in an amount of $106,788.26 from the General Fund. *220 Los Angeles Gateway Region Integrated Regional Water Management Joint Powers Authority*

Responding to a question from Vice Mayor DuBois, Ms. Rapp stated that working through the COG was very advantageous for the City as it allows the participating cities to share the cost of consultants in areas where the cities lacked necessary technical expertise.

Ms. Rapp responded to questions from Council Member Rogers by stating that since these were regulations coming down from the U.S. Environmental Protection Agency, it was hoped that a funding source would be identified, as compliance was very expensive for everyone involved, and that with the next year, we would have a clearer picture of the timeframe and requirements ahead.

3.1 • CONTRIBUTION FOR THE LOS CERRITOS CHANNEL METALS TOTAL MAXIMUM DAILY LOAD (TMDL) - Continued

Council Member Croft observed that the timetable in the consent decree was quickly approaching. Ms. Rapp stated that the City would not be considered in violation as long as we were working with the EPA and showing effort.

VICE MAYOR DUBOIS MOVED AND COUNCIL MEMBER WOOD SECONDED TO APPROVE STAFF'S RECOMMENDATION. UPON ROLL CALL VOTE, THE MOTION WAS APPROVED:

AYES: COUNCIL MEMBERS: Rogers, Croft, Wood, DuBois and Van Nostran
NAYS: COUNCIL MEMBERS: None

3.2 • STATEWIDE WATER SUPPLY UPDATE

481
Water Conservation

Water Resources Director Jim Glancy displayed slides and made a presentation based on the report in the agenda. He stated the Governor had declared an official end to the drought in California. He reported that the State's reservoirs were near maximum capacity, the snowpack was at 165 percent of average for the season, and the Metropolitan Water District would not be restricting deliveries. He noted that since there were still regulatory restrictions and State mandates which required a reduction in per capita water use by 20 percent in the year 2020, continued conservation was necessary. He concluded by issuing a reminder of the rebate program available for landscape water conservation devices. It was the recommendation of staff that the City Council direct staff to continue to promote water conservation in an effort to meet the mandate to reduce water use by 20 percent per capita by 2020.

Council Member Croft stated that with the drought over, the issue of water storage would not be a priority, even though a couple of dry years could mean water shortages again. He stressed the importance of continuing to work on the long-term issue of water storage.

Council Member Rogers stated that it was frustrating that in a time of plenty, so much surplus water was left to go out to the ocean for lack of storage. He noted that the technology existed to store more water underground, but that politics kept getting in the way. He inquired if there was any movement on the State level toward water storage. Mr. Glancy responded by stating the Association of California Water Agencies (ACWA) had a blueprint out for a proposed aqueduct system of tunnels that would move water through the Sacramento bay delta while preserving the ecosystem, but that there was not much interest at present.

COUNCIL MEMBER CROFT MOVED AND COUNCIL MEMBER WOOD SECONDED TO APPROVE STAFF'S RECOMMENDATION. UPON ROLL CALL VOTE, THE MOTION WAS APPROVED:

AYES: COUNCIL MEMBERS: Rogers, Croft, Wood, DuBois and Van Nostran
NAYS: COUNCIL MEMBERS: None

MEMORANDUM OF AGREEMENT (MOA)
BETWEEN
THE LOS ANGELES GATEWAY REGION INTEGRATED REGIONAL WATER MANAGEMENT JOINT POWERS AUTHORITY
AND
THE CITY OF LAKEWOOD

FOR THE ADMINISTRATION AND COST SHARING RESULTING FROM PREPARATION OF THE LOS CERRITOS CHANNEL METALS TOTAL MAXIMUM DAILY LOAD IMPLEMENTATION PLAN, MONITORING PROGRAM, AND SPECIAL STUDIES

This Memorandum of Agreement ("Agreement") is made and entered into as of the date of the last signature, set forth below, by and between the Los Angeles Gateway Region Integrated Regional Water Management Joint Powers Authority ("Gateway Authority"), a California Joint Powers Authority, and the City of Lakewood, a California municipal corporation ("City"); hereinafter referred to as "Party" or "Parties":

RECITALS

WHEREAS, the mission of the Gateway Authority includes the equitable protection and management of water resources within its area; and

WHEREAS, portions of the Gateway Authority cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill, are located within the Los Cerritos Channel Watershed; and

WHEREAS, for the purposes of this Agreement, the term "Watershed Entities" shall include, to the extent that each enters into agreements substantially similar to this Agreement, the Gateway Authority cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill, as well as the California Department of Transportation ("Caltrans"), all of which manage or drain stormwater into at least a portion of the Los Cerritos Channel Watershed; and

WHEREAS, the United States Environmental Protection Agency ("USEPA") established the Los Cerritos Channel Metals Total Maximum Daily Load ("Metals TMDL") on March 17, 2010, with the intent of protecting and improving water quality in the Los Cerritos Channel Watershed; and

WHEREAS, this Metals TMDL will regulate certain discharges from NPDES Permit holders, requiring organization and cooperation among the regulated entities; and

WHEREAS, the Parties recognize that the proposed Metals TMDL is not self-enforcing, but could potentially become legally enforceable through incorporation into future National Pollutant Discharge Elimination System ("NPDES") Permits; and

WHEREAS, the Cities of Long Beach and Signal Hill funded technical assistance and studies on behalf of the Watershed Entities that resulted in technical modifications of the TMDL; and

WHEREAS, achieving the objectives of the Metals TMDL will be facilitated through preparation of an Implementation Plan ("IP"), a Monitoring Plan ("MP"), and specific Special Studies, by the Watershed Entities, to demonstrate compliance; and

WHEREAS, preparation of these plans and studies requires administrative and professional coordination services that the Gateway Authority can provide; and

WHEREAS, a Metals TMDL Technical Committee ("TC"), consisting of representatives of the Watershed Entities as well as stormwater experts, has been established to assist the Gateway Authority in coordinating the preparation and submission of the IP, MP, and any Special Studies to the California Regional Water Quality Control Board, Los Angeles Region on behalf of the Watershed Entities; and

WHEREAS, a Metals TMDL Steering Committee ("SC"), consisting of representatives of the Watershed Entities and other persons approved by the Watershed Entities, has been established for the purpose of overseeing administrative and fiscal coordination in support of achieving the Metals TMDL objectives; and

WHEREAS, the SC has determined that the approximately $293,000 spent by the Cities of Long Beach ($136,000) and Signal Hill ($157,000) in TMDL Development costs, along with the costs of preparing the IP, MP, and potential Special Studies and other related costs incurred by the Gateway Authority in administering this Agreement, should be shared by the Watershed Entities based on the cost allocation formula contained in Exhibit A; and

WHEREAS, the Gateway Authority will endeavor to conclude substantially similar agreements with all of the Watershed Entities in order to minimize the cost to each Watershed Entity of complying with the Metals TMDL.

NOW, THEREFORE, in consideration of the mutual covenants and conditions set forth herein, the Parties do hereby agree as follows:

Section 1. Recitals. The recitals set forth above are fully incorporated as part of this Agreement.

Section 2. Purpose. The purpose of this Agreement is to cooperatively support and undertake preparation of the IP, MP, and any Special Studies agreed to by the Parties.

Section 3. Cooperation. The Parties shall fully cooperate with one another to achieve the purposes of this Agreement.

Section 4. Voluntary Nature. The Parties voluntarily enter into this Agreement.

Section 5. Term. This Agreement shall remain and continue in effect until completion of the IP, MP, and any Special Studies agreed to by the Parties, or December 31, 2022, whichever occurs first.

Section 6. Role of the Gateway Authority.

a) The Gateway Authority shall endeavor to enter into substantially and materially similar agreements with each of the Watershed Entities.

b) Based on the directions of the TC, the Gateway Authority shall retain a Consultant or Consultants ("Consultant(s)") to prepare the IP, MP, and any agreed upon Special Studies to demonstrate compliance with the Metals TMDL. The Consultant's Scope of Work shall substantially conform to the Scope of Work set forth in Exhibit B to this Agreement.

c) The Gateway Authority shall invoice the Watershed Entities a proportional amount to cover the costs incurred by the Gateway Authority in the performance of its duties under this Agreement. Such costs shall include, but not be limited to, the costs of: the Consultant's fees and costs for the preparation of the IP, MP, and Special Studies; Gateway Authority staff time; legal fees; audit expenses; and administering this Agreement (collectively, the "Agreement Costs"). The Gateway Authority shall invoice the Watershed Entities on an annual basis in an amount based on the Cost Share Formula in Exhibit A.

Section 7. Obligation to Pay Proportional Costs.

a) Upon receiving an invoice, the City shall pay the Gateway Authority its proportionate share of the Gateway Authority's anticipated Agreement Costs in accordance with the Cost Share Formula set forth in Exhibit A.

b) The Agreement shall become effective only if the Gateway Authority is able to execute substantially similar agreements with the cities of Bellflower, Lakewood and Long Beach. The City shall pay the adjusted proportional cost based on the Cost Share Formula set forth in Exhibit A. If the Gateway Authority is unable to execute materially similar agreements with any of the other Watershed Entities, the proportional costs set forth in Exhibit A shall be adjusted.

c) Any over or underpayment of Agreement costs shall be credited or billed to the City during the following period or, if it occurs in the last year of this Agreement, it shall be returned upon termination of this Agreement.

Section 8. Invoicing and Payment.

a) Payment to the Gateway Authority is due within sixty (60) days of the invoice date. The first invoice should be expected within sixty (60) days of signing this agreement. Invoices for future Agreement Costs will be billed annually in March, starting in the year 2011.

b) Any payment that is late shall be subject to interest from the due date. For any payment that is made from 1 to 30 days after the due date, the interest rate shall be equal to the Prime Rate in effect on the due date plus one (1) percent (e.g., if the Prime Rate is 5 percent, the interest rate for this Agreement will be 6 percent). For any payment made from 31 to 60 days after the due date, the interest rate shall be equal to the Prime Rate in effect on the due date plus five (5) percent. For payments made over 60 days after the due date, the interest rate shall be the Prime Rate in effect on the due date plus ten (10) percent. The rates shall, nevertheless, not exceed the maximum allowed by law.

c) A Party will be delinquent if payment is not received within 120 days after first being invoiced by the Gateway Authority. The Gateway Authority will follow the procedure listed below, or such other procedure that the Steering Committee directs to effectuate payment: 1) verbally contact the official to whom notices should be addressed pursuant to Section 12 of this Agreement and 2) submit a formal letter from the Gateway Authority Executive Officer to the delinquent Watershed Entity. If payment is not received, the Gateway Authority may terminate the Agreement and recalculate the proportional cost for the remaining Watershed Entities.

d) Any interest accrued on the funds collected per this Agreement shall be applied toward the Agreement Costs. The Gateway Authority shall annually submit a report to the SC on the amount of interest accrued by the Agreement account. Funds remaining at the end of the term of this Agreement shall be returned to the participating Watershed Entities in accordance with the Cost Share Formula in Exhibit A.

Section 9. Independent Contractor.

a) The Gateway Authority is, and shall at all times remain, a wholly independent contractor for performance of the obligations described in this Agreement. The Gateway Authority's officers, officials, employees and agents shall at all times during the Term of this Agreement be under the exclusive control of the Gateway Authority. The Watershed Entities shall not control the conduct of the Gateway Authority or any of its officers, officials, employees or agents, except as set forth in this Agreement. The Gateway Authority, and its officers, officials, employees, and agents shall not be deemed to be employees of the Watershed Entities.

b) The Gateway Authority is solely responsible for the payment of salaries, wages, other compensation, employment taxes, worker's compensation, or similar taxes for its employees performing services hereunder.

Section 10. Indemnification and Insurance.

a) The Gateway Authority shall include an indemnification provision in the agreement with the Consultant requiring the Consultant to defend, indemnify and hold harmless the City and the Gateway Authority, and their officers, employees, and other representatives and agents, from and against any and all liabilities, actions, suits, proceedings, claims, demands, losses, costs, and expenses, including legal costs and attorney's fees, for injury to or death of person (s), for damage to property (including property owned by the Gateway Authority or the City) resulting from negligent or intentional acts, errors and omissions committed by Consultant, its officers, employees, and other representatives and agents, arising out of or related to Consultant's performance under this Agreement.

b) The City shall defend, indemnify and hold harmless the Gateway Authority, its officers, employees, and other representatives and agents of the Gateway Authority, from and against any and all liabilities, actions, suits, proceedings, claims, demands, losses, costs, and expenses, including legal costs and attorney's fees, for injury to or death of person (s), for damage to property (including property owned by the Gateway Authority) and for negligent or intentional acts, errors and omissions committed by City, its officers, employees, and other representatives and agents, arising out of or related to City's performance under this Agreement, except for such loss as may be caused by Gateway Authority's gross negligence or intentional acts or the gross negligence or intentional acts of its officers, employees, or other representatives and agents.

c) Consultant's Insurance. The Gateway Authority shall require the Consultant to provide proof of current Automotive and/or General Liability, Professional (Errors and Omissions) in sufficient coverage amounts, naming the Gateway Authority and each Watershed Entity as an additional insured. Consultant shall also be required to provide proof of current Workman's Compensation insurance, when applicable.

Section 11. Termination of Agreement. Either Party may terminate this Agreement in whole or in part, for any reason, or no reason, by giving the other Party thirty (30) days written notice thereof. The City shall be responsible for Agreement Costs to which the Gateway Authority became bound prior to the date of termination. Such Agreement Costs shall include the remaining fees of any Consultant retained by the Gateway Authority prior to the date of termination. Gateway Authority shall notify in writing all Watershed Entities within fourteen (14) days after receiving written notice from any Watershed Entity that said entity intends to terminate this Agreement. Each

Watershed City's proportionate cost allocation shall be reapportioned thereafter in accordance with the Cost Share Formula in Exhibit A.

Section 12. Miscellaneous.

a) Notices. All notices which any Party is required or desires to give hereunder shall be in writing and shall be deemed given when delivered personally or three (3) days after mailing by registered or certified mail (return receipt requested) to the following address or as such other addresses as the Parties may from time to time designate by written notice in the aforesaid manner:

To Gateway Authority:
Ms. Annette Hubbell
Gateway Authority Executive Officer
City of Downey
11111 Brookshire Ave.
Downey, CA 90241

To City of Lakewood:
City Clerk
City of Lakewood
5050 Clark Avenue
Lakewood, CA 90712

b) Separate Accounting and Auditing. The Gateway Authority agrees to establish a separate account to track revenues and expenses resulting from the Agreement. Annual financial statements and audits will be made available to the participating Parties, after review and approval by the Metals TMDL SC.

c) Binding Effect. This Agreement shall be binding upon and inure to the benefit of each Party to this Agreement and its respective heirs, administrators, representatives and successors.

d) Amendment. The terms and provisions of this Agreement may not be amended, modified or waived, except by a written instrument signed by both Parties.

e) Waiver. Waiver by either Party of any term, condition, or covenant of this Agreement shall not constitute a waiver of any other term, condition, or covenant. Waiver, by any Party, to any breach of the provisions of this Agreement shall not constitute a waiver of any other provision, or a waiver of any subsequent breach of any provision of this Agreement.

f) Law to Govern; Venue. This Agreement shall be interpreted, construed, and governed according to the laws of the State of California. In the event of litigation between the Parties, venue shall lie exclusively in the County of Los Angeles.

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g) No Presumption in Drafting. The Parties to this Agreement agree that the general rule that an Agreement is to be interpreted against the Party drafting it, or causing it to be prepared, shall not apply.

h) Severability. If any term, provision, condition or covenant of this Agreement is declared or determined by any court of competent jurisdiction to be invalid, void, or unenforceable, the remaining provisions of this Agreement shall not be affected thereby and this Agreement shall be read and construed without the invalid, void, or unenforceable provision(s).

i) Entire Agreement. This Agreement constitutes the entire agreement of the Parties with respect to the subject matter hereof and supersedes all prior or contemporaneous agreements, whether written or oral, with respect thereto.

j) Counterparts. This Agreement may be executed in any number of counterparts, each of which shall be an original, but all of which taken together shall constitute but one and the same instrument, provided, however, that such counterparts shall have been delivered to both Parties to this Agreement.

k) Legal Representation. All Parties have been represented by counsel in the preparation and negotiation of this Agreement. Accordingly, this Agreement shall be construed according to its fair language.

l) Agency Authorization. Each of the persons signing below on behalf of a Party represents and warrants that he or she is authorized to sign this Agreement on behalf of such Party.

IN WITNESS WHEREOF, the Parties hereto have caused this Agreement to be executed on their behalf, respectively, as follows:

DATE: 8-24-2010

CITY OF LAKEWOOD

City Official

ATTEST:

City Clerk

APPROVED AS TO FORM:

City Attorney

DATE: _____

LOS ANGELES GATEWAY REGION
INTEGRATED REGIONAL WATER
MANAGEMENT JOINT POWERS AUTHORITY

Gateway Authority Chair

ATTEST:

Gateway Authority Secretary

APPROVED AS TO FORM:

Gateway Authority General Counsel

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EXHIBIT A

LOS CERRITOS CHANNEL METALS TMDL
COST ALLOCATION

Agency Name	Acres in Watershed[1]	Percent of Watershed Area	Agency Cost Share per $100,000		
			Flat Fee	Area Share	Total
Bellflower	2,818.43	16.00%	$5,000	$9,599	$14,599
CalTrans	497.74	2.83%	$5,000	$1,695	$6,695
Cerritos	57.60	0.33%	$5,000	$196	$5,196
Downey	245.00	1.39%	$5,000	$834	$5,834
Lakewood	4,802.77	27.26%	$5,000	$16,358	$21,358
Long Beach	7,535.38	42.77%	$5,000	$25,665	$30,665
Paramount	1,128.93	6.41%	$5,000	$3,845	$8,845
Signal Hill	530.75	3.01%	$5,000	$1,808	$6,808
JPA MOA Total	17,616.60	100.00%	$40,000	$60,000	$100,000
UNI Los Angeles Co.	94.40				
USEPA TMDL Total	17,711.00				

[1] CalTrans provided acreage values were subtracted from city acreage provided by USEPA.

The City of Long Beach and Signal Hill's annual payments as shown above shall be offset by the credits outlined in the Recitals of the Agreement.

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EXHIBIT B

SCOPE OF WORK
FOR
DEVELOPMENT OF AN IMPLEMENTATION PLAN FOR AN EPA-ESTABLISHED METALS TMDL FOR THE LOS CERRITOS CHANNEL FRESHWATER WATERSHED

1. Prepare a detailed outline for Metals TMDL Implementation component to accompany the incorporation of the Metals TMDL in the reissued MS4 NPDES Permits, an Implementation Plan for the Los Cerritos Channel Metals TMDL

2. Prepare an Implementation Strategy, including
   a. An adaptive management approach,
   b. Tiered source control measures, and
   c. Tiered treatment control, if necessary

3. Prepare recommended Implementation Actions for
   a. Municipal Stormwater Permittees
   b. Caltrans
   c. Construction Stormwater Permittees
   d. Industrial Stormwater Permittees

4. Draft and Negotiate an Implementation Schedule acceptable to
   a. Municipal permittees
   b. The Los Angeles Regional Water Quality Control Board
   c. USEPA Region IX

5. Coordinate with Monitoring Consultant on Establishment of
   a. Ambient Monitoring Program
   b. TMDL Effectiveness Monitoring
   c. Special Studies, if any

6. Coordinate with Technical Committee and Steering Committee
   a. Attend meetings, as requested
   b. Submit draft materials to Technical Committee for review and approval
   c. Submit draft final materials to Steering Committee for review and approval before submittal to Regional Water Board

7. Coordinate with Regional Water Board staff
   a. Obtain an outline format for a Basin Plan Amendment
   b. Review Implementation Strategy with Regional Water Board staff
   c. Review Implementation Actions with Regional Water Board staff

Note: The Technical Committee may modify details of Scope of Work, if necessary.

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LOS CERRITOS CHANNEL TMDL AMBIENT MONITORING

OVERVIEW

Ambient monitoring will establish baseline conditions for three major segments of the watershed and provide the necessary groundwork for effectiveness monitoring. The basic monitoring design used in the ambient monitoring effort will be the backbone of the effectiveness monitoring program.

OUTLINE OF MONITORING PROGRAM

Ambient Monitoring Program –Wet Season

Wet season monitoring is intended to provide measurement of trace metal concentrations and loads at the three sites representing each of three major segments of the Los Cerritos Channel storm drain. The following subtasks will be required for the first year of the program. The first two tasks will apply only to the first year.

1. Identify three additional monitoring sites
2. Purchase and install equipment to obtain automated flow-composite samples.
3. Continue monitoring at the City of Long Beach Stearns Street monitoring site.
4. Monitoring at all sites will include:
   - Continuous measurement of flow and rainfall
   - Collection of flow-rated composite samples for six (6) storm events
   - Analyses will include total hardness, TSS and trace metals. Trace metals will include dissolved and total fractions of copper, lead and zinc.

Ambient Monitoring Program –Dry Season

Dry weather flows will need to be monitored continuously throughout the summer dry season (May through September) and sampled to determine metals concentrations and loads. Alternative flow measurement techniques will be necessary during the summer dry season to provide continuous measurement of dry weather flow and more accurate baseline measurements of concentration and loads. Monitoring will be conducted at the same locations used for monitoring storm flows during the winter wet season. Subtasks for the dry weather ambient monitoring effort will include the following:

1. Determine flume sizes. Purchase the flumes, sidewalls (stop logs) for consolidating shallow flows, data loggers and high-precision pressure sensors for each site.
2. Install temporary flumes and electronic packages at the three TMDL monitoring sites and the Long Beach Mass Emission monitoring site during the summer.
3. Provide continuous measurements of summer dry weather flow at each site.
4. Collect grab samples for hardness, TSS and trace metals **4** times during the summer dry weather period and **2** times during winter dry weather period.

Reporting

Annual draft and final report will be submitted after the first full year of monitoring. The dates for submission of these reports will be established once the program is initiated.

* Notes: Details of scope may be modified by Technical Committee, if necessary.

TO: The Honorable Mayor and City Council

SUBJECT: Approve A Memorandum of Agreement with the Los Angeles Gateway Region Integrated Regional Water management Joint Powers Authority (JPA) for the Administration of the Los Cerritos Channel Total Maximum Daily Load for Metals

INTRODUCTION

In March 2010, the United States Environmental Protection Agency (USEPA) approved and issued the Los Cerritos Channel Total Maximum Daily Loads for Metals. This regulation sets limits on the amount of copper, lead and zinc that reaches the Los Cerritos Channel from urban runoff. This TMDL affects the Cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, Signal Hill and Caltrans, as they are all a source of runoff to the Los Cerritos Channel. The Cities, Caltrans, and the JPA have developed an agreement to develop monitoring and implementation programs and special studies to address scientific and technical issues resulting from approval of the TMDL and its incorporation into the Municipal Separate Storm Sewer System (MS4) Permit. The City Council is requested to approve the attached Memorandum of Agreement with the JPA regarding the administration and cost sharing for the implementation of the Los Cerritos Channel Metals TMDL.

BACKGROUND

Over the years, water quality in rivers, streams and lakes has been impaired by pollutants from a variety of sources. However since the signing of the Federal Clean Water Act (CWA) in 1972, water quality has improved greatly, primarily through regulation of point source discharges. Although, great efforts have been made in restoring our state's water quality, there are still impaired water bodies that need attention. Restoring water quality is crucial in maintaining a healthy environment and ensuring the sustainability of such water bodies.

The Los Cerritos Channel has been identified by the EPA as having exceeded water quality objectives for a variety of metals. For this reason, the Clean Water Act requires a Total Maximum Daily Load (TMDL) be developed to restore the impaired waterbodies to their full beneficial uses. The purpose of the TMDL program for metals is to: 1) to clean-up impaired surface water bodies, 2) to return those water bodies to their most beneficial use, 3) to maintain clean-up levels, once clean-up has been attained.

SUMMARY

The City of Lakewood drains to San Gabriel and Los Angeles Rivers, and Coyote Creek however a 4,803 acre portion of Lakewood drains into the 17,617 acre Los Cerritos Channel watershed shown in Figure 1. Lakewood has the second highest percentage of acreage in the watershed, next to Long Beach. According to a judicial consent decree between environmental organizations and the USEPA the levels of copper, lead and zinc in the runoff from this area is adversely impacting the beneficial uses of the Los Cerritos Channel. Compliance with the TMDL requires the Cities and Caltrans to monitor pollutant transport, develop an implementation plan to reduce pollutant loads, and conduct special studies to control the sources of these pollutants.

The Los Angeles Gateway Region Integrated Regional Water Management Joint Powers Authority has agreed to work with the seven impaired cities and Caltrans to conduct special studies and to develop a monitoring program and implementation plan to ensure compliance with the requirements of the TMDL.

FISCAL IMPACT

According to the cost allocation formula shown on Exhibit A of the MOA, Lakewood's allocation is approximately $21,358 per $100,000.00 of cost. Future costs for compliance with the TMDL are undetermined at this time but will be shared by the seven cities and Caltrans based on a funding formula that consists of a flat administrative fee and an area share based on the prorated portion of land area in the watershed.

RECOMMENDATION

Staff recommends that City Council approve the attached Memorandum of Agreement with the Los Angeles Gateway Region Integrated Regional Water Management Joint Powers Authority for the implementation of the Los Cerritos Channel Metals TMDL.

Lisa Ann Rapp
Director of Public Works

Howard L. Chambers
City Manager

3.2 • DISPOSITION OF PLAY EQUIPMENT

133 Parks

220 Kids Around The World

Administrative Services Director Diane Perkin displayed slides and gave a report based on the memo in the agenda. She reported that as part of the Play Area Capital Improvement Project, play equipment from the Palms Park School Age Play Area would be replaced. She advised that the replacement was necessary as, due to the age of the equipment, it no longer met current guidelines and ADA regulations and replacement parts were no longer available. She stated that since all of the plastic pieces of the equipment were not recyclable, staff had sought an alternative to landfill disposal. Kids Around The World, a nonprofit organization based in Illinois, would accept the play equipment and dismantle, ship and reassemble it in a location outside the United States. She noted that a number of other California cities had participated in this playground recycling program and that the timing of the removal from Palms Park meant that the equipment would likely be installed at an orphanage in Uganda. It was the recommendation of staff that the City Council approve the disposition of Palms Park School Age Play Area equipment by donating it to the Kids Around The World organization and authorize the City Manager to sign the Release and Indemnification Agreement.

Council Member DuBois commended the staff for not only finding a creative way to keep the materials out of the landfill, but also finding a reuse that would benefit the less fortunate.

Responding to a question from Council Member Rogers, Ms. Perkin stated that it was not an issue of equipment safety, but one of accessibility and the unavailability of replacement parts.

Council Member Croft stated that this was a great opportunity to give some play equipment a second life. He noted that the kids at Palms Park were thrilled to know that their play equipment would be going to help other kids in need somewhere else in the world.

VICE MAYOR VAN NOSTRAN MOVED AND COUNCIL MEMBER DUBOIS SECONDED TO APPROVE STAFF'S RECOMMENDATION. UPON ROLL CALL VOTE, THE MOTION WAS APPROVED:

AYES: COUNCIL MEMBERS: Van Nostran, DuBois, Croft, Rogers and Esquivel
NAYS: COUNCIL MEMBERS: None

3.3 • MEMORANDUM OF AGREEMENT FOR THE DEVELOPMENT OF COORDINATED IMPLEMENTATION PLAN FOR LOS CERRITOS CHANNEL TOTAL MAXIMUM DAILY LOAD

220 Los Angeles Gateway Region Integrated Regional Water Management Joint Powers Authority

480 Water

Public Works Director Lisa Rapp displayed slides and made a presentation based on the memo in the agenda. She stated that following a finding by the U.S. Environmental Protection Agency (EPA) that the Los Cerritos Channel had exceeded water quality objectives of various metals, the local agencies identified as sources of urban runoff were required to develop a Total Maximum Daily Load (TMDL) Implementation Plan for metals in order to restore the impaired water body. The participation of the cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, Signal Hill and CalTrans with the Los Angeles Gateway Region Integrated Regional Water Management Joint Powers Authority (JPA) would not only enable a unified approach to the preparation of the required TMDL, but could improve the opportunities for any available grant funding. She noted that

3.3 • MEMORANDUM OF AGREEMENT FOR TMDL IMPLEMENTATION PLAN FOR LOS CERRITOS CHANNEL - Continued

the alternative to working with the JPA would be for the City to develop its own TMDL Implementation Plan which would be considerably more expensive. She also noted that with the special studies necessary to develop an implementation plan and monitoring program, it would take years to meet these Federal requirements. It was the recommendation of staff that the City Council approve the proposed Memorandum of Agreement for the Los Angeles Gateway Region Integrated Regional Water Management Joint Powers Authority.

Vice Mayor Van Nostran inquired about methods to improve the quality of runoff water. Ms. Rapp responded by stating that in the same manner that devices for catch basins had been developed to collect trash before it could get into the storm drain system, a filter or other modification might be developed to screen out metals. She noted, however, that the study would address different options, looking for the most effective and cost efficient solutions.

Responding to a question from Vice Mayor Van Nostran, Water Resources Director Jim Glancy stated that the metals found in the Los Cerritos Channel would collect in the top few inches of soil, and since Lakewood's water system used deep water wells protected by layers of clay and in some cases, concrete, contamination of that water was not a problem.

Council Member Croft stated that the TMDL issue was an example of the type of situation where forming a coalition to deal with a regional issue could be more effective for all of the parties involved. He determined from Ms. Rapp that the current estimate was two to four years before the implementation plan and monitoring program would be ready for submittal.

In response to a question from Council Member Rogers, Ms. Rapp stated that all of the other cities had indicated their intent to participate, and that only the County of Los Angeles was planning to prepare its own plan. She also confirmed that the Federal mandates came without any funding to accomplish compliance and that a major goal of the study would be to identify all of the costs associated with compliance.

VICE MAYOR VAN NOSTRAN MOVED AND COUNCIL MEMBER DUBOIS SECONDED TO APPROVE STAFF'S RECOMMENDATION. UPON ROLL CALL VOTE, THE MOTION WAS APPROVED:

AYES: COUNCIL MEMBERS: Van Nostran, DuBois, Croft, Rogers and Esquivel
NAYS: COUNCIL MEMBERS: None

At 8:23 p.m., the Regular Meeting of the City Council was recessed for the Meeting of the Lakewood Redevelopment Agency. At 8:24 p.m., the City Council Meeting was reconvened.

ATTACHMENT F.4:

CITY OF LAKEWOOD DRAFT LID ORDINANCE

TO: The Honorable Mayor and City Council

SUBJECT: Draft Green Street Policy and Low Impact Development Ordinance

INTRODUCTION

The Los Angeles Regional Water Quality Control Board adopted a new NPDES Municipal Separate Storm Sewer (MS4) permit, which became effective on December 28, 2013, and it contains many provisions regarding development and public works projects. This report presents a draft Green Streets Policy and draft Low Impact Development Ordinance necessary to submit our Notice of Intent for the three watersheds of which we are associated.

STATEMENT OF FACT

The Municipal Separate Storm Sewer System (MS4) Permit (LARWQCB Order No. R-2012-0175) was adopted by LARWQCB on November 8, 2012. This updated MS4 permit is a several hundred page document that contains many new requirements related to the management of surface water quality in Los Angeles County. The City of Lakewood is one of the municipalities named as a permittee in the MS4 Permit. Lakewood is cooperating with other nearby cities in the Los Cerritos Channel Watershed, the San Gabriel River and Coyote Creek watersheds, and the Los Angeles River Watershed, in order to comply with the requirements of the MS4 Permit. The City is a member of the Gateway Regional Water Management Authority Joint Powers Agency, as well as participant in existing MOA's for the development of TMDLs for the three watersheds.

In cooperation with nearby cities, City staff recommends Lakewood pursue a compliance path under the MS4 Permit that involves the preparation of a Watershed Management Program (WMP) which must be submitted to the LARWQCB by June 28, 2014. The MS4 Permit requires the City submit to the LARWQCB a Notice of Intent (NOI) describing: the City's intent to prepare a WMP, a list of priority pollutants (TMDLs) found in waters downstream of the City, discharge limitations, and a list of participating agencies. In addition, the MS4 Permit requires the adoption of a Green Streets Policy and a Low Impact Development (LID) Ordinance. This report presents drafts of the proposed ordinance and policy. Both of these documents will require further refinement over the next couple of months, before they are proposed for final approval by Council.

Notice of Intent (NOI)

The MS4 Permit requires the City notify the LARWQCB by June 28, 2013 of its intent to comply with the permit by pursuing one of several possible compliance paths. In cooperation with the Gateway Water Management Authority (GWMA) and the cities that participate in the three watersheds, City staff recommends Lakewood follow a compliance path that involves preparation of Watershed Management Plans. The consultants who have been assisting the

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GWMA and the cities have prepared draft NOIs for each watershed and the cities must sign Letters of Intent to participate. Each of the watersheds plan to jointly submit an NOI that contains more specific details about the proposed compliance path under the MS4 Permit. Staff recommends that the City Manager be authorized to sign each of our Letters of Intent.

Green Streets Policy

Permittees electing to prepare a Watershed Management Program or an Enhanced Watershed Management Program under the MS4 Permit are required to demonstrate that there are green streets policies in place and/or commence development of policies that specify the use of green street strategies for transportation corridors within 60 days of the effective date of the Order and have a draft policy within 6 months of the effective date of the Order. Lakewood cooperated with the development of a model Green Streets Policy through the GWMA and its consultant. The Draft Lakewood Green Streets Policy (attached) is based on the model document of the GWMA.

Staff will continue to refine the Draft Lakewood Green Streets Policy and submit the policy for review by the City Attorney prior to its adoption. Staff intends to return to the City Council with a revised draft by October 2013.

Low Impact Development Ordinance

Permittees electing to prepare a Watershed Management Program under the MS4 Permit are required to establish a LID Ordinance to lessen the impacts of development by using smart growth practices and to integrate LID practices and standards for stormwater pollution mitigation for new development and redevelopment projects. The draft LID Ordinance must be developed by June 28, 2013. Lakewood cooperated with the development of model LID Ordinance through the GWMA and its consultant. The Draft LID Ordinance (attached) is based on a combination of the model document of the GWMA, plus other features from the County of Los Angeles draft ordinance. Since the City of Lakewood uses the Los Angeles County Department of Public Works for development plan check, it will be most efficient to include similar features in our ordinance to the County's to expedite plan checking.

Staff will continue to refine the draft LID Ordinance and seek review by the City Attorney prior to its introduction and adoption. Staff intends to return to the City Council with a revised draft ordinance for introduction by October 2013.

Fiscal Impact

There is no direct fiscal impact of the recommended actions. However, adoption of a Green Streets Policy and a Low Impact Development ordinance in compliance with the MS4 Permit will likely increase costs of some future city street projects and some future private development projects. The costs of compliance with the MS4 Permit cannot be precisely estimated at this time, but are expected to be in the millions of dollars.

RECOMMENDATION

Staff recommends that the City Council:

1. Authorize the City Manager to sign each watershed Letter of Intent to be submitted for each Notice of Intent to prepare a Watershed Management Plan.
2. Approve a Draft Lakewood Green Streets Policy and direct staff to further refine the draft and return with a recommended final draft for adoption at a City Council meeting in October 2013; and
3. Approve a Draft Low Impact Development Ordinance and direct staff to further refine the draft and return with a final draft for introduction at a City Council meeting in October 2013.

Lisa Ann Rapp
Director of Public Works

Howard L. Chambers
City Manager

Sonia Southwell
Director of Community Development

ORDINANCE NO.

AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF LAKEWOOD, CALIFORNIA, AMENDING THE LAKEWOOD MUNICIPAL CODE PERTAINING TO LOW IMPACT DEVELOPMENT

THE CITY COUNCIL OF THE CITY OF LAKEWOOD DOES FIND AND ORDAIN AS FOLLOWS:

SECTION 1. FINDINGS.

(A) The City of Lakewood is authorized by Article XI, §5 and §7 of the State Constitution to exercise the police power of the State by adopting regulations to promote public health, public safety and general prosperity.

(B) The City of Lakewood has authority under the California Water Code to adopt and enforce ordinances imposing conditions, restrictions and limitations with respect to any activity which might degrade the quality of waters of the State.

(C) The City is a permittee under the "Waste Discharge Requirements for Municipal Separate Storm Sewer System (MS4) Discharges within the Coastal Watersheds of Los Angeles County, Except those Discharges Originating from the City of Long Beach MS4," issued by the California Regional Water Quality Control Board--Los Angeles Region," (Order No. R4-2012-0175) which also serves as an NPDES Permit under the Federal Clean Water Act (NPDES No. CAS004001), as well as Waste Discharge Requirements under California law (the "Municipal NPDES permit"). In order to participate in a Watershed Management Program and/or Enhanced Watershed Management Program, the Municipal NPDES permit requires permittees to develop and implement a LID Ordinance.

(D) The City of Lakewood is committed to a stormwater management program that protects water quality and water supply by employing watershed-based approaches that balance environmental, social, and economic considerations.

(E) Urbanization has led to increased impervious surface areas resulting in increased water runoff and less percolation to groundwater aquifers causing the transport of pollutants to downstream receiving waters.

(F) The City of Lakewood needs to take a new approach to managing rainwater and urban runoff while mitigating the negative impacts of development and urbanization.

(G) LID is widely recognized as a sensible approach to managing the quantity and quality of stormwater runoff by setting standards and practices to maintain or restore the natural hydrologic character of a development site, reduce off-site runoff, improve water quality, and provide groundwater recharge.

(H) It is the intent of the City of Lakewood to expand the applicability of the existing Standard Urban Stormwater Mitigation Plan (SUSMP) requirements by providing stormwater and rainwater LID strategies for Development and Redevelopment projects as defined under "Applicability." Where there are conflicts between this Ordinance and previously adopted SUSMP and/or LID standards, the standards in this Ordinance shall prevail.

(I) The proposed LID Ordinance qualifies for a Class 8 California Exemption under the provisions of the California Environmental Quality Act (CEQA) Section 15308. Class 8 exempts actions taken by regulatory agencies as authorized by State or local ordinance to assure the maintenance, restoration, enhancement or protection of the environment where the regulatory process involves procedures for protection of the environment.

SECTION 2. LOW IMPACT DEVELOPMENT ORDINANCE

Part 7 of Chapter 3 of Article IX of the Lakewood Municipal Code pertaining to General Provisions Relating to Uses is hereby amended by adding the following:

9379. LOW IMPACT DEVELOPMENT - DEFINITIONS.

For the purposes of this Section, the following definitions apply:

A. **Automotive Service Facility** means a facility that is categorized in any one of the following Standard Industrial Classification (SIC) and North American Industry Classification System (NAICS) codes. For inspection purposes, Permittees need not inspect facilities with SIC codes 5013, 5014, 5541, 5511, provided that these facilities have no outside activities or materials that may be exposed to stormwater (Source: Order No. R4-2012-0175).

B. **Basin Plan** means the Water Quality Control Plan, Los Angeles Region, Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties, adopted by the Regional Water Board on June 13, 1994 and subsequent amendments (Source: Order No. R4-2012-0175).

C. **Best Management Practice (BMP)** means practices or physical devices or systems designed to prevent or reduce pollutant loading from stormwater or non-stormwater discharges to receiving waters, or designed to reduce the volume of stormwater or non-stormwater discharged to the receiving water (Source: Order No. R4-2012-0175).

D. **Biofiltration** means a LID BMP that reduces stormwater pollutant discharges by intercepting rainfall on vegetative canopy, and through incidental infiltration and/or evapotranspiration, and filtration. Incidental infiltration is an important factor in achieving the required pollutant load reduction. Therefore, the term "biofiltration" as used in this Ordinance is defined to include only systems designed to facilitate incidental

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infiltration or achieve the equivalent pollutant reduction as biofiltration BMPs with an underdrain (subject to approval by the Regional Board's Executive Officer). Biofiltration BMPs include bioretention systems with an underdrain and bioswales (Modified from: Order No. R4-2012-0175).

E. **Bioretention** means a LID BMP that reduces stormwater runoff by intercepting rainfall on vegetative canopy, and through evapotranspiration and infiltration. The bioretention system typically includes a minimum 2-foot top layer of a specified soil and compost mixture underlain by a gravel-filled temporary storage pit dug into the in-situ soil. As defined in the Municipal NPDES permit, a bioretention BMP may be designed with an overflow drain, but may not include an underdrain. When a bioretention BMP is designed or constructed with an underdrain it is regulated by the Municipal NPDES permit as biofiltration (Modified from: Order No. R4-2012-0175).

F. **Bioswale** means a LID BMP consisting of a shallow channel lined with grass or other dense, low-growing vegetation. Bioswales are designed to collect stormwater runoff and to achieve a uniform sheet flow through the dense vegetation for a period of several minutes (Source: Order No. R4-2012-0175).

G. **City** means the City of Lakewood.

H. **Clean Water Act (CWA)** means the Federal Water Pollution Control Act enacted in 1972, by Public Law 92-500, and amended by the Water Quality Act of 1987. The Clean Water Act prohibits the discharge of pollutants to Waters of the United States unless the discharge is in accordance with an NPDES permit.

I. **Commercial Development** means any development on private land that is not heavy industrial or residential. The category includes, but is not limited to: hospitals, laboratories and other medical facilities, educational institutions, recreational facilities, plant nurseries, car wash facilities; mini-malls and other business complexes, shopping malls, hotels, office buildings, public warehouses and other light industrial complexes (Order No. R4-2012-0175).

J. **Commercial Malls** means any development on private land comprised of one or more buildings forming a complex of stores which sells various merchandise, with interconnecting walkways enabling visitors to easily walk from store to store, along with parking area(s). A commercial mall includes, but is not limited to: mini-malls, strip malls, other retail complexes, and enclosed shopping malls or shopping centers (Source: Order No. R4-2012-0175).

K. **Construction Activity** means any construction or demolition activity, clearing, grading, grubbing, or excavation or any other activity that result in land disturbance. Construction does not include emergency construction activities required to immediately protect public health and safety or routine maintenance activities required to maintain the integrity of structures by performing minor repair and restoration work, maintain the original line and grade, hydraulic capacity, or original purposes of the facility. See "Routine Maintenance"

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definition for further explanation. Where clearing, grading or excavating of underlying soil takes place during a repaving operation, State General Construction Permit coverage by the State of California General Permit for Storm Water Discharges Associated with Industrial Activities or for Stormwater Discharges Associated with Construction Activities is required if more than one acre is disturbed or the activities are part of a larger plan (Source: Order No. R4-2012-0175).

L. **Control** means to minimize, reduce or eliminate by technological, legal, contractual, or other means, the discharge of pollutants from an activity or activities (Source: Order No. R4-2012-0175).

M. **Development** means construction, rehabilitation, redevelopment or reconstruction of any public or private residential project (whether single-family, multi-unit or planned unit development); industrial, commercial, retail, and other non-residential projects, including public agency projects; or mass grading for future construction. It does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of facility, nor does it include emergency construction activities required to immediately protect public health and safety (Source: Order No. R4-2012-0175).

N. **Directly Adjacent** means situated within 200 feet of the contiguous zone required for the continued maintenance, function, and structural stability of the environmentally sensitive area (Source: Order No. R4-2012-0175).

O. **Discharge** means any release, spill, leak, pump, flow, escape, dumping, or disposal of any liquid, semi-solid, or solid substance.

P. Disturbed Area means an area that is altered as a result of clearing, grading, and/or excavation (Source: Order No. R4-2012-0175).

Q. **Flow-through BMPs** means modular, vault type "high flow biotreatment" devices contained within an impervious vault with an underdrain or designed with an impervious liner and an underdrain (Modified from: Order No. R4-2012-0175).

R. **Full Capture System** means any single device or series of devices, certified by the Executive Officer, that traps all particles retained by a 5 mm mesh screen and has a design treatment capacity of not less than the peak flow rate Q resulting from a one-year, one-hour storm in the sub-drainage area (Order No. R4-2012-0175).

S. General Construction Activities Storm Water Permit (GCASP) means the general NPDES permit adopted by the State Board which authorizes the discharge of stormwater from construction activities under certain conditions.

T. **General Industrial Activities Storm Water Permit (GIASP)** means the general NPDES permit adopted by the State Board which authorizes the discharge of stormwater from certain industrial activities under certain conditions.

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U. **Green Roof** means a LID BMP using planter boxes and vegetation to intercept rainfall on the roof surface. Rainfall is intercepted by vegetation leaves and through evapotranspiration. Green roofs may be designed as either a bioretention BMP or as a biofiltration BMP. To receive credit as a bioretention BMP, the green roof system planting medium shall be of sufficient depth to provide capacity within the pore space volume to contain the design storm depth and may not be designed or constructed with an underdrain (Source: Order No. R4-2012-0175).

V. **Hazardous Material(s)** means any material(s) defined as hazardous by Division 20, Chapter 6.95 of the California Health and Safety Code.

W. **Hillside** means a property located in an area with known erosive soil conditions, where the development contemplates grading on any natural slope that is 25% or greater and where grading contemplates cut or fill slopes (Source: Order No. R4-2012-0175).

X. **Impervious Surface** means any man-made or modified surface that prevents or significantly reduces the entry of water into the underlying soil, resulting in runoff from the surface in greater quantities and/or at an increased rate, when compared to natural conditions prior to development. Examples of places that commonly exhibit impervious surfaces include parking lots, driveways, roadways, storage areas, and rooftops. The imperviousness of these areas commonly results from paving, compacted gravel, compacted earth, and oiled earth.

Y. **Industrial/Commercial Facility** means any facility involved and/or used in the production, manufacture, storage, transportation, distribution, exchange or sale of goods and/or commodities, and any facility involved and/or used in providing professional and non-professional services. This category of facilities includes, but is not limited to, any facility defined by either the Standard Industrial Classifications (SIC) or the North American Industry Classification System (NAICS). Facility ownership (federal, state, municipal, private) and profit motive of the facility are not factors in this definition (Order No. R4-2012-0175).

Z. **Industrial Park** means land development that is set aside for industrial development. Industrial parks are usually located close to transport facilities, especially where more than one transport modalities coincide: highways, railroads, airports, and navigable rivers. It includes office parks, which have offices and light industry (Source: Order No. R4-2012-0175).

AA. **Infiltration BMP** means a LID BMP that reduces stormwater runoff by capturing and infiltrating the runoff into in-situ soils or amended onsite soils. Examples of infiltration BMPs include infiltration basins, dry wells, and pervious pavement (Source: Order No. R4-2012-0175).

BB. **LID** means Low Impact Development. LID consists of building and landscape features designed to retain or filter stormwater runoff (Source: Order No. R4-2012-0175).

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CC. **MS4** means Municipal Separate Storm Sewer System (MS4). The MS4 is a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains):

i. Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, stormwater, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States;
ii. Designed or used for collecting or conveying stormwater;
iii. Which is not a combined sewer; and
iv. Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR §122.2.

(40 CFR § 122.26(b)(8)) (Source: Order No. R4-2012-0175)

DD. **National Pollutant Discharge Elimination System (NPDES)** means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under CWA §307, 402, 318, and 405. The term includes an "approved program" (Source: Order No. R4-2012-0175).

EE. **Natural Drainage System** means a drainage system that has not been improved (e.g., channelized or armored). The clearing or dredging of a natural drainage system does not cause the system to be classified as an improved drainage system (Source: Order No. R4-2012-0175).

FF. **New Development** means land disturbing activities; structural development, including construction or installation of a building or structure, creation of impervious surfaces; and land subdivision (Source: Order No. R4-2012-0175).

GG. **Non-Stormwater Discharge** means any discharge to a municipal storm drain system that is not composed entirely of stormwater (Source: Order No. R4-2012-0175).

HH. **Outfall** means a point source as defined by 40 CFR 122.2 at the point where a municipal separate storm sewer discharges to waters of the United States and does not include open conveyances connecting two municipal separate storm sewers, or pipes, tunnels or other conveyances with connect segments of the same stream or other waters of the United Sates and are used to convey waters of the United States. (40 CFR Section 122.26(b)(9)) (Order No. R4-2012-0175).

II. **Parking Lot** means land area or facility for the parking or storage of motor vehicles used for businesses, commerce, industry, or personal use, with a lot size of 5,000 square feet or

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more of surface area, or with 25 or more parking spaces (Source: Order No. R4-2012-0175).

JJ. **Person** means any individual, partnership, co-partnership, firm, company, corporation, association, joint stock company, trust, state, governmental entity or any other legal entity, or their legal representatives, agents or assigns. The masculine gender shall include the feminine and the singular shall include the plural where indicated by the context.

KK. **Planning Priority Projects means** development projects subject to Permittee conditioning and approval for the design and implementation of post-construction controls to mitigate stormwater pollution, prior to completion of the project(s) (Modified from: Order No. R4-2012-0175).

LL. **Pollutant** means any "pollutant" defined in Section 502(6) of the Federal Clean Water Act or incorporated into the California Water Code Sec. 13373. Pollutants may include, but are not limited to the following:

(1) Commercial and industrial waste (such as fuels, solvents, detergents, plastic pellets, hazardous substances, fertilizers, pesticides, slag, ash, and sludge).

(2) Metals (such as cadmium, lead, zinc, copper, silver, nickel, chromium, and non-metals such as phosphorus and arsenic).

(3) Petroleum hydrocarbons (such as fuels, lubricants, surfactants, waste oils, solvents, coolants, and grease).

(4) Excessive eroded soil, sediment, and particulate materials in amounts that may adversely affect the beneficial use of the receiving waters, flora, or fauna of the State.

(5) Animal wastes (such as discharge from confinement facilities, kennels, pens, recreational facilities, stables, and show facilities).

(6) Substances having characteristics such as pH less than 6 or greater than 9, or unusual coloration or turbidity, or excessive levels of fecal coliform, or fecal streptococcus, or enterococcus.

MM. **Project** means all development, redevelopment, and land disturbing activities. The term is not limited to "Project" as defined under CEQA (Pub. Resources Code §21065) (Source: Order No. R4-2012-0175).

NN. **Rainfall Harvest and Use** means a LID BMP system designed to capture runoff, typically from a roof but can also include runoff capture from elsewhere within the site, and to provide for temporary storage until the harvested water can be used for irrigation or non-potable uses. The harvested water may also be used for potable water uses if the

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system includes disinfection treatment and is approved for such use by the local building department (Source: Order No. R4-2012-0175).

OO. **Receiving Water** means "water of the United States" into which waste and/or pollutants are or may be discharged (Source: Order No. R4-2012-0175).

PP. **Redevelopment** means land-disturbing activity that results in the creation, addition, or replacement of 5,000 square feet or more of impervious surface area on an already developed site. Redevelopment includes, but is not limited to: the expansion of a building footprint; addition or replacement of a structure; replacement of impervious surface area that is not part of routine maintenance activity; and land disturbing activity related to structural or impervious surfaces. It does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of facility, nor does it include emergency construction activities required to immediately protect public health and safety (Source: Order No. R4-2012-0175).

QQ. **Regional Board** means the California Regional Water Quality Control Board, Los Angeles Region.

RR. **Restaurant** means a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC Code 5812) (Source: Order No. R4-2012-0175).

SS. **Retail Gasoline Outlet** means any facility engaged in selling gasoline and lubricating oils (Source: Order No. R4-2012-0175).

TT. **Routine Maintenance** projects include, but are not limited to projects conducted to:

1. Maintain the original line and grade, hydraulic capacity, or original purpose of the facility.
2. Perform as needed restoration work to preserve the original design grade, integrity and hydraulic capacity of flood control facilities.
3. Includes road shoulder work, regrading dirt or gravel roadways and shoulders and performing ditch cleanouts.
4. Update existing lines* and facilities to comply with applicable codes, standards, and regulations regardless if such projects result in increased capacity.
5. Repair leaks

Routine maintenance does not include construction of new** lines or facilities resulting from compliance with applicable codes, standards and regulations.

* Update existing lines includes replacing existing lines with new materials or pipes.

** New lines are those that are not associated with existing facilities and are not part of a project to update or replace existing lines (Source: Order No. R4-2012-0175).

UU. **Significant Ecological Areas (SEAs)** means an area that is determined to possess an example of biotic resources that cumulatively represent biological diversity, for the

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purposes of protecting biotic diversity, as part of the Los Angeles County General Plan. Areas are designated as SEAs, if they possess one or more of the following criteria:

1. The habitat of rare, endangered, and threatened plant and animal species.
2. Biotic communities, vegetative associations, and habitat of plant and animal species that are either one of a kind, or are restricted in distribution on a regional basis.
3. Biotic communities, vegetative associations, and habitat of plant and animal species that are either one of a kind or are restricted in distribution in Los Angeles County.
4. Habitat that at some point in the life cycle of a species or group of species, serves as a concentrated breeding, feeding, resting, migrating grounds and is limited in availability either regionally or within Los Angeles County.
5. Biotic resources that are of scientific interest because they are either an extreme in physical/geographical limitations, or represent an unusual variation in a population or community.
6. Areas important as game species habitat or as fisheries.
7. Areas that would provide for the preservation of relatively undisturbed examples of natural biotic communities in Los Angeles County.
8. Special areas (Source: Order No. R4-2012-0175).

VV. **Site** means land or water area where any "facility or activity" is physically located or conducted, including adjacent land used in connection with the facility or activity (Source: Order No. R4-2012-0175).

WW. **Storm Drain System** means any facilities or any part of those facilities, including streets, gutters, conduits, natural or artificial drains, channels, and watercourses that are used for the purpose of collecting, storing, transporting or disposing of stormwater and are located within the City of Lakewood.

XX. **Storm Water or Stormwater** means water that originates from atmospheric moisture (rain or snow) and that falls onto land, water, or other surfaces. Without any change in its meaning, this term may be spelled or written as one word or two separate words.

YY. **Stormwater Runoff** means that part of precipitation (rainfall or snowmelt) which travels across a surface to the storm drain system or receiving waters.

ZZ. **SUSMP** means the Los Angeles Countywide Standard Urban Stormwater Mitigation Plan. The SUSMP was required as part of the previous Municipal NPDES Permit (Order No. 01-182, NPDES No. CAS004001) and required plans that designate best management practices (BMPs) that must be used in specified categories of development projects.

AAA. **Urban Runoff** means surface water flow produced by storm and non-storm events. Non-storm events include flow from residential, commercial, or industrial activities involving the use of potable and non-potable water.

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9379.1. STORMWATER POLLUTION CONTROL MEASURES FOR DEVELOPMENT PLANNING AND CONSTRUCTION ACTIVITIES

(A) Objective. The provisions of this Section establish requirements for construction activities and facility operations of Development and Redevelopment projects to comply with the current "Order No. R4-2012-0175," lessen the water quality impacts of development by using smart growth practices, and integrate LID practices and standards for stormwater pollution mitigation through means of infiltration, evapotranspiration, biofiltration, and rainfall harvest and use. LID shall be inclusive of new development and/or redevelopment requirements.

(B) Scope. This Section contains requirements for stormwater pollution control measures in Development and Redevelopment projects and authorizes the City of Lakewood to further define and adopt stormwater pollution control measures, develop LID principles and requirements, including but not limited to the objectives and specifications for integration of LID strategies, grant waivers from the requirements of the LID requirements, and collect funds for projects that are granted waivers. Except as otherwise provided herein, the City of Lakewood shall administer, implement and enforce the provisions of this Section.

(C) Applicability. The following Development and Redevelopment projects, termed "Planning Priority Projects," shall comply with the requirements of Article IX, Section 9379 et seq.:

(1) All development projects equal to 1 acre or greater of disturbed area that adds more than 10,000 square feet of impervious surface area.

(2) Industrial parks 10,000 square feet or more of surface area.

(3) Commercial malls 10,000 square feet or more of surface area.

(4) Retail gasoline outlets with 5,000 square feet or more of surface area.

(5) Restaurants (Standard Industrial Classification (SIC) of 5812) with 5,000 square feet or more of surface area.

(6) Parking lots with 5,000 square feet or more of impervious surface area, or with 25 or more parking spaces.

(7) Streets and roads construction of 10,000 square feet or more of impervious surface area.

(8) Automotive service facilities (Standard Industrial Classification (SIC) of 5013, 5014, 5511, 5541, 7532-7534 and 7536-7539) 5,000 square feet or more of surface area.

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(9) Projects located in or directly adjacent to, or discharging directly to an Environmentally Sensitive Area (ESA), where the development will:

a. Discharge stormwater runoff that is likely to impact a sensitive biological species or habitat; and

b. Create 2,500 square feet or more of impervious surface area

(10) Single-family hillside homes.

(11) Redevelopment Projects

a. Land disturbing activity that results in the creation or addition or replacement of 5,000 square feet or more of impervious surface area on an already developed site on Planning Priority Project categories.

b. Where Redevelopment results in an alteration to more than fifty percent of impervious surfaces of a previously existing development, and the existing development was not subject to post-construction stormwater quality control requirements, the entire project must be mitigated.

c. Where Redevelopment results in an alteration of less than fifty percent of impervious surfaces of a previously existing development, and the existing development was not subject to post-construction stormwater quality control requirements, only the alteration must be mitigated, and not the entire development.

d. Redevelopment does not include routine maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, original purpose of facility or emergency redevelopment activity required to protect public health and safety. Impervious surface replacement, such as the reconstruction of parking lots and roadways which does not disturb additional area and maintains the original grade and alignment, is considered a routine maintenance activity. Redevelopment does not include the repaving of existing roads to maintain original line and grade.

e. Existing single-family dwelling and accessory structures are exempt from the Redevelopment requirements unless such projects create, add, or replace 10,000 square feet of impervious surface area.

(D) Effective Date. The Planning and Land Development requirements contained in Section 7 of Order No. R4-2012-0175 shall become effective 30 days from the adoption of the Ordinance. This includes Planning Priority Projects that are discretionary permit projects or project phases that have not been deemed complete for processing, or discretionary permit projects without vesting tentative maps that have not requested and received an extension of previously granted approvals within 90 days of adoption of the Ordinance.

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Projects that have been deemed complete within 90 days of adoption of the Ordinance are not subject to this chapter.

(E) Stormwater Pollution Control Requirements. The Site for every Planning Priority Project shall be designed to control pollutants, pollutant loads, and runoff volume to the maximum extent feasible by minimizing impervious surface area and controlling runoff from impervious surfaces through infiltration, evapotranspiration, bioretention and/or rainfall harvest and use.

(1) A new single-family hillside home development shall include mitigation measures to:

a. Conserve natural areas;

b. Protect slopes and channels;

c. Provide storm drain system stenciling and signage;

d. Divert roof runoff to vegetated areas before discharge unless the diversion would result in slope instability; and

e. Direct surface flow to vegetated areas before discharge, unless the diversion would result in slope instability.

(2) Street and road construction of 10,000 square feet or more of impervious surface shall follow the City of Lakewood's Green Street Policy and Guidelines.

(3) The remainder of Planning Priority Projects shall prepare a LID Plan to comply with the following:

a. Retain stormwater runoff onsite for the Stormwater Quality Design Volume (SWQDv) defined as the runoff from:

i. The 85th percentile 24-hour runoff event as determined from the Los Angeles County 85th percentile precipitation isohyetal map; or

ii. The volume of runoff produced from a 0.75 inch, 24-hour rain event, whichever is greater.

b. Minimize hydromodification impacts to natural drainage systems as defined in order NO. R4-2012-0175.

c. When, as determined by the Approving Agency, 100 percent onsite retention of the SWQDv is technically infeasible, partially or fully, the infeasibility shall be demonstrated in the submitted LID Plan. The technical infeasibility may result from conditions that may include, but are not limited to:

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i. The infiltration rate of saturated in-situ soils is less than 0.3 inch per hour and it is not technically feasible to amend the in-situ soils to attain an infiltration rate necessary to achieve reliable performance of infiltration or bioretention BMPs in retaining the SWQDv onsite.

ii. Locations where seasonal high groundwater is within five to ten feet of surface grade;

iii. Locations within 100 feet of a groundwater well used for drinking water;

iv. Brownfield development sites or other locations where pollutant mobilization is a documented concern;

v. Locations with potential geotechnical hazards;

vi. Smart growth and infill or redevelopment locations where the density and/ or nature of the project would create significant difficulty for compliance with the onsite volume retention requirement.

d. If partial or complete onsite retention is technically infeasible, the project Site may biofiltrate 1.5 times the portion of the remaining SWQDv that is not reliably retained onsite. Biofiltration BMPs must adhere to the design specifications provided in the Municipal NPDES Permit.

i. Additional alternative compliance options such as offsite infiltration may be available to the project Site. The project Site should contact the Approving Agency to determine eligibility. Alternative compliance options are further specified in CASQA's Post-Construction BMP Handbook

e. The remaining SWQDv that cannot be retained or biofiltered onsite must be treated onsite to reduce pollutant loading. BMPs must be selected and designed to meet pollutant-specific benchmarks as required per the Municipal NPDES Permit. Flow-through BMPs may be used to treat the remaining SWQDv and must be sized based on a rainfall intensity of:

i. 0.2 inches per hour, or
ii. The one year, one-hour rainfall intensity as determined from the most recent Los Angeles County isohyetal map, whichever is greater.

f. A Multi-Phased Project may comply with the standards and requirements of this section for all of its phases by: (a) designing a system acceptable to the Approving Agency to satisfy these standards and requirements for the entire Site during the first phase, and (b) implementing these standards and requirements for each phase of Development or Redevelopment of the Site during the first phase or prior to commencement of construction of a later phase, to the extent necessary to treat the stormwater from such later phase. For purposes of this section, "Multi-Phased

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Project" shall mean any Planning Priority Project implemented over more than one phase and the Site of a Multi-Phased Project shall include any land and water area designed and used to store, treat or manage stormwater runoff in connection with the Development or Redevelopment, including any tracts, lots, or parcels of real property, whether Developed or not, associated with, functionally connected to, or under common ownership or control with such Development or Redevelopment.

(E) Other Agencies of the City. All City departments, offices, entities and agencies, shall establish administrative procedures necessary to implement the provisions of this Article on their Development and Redevelopment projects and report their activities annually to the Public Works Department.

(F) Validity. If any provision of this Ordinance is found to be unconstitutional or otherwise invalid by any court of competent jurisdiction, such invalidity shall not affect remaining provisions of this Ordinance are declared to be severable.

SECTION 3. Savings Clause. Neither the adoption of this ordinance nor the repeal of any other ordinance of this City shall in any manner affect the prosecution for violations of ordinances; which violations were committed prior to the effective date hereof, nor be construed as a waiver of any license or penalty or the penal provisions applicable to any violation thereof. The provision of this ordinance, insofar as they are substantially the same as ordinance provisions previously adopted by the City relating to the same subject matter, shall be construed as restatements and continuations, and not as new enactments.

SECTION 4. Effective Date. This Ordinance shall become effective thirty (30) calendar days from and after its adoption.

SECTION 5. The City Clerk shall attest to the adoption of this Ordinance and shall cause this Ordinance to be posted in the manner required by law.

PASSED, APPROVED AND ADOPTED this _____ day of _____, 2013.

CITY OF LAKEWOOD

By:_____
Mayor

ATTEST:

_____
City Clerk

ATTACHMENT F.5:

CITY OF LAKEWOOD DRAFT GREEN STREETS POLICY

RESOLUTION NO. 2013-

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF LAKEWOOD CALIFORNIA, ESTABLISHING A GREEN STREETS POLICY

The City Council of the City of Lakewood, California, hereby resolves, determines and orders as follows:

Section 1. The Municipal Separate Storm Sewer System (MS4) Permit (Order No. R-2012-0175) was adopted by the California Regional Water Quality Control Board, Los Angeles Region on November 8, 2012. Municipalities electing to prepare a Watershed Management Program under this Permit are required to demonstrate that Green Street policies are in place that specifies the use of green street strategies for transportation corridors.

Section 2. Green Streets are enhancements to street and road projects to improve the quality of storm water and urban runoff through the implementation of infiltration, bio-treatment, xeriscaping parkways and tree lined streets.

Section 3. That on FEBRUARY 26, 2013, the City notified the Gateway Water Management Authority that development of a Green Street Policy has been initiated.

Section 4. That the City Council of the City of Lakewood, California, hereby directs the Director of Public Works to implement Green Streets for transportation corridors as described in the City of Lakewood Green Street Manual. The Green Street Manual is hereby approved and a copy of which shall be maintained in the office of the City Clerk.

Section 5. Routine maintenance including but not limited to: slurry seals, grind and overlay and reconstruction to maintain original line are grade are excluded from the Green Street Policy.

Section 6. At its regular meeting held on _____, 2013, after considering the adoption of this policy, the City Council determined that the public interest and necessity justify the adoption of the Green Street Policy.

PASSED, APPROVED, AND ADOPTED at a regular meeting of the City Council of the City of Lakewood, California, on this [DAY] day of [MONTH] 2013.

_____

Steve Croft,

MAYOR

ATTEST:

_____

CITY CLERK

ATTACHMENT G:

CITY OF LONG BEACH LETTER OF INTENT AND RELATED MATERIALS

ATTACHMENT G.1:

CITY OF LONG BEACH
JUNE 25, 2013 LETTER OF
INTENT

CITY OF LONG BEACH
DEPARTMENT OF PUBLIC WORKS

STORM WATER MANAGEMENT
CITY OF LONG BEACH

333 W. Ocean Blvd., 9th Floor | Long Beach, CA 90802 | (562) 570-66023 FAX: (562) 570-6501

STORM WATER/ENVIRONMENTAL COMPLIANCE DIVISION

June 25, 2013

Samuel Unger, Executive Office
Los Angeles Regional Water Quality Control Board
320 West Fourth Street, Suite 200
Long Angeles, California 90013

Attn: Renee Purdy

LETTER OF INTENT TO PARTICIPATE IN THE DEVELOPMENT OF A WATERSHED MANAGEMENT PROGRAM (WMP) AND COORDINATED INTEGRATED MONITORING PROGRAM (CIMP) IN COOPERATION WITH THE LOS CERRITOS CHANNEL WATERSHED GROUP

Dear Mr. Unger:

The City of Long Beach (City) intends to participate in the development of the Los Cerritos Channel Watershed Group Watershed Management Program (WMP) and in a Coordinated Integrated Monitoring Program (CIMP). Information developed in this regional participation of the subject WMP can be use in the City's future NPDES Permit.

Should you have any questions please contact me at your convenience at 562-570-6023.

Sincerely,

Anthony Arevalo
Storm Water Environmental/Compliance Officer

AA:la
LOI_LCCWG.doc

ATTACHMENT G.2:

EXISTING CITY OF LONG BEACH/GWMA MOA

32861

MEMORANDUM OF AGREEMENT (MOA)
BETWEEN
THE LOS ANGELES GATEWAY REGION INTEGRATED REGIONAL WATER MANAGEMENT JOINT POWERS AUTHORITY
AND
THE CITY OF LONG BEACH

FOR THE ADMINISTRATION AND COST SHARING RESULTING FROM PREPARATION OF THE LOS CERRITOS CHANNEL METALS TOTAL MAXIMUM DAILY LOAD IMPLEMENTATION PLAN, MONITORING PROGRAM, AND SPECIAL STUDIES

This Memorandum of Agreement ("Agreement") is made and entered into as of the date of the last signature, set forth below, by and between the Los Angeles Gateway Region Integrated Regional Water Management Joint Powers Authority ("Gateway Authority"), a California Joint Powers Authority, and the City of Long Beach, a California municipal corporation ("City"); hereinafter referred to as "Party" or "Parties":

RECITALS

WHEREAS, the mission of the Gateway Authority includes the equitable protection and management of water resources within its area; and

WHEREAS, portions of the Gateway Authority cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill, are located within the Los Cerritos Channel Watershed; and

WHEREAS, for the purposes of this Agreement, the term "Watershed Entities" shall include, to the extent that each enters into agreements substantially similar to this Agreement, the Gateway Authority cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill, as well as the California Department of Transportation ("Caltrans"), all of which manage or drain stormwater into at least a portion of the Los Cerritos Channel Watershed; and

WHEREAS, the United States Environmental Protection Agency ("USEPA") established the Los Cerritos Channel Metals Total Maximum Daily Load ("Metals TMDL") on March 17, 2010, with the intent of protecting and improving water quality in the Los Cerritos Channel Watershed; and

WHEREAS, this Metals TMDL will regulate certain discharges from NPDES Permit holders, requiring organization and cooperation among the regulated entities; and

WHEREAS, the Parties recognize that the proposed Metals TMDL is not self-enforcing, but could potentially become legally enforceable through incorporation into future National Pollutant Discharge Elimination System ("NPDES") Permits; and

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WHEREAS, the Cities of Long Beach and Signal Hill funded technical assistance and studies on behalf of the Watershed Entities that resulted in technical modifications of the TMDL; and

WHEREAS, achieving the objectives of the Metals TMDL will be facilitated through preparation of an Implementation Plan ("IP"), a Monitoring Plan ("MP"), and specific Special Studies, by the Watershed Entities, to demonstrate compliance; and

WHEREAS, preparation of these plans and studies requires administrative and professional coordination services that the Gateway Authority can provide; and

WHEREAS, a Metals TMDL Technical Committee ("TC"), consisting of representatives of the Watershed Entities as well as stormwater experts, has been established to assist the Gateway Authority in coordinating the preparation and submission of the IP, MP, and any Special Studies to the California Regional Water Quality Control Board, Los Angeles Region on behalf of the Watershed Entities; and

WHEREAS, a Metals TMDL Steering Committee ("SC"), consisting of representatives of the Watershed Entities and other persons approved by the Watershed Entities, has been established for the purpose of overseeing administrative and fiscal coordination in support of achieving the Metals TMDL objectives; and

WHEREAS, the SC has determined that the approximately $293,000 spent by the Cities of Long Beach ($136,000) and Signal Hill ($157,000) in TMDL Development costs, along with the costs of preparing the IP, MP, and potential Special Studies and other related costs incurred by the Gateway Authority in administering this Agreement, should be shared by the Watershed Entities based on the cost allocation formula contained in Exhibit A; and

WHEREAS, the Gateway Authority will endeavor to conclude substantially similar agreements with all of the Watershed Entities in order to minimize the cost to each Watershed Entity of complying with the Metals TMDL.

NOW, THEREFORE, in consideration of the mutual covenants and conditions set forth herein, the Parties do hereby agree as follows:

Section 1. Recitals. The recitals set forth above are fully incorporated as part of this Agreement.

Section 2. Purpose. The purpose of this Agreement is to cooperatively support and undertake preparation of the IP, MP, and any Special Studies agreed to by the Parties.

Section 3. Cooperation. The Parties shall fully cooperate with one another to achieve the purposes of this Agreement.

Section 4. Voluntary Nature. The Parties voluntarily enter into this Agreement.

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Section 5. Term. This Agreement shall remain and continue in effect until completion of the IP, MP, and any Special Studies agreed to by the Parties, or December 31, 2022, whichever occurs first.

Section 6. Role of the Gateway Authority.

a) The Gateway Authority shall endeavor to enter into substantially and materially similar agreements with each of the Watershed Entities.

b) Based on the directions of the TC, the Gateway Authority shall retain a Consultant or Consultants ("Consultant(s)") to prepare the IP, MP, and any agreed upon Special Studies to demonstrate compliance with the Metals TMDL. The Consultant's Scope of Work shall substantially conform to the Scope of Work set forth in Exhibit B to this Agreement.

c) The Gateway Authority shall invoice the Watershed Entities a proportional amount to cover the costs incurred by the Gateway Authority in the performance of its duties under this Agreement. Such costs shall include, but not be limited to, the costs of: the Consultant's fees and costs for the preparation of the IP, MP, and Special Studies; Gateway Authority staff time; legal fees; audit expenses; and administering this Agreement (collectively, the "Agreement Costs"). The Gateway Authority shall invoice the Watershed Entities on an annual basis in an amount based on the Cost Share Formula in Exhibit A.

Section 7. Obligation to Pay Proportional Costs.

a) Upon receiving an invoice, the City shall pay the Gateway Authority its proportionate share of the Gateway Authority's anticipated Agreement Costs in accordance with the Cost Share Formula set forth in Exhibit A.

b) The Agreement shall become effective only if the Gateway Authority is able to execute substantially similar agreements with the cities of Bellflower, Lakewood and Long Beach. The City shall pay the adjusted proportional cost based on the Cost Share Formula set forth in Exhibit A. If the Gateway Authority is unable to execute materially similar agreements with any of the other Watershed Entities, the proportional costs set forth in Exhibit A shall be adjusted.

c) Any over or underpayment of Agreement costs shall be credited or billed to the City during the following period or, if it occurs in the last year of this Agreement, it shall be returned upon termination of this Agreement.

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Section 8. Invoicing and Payment.

a) Payment to the Gateway Authority is due within sixty (60) days of the invoice date. The first invoice should be expected within sixty (60) days of signing this agreement. Invoices for future Agreement Costs will be billed annually in March, starting in the year 2011.

~~b) Any payment that is late shall be subject to interest from the due date. For any payment that is made from 1 to 30 days after the due date, the interest rate shall be equal to the Prime Rate in effect on the due date plus one (1) percent (e.g., if the Prime Rate is 5 percent, the interest rate for this Agreement will be 6 percent). For any payment made from 31 to 60 days after the due date, the interest rate shall be equal to the Prime Rate in effect on the due date plus five (5) percent. For payments made over 60 days after the due date, the interest rate shall be the Prime Rate in effect on the due date plus ten (10) percent. The rates shall, nevertheless, not exceed the maximum allowed by law.~~

c) A Party will be delinquent if payment is not received within 120 days after first being invoiced by the Gateway Authority. The Gateway Authority will follow the procedure listed below, or such other procedure that the Steering Committee directs to effectuate payment: 1) verbally contact the official to whom notices should be addressed pursuant to Section 12 of this Agreement and 2) submit a formal letter from the Gateway Authority Executive Officer to the delinquent Watershed Entity. If payment is not received, the Gateway Authority may terminate the Agreement and recalculate the proportional cost for the remaining Watershed Entities.

d) Any interest accrued on the funds collected per this Agreement shall be applied toward the Agreement Costs. The Gateway Authority shall annually submit a report to the SC on the amount of interest accrued by the Agreement account. Funds remaining at the end of the term of this Agreement shall be returned to the participating Watershed Entities in accordance with the Cost Share Formula in Exhibit A.

Section 9. Independent Contractor.

a) The Gateway Authority is, and shall at all times remain, a wholly independent contractor for performance of the obligations described in this Agreement. The Gateway Authority's officers, officials, employees and agents shall at all times during the Term of this Agreement be under the exclusive control of the Gateway Authority. The Watershed Entities shall not control the conduct of the Gateway Authority or any of its officers, officials, employees or agents, except as set forth in this Agreement. The Gateway Authority, and its officers, officials, employees, and agents shall not be deemed to be employees of the Watershed Entities.

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b) The Gateway Authority is solely responsible for the payment of salaries, wages, other compensation, employment taxes, worker's compensation, or similar taxes for its employees performing services hereunder.

Section 10. Indemnification and Insurance.

a) The Gateway Authority shall include an indemnification provision in the agreement with the Consultant requiring the Consultant to defend, indemnify and hold harmless the City and the Gateway Authority, and their officers, employees, and other representatives and agents, from and against any and all liabilities, actions, suits, proceedings, claims, demands, losses, costs, and expenses, including legal costs and attorney's fees, for injury to or death of person (s), for damage to property (including property owned by the Gateway Authority or the City) resulting from negligent or intentional acts, errors and omissions committed by Consultant, its officers, employees, and other representatives and agents, arising out of or related to Consultant's performance under this Agreement.

b) The City shall defend, indemnify and hold harmless the Gateway Authority, its officers, employees, and other representatives and agents of the Gateway Authority, from and against any and all liabilities, actions, suits, proceedings, claims, demands, losses, costs, and expenses, including legal costs and attorney's fees, for injury to or death of person (s), for damage to property (including property owned by the Gateway Authority) and for negligent or intentional acts, errors and omissions committed by City, its officers, employees, and other representatives and agents, arising out of or related to City's performance under this Agreement, except for such loss as may be caused by Gateway Authority's gross negligence or intentional acts or the gross negligence or intentional acts of its officers, employees, or other representatives and agents.

c) Consultant's Insurance. The Gateway Authority shall require the Consultant to provide proof of current Automotive and/or General Liability, Professional (Errors and Omissions) in sufficient coverage amounts, naming the Gateway Authority and each Watershed Entity as an additional insured. Consultant shall also be required to provide proof of current Workman's Compensation insurance, when applicable.

Section 11. Termination of Agreement. Either Party may terminate this Agreement in whole or in part, for any reason, or no reason, by giving the other Party thirty (30) days written notice thereof. The City shall be responsible for Agreement Costs to which the Gateway Authority became bound prior to the date of termination. Such Agreement Costs shall include the remaining fees of any Consultant retained by the Gateway Authority prior to the date of termination. Gateway Authority shall notify in writing all Watershed Entities within fourteen (14) days after receiving written notice from any Watershed Entity that said entity intends to terminate this Agreement. Each

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Watershed City's proportionate cost allocation shall be reapportioned thereafter in accordance with the Cost Share Formula in Exhibit A.

Section 12. Miscellaneous.

a) Notices. All notices which any Party is required or desires to give hereunder shall be in writing and shall be deemed given when delivered personally or three (3) days after mailing by registered or certified mail (return receipt requested) to the following address or as such other addresses as the Parties may from time to time designate by written notice in the aforesaid manner:

To Gateway Authority:
Ms. Annette Hubbell
Gateway Authority Executive Officer
City of Downey
11111 Brookshire Ave.
Downey, CA 90241

To City of Long Beach:
Patrick H. West
City Manager
333 W. Ocean Blvd.
Long Beach, CA 90802

b) Separate Accounting and Auditing. The Gateway Authority agrees to establish a separate account to track revenues and expenses resulting from the Agreement. Annual financial statements and audits will be made available to the participating Parties, after review and approval by the Metals TMDL SC.

c) Binding Effect. This Agreement shall be binding upon and inure to the benefit of each Party to this Agreement and its respective heirs, administrators, representatives and successors.

d) Amendment. The terms and provisions of this Agreement may not be amended, modified or waived, except by a written instrument signed by both Parties.

e) Waiver. Waiver by either Party of any term, condition, or covenant of this Agreement shall not constitute a waiver of any other term, condition, or covenant. Waiver, by any Party, to any breach of the provisions of this Agreement shall not constitute a waiver of any other provision, or a waiver of any subsequent breach of any provision of this Agreement.

f) Law to Govern; Venue. This Agreement shall be interpreted, construed, and governed according to the laws of the State of California. In the event of litigation between the Parties, venue shall lie exclusively in the County of Los Angeles.

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g) No Presumption in Drafting. The Parties to this Agreement agree that the general rule that an Agreement is to be interpreted against the Party drafting it, or causing it to be prepared, shall not apply.

h) Severability. If any term, provision, condition or covenant of this Agreement is declared or determined by any court of competent jurisdiction to be invalid, void, or unenforceable, the remaining provisions of this Agreement shall not be affected thereby and this Agreement shall be read and construed without the invalid, void, or unenforceable provision(s).

i) Entire Agreement. This Agreement constitutes the entire agreement of the Parties with respect to the subject matter hereof and supersedes all prior or contemporaneous agreements, whether written or oral, with respect thereto.

j) Counterparts. This Agreement may be executed in any number of counterparts, each of which shall be an original, but all of which taken together shall constitute but one and the same instrument, provided, however, that such counterparts shall have been delivered to both Parties to this Agreement.

k) Legal Representation. All Parties have been represented by counsel in the preparation and negotiation of this Agreement. Accordingly, this Agreement shall be construed according to its fair language.

l) Agency Authorization. Each of the persons signing below on behalf of a Party represents and warrants that he or she is authorized to sign this Agreement on behalf of such Party.

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IN WITNESS WHEREOF, the Parties hereto have caused this Agreement to be executed on their behalf, respectively, as follows:

DATE: 11.9.10

CITY OF LONG BEACH

Assistant City Manager

City Manager

EXECUTED PURSUANT TO SECTION 301 OF THE CITY CHARTER.

ATTEST:

City Clerk

APPROVED AS TO FORM:

10-18, 2010

ROBERT E. SHANNON, City Attorney

By _____
City Attorney

AMY R. BURTON
DEPUTY CITY ATTORNEY

DATE: _____

LOS ANGELES GATEWAY REGION INTEGRATED REGIONAL WATER MANAGEMENT JOINT POWERS AUTHORITY

Gateway Authority Chair

ATTEST:

Gateway Authority Secretary

APPROVED AS TO FORM:

Gateway Authority General Counsel

EXHIBIT A

LOS CERRITOS CHANNEL METALS TMDL
COST ALLOCATION

Agency Name	Acres in Watershed[1]	Percent of Watershed Area	Agency Cost Share per $100,000		
			Flat Fee	Area Share	Total
Bellflower	2,818.43	16.00%	$5,000	$9,599	$14,599
CalTrans	497.74	2.83%	$5,000	$1,695	$6,695
Cerritos	57.60	0.33%	$5,000	$196	$5,196
Downey	245.00	1.39%	$5,000	$834	$5,834
Lakewood	4,802.77	27.26%	$5,000	$16,358	$21,358
Long Beach	7,535.38	42.77%	$5,000	$25,665	$30,665
Paramount	1,128.93	6.41%	$5,000	$3,845	$8,845
Signal Hill	530.75	3.01%	$5,000	$1,808	$6,808
JPA MOA Total	17,616.60	100.00%	$40,000	$60,000	$100,000
UNI Los Angeles Co.	94.40				
USEPA TMDL Total	17,711.00				

[1] CalTrans provided acreage values were subtracted from city acreage provided by USEPA.

The City of Long Beach and Signal Hill's annual payments as shown above shall be offset by the credits outlined in the Recitals of the Agreement.

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EXHIBIT B

SCOPE OF WORK
FOR
DEVELOPMENT OF AN IMPLEMENTATION PLAN FOR AN EPA-ESTABLISHED METALS TMDL FOR THE LOS CERRITOS CHANNEL FRESHWATER WATERSHED

1. Prepare a detailed outline for Metals TMDL Implementation component to accompany the incorporation of the Metals TMDL in the reissued MS4 NPDES Permits, an Implementation Plan for the Los Cerritos Channel Metals TMDL

2. Prepare an Implementation Strategy, including
   a. An adaptive management approach,
   b. Tiered source control measures, and
   c. Tiered treatment control, if necessary

3. Prepare recommended Implementation Actions for
   a. Municipal Stormwater Permittees
   b. Caltrans
   c. Construction Stormwater Permittees
   d. Industrial Stormwater Permittees

4. Draft and Negotiate an Implementation Schedule acceptable to
   a. Municipal permittees
   b. The Los Angeles Regional Water Quality Control Board
   c. USEPA Region IX

5. Coordinate with Monitoring Consultant on Establishment of
   a. Ambient Monitoring Program
   b. TMDL Effectiveness Monitoring
   c. Special Studies, if any

6. Coordinate with Technical Committee and Steering Committee
   a. Attend meetings, as requested
   b. Submit draft materials to Technical Committee for review and approval
   c. Submit draft final materials to Steering Committee for review and approval before submittal to Regional Water Board

7. Coordinate with Regional Water Board staff
   a. Obtain an outline format for a Basin Plan Amendment
   b. Review Implementation Strategy with Regional Water Board staff
   c. Review Implementation Actions with Regional Water Board staff

Note: The Technical Committee may modify details of Scope of Work, if necessary.

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LOS CERRITOS CHANNEL TMDL AMBIENT MONITORING

OVERVIEW

Ambient monitoring will establish baseline conditions for three major segments of the watershed and provide the necessary groundwork for effectiveness monitoring. The basic monitoring design used in the ambient monitoring effort will be the backbone of the effectiveness monitoring program.

OUTLINE OF MONITORING PROGRAM

Ambient Monitoring Program –Wet Season

Wet season monitoring is intended to provide measurement of trace metal concentrations and loads at the three sites representing each of three major segments of the Los Cerritos Channel storm drain. The following subtasks will be required for the first year of the program. The first two tasks will apply only to the first year.

1. Identify three additional monitoring sites
2. Purchase and install equipment to obtain automated flow-composite samples.
3. Continue monitoring at the City of Long Beach Stearns Street monitoring site.
4. Monitoring at all sites will include:
   - Continuous measurement of flow and rainfall
   - Collection of flow-rated composite samples for six (6) storm events
   - Analyses will include total hardness, TSS and trace metals. Trace metals will include dissolved and total fractions of copper, lead and zinc.

Ambient Monitoring Program –Dry Season

Dry weather flows will need to be monitored continuously throughout the summer dry season (May through September) and sampled to determine metals concentrations and loads. Alternative flow measurement techniques will be necessary during the summer dry season to provide continuous measurement of dry weather flow and more accurate baseline measurements of concentration and loads. Monitoring will be conducted at the same locations used for monitoring storm flows during the winter wet season. Subtasks for the dry weather ambient monitoring effort will include the following:

1. Determine flume sizes. Purchase the flumes, sidewalls (stop logs) for consolidating shallow flows, data loggers and high-precision pressure sensors for each site.
2. Install temporary flumes and electronic packages at the three TMDL monitoring sites and the Long Beach Mass Emission monitoring site during the summer.
3. Provide continuous measurements of summer dry weather flow at each site.
4. Collect grab samples for hardness, TSS and trace metals **4** times during the summer dry weather period and **2** times during winter dry weather period.

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Reporting
Annual draft and final report will be submitted after the first full year of monitoring. The dates for submission of these reports will be established once the program is initiated.

* Notes: Details of scope may be modified by Technical Committee, if necessary.

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ATTACHMENT G.3:

CITY OF LONG BEACH IN PLACE LID ORDINANCE

Long Beach, California, Municipal Code >> CHAPTER 18.74 LOW IMPACT DEVELOPMENT STANDARDS >>

CHAPTER 18.74 LOW IMPACT DEVELOPMENT STANDARDS

18.74.010 Purpose.
18.74.020 Definitions.
18.74.030 LID requirements and applicability.
18.74.040 LID plan review.
18.74.050 LID plan review, permit and Offsite Runoff Mitigation Fees.
18.74.060 LID Best Management Practices Manual.

18.74.010 Purpose.

The purpose of this Chapter is to require the use of low impact development (LID) standards in the planning and construction of development projects. LID standards promote the goal of environmental sustainability by helping improve the quality of receiving waters, protecting the Los Angeles and San Gabriel River watersheds, maintaining natural drainage paths, and protecting potable water supplies within the City. The LID objective of controlling and maintaining flow rate is addressed through land development and storm water management techniques that imitate the natural hydrology (or movement of water) found on the site. Using site design and best management practices that allow for storage and retention, infiltration, filtering, and flowrate adjustments achieve the goals of LID, advances sustainability and reduces the overall cost of storm water management. The use of engineered systems, structural devices, and vegetated natural designs distributes storm water and urban runoff across a development site maximizing the effectiveness of LID.

(ORD-10-0035, § 1, 2010)

18.74.020 Definitions.

"Brownfield" means a piece of industrial or commercial property that is abandoned or underused and often environmentally contaminated, especially one considered as a potential site for redevelopment.

"Development" means any construction, rehabilitation, redevelopment or reconstruction of any public or private residential project (whether single-family, multi-unit or planned unit development); industrial, commercial, retail and other non-residential projects, including public agency projects; or mass grading for future construction. It does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of facility, nor does it include emergency construction activities required to immediately protect public health and safety.

"LID Best Management Practices Manual" means a manual of LID standards and practices for storm water pollution mitigation, including technical feasibility and implementation parameters, alternative compliance for technical infeasibility, as well as other rules, requirements and procedures as the City deems necessary, for implementing the provisions of this Section of the Long Beach Municipal Code.

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"Multi-phased project" shall mean any development or redevelopment implemented over more than one (1) phase and the site of a multi-phased project shall include any land and water area designed and being used to store, treat or manage storm water runoff in connection with the Development or Redevelopment, including any tracts, lots, or parcels of real property, whether Developed or not, associated with, functionally connected to, or under common ownership or control with such Development or Redevelopment.

"Offsite Runoff Mitigation Fee" means fee paid to the City for the management of storm water runoff generated from the 0.75-inch water quality storm in excess of the storm water runoff that is infiltrated, evapotranspired and/or stored for use. The Offsite Runoff Mitigation Fee shall be used by the City to construct or apply towards the construction of an offsite mitigation project within the same sub-watershed that will achieve at least the same level of water quality protection as if all of the runoff was retained onsite.

"Redevelopment" means land-disturbing activities that result in the creation, addition, or replacement of five hundred (500) square feet or more of impervious surface area on an already developed site. Redevelopment includes, but is not limited to: the expansion of a building footprint; addition or replacement of a structure; replacement of impervious surface area that is not part of a routine maintenance activity; and land-disturbing activities related to structural or impervious surfaces. It does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of facility, nor does it include emergency construction activities required to immediately protect public health and safety.

"Site" means the land or water area where any "facility or activity" is physically located or conducted, including adjacent land use in connection with the facility or activity.

(ORD-10-0035, § 1, 2010)

18.74.030 LID requirements and applicability.

A. The provisions of this Section set forth the requirements for and shall apply to all new Development and Redevelopment projects in the City of Long Beach. The following Development or Redevelopment projects are exempt from the requirements of this Chapter:
   1. Any Development or Redevelopment projects that creates, adds or replaces less than five hundred (500) square feet of impervious area;
   2. Any Development and Redevelopment projects involving emergency construction activities required to immediately protect public health and safety;
   3. Any interior building alteration or addition that does not expand the building footprint; or
   4. Any Development or Redevelopment projects that do not requiring a building permit.

B. LID requirements for new Development or Redevelopment projects:
   1. Residential development of four (4) Units or Less:
      a. For new development less than one (1) acre, or if redevelopment alters at least fifty percent (50%) or more of the impervious surfaces of an existing developed site, comply with the standards and requirements of this Chapter and implement at least two (2) adequately sized LID BMP alternatives from the LID Best Management Practices Manual.
      b. For new Development that is one (1) acre and greater, the entire Site shall

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comply with the standards and requirements of this Chapter and the LID Best Management Practices Manual.

2. Residential Developments of five Units or More and nonresidential Developments:
   a. For new development, or if redevelopment alters at least fifty percent (50%) or more of the impervious surfaces of an existing developed site, the entire site shall comply with the standards and requirements of this Chapter and of the LID Best Management Practices Manual.
   b. Where the Redevelopment alters less than fifty percent (50%) of the impervious surfaces of an existing developed site, only such incremental Redevelopment shall comply with the standards and requirements of this Chapter and of the LID Best Management Practices Manual.

C. This Chapter shall not apply to those projects for which a building permit application has been filed for and deemed complete by the Department of Development Services prior to July 1, 2011.

(ORD-10-0035, § 1, 2010)

18.74.040 LID plan review.

A. Compliance with the LID standards of this Chapter shall be demonstrated through a LID plan review. Permit applicant shall be required to submit an LID plan for review to the Department of Development Services. The LID plan shall demonstrate how the project will meet the standards and requirements of this Chapter and of the LID Best Management Practices Manual. A submitted LID plan shall indicate compliance with the following standards:
   1. Storm water runoff will be infiltrated, captured and reused, evapotranspired, and/or treated onsite through storm water best management practices allowed in the LID Best Management Practices Manual.
   2. The onsite storm water management techniques must be properly sized, at a minimum, to infiltrate, evapotranspire, and/or store for use without any storm water runoff leaving the site to the maximum extent feasible, for at least the volume of water produced by a storm event that results from:
      a. The volume of runoff produced from a 0.75 inch storm event; or
      b. The 85th percentile twenty-four (24) hour runoff event determined as the maximized capture storm water volume for the area using a forty-eight (48) to seventy-two (72) hour draw down time, from the formula recommended in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998); or
      c. The volume of annual runoff based on unit basin storage water quality volume, to achieve eighty percent (80%) or more volume treatment by the method recommended in the California Storm Water Best Management Practices Handbook - Industrial/Commercial, (2003).

B. When the onsite LID requirements are technically infeasible, the infeasibility shall be demonstrated in the submitted LID plan and shall be reviewed in consultation with the Department of Development Services. The technical infeasibility may result from conditions that may include, but are not limited to:
   1. Locations where seasonal high ground water is within ten (10) feet of surface grade;
   2. Locations within one hundred (100) feet of a ground water well used for drinking

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water;

3. Brownfield Development sites or other locations where pollutant mobilization is a documented concern;

4. Locations with potential geotechnical hazards; or

5. Locations with impermeable soil type as indicated in applicable soils and geotechnical reports.

C. If complete onsite compliance of any type is technically infeasible, a Development or Redevelopment project shall be required to comply with, at a minimum, all applicable Standard Urban Storm Water Mitigation Plan (SUSMP) requirements of Chapter 18.61 in order to maximize onsite compliance. For the remaining runoff that cannot feasibly be managed onsite, one or a combination of the following shall be required:

1. An Offsite Runoff Mitigation Fee pursuant to Subsection 18.74.050.B shall be paid to the City of Long Beach's Storm Water Pollution Abatement Fund for offsite mitigation, as described in the LID Best Management Practices Manual. The funding will be applied towards the construction of an offsite mitigation project(s) within the same sub-watershed that will achieve at least the same level of water quality protection as if all of the runoff was retained onsite.

2. To provide an incentive for onsite management of storm water runoff, Development and Redevelopment projects will receive the following reduction in the Offsite Runoff Mitigation Fee based on the percentages of storm water runoff that is managed onsite through infiltration, evapotranspiration, and/or capture and use:

Storm water Runoff Managed Onsite	Fee Reduction
Between 90% and 99%	75%
Between 75% and 89%	50%
Between 50% and 74%	25%

3. A Multi-Phased Project must design a system acceptable to satisfy these standards and requirements for the entire Site during the first phase and will implement these standards and requirements for each phase of Development or Redevelopment projects of the Site during the first phase or prior to commencement of construction of a later phase, to the extent necessary to treat the storm water from such later phase.

(ORD-10-0035, § 1, 2010)

18.74.050 LID plan review, permit and Offsite Runoff Mitigation Fees.

A. Permit applicants who seeks to engage in new Development or Redevelopment as defined in this Chapter by obtaining a building permit shall pay the required plan examination and permit fees as set forth in Chapter 18.06

B. Permit applicants who seeks to engage in new Development or Redevelopment as defined in this Chapter by obtaining a building permit and does not demonstrate complete onsite compliance as described in the LID Best Management Practices Manual, is required to pay an Offsite Runoff Mitigation Fee in the manner and amount as set forth in the schedule of

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fees and charges established by City Council resolution.

C. Any Development or Redevelopment projects that are exempted from this Chapter shall have the option to voluntarily opt in and incorporate into the project the LID requirements of this Chapter. In such case, the LID plan review, permit and Offsite Runoff Mitigation Fees associated with the project shall be waived.

(ORD-10-0035, § 1, 2010)

18.74.060 LID Best Management Practices Manual.

A. The Department of Development Services shall prepare, maintain, and update, as deemed necessary and appropriate, the LID Best Management Practices Manual to include LID standards and practices and standards for storm water pollution mitigation. The LID Best Management Practices Manual shall also include technical feasibility and implementation parameters, alternative compliance for technical infeasibility, as well as other rules, requirements and procedures as the City deems necessary, for implementing the provisions of this Chapter of the Long Beach Municipal Code.

B. The Department of Development Services shall develop, as deemed necessary and appropriate, in cooperation with other City Departments and stakeholders, informational bulletins, training manuals and educational materials to assist in the implementation of the LID requirements.

(ORD-10-0035, § 1, 2010)

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ATTACHMENT H:

CITY OF PARAMOUNT LETTER OF INTENT AND RELATED MATERIALS

ATTACHMENT H.1:

CITY OF PARAMOUNT
JUNE 24, 2013 LETTER OF
INTENT

GENE DANIELS
Mayor
DIANE J. MARTINEZ
Vice Mayor
TOM HANSEN
Councilmember
DARYL HOFMEYER
Councilmember
PEGGY LEMONS
Councilmember

June 24, 2013

Samuel Unger, Executive Office
Los Angeles Regional Water Quality Control Board
320 West Fourth Street, Suite 200
Los Angeles, CA 90013

Attn.: Renee Purdy

LETTER OF INTENT TO PARTICIPATE IN THE DEVELOPMENT OF A WATERSHED MANAGEMENT PROGRAM (WMP) AND COORDINATED INTEGRATED MONITORING PROGRAM (CIMP) IN COOPERATION WITH THE LOS CERRITOS CHANNEL WATERSHED GROUP

Dear Mr. Unger:

The City of Paramount has voluntarily joined the Los Cerritos Channel Watershed Group in the Development of a Watershed Management Program (WMP) and a Coordinated Integrated Monitoring Program (CIMP) and intends to comply with the requirements and provisions of Order No. R4-2012-0175. The Los Cerritos Channel Watershed Group is comprised of the following permittees: the Cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill, as well as the Los Angeles County Flood Control District and Caltrans.

Our City complied with Part VI.C.4.c.i (1) and Part VI.C.4.c.iv (1) through submission of a Notice of Intent letter dated December 17, 2012 (attached). We are complying with Part VI.C.4.c.i (2) VI.C.4.c.iv (2) by attaching our adopted Green Streets Policy and our Draft LID Ordinance.

The City of Paramount signed a Memorandum of Agreement (MOA) with the Los Angeles Gateway Regional Water Management Joint Powers Authority for the Administration and Cost Sharing Resulting From Preparation of the Los Cerritos Channel Metals Total Maximum Daily Load Implementation Plan, Monitoring Program and Special Studies (Attached). This MOA has been used to begin preparation of a Watershed Management Program, but it will soon be replaced with an MOU for Development of a WMP or EWMP and a Coordinated Integrated Monitoring Program (CIMP).

The City recognizes that while maintaining the 18-month schedule for development of the WMP, the Los Cerritos Channel Watershed Group intends to continue to evaluate and consider the Enhanced WMP (EWMP) option. If the group decides prior to December 28, 2013 deadline to develop an EWMP, your office will be

notified in a separate letter, and our City will participate in the development of the EWMP.

At its meeting of June 4, 2013, the City Council adopted a Green Streets Policy for Paramount and had the first reading of its draft Low Impact Development (LID) Ordinance. Adoption of the LID Ordinance is expected on July 2, 2013.

Should you have any questions, please contact Sarah Ho at 562.220.2020. Thank you.

Sincerely,

CITY OF PARAMOUNT

Linda Benedetti-Leal
City Manager

ATTACHMENT H.2:

CITY OF PARAMOUNT
DECEMBER 17, 2012 NOTICE OF
INTENT

PEGGY LEMONS
Mayor
GENE DANIELS
Vice Mayor
TOM HANSEN
Councilmember
DARYL HOFMEYER
Councilmember
DIANE J. MARTINEZ
Councilmember

December 17, 2012

Mr. Sam Unger
Executive Officer
Los Angeles Regional Water Quality Control Board
320 W. 4th Street
Los Angeles, CA 90013

Subject: Notification of Intent to Participate in Development of a Watershed Management Program for the Los Cerritos Channel Watershed

Dear Mr. Unger:

The City of Paramount hereby notifies the Regional Water Board of our intent to participate in development of a Watershed Management Program (WMP) for the portion of the City within the Los Cerritos Channel Watershed. We have participated with the other cities for the last few years on the Technical Committee for the Los Cerritos Channel Metals TMDL (see attached map for portions of cities within Los Cerritos Channel Watershed). The Technical Committee has determined that we should begin immediately on development of a Watershed Management Program pursuant to Part VI.C of the recently adopted *NPDES Permit CAS004001 for Municipal Separate Storm Sewer System (MS4) Discharges within the Coastal Watersheds of Los Angeles County, Except Those Discharges Originating from the City of Long Beach.*

Since we are already organized and have a revenue source through Memoranda of Agreement that the Cities have entered into with the Gateway Water Management Authority, the Technical Committee does not want to waste several months deciding which Watershed Management Program or Enhanced Watershed Management Program (EWMP) option to choose. Rather, we and the other participating cities would prefer to start immediately on a standard WMP with a December 28, 2013 due date and concurrently investigate other options.

If within six months of the effective date of the permitwe are able to demonstrate that LID ordinances and green street policies were either in effect or under development within 60 days of the effective date of the permit and that draft LID ordinances and draft green street policies are in place in greater than 50% of the watershed, we intend to request a completion date of June 28, 2014 for our Watershed Managernent Program in order to gather more information and further strengthen the Program. In addition, during the initial months after the effective date of the permit, the Technical Committee intends to investigate the potential application of an EWMP for the Los Cerritos Watershed. Prior to six months after the effective date of the permit we propose to notify the Regional Water Board whether or not we have elected to collaborate on an EWMP that meets the requirements of Part VI.C.4.c.IV of the permit.

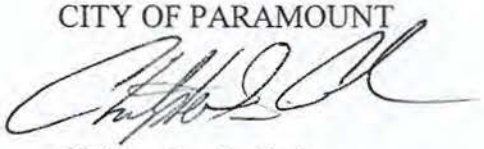
16400 Colorado Avenue • Paramount, CA 90723-5012 • Ph: 562-220-2000 • Fax: 562-630-6731
www.paramountcity.com

There are no interim or final trash water quality based effluent limitations (WQBELs) applicable to the Los Cerritos Channel Watershed. The only interim or final WQBELs applicable to the Los Cerritos Channel Watershed are for the Los Cerritos Channel Total Maximum Daily Loads for Metals established by EPA on 17 March 2010. The schedule for meeting interim and final WQBELs associated with this TMDL is uncertain at this time because the Regional Water Board is in the process of developing a Basin Plan Amendment for implementation of the Los Cerritos Channel TMDLs for Metals and the TMDLs for Metals and Selenium for the San Gabriel River and Impaired Tributaries established by EPA on March 26, 2007. The Technical Committee and its consultant have met with your staff regarding development of the Basin Plan Amendment and have submitted two draft implementation schedules. Although the draft Basin Plan Amendment has not yet been circulated for public review, we believe that no final or interim WQBEL compliance dates will occur prior to approval of a WMP or EWMP for the Los Cerritos Watershed.

With respect to watershed control measures that will be implemented by participating agencies concurrently with the development of a WMP or EWMP, we are not entirely sure. We do know that we will continue to implement watershed control measures in our existing stormwater management programs and continue to implement watershed control measures to eliminate non-stormwater discharges through the MS4 that are sources of pollutants to receiving waters. We also know that a Proposition 84 Planning and Monitoring Grant received by the Gateway Water Management Authority to determine optimal locations for retrofitting LID and water harvesting measures within the Los Cerritos Channel Watershed will be underway while a WMP or EWMP is being developed. In addition, the Technical Committee is analyzing local measures that can be included in the Basin Plan Amendment and implemented concurrently with development of a WMP or an EWMP.

We would appreciate receiving an acknowledgment that you have received this notice and concur with the approach that we have proposed to start immediately with preparation of a Watershed Management Program while reserving the right to alter our submittal date for a draft program plan depending on the development of LID ordinances and green streets policies within the watershed and our investigation of the potential applicability of an EWMP for the watershed.

CITY OF PARAMOUNT



Christopher S. Cash
Public Works Director

ATTACHMENT H.3:

EXISTING CITY OF PARAMOUNT/GWMA MOA

MEMORANDUM OF AGREEMENT (MOA)
BETWEEN
THE LOS ANGELES GATEWAY REGION INTEGRATED REGIONAL WATER MANAGEMENT JOINT POWERS AUTHORITY
AND
THE CITY OF PARAMOUNT

FOR THE ADMINISTRATION AND COST SHARING RESULTING FROM PREPARATION OF THE LOS CERRITOS CHANNEL METALS TOTAL MAXIMUM DAILY LOAD IMPLEMENTATION PLAN, MONITORING PROGRAM, AND SPECIAL STUDIES

This Memorandum of Agreement ("Agreement") is made and entered into as of the date of the last signature, set forth below, by and between the Los Angeles Gateway Region Integrated Regional Water Management Joint Powers Authority ("Gateway Authority"), a California Joint Powers Authority, and the City of Paramount, a California municipal corporation ("City"); hereinafter referred to as "Party" or "Parties":

RECITALS

WHEREAS, the mission of the Gateway Authority includes the equitable protection and management of water resources within its area; and

WHEREAS, portions of the Gateway Authority cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill, are located within the Los Cerritos Channel Watershed; and

WHEREAS, for the purposes of this Agreement, the term "Watershed Entities" shall include, to the extent that each enters into agreements substantially similar to this Agreement, the Gateway Authority cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill, as well as the California Department of Transportation ("Caltrans"), all of which manage or drain stormwater into at least a portion of the Los Cerritos Channel Watershed; and

WHEREAS, the United States Environmental Protection Agency ("USEPA") established the Los Cerritos Channel Metals Total Maximum Daily Load ("Metals TMDL") on March 17, 2010, with the intent of protecting and improving water quality in the Los Cerritos Channel Watershed; and

WHEREAS, this Metals TMDL will regulate certain discharges from NPDES Permit holders, requiring organization and cooperation among the regulated entities; and

WHEREAS, the Parties recognize that the proposed Metals TMDL is not self-enforcing, but could potentially become legally enforceable through incorporation into future National Pollutant Discharge Elimination System ("NPDES") Permits; and

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WHEREAS, the Cities of Long Beach and Signal Hill funded technical assistance and studies on behalf of the Watershed Entities that resulted in technical modifications of the TMDL; and

WHEREAS, achieving the objectives of the Metals TMDL will be facilitated through preparation of an Implementation Plan ("IP"), a Monitoring Plan ("MP"), and specific Special Studies, by the Watershed Entities, to demonstrate compliance; and

WHEREAS, preparation of these plans and studies requires administrative and professional coordination services that the Gateway Authority can provide; and

WHEREAS, a Metals TMDL Technical Committee ("TC"), consisting of representatives of the Watershed Entities as well as stormwater experts, has been established to assist the Gateway Authority in coordinating the preparation and submission of the IP, MP, and any Special Studies to the California Regional Water Quality Control Board, Los Angeles Region on behalf of the Watershed Entities; and

WHEREAS, a Metals TMDL Steering Committee ("SC"), consisting of representatives of the Watershed Entities and other persons approved by the Watershed Entities, has been established for the purpose of overseeing administrative and fiscal coordination in support of achieving the Metals TMDL objectives; and

WHEREAS, the SC has determined that the approximately $293,000 spent by the Cities of Long Beach ($136,000) and Signal Hill ($157,000) in TMDL Development costs, along with the costs of preparing the IP, MP, and potential Special Studies and other related costs incurred by the Gateway Authority in administering this Agreement, should be shared by the Watershed Entities based on the cost allocation formula contained in Exhibit A; and

WHEREAS, the Gateway Authority will endeavor to conclude substantially similar agreements with all of the Watershed Entities in order to minimize the cost to each Watershed Entity of complying with the Metals TMDL.

NOW, THEREFORE, in consideration of the mutual covenants and conditions set forth herein, the Parties do hereby agree as follows:

Section 1. Recitals. The recitals set forth above are fully incorporated as part of this Agreement.

Section 2. Purpose. The purpose of this Agreement is to cooperatively support and undertake preparation of the IP, MP, and any Special Studies agreed to by the Parties.

Section 3. Cooperation. The Parties shall fully cooperate with one another to achieve the purposes of this Agreement.

Section 4. Voluntary Nature. The Parties voluntarily enter into this Agreement.

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Section 5. Term. This Agreement shall remain and continue in effect until completion of the IP, MP, and any Special Studies agreed to by the Parties, or December 31, 2022, whichever occurs first.

Section 6. Role of the Gateway Authority.

a) The Gateway Authority shall endeavor to enter into substantially and materially similar agreements with each of the Watershed Entities.

b) Based on the directions of the TC, the Gateway Authority shall retain a Consultant or Consultants ("Consultant(s)") to prepare the IP, MP, and any agreed upon Special Studies to demonstrate compliance with the Metals TMDL. The Consultant's Scope of Work shall substantially conform to the Scope of Work set forth in Exhibit B to this Agreement.

c) The Gateway Authority shall invoice the Watershed Entities a proportional amount to cover the costs incurred by the Gateway Authority in the performance of its duties under this Agreement. Such costs shall include, but not be limited to, the costs of: the Consultant's fees and costs for the preparation of the IP, MP, and Special Studies; Gateway Authority staff time; legal fees; audit expenses; and administering this Agreement (collectively, the "Agreement Costs"). The Gateway Authority shall invoice the Watershed Entities on an annual basis in an amount based on the Cost Share Formula in Exhibit A.

Section 7. Obligation to Pay Proportional Costs.

a) Upon receiving an invoice, the City shall pay the Gateway Authority its proportionate share of the Gateway Authority's anticipated Agreement Costs in accordance with the Cost Share Formula set forth in Exhibit A.

b) The Agreement shall become effective only if the Gateway Authority is able to execute substantially similar agreements with the cities of Bellflower, Lakewood and Long Beach. The City shall pay the adjusted proportional cost based on the Cost Share Formula set forth in Exhibit A. If the Gateway Authority is unable to execute materially similar agreements with any of the other Watershed Entities, the proportional costs set forth in Exhibit A shall be adjusted.

c) Any over or underpayment of Agreement costs shall be credited or billed to the City during the following period or, if it occurs in the last year of this Agreement, it shall be returned upon termination of this Agreement.

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Section 8. Invoicing and Payment.

a) Payment to the Gateway Authority is due within sixty (60) days of the invoice date. The first invoice should be expected within sixty (60) days of signing this agreement. Invoices for future Agreement Costs will be billed annually in March, starting in the year 2011.

b) Any payment that is late shall be subject to interest from the due date. For any payment that is made from 1 to 30 days after the due date, the interest rate shall be equal to the Prime Rate in effect on the due date plus one (1) percent (e.g., if the Prime Rate is 5 percent, the interest rate for this Agreement will be 6 percent). For any payment made from 31 to 60 days after the due date, the interest rate shall be equal to the Prime Rate in effect on the due date plus five (5) percent. For payments made over 60 days after the due date, the interest rate shall be the Prime Rate in effect on the due date plus ten (10) percent. The rates shall, nevertheless, not exceed the maximum allowed by law.

c) A Party will be delinquent if payment is not received within 120 days after first being invoiced by the Gateway Authority. The Gateway Authority will follow the procedure listed below, or such other procedure that the Steering Committee directs to effectuate payment: 1) verbally contact the official to whom notices should be addressed pursuant to Section 12 of this Agreement and 2) submit a formal letter from the Gateway Authority Executive Officer to the delinquent Watershed Entity. If payment is not received, the Gateway Authority may terminate the Agreement and recalculate the proportional cost for the remaining Watershed Entities.

d) Any interest accrued on the funds collected per this Agreement shall be applied toward the Agreement Costs. The Gateway Authority shall annually submit a report to the SC on the amount of interest accrued by the Agreement account. Funds remaining at the end of the term of this Agreement shall be returned to the participating Watershed Entities in accordance with the Cost Share Formula in Exhibit A.

Section 9. Independent Contractor.

a) The Gateway Authority is, and shall at all times remain, a wholly independent contractor for performance of the obligations described in this Agreement. The Gateway Authority's officers, officials, employees and agents shall at all times during the Term of this Agreement be under the exclusive control of the Gateway Authority. The Watershed Entities shall not control the conduct of the Gateway Authority or any of its officers, officials, employees or agents, except as set forth in this Agreement. The Gateway Authority, and its officers, officials, employees, and agents shall not be deemed to be employees of the Watershed Entities.

RB-AR6876

b) The Gateway Authority is solely responsible for the payment of salaries, wages, other compensation, employment taxes, worker's compensation, or similar taxes for its employees performing services hereunder.

Section 10. Indemnification and Insurance.

a) The Gateway Authority shall include an indemnification provision in the agreement with the Consultant requiring the Consultant to defend, indemnify and hold harmless the City and the Gateway Authority, and their officers, employees, and other representatives and agents, from and against any and all liabilities, actions, suits, proceedings, claims, demands, losses, costs, and expenses, including legal costs and attorney's fees, for injury to or death of person (s), for damage to property (including property owned by the Gateway Authority or the City) resulting from negligent or intentional acts, errors and omissions committed by Consultant, its officers, employees, and other representatives and agents, arising out of or related to Consultant's performance under this Agreement.

b) The City shall defend, indemnify and hold harmless the Gateway Authority, its officers, employees, and other representatives and agents of the Gateway Authority, from and against any and all liabilities, actions, suits, proceedings, claims, demands, losses, costs, and expenses, including legal costs and attorney's fees, for injury to or death of person (s), for damage to property (including property owned by the Gateway Authority) and for negligent or intentional acts, errors and omissions committed by City, its officers, employees, and other representatives and agents, arising out of or related to City's performance under this Agreement, except for such loss as may be caused by Gateway Authority's gross negligence or intentional acts or the gross negligence or intentional acts of its officers, employees, or other representatives and agents.

c) Consultant's Insurance. The Gateway Authority shall require the Consultant to provide proof of current Automotive and/or General Liability, Professional (Errors and Omissions) in sufficient coverage amounts, naming the Gateway Authority and each Watershed Entity as an additional insured. Consultant shall also be required to provide proof of current Workman's Compensation insurance, when applicable.

Section 11. Termination of Agreement. Either Party may terminate this Agreement in whole or in part, for any reason, or no reason, by giving the other Party thirty (30) days written notice thereof. The City shall be responsible for Agreement Costs to which the Gateway Authority became bound prior to the date of termination. Such Agreement Costs shall include the remaining fees of any Consultant retained by the Gateway Authority prior to the date of termination. Gateway Authority shall notify in writing all Watershed Entities within fourteen (14) days after receiving written notice from any Watershed Entity that said entity intends to terminate this Agreement. Each

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Watershed City's proportionate cost allocation shall be reapportioned thereafter in accordance with the Cost Share Formula in Exhibit A.

Section 12. Miscellaneous.

a) Notices. All notices which any Party is required or desires to give hereunder shall be in writing and shall be deemed given when delivered personally or three (3) days after mailing by registered or certified mail (return receipt requested) to the following address or as such other addresses as the Parties may from time to time designate by written notice in the aforesaid manner:

To Gateway Authority:

Ms. Annette Hubbell
Gateway Authority Executive Officer
City of Downey
11111 Brookshire Ave.
Downey, CA 90241

To City of Paramount:

Linda Benedetti-Leal
City Manager
16400 Colorado Ave.
Paramount, CA 90723

b) Separate Accounting and Auditing. The Gateway Authority agrees to establish a separate account to track revenues and expenses resulting from the Agreement. Annual financial statements and audits will be made available to the participating Parties, after review and approval by the Metals TMDL SC.

c) Binding Effect. This Agreement shall be binding upon and inure to the benefit of each Party to this Agreement and its respective heirs, administrators, representatives and successors.

d) Amendment. The terms and provisions of this Agreement may not be amended, modified or waived, except by a written instrument signed by both Parties.

e) Waiver. Waiver by either Party of any term, condition, or covenant of this Agreement shall not constitute a waiver of any other term, condition, or covenant. Waiver, by any Party, to any breach of the provisions of this Agreement shall not constitute a waiver of any other provision, or a waiver of any subsequent breach of any provision of this Agreement.

f) Law to Govern; Venue. This Agreement shall be interpreted, construed, and governed according to the laws of the State of California. In the event of litigation between the Parties, venue shall lie exclusively in the County of Los Angeles.

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g) No Presumption in Drafting. The Parties to this Agreement agree that the general rule that an Agreement is to be interpreted against the Party drafting it, or causing it to be prepared, shall not apply.

h) Severability. If any term, provision, condition or covenant of this Agreement is declared or determined by any court of competent jurisdiction to be invalid, void, or unenforceable, the remaining provisions of this Agreement shall not be affected thereby and this Agreement shall be read and construed without the invalid, void, or unenforceable provision(s).

i) Entire Agreement. This Agreement constitutes the entire agreement of the Parties with respect to the subject matter hereof and supersedes all prior or contemporaneous agreements, whether written or oral, with respect thereto.

j) Counterparts. This Agreement may be executed in any number of counterparts, each of which shall be an original, but all of which taken together shall constitute but one and the same instrument, provided, however, that such counterparts shall have been delivered to both Parties to this Agreement.

k) Legal Representation. All Parties have been represented by counsel in the preparation and negotiation of this Agreement. Accordingly, this Agreement shall be construed according to its fair language.

l) Agency Authorization. Each of the persons signing below on behalf of a Party represents and warrants that he or she is authorized to sign this Agreement on behalf of such Party.

RB-AR6879

IN WITNESS WHEREOF, the Parties hereto have caused this Agreement to be executed on their behalf, respectively, as follows:

DATE: 8/4/2010

CITY OF PARAMOUNT

City Manager

ATTEST:

City Clerk

APPROVED AS TO FORM:

City Attorney

DATE: 9/16/10

LOS ANGELES GATEWAY REGION INTEGRATED REGIONAL WATER MANAGEMENT JOINT POWERS AUTHORITY

Gateway Authority Chair

ATTEST:

Gateway Authority Secretary

APPROVED AS TO FORM:

Gateway Authority General Counsel

EXHIBIT A

LOS CERRITOS CHANNEL METALS TMDL
COST ALLOCATION

Agency Name	Acres in Watershed[1]	Percent of Watershed Area	Agency Cost Share per $100,000		
			Flat Fee	Area Share	Total
Bellflower	2,818.43	16.00%	$5,000	$9,599	$14,599
CalTrans	497.74	2.83%	$5,000	$1,695	$6,695
Cerritos	57.60	0.33%	$5,000	$196	$5,196
Downey	245.00	1.39%	$5,000	$834	$5,834
Lakewood	4,802.77	27.26%	$5,000	$16,358	$21,358
Long Beach	7,535.38	42.77%	$5,000	$25,665	$30,665
Paramount	1,128.93	6.41%	$5,000	$3,845	$8,845
Signal Hill	530.75	3.01%	$5,000	$1,808	$6,808
JPA MOA Total	17,616.60	100.00%	$40,000	$60,000	$100,000
UNI Los Angeles Co.	94.40				
USEPA TMDL Total	17,711.00				

[1] CalTrans provided acreage values were subtracted from city acreage provided by USEPA.

The City of Long Beach and Signal Hill's annual payments as shown above shall be offset by the credits outlined in the Recitals of the Agreement.

RB-AR6881

EXHIBIT B

SCOPE OF WORK
FOR
DEVELOPMENT OF AN IMPLEMENTATION PLAN FOR AN EPA-ESTABLISHED METALS TMDL FOR THE LOS CERRITOS CHANNEL FRESHWATER WATERSHED

1. Prepare a detailed outline for Metals TMDL Implementation component to accompany the incorporation of the Metals TMDL in the reissued MS4 NPDES Permits, an Implementation Plan for the Los Cerritos Channel Metals TMDL

2. Prepare an Implementation Strategy, including
   a. An adaptive management approach,
   b. Tiered source control measures, and
   c. Tiered treatment control, if necessary

3. Prepare recommended Implementation Actions for
   a. Municipal Stormwater Permittees
   b. Caltrans
   c. Construction Stormwater Permittees
   d. Industrial Stormwater Permittees

4. Draft and Negotiate an Implementation Schedule acceptable to
   a. Municipal permittees
   b. The Los Angeles Regional Water Quality Control Board
   c. USEPA Region IX

5. Coordinate with Monitoring Consultant on Establishment of
   a. Ambient Monitoring Program
   b. TMDL Effectiveness Monitoring
   c. Special Studies, if any

6. Coordinate with Technical Committee and Steering Committee
   a. Attend meetings, as requested
   b. Submit draft materials to Technical Committee for review and approval
   c. Submit draft final materials to Steering Committee for review and approval before submittal to Regional Water Board

7. Coordinate with Regional Water Board staff
   a. Obtain an outline format for a Basin Plan Amendment
   b. Review Implementation Strategy with Regional Water Board staff
   c. Review Implementation Actions with Regional Water Board staff

Note: The Technical Committee may modify details of Scope of Work, if necessary.

RB-AR6882

LOS CERRITOS CHANNEL TMDL AMBIENT MONITORING

OVERVIEW

Ambient monitoring will establish baseline conditions for three major segments of the watershed and provide the necessary groundwork for effectiveness monitoring. The basic monitoring design used in the ambient monitoring effort will be the backbone of the effectiveness monitoring program.

OUTLINE OF MONITORING PROGRAM

Ambient Monitoring Program –Wet Season

Wet season monitoring is intended to provide measurement of trace metal concentrations and loads at the three sites representing each of three major segments of the Los Cerritos Channel storm drain. The following subtasks will be required for the first year of the program. The first two tasks will apply only to the first year.

1. Identify three additional monitoring sites
2. Purchase and install equipment to obtain automated flow-composite samples.
3. Continue monitoring at the City of Long Beach Stearns Street monitoring site.
4. Monitoring at all sites will include:
   - Continuous measurement of flow and rainfall
   - Collection of flow-rated composite samples for six (6) storm events
   - Analyses will include total hardness, TSS and trace metals. Trace metals will include dissolved and total fractions of copper, lead and zinc.

Ambient Monitoring Program –Dry Season

Dry weather flows will need to be monitored continuously throughout the summer dry season (May through September) and sampled to determine metals concentrations and loads. Alternative flow measurement techniques will be necessary during the summer dry season to provide continuous measurement of dry weather flow and more accurate baseline measurements of concentration and loads. Monitoring will be conducted at the same locations used for monitoring storm flows during the winter wet season. Subtasks for the dry weather ambient monitoring effort will include the following:

1. Determine flume sizes. Purchase the flumes, sidewalls (stop logs) for consolidating shallow flows, data loggers and high-precision pressure sensors for each site.
2. Install temporary flumes and electronic packages at the three TMDL monitoring sites and the Long Beach Mass Emission monitoring site during the summer.
3. Provide continuous measurements of summer dry weather flow at each site.
4. Collect grab samples for hardness, TSS and trace metals **4** times during the summer dry weather period and **2** times during winter dry weather period.

Reporting

Annual draft and final report will be submitted after the first full year of monitoring. The dates for submission of these reports will be established once the program is initiated.

* Notes: Details of scope may be modified by Technical Committee, if necessary.

RB-AR6883

ATTACHMENT H.4:

CITY OF PARAMOUNT DRAFT LID ORDINANCE

CITY OF PARAMOUNT
LOS ANGELES COUNTY, CALIFORNIA

ORDINANCE NO. 1041

AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF PARAMOUNT, CALIFORNIA, AMENDING CHAPTER 48 OF THE PARAMOUNT MUNICIPAL CODE TO EXPAND THE APPLICABILITY OF THE EXISTING URBAN STORM WATER MITIGATION PLAN PROVISIONS BY IMPOSING RAINWATER LOW IMPACT DEVELOPMENT (LID) STRATEGIES ON PROJECTS THAT REQUIRE BUILDING, GRADING AND ENCROACHMENT PERMITS

WHEREAS, the City is authorized by Article XI, Section 5 and Section 7 of the State Constitution to exercise the police power of the State by adopting regulations to promote public health, public safety and general prosperity; and

WHEREAS, the federal Clean Water Act establishes Regional Water Quality Control Boards in order to prohibit the discharge of pollutants in stormwater runoff to waters of the United States; and

WHEREAS, the City is a permittee under the California Regional Water Quality Control Board, Los Angeles Region Order No. R4-2012-0175, issued on November 08, 2012 which establishes Waste Discharge Requirements for Municipal Separate Storm Sewer Systems (MS4) Discharges within the Coastal Watersheds of Los Angeles County, Except those Discharges Originating from the City of Long Beach MS4; and

WHEREAS, Order No. R4-2012-0175 contains requirements for municipalities to establish an LID Ordinance in order to participate in a Watershed Management Program and/or Enhanced Watershed Management Program; and

WHEREAS, the Regional Board has adopted Total Maximum Daily Loads (TMDLs) for pollutants which are numerical limits that must be achieved effectively through LID implementation; and

WHEREAS, the City has the authority under the California Water Code to adopt and enforce ordinances imposing conditions, restrictions and limitations with respect to any activity that might degrade waters of the State; and

WHEREAS, the City is committed to a stormwater management program that protects water quality and water supply by employing watershed-based approaches that balance environmental and economic considerations; and

WHEREAS, urbanization has led to increased impervious surface areas resulting in increased water runoff and less percolation to groundwater aquifers causing the transport of pollutants to downstream receiving waters; and

WHEREAS, is it the intent of the City to expand the applicability of the existing LID requirements by providing stormwater and rainwater LID strategies for all projects for Development and Redevelopment projects as defined under "Applicability."

THE CITY COUNCIL OF THE CITY OF PARAMOUNT, CALIFORNIA, DOES HEREBY ORDAIN AS FOLLOWS:

Section 1. Section 48-1 of the Paramount Municipal Code is hereby amended in its entirety as follows:

Sec. 48-1. Definitions.
The following words, phrases and terms as used in this chapter shall have the meanings ascribed to them in Part 1.

100,000 square foot commercial or development. Any commercial development that creates at least 100,000 square feet of impervious area, including parking areas. (Ord. No. 916)

Act. The Federal Water Pollution Act, also known as the Clean Water Act, as amended, 33 U.S.C. 1251, et seq. (Ord. No. 892)

Adverse impact. A detrimental effect upon water quality or beneficial uses caused by a discharge or loading of a pollutant or pollutants. (Ord. No 892)

Area susceptible to runoff. Any surface exposed to precipitation or in the path of runoff caused by precipitation that leads directly to the street or storm drain. (Ord. No. 916)

Automotive repair shop. A facility that is categorized in any one of the following Standard Industrial Classifications (SIC); Codes 5013, 5014, 5541, 8532-7534, or 7536-7539. (Ord. No. 916)

Automotive service facility. A facility that is categorized in any one of the following Standard Industrial Classification (SIC) and North American Industry Classification System (NAICS) codes. For inspection purposes, Permittees need not inspect facilities with SIC codes 5013, 5014, 5511, 5541, 7532-7534, and 7536-7539 provided that these facilities have no outside activities or materials that may be exposed to stormwater.

Basin plan. The Water Quality Control Plan, Los Angeles Region, Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties, adopted by the Regional Water Board on June 13, 1994 and subsequent amendments. (Ord. No. 892)

Beneficial uses. Existing or potential uses of receiving waters as defined in a basin plan. (Ord. No. 892)

Best Management Practice (BMP). Practices or physical devices or systems designed to prevent or reduce pollutant loading from stormwater or non-stormwater discharges to receiving waters, or designed to reduce the volume of stormwater or non-stormwater discharged to the receiving water. (Ord No. 892)

Board. The City Council of the City of Paramount (Ord. No. 892)

Biofiltration. A LID BMP that reduces stormwater pollutant discharges by intercepting rainfall on vegetative canopy, and through incidental infiltration and/or evapotranspiration, and filtration. Incidental infiltration is an important factor in achieving the required pollutant load reduction. Therefore, the term "biofiltration" as used in this Ordinance is defined to include only systems designed to facilitate incidental infiltration or achieve the equivalent pollutant reduction as biofiltration BMPs with an underdrain (subject to approval by the Regional Board's Executive Officer). Biofiltration BMPs include bioretention systems with an under drain and bio-swales.

Bioretention. A LID BMP that reduces stormwater runoff by intercepting rainfall on vegetative canopy, and through evapotranspiration and infiltration. The bioretention system typically includes a minimum 2-foot top layer of a specified soil and compost mixture underlain by a gravel-filled temporary storage pit dug into the in-situ soil. As defined in this Ordinance, a bioretention BMP may be designed with an overflow drain, but may not include an underdrain. When a bioretention BMP is designed or constructed with an underdrain it is regulated by Order No. R4-2012-0175 as biofiltration.

Bio-swale. A LID BMP consisting of a shallow channel lined with grass or other dense, low-growing vegetation. Bioswales are designed to collect stormwater runoff and to achieve a uniform sheet flow through the dense vegetation for a period of several minutes.

City. The City of Paramount. (Ord. No. 892)

Clean Water Act (CWA). The Federal Water Pollution Control Act enacted in 1972, by Public Law 92-500, and amended by the Water Quality Act of 1987. The Clean Water Act prohibits the discharge of pollutants to Waters of the United States unless the discharge is in accordance with an NPDES permit.

Code of Federal Regulations (CFR). The codification of the general and permanent rules published in the Federal Register by the executive departments and agencies of the federal government of the United States. (Ord. No. 892)

Commercial activity. Any public or private activity not defined as an industrial activity in 40 CFR 122.26(b) (14), involved in the storage, transportation, distribution, exchange or sale of goods and/or commodities or providing professional and/or non-professional services. Commercial activity does not mean a dwelling as defined in Chapter 44 of the code. (Ord. No. 892)

Commercial development. Any development on private land that is not heavy industrial or residential. The category includes, but is not limited to: hospitals, laboratories and other medical facilities, educational institutions, recreational facilities, plant nurseries, car wash facilities; mini-malls and other business complexes, shopping malls, hotels, office buildings, public warehouses and other light industrial complexes. (Ord. No. 916)

Commercial malls. Any development on private land comprised of one or more buildings forming a complex of stores which sells various merchandise, with interconnecting walkways enabling visitors to easily walk from store to store, along with parking area(s). A commercial mall includes, but is not limited to: mini-malls, strip malls, other retail complexes, and enclosed shopping malls or shopping centers.

Construction activity. Any construction or demolition activity, clearing, grading, grubbing, or excavation or any other activity that results in land disturbance. Construction does not include emergency construction activities required to immediately protect public health and safety or routine maintenance activities required to maintain the integrity of structures by performing minor repair and restoration work, maintain the original line and grade, hydraulic capacity, or original purposes of the facility. See “Routine Maintenance” definition for further explanation. Where clearing, grading or excavating of underlying soil takes place during a repaving operation, State General Construction Permit coverage by the State of California General Permit for Storm Water Discharges Associated with Industrial Activities or for Stormwater Discharges Associated with Construction Activities is required if more than one acre is disturbed or the activities are part of a larger plan. (Ord. No. 892)

Control. To minimize, reduce or eliminate by technological, legal, contractual, or other means, the discharge of pollutants from an activity or activities.

County. The Department of Public Works of the County of Los Angeles. (Ord. No. 892)

Department. The Department of Public Works of the City of Paramount. (Ord. No. 892)

Development. Construction, rehabilitation, redevelopment or reconstruction of any public or private residential project (whether single-family, multi-unit or planned unit development); industrial, commercial, retail, and other non-residential projects, including public agency projects; or mass grading for future construction. It does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of facility, nor does it include emergency construction activities required to immediately protect public health and safety.

Directly connected to impervious areas. The area covered by a structure, impervious pavement, and other impervious surfaces, which drains directly into the storm drain without first flowing across pervious land area (i.e. lawns). (Ord. No. 916)

Directly adjacent. Situated within 200 feet of the contiguous zone required for the continued maintenance, function, and structural stability of the environmentally sensitive area.

Director. The Director of Public Works of the City of Paramount, or his/her authorized deputy, agent, representative, or inspector. (Ord. No. 892)

Discharge. Any release, spill, leak, pump, flow, escape, dumping, or disposal of any liquid, semi-solid, or solid substance. (Ord. No. 892)

Discharge exception. Shall mean the group activities not restricted or prohibited by this ordinance, including only:

Discharges composed entirely of storm water; discharges subject to regulation under current EPA or Regional Water Quality Control Board issued NPDES permits, State General Permits, or other waivers, permits or approvals granted by an appropriate governmental agency; discharges for which mitigation measures for construction activity have been permitted pursuant to Chapter 10 of this Code; discharges to the storm drain system from potable water line flushing, fire fighting activities, landscape irrigation systems, diverted stream flows, rising groundwater, and de minimis groundwater infiltration to the storm water drain system (from leaks in joints or connections or cracks in water drainage pipes or conveyance systems); discharges from potable water sources, passive foundation drains, air conditioning condensate and other building roof runoff; water from crawl space pumps, passive footing drains, lawn

watering, non-commercial vehicle washing unless otherwise prohibited by this ordinance; flows from riparian habitats and wetlands; dechlorinated swimming pool discharges; discharges of reclaimed water generated by a lawfully permitted water treatment facility, and street wash waters when related to cleaning and maintenance by, or on behalf of, the City. (Ord. No. 892)

Discretionary project. A project that requires the exercise of judgement or deliberation when the public agency or public body decides to approve or disapprove a particular activity, as distinguished from situations where the public agency or body has to determine whether there has been conformity with applicable statutes, ordinances, or regulations. (Ord. No. 916)

Disturbed area. An area that is altered as a result of clearing, grading, and/or excavation.

Flow-through treatment BMPs. A modular, vault type "high flow biotreatment" device contained within an impervious vault with an underdrain or designed with an impervious liner and an underdrain.

Full capture system. Any single device or series of devices, certified by the Executive Officer, that traps all particles retained by a 5 mm mesh screen and has a design treatment capacity of not less than the peak flow rate Q resulting from a one-year, one-hour storm in the sub-drainage area.

General Construction Activities Storm Water Permit (GCASP). The general NPDES permit adopted by the State Board which authorizes the discharge of stormwater from construction activities under certain conditions.

General Industrial Activities Storm Water Permit (GIASP). The general NPDES permit adopted by the State Board which authorizes the discharge of stormwater from certain industrial activities under certain conditions.

Green roof. A LID BMP using planter boxes and vegetation to intercept rainfall on the roof surface. Rainfall is intercepted by vegetation leaves and through evapotranspiration. Green roofs may be designed as either a bioretention BMP or as a biofiltration BMP. To receive credit as a bioretention BMP, the green roof system planting medium shall be of sufficient depth to provide capacity within the pore space volume to contain the design storm depth and may not be designed or constructed with an underdrain.

Good housekeeping practice. A best management practice related to the transfer, storage, use, or cleanup of materials performed in a regular

manner that minimizes the discharge of pollutants to the storm drain system and/or receiving waters. (Ord. No. 892)

Hazardous material(s). Any material(s) defined as hazardous by Division 20, Chapter 6.95 of the California Health and Safety Code. (Ord. No. 892)

Hazardous waste. A hazardous material which is to be discharged, discarded, recycled, and/or reprocessed. (Ord. No. 892)

Illicit connection. Any human made conveyance that is connected to the storm drain system without a permit, excluding roof drains which convey only storm water. The term illicit connection shall not include a Legal Non-conforming Connection or connections to the storm drain system that are hereinafter authorized by the agency with jurisdiction over the system at the location at which the connection is made. (Ord. No. 892)

Illicit discharge. Any discharge to the storm drain system that is prohibited under local, state, federal statues, ordinances, codes, or regulations. Illicit discharge includes all non-storm water discharges exept discharges pursuant to a NPDES permit or discharges that are exempted or conditionally exempted by such permit. (Ord. No. 892)

Impervious surface. Any man-made or modified surface that prevents or significantly reduces the entry of water into the underlying soil, resulting in runoff from the surface in greater quantities and/or at an increased rate, when compared to natural conditions prior to development. Examples of places that commonly exhibit impervious surfaces include parking lots, driveways, roadways, storage areas, and rooftops. The imperviousness of these areas commonly results from paving, compacted gravel, compacted earth and oiled earth.

Industrial activity. Any public or private activity which is in any of the 11 categories of activities defined in 40 CFR 122.26(b) (14) and which is required to obtain an NPDES permit. (Ord. No. 892)

Industrial/Commercial facility. Any facility involved and/or used in the production, manufacture, storage, transportation, distribution, exchange or sale of goods and/or commodities, and any facility involved and/or used in providing professional and non-professional services. This category of facilities includes, but is not limited to, any facility defined by either the Standard Industrial Classifications (SIC) or the North American Industry Classification System (NAICS). Facility ownership (federal, state, municipal, private) and profit motive of the facility are not factors in this definition. (Ord. No. 892)

Industrial park. Land development that is set aside for industrial development. Industrial parks are usually located close to transport

facilities, especially where more than one transport modalities coincide: highways, railroads, airports, and navigable rivers. It includes office parks, which have offices and light industry.

Infiltration. The downward entry of water into the surface of the soil. (Ord. No. 916)

Infiltration BMP. A LID BMP that reduces stormwater runoff by capturing and infiltrating the runoff into in-situ soils or amended onsite soils. Examples of infiltration BMPs include infiltration basins, dry wells, and pervious pavement.

Legal non-conforming connection. Shall mean connections to the storm drain system existing as of the adoption of this ordinance that were in compliance with all federal, state and local rules, regulations, statutes and administrative requirements in effect at the time the connection was established. (Ord. No. 892)

Low Impact Development (LID). Consists of building and landscape features designed to retain or filter stormwater runoff.

Municipal separate storm sewer system (MS4). A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains):

(a) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, stormwater, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States;

(b) Designed or used for collecting or conveying stormwater;

(c) Which is not a combined sanitary sewer; and

(d) Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR Section 122.2.

(Ord. No. 916)
National Pollutant Discharge Elimination System (NPDES). The national program for issuing, modifying, revoking and reissuing, terminating,

monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under CWA Section 307, 402, 318, and 405. The term includes an “approved program.” (Ord. No. 892)

Natural drainage system. A drainage system that has not been improved (e.g., channelized or armored). The clearing or dredging of a natural drainage system does not cause the system to be classified as an improved drainage system.

New development. Land disturbing activities; structural development, including construction or installation of a building or structure, creation of impervious surfaces; and land subdivision.

Non-stormwater discharge. Any discharge to a municipal storm drain system that is not composed entirely of stormwater. (Ord. No. 892)

Outfall. A point source as defined by 40 CFR 122.2 at the point where a municipal separate storm sewer discharges to waters of the United States and does not include open conveyances connecting two municipal separate storm sewers, or pipes, tunnels or other conveyances with connect segments of the same stream or other waters of the United Sates and are used to convey waters of the United States. [40 CFR Section 122.26(b)(9)]

Parking lot. Land area or facility for the parking or storage of motor vehicles used for businesses, commerce, industry, or personal use, with a lot size of 5,000 square feet or more of surface area, or with 25 or more parking spaces. (Ord. No. 916)

Planning priority projects. Development projects subject to Permittee conditioning and approval for the design and implementation of post-construction controls to mitigate stormwater pollution, prior to completion of the project(s).

Pollutant. Any “pollutant” defined in Section 502(6) of the Federal Clean Water Act or incorporated into the California Water Code Section 13373 . (Ord. No. 892)

Post construction BMP. A structural on non-structural BMP incorporated into the design of a project to control or reduce the discharge of pollutants from the site after construction is complete for the life of the project. (Ord. No. 916)

Project. All development, redevelopment, and land disturbing activities. The term is not limited to "Project" as defined under CEQA (Pub. Resources Code Section 21065).

Rainfall harvest and use. A LID BMP system designed to capture runoff, typically from a roof but can also include runoff capture from elsewhere within the site, and to provide for temporary storage until the harvested water can be used for irrigation or non-potable uses. The harvested water may also be used for potable water uses if the system includes disinfection treatment and is approved for such use by the local building department.

Receiving water. "Water of the United States" into which waste and/or pollutants are or may be discharged. (Ord. No. 892)

Redevelopment. Land-disturbing activity that results in the creation, addition, or replacement of 5,000 square feet or more of impervious surface area on an already developed site. Redevelopment includes, but is not limited to: the expansion of a building footprint; addition or replacement of a structure; replacement of impervious surface area that is not part of routine maintenance activity; and land disturbing activity related to structural or impervious surfaces. It does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of facility, nor does it include emergency construction activities required to immediately protect public health and safety. (Ord. No 916)

Regional board. The California Regional Water Quality Control Board, Los Angeles Region. (Ord. No. 892)

Restaurant. A facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC Code 5812). (Ord. No. 916)

Retail gasoline outlet. Any facility engaged in selling gasoline and lubricating oils (Order No. R4-2012-0175). (Ord. No. 916)

Routine maintenance. Includes, but is not limited to projects conducted to:

(a) Maintain the original line and grade, hydraulic capacity, or original purpose of the facility.
(b) Perform as needed restoration work to preserve the original design grade, integrity and hydraulic capacity of flood control facilities.
(c) Includes road shoulder work, re-grading dirt or gravel roadways and shoulders and performing ditch cleanouts.
(d) Update existing lines* and facilities to comply with applicable codes, standards, and regulations regardless if such projects result in increased capacity.

(e) Repair leaks.
Routine maintenance does not include construction of new** lines or facilities resulting from compliance with applicable codes, standards and regulations.

* Update existing lines includes replacing existing lines with new materials or pipes.

** New lines are those that are not associated with existing facilities and are not part of a project to update or replace existing lines.

Runoff. Any storm water or non-storm water discharge from any surface and/or drainage area that reaches the storm drain system and/or receiving waters. (Ord. No. 892)

Significant Ecological Areas (SEAs). An area that is determined to possess an example of biotic resources that cumulatively represent biological diversity, for the purposes of protecting biotic diversity, as part of the Los Angeles County General Plan. Areas are designated as SEAs, if they possess one or more of the following criteria:

(a) The habitat of rare, endangered, and threatened plant and animal species.
(b) Biotic communities, vegetative associations, and habitat of plant and animal species that are either one of a kind, or are restricted in distribution on a regional basis.
(c) Biotic communities, vegetative associations, and habitat of plant and animal species that are either one of a kind or are restricted in distribution in Los Angeles County.
(d) Habitat that at some point in the life cycle of a species or group of species, serves as a concentrated breeding, feeding, resting, migrating grounds and is limited in availability either regionally or within Los Angeles County.
(e) Biotic resources that are of scientific interest because they are either an extreme in physical/geographical limitations, or represent an unusual variation in a population or community.
(f) Areas important as game species habitat or as fisheries.
(g) Areas that would provide for the preservation of relatively undisturbed examples of natural biotic communities in Los Angeles County.
(h) Special areas.

Site. Land or water area where any “facility or activity” is physically located or conducted, including adjacent land used in connection with the facility or activity.

Standard Industrial Classification (SIC). A numbering system developed by the United States Government, Office of Budget, for the classification of businesses by the type of activity in which they are engaged. (Ord. No. 916)

State Board. The State Water Resources Control Board. (Ord. No. 892)

Storm drain system. Any facility or any parts of the facility, including streets, gutters, conduits, natural or artificial drains, channels and watercourse that are used for the purpose of collecting, storing, transporting or disposing of stormwater and are located within the City. (Ord. No. 892)

Storm event. A rainfall event that produces more than 0.10 of an inch of precipitation and that is separated from the previous rainfall event by at least 72 hours. (Ord. No. 916)

Storm water or stormwater. Runoff and drainage related to precipitation events (pursuant to 40 CFR Section 122.26(b)(13); 55 Fed. Reg. 47990, 47995 (Nov. 16, 1990). (Ord. No. 892)

Storm Water Pollution Prevention Plan (SWPPP). A plan required by and for which the contents are specified in a NPDES permit. (Ord. No. 892)

Storm water runoff. Part of precipitation (rainfall or snowmelt) which travels across a surface to the storm drain system or receiving water. (Ord. No. 892)

Structural BMP. Any permanent facility constructed to control, treat, store, divert, neutralize, dispose of, and/or monitor runoff in order to reduce or measure pollutants. (Ord. No. 892)

Treatment. The application of engineering systems that use physical, chemical, or biological processes to remove pollutants. Such processes include, but are not limited to, filtration, gravity settling, medial absorption, biodegradation, biological uptake, chemical oxidation and UV radiation. (Ord. No. 916)

Treatment control BMP. Any engineered system designed to remove pollutants by simple gravity settling of particulate pollutants, filtration, biological uptake, media absorption or any physical, biological or chemical process. (Ord. No. 916)

Uncontrolled discharge. Any discharge intentional or accidental, occurring in such a manner that the discharger is unable to determine or regulate the quantity, quality, or effects of the discharge. (Ord. No. 892)

Urban Storm Water Mitigation Plan (USWMP). A plan required as part of the previous Municipal NPDES permit Order No. 01-182, NPDES No. CAS004001 and required plans that designate best management practices (BMPs) that must be used in specific categories of development projects. (Ord. No. 916)

Urban runoff. Surface water flow produced by storm and non-storm events. Non-storm events include flow from residential, commercial or industrial activities involving the use of potable and non-potable water.

U.S. EPA. The United States Environmental Protection Agency. (Ord. No. 892)

Section 2. Section 48-4.5 through Section 48-4.5.5 of the City of Paramount Municipal Code are hereby repealed.

Section 3. Section 48-4.5 of the City of Paramount Municipal Code is hereby added as follows:

Sec. 48-4.5. Low impact development measures for new development and/or redevelopment planning and construction activities.

(a) Objective. The provisions of this Section establish requirements for construction activities and facility operations of Development and Redevelopment projects to comply with the current "Order No. R4-2012-0175," to lessen the water quality impacts of development by using smart growth practices, and integrate LID practices and standards for stormwater pollution mitigation through means of infiltration, evapotranspiration, biofiltration, and rainfall harvest and use. LID shall be inclusive of new development and/or redevelopment requirements.

(b) Scope. This Section contains requirements for stormwater pollution control measures in Development and Redevelopment projects and authorizes the City to further define and adopt stormwater pollution control measures, and to develop LID principles and requirements, including but not limited to the objectives and specifications for integration of LID strategies, grant waivers from the LID requirements, and collect funds for projects that are granted waivers. Except as otherwise provided herein, the City shall administer, implement and enforce the provisions of this Section.

(c) Applicability. Development projects subject to Permittee conditioning and approval for the design and implementation of post-construction controls to mitigate storm water pollution, prior to completion of the project(s), are:

(1) All development projects equal to 1 acre or greater of disturbed area that adds more than 10,000 square feet of impervious surface area.

(2) Industrial parks 10,000 square feet or more of impervious surface area.

(3) Commercial malls 10,000 square feet or more of impervious surface area.

(4) Retail gasoline outlets with 5,000 square feet or more of impervious surface area.

(5) Restaurants (Standard Industrial Classification (SIC) of 5812) with 5,000 square feet or more of impervious surface area.

(6) Parking lots with 5,000 square feet or more of impervious surface area, or with 25 or more parking spaces.

(7) Streets and roads construction of 10,000 square feet or more of impervious surface area. Street and road construction applies to standalone streets, roads, highways, and freeway projects, and also applies to streets within larger projects.

(8) Automotive service facilities (Standard Industrial Classification (SIC) of 5013, 5014, 5511, 5541, 7532-7534 and 7536-7539) 5,000 square feet or more of impervious surface area.

(9) Redevelopment projects.

a. Land disturbing activity that results in the creation or addition or replacement of 5,000 square feet or more of impervious surface area on an already developed site of Planning Priority Project categories.

b. Where Redevelopment results in an alteration to more than fifty percent of impervious surfaces of a previously existing development, and the existing development was not subject to post-construction stormwater quality control requirements, the entire project must be mitigated.

c. Where Redevelopment results in an alteration of less than fifty percent of impervious surfaces of a previously existing development, and the existing development was not subject to post-construction stormwater quality control requirements,

only the alteration must be mitigated, and not the entire development.

d. Redevelopment does not include routine maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, original purpose of facility or emergency redevelopment activity required to protect public health and safety. Impervious surface replacement, such as the reconstruction of parking lots and roadways which does not disturb additional area and maintains the original grade and alignment, is considered a routine maintenance activity. Redevelopment does not include the repaving of existing roads to maintain original line and grade.

e. Existing single-family dwelling and accessory structures are exempt from the Redevelopment requirements unless such projects create, add, or replace 10,000 square feet of impervious surface area.

(d) Effective date. The Planning and Land Development requirements contained in Section 7 of Order No. R4-2012-0175 shall become effective 30 days from the adoption of the Order. This includes Planning Priority Projects that are discretionary permit projects or project phases that have not been deemed complete for processing, or discretionary permit projects without vesting tentative maps that have not requested and received an extension of previously granted approvals within 90 days of adoption of the Order. Projects that have been deemed complete within 90 days of adoption of the Order are not subject to the requirements Section 7.

(e) Specific requirements. The Site for every Planning Priority Project shall be designed to control pollutants, pollutant loads, and runoff volume to the maximum extent feasible by minimizing impervious surface area and controlling runoff from impervious surfaces through infiltration, evapotranspiration, bioretention and/or rainfall harvest and use.

(1) Street and road construction of 10,000 square feet or more of impervious surface shall follow USEPA guidance regarding Managing Wet Weather with Green Infrastructure: Green Streets (December 2008 EPA-833-F-08-009) to the maximum extent practicable.

(2) The remainder of Planning Priority Projects shall prepare a LID Plan to comply with the following:

a. Retain stormwater runoff onsite for the Stormwater Quality Design Volume (SWQDv) defined as the runoff from:

1. The 85th percentile 24-hour runoff event as determined from the Los Angeles County 85th percentile precipitation isohyetal map; or

2. The volume of runoff produced from a 0.75 inch, 24-hour rain event, whichever is greater.

3. $SWQDv = (2{,}722.5\ ft^3/acre)*[(A_I)(0.9)+(A_P+A_U)(C_U)]*(I_{85\%}/I_{0.75})$

    i. A_I = Area of impervious coverage in acres
    ii. A_P = Area of Pervious coverage in acres
    iii. A_U = Area of Undeveloped area in acres
    iv. C_U = Undeveloped runoff coefficient
    v. $I_{85\%}$ = Intensity of the storm for the 85th Percentile 24 hour storm
    vi. $I_{0.75}$ = Intensity of the storm for the 0.75 inch, 24-hour rain event

b. To demonstrate technical infeasibility, the project applicant must demonstrate that the project cannot reliably retain 100 percent of the SWQDv on-site, even with the maximum application of green roofs and rainwater harvest and use, and that compliance with the applicable post-construction requirements would be technically infeasible by submitting a site-specific hydrologic and/or design analysis conducted and endorsed by a registered professional engineer, geologist, architect, and/or landscape architect. Technical infeasibility may result from conditions including the following:

    1. The infiltration rate of saturated in-situ soils is less than 0.3 inch per hour and it is not technically feasible to amend the in-situ soils to attain an infiltration rate necessary to achieve reliable performance of infiltration or bioretention BMPs in retaining the SWQDv onsite.

    2. Locations where seasonal high groundwater is within five to ten feet of surface grade;

    3. Locations within 100 feet of a groundwater well used for drinking water;

4. Brownfield development sites or other locations where pollutant mobilization is a documented concern;

5. Smart growth and infill or redevelopment locations where the density and/ or nature of the project would create significant difficulty for compliance with the onsite volume retention requirement.

c. If partial or complete onsite retention is technically infeasible, the project Site may biofiltrate 1.5 times the portion of the remaining SWQDv that is not reliably retained onsite. Biofiltration BMPs must adhere to the design specifications provided in Attachment H of Order No. R4-2012-0175.

1. Additional alternative compliance options such as offsite infiltration and groundwater replenishment projects may be available to the project site. The project site should contact the City of Paramount to determine eligibility.

d. The remaining SWQDv that cannot be retained or bioretained onsite must be treated onsite to reduce pollutant loading. BMPs must be selected and designed to meet pollutant-specific benchmarks as required per Table 11 of Order No. R4-2012-0175. Flow-through BMPs may be used to treat the remaining SWQDv and must be sized based on a rainfall intensity of:

1. 0.2 inches per hour, or

2. The one year, one-hour rainfall intensity as determined from the most recent Los Angeles County isohyetal map, whichever is greater.

(f) Content of the LID Plan. The LID plan required by this section shall be prepared by a registered Civil Engineer, Licensed Architect, Landscape Architect or any other professional knowledgeable about Storm Water Quality Issues and shall document in detail the requirements established above. The plan shall identify the treatment BMPs that are required to reduce the pollutant load from the discharges of the SWQDv that cannot be infiltrated, bio-retained or captured and used on the development and redevelopment site and the BMPs that are proposed to treat the discharge from the property above the SWQDv. The LID plan shall also identify the following:

(1) Provide storm drain system stenciling and signage. All Storm Drain inlets from a project shall be clearly labeled to indicate that "No Dumping, Drains to Ocean" Label shall be maintained at least annually as needed.

(2) Proper design of trash storage areas. Trash enclosure areas shall not be designed in the path of drainage nor shall roof drainage downspouts discharge to the trash enclosure.

(3) Vehicle/equipment wash areas. If a project is designed with a vehicle/equipment wash area the design shall include a roof to prevent rainwater from entering the area along with a berm to prevent site drainage from entering the area. The wash area shall be connected to the Sanitary Sewer.

(4) Proof of ongoing maintenance. The plan shall incorporate record keeping standards to document maintenance of structural BMPs to assure ongoing operation of the system. Records shall be kept for three (3) years. The records shall be made available for inspection upon the request of the City Engineer, the Regional Water Quality Control Board or the USEPA or their designated agent during normal business hours.

(g) Project specific issues to be addressed by the LID Plan. In addition to the items identified above the LID Plan shall also consider issues unique to the occupancy:

(1) Automotive repair shops.

a. Proper design of fueling areas. If provided at an Automotive repair shop Fueling facilities shall be designed as required for Retail Gasoline outlets below.

b. Proper design of outside material storage areas. Areas used for storage of vehicles under repair or for storage of spare parts or the storage of used oil products shall be designed to minimize the exposure of stored cars, parts or fluids to rain fall.

c. Proper design of maintenance bays. Repair/Maintenance bays shall be within a building or under a roof to eliminate the exposure of vehicles being repaired to rain fall. The bays shall also be designed to allow for the collection of all fluid spills and floor wash down runoff. Fluid spills and floor wash down runoff shall either be collected and discharged to the Sanitary sewer or shall be collected by other means and

disposed of as required by State Law or USEPA regulations. Automotive fluids and greases shall not be discharged to areas exposed to rain fall.

d. Spill prevention and cleanup. Spill prevention and cleanup materials shall be maintained on site and staff shall be trained in its proper use.

(2) Industrial/commerial developments with more than 10,000 sq. ft. of impervious area.

a. Proper design of outside material storage areas. Areas used for storage of storage of raw materials, finished products or merchandise shall be designed to minimize the exposure of stored materials to rain fall.

b. Proper design of maintenance bays. Repair/Maintenance bays shall be within a building or under a roof to eliminate the maintenance of vehicles from rain fall. The bays shall also be designed to allow for the collection of all fluid spills and floor wash down runoff. Fluid spills and floor wash down runoff shall either be collected and discharged to the Sanitary sewer or shall be collected by other means and disposed of as required by State Law or USEPA regulations. Automotive fluids and greases shall not be discharged to areas exposed to rain fall.

c. Proper design of loading and unloading areas. Loading and Unloading areas shall be roof where practical to limit the exposure of materials to rain fall. Spill prevention and cleanup materials shall be maintained on site and staff shall be trained in its proper use.

(3) Restaurants.

a. Properly designed equipment/accessory wash areas. Projects in this classification shall be designed with an area for the washing of floor mats and other large equipment that is connected to the sanitary sewer system. The area shall be roofed to prevent the entranceof rainwater or shall be designed to activate a valve to transfer the discharge from the storm drain to the sanitary sewer when mats or equipment are being washed. The operator may, upon submission of substantial proof, eliminate the wash area if no floor mats or equipment will be washed outside.

b. Proper design of outside storage areas. Projects shall be designed to limit the exposure to rain fall or rainwater runoff for materials stored outside. This provision shall apply to, but not be limited to, the storage of fryer fat stored for recycling, cardboard or paper storage intended for recycling, and waste food products stored for recycling or disposal. The storage of these materials shall be under a roof whenever possible.

(4) Retail gasoline outlets.

a. Properly design fueling areas**.** Fueling facilities for a new Retail Gasoline outlet project shall be constructed in compliance with the Service Station Managers Association guidelines.

b. Proper design of outside material storage areas. Areas used for storage of vehicles under repair or for storage of spare parts or the storage of used oil products shall be designed to minimize the exposure of stored cars, parts or fluids to rain fall.

c. Proper design of maintenance bays. Repair/Maintenance bays shall be within a building or under a roof to eliminate the exposure of vehicles being repaired to rain fall. The bays shall also be designed to allow for the collection of all fluid spills and floor wash down runoff. Fluid spills and floor wash down runoff shall either be collected and discharged to the Sanitary sewer or shall be collected by other means and disposed of as required by State Law or USEPA regulations. Automotive fluids and greases shall not be discharged to areas exposed to rain fall.

(5) Parking lots.

a. As required above the SWQDv shall be retained on site for infiltration.

b. Sweep lot regularly to limit the accumulation of trash and debris. Also inspect the lot once per month for the accumulation of oil on the parking lot pavement. The inspection shall be documented with an inspection report and any accumulated oil or grease shall be removed to limit the exposure of oil and grease to rain fall.

(h) Review of the LID Plan by the City. The City shall review the LID Plan to assure that all elements of the plan have been addressed and that the applicant has identified the areas to be set aside for the infiltration of the SWQDv and for the BMPs necessary to protect the storm drain system. If the plan is found to comply with the provisions of this section the grading and building permits may be issued for the project. If during construction, the plan is found to be deficient by the City or any other interested party the applicant shall amend the plan to address the deficiencies.

(i) Filing of LID Plan with the County Recorder. Upon acceptance of the LID plan by the City the applicant shall file a signed original of the plan with the County Recorder. The document shall bebinding on the applicant and all successors in interest to the property. The form shall be provided by the City and shall only be amended or deleted from title with the consent of the City.

(j) Other agencies of the City of Paramount. All Paramount departments, offices, entities and agencies, shall establish administrative procedures necessary to implement the provisions of this Article on the Development and Redevelopment projects and report their activities to the Public Works Department

(k) Validity. If any provision of this Ordinance is found to be unconstitutional or otherwise invalid by any court of competent jurisdiction, such invalidity shall not affect remaining provisions of this Ordinance are declared to be severable.

PASSED, APPROVED, and ADOPTED by the City Council of the City of Paramount this 2nd day of July 2013.

Gene Daniels, Mayor

ATTEST:

Lana Chikami, City Clerk

H:\CITYMANAGER\AGENDA\ORD\1041-SARA.DOC; 6/27/2013 8:18 AM

ATTACHMENT H.5:

CITY OF PARAMOUNT IN PLACE

GREEN STREETS POLICY

Green Street Policy

Purpose

The City of Paramount, Department of Public Works, has established a policy on the implementation of Green Street Best Management Practices (BMPs) for transportation corridors associated with new development, and redevelopment street and roadway projects, including Capital Improvement Projects (CIPs). This policy is enacted to demonstrate compliance with the NPDES MS4 Permit for the Los Angeles Region (Order No. R4-2012-0175).

Green Streets are an amenity that provide many benefits, including water quality improvement, groundwater replenishment, creation of attractive streetscapes, creation of greenbelts, and pedestrian and bicycle accessibility. Green streets are defined as right-of-way areas that incorporate infiltration, biofiltration, and/or storage, and use BMPs to collect, retain, or detain stormwater runoff, as well as design elements that create attractive streetscapes.

Policy

A. Application. The Department of Public Works shall require new private development and/or redevelopment of streets and roadway projects and CIP projects conducted within the right-of-way of transportation corridors to incorporate green street BMPs where the BMPs will not lead to excessive maintenance or deterioration of the street improvements. Transportation corridor projects are on major arterials, as defined in the City of Paramount General Plan, which add at least 10,000 square feet of impervious surface. Routine maintenance or repair and linear utility projects are excluded from these requirements. Routine maintenance includes slurry seals, repaving, and reconstruction of the road or street where the original line and grade are maintained.

B. Amenities. The Department of Public Works shall consider opportunities to replenish groundwater, create attractive streetscapes, and provide pedestrian and bicycle accessibility through new private development and redevelopment of streets and roadway projects and CIPs.

C. Guidance. The Department of Public Works shall use the City of Los Angeles Green Streets guidance, USEPA's *Managing Wet Weather with Green Infrastructure Municipal Handbook: Green Streets*[1], or equivalent guidance developed by the Department of Public Works for use in public and private developments.

D. Retrofit Scope. The Department of Public Works shall use the City's Watershed Management Program or Enhanced Watershed Management Program to identify opportunities for green street BMP retrofits. Final decisions regarding implementation will be determined by the Director of Public Works based on the availability of adequate funding and consideration of site conditions that might lead to excessive maintenance or deterioration of the proposed improvements.

E. Training. The Department of Public Works shall incorporate aspects of green streets into internal annual staff trainings.

[1] EPA-833-F-08-009, December 2008.

ATTACHMENT I:

CITY OF SIGNAL HILL LETTER
OF INTENT AND RELATED
MATERIALS

ATTACHMENT I.1:

CITY OF SIGNAL HILL
JUNE 24, 2013 LETTER OF
INTENT

CITY OF SIGNAL HILL

2175 Cherry Avenue • Signal Hill, California 90755-3799

June 24, 2013

Samuel Unger, Executive Office
Los Angeles Regional Water Quality Control Board
320 West Fourth Street, Suite 200
Los Angeles, CA 90013

Attn.: Renee Purdy

Subject: Letter of Intent to Participate in the Development of a Watershed Management Program (WMP) and Coordinated Integrated Monitoring Program (CIMP) in Cooperation with the Los Cerritos Channel Watershed Group

Dear Mr. Unger:

The City of Signal Hill has voluntarily joined the Los Cerritos Channel Watershed Group in the Development of a Watershed Management Program (WMP) and a Coordinated Integrated Monitoring Program (CIMP) and intends to comply with the requirements and provisions of Order No. R4-2012-0175. The Los Cerritos Channel Watershed Group is comprised of the following permittees: the Cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill, as well as the Los Angeles County Flood Control District and Caltrans.

Our City complied with Part VI.C.4.c.i (1) and Part VI.C.4.c.iv (1) through submission of a Notice of Intent letter dated June 18, 2013, (attached). We are complying with Part VI.C.4.c.i (2) VI.C.4.c.iv (2) by attaching our adopted Green Streets Policy and our Draft LID Ordinance.

The City of Signal Hill signed a Memorandum of Agreement (MOA) with the Los Angeles Gateway Regional Water Management Joint Powers Authority for the Administration and Cost Sharing Resulting from Preparation of the Los Cerritos Channel Metals Total Maximum Daily Load Implementation Plan, Monitoring Program and Special Studies (Attached). This MOA has been used to begin preparation of a Watershed Management Program, but it will soon be replaced

with an MOU for Development of a WMP or EWMP and a Coordinated Integrated Monitoring Program (CIMP).

The City recognizes that while maintaining the 18-month schedule for development of the WMP, the Los Cerritos Channel Watershed Group intends to continue to evaluate and consider the Enhanced WMP (EWMP) option. If the group decides prior to December 28, 2013 deadline to develop an EWMP, your office will be notified in a separate letter, and the City of Signal Hill will participate in the development of the EWMP.

At its meeting of June 18, 2013, the City Council authorized the submittal of this letter of intent. In addition, on June 4, 2013, the City Council adopted a Green Streets Policy, and on June 18, 2013, had the first reading of its draft Low Impact Development (LID) Ordinance. Adoption of the LID Ordinance is expected in July.

Should you have any questions, please contact me at (562) 989-7302. Thank you.

Sincerely,

CITY OF SIGNAL HILL

Kenneth C. Farfsing
City Manager

ATTACHMENT I.2:

EXISTING CITY OF SIGNAL HILL/GWMA MOA

MEMORANDUM OF AGREEMENT (MOA)
BETWEEN
THE LOS ANGELES GATEWAY REGION INTEGRATED REGIONAL WATER MANAGEMENT JOINT POWERS AUTHORITY
AND
THE CITY OF SIGNAL HILL

FOR THE ADMINISTRATION AND COST SHARING RESULTING FROM PREPARATION OF THE LOS CERRITOS CHANNEL METALS TOTAL MAXIMUM DAILY LOAD IMPLEMENTATION PLAN, MONITORING PROGRAM, AND SPECIAL STUDIES

This Memorandum of Agreement ("Agreement") is made and entered into as of the date of the last signature, set forth below, by and between the Los Angeles Gateway Region Integrated Regional Water Management Joint Powers Authority ("Gateway Authority"), a California Joint Powers Authority, and the City of Signal Hill, a California municipal corporation ("City"); hereinafter referred to as "Party" or "Parties":

RECITALS

WHEREAS, the mission of the Gateway Authority includes the equitable protection and management of water resources within its area; and

WHEREAS, portions of the Gateway Authority cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill, are located within the Los Cerritos Channel Watershed; and

WHEREAS, for the purposes of this Agreement, the term "Watershed Entities" shall include, to the extent that each enters into agreements substantially similar to this Agreement, the Gateway Authority cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill, as well as the California Department of Transportation ("Caltrans"), all of which manage or drain stormwater into at least a portion of the Los Cerritos Channel Watershed; and

WHEREAS, the United States Environmental Protection Agency ("USEPA") established the Los Cerritos Channel Metals Total Maximum Daily Load ("Metals TMDL") on March 17, 2010, with the intent of protecting and improving water quality in the Los Cerritos Channel Watershed; and

WHEREAS, this Metals TMDL will regulate certain discharges from NPDES Permit holders, requiring organization and cooperation among the regulated entities; and

WHEREAS, the Parties recognize that the proposed Metals TMDL is not self-enforcing, but could potentially become legally enforceable through incorporation into future National Pollutant Discharge Elimination System ("NPDES") Permits; and

WHEREAS, the Cities of Long Beach and Signal Hill funded technical assistance

and studies on behalf of the Watershed Entities that resulted in technical modifications of the TMDL; and

WHEREAS, achieving the objectives of the Metals TMDL will be facilitated through preparation of an Implementation Plan ("IP"), a Monitoring Plan ("MP"), and specific Special Studies, by the Watershed Entities, to demonstrate compliance; and

WHEREAS, preparation of these plans and studies requires administrative and professional coordination services that the Gateway Authority can provide; and

WHEREAS, a Metals TMDL Technical Committee ("TC"), consisting of representatives of the Watershed Entities as well as stormwater experts, has been established to assist the Gateway Authority in coordinating the preparation and submission of the IP, MP, and any Special Studies to the California Regional Water Quality Control Board, Los Angeles Region on behalf of the Watershed Entities; and

WHEREAS, a Metals TMDL Steering Committee ("SC"), consisting of representatives of the Watershed Entities and other persons approved by the Watershed Entities, has been established for the purpose of overseeing administrative and fiscal coordination in support of achieving the Metals TMDL objectives; and

WHEREAS, the SC has determined that the approximately $293,000 spent by the Cities of Long Beach ($136,000) and Signal Hill ($157,000) in TMDL Development costs, along with the costs of preparing the IP, MP, and potential Special Studies and other related costs incurred by the Gateway Authority in administering this Agreement, should be shared by the Watershed Entities based on the cost allocation formula contained in Exhibit A; and

WHEREAS, the Gateway Authority will endeavor to conclude substantially similar agreements with all of the Watershed Entities in order to minimize the cost to each Watershed Entity of complying with the Metals TMDL.

NOW, THEREFORE, in consideration of the mutual covenants and conditions set forth herein, the Parties do hereby agree as follows:

Section 1. Recitals. The recitals set forth above are fully incorporated as part of this Agreement.

Section 2. Purpose. The purpose of this Agreement is to cooperatively support and undertake preparation of the IP, MP, and any Special Studies agreed to by the Parties.

Section 3. Cooperation. The Parties shall fully cooperate with one another to achieve the purposes of this Agreement.

Section 4. Voluntary Nature. The Parties voluntarily enter into this Agreement.

Section 5. Term. This Agreement shall remain and continue in effect until completion of the IP, MP, and any Special Studies agreed to by the Parties, or December 31, 2022, whichever occurs first.

RB-AR6914

Section 6. Role of the Gateway Authority.

a) The Gateway Authority shall endeavor to enter into substantially and materially similar agreements with each of the Watershed Entities.

b) Based on the directions of the TC, the Gateway Authority shall retain a Consultant or Consultants ("Consultant(s)") to prepare the IP, MP, and any agreed upon Special Studies to demonstrate compliance with the Metals TMDL. The Consultant's Scope of Work shall substantially conform to the Scope of Work set forth in Exhibit B to this Agreement.

c) The Gateway Authority shall invoice the Watershed Entities a proportional amount to cover the costs incurred by the Gateway Authority in the performance of its duties under this Agreement. Such costs shall include, but not be limited to, the costs of: the Consultant's fees and costs for the preparation of the IP, MP, and Special Studies; Gateway Authority staff time; legal fees; audit expenses; and administering this Agreement (collectively, the "Agreement Costs"). The Gateway Authority shall invoice the Watershed Entities on an annual basis in an amount based on the Cost Share Formula in Exhibit A.

Section 7. Obligation to Pay Proportional Costs.

a) Upon receiving an invoice, the City shall pay the Gateway Authority its proportionate share of the Gateway Authority's anticipated Agreement Costs in accordance with the Cost Share Formula set forth in Exhibit A.

b) The Agreement shall become effective only if the Gateway Authority is able to execute substantially similar agreements with the cities of Bellflower, Lakewood and Long Beach. The City shall pay the adjusted proportional cost based on the Cost Share Formula set forth in Exhibit A. If the Gateway Authority is unable to execute materially similar agreements with any of the other Watershed Entities, the proportional costs set forth in Exhibit A shall be adjusted.

c) Any over or underpayment of Agreement costs shall be credited or billed to the City during the following period or, if it occurs in the last year of this Agreement, it shall be returned upon termination of this Agreement.

RB-AR6915

Section 8. Invoicing and Payment.

a) Payment to the Gateway Authority is due within sixty (60) days of the invoice date. The first invoice should be expected within sixty (60) days of signing this agreement. Invoices for future Agreement Costs will be billed annually in March, starting in the year 2011.

b) Any payment that is late shall be subject to interest from the due date. For any payment that is made from 1 to 30 days after the due date, the interest rate shall be equal to the Prime Rate in effect on the due date plus one (1) percent (e.g., if the Prime Rate is 5 percent, the interest rate for this Agreement will be 6 percent). For any payment made from 31 to 60 days after the due date, the interest rate shall be equal to the Prime Rate in effect on the due date plus five (5) percent. For payments made over 60 days after the due date, the interest rate shall be the Prime Rate in effect on the due date plus ten (10) percent. The rates shall, nevertheless, not exceed the maximum allowed by law.

c) A Party will be delinquent if payment is not received within 120 days after first being invoiced by the Gateway Authority. The Gateway Authority will follow the procedure listed below, or such other procedure that the Steering Committee directs to effectuate payment: 1) verbally contact the official to whom notices should be addressed pursuant to Section 12 of this Agreement and 2) submit a formal letter from the Gateway Authority Executive Officer to the delinquent Watershed Entity. If payment is not received, the Gateway Authority may terminate the Agreement and recalculate the proportional cost for the remaining Watershed Entities.

d) Any interest accrued on the funds collected per this Agreement shall be applied toward the Agreement Costs. The Gateway Authority shall annually submit a report to the SC on the amount of interest accrued by the Agreement account. Funds remaining at the end of the term of this Agreement shall be returned to the participating Watershed Entities in accordance with the Cost Share Formula in Exhibit A.

Section 9. Independent Contractor.

a) The Gateway Authority is, and shall at all times remain, a wholly independent contractor for performance of the obligations described in this Agreement. The Gateway Authority's officers, officials, employees and agents shall at all times during the Term of this Agreement be under the exclusive control of the Gateway Authority. The Watershed Entities shall not control the conduct of the Gateway Authority or any of its officers, officials, employees or agents, except as set forth in this Agreement. The Gateway Authority, and its officers, officials, employees, and agents shall not be deemed to be employees of the Watershed Entities.

b) The Gateway Authority is solely responsible for the payment of salaries, wages, other compensation, employment taxes, worker's compensation, or similar taxes

RB-AR6916

for its employees performing services hereunder.

Section 10. Indemnification and Insurance.

a) The Gateway Authority shall include an indemnification provision in the agreement with the Consultant requiring the Consultant to defend, indemnify and hold harmless the City and the Gateway Authority, and their officers, employees, and other representatives and agents, from and against any and all liabilities, actions, suits, proceedings, claims, demands, losses, costs, and expenses, including legal costs and attorney's fees, for injury to or death of person (s), for damage to property (including property owned by the Gateway Authority or the City) resulting from negligent or intentional acts, errors and omissions committed by Consultant, its officers, employees, and other representatives and agents, arising out of or related to Consultant's performance under this Agreement.

b) The City shall defend, indemnify and hold harmless the Gateway Authority, its officers, employees, and other representatives and agents of the Gateway Authority, from and against any and all liabilities, actions, suits, proceedings, claims, demands, losses, costs, and expenses, including legal costs and attorney's fees, for injury to or death of person (s), for damage to property (including property owned by the Gateway Authority) and for negligent or intentional acts, errors and omissions committed by City, its officers, employees, and other representatives and agents, arising out of or related to City's performance under this Agreement, except for such loss as may be caused by Gateway Authority's gross negligence or intentional acts or the gross negligence or intentional acts of its officers, employees, or other representatives and agents.

c) Consultant's Insurance. The Gateway Authority shall require the Consultant to provide proof of current Automotive and/or General Liability, Professional (Errors and Omissions) in sufficient coverage amounts, naming the Gateway Authority and each Watershed Entity as an additional insured. Consultant shall also be required to provide proof of current Workman's Compensation insurance, when applicable.

Section 11. Termination of Agreement. Either Party may terminate this Agreement in whole or in part, for any reason, or no reason, by giving the other Party thirty (30) days written notice thereof. The City shall be responsible for Agreement Costs to which the Gateway Authority became bound prior to the date of termination. Such Agreement Costs shall include the remaining fees of any Consultant retained by the Gateway Authority prior to the date of termination. Gateway Authority shall notify in writing all Watershed Entities within fourteen (14) days after receiving written notice from any Watershed Entity that said entity intends to terminate this Agreement. Each Watershed City's proportionate cost allocation shall be reapportioned thereafter in accordance with the Cost Share Formula in Exhibit A.

Section 12. Miscellaneous.

a) Notices. All notices which any Party is required or desires to give hereunder shall be in writing and shall be deemed given when delivered personally or three (3)

days after mailing by registered or certified mail (return receipt requested) to the following address or as such other addresses as the Parties may from time to time designate by written notice in the aforesaid manner:

To Gateway Authority:
Ms. Annette Hubbell
Gateway Authority Executive Officer
City of Downey
11111 Brookshire Ave.
Downey, CA 90241

To City of Signal Hill:
Mr. Kenneth C. Farfsing
City Manager
City of Signal Hill
2175 Cherry Avenue
Signal Hill, CA 90755

b) Separate Accounting and Auditing. The Gateway Authority agrees to establish a separate account to track revenues and expenses resulting from the Agreement. Annual financial statements and audits will be made available to the participating Parties, after review and approval by the Metals TMDL SC.

c) Binding Effect. This Agreement shall be binding upon and inure to the benefit of each Party to this Agreement and its respective heirs, administrators, representatives and successors.

d) Amendment. The terms and provisions of this Agreement may not be amended, modified or waived, except by a written instrument signed by both Parties.

e) Waiver. Waiver by either Party of any term, condition, or covenant of this Agreement shall not constitute a waiver of any other term, condition, or covenant. Waiver, by any Party, to any breach of the provisions of this Agreement shall not constitute a waiver of any other provision, or a waiver of any subsequent breach of any provision of this Agreement.

f) Law to Govern; Venue. This Agreement shall be interpreted, construed, and governed according to the laws of the State of California. In the event of litigation between the Parties, venue shall lie exclusively in the County of Los Angeles.

g) No Presumption in Drafting. The Parties to this Agreement agree that the general rule that an Agreement is to be interpreted against the Party drafting it, or causing it to be prepared, shall not apply.

h) Severability. If any term, provision, condition or covenant of this Agreement is declared or determined by any court of competent jurisdiction to be invalid, void, or unenforceable, the remaining provisions of this Agreement shall not be affected thereby and this Agreement shall be read and construed without the invalid, void, or unenforceable provision(s).

i) Entire Agreement. This Agreement constitutes the entire agreement of the Parties with respect to the subject matter hereof and supersedes all prior or contemporaneous agreements, whether written or oral, with respect thereto.

j) Counterparts. This Agreement may be executed in any number of counterparts, each of which shall be an original, but all of which taken together shall constitute but one and the same instrument, provided, however, that such counterparts shall have been delivered to both Parties to this Agreement.

k) Legal Representation. All Parties have been represented by counsel in the preparation and negotiation of this Agreement. Accordingly, this Agreement shall be construed according to its fair language.

l) Agency Authorization. Each of the persons signing below on behalf of a Party represents and warrants that he or she is authorized to sign this Agreement on behalf of such Party.

IN WITNESS WHEREOF, the Parties hereto have caused this Agreement to be executed on their behalf, respectively, as follows:

DATE: _____

CITY OF SIGNAL HILL

Kenneth C. Farsing

ATTEST:

City Clerk

APPROVED AS TO FORM:

City Attorney

DATE: 8-3-10

LOS ANGELES GATEWAY REGION INTEGRATED REGIONAL WATER MANAGEMENT JOINT POWERS AUTHORITY

Gateway Authority Chair

ATTEST:

Gateway Authority Secretary

APPROVED AS TO FORM:

Gateway Authority General Counsel

RB-AR6920

EXHIBIT A

LOS CERRITOS CHANNEL METALS TMDL
COST ALLOCATION

Agency Name	Acres in Watershed[1]	Percent of Watershed Area	Agency Cost Share per $100,000		
			Flat Fee	Area Share	Total
Bellflower	2,818.43	16.00%	$5,000	$9,599	$14,599
CalTrans	497.74	2.83%	$5,000	$1,695	$6,695
Cerritos	57.60	0.33%	$5,000	$196	$5,196
Downey	245.00	1.39%	$5,000	$834	$5,834
Lakewood	4,802.77	27.26%	$5,000	$16,358	$21,358
Long Beach	7,535.38	42.77%	$5,000	$25,665	$30,665
Paramount	1,128.93	6.41%	$5,000	$3,845	$8,845
Signal Hill	530.75	3.01%	$5,000	$1,808	$6,808
JPA MOA Total	17,616.60	100.00%	$40,000	$60,000	$100,000
UNI Los Angeles Co.	94.40				
USEPA TMDL Total	17,711.00				

[1] CalTrans provided acreage values were subtracted from city acreage provided by USEPA

The City of Long Beach and Signal Hill's annual payments as shown above shall be offset by the credits outlined in the Recitals of the Agreement.

EXHIBIT B

SCOPE OF WORK
FOR
DEVELOPMENT OF AN IMPLEMENTATION PLAN FOR AN EPA-ESTABLISHED METALS TMDL FOR THE LOS CERRITOS CHANNEL FRESHWATER WATERSHED

1. Prepare a detailed outline for Metals TMDL Implementation component to accompany the incorporation of the Metals TMDL in the reissued MS4 NPDES Permits, an Implementation Plan for the Los Cerritos Channel Metals TMDL

2. Prepare an Implementation Strategy, including
   a. An adaptive management approach,
   b. Tiered source control measures, and
   c. Tiered treatment control, if necessary

3. Prepare recommended Implementation Actions for
   a. Municipal Stormwater Permittees
   b. Caltrans
   c. Construction Stormwater Permittees
   d. Industrial Stormwater Permittees

4. Draft and Negotiate an Implementation Schedule acceptable to
   a. Municipal permittees
   b. The Los Angeles Regional Water Quality Control Board
   c. USEPA Region IX

5. Coordinate with Monitoring Consultant on Establishment of
   a. Ambient Monitoring Program
   b. TMDL Effectiveness Monitoring
   c. Special Studies, if any

6. Coordinate with Technical Committee and Steering Committee
   a. Attend meetings, as requested
   b. Submit draft materials to Technical Committee for review and approval
   c. Submit draft final materials to Steering Committee for review and approval before submittal to Regional Water Board

7. Coordinate with Regional Water Board staff
   a. Obtain an outline format for a Basin Plan Amendment
   b. Review Implementation Strategy with Regional Water Board staff
   c. Review Implementation Actions with Regional Water Board staff

Note: The Technical Committee may modify details of Scope of Work, if necessary.

LOS CERRITOS CHANNEL TMDL AMBIENT MONITORING

OVERVIEW

Ambient monitoring will establish baseline conditions for three major segments of the watershed and provide the necessary groundwork for effectiveness monitoring. The basic monitoring design used in the ambient monitoring effort will be the backbone of the effectiveness monitoring program.

OUTLINE OF MONITORING PROGRAM

Ambient Monitoring Program –Wet Season

Wet season monitoring is intended to provide measurement of trace metal concentrations and loads at the three sites representing each of three major segments of the Los Cerritos Channel storm drain. The following subtasks will be required for the first year of the program. The first two tasks will apply only to the first year.

1. Identify three additional monitoring sites
2. Purchase and install equipment to obtain automated flow-composite samples.
3. Continue monitoring at the City of Long Beach Stearns Street monitoring site.
4. Monitoring at all sites will include:

- Continuous measurement of flow and rainfall
- Collection of flow-rated composite samples for six (6) storm events
- Analyses will include total hardness, TSS and trace metals. Trace metals will include dissolved and total fractions of copper, lead and zinc.

Ambient Monitoring Program –Dry Season

Dry weather flows will need to be monitored continuously throughout the summer dry season (May through September) and sampled to determine metals concentrations and loads. Alternative flow measurement techniques will be necessary during the summer dry season to provide continuous measurement of dry weather flow and more accurate baseline measurements of concentration and loads. Monitoring will be conducted at the same locations used for monitoring storm flows during the winter wet season. Subtasks for the dry weather ambient monitoring effort will include the following:

1. Determine flume sizes. Purchase the flumes, sidewalls (stop logs) for consolidating shallow flows, data loggers and high-precision pressure sensors for each site.
2. Install temporary flumes and electronic packages at the three TMDL monitoring sites and the Long Beach Mass Emission monitoring site during the summer.
3. Provide continuous measurements of summer dry weather flow at each site.
4. Collect grab samples for hardness, TSS and trace metals 4 times during the summer dry weather period and 2 times during winter dry weather period.

Reporting

Annual draft and final report will be submitted after the first full year of monitoring. The dates for submission of these reports will be established once the program is initiated.

* Notes: Details of scope may be modified by Technical Committee, if necessary.

ATTACHMENT I.3:

CITY OF SIGNAL HILL DRAFT LID ORDINANCE

CITY OF SIGNAL HILL

2175 Cherry Avenue◆Signal Hill, CA 90755-3799

June 18, 2013

AGENDA ITEM

TO: HONORABLE MAYOR
AND MEMBERS OF THE CITY COUNCIL

FROM: STEVE MYRTER, P.E.
DIRECTOR OF PUBLIC WORKS

SUBJECT: **PUBLIC HEARING - INTRODUCTION OF AN ORDINANCE AMENDING SIGNAL HILL MUNICIPAL CODE TITLE 12 BY ADDING TO CHAPTER 12.16: LOW IMPACT DEVELOPMENT ORDINANCE**

Summary:

Storm water and dry-weather urban runoff from the City of Signal Hill are subject to Waste Discharge Requirements issued by the Los Angeles Regional Water Quality Control Board (RWQCB). The current Municipal Separate Storm Sewer System (MS4) permit recently adopted by the RWQCB requires changes to Chapter 12.16 of the Signal Hill Municipal Code including incorporation of low impact development strategies to meet the more stringent permit requirements. The Public Hearing was opened on June 4, 2013, and continued to June 18, 2013.

Recommendation:

Waive further reading and introduce the following ordinance, entitled:

AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF SIGNAL HILL, CALIFORNIA, AMENDING SIGNAL HILL MUNICIPAL CODE CHAPTER 12.16 ENTITLED STORM WATER/URBAN RUNOFF, TO EXPAND THE APPLICABILITY OF THE EXISTING POLLUTANT SOURCE REDUCTION REQUIREMENTS BY IMPOSING RAINWATER LOW IMPACT DEVELOPMENT (LID) STRATEGIES ON CERTAIN PROJECTS THAT REQUIRE BUILDING, GRADING AND ENCROACHMENT PERMITS

Fiscal Impact:

No immediate fiscal impact from the adoption of this ordinance is anticipated. However, future City capital improvement projects may be impacted from time to time as a result of the additional costs that would be required to construct storm water treatment systems.

Background:

SEPARATE STORM SEWER SYSTEM (MS4) PERMIT

Storm water and dry-weather urban runoff from the City of Signal Hill are subject to Waste Discharge Requirements issued by the Los Angeles Regional Water Quality Control Board (RWQCB). These requirements include numerical effluent limits for pollutants that have been established by Total Maximum Daily Loads (TMDLs) and the Regional Board's Basin Plan. The Municipal Separate Storm Sewer System (MS4) permit that was approved by the Los Angeles Regional Quality Control Board (RWQCB) on November 8, 2012, requires changes to Chapter 12.16 of the Signal Hill Municipal Code. These changes, in general, expand the number and types of new and redevelopment projects that will now be required to install storm water runoff treatment systems. In addition, the numerical effluent limits are not likely to be achievable without the installation of storm water treatment systems that will cumulatively receive drainage from a large portion of the City. The amendments to Chapter 12.16 of the Signal Hill Municipal Code establishes requirements and standards for the installation of small scale treatment systems on individual parcels with a minimum of 500 square feet or more of new or remodeled impervious surfaces.

The proposed changes to Chapter 12 also remove requirements that are no longer applicable with the adoption of the new MS4 Permit. For example, under the old MS4 Permit (and currently in the Municipal Code) construction projects over 5 acres are required to prepare a Local Storm Water Pollution Prevention Plan (LSWPPP) and submit to the City for review and approval. The 5 acre threshold was lowered to 1 acre by the State in 2003; and subsequently, the LSWPPP requirement was completely eliminated in the new MS4 Permit. The proposed amendment eliminates references to the LSWPPP, and updates and restructures many other aspects of the Municipal Code to bring it into line with the Development Planning section of the new MS4 Permit.

LOW IMPACT DEVELOPMENT OVERVIEW

Low Impact Development is a strategy for improving the quality of runoff by requiring that development projects direct runoff to storm water treatment systems consisting of vegetation and soil. Since 2007, the City has been requiring Low Impact Development for high priority projects, such as parking lots that are over 5,000 square feet, and housing developments that have 10 or more dwelling units. The new NPDES (MS4)

permit increased the number and type of high priority (large) projects. For example, under the old permit, industrial and commercial projects disturbing one acre (43,560 square-feet) or more of soil would have to install storm water runoff treatment systems. The new MS4 Permit lowers this threshold to 10,000 square feet. However, this new lower threshold still leaves many small scale projects (projects that impact between 500 and 10,000 square-feet of soil) without treatment.

The new MS4 Permit's establishment and enforceability of Total Maximum Daily Loads (TMDLs), a regulatory numerical effluent discharge measurement for targeted storm water pollutants including metals, bacteria, and nutrients to name a few, necessitates that both high priority and small scale projects now incorporate storm water treatment systems. As stated above, the new TMDL requirements will not be achievable without extensive Low Impact Development. In order to minimize cost impacts and address unique individual project constraints, the number of treatment system alternatives has been increased. These treatment systems, depending upon design, can reduce pollutant levels by as much as 50 to 90 percent from their associated draining area. The installation of these treatment systems can be low-cost and generally require low-maintenance, often being incorporated into the parcels' landscape design.

Analysis:

An increased number of development projects will now be required to submit plans and obtain approval for the proposed low impact development measures being incorporated prior to permit issuance. The review process for high priority projects that was in effect under the old permit is not anticipated to change significantly. The Low Impact Development (for small sites) Technical Guidance Manual was presented to the Sustainability Committee at the June 26, 2012, meeting for consideration and comment. At this meeting, comments regarding cost/benefit, vector control, and enforcement were made and revisions have been incorporated into the guidance manual. A copy of the completed Low Impact Development for small sites Technical Guidance Manual to be used by the property owner and/or developer is attached as Attachment "A".

The goals of Low Impact Development include: (1) reducing the amounts of pollutants in storm water and urban runoff, (2) development of specifications for low cost treatment systems that are easy for the property owner to install, and (3) encouraging property owners to select treatment systems that are easy to maintain thus minimizing the need for City enforcement. Specific elements include:

- Projects under 500 square feet will be exempted from this program.

- Residential development for 1-4 units will be able to put City specifications on plans and provide simple calculations showing the treatment surface area is 4 percent of the new impervious area.
- Residential development involving 5 or more dwelling units and those for commercial or industrial development are more likely to have professional engineers and architects involved in the project and will be subject to slightly more complex documentation showing that the treatment system can accommodate runoff for the first ¾ inch of rainfall.
- Where redevelopment involves more than 50 percent of the site, runoff from the entire site would have to be treated.
- Readily approvable treatment systems such as:
    - Flow-through planters
    - Vegetative (concave) swales with underdrains
    - Rain Gardens (concave rock and plant areas)
    - Hollywood or other pervious style driveways
    - Bottomless trench drains across driveways
- Other permitted treatment systems to be approved by the City.
- Projects subject to New Development and Redevelopment provisions of the MS4 permit (large projects) will be separately evaluated in accordance with the LID criteria of the MS4 permit.

Proposed enforcement to ensure the ongoing effectiveness of these treatment systems includes:

1. No enforcement, and reliance on the "honor" system for property owners to maintain these systems, recognizing a portion of property owners will not actively maintain the systems, or would even alter or remove some of the systems, or

2. A limited enforcement program that could require:

    a. Small signs or markers at the time of installation stating, "This landscape feature is part of a storm water treatment system and alterations are not permitted without prior City authorization", or

    b. Letters sent out annually reminding owners to properly maintain these systems,

3. Inspections made by City representatives, annually or every 2 years, at the 5 unit or more residential facilities and industrial/commercial sites (Inspections at the 1-4 unit

residential sites are regarded as problematic due to property rights issues and are not likely to be cost effective.)

Instead of implementing a Low Impact Development program requiring treatment systems at the per-parcel level as described above, the City does have the alternative of installing a few very large regional treatment systems. This will require locating available City or public agency owned sites, or the purchase of land, near a major storm drain to install large treatment systems. The City would be responsible for ongoing maintenance. The costs associated with this are speculative at this point and therefore are not included herein but are anticipated to be considerably higher than the per-parcel approach.

Approved:

Kenneth C. Farfsing

Attachments

ORDINANCE NO._____

AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF SIGNAL HILL, CALIFORNIA, AMENDING SIGNAL HILL MUNICIPAL CODE CHAPTER 12.16 ENTITLED STORM WATER/URBAN RUNOFF, TO EXPAND THE APPLICABILITY OF THE EXISTING POLLUTANT SOURCE REDUCTION REQUIREMENTS BY IMPOSING RAINWATER LOW IMPACT DEVELOPMENT (LID) STRATEGIES ON CERTAIN PROJECTS THAT REQUIRE BUILDING, GRADING AND ENCROACHMENT PERMITS

WHEREAS, the City is authorized by Article XI, Section 5 and Section 7 of the State Constitution to exercise the police power of the State by adopting regulations to promote public health, public safety and general prosperity; and

WHEREAS, the federal Clean Water Act establishes Regional Water Quality Control Boards in order to prohibit the discharge of pollutants in storm water runoff to waters of the United States; and

WHEREAS, the City is a permittee under the California Regional Water Quality Control Board, Los Angeles Region Order No. R4-2012-0175, issued on November 08, 2012, which establishes Waste Discharge Requirements for Municipal Separate Storm Sewer Systems (MS4) Discharges within the Coastal Watersheds of Los Angeles County, Except those Discharges Originating from the City of Long Beach MS4; and

WHEREAS, Order No. R4-2012-0175 contains requirements for municipalities to establish a LID Ordinance in order to participate in a Watershed Management Program and/or Enhanced Watershed Management Program; and

WHEREAS, the Regional Board has adopted Total Maximum Daily Loads (TMDLs) for pollutants, which are numerical limits that must be achieved effectively through LID implementation; and

WHEREAS, the City has the authority under the California Water Code to adopt and enforce ordinances imposing conditions, restrictions and limitations with respect to any activity that might degrade waters of the State; and

WHEREAS, the City is committed to a storm water management program that protects water quality and water supply by employing watershed-based approaches that balance environmental and economic considerations; and

WHEREAS, urbanization has led to increased impervious surface areas resulting in increased water runoff and less percolation to groundwater aquifers causing the transport of pollutants to downstream receiving waters; and

WHEREAS, it is the intent of the City to expand the applicability of the existing LID requirements by providing storm water and rainwater LID strategies for all Development and Redevelopment projects, as defined herein.

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF SIGNAL HILL, CALIFORNIA, DOES HEREBY ORDAIN AS FOLLOWS:

SECTION 1. Section 12.16.010 of the Signal Hill Municipal Code is repealed in its entirety and shall be replaced with the following:

12.16.010. DEFINITIONS.

A. "40 CFR" means Title 40 of the Code of Federal Regulations.

B. "Automotive Service Facility" means a facility that is categorized in any one of the following Standard Industrial Classification Codes: 5013, 5014, 5541, 7532-7534 or 7536-7539.

C. "Basin Plan" means the Water Quality Control Plan, Los Angeles Region, Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties, adopted by the Regional Water Board on June 13, 1994 and subsequent amendments.

D. "Best Management Practice (BMP)" means practices or physical devices or systems designed to prevent or reduce pollutant loading from storm water or non-storm water discharges to receiving waters, or designed to reduce the volume of storm water or non-storm water discharged to the receiving water.

E. "Biofiltration" means a LID BMP that reduces storm water pollutant discharges by intercepting rainfall on vegetative canopy, and through incidental

infiltration and/or evapotranspiration, and filtration. Incidental infiltration is an important factor in achieving the required pollutant load reduction. Therefore, the term "biofiltration" as used in this Chapter is defined to include only systems designed to facilitate incidental infiltration or achieve the equivalent pollutant reduction as biofiltration BMPs with an underdrain (subject to approval by the Regional Board's Executive Officer). Biofiltration BMPs include bioretention systems with an underdrain and bioswales.

F. "Bioretention" means a LID BMP that reduces storm water runoff by intercepting rainfall on vegetative canopy, and through evapotranspiration and infiltration. The bioretention system typically includes a minimum 2-foot top layer of a specified soil and compost mixture underlain by a gravel-filled temporary storage pit dug into the in-situ soil. As defined in this Chapter, a bioretention BMP may be designed with an overflow drain, but may not include an underdrain. When a bioretention BMP is designed or constructed with an underdrain it is regulated by the MS4 Permit as biofiltration.

G. "Bioswale" means a LID BMP consisting of a shallow channel lined with grass or other dense, low-growing vegetation. Bioswales are designed to collect storm water runoff and to achieve a uniform sheet flow through the dense vegetation for a period of several minutes.

H. "Brownfield Development" means real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant.

I. "CEQA" means the California Environmental Quality Act, California Public Resource Code Sections 21000 et seq., and the regulations thereunder.

J. "City" means the City of Signal Hill.

K. "Clean Water Act" or "CWA" means the Federal Water Pollution Control Act, amended in 1977 as the Clean Water Act (Title 33 U.S.C. § 1251 et seq.), and amended in 1987 to establish new controls on industrial and municipal storm water discharges, and any and all subsequent amendments thereto.

L. "Commercial Development" means any development on private land that is not heavy industrial or residential. Commercial Development includes, but is not limited to: hospitals, laboratories and other medical facilities, educational institutions, recreational facilities, plant nurseries, car wash facilities; mini-malls and other business complexes, shopping malls, hotels, office buildings, public warehouses and other light industrial complexes.

M. "Commercial Mall" means any development on private land comprised of one or more buildings forming a complex of stores which sells various merchandise, with interconnecting walkways enabling visitors to easily walk from store to store, along with parking area(s). Commercial Mall includes, but is not limited to: mini-malls, strip malls, other retail complexes, and enclosed shopping malls or shopping centers.

N. "Construction Activity" means any construction or demolition activity, clearing, grading, grubbing, or excavation or any other activity that results in land disturbance. The term "Construction Activity" does not include emergency construction activities required to immediately protect public health and safety, nor does it include routine maintenance activities required to maintain the integrity of structures by performing minor repair and restoration work, maintain the original line and grade, hydraulic capacity, or original purposes of the facility.

O. "Control" means to minimize, reduce or eliminate, by technological, legal, contractual, or other means, the discharge of pollutants from an activity or activities.

P. "Dechlorinated/debrominated swimming pool discharges" means swimming pool discharges which have no measurable chlorine or bromine and do not contain any detergents, wastes, or additional chemicals not typically found in swimming pool water. The term "swimming pool discharges" does not include swimming pool filter back wash.

Q. "Development" means construction, rehabilitation, redevelopment or reconstruction of any public or private residential project (whether single-family, multi-unit or planned unit development); industrial, commercial, retail, and other non-residential projects, including public agency projects; or mass grading for future construction. It does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of facility, nor does it include emergency construction activities required to immediately protect public health and safety.

R. "Directly Adjacent" means situated within 200 feet of the contiguous zone required for the continued maintenance, function, and structural stability of the environmentally sensitive area.

S. "Director" shall refer to the city of Signal Hill's Director of Public Works or his or her designee.

T. "Discharge" means any release, spill, leak, disposal, flow, escape, leaching (including subsurface migration or deposition to groundwater), dumping or discarding of any liquid, semisolid or solid substance, or combination thereof.

U. "Disturbed Area" means an area that is altered as a result of clearing, grading, and/or excavation.

V. "Environmentally Sensitive Area" (ESA) means an area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which would be easily disturbed or degraded by human activities and developments (California Public Resources Code § 30107.5). Areas subject to storm water mitigation requirements are: areas designated as Significant Ecological Areas by the County of Los Angeles (Los Angeles County Significant Areas Study, Los Angeles County Department of Regional Planning (1976) and amendments); an area designated as a Significant Natural Area by the California Department of Fish and Game's Significant Natural Areas Program, provided that area has been field verified by the Department of Fish and Game; an area listed in the Basin

Plan as supporting the "Rare, Threatened, or Endangered Species (RARE)" beneficial use; and an area identified by a permittee as environmentally sensitive.

W. "Flow-through treatment BMPs" means a modular, vault type "high flow biotreatment" device contained within an impervious vault with an underdrain or designed with an impervious liner and an underdrain.

X. "Full Capture System" means any single device or series of devices that traps all particles retained by a 5 mm mesh screen and has a design treatment capacity of not less than the peak flow rate Q resulting from a one-year, one-hour storm in the sub-drainage area.

Y. "General Construction Activities Storm Water Permit (GCASP)" means the general NPDES permit adopted by the State Board which authorizes the discharge of storm water from construction activities under certain conditions.

Z. "General Industrial Activities Storm Water Permit (GIASP)" means the general NPDES permit adopted by the State Board which authorizes the discharge of storm water from certain industrial activities under certain conditions.

AA. "Green Roof" means a LID BMP using planter boxes and vegetation to intercept rainfall on the roof surface. Rainfall is intercepted by vegetation leaves and through evapotranspiration. Green roofs may be designed as either a bioretention BMP or as a biofiltration BMP. To receive credit as a bioretention BMP, the green roof system planting medium shall be of sufficient depth to provide capacity within the pore space volume to contain the design storm depth and may not be designed or constructed with an underdrain.

BB. "Hazardous Substance" means any "Hazardous Substance" as that term is defined under California Health & Safety Code Sections 25281(g), 25501(o) and 25501.7, and pursuant to Title 42, Section 9601(14) of the United States Code; any "hazardous waste" as that term is defined under Title 42 Sections 6903(5) of the United States Code, and under California Health & Safety Code Section 25550(p); any "hazardous material," as that term is defined under California Health & Safety Code Section 25501(n); any chemical which the Governor of California has identified as a chemical known to cause cancer or reproductive toxicity, pursuant to California Health & Safety Code Section 25249.8; and any crude oil or refined or unrefined petroleum product, or any fraction or derivative thereof, and any asbestos or asbestos containing material. The term "Hazardous Substance" includes any amendments to the above-referenced statutes and regulations.

CC. "Hillside Property" means property located in an area with known erosive soil conditions, where the development contemplates grading on any natural slope that is 25 percent or greater.

DD. "Illicit Connection" means any man-made conveyance that is connected to the storm drain system without a permit, excluding roof drains and other similar type connections. Examples include channels, pipelines, conduits, inlets, or outlets that are connected directly to the storm drain system.

EE. "Illicit Discharge" means any discharge to the storm drain system that is prohibited under local, state, or federal statutes, ordinances, codes or regulations. The term Illicit Discharge includes all nonstorm water discharges except discharges made pursuant to a National Pollutant Discharge Elimination System (NPDES) permit, discharges that are listed within this chapter as exempt and discharges authorized by the Regional Board Executive Officer.

FF. "Impaired Water Body" means a water body that is listed by the State Board as impaired by a particular pollutant or pollutants, pursuant to Section 303(d) of the Clean Water Act.

GG. "Impervious Surface" means any surface that prevents or significantly reduces the entry of water into the underlying soil resulting in runoff from the surface in greater quantities and/or at an increased rate when compared to natural conditions prior to development including, but not limited to: parking lots, driveways, roadways, storage areas, and rooftops. The imperviousness of these areas commonly results from the use of paving or compacted gravel.

HH. "Industrial/Commercial Facility" means any facility involved and/or used in the production, manufacture, storage, transportation, distribution, exchange or sale of goods and/or commodities, and any facility involved and/or used in providing professional and non-professional services. This category of facilities includes, but is not limited to, any facility defined by either the Standard Industrial Classifications (SIC) or the North American Industry Classification System (NAICS). Facility ownership (federal, state, municipal, private) and profit motive of the facility are not factors in this definition.

II. "Industrial Park" means land development that is set aside for industrial development. Industrial parks are usually located close to transport facilities, especially where more than one transport modalities coincide: highways, railroads, airports, and navigable rivers. It includes office parks, which have offices and light industry.

JJ. "Infiltration BMP" means a LID BMP that reduces storm water runoff by capturing and infiltrating the runoff into in-situ soils or amended onsite soils. Examples of infiltration BMPs include infiltration basins, dry wells, and pervious pavement.

KK. "Low Impact Development (LID)" consists of building and landscape features designed to retain or filter storm water runoff.

LL. "Low Impact Development for Small Sites Technical Guidance Manual (LID Manual for Small Sites)" means such manual prepared by the Director and approved by the City Council pursuant to Section 12.16.116(A) of this Chapter..

MM. "Low Impact Development Plan (LID Plan)" means such plan prepared by the project applicant pursuant to Section 12.16.114(D) of this Chapter.

NN. "Maximum Extent Practicable" as defined in the permit means a standard for implementation of storm water management programs to reduce pollutants in storm water. CWA 402(p)(3)(B)(iii) requires that municipal permits "shall require controls to

reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or State determines appropriate for the control of such pollutants."

OO. "Municipal NPDES Permit (MS4 Permit)" means the current, area-wide NPDES permit issued to a government agency or agencies permitting the discharge of storm water from an MS4.

PP. "Municipal Separate Storm Sewer System (MS4)" or "Municipal Storm Drain System" means a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains):

1. Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States;

2. Designed or used for collecting or conveying storm water;

3. Which is not a combined sewer; and

4. Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR Section 122.2.

(40 CFR Section 122.26(b)(8)) (Order No. R4-2012-0175)

QQ. "National Pollutant Discharge Elimination System (NPDES)" means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under CWA Section 307, 402, 318, and 405.

RR. "National Pollutant Discharge Elimination System ("NPDES") Permit" means a storm water discharge permit issued by the Los Angeles Regional Water Quality Control Board or the State Water Resources Control Board, that authorizes discharges to water of the United States and requires the reduction of pollutants in such discharges.

SS. "Natural Drainage System" means a drainage system that has not been improved (e.g., channelized or armored). The clearing or dredging of a natural drainage system does not cause the system to be classified as an improved drainage system.

TT. "New Development" means land disturbing activities, structural development (including construction or installation of a building or structure), creation of impervious surfaces, and land subdivision.

UU. "Non-Storm Water Discharge" means any discharge to the Municipal Storm Drain System that is not composed entirely of storm water.

VV. "Outfall" means a point source as defined by 40 CFR 122.2 at the point where a municipal separate storm sewer discharges to waters of the United States. Outfall does not include open conveyances connecting two municipal separate storm sewers, or pipes, tunnels or other conveyances with connect segments of the same stream or other waters of the United States and are used to convey waters of the United States.

WW. "Parking Lot" means land area or facility for the parking or storage of motor vehicles used for businesses, commerce, industry, or personal use, with a lot size of 5,000 square feet or more of surface area, or with 25 or more parking spaces.

XX. "Person" means any natural person, firm, association, club, organization, corporation, partnership, sole proprietorship, business trust, company or other entity which is recognized by law as the subject of rights or duties.

YY. "Pollutant" means those pollutants defined in Section 502(6) of the Federal Clean Water Act (33 USC § 1362(c)) or incorporated into California Water Code Section 13373. Examples of pollutants include, but are not limited to, the following:

1. Artificial materials, chips or pieces of man-made materials (such as floatable plastics, paper, cartons, or pieces of metal);

2. Commercial or industrial water (such as fuels, solutions, detergents, plastic pellets, hazardous substances, fertilizer, pesticides, slag, ash and sludge);

3. Household waste (such as trash, paper, plastics, lawn clippings and yard wastes; animal fecal materials; excessive pesticides, herbicides and fertilizers; used oil and fluids from vehicles, lawn mowers and other common household equipment);

4. Metals, including but not limited to cadmium, lead, zinc, copper, silver, nickel, chromium, and non-metals, such as phosphorus and arsenic;

5. Petroleum hydrocarbons (such as crude oils, fuels, lubricants, surfactants, waste oils, solvents, coolants, condensate and grease);

6. Excessive eroded soils, sediment and particulate materials in amounts which may adversely affect the beneficial use of the receiving waters, or flora or fauna of the State of California;

7. Animal wastes (such as discharge from confinement facilities, kennels, pens and recreational facilities, including, stables, show facilities, or polo fields);

8. Substances having characteristics with a pH of less than 6 or greater than 9; or unusual coloration or turbidity, or excessive levels of fecal coliform, fecal streptococcus or enterococcus;

9. Waste materials and wastewater generated on construction sites and by construction activities (such as painting and staining; use of sealants, glues, limes; excessive pesticides, fertilizers or herbicides; use of wood preservatives and solvents; disturbance of asbestos fibers, paint flakes or stucco fragments; application of oils, lubricants, hydraulic, radiator or battery fluids; construction equipment washing, concrete pouring and cleanup wash water or use of concrete detergents; steam cleaning or sand blasting residues; use of chemical degreasing or diluting agents; and super chlorinated water generated by potable water line flushing);

10. The term "Pollutant" shall not include uncontaminated storm water runoff, potable water or reclaimed water generated by a lawfully permitted water treatment facility.

ZZ. "Potable Water Sources" means flows from drinking water distribution systems, including flows from system failures, pressure releases, system maintenance, well development, testing, fire hydrant flow testing and flushing, and dewatering of pipes, reservoirs, vaults, and wells.

AAA. "Premises" means any building, structure, fixture or improvement on land, and any lot, parcel of land, land or portion of land whether improved or unimproved.

BBB. "Project" means all development, redevelopment, and land disturbing activities. The term is not limited to "Project" as defined under CEQA (Pub. Resources Code Section 21065).

CCC. "Proper Disposal" means the act of disposing of material(s) in a lawful manner which ensures protection of water quality and beneficial uses of receiving waters.

DDD. "Rainfall Harvest and Use" means a LID BMP system designed to capture runoff, typically from a roof but can also include runoff capture from elsewhere within the site, and to provide for temporary storage until the harvested water can be used for irrigation or non-potable uses. The harvested water may also be used for potable water uses if the system includes disinfection treatment and is approved for such use by the local building department.

EEE. "Receiving Water" means "water of the United States" into which waste and/or pollutants are or may be discharged.

FFF. "Redevelopment" means land-disturbing activity that results in the creation, addition, or replacement of 5,000 square feet or more of impervious surface area on an already developed site. Redevelopment includes, but is not limited to: the expansion of a building footprint; addition or replacement of a structure; replacement of impervious surface area that is not part of routine maintenance activity; and land disturbing activity related to structural or impervious surfaces. It does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of facility, nor does it include emergency construction activities required to immediately protect public health and safety.

GGG. "Regional Board" means the California Regional Water Quality Control Board, Los Angeles Region.

HHH. "Restaurant" means a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption.

III. "Retail Gasoline Outlet" means any facility engaged in selling gasoline and lubricating oils.

JJJ. "Routine Maintenance" includes, but is not limited to projects conducted to:

1. Maintain the original line and grade, hydraulic capacity, or original purpose of the facility;

2. Perform as needed restoration work to preserve the original design grade, integrity and hydraulic capacity of flood control facilities;

3. Perform road shoulder work, regrade dirt or gravel roadways and shoulders and perform ditch cleanouts;

4. Update existing lines* and facilities to comply with applicable codes, standards, and regulations regardless if such projects result in increased capacity; or

5. Repair leaks.

Routine maintenance does not include construction of new lines** or facilities resulting from compliance with applicable codes, standards and regulations.

* Update existing lines includes replacing existing lines with new materials or pipes.

** New lines are those that are not associated with existing facilities and are not part of a project to update or replace existing lines.

KKK. "Runoff" means any runoff, including storm water and dry weather flows, that reaches a receiving water body or subsurface. During dry weather, it is typically

comprised of many base flow components that are either contaminated with pollutants, or that are uncontaminated.

LLL. "Significant Ecological Areas (SEAs)" means an area that is determined to possess an example of biotic resources that cumulatively represent biological diversity, for the purposes of protecting biotic diversity, as part of the Los Angeles County General Plan. Areas are designated as SEAs if they possess one or more of the following criteria:

1. The habitat of rare, endangered, and threatened plant and animal species.

2. Biotic communities, vegetative associations, and habitat of plant and animal species that are either one of a kind, or are restricted in distribution on a regional basis.

3. Biotic communities, vegetative associations, and habitat of plant and animal species that are either one of a kind or are restricted in distribution in Los Angeles County.

4. Habitat that at some point in the life cycle of a species or group of species, serves as a concentrated breeding, feeding, resting, migrating grounds and is limited in availability either regionally or within Los Angeles County.

5. Biotic resources that are of scientific interest because they are either an extreme in physical/geographical limitations, or represent an unusual variation in a population or community.

6. Areas important as game species habitat or as fisheries.

7. Areas that would provide for the preservation of relatively undisturbed examples of natural biotic communities in Los Angeles County.

8. Special areas.

MMM. "Site" means land or water area where any "facility or activity" is physically located or conducted, including adjacent land used in connection with the facility or activity.

NNN. "Small Site Low Impact Development Plan (Small Site LID Plan)" means such plan prepared by the project applicant pursuant to Section 12.16.116(B) of this Chapter

OOO. "State Board" means the State Water Resources Control Board.

PPP. "State General Construction Permit" means the current State approved NPDES Permit and waste discharge requirements for discharges of storm water associated with construction activities, and any amendments thereto.

QQQ. "Storm Drain System" means any facility or any parts of the facility, including streets, gutters, conduits, natural or artificial drains, channels and watercourse that are used for the purpose of collecting, storing, transporting or disposing of storm water and are located within the City.

RRR. "Storm Water or Storm water" means runoff and drainage related to precipitation events (pursuant to 40 CFR Section 122.26(b)(13); 55 Fed. Reg. 47990, 47995 (Nov. 16, 1990)).

SSS. "Storm Water Pollution Prevention Plan (SWPPP)" means such plan, as developed by a Qualified SWPPP Developer, as defined by the Construction General Permit.

TTT. "Urban Runoff" means surface water flow produced by storm and non-storm events. Non-storm events include flow from residential, commercial or industrial activities involving the use of potable and non-potable water.

UUU. "US EPA" means the United States Environment Protection Agency.

VVV. "Water Quality Standards" means those water quality standards and/or water quality objectives adopted by either the State Board and/or US EPA for the Los Angeles Region.

SECTION 2. Section 12.16.110 of the Signal Hill Municipal Code is hereby repealed in its entirety and shall be replaced with the following:

12.16.110 POLLUTANT SOURCE REDUCTION.

A. Treatment Systems. All persons who own, operate or maintain storm water clarifiers, separators, sediment ponds, LID BMPs, and other storm water treatment systems shall at all times maintain such systems in good working order and repair. This maintenance requirement shall be understood to include any maintenance activities necessary to prevent the breeding of vectors. Such systems shall be constructed and installed in a manner so as to at all times permit easy and safe access for proper maintenance, repair and inspection.

B. Industrial Sites. Each owner, operator or person in charge of day-to-day activities at any industrial site (including construction sites) within the City shall implement those minimum BMPs as may be designated by the Director, as necessary to control Pollutants (or the potential contribution of Pollutants) that exist or may exist in Discharges in runoff from such facility into the MS4. For those industrial sites that are located within ESAs or that are tributary to Impaired Water Bodies, and those industrial sites implementing BMPs that are not adequate to achieve Water Quality Standards, the Director may impose additional BMPs or additional controls in existing BMPs may be required to be implemented as required by the Director.

C. Commercial, Residential Uses. All owners, operators, and/or persons in charge of the day-to-day activities in any commercial (including institutional) or residential

facility, or any other non-industrial operation within the City, shall implement those BMPs as may be required by the Director and needed to reduce the discharge of Pollutants into the MS4, as well as such additional controls as needed to avoid causing or contributing to an exceedence of a Water Quality Standard, or to reduce Pollutants in runoff in or discharging to an ESA or such areas that are tributary to an Impaired Water Body.

SECTION 3. Section 12.16.112 of the Signal Hill Municipal Code entitled "Construction Pollutant Reduction" is hereby added to read, in its entirety, as follows:

12.16.112 CONSTRUCTION POLLUTANT REDUCTION.

A. Copies of Documents. All persons engaged in Construction Activity within the City requiring State Construction General Permit coverage shall have at least the following readily available at the construction site:

1. One (1) copy of the notice of intent for the State Construction General Permit.

2. The waste discharge identification (WDID) number issued by the State Board

3. One (1) copy of the SWPPP and storm water monitoring plan as required by the permit.

The documents listed above must also be retained for three (3) years from the date generated or date submitted, whichever is last.

B. All persons engaged in Construction Activity within the City shall implement Best Management Practices to avoid, to the Maximum Extent Practicable, the discharge of Pollutants to the MS4, in accordance with the City's grading manual, as developed and updated by the City Engineer, and, when applicable, in accordance with a grading plan approved by the City Engineer for such project.

1. Where clearing, grading or excavating of underlying soil takes place during a repaving operation, State General Construction Permit coverage by the State of California General Permit for Storm Water Discharges Associated with Industrial Activities or for Storm water Discharges Associated with Construction Activities is required if more than one acre is disturbed or the activities are part of a larger plan.

C. Development Construction Requirements.

1. Runoff from construction activity at all construction sites shall meet the following minimum requirements:

a. Sediments generated on the project site shall be retained using adequate Treatment Control or Structural BMPs;

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b. Construction-related materials, wastes, spills, or residues shall be retained at the project site to avoid discharge to streets, drainage facilities, receiving waters, or adjacent properties by wind or runoff;

c. Non-storm water runoff from equipment and vehicle washing and any other activity shall be contained at the project site; and

d. Erosion from slopes and channels shall be controlled by implementing an effective combination of BMPs (as approved in Regional Board Resolution No. 99-03), such as the limiting of grading scheduled during the wet season; inspecting graded areas during rain events; planting and maintenance of vegetation on slopes; and covering erosion susceptible slopes.

2. For those construction projects which are one acre and greater, the owner, operator and person in charge of the day-to-day activities at such construction site shall meet the following minimum requirements:

a. Where coverage is required pursuant to the State Construction General Permit, to have proof of a Waste Discharger Identification Number for filing of a Notice of Intent for permit coverage under the State Construction General Permit, as well as a certification that an SWPPP has been prepared; and

b. To show proof of a Notice of Intent and a copy of the SWPPP upon the transfer of ownership of any part or portion of the subject property, while construction activities are ongoing.

D. City Review and Plan Approval.

1. Prior to the issuance of a permit for a New Development or Redevelopment Project, the City shall evaluate the proposed project using the applicable State Construction General Permit approved by the Regional Board, and erosion and grading requirements of the City Building Official or Director to determine (i) its potential to generate the flow of Pollutants into the MS4 during construction; and (ii) how well the SWPPP for the proposed project meets the goals of this Chapter. Each plan will be evaluated on its own merits according to the particular characteristics of the project and the site to be developed. Based upon the review, the City may impose conditions upon the issuance of the building permit, in addition to any required by the State Construction General Permit for the project, in order to minimize the flow of Pollutants into the MS4.

2. No grading permit for developments requiring coverage under the State Construction General Permit shall be issued unless the applicant can show that a notice of intent to comply with the State Construction General Permit has been filed and that a SWPPP has been prepared for the project.

3. Storm Water runoff containing sediment, construction waste or other Pollutants from the construction site and parking areas shall be reduced to the

Maximum Extent Practicable. The following Best Management Practices shall apply to all construction projects within the City, and shall be required from the time of demolition of existing structures or commencement of construction until receipt of a certificate of occupancy:

a. Sediment, construction waste, and other Pollutants from construction activities shall be retained on the construction site to the Maximum Extent Practicable;

b. Structural controls such as sediment barriers, plastic sheeting, detention ponds, dikes, filter beams and similar controls shall be utilized to the Maximum Extent Practicable in order to minimize the escape of sediment and other Pollutants from the site;

c. All excavated soil shall be located on the site in a manner that minimizes the amount of sediments running onto the street, drainage facilities or adjacent properties. Soil piles shall be covered with plastic or similar material until the soil is either used or removed from the site;

d. No washing of construction or other vehicles is permitted adjacent to a construction site. No water from the washing of construction or other vehicles is permitted to run off the construction site, or to otherwise enter the MS4.

4. As a condition to granting a building permit or grading permit, the City may set reasonable limits on the clearing of natural vegetation from construction sites, in order to reduce the potential for soil erosion. These limits may include, but are not limited to, regulating the length of time soil is allowed to remain bare or prohibiting bare soil.

5. The Director may require, prior to the issuance of any building or grading permit, preparation of appropriate wet weather erosion control plan, SWPPP or other plans consistent with countywide development construction guidance provisions and the goals of this chapter.

6. Full or partial waivers of compliance with the requirements of this section may be obtained where the project applicant shows by application in writing that the incorporation and design elements that address the objectives set forth in this section are impracticable, and are non-economical or otherwise physically impossible due to the site characteristics or other characteristics unique to the project. Any waiver request shall be in writing to the Director and may only be approved where permitted in accordance with the terms of the existing Construction General Permit.

SECTION 4. Section 12.16.114 of the Signal Hill Municipal Code entitled "New Development/Redevelopment Pollutant Reduction" is hereby added to read, in its entirety, as follows:

RB-AR6944

12.16.114. NEW DEVELOPMENT/REDEVELOPMENT POLLUTANT REDUCTION.

A. Objective. The provisions of this Section establish requirements for construction activities and facility operations of Development and Redevelopment Projects to comply with the MS4 Permit, to lessen the water quality impacts of development by using smart growth practices, and to integrate LID practices and standards for storm water pollution mitigation through means of infiltration, evapotranspiration, biofiltration, and rainfall harvest and use. LID shall be inclusive of new development and/or redevelopment requirements.

B. Scope. This Section contains requirements for storm water pollution control measures in Development and Redevelopment Projects, and authorizes the City to further define and adopt storm water pollution control measures, and authorizes the City to further define and adopt storm water pollution control measures and to develop LID principles and requirements, including but not limited to the objectives and specifications for integration of LID strategies. Except as otherwise provided herein, the City shall administer, implement and enforce the provisions of this Section.

C. Applicability. This Section applies to the following Projects:

1. All Development Projects equal to 1 acre or greater of disturbed area that adds more than 10,000 square feet of Impervious Surface area.

2. Industrial Parks with 10,000 square feet or more of surface area.

3. Commercial Malls with 10,000 square feet or more of surface area.

4. Retail Gasoline Outlets with 5,000 square feet or more of surface area.

5. Restaurants with 5,000 square feet or more of surface area.

6. Parking Lots with 5,000 square feet or more of Impervious Surface area, or with 25 or more parking spaces.

7. Streets and roads construction with 10,000 square feet or more of Impervious Surface area. Street and road construction applies to standalone streets, roads, highways, and freeway projects, and also applies to streets within larger projects.

8. Automotive Service Facilities with 5,000 square feet or more of surface area.

9. Projects located in or directly adjacent to, or discharging directly to an Environmentally Sensitive Area, where the Development will:

a. Discharge Storm water Runoff that is likely to impact a sensitive biological species or habitat; and

b. Create 2,500 square feet or more of Impervious Surface area

10. Single-family Hillside Properties.

11. Redevelopment Projects

a. Construction Activity that results in the creation, addition or replacement of 5,000 square feet or more of Impervious Surface area on an already developed Site of one of the Projects identified in this Subsection.

b. Where Redevelopment results in an alteration to more than fifty percent of Impervious Surfaces of a previously existing development, and the existing development was not subject to post-construction Storm water quality control requirements, the entire project must be mitigated.

c. Where Redevelopment results in an alteration to less than fifty percent of Impervious Surfaces of a previously existing development, and the existing development was not subject to post-construction Storm water quality control requirements, only the alteration must be mitigated, and not the entire development.

d. Redevelopment does not include Routine Maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, original purpose of facility or emergency redevelopment activity required to protect public health and safety. Impervious Surface replacement, such as the reconstruction of parking lots and roadways which does not disturb additional area and maintains the original grade and alignment, is considered a Routine Maintenance activity. Redevelopment does not include the repaving of existing roads to maintain original line and grade.

e. Existing single-family dwelling and accessory structures are exempt from the Redevelopment requirements unless such projects create, add, or replace 10,000 square feet of Impervious Surface area.

D. Requirements. The Site for every Project identified in Section 12.16.114(C) shall be designed to control Pollutants, pollutant loads, and runoff volume to the maximum extent feasible by minimizing Impervious Surface area and controlling Runoff from Impervious Surfaces through infiltration, evapotranspiration, bioretention and/or rainfall harvest and use. The project applicant shall prepare a LID Plan which implements set LID standards and practices for storm water pollution mitigation and provides documentation to demonstrate compliance with the MS4 Permit on the plans and permit application submitted to the City. Such a LID Plan shall comply with the following:

1. A new single-family Hillside Property Development shall prepare a LID Plan to include mitigation measures to:

a. Conserve natural areas;

b. Protect slopes and channels;

c. Provide storm drain system stenciling and signage;

d. Divert roof runoff to vegetated areas before discharge unless the diversion would result in slope instability; and

e. Direct surface flow to vegetated areas before discharge, unless the diversion would result in slope instability.

2. Street and road construction of 10,000 square feet or more of Impervious Surface shall follow US EPA guidance regarding Managing Wet Weather with the City's most current Green Streets Manual to the Maximum Extent Practicable.

3. The remainder of Projects identified in Section 12.16.114(C) shall prepare a LID Plan to comply with the following:

a. Retain Storm water Runoff onsite for the Storm water Quality Design Volume (SWQDv) defined as the Runoff from:

i. The 85th percentile 24-hour Runoff event as determined from the Los Angeles County 85th percentile precipitation isohyetal map; or

ii. The volume of Runoff produced from a 0.75 inch, 24-hour rain event, whichever is greater.

b. Minimize hydromodification impacts to natural drainage systems.

E. Technical Infeasibility.

1. Full or partial waivers of compliance with the requirements of this Section may be obtained where the project applicant shows by application in writing that the incorporation and design elements that address the objectives set forth in this Section are impracticable and are non-economical or otherwise physically impossible due to the Site characteristics or other characteristics unique to the Project. Any waiver request shall be in writing to the Director and may only be approved where permitted in accordance with the terms of the MS4 Permit.

2. To demonstrate technical infeasibility, the project applicant must demonstrate that the project cannot reliably retain 100 percent of the SWQDv on-site, even with the maximum application of green roofs and rainwater harvest and use, and that compliance with the applicable post-construction requirements would be technically infeasible by submitting a site-specific hydrologic and/or design analysis conducted and endorsed by a registered professional engineer, geologist, architect, and/or landscape architect. Technical infeasibility may result from conditions including the following:

a. The infiltration rate of saturated in-situ soils is less than 0.3 inch per hour and it is not technically feasible to amend the in-situ soils to attain an infiltration rate necessary to achieve reliable performance of infiltration or bioretention BMPs in retaining the SWQDv onsite.

RB-AR6947

b. Locations where seasonal high groundwater is within five to ten feet of surface grade;

c. Locations within 100 feet of a groundwater well used for drinking water;

d. Brownfield Development sites or other locations where pollutant mobilization is a documented concern;

e. Locations with potential geotechnical hazards; and

f. Smart growth and infill or redevelopment locations where the density and/ or nature of the project would create significant difficulty for compliance with the onsite volume retention requirement.

3. If partial or complete onsite retention is technically infeasible, the project Site may biofiltrate 1.5 times the portion of the remaining SWQDv that is not reliably retained onsite. Biofiltration BMPs must adhere to the design specifications provided in the MS4 permit.

a. Additional alternative compliance options such as offsite infiltration and groundwater replenishment projects may be available to the project Site. The applicant should contact the Director to determine eligibility.

4. The remaining SWQDv that cannot be retained or biofiltered onsite must be treated onsite to reduce pollutant loading. BMPs must be selected and designed to meet pollutant-specific benchmarks as required by the MS4 permit. Flow-through BMPs may be used to treat the remaining SWQDv and must be sized based on a rainfall intensity of:

a. 0.2 inches per hour, or

b. The one year, one-hour rainfall intensity as determined from the most recent Los Angeles County isohyetal map, whichever is greater.

F. Exemptions from LID Requirements. The provisions of this Section do not apply to any of the following:

1. A Development involving only emergency construction activity required to immediately protect public health and safety;

2. Infrastructure projects within the public right-of-way;

3. A Development or Redevelopment involving only activity related to gas, water, cable, or electricity services on private property;

4. A Development involving only resurfacing and/or re-striping of permitted parking lots, where the original line and grade, hydraulic capacity, and original purpose of the facility is maintained;

RB-AR6948

5. A project involving only exterior movie or television production sets, or facades on an existing developed site;

6. A project not requiring a City building, grading, demolition or other permit for construction activity.

G. Any Development that is exempted from LID requirements under Subsection F of this Section has the option to voluntarily opt in and incorporate into the project the LID requirements set forth herein.

H. City Review and Approval

1. Prior to the issuance of a permit for a New Development or Redevelopment Project, the City shall evaluate the proposed project using the MS4 Permit, and erosion and grading requirements of the City Building Official or Director to determine (i) its potential to generate the flow of Pollutants into the MS4 after construction; and (ii) how well the LID Plan for the proposed project meets the goals of this Chapter. Each plan will be evaluated on its own merits according to the particular characteristics of the project and the site to be developed. Based upon the review, the City may impose conditions upon the issuance of the building permit, in addition to any required by the State Construction General Permit for the project, in order to minimize the flow of Pollutants into the MS4.

2. The Director shall approve or disapprove of the LID Plan within thirty (30) calendar days of submittal, or within thirty (30) days of approval of the development project by the Planning Commission, where Planning Commission approval is required. If the LID Plan is disapproved, the reasons for disapproval shall be given in writing to the applicant. Any LID Plan disapproved may be revised by the applicant and resubmitted for approval. A resubmitted plan will be approved or disapproved within thirty (30) days of submittal. No building or grading permit shall be issued until a LID Plan has been approved by the Director.

3. If no building permit has been issued or no construction has begun on a project within a period of one hundred eighty (180) days of approval of a LID Plan, the LID Plan for that project shall expire. The Director may extend the time by written extension for action by the applicant for a period not to exceed one hundred eighty (180) days upon written request by the applicant showing that circumstances beyond the control of the applicant prevented the construction from commencing. In order to renew the LID Plan, the applicant shall resubmit all necessary forms and other data and pay a new LID plan check fee.

I. Transfer of Properties Subject to the Requirements of this Section.

1. The transfer or lease of a property subject to maintenance requirements for LID BMPs shall include conditions requiring the transferee and its successors and assigns to either: (a) assume responsibility for maintenance of any existing LID BMP, or (b) replace an existing LID BMP with new control measures or

BMPs meeting the then current standards of the City and MS4 Permit. Such requirement shall be included in any sale or lease agreement or deed for such property. The condition of transfer shall include a provision that the successor property owner or lessee conduct maintenance inspections of all LID BMPs at least once a year and retain proof of inspection.

2. For residential properties where the LID BMPs are located within a common area which will be maintained by a homeowners' association, language regarding the responsibility for maintenance shall be included in the project's conditions, covenants and restrictions (CC&Rs). Printed educational materials will be required to accompany the first deed transfer to highlight the existence of the requirement and to provide information on what LID BMPs are present, signs that maintenance is needed, and how the necessary maintenance can be performed. The transfer of this information shall also be required with any subsequent sale of the property.

3. If LID BMPs are located within an area proposed for dedication to a public agency, they will be the responsibility of the developer until the dedication is accepted.

SECTION 5. Section 12.16.116 of the Signal Hill Municipal Code entitled "Small Site New Development/Redevelopment Pollutant Reduction" is hereby added to read, in its entirety, as follows:

12.16.116. SMALL SITE NEW DEVELOPMENT/REDEVELOPMENT POLLUTANT REDUCTION.

A. LID Manual. The LID Manual for Small Sites shall be prepared, maintained, and updated, as deemed necessary and appropriate, by the Director and approved by the City Council. It shall set LID standards and practices for Storm water pollution mitigation, including Urban and Storm water Runoff quantity and quality control development principles and technologies for achieving the LID standards for projects not otherwise required to implement LID strategies by the MS4 Permit.. The LID Manual for Small Sites shall also include technical feasibility and implementation parameters, alternative compliance for technical infeasibility, as well as other rules, requirements and procedures as the Director deems necessary.

B. Requirements. The Site for Projects not listed in Section 12.16.114(C), but resulting in the creation or addition or replacement of 500 square feet or more of Impervious Surface area shall be designed to control Pollutants, pollutant loads, and Runoff volume per the LID Manual for Small Sites. The project applicant shall prepare a Small Site LID Plan which implements set LID standards and practices, as identified in the LID Manual for Small Sites for storm water pollution mitigation, and provides documentation to demonstrate compliance with theLID Manual for Small Sites on the plans submitted to the City. Such a Small Site LID Plan shall comply with the following:

RB-AR6950

1. Storm water Runoff will be infiltrated, evapotranspired, captured and used, biofiltrated/biotreated through high removal efficiency LID BMP alternatives as identified in the LID Manual for Small Sites, onsite, through Storm water management techniques that comply with the provisions of the LID Manual for Small Sites. To the maximum extent feasible, onsite Storm water management techniques must be properly sized, at a minimum, without any Storm Water Runoff leaving the Site for at least the volume of water produced by the water quality design storm event that results from:

a. The 85th percentile 24-hour rain event determined as the maximized capture Storm water volume for the area using a 48 to 72-hour draw down time; or

b. The volume of Runoff produced from a 0.75 inch, 24 hour rain event.

2. Pollutants shall be prevented from leaving the Site for a water quality design storm event as defined in paragraph 1 of this Subsection, unless the Site has been treated through an approved LID strategy.

3. Any Development four or fewer units intended for residential use shall implement LID BMP alternatives identified in the LID Manual for Small Sites for the Residential LID category and provide documentation to demonstrate compliance on the plans and permit application submitted to the City.

4. Any Development of five or more units intended for residential use or any Development intended for nonresidential use shall implement LID BMP alternatives identified in the LID Manual for Small Sites for the Commercial/Industrial LID category and provide documentation to demonstrate compliance on the plans and permit application submitted to the City.

5. For any Construction Activity resulting in an alteration of at least fifty percent (50%) or more of the Impervious Surfaces on an existing developed Site, the entire Site must comply with the standards and requirements stated above and with the LID Manual for Small Sites.

6. For any Construction Activity resulting in an alteration of less than fifty percent (50%) of the Impervious Surfaces of an existing developed Site, only such incremental Development shall comply with the standards and requirements stated above and with the LID Manual for Small Sites.

C. Technical Infeasibility.

1. When, as determined by the Director, the onsite LID requirements are technically infeasible, partially or fully, the infeasibility shall be demonstrated in the submitted Small Site LID Plan, shall be consistent with other City requirements, and shall be reviewed in consultation with the Department of Building and Safety. The technical infeasibility may result from conditions that may include, but are not limited to:

a. Locations where seasonal high groundwater is within five to ten feet of surface grade;

b. Locations within 100 feet of a groundwater well used for drinking water;

c. Brownfield Development sites or other locations where pollutant mobilization is a documented concern;

d. Locations with potential geotechnical hazards;

e. Locations with impermeable soil type as indicated in applicable soils and geotechnical reports; and

f. The infiltration rate of saturated in-situ soils is less than 0.3 inch per hour and it is not technically feasible to amend the in-situ soils to attain an infiltration rate necessary to achieve reliable performance of infiltration or bioretention BMPs.

2. If partial or complete onsite compliance of any type is technically infeasible, as determined by the Director, the project Site and LID Plan will be granted a waiver from the requirements of this Section and the LID Manual for Small Sites. If a portion of the Project Site is deemed technically infeasible, the project applicant may propose an equivalent area within the same project area for LID. The Director may permit substitutions of equivalent areas upon request by the project applicant.

D. Exemptions from LID Requirements. The provisions of this Section do not apply to any of the following:

1. A Development involving only emergency construction activity required to immediately protect public health and safety;

2. Infrastructure projects within the public right-of-way;

3. A Development or Redevelopment involving only activity related to gas, water, cable, or electricity services on private property;

4. A Development involving only resurfacing and/or re-striping of permitted parking lots, where the original line and grade, hydraulic capacity, and original purpose of the facility is maintained;

5. A project involving only exterior movie or television production sets, or facades on an existing developed site;

6. A project not requiring a City building, grading, demolition or other permit for construction activity.

E. Any Development that is exempted from LID requirements under Subsection D of this Section has the option to voluntarily opt in and incorporate into the project the LID requirements set forth herein.

F. City Review and Plan Approval.

1. Prior to the issuance of a permit for a small site, as described in Section 12.16.116(B), the City shall evaluate the proposed project using the LID Manual for Small Sites and erosion and grading requirements of the City Building Official or Director to determine (i) its potential to generate the flow of Pollutants into the MS4 after construction; and (ii) how well the Small Site LID Plan for the proposed project meets the goals of this Chapter. Each plan will be evaluated on its own merits according to the particular characteristics of the project and the site to be developed. Based upon the review, the City may impose conditions upon the issuance of the building permit, in order to minimize the flow of Pollutants into the MS4.

2. The Director shall approve or disapprove of the Small Site LID Plan within thirty (30) calendar days of submittal, or within thirty (30) days of approval of the development project by the Planning Commission, where Planning Commission approval is required. If the plan is disapproved, the reasons for disapproval shall be given in writing to the applicant. Any plan disapproved may be revised by the applicant and resubmitted for approval. A resubmitted plan will be approved or disapproved within thirty (30) days of submittal. No building or grading permit shall be issued until a Small Site LID Plan has been approved by the Director.

3. If no building permit has been issued or no construction has begun on a project within a period of one hundred eighty (180) days of approval of a Small Site LID Plan, the Small Site LID Plan for that project shall expire. The Director may extend the time by written extension for action by the applicant for a period not to exceed one hundred eighty (180) days upon written request by the applicant showing that circumstances beyond the control of the applicant prevented the construction from commencing. In order to renew the Small Site LID Plan, the applicant shall resubmit all necessary forms and other data and pay a new plan review fee.

G. Transfer of Properties Subject to the Requirements of this Section.

1. The transfer or lease of a property subject to maintenance requirements for LID BMPs shall include conditions requiring the transferee and its successors and assigns to either: (a) assume responsibility for maintenance of any existing LID BMP, or (b) replace an existing LID BMP with new control measures or BMPs meeting the then current standards of the City and MS4 Permit. Such requirement shall be included in any sale or lease agreement or deed for such property. The condition of transfer shall include a provision that the successor property owner or lessee conduct maintenance inspections of all LID BMPs at least once a year and retain proof of inspection.

2. For residential properties where the LID BMPs are located within a common area which will be maintained by a homeowners' association, language regarding the responsibility for maintenance shall be included in the project's conditions, covenants and restrictions (CC&Rs). Printed educational materials will be required to accompany the first deed transfer to highlight the existence of the requirement and to provide information on what LID BMPs are present, signs that maintenance is needed, and how the necessary maintenance can be performed. The transfer of this information shall also be required with any subsequent sale of the property.

3. If LID BMPs are located within an area proposed for dedication to a public agency, they will be the responsibility of the developer until the dedication is accepted.

SECTION 6. Section 12.16.118 of the Signal Hill Municipal Code entitled "Low Impact Development Plan Check Fees" is hereby added to read, in its entirety, as follows:

12.16.118. LOW IMPACT DEVELOPMENT PLAN CHECK FEES

A. Before review and approval of a set of plans and specifications, the applicant shall pay a LID plan check fee.

B. LID plan check fees will be established by resolution of the City Council.

SECTION 7. Effective Date. The City Clerk shall certify to the passage and adoption of this ordinance by the City Council of the City of Signal Hill and shall, within 15 days after its final passage, cause the same to be published once in the Signal Hill Tribune, a newspaper of general circulation which is hereby designated for that purpose. This Ordinance shall take effect 30 days after its passage.

SECTION 8. Severability. If any section, subsection, sentence, clause, phrase, or portion of this Ordinance is, for any reason, held to be invalid or unconstitutional by the decision of any court of competent jurisdiction, such decision shall not affect the validity of the remaining portions of this Ordinance. The City Council of the City of Signal Hill hereby declares that it would have adopted this Ordinance and each section, subsection, sentence, clause, phrase, or portion thereof, irrespective of

the fact that any one or more sections, subsections, sentences, clauses, phrases, or portions thereof may be declared invalid or unconstitutional.

SECTION 9. CEQA Findings. The City Council hereby finds that this Ordinance is an activity taken to maintain, restore, enhance, or protect the environment and therefore categorically exempt from CEQA review as a Class 8 exemption pursuant to 14 California Code of Regulations Section 15308.

PASSED, APPROVED, AND ADOPTED at a regular meeting of the City Council of the City of Signal Hill, California, on this 18th day of June 2013.

MICHAEL J. NOLL
MAYOR

ATTEST:

KATHLEEN L. PACHECO
CITY CLERK

STATE OF CALIFORNIA)
COUNTY OF LOS ANGELES) ss.
CITY OF SIGNAL HILL)

I, KATHLEEN L. PACHECO, City Clerk of the City of Signal Hill, California, hereby certify that Ordinance No. _____ was introduced at a regular meeting of the City Council of the City of Signal Hill held on the 18th of June 2013, and thereafter was adopted by the City Council at a regular meeting held on the _____ of _____ 2013, and that the same was adopted by the following roll call vote:

AYES:

NOES:

ABSENT:

ABSTAIN:

_____
KATHLEEN L. PACHECO
CITY CLERK

RESOLUTION NO. 2013-06-6021

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF SIGNAL HILL, CALIFORNIA, APPROVING A GREEN STREETS POLICY

WHEREAS, the City Council of the City of Signal Hill, California, hereby resolves, determines and orders as follows:

Section 1. The Municipal Separate Storm Sewer System (MS4) Permit (Order No. R-2012-0175) was adopted by the California Regional Water Quality Control Board, Los Angeles Region on November 8, 2012. Municipalities electing to prepare a (Enhanced) Watershed Management Program under this Permit are required to demonstrate that Green Streets Policies are in place that specify the use of green street strategies for transportation corridors.

Section 2: Signal Hill intends to prepare a (Enhanced) Watershed Management Program in coordination with cities of the Gateway Water Management Authority.

Section 3. Green Streets are enhancements to street and road projects to improve the quality of storm water and urban runoff through the implementation of infiltration, bio-treatment, xeriscaping parkways and tree lined streets.

Section 4. The City initiated the development of a Green Streets Policy and a corresponding Green Streets Manual (Exhibit "A") prior to February 26, 2013.

Section 5. The City Council of the City of Signal Hill, California, hereby directs the Director of Public Works to implement Green Streets for transportation corridors as described in the City of Signal Hill's Green Streets Manual.

Section 5. Routine maintenance including but not limited to: slurry seals, grind and overlay, and reconstruction to maintain original line grade are excluded from the Green Streets Policy.

Section 6. The Director of Public Works is authorized to modify the City of Signal Hill's Green Streets Manual from time to time to maintain consistency with the latest MS4 permit.

Section 7. At its regular meeting held on June 4, 2013, the City Council determined that the public interest and necessity justify the adoption of the Green Streets Policy.

PASSED, APPROVED, AND ADOPTED at a regular meeting of the City Council of the City of Signal Hill, California, on this 4th day of June 2013.

MICHAEL J. NOLL
MAYOR

ATTEST:

KATHLEEN L. PACHECO
CITY CLERK

STATE OF CALIFORNIA)
COUNTY OF LOS ANGELES) ss.
CITY OF [CITY NAME])

I, KATHLEEN L. PACHECO, City Clerk of the City of Signal Hill, California, hereby certify that Resolution No. 2013-02-6021 was adopted by the City Council of the City of Signal Hill, California, at a regular meeting held on the 4th day of June 2013, and that the same was adopted by the following vote:

AYES: MAYOR MICHAEL J. NOLL, VICE MAYOR EDWARD H.J. WILSON, COUNCIL MEMBERS LARRY FORESTER, TINA L. HANSEN, LORI Y. WOODS

NOES: NONE

ABSENT: NONE

ABSTAIN: NONE

KATHLEEN L. PACHECO
CITY CLERK
CITYOF SIGNAL HILL

ATTACHMENT I.4:

CITY OF SIGNAL HILL IN PLACE

GREEN STREETS POLICY

Exhibit "A"

Signal Hill
Green Streets Manual

RB-AR6960

April 2013

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- Can be located in curb extensions, medians, traffic circles, roundabouts, and any other landscaped area 7
- Can be integrated medians, islands, circles, street ends, chicanes, and curb extensions 7
- Suitable for parking or emergency access lanes 7
- Can be located in furniture zones of sidewalks especially adjacent to tree wells 7
- Cannot be placed in areas with large traffic volume or heavy load lanes 7
- Avoid steep streets 7
- Cannot be placed within 20 feet of sub-sidewalk basements 7
- Above-grade planters should be structurally separate from adjacent sidewalks 7
- Can be located adjacent to roadways, sidewalks, or parking areas 7
- Can be integrated into traffic calming devices such as chicanes and curb extensions 7
- Can be placed in medians where the street drains to the median 7
- Can be placed alongside streets and pathways 7
- Can be located in multi-way boulevards, park edge streets, or sidewalk furniture zones 7
- Can be located in a catch basin, manhole, or vault 7
- Can be installed on an existing outlet pipe or at the bottom of an existing catch basin with an overflow 7
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RB-AR6962

SECTION 1 – INTRODUCTION

1.1 WHAT ARE GREEN STREETS?

Roads present many opportunities for green infrastructure application. One principle of green infrastructure involves reducing and treating storm water close to its source. Urban transportation right-of-ways integrated with green techniques are often called "green streets." Green streets provide source controls for storm water runoff and pollutant loads. In addition, green infrastructure approaches complement street facility upgrades, street aesthetic improvements, and urban tree canopy efforts that also make use of the right-of-way and allow it to achieve multiple goals and benefits. Using the right-of-way for treatment of storm water runoff links green with grey infrastructure by making use of the engineered conveyance of roads and providing connections to conveyance systems when needed.

Green streets are beneficial for new road construction and retrofits. They can provide substantial economic benefits when used in transportation applications. Coordinating green infrastructure installation with broader transportation improvements can reduce the cost of storm water management by including it within larger infrastructure improvements. A large municipal concern regarding green infrastructure use is maintenance access; using roads and rights-of-way as locations for green infrastructure not only addresses a significant pollutant source, but also alleviates access and maintenance concerns by using public space. Also, right-of-way installations allow for easy public maintenance.

Green streets can incorporate a wide variety of design elements including street trees, permeable pavements, bioretention, and swales. Although the design and appearance of green streets will vary, the functional goals are the same; provide source control of storm water, limit its transport and pollutant conveyance to the collection system, restore pre-development hydrology to the maximum extent practicable, and provide environmentally enhanced roads. Successful application of green techniques will encourage soil and vegetation contact and infiltration and retention of storm water.

1.2 WHY ARE GREEN STREETS BEING REQUIRED?

This Green Streets Manual provides guidance to comply with the MS4 Permit (Order Number R4-2012-0175) which requires that jurisdictions in Los Angeles County reduce contaminants in runoff to improve water quality in waterways. These requirements stem from the National Pollutant Discharge Elimination System (NPDES) requirements of the Clean Water Act (CWA).

The MS4 Permit requires Green Streets strategies to be implemented for transportation corridors. Transportation corridors represent a large percentage of the impervious area within Los Angeles and therefore generate a substantial amount of runoff from storm events. The altered flow regime from traditional roadways, increased runoff volume, and high runoff peak flows, are damaging to the environment and a risk to property downstream.

Traditionally, street design has focused on removing water from the street as quickly as possible and transferring it to storm drains, channels, and water bodies. Storm water runoff can contain bacteria and other pollutants, and is thereby regulated at the state and local level (refer to *Table 1* for a list of pollutants typical of roads). Green Streets will help to transform the design of streets from the conventional method of moving water off-site as quickly as possible to a method of storing and treating water on-site for a cleaner discharge into the waters of the U.S.

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Street and road construction applies to major arterials, state routes, highways, or rail lines used for the movement of people or goods by means of bus services, trucks, and vehicles, and transportation corridors within larger projects. Projects which are required to follow this Green Streets Guidance Manual include the following:

1. Street and road construction of 10,000 square feet or more of impervious surface area.
2. Street and road redevelopment resulting in the creation or addition or replacement of 5,000 square feet or more of impervious surface area on an already developed site. Redevelopment does not include routine maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, original purpose of facility or emergency redevelopment activity required to protect public health and safety. Impervious surface replacement, such as the reconstruction of parking lots and roadways which does not disturb additional area and maintains the original grade and alignment, is considered a routine maintenance activity. Redevelopment does not include the repaving of existing roads to maintain original line and grade.
3. Street and road improvement with a cost of $500,000 or more.

Table 1: Examples of Storm water Pollutants Typical of Roads (*Managing Wet Weather with Green Infrastructure Municipal Handbook: Green Streets, 2008*).

Pollutant	Source	Effects
Trash	Littering	Physical damage to aquatic animals and fish, release of poisonous substances
Sediment/solids	Construction, unpaved areas	Increased turbidity, increased transport of soil bound pollutants, negative effects on aquatic organisms reproduction and function
Metals (Copper, Zinc, Lead, Arsenic)	Vehicle brake pads, vehicle tires, motor oil, vehicle emissions and engines, vehicle emissions, brake linings, automotive fluids	Toxic to aquatic organisms and can accumulate in sediments and fish tissues
Organics associated with petroleum (e.g., PAHs)	Vehicle emissions, automotive fluids, gas stations	Toxic to aquatic organisms
Nutrients	Vehicle emissions, atmospheric deposition	Promotes eutrophication and depleted dissolved oxygen concentrations

1.3 PLANNING AND DEVELOPMENT

Ideally, a site would be designed to capture and use or infiltrate the entire runoff volume of a storm, however site and design constraints make it difficult to achieve that goal. This Green Streets Manual is designed to provide guidance with BMP selection based on site constraints typical to street design. Streetscape geometry, topography, and climate determine the types of controls that can be implemented. The initial step in selecting a storm water tool is determining the available open space and constraints. Storm water controls should be selected using the hierarchy represented in *Figure 1*, the site guidelines represented in *Table 2*, and the location opportunities listed in *Table 3*.

1.3.1 Site Considerations

Specific elements which should be given special consideration in the site assessment process for applicable Green Streets include:

- **Ownership of land adjacent to right of ways.** The opportunity to provide storm water treatment may depend on the ownership of land adjacent to the right-of-way. Acquisition of additional right-of-way and/or access easements may be more feasible if land bordering the project is owned by relatively few land owners.

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- **Location of existing utilities.** The location of existing storm drainage utilities can influence the opportunities for Green Streets infrastructure. For example, storm water planters can be designed to overflow along the curb-line to an existing storm drain inlet, thereby avoiding the infrastructure costs associated with an additional inlet. The location of other utilities may limit the allowable placement of BMPs to only those areas where a clear pathway to the storm drain exists.
- **Grade differential between road surface and storm drain system.** Some BMPs require more head from inlet to outlet than others; therefore, allowable head drop may be an important consideration in BMP selection. Storm drain elevations may be constrained by a variety of factors in a roadway project (utility crossings, outfall elevations, etc.) that cannot be overcome and may override storm water management considerations.
- **Longitudinal slope.** The suite of BMPs which may be installed on steeper road sections is more limited. Specifically, permeable pavement and swales are more suitable for gentle grades. Other BMPs may be more readily terraced to be used on steeper slopes.
- **Soil suitability.** Infiltration BMPs require specific types of soil. The site assessment should determine the type of soils on the site and the infiltration rate of the soils if infiltration BMPs are proposed.
- **Potential access opportunities.** A significant concern with installation of BMPs in major right of ways is the ability to safely access the BMPs for maintenance considering traffic hazards. Vehicle travel lanes and specific areas potentially hazardous for maintenance crews should be identified during the site assessment. The Green Streets WQMP should provide subsequent steps to avoid placing BMPs in the identified hazardous areas.

1.3.2 Design Considerations

The drainage patterns of the project should be developed so that drainage can be routed to areas with BMP opportunities before entering storm drains. For example, if a median strip is present, a reverse crown should be considered, where allowed, so that storm water can drain to a median swale. Likewise, standard peak-flow curb inlets should be located downstream of areas with potential for storm water planters so that water can first flow into the planter, and then overflow to the downstream inlet if capacity of the planter is exceeded. It is more difficult to apply green infrastructure after water has entered the storm drain.

Green Streets projects are not required to treat off-site runoff; however treatment of comingled off-site runoff may be used to off-set the inability to treat areas within the project for which significant constraints prevent the ability to provide treatment.

Applicable Green Streets projects should apply the following site design measures to the maximum extent practicable and as specified in the local permitting agency's codes:

- Minimize street width where feasible while maintaining traffic flow and public safety.
- Add tree canopy by planting or preserving trees/shrubs.
- Use porous pavement or pavers for low traffic roadways, on-street parking, shoulders or sidewalks.
- Integrate traffic calming measures in the form of bioretention curb extensions.

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1.3.3 BMP Sizing for Applicable Green Streets Projects

An 85th percentile standard design storm should be used to determine the appropriate size, slope, and materials of each facility. After identifying the appropriate storm water facilities for a site, an integrated approach using several BMPs is encouraged. To increase water quality and functional hydrologic benefits, several storm water management BMPs can be used in succession. This is called a treatment train approach. The control measures should be designed using available topography to take advantage of gravity for conveyance to and through each facility. All Green Streets designs must be based off of a published design standard.

The following steps should be used to size BMPs for applicable Green Streets projects:

1. Delineate drainage areas tributary to BMP locations and compute imperviousness.
2. Look up the recommended sizing method for the BMP selected in each drainage area and calculate target sizing criteria.
3. Design BMPs per a published design standard.
4. Attempt to provide the calculated sizing criteria for the selected BMPs.
5. If sizing criteria cannot be achieved, document the constraints that override the application of BMPs and provide the largest portion of the sizing criteria that can be reasonably provided given constraints. If BMPs cannot be sized to provide the calculated volume for the tributary area, it is still essential to design the BMP inlet, energy dissipation, and overflow capacity for the full tributary area to ensure that flooding and scour is avoided. It is strongly recommended that BMPs which are designed to less than their target design volume be designed to bypass peak flows.

1.3.4 Alternative Compliance Options for Applicable Green Streets Projects

Alternative compliance programs should be considered for applicable Green Streets projects if on-site green infrastructure approaches cannot practicably treat the design volume. The primary alternative compliance option for applicable Green Streets projects is the completion of off-site mitigation projects. The proponent would implement a project to reduce storm water pollution for other portions of roadway or similar land uses when being reconstructed to the project in the same hydrologic unit, ideally as close to the project as possible and discharging to the same outfall.

1.3.5 Infiltration Considerations

Appropriate soils, infiltration media, and infiltration rates should be used for infiltration BMPs. If infiltration is proposed, a complete geotechnical or soils report should be undertaken to determine infiltration rates, groundwater depth, soil toxicity and stability, and other factors that will affect the ability and the desirability of infiltration. At a minimum, the infiltration capacity of the underlying soils shall be deemed suitable for infiltration (0.3 inches per hour or greater), appropriate media should be used in the BMP itself, the groundwater shall be located at a depth of ten feet or greater.

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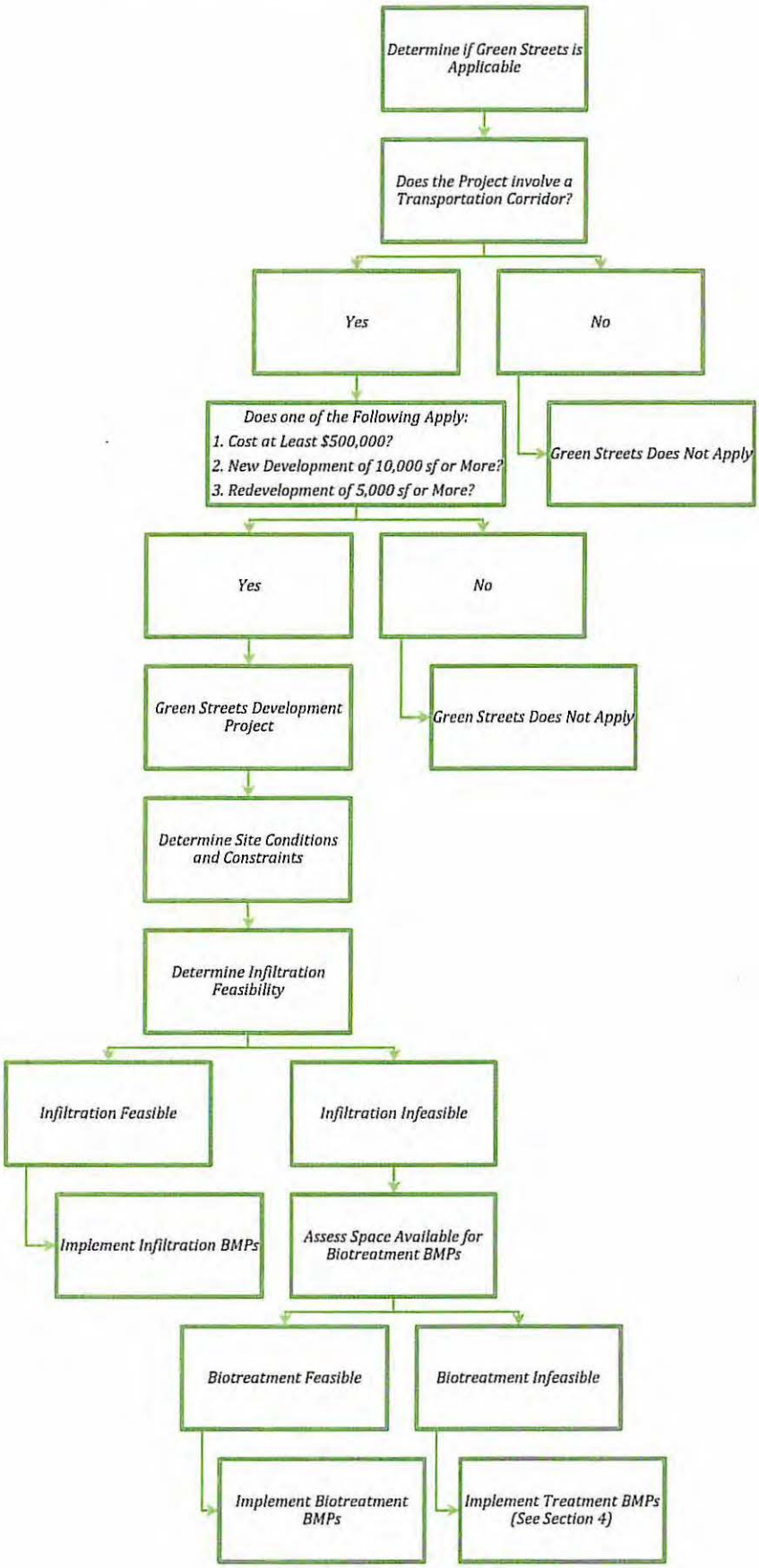

Figure 1: BMP Selection Flow Chart.

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Table 2: BMP Selection by Street Context (*Model for Living Streets Design Manual, 2011*).

	STREET CONTEXT	BIORETENTION			DETENTION		PAVING	INLET PROTECTIONS		
		Swales	Planters	Vegetated Buffer Strips	Rain Gardens	Infiltration Trenches & Dry Wells	Permeable Pavement	Storm Drain Inlet Screens	Storm Drain Filter Inserts	Pipe Filter Inserts
Commercial	Downtown Commercial		✓			✓	✓	✓	✓	✓
	Commercial Throughway		✓	✓		✓	✓	✓	✓	✓
	Neighborhood Commercial		✓	✓	✓	✓	✓	✓	✓	✓
Residential	Downtown Residential	✓	✓		✓	✓	✓	✓	✓	✓
	Residential Throughway	✓	✓		✓	✓	✓	✓	✓	✓
	Neighborhood Residential	✓	✓		✓	✓	✓	✓	✓	✓
Industrial And Mixed-Use	Industrial	✓	✓		✓	✓	✓	✓	✓	✓
	Mixed-Use		✓	✓	✓	✓	✓	✓	✓	✓
Special	Sidewalk Furniture Zone	✓	✓		✓	✓	✓	✓	✓	✓
	Park Edge	✓	✓		✓	✓	✓	✓	✓	✓
	Boulevard	✓	✓		✓	✓	✓	✓	✓	✓
	Ceremonial (Civic)						✓	✓	✓	✓
Small	Alley		✓			✓	✓	✓	✓	✓
	Shared Public Way		✓			✓	✓	✓	✓	✓
	Walk Street		✓	✓		✓	✓	✓	✓	✓

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Table 3: BMP Location Opportunity Summary.

BMP	Location Opportunity Summary
Bioretention	• Adjacent to traveled way and in frontage or furniture sidewalk zones • Can be located in curb extensions, medians, traffic circles, roundabouts, and any other landscaped area • Suitable for constrained locations
Infiltration Trench/Dry Well	• Can be located under sidewalks and in sidewalk planting strips, curb extensions, roundabouts, and medians
Rain Gardens	• Can be integrated medians, islands, circles, street ends, chicanes, and curb extensions • Can be located at the terminus of swales in the landscape
Permeable Pavement	• Suitable for parking or emergency access lanes • Can be located in furniture zones of sidewalks especially adjacent to tree wells • Cannot be placed in areas with large traffic volume or heavy load lanes • Avoid steep streets • Cannot be placed within 20 feet of sub-sidewalk basements • Cannot be within 50 feet of domestic water wells
Flow-Through Planters	• Above-grade planters should be structurally separate from adjacent sidewalks • At-grade planter systems can be installed adjacent to curbs within the frontage and/or furniture zones
Vegetated Swales	• Can be located adjacent to roadways, sidewalks, or parking areas • Can be integrated into traffic calming devices such as chicanes and curb extensions • Can be placed in medians where the street drains to the median • Can be placed alongside streets and pathways • Should be designed to work in conjunction with the street slope
Vegetated Buffer Strips	• Can be located in multi-way boulevards, park edge streets, or sidewalk furniture zones • Can serve as pre-treatment
Treatment BMPs	• Can be located in a catch basin, manhole, or vault • Can be installed on an existing outlet pipe or at the bottom of an existing catch basin with an overflow • Can be placed on existing curbside catch basins and flush grate openings • Can be installed on the existing wall of a catch basin and on the curb side wall of a catch basin • Minimum set-backs from foundations and slopes should be observed if the BMP is not lined
Street Trees	• Can be placed on sidewalks, in furniture zones, and on medians • Adequate spacing must be provided between trees and street lights, pedestrian lights, accessible parking spaces, bus shelters, awnings, canopies, balconies, and signs

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SECTION 2 – INFILTRATION

Infiltration systems utilize rock, gravel, and other highly permeable materials for on-site infiltration. In these systems, storm water runoff is directed to the system and allowed to infiltrate into the soils for on-site retention and groundwater recharge. During small storm events, infiltration systems can result in significant or even complete volume reduction of storm water runoff.

Infiltration should be used to the maximum extent practicable. Biotreatment BMPs should be considered if infiltration is found to be infeasible due to low infiltration rates, soil instability, high groundwater, or soil contamination.

Infiltration BMPs may become damaged by storm water carrying high levels of sediment, therefore pre-treatment features should be designed to treat street runoff prior to discharging to infiltration features. Media filters, filter inserts, vortex type units, bioretention devices, sumps, and sedimentation basins are several pre-treatment tools effective at removing sediment.

2.1 INFILTRATION TRENCHES AND DRY WELLS

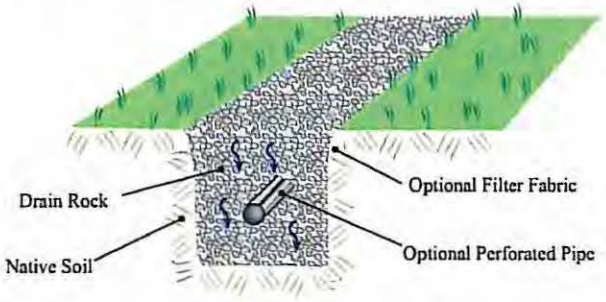

Figure 2: Infiltration Trench (*Model for Living Streets Design Manual, 2011).*

Description

Infiltration trenches are linear, rock-filled features that promote infiltration by providing a high ratio of sub-surface void space in permeable soils. They provide on-site storm water retention and may contribute to groundwater recharge. Infiltration trenches may accept storm water from sheet flow, concentrated flow from a swale or other surface feature, or piped flow from a catch basin. Because they are not flow-through BMPs, infiltration trenches do not have outlets but may have overflow outlets for large storm events.

Dry wells are typically distinguished from infiltration trenches by being deeper than they are wide. They are usually circular, resembling a well, and are backfilled with the same materials as infiltration trenches. Dry wells typically accept concentrated flow from surface features or from pipes and do not have outlets.

Infiltration trenches and dry wells are typically designed to infiltrate all flow they receive. In large storm events, partial infiltration of runoff can be achieved by providing an overflow outlet. In these systems, significant or even complete volume reduction is possible in smaller storm events. During large storm events, these systems may function as detention facilities and provide a limited amount of retention and infiltration.

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Location and placement guidelines

Infiltration trenches and dry wells typically have small surface footprints so they are potentially some of the most flexible elements of landscape design. However, because they involve sub-surface excavation, these features may interfere with surrounding structures. Care needs to be taken to ensure that surrounding building foundations, pavement bases, and utilities are not damaged by infiltration features. Once structural soundness is ensured, infiltration features may be located under sidewalks and in sidewalk planting strips, curb extensions, roundabouts, and medians. When located in medians, they are most effective when the street is graded to drain to the median. Dry wells require less surface area than trenches and may be more feasible in densely developed areas.

Infiltration features should be sited on uncompacted soils with acceptable infiltration capacity. They are best used where soil and topography allow for moderate to good infiltration rates (0.3 inches per hour or better) and the depth to groundwater is at least 10 feet. Prior to design of any retention or infiltration system, proper soil investigation and percolation testing shall be conducted to determine appropriate infiltration design rates, depth to groundwater, and if soil will exhibit instability as a result of infiltration. Any site with potential for previous underground contamination shall be investigated. Infiltration trenches and dry wells can be designed as stand-alone systems when water quality is not a concern or may be combined in series with other storm water tools.

Perforated pipes and piped inlets and outlets may be included in the design of infiltration trenches. Cleanouts should be installed at both ends of any piping and at regular intervals in long sections of piping, to allow access to the system. Access ports are recommended for both trenches and wells and can be combined with clean-outs. If included, the overflow inlet from the infiltration trench should be properly designed for anticipated flows.

2.2 RAIN GARDENS

Figure 3: Rain garden (*Model for Living Streets Design Manual, 2011).*

Description

Rain gardens are vegetated depressions in the landscape. They have flat bottoms and gently sloping sides. Rain gardens can be similar in appearance to swales, but their footprints may be any shape. Rain gardens hold water on the surface, like a pond, and have overflow outlets. The detained water is infiltrated through the topsoil and subsurface drain rock unless the volume

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of water is so large that some must overflow. Rain gardens can reduce or eliminate off-site storm water discharge while increasing on-site recharge.

Location and Placement Guidelines

Rain gardens may be placed where there is sufficient area in the landscape and where soils are suitable for infiltration. Rain gardens can be integrated with traffic calming measures installed along streets, such as medians, islands, circles, street ends, chicanes, and curb extensions. Rain gardens are often used at the terminus of swales in the landscape.

2.3 PERMEABLE PAVEMENT

Figure 4: Permeable pavement during a storm event (*Model for Living Streets Design Manual, 2011).*

Description

Permeable pavement is a system with the primary purpose of slowing or eliminating direct runoff by absorbing rainfall and allowing it to infiltrate into the soil. Permeable pavement also filters and cleans pollutants such as petroleum deposits on streets, reduces water volumes for existing overtaxed pipe systems, and decreases the cost of offsite or onsite downstream infrastructure. This BMP is impaired by sediment-laden run-on which diminishes its porosity. Care should be taken to avoid flows from landscaped areas reaching permeable pavement. Permeable pavement is, in certain situations, an alternative to standard pavement. Conventional pavement is designed to move storm water off-site quickly. Permeable pavement, alternatively, accepts the water where it falls, minimizing the need for management facilities downstream.

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Location and Placement Guidelines

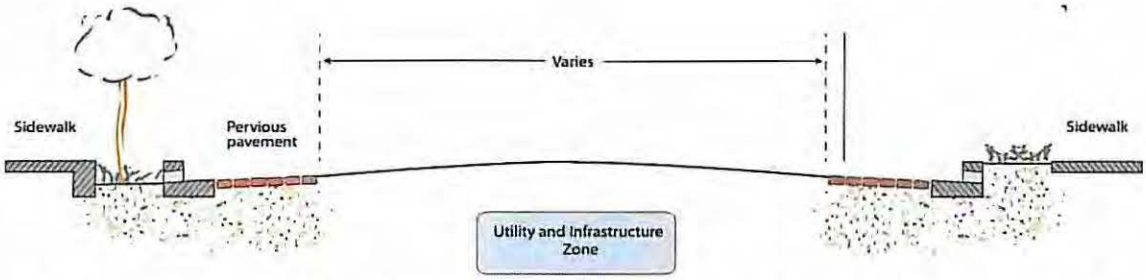

Figure 5: Possible pervious pavement design layout (*Model for Living Streets Design Manual, 2011).*

Conditions where permeable pavement should be encouraged include:

- Sites where there is limited space in the right-of-way for other BMPs;
- Parking or emergency access lanes; and
- Furniture zones of sidewalks especially adjacent to tree wells

Conditions where permeable pavement should be avoided include:

- Large traffic volume or heavy load lanes;
- Where runoff is already being harvested from an impervious surface for direct use, such as irrigation of bioretention landscape areas;
- Steep streets;
- Gas stations, car washes, auto repair, and other sites/sources of possible chemical contamination;
- Areas with shallow groundwater;
- Within 20 feet of sub-sidewalk basements; and
- Within 50 feet of domestic water wells.

Material and Design Guidelines

A soil or geotechnical report should be conducted to provide information about the permeability rate of the soil, load-bearing capacity of the soil, the depth to groundwater (10 feet or more required), and if soil will exhibit instability as a result of implementation. Infiltration rate and load capacity are key factors in the functionality of this BMP. Permeable pavement generally does not have the same load-bearing capacity as conventional pavement, so this BMP may have limited applications depending on the underlying soil strength and pavement use. Permeable pavement should not be used in general traffic lanes due to the possible variety of vehicles weights and heavy volumes of traffic.

When used as a road paving, permeable pavement that carries light traffic loads typically has a thick drain rock base material. Pavers should be concrete as opposed to brick or other light-duty materials. Other possible permeable paving materials include porous concrete and porous asphalt. These surfaces also have specific base materials that detain infiltrated water and provide structure for the road surface. Base material depths should be specified based on design load and the soils report.

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Plazas, emergency roads, and other areas of limited vehicular access can also be paved with permeable pavement. Paving materials for these areas may include open cell paver blocks filled with stones or grass and plastic cell systems. Base material specifications may vary depending on the product used, design load, and underlying soils.

When used for pedestrian paths, sidewalks, and shared-use paths, appropriate materials include those listed above as well as rubber pavers and decomposed granite or something similar (washed or pore-clogging fine material). Pedestrian paths may also use broken concrete pavers as long as ADA requirements are met. Paths should drain into adjoining landscapes and should be higher than adjoining landscapes to prevent run-on. Pavement used for sidewalks and pedestrian paths should be ADA compliant, especially smooth, and not exceed a 2 percent slope or have gaps wider than 0.25 inches. In general, tripping hazards should be avoided.

Design considerations for permeable pavement include:

- The location, slope and load-bearing capacity of the street, and the infiltration rate of the soil;
- The amount of storage capacity of the base course;
- The traffic volume and load from heavy vehicles;
- The design storm volume calculations and the quality of water; and
- Drain rock, filter fabrics, and other subsurface materials.

Maintenance Guidelines

Maintenance of permeable pavement systems is essential to their continued functionality. Regular vacuuming and street sweeping should be performed to remove sediment from the pavement surface. The bedding and base material should be selected for long life and sufficient infiltration rates.

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SECTION 3 – BIOTREATMENT

Biotreatment BMPs are landscaped, shallow depressions that capture and filter storm water runoff. These types of BMPs are an increasingly common type of storm water treatment device that are installed at curb level and filled with a bioretention type soil. They are designed as soil and plant-based filtration devices that remove pollutants through a variety of physical, biological, and chemical treatment processes. They typically consist of a ponding area, mulch layer, planting soils, and plants. Storm water is directed to the system and pollutants are treated as the storm water drains through the planting soil and either infiltrated or collected by an underdrain and directed to a collection system.

Biotreatment should only be used in cases where infiltration has been proven infeasible due to low infiltration rates, soil instability, high groundwater, or soil contamination.

3.1 BIORETENTION

Figure 6: Bioretention system (*Model for Living Streets Design Manual, 2011).*

Description

Bioretention is a storm water management process that cleans storm water by mimicking natural soil filtration processes as water flows through a bioretention BMP. It incorporates mulch, soil pores, microbes, and vegetation to reduce and remove sediment and pollutants from storm water. Bioretention is designed to slow, spread, and, to some extent, infiltrate water. Each component of the bioretention BMP is designed to assist in retaining water, evapotranspiration, and adsorption of pollutants into the soil matrix. As runoff passes through the vegetation and soil, the combined effects of filtration, absorption, adsorption, and biological uptake of plants remove pollutants.

For areas with low permeability or other soil constraints, bioretention can be designed as a flow-through system with a barrier protecting storm water from native soils. Bioretention areas can be designed with an underdrain system that directs the treated runoff to infiltration areas, cisterns, or the storm drain system, or may treat the water exclusively through surface flow. Examples of bioretention BMPs include swales, planters, and vegetated buffer strips.

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Location and Placement Guidelines

Bioretention facilities can be included in the design of all street components; adjacent to the traveled way and in the frontage or furniture sidewalk zones. They can be designed into curb extensions, medians, traffic circles, roundabouts, and any other landscaped area. Depending on the feature, maintenance and access should always be considered in locating the device. Bioretention systems are also appropriate in constrained locations where other storm water facilities requiring more extensive subsurface materials are not feasible.

If bioretention devices are designed to include infiltration, native soil should have a minimum permeability rate of 0.3 inches per hour and at least 10 feet to the groundwater table. Sites that have more than a 5 percent slope may require other storm water management approaches or special engineering.

3.2 FLOW-THROUGH PLANTERS

Figure 7: Flow-through planter (*Model for Living Streets Design Manual, 2011).*

Description

Flow-through planters are typically above-grade or at-grade with solid walls and a flow-through bottom. They are contained within an impermeable liner and use an underdrain to direct treated runoff back to the collection system. Where space permits, buildings can direct roof drains first to building-adjacent planters. Both underdrains and surface overflow drains are typically installed with building-adjacent planters.

At-grade street-adjacent planter boxes are systems designed to take street runoff and/or sidewalk runoff and incorporate bioretention processes to treat storm water. These systems may or may not include underdrains.

Location and Placement Guidelines

Above-grade planters should be structurally separate from adjacent sidewalks to allow for future maintenance and structural stability per local department of public works' standards. At-grade planter systems can be installed adjacent to curbs within the frontage and/or furniture zones.

All planters should be designed to pond water for less than 48 hours after each storm. Flow-through planters designed to detain roof runoff can be integrated into a building's foundation walls, and may be either raised or at grade.

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For at-grade planters, small localized depressions may be included in the curb opening to encourage flow into the planter. Following the inlet, a sump (depression) to capture sediment and debris may be integrated into the design to reduce sediment loadings.

3.3 VEGETATED SWALES

Figure 8: Vegetated swale (*Signal Hill, CA*).

Description

Swales are linear, vegetated depressions that capture rainfall and runoff from adjacent surfaces. The swale bottom should have a gradual slope to convey water along its length. Swales can reduce off-site storm water discharge and remove pollutants along the way. In a swale, water is slowed by traveling through vegetation on a relatively flat grade. This gives particulates time to settle out of the water while contaminants are removed by the vegetation.

Location and Placement Guidelines

Swales can easily be located adjacent to roadways, sidewalks, or parking areas. Roadway runoff can be directed into swales via flush curbs or small evenly-spaced curb cuts into a raised curb. Swale systems can be integrated into traffic calming devices such as curb extensions.

Swales can be placed in medians where the street drains to the median. Placed alongside streets and pathways, vegetated swales can be landscaped with native plants which filter sediment and pollutants and provide habitat for wildlife. Swales should be designed to work in conjunction with the street slope to maximize filtration and slowing of storm water.

Swales are designed to allow water to slowly flow through the system. Depending on the landscape and design storm, an overflow or bypass for larger storm events may be needed. Curb openings should be designed to direct flow into the swale. Following the inlet, a sump may be built to capture sediment and debris.

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3.4 VEGETATED BUFFER STRIPS

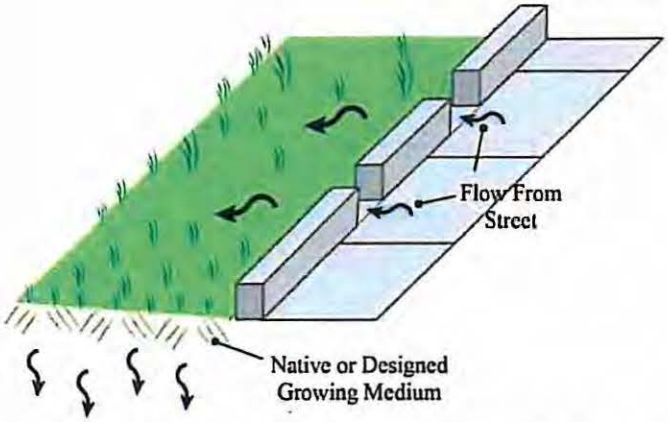

Figure 9: Vegetated buffer strip detail (*Model for Living Streets Design Manual, 2011*).

Description

Vegetated buffer strips are sloping planted areas designed to treat and absorb sheet flow from adjacent impervious surfaces. These strips are not intended to detain or retain water, only to treat it as a flow-through feature. They should not receive concentrated flow from swales or other surface features, or concentrated flow from pipes.

Location and Placement Guidelines

Vegetated buffer strips are well-suited to treating runoff from roads and highways, small parking lots, and pervious surfaces. They may be commonly used on multi-way boulevards, park edge streets, or sidewalk furniture zones with sufficient space. When selecting potential placement the need for supplemental irrigation should be considered. Vegetated buffers can also be situated so they serve as pre-treatment for another storm water management feature, such as an infiltration BMP.

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SECTION 4 – TREATMENT BMPS

4.1 SAND FILTERS & STORM DRAIN INLET PROTECTIONS

As described in Section 1 of this Green Streets Manual, it may be infeasible for specific projects to apply infiltration or biotreatment BMPs. In these cases, sand filters or filter inserts as treatment BMPs can be considered as an alternative. Sand filters and filter inserts can be designed to prevent particulates, debris, metals, and petroleum-based materials conveyed by storm water from entering the storm drain system. All treatment BMP units should have an overflow system that allows the storm drain to remain functional if the filtration system becomes clogged during rainstorms. All storm drain inlet protections must be of a style and configuration approved by the agency with ownership of the inlet.

Typical maintenance of catch basins includes scheduled trash removal if a screen or other debris capturing device is used. Street sweeping should be performed by vacuum sweepers with occasional weed and large debris removal. Maintenance should include keeping a log of the amount of sediment collected and the data of removal.

The following are examples of acceptable treatment BMPs:

- **Sand Filters:** Sand filters are designed to filter storm water through a constructed media bed and to an underdrain system. As storm water flows through the media pollutants are filtered out of the water. The filtered water is conveyed through the underdrain to a collection system. Pretreatment is necessary to eliminate significant sediment load or other large particles which would clog the system. Minimum set-backs from foundations and slopes should be observed if the facility is not lined. Filters should be designed and maintained such that ponded water should not persist for longer than 48 hours following a storm event.
- **Cartridge Media Filters:** Cartridge media filters contain multiple modular filters which contain engineered media. The filters can be located in a catch basin, manhole, or vault. The manhole or vault may be divided into multiple chambers so that the first chamber may act as a pre-settling basin for removal of coarse sediment while the next chamber may act as the filter chamber. Cartridge media filters are recommended for drainage areas with limited available surface area or where surface BMPs would restrict uses. Depending on the number of cartridges, maintenance events can have long durations. Locations should be chosen so that maintenance events will not significantly disrupt businesses or traffic. Inlet inserts should be sized to capture all debris and should therefore be selected to match the specific size and shape of each catch basin and inlet. Filter media should be selected to target pollutants of concern. A combination of media may be used to remove a variety of pollutants. Systems with lower maintenance requirements are preferred.
- **Storm Drain Inlet Screens:** Inlet screens are designed to prevent large litter and trash from entering the storm drain system while allowing smaller particles to pass through. The screens function as the first preventive measure in removing pollutants from the storm water system. The City's street sweeping department should be consulted to ensure compliance with local specifications and to schedule regular maintenance. Annual inspection of the screen is recommended to ensure functionality. Note that most LA River drainage areas are already protected using connector pipe screens through collective systems.
- **Storm Drain Pipe Filter Insert:** The storm drain outlet pipe filter is designed to be installed on an existing outlet pipe or at the bottom of an existing catch basin with an overflow. This filter removes debris, particulates, and other pollutants from storm water as it leaves the

RB-AR6979

storm drain system. This BMP is less desirable than a protection system that prevents debris from entering the storm drain system because the system may become clogged with debris. Outlet pipe filters can be placed on existing curbside catch basins and flush grate openings. Regular maintenance is required and inspection should be performed rigorously. Because this filter is located at the outlet of a storm drain system, clogging with debris is not as apparent as with filters at street level. This BMP may be used as a supplemental filter with an inlet screen or inlet insert unit.

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SECTION 5 – STREET TREES

5.1 STREET TREES

Figure 10: Street trees (*Signal Hill, CA*).

Description

Healthy urban trees are powerful storm water management tools. Leaves and branches catch and slow rain as it falls, helping it to soak into the ground. The plants themselves take up and store large quantities of water that would otherwise contribute to surface runoff. Part of this moisture is then returned to the air through evaporation to further cool the city. As an important element along sidewalks, street trees must be provided with conditions that allow them to thrive, including adequate uncompacted soil, water, and air.

The goal of adding street trees is to increase the canopy cover of the street, the percentage of its surface either covered by or shaded by vegetation. The selection, placement, and management of all elements in the street should enhance the longevity of a city's street trees and healthy, mature plantings should be retained and protected whenever possible.

Benefits to adding street trees include:

- Creation of shade to lower temperatures in a city, reduces energy use, and makes the street a more pleasant place in which to walk and spend time
- Slowing and capture of rainwater, helping it soak into the ground to restore local hydrologic functions and aquifers
- Improving air quality by cooling air, producing oxygen, and absorbing and storing carbon in woody plant tissues

Guidelines

For guidelines on street tree design refer to the Signal Hill Street Tree Ordinance at http://www.cityofsignalhill.org/DocumentCenter/Home/View/774.

RB-AR6981

SECTION 6 – DEFINITIONS

Best Management Practice (BMP)
Operating methods and/or structural devices used to reduce storm water volume, peak flows, and/or pollutant concentrations of storm water runoff through evapotranspiration, infiltration, detention, filtration, and/or biological and chemical treatment.

Bioretention
Soil and plant-based retention practice that captures and biologically degrades pollutants as water infiltrates through sub-surface layers containing microbes that treat pollutants. Treated runoff is then slowly infiltrated and recharges the groundwater.

Conveyance
The process of water moving from one place to another.

Design Storm
A storm whose magnitude, rate, and intensity do not exceed the design load for a storm drainage system or flood protection project.

Detention
Storm water runoff that is collected at one rate and then released at a controlled rate. The volume difference is held in temporary storage.

Filtration
A treatment process that allows for removal of solid (particulate) matter from water by means of porous media such as sand, soil, vegetation, or a man-made filter. Filtration is used to remove contaminants.

Furniture Zone
The furniture zone is the area which lies between the curb and pedestrian zones and is intended to house utilities and pedestrian amenities.

Hardscape
Impermeable surfaces, such as concrete or stone, used in the landscape environment along sidewalks or in other areas used as public space.

Infiltration
The process by which water penetrates into soil from the ground surface.

Permeability/Impermeability
The quality of a soil or material that enables water to move through it, determining its suitability for infiltration.

Retention
The reduction in total runoff that results when storm water is diverted and allowed to infiltrate into the ground through existing or engineered soil systems.

Runoff
Water from rainfall that flows over the land surface that is not absorbed into the ground.

RB-AR6982

Sedimentation
The deposition and/or settling of particles suspended in water as a result of the slowing of the water.

Storm water
Water runoff from rain or snow resulting from a storm.

Transportation Corridor
A major arterial, state route, highway, or rail line used for the movement of people or goods by means of bus services, trucks, and vehicles.

RB-AR6983

SECTION 7 – REFERENCES

1. Los Angeles County. *Model for Living Streets Design Manual*. 2011.
2. U.S. Environmental Protection Agency (EPA). *Managing Wet Weather With Green Infrastructure Municipal Handbook: Green Streets*. December 2008.
3. Orange County. *Technical Guidance Document*. May 2011.

RB-AR6984

ATTACHMENT J:

LACFCD JUNE 24, 2013

LETTER OF INTENT

COUNTY OF LOS ANGELES

DEPARTMENT OF PUBLIC WORKS

"To Enrich Lives Through Effective and Caring Service"

GAIL FARBER, Director

900 SOUTH FREMONT AVENUE
ALHAMBRA, CALIFORNIA 91803-1331
Telephone: (626) 458-5100
http://dpw.lacounty.gov

ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1460
ALHAMBRA, CALIFORNIA 91802-1460

IN REPLY PLEASE
REFER TO FILE: WM-7

June 24, 2013

Mr. Samuel Unger, P.E.
Executive Officer
California Regional Water Quality
Control Board – Los Angeles Region
320 West 4th Street, Suite 200
Los Angeles, CA 90013

Attention Ms. Renee Purdy

Dear Mr. Unger:

LETTER OF INTENT – LOS ANGELES COUNTY FLOOD CONTROL DISTRICT
LOS CERRITOS CHANNEL WATERSHED
WATERSHED MANAGEMENT PROGRAM
AND COORDINATED INTEGRATED MONITORING PROGRAM

The Los Angeles County Flood Control District (LACFCD) submits this Letter of Intent to participate in and share the cost of the development of a Watershed Management Program (WMP) and a Coordinated Integrated Monitoring Program (CIMP) with the Los Cerritos Channel watershed permittees. This Letter of Intent serves to satisfy the WMP/EWMP notification requirements of Section VI.C.4.b of Order No. R4-2012-0175 (Municipal Separate Storm Sewer System Permit) and the CIMP requirements of Section IV.C.1 of Attachment E of the Municipal Separate Storm Sewer System Permit.

The participating permittees in the Los Cerritos Channel watershed consists of the following agencies: City of Long Beach as the coordinating agency for the WMP and CIMP development, LACFCD, and cities of Bellflower, Cerritos, Downey, Lakewood, Paramount, and Signal Hill. Attachment A illustrates the LACFCD territory that will be included in this WMP and CIMP. The LACFCD intends to submit a final Memorandum of Understanding to the County of Los Angeles Board of Supervisors (which is the LACFCD's governing body) for approval prior to December 28, 2013.

If you have any questions, please contact Ms. Terri Grant at (626) 458-4309 or tgrant@dpw.lacounty.gov.

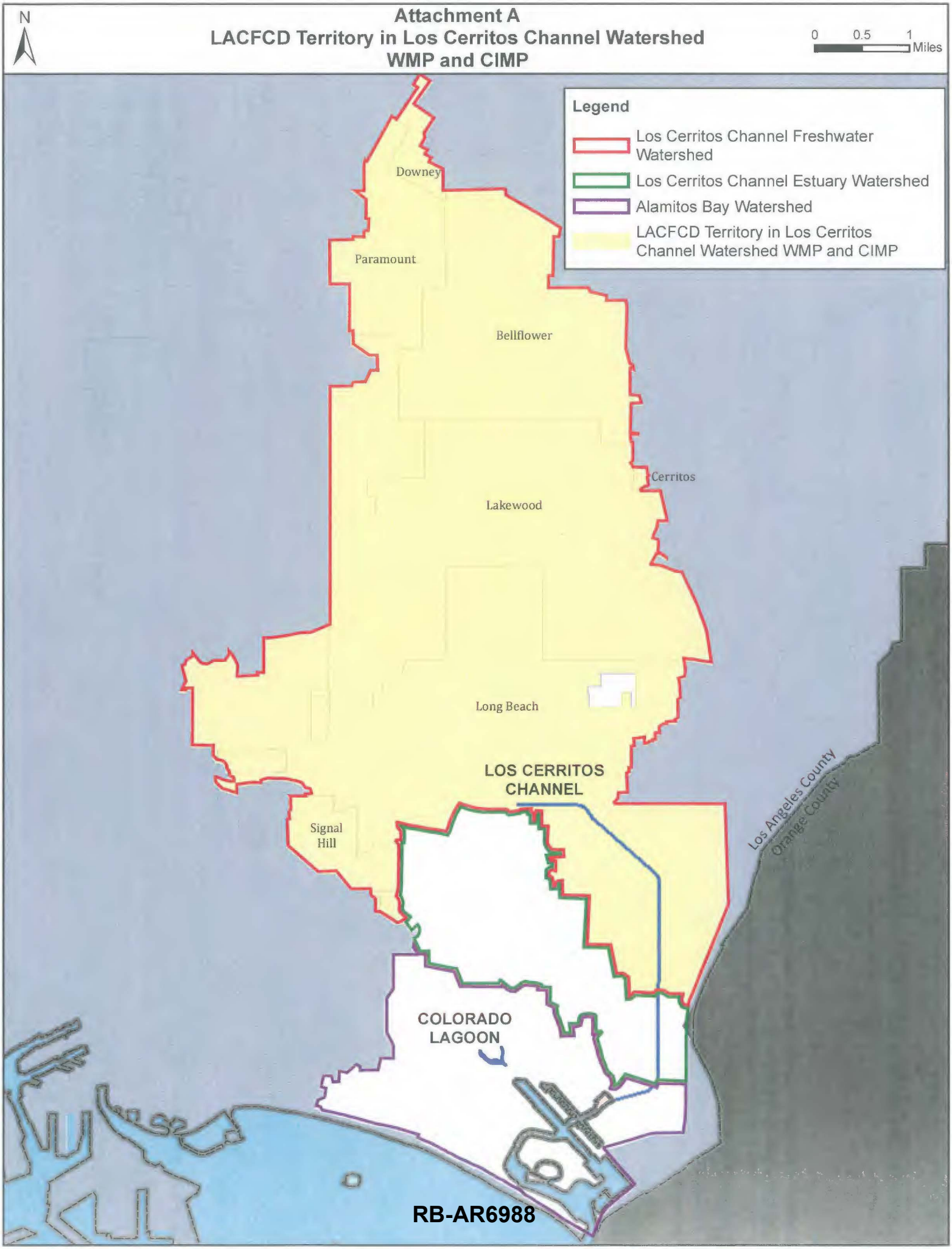
Very truly yours,

for GAIL FARBER
Chief Engineer of the Los Angeles County Flood Control District

JD:jht
P:\wmpub\Secretarial\2013 Documents\Letter\LOI - Los Cerritos Channel LACFCD.doc\C13208

Attach.

cc: City of Bellflower
City of Cerritos
City of Downey
City of Lakewood
City of Long Beach
City of Paramount
City of Signal Hill


Attachment A
LACFCD Territory in Los Cerritos Channel Watershed
WMP and CIMP
N
0 0.5 1 Miles
Legend
Los Cerritos Channel Freshwater Watershed
Los Cerritos Channel Estuary Watershed
Alamitos Bay Watershed
LACFCD Territory in Los Cerritos Channel Watershed WMP and CIMP
Downey
Paramount
Bellflower
Cerritos
Lakewood
Long Beach
LOS CERRITOS CHANNEL
Signal Hill
COLORADO LAGOON
Los Angeles County
Orange County
RB-AR6988

ATTACHMENT K:

CALTRANS JUNE 18, 2013
LETTER OF INTENT

DEPARTMENT OF TRANSPORTATION
OFFICE OF THE DIRECTOR
P.O. BOX 942873, MS-49
SACRAMENTO, CA 94273-0001
PHONE (916) 654-5266
FAX (916) 654-6608
TTY 711
www.dot.ca.gov

Flex your power!
Be energy efficient!

June 18, 2013

Samuel Unger, Executive Office
Los Angeles Regional Water Quality Control Board
320 West Fourth Street, Suite 200
Los Angeles, California 90013

Attn.: Renee Purdy

LETTER OF INTENT TO PARTICIPATE IN THE DEVELOPMENT OF A WATERSHED MANAGEMENT PROGRAM (WMP) AND COORDINATED INTEGRATED MONITORING PROGRAM (CIMP) IN COOPERATION WITH THE LOS CERRITOS CHANNEL WATERSHED GROUP

Dear Mr. Unger:

Caltrans intends to voluntarily join the Los Cerritos Channel Watershed Group in the Development of the Watershed Management Program (WMP) and a Coordinated Integrated Monitoring Program (CIMP) to meet the intent of Caltrans TMDL requirements as part of the Caltrans Statewide NPDES Permit and the goals of watershed collaboration.

Caltrans recognizes that while maintaining the 18-month schedule for development of the WMP, the Watershed Group intends to continue to evaluate and consider the Enhanced WMP (EWMP) option. If the group decides to develop an EWMP prior to the December 28, 2013 deadline, your office will be notified in a separate letter and confirm whether Caltrans intends to participate in development of the EWMP.

Should you have any questions, please contact Keith Jones at (916) 653-4947. Thank you.

Sincerely,

G. SCOTT McGOWEN
Chief Environmental Engineer
California Department of Transportation

RB-AR6990

September 25, 2013

Los Cerritos Channel Watershed Management Group
(See Distribution List)

APPROVAL OF NOTIFICATION OF INTENT (NOI) TO DEVELOP A WATERSHED MANAGEMENT PROGRAM (WMP), PURSUANT TO THE LOS ANGELES COUNTY MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) PERMIT (NPDES PERMIT NO. CAS004001; ORDER NO. R4-2012-0175)

Dear Los Cerritos Channel Watershed Management Group Participants:

Regional Board staff received and reviewed the NOI to prepare a WMP that the Los Cerritos Channel Watershed Management Group submitted to the Regional Board on June 27, 2013; according to the NOI, the participants in the Los Cerritos Channel Watershed Management Group are the Cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, Signal Hill, and the California Department of Transportation, and the Los Angeles County Flood Control District. Upon review, Regional Board staff determined the NOI meets the notification requirements of Part VI.C of Order No. R4-2012-0175, *Waste Discharge Requirements for MS4 Discharges within the Coastal Watersheds of Los Angeles County, except those Discharges Originating from the City of Long Beach* (hereafter, Order).

As you are aware, the Order allows permittees the option to submit to the Regional Board for approval an NOI to prepare a WMP. Preparing a WMP allows permittees to implement the requirements of the Order on a watershed scale through customized strategies, control measures, and best management practices (BMPs). Implementing a WMP allows permittees to address the highest watershed priorities, including complying with the requirements of Part V.A (Receiving Water Limitations), Part VI.E (Total Maximum Daily Load Provisions) and Attachments L through R, by customizing the control measures in Parts III.A (Prohibitions – Non-Storm Water Discharges) and VI.D (Minimum Control Measures) of the Order.

The Los Cerritos Channel Watershed Management Group must submit to the Regional Board for review and approval a draft WMP for the Los Cerritos Channel watershed no later than June 28, 2014. Until Regional Board staff approves the Los Cerritos Channel Watershed Management Group WMP, each Los Cerritos Channel Watershed Management Group participant must do the following:

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1. Continue to implement all the watershed control measures in their corresponding storm water management programs, including actions within each of the six categories of minimum control measures consistent with Title 40 Code of Federal Regulations Section 122.26(d)(2)(iv) and Part VI.C.4.d.i of the Order.
2. Continue to implement watershed control measures to eliminate non-storm water discharges through the MS4 that are a source of pollutants to receiving waters consistent with Clean Water Act Section 402(p)(3)(B)(ii) and Part VI.C.4.d.ii of the Order.
3. Target implementation of watershed control measures listed above to address known contributions of pollutants from MS4 discharges to receiving waters.
4. Meet all interim and final deadlines for development of a WMP.

Additionally, the Regional Board exhorts participants of the Los Cerritos Channel Watershed Management Group to closely collaborate with Los Angeles County and the Los Angeles County Flood Control District when developing the WMP and when planning and implementing watershed control measures as described above.

The Regional Board understands that the Los Cerritos Channel Watershed Management Group may opt to develop an enhanced watershed management program (EWMP) instead of a WMP, after further evaluation. Regional Board staff determined the NOI the Los Cerritos Channel Watershed Management Group submitted met most of the requirements specific to an EWMP but lacked sufficiently detailed information about the structural best management practice(s) the Los Cerritos Channel Watershed Management Group participants will implement to provide meaningful water quality improvement. If the Los Cerritos Channel Watershed Management Group decides to develop an EWMP, please notify the Regional Board in writing no later December 28, 2013. Along with this written notification, submit a copy of the executed memorandum of understanding describing the mechanism to fund the development of the EWMP, and detailed technical information on the structural best management practice (BMP) or suite of BMPs the Los Cerritos Channel Watershed Management Group will implement, including the BMPs to quantifiably reduce pollutant loads, the size of the drainage area, the volume of storm water addressed, and the estimated pollutant load reduction.

If you have any questions, please contact Ms. Pavlova Vitale of the Storm Water Permitting Unit by electronic mail at Pavlova.Vitale@waterboards.ca.gov or by phone at (213) 576-6761. Alternatively, you may also contact Mr. Ivar Ridgeway, Chief of the Storm Water Permitting Unit, by electronic mail at Ivar.Ridgeway@waterboards.ca.gov or by phone at (213) 620-2150.

Sincerely,

Samuel Unger

Samuel Unger, P.E.
Executive Officer

cc: Bernardo Iniguez, City of Bellflower
Mike O'Grady, City of Cerritos

Jason Wen, City of Downey
Konya Vivanti, City of Lakewood
Anthony Arevalo, City of Long Beach
Sarah Ho, City of Paramount
Keith Jones, Caltrans
Terri Grant, Los Angeles County Flood Control District
Dave Smith, US EPA
Walt Shannon, State Water Resources Control Board – Storm Water Section
Jennifer Fordyce, State Water Resources Control Board – Office of Chief Counsel

ECM#

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   Alhambra, CA 91803

LOS CERRITOS CHANNEL
WATERSHED GROUP

Los Cerritos Channel

Coordinated Integrated Monitoring Program

Participants:

Bellflower
Cerritos
Downey
Lakewood
Long Beach
Paramount
Signal Hill
Los Angeles County Flood Control District

Prepared by:

KINNETIC LABORATORIES INCORPORATED

June 27, 2014

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1.1

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ACRONYMS

ALERT	Automatic Local Evaluation in Real Time
AMEL	Average Monthly Effluent Limitation
Basin Plan	*Water Quality Control Plan for the Coastal Watersheds of Los Angeles and Ventura Counties*
BMP	Best Management Practices
BPJ	Best Professional Judgment
BOD	Biochemical Oxygen Demand 5-day @ 20 °C
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CIMP	Coordinated Integrated Monitoring Program
CL	Control Limit
COD	Chemical Oxygen Demand
CTR	California Toxics Rule
CV	Coefficient of Variation
CWA	Clean Water Act
CWC	California Water Code
Discharger	Los Angeles County MS4 Permittees
DNQ	Detected But Not Quantified
EFA	Effective Filtration Area
ELAP	California Department of Public Health Environmental Laboratory Accreditation Program
Facility	Los Angeles County MS4s
FIB	Fecal Indicator Bacteria
GIS	Geographical Information System
gpd	gallons per day
HUC	Hydrologic Unit Code
IC50	Concentration at which the organism is 50% inhibited
IC/ID	Illicit Connection and Illicit Discharge Elimination
LA	Load Allocations
LARWQCB	Regional Water Quality Control Board, Los Angeles
LID	Low Impact Development
LOEC	Lowest Observed Effect Concentration
MAL	Municipal Action Limits
MCM	Minimum Control Measure
mg/L	milligrams per Liter
MDEL	Maximum Daily Effluent Limitation
µg/L	micrograms per Liter
MEC	Maximum Effluent Concentration
MGD	Million Gallons Per Day
ML	Minimum Level
MRP	Monitoring and Reporting Program

MS4	Municipal Separate Storm Sewer System
ND	Not Detected
NOEC	No Observable Effect Concentration
NPDES	National Pollutant Discharge Elimination System
NTR	National Toxics Rule
QA	Quality Assurance
QA/QC	Quality Assurance/Quality Control
Ocean Plan	Water Quality Control Plan for Ocean Waters of California
ORI	Outfall Reconnaissance Inventory
PWS	Primary Watershed Segment
PES	Polyester-reinforced polysulfone
RAP	Reasonable Assurance Program
Regional Water Board	California Regional Water Quality Control Board, Los Angeles Region
RPA	Reasonable Potential Analysis
RWL	Receiving Water Limitations
SIP	State Implementation Policy (Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California)
SMR	Self-Monitoring Reports
SQO	Sediment Quality Objective
SSC	Suspended Sediment Concentration
State Water Board	California State Water Resources Control Board
SWS	Secondary Watershed Segment
TAC	Test Acceptability Criteria
TIE	Toxicity Identification Evaluation
TMDL	Total Maximum Daily Load
TOC	Total Organic Carbon
TRE	Toxicity Reduction Evaluation
TSD	Technical Support Document
TSS	Total Suspended Solid
TU_c	Chronic Toxicity Unit
USEPA	United States Environmental Protection Agency
WDR	Waste Discharge Requirements
WET	Whole Effluent Toxicity
WLA	Waste Load Allocations
WMA	Watershed Management Area
WMMS	Watershed Management Modeling System
WMP	Watershed Management Program
WQBELs	Water Quality-Based Effluent Limitations
WQS	Water Quality Standards
%	Percent

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COORDINATED INTEGRATED MONITORING PROGRAM FOR THE LOS CERRITOS CHANNEL WATERSHED GROUP

1. Introduction

A Coordinated Integrated Monitoring Program (CIMP) is required to be submitted either separately or as part of a Watershed Management Plan (WMP). The CIMP is required to integrate requirements of the current Los Angeles County MS4 Permit, the City of Long Beach MS4 permit and TMDL monitoring requirements. This plan was developed to address five primary objectives which include:

- Assess the chemical, physical, and biological impacts of discharges from the MS4s on receiving waters.
- Assess compliance with receiving water limitations and water quality-based effluent limitations (WQBELs) established to implement TMDL wet and dry weather load allocations
- Characterize pollutant loads in MS4 discharges.
- Identify sources of pollutants in MS4 discharges.
- Measure and improve the effectiveness of pollutant controls implemented under the new MS4 permits.

The approach presented in this CIMP incorporates all objectives of the MRP but provides a customized approach to address the objectives identified in the MRP for Stormwater Outfall Monitoring based upon the unique characteristics of the Los Cerritos Channel (LCC) watershed. Unlike other Watershed Management Groups (WMGs) in Los Angeles County, the LCC watershed does not receive flow from other WMGs. External contributions of contaminants are limited to atmospheric deposition originating predominantly from major transportation corridors and facilities.

Figure 1-1 provides a summary of all jurisdictions that are participating in both the Watershed Management Plan (WMP) and the CIMP. The Los Angeles County Flood Control District includes the entire area addressed by the Los Cerritos Channel WMP and CIMP.

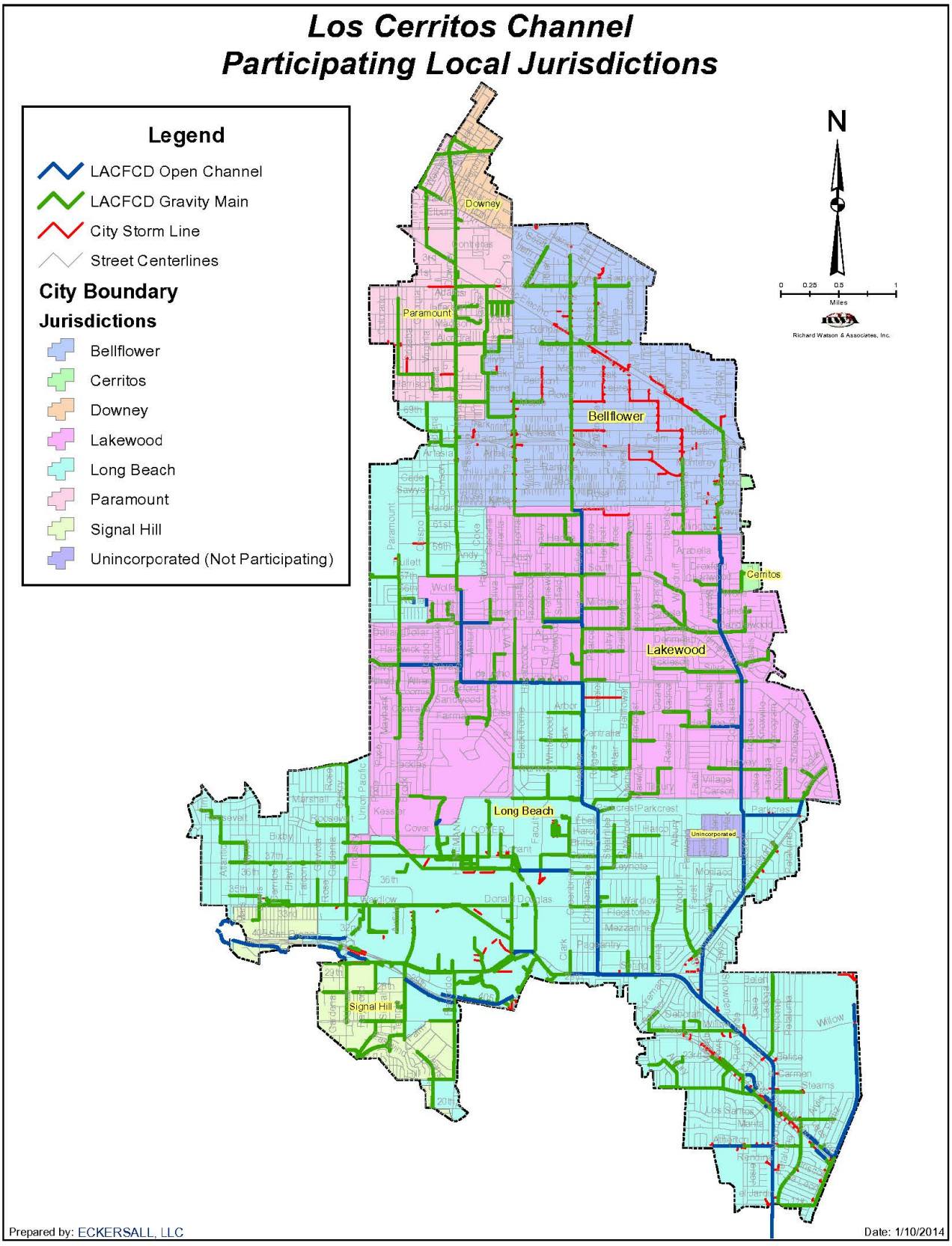


Figure 1-1. Jurisdictions Participating in the WMP and CIMP.

1.1 Monitoring Objectives

The Permit Monitoring and Reporting Program (MRP) for Los Angeles County[1] and the City of Long Beach[2] have equivalent requirements. The Los Cerritos Channel watershed is located in areas covered by both permits but the requirements differ only in terms of schedules. The City of Long Beach opted to participate in the WMP and CIMP being developed under the Los Angeles County Permit schedule but the major elements and primary objectives listed below are identical. The CIMP is required to incorporate the following elements and address the established objectives under each element.

- Receiving Water Monitoring (Wet and Dry Weather) (Part II.E.1 of the MRP)
    - Are receiving water limitations being met?
    - Are there trends in pollutant concentrations over time or during specified conditions?
    - Are designated beneficial uses fully supported as determined by water chemistry, aquatic toxicity, and bioassessment monitoring?
- Stormwater Outfall Monitoring (Part II.E. 2 of the MRP)
    - How does the quality of the permittees' discharges compare to Municipal Action Limits (MALs)?
    - Are the permittees' discharges in compliance with applicable stormwater WQBELs derived from TMDL WLAs?
    - Do the permittees' discharges cause or contribute to an exceedance of the receiving water limitations?
- Non-Stormwater Outfall Based Monitoring (Part II.E.3 of the MRP)
    - Are the permittees' discharges in compliance with non-stormwater WQBELs derived from TMDL WLAs.
    - How does the quality of the permittees' discharges compare to Non-Stormwater Action Levels?
    - Do the permittees' discharges cause or contribute to an exceedance of the receiving water limitations?
    - Do the permittees comply with the requirements of the Illicit Connection and Illegal Discharge Program?
- New Development/Re-Development Effectiveness Tracking (Part II.E.4 of the MRP)
    - Are the conditions established in building permits issued by the Permittees being met?
    - Are stormwater volumes associated with the design storm effectively retained on-site?
- Regional Studies
    - How do the permittees plan to participate in efforts to characterize the impact of the MS4 on receiving waters? Include participation in regional studies with the Southern California Stormwater Monitoring Coalition (SMC) and any special studies specified in TMDLs.

[1] Order No. R4-2012-0175, NPDES Permit No. CAS004001

[2] Order No. R4-2014-0024, NPDES Permit No. CAS004003

1.2 Monitoring Sites and Approach

The approach presented in this CIMP incorporates all objectives of the MRP but provides a customized approach to address the objectives identified in the MRP for Stormwater Outfall Monitoring based upon the unique characteristics of the Los Cerritos Channel (LCC) watershed. Unlike other Watershed Management Groups (WMGs) in Los Angeles County, the LCC watershed does not receive flow from other WMGs. External contributions of contaminants are limited to atmospheric deposition originating predominantly from major transportation corridors and facilities.

1.2.1 Receiving Water

Receiving water quality monitoring will be conducted at the historic Los Cerritos Channel site at Stearns Street (LLAR1). Originally, this location was considered a mass emission monitoring site for the City's stormwater program since it captures runoff stormwater that originates from a large segment of the City. This site is also the compliance monitoring site for TMDL monitoring. This site is located about 100 feet downstream of a former gaging station (Figure 1-2) and effectively marks the downstream extent of freshwater influences within the Channel. During low tides, freshwater extends down to the end of the concrete-line channel below Atherton St. LCC1 marks the upper extent of tidal influence for all but the most extreme high tides. The portion of the Los Cerritos Channel listed as impaired for metals was identified as the 2.1 mile freshwater portion above the tidal prism. EPA (2010) used data from 10 years of both wet and dry weather monitoring at the LCC1 to establish the freshwater metals TMDL for the Los Cerritos Channel. This site now has a record of stormwater and dry weather water quality measurements that extend back for 13 years using consistent methods and, in most cases, consistent detection limits applicable to current receiving water limitations (RWLs).

1.2.2 Primary Watershed Segmentation (PWS) Monitoring

Stormwater outfall monitoring in the LCC watershed will be addressed by partitioning the watershed into segments that correspond to those used in the Los Cerritos Metals TMDLs to develop a model for estimating flow and pollutant loads. This allows the modeling information to be used to assist in directing sampling efforts to target areas of the watershed believed to contribute the greater loads and verify the accuracy of the model. If the monitoring program identifies a segment of the watershed as contributing significantly higher pollutants loads than the segments, then further monitoring will be conducted to further identify and isolate the source. This forensic monitoring would further partition the watershed by monitoring of Secondary Watershed Segmentation (SWS) using more portable sampling stations.

PWS sampling is intended to assist in determining whether the permittee's discharges are causing or contributing to exceedance of receiving water limitations, assess whether the permittee's discharges are in compliance with applicable WQBELs derived from TMDL WLAs and with applicable action limits. The Los Cerritos Channel watershed is highly divided with a number of separate channels contributing flow. In practice, no clear distinction exists between the end of the storm drain system and the start of tributaries or receiving waters. Restricting monitoring sites to locations considered to be "outfall" sites would limit sampling to much smaller catchments that are intended to be representative of land use throughout the LCC watershed. This monitoring approach was not considered to be an effective

strategy for identification of the major sources of contaminants and would provide limited assistance in directing effective implementation of control measures in this watershed.

Primary Watershed Segment (PWS) sites (Figure 1-2) were selected based upon:

- LSPC modeling results from the LCC Metals TMDL (U.S. EPA 2010),
- land use characteristics within the watershed, and
- the ability to isolate major portions of the watershed.

The LSPC model was used to simulate flows and metals concentrations in Los Cerritos Channel during development of the LCC Metals TMDLs. An updated version of the LSPC serves as the basis for the Los Angeles County Watershed Management Modeling System (WMMS). The model divided the watershed into 10 sub-basins (Figure 1-2) and developed loading estimates (Figure 1-3) for each of the sub-basins. The LSPC model results provided the primary guidance for selection of appropriate watershed monitoring sites. Site selection first considered sub-basins that the model identified as the most significant sources of metals. Potential sites were considered at locations near the downstream edge of each sub-basin and where runoff from each sub-basin could be effectively isolated. Land use information for within each sub-basin was then examined to determine dominant land uses within each segment and assure that all major land uses would be effectively sampled. Lastly, sites were selected to effectively represent a large proportion of the watershed and yet avoid large disparities in the sizes of each segment such that pollutant or sediment delivery ratios[3] would not vary substantially among monitoring sites.

Sites selected as PWS sites include SB4, SB10, SB8 and SB9 (Figure 1-2; Table 1-2). Each of these isolates significant proportions of their respective sub-basins (4, 10, 8 and 9). Together, these monitoring locations allow 68% of the entire watershed to be monitored. Once implemented, pollutant loading rates for each of the PWS sites can be compared to loads measured at the downstream receiving water site (LCC1) in order to assess potential discrepancy in load contributions and determine if further implementation of control measures is warranted

SB4 is located in the Los Cerritos Channel just west of Lakewood Blvd and adjacent to the Long Beach Daugherty Airport. This site will effectively sample runoff from sub-basin 4. LSPC modeling indicated that this segment may be a significant source of both copper and zinc (Figure 1-3). Land use in this segment of the watershed (Table 1-1) is dominated equally by the Airport (classified as mixed urban in the model) and industrial land use. This segment represents approximately 13% of the entire LCC watershed.

SB10 is located in the Palo Verde Channel and will collect runoff from the sub-basin 10. This segment of the watershed is comprised largely of low density residential neighborhoods (Table 1-1) and represents 19% of the entire LCC watershed. The LSPC model predicted that this portion of the watershed would

[3] The delivery ratio of pollutant loads can be defined as the ratio of the discharged pollutant load delivered to the point of interest divided by the mass of pollutants generated at the source.

produce moderate loads of copper, lead and zinc. This watershed is somewhat unique in its relatively large size (3403 acres) and having more than 77 percent residential land use (71% low density and 6.3% high density residential land use). Monitoring of this sub-basin is considered to be useful in validating the modeling results and providing improved estimates of trace metal loads from residential areas.

Sub-basins 8 and 9 are located in northern portion of the watershed (Figure 1-2) draining portions of Bellflower, Downey, Lakewood, Long Beach, and Paramount. LSPC modeling indicated that these two sub-basins would likely yield some of the highest loads of metals (Figure 1-3). Initial modeling indicated that sub-basin 9 was expected to have higher loads of copper, lead and zinc than most other areas. The model projected that copper and lead loading would be elevated in sub-basin 8 but this region was expected to produce slightly lower levels of zinc. Land uses in both sub-basins are predominantly residential with substantial amounts of commercial activities (Table 1-1). Together, these two sub-basins comprise over a third of the LCC watershed. Monitoring sites are located near the bottom of each of these sub-basins. SB8 is located in the Clark Channel just north of the Lakewood Civic Center and SB9 is located in the Del Amo Channel near Clark Avenue.

Monitoring at these four PWS sites will form the backbone of the program. This program allows for an adaptive process that enables resources to be focused on confirming modeling results and portions of the watershed that are significant sources of contaminants and flow. Wet weather monitoring at the LCC1 receiving water monitoring site and the four PWS sites will be used to evaluate if one or more of these segments is contributing excessive loads of key pollutants.

Potential Secondary Watershed Segment (SWS) sites for forensic monitoring have been identified within each of the four sub-basins (Figure 1-2). SWS sites are identified by the name of the sub-basin monitoring site followed by a hyphen and a sequential number for each added site. For example, potential SWS sites in sub-basin 4 are identified as SB4-1 and SB4-2.

Where possible, these sites are positioned at locations that further dissect the sub-basins. In sub-basin 4, tentative SWS sites effectively divide the sub-basin into two areas of comparable size. SWS sites isolate major, but unequal branches of the drainages within both sub-basins 8 and 9. Sub-basin 10 has a more linear configuration that required locating potential SWS sites at two locations along the length of the sub-basin. These are sites where further monitoring would be conducted if one of more of the sub-basins is identified as having high pollutant loading rates. It is not anticipated that all secondary sampling locations will require sampling and it is possible that none will require further sampling.

Any sampling initiated at these SWS sites would be conducted with temporary installations designed to allow for installation within one day. Monitoring at these sites would utilize 24-hour, time-based sampling triggered by flow. Sampling would be conducted concurrently with sampling of the long-term sub-basin watershed sites (PWS sites) and the receiving water monitoring site (LCC1).

SWS sites will utilize time-based monitoring methods to aid in isolating areas that may be contributing excessive concentrations of contaminants. If monitoring data indicate that one of the two SWS sites has elevated concentrations of any contaminant of concern, additional upstream monitoring sites will be selected based upon the configuration of the upstream storm drains and land use. Monitoring

equipment used for the paired secondary stations would then be relocated upstream in the targeted segment to better isolate potential sources.

1.2.3 Non-Stormwater Outfall Monitoring

Non-Stormwater Outfall Based Monitoring will be conducted throughout the major open channels of the Los Cerritos Channel Watershed. Initially, all pipes exceeding 12 inches in diameter and discharging either directly into the Los Cerritos Channel receiving water or into any of the open channels will be identified in the first screening survey. By the end of 2014, the database will be refined to determine which of the 12-inch to 36-inch pipes include discharges from areas with industrial land uses. Discharge pipes less than 36 inches and determined not to incorporate runoff from industrial land use areas will be excluded from further surveys. After completing an inventory of the outfalls, two more screening surveys will be conducted by the end of 2014 to document sites with persistent and significant non-stormwater flows. Subsequently, the source ID program will utilize an array of different methods to assist in determining whether flows are the result of illicit connections/illicit discharges (IC/IDs), authorized or conditionally exempt non-stormwater flows, natural flows or unknown. These may include available drainage maps, information on existing dewatering permits or industrial discharges, and a combination of field tests and limited laboratory testing.

1.2.4 New Development/Re-Development Effectiveness Tracking

Participating agencies have developed mechanisms for tracking information related to new and re-development projects that are subject to post-construction best management practice requirements in Part VI.D.7 of the MS4 Permit.

1.2.5 Regional Studies

On behalf of the participating agencies, the Los Angeles County Flood Control District (LACFCD) will continue to provide financial and/or monitoring resources to the Southern California Stormwater Monitoring Coalition Regional Watershed Monitoring Program, also known as the Regionally Consistent and Integrated Freshwater Stream Bioassessment Monitoring Program (Bioassessment Program). The Bioassessment Program was initiated in 2009 and is structured to occur in cycles of five years. Sampling under the first cycle concluded in 2013. The next five-year cycle is scheduled to begin in 2015, with additional special study monitoring scheduled to occur in 2014.

Permittee representatives will also participate in the Southern California Stormwater Monitoring Coalition (SMC) meetings and assist in development and implementation of selected and appropriate regional studies designed to improve stormwater characterization and impact assessment.

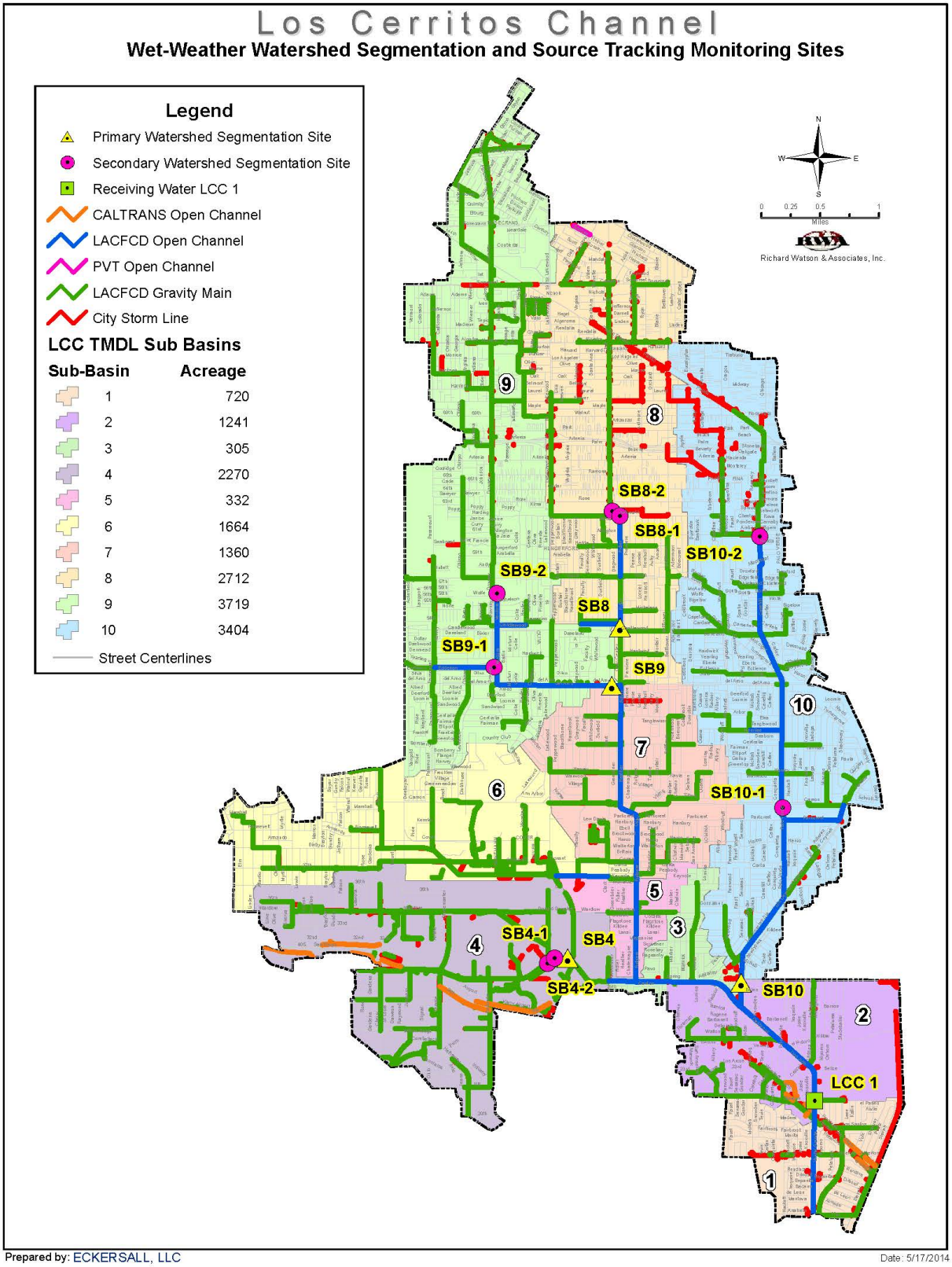
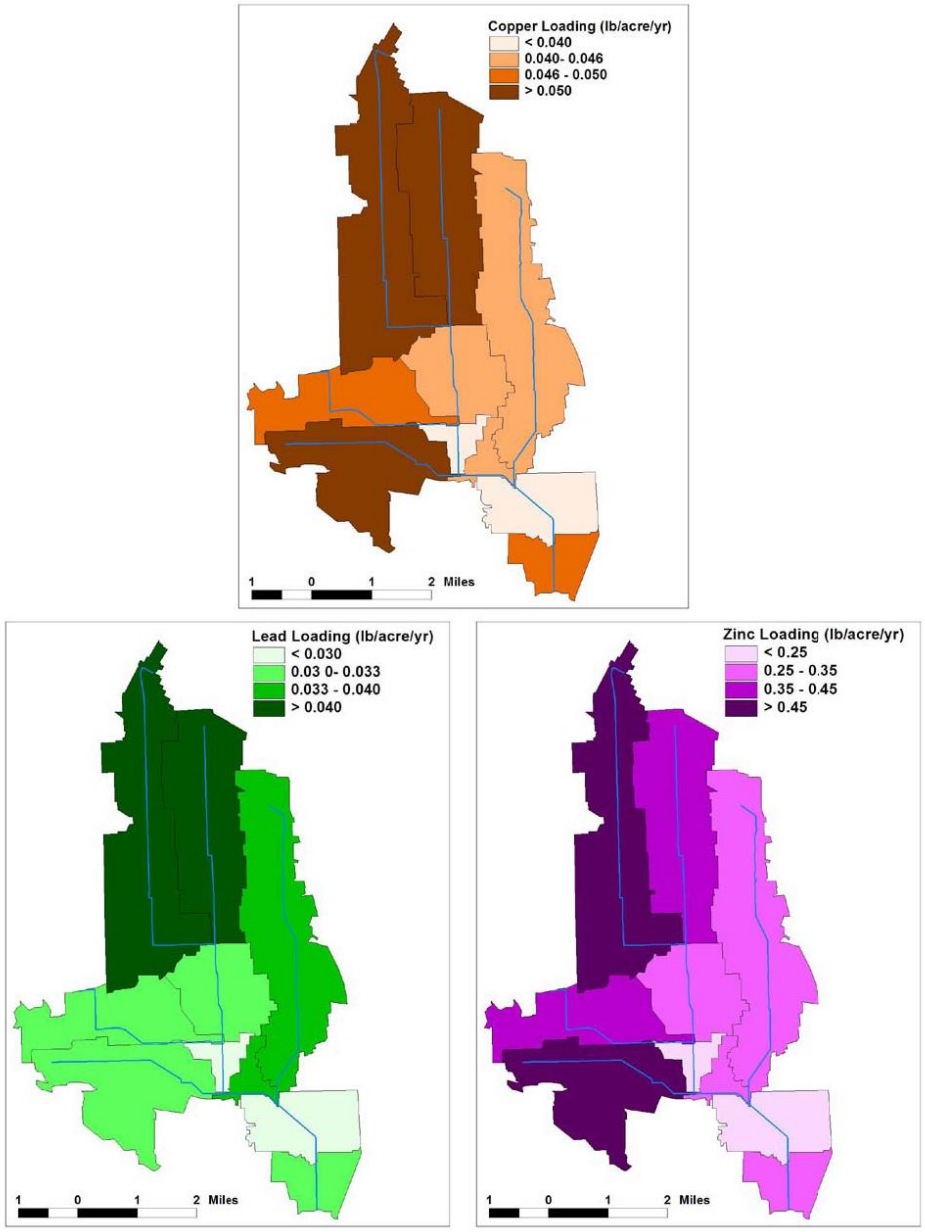


Figure 1-2. Locations of Potential Wet Weather Monitoring Sites in the Los Cerritos Channel Watershed.



Source: EPA 2010. Los Cerritos Channel Metals TMDL.

Figure 1-3. Estimated Concentrations of Metals from each Sub-basin of the Los Cerritos Channel Watershed.

Table 1-1. Summary of Land Use Associated with Monitored Segments of the Los Cerritos Channel Watershed.

	SUB-BASIN NUMBER/ACREAGE				
Land Use	4	8	9	10	TOTAL[2]
Agriculture	0	37.3	42.4	50	129.7
Commercial	352.5	506.8	709.9	371.9	1941.1
Industrial	705.8[1]	124.9	499.8	59	1389.5
HD Residential	40	371.3	490.5	212.7	1114.5
LD Residential	276.1	1,597.5	1,782.8	2,415.6	6072
Mixed Urban	752.8	13.6	120.2	142.4	1029
Open	143.5	60.4	63.9	151.5	419.3
Total Acres	2,271	2,712	3,710	3,403	12,096
		Total Watershed Acres			**17,716**
	SUB-BASIN NUMBER/%				
Land Cover	4	8	9	10	-
Agriculture	0.0	1.4	1.1	1.5	0.7
Commercial	15.5	18.7	19.1	10.9	11.0
Industrial	31.1	4.6	13.5	1.7	7.8
HD Residential	1.8	13.7	13.2	6.3	6.3
LD Residential	12.2	58.9	48.1	71.0	34.3
Mixed Urban	33.2	0.5	3.2	4.2	5.8
Open	6.3	2.2	1.7	4.5	2.4
Total %	13	15	21	19	68

HD= High Density, LD= Low Density

[1] Bolded values indicate major land uses present in each sub-basin.

[2]Land use composition for all 10 sub-basins can be accessed in the Los Cerritos Channel Metals TMDLs (EPA 2010)

Table 1-2. Monitoring Site Designation and Monitoring Function.

Site Name	Site Description	Datum NAD83		Type of Site			
				Receiving Water	TMDL	WATERSHED	
		Latitude (N)	Longitude (W)			Primary	Secondary[1]
LCC1	Stearns Street	33.79538	118.10361	**X**	**X**	**X**	
SB4	Sub-basin 4 – Spring St. Drain	33.81306	118.13953		**X**	**X**	
SB8	Sub-basin 8 – Clark Drain	33.85384	118.13226		**X**	**X**	
SB9	Sub-basin 9 – Del Amo/Downey	33.84682	118.13370		**X**	**X**	
SB10	Sub-basin 10 – Palo Verde	33.81044	118.11430		**X**	**X**	
SB4-1	Northern Sub-basin[1]	33.81316	118.14235				**X**
SB4-2	Southern Sub-basin[1]	33.81288	118.14249				**X**
SB8-1	North Clark Channel[1]	33.86848	118.13355				**X**
SB8-2	West Clark Channel[1]	33.86783	118.13225				**X**
SB9-1	West Downey Channel[1]	33.84908	118.15978				**X**
SB9-2	North Downey Channel[1]	33.85844	118.15046				**X**
SB10-1	North Palo Verde Channel[1]	33.86546	118.11160				**X**
SB10-2	Mid Palo Verde Channel	33.83210	118.10836				**X**

[1] These locations are ***tentative*** sites and will be further evaluated as part of the adaptive management of the CIMP. Monitoring at secondary sites will be dependent upon the monitoring results at each of the Primary Watershed Sites.

2 Overview of the Schedule and Sampling Frequencies for each CIMP Element

The CIMP will be implemented in a phased process (Table 2-1). Existing monitoring at LCC1 continues to be conducted, and the dry weather screening of major outfalls has commenced. Implementation of new monitoring programs and modifications to the existing monitoring program at LCC1 will be implemented beginning July 1, 2015 or 90 days after the approval of the CIMP, whichever is later.

Receiving Water Quality Monitoring

- Monitoring will occur at one Receiving Water Quality Monitoring Site, LCC1, which will also serve as the LCC Metals TMDL compliance site.
- Monitoring will be conducted during two dry weather and three wet weather events. Although the LCC Metals TMDL calls for monitoring during four storm events, monitoring of three events is considered suitable to address the objectives of both programs. This allows alignment of monitoring the Receiving Water and Stormwater Outfall Monitoring requirements of the Permit with TMDL Monitoring. Alignment of these monitoring requirements allows for a more efficient and cost effective program.
- Monitoring of the two dry weather flows will start in July 1, 2015 or 90 days after approval of the CIMP, whichever is later. Wet season monitoring will follow for three storm events during the 2015/16 wet season.
- Water quality testing during the critical dry weather flows (July) and during the first significant storm event of the year will incorporate the entire list of water quality parameters listed in Table E-2 of the MRP. Water quality testing during the remaining two wet weather events and one dry weather event will incorporate all constituents listed under water body/pollutant classifications 1, 2 and 3 (See Section 3) for the Los Cerritos Channel receiving waters. In summary, these include all constituents with existing TMDLS, those that are 303(d) listed or with sufficient data to warrant listing and constituents with a recent history or exceedances of relevant water quality criteria.
- If Table E-2 constituents are not detected at the specified Method Detection Limit (MDL) for their respective test method or if the results are below the lowest applicable water quality objective, and is not otherwise identified as being 303(d)-listed or part of an ongoing TMDL, the analyte will not be further analyzed. In accordance with the minimum requirements established in the Permit Monitoring and Reporting Program (MRP) (page E-16) parameters exceeding the lowest applicable water quality objective will continue to be analyzed for the remainder of the Order at the receiving water monitoring station.
- The Aquatic Toxicity Testing program will be initiated during the 2015 dry weather season at LCC1. Aquatic Toxicity Testing will be conducted during one dry weather monitoring event when critical low flow conditions are expected and during two storm events including the first major storm of the year.

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Primary Watershed Segmentation (PWS) Stormwater Monitoring

- Two PWS sites, SB4 and SB10, will be installed and ready for monitoring during the 2015/16 wet season. SB9 will be installed and prepared to monitor storm events during the 2016/17 wet season. SB8 will be installed in preparation for the subsequent season (2017/18) and will complete the planned array of four PWS sites.
- When possible, PWS sampling will be conducted concurrently with stormwater monitoring at LCC1. This will result in three monitored stormwater events for each PWS site as they are installed and ready for collection of flow-rated composite samples.
- Water quality testing at PWS sites will initially incorporate a list of general and conventional pollutants, *E. coli*, nutrients, and metals. A detailed list of analytes to be initially tested at PWS sites is addressed in Section 3.1 This set of constituents assures that all Category 1, 2, and 3 analytes and ancillary information needed to interpret the data are part of the initial testing. The only exception will be enterococcus which is only included at PWS sites that would discharge to marine or estuarine waters. Enterococcus was only included due to the fact that the LCC1 receiving water/mass emission site is located in an area adjacent to estuarine/marine waters.
- Additional water quality parameters listed in Table E-2 of the MRP may be incorporated based upon results of stormwater monitoring at the receiving water station, LCC1. These constituents will be added to monitoring requirements at PWS sites once an analyte is detected in stormwater runoff at LCC1 during two consecutive stormwater monitoring events. Similarly, if analytes added the PWS monitoring are not detected at PWS sites during two consecutive stormwater monitoring events, they will be removed from the required analytical list.
- Once a minimum of two seasons of wet weather monitoring data (six events) are available from a PWS site, data will be evaluated to determine if forensic monitoring is necessary to assist in source tracking and identifying upstream sources of key pollutants. Forensic monitoring would be conducted by further dividing the watershed with Secondary Watershed Segmentation (SWS) sites. Potential SWS sites have been identified for each of the four PWS sites but these sites will only be used if water quality constituents measured at the PWS sites are sufficiently elevated to warrant implementation of forensic monitoring.
- Sampling would be performed with temporary, mobile stormwater sampling stations used to take time-based composite samples and would focus on the specific analytes of concern as well as any appropriate ancillary data. Source tracking would be triggered if running averages measured at a PWS site exceeds Municipal Action Limits (MALs; Attachment G of the MRP) by more than 20% any analytes that have limits and that are required to be sampled at the PWS sites. Similarly, forensic sampling would also be conducted if the running average pollutant loading rates for Category 1 or 2 pollutants are found to exceed those measured at LCC1 (the Los Cerritos Channel receiving water/TMDL monitoring site) by more than 25%.

Non-Stormwater Outfall Monitoring Program

- Three initial surveys will be completed. The first will focus upon verification of outfalls as identified based upon available City and County GIS records, providing baseline photographic records, assessing flow, recording observations, and field water quality measurements. An inventory of outfalls above 12 inches in diameter will be created. The second and third screening surveys will expand field water quality testing to assist in the identification and classification of the discharge.
- Information from the three initial surveys will be used to determine which outfalls have significant discharges and classify these outfalls for further investigation. Information from the three surveys such as flow rates of the discharge, flow rates in the channel, the nature of the channel-earthen or concrete, and land uses in the drainage area will be used collectively to determine significance.
- Outfalls with significant flow will be classified for further investigation. Flow measurements, observations, field water quality tests and limited laboratory tests may be used to classify the remaining outfalls as either **Suspect Discharges**, **Potential Discharges** or **Unlikely** discharges of concern. Clean outfalls with no evidence of discharges or odors during the initial surveys will be classified as **Unlikely** sources of non-stormwater discharges and will not require further investigation.
- Outfalls considered having the highest risk for illicit discharges or illegal flows will be classified as **Suspect Discharges.** This will require multiple lines of evidence indicative of potential illicit discharges or persistent high flows that represent significant contributions to the receiving waters.
- Outfalls considered to be **Suspect Discharges** will be further classified and ranked for further investigations designed to identify the sources of these discharges and to determine whether discharges are illicit, exempt, conditionally exempt, conditionally exempt but non-essential flows or unknown.
- Suspect outfalls determined to have exempt or conditionally exempt discharges will be identified in annual reports along with the measures taken to identify the sources.
- Suspect outfalls identified with conditionally exempt but non-essential flows or flows from unknown sources will be first be subject to review to determine if suitable control measures can be implemented to eliminate the discharges.
- If discharges cannot be eliminated, they will be subjected to a periodic monitoring program to document that sufficient measures are taken to control potential discharges of pollutants in the discharge.
- Source investigations for discharges from outfalls classified as suspect will be ongoing in order to meet the requirement that investigations are conducted for no less than 25% of the outfalls in the inventory by December 2015 and 100% of the outfalls in the inventory by December 2017.
- Outfalls classified as **Potential Discharges** will reassessed during the permit.
- Outfalls with obvious illicit discharges will be immediately classified as such and investigated immediately.

Table 2-1. Schedule for Implementation of Monitoring Activities in the Los Cerritos Channel Watershed.

Task	Dry 2014	Dry 2015	Wet 2015-16	Dry 2016	Wet 2016-17	Dry 2017	Wet 2017-18	Dry 2018
Receiving Water/TMDL								
LCC1 Stearns St.	Note 6							
Chemistry[1]		2	3	2	3	2	3	2
Aquatic Toxicity		1	2	1	2	1	2	1
Primary Watershed Segments								
SB10			3		3		3	
SB4			3		3		3	
SB8							3	
SB9					3		3	
Secondary Watershed Segments[2]								
SBX-1					3		3	
SBX-2					3		3	
Non-Stormwater Outfall								
Inventory & Screen[3]	3							
Source ID[4]		Ongoing		Ongoing		Ongoing		Ongoing
Monitoring[5]				2		2		2

1. Table E-2 chemical analyses will be performed once during the first wet weather event and once during the first critical dry weather monitoring event. Constituents that exceed MDLs and available water quality objectives will continue to be monitored along with all constituents included as Category 1, 2 or 3 water body/pollutant classifications for the subject water body. Wet and dry weather chemical constituents will be separately assessed for purposes of continued monitoring. All constituents classified as category 1, 2, and 3 water body/pollutant in the water body will continue to be monitored during the permit cycle unless the constituents (primarily category 3 constituents) are shown to not be present at levels of concern on a consistent basis.
2. Initial locations of Secondary Watershed Segmentation (SWS) sites have been selected for each Primary Watershed Segment (PWS). Implementation of monitoring at SWS site will be dependent upon results of monitoring at PWS sites (e.g. exceedance of action limits).
3. Initial Inventory and Screening will be completed in three surveys before the end of 2014. One re-assessment of the Non-Stormwater Outfall Monitoring Program will be conducted prior to December 2017.
4. Investigations designed to track and classify discharges will start during the 2015 dry season. Source tracking and classification work depend upon the number of sites categorized as Suspect outfalls with evidence of significant flow.
5. Monitoring will be implemented if significant dry weather flows are identified at discharge points that are cannot be identified, are non-essential exempt flows, or identified as illicit flows that are not yet controlled. These sites will be initially monitored twice a year in conjunction with dry weather monitoring of the receiving water site.
6. Monitoring at LCC1 will continue to be conducted in accordance with the existing permit until the CIMP is approved.

3 Chemical/Physical Parameters

Section 2 of the Watershed Management Plan provides a detailed analysis of water quality priorities within the Los Cerritos Channel Watershed. Water quality priorities were established in accordance with Section C.5.a.ii of the Permit. The three Permit categories are defined as:

- **Category 1 (Highest Priority):** Water body-pollutant combinations for which water quality-based effluent limitations and/or receiving water limitations are established in Part VI.E and Attachments L through R of the Order.
- **Category 2 (High Priority):** Pollutants for which data indicate water quality impairment in the receiving water according to the State's Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List (State Listing Policy) and for which MS4 discharges may be causing or contributing to the impairment.
- **Category 3 (Medium Priority):** Pollutants for which there are insufficient data to indicate water quality impairment in the receiving water according to the State's Listing Policy, but which exceed applicable receiving water limitations contained in this Order and for which MS4 discharges may be causing or contributing to the exceedance.

These Permit categories were intended to be specific to water bodies within the watershed but, in the case of the Los Cerritos Channel, data are limited to a single point in the watershed. Table 3-1 summarizes pollutants within each category.

Table 3-1. Waterbody-Pollutant Categories for the Los Cerritos Channel Watershed.

Category	Constituents
1	copper, lead, zinc, DDT, chlordane, PCBs, PAHs
2	ammonia, bis(2)ethylhexylphthalate, *E. coli*, pH
3	MBAS, enterococcus

The primary constituents of concern in the watershed are copper, lead and zinc which are part of the Los Cerritos Channel Metals TMDLs. Chlordane, DDTs, PCBs and PAHs are incorporated due to a 303(d) listing for chlordane in sediments downstream in the tidal portion of the channel and the Harbor Toxics TMDL for which the Los Cerritos Channel is considered part of the nearshore watershed[4]. Permittees in

[4] As recognized by the footnote in Attachment K-4 of the Permit, the Cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, Signal Hill, and the LACFCD have entered into an Amended Consent Decree with the United States and the State of California, including the Regional Board, pursuant to which the Regional Board has released the aforementioned entities from responsibility for toxic pollutants in the Dominguez Channel and the Greater Los Angeles and Long Beach Harbors. Accordingly, no inference should be drawn from the submission of this CIMP or from any action or implementation taken pursuant to it that the aforementioned entities are obligated to implement the Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters Toxic Pollutants TMDL, including this CIMP or any of the TMDL's other obligations or plans, or that the aforementioned entities have waived any rights under the Amended Consent Decree.

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the nearshore watershed are separately contributing to monitoring requirements in the Harbor waters and the Los Angeles River Estuary. Therefore DDTs, PCBs and PAHs are not currently incorporated into the sampling requirements for the ME and PWS monitoring sites. Two other constituents, ammonia and pH, are 303(d) listed due to dry weather flows where extremely shallow flows cause a daily cycle of pH and result in calculated ammonia water quality criteria to be exceeded despite extremely low concentrations. Additional listings exist for minor exceedances of MBAS criteria and exceedance of coliform and enterococcus bacteria. Enterococcus bacteria are limited to LCC1 since this site discharges to an estuarine environment.

Table 3-2 summarizes the constituents that will be monitoring at the ME and PWS sites. These constituents will serve as the core of the monitoring program. In addition, sections VI.C.1.e and VI.D.1.d of the MRP require that a comprehensive list of constituents is screened once during the first major storm event of the year and once during a period of critical low flow. Results of this analytical screening process will determine which constituents need to be analyzed at the mass emission site for the remainder of the five-year cycle of the permit.

If a parameter is not detected above the Method Detection Limit (MDL) for its respective test method *or* the result is below the lowest applicable water quality objective, and is not otherwise identified as a basic monitoring requirement, a TMDL analyte or a 303(d) listing, it need not be further analyzed. If a parameter is detected exceeding the lowest applicable water quality objective during either the wet or dry weather screening then the parameter shall be analyzed for the remainder of the Order (2017) at the receiving water monitoring station where it was detected during the respective conditions (wet or dry).

Analytical tests will be reconsidered at least once during each permit cycle in order to assess the appropriateness of maintaining the analyte or suite of analyses in the testing requirements. Water quality criteria, analytical methods, analytical results consistently near detection limits, updated information with respect to sources or many other additional factors may contribute to factors may warrant reconsideration of the analyte. If an analyte is not detected at levels of concern during two consecutive monitoring events representing the same seasonal conditions, the analysis will be removed from the sampling requirements until being subject to reconsideration during the next five year Permit cycle. In order to avoid bias due to seasonal build-up/wash off, this evaluation would be limited to the comparisons of the first major storm of the season rather than data consecutive events from the same season.

Constituents requiring screening are listed in Table E-2 of the Monitoring and Reporting Program. These constituents are further broken out by major analytical groups in Table 3-3 through Table 3-9below.

Table 3-2. Summary of Constituents to be Monitored on a Regular Basis at the Mass Emission Site (LCC1) and the Primary Watershed Segmentation (PWS) Sites.

CLASS OF MEASUREMENTS	MASS EMISSION SITE (LCC1)		PRIMARY WATERSHED SEGMENTATION (PWS) SITES
	Wet	Dry	Wet
Flow	3	2	3
Field Measurements (dissolved oxygen, pH, temperature, and specific conductivity)	3	2	3
MRP Table E-2 Constituents[1] (other than those specifically listed below)	1	1	
Aquatic Toxicity	2	1	
General and Conventional Pollutants (Table 3-3) (All except total phenols, turbidity, BOD_5, MTBE, and perchlorate, chloride and fluoride)	3	2	3
Microbiological Constituents (Table 3-4) *E.coli,* Total & Fecal Coliform, enterococcus[3]	3	2	
E.coli			3
Nutrients (Table 3-5) - none required			
Organochlorine Pesticides and PCBs (Table 3-7) Chlordane[2]	3	2	
Metals (Table 3-6) Cu, Pb, & Zn	3	2	3
Organophosphate Pesticides[4] (Table 3-8) - none required			
Semivolatile Organic Compounds (Table 3-9**)** bis(2)ethylhexylphthalate	3	2	

1. All Table E-2 constituents will be measured during the first major storm event of the season and the critical, low flow dry weather event (July) during the first year of the CIMP.
2. Chlordane components are based upon sum of chlordane-alpha, chlordane-gamma, nonachlor-alpha, nonachlor-gamma, and oxychlordane consistent with the Harbor Toxics TMDL.
3. Analysis of all Fecal Indicator Bacteria (FIBs) will only be included for LCC1 that discharges directly to the Los Cerritos Channel Estuary. Enterococcus will not be analyzed at PWS sites since they do not discharge to marine or estuarine waters.
4. No organophosphate pesticides are required as part of the baseline program.

Analytical requirements for the program are broken out by analytical test requirements since many are associated with an analytical test suite. This is most evident with the semivolatile organic compounds analyzed by EPA Method 625. Although this section identifies recommended methods for each analyte, many of the target constituents can be addressed by alternative methods. Use of alternative analytical

methods may be preferable in cases where a larger suite of target analytes can be tested and still enable meeting minimum levels (MLs) established for each analyte. Selection of analytical methods is intended to be performance-based to allow laboratories flexibility to utilize methods that meet or exceed MLs listed in the MRP. As an example, the following tables (Table 3-7 and Table 3-8) list separate EPA methods for organochlorine pesticides and aroclors, organophosphate pesticides and semivolatile organic compounds. Some laboratories choose to use EPA Method 625 for all of these test requirements. This approach is acceptable as long as the method meets the MLs listed in Table E-2 of the MRP and meet data quality objectives consistent with the State's Surface Water Ambient Monitoring Program (SWAMP), but other laboratories will use separate test protocol for organophosphate pesticides.

The critical dry weather event is defined as the period when historical in-stream flow records are the lowest or during the historically driest month. Point measurements of dry weather flows taken in Los Cerritos Channel between 2000 and 2014 have been relatively uniform between May and September of each year, but base flows have decreased to approximately 0.5 cfs in recent years. Rainfall during the summer dry season is minimal and only briefly impacts flows in the channel. As a result, it is expected that critical dry weather flow testing could be performed anytime between May and September. Nevertheless, regional data suggest that rainfall and flows in major watersheds (Los Angeles River and San Gabriel River watersheds) are least in July. As such, critical low flow monitoring will be conducted in July.

A more accurate assessment of critical dry weather flow conditions will be completed and available by the end of the 2014 dry season. Flumes equipped with stilling wells, pressure sensors and data loggers will be constructed and installed throughout the watershed for a period of 6-8 weeks. The work is part of a State-funded Proposition 84 study[5] intended to provide detailed, continuous records of water level, flow and temperature at each site for the duration of the deployment. Four of flumes will be located at sites selected as PWS sites for this CIMP. These data will be used to determine if flow diminishes over the course of a few weeks or exhibits diurnal fluctuations as expected. Concurrent water samples will also be taken over three 24-hour time periods to analyze trace metals (especially copper, lead, and zinc) and nutrient loading. If differences are noted, forensic work will be conducted to identify and mitigate the source the discharges. Although this work is not part of the CIMP, the results of this program will be utilized to refine the "critical dry weather flow period" and to help provide guidance with respect to segments most likely to contribute higher loads of metals during dry weather conditions.

[5] Gateway Water Management Authority Agreement No. 12-423-550. Los Cerritos Channel Watershed Segmentation and Low Impact Development (LID) Project

3.1 General and Conventional Pollutants

Most of the general and conventional pollutants listed in Table 3-3 will continue to be analyzed as part of the base monitoring requirements for both receiving water and PWS/SWS sampling. These constituents are common contaminants in stormwater from urban environments. Some, such as turbidity, are redundant and best used as surrogates under special studies. Turbidity is often used as a surrogate for suspended solids but requires calibration to the source material. Turbidity measurements are recognized to lack comparability due to differences in equipment as well as the differences between static and dynamic measurements (Anderson 2005 -USGS National Field Manual for Collection of Water Quality Data, Chapter 6.7). Total suspended solids and suspended sediment concentrations directly examine particles associated with water samples and don't suffer from the problems associated with measuring turbidity.

Other pollutants in this group have been tested in samples from LCC1 since 2000 and have not been detected. As an example, total phenols have never exceeded the ML of 0.1 mg/L in this watershed. MTBE and cyanide were analyzed during the first three years of the City of Long Beach Stormwater Monitoring Program. MTBE has only detected in 1 out of 11 samples and cyanide was never detected. Although perchlorate has not been analyzed in stormwater in the LCC watershed, industrial activities likely to result in perchlorate discharges do not exist in the watershed. Perchlorate will be screened at the receiving water site (LCC1) during the initial surveys but this contaminant is not expected to require continued analysis at any monitoring site.

In summary, sufficient evidence exists to eliminate total recoverable phenolic compounds, cyanide, turbidity and MTBE from further analysis. Perchlorate will be incorporated in the initial screening since it has not been tested but it is not expected that continued testing will be required. Most other constituents included in this list are common contaminants in stormwater runoff and will continue to be analyzed. Analysis of chloride and fluoride may be analyzed as needed to assist in differentiating potable water and groundwater sources during source tracking programs for the non-stormwater outfall monitoring program but will not be included in monitoring conducted for wet/dry weather receiving water monitoring or for monitoring of the PWS/SWS monitoring sites.

Table 3-3. Conventional Constituents, Analytical Methods and Quantitation Limits.

CONSTITUENTS CONVENTIONAL POLLUTANTS	METHOD	Target Reporting Limits mg/L
Oil and Grease	EPA1664	5
Total Petroleum Hydrocarbon	EPA 418.1	5
Total Suspended Solids	EPA 160.2	1
Total Dissolved Solids	EPA 160.1	1
Volatile Suspended Solids	EPA 160.4	1
Total Organic Carbon	EPA 415.1	1
Biochemical Oxygen Demand	SM 5210B EPA 405.1	3
Chemical Oxygen Demand	EPA 410.1	4
Alkalinity	EPA 310.1	5
Specific Conductance	EPA 120.1	1 umho
Total Hardness	EPA 130.2	1
MBAS	EPA 425.1	0.02
Chloride	EPA300.0	2
Fluoride	EPA300.0	0.1
Perchlorate	EPA314.0	4 ug/L
Field Measurements	**METHOD**	**mg/L**
pH-field instrumentation	EPA 150.1	0 – 14
Temperature-field	In-situ	N/A
Dissolved Oxygen- field [1]	In-situ	Sensitivity to 5 mg/L

[1]Dissolved Oxygen will only be measured during dry weather surveys.

3.2 Microbiological Constituents

All four microbiological constituents used as fecal indicator bacteria (FIB) will continue to be monitored at the LCC1 Receiving Water monitoring site. Bacteria used as fecal indicators in marine waters will continue to be analyzed during wet and dry weather surveys due to being situated just above the Los Cerritos Channel Estuary. Only *E. coli* will be monitored at the four primary watershed segment sites since these are each located in freshwater portion of the watershed. Table 3-4 provides both upper and lower quantification limits for each FIB which was established to assure that quantifiable results are obtained. Upper quantitation limits are provided to assure that FIBs are quantified.

Table 3-4. Microbiological Constituents, Analytical Methods and Quantitation Limits.

BACTERIA[1]	Method	Lower Limits MPN/100ml	Upper Limits MPN/100ml
Total coliform (marine waters)	SM 9221B	<20	>2,400,000
Fecal coliform (marine waters)	SM 9221E	<20	>2,400,000
Enterococcus (marine waters)	SM 9230B/C	<20	>2,400,000
E. coli (fresh waters)	SM 9221E/ Colilert-QT	<10	>2,400,000

[1]Microbiological constituents will vary based upon sampling point. Total and fecal coliform and enterococcus will be measured only in marine waters or at locations where either the discharge point or receiving water body will impact marine waters. *E. coli* will be analyzed at sites within the freshwater portion of the watershed.

3.3 Nutrients

Nutrients (Table 3-5) are also considered as part of the base requirements for the monitoring program. These will be analyzed as part of the Table E-2 screening requirements during the first major storm event of the year and a critical dry weather sampling event at both the receiving water site (LCC1). Nutrients have not been identified as exceeding any applicable RWL to date and are therefore not scheduled to be sampled as part of the ongoing program unless required based upon the initial screening. The current monitoring plan calls for separate analysis of nitrate-N and nitrite-N. Concentrations of nitrite-N have typically been low. If data indicates that concentrations of nitrite-N remain minimal, these analytes will be combined into one analytical procedure that quantifies both nitrate-N and nitrite-N at the same time.

Table 3-5. Nutrients, analytical methods, and quantitation limits

CONSTITUENT	METHOD	REPORTING LIMIT (mg/L)
Total Kjeldahl Nitrogen (TKN)[1]	EPA 351.1	0.50
Nitrate as Nitrogen (NO_3-N)[1,2]	EPA 300.0	0.10
Nitrite as Nitrogen (NO_2-N)[1,2]	EPA 300.0	0.05
Total Nitrogen[1]	calculation	NA
Ammonia as Nitrogen (NH_3-N)	EPA 350.1	0.10
Total Phosphorus	SM 4500-P E or F	0.1
Dissolved Phosphorus	SM 4500-P E or F	0.1

1. Total Nitrogen is the sum of TKN, nitrate, and nitrite.
2. Nitrate –N and Nitrite-N may be analyzed together using EPA 300

3.4 Total and Dissolved Trace Metals

A total of 16 trace metals are listed in Table E-2 of the MRP. Analytical methods and reporting limits for these elements are summarized in Table 3-6. Most metals will be analyzed by EPA Method 200.8 using ICP-MS to provide appropriate detection limits. Hexavalent chromium and mercury both require alternative methods. Neither hexavalent chromium nor mercury is commonly analyzed as part of stormwater programs. Hexavalent chromium has been analyzed at LACFCD's mass emission monitoring sites in both the Los Angeles River (S10) and the San Gabriel River (S14) for the past eight to ten years and has not been detected. Mercury has been detected at some mass emission monitoring sites but detections are not common at any. Analytical methods and detection limits used for the monitoring have been consistent with those required in Table E-2 of the MRP.

Measurement of mercury is generally not considered to be appropriate in flow-weighted composite samples taken with autosamplers due to the volatility. This becomes more of an issue when sampling is conducted near the limits of a peristaltic pump. Despite the known issues, autosamplers have been used to take samples of stormwater runoff throughout the country and analysis of both total and dissolved mercury are required for both stormwater and dry weather compliance monitoring locations within both the Los Angeles and San Gabriel Rivers. If mercury is detected in flow-rated composite samples, it is likely that alternative sampling and analytical methods may be warranted in order to better assess the problem.

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Table 3-6. Metals Analytical Methods, and Quantitation Limits.

METALS (Dissolved & Total)	METHOD	Reporting Limit *ug/L*
Aluminum	EPA200.8	100
Antimony	EPA200.8	0.5
Arsenic	EPA200.8	0.5
Beryllium	EPA200.8	0.5
Cadmium	EPA200.8	0.25
Chromium (total)	EPA200.8	0.5
Chromium (Hexavalent)	EPA218.6	5
Copper	EPA200.8	0.5
Iron	EPA200.8	25
Lead	EPA200.8	0.5
Mercury	EPA245.1	0.2
Nickel	EPA200.8	1
Selenium	EPA200.8	1
Silver	EPA200.8	0.25
Thallium	EPA200.8	0.5
Zinc	EPA200.8	1

3.5 Organochlorine Pesticides and PCBs

Although organochlorine pesticides (OC pesticides) and PCBs are not commonly present in stormwater sampled at LCC1, they have periodically been detected at low concentrations. The analytical methods and detection limits for these compounds are summarized in Table 3-7. These compounds are specified in Table E-2 of the MRP. The MRP suggests that detection of any of these analytes in excess of the ML and/or applicable criteria will require continuation of the analysis through the period of the permit. Since this could be attributable to analytical issues, we have recommended more frequent reevaluation (refer to Section 3).

Since the OC pesticides are part of an analytical suite, detection of one compound would necessitate continuation of the entire suite. However, this would not require continuation of analysis of PCBs analyses if they are not detected in the early storm event and critical dry weather monitoring event.

Table 3-7. Chlorinated Pesticides and PCB Analytical Methods, and Quantitation Limits

CHLORINATED PESTICIDES	METHOD	Reporting Limit ug/L
Aldrin	EPA 608, 8081A	0.005
alpha-BHC	EPA 608, 8081A	0.01
beta-BHC	EPA 608, 8081A	0.005
delta-BHC	EPA 608, 8081A	0.005
gamma-BHC (lindane)	EPA 608, 8081A	0.02
alpha-chlordane	EPA 608, 8081A	0.1
gamma-chlordane	EPA 608, 8081A	0.1
4,4'-DDD	EPA 608, 8081A	0.05
4,4'-DDE	EPA 608, 8081A	0.05
4,4'-DDT	EPA 608, 8081A	0.01
Dieldrin	EPA 608, 8081A	0.01
alpha-Endosulfan	EPA 608, 8081A	0.02
beta-Endosulfan	EPA 608, 8081A	0.01
Endosulfan sulfate	EPA 608, 8081A	0.05
Endrin	EPA 608, 8081A	0.01
Endrin aldehyde	EPA 608, 8081A	0.01
Heptachlor	EPA 608, 8081A	0.01
Heptachlor Epoxide	EPA 608, 8081A	0.01
Toxaphene	EPA 608, 8081A	0.5
POLYCHLORINATED BIPHENYLS		
Aroclor-1016	EPA 608,EPA 8082	0.5
Aroclor-1221	EPA 608,EPA 8082	0.5
Aroclor-1232	EPA 608,EPA 8082	0.5
Aroclor-1242	EPA 608,EPA 8082	0.5
Aroclor-1248	EPA 608,EPA 8082	0.5
Aroclor-1254	EPA 608,EPA 8082	0.5
Aroclor-1260	EPA 608,EPA 8082	0.5

3.6 Organophosphate Pesticides and Herbicides

Organophosphate pesticides, triamine pesticides and herbicides list in Table E-2 of the MRP are summarized in Table 3-8. Due to the fact that diazinon and chlorpyrifos are no longer available for residential use, these constituents are now rarely detected. When detected, concentrations rarely exceed available ambient water quality criteria for protection of aquatic life. Malathion, however, remains a common constituent in stormwater runoff but this pesticide is not as toxic as other organophosphate pesticides.

Two compounds in this list, atrazine and simazine, are not organophosphate pesticides but can be analyzed by EPA Method 8141a. Both are triazine herbicides which are used for control of broadleaf weeds. Based upon historical data, herbicides such as these and the three additional separately listed compounds are unlikely to require continued analysis after completion of initial screening of Table E-2

constituents. Alternative analytical methods may be considered and used as long as the established reporting limits can be met.

Table 3-8. Organophosphate Pesticides and Herbicides Analytical Methods, and Quantitation Limits

ORGANOPHOSPHATE PESTICIDES	METHOD	Reporting Limit ug/L
Atrazine	EPA507,8141A	1
Chlorpyrifos	EPA8141A	0.05
Cyanazine	EPA8141A	1
Diazinon	EPA8141A	0.01
Malathion	EPA8141A	1
Prometryn	EPA8141A	1
Simazine	EPA8141A	1
HERBICIDES		
Glyphosate	EPA547	5
2,4-D	EPA515.3	0.02
2,4,5-TP-SILVEX	EPA515.3	0.2

3.7 Semivolatile Organic Compounds (Acid, Base/Neutral)

Semivolatile organic compounds from Table E-2 of the MRP are listed in **Error! Reference source not ound.**Table 3-9 below. Acids consist mostly of phenolic compounds which are uncommon in stormwater samples. Base/neutrals include polynuclear aromatic hydrocarbons (PAHs) and phthalates. Semivolatile organic compounds were only measured during the first two years of the City of Long Beach Stormwater Monitoring Program. Very few analytes were detected and those that were detected were typically less than 10 times the reporting limit. Phthalates were among the most common semivolatile organic compounds detected and are 303(d) listed based upon measurements taken over ten years ago. Phthalates have been historically a common laboratory contaminant due to the significant use of plastic in laboratories but they are also a common environmental contaminant for the same reason.

Table 3-9. Semivolatile Organic Compounds, Analytical Methods, and Quantification Limits.,

SEMIVOLATILE ORGANIC COMPOUNDS	METHOD	Reporting Limit
ACIDS		**ug/L**
2-Chlorophenol	EPA625	2
4-Chloro-3-methylphenol	EPA625	1
2,4-Dichlorophenol	EPA625	1
2,4-Dimethylphenol	EPA625	2
2,4-Dinitrophenol	EPA625	5
2-Nitrophenol	EPA625	10
4-Nitrophenol	EPA625	5
Pentachlorophenol	EPA625	2
Phenol	EPA625	1
2,4,6-Trichlorophenol	EPA625	10
BASE/NEUTRAL		ug/L
Acenaphthene	EPA625	1
Acenaphthylene	EPA625	2
Anthracene	EPA625	2
Benzidine	EPA625	5
1,2 Benzanthracene	EPA625	5
Benzo(a)pyrene	EPA625	2
Benzo(g,h,i)perylene	EPA625	5
3,4 Benzofluoranthene	EPA625	10
Benzo(k)fluoranthene	EPA625	2
Bis(2-Chloroethoxy) methane	EPA625	5
Bis(2-Chloroisopropyl) ether	EPA625	2
Bis(2-Chloroethyl) ether	EPA625	1
Bis(2-Ethylhexl) phthalate	EPA625	5
4-Bromophenyl phenyl ether	EPA625	5
Butyl benzyl phthalate	EPA625	10
2-Chloroethyl vinyl ether	EPA625	1
2-Chloronaphthalene	EPA625	10
4-Chlorophenyl phenyl ether	EPA625	5
Chrysene	EPA625	5
Dibenzo(a,h)anthracene	EPA625	0.1
1,3-Dichlorobenzene	EPA625	1
1,4-Dichlorobenzene	EPA625	1
1,2-Dichlorobenzene	EPA625	1
3,3-Dichlorobenzidine	EPA625	5
Diethyl phthalate	EPA625	2
Dimethyl phthalate	EPA625	2
di-n-Butyl phthalate	EPA625	10
2,4-Dinitrotoluene	EPA625	5
2,6-Dinitrotoluene	EPA625	5
4,6 Dinitro-2-methylphenol	EPA625	5

SEMIVOLATILE ORGANIC COMPOUNDS	METHOD	Reporting Limit
1,2-Diphenylhydrazine	EPA625	1
di-n-Octyl phthalate	EPA625	10
Fluoranthene	EPA625	0.05
Fluorene	EPA625	0.1
Hexachlorobenzene	EPA625	1
Hexachlorobutadiene	EPA625	1
Hexachloro-cyclopentadiene	EPA625	5
Hexachloroethane	EPA625	1
Indeno(1,2,3-cd)pyrene	EPA625	0.05
Isophorone	EPA625	1
Naphthalene	EPA625	0.2
Nitrobenzene	EPA625	1
N-Nitroso-dimethyl amine	EPA625	5
N-Nitroso-diphenyl amine	EPA625	1
N-Nitroso-di-n-propyl amine	EPA625	5
Phenanthrene	EPA625	0.05
Pyrene	EPA625	0.05
1,2,4-Trichlorobenzene	EPA625	1

4 Aquatic Toxicity Testing and Toxicity Identification Evaluations

Aquatic toxicity testing supports the identification of best management practices (BMPs) to address sources of toxicity in urban runoff. The following outlines the approach for conducting aquatic toxicity monitoring and evaluating results. Control measures and management actions to address confirmed toxicity caused by urban runoff are addressed by the WMP, either via currently identified management actions or those that are identified via adaptive management of the WMP.

The generalized approach to conducting aquatic toxicity monitoring is presented in Figure 4-1, which describes an evaluation process for each sample collected as part of routine sampling conducted twice per year in wet weather and once per year in dry weather. Monitoring begins in the receiving water and the information gained is used to identify constituents for monitoring at outfalls to support the identification of pollutants that need to be addressed in the WMP. The sub-sections below describe the process and its technical and logistical rationale.

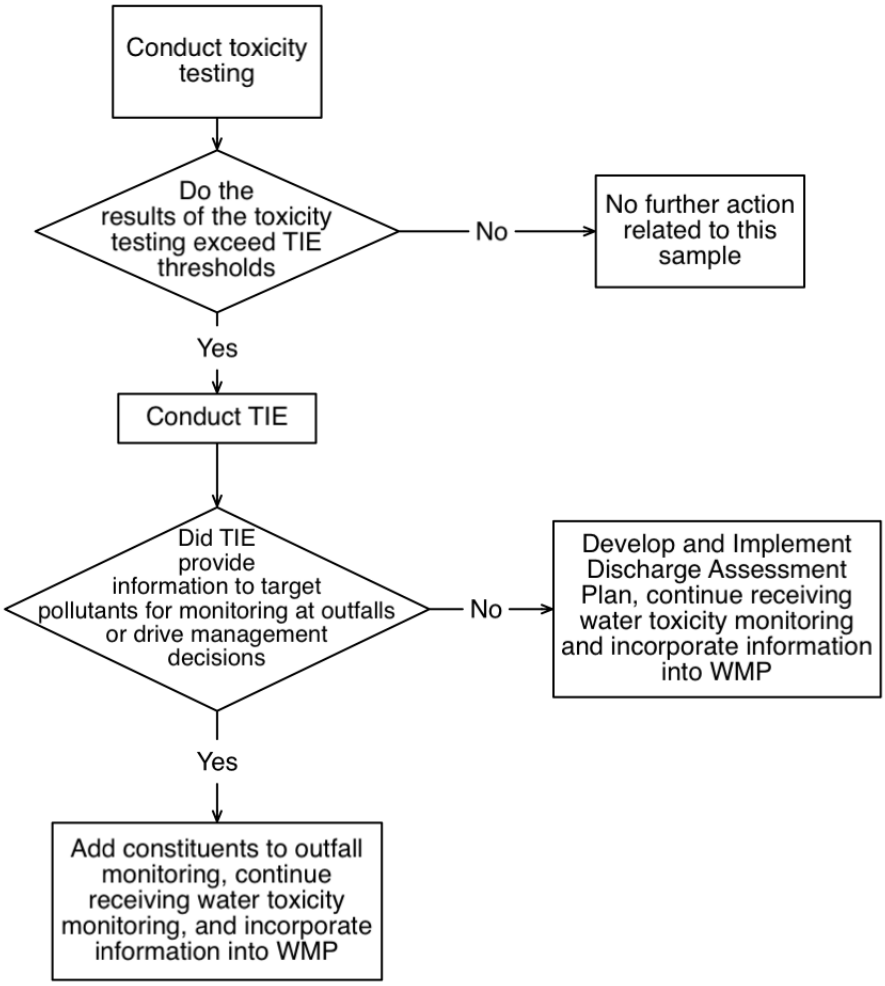

Figure 4-1. Generalized Aquatic Toxicity Assessment Process

4.1 Sensitive Species Selection

The Permit Monitoring and Reporting Program (MRP) (page E-32) states that sensitivity screening to select the most sensitive test species should be conducted unless "a sensitive test species has already been determined, or if there is prior knowledge of potential toxicant(s) and a test species is sensitive to such toxicant(s), then monitoring shall be conducted using only that test species." Previous relevant studies conducted in the watershed should be considered. Such studies may have been completed via previous MS4 sampling, wastewater NPDES sampling, or special studies conducted within the watershed.

As described in the MRP (page E-31), if samples are collected in receiving waters with salinity less than 1 part per thousand (ppt), or from outfalls discharging to receiving waters with salinity less than 1 ppt, toxicity tests should be conducted on the most sensitive test species in accordance with species and short-term test methods in *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms* (EPA/821/R-02/013, 2002; Table IA, 40 CFR Part 136). Salinities of both dry and wet weather discharges from the Los Cerritos Channel are considered to meet the freshwater criteria. During extreme high tides, salinity at the LCC1 receiving water monitoring site can exceed 1 ppt but dry weather sampling is always scheduled to avoid these extremes. The freshwater test species identified in the MRP are:

- A static renewal toxicity test with the fathead minnow, *Pimephales promelas* (Larval Survival and Growth Test Method 1000.04).
- A static renewal toxicity test with the daphnid, *Ceriodaphnia dubia* (Survival and Reproduction Test Method 1002.05).
- A static renewal toxicity test with the green alga, *Selenastrum capricornutum* (also named *Raphidocelis subcapitata*) (Growth Test Method 1003.0).

The three test species were evaluated to determine if either a sensitive test species had already been determined, or if there is prior knowledge of potential toxicant(s) and a test species is sensitive to such toxicant(s). In reviewing the available data in the Los Angeles River, Los Cerritos Channel, and the San Gabriel River watersheds, organophosphate pesticides and/or metals have been identified as problematic and are generally considered the primary aquatic life toxicants of concern found in urban runoff. Pyrethroid pesticides are known to be present in urban runoff and potentially contribute to toxicity in these waters. Tests specific to pyrethroid pesticides are simply less common. Given the knowledge of the presence of these potential toxicants in the watershed, the sensitivities of each of the three species were considered to evaluate which is the most sensitive to the potential toxicants in the watersheds.

Ceriodaphnia dubia has been reported as a sensitive test species for historical and current use pesticides and metals, and studies indicate that it is more sensitive to the toxicants of concern than *P. promelas* or *S. capricornutum*. In its aquatic life copper criteria document, the USEPA reports greater sensitivity of *C. dubia* to copper (species mean acute value of 5.93 µg/l) compared to *Pimephales promelas* (species mean acute value of 69.93 µg/l; EPA, 2007). *C. dubia's* relatively higher sensitive to metals is common across multiple metals. Researchers at the University of California, Davis also reviewed available species

sensitivity values in developing pesticide criteria for the Central Valley Regional Water Quality Control Board. The UC Davis researchers reported higher sensitivity of *C. dubia* to diazinon and bifenthrin (species mean acute value of 0.34 µg/l and 0.105 µg/l) compared to *P. promelas* (species mean acute value of 7804 µg/l and 0.405 µg/l; Palumbo et al., 2010a, b). Additionally, a study of the City of Stockton urban stormwater runoff found acute and chronic toxicity to *C. dubia*, with no toxicity to *S. capricornutum* or *P. promelas* (Lee and Lee, 2001). The toxicity was attributed to organophosphate pesticides, indicating a higher sensitivity of *C. dubia* compared to *S. capricornutum* or *P. promelas*. *P. promelas* is generally less sensitive to metals and pesticides but has been found to be more sensitive to ammonia than *C. dubia*. However, as ammonia is not typically a constituent of concern for urban runoff and ammonia is not consistently observed above the toxic thresholds in the watershed, *P. promelas* is not considered a particularly sensitive species for evaluating the impacts of urban runoff in receiving waters in the watershed.

Selenastrum capricornutum is a species that is sensitive to herbicides; however, while sometimes present in urban runoff, measured concentrations are typically very low. Herbicides have not been identified as a potential toxicant in the watershed. *S. capricornutum* is also not considered the most sensitive species as it is not sensitive to either pyrethroids or organophosphate pesticides and is not as sensitive to metals as *C. dubia*. The *S. capricornutum* growth test can also be affected by high concentrations of suspended and dissolved solids, color and pH extremes, which can interfere with the determination of sample toxicity. As a result, it is common to manipulate the sample by centrifugation and filtration to remove solids in order to conduct the test. This process may affect the toxicity of the sample. In a study of urban highway stormwater runoff (Kayhanian et. al, 2008), the green alga response to the stormwater samples was more variable than both the *C. dubia* and the *P. promelas* and in some cases the alga growth was considered to be potentially enhanced due to the presence of stimulatory nutrients.

As *C. dubia* is identified as the most sensitive to known potential toxicant(s) typically found in receiving waters and urban runoff in the freshwater potions of the watershed and has demonstrated toxicity in programs within the watershed (CWH and ABC Laboratories, 2013), *C. dubia* is selected as the most sensitive species. The species also has the advantage of being easily maintained in in-house mass cultures. The simplicity of the test, the ease of interpreting results, and the smaller volume necessary to run the test, make the test a valuable screening tool. The ease of sample collection and higher sensitivity will support assessing the presence of ambient receiving water toxicity or long term effects of toxic stormwater over time. As such, toxicity testing will be conducted using *C. dubia*.

An alternative species of water fleas, *Daphnia magna*, may be used if the water being tested has elevated hardness. *C. dubia* test organisms are typically cultured in moderately hard waters (80-100 mg/L CaCO3) and can have increased sensitivity to elevated water hardness greater than 400 mg/L CaCO3), which is beyond their typical habitat range. Because of this, *Daphnia magna* may be substituted in instances where hardness in site waters exceeds 400 mg/L ($CaCO_3$). *Daphnia magna* is more tolerant to high hardness levels and is a suitable substitution for *C. dubia* in these instances (Cowgill and Milazzo, 1990).

4.2 Testing Period

As wet weather conditions in the region generally persist for less than the acute and chronic testing periods (typically 48 hours and 7 days, respectively), the shorter of the two testing methods, in the case of *C. dubia* acute testing measuring survival, will be used for wet weather toxicity testing. Because storm events are short duration, chronic tests performed on wet weather samples are not representative of the conditions found in the receiving water. Acute toxicity tests are consistent with the relatively shorter exposure periods of species in the watershed to potential toxicants introduced by urban runoff during storm events. Acute testing to assess survival endpoints will be conducted in accordance with *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms* (EPA, 2002b).

Chronic toxicity tests will be used to assess both survival and reproductive/growth endpoints for *C. dubia* in dry weather samples. Chronic testing will be conducted on undiluted samples in accordance with *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms* (USEPA, 2002a).

4.3 Toxicity Endpoint Assessment and Toxicity Identification Evaluation Triggers

Acute and chronic toxicity test endpoints will be analyzed, per the MRP, using the Test of Significant Toxicity (TST) t-test approach specified by the USEPA (USEPA, 2010). The Permit specifies that the chronic in-stream waste concentration (IWC) is set at 100% receiving water for receiving water samples and 100% effluent for outfall samples. Using the TST approach, a t-value is calculated for a test result and compared with a critical t-value from USEPA's TST Implementation Document (USEPA, 2010). Follow-up triggers are generally based on the Permit specified statistical assessment as described below.

For acute *C. dubia* toxicity testing, if a statistically significant 50% difference in mortality is observed between the sample and laboratory control, a toxicity identification evaluation (TIE) will be performed. TIE procedures are discussed in detail in the following section. Experience conducting TIEs in receiving waters in the region supports using a 50% mortality trigger to provide a reasonable opportunity for a successful TIE. During TMDL monitoring in the Calleguas Creek Watershed (CCW) in 2003 and 2004, TIEs were initiated on samples exceeding the 50% threshold (the majority of which displayed 100% mortality). In that study, toxicity degraded in approximately 40% of the samples on which TIE procedures were conducted making the TIE unsuccessful (and effectively useless in pinpointing specific toxicants). Similar degradation of toxicity has been noted in tests conducted on stormwater samples from the Los Cerritos Channel mass emission monitoring site (LCC!). The Los Angeles Regional Water Quality Control Board approved monitoring program for the CCW Toxicity TMDL utilizes a 50% threshold for TIE initiation. Additionally, a 50% mortality threshold is utilized in the Ventura County MS4 Permit.

For chronic *C. dubia* toxicity testing, a TIE will be performed if a statistically significant 50% difference in mortality is observed between the sample and laboratory control. If a statistically significant 50% difference is observed in a sub-lethal endpoint between the sample and laboratory control, a confirmatory sample will be collected from the receiving water within two weeks of obtaining the results of the initial sample. If a statistically significant 50% difference in mortality or sub-lethal endpoint

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is again observed between the sample and laboratory control on the confirmatory sample, a TIE will be performed.

TIE procedures will be initiated as soon as possible after the toxicity trigger threshold is observed to reduce the potential for loss of toxicity due to extended sample storage. If the cause of toxicity is readily apparent or is caused by pathogen related mortality or epibiont interference with the test, the result will be rejected, if necessary, a modified testing procedure will be developed for future testing.

In cases where significant endpoint toxicity effects in excess of 50% are observed in the original sample, but the follow-up TIE positive control "signal" is found to not be statistically significant, the cause of toxicity will be considered non-persistent. No immediate follow-up testing is required on the sample. However, future test results will be evaluated to determine if implementation of concurrent TIE treatments are needed to provide an opportunity to identify the cause of toxicity.

4.4 Toxicity Identification Evaluation Approach

The results of toxicity testing will be used to trigger further investigations to determine the cause of observed laboratory toxicity. The primary purpose of conducting TIEs is to support the identification of management actions that will result in the removal of pollutants causing toxicity in receiving waters. Successful TIEs will direct monitoring at outfall sampling sites to inform management actions. As such, the goal of conducting TIEs is to identify pollutant(s) that should be sampled during outfall monitoring so that management actions can be identified to address the pollutant(s).

The TIE approach as described in USEPA's 1991 Methods for Aquatic Toxicity Identification is divided into three phases although some elements of the first two phases are often combined. Each of the three phases is briefly summarized below:

- Phase I utilizes methods to characterize the physical/chemical nature of the constituents, which cause toxicity. Such characteristics as solubility, volatility and filterability are determined without specifically identifying the toxicants. Phase I results are intended as a first step in specifically identifying the toxicants but the data generated can also be used to develop treatment methods to remove toxicity without specific identification of the toxicants.
- Phase II utilizes methods to specifically identify toxicants.
- Phase III utilizes methods to confirm the suspected toxicants.

A Phase I TIE will be conducted on samples that exceed a TIE trigger described in Section4.4. Water quality data will be reviewed to future support evaluation of potential toxicants. A range of sample manipulations may be conducted as part of the TIE process. The most common manipulations are described in Table 4-1. Information from previous chemical testing and/or TIE efforts will be used to determine which of these (or other) sample manipulations are most likely to provide useful information for identification of primary toxicants. TIE methods will generally adhere to USEPA procedures documented in conducting TIEs (USEPA, 1991, 1992, 1993a-b).

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Table 4-1. Phase I and II Toxicity Identification Evaluation Sample Manipulations

TIE Sample Manipulation	Expected Response
pH Adjustment (pH 7 and 8.5)	Alters toxicity in pH sensitive compounds (i.e., ammonia and some trace metals)
Filtration or centrifugation	Removes particulates and associated toxicants
Ethylenediamine-Tetraacetic Acid (EDTA)	Chelates trace metals, particularly divalent cationic metals
Sodium thiosulfate (STS) addition	Reduces toxicants attributable to oxidants (i.e., chlorine) and some trace metals
Piperonyl Butoxide (PBO)	Reduces toxicity from organophosphate pesticides such as diazinon, chlorpyrifos and malathion, and enhances pyrethroid toxicity
Carboxylesterase addition(1)	Hydrolyzes pyrethroids
Temperature adjustments(2)	Pyrethroids become more toxic when test temperatures are decreased
Solid Phase Extraction (SPE) with C18 column	Removes non-polar organics (including pesticides) and some relatively non-polar metal chelates
Sequential Solvent Extraction of C18 column	Further resolution of SPE-extracted compounds for chemical analyses
No Manipulation	Baseline test for comparing the relative effectiveness of other manipulations

1 Carboxylesterase addition has been used in recent studies to help identify pyrethroid-associated toxicity (Wheelock et al., 2004; Weston and Amweg, 2007). However, this treatment is experimental in nature and should be used along with other pyrethroid-targeted TIE treatments (e.g., PBO addition).

2 Temperature adjustments are another recent manipulation used to evaluate pyrethroid-associated toxicity. Lower temperatures increase the lethality of pyrethroid pesticides. (Harwood, You and Lydy, 2009)

The Watershed Group will identify the cause(s) of toxicity using a selection of treatments in Table 4-1 and, if possible, using the results of water column chemistry analyses. After any initial assessments of the cause of toxicity, the information may be used during future events to modify the targeted treatments to more closely target the expected toxicant or class of toxicants. Moreover, if the toxicant or toxicant class is not initially identified, toxicity monitoring during subsequent events will confirm if the toxicant is persistent or a short-term episodic occurrence.

As the primary goals of conducting TIEs is to identify pollutants for incorporation into outfall monitoring, narrowing the list of toxicants following Phase I TIEs via Phase II/III TIEs is not necessary if the toxicant class determined during the Phase I TIE is sufficient for 1) identifying additional pollutants for outfall monitoring and/or 2) identifying control measures. Thus, if the specific pollutant(s) or classes of pollutants (e.g., metals that are analyzed via EPA Method 200.8) are identified then sufficient information is available to incorporate the additional pollutants into outfall monitoring and to start implementation of control measures to target the additional pollutants.

Phase II TIEs may be utilized to identify specific constituents causing toxicity in a given sample if the results of Phase I TIE testing and a review of available chemistry data fails to provide information necessary to identify constituents that warrant additional monitoring activities or management actions to identify likely sources of the toxicants and lead to elimination of the sources of these contaminants. Phase III TIEs will be conducted following any Phase II TIEs.

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TIEs will be considered inconclusive if 1) the toxicity is persistent (i.e., observed in the positive control), and 2) the cause of toxicity cannot be attributed to a class of constituents (e.g., insecticides, metals, etc.) that can be targeted for monitoring.

The TIE is considered conclusive if:

- a combination of causes that act in a synergistic or additive manner are identified
- toxicity can be removed with a treatment or combination of the TIE treatments
- analysis of water quality data collected during the same event identifies the pollutant or analytical class of pollutants

Note that the MRP (page E-33) allows a TIE Prioritization Metric (as described in Appendix E of the Stormwater Monitoring Coalition's Model Monitoring Program) for use in ranking sites for TIEs. Information is currently not available to determine whether a prioritization metric will be warranted. If toxicity results indicate the need for development of a prioritization metric, a strategy will be developed and structured through the WMP adaptive management process. The suggested prioritization approach will be developed through the CIMP adaptive management process described in the CIMP annual report.

4.5 Discharge Assessment

The Watershed Management Group will prepare a brief Discharge Assessment Plan if TIEs conducted on consecutive sampling events are inconclusive. The discharge assessment will be conducted after consecutive inconclusive TIEs, rather than after one, because of inherit variability associated with the toxicity and TIE testing methods.

The Discharge Assessment Plan will consider the observed potential toxicants in the receiving water and associated urban runoff discharges above known species effect levels and the relevant exposure periods compared to the duration of the observed toxicity. The Discharge Assessment Plan will reexamine the following issues:

- Is additional receiving water toxicity monitoring necessary to better evaluate the spatial extent of receiving water toxicity?
- Should different test species be considered? If a species is proposed that is different than the species utilized when receiving water toxicity was observed, justification for the substitution will be provided.
- Is the number and location of monitoring sites suitable for understanding their impacts to the observed receiving water toxicity?
- What program adjustments are necessary to facilitate a better understanding of the cause of toxicity? Examine the number of monitoring events to be conducted, a schedule for conducting the monitoring, and a process for evaluating the completion of the assessment monitoring.

The Discharge Assessment Plan will be submitted to Los Angeles Regional Water Board for comment within 60 days of receipt of notification of the second consecutive inconclusive result. If no comments

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are received within 30-days, it will be assumed that the approach is appropriate for the given situation and the Plan should be implemented within 90-days of submittal.

4.6 Follow Up on Toxicity Testing Results

The MRP (page E-33) indicates the following actions should be taken when a toxicant or class of toxicants is identified through a TIE:

1. Group Members shall analyze for the toxicant(s) during the next scheduled sampling event in the discharge from the outfall(s) upstream of the receiving water location.
2. If the toxicant is present in the discharge from the outfall at levels above the applicable receiving water limitation, a toxicity reduction evaluation (TRE) will be performed for that toxicant.

The list of constituents monitored at outfalls identified in the CIMP will be modified based on the results of the TIEs. Monitoring for those constituents will occur as soon as feasible following the completion of a successful TIE (i.e., the next monitoring event that is at least 45 days following the toxicity laboratory's report transmitting the results of a successful TIE).

The requirements of the TREs will be met as part of the adaptive management process in the WMPs rather than the CIMP. The identification and implementation of control measures to address the causes of toxicity are tied to management of the stormwater program, not the CIMP. It is expected that the requirements of TREs will only be conducted for toxicants that are not already addressed by an existing Permit requirement (i.e., TMDLs) or existing or planned management actions.

4.7 Summary of Aquatic Toxicity Monitoring

The approach to conducting aquatic toxicity monitoring as described in the previous sections is summarized in detail in Figure 4-2. The intent of the approach is to identify the cause of toxicity observed in receiving water to the extent possible with the toxicity testing tools available, thereby directing outfall monitoring for the pollutants causing toxicity with the ultimate goal of supporting the development and implementation of management actions.

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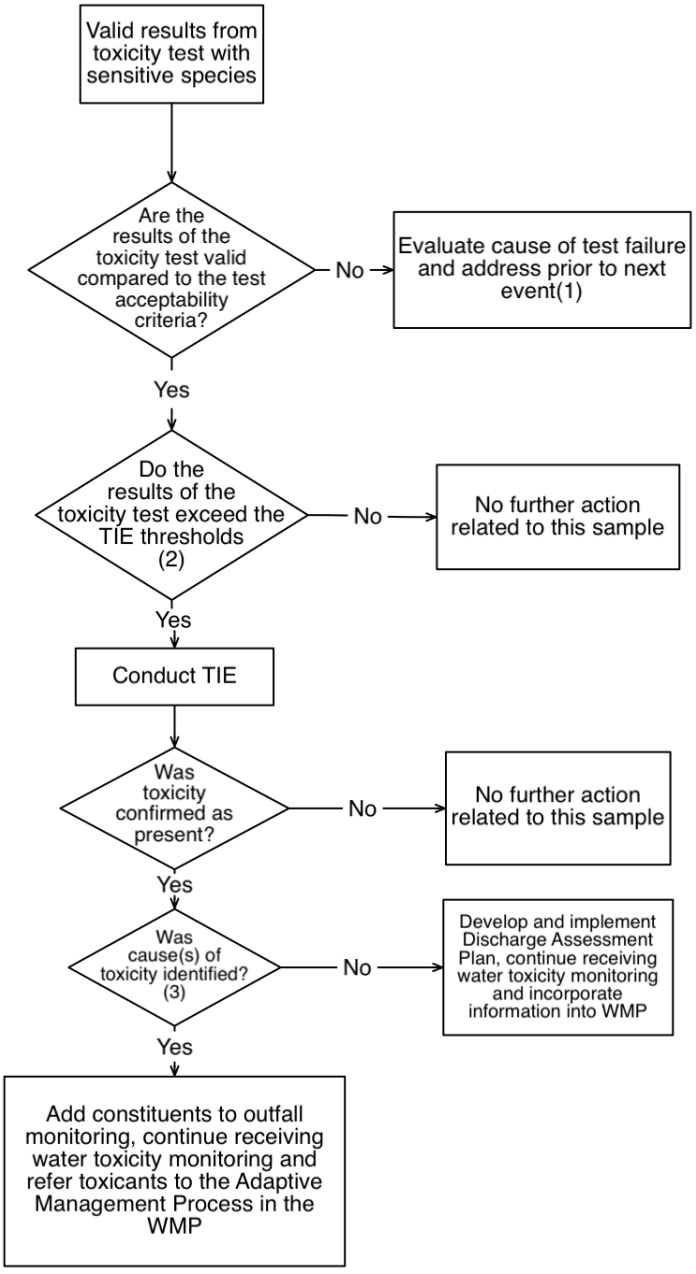

1. **Test failure includes pathogen or epibiont interference which should be addressed prior to the next toxicity sampling event.**
2. **The TIE threshold is >50% mortality in an acute (wet weather) or chronic (dry weather) sample. If a >50% effect in a sub-lethal endpoint for a chronic test is observed a follow up sample will be initiated within two weeks of the completion of the initial sample collection. If the follow up sample exhibits a greater than 50% effect, a TIE will be initiated.**
3. **The goal of conducting the Phase I TIE is to identify the cause of toxicity so that outfall monitoring can incorporate the toxicant(s) into the list of constituents monitored during outfall monitoring. Thus, if the specific toxicant(s) or the analytical classes of toxicants (i.e., metals that are analyzed via EPA Method 200.8) are identified, sufficient information is available to inform the addition of pollutants to the list of pollutants monitoring during outfall monitoring.**

Figure 4-2. Detailed Aquatic Toxicity Assessment Process

5 Receiving Water Quality Monitoring (Wet and Dry Weather)

Receiving water quality monitoring will primarily be conducted with automated stormwater monitoring equipment detailed in Appendix A. Water samples for bacteria, oil and grease, , petroleum hydrocarbons, and volatile organic compounds must be collected separately as grab samples. Appendix A also discussed manual collection of water samples when required. This section addresses both the equipment and protocol used for collection of flow-weighted and time-weighted composite samples. Figure 1-2 will serve as the Receiving Water and TMDL compliance monitoring location for the Los Cerritos Channel. The monitoring equipment provides continuous records of rainfall at this site as well as flow during storm events. This site monitors and records all flows exceeding 18 cfs. Flow estimates are based upon a rating curve established for a former gaging station located approximately 100 feet upstream.

During dry weather monitoring, manual flow measurements are required to obtain instantaneous estimates of flow rates. Measurements are taken at a position where flow is relative uniform over a distance of 10 to 20 feet. Measurements are taken to determine to average width of the flowing water and the depth of water at the center of the flow. Water velocities are recorded by the time required for particles to travel a measured distance along the channel. The velocity of water flow is multiplied by the cross-sectional area of the channel to estimate flow. Since the channel approximates a triangular form, the cross-sectional area of the flowing water is calculated as ½ of the depth at the center of the channel multiplied by the width of flowing water. Dry weather flows have averaged approximately 0.5 cfs during the past five years.

5.1 Sampling Frequency and Mobilization Requirements

Monitoring of receiving water quality will be performed three times a year during the wet season and two times a year during dry weather conditions. Screening for Table E-2 constituents listed in the MRP will be conducted during the first significant storm of the year and during a critically dry weather period. Large sampling volumes are required to incorporate all analytical tests and associated QA/QC needed for Table E-2 constituents, bioassay tests and to provide sufficient volumes should TIEs be required. Due to these requirements, mobilization criteria for the initial wet weather events will differ from subsequent events.

Mobilization of field crews will typically start when a there is both a 70% probability of rainfall within 24 hours of the arrival of a predicted storm event and Quantitative Precipitation Forecasts (QPFs) indicate that a minimum of 0.25 inches will occur within a 24-hour time period. Due to the importance of the first storm event of the year, crews will be mobilized to prepare the site (or sites) for monitoring 24 hours in advance of any events with at least a 50% probability of rainfall and QPFs of at least 0.20 inches within a 24-hour time period. If weather forecasts for the first storm of the season indicate

development of a condition known as a "cut-off low"[6], partial field teams may initially be deployed to prepare stations since such conditions create highly unpredictable situations that have the potential to suddenly move onshore with higher than expected rainfall. Full mobilization will require an upgrade in the local forecast to a predicted rainfall of at least 0.25 inches with a minimum probability of 70% within 12 hours of the event. For the purposes of this CIMP, weather forecasts and Quantitative Precipitation Forecasts (QPFs) provided by the Los Angeles/Oxnard National Weather Service and the California Nevada River Forecast Center will be used to assess whether mobilization criteria are met.

Once the screening phase has been completed for Table E-2 constituents, storm events will be considered suitable for monitoring given a minimum of 72 hours (3 days) with cumulative rainfall of less than 0.1 inches of rainfall within the watershed. Evaluation of antecedent rainfall conditions will initially be based upon Los Angeles County ALERT (Automatic Local Evaluation in Real Time) stations and rain gauges within or near the Los Cerritos Channel Watershed and rainfall measured at LCC1. The rain gauge located at Signal Hill City Hall (#335) will serve as the primary site for evaluation of antecedent conditions. The rain gauge installed at LCC1 will serve as the secondary site if the primary site is inoperable or unavailable. As the Primary Watershed Segmentation (PWS) sites come on line, these sites will also be used to evaluate antecedent conditions. Assessment of antecedent conditions will be based upon average rainfall measured at sites located within the watershed boundaries and that are known to be fully operable. Due to anticipated reductions in required stormwater volumes, monitoring of subsequent storm events will be based upon weather forecasts predicting rainfall of 0.25 inches at probability of at least 70% within 24 hours of the predicted event. Once crews are mobilized for a storm event, rainfall must exceed a minimum of 0.25 inches and provide sufficient rainfall to project objectives. One of the three storm events to be sampled at the LCC1 Receiving Water Monitoring Site is only intended to address the requirements of the metals TMDL. At this site, a minimum rainfall event of 0.15 to 0.25 inches would be expected fulfill sampling requirements for the TMDL constituents and provide a representative flow-composite sample due to the fact that the watershed is highly impervious.

Two monitoring events are required during dry weather conditions. There has been no indication that seasonal trends exist with respect to dry weather flows in the Los Cerritos Channel Watershed but data from the ongoing Proposition 84 study will provide information to evaluate if seasonality in flow exists in different areas of the watershed. Based upon existing information, dry weather monitoring at the LCC1 Receiving Water Monitoring Site will be conducted once in late spring/early summer (May to June) and again towards the end of the dry season in September/October. This will be consistent with historical dry weather sampling conducted under the City of Long Beach NPDES Permit. During the dry season, the only restriction on sampling will be that total rainfall over the 72 hour time period preceding the sampling event does not exceed 0.1 inches. In practice, rainfall is very rare during the summer months. With the exception of unusual periods when hurricanes developing off of Baja California cause some

[6] A closed upper-level low which has become completely displaced (cut off) from basic westerly current, and moves independently of that current. Cutoff lows may remain nearly stationary for days, or on occasion may move westward opposite to the prevailing flow aloft (i.e., retrogression).

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precipitation to spin north, rainfall events are very infrequent. When practical, dry weather monitoring will be conducted during periods with less than 0.1 inches of rain occur over the previous week.

5.2 Sampling Constituents

With minor exceptions, chemical analyses are scheduled to be conducted for all analytes listed in Table 3-3 through Table 3-9 during the first significant rainfall of the season and again during a period of critical low flow. Chemical constituents not detected in excess of their respective Method Detection Limits (MDLs) or that do not exceed available water quality standards will be considered for removal during subsequent surveys. Adjustments to the list of analytical tests will be assessed separately for wet and dry weather sampling requirements. Since the initial screening event may be followed too quickly for the data to be received and fully evaluated, the field team must be prepared to collect water samples for the testing the full set of Table E-2 constituents during the second sampling event.

Most of the general and conventional pollutants listed in Table 3-3 will continue to be analyzed as part of the base monitoring requirements for continued monitoring for both receiving waters and for the metals TMDL. The only pollutants considered for elimination will be cyanide, total phenols, perchlorate, and MTBE. Analysis of chloride and fluoride will continue to be used to assist in the interpretation of potential potable water sources during in association with the non-stormwater screening program. In addition, microbiological constituents (Table 3-4), nutrients (Table 3-5), chlordane compounds listed in Table 3-7 and TMDL metals (Table 3-6) will continue to be part of the ongoing monitoring at LLC1.

As noted in the previous section, it has been determined that adequate data exist to determine which of the three freshwater species are considered to be most sensitive during both storm events and dry weather periods. Available literature and local data indicate that the most sensitive bioassay test species is *Ceriodaphnia dubia*. The prior section on Aquatic Toxicity Testing and TIEs goes into detail as to species selection and the overall approach recommended for measuring toxicity in the receiving waters and strategies to eliminate any sources of toxicity. During wet weather conditions, bioassay tests will be performed based upon exposure to 100 percent test waters over a 48-hour time period since this time exposure is deemed to be more consistent with the duration of typical storm events. Since exposure times during the dry season are much long, dry weather testing will utilize 7-day chronic toxicity tests that assess both survival and reproductive endpoints for *C. dubia*. Chronic testing will also be conducted on 100 percent undiluted samples. Table 5-1 provides sample volumes necessary for toxicity tests (both wet and dry weather) as well as minimum volumes necessary to fulfill Phase I TIE testing if necessary. As detailed in the previous section, the sublethal endpoints will be assessed using EPA's TST procedure to determine if there is a statistically significant 50% difference between sample controls and the test waters and ultimately determine if further testing should be is necessary.

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Table 5-1. Toxicity Test Volume Requirements for Aquatic Toxicity Testing as part of the Los Cerritos Channel Coordinated Integrated Monitoring Program.

Test Organism	Toxicity Test Type	Test Concentration	Volume Required for Initial Screen (L)	Minimum Volume Required for TIE (L)[1]
Freshwater Tests for Samples with Salinity < 1.0 ppt				
Daphnid Water Flea (Ceriodaphnia dubia)	48-Hour Acute Survival 7-day Chronic Survival and Reproduction	100% only	1.5	10
Sample Receipt Water Quality	--	--	1.0	--
Total volume required per event for samples with salinity < 1.0 ppt;			2.5	a

[1] Minimum volumes for TIE are for Phase 1 characterization testing only. The additional volume collected for potential TIE testing can be held in refrigeration (4°C in the dark, no head space) and shipped to the laboratory at a later date if needed.

Note: The NPDES permit targets a 36-hr holding time for initiation of testing but allows a maximum holding time of 72-hr if necessary.

6 Primary Watershed Segmentation (PWS) Sites

6.1 Sampling Frequency and Mobilization Requirements

The sampling frequency and mobilization requirements for the stormwater outfall sites will be consistent with monitoring conducted at the LCC1. A total of three storm events will be monitored at each site once they are installed. Monitoring will be concurrent with LCC1 monitoring in order to allow for comparison of pollutant loading rates associated with each segment relative to ultimate pollutant loads measured at the LCC1 site.

6.2 PWS Sampling Constituents

Constituents monitored at each PWS site will include all TMDL constituents as well as general and conventional constituents necessary to assist in evaluation of the data (Table 6-1). Constituents included in the MAL list and monitored at the outfall sites will be included in an annual MAL Assessment Report reported as part of the Annual Report. The MAL Assessment Report will summarize the monitoring data in comparison to the applicable MALs, and identify those subwatersheds where the running average concentrations of these constituents exceed the MALs by twenty percent or more.

Table 6-1. Constituents Monitored at Primary Watershed Segment (PWS) Sites.

CONSTITUENTS CONVENTIONAL POLLUTANTS	METHOD	TARGET REPORTING LIMITS mg/L
Total Suspended Solids	EPA 160.2	1
Total Dissolved Solids	EPA 160.1	1
Volatile Suspended Solids	EPA 160.4	1
Total Organic Carbon	EPA 415.1	1
Chemical Oxygen Demand	EPA 410.1	4
Alkalinity	EPA 310.1	5
Specific Conductance	EPA 120.1	1
Total Hardness	EPA 130.2	1
MBAS	EPA 425.1	0.02
Chloride	EPA300.0	2
Fluoride	EPA300.0	0.1
METALS (Dissolved & Total)	**METHOD**	**ug/L**
Copper	EPA200.8	0.5
Lead	EPA200.8	0.5
Zinc	EPA200.8	1

7 Secondary Watershed Segmentation (SWS) Sites (Wet Weather)

Secondary Watershed Segmentation (SWS) sites will be monitored with portable equipment that will be used to assist in tracking sources of constituents found to be elevated at one of the Primary Watershed Segmentation sites. The portable monitoring stations will consist of a battery powered autosamplers triggered by sensors installed in the channel to detect the start of flow. Once triggered, the samplers

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will take time-weighted samples for a 24-hour period. The autosamplers will be set to take 200 mL samples every 15 minutes while is present in the channel. All sample composite bottles and materials contacting the water will be identical to those used for each of the "permanent" or fixed monitoring sites.

SWS sites are expected to be deployed above PWS sites where specific contaminants are found to be elevated. Tentative locations (Figure 1-2) have been established at sites in each subwatershed should PWS monitoring data indicate that forensic monitoring is necessary to further isolate areas contributing excessive pollutant loads. The selected sites further segment the subwatersheds into two areas and are designed to be monitored concurrently with the SWS site. Pre-selection of candidate SWS sites was intended to facilitate implementation of forensic monitoring by clearly identifying the next step if conditions are met that trigger further testing.

SWS monitoring will be triggered if the running average of any MAL constituent is exceeded by 20 percent or if the running average of MAL or TMDL constituents at a PWS site exceeds the running average at other PWS sites by more than 20 percent. SWS sites would focus on monitoring the specific constituent of concern and any additional data necessary to help interpret the results. For example, if the constituent of concern is a trace metal, monitoring at SWS sites would include both TSS and hardness.

8 Non-Stormwater (NSW) Outfall Monitoring

Detailed objectives of the screening and monitoring process (Section IX.A, page E-23 of the MRP) include the following:

1. Develop criteria or other means to ensure that all outfalls with significant non-stormwater discharges are identified and assessed during the term of this Order.

2. For outfalls determined to have significant non-stormwater flow, determine whether flows are the result of illicit connections/illicit discharges (IC/IDs), authorized or conditionally exempt non-stormwater flows, natural flows, or from unknown sources.

3. Refer information related to identified IC/IDs to the IC/ID Elimination Program (Part VI.D.10 of the Order) for appropriate action.

4. Based on existing screening or monitoring data or other institutional knowledge, assess the impact of non-stormwater discharges (other than identified IC/IDs) on the receiving water.

5. Prioritize monitoring of outfalls considering the potential threat to the receiving water and applicable TMDL compliance schedules.

6. Conduct monitoring or assess existing monitoring data to determine the impact of non-stormwater discharges on the receiving water.

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7. Conduct monitoring or other investigations to identify the source of pollutants in non-stormwater discharges.

8. Use results of the screening process to evaluate the conditionally exempt non-stormwater discharges identified in Parts III.A.2 and III.A.3 of the Order and take appropriate actions pursuant to Part III.A.4.d of the Order for those discharges that have been found to be a source of pollutants. Any future reclassification will occur per the conditions in Parts III.A.2 or III.A.6 of the Order.

9. Maximize the use of Permittee resources by integrating the screening and monitoring process into existing or planned CIMP efforts.

Ultimately, the NSW program is intended to establish a process for identifying outfalls that serve as potential sources of contaminants. Sites where initial screening indicates the potential for discharges of a magnitude considered to have the potential to cause or contribute to exceedances of receiving water limitations will require further efforts to classify the discharges and determine appropriate actions, if any.

In cases where flow or other factors show evidence of potential discharges of concern, the program will take further action to determine if the flows are illicit, exempt, conditionally exempt, conditionally exempt but non-essential, or if the source(s) of the discharge cannot be identified (unknown). Illicit discharges require immediate action and, if they cannot be eliminated, monitoring will be implemented until such time that the illicit discharge can be eliminated. Discharges classified as conditionally exempt but non-essential or unknown also require ongoing monitoring.

The following sections summarize the elements of the program and processes to ultimately eliminate major sources of non-stormwater discharges.

8.1 Non-Stormwater Outfall Screening and Monitoring Program

The NSW Outfall Screening and Monitoring Program will consist of a screening phase designed to initially classify outfalls into one of three categories. Three screening surveys will be conducted starting in the summer of 2014 to identify outfalls or other discharges that are considered to be significant and persistent sources of non-stormwater flow to either the open channels or receiving waters.

The initial survey will focus on completing an inventory of all outfalls (refer to Appendix E) to receiving waters. Outfalls greater than 12-inches in diameter (or equivalent) will be photographed and documented. All minor outfalls[7] (outfalls less than 36-inches in diameter or equivalent) without

[7] Minor municipal separate storm sewer outfall (or ‘‘minor outfall’’) means a municipal separate storm sewer outfall that discharges from a single pipe with an inside diameter of less than 36 inches or its equivalent (discharge from a single conveyance other than circular pipe which is associated with a drainage area of less than 50 acres); or for MS4s that receive stormwater from lands zoned for industrial activity (based on comprehensive zoning plans or the equivalent), an outfall that discharges from a single pipe with an inside diameter of less than 12 inches or from its equivalent (discharge from other than a circular pipe associated with a drainage area of 2 acres or less)

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evidence of the presence of industrial activities will be maintained in the database but will be considered as not requiring any further action.

If while in the process of conducting any of the site inspections, the inspection team encounters a transitory discharge, such as a liquid or oil spill, the problem will be immediately referred to the appropriate local jurisdiction for clean-up or response. If it is not readily apparent which jurisdictional authority has responsibility, the discharge will be reported to the WMG technical committee chair.

Information from all three screening surveys will be consolidated to assist in the identification and ranking of outfalls considered to have significant NSW discharges. Multiple lines of evidence will be considered when assessing the significance of a discharge. Data from the field screening program such as flow measurements, general observations and *in-situ* water quality information will be given primary consideration but land uses within the drainage area will also be considered.

A combination of field observations, flow measurements and field water quality measurements collected during the screening surveys will be used to classify outfalls into one of the following three categories that will determine further actions (Figure 8-1):

1. **Suspect Discharge** – Outfalls with persistent high flows during at least two out of three visits and with high severity on one or more physical indicators (odors, oil deposits, etc.). Outfalls in this category require prioritization and further investigation.

2. **Potential Discharge** - Flowing or non-flowing outfalls with presence of two or more physical indicators. Outfalls in this category are considered to be low priority but will be continue to be monitored periodically to determine if the sites are subject to less frequent, discharges or determine if actions can be taken to reduce or eliminate the factors that lead to the site being considered a potential source of contaminants.

3**. Unlikely Discharge** - Non-flowing outfalls with no physical indicators of an illicit discharge. Outfalls within this classification would be not be subject to any further screening.

Initial screening activities will emphasize use of field water quality instrumentation and/or simple field test kits to assist in classifying discharges. Collection of water samples for limited laboratory testing may be incorporated into the program as requirements for more complex, accurate and scientifically supportable data become necessary to characterize non-stormwater discharges and provide scientifically supportable data to track the source of these discharges. The Center for Watershed Protection and Pitt (2004) provide an evaluation of twelve analytes for assistance in determining the source of NSW discharges (Table 8-2). Three of the analytes can be measured with *in-situ* instrumentation. Others can be analyzed relatively inexpensively by use of field test kits or can be analyzed in an ELAP-certified laboratory. In addition, three to five of the listed tests are often considered sufficient to screen for illicit discharges. Ammonia, MBAS, fluoride (assuming tap water is fluorinated), and potassium are considered to confidently differentiate between sewage, wash water, tap water and industrial wastes. Incorporation of *in-situ* measurement of temperature, pH, TDS/salinity,

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turbidity and dissolved oxygen can further assist in characterizing and tracking the source(s) of an NSW discharge.

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Table 8-1. Outline of the NSW Outfall Screening and Monitoring Program.

Element	Description	Timing of Completion
1. Outfall Screening	Because data required to implement the NSW Outfall Program are not available, the Permittees will implement a screening process to determine which outfalls exhibit significant NSW discharges and those that do not require further investigation. Data will be recorded on Outfall Reconnaissance Investigation (ORI) forms and in the associated database.	The Outfall Screening process is currently being implemented. Identification of obvious illicit discharges will be immediately addressed. Otherwise, the Outfall Screening process will be completed prior to starting source investigations.
2. Identification of outfalls with significant NSW discharge (Part IX.C of the MRP)	Data from the Outfall Screening process will be used to categorize MS4 outfalls on the basis of discharge flow rates, field water quality and physical observations.	Concurrent with Outfall Screening December 28, 2014 with Annual CIMP Report
3. Inventory of Outfalls with NSW discharge (Part IX.D of the MRP)	Develop an inventory of all major MS4 outfalls, identify outfalls with known NSW discharges and identify outfalls with no flow requiring no further assessment.	Concurrent with Outfall Screening December 28, 2014 with Annual CIMP Report
4. Prioritized source investigation (Part IX.E of the MRP)	Use the data collected during the Outfall Screening process to further prioritize outfalls for source investigations.	Prioritization for Source Investigation will be occur after completion of Outfall Screening
5. Identify sources of significant NSW discharges (Part IX.F of the MRP)	For outfalls exhibiting significant NSW discharges, Permittees will perform source investigations per the established prioritization.	Complete source investigations for 25% of the outfalls with significant NSW discharges by December 28, 2015 and 100% by December 28, 2017
6. Monitoring NSW discharges exceeding criteria (Part IX.G of the MRP)	Monitor outfalls determined to convey significant NSW discharges comprised of either unknown or conditionally exempt non-essential discharges, or illicit discharges that cannot be abated.	Monitoring will commence within 90 days of completing the source investigations

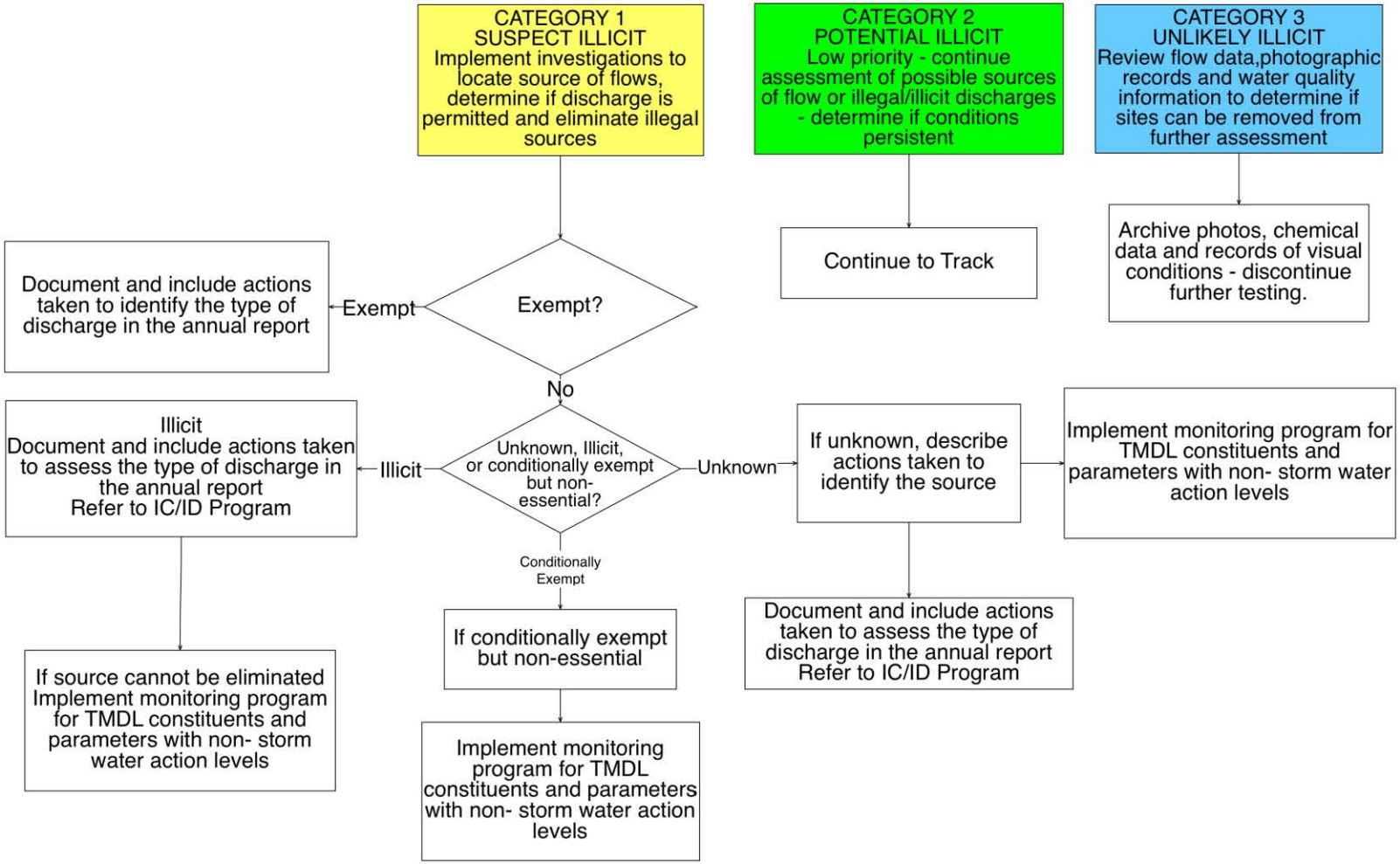

Figure 8-1. Flow Diagram of NSW Outfall Program after Classifying Outfalls during Initial Screening.

Table 8-2. Potential Indicator Parameters for Identification of Sources of NSW Discharges.

Indicator Parameters	
Ammonia	E. coli
Boron	Fluoride
Chlorine	Hardness
Color	pH - Field
Conductivity-Field	Potassium
Detergents – Surfactants (MBAS or fluorescence)	Turbidity

Based upon CWP and Pitt 2004. Illicit Discharge Detection and Elimination A Guidance Manual for Program Development and Technical Assessments

8.1.1 Identification of Outfalls with Significant Non-Stormwater Discharges

Existing monitoring data or institutional knowledge (Objective 4) are not available to allow identification of outfalls with significant NSW discharges. The screening program is necessary to collect information necessary to identify outfalls with potentially significant NSW discharges. The outfall screening includes collection of information necessary to provide an accurate inventory of the major outfalls, assess flow from each outfall and in the receiving waters, determine the general characteristics of the receiving waters (e.g. is flow present, does the flow from the outfall represent a large proportion of the flow, is it an earthen or lined channel), and record general observations indicative of possible illicit discharges. The initial screening survey(s) will also be used to refine the inventory information required in Section 8.1.2.

The outfall screening process has already been initiated in order to meet the established schedule for completion of 25% of the source identification work. Once the screening process is completed Permittees are required to identify MS4 outfalls with "significant" NSW discharges. The MRP (Section IX.C.1) indicates that significant NSW discharges may be determined based upon one or more of the following characteristics:

a. Discharges from major outfalls subject to dry weather TMDLs.

b. Discharges for which existing monitoring data exceeds Non-Stormwater Action Levels (NALs) identified in Attachment G of the Order.

c. Non-stormwater discharges that have caused or have the potential to cause overtopping of downstream diversions.

d. Discharges exceeding a proposed threshold discharge rate as determined by the Permittee.

Most of these characteristics are either unlikely to differentiate significant NSW discharges or the information will not be available when the screening process is completed. Multiple lines of evidence derived from flow measurements, observations and *in-situ* water quality information recorded on the Outfall Reconnaissance Investigation (ORI) forms used during the screening process will be used to determine "significant" NSW discharges and appropriately rank sites for source investigations. The

relative magnitude of the discharges, persistence of the flow, visual and physical characteristics recorded at each site, and land uses associated with the drainage may also be considered. Characteristics of the receiving waters (flow, channel characteristics –hard or soft-bottom, etc.) at the discharge location will also be considered when determining the relative significance of NSW discharges. The most important consideration is whether the discharge has the potential to cause or contribute to exceedance of receiving water quality limitations. Factors that provide the best insight with respect to these impacts will receive the greatest weight when establishing the list of "significant" NSW discharges.

8.1.2 Inventory of MS4 Outfalls with Non-Stormwater Discharges

Part VII.A of the MRP requires that the CIMP plan(s) include a map(s) and/or database of the MS4 that includes the elements listed in Table 8-3. Most required elements are complete and being submitted with this CIMP. Elements requiring further development include the Effective Impervious Area, information on the length of open channels and underground pipes equal to or greater than 18 inches, and the drainage areas associated with each outfall. Subbasins used for the WMMS model are currently associated with each outfall within that subbasin. If an outfall is identified as a significant source of NSW discharges, drainage areas for each targeted outfall will be refined and updated in the database. Additional information such as documenting presence of significant NSW discharges, links to a database documenting water quality measurements at sites with significant NSW discharges will be updated annually and submitted with the CIMP annual report.

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Table 8-3. Basic Database and Mapping Information for the Watershed.

Database Element	Status	
	Complete	Schedule
1. Surface water bodies within the Permittee(s) jurisdiction	X	
2. Sub-watershed (HUC 12) boundaries	X	
3. Land use overlay	X	
4. Effective Impervious Area (EIA) overlay (if available)		Will provide if available
5. Jurisdictional boundaries	X	
6. The location and length of all open channel and underground pipes 18 inches in diameter or greater (with the exception of catch basin connector pipes)	X[1]	
7. The location of all dry weather diversions	X	
8. The location of all major MS4 outfalls within the Permittee's jurisdictional boundary. Each major outfall shall be assigned an alphanumeric identifier, which must be noted on the map	X[2]	
9. Notation of outfalls with significant non-stormwater discharges (to be updated annually)	X	ongoing
10. Storm drain outfall catchment areas for each major outfall within the Permittee(s) jurisdiction	X[3]	ongoing
11. Each mapped MS4 outfall shall be linked to a database containing descriptive and monitoring data associated with the outfall. The data shall include:[4]		
a. Ownership	X	
b. Coordinates	X	
c. Physical description	X	
d. Photographs of the outfall, where possible to provide baseline information to track operation and maintenance needs over time	X	
e. Determination of whether the outfall conveys significant non-stormwater discharges		ongoing
f. Stormwater and non-stormwater monitoring data		ongoing

1. Locations are identified but the length of all open channel and underground pipes are not fully documented.
2. Attributes in the shapefile contain a Unique ID for all outfalls greater than 12" in diameter.
3. Catchments for each outfall are included as the area of the subbasins associated with each outfall. Several outfalls may drain these subbasins. Data will be developed as needed to resolve the drainage areas specific to each outfall.
4. Efforts are ongoing to define ownership and maintenance responsibility. As data become available, information regarding the conveyance of NSW and associated water quality data will be added to the database. Information will be updated based upon the three screening surveys.

As a component of the inventory and screening process, Permittees are required to document the physical attributes of MS4 outfalls determined to have significant non-stormwater discharges. Table 8-4 summarizes the minimum physical attributes required to be recorded and linked to the outfall database.

These data will be maintained using the Outfall Reconnaissance Inventory (ORI) field form and associated database (Appendix C) developed by CWP and Pitt (2004). Data entry can be accomplished by completing the ORI form while conducting the screening survey. Current forms are shown in the Appendix D but may be modified as the parameters and database are modified to provide different information more relevant to the NSW program.

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Table 8-4. Minimum Physical Attributes Recorded during the Outfall Screening Process.

Database Element
a. Date and time of last visual observation or inspection
b. Outfall alpha-numeric identifier
c. Description of outfall structure including size (e.g., diameter and shape)
d. Description of receiving water at the point of discharge (e.g., natural, soft-bottom with armored sides, trapezoidal, concrete channel)
e. Latitude/longitude coordinates
f. Nearest street address
g. Parking, access, and safety considerations
h. Photographs of outfall condition
i. Photographs of significant non-stormwater discharge (or indicators of discharge) unless safety considerations preclude obtaining photographs
j. Estimation of discharge rate
k. All diversions either upstream or downstream of the outfall
l. Observations regarding discharge characteristics such as turbidity, odor, color, presence of debris, floatables, or characteristics that could aid in pollutant source identification
m. Observations regarding the receiving water such as flow, channel type, hard/soft bottom. (added minimum attribute.

8.1.3 Prioritized Source Identification

After completion of the initial reconnaissance survey and the two additional screening surveys, sites will be ranked based upon both initial flow observations from the reconnaissance inventory and the classifications assigned during each of the screening surveys. Source investigations will be scheduled to be conducted at sites categorized as Potential Illicit discharges.

The MRP (IX.E.1) states that prioritization of source investigations should be based upon the following items in order of importance.

a. Outfalls discharging directly to receiving waters with WQBELs or receiving water limitations in the TMDL provisions for which final compliance deadlines have passed.

b. All major outfalls and other outfalls that discharge to a receiving water subject to a TMDL shall be prioritized according to TMDL compliance schedules.

c. Outfalls for which monitoring data exist and indicate recurring exceedances of one or more of the Action Levels identified in Attachment G of this Order.

d. All other major outfalls identified to have significant non-stormwater discharges.

Additional information from the screening process will be used to refine priorities. Sites with evidence of higher, more frequent flow, presence of odors or stains will be assigned higher priorities for source investigations.

8.1.4 Identify Source(s) of Significant Non-Stormwater Discharges

The screening and source identification component of the program is intended to identify the source or sources of contaminants contributing to an NSW discharge. The prioritized list of major outfalls with significant NSW discharges will be used to direct investigations starting with outfalls deemed to present the greatest risk to the receiving water body.

The Order requires the WMG to develop a source identification schedule based on the prioritized list of outfalls exhibiting significant NSW discharges. Source investigations will be conducted for no less than 25% of the outfalls in the inventory by December 2015 and 100% of the outfalls in the inventory by December 2017.

Part IX.A.2 of the MRP requires Permittees to classify the source investigation results into one of four endpoints: illicit connections/illicit discharges (IC/IDs), authorized or conditionally exempt non-stormwater flows, natural flows, or from unknown sources. If source investigations indicate the source is illicit or unknown, the Permittee will document actions to eliminate the discharge and implement monitoring if the discharge cannot be eliminated.

If the source of a discharge is found to be attributable to natural flows or authorized conditionally exempt NSW discharge, the Permittee must identify the basis for the determination (natural flows) and identify the NPDES permitted discharger. If the source is found to be a conditionally exempt but non-essential discharge, monitoring is required to determine whether the discharge should remain conditionally exempt or be prohibited.

Source investigations will be conducted using a variety of different approaches depending upon the initial screening results, land use within the area drained by the discharge point, and the availability of drainage maps. Any additional water quality sampling will emphasize analysis of simple indicators, most of which can be either taken to a laboratory or analyzed in the field using field test kits. Such testing would only be conducted as needed to differentiate major sources of flows or to assist in assessing mixed sources rather than detailed characterization of the discharge. Investigations may include:

- Tracking of dry weather flows from the location where they are first observed in an upstream direction along the conveyance system.
- Collection of additional water samples for analysis of NWS indicators for assistance in differentiating major categories of discharges such as tap water, groundwater, wash waters and industrial wastewaters.
- Compiling and reviewing available resources including past monitoring and investigation data, land use/MS4 maps, aerial photography, existing NPDES discharge permits and property ownership information.

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If source tracking efforts indicate that the discharge originates from a jurisdiction upstream of the boundaries of the LCC WMP, the appropriate jurisdiction and the Regional Board will be notified in writing of the discharge within 30 days of the determination. All existing information regarding documentation and characterization of the data, contribution determination efforts, and efforts taken to identify its source will be included.

Investigations will be concluded if authorized, natural, or essential conditionally exempt flows are found to be the source of the discharge. If the discharge is determined to be due to non-essential conditionally exempt, illicit, or unknown discharges, further investigations will be considered to assess whether the discharge can be eliminated. Alternatively, if the discharges are either non-essential conditionally exempt or of an unknown source, additional investigations may be conducted to demonstrate that it is not causing or contributing to receiving water impairments.

8.1.5 Monitor Non-Stormwater Discharges Exceeding Criteria

As required in the MRP (Part II.3.3), outfalls with significant NSW discharges that remain unaddressed after source identification will be monitored. The objectives of the non-stormwater outfall based monitoring program include the following:

a. Determine whether a Permittee's discharge is in compliance with applicable NSW WQBELs derived from TMDL WLAs,

b. Determine whether a Permittee's discharge exceeds NSW action levels, as described in Attachment G of the Order,

c. Determine whether a Permittee's discharge contributes to or causes an exceedance of receiving water limitations

d. Assist a Permittee in identifying illicit discharges as described in Part VI.D.10 of the Order.

After completion of source investigations, outfalls found to convey NSW discharges that could not be abated and were identified as illicit, conditionally exempt but non-essential or unknown will be monitored. Monitoring will be initiated within 90 days of completing the source investigations or as soon as the first scheduled dry weather survey. Conducting NSW monitoring at the same time as receiving water dry weather monitoring will be more cost effective and allow evaluation of whether the NSW discharges are causing or contributing to any observed exceedances of water quality objectives in the receiving water.

Monitoring of NSW discharges is expected to undergo substantial changes from year to year as the result of ongoing actions taken to control or eliminate these discharges. As NSW discharges are addressed, monitoring of the discharges will no longer be required. In addition, if monitoring demonstrates that discharges do not exceed any WQBELs, non-stormwater action levels, or water quality standards for pollutants identified on the 303(d) list after the first year, monitoring of the pollutants meeting all receiving water limitations will be no longer be necessary. Due to potential frequent adjustments in the number and location of outfalls requiring monitoring and pollutants

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requiring monitoring, the annual CIMP report is expected to communicate adjustments in the number and locations of monitored discharges, pollutants being monitored and justifications for any adjustments.

8.1.5.1 Monitoring Parameters and Frequency

The MRP (Section IX.G.1) specifies the minimum parameters for monitoring of NSW discharges. Determination of monitoring parameters at each site requires consideration of a number of factors applicable to each site. Monitoring parameters will include:

a. Flow,

b. Pollutants assigned a WQBEL or receiving water limitation to implement TMDL Provisions for the respective receiving water, as identified in Attachments L - R of the Order,

c. Other pollutants identified on the CWA section 303(d) List for the receiving water or downstream receiving waters,

d. Pollutants identified in a TIE conducted in response to observed aquatic toxicity during dry weather at the nearest downstream receiving water monitoring station (LCC1) during the last sample event or, where the TIE conducted on the receiving water sample was inconclusive, aquatic toxicity. If the discharge exhibits aquatic toxicity, then a TIE shall be conducted.

e. Other parameters in Table E-2 identified as exceeding the lowest applicable water quality objective at LCC1 (the nearest downstream receiving water station) per Part VI.D.1.d.

The MRP (Part IX.G.2-4) specifies the following monitoring frequency for NSW outfall monitoring:

- For outfalls subject to a dry weather TMDL, the monitoring frequency shall be per the approved TMDL monitoring plan or as otherwise specified in the TMDL or as specified in an approved CIMP.
- For outfalls not subject to dry weather TMDLs, approximately quarterly for first year.
- Monitoring can be eliminated or reduced to twice per year, beginning in the second year of monitoring if pollutant concentrations measured during the first year do not exceed WQBELs, NALs or water quality standards for pollutants identified on the 303(d) List.

While a monitoring frequency of four times per year is specified in the Permit, it is inconsistent with the dry weather receiving water monitoring requirements. The receiving water monitoring requires two dry weather monitoring events per year. Additionally, during the term of the current Permit, outfalls are required to be screened at least once and those with significant NSW discharges will be subject to a source investigation. As a result, the LCC WMG recommends that NSW outfall monitoring events be conducted twice per year. The NSW outfall monitoring events will be coordinated with the dry weather receiving water monitoring events to provide better opportunities to determine if the NSW discharges are causing or contributing to any observed exceedances of water quality objectives in the receiving water.

Any monitoring required will be performed using grab samples (refer to Appendix A for field sampling procedures) rather than automated samplers. Bacteria, which are expected to be the limiting factor at many sites during dry weather, require collection by grab methods and delivery to the laboratory within 6 hours. Based upon the much reduced variability experienced in measurements of dry weather flows associated with ongoing monitoring programs, measured concentrations of other analytes are not expected to vary significantly over a 24-hour period.

9 New Development/Re-Development Effectiveness Tracking

Each of the cities in the watershed will maintain an electronic database to track qualifying new development and re-development projects that are subject to the Planning and Land Development Programs of Part VI.D.7 of Order No. R4 2012- 0175 and Part VII.J of Order No. R4 2014-0024. The electronic databases contain the information listed in Table 9-1 that includes details about the project and the design of onsite and offsite best management practices, as well as descriptions of the required information.

To promote consistency across the watershed and facilitate future planning and research within the watershed, all of the cities within the watershed are subscribing to MS4Front, a web-based software system designed to streamline record keeping for MS4 permits and assists with annual reporting. The cities concluded that although it is a sophisticated management tool, it is flexible and relatively easy to use. The existing tracking programs will be converted to MS4Front.

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Table 9-1. Information Required in the New Development/Re-Development Tracking Database.

	Required Information	Description
General Site Information	Project Name and Developer Name	Brief name of project and developer information (e.g. name, address, and phone number).
	Project Location and Map	Coordinates and map of the project location. The map should be linked to the GIS storm-drain map required in part VII.A of the Permit.
	Documentation of issuance of requirements to the developer	Date that the project developer was issued the Permit requirements for the project (e.g. conditions of approval).
	Date of Certificate of Occupancy	Date that the Certificate of Occupancy was issued.
On-site BMP Sizing Information	85th percentile storm event (inches per 24 hours)	85th percentile storm depth for the project location calculated using the Analysis of 85th Percentile 24-hour Rainfall Depths Within the County of Los Angeles.
	95th percentile storm event (inches per 24 hours)	95th percentile storm depth for the project location calculated using the *Analysis of 85th Percentile 24-hour Rainfall Depths Within the County of Los Angeles*. Only applies if the project drains directly to a natural drainage system[8] and is subject to hydromodification control measures.
	Project design storm (inches per 24 hours)	The design storm for each BMP as calculated using the Analysis of 85th Percentile 24-hour Rainfall Depths Within the County of Los Angeles.
	Projects design volume (gallons or MGD)	The design storm volume (design storm multiplied by tributary area and runoff coefficient) for each BMP.
	Percent of design storm volume to be retained on site	The percentage of the design volume which on-site BMPs will retain.
	Other design criteria required to meet hydromodification requirements for projects that directly drain to natural water bodies	Information relevant to determine if the project meets hydromodification requirements as described in the Permit e.g., peak flow and velocity in natural water body, peak flow from project area in mitigated and unmitigated condition, etc.). Only applies if the project drains directly to a natural drainage system.
	One -year, one-hour storm intensity as depicted on the most recently issued isohyetal map published by the Los Angeles County Hydrologist for flow-through BMPs	If flow-through BMPs (e.g., sand filters, media filters) for water quality are used at the project, provide the one-year, one-hour storm intensity at the project site from the most recent isohyetal map issued by LA County.
Off-site BMP Information	Location and maps of off-site mitigation, groundwater replenishment, or retrofit sites	If any off-site mitigation is used, provide locations and maps linked to the GIS storm-drain map required in part VII.A of the Permit.
	Design volume for water quality mitigation treatment BMPs	The calculated design volume, If water quality mitigation is required.
	Percent of design storm volume to be infiltrated at an off-site mitigation or groundwater replenishment project site	The percentage of the design volume which off-site mitigation or groundwater replenishment will retain.
	Percent of design storm volume to be retained or treated with biofiltration at an off-site retrofit project	The percentage of the design volume which off-site biofiltration will retain or treat.

[8] A natural drainage system is defined as a drainage system that has not been improved (e.g., channelized or armored). The clearing or dredging of a natural drainage system does not cause the system to be classified as an improved drainage system.

10 Reporting

Reporting will normally consist of Annual CIMP Reports and semi-annual data reports. Discharge Assessment Plans will be only submitted if TIEs are found to produce inconsistent results during two consecutive tests. These include the following reports:

Annual CIMP Reports

Annual CIMP monitoring reports are required to be submitted to the Regional Water Board Executive Officer by December 15th of each year in the form of three compact disks (CD). The reporting period will cover July 1 through June 30. The annual reporting process is intended to meet the following objectives.

Summary information allowing the Regional Board to assess:

a. Each Permittee's participation in one or more Watershed Management Programs.
b. The impact of each Permittee(s) stormwater and non-stormwater discharges on the receiving water.
c. Each Permittee's compliance with receiving water limitations, numeric water quality-based effluent limitations, and non-stormwater action levels.
d. The effectiveness of each Permittee(s) control measures in reducing discharges of pollutants from the MS4 to receiving waters.
e. Whether the quality of MS4 discharges and the health of receiving waters is improving, staying the same, or declining as a result watershed management program efforts, and/or TMDL implementation measures, or other Minimum Control Measures.
f. Whether changes in water quality can be attributed to pollutant controls imposed on new development, re-development, or retrofit projects.

Data Submittals

Analytical data reports are required to be submitted to the Regional Board on a semi-annual basis in accordance with the Southern California Municipal Storm Water Monitoring Coalition's Standardized Data Transfer Formats. These reports are required to be subject to verification and validation prior to submittal. They are to cover monitoring periods of July 1 through December 31 for the mid-year report and January 1- June 30 for the end of year report These data reports should summarize:

- Exceedances of applicable WQBELs, receiving water limitations, or any available interim action levels or other aquatic toxicity thresholds.
- Basic information regarding sampling dates, locations, or other pertinent documentation.

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Discharge Assessment Plan

A Discharge Assessment Plan is applicable only if TIEs are conducted during two consecutive events and the results are inclusive for each. A Discharge Assessment Plan will be submitted to Los Angeles Regional Water Board for comment within 60 days of receipt of notification of the second consecutive inconclusive TIE result. If no comments are received within 30-days, it will be assumed that the approach is appropriate for the given situation and the Plan should be implemented within 90-days of submittal.

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APPENDIX A

AUTOMATED STORMWATER MONITORING EQUIPMENT

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1 Automated Stormwater Monitoring Equipment

Monitoring of stormwater runoff at the Mass Emission (ME) sites and Stormwater Outfall Monitoring sites will require use of automated stormwater sampling equipment. This section addresses equipment and sampling procedures that will be used for LCC1, PWS and SWS sites.

Flow-weighted and time-weighted sampling will require similar equipment with minor exceptions at upstream, stormwater outfall monitoring sites. Similar equipment will be necessary regardless of the selected sampling approach. Time-weighted composite samples simply allow for more mobile installations that do not require flow meters, rain gauges, solar panels, or communication equipment. In lieu of communications equipment, such sites require added field personnel to monitor and track performance of the equipment along with added sensors to trigger the equipment to initiate the sampling.

For purposes of this CIMP, it is assumed that all sites requiring collection of flow-weighted composite samples will be established as "permanent" or "long-term" sites with appropriate security to protect the equipment and intake structures from debris coming down the stream or vandalism. As noted, collection of time-weighted samples will be utilize the same types of autosamplers and composite containers but will not include flow meters, rain gauges and telecommunication packages. Monitoring stations designed to take time-weighted composite samples will require sensors to detect initial flows and trigger the sampler. This will allow for use of smaller security enclosures that can temporally be secured at a site or, if necessary, equipment can be deployed in a manhole.

Fixed monitoring sites will utilize automated stormwater sampling stations that incorporate an autosampler (American Sigma or Isco), a datalogger/flow module to monitor flow and pace the autosampler, a rain gauge to monitor and record local rainfall, and telecommunications to allow for remote monitoring and control of each site. Sites without access to AC power will be powered by deep-cycle marine batteries. Sites without direct access to AC power will utilize solar panels to provide the energy needed to maintain the charge on two deep cycle batteries used to power the autosampler, flow meter and datalogger. Providing reliable telecommunications for real-time access to data and to provide command and control functionality has greatly improved efficiency and contributed to improved stormwater data.

Both types of automated stormwater monitoring systems considered for this monitoring program use peristaltic pumping systems. When appropriate measures are taken, it has been demonstrated that these types of systems are capable of collecting blanks that are uncontaminated and high quality, reproducible data using detection limits appropriate to water quality criteria. In order to accomplish this, extreme care must be taken to avoid introduction of contaminants.

Requirements include:

- Assuring that all materials coming into contact with the samples are intrinsically low in trace metals and do not adsorb/absorb metals or other target.

- Materials coming into contact with the sample water are subjected to intensive cleaning using standardized protocol and subjected to systematic blanking to demonstrate and document that blanking standards are met.
- All cleaned sampling equipment and bottles are appropriately tracked so that blanking data can be associated with all component deployed in the field.
- Samples are collected, processed and transported taking care to avoid contamination from field personnel or their gear, and
- Laboratory analysis is conducted in a filtered air environment using ultrapure reagents.

Table 2-1 of the USGS National Field Manual (http://pubs.water.usgs.gov/twri9A/) provides a summary of acceptable materials for use sampling organic and inorganic constituents. The stormwater monitoring stations will primarily utilize 20-L borosilicate glass media bottles for the composite samples, FEP tubing for the sample hose and either 316 SS or Teflon-coated intake strainers. Ten (10) liter borosilicate glass media bottles will be considered for sites where required sample volumes are low and lower sample volumes are acceptable. The peristaltic hose is a silicone-base material that is necessary for operation of the autosamplers. The peristaltic hose can be as source of silica which is not a target compound.

Although the technical limitations of autosamplers are often cited, they still provide the most practical method for collecting representative samples of stormwater runoff for characterization of water quality and have been heavily utilized for this purpose for the past 20 years. The alternative, manual sampling, is generally not practical for collection of flow-weighted composite samples from a large number of sites or for sampling events that occur over an extended period of time. Despite the known drawbacks, autosamplers combined with accurate flow metering remain the most common and appropriate tool for monitoring stormwater runoff.

1.1 Sampler Intake Strainer, Intake Tubing and Flexible Pump Tubing

Intake strainers will be used to prevent small rocks and debris from being drawn into the intake tubing and causing blockages or damage to the pump and peristaltic pump tubing. Strainers will be constructed of a combination of Teflon and 316 stainless or simply stainless steel. The low profile version is typically preferred to provide greater ability to sample shallow flows. Although high grade stainless steel intake strainers are not likely to impact trace metal measurements, it is preferable to use strainers coated with a fluoropolymer coating. If the stainless steel intake is not coated, the strainer will not be subjected to cleaning with acids. Cleaning will be limited to warm tap water, laboratory detergents and MilliQ water rinses.

Tubing comprised of 100% FEP (Fluorinated Ethylene Propylene) will be used for the intake tubing. Several alternative fluoropolymer products are available but 3/8" ID solid FEP tubing has the chemical characteristics suitable for sampling metals and organics at low levels and appropriate physical characteristics. The rigidity of FEP tubing provides resistance to collapse at high head differentials but still is manageable for tight configurations.

The peristaltic hose used in autosamplers is a medical-grade silicon product. The specifications for the peristaltic pump hoses used in these samplers are unique to the samplers. It is very important that hose specified and provided by the manufacturers of the autosamplers be used. Minor

differences in the peristaltic hose can cause major deterioration in performance of the samplers. Use of generic peristaltic pump hose from other sources can lead to problems with the ability to calibrate the samplers and maintain intake velocities of greater than 2.5 feet per second with higher lift requirements.

The peristaltic hose is connected to the FEP tubing and fed through the pump head leaving the minimum amount necessary to feed the peristaltic pump hose into the top of the composite bottle. The composite container will always have a lid to prevent dust from settling in the container.

1.2 Composite Containers

The composite containers used for monitoring must be demonstrated to be free of contaminants of interest at the desired levels (USEPA 1996). Containers constructed of fluoropolymers (FEP, PTFE), conventional or linear polyethylene, polycarbonate, polysulfone, polypropylene, or ultrapure quartz are considered optimal for metals but borosilicate glass has been shown to be suitable for both trace metals and organics at limits appropriate to EPA water quality criteria. High capacity borosilicate media bottles (20-liters or ~5-gallons) are preferred for storm monitoring since they can be cleaned and suitably blanked for analysis of both metals and organic compounds. The transparency of the bottles is also a useful feature when subsampling and cleaning the containers for reuse.

Figure 1. Composite Bottle with Label and installed Tubing inside Brute® Container.

These large media bottles are designed for stoppers and thus do not come with lids. Suitable closure mechanisms must be fabricated for use during sampling, transport and storage of clean bottles. The preferred closure mechanism is a Teflon® stopper fitted with a Viton® O-ring (2 3/8" - I.D. x 23/4"- O.D.) that seals the lid against the media bottle. A polypropylene clamp (Figure 2) is used to seal the Teflon® stopper and O-ring to the rim of the composite sample bottle. Two polypropylene bolts with wing-nuts are used to maintain pressure on the seal or to assist in removal of the lid.

Every composite bottle requires one solid lid for use in protecting the bottle during storage and transport. A minimum of one Teflon® stopper should be available for each monitoring site during storm events. Each field sampling crew should have additional stoppers with holes ("sampling stopper") that would be available if a sampling stopper is accidentally contaminated during bottle changes or original installations.

Figure 2. Composite bottle showing bottle bag used for transport and lifting.

The holes in the sampling stoppers should be minimally larger than the external diameter of the peristaltic hose. If a tight fit exists, the pressure created when water is pumped into the bottle will cause the hose to be ejected and the sampling event will to be abandoned.

Transporting composite bottles is best accomplished by use of 10-gallon Brute® containers to both protect them from breakage and simplify handling. They also provide additional capacity for ice while transporting full bottles to the laboratory or subsampling site.

Bottle bags (Figure 2) are also useful in allowing full bottles to be handled easier and reduce the need to contact the bottles near the neck. They are important for both minimizing the need to handle the neck of the bottle and are also an important Health and Safety issue. The empty bottles weigh 15 pounds and they hold another 40 pounds of water when full. These can be very slippery and difficult to handle when removing them from the autosamplers. Bags can be easily fabricated out of square-mesh nylon netting with nylon straps for handles. Use of bottle bags allows two people to lift a full bottle out of the ice in the autosampler and place it in a Brute® container. Whether empty or full, suitable restraints should be provided whenever the 20-L composite bottles and Brute® containers are being transported.

1.3 Flow Monitoring

Retrieval of flow-weighted stormwater samplers requires the ability to accurately measure flow over the full range of conditions that occur at the monitoring site. The ability to accurately measure flow at an outfall site should be carefully considered during the initial site selection process. Hydraulic characteristics necessary to allow for accurate flow measurement include a relatively straight and uniform length of pipe or channel without major confluences or other features that would disrupt establishment of uniform flow conditions. The actual measurement site should be located sufficiently downstream from inflows to the drainage system to achieve well-mixed conditions across the channel. Ideally, the flow sensor and sample collection inlet should be placed a minimum of five pipe diameters upstream and ten pipe diameters downstream of any confluence to minimize turbulence and ensure well-mixed flow. The latest edition of the *Isco Open Channel Flow Measurement Handbook* (Walkowiak 2008) is an invaluable resource to assist in selection of the most appropriate approach for flow measurements and information on the constraints of each method.

The existing mass emission site has an established flow rating curve (Stage-Flow relationships) that only requires measurement of water level to estimate flow. Additional sites requiring flow monitoring are expected to utilize area-velocity sensors that use Doppler-based sensors to measure

the velocity of water in the conveyance, a pressure sensor to measure water depth, and information regarding channel dimensions to allow for real-time flow measurements to pace the autosamplers.

1.4 Rainfall Gauges

Electronic tipping bucket rain gauges will be installed at each fixed monitoring location to provide improved assessment of rainfall in the smaller drainages. Use of a localized rain gauge provides better representation of conditions at the site. A variety of quality instruments are available but all require substantial maintenance to ensure maintenance of high data quality.

Tipping bucket rain gauges with standard 8-inch diameter cones will be used at each site. These provide 1 tip per 0.01" of rain and have an accuracy of ± 2% up to 2"/hr. The accuracy of tipping bucket rain gauges can be impacted by very intense rainfall events but errors are more commonly due to poor installation.

Continuous data records will be maintained throughout the wet season with data being output and recorded for each tip of the bucket. The rainfall data is downloaded at the same rate as the flow and stormwater monitoring events.

1.5 Power

Stormwater monitoring equipment can generally be powered by battery or standard 120VAC. If 120VAC power is unavailable, external, sealed deep-cycle marine batteries will be used to power the monitoring site. Even systems with access to 120VAC will be equipped with batteries that can provide backup power in case of power outages during an event. All batteries will be placed in plastic marine battery cases to isolate the terminals and wiring. A second battery will be provided at each site to support the telecommunication packages. Sites relying on battery power will also be equipped with a solar panel to assure that a full charge is available when needed for a storm event.

1.6 Telecommunication for System Command/Control and Data Access

The ability to remotely communicate with the monitoring equipment has been shown to provide efficient and representative sampling of stormwater runoff. Remote communication facilitates preparation of stations for storm events and making last minute adjustments to sampling criteria based upon the most recent forecasts. Communication with the sites also reduces the number of field visits by monitoring personnel. Remote two-way communication with monitoring sites allows the project manager (storm control) to make informed decisions during the storm as to the best allocations of human resources among sampling sites. By remotely monitoring the status of each monitoring site, the manager can more accurately estimate when composite bottles will fill and direct field crews to the site to avoid disruptions in the sampling. Real time access to flow, sampling and rainfall data also provides important information for determining when sampling should be terminated and crews directed to collect and process the samples. Increases in both efficiency and sample quality make two-way communication with monitoring stations a necessity for most monitoring programs.

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APPENDIX B

CLEANING AND BLANKING PROTOCOL

FOR

EQUIPMENT AND SUPPLIES USED IN COLLECTION OF FLOW OR TIME-WEIGHTED COMPOSITES

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CLEANING PROTOCOL FOR:

20-L Borosilicate Glass Composite Bottles (Media Bottles) and Closures

1.0 SCOPE

This Standard Operating Procedure (SOP) describes the procedures for the cleaning of 20-liter composite sample bottles and the related equipment necessary to complete the task. The purpose of these procedures is to ensure that the sample bottles are contaminant-free and to ensure the safety of the personnel performing this procedure.

2.0 APPLICATION

This SOP applies to all laboratory activities that comprise the cleaning of 20-liter composite sample bottles and stoppers.

3.0 HEALTH AND SAFETY CONSIDERATIONS

The cleaning of 20-liter composite-sample bottles and associated equipment involves hazardous materials. Skin contact with all materials and solutions should be minimized by wearing appropriate personal protective equipment (PPE) including: chemical-resistant gloves, laboratory coats, chemical-resistant aprons, and goggles. To ensure that you are aware of the hazards involved, the material safety data sheets (MSDSs) for nitric acid and laboratory detergents should be reviewed before beginning any of these procedures.

Note: Preparations should be made to contain and neutralize any spillage of acid. Be aware of the location of absorbent, neutralizing, and containment materials in the bottle cleaning area.

4.0 DEFINITIONS

4.1 **Composite sample bottle** - 20 liter borosilicate glass bottle that is used with autosamplers to collect a stormwater composite sample.

4.2 **Stopper** - a Teflon® cap used to seal the composite sample bottle (either solid, or drilled with holes for the silicon inlet tubing).

4.3 **O-Ring** - Viton O-ring 23/8"- I.D. x 23/4"- O.D. that is located around the base of stopper.

4.4 **Clamp** - Polypropylene clamp, 2 bolts, and wing nuts specifically designed to fasten the stopper and the O-ring to the rim of the composite sample bottle.

4.5 **De-ionized (DI) water** - commercial de-ionized water (12-13 Megohm/cm)

4.6 **Laboratory Detergent** - 2% solution of Contrad 70® or Micro-90® detergent

5.0 EQUIPMENT

5.1 Instrumentation:

1) Peristaltic pump with a protocol-cleaned sub-sampling hose setup

5.2 Reagents:

1) ACS Reagent Grade nitric acid in a 2 Normal solution (2N HNO_3)

2) Contrad 70® non-phosphate laboratory detergent

3) Contrad 70® anti-foaming agent

4) Micro-90® non-phosphate laboratory detergent

5) Baking soda or equivalent to neutralize acid

6) pH paper

5.3 Apparatus:

1) Bottle Rolling Rack

2) DI Rinse Rack

3) Yellow Neutralization Drip Bucket

4) Neutralization Tank

5.4 Documentation:

The status of each composite sample bottle must be tracked. Bottles should be washed in batches of 10, 20, or 30 and the status of each batch must be made apparent to all personnel by posting a large status label (including the start date) with each batch. This will ensure that all required soak times have been attained and that each bottle was subjected to the proper cleaning procedures. Information on each batch of bottles cleaned (including bottle number, QA batch, date cleaning started, date finished, date blanked, and cleaning technicians) should be entered in the **Bottle Cleaning Log Sheet**.

6.0 CLEANING PROCEDURES

Care must be taken to ensure that no contaminants are introduced at any point during this procedure. If the wash is not performed with this in mind, the possibility for the introduction of contaminants (i.e., from dust, dirty sub-sampling tubing tips, dirty fingers/gloves, automobile emissions, etc.) is increased significantly.

6.1 Teflon® Bottle Stoppers with Holes and Field Extras:

To be performed whenever required for field use.

1) Wash with laboratory detergent using a clean all-plastic brush.

2) Rinse thoroughly (minimum of three times) with tap water.

3) Rinse thoroughly (minimum of three times) with DI water.

4) Wash three times with 2N nitric acid squirt bottle.

5) Rinse thoroughly (minimum of three times) with DI water.

6) Allow to dry in a dust-free environment.

7) Store in two sealed clean Ziploc® bags.

6.2 NPS 20 liter composite sample bottle Cleaning:

6.2.1 Preliminary Bottle Cleaning:

Bottles should undergo a preliminary rinse with tap water as soon as possible after they are available. This includes dumping any remaining stormwater into a sanitary drain and rinsing the bottles and stoppers. This prevents material from adhering to the interior surface of the bottle.

6.2.2 **48 Hour Soak:** Place the bottle to be cleaned into a secondary containment bucket. Prepare a 2% solution of laboratory detergent with tap water directly in the bottle. Note: Since laboratory detergent is a foaming solution, add 3/4 of the tap water first, add the detergent, then add the rest of the water. Should excessive foam be generated, a few drops of Contrad 70® anti-foaming agent may be added. **Make sure that the bottle is filled to the rim and scrub the rim with an all-plastic scrub brush.** Scrub a Teflon® stopper with 2% solution of laboratory detergent and place stopper over the full bottle so overflowing happens. This will allow both the stopper and the bottle to soak for 48 hours. After the 48 hour soak, this solution may be may be retained for reuse (i.e., siphoned into other dirty bottles) or it can be poured off into a sanitary drain.

6.2.3 Teflon® Bottle Stopper and O-ring Cleaning:

This procedure should be performed prior to the bottle washing process so that the stopper can follow the bottle through the acid wash.

1) Rinse thoroughly (minimum of three times) with tap water.

2) Rinse thoroughly (minimum of three times) with DI water.

3) Store temporarily in a similarly cleaned

6.2.4 **Tap Water Rinse:** Tap water rinses detergent better than DI water. Flush upside down bottle with tap water for 20 sec. Rinse each bottle 3 times with tap water being careful not to contaminate the clean surfaces.

6.2.5 **DI Rinse:** Rinse the top and neck of the bottles with DI water using a squirt bottle and then rinse upside down for three minutes on the DI rinse rack for bottles. Make sure to tip bottles from side to side for a more thorough rinsing. Allow 1-2 minutes for the bottles

to drain as much as possible. Rinse each stopper with DI water squirt bottle 3 times (being careful not to touch the clean surfaces).

6.2.6 **Acid Wash:** Note that it is important to Wash the bottle with 2N nitric acid according to the following procedure:

1) Place the empty bottle near the 2N nitric acid carboy and peristaltic pump. The location should be able to safely contain a spill if the 20L bottle breaks.

2) Pump acid into the bottle using the peristaltic pump fitted with a protocol-cleaned sub-sampling hose setup

3) Fill the bottle slightly more than half full.

4) Place a protocol-cleaned solid Teflon® stopper (with a properly seated O-ring) (Refer to Section 6.2.3 above) on the bottle and clamp it securely.

5) **Carefully** lift and place the bottle on the roller rack and check for leakage from the stopper. Neutralize any spillage. Often small leaks can be corrected by a slight tightening of the clamp. Roll the bottles for twenty minutes.

6) Pump the acid into another bottle for rolling or back into the 2N nitric acid carboy.

6.2.7 **DI Rinse for Sub-sampling Hose**: After use, the sub-sampling hose setup should be rinsed by pumping 1-2 gallons of DI water through the hoses and into a neutralization tank. Carefully rinse the outside of the hose to remove any acid that may be on the exterior of the hose. pH paper should be used to insure that the fluid in and on the hose is 6.8 or higher. Continue rinsing until your reach neutral pH. Store hose in a clean, large plastic bag between uses. Dispose of rinsate in accordance with all federal, state, and local regulations

6.2.8 **DI Rinse for Bottles**: Allow the bottles to drain into a yellow neutralization bucket for at least 1 minute. Place four bottles at a time on the DI rinse rack and rinse for 5 minutes. Move bottles around to ensure complete and thorough rinsing. Rinse the outside of the bottle with tap water. Allow bottles to drain for 2 minutes.

6.2.9 **DI Rinse for Stoppers**: Rinse caps thoroughly 3 times over neutralization tank. Place on a clean surface where the clean side of the stopper will not be contaminated.

6.3 **Storage:** Clamp a stopper (one that went through the entire cleaning procedure) on the bottle. Properly label the bottle as to the date cleaned and by whom and place on the bottle storage rack or in a secondary containment bucket in a safe area. Also, fill out the **Bottle Cleaning Log Sheet**.

7.0 QUALITY ASSURANCE REQUIREMENTS

7.1 The NPS 20 liter sample bottles must be evaluated ("blanked") for contaminants after they have completed the decontamination procedure. The analytical laboratory performing

the evaluation should supply Milli-Q® water that is used as a blanking rinsate, and sample bottles for the appropriate constituents of concern. This evaluation will be accomplished by randomly blanking 10% of the washed bottles, or 1 bottle per batch (whichever is greater) and having the blanking rinsate analyzed by the laboratory for the appropriate constituents.

7.2 If any of the bottles fail the analyses (concentration of any analytes are at or above the limit of detection), all of the bottles from that batch must be decontaminated. Again, 10% of these bottles must be subjected to the blanking process as described-above.

7.3 If results of the evaluation process show that the bottles are not contaminant-free, the cleaning procedure must be re-evaluated. Consult with the Quality Assurance/Quality Control Officer to determine the source of contamination.

CLEANING PROTOCOL FOR:

Miscellaneous Laboratory Equipment used for Cleaning and Blanking

1.0 SCOPE

This Standard Operating Procedure describes the procedures for cleaning the miscellaneous items necessary to complete the tasks of cleaning 20- liter composite sample bottles and hoses. The purpose of these procedures is to ensure that the items are contaminant-free and to ensure the safety of the personnel performing this procedure.

2.0 APPLICATION

This SOP applies to all laboratory activities that comprise the cleaning of ancillary items necessary to complete the tasks of cleaning 20 liter composite sample bottles and NPS hoses.

3.0 HEALTH AND SAFETY CONSIDERATIONS

The cleaning of the following items may involve contact with hazardous materials. Skin contact with all materials and solutions should be minimized by wearing appropriate personal protective equipment (PPE) including: chemically-resistant protective gloves, laboratory coats, chemically-resistant aprons, and goggles. In addition, to ensure that you are aware of the hazards involved and of any new revisions to the procedure, the material safety data sheets (MSDSs) for nitric acid and the laboratory detergent should be reviewed before beginning any of these procedures.

4.0 DEFINITIONS

4.1 Polyethylene Squirt Bottles - ½ and 1 liter squirt bottles for washing and/or rinsing with DI water or nitric acid.

4.2 Polycarbonate and Polyethylene De-ionized Water Jugs - For holding DI water.

4.3 Polyethylene Bucket - For holding tap water, DI water or detergent solutions during hose washing procedures.

4.4 Four-inch Teflon® Connector - For connecting two lengths of silicon peristaltic tubing together.

4.5 Four-inch Silicon Connector - For connecting two lengths of Teflon® hose together.

4.6 Orange Polypropylene Hose Caps - For placing over the ends of clean Teflon® hose to prevent contamination.

4.7 De-ionized (DI) water - Commercial de-ionized water

4.8 Laboratory Detergent - 2% solution of Contrad 70® or Micro-90® detergent.

5.0 EQUIPMENT

5.1 Instrumentation: Not applicable.

5.2 Reagents:

1) ACS Reagent Grade nitric acid as a 2 Normal solution (2N HNO_3)

2) Micro-90® non-phosphate laboratory detergent

3) Contrad 70® non-phosphate laboratory detergent

4) Contrad 70® anti-foaming agent.

5) pH paper or pH meter

6) Baking soda ($NaHCO_3$) or equivalent to neutralize acid

5.3 Apparatus:

1) Clean polyethylene squirt bottles.

2) Clean polyethylene trays or 2000 ml glass beakers.

3) Neutralization Tank

5.4 Documentation:

Label each squirt bottle, DI jug, storage container holding clean items, etc. as to the date each was cleaned and the initials of the cleaning technician.

6.0 CLEANING PROCEDURES

Care must be taken to ensure that no contaminants are introduced at any point during these procedures. If the wash is not performed with this in mind, the possibility for the introduction of contaminants (i.e., from dirty sinks, dirty counter tops, dirty fingers/gloves, dirty hose ends, etc.) is increased significantly.

Rinsing properly is essential to ensure proper cleaning. This is done by squirting the liquid over the item to be cleaned in a top-down fashion, letting the water flow off completely **before** applying the next rinse. Rinse the item in this fashion **a minimum** of three times. **Numerous rinses of relatively small volumes are much better than one or two rinses of higher volume.** Be aware of handling: use clean gloves (it is best if they have gone through the same prior wash as the item to be rinsed) and rinse off the fingers prior to grasping the item to be cleaned. Try to grasp the item in a slightly different place between rinses so ones fingers do not cover a portion of the item throughout the rinses.

6.1 Polyethylene Squirt Bottles:

1) Soak in a 2% solution of laboratory detergent in a protocol-cleaned bucket for 48 hours.

2) Rinse thoroughly (minimum of three times) with tap water.

3) Rinse thoroughly (minimum of three times) with DI water.

4) Wash three times with 2N (10%) nitric acid.

5) Rinse thoroughly (minimum of three times) with DI water. Neutralize and dispose of rinsate in accordance with all federal, state, and local regulations.

6.2 Polycarbonate and Polyethylene DI Water Jugs:

1) Fill to the rim with a 2% solution of laboratory detergent, cap the jug, and let soak for 48 hours. Wash cap with an all-plastic scrub brush after soak.

2) Rinse thoroughly (minimum of three times) with tap water.

3) Rinse thoroughly (minimum of three times) with DI water.

4) Wash three times with 2N (10%) nitric acid.

5) Rinse thoroughly (minimum of three times) with DI water. Neutralize and dispose of rinsate in accordance with all federal, state, and local regulations.

6.3 Polyethylene Bucket:

1) Fill to the rim with a 2% solution of laboratory detergent and let soak for 48 hours.

2) Rinse thoroughly (minimum of three times) with tap water.

3) Rinse thoroughly (minimum of three times) with DI water.

4) Wash three times with 2N (10%) nitric acid squirt bottle.

5) Rinse thoroughly (minimum of three times) with DI water. Neutralize and dispose of rinsate in accordance with all federal, state, and local regulations. **Label as to the date cleaned and initial**.

6.4 Four-inch Teflon® and Silicon Hose Connectors and Orange Polypropylene Hose Caps. The purpose of the four-inch sections of Teflon® and silicon hose is to connect longer lengths of each type of hose together during the hose cleaning procedures. The orange polypropylene hose caps are for the ends of cleaned FEP hoses to prevent contamination prior to use in the field or laboratory.

1) Using a 2% solution of laboratory detergent, soak the four-inch sections of FEP hose, silicon tubing, and orange caps for 48 hours.

2) Rinse thoroughly with tap water (minimum of three rinses).

3) Rinse thoroughly with DI water (minimum of three rinses).

4) Using a squirt bottle filled with 2N (10%) HNO_3, thoroughly rinse the interior and exterior of the connectors and caps thoroughly OR, roll/agitate them in a shallow layer of 2N (10%) HNO_3

in a laboratory detergent cleaned glass beaker or other appropriate, clean container for a more thorough washing.

5) Thoroughly rinse connectors and caps with DI water (minimum of three rinses). Neutralize and dispose of rinsate in accordance with all federal, state, and local regulations. Keep clean connectors and caps in a similarly cleaned (or certified clean) widemouth glass jar or detergent-cleaned resealable bag and **label as clean, date cleaned, and initial**.

NPS 20-Liter Bottle Subsampling Procedure

1.0 Scope

This Standard Operating Procedure (SOP) describes the procedures for the compositing and sub-sampling of non-point source (NPS) 20 liter sample bottles. The purpose of these procedures is to ensure that the sub-samples taken are representative of the entire water sample in the 20-L bottle (or bottles). In order to prevent confusion, it should be noted that in other KLI SOPs relating to 20-L bottles they are referred to as "composite" bottles because they are a composite of many small samples taken over the course of a storm; in this SOP the use of "compositing" generally refers to the calculated combining of more than one of these 20-L "composite" bottles.

2.0 Application

This SOP applies to all laboratory activities that comprise the compositing and sub-sampling of NPS 20 liter sample bottles.

3.0 Health and Safety Considerations

The compositing and sub-sampling of NPS 20 liter sample bottles may involve contact with contaminated water. Skin contact with sampled water should be minimized by wearing appropriate protective gloves, clothing, and safety glasses. Avoid hand-face contact during the compositing and sub-sampling procedures. Wash hands with soap and warm water after work is completed.

4.0 Definitions

4.1 **20 liter sample bottle:** 20 liter borosilicate glass bottle that is used to collect multiple samples over the course of a storm (a composite sample).

4.2 **Large-capacity stirrer**: Electric motorized "plate" that supports a 20 liter bottle and facilitates the mixing of sample water within the bottle by means of spinning a pre-cleaned magnetic stir-bar which is introduced into the bottle.

4.3 **Stir-bar**: Teflon-coated magnetic "bar" approximately 2-3 inches in length which is introduced into a 20 liter bottle and is spun by the stirrer, thereby creating a vortex in the bottle and mixing the sample. Pre-cleaned using cleaning protocols provided in KLI SOP for *Cleaning Procedures for Miscellaneous Items Related to NPS Sampling*.

4.4 **Sub-sampling hose**: Two ~3-foot lengths of Teflon tubing connected by a ~2-foot length of silicon tubing. Pre-cleaned using cleaning protocols provided in SOP for *Teflon Sample Hose and Silicon Peristaltic Tubing Cleaning Procedures*. Used with a peristaltic pump to transfer sample water from the 20-L sample bottle to sample analyte containers.

4.6 **Volume-to-Sample Ratio (VSR):** A number that represents the volume of water that will flow past the flow-meter before a sample is taken (usually in liters but can also be in kilo-cubic feet for river deployments). For example, if the VSR is 1000 it means that every time 1000 liters passes

the flow-meter the sampler collects a sample (1000 liters of flow per 1 sample taken). Note: The VSR indicates when a sample should be taken and is NOT an indication of the sample size.

5.0 EQUIPMENT

5.1 Instrumentation: Not applicable

5.2 Reagents: Not applicable.

5.3 Apparatus

1) Large capacity stirrer.

2) Stir bar.

3) Sub-sampling hose.

4) Peristaltic pump.

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APPENDIX C

QUALITY ASSURANCE/QUALITY CONTROL

1. Quality Assurance/Quality Control

Elements of a Quality Assurance and Quality Control (QA/QC) Plan have been incorporated into the CIMP in order to detail critical activities conducted to assure that both chemical and physical measurements meet the standard of quality needed to evaluate measurements at levels relevant to applicable water quality criteria. With many different monitoring programs being implemented within the region, comparability should remain of the primary goals of the QA/QC monitoring program. The Intergovernmental Task Force on Monitoring Water Quality (ITFM, 1995) defines comparability as the "characteristics that allow information from many sources to be of definable or equivalent quality so that it can be used to address program objectives not necessarily related to those for which the data were collected."

One important aspect of comparability is the use of analytical laboratories that are accredited under a program such as the National Environmental Laboratory Accreditation Program (NELAP), California's Environmental Laboratory Accreditation Program (ELAP) or a well-qualified research laboratory. In addition, the laboratory should be a participant in a laboratory proficiency and intercalibration program. Laboratories have not been selected for this program but participation in the Stormwater Monitoring Coalition's (SMC) intercalibration program will be a primary consideration. Unfortunately, the SMC has not fully completed implementation of a program the full range of analyses included in the MRP Table E-2 list.

Evaluation of data quality will be based upon protocols provided in the *National Functional Guidelines for Inorganic Superfund Data Review (USEPA540-R-10-011)* (USEPA 2010), *National Functional Guidelines for Superfund Organic Methods Data Review (EPA540/R-08-01),* and the *Guidance on the Documentation and Evaluation of Trace Metals Data Collected for Clean Water Act Compliance Monitoring (EPA/821/B/95/002)* (USEPA 1996).

The sections that follow address activities associated with both field sampling and laboratory analyses. Quality assurance activities start with procedures designed to assure that errors introduced in the field sampling and subsampling processes are minimized. Field QA/QC samples are collected and used to evaluate potential contamination and sampling error introduced into a sample prior to its submittal to the analytical laboratory. Laboratory QA/QC activities are used to provide information needed to assess potential laboratory contamination, analytical precision and accuracy, and representativeness.

1.1.1 Sample Handling, Containers and Holding Times.

Table **1** provides a summary of the types of sample volumes, container types, preservation and holding times for each analytical method. Analytical methods requiring the same preservation and container types may be transferred to the laboratory in one container in order to minimize handling prior to transfer to the laboratory.

RB-AR7090

Table 1. Constituents, Sample Container, Preservation and Holding Times.

Analyte	EPA Method Number	Holding Time	Container Size	Container Type	Preservation	Minimum Level/ Resolution	Units
Conventionals							
pH	150.1	15 minutes		glass or PE	none	+/- 0.1	std. units
Oil and Grease	1664A	28 days	1 L	Glass	HCl	5	mg/L
TPH	418.1	28 days	1 L	Glass	HCl	5	mg/L
Total Phenols	420.1	28 days	500mL-1 L	Glass	H_sSO_4	5	mg/L
Cyanide	SM4500-CN-E	14 days	500 mL	HDPE	NaOH	0.003	mg/L
Turbidity	SM2130B	48 hours	100-250mL	Glass	4-6°C	1	NTU
TSS	160.2	7 days	1 L	HDPE	4-6°C	4	mg/L
SSC[1]	ASTMD3977B	7 days	1 L	HDPE	4-6°C	4	mg/L
TDS	160.1	7 days	1 L	HDPE	4-6°C	1	mg/L
VSS	160.4	7 days	1 L	HDPE	4-6°C	1	mg/L
TOC; DOC	415.1	28 days	250 mL	glass	4°C and HCl or H_2SO_4 to pH<2	1	mg/L
BOD_5	SM5210B	48 hours	600mL-1L	HDPE	4-6°C	3	mg/L
COD	410.1	28 days	20-250 mL	Glass	H_sSO_4	4	mg/L
Alkalinity	SM 2320B	Filter ASAP, 14 days	100-250 mL	HDPE	4-6°C	1	mg/L
Conductivity	SM 2510	28 days	100-250 mL	HDPE	4°C; filter if hold time >24 hours	1	µmho/cm
Hardness	130.2	6 months	100-250 mL	HDPE	and HNO_3 or H_2SO_4 to pH<2	1	mg/L
MBAS	425.1	48 hours	250-500 mL	HDPE	4-6°C	0.02	mg/L
Chloride	300	28 days	250-500 mL	HDPE	4-6°C	2	mg/L
Fluoride	300	28 days	250-500 mL	HDPE	4-6°C	0.1	mg/L
Perchlorate	314.0	28 days	100-250 mL	HDPE	4-6°C	4	µg/L
Volatile Organics							
MTBE	624	14 days	3 40mL VOA	Glass	HCl	1	µg/L

Analyte	EPA Method Number	Holding Time	Container Size	Container Type	Preservation	Minimum Level/ Resolution	Units
Bacteria							
Total Coliform	SM9221B	6 hr-8 hr	100 mL	Sterile HDPE	4-6°C	20-2,400,000	MPN/100mL
Fecal Coliform	SM9221B	6 hr-8 hr	100 mL	Sterile HDPE	4-6°C	20-2,400,000	MPN/100mL
Enterococcus	SM9230B or C	6 hr-8 hr	100 mL	Sterile HDPE	4-6°C	20-2,400,000	MPN/100mL
E. coli	SM 9223 COLt	6 hr-8 hr	100 mL	Sterile HDPE	4-6°C	20-2,400,000	MPN/100mL
Nutrients							
TKN	351.1	28 days	500mL-1L	Amber glass	H_sSO_4	0.5	mg/L
Nitrate-N	300	48 hours	50-125mL	HDPE	4-6°C	0.1	mg/L
Nitrite-N	300	48 hours	50-125mL	HDPE	4-6°C	0.05	mg/L
Total Nitrogen	Calculation					NA	mg/L
Ammonia-N	350.1	28 days	500mL-1L	Amber glass	H_sSO_4	0.1	mg/L
Total Phosphorus	SM4500-P,EorF	28 days	100-250 mL	glass	H_sSO_4	0.1	mg/L
Dissolved Phosphorus	SM4500-P,EorF	28 days	100-250 mL	glass	4-6°C	0.1	mg/L
Organic Compounds (pesticides and herbicides)							
Organochlorine Pesticides & PCBs	608	7days:40days	1L	Amber glass	4-6°C	0.005-0.5	µg/L
Organophosphate Pesticides	507	14days	1L	Amber glass	$Na_sS_2O_3$ 4-6°C	0.01-1	µg/L
Glyphosate	547	14days	250mL	Amber glass	$Na_sS_2O_3$ 4-6°C	5	µg/L
Chlorinated Acids	515.3	14days	250mL	Amber glass	$Na_sS_2O_3$ 4-6°C		
2,4-D						0.02	µg/L
2,4,5-TP-Silvex						0.2	µg/L
Semivolatile Organic Compounds	625;8270D	7days;40days	1L	Amber glass	4-6°C	0.05-10	µg/L

Metals (Total and Dissolved)

Analyte	EPA Method Number	Holding Time	Container Size	Container Type	Preservation	Minimum Level/ Resolution	Units
Aluminum	200.8	If practical, filter immediately after subsampling. Otherwise filter in laboratory for dissolved fraction and preserve not more than 24 hours after subsampling; 6 months to analysis	250 to500 mL	HDPE	4°C and HNO_3 to pH<2	100	µg/L
Antimony	200.8					0.5	µg/L
Arsenic	200.8					0.5	µg/L
Beryllium	200.8					0.5	µg/L
Cadmium	200.8					0.25	µg/L
Chromium (Total)	200.8					0.5	µg/L
Copper	200.8					0.5	µg/L
Iron	200.8					25	µg/L
Lead	200.8					0.5	µg/L
Nickel	200.8					1	µg/L
Selenium	200.8					1	µg/L
Silver	200.8					0.25	µg/L
Thallium	200.8					0.5	µg/L
Zinc	200.8					1	µg/L
Chromium (Hexavalent)	218.6	Filter as above 24 hours	250 ml	HDPE	4°C	5	µg/L
Mercury	245.1	Filter as above 28 days	250 ml	Glass or Teflon	4°C and HNO_3 to pH<2	0.2	µg/L

Abbreviations

TSS=Total Suspended Solids
SSC=Suspended Sediment Concentration
TDS=Total Dissolved Solids
TPH=Total Petroleum Hydrocarbons
VSS=Volatile Suspended Solids
TOC=Total Organic Carbon
BOD_5=Five-day Biochemical Oxygen Demand
COD=Chemical Oxygen Demand
MBAS=Methylene Blue Active Substances
MTBE= Methyl Tertiary Butyl Ether
TKN=Total Kjeldahl Nitrogen
PCBs=Polychlorinated Biphenyls

1.1.2 Precision, Bias, Accuracy, Representativeness, Completeness, and Comparability

The overall quality of analytical measurements is assessed through evaluation of precision, accuracy/bias, representativeness, comparability and completeness. Precision and accuracy/bias are measured quantitatively. Representativeness and comparability are both assessed qualitatively. Completeness is assessed in both quantitative and qualitative terms. The following sections examine how these measures are typically applied.

1.1.2.1 Precision

Precision provides an assessment of mutual agreement between repeated measurements. These measurements apply to field duplicates, laboratory duplicates, matrix spike duplicates, and laboratory control sample duplicates. Monitoring of precision through the process allows for the evaluation of the consistency of field sampling and laboratory analyses.

The Relative Percent Difference (RPD) will be used to evaluate precision based upon duplicate samples. The RPD is calculated for each pair of data is calculated as:

$$RPD=[(x_1-x_2)*100]/[(x_1+x_2)/2)$$

Where:

x_1=concentration or value of sample 1 of the pair

x_2=concentration or value of sample 2 of the pair

In the case of matrix spike/spike duplicate, RPDs are compared with measurement quality objectives (MQOs) established for the program. MQOs will be established to be consistent with the most current SWAMP objectives in the SWAMP Quality Assurance Project Plan (2008) including the most recent updates as well as consultations with the laboratories performing the analyses. In the case of laboratory or field duplicates, values can often be near or below the established reporting limits. The most current SWAMP guidelines rely upon matrix spike/spike duplicate analyses for organic compounds instead of using laboratory duplicates since one or both values are often below detection limits or are near the detection limits. In such cases, RPDs do not provide useful information.

1.1.2.2 Bias

Bias is the systematic inherent in a method or caused by some artifact or idiosyncrasy of the measurement system. Bias may be either positive or negative and can emanate from a number of different points in the process. Although both positive and negative biases may exist concurrently in the same sample, the net bias is all that can be reasonably addressed in this project. Bias is preferably measured through analysis of spiked samples so that matrix effects are incorporated.

1.1.2.3 Accuracy

Accuracy is a measure of the closeness of a measurement or the average of a number of measurements to the true value. Accuracy includes of a combination of random error as measured by precision and systematic error as measured by bias. An assessment of the accuracy of measurements is based on determining the percent difference between measured values and known or "true" values applied to surrogates, Matrix Spikes (MS), Laboratory Control Samples (LCS) and Standard Reference Materials (SRM). Surrogates and matrix spikes evaluate matrix interferences on analytical performance, while laboratory control samples, standard reference materials and blank spikes (BS) evaluate analytical performance in the absence of matrix effects.

Assessment of the accuracy of measurements is based upon determining the difference between measured values and the true value. This is assessed primarily through analysis of spike recoveries or certified value ranges for SRMs. Spike recoveries are calculated as Percent Recovery according to the following formula:

$$\text{Percent Recovery} = [(t-x)/\alpha]*100\%$$

Where:

t=total concentration found in the spiked sample

x=original concentration in sample prior to spiking, and

α=actual spike concentration added to the sample

1.1.2.4 Representativeness, Comparability and Completeness

Representativeness is the degree to which data accurately and precisely represents the natural environment. For stormwater runoff, representativeness is first evaluated based upon the automated flow-composite sample and the associated hydrograph. To be considered as representative, the autosampler must have effectively triggered to capture initial runoff from the pavement and the composite sample should:

- be comprised of a minimum number of aliquots over the course of the storm event,
- effectively represent the period of peak flow,
- contain flow-weighted aliquots from over 80% of the total runoff volume, and
- demonstrate little or no evidence of "stacking".

Stacking occurs when the sampling volume is set too low and commands back up in the memory of an autosampler causing it to continuously cycle until it catches up with the accumulation of total flow measured by the stormwater monitoring station.

Representativeness is also assessed through the process of splitting or subsampling 20 L composite bottles into individual sample containers being sent to the laboratory. The first subsamples removed from the composite bottle should have the same composition as the last. Subsampling should be conducted in accordance with guidance in the subsampling SOP. This SOP is based upon use of large laboratory magnetic stir plate, an autosampler, and precleaned subsampling hoses to

minimize variability. Sample splitting can introduce a substantial amount of error especially if significant quantities of coarse sediments (greater than 250 µm) represent as significant fraction of the suspended sediments. Use of a USGS Teflon churns or Decaport cone splitter may also be used but would require development of a separate SOP.

Comparability is the measure of confidence with which one dataset can be compared to another. The use of standardized methods of chemical analysis and field sampling and processing are ways of insuring comparability. Application of consistent sampling and processing procedures is necessary for assuring comparability among data sets. Thorough documentation of these procedures, quality assurance activities and a written assessment of data validation and quality are necessary to provide others with the basic elements to evaluate comparability.

Completeness is a measure of the percentage of the data judged valid after comparison with specific validation criteria. This includes data lost through accidental breakage of sample containers or other activities that result in irreparable loss of samples. Implementation of standardized Chain-of-Custody procedures which track samples as they are transferred between custodians is one method of maintaining a high level of completeness.

A high level of completeness is essential to all phases of this study due to the limited number of samples. Of course, the overall goal is to obtain completeness of 100%, however, a realistic data quality indicator of 95% insures an adequate level of data return.

1.1.3 Laboratory Quality Assurance/Quality Control

The quality of analytical data is dependent on the ways in which samples are collected, handled and analyzed. Data Quality Objectives provide the standards against which the data are compared to determine if they meet the quality necessary to be used to address program objectives. Data will be subjected to a thorough verification and validation process designed to evaluate project data quality and determine whether data require qualification.

The three major categories of QA/QC checks are accuracy, precision, and contamination were discussed in the previous section. As a minimum, the laboratory will incorporate analysis of method blanks, and matrix spike/spike duplicates with each analytical batch. Laboratory duplicates will be analyzed for analytical tests where matrix spike/spike duplicate are not analyzed. Use of Certified Reference Materials (CRM) or Standard Reference Materials (SRM) is also recommended as these allow assessment of long term performance of the analytical methods so that representativeness can be assessed. Laboratories often use an internal CRM that is analyzed with each batch to evaluate any potential long-term shift in performance of the analytical procedures. Recommended minimum quality control samples will be based upon SWAMP QAPP (2008) and the associated 2013 Quality Control and Sample Handling Tables for water (http://www.swrcb.ca.gov/water_issues/programs/swamp/mqo.shtml).

1.1.4 Field QA/QC

1.1.4.1 Blanks

A thorough system of blanking is an essential element of monitoring. Much of the blanking processes are performed well in advance of the actual monitoring in order to demonstrate that all equipment expected to contact water is free of contaminants at the detection limits established for the program. Equipment components are cleaned in batches. Subsamples from each cleaning batch are rinsed with Type 1 laboratory blank water and submitted to the laboratory for analysis. If hits are encountered in any cleaning batch, the entire batch is put back through the cleaning and blanking process until satisfactory results are obtained. If contaminants are measured in the blanks, it is often prudent to reexamine the cleaning processes and equipment or materials used in the cleaning process. Equipment requiring blanks and the frequency of blanks is summarized below and in Table 2.

Table 2. Summary of Blanking Requirements for Field Equipment.

System Component	Blanking Frequency
Intake Hose	One per batch
Peristaltic Pump Hose	One per batch[1] or 10% for batches greater than 10
Composite Bottles	One per batch or 10% for batches greater than 10
Subsampling Pump Hose	One per batch or 10% for batches greater than 10
Laboratory Sample Containers	2% of the lot[2] or batch, minimum of one
Capsule Filter Blank[3]	One per batch or 10% for batches greater than 10
Churn/Cone Splitter[4]	When field cleaning is performed, process one blank per session

[1] A batch is a group of samples that are cleaned at the same time and in the same manner.

[2] If decontaminated bottles are sent directly from the manufacturer, the batch would be the lot designated by the manufacturer in their testing of the bottles.

[3] If filtration is performed in the laboratory, the capsule filter blanks would be considered part of laboratory QA/QC.

[4] This is applicable to use of a churn or cone splitter to subsample flow-weighted composite samples into individual containers. Splitting may be performed by the sampling team in a protected, clean area or by the laboratory.

1.1.4.2 Field Duplicates

Composite subsampling duplicates associated with flow-weighted composite samples are often referred to as field duplicates but, in fact, they are subsampling replicates. These replicates help assess combined variability associated with subsampling from the composite container and variability associated with the analytical process. They are evaluated against the same criteria as used for laboratory duplicates.

1.1.5 Equipment Cleaning, Blanking and Tracking

Sample collection, handling, and processing materials can contribute and/or sorb trace elements within the time scales typical for collection, processing and analysis of runoff samples. Sampling artifacts are especially important when measured concentrations that are at or near analytical detection limits (Horowitz 1997). Therefore, great care is required to collect and process samples in a manner that will minimize potential contamination and variability in the sampling process (Breault and Granato 2000).

Sampling conducted to measure dissolved metals and other trace contaminants at levels relevant to EPA water quality criteria requires documentation that all sampling equipment is free of contamination and that the processes used to obtain and handle samples do not introduce contamination. This requires documentation that methods used to collect, process and analyze the samples do not introduce contamination. Documentation for the CIMP includes written procedures provided in Appendix B for cleaning all components of the sampling system, blanking processes necessary to verify that system components and sample handling are not introducing contamination, and a system of tracking deployment of protocol-cleaned equipment in the field as described in this section.

All composite containers and equipment used for sample collection in the field and/or sample storage in the laboratory will be decontaminated and cleaned prior to use. These include the FEP tubing, Teflon® lids, strainers and hoses/fittings that are used in the subsampling process (USGS 1993). Personnel assigned to clean and handle the equipment are thoroughly trained and familiar with the cleaning, blanking, and tracking procedures. In addition, all field sampling staff will be trained to be familiar with these processes so that they have a better understanding of the importance of using clean sampling procedures and the effort required to eliminate sources of contamination.

Sample contamination has long been considered one of the most significant problems associated with measurement of dissolved metals and may be accentuated with use of High Resolution Mass Spectroscopy (HRMS) methods for trace levels of organic constituents at levels three orders of magnitude lower than conventional GCMS methods. One of the major elements of QA/QC documentation is establishing that clean sampling procedures are used throughout the process and that all equipment used to collect and process the water samples are free of contamination.

Cleaning protocols are consistent with ASTM (2008) standard D5088 – 02 that covers cleaning of sampling equipment and sample bottles. The generalized cleaning process is based upon a series of washings that typically start with tap water with a phosphate-free detergent, a tap water rinse, soaking in a 10% solution of reagent grade nitric acid, and a final series of rinses with ASTM Type 1 water. Detailed procedures for decontamination of sampling equipment are provided in Appendix A. In addition, Appendix G of the most recent Caltrans Stormwater Monitoring Guidance Manual (Caltrans, 2013) provides alternative cleaning procedure that incorporate use of methylene chloride to remove potential organic contaminants. Experience indicates that this step can be eliminated and still result in blanking data suitable for most target organic contaminants. Addition of this cleaning step or a comparable step to address organic contaminants may be necessary if satisfactory equipment blanks cannot be attained. Significant issues exist with respect to use of

methylene chloride. This chemical is highly toxic, must be handled and disposed as a hazardous waste and is difficult to fully remove from the 20-L media bottles used as composite containers.

In order to account for any contamination introduced by sampling containers, blanks must be collected for composite bottles and laboratory bottles used for sample storage for trace contaminants. A sampling container blank is prepared by filling a clean container with blank water and measuring the concentrations of selected constituents (typically metals and other trace contaminants for composite bottles and metals analysis only for metals storage bottles). Blanking of the 20-L composite bottles will be performed by using the minimum amount of blank water necessary for the selected analytical tests. This is typically requires one to two liters. The bottle is capped and then manipulated to assure that all surfaces up to the neck of the bottle are rinsed. The water is then be allowed to sit for a minimum of one hour before decanting the rinse water into sample containers. In order to provide adequate control, media bottles are labelled and tracked. All media bottles cleaned and blanked in one batch are tracked to allow for recall if laboratory analyses reveal any contamination. Further tracking is required in the field to document where bottles from each cleaning batch are used and to assist in tracking of any contamination that might be detected after bottles have been deployed since laboratory turnaround in the middle of the storm season may require use of decontaminated bottles prior to receiving the results of the blank analyses.

Selected constituents for blanking will be dependent upon the list of contaminants with reasonable potential to be present at levels that could impact sample results. Minimum parameters used for blank analyses will include total recoverable trace metals, TDS, TOC and nutrients. Analysis of total metals will allow for detection of any residual metal contamination which will be of concern for all sampling. Nutrients, particularly nitrogen compounds, will assure that residual nitrogen from acid cleaning has been fully removed. TDS and TOC are useful for accessing presence of any residual contaminants. Additional blanking may be added when sampling other constituents with ultra-low analytical methods. These blanks may be submitted "blind" to the laboratory by field personnel or prepared internally by the laboratory.

Certified pre-cleaned QC-grade laboratory containers can be used. These bottles are cleaned using acceptable protocol for the intended analysis and tracked by lots. They come with standard certification forms that document the concentration to which the bottles are considered "contaminant-free" but these concentrations are not typically suitable for program reporting limits required for measurement of dissolved metals. Manufacturers may provide an option of certification to specific limits required by a project but it is preferable to purchase the QC bottles that are tracked by lot and conduct internal blanking studies. Lots not meeting project requirements should be returned to the manufacturer and exchanged for containers from another lot. At least 2% of the bottles in any "lot" or "batch" should be blanked at the program detection limits with a minimum frequency of one bottle per batch. A batch is considered to be a group of samples that are cleaned at the same time and in the same manner; or, if decontaminated bottles are sent directly from the manufacturer, the batch would be the lot designated by the manufacturer in their testing of the bottles. Cleaned bottles are stored in a clean area with lids properly secured.

Subsampling hoses consist of a length of peristaltic hose with short lengths of FEP tubing attached to each end. These are required to be cleaned inside and out since the FEP tubing is immersed in the composite bottle during the subsampling process. Once cleaned, the ends of the subsampling hoses are bagged. All hoses associated with the batch are then stored in large zip-lock containers labeled to identify the cleaning batch. Blanking of subsampling hoses is conducted as part of the composite bottle blanking process. A clean subsampling hose is used to decant blank water from the 20-L composite bottles into clean laboratory containers. Detection of any contaminants in the bottle blanks therefore requires that the subsampling hoses also are subjected another decontamination process. After cleaning, the subsampling hoses should only be handled while wearing clean, powder-free nitrile gloves.

APPENDIX D

NON-STORMWATER IC/ID AND OUTFALL TRACKING

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Operation Procedures	
Illicit Discharge Detection & Elimination: Initial Outfall Screening	
Purpose:	This provides a basic checklist for field crews conducting initial survey of storm drainage system outfalls for use in identification of illicit discharges

Reference: Brown et al., *Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments,* Center for Watershed Protection, Ellicott City, 2004.

Planning Considerations:

- ❑ Employees should have reviewed and understand the information presented in Chapter 11 of the reference manual
- ❑ Inspections are to occur during dry weather (no runoff producing precipitation in last 72 hours)
- ❑ Conduct inspections with at least two staff per crew
- ❑ Conduct inspections during low groundwater (if appropriate).
- ❑ Complete ***Site Info section on Outfall Reconnaissance Inventory Form*** before leaving the office. Additional forms should be available for undocumented outfalls

Field Methods:

- ❑ Ensure outfall is accessible.
- ❑ Inspect outfall only if safe to do so.
- ❑ Characterize the outfall by recording information on the ***LCC Outfall Reconnaissance Inventory Form.***
- ❑ Photograph the outfall with a digital camera (use dry erase board to identify outfall).
- ❑ Enter flow information on form if dry weather flow is present and ***easily*** obtained. If not, provide rough estimate of flow.
- ❑ Document clean, dry outfalls for potential elimination during future screening programs.
- ❑ Water samples will not be collected during the initial survey. In-situ measurements of temperature, conductivity, and pH should be taken if significant flow is present.
- ❑ Do not enter private property without permission.
- ❑ Photograph each site with the site identification written on the dry erase board.

Equipment List:

1. System map
2. Outfall Reconnaissance Inventory Forms
3. City identification or business cards
4. Digital camera (spare batteries)
5. Cell phone
6. GPS unit
7. Clip board and pencils
8. Dry erase board and pens
9. Hand Mirror
10. Flashlight (spare batteries)
11. Disposable gloves
12. Folding wood ruler or comparable
13. Temperature, Conductivity probe
14. pH probe/strips
15. ***Ammonia test strips***
16. ***Ten1-liter (polyethylene) sample bottles***
17. Watch with second hand
18. Calculator
19. Hand sanitizer
20. Safety vests
21. First aid kit
22. ***Cooler***
23. Permanent marker

Bolded, italicized items will only be needed for later surveys. No water quality samples will be taken for laboratory analysis during the first survey.

LOS CERRITOS CHANNEL OUTFALL RECONNAISSANCE INVENTORY/ SAMPLE COLLECTION FIELD SHEET

Section 1: Background Data

Subbasin:		Outfall ID:	
Today's date:		Time (Military):	
Investigators:		Form completed by:	
Temperature (°F):	Rainfall (in.): Last 24 hours: Last 48 hours:		
Latitude:	Longitude:	GPS Unit:	GPS LMK #:
Camera:		Photo #s:	

Land Use in Drainage Area (Check all that apply):

☐ Industrial ☐ Open Space

☐ Ultra-Urban Residential ☐ Institutional

☐ Suburban Residential Other: _____

☐ Commercial Known Industries: _____

Notes (e.g.., origin of outfall, if known):

Section 2: Outfall Description

LOCATION	MATERIAL	SHAPE		DIMENSIONS (IN.)	SUBMERGED
☐ **Closed Pipe**	☐ RCP ☐ CMP ☐ PVC ☐ HDPE ☐ Steel ☐ Other: _____	☐ Circular ☐ Elliptical ☐ Box ☐ Other: _____	☐ Single ☐ Double ☐ Triple ☐ Other: _____	Diameter/Dimensions: _____	In Water: ☐ No ☐ Partially ☐ Fully With Sediment: ☐ No ☐ Partially ☐ Fully
☐ **Open drainage**	☐ Concrete ☐ Earthen ☐ rip-rap ☐ Other: _____	☐ Trapezoid ☐ Parabolic ☐ Other: _____		Depth: _____ Top Width: _____ Bottom Width: _____	
☐ **In-Stream**	**(applicable when collecting samples)**				
Flow Present?	☐ Yes ☐ No	***If No, Skip to Section 5***			
Flow Description (If present)	☐ Trickle ☐ Moderate ☐ Substantial				

Section 3: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS				
PARAMETER		**RESULT**	**UNIT**	**EQUIPMENT**
☐Flow #1	Volume		Liter	Bottle
	Time to fill		Sec	
☐Flow #2	Flow depth		In	Tape measure
	Flow width	____' ____"	Ft, In	Tape measure
	Measured length	____' ____"	Ft, In	Tape measure
	Time of travel		S	Stop watch
Temperature			°F	Meter
pH			pH Units	Meter
Ammonia			mg/L	Test strip

Los Cerritos Channel Outfall Reconnaissance Inventory Field Sheet

Section 4: Physical Indicators for Flowing Outfalls Only

Are Any Physical Indicators Present in the flow? ☐ Yes ☐ No *(If No, Skip to Section 5)*

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (1-3)		
Odor	☐	☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas ☐ Sulfide ☐ Other:	☐ 1 – Faint	☐ 2 – Easily detected	☐ 3 – Noticeable from a distance
Color	☐	☐ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other:	☐ 1 – Faint colors in sample bottle	☐ 2 – Clearly visible in sample bottle	☐ 3 – Clearly visible in outfall flow
Turbidity	☐	See severity	☐ 1 – Slight cloudiness	☐ 2 – Cloudy	☐ 3 – Opaque
Floatables -Does Not Include Trash!!	☐	☐ Sewage (Toilet Paper, etc.) ☐ Suds ☐ Petroleum (oil sheen) ☐ Other:	☐ 1 – Few/slight; origin not obvious	☐ 2 – Some; indications of origin (e.g., possible suds or oil sheen)	☐ 3 - Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls

Are physical indicators that are not related to flow present? ☐ Yes ☐ No *(If No, Skip to Section 6)*

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
Outfall Damage	☐	☐ Spalling, Cracking or Chipping ☐ Peeling Paint ☐ Corrosion	
Deposits/Stains	☐	☐ Oily ☐ Flow Line ☐ Paint ☐ Other:	
Abnormal Vegetation	☐	☐ Excessive ☐ Inhibited	
Poor pool quality	☐	☐ Odors ☐ Colors ☐ Floatables ☐ Oil Sheen ☐ Suds ☐ Excessive Algae ☐ Other:	
Pipe benthic growth	☐	☐ Brown ☐ Orange ☐ Green ☐ Other:	

Section 6: Overall Outfall Characterization

☐ Unlikely ☐ Potential (presence of two or more indicators) ☐ Suspect (one or more indicators with a severity of 3) ☐ Obvious

Section 7: Data Collection

1. Sample for the lab?	☐ Yes	☐ No	
2. If yes, collected from:	☐ Flow	☐ Pool	
3. Intermittent flow trap set?	☐ Yes	☐ No	If Yes, type: ☐ OBM ☐ Caulk dam

Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)?

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APPENDIX E

MAJOR AND MINOR OUTFALLS TO THE LOS CERRITOS CHANNEL WATERSHED

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Major Outfalls (=>36 inches) in the Los Cerritos Channel Watershed

LDISCHARGE POINT	DESCRIPTION	DISCHARGE POINT LATITUDE	DISCHARGE POINT LONGITUDE	OWNER	SIDE (R/L)	DISTANCE FROM CHANNEL STARTING POINT (km)	JURISDICTION	MODEL SUB WATERSHED	UNIQUE ID	PHOTO UNIQUE ID	CHANNEL UNIQUE ID
CLARK CHANNEL											
N. Charlemagne Ave/E. Pageantry St	36" Discharge	33.81315	-118.12997	Long Beach	R	1.925	Long Beach	BI9A-5	BI9A-5-001		CC-0.273
N. Rutgers Ave/E. Pageantry St	36" Discharge	33.81317	-118.12970	Long Beach	L	1.927	Long Beach	BI9A-5	BI9A-5-002		CC-0.275
N Charlemagne Ave/E. Mezzanine Way	72" Discharge	33.81519	-118.12998	Long Beach	R	2.141	Long Beach	BI9A-5	BI9A-5-003		CC-0.494
N Rutgers Ave/E. Mezzanine Way	54" Discharge	33.81519	-118.12971	Long Beach	L	2.152	Long Beach	BI9A-5	BI9A-5-004		CC-0.507
3343 Rutgers Ave/E. Wardlow Rd	36" Discharge	33.81791	-118.12970	UNK	L	2.449	Long Beach	BI9A-5	BI9A-5-005		CC-0.793
N. Charlemagne Ave/E. Wardlow Rd	42" Discharge	33.81870	-118.12997	LACFCD	R	2.528	Long Beach	BI9A-5	BI9A-5-006		CC-0.877B
N. Rutgers Ave/E. Wardlow Rd	42" Discharge	33.81869	-118.12971	LACFCD	L	2.528	Long Beach	BI9A-5	BI9A-5-007		CC-0.877A
N. Charlemagne/E. Monlaco Rd	150" Discharge	33.82273	-118.12977	LACFCD	R	2.993	Long Beach	BI9A-5	BI9A-5-015		CC-1.342
N. Rutgers Ave/E. Keynote St	63" Discharge	33.82355	-118.12967	LACFCD	L	3.070	Long Beach	BI9A-4	BI9A-4-001		CC-1.419
E. Conant St/N. Charlemagne Ave	39" Discharge	33.82505	-118.12990	LACFCD	R	3.238	Long Beach	BI9A-4	BI9A-4-002		CC-1.586
Carson St/N. Bellflower Blvd	63" Discharge	33.83124	-118.13056	LACFCD	L	3.960	Long Beach	BI9A-4	BI9A-4-007		CC-2.309

Carson St/N. Greenbrier Rd	48" Discharge	33.83215	-118.13235	LACFCD	R	4.164	Long Beach	BI9A-4	BI9A-4-008		CC-2.512
Carson St/N. Greenbrier Rd	45" Discharge	33.83233	-118.13233	LACFCD	R	4.206	Long Beach	BI9A-4	BI9A-4-011		CC-2.555
Harvey Way/N. Greenbrier Rd	51" Discharge	33.83612	-118.13233	LACFCD	R	4.599	Long Beach	BI9A-4	BI9A-4-016		CC-2.948
Harvey Way/Heather Rd	81" Discharge	33.83613	-118.13205	LACFCD	L	4.602	Long Beach	BI9A-4	BI9A-4-017		CC-2.950
E. Centralia St/N. Greenbrier Rd	42" Discharge	33.83954	-118.13225	LACFCD	R	4.976	Long Beach	BI9A-3	BI9A-3-001		CC-3.324A
E. Centralia St/Heather Rd	42" Discharge	33.83951	-118.13206	LACFCD	L	4.976	Long Beach	BI9A-3	BI9A-3-002		CC-3.324B
E. Arbor Rd/Clark Ave	36" Discharge	33.84300	-118.13226	LACFCD	R	5.348	Long Beach	BI9A-3	BI9A-3-007		CC-3.696
E. Arbor Rd/Clark Ave	39" Discharge	33.84297	-118.13225	LACFCD	R	5.357	Long Beach	BI9A-3	BI9A-3-008		CC-3.705
4763 Fidler Ave/Del Amo Blvd	36" Discharge	33.84500	-118.13203	Long Beach	L	5.586	Long Beach	BI9A-3	BI9A-3-011		CC-3.934
Del Amo Blvd/Fidler Ave	138" Discharge	33.84697	-118.13223	LACFCD	C	5.807	Lakewood	BI9A-3	BI9A-3-014		CC-4.155
Civic Center/Clark Ave	36" Discharge	33.84922	-118.13228	LACFCD	R	6.052	Lakewood	BI9A-2	BI9A-2-002		CC-4.413
Candlewood St/Fidler Ave	57" Discharge	33.85360	-118.13219	LACFCD	L	6.521	Lakewood	BI9A-2	BI9A-2-009		CC-4.882
Candlewood St/Fidler Ave	126" Discharge	33.85379	-118.13221	LACFCD		6.586	Lakewood	BI9A-1	BI9A-1-002		CC-4.916
Candlewood St/Clark Ave	72" Discharge	33.85442	-118.13226	LACFCD	R	6.625	Lakewood	BI9A-1	BI9A-1-003		CC-4.986
5443 Fidler Ave/Michelson St	36" Discharge	33.85618	-118.13213	LACFCD	L	6.818	Lakewood	BI9A-1	BI9A-1-008	BI9A-1-007	CC-5.179
Clark Ave/Michelson St	126" Discharge	33.85684	-118.13225	LACFCD		6.889	Lakewood	BI9A-1	BI9A-1-010		CC-5.250
South St/Fidler Ave	39" Discharge	33.86017	-118.13219	LACFCD	L	7.255	Lakewood	BI9A-1	BI9A-1-013		CC-5.616A

South St/Dagwood Ave	57" Discharge	33.86017	-118.13232	LACFCD	R	7.255	Lakewood	BI9A-1	BI9A-1-014		CC-5.616B
											CC-5.652
South St/Dagwood Ave	132" Discharge	33.86046	-118.13225	LACFCD	C	7.290	Lakewood	BI9A-1	BI9A-1-017		CC-5.651
Hedda St/Fidler Ave	39" Discharge	33.86411	-118.13232	LACFCD	L	7.696	Lakewood	BI9A-1	BI9A-1-018		CC-6.057B
Hedda St/Fidler Ave	39" Discharge	33.86409	-118.13234	LACFCD	R	7.696	Lakewood	BI9A-1	BI9A-1-019		CC-6.057A
Ashworth St/Fidler Ave	75" Discharge	33.86780	-118.13235	LACFCD	R	8.109	Lakewood	BI9A-1	BI9A-1-022		CC-6.469
Ashworth St/Fidler Ave	132" Discharge	33.86836	-118.13233	Lakewood	L	8.162	Lakewood	BI9A-1	BI9A-1-025		CC-6.522
Clark Ave/Ashworth St	87" Discharge	33.86848	-118.13355	LACFCD		8.282	Lakewood	BI9A-1	BI9A-1-026		CC-6.643
DEL AMO CHANNEL											
Del Amo Blvd/Whitewood Ave	36" Discharge	33.84696	-118.13552	UNK	L	0.286	Lakewood	BI9B-2	BI9B-2-003	BI9B-2-003	DAC-0.331
Del Amo Blvd/Faculty Ave	36" Discharge	33.84696	-118.13695	LACFCD	L	0.421	Lakewood	BI9B-2	BI9B-2-004	BI9B-2-004	DAC-0.466
Del Amo Blvd/Graywood Ave	42" Discharge	33.84698	-118.13783	LACFCD	L	0.508	Lakewood	BI9B-2	BI9B-2-005	BI9B-2-005	DAC-0.554
Del Amo Blvd/Graywood Ave	36" Discharge	33.84699	-118.13797	LACFCD	L	0.516	Lakewood	BI9B-2	BI9B-2-006	BI9B-2-005	DAC-0.561
Del Amo Blvd/Hazelbrook Ave	36" Discharge	33.84694	-118.19539	LACFCD	L	0.664	Lakewood	BI9B-2	BI9B-2-010	BI9B-2-010	DAC-0.709
Del Amo Blvd/Blackthorne Ave	36" Discharge	33.84697	-118.14041	LACFCD	R	0.737	Lakewood	BI9B-2	BI9B-2-011	BI9B-2-011	DAC-0.782

Del Amo Blvd/N. Blackthorne Ave	18" Discharge	33.84698	-118.14024	LACFCD	L	0.7388	Lakewood	BI9B-2	BI9B-2-012		DAC-0.784
Del Amo Blvd/N. Pepperwood Ave	36" Discharge	33.84699	-118.14126	LACFCD	L	0.820	Lakewood	BI9B-2	BI9B-2-014	BI9B-2-014	DAC-0.865
Del Amo Blvd/Lakewood Blvd	36" Discharge	33.84701	-118.14200	LACFCD	L	0.902	Lakewood	BI9B-2	BI9B-2-016	BI9B-2-016	DAC-0.947
Del Amo Blvd/Lakewood Blvd	45" Discharge	33.84699	-118.14226	LACFCD	L	0.917	Lakewood	BI9B-2	BI9B-2-018	BI9B-2-018	DAC-0.963
Del Amo Blvd/Lakewood Blvd	36" Discharge	33.84700	-118.14255	UNK	L	1.960	Lakewood	BI9B-2	BI9B-2-020	BI9B-2-020	DAC-1.004
Del Amo Blvd/Hayter Ave	48" Discharge	33.84702	-118.14598	LACFCD	L	1.253	Lakewood	BI9B-2	BI9B-2-024	BI9B-2-024	DAC-1.253
Del Amo Blvd/Hayter Ave	45" Discharge	33.84684	-118.14629	LACFCD	R	1.289	Lakewood	BI9B-2	BI9B-2-027	BI9B-2-027	DAC-1.334B
Del Amo Blvd/Downey Ave	48" Discharge	33.84703	-118.15051	LACFCD	R	1.666	Lakewood	BI9B-2	BI9B-2-029	BI9B-2-029	DAC-1.711
Downey Ave/Eckleson St	114" Discharge	33.84884	-118.15047	LACFCD		1.911	Lakewood	BI9B-2	BI9B-2-032		DAC-1.911
DOWNEY CHANNEL											
Candlewood St/Downey Ave	42" Discharge	33.853717	-118.150524	UNK	R	0.551	Lakewood	BI447A	BI447A-003	BI447A-003	DNC-0.5514
Candlewood St/Downey Ave	42" Discharge	33.854243	-118.150513	UNK	R	0.609	Lakewood	BI447A	BI447A-005	BI447-005	DNC-0.6093
Candlewood St/Downey Ave	42" Discharge	33.854297	-118.150527	Lakewood	R	0.618	Lakewood	BI447A	BI447A-006	BI447A-006	DNC-0.618
Candlewood St/Downey Ave	72" Discharge	33.854368	-118.150421	Lakewood	L	0.624	Lakewood	BI447A	BI447A-007	BI447A-007	DNC-0.624
Saint Pancratius Pl/Verdura Ave	117" Discharge	33.858402	-118.150459	Lakewood	L	1.072	Lakewood	BI447A	BI447A-008		DNC-1.072B

Saint Pancratius Pl/Verdura Ave	117" Discharge	33.858405	-118.15051	Lakewood	R	1.072	Lakewood	BI447A	BI447A-009		DNC-1.072A
Candlewood St/Downey Ave	72" Discharge	33.854382	-118.15029	Lakewood		0.633	Lakewood	BI447A	BI447A-010		DNC-0.796
Obispo Ave/Eckleson St	36" Discharge	33.849078	-118.154687	LACFCD	R	2.332	Lakewood	BI9B-1	BI9B-1-004		DNC-2.332
Obispo Ave/Eckleson St	60" Discharge	33.849074	-118.154747	LACFCD	R	2.336	Lakewood	BI9B-1	BI9B-1-005		DNC-2.336
Obispo Ave/Eckleson St	36" Discharge	33.849083	-118.154825	UNK	R	2.347	Lakewood	BI9B-1	BI9B-1-006		DNC-2.347
Obispo Ave/Eckleson St	48" Discharge	33.849183	-118.154825	UNK	L	2.347	Lakewood	BI9B-1	BI9B-1-007		DNC-2.347
Paramount Blvd/Eckleson St	66" Discharge	33.849146	-118.159614	LACFCD	L	2.804	Lakewood	BI9B-1	BI9B-1-008	BI9B-1-008	DNC-2.804A
Paramount Blvd/Eckleson St	66" Discharge	33.849096	-118.159614	LACFCD	R	2.804	Lakewood	BI9B-1	BI9B-1-009	BI9B-1-008	DNC-2.804B
LOS CERRITOS CHANNEL											
Knoxville Ave/E. Atherton St	36" Discharge (1 of 3)	33.78867	-118.10368	Long Beach	R	7.386	Long Beach	LCERR-5	LCERR-5-003		LCC-0.030
Knoxville Ave/E. Atherton St	36" Discharge (2 of 3)	33.78884	-118.10370	Long Beach	R	7.386	Long Beach	LCERR-5	LCERR-5-004		LCC-0.031
Knoxville Ave/E. Atherton St	36" Discharge (3 of 3)	33.78902	-118.10369	Long Beach	R	7.387	Long Beach	LCERR-5	LCERR-5-005		LCC-0.032
Vuelta Grande Ave/E. Atherton St	42" Discharge	33.78917	-118.10331	Long Beach	L	7.417	Long Beach	LCERR-5	LCERR-5-006		LCC-0.062
2040 Knoxville Ave	48" Discharge (1 of 3)	33.79319	-118.10369	LACFCD	R	7.876	Long Beach	LCERR-5	LCERR-5-007		LCC-0.521
2040 Knoxville Ave	48" Discharge (2 of 3)	33.79336	-118.10368	LACFCD	R	7.877	Long Beach	LCERR-5	LCERR-5-008		LCC-0.522

2040 Knoxville Ave	48" Discharge (3 of 3)	33.79356	-118.10369	LACFCD	R	7.878	Long Beach	LCERR-5	LCERR-5-009		LCC-0.523
Vuelta Grande Ave/N. Hidden Ln	42" Discharge	33.79304	-118.10333	LACFCD	L	7.899	Long Beach	LCERR-5	LCERR-5-010		LCC-0.544
Vuelta Grande Ave/E. Stearns St	48" Discharge	33.79565	-118.10330	LACFCD	L	8.135	Long Beach	LCERR-4	LCERR-4-001		LCC-0.780
Vuelta Grande Ave/E. la Marimba St	36" Discharge	33.79793	-118.10332	Long Beach	L	8.387	Long Beach	LCERR-4	LCERR-4-004		LCC-1.032
2372 Knoxville Ave/E. Cantel St	36" Discharge	33.80000	-118.10472	Long Beach	R	8.682	Long Beach	LCERR-4	LCERR-4-007		LCC-1.327
6400 Willow St/Palo Verde Ave	42" Discharge	33.80262	-118.10779	Long Beach	L	9.071	Long Beach	LCERR-4	LCERR-4-008		LCC-1.716
6220 Willow St/Palo Verde Ave	48" Discharge	33.80304	-118.10890	PVRT	R	9.181	Long Beach	LCERR-4	LCERR-4-009		LCC-1.826
Spring St/San Anseline Ave	66" Discharge	33.81035	-118.12130	LACFCD	L	0.725	Long Beach	LCERR-3	LCERR-3-002		LCC-3.388
Spring St/Bellflower Blvd	36" Discharge	33.81043	-118.12552	LACFCD	L	1.115	Long Beach	LCERR-3	LCERR-3-006		LCC-3.778
Spring St/Montair Ave	45" Discharge	33.81014	-118.12680	Long Beach	R	1.230	Long Beach	LCERR-3	LCERR-3-009		LCC-3.892
Heather Rd/Spring St	45" Discharge	33.81026	-118.13101	UNK	R	0.135	Long Beach	LCERR-2	LCERR-2-002		LCC-4.301A
Clark Ave/Spring St	96" Discharge	33.81034	-118.13376	LACFCD	C	0.392	Long Beach	LCERR-2	LCERR-2-004		LCC-4.558

N. Lakewood Blvd/E. Spring St	96" Discharge	33.81303	-118.13950	LACFCD		1.077	Long Beach	LCERR-2	LCERR-2-007		LCC-5.221
Lakewood Blvd/Spring St	36" Discharge	33.81306	-118.13949	LACFCD	L	1.045	Long Beach	LCERR-2	LCERR-2-005		LCC-5.229
Spring St/Lakewood Blvd	54" Discharge	33.81313	-118.14033	LACFCD	R	1.135	Long Beach	LCERR-2	LCERR-2-006		LCC-5.319
Spring St/Lakewood Blvd	108" Discharge	33.81316	-118.14235	LACFCD	L	1.322	Long Beach	LCERR-1	LCERR-1-001		LCC-5.506
Spring St/Lakewood Blvd	120" Discharge	33.81288	-118.14249	LACFCD	R	1.341	Long Beach	LCERR-1	LCERR-1-002		LCC-5.525
WARDLOW CHANNEL											
Clark Ave/Keynote St	228" Discharge	33.82331	-118.13408	LACFCD		5.885	Long Beach	BI9C	BI9C-001		WC-5.883
Lakewood Blvd	36" Discharge	33.82333	-118.13822	LACFCD	L	6.194	Long Beach	BI9C	BI9C-004		WC-6.264
Lakewood Blvd	42" Discharge	33.82332	-118.14130	LACFCD	L	6.482	Long Beach	BI9C	BI9C-005		WC-6.555
Lakewood Blvd	228" Discharge	33.82332	-118.14165	LACFCD		6.520	Long Beach	BI9A-5	BI9A-5-017		WC-6.586
PALO VERDE CHANNEL											
WOODRUFF AVE / SPRING ST	54" Discharge	33.81090	-118.11427	Long Beach	R	0.430	Long Beach	BI9E-2	BI9E-2-006		PVC-0.430
3055 SHADYPARK DR/McNab Ave	36" Discharge	33.81224	-118.11410	Long Beach	L	0.584	Long Beach	BI9E-2	BI9E-2-007		PVC-0.584

LOS CERRITOS DRAIN LINE E / LOS COYOTES DIA/E.Pagentry St	36" Discharge (1 of 2)	33.81329	-118.11409	LACFCD	R	0.723	Long Beach	BI9E-2	BI9E-2-009		PVC-0.723
LOS CERRITOS DRAIN LINE E / LOS COYOTES DIA/E.Pagentry St	36" Discharge (2 of 2)	33.81359	-118.11407	LACFCD	R	0.727	Long Beach	BI9E-2	BI9E-2-010		PVC-0.727
LOS COYOTES DIA / GONDAR AVE	48" Discharge	33.81550	-118.11258	LACFCD	R	0.987	Long Beach	BI9E-2	BI9E-2-014		PVC-0.987
6228 WARDLOW RD/Los Coyotes Dia W	36" Discharge	33.81864	-118.10980	Long Beach	R	1.426	Long Beach	BI9E-2	BI9E-2-016		PVC-1.426
Los Coyotes Dia/Conquista Ave	42" Discharge	33.82054	-118.10802	Long Beach	L	1.684	Long Beach	BI9E-2	BI9E-2-019		PVC-1.684
PALO VERDE AVE / LOS COYOTES DIA	36" Discharge (1 of 2)	33.82110	-118.10793	LACFCD	L	1.748	Long Beach	BI9E-2	BI9E-2-021		PVC-1.747
PALO VERDE AVE / LOS COYOTES DIA	36" Discharge (2 of 2)	33.82110	-118.10793	LACFCD	L	1.748	Long Beach	BI9E-2	BI9E-2-022		PVC-1.748
3778 PALO VERDE AVE/Harco St	36" Discharge	33.82715	-118.10795	LACFCD	L	2.434	Long Beach	BI9E-2	BI9E-2-026		PVC-2.434
3788 CONQUISTA AVE/Harco St	48" Discharge	33.82758	-118.10811	LACFCD	R	2.470	LA County(LBC-254)	BI9E-2	BI9E-2-027		PVC-2.470
Palo Verde Ave/E. Parkcrest St	72" Discharge	33.83025	-118.10793	LACFCD	L	2.778	Los Angeles County	BI9E-2	BI9E-2-028		PVC-2.778A
	72" Discharge	33.83026	-118.10793	LACFCD	L	2.7779	Los Angeles County	BI9E-2	BI9E-2-029		PVC-2.778B
Carson St/Palo Verde Ave	48" Discharge	33.83232	-118.10832	Long Beach	L	3.008	Long Beach	BI9E-1	BI9E-1-034		PVC-3.008
Harvey Way/Palo Verde Ave	36" Discharge	33.83585	-118.10829	LACFCD	L	3.418	Lakewood	BI9E-1	BI9E-1-006	BI9E-1-006	PVC-3.417
Harvey Way/Palo Verde Ave	36" Discharge	33.83592	-118.10840	LACFCD	R	3.418	Lakewood	BI9E-1	BI9E-1-007	BI9E-1-007	PVC-3.418

Harvey Way/Palo Verde Ave	36" Discharge	33.83613	-118.10839	LACFCD	R	3.438	Lakewood	BI9E-1	BI9E-1-008	BI9E-1-008	PVC-3.437
Centralia St/Palo Verde Ave	48" Discharge	33.83948	-118.10822	LACFCD	L	3.827	Lakewood	BI9E-1	BI9E-1-013	BI9E-1-013	PVC-3.827
Henrilee Lateral/Conquista Ave	6'x7' Trap Channel Discharge	33.84132	-118.10834	LACFCD	R	4.017	Lakewood	BI9E-1	BI9E-1-032	BI9E-1-032	PVC-4.017
Turnergrove Dr/Silva St	48" Discharge (1 of 2)	33.84822	-118.10873	LACFCD	R	4.793	Lakewood	BI9E-1	BI9E-1-025	BI9E-1-025	PVC-4.793
Turnergrove Dr/Silva St	48" Discharge (2 of 2)	33.84824	-118.10873	LACFCD	R	4.795	Lakewood	BI9E-1	BI9E-1-026	BI9E-1-025	PVC-4.795
Palo Verde Ave/Carfax Ave	48" Discharge	33.84925	-118.10918	LACFCD	L	4.905	Lakewood	BI9E-1	BI9E-1-027	BI9E-1-027	PVC-4.905
Candlewood St/Carfax Ave	51" Discharge	33.85309	-118.11127	LACFCD	L	5.368	Lakewood	BI9E-1	BI9E-1-030	BI9E-1-030	PVC-5.368
Candlewood St/Carfax Ave	54" Discharge	33.85313	-118.11142	LACFCD	R	5.374	Lakewood	BI9E-1	BI9E-1-031	BI9E-1-031	PVC-5.374
South St/Canehill Ave	63" Discharge	33.85820	-118.11151	LACFCD	L	5.960	Lakewood	BI446B	BI446B-004	BI446B-004	PVC-5.960
South St/Canehill Ave	42" Discharge	33.85854	-118.11148	LACFCD	L	6.004	Lakewood	BI446B	BI446B-007	BI446B-007	PVC-6.004
Snowden Ave/Charlwood St	36" Discharge	33.85921	-118.11171	LACFCD	R	6.080	Lakewood	BI446B	BI446B-008	BI446B-000	PVC-6.080
Allington St/Canehill Ave	72" Discharge	33.86546	-118.11160	LACFCD	L	6.792	Lakewood	BI446B	BI446B-011	BI446B-011	PVC-6.793B
Allington St/Canehill Ave	75" Discharge	33.86546	-118.11161	LACFCD	R	6.792	Lakewood	BI446B	BI446B-012	BI446B-011	PVC-6.793A

Minor Outfalls (12-36 inches) in the Los Cerritos Channel Watershed

DISCHARGE POINT	EFFLUENT DESCRIPTION	DISCHARGE POINT LATITUDE	DISCHARGE POINT LONGITUDE	OWNER	SIDE (L/R)	DISTANCE FROM CHANNEL STARTING POINT (km)	JURISDICTION	MODEL SUB WATERSHED	UNIQUE ID	PHOTO UNIQUE ID	CHANNEL UNIQUE ID
CLARK CHANNEL											
Charlemagne Ave/Spring St	24" Discharge	33.81081	-118.13000	LACFCD	R	1.662	Long Beach	LCERR-3	LCERR-3-011		CC-0.009A
Rutgers Ave/Spring St	18" Discharge	33.81079	-118.12973	LACFCD	L	1.662	Long Beach	LCERR-3	LCERR-3-012		CC-0.009B
N. Charlemagne Ave/E. Wardlow Rd	18" Discharge	33.81895	-118.12994	Long Beach	R	2.565	Long Beach	BI9A-5	BI9A-5-008		CC-0.914B
E. Wardlow Rd/N. Rutgers Ave	18" Discharge	33.81897	-118.12970	Long Beach	L	2.565	Long Beach	BI9A-5	BI9A-5-009		CC-0.914A
Stanbridge Ave/E. Wardlow Rd	24" Discharge	33.81936	-118.12971	LACFCD	L	2.612	Long Beach	BI9A-5	BI9A-5-010		CC-0.961
E. Monlaco Rd/N. Rutgers Ave	18" Discharge	33.82216	-118.12968	Long Beach	L	2.924	Long Beach	BI9A-5	BI9A-5-012		CC-1.273
E. Monlaco Rd/N. Rutgers Ave	18" Discharge	33.82236	-118.12967	Long Beach	L	2.941	Long Beach	BI9A-5	BI9A-5-013		CC-1.290A
E. Monlaco Rd/N. Charlemagne Ave	18" Discharge	33.82233	-118.12995	Long Beach	R	2.941	Long Beach	BI9A-5	BI9A-5-014		CC-1.290B
E. Conant St/N. Charlemagne Ave	15" Discharge	33.82498	-118.12992	Long Beach	R	3.239	Long Beach	BI9A-4	BI9A-4-003		CC-1.587
E. Conant St/N. Charlemagne Ave	15" Discharge	33.82517	-118.12992	Long Beach	R	3.256	Long Beach	BI9A-4	BI9A-4-004		CC-1.605
N. Charlemagne Ave/E. Brittain St	24" Discharge	33.82604	-118.12991	Long Beach	R	3.354	Long Beach	BI9A-4	BI9A-4-005		CC-1.703
Carson St/N. Bellflower Blvd	12" Discharge	33.83070	-118.12970	LACFCD	L	3.865	Long Beach	BI9A-4	BI9A-4-006		CC-2.214
Carson St/N. Greenbrier Rd	24" Discharge	33.83223	-118.13231	Long Beach	R	4.168	Long Beach	BI9A-4	BI9A-4-009		CC-2.517A
Carson St/Heather Rd	24" Discharge	33.83223	-118.13210	Long Beach	L	4.168	Long Beach	BI9A-4	BI9A-4-010		CC-2.517B
Carson St/N. Greenbrier Rd	24" Discharge	33.83246	-118.13231	Long Beach	R	4.211	Long Beach	BI9A-4	BI9A-4-012		CC-2.560A
Carson St/Heather Rd	24" Discharge	33.83246	-118.13209	Long Beach	L	4.211	Long Beach	BI9A-4	BI9A-4-013		CC-2.560B
Harvey Way/Heather Rd	18" Discharge	33.83606	-118.13204	Long Beach	L	4.598	Long Beach	BI9A-4	BI9A-4-014		CC-2.947A

Harvey Way/Heather Rd	18" Discharge	33.83606	-118.13232	Long Beach	R	4.598	Long Beach	BI9A-4	BI9A-4-015		CC-2.947B
Harvey Way/N. Greenbrier Rd	18" Discharge	33.83620	-118.13231	Long Beach	R	4.610	Long Beach	BI9A-4	BI9A-4-018		CC-2.958A
Harvey Way/Heather Rd	18" Discharge	33.83620	-118.13205	Long Beach	L	4.610	Long Beach	BI9A-4	BI9A-4-019		CC-2.958B
E. Centralia St/N. Greenbrier Rd	18" Discharge	33.83969	-118.13227	Long Beach	R	4.994	Long Beach	BI9A-3	BI9A-3-003		CC-3.342A
E. Centralia St/Heather Rd	18" Discharge	33.83967	-118.13203	Long Beach	L	4.994	Long Beach	BI9A-3	BI9A-3-004		CC-3.342B
E. Centralia St/Pan American Park	15" Discharge	33.84087	-118.13202	Long Beach	L	5.129	Long Beach	BI9A-3	BI9A-3-005		CC-3.477
E. Arbor Rd/Pan American Park	15" Discharge	33.84154	-118.13203	Long Beach	L	5.205	Long Beach	BI9A-3	BI9A-3-006		CC-3.554
E. Arbor Rd/N. Charlemagne	24" Discharge	33.84312	-118.13202	Long Beach	L	5.379	Long Beach	BI9A-3	BI9A-3-009		CC-3.728
E. Arbor Rd./Fidler Ave	30" Discharge	33.84351	-118.13202	Long Beach	L	5.416	Long Beach	BI9A-3	BI9A-3-010		CC-3.764
Del Amo Blvd/Fidler Ave	33" Discharge	33.84693	-118.13217	LACFCD	L	5.801	Lakewood	BI9A-3	BI9A-3-012	BI9A-3-012	CC-4.149
Del Amo Blvd/Fidler Ave	18" Discharge	33.84701	-118.13216	UNK	L	5.802	Lakewood	BI9A-3	BI9A-3-013	BI9A-3-013	CC-4.150
Del Amo Blvd/Civic Center Way	30" Discharge	33.84721	-118.13220	UNK	L	5.834	Lakewood	BI9A-2	BI9A-2-001		CC-4.182
Civic Center/Del Amo Blvd	24" Discharge	33.84984	-118.13231	UNK	R	6.123	Lakewood	BI9A-2	BI9A-2-003		CC-4.484
Civic Center Way/Hardwick St	30" Discharge	33.85077	-118.13222	LACFCD	L	6.215	Lakewood	BI9A-2	BI9A-2-004		CC-4.575
Civic Center Way/Candlewood St	12" Discharge	33.85243	-118.13229	UNK	R	6.401	Lakewood	BI9A-2	BI9A-2-007		CC-4.762
Civic Center Way/Candlewood St	18" Discharge	33.85268	-118.13229	Lakewood	R	6.422	Lakewood	BI9A-2	BI9A-2-008		CC-4.783
Candlewood St/Clark Ave	18" Discharge	33.85382	-118.13222	LACFCD	R	6.545	Lakewood	BI9A-1	BI9A-1-001		CC-4.906
Candlewood St/Clark Ave	12" Discharge	33.85493	-118.13235	UNK	R	6.674	Lakewood	BI9A-1	BI9A-1-004		CC-5.035
Clark Ave/Michelson St	12" Discharge	33.85577	-118.13230	UNK	R	6.774	Lakewood	BI9A-1	BI9A-1-005		CC-5.135
Clark Ave/Michelson St	12" Discharge	33.85594	-118.13231	UNK	R	6.791	Lakewood	BI9A-1	BI9A-1-006		CC-5.151
Clark Ave/Michelson St	12" Discharge	33.85612	-118.13231	UNK	R	6.807	Lakewood	BI9A-1	BI9A-1-007		CC-5.168
Clark Ave/Michelson St	12" Discharge	33.85631	-118.13231	UNK	R	6.834	Lakewood	BI9A-1	BI9A-1-009		CC-5.194
Fidler Ave/Bigelow St	12" Discharge	33.85765	-118.13232	UNK	R	6.981	Lakewood	BI9A-1	BI9A-1-011		CC-5.342
Clark Ave/South St	24" Discharge	33.85968	-118.13228	Lakewood	R	7.192	Lakewood	BI9A-1	BI9A-1-012		CC-5.553
South St/Dagwood Ave	20" Discharge	33.86046	-118.13233	UNK	R	7.289	Lakewood	BI9A-1	BI9A-1-015		CC-5.649
South St/Fidler Ave	30" Discharge	33.86045	-118.13219	UNK	L	7.291	Lakewood	BI9A-1	BI9A-1-016		CC-5.652
Hedda St/Fidler Ave	15" Discharge	33.86417	-118.13221	UNK	L	7.697	Lakewood	BI9A-1	BI9A-1-020		CC-6.058

Hedda St/Fidler Ave	15" Discharge	33.86427	-118.13221	UNK	L	7.708	Lakewood	BI9A-1	BI9A-1-021		CC-6.089
Ashworth St/Fidler Ave	15" Discharge	33.86783	-118.13225	Lakewood	L	8.112	Lakewood	BI9A-1	BI9A-1-023		CC-6.472
Ashworth St/Fidler Ave	15" Discharge	33.86799	-118.13227	Lakewood	L	7.708	Lakewood	BI9A-1	BI9A-1-024		CC-6.485
DEL AMO CHANNEL											
Del Amo Blvd/Fidler Ave	24" Discharge	33.84697	-118.13290	UNK	L	0.079	Lakewood	BI9B-2	BI9B-2-001	BI9B-2-001	DAC-0.079
Del Amo Blvd/Whitewood Ave	24" Discharge	33.84697	-118.13540	Lakewood	L	0.283	Lakewood	BI9B-2	BI9B-2-002	BI9B-2-002	DAC-0.328
Del Amo Blvd/Graywood Ave	18" Discharge	33.84680	-118.13791	Long Beach	R	0.517	Lakewood	BI9B-2	BI9B-2-007	BI9B-2-007	DAC-0.562
Del Amo Blvd/Graywood Ave	15" Discharge	33.84680	-118.13827	Long Beach	R	0.538	Lakewood	BI9B-2	BI9B-2-008	BI9B-2-008	DAC-0.583
Del Amo Blvd/Graywood Ave	15" Discharge	33.84680	-118.13930	Long Beach	R	0.554	Lakewood	BI9B-2	BI9B-2-009	BI9B-2-009	DAC-0.599
Del Amo Blvd/Hazelbrook Ave	36" Discharge	33.84694	-118.13953		L	0.6642	Lakewood	BI9B-2	BI9B-2-010		DAC-0.709
Del Amo Blvd/Blackthorne Ave	18" Discharge	33.84680	-118.14030	Long Beach	R	0.742	Lakewood	BI9B-2	BI9B-2-013	BI9B-2-013	DAC-0.784
Del Amo Blvd/N. Blackthorne Ave	18" Discharge	33.84698	-118.14024	LACFCD	L	0.739	Lakewood	BI9B-2	BI9B-2-012	BI9B-2-012	DAC-0.787
Del Amo Blvd/N. Pepperwood Ave	15" Discharge	33.84681	-118.14139	Long Beach	R	0.836	Lakewood	BI9B-2	BI9B-2-015	BI9B-2-015	DAC-0.881
Del Amo Blvd/Lakewood Blvd	15" Discharge	33.84682	-118.14225	Long Beach	R	0.908	Lakewood	BI9B-2	BI9B-2-017	BI9B-2-017	DAC-0.953
Del Amo Blvd/Lakewood Blvd	18" Discharge	33.84700	-118.14241	Long Beach	L	0.924	Lakewood	BI9B-2	BI9B-2-019	BI9B-2-019	DAC-0.970
Del Amo Blvd/Lakewood Blvd	12" Discharge	33.84689	-118.14267	Lakewood	L	1.005	Lakewood	BI9B-2	BI9B-2-021	BI9B-2-021	DAC-1.005
Del Amo Blvd/Lakewood Blvd	18" Discharge	33.84681	-118.14264	Long Beach	R	1.961	Lakewood	BI9B-2	BI9B-2-022	BI9B-2-021	DAC-1.006
Del Amo Blvd/Oliva Ave	30" Discharge	33.84683	-118.14493	UNK	R	1.207	Lakewood	BI9B-2	BI9B-2-023	BI9B-2-023	DAC-1.252
Del Amo Blvd/Hayter Ave	30" Discharge	33.84686	-118.14618	UNK	R	1.289	Lakewood	BI9B-2	BI9B-2-026	BI9B-2-026	DAC-1.324
Del Amo Blvd/Hayter Ave	30" Discharge	33.84701	-118.14623	UNK	L	1.279	Lakewood	BI9B-2	BI9B-2-025	BI9B-2-025	DAC-1.334A
Del Amo Blvd/Verdura Ave	24" Discharge	33.84705	-118.14970	UNK	L	1.614	Lakewood	BI9B-2	BI9B-2-028	BI9B-2-028	DAC-1.659
Del Amo Blvd/Downey Ave	18" Discharge	33.84723	-118.15061	UNK	R	1.693	Lakewood	BI9B-2	BI9B-2-030	BI9B-2-030	DAC-1.738
DOWNEY CHANNEL											
Hardwick St/Downey Ave	30" Discharge	33.85025	-118.15041	UNK	L	0.165	Lakewood	BI447A	BI447A-001		DNC-0.165
Hardwick St/Downey Ave	30" Discharge	33.85031	-118.15054	UNK	R	0.173	Lakewood	BI447A	BI447A-002	BI447A-002	DNC-0.173
Candlewood St/Downey Ave	24" Discharge	33.85372	-118.15039	UNK	L	0.554	Lakewood	BI447A	BI447A-004	BI447A-004	DNC-0.554

Downey Ave/Eckleson St	18" Discharge	33.84919	-118.15089	Lakewood	L	1.985	Lakewood	BI9B-1	BI9B-1-001		DNC-1.985
Downey Ave/Eckleson St	21" Discharge	33.84920	-118.15121	UNK	L	2.019	Lakewood	BI9B-1	BI9B-1-002		DNC-2.019
Downey Ave/Eckleson St	18" Discharge	33.84908	-118.15121	UNK	R	2.022	Lakewood	BI9B-1	BI9B-1-003		DNC-2.022
LOS CERRITOS CHANNEL											
Knoxville Ave/E. el Progreso St	24" Discharge	33.79599	-118.10369	Long Beach	R	8.172	Long Beach	LCERR-4	LCERR-4-002		LCC-0.817
Vuelta Grande Ave/Stearns St	24" Discharge	33.79599	-118.10328	Long Beach	L	8.173	Long Beach	LCERR-4	LCERR-4-003		LCC-0.818
Vuelta Grande Ave/Los Arcos St	33" Discharge	33.79944	-118.10356	Long Beach	L	8.555	Long Beach	LCERR-4	LCERR-4-005		LCC-1.199
Vuelta Grande Ave/Ladoga Ave	21" Discharge	33.80006	-118.10427	LACFCD	L	8.649	Long Beach	LCERR-4	LCERR-4-006		LCC-1.294
Vuelta Grande Ave/Snowden Ave	24" Discharge	33.80557	-118.11188	Long Beach	L	9.678	Long Beach	LCERR-4	LCERR-4-010		LCC-2.323
Spring St/Lomina Ave	21" Discharge	33.81012	-118.12110	LACFCD	R	0.721	Long Beach	LCERR-3	LCERR-3-001		LCC-3.384
Spring St/San Anseline Ave	18" Discharge	33.81036	-118.12163	LACFCD	L	0.759	Long Beach	LCERR-3	LCERR-3-003		LCC-3.422
Spring St/Bellflower Blvd	21" Discharge	33.81013	-118.12411	LACFCD	R	1.000	Long Beach	LCERR-3	LCERR-3-004		LCC-3.663
Spring St/Bellflower Blvd	15" Discharge	33.81041	-118.12514	LACFCD	L	1.085	Long Beach	LCERR-3	LCERR-3-005		LCC-3.748
Spring St/Montair Ave	15" Discharge	33.81042	-118.12562	LACFCD	L	1.135	Long Beach	LCERR-3	LCERR-3-007		LCC-3.798
Spring St/Montair Ave	18" Discharge	33.81041	-118.12674	Long Beach	L	1.222	Long Beach	LCERR-3	LCERR-3-008		LCC-3.885
Charlemagne Ave/Spring St	15" Discharge	33.81051	-118.13042	Long Beach	L	0.078	Long Beach	LCERR-2	LCERR-2-001		LCC-4.245
Heather Rd/Spring St	24" Discharge	33.81023	-118.13107	Long Beach	R	0.135	Long Beach	LCERR-2	LCERR-2-003		LCC-4.301B
WARDLOW CHANNEL											
Clark Ave/Keynote St	18" Discharge	33.82335	-118.13495	Long Beach	L	5.885	Long Beach	BI9C	BI9C-002		WC-5.964
Clark Ave/Keynote St	18" Discharge	33.82337	-118.13574	Long Beach	L	5.918	Long Beach	BI9C	BI9C-003		WC-6.038
Lakewood Blvd	18" Discharge	33.82331	-118.14151	Long Beach	L	6.519	Lakewood	BI9A-5	BI9A-5-016		WC-6.571
SOUTH OF ATHERTON											
Vuelta Grande Ave/Espanita St	30" Discharge	33.78581	-118.10343	Long Beach	L	7.049	Long Beach	LCERR-5	LCERR-5-001		LCC-7049.1
Vuelta Grande Ave/E. Driscoll St	30" Discharge	33.78644	-118.10384	Long Beach	R	7.116	Long Beach	LCERR-5	LCERR-5-002		LCC-7116.2
PALO VERDE CHANNEL											
WOODRUFF AVE / VUELTA GRANDE AVE	24" Discharge	33.80836	-118.11435	Long Beach	R	0.156	Long Beach	BI9E-2	BI9E-2-001		PVC-0.156

6036 SPRING ST/Woodruff Ave	15" Discharge	33.81039	-118.11423	Long Beach	L	0.377	Long Beach	BI9E-2	BI9E-2-002		PVC-0.377
WOODRUFF AVE / SPRING ST	18" Discharge	33.81039	-118.11432	Long Beach	R	0.378	Long Beach	BI9E-2	BI9E-2-003		PVC-0.378
SPRING ST / WOODRUFF AVE	18" Discharge	33.81064	-118.11431	LACFCD	R	0.408	Long Beach	BI9E-2	BI9E-2-004		PVC-0.408
SPRING ST / WOODRUFF AVE	15" Discharge	33.81065	-118.11431	Long Beach	R	0.408	Long Beach	BI9E-2	BI9E-2-005		PVC-0.408
3128 LOS COYOTES DIA/E. Pageantry St	24" Discharge	33.81311	-118.11411	LACFCD	R	0.705	Long Beach	BI9E-2	BI9E-2-008		PVC-0.705
3143 LOS COYOTES DIA/E. Pagentry St	30" Discharge	33.81394	-118.11397	Long Beach	R	0.775	Long Beach	BI9E-2	BI9E-2-011		PVC-0.775
3142 LOS COYOTES DIA/E. Pagentry St	21" Discharge	33.81406	-118.11376	Long Beach	L	0.792	Long Beach	BI9E-2	BI9E-2-012		PVC-0.792
3169 LOS COYOTES DIA/N. Hayfield Dr	15" Discharge	33.81449	-118.11347	Long Beach	R	0.848	Long Beach	BI9E-2	BI9E-2-013		PVC-0.848
3302 LOS COYOTES DIA/Metz St	21" Discharge	33.81666	-118.11144	Long Beach	L	1.154	Long Beach	BI9E-2	BI9E-2-015		PVC-1.154
3425 LOS COYOTES DIA/Canehill Ave	21" Discharge	33.81940	-118.10913	Long Beach	R	1.527	Long Beach	BI9E-2	BI9E-2-017		PVC-1.527
LOS COYOTES DIA / PALO VERDE AVE	21" Discharge	33.82048	-118.10807	Long Beach	L	1.676	Long Beach	BI9E-2	BI9E-2-018		PVC-1.676
LOS COYOTES DIA / PALO VERDE AVE	18" Discharge	33.82081	-118.10792	LACFCD	L	1.721	Long Beach	BI9E-2	BI9E-2-020		PVC-1.721
PALO VERDE AVE/E. Monlaco Rd	24" Discharge	33.82224	-118.10796	Long Beach	R	1.878	Long Beach	BI9E-2	BI9E-2-023		PVC-1.878
Palo Verde Ave/E. Keynote St	27" Discharge	33.82280	-118.10793	Long Beach	L	1.937	Long Beach	BI9E-2	BI9E-2-024		PVC-1.937
3702 CONQUISTA AVE/Palo Verde Ave	27" Discharge	33.82505	-118.10798	Long Beach	R	2.201	Long Beach	BI9E-2	BI9E-2-025		PVC-2.201
Carson St/Palo Verde Ave	12" Discharge	33.83210	-118.10836	Long Beach		2.985	Long Beach	BI9E-1	BI9E-1-001		PVC-2.985
Carson St/Palo Verde Ave	18" Discharge	33.83235	-118.10832	Long Beach	L	3.009	Long Beach	BI9E-1	BI9E-1-002		PVC-3.009
Carson St/Palo Verde Ave	18" Discharge	33.83241	-118.10833	UNK	L	3.030	Lakewood	BI9E-1	BI9E-1-033	BI9E-1-033	PVC-3.030
Carson St/Palo Verde Ave	30" Discharge	33.83240	-118.10843	UNK	R	3.031	Lakewood	BI9E-1	BI9E-1-003	BI9E-1-003	PVC-3.031
4139 Palo Verde Ave/Harvey Way	18" Discharge	33.83433	-118.10831	UNK	L	3.228	Lakewood	BI9E-1	BI9E-1-004	BI9E-1-004	PVC-3.228
4222 Conquista Ave/Harvey Way	18" Discharge	33.83500	-118.10841	UNK	R	3.300	Lakewood	BI9E-1	BI9E-1-005	BI9E-1-005	PVC-3.300
Harvey Way/Palo Verde Ave	18" Discharge	33.83611	-118.10829	Lakewod	L	3.438	Lakewood	BI9E-1	BI9E-1-009	BI9E-1-009	PVC-3.438
Harvey Way/Palo Verde Ave	18" Discharge	33.83615	-118.10828	UNK	L	3.444	Lakewood	BI9E-1	BI9E-1-010	BI9E-1-010	PVC-3.444
Centralia St/Palo Verde Ave	15" Discharge	33.83775	-118.10824	UNK	L	3.622	Lakewood	BI9E-1	BI9E-1-011	BI9E-1-011	PVC-3.622

Centralia St/Palo Verde Ave	15" Discharge	33.83936	-118.10822	UNK	R	3.804	Lakewood	BI9E-1	BI9E-1-012	BI9E-1-012	PVC-3.804
Centralia St/Palo Verde Ave	24" Discharge	33.83947	-118.10842	UNK	R	3.824	Lakewood	BI9E-1	BI9E-1-014	BI9E-1-014	PVC-3.824
Centralia St/Palo Verde Ave	15" Discharge	33.83958	-118.10822	UNK	L	3.829	Lakewood	BI9E-1	BI9E-1-015	BI9E-1-015	PVC-3.829
Conquista Ave/Arbor Rd	15" Discharge	33.84135	-118.10821	UNK	L	4.020	Lakewood	BI9E-1	BI9E-1-016	BI9E-1-016	PVC-4.020
Arbor Rd/Palo Verde Ave	15" Discharge	33.84306	-118.10820	UNK	L	4.208	Lakewood	BI9E-1	BI9E-1-017	BI9E-1-017	PVC-4.208
Arbor Rd/Palo Verde Ave	24" Discharge	33.84326	-118.10841	UNK	R	4.228	Lakewood	BI9E-1	BI9E-1-018	BI9E-1-018	PVC-4.228
Arbor Rd/Palo Verde Ave	30" Discharge	33.84327	-118.10841	UNK	L	4.229	Lakewood	BI9E-1	BI9E-1-019	BI9E-1-019	PVC-4.229
Arbor Rd/Palo Verde Ave	18" Discharge	33.84332	-118.10820	UNK	L	4.235	Lakewood	BI9E-1	BI9E-1-020	BI9E-1-020	PVC-4.235
Arbor Rd/Palo Verde Ave	15" Discharge	33.84507	-118.10822	UNK	L	4.434	Lakewood	BI9E-1	BI9E-1-021	BI9E-1-021	PVC-4.434
Del Amo Blvd/Palo Verde Ave	15" Discharge	33.84685	-118.10819	UNK	L	4.628	Lakewood	BI9E-1	BI9E-1-022	BI9E-1-022	PVC-4.628
Del Amo Blvd/Palo Verde Ave	18" Discharge	33.84713	-118.10821	LACFCD	L	4.659	Lakewood	BI9E-1	BI9E-1-023	BI9E-1-023	PVC-4.659
Del Amo Blvd/Palo Verde Ave	24" Discharge	33.84714	-118.10836	LACFCD	R	4.659	Lakewood	BI9E-1	BI9E-1-024	BI9E-1-024	PVC-4.660
5023Carfax Ave/E. Hardwick St	18" Discharge	33.85007	-118.10960	UNK	L	4.962	Lakewood	BI9E-1	BI9E-1-028	BI9E-1-028	PVC-4.962
6251 McKnight Dr/Chesteroark Dr	24" Discharge	33.85057	-118.11001	UNK	R	5.075	Lakewood	BI9E-1	BI9E-1-029	BI9E-1-029	PVC-5.075
Candlewood St/Carfax Ave	24" Discharge	33.85321	-118.11132	UNK	L	5.403	Lakewood	BI446B	BI446B-001		PVC-5.403
Candlewood St/Cardale St	30" Discharge	33.85389	-118.11155	Lakewood	L	5.489	Lakewood	BI446B	BI446B-002		PVC-5.489
Candlewood St/Capetown St	27" Discharge	33.85441	-118.11167	Lakewood	R	5.543	Lakewood	BI446B	BI446B-003	BI446B-003	PVC-5.543
South St/Canehill Ave	18" Discharge	33.85822	-118.11172	UNK	R	5.970	Lakewood	BI446B	BI446B-005		PVC-5.970
South St/Canehill Ave	12" Discharge	33.85827	-118.11172	Lakewod	R	5.980	Lakewood	BI446B	BI446B-006		PVC-5.980

LOS CERRITOS CHANNEL
WATERSHED GROUP

Los Cerritos Channel
Watershed Management Program

Bellflower Cerritos Downey Lakewood Long Beach Paramount Signal Hill Los Angeles County Flood Control District

We Serve to Protect our Coastal Waters

DRAFT

Prepared by: RICHARD WATSON & ASSOCIATES, INC.
Stormwater Quality Planning

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LIST OF ACRONYMS

BMPs – Best Management Practices

CALTRANS – California Department of Transportation

CASQA – California Stormwater Quality Association

CIMP – Coordinated Integrated Monitoring Plan

DEHP - Bis (2-ethylhexyl)phthalate

EWMP – Enhanced Watershed Management Program

Long Beach Permit - Order No. R4-2014-0024 (NPDES Permit No. CAS004003, *Waste Discharge Requirements for Municipal Separate Storm Sewer System Discharges from the City of Long Beach)*

Los Angeles Permit - Order No. R4-2012-0175 (NPDES Permit No. CAS004001, *Waste Discharge Requirements for Municipal Separate Storm Sewer System [MS4] Discharges within the Coastal Watersheds of Los Angeles County, Except those Discharges Originating from the City of Long Beach MS4)*

LCC – Los Cerritos Channel

MCMs – Minimum Control Measures

MEP – Maximum Extent Practicable

NPDES – National Pollutant Discharge Elimination System

RWL – Receiving Water Limitations

Regional Water Board – Los Angeles Regional Water Quality Control Board

TAC – Technical Advisory Committee

TMDL – Total Maximum Daily Load

TSS – Total Suspended Solids

WAGs – Watershed Authority Groups

Watershed Group – Los Cerritos Channel Watershed Group

WMP – Watershed Management Program

WQP – Water Quality Priority

WQBELs – Water Quality Based Effluent Limitations

Executive Summary

The Permittees of the Los Cerritos Channel (LCC) Freshwater Watershed (Watershed), a portion of the Los Cerritos Channel and Alamitos Bay Watershed Management Area, have developed this Watershed Management Program (WMP) as specified in Order R4-2012-0175. This WMP sets forth a plan to achieve pollutant reductions in the waterbodies of the LCC Watershed. It serves as the Implementation Plan for the Los Cerritos Channel Metals TMDLs. The associated Coordinated Integrated Monitoring Plan (CIMP) serves as the Coordinated Monitoring Plan for the Metals TMDL. In addition to the CIMP, the WMP is accompanied by a reasonable assurance analysis (RAA) based upon the Watershed Management Modeling System previously developed by the Los Angeles County Flood Control District (LACFCD) in collaboration with USEPA. The WMP is a long-term planning document that takes a comprehensive look at the LCC Watershed, including land uses, the municipal separate storm sewer system (MS4), existing and planned control measures, and historical monitoring data. It lays the groundwork for expanding upon Permittees' existing water quality management programs and provides the flexibility necessary to allow the Permittees to respond to new issues or concerns that might arise in the course of routine monitoring or as the result of emerging topics in stormwater science.

The LCC Permittees began working together to address water quality in late 2008 by forming a Technical Committee in response to a draft of the EPA-established Metals TMDLs for the LCC Watershed. The Group, now known as the Los Cerritos Channel Watershed Group, is comprised of the Cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill, as well as the Los Angeles County Flood Control District and, informally, the California Department of Transportation (Caltrans). The Group originally entered into Memoranda of Agreement (MOAs) in 2010, with the Gateway Water Management Authority (GWMA) acting as fiduciary agent. The Group is covered by the Los Angeles County MS4 Permit (Order No. R4-2012-0175, adopted November 8, 2012), except for the City of Long Beach, which is covered by the City of Long Beach MS4 Permit (NPDES Permit Order No. R4-2014-0024, adopted February 6, 2014). Both Permits are on five-year renewal cycles. Caltrans is regulated by a separate statewide permit, which was adopted September 19, 2012 and became effective on July 1, 2013. It too is on a five-year cycle. Since the adoption of the new Los Angeles MS4 Permit, the Watershed Group has worked to analyze the range of stormwater management alternatives contained in the Permit for addressing targeted stormwater pollutants in the Los Cerritos Channel.

The Los Cerritos Channel Watershed Group has considered how best to develop a WMP to implement the requirements of the Permits on a watershed scale through each Permittee's stormwater management program and through customized strategies, control measures, and best management practices (BMPs). The Watershed Group has revisited strategies, control measures, and BMPs and concludes that addressing water quality impairments within the Watershed should be based on a multi-faceted approach, initially focused on source control, total suspended solids (TSS) reduction, and runoff reduction. Members of the Watershed Group have been particularly focused on true source control (pollution prevention) because major sources of copper, lead, and zinc are released into the atmosphere, which results in widespread deposition on impervious surfaces such as streets, highways, parking lots, and rooftops. In

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addition, these metals are directly deposited onto roadways and other surfaces from motor vehicle components such as brakes, wheel weights, and tires. In addition, the Watershed Group's strategy includes LID and green streets, operational source control methods (including enhanced street sweeping), and capture and infiltration and/or capture and use of stormwater, with treatment controls considered the method of last resort, since they are the least effective and most costly water quality improvement methods.

Each of the Cities in the Watershed Group contributed either directly or indirectly to efforts by the California Stormwater Quality Association (CASQA) and Sustainable Conservation to develop and negotiate SB 346 – the passage of which is a milestone that will significantly reduce the level of copper in metropolitan area waters throughout the state through reduction of copper in vehicle brake pads. Members of the Watershed Group look forward to working with CASQA next to address zinc in vehicle tires. The Department of Toxic Substances Control (DTSC) has newly adopted Safer Consumer Product Regulations that will be a future method by which zinc in tires could potentially be addressed. These two true source control efforts will address two of the Watershed's major pollutants of concern. Although, due to the DTSC's schedule for addressing pollutants, it will be a few years before the Watershed Group would be able to address zinc through the Safer Consumer Product Regulations, Group Members can work in the interim to gain support for including zinc in DTSC's list of pollutants of concern on a future list.

The Los Cerritos Channel Metals TMDLs established waste load allocations (WLAs) for copper, lead, and zinc during wet weather and copper during dry weather. Total lead limits were based upon maintenance of historical concentrations, and total lead concentrations and loads remain in compliance with the TMDL limits. Elevated concentrations of total recoverable aluminum, copper, lead, and zinc are commonly associated with elevated sediment concentrations during storm events. Aluminum is expected to be elevated during storm events due to its natural abundance in soils and is not considered to be a major pollutant of concern. Concentrations of dissolved copper and zinc commonly exceed freshwater quality criteria during storm events, and are the two metals of primary concern. The Watershed Group expects to see reductions in copper loading soon, due to implementation of SB 346. Brake pad manufacturers have already begun to reduce the amount of copper in vehicle brake pads.

Los Cerritos Channel Watershed Group Permittees are fortunate to have 13 years of data already collected by the City of Long Beach at its Stearns Street mass emission monitoring site. Major elements incorporated in Long Beach's monitoring and reporting program include, 1) mass emission monitoring during storm events, 2) monitoring of dry weather discharges at each mass emission site, and 3) special studies. Data from the Long Beach monitoring program is intended to support decisions needed to refine BMPs for the reduction of pollutant loading and the protection and enhancement of beneficial use of the receiving waters.

The Long Beach mass emission monitoring program is intended to characterize stormwater discharges, identify contaminants of concern and develop pollutant load estimates for each major watershed. Flow-rated, whole storm composite samples are obtained and analyzed for major constituents of concern that include conventional constituents, total and dissolved metals, organochlorine pesticides, organophosphate pesticides and, in the past three years, pyrethroid pesticides. Trends over the past 10 years have been examined for principal contaminants of concern. Concentrations of contaminants measured in both wet- and dry-weather discharges

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are compared with various receiving water quality criteria. For purposes of analysis, water quality criteria or objectives were used to provide reference points for assessing the relative importance of various stormwater contaminants, although specific receiving water studies are necessary to quantify the presence and magnitude of any actual water quality impacts.

Part VI.C.5.a of the Los Angeles MS4 Permit requires Permittees to identify the water quality priorities within each Watershed Management Area (WMA) that will be addressed by a WMP. It further requires Permittees to designate three categories of priority pollutants that will be addressed: Category 1 (Highest Priority), Category 2 (High Priority), and Category 3 (Medium Priority). Highest Priority pollutants are those for which water quality-based effluent limitations and/or receiving water limitations are established in the Order. High Priority are those pollutants for which water quality data indicate a water quality impairment in the receiving water according to the California's Clean Water Act (CWA) Section 303(d) List for which MS4 discharges may be causing or contributing to the impairment, but which are not being addressed through TMDLs. The third category is not as clear-cut. It is defined to include pollutants for which there are insufficient data to indicate water quality impairment, but which exceed applicable receiving water limitations. This LCC WMP identifies Category 1 and Category 2 pollutants, and proposes a screening process to separate medium priority (Category 3) pollutants from those the Watershed Group considers to be low priority at this time.

In implementing this WMP, the Watershed Group will select control measures that will facilitate cost-effective implementation of the Water Quality Improvement Strategy specified in Section 3 of this Program. Section 4 of the Program includes a summary of the assessment of each minimum control measure (MCM) program, as well as determination as to whether the Permittees will implement the MCM provisions as explicitly stated or with modifications to focus on specific water quality problems. Information on how compliance with receiving water limitations can be achieved through stormwater capture is in Section 5 of this WMP, with further details in the RAA that was prepared collectively for three watersheds – the LCC, Lower Los Angeles River, and Lower San Gabriel River Watersheds – because several cities are in two or three of these watersheds and the cities wanted consistency within the jurisdictions. The RAA is described in Section 8 and found in Attachment A.

The Watershed Group has begun implementation of the CIMP by conducting the first field screening of non-stormwater outfalls. Full implementation of the CIMP is proposed to commence within 90 days after approval of the CIMP by the Executive Officer of the Regional Board or by July 1, 2015, whichever is later. The schedule provides for commencing monitoring on July 1, 2015 as starting monitoring part way through a complete monitoring year or missing the first storms of the year would not be productive. Formal implementation of the Los Cerritos Channel WMP will begin upon approval of the final Program pursuant to Table 9 of Order No. R4-2012-0175.

The LCC Watershed Group has developed its implementation schedules based on guidance in the Permit that specifies that compliance schedules and interim milestone dates be used to measure progress toward addressing the highest water quality priorities and achieving applicable water quality-based effluent limitations. The schedules in this WMP will allow the Watershed Group to measure progress on a watershed scale every two years as part of an adaptive management process. Schedules have been initially developed for the strategies,

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control measures, and BMPs to be implemented on a watershed scale and on municipal roles in planning and implementing these projects (See Section 6 of this WMP). The Watershed Group is emphasizing a watershed approach to addressing water quality problems within the Watershed.

The overall implementation schedule for the LCC WMP is strongly influenced by TMDL final compliance dates and target dates for Category 2 and 3 pollutants, the Watershed Group's Water Quality Improvement Strategy, and the need to establish a stable and sustainable stormwater funding source in Los Angeles County to pay for the expensive stormwater capture and stormwater treatment facilities anticipated to be necessary to meet water quality standards in a timely manner. Final wet-weather compliance target dates for Category 1, 2, and 3 pollutants are shown in Section 2 and Section 6 of this Program (see Tables 2-9 through 2-12 and 6-1). Schedules for jurisdictional projects will be added to the schedules during adaptive management review as cities plan and program implementation of green streets, LID, and other local projects. The initial schedule contained in this WMP covers a 25-year period and is structured into eight three-year phases and a two-year phase. The schedule assumes a 2015 start date and is based on an anticipated 5-year permit renewal cycle (see Tables in Section 6 of this Program).

The Los Cerritos Channel Watershed Group looks forward to continuing to work together, and with the Regional Water Board, to achieve pollutant reductions in the waterbodies of the Watershed. Prior to 2012, MS4 permits required cities and agencies to implement a series of BMPs such as street sweeping and catch basin cleaning to demonstrate compliance. With the adoption of the fourth term MS4 permit by the Regional Water Board on November 8, 2012, the emphasis shifted to a watershed-based effort that includes the goals of achieving specific pollutant targets as runoff leaves the storm drain system and enters the Los Cerritos Channel. This Watershed Management Program, together with its accompanying RAA and CIMP, constitutes the first step in that watershed-based effort.

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1.0 Introduction and Background

1.1 Introduction

The Los Cerritos Channel (LCC) Watershed (Watershed) is a small, urbanized watershed comprising 17,711 acres in the Los Cerritos Channel and Alamitos Bay Watershed Management Area. The Permittees in the Watershed have been working together since late 2008 to address water quality issues in the Watershed. The Watershed includes the Cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill, as well as 94 acres of unincorporated land. After formalizing their partnership in 2010, these Permittees came together as the Los Cerritos Channel Technical Committee, and are now known as the Los Cerritos Channel Watershed Group. Since then, the Los Angeles County of Flood Control District has joined the Watershed Group, and the California Department of Transportation (Caltrans) participates with the Group on an informal basis.

The Los Cerritos Channel Watershed Group has chosen to develop a Watershed Management Program (WMP) as a collaborative effort pursuant to Part VI.C. of Order No. R4-2012-0175 (National Pollutant Discharge Elimination System [NPDES] Permit No. CAS004001, *Waste Discharge Requirements for Municipal Separate Storm Sewer System [MS4] Discharges within the Coastal Watersheds of Los Angeles County, Except those Discharges Originating from the City of Long Beach MS4*, or "Los Angeles County Permit") and Part VII.C. of Order No. R4-2014-0024 (NPDES Permit No. CAS004003, *Waste Discharge Requirements for Municipal Separate Storm Sewer System Discharges from the City of Long Beach*, or "Long Beach Permit") to implement the requirements of the Order on a watershed scale through customized strategies and control measures and continued implementation of the applicable minimum control measures (MCMs) specified in Part VI.D. of the Order No. R4-2012-0175 and Part VI. C of Order No. R4-2014-0024. This voluntary approach to compliance with the Order will allow the Permittees the flexibility of addressing the highest watershed priorities first and allow the Permittees to develop a Coordinated Integrated Monitoring Program (CIMP) that matches the unique nature of the Watershed through watershed segmentation and forensic monitoring to locate the primary sources of pollutants within the Watershed. The customized strategies and control measures presented in this Program will be implemented both on a watershed and sub-basin basis and, where applicable, through each Permittee's stormwater management program.

Consistent with the Order, the WMP is designed to ensure that, over time, discharges from the Watershed Group's MS4s will achieve applicable water quality based effluent limitations (WQBELs) in Part VI.E. of the Permit, including the Los Cerritos Channel Metals Total Maximum Daily Loads (TMDLs) (Attachment Q of the Permit) and the Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters Toxic Pollutants TMDL (Attachment N of the Permit), not cause or contribute to exceedances of receiving water limitations in Parts V.A and VI.E of the Order or the applicable TMDLs, and not include non-stormwater discharges that are effectively prohibited by Part III.A. of the Order. Control measures will be implemented to reduce the discharge of pollutants to the maximum extent practicable. (MEP).

Consistent with Part VI.C.5-C.8, the WMP:

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1. Prioritizes water quality issues;
2. Identifies and implements strategies, control measures, and best management practices (BMPs) to achieve required water quality outcomes;
3. Executes an integrated monitoring program and assessment program;
4. Modifies strategies, control measures, and BMPs, as necessary, based on analysis of monitoring data collected, to ensure that applicable water quality-based effluent limitations and receiving water limitations and other milestones set forth in the WMP are achieved in the required timeframes; and
5. During the preparation of this WMP, the Los Cerritos Channel Watershed Group held a joint stakeholder meeting with the Lower San Gabriel River Watershed Committee. The Groups held the joint meeting on April 30 to seek stakeholder input, partially because several cities are in both watersheds and partially because the Regional Water Board's June 2013 Basin Plan Amendment addressed the Metals TMDLs for both watersheds and included a common implementation schedule. The joint presentation included descriptions of the watersheds, the overall approach to the WMPs, water quality priorities, monitoring, the Reasonable Assurance Analysis, strategies, control measures, schedules, priority pollutants, regional projects, and next steps. The presentation was followed by a valuable question and answer session.

Even though the Los Cerritos Watershed Group has chosen to propose a WMP – not an Enhanced Watershed Management Program (EWMP) – it will evaluate opportunities through the adaptive management process for collaboration on multi-benefit regional projects that collectively, wherever feasible, retain all non-stormwater runoff and all stormwater runoff from the 85th percentile 24-hour storm event for the drainage area tributary to the projects while achieving other benefits, such as water supply.

The WMP also addresses compliance with receiving water limitations not otherwise addressed by a TMDL. For pollutants with the same fate and transport mechanisms as pollutants addressed by a specified TMDL, the planned control measures will be designed to address both the TMDL pollutants and the other pollutants identified as having the same fate and transport mechanisms. A major example of this is the total suspended solids (TSS) reduction measures discussed in Section 3.4, which will address metals and legacy organics. In this case, both sets of pollutants are subject to a TMDL, but the TMDLs address different areas and have different compliance dates. The control measures designed to address the TMDL with the earlier compliance date will also reduce the loading of pollutants subject to the TMDL with the later compliance date.

The development of this WMP is based on an assumption that the current requirements will withstand the appeals to the State Water Board and possible litigation. However, the Los Cerritos Watershed Group recognizes that there could be some future changes to the requirements in Order No. R4-2012-0175. For instance, in a letter dated July 8, 2013, the State Water Board invited comments on the following two questions:

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1. Is the watershed management program/enhanced watershed management program alternative contained in the Los Angeles MS4 Permit an appropriate approach to revising the receiving water limitations in MS4 permits?
2. If not, what revisions to the watershed management program/enhanced watershed management program alternative of the Los Angeles MS4 Permit would make the approach a viable alternative for receiving water limitations in MS4 permits?

Numerous entities provided comments on WMPs/EWMPs as an alternative approach. Previously, based on comments provided during the public comment period prior to Permit adoption, Los Angeles Regional Water Quality Control Board (Regional Water Board) staff proposed the use of WMPs/EWMPs, and the Regional Water Board members voted unanimously to include them in the Los Angeles MS4 Permit.

Pursuant to 303(d) listings for the Los Cerritos Channel for copper, zinc, and lead, and to a 13-year time schedule imposed by a 1999 Consent Decree between USEPA and local environmental groups (*Heal the Bay, et al v. Browner et al*), USEPA established the Los Cerritos Channel Total Maximum Daily Loads for Metals on March 17, 2010. Since USEPA does not establish implementation plans or implementation schedules for its TMDLs, development of both was necessary for the Los Cerritos Channel. The Regional Water Board agreed to adopt a Basin Plan Amendment including general implementation plans and schedules for the Los Cerritos Channel Metals TMDLs. This WMP will serve as a detailed implementation plan for addressing the Los Cerritos Channel Metals TMDLs. Pursuant to Section VI.E.3 of the Order, upon its completion and approval.

The WMP is a compliance-oriented water quality management tool to be used to facilitate improvement of surface water quality and provide opportunities to increase local water supplies. As stated in the Fact Sheet for the Los Angeles MS4 Permit, "the purpose of Watershed Management Programs is to provide a framework for Watershed Group members to implement the requirements of [permits] in an integrated and collaborative fashion to address water quality priorities on a watershed scale." The program is designed to facilitate watershed-based stormwater management planning using an adaptive management approach that allows for strategic planning and integration of water quality goals with water supply benefits.

Development of a WMP, with its associated monitoring program and Reasonable Assurance Analysis, is expensive, and its implementation will be both costly and rigorous. In acknowledgement of that fact, the Regional Water Board included some incentives in the Permit to encourage participation in WMP or EWMP programs. One such incentive is the provision that, through implementation of a WMP, Permittees may comply with receiving water limitations, including water quality based effluent limitations.

1.2 The Watershed

The Los Cerritos Channel Watershed comprises a predominantly urban land area of approximately 17,711 acres (27.7 square miles) (See Figure 1-1).

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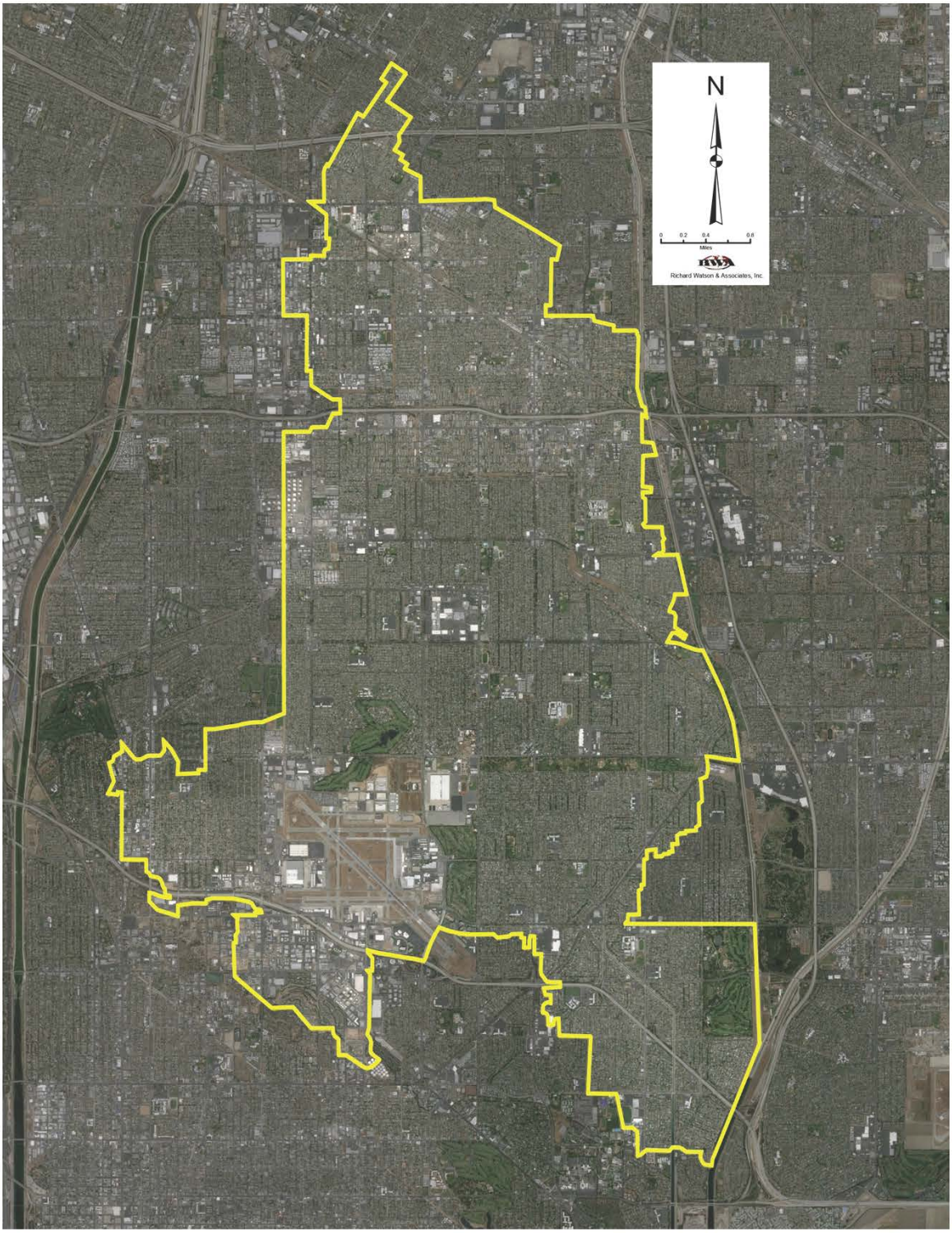
Figure 1-1. Los Cerritos Channel Watershed



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The Watershed extends from just north of I-105 in Downey south to Atherton Street in Long Beach, where the Channel discharges into the Los Cerritos Channel Estuary, which, in turn, discharges through Marine Stadium and Alamitos Bay to San Pedro Bay. The Watershed includes ten MS4 Permittees regulated under three MS4 permits: the Los Angeles MS4 Permit, the Long Beach MS4 Permit, and the Caltrans Permit. Seven Cities and the Los Angeles County Flood Control District (LACFCD) are participating formally together in development of a WMP and a CIMP. (See Figure 1-2.) The entire Watershed is within the LACFCD. Caltrans is participating informally as of June 2014, since a Memorandum of Understanding (MOU) has not yet been signed. Completion of an MOU and formal participation on the part of Caltrans is anticipated soon. The total area covered by the WMP includes approximately 17,199 acres. Approximately 498 acres of Caltrans property regulated under a statewide MS4 permit and a 94-acre unincorporated area with a separate WMP are excluded from this WMP. The following table provides a breakdown of the land area within the Los Cerritos Channel Watershed by Permittee.

Table 1-1: Los Cerritos Channel Watershed Land Area by Permittee

Permittee	Land Area (Acres)[1,]	Percentage of Total Area
Bellflower	2,818.4	15.91%
Cerritos	57.6	0.33%
Downey	245.0	1.38%
Lakewood	4,802.7	27.12%
Long Beach	7,535.4	42.55%
Paramount	1,128.9	6.37%
Signal Hill	530.7	3.00%
Caltrans	498.0[1]	2.81%
County FCD	NA[2]	NA
Total:	**17,616.7**	**100%**

[1] Caltrans average subtracted from city areas.
[2] County of Los Angeles' 94-acre area within the Los Cerritos Channel and Alamitos Bay Watershed Management Area is not included in this WMP.

The County of Los Angeles and the LACFCD are preparing a separate WMP and CIMP for the 94-acre unincorporated area and other LACFCD service areas within portions of the Los Cerritos Channel and Alamitos Bay Watershed Management Area.

The Los Cerritos Channel itself is an open flood control channel. The Cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill, and a small portion of unincorporated Los Angeles County are located within the area that drains to the Channel. It is a concrete-lined freshwater channel until it reaches approximately Atherton Road, where the Channel's tidal prism begins. A small marina located in the Estuary is used for recreational purposes. Average dry-weather flows in the Channel were 2.35 cubic feet per second (cfs) when the Metals TMDLs were established, with storm event flows recorded as high as a historical maximum of 1,460 cfs. Dry weather flows have subsequently decreased, due in part to the water conservation efforts by cities within the Watershed.

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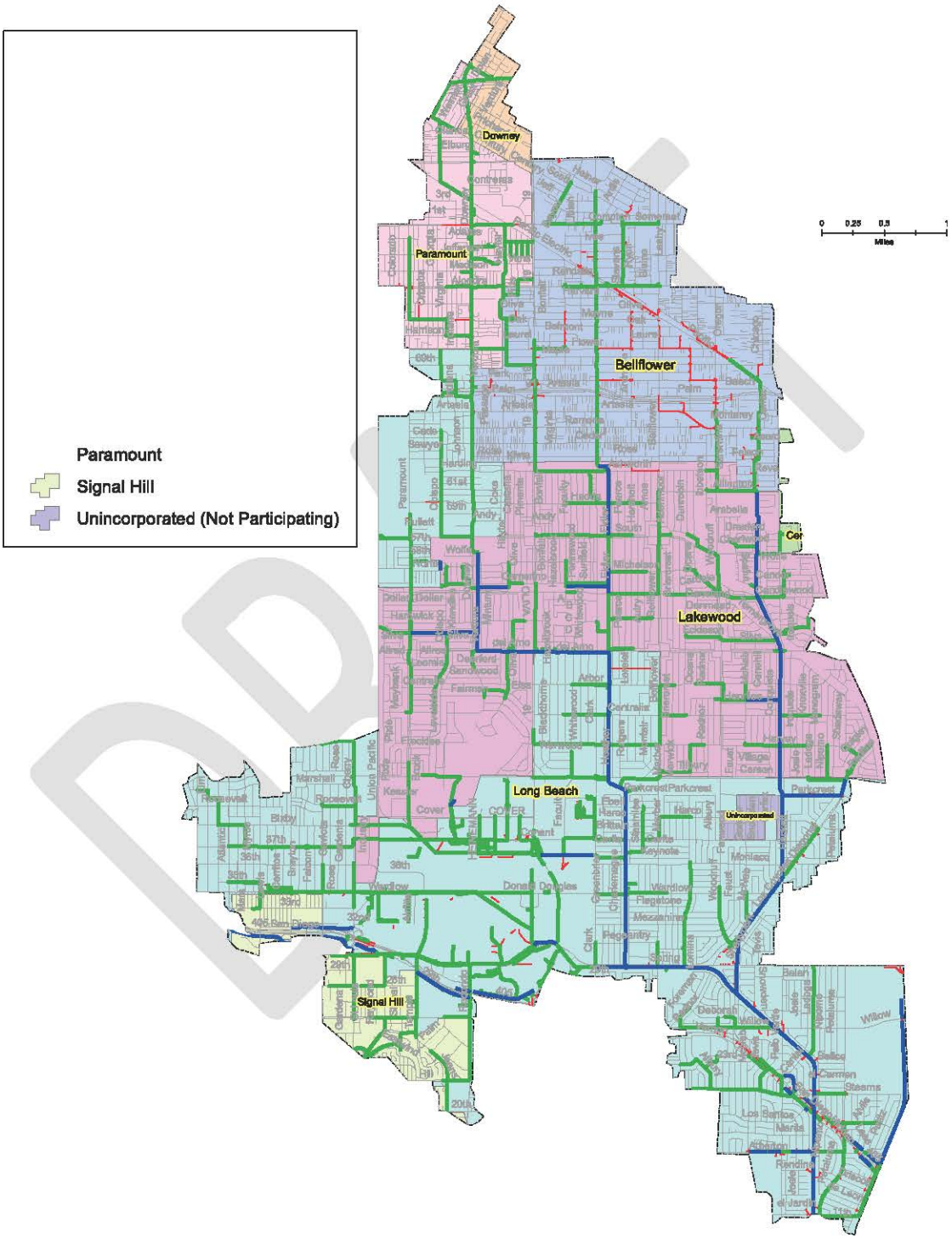
Figure 1-2. Los Cerritos Channel Participating Local Agencies



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The portion of the Los Cerritos Channel listed as impaired for metals is the approximately 2.1-mile long freshwater portion above the tidal prism. Approximately 44 percent of the Watershed is located in the eastern part of the City of Long Beach, with the remaining 56 percent located outside the City of Long Beach in the other jurisdictions in the Watershed.

Land use within the Watershed is 93% urban, including approximately 60% residential, 9% mixed urban, 15% commercial, and 9% industrial. Open space accounts for approximately 6% of land use in the Watershed, with agriculture comprising <1% of land use. The following table reproduced from the *Los Cerritos Channel Total Maximum Daily Loads for Metals* illustrates the specific land use percentages in the Watershed:

Table 1-2: Los Cerritos Channel Watershed Land Use Percentages

Land Cover Type	No. of Acres[1]	Percentage of Watershed
Agriculture	137.1	0.8%
Commercial	2,668.6	15.1%
High Density Residential	1,228.5	6.9%
Industrial	1,615.0	9.1%
Low Density Residential	9,278.9	52.4%
Mixed Urban	1,665.8	9.4%
Open Space	1,097.9	6.2%
Water	18.9	0.1%
Total	**17,710.7**	**100%**

[1] Includes 94 acres of unincorporated area and 498 acres of Caltrans properties.

These land uses were converted into hydrological response units as part of development of the Watershed Modeling System (WMMS) for the County of Los Angeles. (See Figure 1-3)

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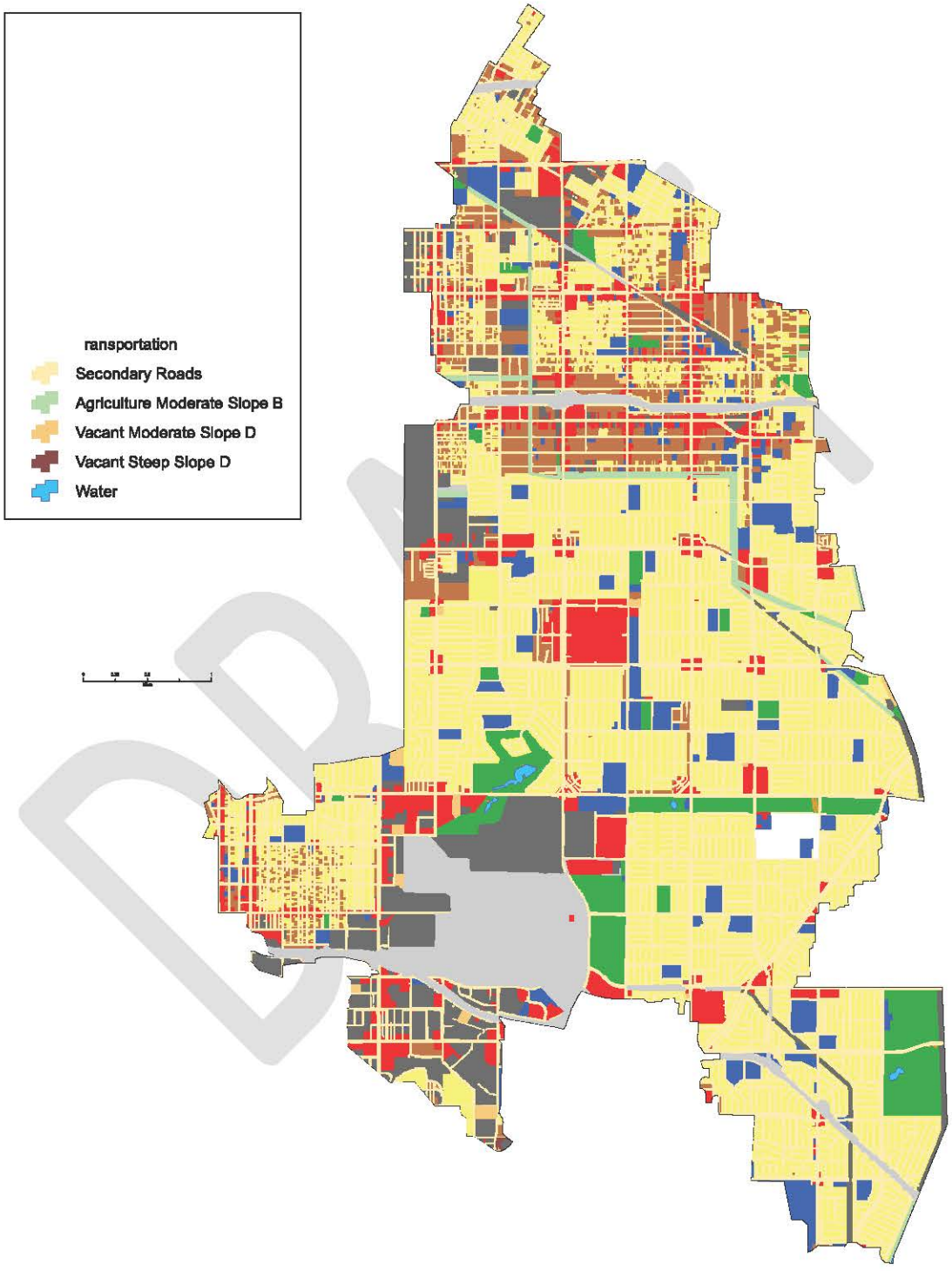
Figure 1-3 LCC Hydrologic Response Units



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1.3 Water Quality Issues and the History of Water Quality Regulation

The MS4 Permits require Permittees to identify water quality priorities that will be addressed by a WMP. These priorities are to include water quality-based effluent limitations and/or receiving water limitations, as well as an evaluation of existing water quality conditions, including characterization of stormwater and non-stormwater discharges. The Permits further require Permittees to designate three categories of pollutants: Category 1 (Highest Priority), Category 2 (High Priority), and Category 3 (Medium Priority). The requirements for the first two designations are clear in terms of the level of impairment that relates to each. However, the third category, which includes pollutants for which there are insufficient data to indicate water quality impairment, is quite broad and does not distinguish between medium priority and low priority pollutants. In order to identify Category 3 pollutants, the Los Cerritos Channel Watershed Group has developed a screening process to distinguish between medium priority pollutants and those the Group considers to be low priority. See Section 2.2 of this Program for detailed descriptions of the Category 1, 2, and 3 pollutants for the Los Cerritos Channel WMP.

The State of California has established water quality standards based on three components: 1) beneficial uses, as defined by the Regional Water Board in the Basin Plan; 2) narrative and/or numeric water quality objectives; and 3) an antidegradation policy. For certain pollutants, USEPA has established numeric criteria that serve as water quality standards for California's inland surface waters. (California Toxics Rule, 40 CFR 131.38).

In 1990, USEPA established Phase I of the municipal National Pollutant Discharge Elimination System (NPDES) program, which, in part, required operators of medium and large MS4s (generally serving populations of 100,000 or more) to implement stormwater management programs. These programs require addressing a variety of water quality–related issues, including:

- Structural control maintenance
- Areas of significant development or redevelopment
- Roadway runoff management
- Flood control related to water quality issues
- Municipally owned operations such as landfills and wastewater treatment plants
- Municipally owned hazardous waste treatment, storage, or disposal sites
- Application of pesticides, herbicides, and fertilizers
- Illicit discharge detection and elimination
- Regulation of sites classified as associated with industrial activity
- Construction site and post-construction site runoff control
- Public education and outreach

Section 303(d) of the federal Clean Water Act (CWA) requires each State to "identify those waters within its boundaries for which the effluent limitations are not stringent enough to implement any water quality objective applicable to such waters." The CWA further requires States to establish priority rankings for waterbody-pollutant combinations on the 303(d) Listing of Impaired Waters, and to establish TMDLs for those waters. A TMDL is defined in the CWA as "the sum of the individual waste

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load allocations for point sources and load allocations for nonpoint sources and natural background." The CWA requires TMDLs to be set at levels "necessary to achieve all applicable water quality standards" in the Channel (Source: *Los Cerritos Channel Total Maximum Daily Loads for Metals, March 2010*.) TMDLs also are required to account for seasonal variations and include a margin of safety to account for any lack of knowledge regarding the relationships between effluent limitations and water quality. USEPA included in the Los Cerritos Channel Metals TMDLs an explicit margin of safety equal to 10% of the loading capacity or existing load available for wet-weather allocations.

The State Water Resources Control Board and the nine Regional Water Quality Control Boards are responsible for preparing lists of impaired waterbodies for the 303(d) list and for preparing TMDLs in California. Both processes are subject to USEPA approval. If USEPA does not approve a State-submitted TMDL, it is required to establish a TMDL for that waterbody. The Regional Water Boards are responsible for issuing NPDES permits and state-specified Waste Discharge Requirements.

During the 1996 and 1998 303(d) listing cycles, the Los Angeles Regional Water Board identified over 700 waterbody-pollutant combinations in the region for which TMDLs are required. As a result of a consent decree approved between USEPA, Heal the Bay, and NRDC, a 13-year schedule for development of TMDLs in the Los Angeles region was established on March 22, 1999. The Consent Decree combined the over 700 waterbody-pollutant combinations into 92 TMDL analytical units. Because of the high volume of TMDLs required, which the State was going to be unable to complete and adopt within the 13-year consent decree deadline, USEPA established some of these TMDLs – including those for Analytical Unit 84, which is for metals listings in Los Cerritos Channel.

1.4 History of Water Quality Impairments in Los Cerritos Channel

The Los Cerritos Channel was included on the 1998, 2002, 2006, and 2010 California Clean Water Act Section 303(d) lists as impaired for copper, lead, and zinc. Dry-weather runoff in the Los Cerritos Channel comes largely from groundwater inflow and discharges to the MS4s from illicit connections, excess irrigation, and other residential and commercial practices. Wet-weather metals sources are generally associated with the accumulation and wash-off of metals on the land surface. The volume of wet-weather loading varies with storm size.

In addition to the metals impairments for which TMDLs have been established, the Channel has been listed through the years as impaired for aluminum, bis(2-ethylhexyl)phthalate, coliform bacteria, trash, and pH, although none of these impairments are currently subject to TMDL requirements. Also, the Watershed was included in the nearshore area for the Greater Harbor Toxics TMDLs, which lists impairments for copper, lead, zinc, DDT (fish tissue), PCBs (fish tissue), chlordane (fish tissue), PAHs (fish tissue), and toxicity (sediment). See Section 2.0 for a detailed discussion of water quality issues within the Watershed and the priority pollutants to be addressed through implementation of this WMP.

At the time the Metals TMDLs were adopted in 2010, there were 68 NPDES permittees in the Los Cerritos Channel Watershed, including MS4 permits, the Caltrans permit, general construction and general industrial stormwater permits, those regulated under minor NPDES permits, and general NPDES

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permits. Individual metals sources in the watershed include vehicle brake pads, vehicle tire wear, building materials, pesticides, erosion of paint, and aerial deposition of emissions from industrial facilities.

As part of development of the Los Cerritos Channel Total Maximum Daily Loads for Metals, USEPA defined ten sub-basins within the Watershed (See Figure 1-4). Since Order No. R4-2012-0175 specifies that WMPs should reflect sub-watersheds defined in TMDLs, this program emphasizes implementation by sub-basin rather than the sub-watershed defined in WMMS. The sub-watersheds aggregate to the sub-basins that will facilitate use of Reasonable Assurance Analysis (RAA) sub-watershed information as the WMP is implemented on a sub-basin basis.

Runoff to the Channel is regulated as a point source discharge in the permits; however, there are both point source and nonpoint source contributions to metals loadings in the Channel. Nonpoint sources are those that discharge via sheet flow or natural discharges, or from unregulated sites such as schools. These loadings from a variety of anthropogenic and natural sources accumulate in the Watershed and are washed into the Channel through rainfall. Sources include urban debris, erosion of susceptible materials, agricultural practices, and atmospheric deposition. The percentage of copper contribution from vehicle brake pads in the Los Cerritos Channel is significant. Copper particles are deposited onto land areas by direct deposition and are released into the air during brake pad use and subsequently deposited onto impervious surfaces and transported into water bodies through stormwater.

The Basin Plan for the Los Angeles Region defines one existing beneficial use (wildlife habitat [WILD]) and two intermittent beneficial uses (noncontact water recreation [REC2] and warm water habitat [WARM]) for Los Cerritos Channel. For development of the Los Cerritos Channel Metals TMDLs, USEPA assessed water quality using data from the City of Long Beach stormwater program and five additional samples provided by Kinnetic Laboratories, Inc. Metals data were collected from the Stearns Street monitoring site in the City of Long Beach, above the tidewater in the Los Cerritos Channel. Flow rates based on flow velocity and channel dimensions were used to calculate total flow following storm events. Dry-weather and wet-weather metals concentrations were compared to California Toxics Rule (CTR) values using hardness measured for each sampling event to assess the frequency of exceedances of the CTR criteria for copper, lead, and zinc in Los Cerritos Channel. Monitoring indicates exceedances for copper in dry weather, but not for lead or zinc. In wet weather, monitoring indicates exceedances for all three metals. A dry-weather TMDL was developed for copper, and wet-weather TMDLs were developed for copper, lead, and zinc.

The latest Los Angeles County MS4 Permit (Order No. R4-2012-0175) was adopted by the Los Angeles Regional Water Quality Control Board on November 8, 2012 and became effective December 28, 2012. This Permit covers 86 co-permittees, including 84 incorporated cities, the County of Los Angeles, and the LACFCD, and is on a five-year renewal cycle. The City of Long Beach MS4 Permit (NPDES Permit Order No. R4-2014-0024) was adopted on February 6, 2014, and is also on a five-year renewal cycle. It covers the City of Long Beach portions of the watershed.

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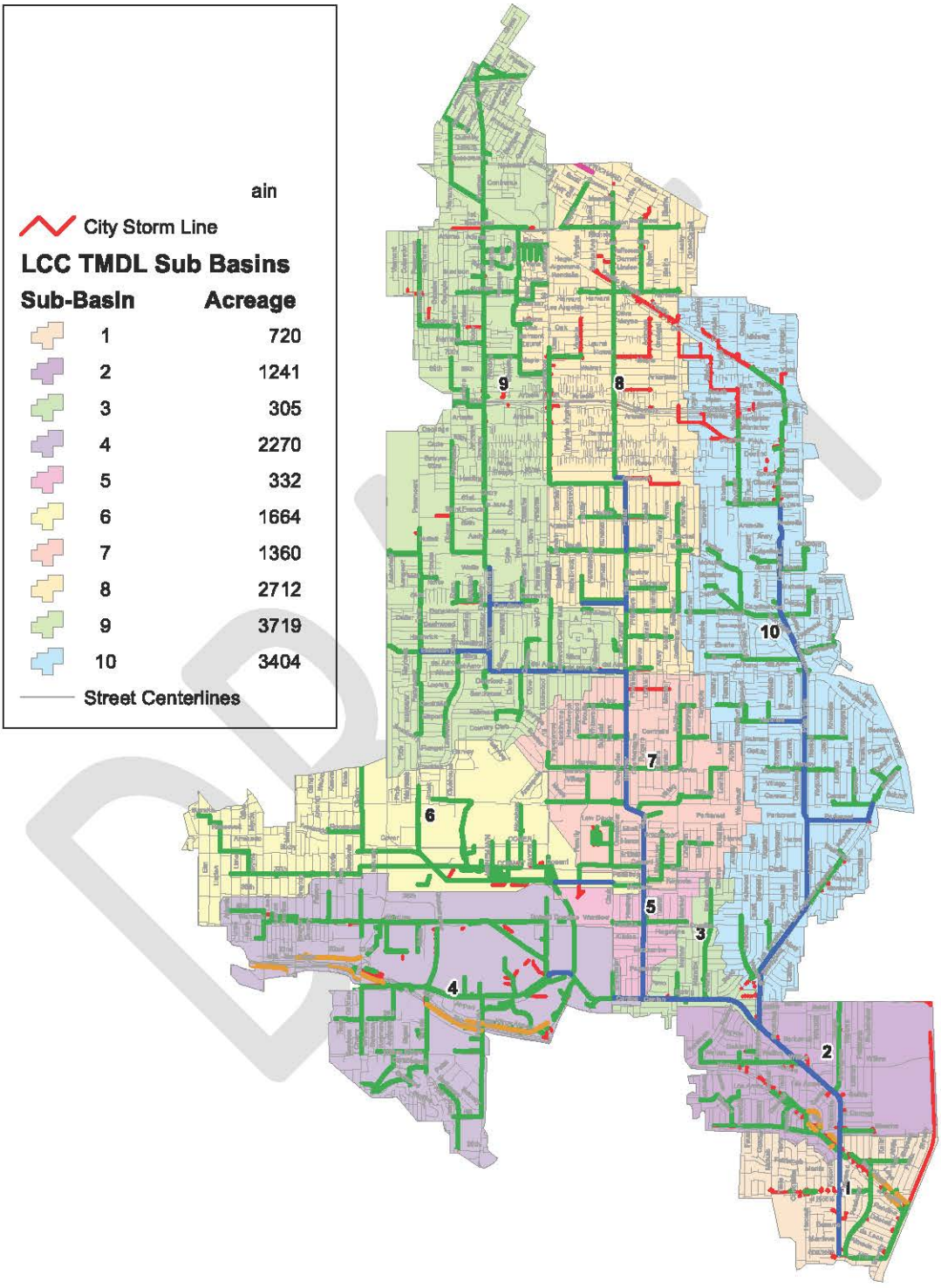
Figure 1-4. Los Cerritos Channel Sub-basins



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1.5 Organizing to Address Water Quality

As noted above, the Los Cerritos Channel Watershed Group has been working together since late 2008, when the group organized in response to a draft of the EPA-established Metals TMDLs for the freshwater portion of the Los Cerritos Channel Freshwater Watershed. The participating agencies, together with the Gateway Water Management Authority (GWMA), which acts as the fiduciary agent for the Watershed Group, entered into memoranda of agreement in 2010. Because of this history of working together to address water quality issues in the watershed, and because of its organizational arrangements with GWMA, the Watershed Group has chosen to continue its focus on the Los Cerritos Channel portion of the Los Cerritos Channel and Alamitos Bay Watershed Management Area, while taking into account water quality impairments in the Los Cerritos Channel Estuary and the Greater Los Angeles/Long Beach Harbor to which the Los Cerritos Channel Watershed may be contributing.

Since the adoption of the new MS4 Permit, the Watershed Group has comprehensively analyzed the range of stormwater management alternatives in the new Permit for addressing targeted stormwater pollutants in the Los Cerritos Channel. The Watershed Group elected to continue working together in a multi-agency effort to prepare a WMP and CIMP. The draft program plan must be submitted to the Regional Water Board by June 30, 2014.

Cities implementing all aspects of the approved program will, with some exceptions, be deemed in compliance – at least for an interim period – with the receiving water numerical discharge limits. Under the Permit there is also protection from third party litigation risks for agencies participating in a WMP.

1.6 Metals TMDLs

The USEPA-established *Los Cerritos Channel Total Maximum Daily Load for Metals* (March 17, 2010) includes the problem statement, numeric targets, source analysis, loading capacity, load allocations (LAs), waste load allocations (WLAs), and margin of safety, but does not include an implementation plan or schedule. As noted earlier, the Regional Water Board has adopted and the State Water Board has approved a Basin Plan Amendment that includes a general implementation plan and a schedule.

The Cities in the Watershed Group have contributed to the effort by the California Stormwater Quality Association (CASQA) and Sustainable Conservation to develop the legislation that ultimately became SB 346. It requires incremental reduction in the amount of copper in vehicle brake pads. Implementation of SB 346 will, over time, significantly reduce the level of copper in urban waters throughout the state. As noted previously, a significant percentage of the copper loading to the Los Cerritos Channel is due to copper in brake pads. Implementation of SB 346 should assist Watershed Group member cities and agencies to reduce copper loadings in their jurisdictions. This represents an example of “true source control,” which is the most cost-effective way to achieve pollutant reductions.

Table 1-3 lists applicable interim and final Water Quality Based Effluent Limitations established by the Implementation Schedule for the Los Cerritos Channel Metals TMDLs.

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Table 1-3: Implementation Schedule for LCC Metals TMDL

TMDL Order	WQBEL	Interim/Final	Compliance Date
Metals TMDLs 2010-2026	Dry Weather[1] 30% of drainage area	Interim	9/30/2017
	70% of drainage area	Interim	9/30/2020
	100% of drainage area	Interim	9/30/2023
	Wet Weather[1] 10% of drainage area	Interim	9/30/2017
	35% of drainage area	Interim	9/30/2020
	65% of drainage area	Interim	9/30/2023
	100% of drainage area	Final	9/30/2026

[1] An Implementation Schedule for the Los Cerritos Channel Metals TMDLs was approved by the Regional Water Board on June 6, 2013 in Attachment B to Resolution No. R13-004.

1.7 MS4 Permit Requirements

Section VI.E.3 of the Los Angeles County MS4 Permit provides a framework for developing implementation plans for USEPA-established TMDLs by requiring Permittees subject to waste load allocations (WLAs) to propose and implement best management practices that will be effective in achieving compliance with USEPA-established numeric WLAs. A CIMP is required to be submitted either separately or as part of a WMP. The Watershed Group's CIMP is required to integrate requirements of the current Los Angeles County MS4 Permit, the City of Long Beach MS4 Permit and TMDL monitoring requirements.

On June 6, 2013, the Los Angeles Regional Water Board adopted Resolution No. R13-004 that amended the Water Quality Control Plan for the Los Angeles Region to incorporate implementation plans for the TMDLs for Metals in the Los Cerritos Channel and for Metals and Selenium in the San Gabriel River and Impaired Tributaries. Attachment B to the Resolution specifies an interim compliance date of September 30, 2017, which is after the anticipated approval date for the WMP, but is approximately three months prior to the expiration date for the Los Angeles County MS4 Permit. Attachment B also specifies two additional interim compliance dates in 2020 and 2023 and a final compliance date of September 30, 2026. Pursuant to Section VI.E.3 of the Order, the WMP will become the Implementation Plan for the EPA-established Los Cerritos Channel TMDLs for Metals. The final compliance date for the Greater Harbor Toxics TMDL is March 23, 2032.

The new MS4 Permit requires that participating agencies prepare individual Letters of Intent to participate in development of a WMP. The member agencies of the LCC Watershed Group each prepared and submitted such letters.

1.8 Overview of WMP Strategy

The Los Cerritos Channel Watershed Group member agencies continue to engage in a number of required control measures that were initiated prior to commencement of WMP development and that have continued throughout the WMP development process. In addition, the Watershed Group has

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concluded that the best way to address water quality impairments within the Los Cerritos Channel receiving waters is to implement a multi-faceted WMP strategy utilizing each member agency's stormwater management program along with customized strategies, control measures, and BMPs at the watershed level. The initial focus will be on true source control, total suspended solids (TSS) reduction, and runoff reduction. Once those options have been pursued, Watershed Permittees will pursue LID and green streets, operational source control, capture and infiltration, capture and use, and treatment controls. (See Figure 3-1 in Section 3.0)

True source control – reducing or eliminating a pollutant at its source – is a critical component of this strategy. Its effectiveness is simple: if pollutants are not generated or released, they will not be available for transport to the receiving waters. The Watershed Group has focused particularly on true source control because major sources of copper, lead, and zinc are released into the atmosphere, resulting in widespread deposition on impervious surfaces such as streets, highways, parking lots, and rooftops, in addition to the direct deposition that occurs on streets, highways, parking lots, and driveways. Copper is being addressed through the implementation of SB 346.

The Watershed Group is planning to working with CASQA to address a major source of zinc – automotive tires. The Department of Toxic Substances Control (DTSC) adopted new Safer Consumer Product Regulations that establish a process for identifying, prioritizing, and eliminating or reducing Chemicals of Concern in Priority Products. Because the requirements for inclusion on the initial priority product list are restrictive, these regulations could not be used to reduce zinc in tires until after January 1, 2016. However, the Watershed Group will be able to utilize the next two years to work with CASQA and others to develop a well-supported petition to support the addition of zinc in tires as a product-chemical combination on the Priority Products List.

The Watershed Group will also emphasize TSS reduction. Reducing total suspended solids in the receiving waters should result in a significant reduction of metals and legacy organics, since both groups of pollutants adhere to sediment. This initial emphasis on TSS reduction should reduce the volume of water that ultimately needs to be captured and infiltrated or used to achieve standards for metals and legacy organics. The Watershed Group also will implement an enhanced street sweeping and parking lot sweeping program within the Palo Verde Channel Sub-watershed during the first phase of implementation of this plan.

The runoff reduction strategy will initially focus on reduction of dry-weather runoff to substantially improve water quality during dry-weather days. This will involve a combination of water conservation and improvements in landscape irrigation efficiency to eliminate or greatly reduce overspray and runoff that provides a transport mechanism to carry pollutants to the storm drain system and into the receiving waters of the Los Cerritos Channel. Watershed Group members will use their Public Outreach Programs and Public Agency Activities Programs to promote and monitor operational source control measures that address priority pollutants within the Watershed.

Reducing runoff during wet weather is challenging and costly. The Watershed is essentially built-out and will be partially dependent on redevelopment to create opportunities for wet-weather runoff reduction.

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However, member agencies will implement green streets; retrofit low impact development (LID) components at key locations; and reduce directly connected impervious areas. In addition, member agencies will implement capture and use and capture and infiltrate measures to the maximum extent practicable.

Because of the depth to the drinking water aquifer and the widespread presence of clay lenses throughout the Watershed, implementation of a capture and infiltrate strategy will be challenging. The Watershed Group has attempted to locate initial potential water capture facilities in locations where captured stormwater can be treated, if necessary, and used for irrigation if infiltration is not feasible. These locations include local parks and golf courses and, potentially, school sites. To date, thirteen first order water capture sites have been identified. The three initial projects are planned for two park locations and a golf course, locations that will be particularly helpful in bringing the upper portions of sub-basins 4, 8, 9, and 10 into compliance with the Waste Load Allocations in the Metals TMDLs and reduce the loads of other priority pollutants with similar fate and transport mechanisms.

The Watershed Group will also implement operational source control measures. These measures include street sweeping and cover and containment, as well as education and outreach efforts to encourage public and private sector entities to reduce or eliminate the discharge of pollutants or to reduce or prevent the contact of pollutants with rainwater and/or urban runoff.

Except for vegetative treatment associated with LID, MS4 treatment control is generally viewed by the Watershed Group as a last resort to be used when true source control, TSS reduction, runoff reduction, and operational source control are not sufficient. The Permittees anticipate that much of the treatment control implemented in the Watershed will be associated with implementation of LID ordinances and Green Streets policies. Further, although enhanced street sweeping should be sufficient to control direct and indirect deposition of zinc on arterials and residential streets, control of zinc from industrial sources may require the installation of targeted treatment controls. The need for installation of treatment control facilities will be continually re-evaluated through the adaptive management process required by Order No. R4-2012-0175 and explained in Section 10 of this Program.

The adaptive management process will be key to successful implementation of the Los Cerritos Channel Watershed Management Program. The Watershed Group will utilize management techniques set forth in this Program, assess and monitor for results, and refine program components, as necessary. For further details on the Watershed Group's multi-pronged strategy, including its Financial Strategy, please see Section 3.0 of this Program.

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2.0 Identification of Water Quality Priorities

2.1 Water Quality Characterization

2.1.1 Introduction

The Permittees within the Los Cerritos Channel Watershed are fortunate to have 13 years of data collected by the City of Long Beach at its Stearns Street mass emission monitoring site. This monitoring site was established pursuant to the City's individual MS4 permit first adopted in 1999

Major elements incorporated in Long Beach's monitoring and reporting program include 1) mass emission monitoring during storm events, 2) monitoring of dry weather discharges at each mass emission site, and 3) special studies. Special studies were included in the original permit to provide the flexibility necessary to allow the program to respond to new issues or concerns that might arise in the course of routine monitoring or as the result of emerging topics in stormwater science. Special studies were generally intended to improve assessment of impacts on receiving water, identify sources and sinks for contaminants, and assess compliance with TMDL targets and water quality objectives. The City has developed a variety of special studies during the past 13 years. In addition, the City has incorporated analysis of additional pollutants of concern based upon changes that have occurred with respect to pesticides that are available for residential use. Data from the monitoring program is intended to support decisions necessary to refine BMPs for the reduction of pollutant loading and the protection and enhancement of beneficial use of the receiving waters.

Mass emission monitoring is specified to be conducted at four sites during four wet weather storm events each year, including the Stearns Street site for the Los Cerritos Channel. The 1999 permit allowed for a phased implementation process with monitoring of the Los Cerritos Channel site starting in the second year of the program. An automated monitoring station was first installed and operable for the 2000/2001 wet season. Dry season monitoring was started in June 2001.

Storm Water Runoff at the Los Cerritos Channel Monitoring Station

The Stearns Street monitoring station serves as both a mass emission monitoring site for the City of Long Beach stormwater monitoring program and as the compliance point for the Los Cerritos Metals

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TMDL. The storm water monitoring station is installed in a steel utility box located on the west side of the channel south of Stearns Street. Water level/flow sensors and Teflon/FEP tubing for water sampling are installed on the bottom of the large concrete lined channel. The sensors and intake tubing pass through conduit to protect against the high flows and debris passing through the channel. Flow rates based upon measured water levels and a stage-flow rating curve used at an adjacent gauging station that is no longer in service.

This sampling site is normally above tidewater on Los Cerritos Channel. During extreme tides that typically occur during the dry weather surveys, this site can be impacted by backwater conditions. This has been remedied in recent years by scheduling dry weather sampling for periods that have less extreme tidal ranges.

The Long Beach Stearns Street mass emission monitoring program was developed to characterize stormwater discharges, identify contaminants of concern and develop pollutant load estimates for each major watershed. Monitoring is required to be conducted during the first significant rainfall event of the season. Flow-rated, whole storm composite samples are obtained and analyzed for major constituents of concern which include conventional constituents, total and dissolved metals, organochlorine pesticides, organophosphate pesticides and, in the past three years, pyrethroid pesticides. A more comprehensive set of constituents was analyzed during the earlier years of the program. These included extensive screening for semivolatile organics (acid, base and neutral compounds), MBTE, and larger suites of both triazine pesticides and trace metals. The analytical set was selectively reduced after these compounds failed to occur at levels exceeding Minimum Levels (MLs) or where concentrations did not exceed any available and appropriate water quality standards. Toxicity testing using sea urchin fertilization tests and water flea survival and reproduction is conducted on composite storm samples. Toxicity tests during the earlier years of the program also included mysids but tests conducted at that time were not as sensitive as either the sea urchin fertilization test or the water flea tests. As with the chemical constituents, toxicity testing using mysids was suspended in lieu of the more sensitive tests. Phase 1 Toxicity Identification Evaluations (TIEs) are required to be performed on all samples that exhibit toxicity in excess of predetermined trigger values. The TIE process is used to determine the likely contaminants contributing to the observed toxicity.

Dry weather monitoring at Stearns Street consists of inspections conducted at the mass emission site and the collection and analysis of dry weather discharges over 24-hour periods. Monitoring is required to be conducted twice during each dry season. Sampling is typically conducted in September just prior to the storm season and in May following several weeks of dry weather. This element of the program is intended to assist in identification of pollutants of concern, assess the impacts that these pollutants might have on biological communities in the receiving waters and identify the sources of these contaminants such that they can be effectively controlled or eliminated. Dry weather discharge samples

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are subjected to the same chemical analysis and toxicity testing procedures as used for storm water monitoring.

2.1.2 Summary of Water Quality Conditions in the Los Cerritos Channel Freshwater Receiving Waters

The following sections discuss the quality of stormwater and dry weather discharges from the mass emission monitoring site. Concentrations of contaminants measured in both wet and dry weather discharges were compared with various receiving water quality criteria. Temporal trends over the past 13 years were examined for principal contaminants of concern. Data from the Stearns Street site were examined in great detail in order to assess progress towards meeting established Waste Load Allocations in the Los Cerritos Channel Metals TMDLs. The toxicity of both storm water and dry weather discharges are summarized for the duration of this time period. Water quality data associated with stormwater runoff (Table 2-1) and dry weather discharges (Table 2-2) are summarized for the most common contaminants of concern. Benchmarks used to evaluate receiving waters are summarized in Table 2-3 and Table 2-4.

For the purpose of this analysis, water quality criteria or objectives were used to provide reference points for assessing the relative importance of various stormwater contaminants, though specific receiving water studies are necessary to quantify the presence and magnitude of any actual water quality impacts. Ultimately, specific beneficial uses of the receiving water body should be considered when selecting the appropriate benchmarks.

Water quality criteria used as benchmarks in freshwater environments are summarized in Table 2-3 Criteria applicable to saline conditions are summarized separately in Table 2-4. These reference water quality criteria are useful for screening Event Mean Concentrations (EMCs) generated for most of the major constituents measured as part of this program. Most importantly, these benchmarks are only intended to serve as a tool to assist with the interpretation of the storm water quality data. Exceedances of these receiving water quality benchmarks do not necessarily indicate impairment. Other factors such as dilution, duration and transformation in the receiving waters must also be considered. Nevertheless they can be extremely useful in screening for analytes that might have greater potential to impact receiving waters and/or warrant more consideration in development of BMPs and implementation of source control strategies.

For comparative purposes, an EMC was considered to be an exceedance if the value was higher than any of the reference or benchmark values. In using these benchmarks, it is important that the source of the specific criterion is considered. For instance, metals concentrations derived from California Toxics Rule (CTR) freshwater criteria for protection of aquatic life are based upon dissolved concentrations and are often a function of hardness. Values listed in Table 2-3 are based upon a default hardness of 100 mg/L

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which is consistent with tabulated values provided in the CTR. Evaluation of any possible exceedance of hardness-dependent criterion is based upon the actual hardness EMC for the site and event therefore the criterion will change. Hardness measured during wet weather events is typically far less than 100 mg/L while hardness associated with dry weather events will be substantially higher. For metals with criteria dependent upon hardness, CTR criteria tend to be much higher for dry weather discharges since elevated hardness encountered during the dry season tends to mitigate potential toxicity of these metals. Saltwater objectives listed for metals under the CTR are also based upon dissolved concentrations while those listed under the California Ocean Plan are based upon total recoverable measurements. Although Ocean Plan numbers are used for comparative purposes, the marine and estuarine receiving waters in the Los Cerritos Channel Estuary would only be subject to the CTR saltwater values since both Alamitos Bay and San Pedro Bay are considered enclosed bays and estuaries. Water quality criteria provided in the Los Angeles Basin Plan are primarily based upon Title 22 drinking water standards. For two of the key organophosphate pesticides, the only available water quality criteria are those proposed by the California Department of Fish and Game (Siepmann and Finlayson, 2002). UC Davis (Faria et al. 2010; Fojut et al. 2012) has recently provided a series of reports that suggest new acute and chronic water quality criteria for a series of pesticides that include various pyrethroids and organophosphate pesticides.

Both acute and chronic water quality criteria are used in this evaluation. Due to the limited period of discharge, the acute criteria are considered most applicable to storm water. Dry weather discharges are most appropriately compared against chronic criteria (CCCs or daily maxima).

2.1.2.1 Wet Season Water Quality

The water quality criteria for pH included in the Los Angeles Basin Plan (CRWQCB, Los Angeles, 1994) indicate that surface waters should be maintained in the range of 6.5 to 8.5. Elevated pH is extremely atypical due to the acidic nature of rainfall. It is unusual to have storm water with measured pH values greater than the upper Basin Plan limit of 8.5 but historically a small percentage of storm water samples have exceeded the upper standard of 8.5.

Although care is taken to get accurate pH measurements, it is well known that accurate measurements in water with low ionic strength are difficult to obtain due to instability and slow response times. It is possible that some historical measurements were impacted by this problem. Sensors and measurement techniques for addressing water with low ionic strength have improved over the past decade.

The total coliform, fecal coliform and enterococcus single sample benchmarks are commonly exceeded during wet weather sampling events. Grab samples taken for bacteria during storm events most often exceed Basin Plan water quality criteria but also have shown a tremendous degree of variability of time. This can be attributed to both extreme variability that can occur over the course of a storm event and

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even extreme short-term variability that is common when taking field duplicates. Although the variation is substantial, overall concentrations of fecal indicator bacteria (FIBs) in storm water average about 104 mpn/100 ml for both Enterococcus and fecal coliform. E. coli have not been directly measured as part of the storm water monitoring program, however, fecal coliform concentrations provide an upper estimate of the E. coli in the water samples.

Over the past 13 years, four total recoverable metals including aluminum, copper, lead and zinc have frequently exceeded benchmark reference values. Criteria for total recoverable aluminum exist for drinking water (Basin Plan criteria) and aquatic life as a nonpriority pollutant (Table 2-3). Elevated levels of aluminum are normal during storm events due to naturally high levels in soils and the increased loads of sediment.

Concentrations of total recoverable copper, lead, and zinc measured in runoff from the Stearns Street site have frequently exceeded Ocean Plan criteria over the past thirteen years of the stormwater monitoring program.

Chlorinated pesticides continue to be uncommon in storm water runoff from the Stearns Street mass emission site. When detected, concentrations of detected compounds have typically been low (less than 10 times the reporting limit). Although largely banned or restricted throughout industrialized nations, these legacy pesticides persist in the environment.

The banning of residential, nonprofessional use of diazinon and chlorpyrifos resulted in these contaminants no longer being measureable in most storm water samples. Lower detection limits were implemented in the middle of the 2010/2011 monitoring season. The detection limits for chlorpyrifos dropped from 0.05 µg/L to 0.002 µg/L and the detection limits for diazinon dropped from 0.01 µg/L to 0.0015 µg/L. Use of the lower detection limits resulted in chlorpyrifos being detected in runoff from the Los Cerritos Channel. However, concentrations remain below the benchmark concentrations developed by California Department of Fish and Wildlife.

Pyrethroid pesticides have largely replaced diazinon and chorpyrifos for pest control in the urban environment. Pyrethroids were not added to the analytical suite until mid-season during 2010/2011. Pyrethroid pesticides have been analyzed in wet weather runoff from the Stearns Street site for the past three years. The presence of bifenthrin, cyfluthrin, cypermethrin and permethrin are of primary concern. Although permethrin is consistently measured at the highest concentrations, this compound is the least toxic of these four pyrethroid pesticides.

These pesticides are known to be highly toxic with several compounds causing a toxic response to *Hyalella* at levels as low as 0.002 µg/L (2 ng/L), which is near the detection limit for many of these compounds. Many of the pyrethroids were measured at concentrations that would be expected to

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cause toxicity to *Hyalella* or *Americamysis* but generally low enough that *Ceriodaphnia* would not be expected to show impacts. It is also unlikely that pyrethroid toxicity would be measureable using the standard suite of WET tests being proposed for use in the new Los Angeles County and City of Long Beach MS4 NPDES permits.

Although pyrethroid pesticides are a recognized concern, the short and long-term impacts of these compounds are not well understood. These compounds are extremely difficult to measure since they are highly hydrophobic and tend to adhere to surfaces. In stormwater, pyrethroids tend to partition to suspended solids reducing bioavailability (Yang et al. 2006).

Since these compounds are highly hydrophobic, they are best known for the toxicity that they exert on the benthos. The environmental toxicity of these compounds was first established using amphipod tests that are conducted using sediment. Tests were later modified to use amphipods for water testing. Although these compounds typically have a half-life in water that ranges from days to months, it is expected that they may persist much longer in the sediments. Recently, Lao et al. (2010) identified the presence of pyrethroid pesticides in sediment sampled in the Ballona Creek Estuary. Levels measured in the sediments were considered sufficient to have caused observed toxicity to *Eohaustorius* which is an amphipod common in marine and estuarine environments.

2.1.2.2 Dry Season Water Quality

With the exception of organophosphate pesticides, water quality of dry weather discharges has not changed substantially since the start of the program in 2000. Dry season water quality has not tended to vary greatly between sites or sampling dates. The most significant changes continue to be decreases in the volume of dry weather discharges.

Exceedance of pH criteria remains one of the most common occurrences during dry weather. These exceedances typically occur only in drainages with open concrete channels. These excursions are not observed in waters that enter the storm drains or receiving waters directly from pipes. Extensive testing conducted in the Los Cerritos Channel during the 2010/2011 season demonstrated natural cycling of pH in any shallow, low flow channel with the presence of algae. Controlling these fluctuations would require enclosing the channel or eliminating flow during the dry seasons. Enclosure of the channels would impact bacterial concentrations by eliminating the sanitizing effects of sunlight that helps to control bacteria.

Exceedances of dissolved metals criteria during dry weather are largely limited to copper in waters from the Los Cerritos Channel. In addition, exceedances of dissolved copper criteria are mostly due to the CTR saltwater criteria. During the dry season, hardness values average 184 mg/L. As a result, water quality criteria for hardness dependent metals are elevated which results in few exceedances of the dissolved copper criterion. At this level of hardness, the CTR freshwater dissolved copper criterion is equal to 15.1 µg/L.

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Low levels of four pyrethroid compounds caused exceedances of draft criteria during dry weather however most were detected at concentrations between the Method Detection Limit and the Reporting Limit. Since the criteria proposed by Fojut et al. (2012) are below the reporting limits, these detections were considered to be exceedances. Bifenthrin was the only pyrethroid pesticide detected above reporting limits during the dry weather surveys. With the exception of these pyrethroid pesticides, organic constituents (aroclors, chlorinated pesticides, and organophosphate pesticides) are typically undetected in dry weather samples.

2.1.3 Toxicity Results

The following sections summarize the results of bioassay tests conducted during both dry and wet weather periods at the Stearns Street monitoring site between the year 2000 and 2013. Figure 2-5 and Figure 2-7 summarize chronic toxicity of stormwater to sea urchin fertilization and water flea reproduction, respectively, throughout the thirteen years of the City's monitoring program. Figure 2-4 and Figure 2-6 provides similar summaries of dry weather chronic toxicity for urchins and water fleas, respectively.

Sea urchins have shown more instances of moderate to high (>8 TUc) wet weather toxicity than have water fleas (Figure 2-5 and Figure 2-7).

Figure 2-7 shows a virtual absence of wet weather water flea toxicity after the 2001/2002 storm season at Stearns Street, except minor to moderate reproductive effects in 2004/2005. In the 2008/2009 program, instances of elevated reproductive toxicity were attributed to statistical artifacts due to very low within-test variability. Data from the 2009/2010 and continuing into the 2012/2013 monitoring programs continues to show that water flea toxicity is almost undetectable in wet weather samples.

There was some suggestion in the toxicity data from early monitoring periods that seasonal flushing may have been a factor affecting the variability in storm water toxicity. Early years of the program suggested that *Ceriodaphnia* toxicity was usually somewhat elevated in early versus late storms, but this pattern was not evident in later years. Toxicity to sea urchins has varied widely over the storm seasons allow generally lower toxicity was encountered since 2006 yet occasional toxicity has been encountered at levels as high as 16 TUc or more (Figure 2-5). Since the 2004/2005 storm season water flea toxicity has dropped to near undetectable levels while the sea urchin toxicity has been more sporadic with toxicity increasing slightly in the 2011/2012 and 2012/2013 storm seasons.

Sources of toxicity were examined by comparing measured toxicity with toxicity predicted based upon the chemical analysis of key toxicants. The predicted acute toxicity of the sample is calculated from the measured concentrations of the chemical constituents and their corresponding EC50 or LC50. Expected water flea toxicity was calculated based upon LC50s for zinc, chlorpyrifos and diazinon. Earlier testing implicated these analytes as the primary toxicants contributing to mortality and reproduction. Expected

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toxicity for the sea urchin fertilization test was calculated based upon EC50 data for zinc and copper. With few exceptions, concentrations of these two metals were found to be sufficient to explain the most of the toxicity observed in the sea urchin fertilization tests.

2.1.3.1 Test of Significant Toxicity (TST)

The Test of Significant Toxicity (TST) is a statistical approach to analyze whole effluent tests (WET) and ambient toxicity data that is being developed by the U.S. Environmental Protection Agency. The State Water Resources Board has proposed a draft policy to implement statewide use of the TST approach. The new policy is intended to provide a consistent approach to monitoring toxicity in discharges to inland surface waters, enclosed bays, and estuaries. The potential impacts of incorporating the TST approach into storm water programs have not been fully evaluated.

The TST is designed to be used as a two-concentration data analysis of the sample contrasting receiving water, also referred to as the critical concentration, with a control concentration. Once WET tests are completed, results are analyzed with the TST calculator to assess if the sample was toxic. The TST approach is intended to determine if a sample at the critical concentration and the control within a WET test differ by an acceptable amount. This method yields a simple yes/no as to whether or not a sample is considered toxic.

Table 2-5 provides a comparison of use of the NOEC and TST methods for initiation of Toxicity Identification Evaluations (TIE) using the results of water flea reproduction tests conducted in waters from the Los Cerritos Channel over the past three years. Application of the TST indicated presence of significant toxicity in four of 15 bioassay tests. Only one of these also exceeded an effect level of 50% which would require immediate implementation of TIE testing under the new Los Angeles County MS4 permit. This was a dry weather sample taken in May 2013.

For the 2012/2013 Los Cerritos Channel season data from all water flea reproduction tests (storm water and dry weather tests) were subjected to both analytical approaches. All storm water samples for water flea reproduction passed using both the NOEC and TST approach. However, use of the TST approach would have triggered an additional TIE test for the Los Cerritos Channel site for a dry weather test in May 2013. This sample had minor evidence of toxicity with a TUc of 2.0. Under the program guidelines, this was minor toxicity was not sufficient to warrant TIE testing.

2.1.4 TMDLS

The Los Cerritos Channel Metals TMDLs established WLAs for total copper, lead and zinc during wet weather and total copper during dry weather. Total lead limits were based upon maintenance of historical concentrations. Total lead concentrations and loads remain compliant with the TMDL limits. Total copper exceeds existing targets by factors ranging from 1.9 to 8. Total zinc exceeds target levels by

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factors of 1.4 to 5.9. Both total lead and total zinc concentrations show evidence of steady decreases in concentration over the past 13 years. During dry weather periods, both concentrations and loads of total copper are declining. The combination of these factors has resulted in dry weather copper loads within the Los Cerritos Channel declining to levels that are less than 20% of the WLA. The copper dry-weather loading capacity (TMDL) for Los Cerritos Channel was established based upon the following calculation: 19.1 µg/L X 2.35 cfs X 0.00539 (conversion factor) = 0.242 lbs/day or 109.7 grams/day. The TMDL objectives are expressed as total recoverable metals.

Dry weather flows have dramatically declined in recent years (Figure 2-3) presumably due to better water conservation efforts. The average flow measured at the Los Cerritos Channel monitoring site has been consistently under 0.5 cfs since 2009. At the same time, concentrations of total copper have significantly declined. The combination of these factors resulted in dry weather copper loads in the Los Cerritos Channel declining to levels that are less than 20% of the WLA.

The wet weather load capacities for total copper, total lead, and total zinc were calculated based upon storm volumes and the following concentrations:

Total copper = 9.8 ug/L
Total lead = 55.8 ug/L
Total zinc = 95.6 ug/L

Table 2-6 provides a summary of the TMDL load limitations for copper, lead and zinc along with storm volumes, calculated loads, and exceedance factors for storm events from 2011 through 2013. Measured loads of total copper exceed the TMDL limits by a factor of 1.9 to 8.0. Similarly, measured loads of zinc exceed the TMDL limitation by factors ranging from 1.4 to 5.9. Load limits established for total lead were based upon assuring that historical conditions were not exceeded. Lead loads have not exceeded a factor of 0.8 (or 80%) of the limit established in the TMDL. This suggests that the historical decline in lead concentrations is continuing. A comparison of concentrations of total copper, lead and zinc prior to the TMDLs and after the TMDLs (Figure 2-1) shows little evidence of changes for metals over this short time but the concentrations of total lead do show less variability in recent time. In contrast, the concentrations for total copper and zinc show substantial variability in post TMDL measurements.

Figure 2-2 provides a more detailed examination of trends over time. Graphics on the left side of the page separate conditions before and after implementation of the TMDLs while those on the right side of the page simply illustrate long-term trends. Flows associated with monitored events are relatively consistent although there is some suggestion that flows associated with these events have slightly increased over time.

Concentrations of total copper have been relatively stable but both total lead and total zinc concentrations show evidence of decreases in concentration over the past 13 years. Wet weather loads show similar but more muted trends as a result of increase in storm volumes. Apparent decreases in total zinc loads after implementation of the TMDL are of interest but are likely an artifact of the limited

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post-TMDL data set.

Necessary decreases in concentrations of total copper are best illustrated by examination of the distributional characteristics of total copper concentrations. All measurements of total copper have exceeded the limit established in the TMDL. In order to simply meet TMDL requirements, total copper concentrations will need to be reduced by more than 70%.

2.1.5 Summary of Monitoring Results

Monitoring of storm water runoff and dry weather flows at the Los Cerritos Channel Stearns Street mass emission site over the past 13 years has resulted in the identification of a relatively small list of constituents of concern. Elevated concentrations of total recoverable aluminum, copper, lead and zinc are commonly associated with storm water discharges due to increased sediment loads. Concentrations of these metals are typically associated with elevated sediment concentrations during storm events. Aluminum is expected to be elevated during storm events simply due to the natural abundance of this metal in soils. Although aluminum temporarily exceeds drinking water quality criteria during storm events, it is not considered to be a major constituent of concern. Concentrations of total recoverable lead are also elevated during storm events but concentrations of dissolved lead consistently meet existing water quality objectives. As a result, the Los Cerritos Channel Metals TMDL established a WLA for total recoverable lead based upon existing loads for both antidegradation purposes and to assure that downstream waters are protected. Concentrations of dissolved copper and zinc commonly exceed freshwater water quality criteria [California Toxics Rule (CTR) Criteria Maximum Concentrations (CMS)] during storm events and are the two metals of primary concern. Long-term trends suggest that both lead and zinc have been declining slightly during the past decade but concentrations of copper remain relatively steady. Concentrations of copper are not expected to decline until reductions in the copper content of brake pads are implemented.

Two organophosphate pesticides, diazinon and chlorpyrifos, were commonly detected in storm water runoff before 2002-2003 when they were banned for residential use. By 2006, concentrations of both compounds declined to levels below benchmarks established by California Fish and Wildlife. These compounds are no longer considered to be constituents of concern.

Fecal Indicator Bacteria (FIBs) tend to be elevated in receiving waters during both wet and dry weather but concentrations increase substantially during storm events. Concentrations of fecal coliform range from 10^4 to 10^5 MPN/100 ml during storm events.

Exceedance of pH criteria is common during periods of dry weather. A year-long study identified a consistent daily cycle of increasing pH during the day and decreasing concentrations at night that was attributed to low flows and intensive algal production. When storm events occur, pH concentrations become relative stable and remain within water quality objectives.

Organochlorine pesticides are not common in stormwater discharges from the Los Cerritos Channel but, when detected, concentrations are typically near detection limits. In most cases, measured values range

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from near at concentrations within 10 times the reporting limits.

In recent years, monitoring was extended to incorporate pyrethroid pesticides. Four of these compounds, bifenthrin, cyfluthrin, cypermethrin and permethrin are of primary concern. Initial studies indicate that concentrations measured during storm events are sufficient to produce a toxic response to more sensitive bioassay species. These compounds are also present in dry weather flows but concentrations are diminished.

A general trend of reduced toxicity has been observed for both stormwater and dry weather flows from the Los Cerritos Channel Freshwater watershed. Thirteen years of bioassay testing during both wet and dry weather indicates that toxicity is decreasing in both frequency and intensity. Decreases in toxicity are most evident during periods of dry weather with tests conducted with water fleas showing the most improvement. Decreases in toxicity were attributed to the elimination of residential uses of diazinon and chlorpyrifos. Bioassays using the sea urchin fertilization test have shown similar improvements. A number of TIEs have been conducted during this time period and in all cases results of the TIEs have shown that toxicity was caused by cationic metals. Cationic metals are simply metals in an ionic form with positive charges. These may include forms of the more common metals present in runoff (cadmium, copper, nickel, lead and zinc).

Comparisons of the actual toxicity versus expected toxicity calculated from the concentrations of key toxicants confirmed that metals were the most likely cause of toxicity in the sea urchin fertilization test. Concentrations of dissolved metals, particularly zinc and copper, measured in stormwater samples were typically sufficient to explain observed toxicity.

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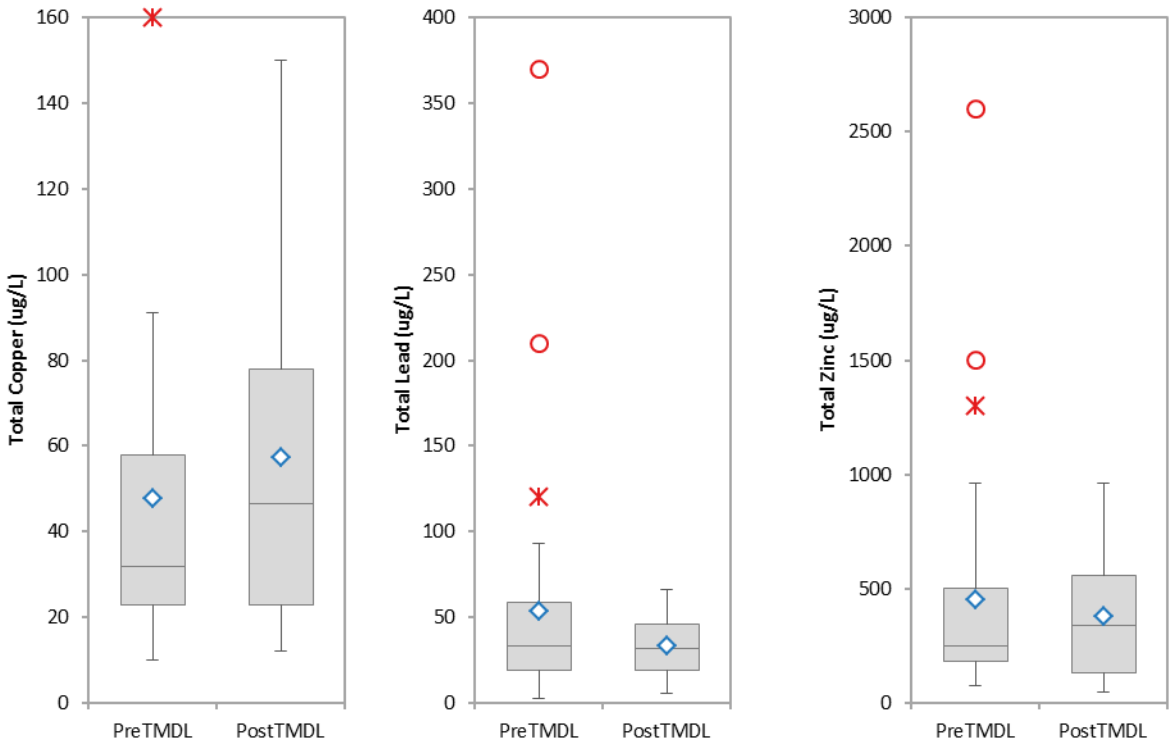

Figure 2-1. Box Plots showing the Distribution of Total Copper, Lead and Zinc before and after TMDL Implementation at the Los Cerritos Channel Monitoring Site (PreTMDL=35 samples, PostTMDL=10 samples)

Box plots display the minimum, 1st quartile, median, mean and 3rd quartile are displayed together with both limits (the ends of the "whiskers") beyond which values are considered anomalous. The mean is displayed with blue ◊ and a black line corresponds to the median. Limits are calculated as follows:

Lower limit: Linf = X(i) such that {X(i) – [Q1 – 1.5 (Q3 – Q1)]} is minimum and X(i) = Q1 – 1.5 (Q3 – Q1).

Upper limit: Lsup = X(i) such that {X(i) - [Q3 + 1.5 (Q3 – Q1)]} is minimum and X(i) = Q3 + 1.5 (Q3 – Q1)

Values that are outside the [Q1 - 3 (Q3 – Q1); Q3 + 3 (Q3 – Q1)] interval are displayed with the * symbol. Values that are in the [Q1 - 3 (Q3 – Q1); Q1 – 1.5 (Q3 – Q1)] or the [Q3 + 1.5 (Q3 – Q1); Q3 + 3 (Q3 – Q1)] intervals are displayed with the "**o**" symbol.

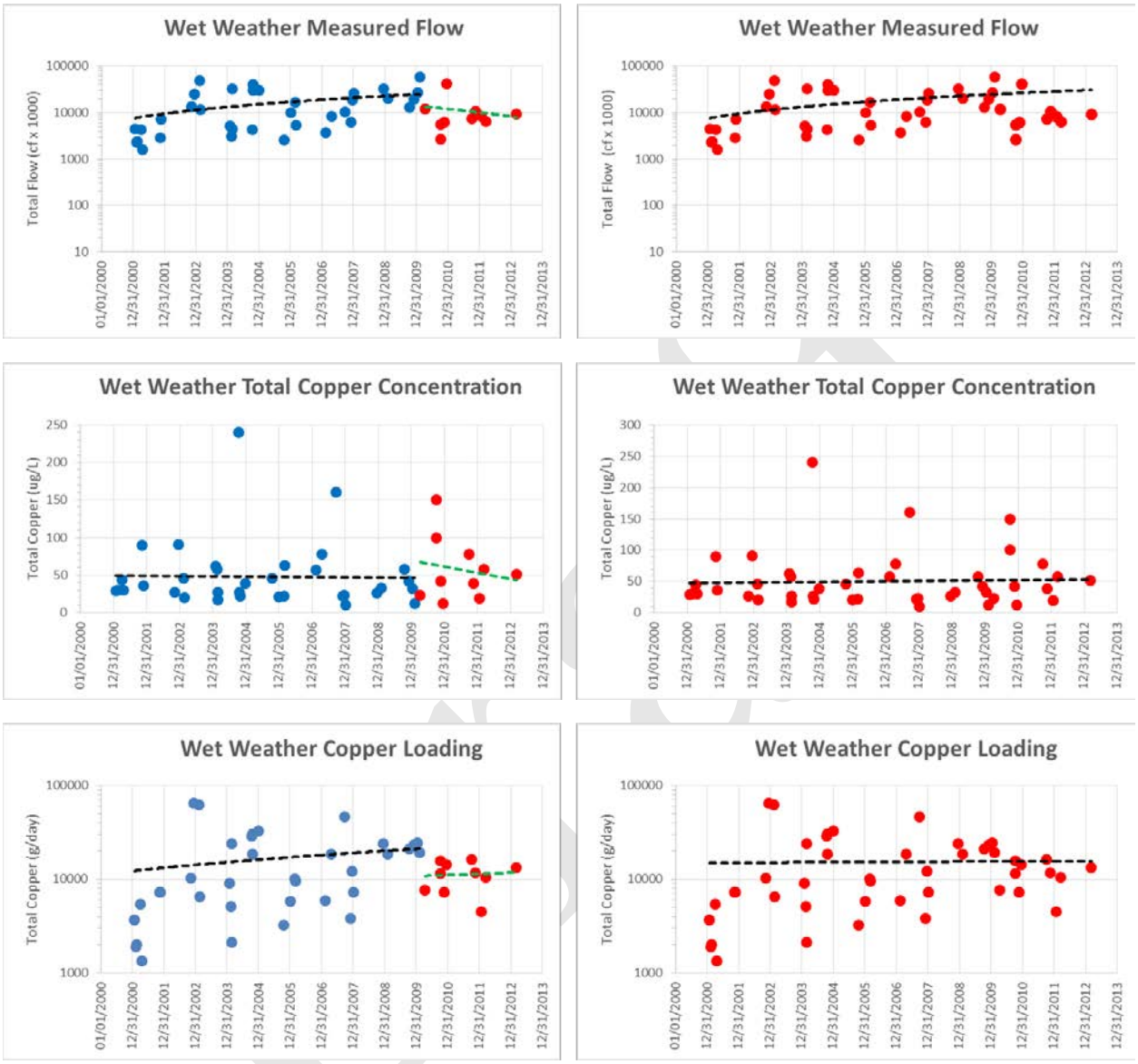

Figure 2-2. Stormwater Flow, Concentration and Loads for Total Copper, Zinc and Lead at the Los Cerritos Channel Station.

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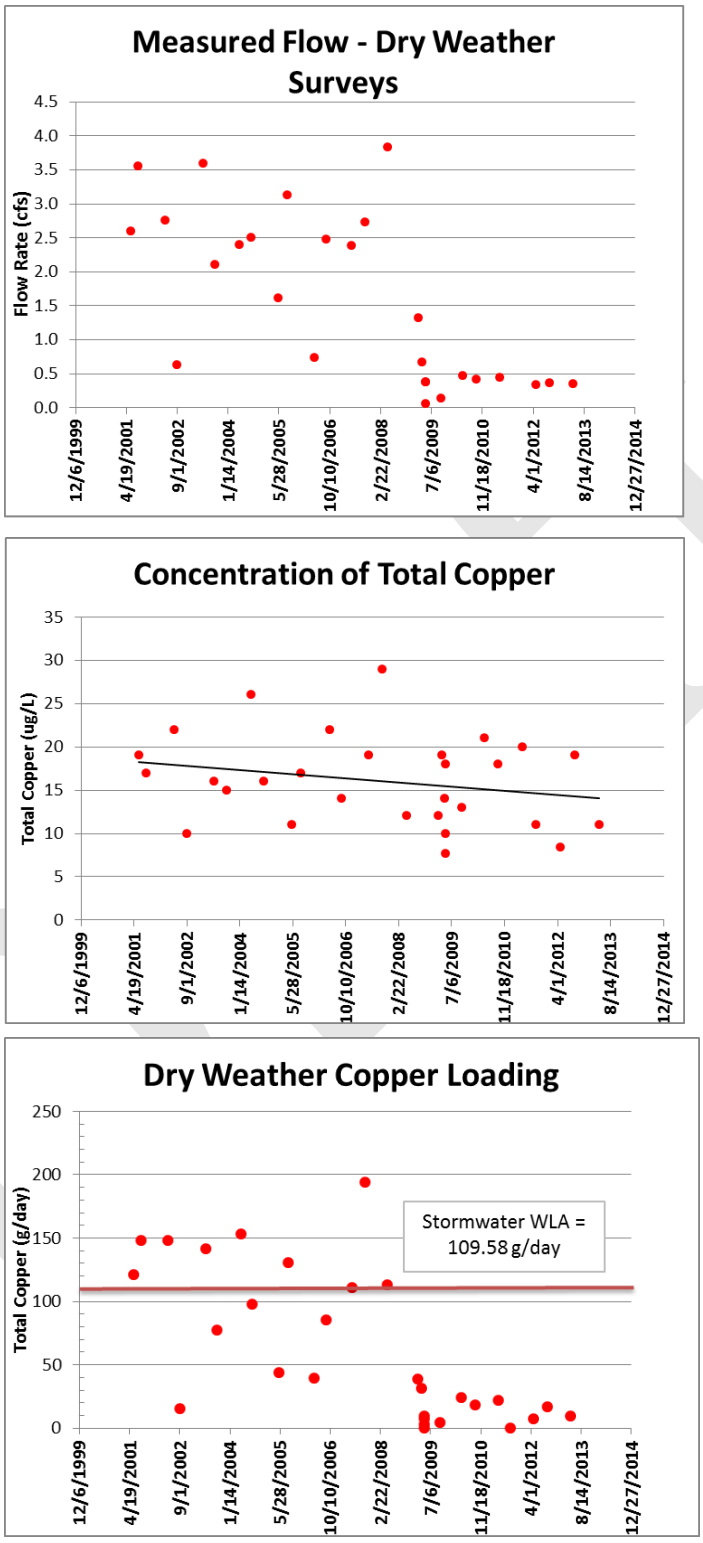

Figure 2-3. Dry Weather Flow, Total Copper Concentrations and Total Copper Loading at the Los Cerritos Channel Monitoring Site

RB-AR7169

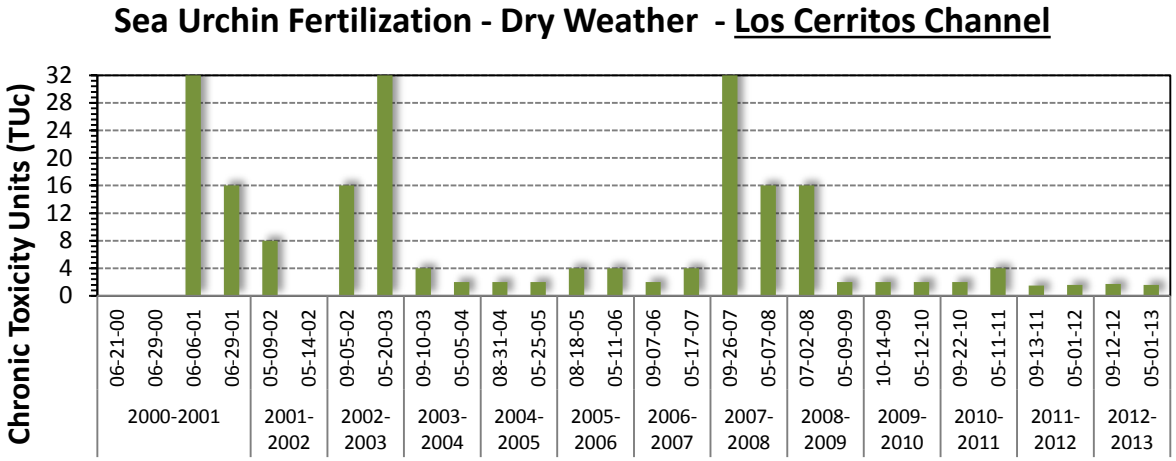

Figure 2-4. Chronic Toxicity of Dry Weather Discharge to Sea Urchin Fertilization 2000 to 2013.

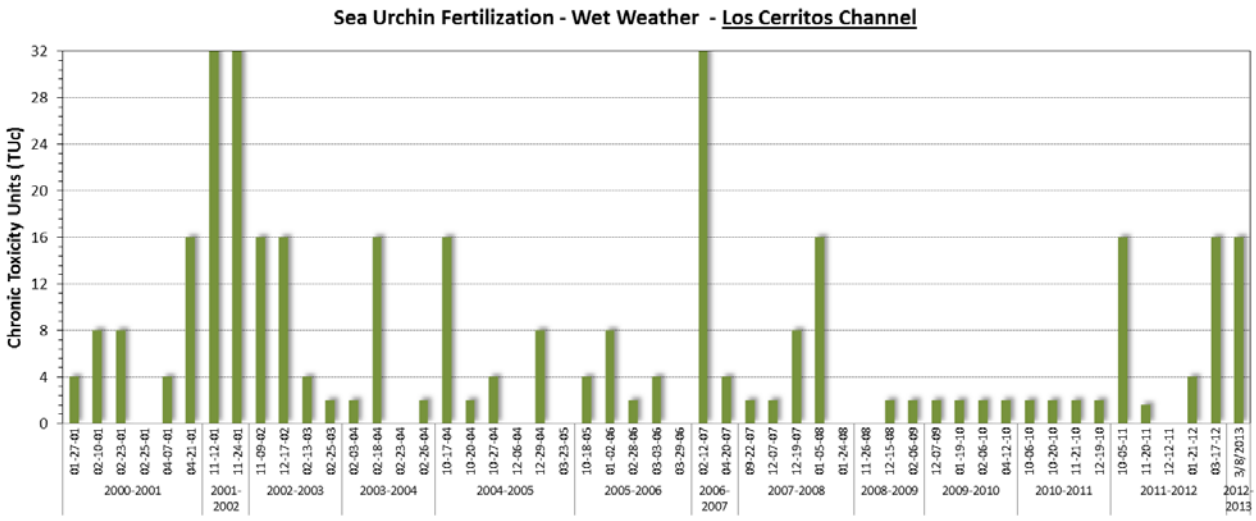

Figure 2-5. Chronic Toxicity of Stormwater Discharge to Sea Urchin Fertilization 2000 to 2013.

RB-AR7170

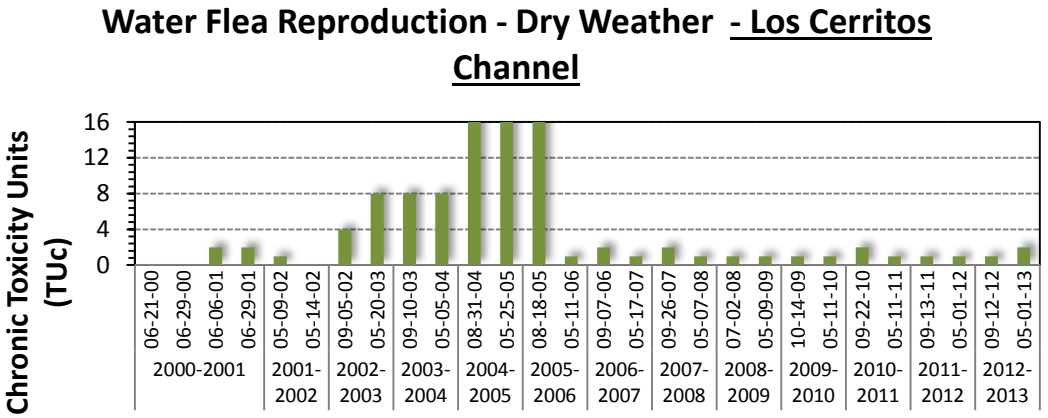

Figure 2-6. Chronic Toxicity of Dry Weather Discharge to Water Flea Reproduction 2000 to 2013.

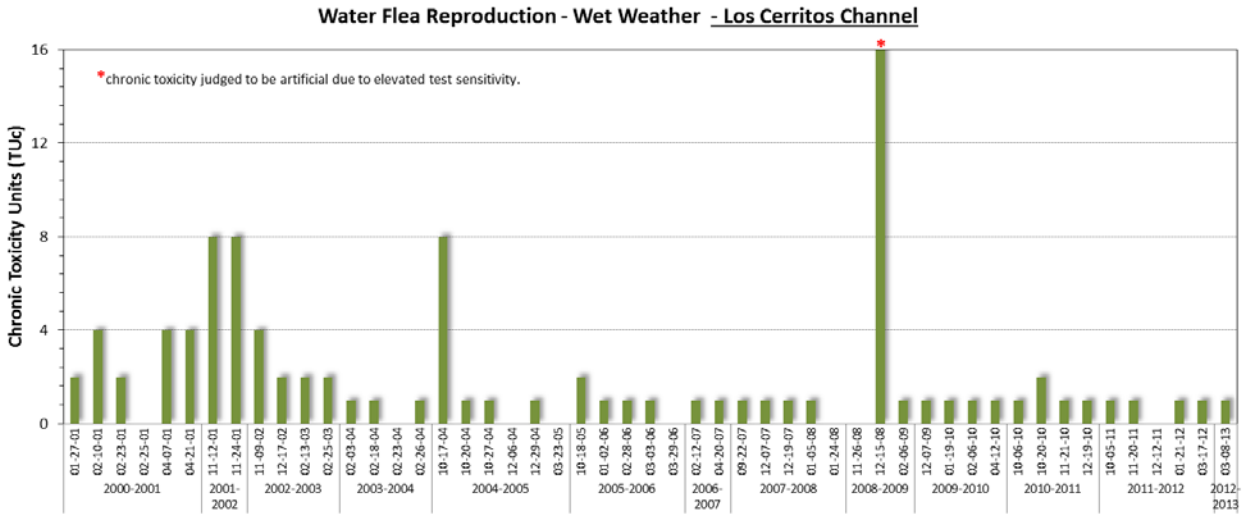

Figure 2-7. Chronic Toxicity of Stormwater Discharge to Water Flea Reproduction 2000 to 2013

RB-AR7171

Table 2-1. Summary of TSS, metals, bacteria and selected organophosphate pesticides measured in stormwater runoff at the Los Cerritos Channel Mass Emission

Date	TSS (mg/L)	Diss Cd (µg/L)	Total Cd (µg/L)	Diss Cu (µg/L)	Total Cu (µg/L)	Diss Pb (µg/L)	Total Pb (µg/L)	Diss Zn (µg/L)	Total Zn (µg/L)	Enterococcus MPN/100mL	Fecal Coliform MPN/100mL	Total Coliform MPN/100mL	Chlorpyrifos	Diazinon	Malathion
1/27/2001	260	0.25U	1.7	11	29	1.1	59	42	250		5000	110000	0.5U	0.5U	0.5U
2/10/2001	260	0.25U	0.81	11	30	0.5U	34	75	290		8000	50000	0.5U	0.5U	0.5U
2/23/2001	210	0.25U	1.3	12	30	1.1	52	51	290		30000	170000	0.5U	0.5U	0.5U
4/7/2001	350	0.21J	3.3	3.6	44	0.5	44	66	960		28000	90000	0.5U	0.5U	0.5U
4/21/2001	170	0.55	1.8	12	30	1.4	35	150	420		50000	300000	0.025U	0.21	0.27J
11/13/2001	1700	0.125U	5.5	7.4	90	3.1	370	48	1500	13210	50000	160000	0.025U	0.005U	0.5U
11/25/2001	200	0.125U	1.6	7.9	36	1.7	43	78	770	7520	50000	160000	0.28	0.41	0.5U
11/10/2002	110	0.36	0.59	19	27	7.6	16	160	180	1178	11000	80000	0.025U	0.2	0.5U
12/17/2002	450	0.125U	2.9	8.1	91	1.4	120	60	680	6670	90000	160000	0.025U	0.11	0.5U
2/13/2003	220	0.125U	1.0	5.0	46	0.79	31	35	250	144	3000	50000	0.025U	0.12	0.5U
2/25/2003	130	0.125U	0.61	5.6	20	0.97	22	63	160	4400	11000	160000		0.13	
2/3/2004	314	0.16	2.6	7.2	62	0.82	93	55	590	24400	13000	24000	0.025U	0.071	0.5U
2/18/2004	166	0.19	2.0	12	58	1.0	59	71	490	93000	130000	130000	0.025U	0.025U	0.5U
2/23/2004	48	0.12	0.62	5.0	17	0.48	19	52	210	12800	8000	30000	0.025U	0.025U	0.5U
2/26/2004	80	0.099J	0.66	4.4	27	0.61	20	37	180	9650	3000	13000	0.025U	0.025U	0.5U
3/3/2004	110														
10/17/2004	940	0.125U	8.3	12	240	3.3	210	130	2600				0.06	0.66	0.93
10/20/2004	130	0.12J	1.2	5.7	27	0.65	26	32	240	94000	70000	900000	0.55	0.05U	0.18
10/27/2004	170	0.125U	0.8	3.5	22	0.4J	28	11	180	35000	9000	90000	0.025U	0.025U	0.2
12/6/2004	69														
12/30/2004	350	0.057	1.2	3.9	39	0.32J	55	9.8	360	39000	22000	240000	0.025U	0.2	0.084
12/31/2004	210														

U=analyte not detected at the associated detection limit.
J=value is considered an estimate. This is most commonly encountered when the analyte is measured at a concentration exceeding the detection limit but below the reporting limit.

RB-AR7172

Date	TSS (mg/L)	Diss Cd (µg/L)	Total Cd (µg/L)	Diss Cu (µg/L)	Total Cu (µg/L)	Diss Pb (µg/L)	Total Pb (µg/L)	Diss Zn (µg/L)	Total Zn (µg/L)	Enterococcus MPN/100mL	Fecal Coliform MPN/100mL	Total Coliform MPN/100mL	Chlorpyrifos	Diazinon	Malathion
1/8/2005	130														
1/10/2005	86														
1/11/2005	220														
1/28/2005	148														
2/12/2005	150														
10/18/2005	370	0.22	1.4	12	46	1.7	38	120		158000	1600000	1600000	0.005U	0.005U	0.299
1/2/2006	73	0.12J	0.6	5.7	21	0.66	13	49	180	9590	13000	90000	0.01U	0.01U	0.19
2/19/2006	320														
2/28/2006	75	0.12J	0.5	6.9	22	0.92	13	53	170	15500	30000	160000	0.005	0.005U	0.0389
3/3/2006	410	0.059J	1.5	4.8	63	0.5U	61	20	500	7900	24000	50000	0.001U	0.002U	0.003
3/29/2006	96														
4/5/2006	63														
4/15/2006	97														
10/14/2006	504														
2/11/2007	190	0.071J	1.1	10	57	0.86	28	78	450	109	300	2800	0.001U	0.002U	0.003
2/19/2007	100														
4/21/2007	280	0.12U	1.7	12	78	1.5	93	91	630	9950	8000	50000	0.001U	0.0232	0.165
9/22/2007	680	0.067	3.4	17	160	3	90	130	1300	1200	2400	11000	0.001U	0.002U	0.5126
12/8/2007	64	0.12U	0.3	11	22	0.92	8.3	74	150	13000	1536	3820	0.001U	0.027	0.1696
12/19/2007	100	0.081	0.47	9.1	23	0.76	14	49	180	21000	17000	160000	0.001U	0.002U	0.086
1/6/2008	80	0.074	0.17	6.8	10	0.44	3.0	42	76	8100	1400	90000	0.001U	0.002U	0.003
1/24/2008	230														
1/27/2008	120														

U=analyte not detected at the associated detection limit.
J=value is considered an estimate. This is most commonly encountered when the analyte is measured at a concentration exceeding the detection limit but below the reporting limit.

Date	TSS (mg/L)	Diss Cd (µg/L)	Total Cd (µg/L)	Diss Cu (µg/L)	Total Cu (µg/L)	Diss Pb (µg/L)	Total Pb (µg/L)	Diss Zn (µg/L)	Total Zn (µg/L)	Enterococcus MPN/100mL	Fecal Coliform MPN/100mL	Total Coliform MPN/100mL	Chlorpyrifos	Diazinon	Malathion
2/4/2008	43														
2/23/2008	17.3														
12/15/2008	150	0.077	0.45	7.4	26	0.34	13	26	160	25000	50000	90000	0.001U	0.002U	0.2866
2/6/2009	190	0.078	0.71	8.1	33	1.1	21	46	230	18000	3000	30000	0.001U	0.002U	0.1617
2/14/2009	226														
10/14/2009	170	0.067	0.89	15	58	1.8	33	85	400	35000	1600000	1600000	0.001U	0.002U	0.1431
12/8/2009	170	0.071	0.69	9.3	42	0.76	20	61	290	4700	5000	22000	0.001U	0.002U	0.1452
1/19/2010	170	0.043	0.54	4.9	32	0.37	71	20	210	18000	24000	160000	0.00U1	0.002U	0.1013
1/27/2010	116.5														
2/6/2010	270	0.083	0.25	3.1	12	0.2J	10	9.3	99	5400	8000	24000	0.001U	0.0216	0.003
3/7/2010	61.3														
4/12/2010	150	0.051	0.54	6.3	23	0.45	19	34	180				0.001U	0.002U	0.1919
10/6/2010	1100	0.048	2.2	13	150	2.0	63	30	960				0.001065	0.00213	0.211
10/20/2010	540	0.062	1.9	12	100	1.6	66	42	690	72000	30000	500000	0.00125	0.0025	0.325
10/30/2010	200														
11/21/2010	140	0.069	0.62	11	42	0.77	20	45	270	6600	3000	24000	0.011	0.0042	0.03
12/19/2010	52	0.049	0.20	4.5	12	0.35	5.5	28	85	6900	16000	50000	0.0016	0.0016	0.05
1/30/2011	108														
2/16/2011	99														
2/26/2011	66														
3/20/2011	46														
10/5/2011	260	0.18	1.4	13	78	1.6	37	64	560	14000	140000	1600000	0.005U	0.01U	0.025U

U=analyte not detected at the associated detection limit.
J=value is considered an estimate. This is most commonly encountered when the analyte is measured at a concentration exceeding the detection limit but below the reporting limit.

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11/12/2011	68														
11/21/2011	160	0.064	0.68	7.1	39	0.57	26	37	290	5500	220000	220000	0.001U	0.0014	0.025U
1/21/2012	53	0.12U	0.35	7.4	19	0.39	9.3	44	130	4100	3300	35000	0.0014	0.00075U	0.03
3/17/2012	370	0.1U	0.78	8.6	58	0.63	43	41	390	9200	160000	160000	0.0051	0.00075U	0.025U
3/26/2012	120														
3/8/2013	410	0.05J	0.87	6.0	51	0.25	46	33	390	7700	54000	54000	0.0047	0.0015U	0.05U

U=analyte not detected at the associated detection limit.
J=value is considered an estimate. This is most commonly encountered when the analyte is measured at a concentration exceeding the detection limit but below the reporting limit.

U=analyte not detected at the associated detection limit.
J=value is considered an estimate. This is most commonly encountered when the analyte is measured at a concentration exceeding the detection limit but below the reporting limit.

RB-AR7175

Table 2-2. Summary of TSS, metals, bacteria and selected organophosphate pesticides measured in dry weather runoff at the Los Cerritos Channel Mass Emission Site.

Date	TSS (mg/L)	Diss Cd (µg/L)	Total Cd (µg/L)	Diss Cu (µg/L)	Total Cu (µg/L)	Diss Pb (µg/L)	Total Pb (µg/L)	Diss Zn (µg/L)	Total Zn (µg/L)	Enterococcus MPN/100mL	Fecal Coliform MPN/100mL	Total Coliform MPN/100mL	Chlorpyrifos (µg/L)	Diazinon (µg/L)	Malathion (µg/L)
6/5/2001	14	0.2	1.1	14	19	2.4	3.1	13	23		13000	160000	0.05U	0.22	0.1U
8/16/2001	58	0.5	0.57	16	17	3.2	3.5	39	43		2300	30000	0.05U	0.096	0.1U
5/9/2002	2	0.25	0.36	16	22	0.5	0.78	9.3	17	910	1100	3000	0.05U	0.32	1U
9/5/2002	18	0.25	0.25	6.7	10	0.58	1.2	9	12	3300	8000	24000	0.05U	0.01U	1U
5/20/2003	4	0.43	0.44	14	16	1.2	1.3	19	13	20300	30000	160000	0.05U	0.05U	1U
9/10/2003	56	0.25	0.27	3.4	15	0.57	6.5	17	92	600	1100	24000	0.05U	0.064	1U
5/5/2004	128	0.23	0.85	7.7	26	0.6	17	8.8	190	3200	4000	110000	0.05U	0.05U	1U
8/31/2004	41	0.25	0.29	9.8	16	0.71	6.8	8.2	33	3100	5000	16000	0.05U	0.71	1U
5/25/2005	11	0.31	0.42	8.4	11	0.7	1.2	14	22	1440	80	2400	0.05U	0.01U	1U
8/18/2005	44	0.2	0.26	12	17	0.6	2.8	43	40	4200	3000	50000	0.01U	0.01U	0.01U
5/11/2006	72	0.23	0.32	15	22	1.1	3.6	19	68	57600	2100	30000	0.002U	0.004U	0.006U
9/7/2006	38	0.046	0.096	7.5	14	0.74	1.5	6.7	22	2400	5000	26000	0.002U	0.004U	0.006U
5/17/2007	20	0.25	0.29	12	19	0.8	1.8	13	24	9900	16000	24000	0.002U	0.004U	0.006U
9/26/2007	2.2	0.26	0.29	27	29	0.78	1.1	17	21	600	240	2400	0.002U	0.004U	0.006U
5/7/2008	11	0.16	0.18	11	12	0.64	0.94	8.3	12	940	1100	3000	0.002U	0.0085	0.006U
7/2/2008	69	0.083	0.21	5.7	13	0.54	3.1	7.2	33	210	2200	16000	0.002U	0.004U	0.006U
5/7/2009	6.8	0.16	0.2	13	14	1.1	1.4	13	16	910	2400	5000	0.002U	0.004U	0.006U
10/13/2009	13	0.054	0.16	9.2	13	0.51	1.5	15	33	220	230	300	0.002U	0.004U	0.006U
5/12/2010	13	0.2	0.24	17	21	0.94	1.7	11	21	1700	90	1300	0.002U	0.004U	0.006U
9/23/2010	6.6	0.17	0.19	6.6	8.4	0.84	0.99	6.3	9.5	60	80	300	0.002U	0.004U	0.006U
5/11/2011	6.4	0.35	0.46	21	25	2	3.9	21	29	10	1300	79000	0.002U	0.0015U	0.05U
9/14/2011	10	0.34	0.47	13	18	0.34	1.3	5.7	15	280	2300	1700	0.002U	0.0015U	0.05U
5/2/2012	8.4	0.3	0.31	18	20	0.73	1.1	12	16	210	18	18	0.005U	0.0025	0.05U

U=analyte not detected at the associated detection limit.
J=value is considered an estimate. This is most commonly encountered when the analyte is measured at a concentration exceeding the detection limit but below the reporting limit.

RB-AR7176

Date	TSS (mg/L)	Diss Cd (µg/L)	Total Cd (µg/L)	Diss Cu (µg/L)	Total Cu (µg/L)	Diss Pb (µg/L)	Total Pb (µg/L)	Diss Zn (µg/L)	Total Zn (µg/L)	Enterococcus MPN/100mL	Fecal Coliform MPN/100mL	Total Coliform MPN/100mL	Chlorpyrifos (µg/L)	Diazinon (µg/L)	Malathion (µg/L)
9/13/2012	11	0.086	0.12	15	19	0.55	0.94	7.5	14	7700	230	230	0.00036U	0.0015U	0.05U
5/1/2013	7.5	0.18	0.2	9.4	11	0.93	1	13	14	860	170	1700	0.002U	0.0015U	0.05U

U=analyte not detected at the associated detection limit.
J=value is considered an estimate. This is most commonly encountered when the analyte is measured at a concentration exceeding the detection limit but below the reporting limit.

U=analyte not detected at the associated detection limit.
J=value is considered an estimate. This is most commonly encountered when the analyte is measured at a concentration exceeding the detection limit but below the reporting limit.

Table 2-3. Available Freshwater Benchmarks and Guidelines Used to Evaluate Quality of Wet and Dry Season Discharges from the Mass Emission Sites.

	Long Beach	LA Basin Plan	California Toxics Rule		California Fish and Game	
	2013	Acute	Chronic	Acute	Chronic	Acute
Analyte Group	ML[4]	Max. Level	CCC [2]	CMC [2]	CCC	CMC
Bacteria (MPN/100 ml) –Freshwater						
E. coli		235				
Conventionals (mg/L unless noted)						
pH (pH Units)	0.1	[6.5 - 8.5]				
MBAS	0.025	0.5				
Nitrate (as N)	0.1	10				
Nitrite (as N)	0.1	1				
Total Ammonia (as N)	0.1	- [1]				
Dissolved Metals (µg/L)						
Arsenic	0.5		150	340		
Cadmium[3]	0.2		1.3	2.0		
Copper	0.5		5.0	7.0		
Lead[3]	0.2		1.2	30		
Nickel	0.5		29	260		
Silver	0.2			1.0		
Zinc	1		66	65		
Total Metals (µg/L)						
Aluminum	25	1000				
Cadmium	0.25	5				
Chromium	0.5	50				
Nickel	0.5	100				
Selenium	1	50	5	20		

1. The one-hour average ammonia-N criterion applicable to storm events is pH dependent. The 30-day ammonia-N criterion applicable to dry weather is both temperature and pH dependent.

U=analyte not detected at the associated detection limit.
J=value is considered an estimate. This is most commonly encountered when the analyte is measured at a concentration exceeding the detection limit but below the reporting limit.

RB-AR7178

2. CTR freshwater dissolved metals are hardness dependent. The values listed here are computed for a hardness of 50 mg/L which is consistent with typical hardness values associated with stormwater runoff.
3. CTR freshwater dissolved cadmium and lead coefficients for conversion of total recoverable to dissolved criteria are also hardness dependent.
4. The detection limits (also MLs) used during the 2012-13 City of Long Beach MS4 Monitoring Program are provided to provide a reference point for the ability to interpret water quality measurements relative to available water quality criteria.

U=analyte not detected at the associated detection limit.
J=value is considered an estimate. This is most commonly encountered when the analyte is measured at a concentration exceeding the detection limit but below the reporting limit.

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Table 2-3. Available Freshwater Benchmarks and Guidelines Used to Evaluate Quality of Wet and Dry Season Discharges from the Mass Emission Sites (continued).

	Long Beach	LA Basin Plan	California Toxics Rule		California Fish and Game		UC Davis	
	2013	Acute	Chronic	Acute	Chronic	Acute	Chronic	Acute
Analyte Group	ML	Max. Level	CCC *	CMC *	CCC	CMC	CCC	CMC
Aroclors (µg/L)								
Aroclor 1016	0.02	0.5						
Aroclor 1221	0.02	0.5						
Aroclor 1232	0.02	0.5						
Aroclor 1242	0.02	0.5						
Aroclor 1248	0.02	0.5						
Aroclor 1254	0.02	0.5						
Aroclor 1260	0.02	0.5						
Chlorinated Pesticides (µg/L)								
4,4'-DDT	0.005		0.001	1.1				
Aldrin	0.005			3				
Dieldrin	0.005		0.056	0.24				
Endrin	0.005	2	0.036	0.086				
gamma-BHC (Lindane)	0.005			0.95				
Endosulfan I	0.005		0.056	0.22				
Endosulfan II	0.005		0.056	0.22				
Heptachlor	0.005	0.01	0.0038					
Heptachlor epoxide	0.005	0.01	0.0038					
Total Chlordane	0.005	0.1	0.0043	2.4				
Methoxychlor	0.005	40						
Mirex	0.005						0.001	
Toxaphene	0.05	2	0.0002					
Organophosphates (µg/L)								
Chlorpyrifos	0.002				0.014	0.02	0.0056	0.011
Diazinon	0.004				0.05	0.08	0.17	0.82
Malathion	0.006				0.1	0.43	0.028	0.17
Atrazine	0.01	3						
Simazine	0.01	4						
Pyrethroids (ng/L)								
Bifenthrin	1.5	3					0.6	4

U=analyte not detected at the associated detection limit.
J=value is considered an estimate. This is most commonly encountered when the analyte is measured at a concentration exceeding the detection limit but below the reporting limit.

RB-AR7180

Cyfluthrin	1.5	2			0.05	0.3
Cypermethrin	1.5				0.2	1
L-Cyhalothrin	1.5				0.5	1
Permethrin	15				2	10
Total Deltamethrin/Tralomethrin	3					
Total Esfenvalerate/Fenvalerate	1.5					

Table 2-4. Saltwater Benchmarks and Guidelines Used to Evaluate Quality of Wet and Dry Season Discharges from the Mass Emission Sites.

	Long Beach	California Ocean Plan			California Toxics Rule		California Fish and Game		UC Davis	
Analyte Group	2013 ML	Instantaneous Single Sample	Daily Maximum	30-day Average	Chronic CCC	Acute CMC	Chronic CCC	Acute CMC	Chronic CCC	Acute CMC
Bacteria (MPN/100 ml)										
Enterococcus	10	104								
Fecal Coliform	20	400								
Total Coliform	20	10000								
Ratio of Fecal to Total Coliform		FC/TC≥0.1 & TC>1000								
Conventionals (mg/L unless noted)										
pH (pH Units)	0.1		[6.0 - 9.0]							
Total Ammonia (as N)	0.1		2.4							
Dissolved Metals (µg/L)										
Arsenic	0.5				36	69				
Cadmium	0.2				9.3	42				
Copper	0.5				3.1	4.8				
Lead	0.2				8.1	210				
Nickel	0.5				8.2	74				
Selenium	1				71	290				
Silver	0.2				-	1.9				
Zinc	1				81	90				
Total Metals (µg/L)										
Arsenic	0.5	80	32							
Cadmium	0.2	10	4							
Copper	0.5	30	12							
Lead	0.2	20	8							
Nickel	0.5	50	20							
Selenium	1	150	60							

U=analyte not detected at the associated detection limit.
J=value is considered an estimate. This is most commonly encountered when the analyte is measured at a concentration exceeding the detection limit but below the reporting limit.

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Silver	0.2	7	2.8			
Zinc	1	200	80			
Aroclors (µg/L)						
Total Aroclors			0.000019			

U=analyte not detected at the associated detection limit.
J=value is considered an estimate. This is most commonly encountered when the analyte is measured at a concentration exceeding the detection limit but below the reporting limit.

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Table 2-4. Saltwater Benchmarks and Guidelines Used to Evaluate Quality of Wet and Dry Season Discharges from the Mass Emission Sites. (continued)

	Long Beach	California Ocean Plan			California Toxics Rule		California Fish and Game		UC Davis	
	2001-2011	Instantaneous	Daily	30-day	Chronic	Acute	Chronic	Acute	Chronic	Acute
Analyte Group	ML	Single Sample	Maximum	Average	CCC	CMC	CCC	CMC	CCC	CMC
Chlorinated Pesticides (µg/L)										
4,4'-DDT	0.005				0.001	0.13				
Aldrin	0.005			0.000022		1.3				
Dieldrin	0.005			0.00004		0.71				
Endrin	0.005		0.004			0.037				
gamma-BHC (Lindane)	0.005					0.16				
Endosulfan I	0.005		0.018			0.034				
Endosulfan II	0.005		0.018			0.034				
Heptachlor	0.005			0.00005		0.053				
Heptachlor epoxide	0.005			0.00002		0.053				
Total Chlordane	0.005				0.004	0.09				
Methoxychlor	0.005									
Mirex	0.005									0.001
Toxaphene	0.05			0.00021		0.21				
Organophosphates (µg/L)										
Chlorpyrifos	0.002						0.009	0.02	0.0056	0.011
Malathion	0.006						0.1	0.34	0.028	0.17
Pyrethroids (ng/L)										
Bifenthrin	1.5								0.6	4
Cyfluthrin	1.5								0.05	0.3
Cypermethrin	1.5								0.2	1
L-Cyhalothrin	1.5								0.5	1
Permethrin	15								2	10
Total Deltamethrin/Tralomethrin	3									
Total Esfenvalerate/Fenvalerate	1.5									

Notes to Table 2-3 and 2-4:

General

Minimum Level (ML) is the concentration at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method specified sample weights, volumes, and processing steps have been followed.

Criteria continuous concentration (CCC) equals the highest concentration of pollutant to which aquatic life can be exposed for an extended period of time without deleterious effects.

Criteria maximum concentration (CMC) equals the highest concentration of pollutant to which aquatic life can be exposed for a short period of time with deleterious effects.

California Toxics Rule

CTR freshwater dissolved metals are hardness dependent. The values listed here are computed for a hardness of 50 mg/L.

U=analyte not detected at the associated detection limit.
J=value is considered an estimate. This is most commonly encountered when the analyte is measured at a concentration exceeding the detection limit but below the reporting limit.

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CTR freshwater dissolved cadmium and lead conversion coefficients for changes from total to dissolved bases are also hardness dependent.
CTR freshwater and saltwater dissolved metal criteria are "CCC" except for silver which are "CMC".
CTR freshwater and saltwater organics are "CCC" except for aldrin and gamma-BHC which are "CMC".

Ocean Plan and LA Basin Plan

Bacteria are instantaneous or single sample criteria.
LA Basin Plan contains Title 22 Drinking Water standards
Ammonia listed is Acute 1-hour average objective for waters not designated COLD and/or MIGR and is pH dependent. The value listed is for a pH of 7.5. Chronic criteria are applied to Dry Weather results and are pH and temperature dependent

California Fish and Game

All values are "CMC" criteria. CMCs are considered acute criteria.

U=analyte not detected at the associated detection limit.
J=value is considered an estimate. This is most commonly encountered when the analyte is measured at a concentration exceeding the detection limit but below the reporting limit.

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Table 2-5. Comparison of the use of Toxicity Units and the TST procedure for triggering Phase 1 TIE tests.

Station	Date	NOEC[a]	Median Response[b]	TU_a[c]	TU_c[d]	TST[e]	% effect at IWC[f]
Los Cerritos	9/23/10	50	>100	<1.0	2.0	Fail	30.7
Los Cerritos	10/6/10	100	>100	<1.0	1.0	Pass	
Los Cerritos	10/20/10	50	>100	<1.0	2.0	Fail	49.4
Los Cerritos	11/21/10	100	>100	<1.0	1.0	Pass	
Los Cerritos	12/19/10	100	>100	<1.0	1.0	Fail	19.1
Los Cerritos	5/11/11	100	>100	<1.0	1.0	Pass	
Los Cerritos	9/14/11	100	>100	<1.0	1.0	Pass	
Los Cerritos	10/6/11	100	>100	<1.0	1.0	Pass	
Los Cerritos	11/20/11	100	>100	<1.0	1.0	Pass	
Los Cerritos	1/21/12	100	>100	<1.0	1.0	Pass	
Los Cerritos	3/17/12	100	>100	<1.0	1.0	Pass	
Los Cerritos	5/2/12	100	>100	<1.0	1.0	Pass	
Los Cerritos	9/13/12	100	>100	<1.0	1.0	Pass	
Los Cerritos	3/8/13	100	>100	<1.0	1.0	Pass	
Los Cerritos	5/1/13	50	86.5	1.2	2.0	Fail	65.7

Test results indicating where a TIE would have been performed using the TST method (TST failure and >50% effect) but was not indicated with the NOEC approach are highlighted in blue. The TST indicated that the test failed and the %effect was greater than 50%. Test results showing failure of the TST that would not have triggered at TIE based upon the NOEC approach are highlighted in red.

[a] No Observed Effect Concentration: the highest concentration with a test response not significantly different from the control.
[b] Concentration causing 50% inhibition in water flea reproduction (IC_{50}).
[c] Acute toxicity units = $100/IC_{50}$.
[d] Chronic toxicity units = 100/NOEC.
[e] Test of Significant Toxicity.
[f] IWC = Instream Waste Concentration (100% receiving water)

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Table 2-6. TMDL Load Limitations and Measured Loads at the Los Cerritos Monitoring Site during Storm Events.

		TMDL Load Limits (ug/L)		
		Total Copper	Total Lead	Total Zinc
		9.8	55.8	95.6

		TMDL Load Limits (kilograms/day)			Total Measured Loads (kilograms/day)			Exceedance Factors (TMDL Load Limit/Measured Load)		
Season	**Total Flow (cf)**	Total Copper	Total Lead	Total Zinc	Total Copper	Total Lead	Total Zinc	Total Copper	Total Lead	Total Zinc
2011-2012	2.07E+08	2.0	11.6	19.8	16.2	7.7	116	8.0	0.7	5.9
	2.99E+08	2.9	16.7	28.6	11.6	7.8	86	4.0	0.5	3.0
	2.36E+08	2.3	13.2	22.6	4.5	2.2	31	1.9	0.2	1.4
	1.8E+08	1.8	10.1	17.2	10.4	7.7	70	5.9	0.8	4.1
2012-2013	2.60E+08	2.6	14.5	24.9	13.3	12.0	102	5.2	0.8	4.1

2.2 Waterbody – Pollutant Classification

Part VI.C.5.a of Order No. R4-2012-0175 requires Permittees to "identify the water quality priorities within each WMA that will be addressed by the Watershed Management Program. At a minimum, these priorities shall include achieving water quality-based effluent limitations and/or receiving water limitations established pursuant to TMDLs, as set forth in Part VI.E and attachments L through R of this Order." The Permit also specifies that each WMP shall include an evaluation of existing water quality conditions, including characterization of stormwater and non-stormwater discharges from the MS4 and receiving water quality.

The permit further requires Permittees to designate three categories of priority pollutants to be addressed by the WMP. Two of these categories are clearly defined. Category 1 (Highest Priority) is to include waterbody-pollutant combinations for which water quality-based effluent limitations and/or receiving water limitations are established in Part VI.E and attachments L through R of the order. Category 1 pollutants are discussed in Section 2.2.1 of this plan. Category 2 (High Priority) pollutants are those for which water quality data indicate a water quality-impairment in the receiving water according to the State's Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List (State Listing Policy) and for which MS4 discharges may be causing or contributing to the impairment. Category 2 pollutants are discussed in Section 2.2.2 of this plan.

The third category is not as clearly defined as the first two categories. Category 3 (Medium Priority) is defined to include pollutants for which there are insufficient data to indicate water quality impairment in the receiving water according to the State's Listing Policy, but which exceed applicable receiving water limitations contained in the Order and for which MS4 discharges may be causing or contributing

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to exceedances. This definition is too broad for a watershed with only a few scattered exceedances for some constituents. This plan proposes a screening process based on three criteria to separate medium priority pollutants from those we consider to be low priority at this time. Category 3 pollutants are discussed in Section 2.2.3 of this plan.

2.2.1 Identification of Category 1 (Highest Priority) Pollutants

Section VI.C.5.a.ii(1) of the Order defines highest priority pollutants as:

> Waterbody-pollutant combinations for which water quality-based effluent limitations and/or receiving water limitations are established in Part VI.E and attachments L through R of this Order.

Category 1 Pollutants from two sets of TMDLs apply directly and indirectly to the Los Cerritos Channel Watershed. The Los Cerritos Channel Metals TMDLs, established by USEPA in March 2010 created waste load allocations for copper, lead, and zinc in the Los Cerritos Channel Freshwater Watershed. The compliance point for these TMDLs is the City of Long Beach monitoring station at Stearns Street upstream of the terminus of the concrete lined flood control channel. The USEPA-established TMDLs do not have implementation plans or schedules. However, the Los Angeles Regional Water Board adopted a Basin Plan Amendment on June 6, 2013. This BPA contains an implementation schedule with both interim and final compliance dates. The final compliance date is September 30, 2026. Interim milestone compliance dates occur on September 30, 2017, September 30, 2020, and September 30, 2023. Only the September 30, 2017 milestone date occurs within the term of Order No R4-2012-0175. (See Table 2-9.)

The set of TMDLs that apply indirectly to the Los Cerritos Channel Watershed are contained in the Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters Toxic Pollutants TMDL. A draft monitoring plan for this TMDL has been prepared and monitoring is expected to commence by late summer of 2014. Three monitoring locations have been established in San Pedro Bay. The results of the monitoring at these sites will guide future monitoring at the mouth of the Los Cerritos Channel, and forensic monitoring within the watershed. Future implementation of control measures within the watershed could also be influenced by the results of the San Pedro Bay monitoring. The monitoring database also includes occasional, isolated exceedances that could have resulted from field or laboratory errors. (See Table 2-10.)

2.2.2 Identification of Category 2 (High Priority) Pollutants

Section VI.C.5.9.ii(2) of the Order defines high priority pollutants as:

> Pollutants for which data indicate water quality impairment in the receiving water according to the State's Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List (State Listing Policy) and for which MS4 discharges may be causing or contributing to the impairment.

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Five pollutants are considered Category 2 (High Priority) pollutants for the Los Cerritos Channel. These are ammonia, bis(2-ethylhexyl)phthalate (DEHP), coliform bacteria, trash, and pH. They were added to the 303(d) list in 2002, 2006, and 2010. Ammonia has been proposed for delisting, but it is not clear when this might happen. (See Table 2-11.)

For one other metal, aluminum, although there have been many exceedances of water quality standards during the past 10 years, these exceedances are based on secondary drinking water standards because State Board Resolution No. 88-63 (Sources of Drinking Water) and Regional Board Resolution No. 89-03 (Incorporation of Sources of Drinking Water Policy into the Water Quality Control Plans (Basin Plans) resulted in all surface and ground waters being considered suitable, or potentially suitable, for municipal water supply. The aluminum in Los Cerritos Channel stormwater is naturally occurring in the suspended sediment and the water used for municipal water supplies would be filtered to remove the sediment. (See Table 2-13) In addition, the Channel is designated in the Basin Plan with a potential MUN beneficial use with an asterisk, meaning that the use may be considered for an exemption at a later date. Therefore, aluminum is considered a low priority pollutant at this time.

2.2.3 Identification of Category 3 (Medium Priority) Pollutants

Section VI.C.5.a.ii(3) of the Order defines medium priority pollutants as:

> "Pollutants for which there are insufficient data to indicate water quality impairment in the receiving water according to the State's Listing Policy, but which exceed applicable receiving water limitations contained in this Order and for which MS4 discharges may be causing or contributing to the exceedance."

This is a very broad definition for a watershed with 13 years of water quality monitoring data, including exceedances in the past for constituents that are no longer sold in metropolitan areas in California (e.g., diazinon and chlorpyrifos), as well as other constituents that have long since been banned for sale in the United States. Some of these constituents left significant, long-lasting residue in the environment (particularly in marine sediments and fish tissue) and are generally referred to as legacy pollutants. Several of these legacy pollutants, including chlordane, DDT, PAHs, and PCBs, are being addressed through the Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters Toxic Pollutants TMDL. (See Table 2-10.)

In order to account for the diversity of data in the database and focus its efforts on priority pollutants, the Watershed Group decided to employ three criteria to define Category 3 Medium Priority Pollutants. First, in order to be consistent with the current/baseline pollutant loading to be used in the Reasonable Assurance Analysis for the Watershed Management Program, only the last 10 years of monitoring data have been used in determining Category 3 priority pollutants. Second, the number of exceedances for both dry weather and wet weather has been compared to Tables 3.1 and 3.2 of the State's Listing Policy to determine the percentage of the minimum number of measured exceedances

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needed to place a water segment on the Section 303(d) List for toxicants and for conventional pollutants. A mid-range of 50% was selected as the cut-off point for considering a pollutant a candidate for designation as a Category 3 Priority Pollutant, and to be conservative, wet and dry weather exceedances are considered separately. Lastly, in order to avoid giving priority to a pollutant based on an exceedance that could have been the result of a field or laboratory error, only pollutants with two exceedances in the last five years have been placed on the initial Category 3 Medium Priority Pollutant List. This process will be revisited as part of the Adaptive Management Process.

The data used to determine which pollutants are included in Category 3 Priority Pollutants is presented in Tables 2-7 and 2-8. One table presents wet-weather monitoring data and the other includes dry-weather monitoring data. Both tables include data for the 2003-2004 rain year through the 2012-2013 rain year. They are both based on regulatory standards for freshwater Non-Regulatory Standards discussed later in this section.

Table 2-7 presents the wet-weather monitoring data analyzed to help determine which pollutants were classified as Category 3 Medium Priority Pollutants. As shown in the table, enterococcus, fecal coliform, total coliform, aluminum, total chlordane, dissolved copper, dissolved zinc, and chlorpyrifos all have 100% or more of the required number of measured exceedances during wet-weather to be candidates for inclusion on the Category 3 list. All but chlorpyrifos have two or more exceedances during the last five years. In addition, MBAS, cadmium, chromium, Simazine, and dissolved silver have 50% of the exceedances required for listing. However, of this group only MBAS has two exceedances in the last five years.

As shown in Table 2-8, enterococcus, fecal coliform, total coliform, pH, and dissolved copper all have 100% or more of the required number of measured exceedances during dry weather to be candidates for inclusion on the Category 3 List. In addition, the single 2003-2004 exceedance for aluminum is 50% of the number of exceedances needed for listing of a toxicant per Table 3.1 of the Listing Policy. However, copper is already a Category 1 pollutant, coliform bacteria and pH are Category 2 pollutants, and the exceedances for enterococcus were based on saltwater standards – not freshwater standards. This was done to monitor enterococcus since the Los Cerritos Channel discharges into a saline estuary.

The resulting Category 3 list is shown in Table 2-12. This table shows the pollutants, the seasons of exceedances, the standards of exceedance, the percentage of required exceedances for listing per the State Listing Policy, proposed final wet-weather target dates, and notes that describe the exceedances. The pollutants on this table are the priority pollutants for which there is insufficient data to indicate water quality impairments.

2.2.4 Identification of Low Priority Pollutants

After review of pollutants for which there is insufficient data to indicate water quality impairment in the receiving water according to the State's Listing Policy in relation to the three criteria used to identify Category 3 Pollutants, the Watershed Group has identified six pollutants as low priority

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pollutants at this time. These pollutants are shown in Table 2-13 that is structured in the same manner as Table 2-12. Three of these pollutants are metals that each showed one wet-weather exceedance in either 2003-04 or 2004-05. The other pollutants are two pesticides that have been banned for sale in urban areas. These are chlorpyrifos and diazinon, which both theoretically quality for 303(d) listing per the State's listing policy, but the last exceedances for both were in 2004-05. In addition, as noted above, aluminum has been included Table 2-13 and not being addressed at this time because it may be considered for an exemption in the Basin Plan at a later date.

2.2.5 Emerging Constituents of Concern

Over 84,000 industrial chemicals are currently being produced and at least 610 of these compounds have been identified as being both persistent and bioaccumulative. Many of these compounds have the potential to be transported into aquatic and marine habitats by way of stormwater discharges. Recent studies in San Francisco Bay and throughout California have identified a number of different compounds or groups of compounds as possible concern. These include pyrethroid pesticides, fipronil and it's degradates, perfluorooctane sulfonate (PFOs), nonylphenols, and various flame retardants (chlorinated phosphates and PBDEs. Early identification and actions have already been effective at reducing accumulation of some of these compounds in sediments and tissues. The Watershed group is currently investigating potential presence of pyrethroids and fipronil in stormwater. The Group will continue to review the literature concerning other constituents of concern and potentially modify the monitoring program or recommend further regional work under the Stormwater Monitoring Coalition effort as part of the adaptive management process.

2.3 Source Assessment

Pursuant to Part VI.C.5.iii of Order No. R4-2012-0175, this section includes a summary of known and suspected stormwater and non-stormwater pollutant sources. For Category 1 pollutants, emphasis has been given to the source assessment in the applicable TMDLs. For category 2 and 3 pollutants, emphasis has been given to source assessments in related TMDLs elsewhere in the Region and professional judgment based on interpretation of various sources, including those listed in Part VI.C.5.iii(1) of the Order.

2.3.1 Sources of Metals

The source assessment section of the Los Cerritos Channel Metals TMDLs provides a thorough overview of the potential sources of copper, lead, and zinc within the watershed. The TMDL states, "Individual sources of metals in stormwater include automobile brake pads, vehicle wear, building materials, pesticides, erosion of paint and deposition of air emissions from fuel combustion and industrial facilities." Air deposition is not the true source of many pollutants, but it is the secondary source for many pollutants, including copper, lead, and zinc. The Metals TMDLs estimated that indirect deposition of copper within the watershed is 531 kg/year, while indirect deposition of lead is 398

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kg/year, and indirect deposition of zinc is 2,655 kg/year. The principal true source of copper is brake pads that are estimated to contribute 50-60% or more of the copper in urban runoff. The true sources of lead are many, but USEPA has estimated that half of the lead in urban area atmospheric deposition of lead is from avgas, the fuel used for piston engine aircraft. There are also many sources of zinc. However, two sources appear to be dominant: tires and galvanized metal. Zinc is used in the vulcanization of rubber and deposited directly and indirectly through atmospheric deposition.

A SCCWRP stormwater study conducted between 2001 and 2005 found that industrial land use sites contributed substantially higher fluxes and event mean concentrations (EMCs) of copper and zinc than other land use categories. Industrial sites typically have more than 70% impervious cover as well as on-site sources of metals, which may explain the higher loadings of copper and zinc from this land use. In addition, industrial sites, along with agricultural land uses, were found to contribute substantially higher fluxes of TSS than other land uses.

Industrial sites within the LCC Freshwater Watershed with stormwater permits include sites for trucking and warehousing, transportation equipment, fabricated metal products, petroleum and coal products, rubber and miscellaneous plastics products, oil and gas extraction, and other miscellaneous industries. There is a potential for metals loadings from each of these industries, particularly transportation and manufacturing facilities. Redevelopment of former industrial sites has a higher potential to discharge sediment containing metals..

2.3.2 Sources of Legacy Organics

The source assessment section of the staff report for the *Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters Toxic Pollutants Total Maximum Daily Loads (Harbor Toxics TMDL)* provides an excellent assessment of the potential sources of legacy organics from the area tributary to the harbors and San Pedro Bay, including the Los Cerritos Channel Watershed portion of the Nearshore Area defined in the TMDLs. The source assessment identifies the potential sources of organochlorine pesticides, PCBs, sediment toxicity, PAHs, and metals. However, this WMP relies on the watershed-specific information in the Los Cerritos Channel Metals TMDL for its assessment of the potential sources of metals. The source assessment in the Harbor Toxics TMDL indicates that PAHs that are currently generated or deposited in the watersheds are then washed off and discharged into receiving waters. It generally views PCBs, DDT, dieldrin, toxaphene, and chlordane as legacy pollutants that remain ubiquitous within the environment, bound to fine-grained particles. However, the Watershed Group also considers PAHs to be partially a legacy pollutant because of their long history of release and binding to fine-grained particles. Like zinc from galvanized metal products, PAHs are ubiquitous within the urban environment. Some are naturally occurring, but most are anthropogenic and come from the release of petroleum products and combustion of organic matter. They are distributed across the Watershed by atmospheric deposition.

A major indirect source of these pollutants in the Los Cerritos Channel is the fine-grained sediment that becomes dislodged and transported through the storm drains and contributes significantly to the

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TSS loads within the Channel. Some of this sediment is from construction sites and some is from streets, highways, and other impervious surfaces. However, much of it is from exposed soil in industrial facility sites, transmission line rights-of-way, freeway rights-of-way, hillside slopes, and vacant lots.

2.3.3 Sources of Category 2 Pollutants

(2-ethylhexyl)phthalate and trash share sources, since DEHP is a plasticizer that most likely enters the receiving waters through the presence of plastic bottles and other plastic materials in trash. The State Water Board's June 2014 Draft Staff Report for the Proposed Draft Amendments to the Statewide Water Quality Control Plans notes that trash is related to the direct and indirect activities of Watershed inhabitants. The draft report lists five primary sources or transport mechanisms for trash to reach State waters:

1) Littering by the public on or adjacent to waterways

2) Storm events draining watersheds and carrying trash originating from littering, inadequate waste handling or illegal dumping via storm drain system to receiving waters

3) Wind-blown trash, also originating from littering, inadequate waste handling, or illegal dumping

4) Illegal dumping into or adjacent to waterbodies, and

5) Direct disposal (overboard disposal and/or dumping) of trash into waterbodies from vessels involved in commercial, military, fishing, or recreational activities.

The proposed amendments to the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries recognizes the following land use categories as priority land uses for addressing trash and high density residential, industrial, commercial, mixed urban, and public transportation stations.

Coliform bacteria have many natural and anthropogenic sources. Pet waste, improper cleaning of restaurant floor mats, inclusion of food and food waste in trash, leaking wastewater tanks on motor homes, and homeless encampments are among the anthropogenic sources. Among the natural sources are wildlife and bird excrement and regrowth in enclosed pipes, behind trash nets, and under algal mats during low flow conditions. The sources of pH are associated with natural processes during dry weather with shallow water flowing over concrete surfaces in the presence of sunlight.

Ammonia in surface water can originate from many sources. Within the Los Cerritos Channel Watershed, the principal sources are probably land-applied manure and bio-solids, airborne ammonia, sediment discharges, wildlife feces, decay of aquatic organisms, and organic materials in the water.

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2.3.4 Sources of Category 3 Pollutants

MBAS is a surfactant, and its sources within the Watershed are likely associated with the discharge of detergents and other cleaning products. Outdoor car washing and illicit discharges by cleaning services may be significant sources.

The sources of enterococcus within the Watershed are similar to the sources of coliform bacteria. However, a few species of enterococcus are associated with plants rather than fecal material. Enterococcus is used in the marine environment because it tends to correlate with viruses.

2.4 Priority and Sequencing of Addressing Water Quality Issues

The initial priority and sequencing of addressing water quality issues in the Los Cerritos Channel Watershed are related largely to four factors: 1) Interim TMDL milestone dates, 2) final TMDL compliance dates, 3) wet-weather compliance target dates for Category 2 and 3 pollutants, and 4) availability of money. The first priority is to address Category 1 pollutants with initial sequencing focused on copper, lead, and zinc, which are included in both the Los Cerritos Channel Metals TMDLs and the Harbor Toxics TMDL. By addressing the 2017, 2020, and 2023 interim milestones for copper, lead, and zinc in the metals TMDLs, and the final compliance date of September 30, 2026, the Watershed Group will also be addressing the metals in the Harbor Toxics TMDL. In addition, to the extent that TSS reduction and runoff reduction are employed to address metals, the legacy organics in the Harbor Toxics TMDL will also be addressed.

The second priority for addressing water quality issues within the watershed is to address trash and Bis(2-ethylhexyl) phthalate through the installation of full capture systems in catch basins in high priority land use areas. DEHP will be addressed because it is a plasticizer and its presence in the receiving waters appears to be associated with the presence of plastic trash in the waters.

The third priority is to address methylene blue active substances (MBAS). Even though MBAS is a Category 3 pollutant, the Watershed Group proposes to address it early in order to eliminate the need to add it to the 303(d) List. The exceedances have generally been low, and it may be able to be handled through the inspection and education processes because it is a surfactant found in detergents used in commercial/industrial facility maintenance and in outdoor car washes.

The fourth priority is to address pH and bacteria in dry-weather by reducing dry-weather discharges and reducing the nutrient discharges throughout the watershed. The pH issue is a natural dry-weather condition associated with algal growth in open concrete-lined channels with low flows of water exposed to bright sunlight. If the dry-weather flows can be eliminated through water conservation, infiltration, and capture and use, the cycle will be interrupted and the diurnal spikes in the pH will be eliminated. Furthermore, the elimination of dry-weather flows will reduce the transport of bacteria and possibly eliminate the algal substrate that facilitates bacteria growth within the open channels.

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The fifth priority will be to address wet-weather bacteria. Fully addressing bacteria will be a complicated and expensive process that requires more research and possibly regulatory changes. Stormwater capture and infiltration or use is one method that will be used to address wet-weather bacteria control. Restaurant inspections, public education regarding cleaning up after pets, and biological treatment of runoff will also be employed. However, the Permittees within the Watershed are not confident that available tools will allow them to meet current regulatory standards.

The Watershed Group does not plan to address ammonia at this time because it has been proposed for delisting.

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Table 2-7. Los Cerritos Channel Wet-Weather Exceedances 2003-4 through 2012-13 Rain Years

Constituent	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	Total Exceed-ances	Data Points	%*
BASIN PLAN CRITERIA													
Microbiology													
Enterococcus	4	3	4	3	4	2	4	3	4	1	32	32	>100
Fecal Coliform	4	3	4	2	4	2	4	3	4	1	31	32	>100
Total Coliform	4	3	4	2	3	2	4	3	4	1	30	32	>100
Conventionals													
MBAS	0	1	0	0	0	0	0	1	1	0	3	34	50
Nitrate (as N)	0	0	0	0	0	0	0	0	0	0	0	33	0
Nitrite (as N)	0	0	0	0	0	0	0	0	0	0	0	33	0
pH	0	0	0	1	0	0	0	0	0	0	1	41	20
Total Metals													
Aluminum	3	4	4	2	2	2	4	4	4	1	30	34	>100
Arsenic	0	0	0	0	0	0	0	0	0	0	0	34	0
Cadmium	0	1	0	0	0	0	0	0	0	0	1	34	50
Chromium	0	1	0	0	0	0	0	0	0	0	1	34	50
Nickel	0	0	0	0	0	0	0	0	0	0	0	34	0
Selenium	0	0	0	0	0	0	0	0	0	0	0	34	0
Aroclors													
Aroclor 1016	0	0	0	0	0	0	0	0	0	0	0	34	0
Aroclor 1221	0	0	0	0	0	0	0	0	0	0	0	34	0
Aroclor 1232	0	0	0	0	0	0	0	0	0	0	0	34	0
Aroclor 1242	0	0	0	0	0	0	0	0	0	0	0	34	0
Aroclor 1248	0	0	0	0	0	0	0	0	0	0	0	34	0
Aroclor 1254			0	0	0	0	0	0	0	0	0	26	0
Aroclor 1260	0	0	0	0	0	0	0	0	0	0	0	34	0
Chlorinated Pesticides													
Endrin	0	0	0	0	0	0	0	0	0	0	0	34	0
gamma-BHC (Lindane)	0	0	0	0	0	0	0	0	0	0	0	34	0
Heptachlor	0	0	0	0	0	0	0	0	0	0	0	34	0
Heptachlor epoxide	0	0	0	0	0	0	0	0	0	0	0	34	0
Methoxychlor	0	0	0	0	0	0	0	0	0	0	0	34	0
Total Chlordane	0	0	0	0	1	0	1	0	0	0	2	34	100
Toxaphene	0	0	0	0	0	0	0	0	0	0	0	34	0
Triazine													
Atrazine	0	0	0	0	0	0	0	0			0	27	0
Simazine	1	0	0	0	0	0	0	0			1	27	50

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Constituent	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	Total Exceed-ances	Data Points	%*
CTR FRESH CMC													
Dissolved Metals													
Arsenic	0	0	0	0	0	0	0	0	0	0	0	34	0
Cadmium	0	0	0	0	0	0	0	0	0	0	0	34	0
Copper	4	2	4	2	3	2	5	4	4	1	31	34	>100
Lead	0	0	0	0	0	0	0	0	0	0	0	34	0
Nickel	0	0	0	0	0	0	0	0	0	0	0	34	0
Silver	0	0	0	0	0	0	1	0	0	0	1	34	50
Zinc	4	2	3	2	2	1	3	2	4	1	24	34	>100
Total Metals													
Selenium	0	0	0	0	0	0	0	0	0	0	0	34	0
Chlorinated Pesticides													
4,4'-DDT	0	0	0	0	0	0	0	0	0	0	0	34	0
Aldrin	0	0	0	0	0	0	0	0	0	0	0	34	0
Dieldrin	0	0	0	0	0	0	0	0	0	0	0	34	0
Endosulfan I	0	0	0	0	0	0	0	0	0	0	0	34	0
Endosulfan II	0	0	0	0	0	0	0	0	0	0	0	34	0
Endrin	0	0	0	0	0	0	0	0	0	0	0	34	0
gamma-BHC (Lindane)	0	0	0	0	0	0	0	0	0	0	0	34	0
Heptachlor	0	0	0	0	0	0	0	0	0	0	0	34	0
Heptachlor epoxide	0	0	0	0	0	0	0	0	0	0	0	34	0
Toxaphene	0	0	0	0	0	0	0	0	0	0	0	34	0
CDFG FRESH CMC													
Organophosphates													
Chlorpyrifos	0	2	0	0	0	0	0	0	0	0	2	34	>100

* Percentage of required exceedances for listing per the State Listing Policy

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Table 2-8. Los Cerritos Channel Dry-Weather Exceedances 2003-04 through 2012-13 Rain Years

Constituent	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	Total Exceed-ances	Data Points	%*
BASIN PLAN													
Microbiology													
Enterococcus	2	2	2	2	2	2	2	0	2	2	18	20	>100
Fecal Coliform	2	1	2	2	1	2	0	1	1	0	12	20	>100
Total Coliform	2	1	2	2	0	1	0	1	0	0	9	20	>100
Conventionals													
MBAS	0	0	1	0	0	0	0	0	0	0	1	20	20
Nitrate (as N)	0	0	0	0	0	0	0	0	0	0	0	20	0
Nitrite (as N)	0	0	0	0	0	0	0	0	0	0	0	20	0
pH	1	2	3	4	3	2	2	1	2	1	21	20	>100
Total Metals													
Aluminum	1	0	0	0	0	0	0	0	0	0	1	20	50
Arsenic	0	0	0	0	0	0	0	0	0	0	0	20	0
Cadmium	0	0	0	0	0	0	0	0	0	0	0	20	0
Chromium	0	0	0	0	0	0	0	0	0	0	0	20	0
Nickel	0	0	0	0	0	0	0	0	0	0	0	20	0
Selenium	0	0	0	0	0	0	0	0	0	0	0	20	0
Aroclors													
Aroclor 1016	0	0	0	0	0	0	0	0	0	0	0	20	0
Aroclor 1221	0	0	0	0	0	0	0	0	0	0	0	20	0
Aroclor 1232	0	0	0	0	0	0	0	0	0	0	0	20	0
Aroclor 1242	0	0	0	0	0	0	0	0	0	0	0	20	0
Aroclor 1248	0	0	0	0	0	0	0	0	0	0	0	20	0
Aroclor 1254			0	0	0	0	0	0	0	0	0	20	0
Aroclor 1260	0	0	0	0	0	0	0	0	0	0	0	20	0
Chlorinated Pesticides													
Endrin	0	0	0	0	0	0	0	0	0	0	0	20	0
gamma-BHC (Lindane)	0	0	0	0	0	0	0	0	0	0	0	20	0
Heptachlor	0	0	0	0	0	0	0	0	0	0	0	20	0
Heptachlor epoxide	0	0	0	0	0	0	0	0	0	0	0	20	0
Methoxychlor	0	0	0	0	0	0	0	0	0	0	0	19	0
Total Chlordane	0	0	0	0	0	0	0	0	0	0	0	20	0
Toxaphene	0	0	0	0	0	0	0	0	0	0	0	20	0
Triazine													
Atrazine	0	0	0	0	0	0	0	0			0	15	0
Simazine	0	0	0	0	0	0	0	0			0	15	0

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Constituent	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	Total Exceed-ances	Data Points	%*
CTR FRESH CCC													
Dissolved Metals													
Arsenic	0	0	0	0	0	0	0	0	0	0	0	20	0
Cadmium	0	0	0	0	0	0	0	0	0	0	0	20	0
Copper	0	0	1	0	1	1	1	1	2	1	8	20	>100
Lead	0	0	0	0	0	0	0	0	0	0	0	20	0
Nickel	0	0	0	0	0	0	0	0	0	0	0	20	0
Zinc	0	0	0	0	0	0	0	0	0	0	0	20	0
Total Metals													
Selenium	0	0	0	0	0	0	0	0	0	0	0	20	0
Chlorinated Pesticides													
4,4'-DDT	0	0	0	0	0	0	0	0	0	0	0	20	0
Aldrin	0	0	0	0	0	0	0	0	0	0	0	20	0
Dieldrin	0	0	0	0	0	0	0	0	0	0	0	20	0
Endosulfan I	0	0	0	0	0	0	0	0	0	0	0	20	0
Endosulfan II	0	0	0	0	0	0	0	0	0	0	0	20	0
Endrin	0	0	0	0	0	0	0	0	0	0	0	20	0
Heptachlor epoxide	0	0	0	0	0	0	0	0	0	0	0	20	0
Toxaphene	0	0	0	0	0	0	0	0	0	0	0	20	0
1.1.1.1.1.1 C FG FRESH CCC													
Organophosphates													
Chlorpyrifos	0	0	0	0	0	0	0	0	0	0	0	20	0
Diazinon	1	1	0	0	0	0	0	0	0	0	2	20	100

*Percentage of required exceedances for listing per the State Policy

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Table 2-9. Los Cerritos Channel Watershed Priority Pollutants – Category 1 (Highest Priority)[1]

Los Cerritos Channel Metals TMDLs

Pollutant	Listing Date	TMDL	Final Wet-Weather Compliance Target Dates	Notes
Copper (Dry weather and wet weather)	2002	EPA-established TMDL March 17, 2010	September 30, 2026	74.7% reduction required by Metals TMDL.
Lead (Wet weather)	2002	EPA-established TMDL March 17, 2010	September 30, 2026	No further reduction required by Metals TMDL.
Zinc (Wet weather)	2002	EPA-established TMDL March 17, 2010	September 30, 2026	69.2% reduction required by Metals TMDL.

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[1] Category 1 (Highest Priority): Water body-pollutant combinations for which quality-based effluent limitations and/or receiving water limitations are established in Part VI.E and Attachments L through R of this Order. (Order No. R4-2012-0175, p. 59)

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Table 2-10. Los Cerritos Channel Watershed Priority Pollutants – Category 1 (Highest Priority)[1]

Greater Harbor Toxics TMDLs[2]

Pollutant	Listing Date	TMDL	Final Wet-Weather Compliance Target Dates	Notes[3]
Copper	1998	TMDL effective March 23, 2012	March 23, 2032	Addressed by LCC Metals TMDLs
Lead	1998	TMDL effective March 23, 2012	March 23, 2032	Addressed by LCC Metals TMDLs
Zinc	1998	TMDL effective March 23, 2012	March 23, 2032	Addressed by LCC Metals TMDLs
DDT (Fish tissue)	1996	TMDL effective March 23, 2012	March 23, 2032	Entire nearshore watershed is 0.7% of DDT loading to Greater Harbor waters. LCC Reduction required unknown.
PCBs (Fish tissue)	1996	TMDL effective March 23, 2012	March 23, 2032	Entire nearshore watershed is 0.2% of PCBs loading to Greater Harbor waters. LCC Reduction required unknown.
Chlordane (Fish tissue)	2006	TMDL effective March 23, 2012	March 23, 2032	Chlordane is primarily a legacy pollutant. A bed sediment concentration of 0.5 µg/kg dry sediment has been assigned to Eastern San Pedro Bay. LCC reduction required unknown.
PAHs (Sediment)	1998	TMDL effective March 23, 2012	March 23, 2032	Entire nearshore watershed is 5.8% of total PAHs loading to Greater Harbor waters. LCC Reduction required unknown.
Toxicity (Sediment)	1996	TMDL effective March 23, 2012	March 23, 2032	Entire nearshore watershed is 1.9% of sediment loading to the Greater Harbor Waters in wet conditions and 0.1% in dry conditions. LCC reduction required unknown.

[1]Category 1 (Highest Priority): Water body-pollutant combinations for which quality-based effluent limitations and/or receiving water limitations are established in Part VI.E and Attachments L through R of this Order. (Order No. R4-2012-0175, p. 59)
[2] Based on 303(d) listings for Los Angeles Harbor.
[3] Source of notes (other than those for metals) is table in linkage analysis section of Attachment A to Resolution No. R11-008.

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Table 2-11. Los Cerritos Channel Watershed Priority Pollutants – Category 2 (High Priority)[1]

Pollutant[2]	Listing Date	State-Proposed TMDL Date	Estimated Final Wet-Weather Compliance Target Dates	Notes
Ammonia	2002	2015	NA	Proposed for de-listing
Bis(2) (DEHP)	2006	2019	2025	Related to plastic trash
Coliform Bacteria	2002	2019	2040	Now only *E. Coli*
Trash	2006	2019	2025	Compliance by installation of full-capture devices in priority land use areas
pH	2010	2021	NA	Natural dry-weather condition

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[1] Category 2 (High Priority): Pollutants for which data indicate water quality impairment in the receiving water according to the State's Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List (State Listing Policy) and for which MS4 discharges may be causing or contributing to the impairment. (Order No. R4-2012-0175, p. 59)

[2] The Channel is also listed as impaired for chlordane in sediment. However, chlordane is considered a Category 1 pollutant since it is included in the Greater Harbor Toxics TMDLs.

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Table 2-12. Los Cerritos Channel Water Body–Pollutant Classification Category 3 (Medium Priority)[1]

Pollutant	Season of Exceedances	Standard of Exceedance	Percentage of Required Exceedance for Listing	Final Wet-Weather Compliance Target Dates	Notes
MBAS	Dry weather and wet weather	Basin Plan	44% (54)[2]	2025	Exceedances: 1 dry-weather in 10 years; none in the last 5 years. 3 wet-weather 10 years; 2 in the last 5 years The limit is 0.5 mg/L and the exceedances were generally low (0.57, 0.58, 0.60, and 0.88 mg/L).
Enterococcus[3]	Dry weather and wet weather	Basin Plan	>100% (52)[2]	2040	Exceedances: 18 dry-weather in 10 years; 8 in the last 5 years. 32 wet-weather in 10 years; 14 in the last 5 years

[1] Category 3 (Medium Priority): Pollutants for which there are insufficient data to indicate water quality impairment in the receiving water according to the State's Listing Policy, but which exceed applicable receiving water limitations contained in this Order and for which MS4 discharges may be causing or contributing to the exceedance. Priority among pollutant that have exceeded standards during the last 10 years is for those for which exceedances have been greater than 50% of the number required for listing for either wet weather or dry weather and have exceeded standards at least twice in the last five years.
[2] Number of samples.
[3] Exceedances based on saline water standard. Included because channel discharges to saline estuary.

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Table 2-13. Los Cerritos Channel Low Priority Pollutants Not Being Addressed at this Time

Pollutant	Season of Exceedances	Standard of Exceedance	Percentage of Required Exceedance for Listing	Final Wet-Weather Compliance Target Dates	Notes
Aluminum[1]	NA	NA	NA	NA	Exceedances: 1 dry-weather in 10 years; none in the last 5 years. 30 wet-weather in 10 years; 15 in the last 5 years Exceedances based on potential MUN beneficial use and secondary drinking water standard
Cadmium	Wet weather	Basin Plan	50% (54)[2]	NA	One wet weather exceedance in 2004-05
Chlorpyrifos[3]	Wet weather	CFW[4] FRESH CCC	100%(50)[2]	NA	Two wet-weather exceedances in 2004-05. No longer sold in area.

[1] The Channel is designated in the Basin Plan with a potential MUN beneficial use with an asterisk, meaning that the use may be considered for an exemption at a later date. Therefore, aluminum is considered a low priority pollutant at this time.
[2] Number of samples
[3] Theoretically chlorpyrifos and diazinon would qualify for listing under the State's listing policy, but the last exceedances were in 2004-05, and the products are no longer sold for urban use. Therefore, the Watershed Group considers these low priority pollutants.
[4] California Department of Fish and Wildlife, formerly California Department of Fish and Game

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Chromium	Wet weather	Basin Plan	50% (54)[2]	NA	One wet-weather exceedance in 2004-05
Diazinon[3]	Dry weather and Wet weather	CFW[4] FRESH CCC	100%(50)[2]	NA	One wet-weather exceedance in 2003-04 and one dry-weather exceedance in 2004-05. No longer sold in area.
Dissolved Silver	Wet weather	CFW[4] FRESH CMC	50% (34)[2]	NA	One wet-weather exceedance in 2003-04

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3.0 Water Quality Improvement Strategy

3.1 Overall Multi-Pronged Strategy

The Los Cerritos Channel Watershed Group (Watershed Group) has considered how best to develop a watershed management program to implement the requirements of Part VI.C.1.a of Order No. R4-2012-0175 and Part VI.C.1.a of Order no. R4-2014-0024 on a watershed scale through each Permittee's stormwater management program and through customized strategies, control measures, and best management practices (BMPs).

The Watershed Group has revisited strategies, control measures, and BMPs that it has discussed during the last five years and has concluded that addressing water quality impairments within the Los Cerritos Channel receiving waters should be based on a multi-faceted strategy initially focused on source control, total suspended solids (TSS) reduction, and runoff reduction. If pollutants are not generated or released, they will not be available for transport to the receiving waters. In addition, if soils can be stabilized, sediment controlled, and dry-weather runoff and initial flushes of stormwater runoff eliminated or greatly reduced, the major transportation mechanisms will be eliminated or greatly reduced, and many fewer pollutants will reach the receiving waters.

The Los Cerritos Channel Watershed Group plans to implement a water quality improvement hierarchy based on true source control, TSS reduction, and runoff reduction. Moving up the pyramid, treatment controls will constitute the smallest component of the overall program, as source control, reduction, LID and green streets, operational source control, capture and infiltration, and capture and use are all more effective methods for improving water quality.

3.2 Source Control Strategy

Members of the Watershed Group are interested in both "true source control" (pollution prevention) and "operational source control." The Watershed Group has been particularly focused on true source control because major sources of copper, lead, and zinc are released into the atmosphere, which results in widespread deposition on impervious surfaces such as streets, highways, parking lots, and rooftops. In addition, these metals are discharged directly onto streets, highways, parking lots, and driveways from motor vehicle components such as brakes, wheel weights, and tires.

Each of the cities within the watershed contributed either directly or indirectly to the effort by the California Stormwater Quality Association (CASQA) and Sustainable Conservation to develop

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and negotiate the legislative proposal that ultimately became SB 346, which was adopted by the legislature in 2010 and signed by the Governor on September 25, 2010 as Chapter 307 of the Statutes of 2010. The passage of SB 346 is a milestone that will significantly reduce the level of copper in metropolitan area waters throughout the state since vehicle brake pads constitute the single largest source of copper in metropolitan environments (See Figure 3-2.) SB 346 requires incremental reduction in the amount of copper in vehicle brake pads with key milestone dates of January 1, 2021, when most brake pads sold in California will be required to contain less than 5% copper by weight and January 1, 2025, when most brake pads will be required to contain less than 0.5% copper by weight. (See Figure 3-3.) Indications from the major brake pad friction materials manufacturers are that they are planning, where feasible, to go straight to a "zero" copper pad where no copper is intentionally added to the pad. They will do this in order to reduce the multi-million dollar costs that would result from two friction materials reformulations within a few years.

Figure 3-1. Water Quality Improvement Hierarchy

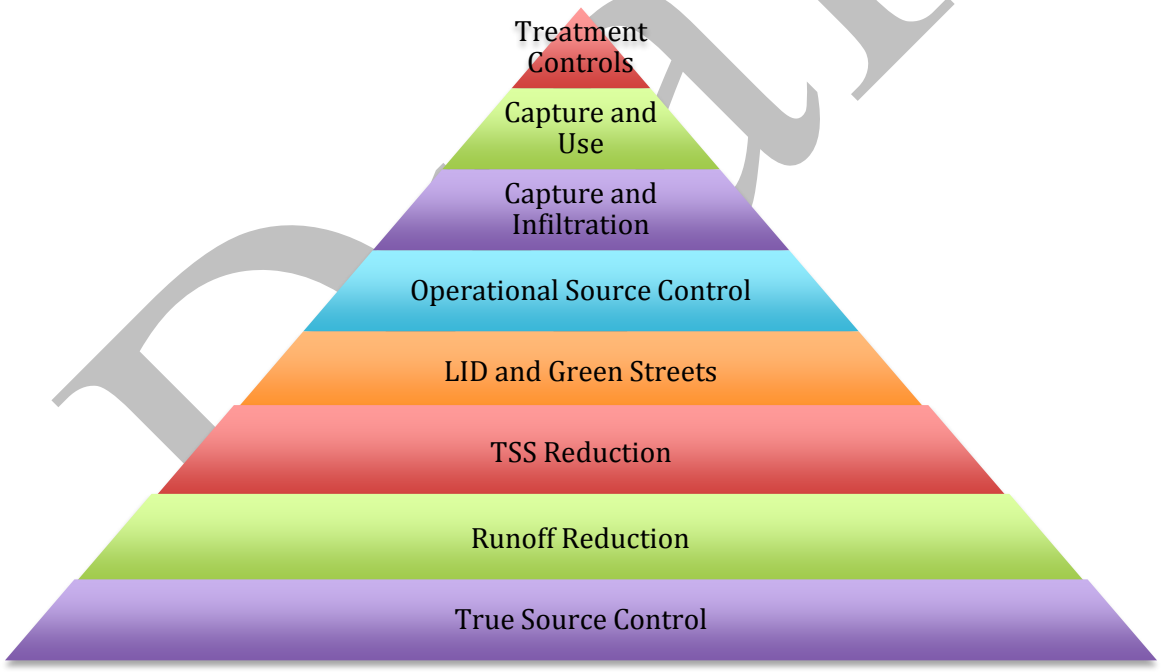

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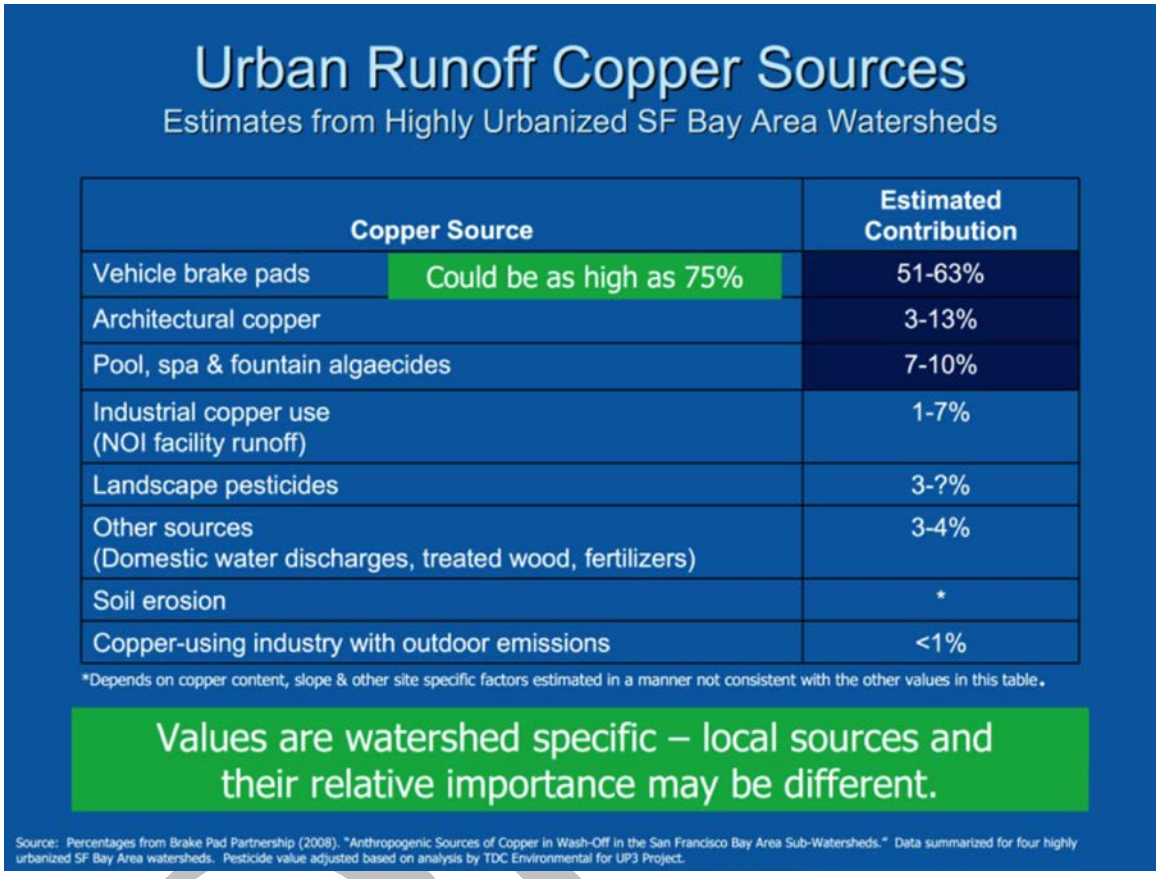
Figure 3-2



Source: Percentages from Brake Pad Partnership (2008). "Anthropogenic Sources of Copper in Wash-off in the San Francisco Bay Area Sub-Watersheds." Data summarized for four highly urbanized SF Bay Area Watersheds. Pesticide value adjusted based on analysis by TDC Environmental for UP3 Project.

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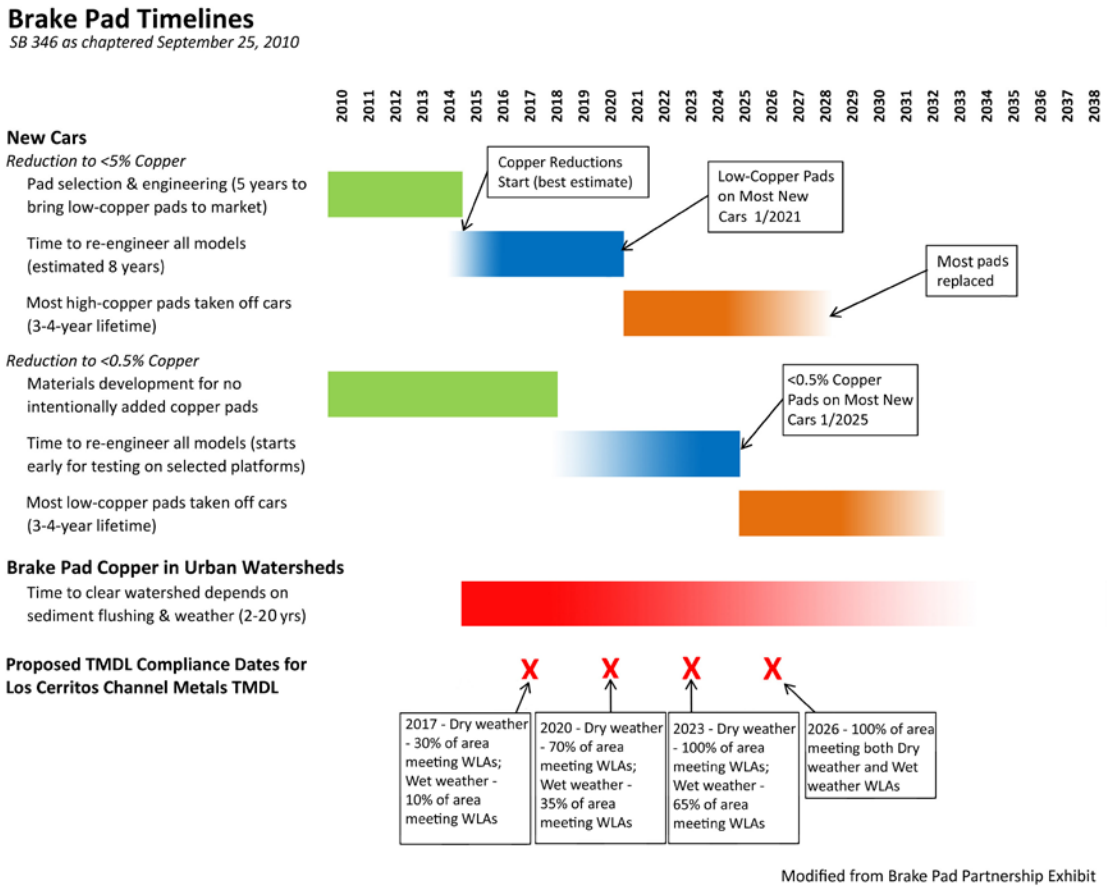
Figure 3-3



Modified from Brake Pad Partnership Exhibit

To improve its understanding of the potential impacts of SB 346, the Watershed Group commissioned a study, "Estimate of Urban Runoff Copper Reduction in Los Angeles County from the Brake Pad Copper Reductions Mandated by SB 346." This estimate relied on available information, which was largely developed through a lengthy collaboration among brake pad manufacturers, government agencies, and environmental groups in the Brake Pad Partnership. The estimate examined three scenarios: a one-step reduction in copper, a two-step reduction in copper, and an aftermarket exemption for 0.5% copper. Scenario one showed a 60% reduction in urban runoff copper reduction from brake pads alone by 2024 and a 61% reduction by 2028. Scenario two showed a 45% reduction by 2024 and a 60% reduction by 2028. Scenario three showed a 39% reduction by 2024 and a 49% reduction by 2028. A CASQA subcommittee is proposing to update these estimates in late 2014 by incorporating new baseline copper concentrations data for new vehicles from Washington State, brake pad industry guidance on various assumptions used in the estimate, and the fraction of all brake pad formulations certified as containing less than 0.5% copper. All brake pads sold in California after January 1, 2014 are expected to be certified and marked with edge codes indicating this compliance level. As of May 20, 2014, 3,819 brake pads have been certified by NSF International, the organization

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that certifies the measurement of copper in brake friction materials. The edge codes will provide information on copper content and the requirement that on and after January 1, 2014 any motor vehicle brake friction materials sold in California must contain no more than 0.1 percent by weight of the following materials: cadmium and its compounds, chromium (VI) salts, lead and its compounds, mercury and its compounds, and asbestiform fibers. There is a limited exception for depletion of inventories, but that exception ends December 31, 2023. The copper reduction study and an accompanying spreadsheet of calculations were reviewed with staff of the Los Angeles Regional Water Board in connection with the development and adoption of an Amendment to the Water Quality Control Plan for the Los Angeles Region to Incorporate Implementation Plans for the Total Maximum Daily Loads for Metals in the Los Cerritos Channel and for Metals and Selenium in the San Gabriel River and Impaired Tributaries.

The results of the study are reflected in the Reasonable Assurance Analysis (RAA) performed to demonstrate that the activities and control measures identified in the Watershed Management Program will ensure that Permittee MS4 discharges will achieve applicable water quality-based effluent limitations for copper.

The Watershed Group has concluded that the most cost-effective and long-lasting way to solve water pollution problems is to develop state-wide or regional control measures that will encourage or require, if necessary, product substitution or material substitution at the manufacturing stage. This can be a complex and time-consuming process, but the payoff in water quality improvement can be tremendous.

The members of the Watershed Group are now looking forward to working with the California Stormwater Quality Association to address a major source of zinc – tires. The Department of Toxic Substances Control (DTSC) adopted new Safer Consumer Product Regulations that became effective October 1, 2013. These regulations contain a process for identifying and prioritizing Chemicals of Concern in Priority Products containing these constituents, as well as a process for eliminating or reducing the adverse impacts of Chemicals of Concern in Priority Products. It will apply to most consumer products placed into the stream of commerce in California. It specifically applies to adverse environmental impacts, including adverse water quality impacts, and it contains a petition process for identification and prioritization of chemicals and projects. CASQA, supported by Los Angeles River Watershed permittees, has started the process of conducting research and building a file of critical information to support the designation of zinc in tires as a future priority product/constituent combination. The initial product of this effort is a zinc literature survey that discusses major and minor sources of zinc as documented in scientific literature from around the world.

The cost and effectiveness relationships between true source control, operational source control, and treatment control are shown in Figure 3-4, prepared for CASQA.

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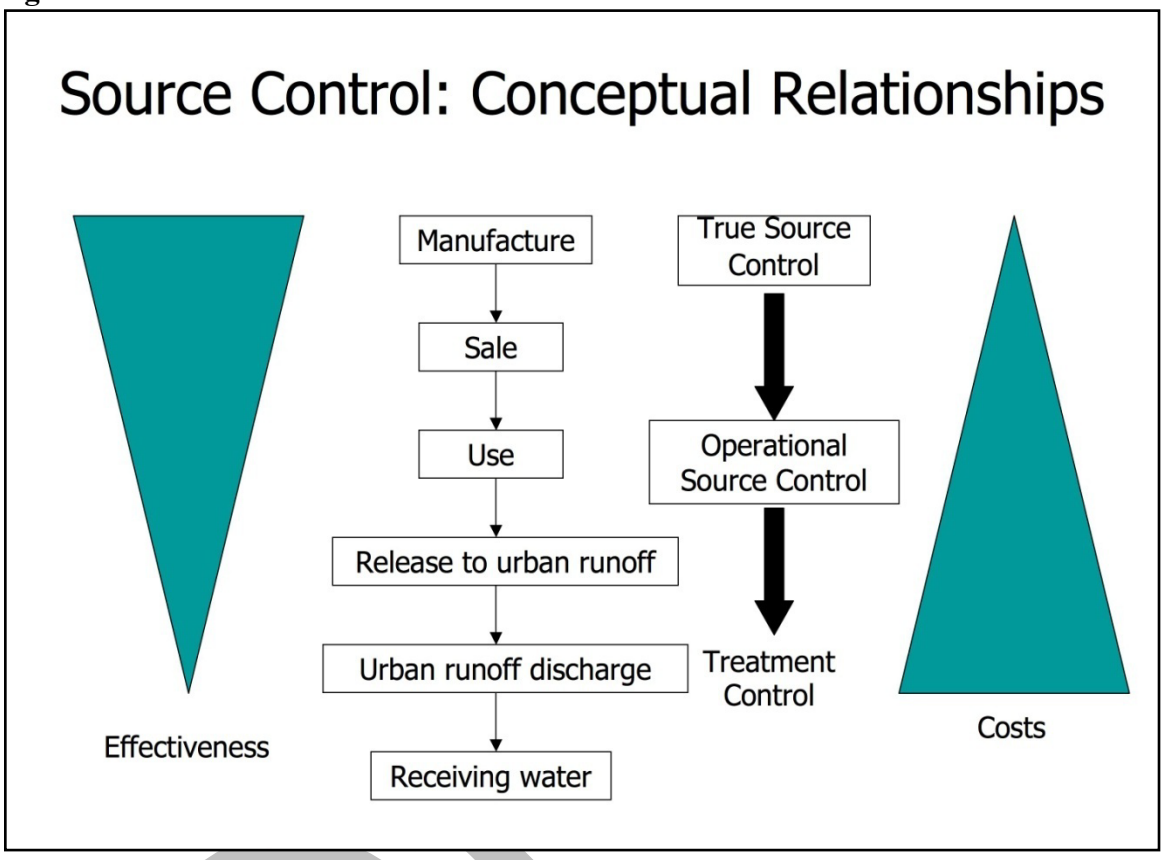
Figure 3-4



Source: California Stormwater Quality Association (CASQA)

Because the requirements for inclusion on the initial priority product list are quite restrictive, the regulations cannot be used to control zinc in tires until after January 1, 2016. However, the Watershed Group and others will be able to utilize the next two years to work with CASQA and others to develop a well-supported petition to support the addition of zinc in tires as a product-chemical combination on the Priority Products List.

Operational source control involves such measures as street sweeping and working with public and private entities to reduce or eliminate the discharge of pollutants or the contact of pollutants with rainwater and/or urban runoff. The Permittees within the watershed will use their Public Outreach Programs and Public Agency Activities Programs to promote and monitor operational source control measures addressing priority pollutants within the Watershed.

The Industrial General Permit, readopted on April 1, 2014, will help control zinc associated with industrial processes. However, it does not regulate outdoor sources of zinc such as galvanized chain link fences and roofs that are common at industrial facilities, but not directly associated with industrial processes.

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Permittees will also address outdoor sources of zinc and other metals partially through the following runoff reduction strategy. Capturing and infiltrating and/or using runoff will interrupt the transport of these metals to receiving waters.

3.3. Runoff Reduction Strategy

In conjunction with true source control (prevention of pollutants at the source) and operational source control, the Watershed Group will implement a runoff reduction strategy that initially will focus on reduction of dry-weather runoff that will result in substantial water quality improvements during dry-weather days (approximately 330 days per year on average). This will be accomplished through a combination of water conservation and improvements in landscape irrigation efficiency to eliminate or greatly reduce overspray and runoff that provides a transport mechanism to carry pollutants to the storm drain system and hence to the receiving waters of the Los Cerritos Channel. Strategic location of green street elements will also help reduce dry-weather runoff.

The Watershed Group will give both short-term and long-term emphasis to dry-weather runoff reduction in order to reduce or eliminate runoff as a mechanism to transport metals from industrial facilities, roads, parking lots, and driveways to the Los Cerritos Channel receiving waters. Water conservation measures will be emphasized in order to reduce the potential for dry-weather runoff. The Watershed Group has already realized reductions in runoff due to the application of water conservation measures. Water conservation and improved irrigation practices will be supplemented by the diversion of dry-weather discharges to facilities designed to store and infiltrate water and a reduction in directly connected imperious surfaces over time.

Reducing runoff during wet weather is a challenging and costly undertaking. The Watershed is essentially built-out and will be primarily dependent on redevelopment to create opportunities for wet-weather runoff reduction. However, the member agencies will endeavor to incorporate green infrastructure into redevelopment projects, implement green streets, retrofit LID components at key locations, capture and use or infiltrate stormwater, and reduce directly connected impervious areas to the extent reasonably feasible. Wet weather runoff reduction is a long-term measure that will be addressed in later phases of the implementation plan as grant funds become available. After source control and runoff reduction, members of the Watershed Group will look to sediment control, direct infiltration, capture and infiltration, capture and use, and treatment controls. (See Figure 3-1, the Water Quality Improvement Hierarchy that is central to the Water Quality Improvement Strategy of the Los Cerritos Channel Freshwater Watershed.)

Areas tributary to well-maintained BMPs designed to capture and infiltrate or capture and use the runoff from an 85th percentile, 24-hour storm should be deemed to be in compliance with

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the assumptions and requirements of the WLAs for Watershed Management Programs as well as for Enhanced Watershed Programs.

The members of the Watershed Group propose to collaborate with water purveyors and their planning departments to use local water conservation requirements and implementation of AB 1881, the Water Conservation in Landscaping Act, to reduce both dry-weather and wet-weather runoff. AB 1881 was approved in the fall of 2006 with a requirement that the Department of Water Resources (DWR) update the model local water efficient landscape ordinance adopted by the Department in the early 1990s pursuant to Chapter 1145 of the Statutes of 1990. The updated model ordinance was promulgated by the Department on September 10, 2009. The Act required that not later than January 1, 2010, local agencies either adopt the updated model ordinance or another water efficient landscape ordinance at least as effective in conserving water as the updated model ordinance. By January 31, 2010, each local agency was required to notify the DWR whether it had adopted its own water efficient landscape ordinance or the updated model ordinance.

AB 1881 encourages the capture and retention of stormwater onsite to improve water use efficiency and water quality. It includes a requirement for a landscape water budget that establishes the maximum amount of water to be applied through an irrigation system. The model ordinance applies to new construction and rehabilitated landscapes for public agency projects and private development projects with a landscape area equal to or greater than 2,500 square feet, as well as developer-installed new construction and rehabilitated landscapes in single family and multi-family projects requiring a building or landscape permit, plan check, or design review. Since the watershed cities are largely built-out, the requirements will generally be limited to public projects and redevelopment projects, but every reduction in landscape irrigation should assist in reducing metal loads.

The majority of cities in the Watershed Group have already adopted water conservation ordinances that require the immediate conservation of water, usually as a progressive scale based on drought levels. These cities have also adopted landscape irrigation efficiency ordinances.

In addition, the Caltrans Stormwater Management Plan (SWMP) specifies requirements for the implementation of BMPs for State transportation projects (Caltrans 2003). Whenever a Caltrans project results in stormwater runoff to receiving waters or a storm drain system owned by another permittee, Caltrans is required to consider approved treatment systems (referred to as Category III BMPs) and, where feasible, to install them. Approved treatment systems vary, but Caltrans maximizes the use of biofilters or bioswales to reduce runoff and pollutant loads. Other approved treatment systems include infiltration basins, detention basins, traction sand traps, and dry weather flow diversions. Continued implementation of these requirements will provide

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water quality benefits over the long term. It may be possible to further increase the use of structural BMPs to maximize infiltration onsite.

3.4 Total Suspended Solids Reduction Strategy

After reviewing the "Wet-Weather Modeling Analysis" subsection of the Linkage Analysis in the Los Cerritos Channel Total Maximum Daily Loads for Metals, the Watershed Group concluded that beyond the Minimum Control Measures and implementation of SB 346, initial implementation of its multi-pronged strategy should focus on TSS reduction. This conclusion is based on statements in the TMDLs document. The wet-weather Modeling Analysis discussion in the TMDLs stated that "To assess the link between the sources of sediment, metals, and the impaired waters, a modeling system was utilized that simulates land-use based sources of sediment and associated metals loads and the hydrologic and hydraulic processes that affect delivery." It went on to say that "Loading processes for metals (copper, lead, and zinc) for each land use were represented through their association with sediment." These statements about the modeling process describe the bases for the metals TMDLs and indicate that initial WMP measures implemented in the watershed should focus on TSS reductions. Reducing TSS in the receiving waters should result in a significant reduction of metals and legacy organics in the receiving waters since both groups of pollutants adhere to sediment. The greater the reduction in TSS, the greater the reduction in metals and legacy organics. Initial emphasis on TSS reduction should reduce the volume of water that ultimately needs to be captured and infiltrated or used to achieve standards for the Category 1 pollutants being addressed by the WMP – namely metals and legacy organics. This would make implementation of the WMP more cost-efficient.

Table 3-1 below, and the accompanying box plots on the following page, provide a summary of TSS concentrations at the Stearns Street monitoring site over a 13-year period, based on 74 wet-weather observations and 25 dry-weather observations.

Table 3-1. Summary statistics of TSS (mg/L) measured at the Los Cerritos Channel Stearns Street mass emission and TMDL monitoring site.

Statistic	Wet Weather	Dry Weather
No. of observations	74	25
Minimum	17	2
Maximum	1700	128
1st Quartile	96	7.5
Median	155	13
3rd Quartile	260	41
Mean	227	27

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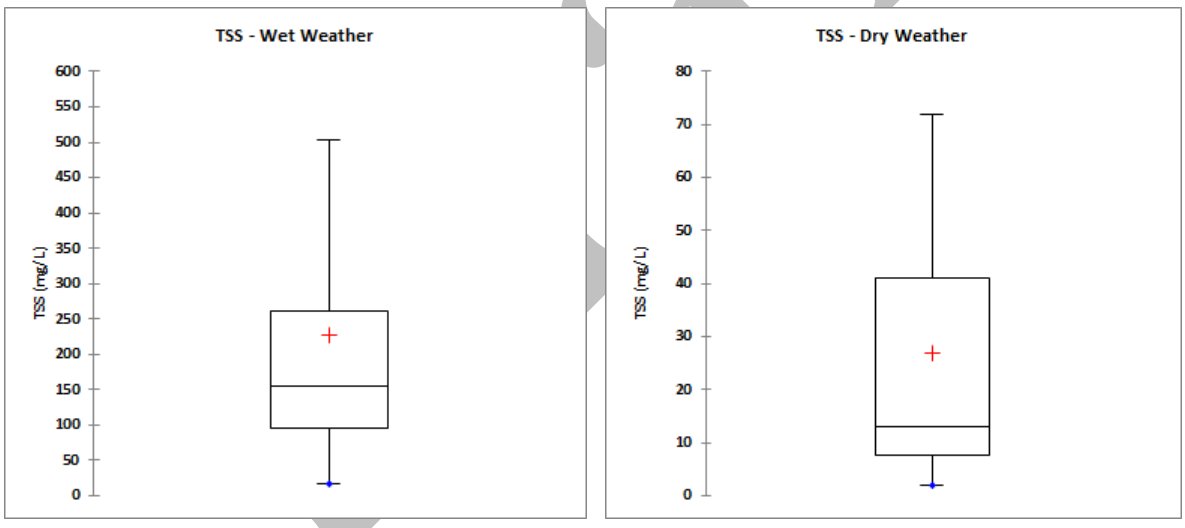
Standard deviation (n-1)	256	30

Although the Reasonable Assurance Analysis is assuming only a 5% reduction in TSS through implementation of the TSS Reduction Strategy, the Watershed Group is actually targeting a reduction in the wet-weather mean concentration of TSS at Stearns Street from 227 mg/l to 150 mg/l. This target seems reasonable in light of TSS concentrations in other developed watersheds. It would be a 34% reduction in the mean concentration of TSS. Since the wet-weather mean sediment load is greatly influenced by the larger loads associated with large storms, to significantly reduce the TSS load in the channel, the Watershed Group will need to adequately address sediment concentrations resulting from larger storms. Implementation of this strategy will be assessed through the adaptive management process.

Table 3-2. Box Plots of Wet and Dry Weather TSS Concentrations at the Los Cerritos Channel Stearns Street Mass Emissions and TMDL Monitoring Site



Dark center line is the median (50th percentile), the red plus sign is the arithmetic average, the upper end of the box is the third quartile or Q3 (75th percentile), the lower end of the box is the first quartile or Q2 (25th percentile), the upper whisker is (Q3 + 1.5*(Q3-Q1)), the lower whisker is (Q1-1.5* (Q3-Q1).

The TSS Load Reduction Strategy is targeted at accelerating reductions of Category 1 pollutants addressed by the Los Cerritos Channel Metals TMDLs and the Greater Harbor Toxics TMDLs. The final compliance date for the Los Cerritos Channel TMDLs is September 30, 2026, and the final compliance date for the Greater Harbor Toxics TMDLs is March 23, 2032. The Watershed Group believes that TSS reduction, combined with true source control (discussed in Section 3.2), low

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impact development, green streets, and implementation of minimum control measures will constitute a strong and effective initial implementation of the WMP. The combination of these measures will facilitate compliance with interim milestones while providing time for funding measures to be put in place to pay for the design, construction, and operation of stormwater capture and low flow diversion facilities and to develop working relationships with water and wastewater agencies.

The core of this program is the Group's soil stabilization/sediment control strategy, described in Section 3.5 of the WMP. Two key components of this strategy are implementation of enhanced erosion and sediment control at construction sites, in accordance with each city's Development Construction Program (see Section 4.3.2), and stabilization of exposed soil not associated with construction sites. As noted above, the Group recognizes that the total sediment load in the Channel is closely associated with infrequent larger storms. For this reason, the Group's soil stabilization/sediment control program will emphasize soil stabilization and, for the larger sources of exposed sediment in each jurisdiction, supplemental sediment control measures. The Group intends to reduce the sediment load from the watershed, as measured at the Stearns Street monitoring station, by at least 20% by 2020. The Watershed Group considers this is a reasonable target given the magnitude of exposed dirt in the watershed.

In preparation for addressing exposed soil not associated with construction sites, various member cities have conducted initial assessments of exposed soil within these jurisdictions. The assessments indicated that the City of Signal Hill has the highest percentage of exposed dirt in the Watershed due to a number of factors, including slopes and the impacts of current and historic oil production. Therefore, the initial focus for TSS reduction will be on sub-basin 4 (See Figure 1-3 and Attachment B), which includes portions of Signal Hill and Long Beach. An initial analysis of exposed dirt not associated with construction in the portion of Signal Hill in the Los Cerritos Channel Watershed indicates that it totals approximately 1.54 million square feet, or 5.5% of the city area within the Watershed. This is a much higher proportion of exposed dirt than in any other city in the Watershed. In addition, Signal Hill has greater local relief than the other cities within the Watershed and hence a higher probability of significant erosion and discharge of sediment than other portions of the Watershed. Furthermore, sub-basin 4 was modeled as being the number one source of zinc in the Watershed during development of the Metals TMDLs by USEPA.

The City of Signal Hill has agreed to develop a model vacant lot ordinance designed to reduce the discharge of sediment from the City. Development of the ordinance will consider elements of a vacant lot landscaping ordinance adopted by the City of Whittier and Signal Hill's own ordinances dealing with Storage Yards and Outdoor Storage Areas and with Trucking Yard Performance Standards. The Whittier Ordinance defines different types of vacant lots and specifies landscaping, irrigation, and maintenance requirements for lots. Lots smaller than one-

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half acre must be fully landscaped with draught tolerant or xeroscape material that requires no or little water after the first three years of growth. For lots one-half acre or larger, a minimum five-foot wide landscaped planter is required adjacent to public rights-of-way, except alleys, using the same landscaping materials used in the smaller lots. Perimeter barrier fences are also required behind the planters. The model ordinance will specifically focus on erosion and sediment control. It will also likely utilize the compliance plan approach used in the Signal Hill ordinances as a tool to build consensus on how best to reduce erosion and the discharge of sediment. The Signal Hill ordinances include a procedure for City review of properties for compliance with provisions of the ordinances. The City then prepares compliance plans for non-compliant properties and allows property owners to prepare alternative compliance plans for City approval.

The initial assessments conducted have indicated that two of the other potential major sources of exposed soil within portions of the watershed are beyond the direct control of the cities. These are Caltrans rights-of-way and transmission line rights-of-way. Caltrans rights-of-way are found in Sub-basins 1, 2, 4, 8, 9, and 10. Transmission line rights-of-way are found in sub-basins 1, 2, 8, 9, and 10. Since Caltrans is a participant in the Watershed Group, the cities will work with Caltrans to ensure that its rights-of-way are stabilized in a timely manner. However, since the public and private utilities whose rights-of-way must be stabilized are not members of the Watershed Group, negotiations with the utilities on how best to keep sediment from their rights-of-way out of the storm drain system will be necessary. This process has already begun with a meeting held with representatives of Southern California Edison.

3.4.1 Soil Stabilization/Sediment Control

The Watershed Group plans a major, multi-faceted program to control sediment to implement its TSS Reduction Strategy and because metals (Category 1 Priority Pollutants) are ubiquitous within the area due to atmospheric deposition. These metals adhere to sediment and are transported to receiving waters by rainfall and urban runoff. The approaches to sediment control proposed for use in the watershed include enhanced erosion and sediment control at construction sites, stabilization of exposed soil not associated with construction sites, enhanced street sweeping, and enhanced parking lot sweeping.

Since the area is built out, there is limited construction at any given time. However, enhanced erosion and sediment control at all construction sites involving disturbed soil of one-acre or more is mandated by the current State Construction General Permit that became effective on July 1, 2010. In addition, the Permittees will require an effective combination of erosion and sediment controls for construction sites of less than one acre, consistent with Part IV.D.8.d of Order No. R4-2012-0175. They also will employ erosion and sediment control on publicly owned areas with exposed soil, and will encourage and/or require private property owners to stabilize

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exposed soil on vacant lots and other privately owned sites. These practices will first be employed in the Phase I sub-watersheds (See Section 6).

Cities throughout the Watershed will consider the adoption of vacant lot ordinances that will contain landscaping as well as erosion control and sediment control, based on experience with a pilot ordinance proposed for adoption by the City of Signal Hill, to help with initial implementation of the TSS Reduction Strategy.

Caltrans will stabilize exposed soil within its rights-of-way in order to reduce the transport of metals in runoff from its facilities and to sequester legacy lead that can be transported by wind as well as water.

3.4.2 Enhanced Street Sweeping

Enhanced street sweeping will be especially important until the sources of metals in atmospheric deposition are controlled. Metals are deposited on streets, highways, and parking lots directly from cars and trucks and also across the Watershed by atmospheric deposition. Much of the critical sediment for transporting metals to receiving waters is very fine and not picked up by traditional broom sweepers.

Street sweeping is getting renewed attention as an operational best management practice to reduce the discharge of sediment and metals. New vacuum sweepers and regenerative sweepers are quite effective at removing fine particles from streets and parking lots. The U.S. Navy is one of the agencies examining the use of high-efficiency sweepers to remove metals from its facilities. In May 2008, the Navy's Space and Naval Warfare Systems Command (SPAWAR) Systems Center in San Diego made a presentation entitled, "Metals Load Reduction in Storm Water Using High-Efficiency Sweepers" to a Joint Services Environmental Management Conference. The Navy observed that there are numerous widespread sources of metals, some of which are not easily controlled. The Navy is responsible for large areas with many discharge points. The Navy was concerned that stormwater metals concentrations, particularly copper and zinc, commonly exceed storm or process water discharge compliance requirements, since metals accumulate in sediments and receiving water impacts occur at low concentrations.

The Navy focused on street sweeping as a potentially effective BMP for reducing the adverse impact of metals on receiving waters because: 1) it can be applied to large areas, 2) particles on the ground are a source of stormwater copper and zinc, and 3) new sweeper technologies may be capable of removing significant amounts of particles, and, therefore, metals. The Navy's early tests showed that some particles swept off the ground were relatively high in copper and zinc and that these particles were a source of dissolved metals. The SPAWAR Systems Center concluded that high efficiency sweepers could remove significant amounts of metals before they become entrained in stormwater and that sweeping provides a potentially useful wide-area BMP.

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The use of high-efficiency sweepers as an area-wide BMP for metals appears to be particularly applicable for the Los Cerritos Channel drainage area because indirect atmospheric deposition and direct deposition from motor vehicles are primary sources of metals in the Watershed.

As a result of the Navy's research and other recent research into the effectiveness of high-efficiency vacuum and regenerative sweepers, the Watershed Group has concluded that the timely use of well-maintained, high-efficiency sweepers could constitute a deemed compliant BMP for metals in the same way that the use of certified full-capture devices does for trash. Therefore, the Watershed Group proposes to implement an enhanced street and parking lot sweeping program within the Palo Verde Channel Sub-watershed and the upper portion of the Clark Channel during the first phase of implementation of this plan. The proposed enhanced sweeping will use a combination of regenerative and vacuum sweepers. Major arterials, major intersections, median curbs, commercial, and industrial areas will be swept more frequently in the month preceding the rainy season. In addition, owners of private parking lots will initially be encouraged to enhance their sweeping programs. Ultimately, parking lot sweeping ordinances may be necessary to ensure that parking lots are swept sufficiently well to remove the fine metal particles resulting from atmospheric deposition and direct deposition from tire wear and braking, as well as other fine sediment particles. The need for future ordinances will be considered during the initial adaptive management process. Several Watershed Group members have already begun using regenerative and vacuum sweepers that are better able to capture fine particles (See Table 3-1, Street Sweeping Survey Table below.)

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Table 3-3: Los Cerritos Channel Street Sweeping Survey								
City	Type of Sweeper	Frequency			Ordinance that restricts parking on a sweeping day	Does your city utilize any special procedures for sweeping major intersections? If yes, please describe those procedures.	Does your city have a program for municipal parking lot sweeping? If it does, please list the frequency/schedule	Does your city have requirements for private parking lots?
		Residential	Commercial	Industrial				
Bellflower	Vacuum	Weekly	Weekly	Weekly	Yes	Regular sweeping at intersections	Parking lots are swept once per week	No
Cerritos	Regenerative	Weekly	Weekly	Weekly	Yes	No	Yes. All City lots are swept once per week	No
Downey	Regenerative	Weekly	2x per week	Weekly	Yes	No	Yes – weekly in early morning	No
Lakewood	Regenerative	Weekly	Weekly	Weekly	Yes	Major intersections swept early morning before traffic	Yes-weekly	No
Long Beach	Broom Sweepers	Weekly	Weekly	Weekly	Yes	No	---	---
Paramount	Regenerative	Weekly	Weekly	Weekly	Yes	Major intersections are swept twice weekly	City owned lots of Parks and City facilities are swept once per week	No
Signal Hill	Regenerative	Weekly	Weekly	Weekly	Yes	All major intersections are swept	Upon request	Yes (see Municipal Code 12.16.060)

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In addition, Caltrans conducts roadway and roadside cleanup operations to provide safe highway conditions and to maintain a neat and clean appearance. Sweeping operations are scheduled at the discretion of the Maintenance Supervisor based on the accumulation of trash and debris. Depending on traffic, weather, and available resources, sweeping frequencies are based on collecting a minimum of 1/2 cubic yard and a maximum of 1 cubic yard of material per mile swept. Debris on the roadway that may constitute a traffic hazard is removed immediately upon discovery or notification. Caltrans uses mechanical broom sweepers that meet the specifications needed to sweep in the highly traveled freeway environment and to pick up the variety of materials found on a the freeway shoulder or median. Caltrans, in cooperation with the other Watershed Group members, will reevaluate its sweeping policy with the goal of improving the efficiency of metals removal.

3.5 Runoff Capture and Infiltrate or Use Strategy

The Los Cerritos Channel Watershed Group chose not to pursue an Enhanced Watershed Management Program, largely because of its knowledge of the depth to the drinking water aquifer and the widespread presence of clay lenses throughout the watershed. The combination of these factors will make implementation of a capture and infiltrate strategy challenging. Therefore, the Group has attempted to locate potential water capture facilities in locations where the captured stormwater can be treated, if necessary, and used for irrigation if infiltration is not feasible. These locations include local parks and golf courses where irrigation is needed (See Section 4.5.2 and Figure 4-1). The Group is also looking at utility right-of-way sites where captured water could be used for nursery or garden plot irrigation, as well as at school sites (See Section 4.5.2 and Figure 4-2). To date, thirteen water capture sites have been identified, primarily in upper and middle portions of the watershed (See Section 4.5 for the location of these sites). Implementation of projects at these sites will be phased in over time, as needed and as funding is available. The initial stormwater capture projects are planned for locations in Mayfair Park in the City of Lakewood, Caruthers Park in the City of Bellflower, and Skylinks Golf Course in the City of Long Beach. Projects at these sites will capture non-stormwater runoff and first flush stormwater discharges from the upper portions of sub-basins 4, 8, 9, and 10, as defined in the Los Cerritos Channel TMDL for Metals in the Cities of Bellflower, Lakewood, Long Beach, Signal Hill, and Paramount. The Mayfair Park project will also capture discharges from the middle portion of sub-basin 8 in the City of Lakewood. These locations will be particularly helpful in bringing the upper portions of these sub-basins into compliance with waste load allocations in the Metals TMDLs and reduce the loads of other priority pollutants with similar fate and transport characteristics. The next three sites will be in Heartwell Park (two sites) and Skylinks Golf Course in the City of Long Beach. These sites will serve sub-basins 6, 7, and 10. In addition to the use of major stormwater capture facilities, the Permittees will accomplish additional stormwater capture and infiltration through implementation of LID ordinances and Green Streets policies. Implementation of projects through the use of these ordinances and policies will be scattered across the built-out watershed because they will be dependent on the

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initiation and completion of redevelopment projects and road reconstruction projects. However, over a sustained period of time, they should contribute significantly to non-stormwater and stormwater infiltration and interruption of the runoff transport mechanisms.

3.6 Treatment Control Strategy

Except for vegetative treatment associated with LID, MS4 treatment control is generally viewed by the Watershed Group as a last resort to be used when true source control and operational source control, runoff reduction, and sediment control are not sufficient to comply with water quality-based effluent limits based on the assumptions and requirements of TMDLs applicable to the Watershed, or other applicable water quality objectives. This view is based on the conceptual relationships shown in Figure 3-4 in Section 3.2. Treatment control before discharge into receiving waters tends to be less effective and more costly than source control, especially true source control, which was why CASQA and Sustainable Conservation spent so much time and money getting SB 346 adopted and signed into law. Removing the very small particles of copper emitted by brake pads from stormwater discharges would have been very difficult, inconsistent, and extremely expensive. Similar relationships are associated with the treatment of other pollutants such as zinc, pesticides, and bacteria. In addition to the current measures to reduce copper in brake pads, the Watershed Group is acutely aware that the removal of lead from leaded gasoline and the banning of the sale of diazinon and chlorpyrifos in urban California have already had positive effects on water quality and reduced the costs of future treatment control. The Permittees are also keenly aware that some treatment control is likely to be necessary to achieve compliance in a timely manner.

The Cities will be complying with the proposed trash amendments to the Water Quality Control Plan for Inland Surface Water, Enclosed Bays, and Estuaries in California when the amendments are adopted by the State Water Resources Control Board and become effective. The strategy for compliance with the amendments will have to be developed after the draft Watershed Management Program has been submitted to the Regional Water Board because the draft amendments have just been released for public comment and will not be adopted until later in 2014. The draft amendments contain compliance options similar to those in the Los Angeles River Trash TMDL, but with the opportunity to focus on high trash generation areas.

The Permittees anticipate that much of the treatment control implemented in the Watershed will be associated with implementation of LID ordinances and Green Streets policies. They also anticipate that some treatment control may be necessary to achieve zinc waste load allocations. Although enhanced street sweeping should be sufficient to control direct and indirect deposition of zinc on arterials and residential streets, control of zinc from industrial sources may require the installation of targeted treatment controls since the capture and infiltration or capture and use of both non-stormwater and stormwater discharges will be a long-term and expensive process. In addition, Permittees are not certain how effective implementation of the

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new Industrial General Permit will be with respect to the reduction of zinc in stormwater discharges. This uncertainty is magnified by the recognition that many zinc sources at industrial facilities are not related to industrial processes and therefore not regulated by the Industrial General Permit.

The need for installation of treatment control facilities will be continually re-evaluated through the adaptive management process required by Order Nos. R4-2012-0175 and R4-2014-0024 and explained in Section 10 of this plan. The Permittees are confident that a continuation of the implementation of SB 346, enhanced street sweeping, dry-weather runoff reduction, and TSS reduction will be sufficient to meet the September 30, 2017 and the September 30, 2020 milestones in the Los Cerritos Channel Total Maximum Daily Loads for Metals. However, compliance with the September 23, 2023 interim milestone and the September 30, 2026 final compliance date may require treatment controls if there is any delay in implementation of SB 346, or if stormwater Permittees are not successful in using the petition process in the Safer Consumer Products Regulations to control zinc in tires. In addition, if new regulations promulgated by the Department of Pesticides Regulation are not successful in reducing pyrethroids in stormwater discharges, effective treatment control measures may have to be developed and implemented.

3.7 Financial Strategy

This financial strategy is provided to meet the development and implementation requirements for this WMP in accordance with Order No. R4-2012-0175 and Order No. R4-2014-0024. The cost estimates provided herein are preliminary and based on the best science available to date. The estimates are also subject to revision as new information becomes available, including as the projects are refined over the implementation period.

Financing the implementation of the Water Quality Improvement Strategy for the Los Cerritos Channel Watershed is the greatest challenge confronting the agencies in the Watershed. In the absence of stormwater utility fees, the agencies have no dedicated revenue streams to pay for the stormwater capture BMPs anticipated if the agencies in the Watershed were to depend on stormwater capture and treatment controls to achieve compliance. Therefore, to be able to sufficiently reduce pollutant loads to meet water quality objectives, the Watershed is going to pursue a multi-pronged financial strategy to match the multi-pronged Water Quality Improvement Strategy. In addition, the Watershed is coordinating the proposed implementation schedule (see Section 6) with the financial strategy.

The Watershed Group has considered the recommendations in the City Managers' Stormwater Funding Options report in developing this financial strategy. The City Managers' report addresses options open to the agencies in Los Angeles County after the County Board of Supervisors chose not to move forward on a proposed stormwater fee that would have generated approximately $295 million annually. A critical component of the report is the

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observation that moving forward with a stormwater fee vote would likely occur after June 2015, which means that the first funds might not be available until property tax payments are received in 2017. If a fee structure similar to the proposal presented to the Board of Supervisors in 2013 were adopted, the Los Cerritos Channel Watershed could expect annual revenues of approximately $2.7 million from a pro-rata distribution of the funds allocated to the Cities in the Watershed starting in 2017, plus a possible $3.4 million for the portion of the fee allocated to the Watershed Authority Groups (WAGs) if the Cities and the applicable WAGs allocated money to the watersheds on a proportional basis.

Assuming a total of approximately $6 million per year available from a funding source based on the proposed Clean Water, Clean Beaches funding initiative, the Watershed could expect approximately $60 million to be available over 10 years and $150 million over 25 years. However, these amounts would not be sufficient to pay for expensive stormwater capture and dry-weather low flow diversions to the sanitary sewer if the agencies had to depend on such projects to come into compliance with receiving water limitations and water quality-based effluent limitations specified in Order No. R4-2012-0175. Estimates provided by Tetra Tech and Paradigm Environmental in the Reasonable Assurance Analysis for this WMP indicate that the volume of water capture capacity within the Watershed could be 209 acre-feet (AF) in 2020 and 592 acre-feet in 2026. According to the RAA, the 209 AF capture value is equivalent to achieving a 35% load reduction by September 20, 2020. The 592 AF in water capture volume was modeled as capture/treatment volume required to achieve the final load reduction requirements of the Metals TMDLs in 2026. These estimates assume total dependence on water capture and that implementation of other measures does not significantly reduce pollutant discharges to the receiving waters.

For cost estimation purposes, this WMP initially assumes that the Watershed could ultimately require the capacity to capture and infiltrate or use 592 AF of water. This estimate is based on the Reasonable Assurance Analysis performed to demonstrate that the activities and control measures proposed in this WMP will achieve compliance with applicable compliance deadlines during the permit term. Based on cost estimates for constructing underground compact concrete stormwater capture facilities with a capacity of eight acre-feet, such a requirement could cost $332 million for construction of these facilities between now and September 30, 2026. This represents an average cost of $18,745 per acre, which is approximately $989 more than the estimated compliance cost of $17,756 per acre for the City of San Diego (under a different permit with fewer TMDLs) and $9,212 less than the estimated costs of $27,957 per acre for the City of Los Angeles (under the same permit). This estimate is a planning level cost estimate. No preliminary engineering has been completed. Costs could be reduced significantly by implementation of effective source control measures, TSS reduction measures, the implementation of green streets, and the implementation of low impact development. Implementation of these alternative control measures will be continuously monitored, and future costs will be re-estimated during each adaptive management review.

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As the City Manager Work Group notes in its Stormwater Funding Options report, "the Los Angeles region faces critical, very costly, and seriously underfunded stormwater and urban runoff water quality challenges." The latest MS4 permits, Order No. R4-2012-0175 and Order No. R4-2014-0024, have greatly magnified the cost challenges. The absence of a stable stormwater funding mechanism not tied to municipal General Funds is becoming even more critical. For that reason, the City Manager Committees of the California Contract Cities Association and the League of California Cities, Los Angeles County Division, formed a Work Group to review stormwater funding options after the County's proposed Clean Water, Clean Beaches funding initiative failed to move forward. The Work Group found that funding stormwater programs is so complex and dynamic, and the water quality improvement measures so costly, that Permittees cannot depend on a single funding option at this time. The City Managers' report includes a variety of recommendations, including: organizational recommendations; education and outreach program recommendations; recommendations for legislation; Clean Water, Clean Beaches recommendations; local funding options; and recommendations for the Regional Water Board.

Watershed Group members have been involved in development of the recommendations, and the Group proposes to consider the recommendations of the City Managers Work Group and to work with its recommendations to do what is necessary to develop long-term solutions to stormwater quality funding. In the meantime, the Watershed Group will focus on the local funding options presented in the report to secure the needed funding for initial implementation of the WMP.

During the early years of implementation, the Permittees anticipate having to depend largely on local fees such as commercial/industrial inspection fees, General Fund expenditures, and, potentially, Clean Water State Revolving Fund program financing agreements to fund implementation of the Water Quality Improvement Strategy. The Watershed Group will seek opportunities to leverage the limited funds available. It will do this by financially supporting efforts of others, such as the California Stormwater Quality Association (CASQA), to seek State approval of true source control measures such as implementation of the Safer Consumer Product Regulations adopted by the Department of Toxic Substances Control in 2013. The Watershed Group will also support programs to increase water conservation, reduce dry-weather discharges to the storm drain system, and reduce TSS during wet weather. Successfully accomplishing these efforts could reduce the money needed in the long term to capture and/or treat stormwater discharges to comply with TMDLs and meet water quality objectives.

Concurrently, the Watershed Group proposes to work with the California Contract Cities, the Los Angeles County Division of the League of California Cities, and others to educate elected officials and voters about the water quality problems facing the region and the need to develop an equitable financing mechanism to fund the programs and facilities necessary to come into compliance with water quality regulations.

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Legislative solutions will be necessary to clarify the application of Proposition 218 to fees for the capture and use of stormwater in light of a recent 6th Appellate Court decision and to ensure that any State water bond put on the ballot in fall 2014 contains funding for stormwater quality projects. The Watershed Group will also support local and statewide efforts to amend Proposition 218 to have stormwater fees treated in the same manner as water, sewage, and refuse fees. The Watershed Group, and/or its member agencies, will also seek grants to implement rainwater capture and reuse or capture and infiltrate projects on publicly owned property.

In the long term, financing the Water Quality Improvement Strategy for the Los Cerritos Channel Watershed will require establishing dependable revenue streams for local water quality programs. Accomplishing this formidable task will require the cooperation of many entities, including business and environmental organizations and the Regional Water Board.

3.8 Uncertainties

There are many uncertainties associated with the implementation of this Watershed Management Program that could impact future program costs, availability of funding, and future risks. These uncertainties will be at least partially addressed through experience and implementation of the adaptive process discussed in Section 10. However, they will continue to exist throughout the life of the Program. The Watershed's communities have already made significant investments in stormwater quality programs. For example, the City of Signal Hill has seen its stormwater compliance budget grow by 260% during the last decade (from $250,000 in 2004 to $650,000 in 2014). By contrast, the City's general fund budget grew by 20% during this same time frame, with general inflation increasing by 31% during this ten-year period. Permittees fear greatly increased costs in the future because of new permit requirements, and they are concerned that they do not know exactly what the costs will be or where they will get the money.

The majority of the Watershed's communities have relied on general fund revenues to finance their stormwater programs. These monies face competition from other critical municipal services, including public safety (police, sheriff, fire, paramedics), parks, and street maintenance programs. This is primarily due to the uncertainties created by Proposition 218. The State's Constitution was amended in 1996 to require votes by either property owners or the general electorate on many parcel based taxes and fees. The *Jarvis v. City of Salinas* case, heard in 1999 in the 6th Appellate Court, resulted in the ruling that stormwater fees must follow the election requirements found in Proposition 218. This has made the adoption of stormwater fees very difficult statewide. However, despite the challenges of implementing stormwater fees caused by Proposition 218, some Cities have been able to fund portions of their stormwater programs with new fees. For instance, in 2004, the City of Signal Hill relied upon the Proposition 218 protest hearing process to increase revenues for trash reduction programs in stormwater. This fee

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annually collects approximately $96,000, which is used to fund trash related implementation costs for the Signal Hill stormwater quality program.

Uncertainties Associated with Long-Term Costs

This Program places great emphasis on source control (pollution prevention), runoff reduction, and erosion and sediment control as cost-efficient means of reducing pollutant loads to come into compliance with TMDLs and other water quality standards. There is a substantial degree of uncertainty associated with these control measures because they are partially dependent on the adoption and implementation of State legislation and local ordinances. Adoption and implementation of these measures, in turn, are dependent upon understanding complex storm water quality issues and upon commitment to implementing measures and enforcing legislation and ordinances. There are also many uncertainties associated with the implementation of structural control measures such as green streets, low impact development, stormwater capture facilities, and treatment control facilities. The success and efficiencies of these projects will be impacted by factors such as the infiltration rates of soils, the presence of clay lenses, the existence of high water tables, and the presence of existing underground utilities. There could also be changes in water quality standards and other regulations that would impact long-term costs.

Uncertainties Associated with Available Funding

As noted in the draft *Stormwater Funding Options* report discussed above in Section 3.7, there are many uncertainties associated with future funding for stormwater quality programs in Los Angeles County and elsewhere in California, since they are functionally orphaned utilities. Stormwater programs were not treated like water, sewer, and refuse utilities in Proposition 218 and therefore face much steeper hurdles in developing stable, sustainable revenue streams. The decision in the recent *Griffith v. Pajaro Valley Water Management Agency* case provides some relief for projects directly associated with water supply and use, but the decision does nothing to assist funding of the majority of stormwater quality programs and projects. An amendment to Article XIIID of the California Constitution would be needed to fully treat funding of stormwater quality programs on par with water, sewer, and refuse utilities. In the meantime, a proposed amendment to the Proposition 218 Omnibus Implementation Act of 1997 would codify the *Griffith* decision by clarifying that water may come from any source, including stormwater.

The decision by the Los Angeles Board of Supervisors in 2013 not to move forward with the proposed stormwater fee created more uncertainty for stormwater quality programs in Los Angeles County. Two of the reasons that the Board of Supervisors decided not to move forward with the proposed fee were that cities did not strongly support the fee and several groups, such as school districts, the business community, and others - including some cities - had concerns with the structure of the fee and the timing of the process. As noted above, the City Managers Committees of the California Contract Cities Association and the League of California Cities, Los

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Angeles County Division, responded to the decision by the Board of Supervisors by convening a meeting of stakeholders. The City Managers' group undertook development of the *Stormwater Funding Options* Report in light of the extraordinary costs expected to result from implementing the Watershed Management Programs and Enhanced Watershed Management Programs specified in the new Los Angeles Area Municipal Stormwater Permit. The *Stormwater Funding Options* Report presents a range of recommendations, but the outcome of these recommendations is not known at this time, adding to the uncertainties associated with future funding availability.

Another potential source of funding is grant funding. Over the last few years stormwater programs have received some project funds from grants funded by Proposition 40, 50, and 84. However, most of these grant funds have been spent or committed. This year, there might be a water bond passed with some money included for stormwater. The legislature previously approved an $11 billion water bond for the November 2014 statewide general election. Surveys have shown that this bond is not widely supported by the voters. As a result, several substitute water bonds were introduced during the 2014 legislative session. These include AB 1331 (Rendon), AB 2554 (Rendon), AB 2686 (Perea), and SB 848 (Wolk). Both of the Rendon bills and the Perea bill contain $250 million for stormwater programs and the Wolk bill contains $500 million for stormwater programs. These bills reflect significant concern over the State's continued and persistent drought and the need to assist local government in water sustainability programs. The Watershed cities have been active in commenting on the proposed water bond legislation, with an emphasis on the increasing the total amount available to cities for stormwater projects. It is unknown whether a compromise bond will be placed on the November ballot, as it is unclear whether Governor Brown will support scheduling a bond election this year. On June 24, 2014, the Governor informed the Legislature that he wants a $6 billion dollar water bond, including $1.5 billion for Water Quality and Water Supply Reliability (including stormwater capture); $1.5 billion for Watershed Protection, Watershed Ecosystem, State Settlements; $2 billion for Storage; $500 million for Sacramento-Dan Joaquin Delta; and $500 million for Statewide Flood Management.

It is also uncertain when a water bond election would be scheduled in the future, if one is not held this year. Even if a water bond containing funding for stormwater is placed on the ballot this November and approved by voters, the amounts allocated to stormwater in the various bond proposals are far below the need and the competition for grants would be statewide.

Uncertainties Associated with Future Risks

In addition to current uncertainties associated with costs and funding, there are multiple uncertainties associated with the possibility of missing compliance dates. The first TMDL standards compliance dates for the LCC Watershed will be the interim metals milestones of 2017, 2020, and 2023, and the final compliance date of September 30, 2026. The final non-TMDL water quality standard target compliance date is projected to be sometime in 2040. Thus,

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there will be many deadlines that must be met despite limited resources. Member agencies will need to set priorities and seek funding in order to meet the various compliance deadlines.

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4.0 Selection of Watershed Control Measures

4.1 Control Measure Objectives

As required by Part III.C.5 of Order No. R4-2012-0175, the specific objectives of the control measures in this WMP include:

(1) Prevention or elimination of non-stormwater discharges to the MS4 that are a source of pollutants from the MS4 to receiving waters;

(2) Implementation of pollutant controls necessary to achieve all applicable interim and final water quality-based effluent limitations and/or receiving water limitations pursuant to corresponding compliance schedules; and

(3) Ensuring that discharges from the MS4 do not cause or contribute to exceedances of receiving water limitations.

In addition, a general objective is the selection of control measures that will facilitate cost-effective implementation of the Water Quality Improvement Strategy specified in Section 3 of this WMP.

4.2 Existing and Planned Control Measures

4.2.1 Control Measures in Effect

The control measures currently in effect are primarily the various control measures programs specified in Order No. 01-182, including the following:

- Public Information and Participation Program,
- Industrial/Commercial Facilities Control Program,
- Development Planning Program,
- Development Construction Program,
- Public Agency Activities Program, and
- Illicit Connection and Illicit Discharge Elimination Program

In addition, as shown in Table 3-3, all seven Cities sweep residential, commercial, and industrial areas on at least a weekly basis.

4.2.2 Existing Planning for Control Measures

As noted in Section 3.2, the Cities in the Watershed have contributed to the planning for implementation of SB 346 to largely remove copper in brake pads by January 1, 2025, 21 months before

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the final compliance date for the copper TMDL for the Los Cerritos Channel Freshwater Watershed established by USEPA.

The Watershed Group also worked with Regional Water Board staff on the development of a Basin Plan Amendment to add an implementation plan and an implementation schedule for the Los Cerritos Channel TMDL for Metals into the Water Quality Control Plan for the Los Angeles Region. This amendment was adopted by the Regional Water Board on June 6, 2013, and approved by the State Water Board on February 6, 2014.

In addition, the Watershed Group has been discussing the use of the Safer Consumer Product Regulations adopted by the Department of Toxic Substances Control to reduce the zinc content of automobile and truck tires after 2016. The Group has also been reviewing local sources of zinc in preparation for developing local control measures for zinc as part of the first adaptive management review process.

4.3 Minimum Control Measures

The Minimum Control Measures (MCMs) are baseline WCMs required for all Permittees. The MCMs are defined in the MS4 Permit (excluding modifications set forth in an approved WMP) and are generally implemented individually by each Permittee. The objectives of the MCMs are to 1) result in a significant reduction in pollutants discharged into receiving waters and 2) satisfy the requirements of 40 CFR §122.26(d)(2)(iv). The MCMs are separate from enhanced Targeted Control Measures, which are developed by the Watershed Group and included in the WMP to specifically address water quality priorities (WQPs).

The MS4 Permit allows the modification of several MCMs programs, so long as the modified actions are set forth in the approved WMP and are consistent with 40 CFR §122.26(d)(2)(iv). The modifications are based on an assessment to identify opportunities for focusing resources on WQPs. The term “modifications” refers only to instances where language from the MS4 Permit MCM provisions is removed and/or replaced. Any control measures that are strictly enhancements of the existing programs (i.e. do not conflict with the MS4 Permit MCM provisions) are included in the separate category of Targeted WCMs.

The following sections include a summary of the assessment of each MCM program as well as a determination as to whether each Participating Agency will implement the MCM provisions 1) as explicitly stated in the corresponding section of the MS4 Permit or 2) with modifications to focus resources on WQPs. Independent of the determinations made, the agencies may consider additional MCM modifications through the Adaptive Management Process. Implementation of the MCMs will follow the approval of this WMP by the Regional Board Executive Officer following MS4 Permit §VI.D.1.b.

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4.3.1 Los Angeles County Flood Control District Minimum Control Measures

The LACFCD will implement the MCMs as defined from §VI.D.1 to §VI.D.4 of the MS4 Permit.

4.3.2. Assessment of Minimum Control Measures (Cities Only)

Pursuant to MS4 Permit §VI.C.5.b.iv.(1).(a), the following section is an assessment of the MS4 Permit MCMs, intended to identify opportunities for focusing resources on WQPs.

4.3.2.1. Development Construction Program

4.3.2.1.1. Assessment

Although controlling sediment is not a WQP, the reduction of sediment through an effective Development Construction Program will address WQPs. This is because sediment mobilizes other pollutants, including many of the WQP pollutants. As such the Development Construction Program is an integral component of each City's jurisdictional stormwater management program.

Compared to the prior MS4 Permit, the current Permit expands the provisions for the Development Construction Program. This expansion includes additional or enhanced requirements for plan review, site tracking, inspection frequencies, inspection standards, Best Management Practice (BMP) implementation and employee training. If implemented effectively, these enhancements will aid in the control of sediment within the Watershed, and consequently, will address WQPs. As such, no modifications to the provisions of the Development Construction Program have been identified.

4.3.2.1.2. Determination

The Cities will implement the MCMs as defined in §VI.D.8 of the MS4 Permit. To assist the Cities in the development and implementation of a jurisdictional program, a guidance document is included in Attachment C.

4.3.2.2. Industrial/Commercial Facilities Program

4.3.2.2.1. Assessment

The MS4 Permit provisions for the Industrial/Commercial Facilities Program provide opportunities for customization to address WQPs. Specifically, §VI.D.6.e.i.4 states that industrial inspection frequencies may be modified through the WMP development process. The Cities propose modifying the inspection frequencies of both industrial and commercial facilities based on a facility prioritization scheme that considers WQPs. For example, facilities that are deemed to have a high potential to discharge metals (a WQP pollutant) may be prioritized as "High" and inspected more frequently while facilities that have a small likelihood to adversely impact WQPs may be prioritized as "Low" and inspected less frequently.

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4.3.2.2.2 Determination

Sections VI.D.6.d and VI.D.6.d of the MS4 Permit will be replaced with the language in Table 3-2, which is located in the following *New and Enhanced MCMs* section of this chapter and is identified as MCM-ICF-3.

In order to provide clarity to the Cities, one combined guidance document has been prepared for the Program, with the prioritization and revised inspection frequencies included – see Attachment C. The document is also intended to assist the Cities in the development and implementation of a jurisdictional program.

4.3.2.3. Illicit Connection and Illicit Discharges Elimination Program

4.3.2.3.1. Assessment

The purpose of the Illicit Connection and Illicit Discharges Elimination (ICID) Program is to detect, investigate and eliminate IC/IDs to the MS4. In order to address WQPs, a potential modification to MS4 Permit provisions would be the inclusion of a proactive approach for the detection of illicit discharges. However such an approach will be addressed through non-stormwater outfall based screening monitoring as outlined in the MRP. Also, such activities do not conflict with the MS4 Permit provisions for an IC/ID Program, and as such would be classified as a Targeted Control Measure. As such there is no need to modify the base provisions of the program.

4.3.2.3.1 Determination

The Cities will implement the MCMs as defined in §VI.D.10 of the MS4 Permit. To assist the Cities in the development and implementation of a jurisdictional program, a guidance document is included in Attachment C.

4.3.2.4 Planning and Land Development Program

4.3.2.4.1. Assessment

Following MS4 Permit §VI.C.5.b.iv.1.a, the Planning and Land Development Program was not assessed for potential modifications.

4.3.2.4.2. Determination

The Cities will implement the MCMs as defined in §VI.D.7 of the MS4 Permit. To assist the Cities in the development and implementation of a jurisdictional program, a guidance document is included in Attachment C.

4.3.2.5 Public Agency Activities Program

4.3.2.5.1 Assessment

The Public Agency Activities Program is divided into several sub-programs. Many of the MS4 Permit provisions within the sub-programs consist of baseline BMPs that do not suggest modification. The sub-programs that do suggest a prioritized approach – such as street sweeping and catch basin cleaning frequencies – already provide this opportunity (frequencies are based on a City's assessment of trash

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and debris generation). The Public Facility Inventory sub-program also provides a prioritization opportunity, based on the tracking data obtained for each facility. However, since these facilities are not subject to regular "public agency" inspections as in the Industrial/Commercial Facilities Program, there is little utility in incorporating such a prioritization. The provisions of the public construction activities sub-program are considered an integral component of the jurisdictional stormwater program, for the reasons explained in the assessment of the Development Construction Program provisions. In summary there is no need to modify the MS4 Permit provisions of the program.

4.3.2.5.2 Determination

The Cities will implement the MCMs as defined in §VI.D.9 of the MS4 Permit. To assist the Cities in the development and implementation of a jurisdictional program, a guidance document is included in Attachment C.

4.3.2.6 Public Information and Participation Program

4.3.2.6.1 Assessment

The MS4 Permit allows a City to implement the requirements of the Public Information and Participation Program (PIPP) 1) by participating in a County-wide effort, 2) by participating in a Watershed Group effort, 3) individually within its jurisdiction or 4) through a combination of these approaches. The Cities will implement the PIPP following a combination of approaches. Consequently some clarifications of the MS4 Permit provisions are necessary.

In terms of modifications to address WQPs, the MS4 Permit provisions for the PIPP are not particularly prescriptive, thus allowing the Cities the flexibility to focus efforts on WQPs through the development of the program. As such, there is no need to modify the MS4 permit provisions of the program.

4.3.2.6.2 Determination

The table below provides clarification on elements of the MS4 Permit provisions for the PIPP:

Table 4-1:Elements of the PIPP

Permit section	Clarification
§VI.D.5.c.(i) Public Participation	Each City will participate in a County-wide sponsored PIPP to provide a means for public reporting of clogged catch basin inlets and illicit discharges/dumping, faded or missing catch basin labels, and general stormwater and non-stormwater pollution prevention information.
§VI.D.5.d Residential Outreach Program	Each City will work in conjunction with a County-wide sponsored PIPP to implement the Residential Outreach Program. Elements of program that will not be administered or implemented by the County will be addressed individually by each City. Through the adaptive management process, PIPP participation may develop into a watershed group or individual effort, or some combination of these approaches.

In order to provide clarity to the Cities, one combined guidance document has been prepared for the Program, with the approach for each provision (i.e. joint or individual effort) included – see Attachment

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C. The document is also intended to assist the Cities in the development and implementation of a jurisdictional program.

4.3.2.7 Progressive Enforcement and Interagency Coordination

4.3.2.7.1 Assessment

Following MS4 Permit §VI.C.5.b.iv.1.a, the Progressive Enforcement and Interagency Coordination Program was not assessed for potential modifications.

4.3.2.7.2 Determination

The Cities will implement the MCMs as defined in §VI.D.2 of the MS4 Permit. To assist the Cities in the development and implementation of a jurisdictional program, a guidance document is included in Attachment C.

4.3.3 Third Term Permit Minimum Control Measures

Until the WMP is approved by the Executive Officer of the Regional Board, the MCM provisions of the prior third term MS4 permit continue to be implemented by the participating agencies. Some of the MCMs of the current MS4 Permit are relatively unchanged carry-overs from the prior third term permit. The remaining MCMs are either enhancements of the third term MCMs or entirely new provisions. These new and enhanced fourth term MCMs are described in the following section.

4.3.4 New Fourth Term Permit Minimum Control Measures (Cities Only)

Part VI.D of the MS4 Permit (the MCM provisions) introduces many new provisions and program elements to be developed and incorporated within each participating agency's jurisdictional stormwater program. This section briefly describes the new and enhanced MCMs required for the Cities (City MCMs), excluding those required for the LACFCD in §VI.D.4. An MCM is considered new if it was not required by the prior MS4 Permit and is considered enhanced if it is an enhancement of a related provision of the prior MS4 Permit.

The details of each provision may be found in the relevant sections of the MS4 Permit, which are included. Unless an alternate date is provided in the MS4 Permit or in this section, the adoption date for the City MCMs coincides with the approval of the WMP by the Regional Board's Executive Officer.

4.3.4.1 Structural Controls

The new and enhanced MCMs consist primarily of nonstructural control measures, with the marked exception of the Planning and Land Development provisions, described as follows.

LID and Hydromodification

MS4 Permit §VI.D.7

The LID and hydromodification provisions of the Planning and Land Development program are a significant enhancement from the prior MS4 Permit. The implementation of structural LID BMPs at new developments throughout the watershed will appreciably decrease the effective impervious area,

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reducing flow and, consequently, pollutant loads. The program is unique in that it will increase in effectiveness over time as more and more existing developments are redeveloped and bound to the LID/hydromodification requirements.

Trash Excluder Installation

MS4 Permit §VI.D.9.h.vii.(1)

In areas that are not subject to a trash TMDL, the Public Agency Activities Program includes a requirement to install excluders (or equivalent devices) on or in Priority A (see §VI.D.9.h.iii.(1))) area catch basins or outfalls to prevent the discharge of trash to the MS4. For LA MS4 Permittees, the deadline is no later than four years after the effective date of the Permit. This provision may be supplanted by the statewide trash amendments for the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California, which propose the installation of full-capture devices in the high priority land use areas of industrial, commercial, high-density residential and public transportation stations. An official staff report is schedule for midsummer 2014.

4.3.4.2 Nonstructural Controls

Table 4-3 lists the new and enhanced nonstructural City MCMs as well as the new and enhanced NSWD measures. The BMP effectiveness from Table 4-3 is based on similar BMPs listed in Tetra Tech's CLRP for Chollas Creek Watershed in San Diego County, 2012. The correlation of BMP effectiveness with WQPs is based on Table 4-2. The pages following Table 4-3 describe each of the listed controls.

Table 4-2 Pollutant Category versus Water Quality Classification

Waterbody-pollutant classification	Type of pollutant								
	Bacteria	Metals	Organics	Sediment	Pesticides	Nutrients	Oil and grease	Dissolved minerals	Trash
Category 1		✗	✗		✗				
Category 2	✗		✗			✗			✗
Category 3	✗		✗						

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Table 4-3: New Fourth Term MS4 Permit Nonstructural MCMs (Cities only) and NSWDs

#	WCM Category/ID	WCM	BMP effectiveness with respect to WQPs					Agency							
			Category I	Category II	Category III	Sediment reduction	Volume or flow reduction	Bellflower	Cerritos	Downey	Flood Control	Lakewood	Long Beach	Paramount	Signal Hill
		Planning and Land Development													
1	MCM-PLD-1	Amend development regulations to facilitate LID implementation	◈	◆	◆	◆	◆	✗	✗	✗	✗	✗	✗	✗	✗
2	MCM-PLD-2	Post-construction BMP tracking, inspections, and enforcement	◈	◈	◈	◈	◈	✗	✗	✗	✗	✗	✗	✗	✗
		Existing Development													
3	MCM-ICF-1	Increase in facility types inspected and number of inspections conducted	◈	◈	◈	◈	◈	✗	✗	✗	✗	✗	✗	✗	✗
4	MCM-ICF-2	Business assistance program and BMP notification	◈	◈	◈	◈	◈	✗	✗	✗	✗	✗	✗	✗	✗
5	MCM-ICF-3 (TCM-ICF-1)	Prioritize facilities/inspections based on water quality priorities	◈	◈	◈	◈	◈	✗	✗	✗	✗	✗	✗	✗	✗
		Construction													
6	MCM-DC-1	Enhanced plan review program	◈	◈	◈	◆	◈	✗	✗	✗	✗	✗	✗	✗	✗
7	MCM-DC-2	Enhanced inspection standards and BMP requirements	◈	◈	◈	◆	◈	✗	✗	✗	✗	✗	✗	✗	✗

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#	WCM Category/ID	WCM	BMP effectiveness with respect to WQPs					Agency							
			Category I	Category II	Category III	Sediment reduction	Volume or flow reduction	Bellflower	Cerritos	Downey	Flood Control	Lakewood	Long Beach	Paramount	Signal Hill
8	MCM-DC-3	Increased inspection frequencies	◈	◈	◈	◆	◈	✗	✗	✗	✗	✗	✗	✗	✗
9	MCM-TRA-1	Enhanced staff training program	◈	◈	◈	◆	◈	✗	✗	✗	✗	✗	✗	✗	✗
		Illicit Discharge Detection/Elimination													
10	MCM-ICID-1	Enhanced IC/ID enforcement and written procedures	◈	◈	◈	◈	◈	✗	✗	✗	✗	✗	✗	✗	✗
11	NSWD-1	Outfall screening and source investigations	◈	◈	◈	◈	◆	✗	✗	✗	✗	✗	✗	✗	✗
12	MCM-TRA-1	Enhanced staff/contractor training	◈	◈	◈	◈	◈	✗	✗	✗	✗	✗	✗	✗	✗
		Dry weather runoff reduction													
13	NSWD-1	Outfall screening and source investigations	◈	◈	◈	◈	◆	✗	✗	✗	✗	✗	✗	✗	✗
14	NSWD-2	Enhanced conditions for NSWDs, including irrigation reduction	◆	◆	◆	◆	◆	✗	✗	✗	✗	✗	✗	✗	✗
		Public Information and Participation													
15	MCM-PIP-1	Stormwater resources on City website	◈	◈	◈	◈	◈	✗	✗	✗	✗	✗	✗	✗	✗

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#	WCM Category/ID	WCM	BMP effectiveness with respect to WQPs					Agency							
			Category I	Category II	Category III	Sediment reduction	Volume or flow reduction	Bellflower	Cerritos	Downey	Flood Control	Lakewood	Long Beach	Paramount	Signal Hill
		Public Agency Activities													
16	MCM-PAA-1	Enhanced BMP requirements for fixed facility/field activities	◈	◈	◈	◈	◈	✗	✗	✗	✗	✗	✗	✗	✗
17	MCM-PAA-2	Reprioritization of catch basins and clean-out frequencies	◆	◈	◈	◆	◇	✗	✗	✗	✗	✗	✗	✗	✗
18	MCM-PAA-3	Integrated Pest Management Program	◈	◈	◈	◇	◇	✗	✗	✗	✗	✗	✗	✗	✗
19	MCM-PAA-4	Enhanced measures to control infiltration from sanitary sewers	◇	◆	◆	◇	◇	✗	✗	✗	✗	✗	✗	✗	✗
20	MCM-PAA-5	Inspection and maintenance of Permittee owned treatment controls	◈	◈	◈	◈	◈	✗	✗	✗	✗	✗	✗	✗	✗
21	MCM-TRA-1	Enhanced inspector/staff training	◈	◈	◈	◈	◈	✗	✗	✗	✗	✗	✗	✗	✗

✗ – To be implemented by agency within current MS4 Permit term. MCM – Minimum Control Measure. NSWD – Non-stormwater discharge measure.

◆ Primary pollutant reduction ◈ Secondary pollutant reduction ◇ Pollutant not addressed

BMP effectiveness ratings based on similar BMPs listed in Tetra Tech's CLRP for Chollas Creek Watershed in San Diego County, 2012.

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Enhanced Staff/Contractor Training Programs MCM-TRA-1

MS4 Permit §VI.D.7.d.iv.(b), §VI.D.8.l, §VI.D.9.k, §VI.D.10.f

Measures introduced:

- Prescriptive staff training requirements to the Development Construction, Illicit Connections and Illicit Discharges Elimination and Public Agency Activities Programs. For example, relevant staff involved with the Construction Program must be knowledgeable in procedures consistent with the State Water Board sponsored Qualified SWPPP Practitioner/Developer (QSP/QSD) program.
- Inspections of structural BMPs under the Planning and Land Development Program must be conducted by trained personnel.
- Outside contractors are bound to the same training standards as in-house staff

These new and enhanced provisions will increase the overall effectiveness of the Jurisdictional Stormwater Management Programs (JSWMPs).

Amend Development Regulations to Facilitate LID Implementation MCM-PLD-1

MS4 Permit §VI.C.4.c.i, §VI.D.7.d.i

The participating agencies have developed and adopted LID ordinances and Green Street Policies. These measures will facilitate LID implementation.

Post-Construction BMP Tracking, Inspections, and Enforcement MCM-PLD-2

MS4 Permit: §VI.D.7.d.iv

The Cities must track post-construction BMPs, conduct BMP verification and maintenance inspections and follow the Progressive Enforcement Policy in cases of non-compliance. This will improve the effectiveness of the Planning and Land Development program.

Increase in Facility Types Inspected and Number of Inspections Conducted MCM-IFC-1

MS4 Permit: §VI.D.6.d, §VI.D.6.e, also affected by NPDES No. CAS000001, the State Water Resources Control Board's (SWRCB) Industrial General Permit (IGP)

Measures introduced:

- Inspect nurseries and nursery centers
- Perform follow-up *No Exposure Verification* inspections for at least 25% of industries that have filed a *No Exposure Certification (NEC)*
- Inspect light industrial facilities. Under the SWRCB's IGP adopted in April 1, 2014, light industries previously excluded from coverage under the IGP must now obtain coverage. Light industry is defined as SICs 20, 21, 22, 23, 2434, 25, 265, 267, 27, 283, 285, 30, 31 (except 311), 323, 34 (except 3441), 35, 36, 37 (except 373), 38, 39 and 4221-4225. This includes facilities ubiquitous in industrial zones such as warehouses and machine shops. Although many of these facilities will

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likely qualify for the NEC, the type and number of facilities requiring inspection under the MS4 Permit will still increase.

These new and enhanced measures will increase the effectiveness of the Industrial/Commercial Facilities Program.

Business Assistance Program and BMP Notification MCM-IFC-2

MS4 Permit: §VI.D.6.c

Measures introduced:

- Notify industrial/commercial owner/operators of applicable BMP requirements.
- Implement a Business Assistance Program to provide technical information to businesses to facilitate their efforts to reduce the discharge of pollutants in stormwater. The business assistance program described in the prior LA MS4 Permit was an optional provision.

These new and enhanced measures will increase the effectiveness of the Industrial/Commercial Facilities Program.

Prioritize Facilities/Inspections Based on Water Quality Priorities MCM-IFC-3 (TCM-ICF-1)

MS4 Permit: Modified MCM (replaces §VI.D.6.d, §VI.D.6.e)

A program has been developed to prioritize industrial/commercial facilities based on their potential to adversely impact WQPs. The resulting prioritization scheme determines the inspection frequency, replacing the uniform inspection frequency provided in the MS4 Permit. This allows Cities to concentrate efforts on WQPs. Sections VI.D.6.d and VI.D.6.e of the MS4 Permit will be replaced with the language presented in Table 3-3.

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Table 4-4

Replaces §VI.D.6.d and §VI.D.6.e of the MS4 Permit

VI.D.6.d Prioritize Critical Industrial/Commercial Sources

VI.D.6.d.i Prioritization Method

Prioritizing facilities by potential water quality impact provides an opportunity to optimize the effectiveness of the Industrial/Commercial Facilities Program and to focus efforts on water quality priorities. The inventory fields in Part VI.D.6.b.ii provide information that allows for such a facility prioritization. Based on these fields, Figure ICF-1 establishes a method for each City to prioritize all industrial/commercial facilities into three tiers – High, Medium and Low. A City may follow an alternative prioritization method provided it results in a similar three-tiered scheme.

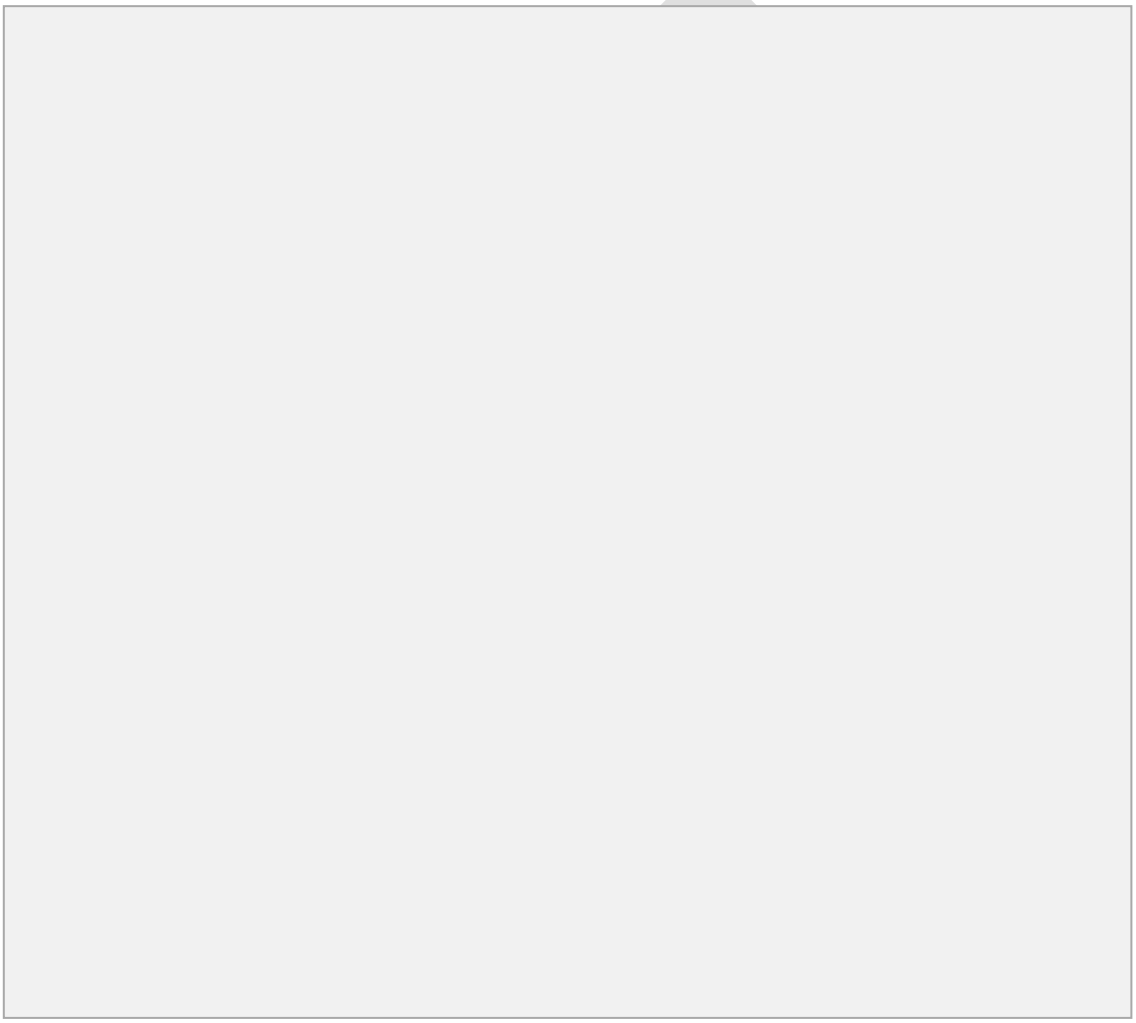

Figure ICF-1: Industrial/Commercial Facility Prioritization Scheme

Step 3 in Figure ICF-1 may also be expressed by the relationships $A \cdot B + C \geq 1 \rightarrow$ High, $1 > A \cdot B + C > 0 \rightarrow$ Medium and $A \cdot B + C = 0 \rightarrow$ Low. The purpose of multiplying A and B is to scale the impact of the presence of the pollutants at a facility (B) by the likelihood that they will be discharged to the MS4 (A). Factor C quantifies water quality concerns

[1] CWA §303(d) listed or subject to a TMDL

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Table 4-4

Replaces §VI.D.6.d and §VI.D.6.e of the MS4 Permit

that are independent of A or B and as such is incorporated through addition. The purpose of this numerical approach is to provide consistency to the prioritization process. It is intended solely as a guide. The City may also prioritize facilities based on a qualitative assessment of factors A, B and C as listed in Figure ICF-1.

VI.D.6.d.i.(1) Prioritization Condition

The following condition will be met during the prioritization process: ***The total number of low priority facilities is less than or equal to 3 times the number of high priority facilities***. This condition is applied to maintain a minimum inspection frequency as explained in Section VI.D.6.e.i.

VI.D.6.d.i.(2) Prioritization Frequency

The default priority for a facility is Medium. Prioritization and reprioritization may be conducted at any time based on the discretion of the City. Figure ICF-2 is a flowchart of the prioritization process.

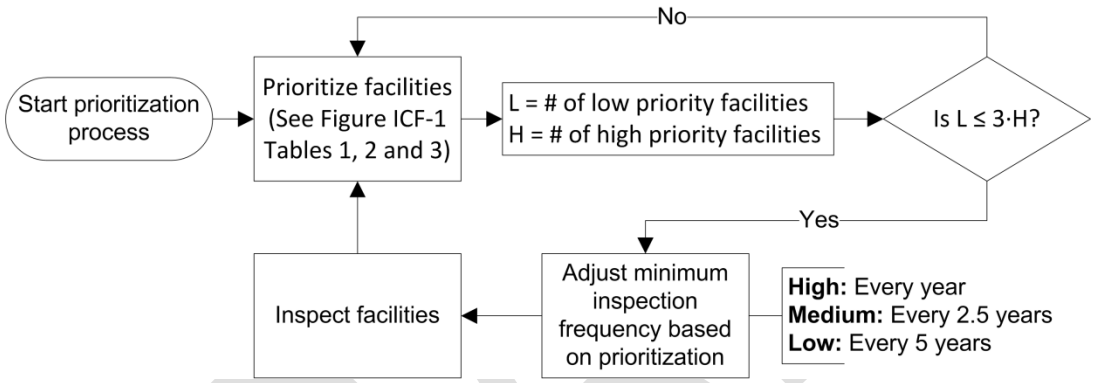

Figure ICF-2

VI.D.6.e Inspect Critical Industrial/Commercial Sources

VI.D.6.e.i Frequency of Industrial/Commercial Inspections

Following the facility prioritization method in Part VI.D.6.d.i, each City will inspect high priority facilities annually, medium priority facilities semi-quinquennially (once every 2.5 years) and low priority facilities quinquennially (once every five years). The frequencies may be altered by the exclusions defined in Part VI.D.6.e.i.(1). The condition in Part VI.D.6.d.i.(1) ensures at least the same average number of inspections conducted per year as the semi-quinquennial frequency defined in the MS4 Permit.

Each City will conduct the first compliance inspection for all industrial/commercial facilities within one year of the approval of the WMP. A minimum interval of 6 months between the first and the second mandatory compliance inspection is required.

VI.D.6.e.i.(1) Exclusions to the Frequency of Industrial Inspections

VI.D.6.e.i.(1).(a) Exclusion of Facilities Previously Inspected by the Regional Water Board

Each City will review the State Water Board's Stormwater Multiple Application and Report Tracking System (SMARTS) database at defined intervals to determine if an industrial facility has recently been inspected by the Regional Water Board. The first interval will occur approximately 2 years after the effective date of the Order. The City does not need to inspect the facility if it is determined that the Regional Water Board conducted an inspection of the facility within the prior 24 month period. The second interval will occur approximately 4 years after the effective date of the Order. Likewise, the City does not need to inspect the facility if it is determined that the Regional Water Board conducted an inspection of the facility within the prior 24 month period.

Table 4-4

Replaces §VI.D.6.d and §VI.D.6.e of the MS4 Permit

VI.D.6.e.i.(1).(b) No Exposure Verification

As a component of the first mandatory inspection, each City will identify those facilities that have filed a No Exposure Certification with the State Water Board. Approximately 3 to 4 years after the effective date of the Order, each City will evaluate its inventory of industrial facilities and perform a second mandatory compliance inspection at a minimum of 25% of the facilities identified to have filed a No Exposure Certification. The purpose of this inspection is to verify the continuity of the no exposure status.

VI.D.6.e.ii Scope of Industrial/Commercial Inspections

VI.D.6.e.ii.(1) Scope of Commercial Inspections

Each City will inspect all commercial facilities to confirm that stormwater and non-stormwater BMPs are being effectively implemented in compliance with municipal ordinances. At each facility, inspectors will verify that the operator is implementing effective source control BMPs for each corresponding activity. Each City will require implementation of additional BMPs where stormwater from the MS4 discharges to a significant ecological area (SEA), a water body subject to TMDL provisions in Part VI.E, or a CWA §303(d) listed impaired water body. Likewise, for those BMPs that are not adequately protective of water quality standards, a City may require additional site-specific controls.

VI.D.6.e.ii.(2) Scope of Industrial Inspections

Each City will confirm that each industrial facility:

a) Has a current Waste Discharge Identification (WDID) number for coverage under the Industrial General Permit, and that a Stormwater Pollution Prevention Plan (SWPPP) is available on-site; or
b) Has applied for, and has received a current No Exposure Certification for facilities subject to this requirement;
c) Is effectively implementing BMPs in compliance with municipal ordinances. Facilities must implement the source control BMPs identified in Table 10, unless the pollutant generating activity does not occur. The Cities will require implementation of additional BMPs where stormwater from the MS4 discharges to a water body subject to TMDL Provisions in Part VI.E, or a CWA §303(d) listed impaired water body. Likewise, if the specified BMPs are not adequately protective of water quality standards, a City may require additional site-specific controls. For critical sources that discharge to MS4s that discharge to SEAs, each City will require operators to implement additional pollutant-specific controls to reduce pollutants in stormwater runoff that are causing or contributing to exceedances of water quality standards.
d) Applicable industrial facilities identified as not having either a current WDID or No Exposure Certification will be notified that they must obtain coverage under the Industrial General Permit and will be referred to the Regional Water Board per the Progressive Enforcement Policy procedures identified in Part VI.D.2.

Enhanced Plan Review Program

MCM-DC-1

MS4 Permit: §VI.D.8.h, §VI.D.8.i

In general the MS4 Permit introduces provisions that conform to the SWRCB's Construction General Permit. For construction sites one acre or greater, measures include the following:

- Construction activity operators must submit Erosion and Sediment Control Plans (ESCPs) prior to grading permit issuance, developed and certified by a QSD to SWPPP standards.
- Operators must propose minimum BMPs that meet technical standards. The cities must provide these standards.

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- Develop procedures and checklists to review and approve relevant construction plans.

These new and enhanced measures will increase the effectiveness of the Development Construction Program, which in turn is expected to reduce TSS loading into the MS4. TSS reduction is an integral component in addressing WQPs.

Enhanced Inspection Standards/BMP Requirements at Construction Sites MCM-DC-2

MS4 Permit: §VI.D.8.d, §VI.D.8.i, §VI.D.8.j

Measures introduced:

- Ensure BMPs from the ESCPs are properly installed and maintained.
- Ensure the minimum BMPs for sites less than one acre are installed and maintained.
- Develop and implement standard operating procedures for City stormwater inspections of construction sites.
- Require activity-specific BMPs for paving projects.

These new and enhanced measures will increase the effectiveness of the Development Construction Program, which in turn is expected to reduce TSS loading into the MS4. TSS reduction is an integral component in addressing WQPs.

Increased Inspection Frequencies MCM-DC-3

MS4 Permit: §VI.D.8.j

The inspection frequency for construction sites one acre or more has significantly increased. The prior LA MS4 Permit required a minimum of one inspection during the rainy season. The current MS4 Permit requires monthly inspections year-round, as well as mandatory inspections based on the phase of construction. This enhanced measure will increase the effectiveness of the Development Construction Program, which in turn is expected to reduce TSS loading into the MS4. TSS reduction is an integral component in addressing WQPs.

Enhanced IC/ID Enforcement and Written Program Procedures MCM-ICID-1

MS4 Permit: §VI.D.2, §VI.D.10

Measures introduced:

- Develop and implement a Progressive Enforcement Policy that applies to the IC/ID Elimination, Development Construction, Planning and Land Development and Industrial/Commercial Facilities Programs. The Progressive Enforcement Policy is an augmentation of the policy listed in the prior LA MS4 Permit, which was restricted to the Industrial/Commercial Facilities Program.
- Maintain written procedures for receiving complaints, conducting investigations and responding to spills.

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These new and enhanced measures will increase the effectiveness of the IC/ID Elimination program, as well as the related enforcement components of the Development Construction, Planning and Land Development and Industrial/Commercial Facilities Programs.

Stormwater Resources on City Website MCM-PIP-1

MS4 Permit: §VI.D.5.d.i.(4)

Measures introduced:

- The MS4 Permit introduces a requirement to maintain a stormwater webpage or provide links to stormwater websites via the City's website. The website (in-house or linked) will include:
    - Educational material and
    - Opportunities for the public to participate in stormwater pollution prevention and clean-up activities.

Enhanced BMP Requirements for Fixed Facility/Field Activities MCM-PAA-1

MS4 Permit: §VI.D.9.e

Measures introduced:

- Implement effective source control BMPs for 65 specific pollutant-generating activities such as mudjacking, shoulder grading and spall repair.
- Contractually require hired contractors to implement and maintain the activity specific BMPs. Conduct oversight of contractor activities to ensure the BMPs are implemented and maintained.

These new and enhanced measures will increase the effectiveness of the Public Agency Activities program.

Reprioritization of Catch Basins and Clean-Out Frequencies MCM-PAA-2

MS4 Permit: §VI.D.9.h.iii

In areas not subject to a trash TMDL, measures introduced include the following:

- Determine priority areas and update the map of catch basins with GPS coordinates and priority.
- Include the rationale or data to support the priority designations.

These new and enhanced measures will increase the effectiveness of the Public Agency Activities program.

Integrated Pest Management Program MCM-PAA-3

MS4 Permit: §VI.D.9.g

The MS4 Permit introduces entirely new, prescriptive requirements to implement an Integrated Pest Management (IPM) Program for public agency activities and at public facilities. These requirements include adopting and verifiably implementing policies, procedures and/or ordinances that support the IPM program. Intertwined with the IPM provisions are additional requirements to control and minimize

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the use of fertilizers. These new and expansive measures will increase the effectiveness of the Public Agency Activities program and address WQPs.

Enhanced Measures to Control Infiltration from Sanitary Sewers MCM-PAA-4

MS4 Permit: §VI.D.9.ix

The MS4 Permit introduces specific requirements to control infiltration from the sanitary sewer into the MS4. The measures include adequate plan checking, preventative maintenance, spill response, enforcement, interagency coordination and staff/contractor education. The requirements may be fulfilled through implementation of a Sewer System Management Plan in accordance with the Statewide General Waste Discharge Requirements for Sanitary Sewer Systems.

Inspection and Maintenance of Permittee-Owned Treatment Controls MCM-PAA-5

MS4 Permit: §VI.D.9.x

The MS4 Permit introduces requirements to implement an inspection and maintenance program for all Permittee owned treatment control BMPs, including post-construction treatment control BMPs. This measure will increase the effectiveness of the Public Agency Activities program.

4.4 Non-Stormwater Discharge Control Measures

4.4.1 Non-Structural Control Measures

Section 3.3 discusses the Watershed's overall runoff reduction strategy. The principal non-stormwater control measure being implemented in the Watershed is water conservation. Many of the municipal water conservation programs within the Watershed were stimulated by the approval of AB 1881, the Water Conservation in Landscaping Act, in 2006. The current drought has provided additional incentive to conserve water. The results of water conservation programs within the watershed are now seen in dry-weather monitoring at the Stearns Street monitoring site above the discharge point from the freshwater channel into the Estuary at Atherton Street in Long Beach. The average dry-weather flow at Stearns Street was estimated in the Metals TMDLs to be 2.35 cfs based on sampling during the 2001-2009 time frame. Current data indicates that average dry-weather flows are less than 0.5 cfs.

The second non-structural measure implemented within the Watershed is improved irrigation practices to reduce the amount of water used and the discharge of excess water to the storm drain system. Continued improvements by municipalities and education of residents and businesses should further reduce non-stormwater discharges.

In addition, the Industrial/Commercial Facilities Inspection Program and the Construction Site Inspection Program will be used to reduce non-stormwater discharges.

4.4.2 Structural Control Measures

Physically modifying irrigation systems to substitute sub-surface irrigation for surface irrigation and realigning spray leads to prevent overspray onto sidewalks and streets will be implemented over time at

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public facilities, as funding becomes available. In addition, residents and businesses will be encouraged to make similar improvements to further reduce non-stormwater discharges.

4.5 TMDL Control Measures

4.5.1 Non-Structural Control Measures

Since the only TMDLs currently applicable to the Los Cerritos Channel are the Metals TMDLs established by USEPA and the Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters Toxic Pollutants TMDL adopted by the Regional Water Board, the TMDL non-structural control measures implemented in and for the Watershed will relate to metals and legacy organics. As noted in Section 3, these measures will emphasize source control and TSS reduction.

The two metals requiring reductions according to the Los Cerritos Channel Metals TMDLs are copper and zinc. There is also a TMDL for lead. However, after review and replication of a translator study, EPA concluded that no further lead reductions are required. The majority of copper reduction is anticipated to come from implementation of SB 346, which requires the reduction in most brake pads sold in California to 5% copper in 2021 and 0.5% in 2025. Additional local non-structural control such as regulating copper roofs, cooper roof gutters, downspouts, and copper-based algaecides may also be necessary in the future.

Reduction of zinc discharges to the receiving waters is also likely to involve non-structural measures. As discussed in Section 3 and above in Section 4.2.2, the Watershed Group is planning to work with others to use the Department of Toxic Substances Control's Safer Consumer Product Regulations to reduce the zinc in tires, one of the greatest sources of zinc in the metropolitan area. The Permittees may also find it necessary to adopt ordinances to regulate local sources of zinc, including the widespread outdoor use of galvanized metal, another major source of zinc.

In addition, the Watershed Group is monitoring the research related to the potential of reducing lead in aviation gasoline, or Avgas, that is used in piston engine aircraft, primarily general aviation aircraft. USEPA has estimated that approximately 50% of lead in metropolitan atmospheric deposition comes from Avgas. A reduction of lead in Avgas could result in a further reduction of lead in the Los Cerritos Channel Watershed because the City of Long Beach is home to many general aviation aircraft.

Implementation of the TSS reduction strategy discussed in Section 3.0 will involve both non-structural and structural measures. The non-structural measures are likely to be ordinances that require landscaping, erosion control, and sediment control on vacant lots and other significant sources of exposed dirt. There will also likely be agreements developed between Cities and electrical utilities regarding erosion and sediment control in transmission line rights-of-way.

4.5.2 Structural Control Measures

The initial structural measures to control TMDL pollutants are anticipated to be water capture measures, including green streets, LID, and stormwater capture and infiltrate or use facilities that will also capture

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non-stormwater discharges. As noted in Section 3.5, the implementation of green streets and LID projects will generally be dependent on the initiation and completion of redevelopment projects and road construction projects in the largely built-out Watershed. Completion of major water capture and use projects, with infiltration when feasible, will be dependent on available funding. The Watershed Group has identified 13 first order (Highest Priority) sites for such projects in public parks and golf courses, plus eight second order sites in utility easements. These sites are listed in Tables 4-5 and 4-6 and shown in Figures 4-1 and 4-2. As noted in Section 3.5, the Watershed Group has identified the first six sites to be addressed and will be pursuing funding to complete initial designs for three of these sites in preparation for seeking grant funding. Assuming an average capacity of eight acre-feet (AF), the Watershed Group anticipated that the first 13 water capture and use projects could have a total stormwater capture capacity of 104 AF and the second eight could add another 64 AF of stormwater capture, if they can be constructed underground within the transmission line rights-of-way. The need for additional centralized water capture will be evaluated through the adaptive management process.

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Table 4-5: Potential Los Cerritos Channel Watershed First Order Major BMP Sites

(Public Park and Golf Courses)

No.	Name	Latitude	Longitude	WMMS Sub-watershed	Sub-basin
1	Potential Progress Park BMP Site (Paramount)	33.892402°	-118.150910°	5523	SB 9
2	Potential Bike Trail @ Clark Ave BMP Site (Bellflower)	33.890138°	-118.133766°	5518	SB 8
3	Potential Sims Park BMP Site (Bellflower)	33.883770°	-118.133772°	5517	SB 8
4	Potential Mayfair Park BMP Site (Lakewood)	33.857028°	-118.132101°	5517	SB 10
5	Potential Caruthers Park BMP Site (Bellflower)	33.878452°	-118.111056°	5507	SB 10
6	Potential Heartwell Park Palo Verde Channel BMP Site (Long Beach)	33.830487°	-118.108951°	5505	SB 10
7	Potential Long Beach Junior Golf Course BMP Site (Long Beach)	33.830422°	-118.104780°	5505	SB 10
8	Potential Heartwell Park Clark Channel BMP Site (Long Beach)	33.830761°	-118.129573°	5514	SB 7
9	Potential Pan American Park BMP Site (Long Beach)	33.842283°	-118.131496°	5514	SB 7
10	Potential Skylinks Wardlow Channel BMP Site (Long Beach)	33.822990°	-118.135062°	5515	SB 6
11	Potential Wardlow Park BMP Site (Long Beach)	33.821295°	-118.129327°	5511	SB 5

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12	Potential Skylinks LCC BMP Site (Long Beach)	33.812905°	-118.138772°	5509	SB 4
13	Potential Reservoir Park BMP Site (Signal Hill)	33.818430°	-118.174593°	5510	SB 4

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Table 4-6: Potential Los Cerritos Channel Watershed Second Order Major BMP Sites

(Transmission Rights-of-Way)

No.	Name	Latitude	Longitude	WMMS Sub-watershed	Sub-basin
1	Potential Transmission R-O-W BMP Site (Paramount)	33.899399°	-118.152599°	5524	SB 9
2	Potential Transmission R-O-W BMP Site [Dunbar/Mayne]	33.886455°	-118.147181°	5519	SB 8/9 (Bellflower)
3	Potential Transmission R-O-W BMP Site [South of Paramount on Downey Ave.] (Bellflower)	33.879384°	-118.151030°	5523	SB 9
4	Potential Transmission R-O-W BMP Site [East of Clark Ave.]	33.868742°	-118.133477°	5517	SB 8 (Lakewood)
5	Potential Transmission R-O-W BMP Site [East of Lakewood Blvd.] (Lakewood)	33.868338°	-118.141666°	5517	SB 8
6	Potential Transmission R-O-W BMP Site [West of Community Gardens]	33.854136°	-118.113120°	5507	SB 10 (Lakewood)
7	Potential Transmission R-O-W BMP Site [Candlewood East of Woodruff] (Lakewood)	33.852845°	-118.114556°	5506	SB 10
8	Potential Transmission R-O-W [West of Palo Verde Channel] (Lakewood)	33.849443°	-118.109604°	5506	SB 10

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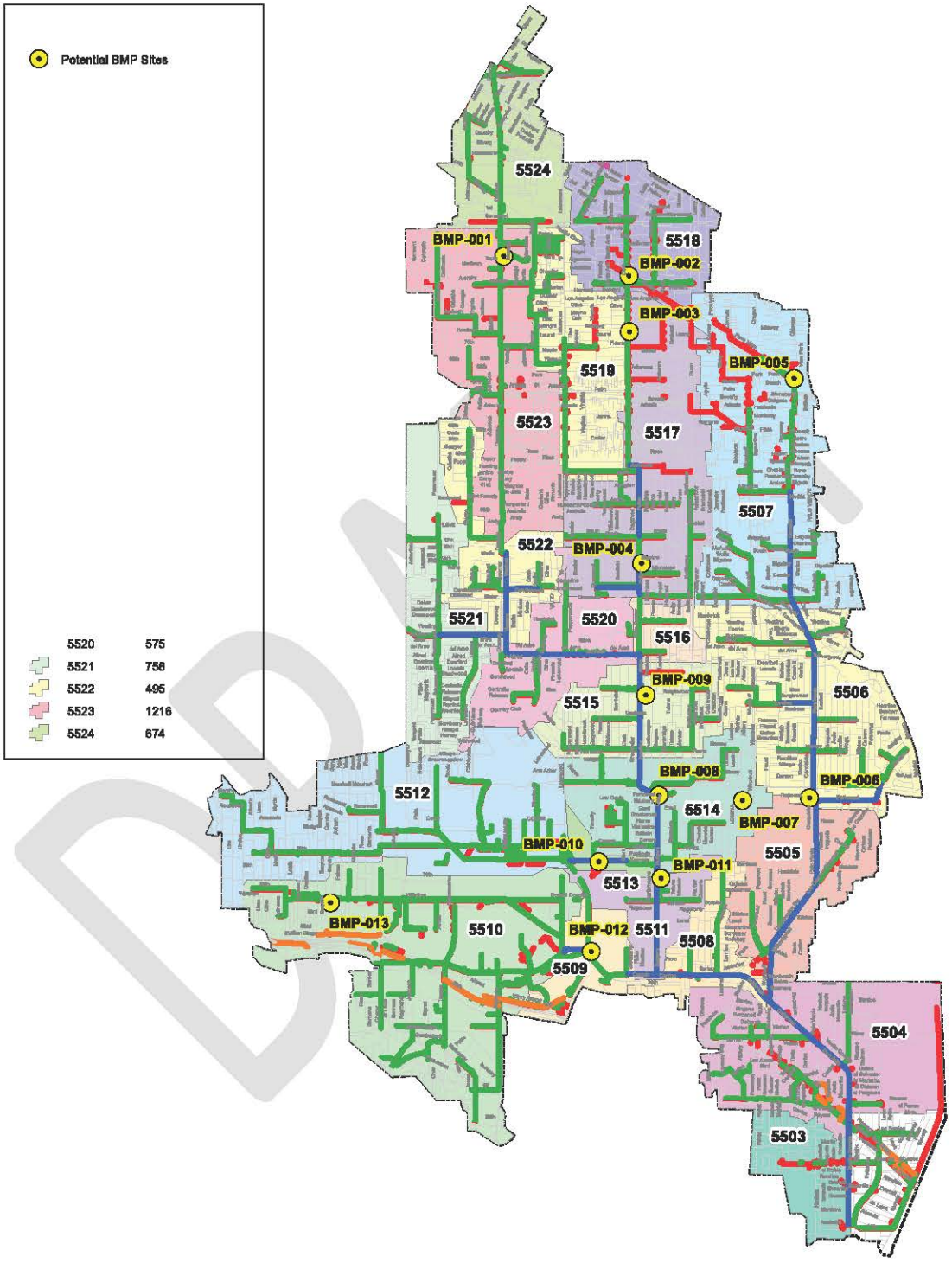

Figure 4-1: LCC Potential Public Parks and Golf Course BMP Sites

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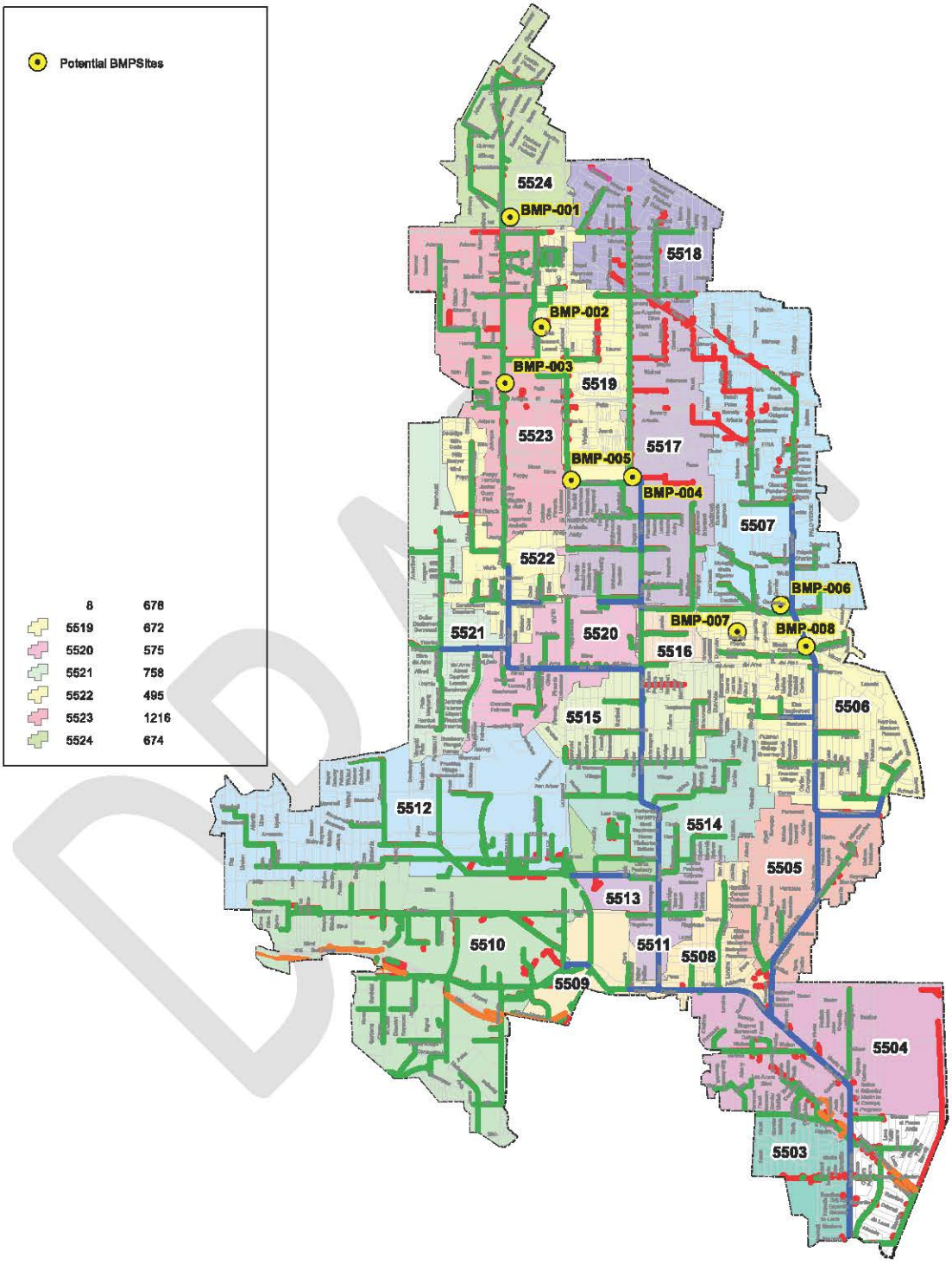

Figure 4-2: LCC Potential Transmission ROW BMP Sites

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4.6 Non-TMDL Impaired Waters Control Measures

4.6.1 Non-Structural Control Measures

The non-structural control measures implemented to address non-TMDL impaired waters will focus on implementation of minimum control measures, particularly commercial/industrial inspections, construction inspections, business outreach, and residential outreach. In addition, the Watershed Group will monitor and support, where appropriate, extended producer responsibility and packaging reductions proposed by the California Product Stewardship Council. Future bacteria control measures will be evaluated through the adaptive management process.

4.6.2 Structural Control Measures

The primary structural measures to control trash will be installation of full capture devices in priority land use areas pursuant to the State Water Board trash amendments when they are adopted. The Watershed Group proposes to work with the Regional Water Board regarding the requirements in Order Part VI.D.9.h.vii(1) related to installation of trash excluders in light of the proposed trash amendments. Future bacteria control measures will be enacted through the adaptive management process.

4.7 Control Measures for Non-Impairment Pollutants

4.7.1 Non-Structural Control Measures

The non-structural control measures to be implemented to control non-impairment pollutants consist primarily of TSS reduction and the full range of minimum control measures, especially the inspection and outreach measures. The Watershed Group will also emphasize true source control and operational source control to reduce the release of potential pollutants. The Group will also monitor and support, when appropriate, extended producer responsibility, including take-back measures that will reduce the probability of pollutant releases.

4.7.2 Structural Control Measures

The Watershed Group is not proposing any special structural control measures to address non-impairment pollutants. Rather, it will depend on LID, green streets, stormwater capture, and other structural measures implemented to address TMDL and non-TMDL requirements to also help control non-impairment pollutants indicated by monitoring results.

4.8 Control Measures To Be Implemented at the Watershed and Sub-Watershed Levels

4.8.1 Non-Structural Control Measures

The non-structural control measures being implemented at the Watershed and sub-watershed scales involve the development of model ordinances, support for true source control and operational source

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control measures, coordination of business outreach and residential outreach, and preliminary design of proto-type water-capture facilities.

4.8.2 Structural Control Measures

Structural measures to be implemented at the Watershed and sub-watershed scales will likely include water capture devices. These will likely be sub-watershed projects developed pursuant to specific MOUs between the benefitting agencies. If a regional or sub-regional stormwater fee is established, construction of Watershed and/or subwatershed projects will become much more feasible. However, Memoranda of Understanding would be required to determine the allocation of benefits and agreement on funding.

4.9 Control Measures To Be Implemented at the Jurisdictional Level

4.9.1 Non-Structural Control Measures

Individual jurisdictions within the Watershed will be responsible for implementation of minimum control measures. They will also be responsible for model ordinances and adopting appropriate targeted implementation ordinances, such as ordinances to implement the TSS Reduction Strategy. In addition, they will be asked to support source control measures such as extended producer responsibility, when appropriate, and to comment on proposed legislation and/or regulations.

4.9.2 Structural Control Measures

Individual jurisdictions will be responsible for installation and maintenance of green streets and LID measures. They may also construct water capture and water treatment facilities when grants are available or sustainable stormwater fee measures have been implemented.

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5.0 Compliance with Receiving Water Limitations

This section explains how the Watershed Group thinks it will come into compliance with receiving water limitations. Additional information on how compliance can be achieved through stormwater capture is contained in the Reasonable Assurance Analysis (RAA) prepared for the Lower Los Angeles River, the Los Cerritos Channel, and the Lower San Gabriel River Watersheds. This RAA is described in Section 8 and found in Attachment A.

5.1 Compliance with Receiving Water Limitations Addressed by a TMDL

5.1.1 Copper

The Los Cerritos Channel TMDL for copper contains interim compliance dates of September 30, 2017, September 30, 2020, and September 30, 2023, as well as a final compliance date of September 30, 2026, for both dry weather and wet weather. Current monitoring indicates that the Watershed has already achieved compliance with water quality standards for copper during dry weather, most likely due to the recent large reduction in dry-weather discharges from 2.35 cfs to less than 0.5 cfs.

The wet-weather compliance date for 2017 requires that 10% of the total drainage area served by the storm drain system effectively meets the wet-weather WLAs. The RAA prepared by Tetra Tech with the assistance of Paradigm Environmental indicates that the Watershed will meet the 2017 interim milestone through implementation of non-structural control measures, including the targeted total suspended solids (TSS) reduction program. The Watershed Group will demonstrate this reduction either by a 10% reduction between 2012/2013 loadings and the wet-weather WLAs as measured at the Stearns Street monitoring site or by monitoring results demonstrating that a sub-basin containing 10% or more of the drainage area served by the storm drain system meets the wet weather WLAs for copper. For September 30, 2020, during the next 5-year permit cycle, the requirement is that 35% of the total drainage area served by the storm drain system effectively meet the wet-weather WLAs. The Watershed Group expects this to be met by the cumulative impacts of implementation of SB 346, implementation of the TSS reduction strategy, implementation of green streets and LID, and implementation of stormwater capture and infiltrate and/or use projects, enhanced street-sweeping, and continued implementation of minimum control measures. These same measures will result in compliance with the 2023 interim milestone and the 2026 final compliance requirements.

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5.1.2 Lead

The Los Cerritos Channel Lead TMDL requires no reduction in lead loads. It requires only maintenance of existing conditions to ensure that freshwater quality for lead does not degrade below current levels and to ensure that lead levels in downstream sediments do not increase in the future.

5.1.3 Zinc

There is no dry-weather TMDL for zinc.

The wet-weather compliance date for 2017 requires that 10% of the total drainage area served by the storm drain system effectively meets the wet-weather WLAs. The RAA prepared by Tetra Tech with the assistance of Paradigm Environmental indicates that the Watershed will meet the 2017 interim milestone through implementation of non-structural control measures, including the targeted TSS reduction program. The Watershed Group will demonstrate this reduction either by a 10% reduction between 2012/2013 loadings and the wet-weather WLAs as measured at the Stearns Street monitoring site or by monitoring results demonstrating that a sub-basin containing 10% or more of the drainage area served by the storm drain system meets the wet weather WLA for zinc. For September 30, 2020, during the next 5-year permit cycle, the requirement is that 35% of the total drainage area served by the storm drain system effectively meet the wet-weather WLAs. The Watershed Group expects this to be met by cumulative impacts of implementation of the TSS reduction strategy, implementation of green streets and LID, and implementation of stormwater capture and infiltrate and/or use projects, enhanced street-sweeping, and continued implementation of minimum control measures. In addition, the Watershed Group proposes to work with CASQA to petition the Department of Toxic Substances Control to regulate zinc in tires through the Safer Consumer Product Regulations that became effective October 1, 2013. These same measures will result in compliance with the 2023 interim milestone and the 2026 final compliance requirements.

The cities will also be addressing multiple local sources of zinc, particularly galvanized metal, which is almost ubiquitous in the urban environment.

5.1.4 Harbor Toxics TMDL

The Greater Harbor Toxics TMDL includes requirements to reduce copper, lead, zinc, DDT, PCBs, chlordane, PAHs, and sediment toxicity. All of these pollutants will be addressed by measures implemented to address metals in the Los Cerritos Channel since three are the same metals in the Los Cerritos Channel Metals TMDLs, four are legacy organics that will also be addressed by the measures to address metals in the Los Cerritos Channel, and the last one is a condition produced by the other pollutants. All of the pollutants adhere to sediment, which is the focus of the TSS Reduction Strategy.

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5.2 Compliance with Receiving Water Limitations Not Otherwise Addressed by a TMDL.

5.2.1 Impairment Pollutants in the Same Class as Those Addressed in a TMDL

Although coliform bacteria and enterococcus are weakly associated with sediment, the Watershed Group has concluded that none of the Category 2 or Category 3 pollutants are in the same class as those pollutants addressed by a TMDL.

5.2.2 Impairment Pollutants Not in the Same Class as Those Addressed in a TMDL

This WMP addresses five impairment pollutants not in the same class as those addressed in a TMDL. These are the Category 2 pollutants ammonia, bis(2-ethylhexyl)phthalate (DEHP), coliform bacteria, trash, and pH. Ammonia is proposed for delisting, and the Watershed Group does not propose to address it at this time. (See Section 2 for more details.)

Bis(2-ethylhexyl)phthalate is a plasticizer associated with plastic trash so it will be addressed with trash. The Watershed Group proposes to address trash through the process outlined in the State Water Board's proposed trash amendments to the California Ocean Plan and the Inland Surface Waters, Enclosed Bays, and Estuaries Plan. Once the State Water Board adopts these amendments, this WMP will be amended to specify how the Watershed will meet trash and DEHP water quality standards. This may happen while the Regional Board is reviewing the Draft WMP or while the Watershed Group is responding to comments in the Draft WMP by Regional Water Board staff.

The 303(d) list includes coliform bacteria (now *E. coli*), which will be partially addressed by runoff reduction and stormwater capture. It will also be addressed by ongoing implementation of several of the minimum control measures. The Watershed Group proposes to address bacteria more directly during the second and third adaptive management reviews after members have had a chance to review the effectiveness of runoff reduction and ongoing implementation of minimum control measures on *E. coli* counts in the receiving waters. The Group will then evaluate the potential need for low-flow diversion and alternative measures. The last impairment is a condition – not a pollutant. It is a pH exceedance associated with shallow water flowing over a concrete surface and sunshine. It is a natural dry-weather condition. The Watershed Group would like to work with Regional Water Board staff on a way to delist pH since it is a natural condition – not a pollutant.

5.2.3 Non-Impairment Pollutants

The only Category 3 pollutants included in this WMP are MBAS and enterococcus. Enterococcus is not a freshwater problem. It is included in the WMP because the principal monitoring site for

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the Watershed (Stearns Street) is located just upstream of the saline Los Cerritos Channel Estuary. It will be addressed in the same manner as *E. coli* is addressed.

5.3 Total Suspended Solids Reduction Quantification

Although expected pollutant reductions resulting from the TSS reduction program are not modeled empirically within WMMS, a rudimentary quantification of the program's potential effectiveness may be calculated through the application of the Revised Universal Soil Loss Equation (RUSLE). The RUSLE is defined as

$$\boldsymbol{A = RKLS}$$

where

- □= Spatially and temporally averaged soil loss per unit area per unit time. The result is expressed in the units elected for □ and □.
- □= Rainfall-runoff erosivity factor (per unit time, generally one year),
- □= Soil erodibility factor (mass per unit area – an area density – generally tons per acre),
- □= Slope length factor and
- □= Slope steepness factor.

Using local values of $\boldsymbol{R}$, $\boldsymbol{K}$ and $\boldsymbol{LS}$ obtained through maps available on the State Water Resources Control Board's website for the Construction General Permit[1],

$$\boldsymbol{R \approx 40\ year^{-1}}$$
$$\boldsymbol{K \approx 0.32\ \frac{tons}{acre}}$$ and
$$\boldsymbol{LS \approx 0.45}$$

giving

$$\boldsymbol{A = \left(40\ year^{-1}\right)\left(0.32\ \frac{tons}{acre}\right)0.45}$$
$$\boldsymbol{A = 5.76\ \frac{tons}{acre\ year}}.$$

Following the CGP Risk assessment procedures, 5.76 tons per acre year is within the "low sediment risk" designation.

During the cooperative preparation of the Lower San Gabriel River, Lower Los Angeles River and Los Cerritos Channel WMPs, several participating agencies provided estimates of exposed soil within their jurisdiction that were not related to construction activities. The City of Bellflower

[1] http://www.waterboards.ca.gov/water_issues/programs/stormwater/constpermits.shtml

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field-verified these estimates which totaled approximately 18 acres or about 0.5% of the City. Following the calculated value for □, this equates to approximately 100 tons of soil loss per year. The City of Signal Hill derived an exposed-soil percentage one order of magnitude larger than Bellflower (5.5%) – however this is an anomalous circumstance specific to the City. Applying the 5.5% to Signal Hill (531 acres) and extrapolating the 0.5% to the remaining area of the Los Cerritos Channel Watershed (17,179 acres), the soil loss tonnage is

$$\boldsymbol{M_{TSS} = fWA = (0.005 \cdot 17,179\ acres + 0.055 \cdot 531\ acres)\left(5.76\ \frac{tons}{acre\ year}\right)}$$

$$\boldsymbol{M_{TSS} \approx 115\ \text{acres}\left(5.76\ \frac{tons}{acre\ year}\right)}$$

$$\boldsymbol{M_{TSS} \approx 663\ \frac{tons}{acre\ year}}$$

where

$\boldsymbol{M_{TSS}} =$ Estimated annual soil loss within the watershed in tons,
$\boldsymbol{f} =$ Estimated fraction of exposed soil (non-construction) within a given urbanized area and
$\boldsymbol{W} =$ Watershed area.

Historical monitoring results from the watershed suggest that approximately 1.8 grams of zinc adheres to every kilogram of TSS, so that the zinc discharge $\boldsymbol{M_{Zn}}$ associated with $\boldsymbol{M_{TSS}}$ is

$$\boldsymbol{M_{Zn} \approx \left(\frac{1.8}{1000}\right) M_{TSS}}$$

$$\boldsymbol{M_{Zn} \approx \left(\frac{1.8}{1000}\right)\left(663\ \frac{tons}{year}\right)\left(\frac{2000\ lbs}{1\ ton}\right)}$$

$$\boldsymbol{M_{Zn} \approx 2,400\ \frac{lbs}{year}\ or\ 1,100\ \frac{kg}{year}.}$$

Assuming that within the term of the MS4 Permits the TSS reduction program approaches an effectiveness goal of 10%, at this time the reduction would equate to 110 kg/year. An effectiveness of 20% equates to a reduction of 220 kg/year and 30% would be 330 kg/year. Reductions of this magnitude for zinc (and other metals) will significantly aid in the achievement of the applicable WQBLs and RWLs of the MS4 Permit.

Draft

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6.0 Implementation Schedules

Formal implementation of the Los Cerritos Channel WMP will begin upon approval of the final program plan pursuant to Table 9 of Order No. R4-2012-0175. For planning purposes, the Watershed Group is projecting final plan approval by March or April of 2015. The schedule provides for commencing monitoring on July 1, 2015 as starting monitoring part way through a complete monitoring year or missing the first storms of the year would not be productive. The implementation schedule is strongly influenced by TMDL final wet-weather compliance dates and target dates for Category 2 and Category 3 pollutants, the Watershed Group's Water Quality Improvement Strategy, and the need to establish a stable and sustainable stormwater funding source in Los Angeles County to pay for the expensive stormwater capture and stormwater treatment facilities anticipated to be necessary to meet water quality standards in a timely manner.

The overall implementation schedule for the Los Cerritos Channel Watershed Management Program is based, in part, on the implementation schedule in the Los Cerritos Channel Metals TMDLs and the Greater Harbor Toxics TMDLs. For other pollutants, the implementation schedules are based on the schedules for TMDLs in other watersheds. Final wet-weather compliance target dates for Category 1, 2, and 3 pollutants are shown in Table 6-1 as well as tables, 2-9, 2-10, 2-11, and 2-12 in Section 2. Interim milestone targets occurring between July 1, 2014 and December 28, 2022 are shown in Table 6-2.

Table 6-1: Final Compliance Dates for Category 1, 2, and 3 Pollutants

Date	Target
September 2025	Target compliance date for trash and Bis(2-ethylhexyl)phthalate and MBAS
September 2026	Final compliance date for LCC Metals TMDLs
March 2032	Final compliance date for Harbor Toxics TMDL
September 2040	Target compliance date for coliform bacteria and enterrococcus

Table 6-2: Interim Milestone Targets Between December 28, 2012 and December 28, 2017

Date	Target
March 23, 2017	Greater Harbor Responsible Parties complete Phase I of Implementation Plan and Sediment Management Plan
September 30, 2017	For the LCC Metals TMDLs, 30% of the drainage area served by storm drain system effectively meeting dry-weather WLAs and 10% of drainage area served by storm drain system meeting wet-weather WLAs or equivalent redirections in total loads at Stearns Street monitoring site.

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September 30, 2017	Installation of full-capture trash control devices serving 10% of the high priority land uses in the watershed to address trash and Bis(2-ethylhexyl)phthalate
September 30, 2017	10% of the watershed meeting Basin Plan standard of 0.5 mg/l for MBAS

Part VI.C.5.c provides guidance for inclusion of implementation schedules into the WMP. Compliance schedules for TMDLs are to be incorporated into the program schedule. Compliance schedules and interim milestone dates are to be used to measure progress toward addressing the highest water quality priorities and achieving applicable water quality-based effluent limitations. Schedules must be adequate to measure progress on a watershed scale every two years as part of an adaptive management process. Schedules are to be developed for the strategies, control measures, and BMPs to be implemented by each Permittee within its jurisdiction and for those that will be implemented by multiple Permittees on a watershed scale. The current schedule focuses on regional projects to be implemented on a watershed scale and on municipal roles in planning and implementing these projects. Schedules for jurisdictional projects will be added to the schedules during adaptive management review as cities plan and program implementation of green streets, LID, and other local projects.

The initial schedule contained in this WMP covers a 25-year period and is structured into eight three-year phases and a two-year phase. These schedules assume a 2015 start date and are based on an anticipated 5-year permit renewal cycle. Table 3 is an implementation summary for the period 2015 through 2040. The table summarizes information for Phases 1-4 (2015-2026) and a schedule for planning Phases 5-9 (2027-2040). It shows the interim milestone and final compliance dates for the metals TMDLs as well as anticipated interim milestone and final compliance dates for the State Water Board's trash amendments. At this time it contains only one compliance date for the Greater Harbor Toxics TMDL. The Watershed Group will review data from the Greater Harbor Regional Monitoring Coalition monitoring of East San Pedro Bay during the first two adaptive management reviews to develop a schedule, if needed, for measures to address Greater Harbor Toxics TMDL pollutants not already addressed.

DRAFT

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Table 6-3
Summary WMP Implementation Schedule[1]

2015-2017 Phase 1 (See Tables 6-4 and 6-8)[2]

Fall 2014 – Anticipated Adoption of Trash Amendment

Winter 2015 – Anticipated Effective Date of Trash Amendment

Winter 2016 – Anticipated Interim Trash Amendment Milestone

Winter 2017 – Anticipated Interim Trash Amendment Milestone

March 23, 2017 – Completion of Phase I of Implementation Plan and Sediment Management Plan for Greater Harbor Toxics TMDL

June 28, 2017 – Report of Waste Discharge (ROWD) Due

September 30, 2017 – Interim Metals TMDL Milestone

2018-2020 Phase 2 (See Tables 6-3 and 6-7)[1, 2]

Winter 2018 – Anticipated Interim Trash Amendment Milestone

Winter 2019 – Anticipated Interim Trash Amendment Milestone

Winter 2020 – Anticipated Interim Trash Amendment Milestone

September 30, 2020 – Interim Metals TMDL Milestone

2021-2023 Phase 3 (See Tables 6-4 and 6-8)[3]

Winter 2021 – Anticipated Interim Trash Amendment Milestone

Winter 2022 – Anticipated Interim Trash Amendment Milestone

June 2022 – Anticipated ROWD Due Date

Winter 2023 – Anticipated Interim Trash Amendment Milestone

September 30, 2023 – Interim Metals TMDLs Milestone

[1] Schedule based on 5-year permit renewal schedule
[2] Phases 1 and 2 are detailed as action plans subject to availability of funds for construction of green streets and stormwater capture devices.
[3] Phase 3 will be converted to an action plan as part of a 2017 Report of Waste Discharge (ROWD).

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2024-2026 Phase 4 (See Tables 6-5 and 6-9)[4]

Winter 2024 – Anticipated Interim Trash Amendment Milestone

Winter 2025 – Anticipated Interim Trash Amendment Final Compliance Date

June 2026 – Anticipated ROWD Due Date

September 30, 2026 – Final Metals TMDLs Compliance Date

2027-2029 Phase 5 (To Be Planned During Phase 3)[5]

2030–2032 Phase 6 (To Be Planned During Phase 4)[6]

2033-2035 Phase 7 (To Be Planned During Phase 5)[7]

2036-2038 Phase 8 (To Be Planned in Phase 6)[8]

2039-2040 Phase 9 (To Be Planned in Phase 7)[9]

Tables 6-4 through 6-7 provide more information about activities during phases 1-4 (2015-2026). They demonstrate the progressive implementation of the WMP, beginning with planning and ordinance development and moving to design and construction, subject to the availability of funding. The schedule for phases 2-4 will be reviewed and refined during the first adaptive management review.

[4] Phase 4 will be converted to an action plan as part of the expected 2022 ROWD.
[5] Phase 5 will be converted to an action plan as part of the expected 2022 ROWD.
[6] Phase 6 will be converted to an action plan as part of the expected 2027 ROWD.
[7] Phase 7 will be converted to an action plan as part of the expected 2032 ROWD.
[8] Phase 8 will be converted to an action plan as part of the expected 2032 ROWD.
[9] Phase 9 will be converted to an action plan as part of the expected 2037 ROWD.

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Table 6-4
WMP Implementation Schedule
Phase 1 (2015-2017)

Minimum Control Measures (Ongoing)

- Public Information and Participation Program
- Industrial/Commercial Facilities Control Program[1]
- Development of Planning Program
- Development of Controls Program
- Public Agencies Activities Program
- Illicit Connection and Illicit Discharge Elimination Program
- Preparation of a targeted industrial inspection component for metals by City of Paramount

True Source Control and Operational Source Control[1] (Ongoing)
(Emphasis on Category 1 pollutants)

- Implementation of SB 346
- Implementation of SB 757
- Development and Implementation of Safer Consumer Products Regulations
- Monitoring of USEPA Proposed Rulemaking to further reduce or remove lead from aviation gasoline
- Monitoring of California Product Stewardship Council Proposals, especially for Extended Producer Responsibility and other true source control measures
- Outreach to industries potentially contributing zinc to Watershed by all municipalities to encourage control of non-industrial process source of zinc.

TSS Reduction (Soil Stabilization/Sediment Control)[1]

- Preparation of model ordinance or ordinances by the City of Signal Hill to reduce TSS within the Watershed (2014-2015)
- Adoption of model TSS reduction ordinances by City of Signal Hill (2015)
- Implementation of model TSS reduction ordinance(s) by City of Signal Hill (2015-2017)
- Consideration of possible adoption of TSS reduction ordinances by other Cities within the Watershed (2015-2016)
- Consideration and possible adoption of parking lot sweeping ordinances by Cities within Watershed (2015-2016)
- Implementation of TSS reduction ordinances by other Cities that have adopted them (2016-2017)
- Enhanced erosion and sediment control at construction sites (ongoing)
- Stabilization of exposed soil not associated with construction sites (ongoing)
- Enhanced street sweeping.
- Enhanced parking lot sweeping (2016-2017)

[1] Refer to Table 6-8 for implementation by sub-basin.

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Runoff Reduction and Stormwater Capture[1]

- Jurisdictional planning for green streets (ongoing)
- Development of prototype design of biofiltration and infiltration chamber for streets with wider parkways by City of Lakewood (2015)
- Development of prototype design of biofiltration and infiltration changes for streets with narrow parkways by City of Paramount (2015)
- Development of concept plan for stormwater capture device at Caruthers Park by the City of Bellflower (2015)
- Development of concept plan for stormwater capture project at Mayfair Park by Cities of Lakewood and Paramount (2015)
- Development of concept plan for stormwater project at Skylinks Golf Course by Cities of Long Beach and Signal Hill (2015)
- Development of a process for allocating costs to design and construct regional stormwater capture projects
- Support State legislation to resolve liability issues raised by school administrators in order to facilitate construction of water capture facilities under school athletic fields and playgrounds (2015-2016)
- Encourage Cities and water purveyors to work together to implement stormwater capture and use or infiltration facilities consistent with the *Griffith v. Pajaro Valley Water Management Agency* decision by the Court of Appeals, Sixth Appellate District
- Construction of initial stormwater capture facility, if funding available (2017)
- Encourage the use of permeable pavements in parking lots
- Encourage the use of cisterns and rain barrels to reduce the discharge of roof stormwater runoff

Trash Reduction and Control[1]

- Watershed Group coordination with California Product Stewardship Council to reduce trash through reduction of packing materials and implementation of take-back programs (ongoing)
- Development and implementation of trash control measures pursuant to trash amendments adopted by State Water Board by all cities in Watershed (2015-2017)
- Inventory by Cities in Watershed of catch basins in high priority land use areas pursuant to Trash Amendments adopted by State Water Board (2015)[2]
- Installation of full capture systems by Cities in 10% of catch basins serving high priority land use areas within the Watershed, subject to the availability of funding (2016)[2]
- Installation of full capture systems by Cities in 20% of catch basins serving high priority land use areas within the Watershed, subject to the availability of funding (2017)[2]
- Research regarding grant opportunities by Watershed Group to pay for installation of full capture systems for high priority land use areas (ongoing)

Treatment Control

[2] Presuming adoption of trash amendments by State Water Board in fall of 2014.

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- Installation of two tree box filters by the City of Downey, funded partially through a Proposition 84 grant received by the Gateway Water Management Agency (2015)
- Installation of two tree box filters by City of Signal Hill, partially funded by a Proposition 84 grant received by the Gateway Water Management Agency (2015)

Stormwater Financing

- Encourage California Contract Cities and League of California Cities, Los Angeles County Division to organize as recommended in the Stormwater Funding Options report to secure sustainable water quality funding in Los Angeles County.
- Improve public education and outreach by Watershed Cities to inform residents, businesses, and others about stormwater program requirements and funding issues.
- Encourage State legislature to adopt a "per tire" zinc control fee with monies made available to local government to construct stormwater capture and/or treatment control facilities to reduce the discharge of zinc to receiving waters
- Encourage inclusion of money for stormwater quality management in State water bonds and transportation bond measures
- Encourage Cities to support adoption of a regional stormwater fee

Priority Sub-basin Targets[3]

Targets	Acreage[4]	% LCC Watershed[3]
Sub-basin 4	2,270.6	12.80
Sub-basin 8	2,711.8	15.30
Sub-basin 10	3,403.1	19.20
		47.30

[3] See Figure 1-3 and Attachment B. Special attention given to control measures serving priority sub-basins during this phase.
[4] Based on EPA TMDL acreages that include Caltrans and County acreages

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Table 6-5
WMP Implementation Schedule
Phase 2 (2018-2020)

Minimum Control Measures (Ongoing)

- Public Information and Participation Program
- Industrial/Commercial Facilities Control Program[1]
- Development Planning Program
- Development Controls Program
- Public Agencies Activities Program
- Illicit Connection and Illicit Discharge Elimination Program

True Source Control and Operational Source Control[2] (Ongoing)
(Emphasis on Category 1 pollutants)

- Implementation of SB 346
- Implementation of SB 757
- Implementation of Safer Consumer Products Regulations to reduce zinc in tires
- Monitoring of USEPA Rulemaking to further reduce or remove lead from aviation gasoline
- Monitoring of California Product Stewardship Council Proposals, especially for Extended Producer Responsibility and other true source control measures
- Outreach to industries potentially contributing zinc to Watershed by all municipalities to encourage control of non-industrial process source of zinc.
- Outreach to restaurants and markets to encourage control of potential sources of bacteria
- Outreach to pet owners to clean up after their pets to reduce sources of bacteria

TSS Reduction (Soil Stabilization/Sediment Control)[2]

- Implementation of TSS reduction ordinance(s) by Cities in Watershed (ongoing)
- Implementation of parking lot sweeping ordinances by Cities in Watershed
- Implementation of agreements with electric utilities regarding control of sediment from their transmission line rights-of-way
- Enhanced erosion and sediment control at construction sites (ongoing)
- Stabilization of exposed soil not associated with construction sites (ongoing)
- Enhanced street sweeping (ongoing)
- Enhanced parking lot sweeping (ongoing)

Runoff Reduction and Stormwater Capture[2]

- Jurisdictional planning for green streets (ongoing)
- Implementation of biofiltration and infiltration chambers for streets with wider parkways by Cities, subject to availability of funding
- Implementation of biofiltration and infiltration chambers for streets with narrow parkways by Cities, subject to availability of funding

[1] Initial emphasis on facilities that are probable metals and trash sources.
[2] Refer to Table 6-8 for implementation by sub-basin.

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- Implementation of stormwater capture device at Caruthers Park by the City of Bellflower, subject to availability of funding
- Implementation of stormwater capture project at Mayfair Park by Cities of Lakewood, Bellflower, and Paramount, subject to availability of funding
- Implementation of stormwater project at Skylinks Golf Course by Cities of Long Beach and Signal Hill, subject to availability of funding
- Development of concept plan for stormwater capture at Heartwell Park by Watershed Group
- Development of concept plan for stormwater capture at Heartwell Park by Cities of Bellflower and Lakewood
- Development of concept plan for stormwater capture at Skylinks Golf Course by City of Long Beach
- Encourage Cities and water purveyors to work together to implement stormwater capture and use or infiltration facilities consistent with the *Griffith v. Pajaro Valley Water Management Agency* decision by the Court of Appeals, Sixth Appellate District
- Encourage the use of permeable pavements in parking lots
- Encourage the use of cisterns and rain barrels to reduce the discharge of roof stormwater runoff

Trash Reduction and Control

- Watershed Group coordination with California Product Stewardship Council to reduce trash through reduction of packing materials and implementation of take-back programs (ongoing)
- Installation of full capture systems by Cities in 30% of catch basins serving high priority land use areas within the Watershed, subject to the availability of funding (2018)[3]
- Installation of full capture systems by Cities in 40% of catch basins serving high priority land use areas within the Watershed, subject to the availability of funding (2019)[3]
- Installation of full capture systems by Cities in 50% of catch basins serving high priority land use areas within the Watershed, subject to the availability of funding (2020)[3]
- Research regarding grant opportunities by Watershed Group to pay for full capture devices for catch basins in high priority land use areas (ongoing)

Stormwater Financing

- To Be Determined

Priority Sub-basin Targets[4]

Targets	Acreage[5]	% LCC Watershed[3]
Sub-basin 4	2,270.6	12.80
Sub-basin 7	1,359.7	7.68
Sub-basin 8	2,711.8	15.30
Sub-basin 9	3,709.3	20.90
Sub-basin 10	3,403.1	19.20
		65.88

[3] Presuming adoption of trash amendments by State Water Board in fall of 2014.
[4] See Figure 1-3 and Attachment B. Special attention given to control measures serving priority sub-basins during this phase.
[5] Based on EPA TMDL acreages that include Caltrans and County acreages

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Table 6-6
WMP Implementation Schedule
Phase 3 (2021-2023) Tentative Plan

Minimum Control Measures (Ongoing)

- Public Information and Participation Program
- Industrial/Commercial Facilities Control Program[1]
- Development Planning Program
- Development Controls Program
- Public Agencies Activities Program
- Illicit Connection and Illicit Discharge Elimination Program

True Source Control and Operational Source Control[2] (Ongoing)
(Emphasis on Category 1 pollutants)

- Implementation of SB 346
- Implementation of SB 757
- Implementation of Safer Consumer Products Regulations to reduce zinc in tires
- Monitoring of USEPA Rulemaking to further reduce or remove lead from aviation gasoline
- Monitoring of California Product Stewardship Council Proposals, especially for Extended Producer Responsibility and other true source control measures
- Outreach to industries potentially contributing zinc to Watershed by all municipalities to encourage control of non-industrial process source of zinc.
- Outreach to restaurants and markets to encourage control of potential sources of bacteria
- Outreach to pet owners to clean up after their pets to reduce sources of bacteria

TSS Reduction (Soil Stabilization/Sediment Control)[2]

- Implementation of TSS reduction ordinance(s) by Cities in Watershed (ongoing)
- Implementation of parking lot sweeping ordinances by Cities in Watershed
- Implementation of agreements with electric utilities regarding control of sediment from their transmission line rights-of-way
- Enhanced erosion and sediment control at construction sites (ongoing)
- Stabilization of exposed soil not associated with construction sites (ongoing)
- Enhanced street sweeping (ongoing)
- Enhanced parking lot sweeping (ongoing)

Runoff Reduction and Stormwater Capture[2]

- Jurisdictional planning for green streets (ongoing)
- Implementation of biofiltration and infiltration chambers for streets with wider parkways by Cities, subject to availability of funding
- Implementation of biofiltration and infiltration chambers for streets with narrow parkways by Cities, subject to availability of funding

[1] Initial emphasis on facilities that are probable metals and trash sources.
[2] Refer to Table 6-8 for implementation by sub-basin.

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- Implementation of stormwater capture device at Skylinks Golf Course by the City of Signal Hill, subject to availability of funding
- Implementation of stormwater capture project at Heartwell Park by Watershed Group, subject to availability of funding
- Implementation of stormwater project at Heartwell Park by Cities of Bellflower and Lakewood, subject to availability of funding
- Development of concept plan for stormwater capture at Reservoir Park by City of Signal Hill
- Development of concept plan for stormwater capture at Progress Park by City of Paramount
- Development of concept plan for stormwater capture at Wardlow Park by City of Long Beach
- Encourage Cities and water purveyors to work together to implement stormwater capture and use or infiltration facilities consistent with the *Griffith v. Pajaro Valley Water Management Agency* decision by the Court of Appeals, Sixth Appellate District
- Encourage the use of permeable pavements in parking lots
- Encourage the use of cisterns and rain barrels to reduce the discharge of roof stormwater runoff

Trash Reduction and Control

- Watershed Group coordination with California Product Stewardship Council to reduce trash through reduction of packing materials and implementation of take-back programs (ongoing)
- Installation of full capture systems by Cities in 60% of catch basins serving high priority land use areas within the Watershed, subject to the availability of funding (2021)[3]
- Installation of full capture systems by Cities in 70% of catch basins serving high priority land use areas within the Watershed, subject to the availability of funding (2022)[3]
- Installation of full capture systems by Cities in 80% of catch basins serving high priority land use areas within the Watershed, subject to the availability of funding (2023)[3]
- Research regarding grant opportunities by Watershed Group to pay for installation of full capture systems for catch basins in high priority land use areas (ongoing)

Stormwater Financing

- To Be Determined

Priority Sub-basin Targets[4]

Targets	Acreage[5]	% LCC Watershed[3]
Sub-basin 5	331.6	1.87
Sub-basin 6	1,663.7	9.39
Sub-basin 7	1,359.7	7.68
Sub-basin 9	3,709.3	20.90
		39.84

[3] Presuming adoption of trash amendments by State Water Board in fall of 2014.

[4] See Figure 1-3 and Attachment B Special attention given to control measures serving priority sub-basins during this phase.

[5] Based on EPA TMDL acreages that include Caltrans and County acreages

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Table 6-7
WMP Implementation Schedule
Phase 4 (2024-2026) Tentative Plan

Minimum Control Measures (Ongoing)

- Public Information and Participation Program
- Industrial/Commercial Facilities Control Program[1]
- Development Planning Program
- Development Controls Program
- Public Agencies Activities Program
- Illicit Connection and Illicit Discharge Elimination Program

True Source Control and Operational Source Control[2] (Ongoing)
(Emphasis on Category 1 pollutants)

- Implementation of SB 346
- Implementation of SB 757
- Implementation of Safer Consumer Products Regulations to reduce zinc in tires
- Implementation of USEPA Rulemaking to further reduce or remove lead from aviation gasoline
- Monitoring of California Product Stewardship Council Proposals, especially for Extended Producer Responsibility and other true source control measures (ongoing)
- Outreach to industries potentially contributing zinc to Watershed by all municipalities to encourage control of non-industrial process source of zinc. (ongoing)
- Outreach to restaurants and markets to encourage control of potential sources of bacteria (ongoing)
- Outreach to pet owners to clean up after their pets to reduce sources of bacteria (ongoing)

TSS Reduction (Soil Stabilization/Sediment Control)[2]

- Implementation of TSS reduction ordinance(s) by Cities in Watershed (ongoing)
- Implementation of parking lot sweeping ordinances by Cities in Watershed
- Implementation of agreements with electric utilities regarding control of sediment from their transmission line rights-of-way
- Enhanced erosion and sediment control at construction sites (ongoing)
- Stabilization of exposed soil not associated with construction sites (ongoing)
- Enhanced street sweeping (ongoing)
- Enhanced parking lot sweeping (ongoing)

Runoff Reduction and Stormwater Capture[2]

- Jurisdictional implementation for green streets
- Implementation of biofiltration and infiltration chambers for streets with wider parkways by Cities, subject to availability of funding
- Implementation of biofiltration and infiltration chambers for streets with narrow parkways by Cities, subject to availability of funding

[1] Initial emphasis on facilities that are probable metals and trash sources.
[2] Refer to Table 6-8 for implementation by sub-basin.

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- Implementation of stormwater capture device at Reservoir Park by the City of Signal Hill, subject to availability of funding
- Implementation of stormwater capture project at Progress Park by City of Paramount, subject to availability of funding
- Implementation of stormwater project at Wardlow Park by City of Long Beach, subject to availability of funding
- Development of concept plan for stormwater capture facility at Sims Park by City of Bellflower
- Development of concept plan for stormwater capture facility at Pan American Park by City of Long Beach
- Development of concept plan for stormwater capture facility at Long Beach Junior Golf Course by City of Long Beach
- Encourage Cities and water purveyors to work together to implement stormwater capture and use or infiltration facilities consistent with the *Griffith v. Pajaro Valley Water Management Agency* decision by the Court of Appeals, Sixth Appellate District (ongoing)
- Encourage the use of permeable pavements in parking lots (ongoing)
- Encourage the use of cisterns and rain barrels to reduce the discharge of roof stormwater runoff (ongoing)

Trash Reduction and Control

- Watershed Group coordination with California Product Stewardship Council to reduce trash through reduction of packing materials and implementation of take-back programs (ongoing)
- Installation of full capture systems by Cities in 90% of catch basins serving high priority land use areas within the Watershed, subject to the availability of funding (2024)[3]
- Installation of full capture systems by Cities in 100% of catch basins serving high priority land use areas within the Watershed, subject to the availability of funding (2025)[3]
- Research regarding grant opportunities by Watershed Group to pay for installation of full capture systems for catch basins in high priority land use areas (ongoing)

Stormwater Financing

- To Be Determined

Priority Sub-basin Targets[4]

Targets	Acreage[5]	% LCC Watershed[3]
Sub-basin 1	719.6	4.06
Sub-basin 2	1,241.1	7.00
Sub-basin 3	305.0	1.72
Sub-basin 5	331.6	1.87
Sub-basin 6	1,663.7	9.39
		24.04

[3] Presuming adoption of trash amendments by State Water Board in fall of 2014.

[4] See Figure 1-3 and Attachment B. Special attention given to control measures serving priority sub-basins during this phase.

[5] Based on EPA TMDL acreages that include Caltrans and County acreages

RB-AR7273

Table 6-8

Sub-Basin Implementation Measures

Target Sub-basin	Acreage	True Source Control BMPs	Runoff Reduction	Operational Source Ctrl BMPs	Sediment Control	Treatment Ctrl BMPs
Sub-basin 1 [Phase 4] (2024-2026)	719.6 ac (4.06% of LCC watershed)	Copper reduction through implementation of SB 346 Lead reduction through implementation of SB 757 Lead reduction through implementation of EPA Rulemaking to further reduce or remove lead from aviation gasoline Zinc reduction through implementation of Safer Consumer Product Alternatives regulations	Reduction of landscape irrigation runoff through implementation of AB 1881 Seek grants for construction of capture and infiltration/use structural BMPs Promote installation of cisterns and rain barrels Installation of green street measures at key locations Seek grants for LID retrofit projects Promote use of porous pavement & distributed capture and infiltration structural BMPs	Outreach to priority industries identified as having high probability of generating copper, lead, or zinc, trucking companies, facilities with large parking lots, and automotive repair facilities to encourage implementation of cover and containment BMPs. Promote coating of exposed galvanized metal Implement requirements for coated galvanized metal for use when exposed	Enhanced street sweeping with vacuum and regenerative sweepers[1] Enhanced erosion and sediment control at construction sites Stabilization of exposed soils not associated with construction sites Implementation of TSS Reduction Ordinances Implementation of Parking Lot Sweeping Ordinances	Distributed LID measures associated with development projects Installation of green street measures at key locations Installation of full capture systems in catch basins in high priority land use areas Others to be determined

[1] Potential Measure; the City of Long Beach is not currently using regenerative or vacuum sweepers

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Target Sub-basin	Acreage	True Source Control BMPs	Runoff Reduction	Operational Source Ctrl BMPs	Sediment Control	Treatment Ctrl BMPs
Sub-basin 2 [Phase 2] (2024-2026)	1,241.1 ac (7% of LCC watershed)	Copper reduction through implementation of SB 346 Lead reduction through implementation of SB 757 Lead reduction through implementation of EPA Rulemaking to further reduce or remove lead from aviation gasoline Zinc reduction through implementation of Safer Consumer Product Alternatives regulations	Reduction of landscape irrigation runoff through implementation of AB 1881 Seek grants for construction of capture and infiltration/use structural BMPs Promote installation of cisterns and rain barrels Installation of green street measures at key locations Seek grants for LID retrofit projects Promote use of porous pavement & distributed capture and infiltration structural BMPs	Outreach to priority industries identified as having high probability of generating copper, lead, or zinc, trucking companies, facilities with large parking lots, and automotive repair facilities to encourage implementation of cover and containment BMPs Promote coating of exposed galvanized metal Implement requirements for coated galvanized metal for use when exposed	Enhanced street sweeping with vacuum and regenerative sweepers[1] Enhanced erosion and sediment control at construction sites Stabilization of exposed soils not associated with construction sites Implementation of TSS Reduction Ordinances Implementation of Parking Lot Sweeping Ordinances	Distributed LID measures associated with development projects Installation of green street measures at key locations Installation of full capture systems in catch basins in high priority land use areas Others to be determined

[1] Potential Measure; the City of Long Beach is not currently using regenerative or vacuum sweepers

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Target Sub-basin	Acreage	True Source Control BMPs	Runoff Reduction	Operational Source Ctrl BMPs	Sediment Control	Treatment Ctrl BMPs
Sub-basin 3 [Phase 4] (2024-2026)	305 ac (1.72% of LCC watershed)	Copper reduction through implementation of SB 346 Lead reduction through implementation of SB 757 Lead reduction through implementation of EPA Rulemaking to further reduce or remove lead from aviation gasoline Zinc reduction through implementation of Safer Consumer Product Alternatives regulations	Reduction of landscape irrigation runoff through implementation of AB 1881 Seek grants for construction of capture and infiltration/use structural BMPs Promote installation of cisterns and rain barrels Installation of green street measures at key locations Seek grants for LID retrofit projects Promote use of porous pavement & distributed capture and infiltration structural BMPs	Outreach to priority industries identified as having high probability of generating copper, lead, or zinc, trucking companies, facilities with large parking lots, and automotive repair facilities to encourage implementation of cover and containment BMPs Promote coating of exposed galvanized metal Implement requirements for coated galvanized metal for use when exposed	Enhanced street sweeping with vacuum and regenerative sweepers[1] Enhanced erosion and sediment control at construction sites Stabilization of exposed soils not associated with construction sites Implementation of TSS Reduction Ordinances Implementation of Parking Lot Sweeping Ordinances	Distributed LID measures associated with development projects Installation of green street measures at key locations Installation of full capture systems in catch basins in high priority land use areas Others to be determined

[1] Potential Measure; the City of Long Beach is not currently using regenerative or vacuum sweepers

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Target Sub-basin	Acreage	True Source Control BMPs	Runoff Reduction	Operational Source Ctrl BMPs	Sediment Control	Treatment Ctrl BMPs
Sub-basin 4 [Phases 1 & 2] (2015-2020)	2,270.6 ac (12.8% of LCC watershed)	Copper reduction through implementation of SB 346 Lead reduction through implementation of SB 757 Lead reduction through implementation of EPA Proposed Rulemaking to further reduce or remove lead from aviation gasoline Zinc reduction through implementation of Safer Consumer Product Alternatives regulations	Reduction of landscape irrigation runoff through implementation of AB 1881 Seek grants for construction of capture and infiltration/use structural BMPs Promote installation of cisterns and rain barrels Installation of green street measures at key locations Seek grants for LID retrofit projects Promote use of porous pavement & distributed capture and infiltration structural BMPs Implementation of Stormwater Capture Project at Skylinks Golf Course (Phase 2)[2] Implementation of Stormwater Capture at Reservoir Park (Delayed until Phase 4)[2]	Outreach to priority industries identified as having high probability of generating copper, lead, or zinc, trucking companies, facilities with large parking lots, and automotive repair facilities to encourage implementation of cover and containment BMPs Promote coating of exposed galvanized metal Implement requirements for coated galvanized metal for use when exposed	Enhanced street sweeping with vacuum and regenerative sweepers[1] Enhanced erosion and sediment control at construction sites Stabilization of exposed soils not associated with construction sites Implementation of TSS Reduction Ordinances (Phase 2) Implementation of Parking Lot Sweeping Ordinances (Phase 2)	Distributed LID measures associated with development project Installation of green street measures at key locations Installation of full capture systems in catch basins in high priority land use areas Others to be determined

[1] Potential Measure for part of sub-basin; the City of Long Beach is not currently using regenerative or vacuum sweepers
[2] Subject to availability of funding

RB-AR7277

Target Sub-basin	Acreage	True Source Control BMPs	Runoff Reduction	Operational Source Ctrl BMPs	Sediment Control	Treatment Ctrl BMPs
Sub-basin 5 [Phases 3 & 4] (2021-2026)	331.6 ac (1.87% of LCC watershed)	Copper reduction through implementation of SB 346 Lead reduction through implementation of SB 757 Lead reduction through implementation of EPA Proposed Rulemaking to further reduce or remove lead from aviation gasoline Zinc reduction through implementation of Safer Consumer Product Alternatives regulations	Reduction of landscape irrigation runoff through implementation of AB 1881 Seek grants for construction of capture and infiltration/use structural BMPs Promote installation of cisterns and rain barrels Installation of green street measures at key locations Seek grants for LID retrofit projects Promote use of porous pavement & distributed capture and infiltration structural BMPs	Outreach to priority industries identified as having high probability of generating copper, lead, or zinc, trucking companies, facilities with large parking lots, and automotive repair facilities to encourage implementation of cover and containment BMPs Promote coating of exposed galvanized metal Implement requirements for coated galvanized metal for use when exposed	Enhanced street sweeping with vacuum and regenerative sweepers[1] Enhanced erosion and sediment control at construction sites Stabilization of exposed soils not associated with construction sites Implementation of TSS Reduction Ordinances Implementation of Parking Lot Sweeping Ordinances	Distributed LID measures associated with development project Installation of green street measures at key locations Installation of full capture systems in catch basins in high priority land use areas Others to be determined

[1] Potential Measure; the City of Long Beach is not currently using regenerative or vacuum sweepers

RB-AR7278

Target Sub-basin	Acreage	True Source Control BMPs	Runoff Reduction	Operational Source Ctrl BMPs	Sediment Control	Treatment Ctrl BMPs
Sub-basin 6 [Phases 3 & 4] (2021-2026	1,663.7 ac (9.39% of LCC watershed)	Copper reduction through implementation of SB 346 Lead reduction through implementation of SB 757 Monitor USEPA Proposed Rulemaking to further reduce or remove lead from aviation gasoline Prepare petition for control of zinc in tires through Safer Consumer Product Regulations	Reduction of landscape irrigation runoff through implementation of AB 1881 Seek grants for construction of capture and infiltration/use structural BMPs Promote installation of cisterns and rain barrels Installation of green street measures at key locations Seek grants for LID retrofit projects Promote use of porous pavement & distributed capture and infiltration structural BMPs Implementation of Stormwater Capture Project at Skylinks Golf Course (Phase 3)[2]	Outreach to priority industries identified as having high probability of generating copper, lead, or zinc, trucking companies, facilities with large parking lots, and automotive repair facilities to encourage implementation of cover and containment BMPs Promote coating of exposed galvanized metal Develop specifications and requirements for coated galvanized metal for use when exposed	Enhanced street sweeping with vacuum and regenerative sweepers[1] Enhanced erosion and sediment control at construction sites Stabilization of exposed soils not associated with construction sites Implementation of TSS Reduction Ordinances Implementation of Parking Lot Sweeping Ordinances	Distributed LID measures associated with development projects Installation of green street measures at key locations Installation of full capture systems in catch basins in high priority land use areas Others to be determined

[1] Potential Measure for part of sub-basin; the City of Long Beach is not currently using regenerative or vacuum sweepers

[2] Subject to availability of funding

RB-AR7279

Target Sub-basin	Acreage	True Source Control BMPs	Runoff Reduction	Operational Source Ctrl BMPs	Sediment Control	Treatment Ctrl BMPs
Sub-basin 7 [Phases 2 & 3] (2018-2023)	1,359.7 ac (7.68% of LCC watershed)	Copper reduction through implementation of SB 346 Lead reduction through implementation of SB 757 Lead reduction through implementation of EPA Rulemaking to further reduce or remove lead from aviation gasoline Zinc reduction through implementation of Safer Consumer Product Alternatives regulations	Reduction of landscape irrigation runoff through implementation of AB 1881 Seek grants for construction of capture and infiltration/use structural BMPs Promote installation of cisterns and rain barrels Installation of green street measures at key locations Seek grants for LID retrofit projects Promote use of porous pavement & distributed capture and infiltration structural BMPs Implementation of Stormwater Capture Project at Heartwell Park (Phase 3)[2] Implementation of Stormwater Capture Project at Pan American Park (Delayed until Phase 4)[2]	Outreach to priority industries identified as having high probability of generating copper, lead, or zinc, trucking companies, facilities with large parking lots, and automotive repair facilities to encourage implementation of cover and containment BMPs Promote coating of exposed galvanized metal Implement requirements for coated galvanized metal for use when exposed	Enhanced street sweeping with vacuum and regenerative sweepers[1] Enhanced erosion and sediment control at construction sites Stabilization of exposed soils not associated with construction sites Implementation of TSS Reduction Ordinances Implementation of Parking Lot Sweeping Ordinances	Distributed LID measures associated with development project Installation of green street measures at key locations Installation of full capture systems in catch basins in high priority land use areas Others to be determined

[1] Potential Measure for part of sub-basin; the City of Long Beach is not currently using regeneration or vacuum sweepers
[2] Subject to availability of funding

RB-AR7280

Target Sub-basin	Acreage	True Source Control BMPs	Runoff Reduction	Operational Source Ctrl BMPs	Sediment Control	Treatment Ctrl BMPs
Sub-basin 8 [Phases 1 & 2] (2015-2020)	2,711.8 ac (15.3% of LCC watershed)	Copper reduction through implementation of SB 346 Lead reduction through implementation of SB 757 Monitor USEPA Proposed Rulemaking to further reduce or remove lead from aviation gasoline Prepare petition for control of zinc in tires through Safer Consumer Product Regulations	Reduction of landscape irrigation runoff through implementation of AB 1881 Seek grants for construction of capture and infiltration/use structural BMPs Promote installation of cisterns and rain barrels Installation of green street measures at key locations Seek grants for LID retrofit projects Promote use of porous pavement & distributed capture and infiltration structural BMPs Implementation of Stormwater Capture Project at Mayfair Park (Phase 2)[1]	Outreach to priority industries identified as having high probability of generating copper, lead, or zinc, trucking companies, facilities with large parking lots, and automotive repair facilities to encourage implementation of cover and containment BMPs Promote coating of exposed galvanized metal Develop specifications and requirements for coated galvanized metal for use when exposed	Enhanced street sweeping with vacuum and regenerative sweepers Enhanced erosion and sediment control at construction sites Stabilization of exposed soils not associated with construction sites Implementation of TSS Reduction Ordinances (Phase 2) Implementation of Parking Lot Sweeping Ordinances (Phase 2)	Distributed LID measures associated with development projects Installation of green street measures at key locations Installation of full capture systems in catch basins in high priority land use areas Others to be determined

[1] Subject to availability of funding

RB-AR7281

Target Sub-basin	Acreage	True Source Control BMPs	Runoff Reduction	Operational Source Ctrl BMPs	Sediment Control	Treatment Ctrl BMPs
Sub-basin 9 [Phases 2 & 3] (2018-2023)	3,709.3 ac (20.9% of LCC watershed)	Copper reduction through implementation of SB 346 Lead reduction through implementation of SB 757 Lead reduction through implementation of EPA Proposed Rulemaking to further reduce or remove lead from aviation gasoline Zinc reduction through implementation of Safer Consumer Product Alternatives regulations	Reduction of landscape irrigation runoff through implementation of AB 1881 Seek grants for construction of capture and infiltration/use structural BMPs Promote installation of cisterns and rain barrels Installation of green street measures at key locations Seek grants for LID retrofit projects Promote use of porous pavement & distributed capture and infiltration structural BMPs Implementation of stormwater capture project at Progress Park (Delayed until Phase 4)[2]	Outreach to priority industries identified as having high probability of generating copper, lead, or zinc, trucking companies, facilities with large parking lots, and automotive repair facilities to encourage implementation of cover and containment BMPs Promote coating of exposed galvanized metal Implement requirements for coated galvanized metal for use when exposed	Enhanced street sweeping with vacuum and regenerative sweepers[1] Enhanced erosion and sediment control at construction sites Stabilization of exposed soils not associated with construction sites Implementation of TSS Reduction Ordinances Implementation of Parking Lot Sweeping Ordinances	Distributed LID measures associated with development project Installation of green street measures at key locations Installation of full capture systems in catch basins in high priority land use areas Others to be determined

[1] Potential Measure for part of sub-basin; the City of Long Beach is not currently using regenerative or vacuum sweepers
[2] Subject to availability of funding

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Target Sub-basin	Acreage	True Source Control BMPs	Runoff Reduction	Operational Source Ctrl BMPs	Sediment Control	Treatment Ctrl BMPs
Sub-basin 10 [Phases 1 & 2] (2015-2020)	3,403.1 ac (19.2% of LCC watershed)	Copper reduction through implementation of SB 346 Lead reduction through implementation of SB 757 Monitor USEPA Proposed Rulemaking to further reduce or remove lead from aviation gasoline Prepare petition for control of zinc in tires through Safer Consumer Product Regulations	Reduction of landscape irrigation runoff through implementation of AB 1881 Seek grants for construction of capture and infiltration/use structural BMPs Promote installation of cisterns and rain barrels Installation of green street measures at key locations Seek grants for LID retrofit projects Promote use of porous pavement & distributed capture and infiltration structural BMPs Implementation of Stormwater Capture Project at Caruthers Park (Phase 2)[2] Implementation of Stormwater Capture Project at Heartwell Park (Delayed until Phase 3)[2]	Outreach to priority industries identified as having high probability of generating copper, lead, or zinc, trucking companies, facilities with large parking lots, and automotive repair facilities to encourage implementation of cover and containment BMPs Promote coating of exposed galvanized metal Develop specifications and requirements for coated galvanized metal for use when exposed	Enhanced street sweeping with vacuum and regenerative sweepers[1] Enhanced erosion and sediment control at construction sites Stabilization of exposed soils not associated with construction sites Implementation of TSS Reduction Ordinances (Phase 2) Implementation of Parking Lot Sweeping Ordinances (Phase 2)	Distributed LID measures associated with development projects Installation of green street measures at key locations Installation of full capture systems in catch basins in high priority land use areas Others to be determined

[1] Potential Measure for part of sub-basin; the City of Long Beach is not currently using regenerative or vacuum sweepers
[2] Subject to availability of funding

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7.0 Legal Authority

This section covers information, such as documentation and references/links to water quality ordinances for each participating agency, that demonstrates adequate legal authority to implement and enforce Watershed Control Measures (WCMs) identified in this plan and as required in Section VI.D.5.b.iv.6 of the MS4 Permit. The goal of these WCMs is to create an efficient program that focuses on Watershed priorities by meeting the following objectives:

- Prevent or eliminate non-stormwater discharges to the MS4 that are a source of pollutants from the MS4 to receiving waters.
- Implement pollutant controls necessary to achieve all applicable interim and final water quality-based effluent limitations and/or receiving water limitations pursuant to corresponding compliance schedules.
- Ensure that discharges from the MS4 do not cause or contribute to exceedances of receiving water limitations.

The WCMs include the minimum control measures, non-stormwater discharge measures and targeted control measures (i.e. controls to address TMDL and 303(d) listings). Since the requirement to incorporate these WCMs is an element of the MS4 Permits, the legal authority to implement them results from each agency's legal authority to implement the NPDES MS4 Permit.

A copy of each participating agency's legal authority certification from their respective chief legal counsels can be found in Attachment D. This certification shall be prepared annually. Table 7-1 includes the section that covers water quality ordinance for each agency with a reference link.

Table 7-1 Water Quality Ordinance Language

City	Water Quality Ordinance	Reference
Bellflower	Title 13 - Public Services, Chapter 13.20, Stormwater and Runoff Pollution Control	http://qcode.us/codes/bellflower
13.20.030 Purpose and Intent (B) - *The intent of this chapter is to enhance and protect the water quality of the receiving waters of the United States in a manner that is consistent with the Clean Water Act and acts amendatory thereof or supplementary thereto, to applicable implementing regulations and the municipal NPDES permit and any amendment, revision, or re-issuance thereof.*		
Cerritos	Title 6 - Health and Sanitation, Chapter 6.32, Stormwater and Urban Runoff Pollution Prevention Controls	http://www.codepublishing.com/ca/cerritos.html
6.32.010 Purpose (C) - *Reducing pollutants in storm water and urban runoff to the maximum extent practicable. (Ord. 777 § 1 (part), 1997)*		
Downey	Article V- Sanitation, Chapter 7, Stormwater and Urban Runoff Pollution and Conveyance Controls	http://qcode.us/codes/downey/
Section 5701. Watershed Management Program - *Notwithstanding other provisions in the Downey Municipal Codes, the MS4 Permit requires the City of Downey to implement the Watershed Management*		

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Program (WMP), and any subsequent amendments, are hereby incorporated into this Ordinance by reference. (Added by Ord. 1142, adopted 02-11-03; amended by Ord. 1320, adopted 11-12-13).		
Lakewood	Article 05 (V) - Sanitation-Health, Chapter 8, Stormwater and Urban Runoff Pollution Control	http://weblink.lakewoodcity.org/weblink8/
5800 - Adoption of the Los Angeles County Stormwater Runoff Pollution Control Ordinance - *Except as otherwise provided in this Chapter, the stormwater runoff pollution control ordinance of the County of Los Angeles contained in Chapter 12.80 of Title 12 - Environmental Protection of the Los Angeles County Code relating to control of pollutants carried by stormwater and runoff adopted by the County of Los Angeles on June 9, 1998, is hereby adopted and made a part hereof as though set forth in full. The same shall hereafter constitute the Stormwater and Runoff Pollution Control Ordinance of the City of Lakewood relating to the control of pollutants carried by stormwater and runoff and discharging into receiving water of the United States.*		
Long Beach	Volume II-Title 18-Building and Construction, Chapter 18.61, NPDES and SUSMP Regulations	http://library.municode.com/index.aspx?clientId=16115
18.61.010 Purpose - *The purpose of this chapter is to provide regulations and give legal effect to certain requirements of the National Pollutant Discharge Elimination System (NPDES) permit issued to the City of Long Beach, and the subsequent requirements of the Standard Urban Storm Water Mitigation Plan (SUSMP), mandated by the California Regional Water Quality Control Board, Los Angeles Region (RWQCB). The intent of these regulations is to effectively prohibit non-storm water discharges into the storm drain systems or receiving waters and to require source control BMPs to prevent or reduce the discharge of pollutants into storm water to the maximum extent practicable.*		
Paramount	Chapter 48 - Urban Stormwater Management	http://www.paramountcity.com/code.cfm?task=detail2&ID=20
Sec. 48-2.1. Purpose and intent - *The purpose of this chapter is to protect the health and safety of the residents of the city by protecting the beneficial uses of receiving waters within the city from pollutants carried by storm water and non-storm water discharges. The intent of this chapter is to enhance and protect the water quality of the receiving waters of the city and the United States, consistent with the Act. (Ord. No. 892)* Sec. 48-2.2. Applicability of this chapter - *The provisions of this chapter shall apply to the discharge, deposit or disposal of any storm water and/or runoff to the storm drain system and/or receiving waters within any incorporated area covered by a NPDES municipal storm water permit. (Ord. No. 892)*		
Signal Hill	Chapter 12.16- Stormwater/ Urban Runoff	http://www.amlegal.com/library/ca/signalhill.shtml
12.16.020 Purpose and Intent - *The purpose of this chapter is to protect the public health, welfare and safety and to reduce the quantity of pollutants being discharged to the waters of the United States through: (D) The protection and enhancement of the quality of the waters of the United States in a manner consistent with the provisions of the Clean Water Act;*		
LACFCD	Flood Control District Code, Chapter 21 - Stormwater and Runoff Pollution Control	https://library.municode.com/index.aspx?clientId=16274
21.01 - Purpose and Intent - *The purpose and intent of this chapter is to regulate the stormwater and non-stormwater discharges to the facilities of the Los Angeles County Flood Control District for the protection of those facilities, the water quality of the waters in and downstream of those facilities, and the quality of the water that is being stored in water-bearing zones underground.*		

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8.0 Los Cerritos Channel Watershed Reasonable Assurance Analysis (RAA)

A key element of the WMP is the Reasonable Assurance Analysis (RAA), which is used to demonstrate "that the activities and control measures…will achieve applicable WQBELs and/or RWLs with compliance deadlines during the Permit term" (NPDES Permit Order No. R4-2012-0175, Section C.5.b.iv.(5); NPDES Permit Order No. R4-2014-0024, Section C.5.h.vii.(2)). Attachment A presents the RAA for the Los Cerritos Channel Watershed. While the Permits prescribe the RAA as a quantitative demonstration that control measures will be effective, the RAA also promotes a modeling process to identify and prioritize potential control measures to be implemented by the WMP. In other words, the RAA not only demonstrates the cumulative effectiveness of BMPs to be implemented, it also supports their selection. Furthermore, the RAA incorporates the applicable compliance dates and milestones for attainment of the WQBELs and RWLs, and therefore supports BMP scheduling.

The Watershed Management Modeling System (WMMS) was used to develop this RAA. WMMS is specified in the Permits as an optional tool to conduct the RAA. The Los Angeles County Flood Control District (LACFCD), through a joint effort with U.S. Environmental Protection Agency (USEPA), developed the WMMS specifically to support informed decisions associated with managing stormwater. The ultimate goal of the WMMS is to identify cost-effective water quality improvement projects through an integrated, watershed-based approach.

On March 25, 2014, the Los Angeles Regional Water Quality Control Board (Regional Board) issued "RAA Guidelines" (LARWQCB 2014) to provide information and guidance to assist permittees in development of the RAA. Attachment A provides appropriate documentation on the modeling assumptions that meet the RAA Guidelines.

The RAA describes the process for identifying milestones within the current and next Permit periods, as well as final milestones to meet applicable TMDLs. Modeling was performed to quantify necessary load reductions to achieve the milestones. Based on these load reduction targets, a pollutant reduction plan was established that outlines the types and sequencing of BMPs for each jurisdiction to achieve milestones throughout the schedule. The RAA provides a detailed list of the capacities needed for BMPs over time, incorporating the existing BMPs and control measures identified in the WMP. These recommendations serve as goals for each jurisdiction to seek opportunities for implementation over time, but strategies may change as opportunities for more cost-effective BMPs are identified throughout the schedule.

The RAA for the Los Cerritos Channel Watershed is included in Attachment A.

RB-AR7286

9.0 Coordinated Integrated Monitoring Program (CIMP)

The option of preparing a Coordinated Integrated Monitoring Program (CIMP) is provided in Attachment E of Order No. R4-2012-0175 and Attachment E of Order No. R4-2014-0024.

A Coordinated Integrated Monitoring Program (CIMP) is required to be submitted either separately or as part of a Watershed Management Plan (WMP). The CIMP is required to integrate requirements of the current Los Angeles County MS4 Permit, the City of Long Beach MS4 Permit, and TMDL monitoring requirements. This plan was developed to address five primary objects that include:

- Assess the chemical, physical, and biological impacts of discharges from the MS4s on receiving waters
- Assess compliance with receiving water limitations water limitations and water quality-based effluent limitations (WQBELs) established to implement TMDL wet and dry weather load allocations
- Characterize pollutant loads in MS4 discharges
- Identify sources of pollutants in MS4 discharges
- Measure and improve the effectiveness of pollutant controls implemented under the new MS4 permits.

The approach presented in the CIMP for the Los Cerritos Channel Watershed incorporates all objectives of the Attachment E Monitoring and Reporting Program (MRP) but provides a customized approach to address the objectives identified in the MRP for Stormwater Outfall Monitoring based upon the unique characteristics of the Los Cerritos Channel Watershed. Unlike other Watershed Management Groups (WMGs) in Los Angeles County, the LCC Watershed does not receive flow from other WMGs. External contributions of contaminants are limited to atmospheric deposition originating predominantly from major transportation corridors and facilities.

To facilitate review by the Regional Water Board, the CIMP for the Los Cerritos Channel Watershed has been prepared as a separate document and included as Attachment E to the WMP. It addresses the MRP objectives related to:

- Receiving Water Monitoring
- Stormwater Outfall Monitoring
- Non-stormwater Outfall-Based Monitoring
- New Development/Redevelopment Effectiveness Training
- Regional Studies

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Section 10.0 Adaptive Management Process

10.1 Summary of Considerations for Adaptive Management Review

The adaptive management process is a critical component of the WMP; it makes the program much more than a static plan that could soon become outdated. "Adaptive Management" is another name for what the National Research Council (NRC) called "Adaptive Implementation" in its 2001 report entitled Assessing the TMDL Approach to Water Quality Management. The Council defined adaptive implementation as "a cyclical process in which TMDL plans are periodically assessed for their achievement of water quality standards including designated uses." The Council stated that, "if the implementation of the plan is not achieving the designated uses, scientific data and information should be used to revise the plan." The process envisioned by the National Research Council is presented in Figure 10-1.

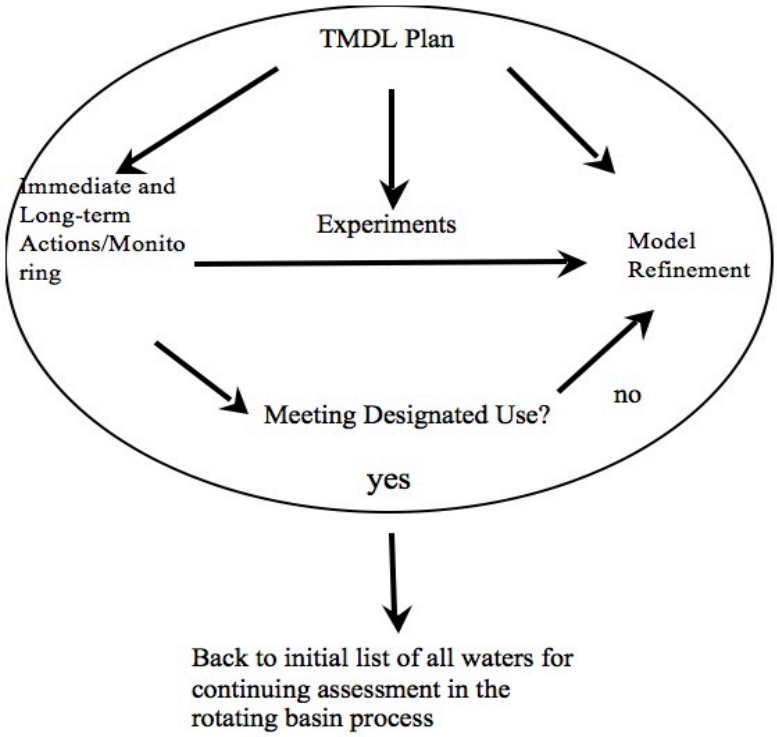

FIGURE 10-1. NRC Adaptive Implementation Flowchart
(Source: National Resource Council, *Assessing the TMDL Approach to Water Quality Management*, 2001.)

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The adaptive management process mandated by Order No. R4-2012-0175 extends the concept beyond TMDLs. It also includes all 303(d) listings of impairment and other exceedances of water quality standards (See Section 2 of this WMP).

In developing the adaptive management component of this WMP, the Watershed Group has leaned heavily on the thoughtful analysis of adaptive implementation by the Committee to Assess the Scientific Basis of the Total Maximum Daily Load Approach to Water Pollution Reduction that was assembled by the NRC to prepare its 2001 report. The Committee suggested that the adaptive implementation process should begin with initial actions that have a high degree of certainty and that future actions be based on 1) continued monitoring to determine how a waterbody responds to actions taken, and 2) carefully designed experiments in the watershed. The Committee appropriately referred to this approach as "a concurrent process of action and learning." The NRC Committee suggested a mix of actions, including immediate actions and an array of possible long-term actions. The Committee recognized that regardless of what immediate actions were taken, there may not be an immediate response in waterbody or biological conditions due to lag times between actions and responses – especially when pollutants are tightly bound to sediments. The Committee suggested that waterbodies be monitored to establish the trajectory of measured water quality criteria. The Committee described longer-term actions as those that show promise, but need further evaluation and development. Given the absence of dedicated revenue streams for funding stormwater quality projects within the watershed, the Watershed Group believes that developing funding sources for implementing longer-term actions is vital. The projected costs are much too great to be funded out of municipal General Fund budgets without adversely impacting other municipal programs.

The NRC Committee envisioned "success monitoring" following implementation action, such that if monitoring indicated a waterbody was meeting water quality standards, no further implementation actions would be taken and the waterbody would be returned to an "all waters" list where it would be monitored as part of a rotating basin process. The Committee also suggested that one of the most important applications of success monitoring data is to revise and improve the initial TMDL forecast over time. This concept is consistent with the application of TMDL reopeners to modify TMDLs based on new data and improved understanding of the underlying science. Stormwater is highly variable and episodic, leading to greater uncertainty in stormwater modeling. Over time this uncertainty can be reduced as monitoring data is gathered and physical, chemical, and biological processes are better understood.

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10.2 Process for Modifications to Watershed Management Program Resulting from Adaptive Management Review

Section VI.C.8.a I of Order No. R4-2012-0175 requires that Permittees implement an adaptive management process, every two years from the date of program approval, adapting the Watershed Management Program to become more effective based on several factors. This process fulfills the requirement in Part V.A.4 of the Order to address continuing exceedances of receiving water limitations.

The three key factors cited in the permit for consideration during the adaptive management process are the following compliance-related factors:

1) Progress toward achieving interim and/or final water quality-based effluent limitations and/or receiving water limitations in Part VI.E. and Attachments L through R, according to compliance schedules;

2) Progress toward achieving improved water quality in MS4 discharges and achieving receiving water limitations through implementation of the watershed control measures based on an evaluation of outfall-based monitoring data and receiving water monitoring data;

3) Achievement of interim milestones.

The Order also specifies four process-oriented factors that may be considered during the Adaptive Management Process, including:

1) Re-evaluation of the water quality priorities identified for the WMA based on more recent water quality data for discharges from the MS4 and the receiving water(s) and a reassessment of sources of pollutants in MS4 discharges;

2) Availability of new information and data from sources other than the Permittees' monitoring program(s) and a reassessment of sources of pollutants in MS4 discharges;

3) Regional Water Board recommendations; and

4) Recommendations for modifications in the Watershed Management Program solicited through a public participation process.

In addition, the Order indicates that the adaptive process is not limited to the enumerated factors. Any other relevant factors may also be considered.

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RB-AR7290

10.3 Los Cerritos Channel Adaptive Management Process

The adaptive management process for the Los Cerritos Channel Watershed is based on the experience of the municipalities and Caltrans working together to address the Los Cerritos Channel Metals TMDLs first proposed by USEPA in November 2008 and the working relationship established among the Permittees in the years since. In reality, the bi-annual process that will result in submission of an adaptive management report to the Regional Water Board every two years after approval of the WMP will be a continuous process.

Data from the receiving monitoring, watershed segmentation, and forensic monitoring components of the customized Coordinated Integrated Monitoring Program – as well as documentation of soil stabilization and sediment control and documentation of runoff reduction – will provide the critical basis for implementation of the adaptive management process during this permit cycle. Additional critical information will come from implementation of SB 346, development and implementation of zinc source control measures, implementation of Low Impact Development Ordinances and Green Streets Policies, documentation of trash control measures, documentation of runoff reduction measures, documentation of outreach programs, assessment of street sweeping effectiveness, and implementation of local and sub-watershed treatment control measures.

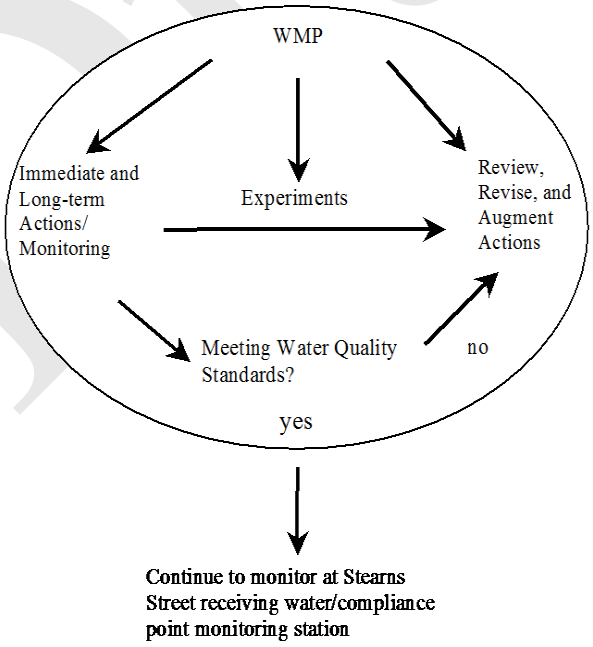

Figure 10-2. Los Cerritos Watershed Management Program Adaptive Management Flowchart

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In addition to the three compliance-related factors and the four process-oriented factors specified in Order No. R4-2012-0175, the Los Cerritos Channel Adaptive Management process will include evaluation of immediate and possible long-term actions, updates of maps and databases, and a discussion of stormwater funding measures. These factors include:

1) Evaluation of Immediate Actions, including:
   a) Minimum Control Measures implementation
   b) TSS Reduction Program implementation
   c) Dry-Weather Runoff Reduction Program implementation
   d) Proposition 84 Los Cerritos Channel Watershed Segmentation and LID Planning Project
   e) Targeted Enhanced Street Sweeping Program implementation
   f) Local No or Low Copper Brake Pad Education Program implementation
   g) Local No or Low Copper Pool Algaecide Education Program implementation
   h) Agreements for Locations of Initial Water Capture Devices
   i) Preliminary Design of Initial Capture Devices
   j) Safer Consumer Product Regulations support efforts
   k) EPA's Airport Lead Monitoring Study and FAA's Unleaded Avgas Transition Plan monitoring
   l) Monitoring of Greater Harbor Toxics TMDLs Regional Monitoring Coalition
   m) Water Control Policy for Developing California's Clean Water Act Section 303(d) List implementation monitoring
   n) Funding measure development monitoring
   o) Status of grant funding for stormwater capture projects

2) Evaluation or Re-evaluation of Long-Term Actions, including:
   a) Minimum control measures and other applicable immediate actions
   b) Low Impact Development Ordinances
   c) Green Streets Policies
   d) Full-capture trash control devices implementation
   e) Targeted installation of porous pavement
   f) Development and implementation of measures to reduce the release of zinc from municipal facilities and operations

3) Evaluation of Possible Long-Term Actions, including:
   a) Stormwater Capture and Infiltration Program implementation
   b) Stormwater Capture and Use Program implementation
   c) Additional dry-weather flow and targeted constituent monitoring with associated forensic monitoring (extension of Prop 84 project)
   d) Sand filter installation

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e) Efforts to encourage the use of coated galvanized metal for exterior applications

4) Updating and refinement of storm drain, channel, and outfall mapping

5) Updating and refinement of storm drain, channel, and outfall database

6) Updating and refinement of land use mapping

7) Updating and refinement of land use database

10.4 Adaptive Management Process Reporting Program

Each adaptive management report will be structured based on the following topical outline:

- Executive Summary
- Assessment of progress toward achieving WQBELs and/or RWLs
- Assessment of progress toward achieving improved water quality in MS4 discharges
- Assessment of progress toward achievement of interim milestones
- Evaluation of water quality priorities
- Assessment of new information for sources other than the CIMP
- Assessment of Regional Water Board Recommendations
- Assessment of recommendations to the WMP from watershed stakeholders and the public
- Modifications to the WMP
- Updates and refinements to storm drain, channel, and outfall database
- Updates and refinements to land use database

The adaptive management report will be incorporated in the Annual Reports due on or before December 15th of the year in which a bi-annual anniversary of WMP approval occurs and as part of the Report of Waste Discharge due July 1, 2017.

Water quality data, information on the development and implementation of source control measures, sediment control, runoff reduction, BMP implementation, and program effectiveness will be gathered and accumulated annually in preparation for reporting on implementation of the adaptive management process every two years and future potential re-evaluation of the Reasonable Assurance Analysis.

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11.0 Reporting Program

11.1 Annual Report

The Watershed Group plans to eventually move to an integrated Watershed Annual Report. However, in the near future, annual reports will be submitted by individual Permittees. For now, the Watershed Group will prepare a WMP annual report to be attached to each participating agency's MS4 annual report for submittal to the Regional Water Board Executive Officer in an electronic format on or before December 15th. The WMP annual reports will present a summary of information that will allow the Regional Board to assess the implementation and effectiveness of the Watershed Management Program[1] The CIMP Annual Report will ultimately be attached to the integrated annual report. For now, copies of it will be attached to the individual MS4 annual reports.

The reporting process is intended to meet the following objectives:

- Each Permittee's participation in one or more Watershed Management Programs.
- The impact of each Permittee's stormwater and non-stormwater discharges on the receiving water.
- Compliance with receiving water limitations, numeric water quality-based effluent limitations, and non-stormwater action levels.
- The effectiveness of control measures in reducing discharges of pollutants from the MS4 to receiving waters.
- Whether the quality of MS4 discharges and the health of receiving waters is improving, staying the same, or declining as a result watershed management program efforts, and/or TMDL implementation measures, or other Minimum Control Measures.
- Whether changes in water quality can be attributed to pollutant controls imposed on new development, re-development, or retrofit projects.

Each report will include summaries for each of the following seven sections as required by the MS4 Permit:

1) Stormwater Control Measures – Including estimated cumulative change in percent EIA Since effective date of the Permit; summary of new development/re-development, retrofit, and other projects designed to intercept stormwater runoff constructed during the reporting year, including estimated total runoff volume captured; summary of actions taken to comply with the approved WMP; summary of riparian/wetlands restoration projects; summary of other MCMs as Permittee deems relevant; and status of multi-year projects continuing into subsequent years.

[1] Annual reports will cover the previous July 1st through June 30th time period.

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2) Effectiveness Assessment of Stormwater Control Measures – Including summary of rainfall data for the reporting year; hydrographs or flow data for applicable storms; and assessments and comparisons of water quality data, including summaries as to whether or not water quality is improving, staying the same, or declining;
3) Non-Stormwater Control Measures – Including estimates of the number of major outfalls within a Permittee's jurisdiction; number of outfalls screened for significant non-stormwater discharges for reporting year and cumulatively; and attribution of outfalls with confirmed significant non-stormwater discharges
4) Effectiveness Assessment of Non-Stormwater Control Measures – Including summary of the effectiveness of control measures implemented
5) Integrated Monitoring Compliance Report – Including summary of identified exceedances of outfall-based stormwater monitoring data, wet weather receiving water monitoring data, dry weather receiving water data and non-stormwater outfall monitoring data; summary of TIE data, if applicable; and description of efforts taken to mitigate and/or eliminate stormwater and non-stormwater discharges that exceed applicable WQBELs or action levels, if applicable
6) Adaptive Management Strategies – Including summary of effective control measures and of less effective control measures; description of significant changes to control measures anticipated to be made in the next year and a rationale for those changes; a detailed description of control measures to be applied to new development or redevelopment projects disturbing more than 50 acres; and status of all multi-year efforts not completed in the current year that will continue
7) Supporting Data and Information – Include a summary of all monitoring data and associated meta data

The participating agencies will submit annual reports as required by the MS4 Permit. The Regional Board is currently preparing a reporting format. Once available, the reporting form will be incorporated into the WMP as an appendix.

11.2 Watershed Summary Information

The WMP Annual Report will include information specified in Section XVII.B of Attachment E of Order No. R4-2012-0175 and Section XVII.A of Attachment E Order No. R4-2014-0024 in odd year Annual Reports. This information will include information related to:

- Watershed Management Area Information
- Sub-watershed (HUC-12) Description
- Permittees' Drainage Areas within the Watershed

The Watershed Group may reference the WMP in the odd-year report, when the required information is already included or addressed in the WMP, to satisfy baseline information requirements.

11.3 TMDL Reporting

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The Watershed Group will report progress of TMDL implementation per schedules in Section XIX of Attachment E of Order No. R4-2012-0175 and Order No. R4-2014-0024. The TMDL reporting that will be addressed is the Los Cerritos Channel Metals TMDLs. Section XIX.F of Attachment E specifies two types of annual reports related to the TMDL:

- Annual Monitoring Reports
- Annual Progress Reports

Both reports are due December 15 annually and will be incorporated into the CIMP Annual Reports required by Section XV of Attachment E.

11.4 Report of Waste Discharge

In accordance with Title 23, Division 3, Chapter 9 of the California Code of Regulations and Title 40, Part 122 of the Code of Federal Regulations, each Discharger shall file a Report of Waste Discharge (ROWD) as application for issuance of new waste discharge requirements no later than 180 days prior to the Order expiration date – December 28, 2017. The Watershed Group proposes to submit the ROWD on behalf of the Permittees within the Watershed on or before July 1, 2017.

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ATTACHMENT A:

REASONABLE ASSURANCE ANALYSIS FOR LOWER LOS ANGELES RIVER, LOS CERRITOS CHANNEL, AND LOWER SAN GABRIEL RIVER

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Reasonable Assurance Analysis for Lower Los Angeles River, Los Cerritos Creek, and Lower San Gabriel River

Submitted to:

LLAR WMP Group LCC WMP Group LSGR WMP Group

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June 6, 2014

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1. Introduction

The Municipal Separate Storm Sewer System Permit (Permits) for Los Angeles County[1] and the City of Long Beach[2] includes optional provisions for a Watershed Management Program (WMP) that allows permittees the flexibility to customize their stormwater programs to achieve compliance with applicable receiving water limitations (RWLs) and water quality based effluent limitations (WQBELs) through implementation of control measures. A key element of each WMP is the Reasonable Assurance Analysis (RAA), which is used to demonstrate "that the activities and control measures…will achieve applicable WQBELs and/or RWLs with compliance deadlines during the Permit term" (NPDES Permit Order No. R4-2012-0175, Section C.5.b.iv.[5], page 64; NPDES Permit Order No. R4-2014-0024, Section C.5.h.vii.[2]). This report presents the Reasonable Assurance Analysis (RAA) for the Lower Los Angeles River (LLAR), Los Cerritos Channel (LCC), and Lower San Gabriel River (LSGR) WMPs.

While the Permits prescribe the RAA as a quantitative demonstration that control measures (best management practices [BMPs]) will be effective, the RAA also promotes a modeling process to identify and prioritize potential control measures to be implemented by the WMP. In other words, the RAA not only demonstrates the cumulative effectiveness of BMPs to be implemented, it also supports their *selection*. Furthermore, the RAA incorporates the applicable compliance dates and milestones for attainment of the WQBELs and RWLs, and therefore supports BMP scheduling.

On March 25, 2014, the Los Angeles Regional Water Quality Control Board (Regional Board) issued "RAA Guidelines" (LARWQCB 2014) to provide information and guidance to assist permittees in development of the RAA. The approach herein is consistent with the RAA Guidelines.

This report is organized in nine sections, as follows:

- Section 1: Introduction
- Section 2: Applicable Interim and Final Requirements
- Section 3: Modeling System to be used for the RAA
- Section 4: Current/Baseline Pollutant Loading
- Section 5: Estimated Required Pollutant Reductions
- Section 6: Determination of BMP Capacity for RAA
- Section 7: Cumulative Volume Reduction Goals to Achieve Required Reductions
- Section 8: Pollutant Reduction Plan
- Section 9: References

[1] National Pollutant Discharge Elimination System Permit Order No. R4-2012-0175

[2] National Pollutant Discharge Elimination System Permit Order No. R4-2014-0024

2. Applicable Interim and Final Requirements

The WMPs for LLAR, LCC, and LSGR follow the process in the Permits and identify the Water Quality Priorities (WQ Priorities) including the highest (Category 1) Water Quality Priorities which are subject to Total Maximum Daily Loads (TMDLs) and WQBELs. Practically all of these TMDLs include associated compliance schedules that are considered in this RAA. The TMDL and WMP milestones/compliance dates establish the pace at which BMPs must be implemented. Traditionally, the approach of TMDL implementation plans has been focused on *final* TMDL compliance, whereas the Permit compliance paths offered to WMPs increase emphasis on *milestones*. In line with the RAA Guidelines, for all final TMDL and TMDL/WMP milestones that occur in the next two Permit cycles, the combination of BMPs expected to result in attainment of the corresponding Permit limits are identified.

The TMDL milestones for the LLAR, LCC, and LSGR WMP areas are shown in Table 2-2 through Table 2-4. The Permits require each WMP to provide reasonable assurance for the TMDL milestones that occur in the current Permit term. If applicable TMDLs do not prescribe a milestone in the current Permits, a milestone must be established. The array of TMDLs creates a potentially complicated sequence based on multiple pollutants, and thus this RAA includes a limiting pollutant analysis. As described in Section 5, the identified limiting pollutant for wet weather is zinc for LLAR, LCC, and LSGR. As such, the wet weather milestones for the Los Angeles River, Los Cerritos Channel, and San Gabriel River Metals TMDLs establish the pace of stormwater BMP implementation. The wet weather milestones established for the current Permits include the following:

- **Lower Los Angeles River:** Achieve 31% of the required reduction by September 30, 2017. This milestone was created for the WMP, as the metals TMDL includes a 25% milestone in 2012 (prior to the current Permit term) and a 50% milestone in 2024 (beyond the current Permit term). Achievement of this milestone for zinc provides reasonable assurance of achieving a similar or greater reduction for other WQ Priorities.
- **Los Cerritos Channel:** Achieve 10% of the required reduction[3] by September 30, 2017. This milestone is directly from the metals TMDL. Achievement of this milestone for zinc provides reasonable assurance of achieving a similar or greater reduction for other WQ Priorities.
- **Lower San Gabriel River:** Achieve 10% of the required reduction by September 30, 2017. This milestone is directly from the metals TMDL. Achievement of this milestone for zinc provides reasonable assurance of achieving a similar or greater reduction for other WQ Priorities.

The pollutant reduction plan to achieve these milestones is described in Section 8, along with the plan to achieve the milestones for the next Permit term (achieve 35% of the required reduction in LCC and LSGR and achieve 50% of the required reduction in LLAR). A summary of the milestones within the current and next Permit terms and final milestone based on final TMDLs are summarized in Table 2-1. The required reductions that form the basis of the milestones are calculated in Section 5.

[3] The interim milestones are expressed in terms of the *required* reduction not total reduction (e.g., if the required reduction to attain final limits is 50%, then the 10% milestone equates to a 5% reduction). These reductions are calculated in Section 5.

Table 2-1. Summary of schedule for interim and final milestones

WMP Area	Milestone 1 (2017)	Milestone 2 (interim date of applicable metals TMDL)	Milestone 3 (final date of applicable metals TMDL)
LLAR	31%	50%	100%
LCC	10%	35%	100%
LSGR	10%	35%	100%

Table 2-2. Schedule of TMDL milestones for the Lower LA River

TMDL	Constituents	Compliance Goal	Weather Condition	Compliance Dates and Compliance Milestone (Bolded numbers indicated milestone deadlines within the current Permit term) [1]									
				2012	**2013**	**2014**	**2015**	**2016**	2020	2024	2028	2032	2037
LAR Nutrients	Ammonia-N, Nitrate-N, Nitrite-N, Nitrate-N+Nitrite-N	Meet WQBELs	All	Pre 2012									
				Final									
LAR Trash	Trash	% Reduction	All	9/30	9/30	9/30	9/30	9/30					
				70%	80%	**90%**	**96.70%**	**100%**					
LAR Metals	Copper, Lead	% of MS4 area Meets WQBELs	Dry	1/11					1/11	1/11			
				50%					75%	100%			
	Copper, Lead, Zinc, Cadmium	% of MS4 area Meets WQBELs	Wet	1/11						1/11	1/11		
				25%						50%	100%		
LA River Bacteria	*E. coli*	Meet WQBELs	Wet and Dry[2]										3/23
													Final
Dominguez Channel and LA/LB Harbors Toxics	Sediment: DDTs, PCBs, Copper, Lead, Zinc, PAHs	Meet WQBELs	All	12/28								3/23	
				Interim								Final	
Long Beach City Beaches and LAR Estuary Bacteria	Total Coliform, Fecal Coliform, Enterococcus	Meet WLAs	All	USEPA TMDLs, which do not contain interim milestones or implementation schedule. The Permits allow MS4 Permittees to propose a schedule in a WMP.									

[1] The Permit term is assumed to be five years from the Los Angeles County Permit effective date or December 27, 2017.

[2] The schedule for attaining the dry weather Bacteria TMDL is not shown in Table 3-2, which is stepwise by reach/segment and depends on whether a Load Reduction Strategy is developed for implementation.

Table 2-3. Schedule of TMDL milestones for Los Cerritos Channel WMP

TMDL	Constituents	Compliance Goal	Weather Condition	Compliance Dates and Compliance Milestone (Bolded numbers indicated milestone deadlines within the current Permit term) [1]									
				2012	**2013**	**2014**	**2015**	**2016**	2017	2020	2023	2026	2032
Los Cerritos Channel Metals	Copper	% Load Reduction or % of MS4 area Meets WQBELs	Dry						9/30	9/30			
									30%	70%	100%		
	Copper, Lead, Zinc	% Load Reduction or % of MS4 area Meets WQBELs	Wet						9/30	9/30			
									10%	35%	70%	100%	
Dominguez Channel and LA/LB Harbors Toxics	Sediment: DDTs, PCBs, Copper, Lead, Zinc, PAHs	Meet WQBELs	All	12/28									3/23
				Interim									Final

[1] The Permit term is assumed to be five years from the Los Angeles County Permit effective date or December 27, 2017.

Table 2-4. Schedule of TMDL milestones for the Lower San Gabriel River WMP

TMDL	Constituents	Compliance Goal	Weather Condition	Compliance Dates and Compliance Milestone (Bolded numbers indicated milestone deadlines within the current Permit term) [1]									
				2012	**2013**	**2014**	**2015**	**2016**	2017	2020	2023	2026	2032
San Gabriel River Metals	Copper, Selenium	% Load Reduction or % of MS4 area Meets WQBELs	Dry						9/30	9/30			
									30%	70%	100%		
	Copper, Lead, Zinc	% Load Reduction or % of MS4 area Meets WQBELs	Wet						9/30	9/30			
									10%	35%	70%	100%	
Dominguez Channel and LA/LB Harbors Toxics	Sediment: DDTs, PCBs, Copper, Lead, Zinc, PAHs	Meet WQBELs	All	12/28									3/23
				Interim									Final

[1] The Permit term is assumed to be five years from the Los Angeles County Permit effective date or December 27, 2017.

3. Modeling System used for the RAA

The Watershed Management Modeling System (WMMS) was used to develop this RAA. WMMS is specified in the Permits as a potential tool to conduct the RAA. The Los Angeles County Flood Control District (LACFCD), through a joint effort with U.S. Environmental Protection Agency (USEPA), developed WMMS specifically to support informed decisions associated with managing stormwater. The ultimate goal of WMMS is to identify cost-effective water quality improvement projects through an integrated, watershed-based approach. The WMMS encompasses Los Angeles County's coastal watersheds of approximately 3,100 square miles, representing 2,566 subwatersheds (Figure 3-1). As described in the following subsections, WMMS is a modeling system that incorporates three tools: (1) the watershed model for prediction of long-term hydrology and pollutant loading, (2) a BMP model, and (3) a BMP optimization tool to support regional, cost-effective planning efforts. A version of WMMS is available for public download from LACFCD.

The version of WMMS to be used for the RAA in the LLAR, LLC, and LSGR WMPs is customized from the public download version, including the following modification/enhancements:

- Updates to meteorological records to represent the last 10 years (per the RAA Guidelines) and to allow for simulation of the design storm;
- Calibration adjustments to incorporate the most recent 10 years of water quality data collected at the nearby mass emission station;
- Application of a second-tier of BMP optimization using System for Urban Stormwater Treatment and Analysis INtegration (SUSTAIN), which replaces the Nonlinearity-Interval Mapping Scheme (NIMS) component of WMMS.
- Optimization of BMP effectiveness for removal of bacteria pollutants (rather than metals only); and
- Updates to Geographic Information System (GIS) layers, as available.

The subwatersheds in the LLAR, LLC, and LSGR WMP areas that are represented by WMMS are shown in Figure 3-2 through Figure 3-4, which include modifications to confine to jurisdictional boundaries included in these WMP areas. Also shown are the "RAA assessment points", which are used to calculate required load reductions (described in Section 5).

3.1. Watershed Model - LSPC

The watershed model included within WMMS is the Loading Simulation Program C++ (LSPC) (Shen et al. 2004; Tetra Tech and USEPA 2002; USEPA 2003). LSPC is a watershed modeling system for simulating watershed hydrology, erosion, and water quality processes, as well as in-stream transport processes. LSPC also integrates a geographic information system (GIS), comprehensive data storage and management capabilities, and a data analysis/post-processing system into a convenient PC-based Windows environment. The algorithms of LSPC are identical to a subset of those in the Hydrologic Simulation Program–FORTRAN (HSPF) model with selected additions, such as algorithms to dynamically address land use change over time. Another advantage of LSPC is that there is no inherent limit to the size and resolution of the model than can be developed, making it an attractive option for modeling the Los Angeles region watersheds. USEPA's Office of Research and Development (Athens, Georgia) first made LSPC available as a component of USEPA's National TMDL Toolbox (http://www.epa.gov/athens/wwqtsc/index.html). LSPC has been further enhanced with expanded capabilities since its original public release.

The WMMS development effort culminated in a comprehensive watershed model of the Los Angeles County Flood Control District that includes the unique hydrology and hydraulics of the system and characterization of water quality loading, fate, and transport for all the key TMDL constituents (LACDPW 2010a, 2010b). Since the original development of the WMMS LSPC model, Los Angeles County personnel have independently updated the model with meteorological data through April 2012.

To support the objectives of the WMPs, jurisdictional boundaries were also intersected with the WMMS LSPC model subwatersheds resulting in a finer resolution spatial unit for modeling. Model land use was then resampled using this subwatershed-jurisdiction intersect, properly distributing land use categories at the jurisdictional level for attributing sources, while maintaining hydrologic connectivity within the watershed model. This refinement introduced a new layer of resolution, facilitating the rollup of modeled results by jurisdiction to better support source attribution and implementation responsibilities among the participating entities.

Figure 3-1. WMMS model domain and represented land uses and slopes by subwatershed

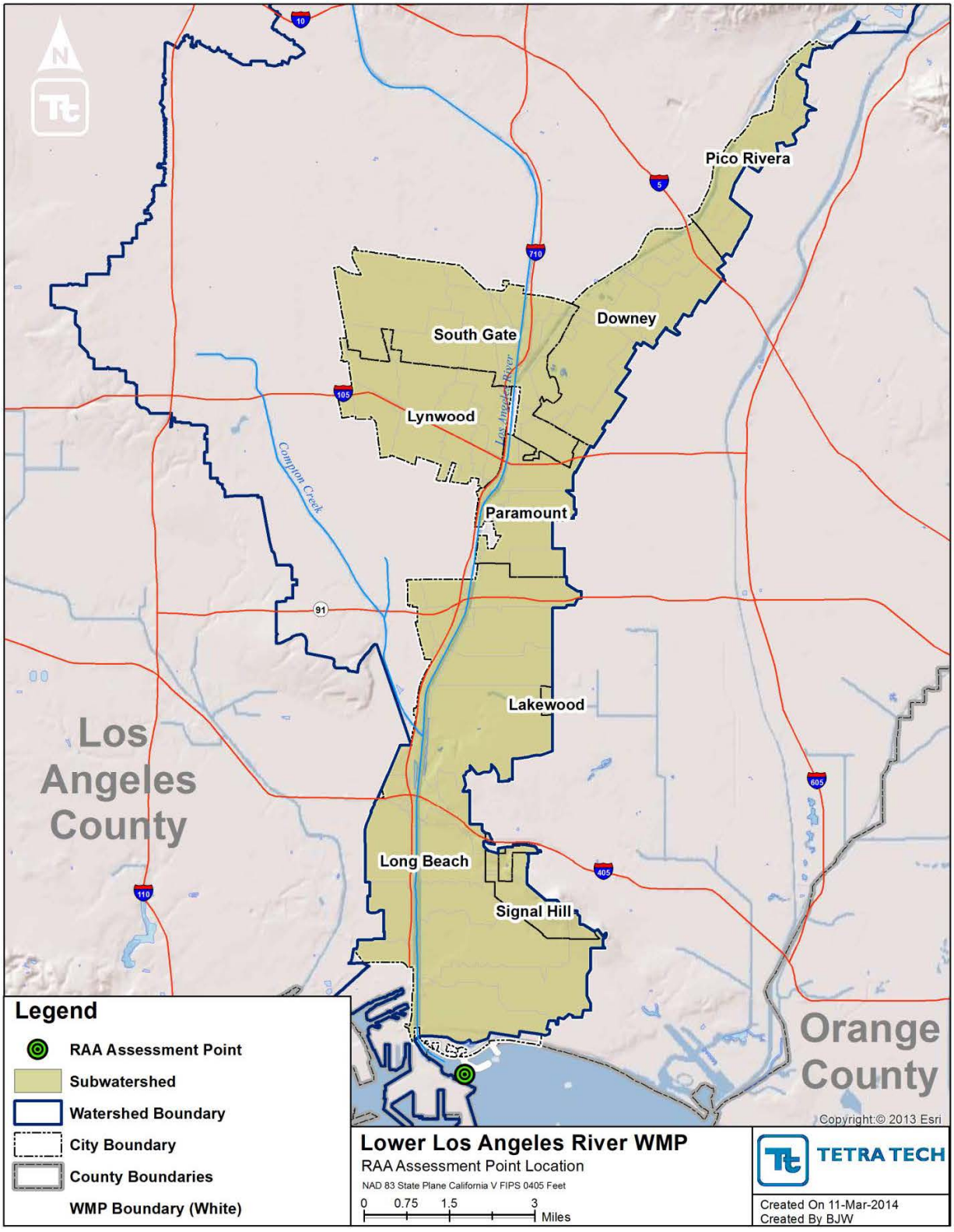

Figure 3-2. Lower LA River WMP Area subwatersheds represented by WMMS

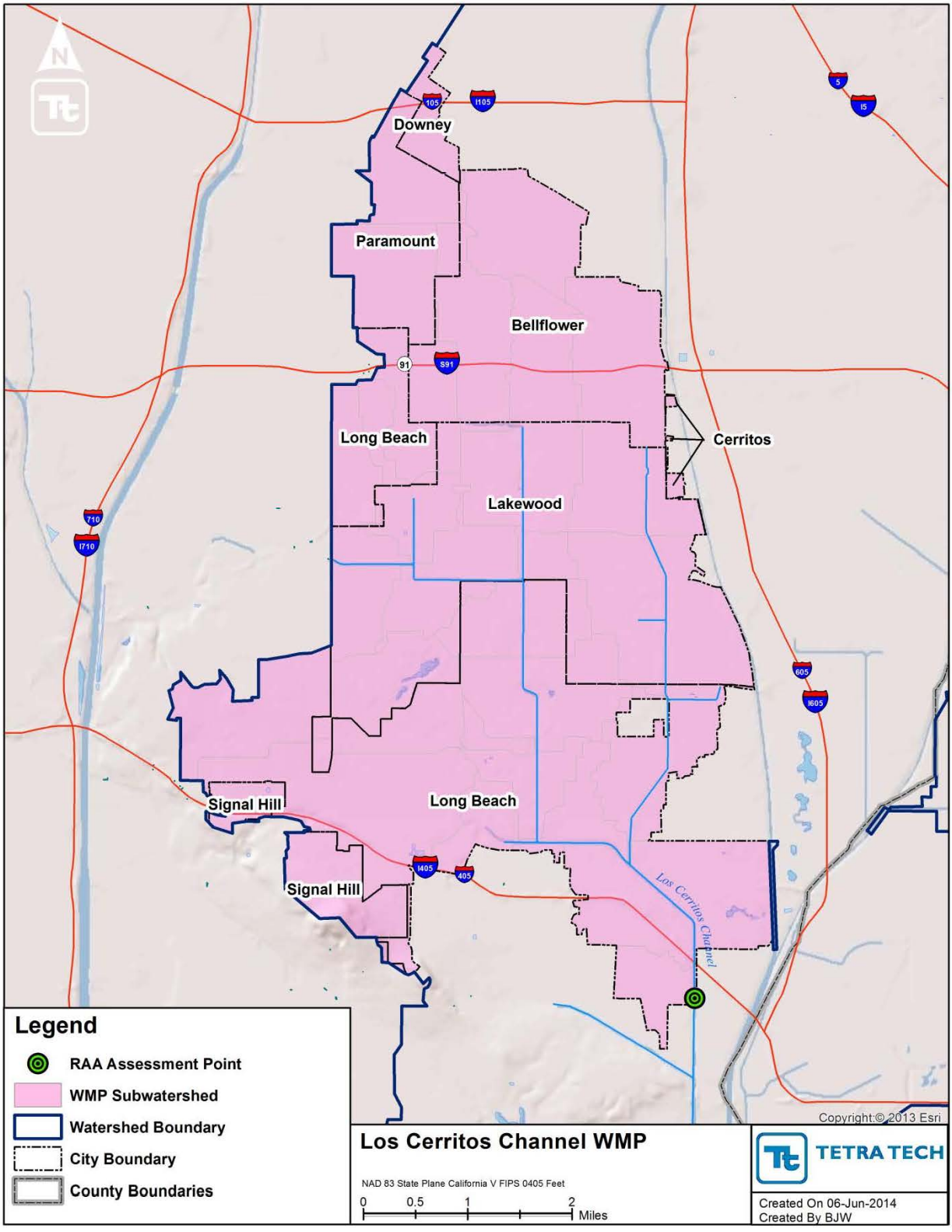

Figure 3-3. Los Cerritos WMP Area subwatersheds represented by WMMS

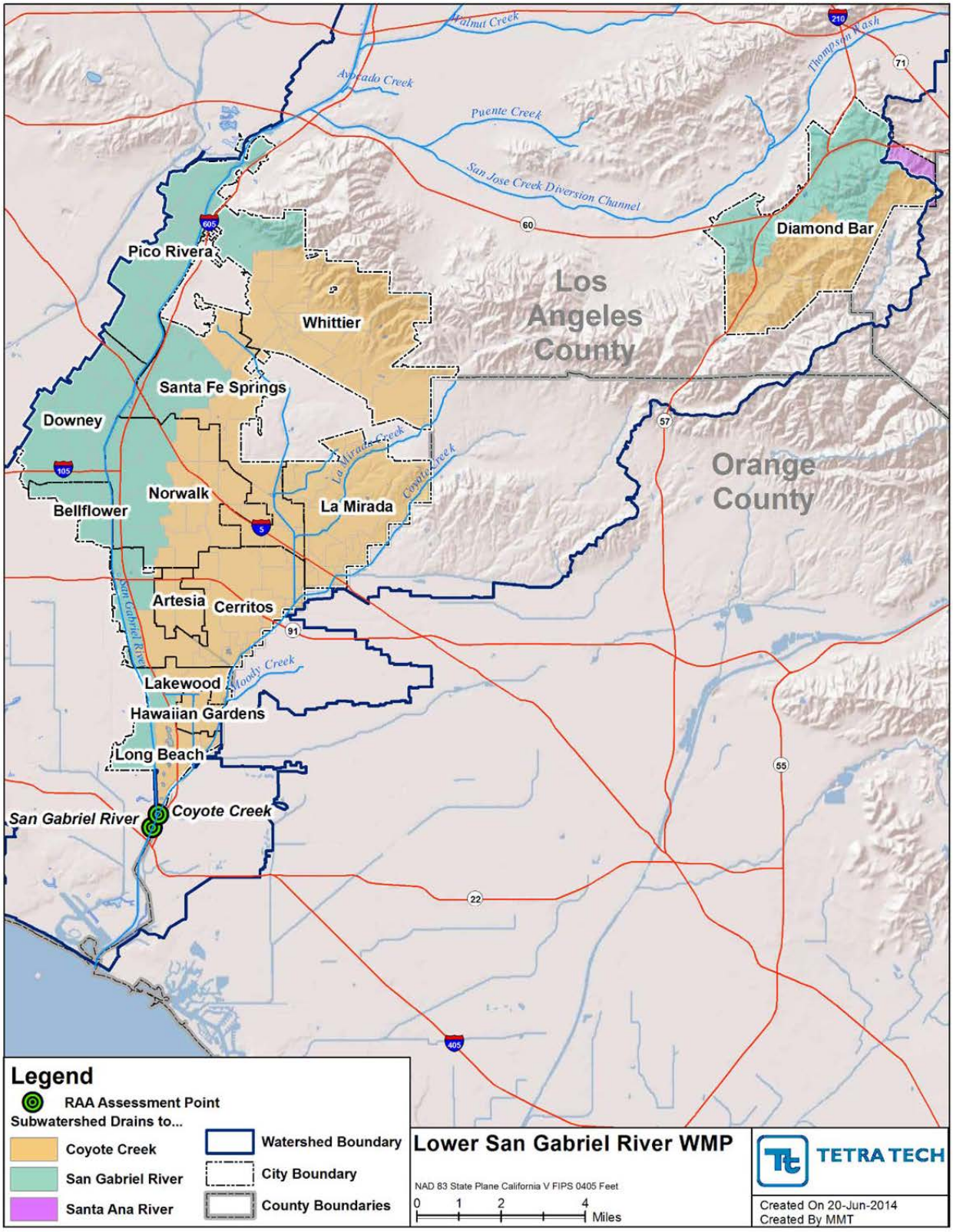

Figure 3-4. Lower San Gabriel River WMP Area subwatersheds represented by WMMS

3.2. Small-Scale BMP Model – SUSTAIN

The System for Urban Stormwater Treatment and Analysis INtegration (SUSTAIN) was developed by USEPA to support practitioners in developing cost-effective management plans for municipal storm water programs and evaluating and selecting BMPs to achieve water resource goals (USEPA, 2009). It was specifically developed as a decision-support system for selection and placement of BMPs at strategic locations in urban watersheds. It includes a process-based continuous simulation BMP module for representing flow and pollutant transport routing through various types of structural BMPs. Users are given the option to select from various algorithms for certain processes (e.g., flow routing, infiltration, etc.) depending on available data, consistency with coupled modeling assumptions, and the level of detail required. Figure 2-3 shows images from the SUSTAIN model user interface and documentation depicting some of the available BMP simulation options in a watershed context.

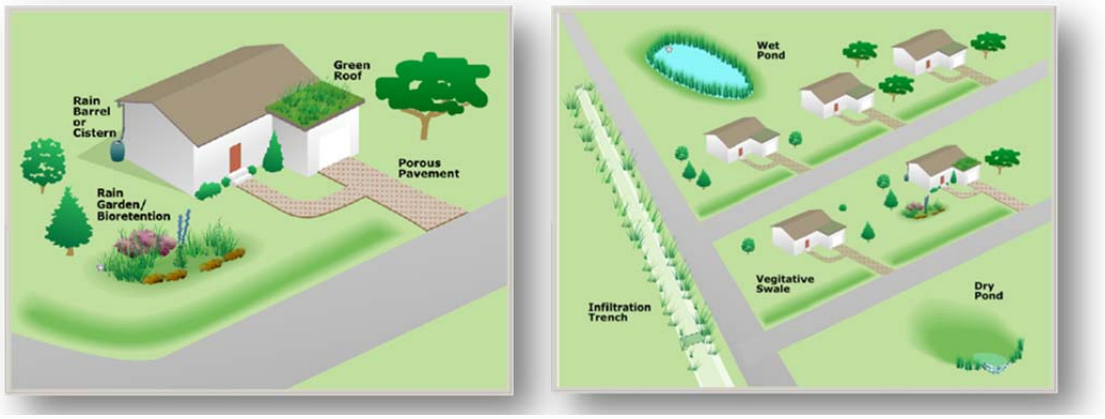

Figure 2-3. SUSTAIN model interface illustrating some available BMPs in watershed settings

SUSTAIN extends the capabilities and functionality of traditionally available models by providing integrated analysis of water quantity, quality, and *cost factors*. The SUSTAIN model in WMMS includes a cost database comprised of typical BMP component cost data from a number of published sources including BMPs constructed and maintained in Los Angeles County. SUSTAIN considers certain BMP properties as "decision variables," meaning that they are permitted to change within a given range during model simulation to support BMP selection and placement optimization. As BMP size changes, so do cost and performance. SUSTAIN runs iteratively to generate a cost-effectiveness curve comprised of optimized BMP combinations within the modeled study area (e.g., the model evaluates the optimal width and depth of certain BMPs to determine the most cost-effective configurations for planning purposes).

3.3. Large-Scale BMP Optimization Tool – NIMS/SUSTAIN

WMMS was specifically designed to dynamically evaluate effectiveness of BMPs implemented in subwatersheds for meeting downstream RWLs while maximizing cost-benefit. WMMS employs optimization based on an algorithm names Nonlinearity-Interval Mapping Scheme (NIMS) to navigate through the many potential scenarios of BMP strategies and identify the strategies that are the most cost effective (Zou et al. 2010). Given the relatively small spatial scale of the WMP area, NIMS was not applied for this study. Instead, a two-tiered approach was applied using the NSGA-II solution technique available in SUSTAIN. For Tier 1, treatment capacities were optimized for each contributing segment, which resulted in unique cost-effectiveness curves for each segment based on available opportunities therein. For Tier 2, the search space was composed of Tier 1 solutions, thereby streamlining the search process. The resulting Tier 2 curve represents the optimal large scale solution because it is comprised of optimized Tier 1 solutions. This approach is especially useful for prioritizing areas for management for scheduling implementation milestones as described in Section 8.

4. Current/Baseline Pollutant Loading

The LSPC model within WMMS was reconfigured and recalibrated specifically for the WMP areas to provide an estimate of current/existing pollutant loads from jurisdictions within the WMPs. Reconfiguration of model subwatersheds was performed to provide specific accounting of loadings from individual jurisdictions. Calibrations were performed to meet specifications of the RAA Guidelines (LARWQCB 2014).

4.1. Model Calibration to Existing Conditions

The LSPC watershed model was originally calibrated for hydrology using a regional approach relying on USGS observed daily streamflow datasets through Water Year (WY) 2006 (LACDPW 2010a). Water Quality was then calibrated using small-scale, land use level water quality monitoring data to develop representative event mean concentrations by land use (LACDPW 2010b). Model performance was also validated at the mass emissions monitoring stations in the context of a county-wide modeling effort. The calibration period for the original WMMS LSPC model began in 1996 and ended in 2006. For the RAA, an analysis was performed to evaluate performance of the LSPC model as it relates to the LLAR, LCC, and LSGR watersheds to understand and benchmark its applicability for use as a baseline condition. The evaluation of monitoring data was extended beyond the original WMMS-LSPC calibration to include the period from 10/1/2001 through 9/30/2011 incorporating both the average year (WY 2008) and 90th percentile (WY 2003) year.

Data available for the LACDPW water quality and hydrologic monitoring stations, S10 and F319 were used to reexamine simulated water quality and hydrology conditions in LA River. The two stations are co-located just south of the West Wardlow Road overpass and drain approximately 800 square miles, or nearly the entire LA River watershed. The monitoring stations were selected for comparison due to their location near the outlet of the LA River watershed, which encompasses the aggregate contributions of all upstream pollutant sources. The selected flow gage, F319, was also used to calibrate the WMMS LSPC model and, therefore, links the current and previous efforts. Water quality and hydrologic records for WYs 2003–2011 were compared to the simulated watershed model output to determine the necessary model parameter adjustments to establish an up-to-date model calibration. The locations of these two gages are presented in Figure 4-1. Statistical summaries and flow regime analysis of the water quality monitoring datasets from the Los Angeles River mass emission station S10 are presented in Attachment E.

Watershed model simulation of existing water quality conditions for the LCC watershed were evaluated for WYs 2003–2011 using data collected at the City of Long Beach Stearns Street monitoring location, just north of interstate 405. The water quality monitoring location is positioned at the WMP hydrologic outlet and captures the cumulative watershed loading effects impacting water quality conditions in this 27 square mile portion of the LCC watershed. No flow monitoring data are available in the watershed, thus simulated flow conditions could not be evaluated against observed data for LCC. The location of the water quality monitoring is presented in Figure 4-1 below and statistical summaries of the monitoring dataset are presented in Attachment E.

For the LSGR, hydrology was re-assessed at two monitoring locations using available data from WYs 2001-2011 The two monitoring locations selected include USGS 11087020 San Gabriel River at Whittier Narrows Dam CA and the LACDPW streamflow gage F354 located along Coyote Creek south of Spring Street (coincident with mass emission station S13). The USGS gage was selected for continuity with the development and calibration of the original WMMS LSPC modeling system. The primary monitoring location selected to calibrate water quality for LSGR was the LA County mass emission station S14. The San Gabriel River Monitoring Station is located below San Gabriel River Parkway in Pico Rivera. At this location the upstream tributary area is 450 square miles (LACDPW 2013). A second mass emission station, the Coyote Creek Monitoring Station (S13) located below Spring Street in the lower San Gabriel River watershed was also used to validate the water quality calibration. The locations of these two gages are presented below in Figure 4-1. Statistical summaries and flow regime analysis of the water quality monitoring datasets from the San Gabriel River and Coyote Creek mass emission stations S14 and S13 are presented in Attachment E.

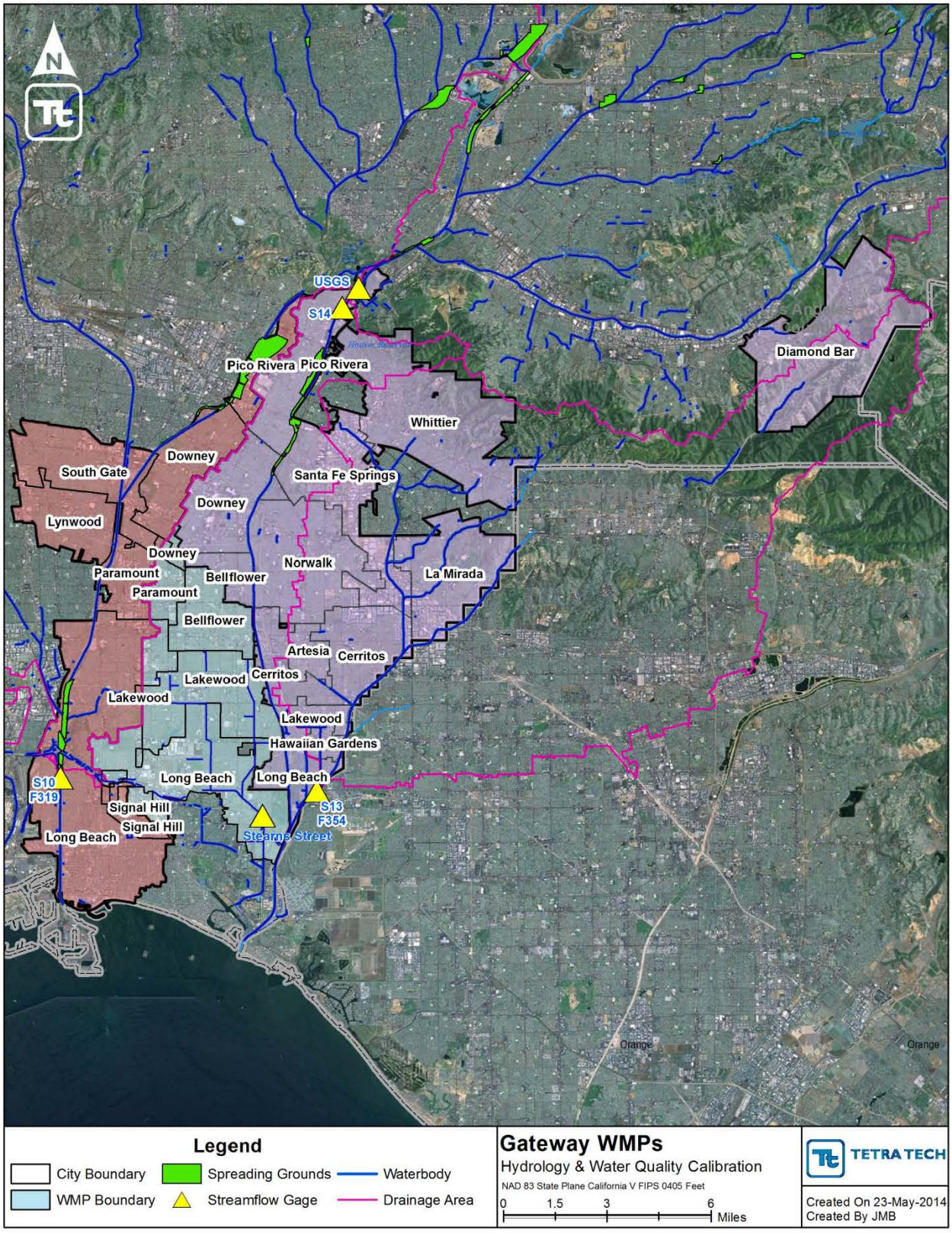

Figure 4-1. WMP groups hydrology and water quality calibration sites.

To demonstrate the ability to predict the effect of watershed processes and management actions, model calibration and validation are necessary and critical steps in any model application. Acceptable model calibration criteria for

benchmarking an RAA were developed by the Regional Board and are listed below in Table 4-1 (LARWQCB 2014). The objectives of establishing model assessment criteria are to ensure the calibrated model reflects all the model conditions and properly utilizes the available modeling parameters, thus yielding meaningful results. The lower bound of "Fair" level of agreement listed in Table 4-1 is considered a target tolerance for the model calibration process.

Table 4-1. Model assessment criteria from the RAA Guidelines

Constituent Group	Percent Difference Between Modeled and Observed		
	Very Good	Good	Fair
Hydrology / Flow	0 – 10	>10 – 15	>15 – 25
Sediment	0 – 20	>20 – 30	>30 – 40
Water Quality	0 – 15	>15 – 25	>25 – 35
Pesticides / Toxics	0 – 20	>20 – 30	>30 – 40

4.1.1. Hydrology Calibration

Table 4-2 and Table 4-3 present the hydrology calibration assessment for the Lower Los Angeles River and Lower San Gabriel River gages, respectively. Nash-Sutcliffle efficiency is a correlation coefficient commonly used in hydrological modeling to measure how well a model predicts temporal variation. A value of 1.0 means a perfect match between modeled and observed. A value of 0 means that the computed mean of observed data is as good a predictor as the model. A negative value means that the data-mean is a better predictor than the model. Because the Regional Board guidance only required annual average flow volume metric, evaluating Nash-Sutcliffe helped to demonstrate that the model also performed well at predicting *intra-annual* flow variablilty.

Table 4-2. Summary of model hydrology calibration performance for Lower Los Angeles River

Water Quality Parameter	Model Period	Hydrology Parameter	Modeled vs. Observed Volume (% Error)	Regional Board Guidance Assessment
In-stream flow at Los Angeles River below Wardlow Road (LA DPW F319)	10/1/2002 – 9/30/2011	Flow Volume	11.88	Good
		Nash-Sutcliffe	0.678	n/a

Table 4-3. Summary of model hydrology calibration performance for Lower San Gabriel River

Water Quality Parameter	Model Period	Hydrology Parameter	Modeled vs. Observed Volume (% Error)	Regional Board Guidance Assessment
In-stream flow at SAN GABRIEL R AB WHITTIER NARROWS DAM CA (USGS 1108702)	10/1/2001 – 9/30/2011	Flow Volume	-19.0	Fair
		Nash-Sutcliffe	0.74	n/a
Coyote Creek near Spring Street (LA DPW F354)	10/1/2003 – 9/30/2011	Flow Volume	4.9	Very Good
		Nash-Sutcliffe	0.61	n/a

4.1.2. Water Quality Calibration

Water quality calibration for the LLAR, LCC, and LSGR incorporated sampling from LA County mass emission stations at S10 (LA River), Streams Street (LCC), and S13 and S14 along Coyote Creek and the San Gabriel River, respectively. The updated observed concentration data collected at these sites were used to refine the calibration and benchmark model performance. Daily observed loads were calculated by multiplying observed concentration and daily observed flow. Daily loads were estimated for LCC using simulated flows due to the lack of observed data. The percent error between this daily observed load and the daily modeled load was then calculated for each constituent. The results of this evaluation at the two gages are presented in Table 4-4 through Table 4-7.

Table 4-4. Summary of model performance by constituent at the Los Angeles River (S10) monitoring location

Water Quality Parameter	Sample Count	Modeled vs. Observed Load (% Error)	Regional Board Guidance Assessment
Total Sediment	91	-6.8	Very Good
Total Copper	58	-3.4	Very Good
Total Zinc	58	-18.1	Good
Total Lead	52	-0.1	Very Good
Fecal Coliform	57	-5.1	Very Good
Total Nitrogen	58	-4.0	Very Good
Total Phosphorous	57	6.9	Very Good

Table 4-5. Summary of model performance by constituent at Los Cerritos Channel (Stearns St.) monitoring location

Water Quality Parameter	Sample Count	Modeled vs. Observed Load (% Error)	Regional Board Guidance Assessment
Total Sediment	85	2.7	Very Good
Total Copper	57	-2.1	Very Good
Total Zinc	56	1.5	Very Good
Total Lead	57	2.2	Very Good
Fecal Coliform	55	1.0	Very Good
Total Nitrogen	56	17.5	Good
Total Phosphorous	56	-0.4	Very Good

Table 4-6. Summary of model performance by constituent at the San Gabriel River (S14) monitoring location

Water Quality Parameter	Sample Count	Modeled vs. Observed Load (% Error)	Regional Board Guidance Assessment
Total Sediment	45	8.57	Very Good
Total Copper	42	-9	Very Good
Total Zinc	44	16.1	Very Good
Total Lead	44	-3.97	Very Good
Fecal Coliform	43	1.85	Very Good
Total Nitrogen	*Not evaluated at this location*		
Total Phosphorous	44	-2.27	Very Good

Table 4-7. Summary of model performance by constituent at the Coyote Creek (S13) monitoring location

Water Quality Parameter	Sample Count	Modeled vs. Observed Load (% Error)	Regional Board Guidance Assessment
Total Sediment	42	1.28	Very Good
Total Copper	27	-28.9	Fair
Total Zinc	27	-32.44	Fair
Total Lead	25	-1.58	Very Good
Fecal Coliform	24	-34.48	Fair
Total Nitrogen	*Not evaluated at this location*		
Total Phosphorous			

Two fecal coliform samples were removed from the observed dataset at the San Gabriel River S14 mass emission station prior to performing the load calculation. These two samples appear to be outliers in the dataset with concentration values 10-100x greater than the remaining samples. These observations occurred on 10/17/2005 and 10/13/2009.

For pollutants not explicitly represented in the WMMS LSPC model, and for dry weather analysis, 90th percentile concentrations were calculated based on observed monitoring data at the LACDPW mass emission sites. The 90th percentile concentration was used for compliance with the Regional Board RAA guidelines (LARWQCB 2014). A summary of the 90th percentile concentrations for each constituent and waterbody are presented below in Table 4-8. For subsequent load reduction analyses, these concentrations were assumed for all wet or dry weather conditions they were assigned to represent existing conditions within their respective watersheds.

Table 4-8. 90th percentile concentrations assumed for non-modeled pollutants

Waterbody	Pollutant	Wet Weather	Dry Weather	90th Percentile Concentration	Units
Los Angeles River (S10)	DDT	●		0.005[1]	ug/L
	PCBs	●		0.0325[1]	ug/L
	PAHs	●		0.835[1]	ug/L
	Cadmium	●		4.8	ug/l
	Copper		●	25.68	ug/l
	Lead		●	3.43	ug/l
	E. coli		●	19,600	MPN/100 mL
Los Cerritos Channel (Stearns)	DDT	●		0.005[1]	ug/L
	PCBs	●		0.0325[1]	ug/L
	PAHs	●		0.835[1]	ug/L
	Copper		●	25.4	ug/l
	E. coli		●	14,200	MPN/100 mL
San Gabriel River (S14)	DDT	●		0.005[1]	ug/L
	PCBs	●		0.0325[1]	ug/L
	PAHs	●		0.835[1]	ug/L
	Copper		●	29.89	ug/l
	Selenium		●	4.77	ug/l
	E. coli		●	2,190	MPN/100 mL
Coyote Creek (S13)	DDT	●		0.005[1]	ug/L
	PCBs	●		0.0325[1]	ug/L
	PAHs	●		0.835[1]	ug/L
	Copper		●	28.54	ug/l
	E. coli		●	11,500	MPN/100 mL

[1] DDT, PCBs and PAHs were below MDL, so concentrations were assumed half MDL.

4.2. Current Best Management Practices/Minimum Control Measures

It is important to note the model calibration incorporates local stormwater BMPs implemented through late 2012 into the baseline condition. The only BMPs/control devices that were explicitly incorporated into the baseline model were the Dominguez Gap basins. All other BMPs, which individually were assumed to have a small effect on water quality at the watershed scale, are implicitly represented in the baseline condition. BMPs implemented in 2013 can be categorized as WMP implementation measures and their volume/load reductions are a component of the pollutant reduction plan for attaining interim and final milestones.

5. Estimated Required Pollutant Load Reductions

This section provides a description of the process for identifying critical conditions and calculating required load reductions to meet interim and final limitations.

5.1. Selected Average (Interim) and Critical (Final) Conditions

The RAA Guidelines specify that average conditions shall be used to establish load reductions for interim milestones and critical conditions shall be used to establish load reductions for final limits. In addition, the Permits provide two pathways for addressing WQ Priorities (see Figure 5-1):

- Volume-based: Retain the standard runoff volume from the 85th percentile, 24-hour storm
- Load-based: Achieve the necessary pollutant load reductions to attain Permit limits

Both types of numeric goals were evaluated as part of this RAA.

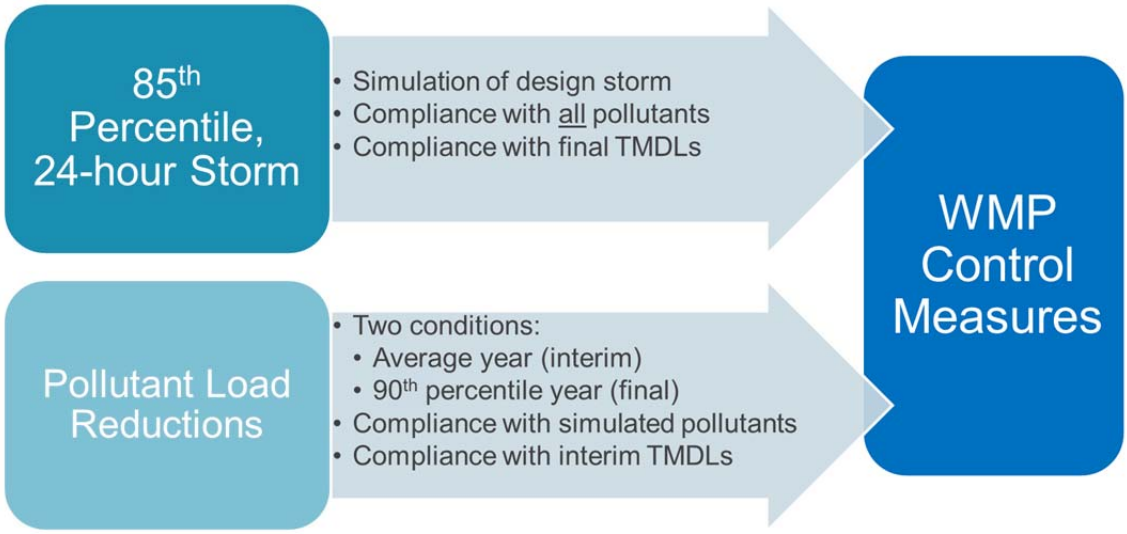

Figure 5-1. Two Types of Numeric Goals and WMP Compliance Paths according to the Permits

5.2. Representative Conditions for Wet Weather

Two approaches were considered and ultimately used in the RAA to represent wet weather critical conditions: the 90th percentile wet year and 85th percentile, 24-hour (design) storm, as described in the following subsections.

5.2.1. Average and 90th Percentile Wet Years

This RAA is based on continuous simulation, and a "representative" year-long time period was selected to represent average and critical conditions, which allows the modeling to capture the variability of rainfall and storm sizes/conditions. For LLAR, LCC, and LSGR, WY2008 was selected as the representative year for average conditions and WY2003 was selected as the representative year for the 90th percentile critical wet conditions.

To select these average and critical years for the RAA, the following steps were taken:

1. **Calculated key rainfall metrics for the last 25-years:** the average and critical years were identified by aggregating data from available rain gages across the entire Los Angeles River and San Gabriel River watersheds (LCC is in between, so the analysis for LLAR and LSGR also applies to LLC). For

comparison, other regional watersheds were also analyzed and presented. The two key metrics evaluated were: (1) total annual rainfall, and (2) average rainfall per wet day (with wet days defined as days with rainfall totals greater than 0.1 inches). The first is clearly an indicator of volume, while the second is an indicator of rainfall intensity. To evaluate long-term conditions, the analysis covered 25 water years (WY) from 1987 through 2011—the total rainfall for each precipitation gage was area-weighted and aggregated into annual totals by water year (i.e. previous October through current September).

2. **Selected years from the most recent 10-years that are most representative of average and 90th percentile**: per the RAA Guidelines, the most recent 10-year period represented in the available data were used to develop the RAA. Table 5-1 and Table 5-2 show average rainfall volumes and intensities (inches per wet day), respectively, for the most recent 10 years compared against the entire 25-years. Both the average and 90th percentile values were compared across the 10- and 25-year records. For the San Gabriel River, 2007-08 is a representative average year based on both the rainfall volume (Table 5-1) and intensity (Table 5-2) metrics. Because BMP performance is typically intensity-dependent, average rainfall per wet day (Table 5-2) was selected as a better metric for use in determining the 90th percentile than annual average rainfall (Table 5-1), which led to selection of 2002-03 as the critical year.

It should be noted that wet weather conditions were also reflective on the definition of dry/wet days. As described in Section 5, for analysis of non-bacteria pollutants (including the limiting pollutant zinc) days with greater than 90th percentile daily average flow were flagged as "wet," which aligns with the critical condition used for the LAR and LSGR metals TMDLs.

5.2.2. 85th Percentile, 24-hour Storm

The design storm is identified in the RAA Guidelines as an acceptable critical condition, and capture of design storm volumes by BMPs is a specified compliance metric in the Permits for TMDLs. The design storm was evaluated and used as a wet weather critical condition for the RAA. As described above, the design storm is a volume-based standard. Each subwatershed within each WMP area has a unique 85th percentile runoff volume, due to varying rainfall amounts and land characteristics (imperviousness, soils, slope, and the like). The rainfall depths associated with the 85th percentile, 24-hour storm are shown in Figure 5-2, based on rolling 24-hour intervals for the 25-year period between October 1, 1987 and September 30, 2011. Within the WMP area, the 85th percentile rainfall depth values range between 0.72 and 1.08 inches.

To determine the "standard volume" associated the design storm, initial conditions were set in LSPC to reflect representative conditions at the start of the simulation, along with regionally derived infiltration rates, and 85th percentile rainfall depths were used as rainfall boundary conditions. At each location the storm distribution presented in Figure 5-3 was used to temporally distribute the 24-hour rainfall volumes (LACDPW 2006). The model was then run to predict the associated runoff volumes for each subwatershed in the WMP area. Those runoff volumes represent the volumes that would need to be retained in order to attain the numeric goals associated with the 85th percentile, 24-hour storm.

Shown in Figure 5-4 are the rainfall depths and runoff depths (runoff volume divided by subwatershed area) associated with the design storm for each subwatershed in the WMP areas. About 50 percent of the subwatersheds in all three WMP areas experiences 0.4 inches or more of runoff under the 85th percentile, 24-hour storm, while about 10 percent of the area experiences about 0.55 inches or more of runoff. Figure 5-5 summarizes the total design storm volumes (in acre-feet) for each jurisdiction. The runoff depths for each subwatershed in the WMP area are graphically shown in Figure 5-6, Figure 5-7, and Figure 5-8.

Table 5-1. Average Rainfall Depths (Water Years 2002–2011 vs. 25-year Average and 90th Percentile)

Year	Average Rainfall Totals (in./year)				
	Ballona Creek	Dominguez Channel	Malibu Creek	San Gabriel River	Los Angeles River
2001-02	25.4	19.1	28.1	30.6	30.5
2002-03	17.1	13.9	20.8	23	20.4
2003-04	10.2	8.1	9.2	13.7	11.2
2004-05	39.3	28.4	42.6	49.6	46.7
2005-06	14.1	9.8	16.9	17.9	17.5
2006-07	4.3	3.1	6.8	6.4	5.8
2007-08	13.2	11.9	18.6	19.4	17.5
2008-09	9.6	8.5	12.3	14.6	12.5
2009-10	16.8	14.9	20.3	24.1	20.5
2010-11	21.2	18.5	25.3	28.5	25.7
Avg. (1987-2011)	15.9	12.5	18.4	20.7	19.2
90th %ile (1987-2011)	30.8	22.9	34.7	37.8	36.9

Red Box: WMP Watersheds. Blue highlighted cells are the two years in each basin with the smallest difference from the 25-year average. Orange cells have the smallest difference from the 90th percentile of the 25-year record.

Table 5-2. Average Rainfall Intensity (Water Years 2002–2011 vs. 25-year Average and 90th Percentile)

Year	Average Rainfall Per Wet Day (in./wet day)				
	Ballona Creek	Dominguez Channel	Malibu Creek	San Gabriel River	Los Angeles River
2001-02	0.36	0.32	0.41	0.42	0.36
2002-03	0.79	0.66	0.88	0.92	0.84
2003-04	0.61	0.48	0.61	0.66	0.58
2004-05	0.98	0.69	1.03	1.07	1.03
2005-06	0.53	0.41	0.61	0.64	0.61
2006-07	0.31	0.27	0.39	0.41	0.37
2007-08	0.56	0.52	0.68	0.76	0.71
2008-09	0.49	0.48	0.56	0.65	0.57
2009-10	0.64	0.6	0.71	0.82	0.72
2010-11	0.62	0.58	0.73	0.76	0.7
Avg. (1987-2011)	0.59	0.52	0.67	0.72	0.66
90th %ile (1987-2011)	0.78	0.66	0.91	0.97	0.89

Red Box: WMP Watersheds. Blue highlighted cells are the two years in each basin with the smallest difference from the 25-year average. Orange cells have the smallest difference from the 90th percentile of the 25-year record.

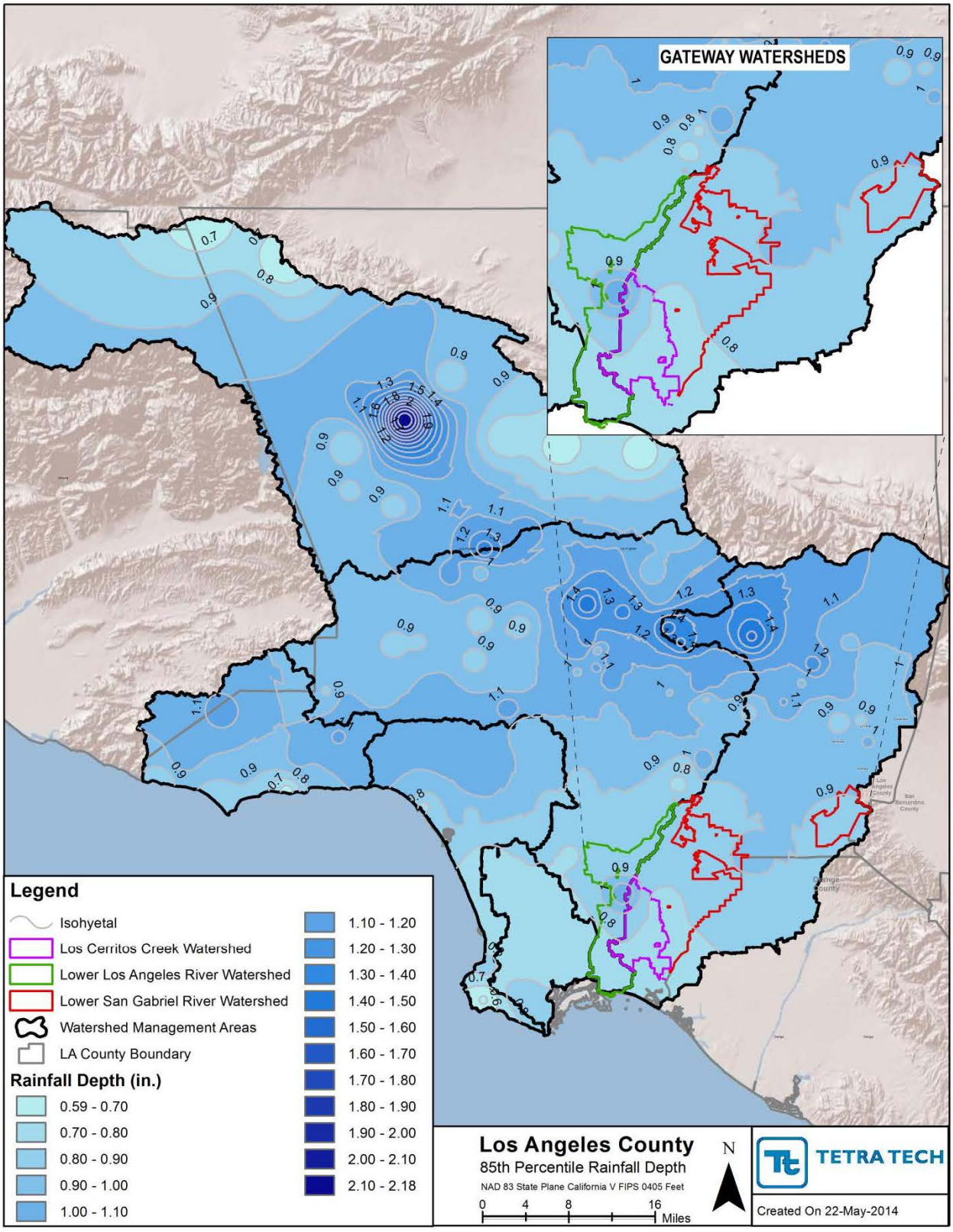

Figure 5-2. Rainfall depths associated with the 85th percentile, 24-hour storm.

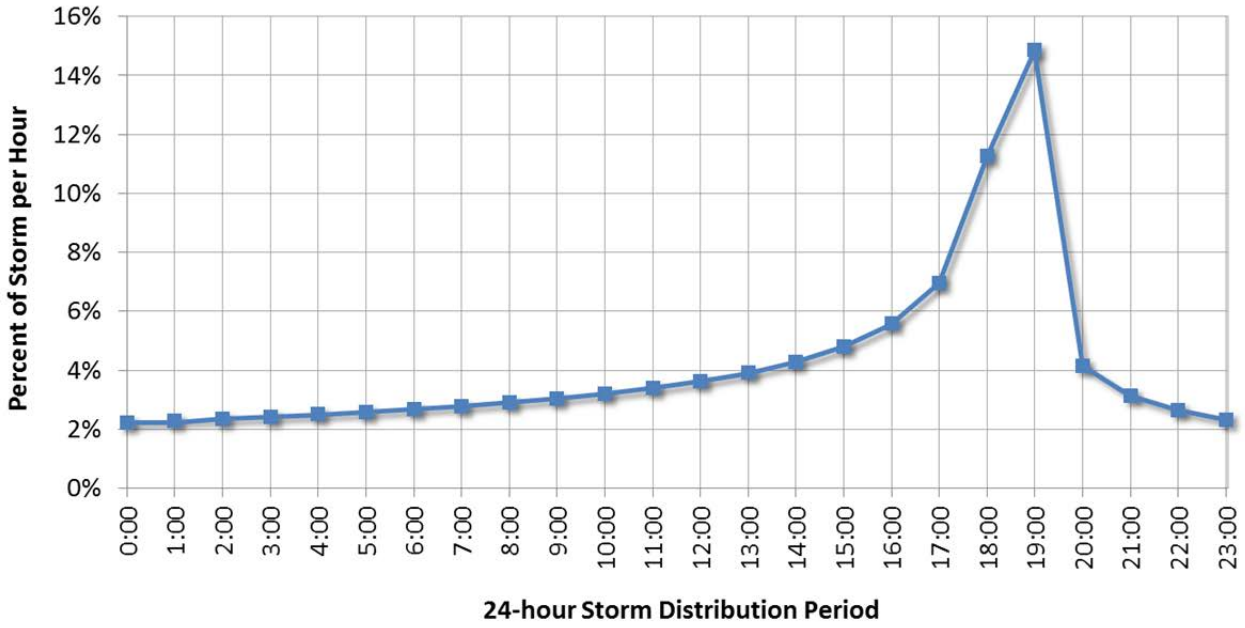

Figure 5-3. Temporal Distribution for 85th Percentile 24-hour Storm for LSPC Simulation.

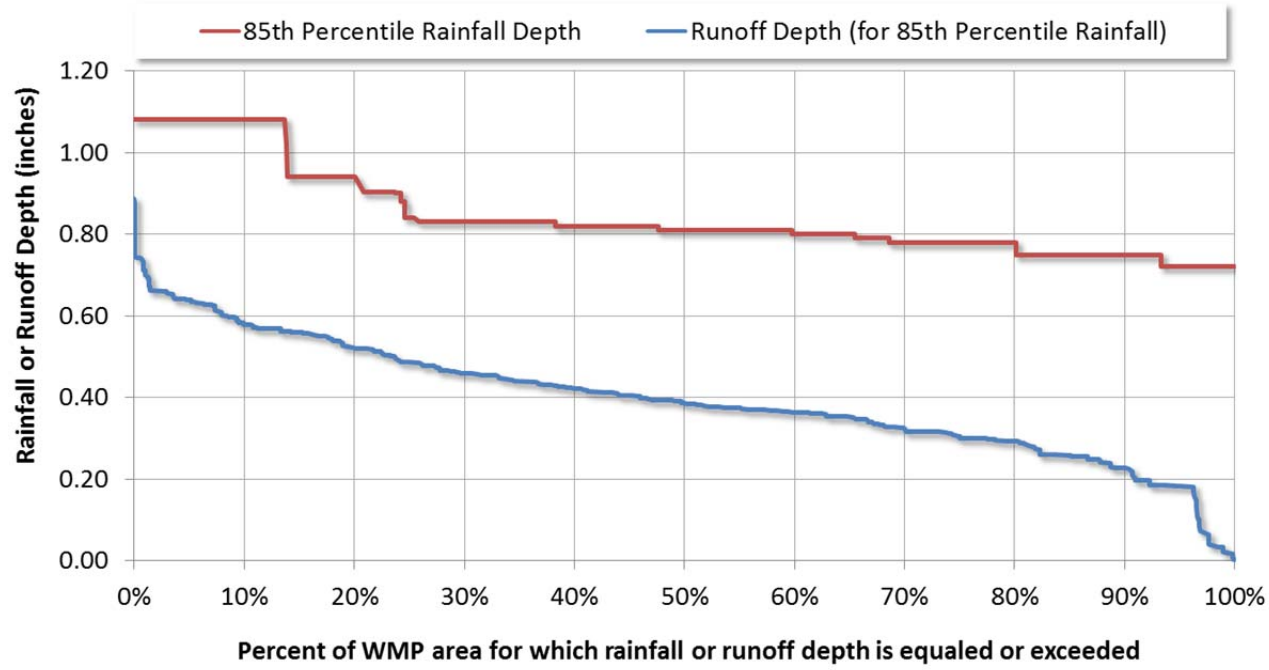

Figure 5-4. Rainfall and Runoff Depths Associated with 85th Percentile Rainfall in the WMP subwatersheds.

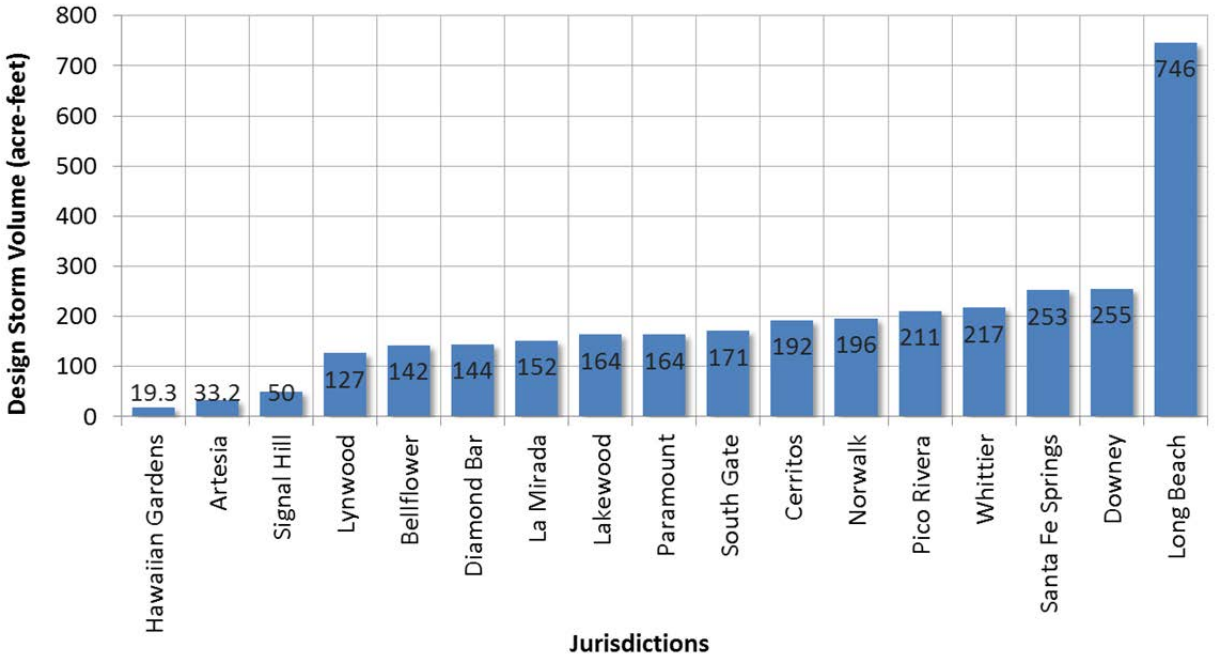

Figure 5-5. Runoff Volume Associated with the 85th Percentile, 24-hour Storm (by jurisdiction).

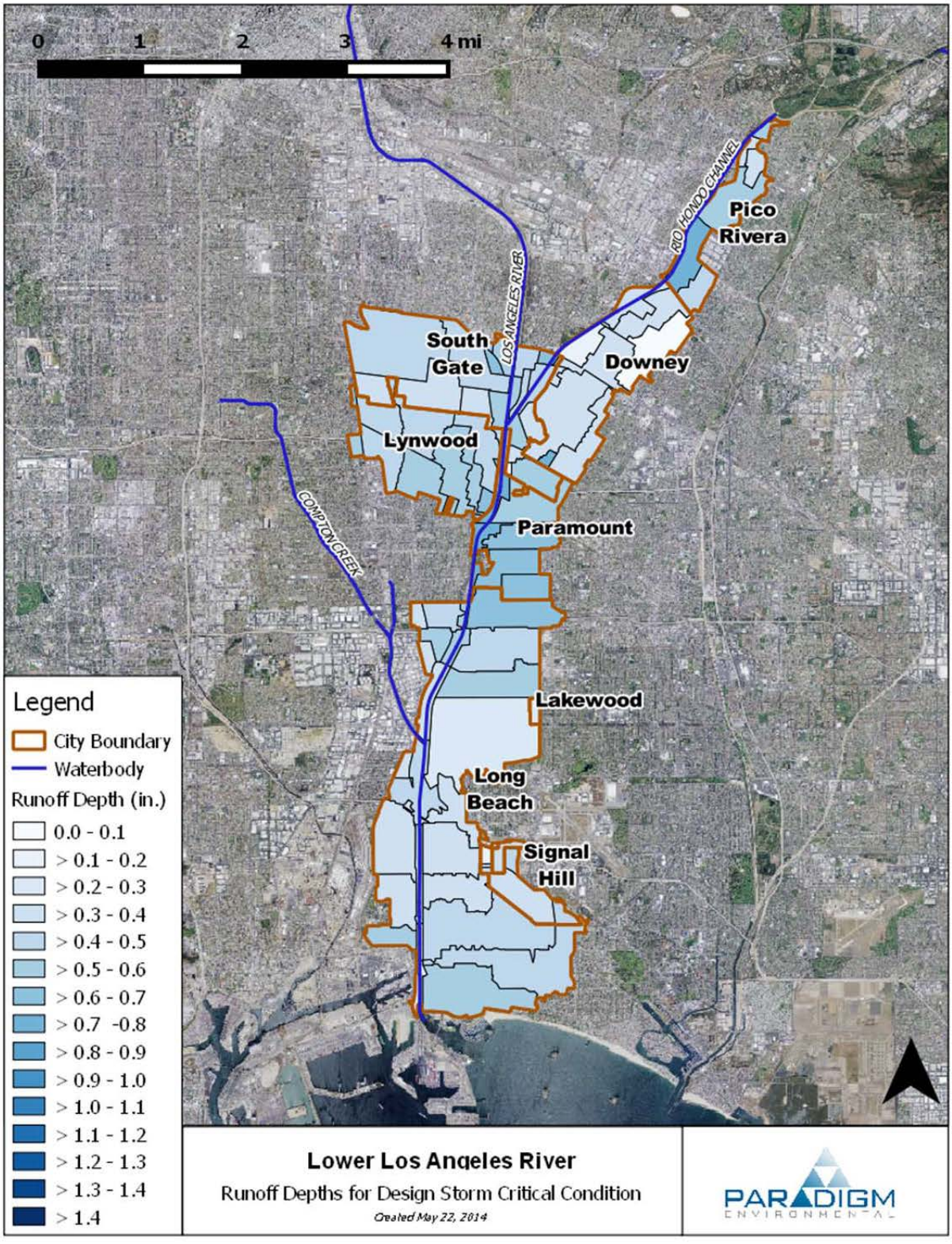

Figure 5-6. Runoff Associated with the 85th Percentile, 24-hour Storm for Lower Los Angeles River.

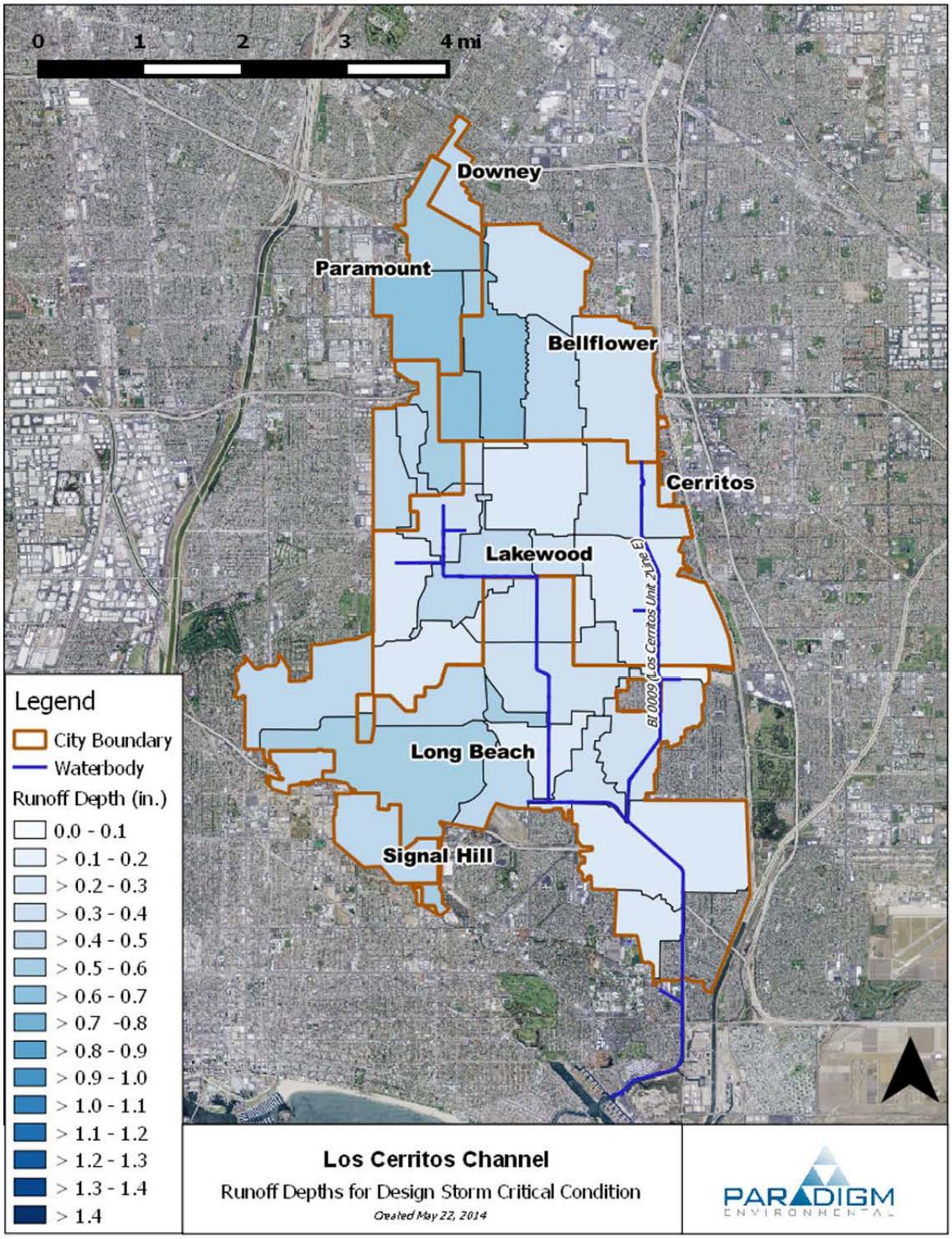

Figure 5-7. Runoff Associated with the 85th Percentile, 24-hour Storm for Los Cerritos Channel.

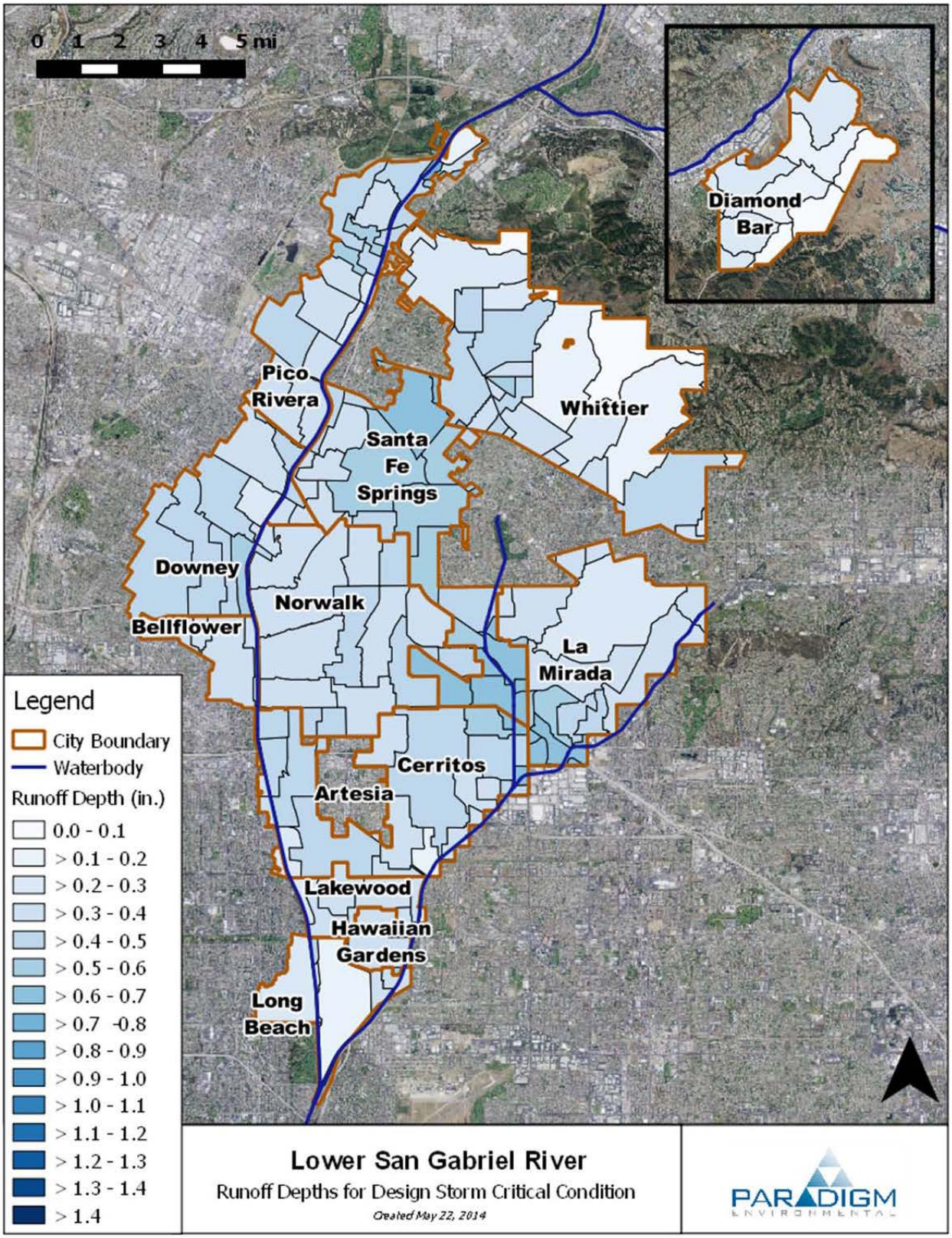

Figure 5-8. Runoff Associated with the 85th Percentile, 24-hour Storm for Lower San Gabriel River.

5.2.3. Representative Conditions for Dry Weather

Although clearly defined definitions exist for wet periods, definitions for dry periods are less clearly defined. Wet weather periods are either defined in terms of rainfall or instream flow. For bacteria, a wet day is one with a rainfall total greater than 0.1 inches plus the three subsequent days, while metals criteria define wet days as those with instream flow above the 90th percentile. One seemingly intuitive way of defining a dry period is simply to use the "non-wet" days represented as the inverse of wet days. However, summary of model results indicate some residual influence of wet weather among the "non-wet" days. This presents some challenges for estimating loads and evaluating dry weather compliance because BMP planning would be better served by choosing design conditions that are more influenced by natural background baseflow and/or anthropogenic activities such as point source discharges or dry weather runoff from irrigation (instead of post-rain event interflow).

The RAA Guidelines recommend using the most recent 10 years of data for modeling scenarios to ensure that the plans are based on a representative range of wet and dry conditions. Regional precipitation and instream flow patterns are highly variable; therefore, a representative dry period is one that consistently represents minimal influence to wet weather conditions. To identify a representative dry period, the analysis covered 25 WYs from 1987 through 2011. The following steps were taken:

1. The total rainfall for each precipitation gage in the study area was summarized and classified into wet and non-wet periods according to the bacteria criteria definition for wet weather (i.e. days with rainfall > 0.1 inches plus the three subsequent days).
2. Dry periods were evaluated on a monthly time scale. Table 5-3 shows the average number of consecutive 30-day dry periods, counted by month of the associated mid-interval date, for each of the rainfall gages within the three WMP areas over the 25 years of rainfall evaluated. The color-ramp indicates relative dryness, with red being driest. Table 5-3 indicates that on average, the months of June, July, and August are the driest months in the year, averaging 24-30 consecutive dry intervals. Note that because this table counts mid-interval dates by month, values approaching 30 actually indicate continuous dry intervals approaching 60 days (15 days on either side of the 30 day interval).
3. Select periods within the average and critical year were identified for dry weather simulations. The areal coverage or non-wet intervals in the two selected representative years (2008 and 2003) were compared against the 10-year period (2001-2011) and the long-term 25-year period (1998-2011). Figure 5-9, Figure 5-10, and Figure 5-11 show the selected representative dry period against summaries of non-wet weather conditions in the LLAR, LCC, and LSGR WMP areas, respectively. Within the two selected years, the 45-day period between 8/17 and 9/30 was found to be the most representative of dry weather conditions because (1) no rainfall occurred at any of the gages throughout all three WMP areas, (2) it was during a time of the year that was historically shown to experience the least amount of spatially-weighted rainfall in a year, and (3) it was late in the summer following an extended period of no rainfall for both 2003 and 2008.

The identified periods between 8/17 and 9/20 during the average and critical years were used for subsequent dry weather simulations for the dry weather component of the RAA.

Table 5-3. Consecutive 30-day Dry Periods per month by WMP and rainfall gage (10/1/1987 – 9/30/2011)

WMP	StaID	Average Number of Consecutive 30-Day Dry Intervals Per Month (10/1/1987 – 9/30/2011)											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Los Cerritos Channel	D1254	2.2	1.9	6.2	11.9	22.3	25.2	28.9	28.9	21.4	12.7	7.8	4.4
	D1255	2.8	1.8	4.4	8.8	20.3	25.1	29.7	29.8	21.8	13.0	7.3	2.9
	D225	3.0	2.3	6.3	10.5	20.6	24.7	28.8	29.5	21.4	13.1	9.1	3.6
	D388	2.1	1.3	3.8	8.5	18.6	24.0	27.6	29.2	21.0	12.3	5.1	3.2
	D415	1.9	1.2	5.7	9.6	19.0	24.0	28.1	29.1	23.4	13.1	8.9	3.7
Lower Los Angeles River	D1113	4.2	2.5	8.3	9.8	19.5	24.4	28.1	27.8	23.6	13.7	8.8	4.5
	D1114	1.6	1.1	4.0	8.9	19.6	25.1	29.7	29.6	20.8	12.3	5.5	3.0
	D1256	2.1	1.4	4.8	10.4	20.5	24.6	28.8	29.8	23.5	14.2	6.2	3.1
	D291	3.3	1.1	5.0	8.8	19.4	24.4	28.7	28.4	21.9	11.6	4.6	3.5
	D388	2.1	1.3	3.8	8.5	18.6	24.0	27.6	29.2	21.0	12.3	5.1	3.2
	D415	1.9	1.2	5.7	9.6	19.0	24.0	28.1	29.1	23.4	13.1	8.9	3.7
Lower San Gabriel River	D106	4.2	0.6	6.0	10.9	19.7	24.6	28.6	29.0	23.9	14.0	8.2	4.0
	D1088	2.2	1.0	3.8	9.0	17.6	24.1	28.5	29.0	20.9	12.6	5.9	2.7
	D1095	2.4	0.5	4.4	10.0	19.2	24.6	28.6	29.1	21.2	14.2	7.1	4.2
	D1114	1.6	1.1	4.0	8.9	19.6	25.1	29.7	29.6	20.8	12.3	5.5	3.0
	D1254	2.2	1.9	6.2	11.9	22.3	25.2	28.9	28.9	21.4	12.7	7.8	4.4
	D1255	2.8	1.8	4.4	8.8	20.3	25.1	29.7	29.8	21.8	13.0	7.3	2.9
	D1256	2.1	1.4	4.8	10.4	20.5	24.6	28.8	29.8	23.5	14.2	6.2	3.1
	D1257	2.0	0.5	4.5	10.6	18.9	24.4	28.6	29.8	21.2	10.3	5.7	3.0
	D1271	1.8	1.6	3.9	9.4	18.1	24.4	28.6	29.7	21.6	11.7	7.3	3.4
	D156	3.0	1.5	5.2	10.1	19.2	24.6	28.5	29.3	21.0	13.4	7.2	5.0
	D17	1.7	1.2	5.2	9.1	17.5	22.4	28.6	29.0	22.6	11.3	5.2	3.7
	D225	3.0	2.3	6.3	10.5	20.6	24.7	28.8	29.5	21.4	13.1	9.1	3.6
	D269	1.8	0.5	4.2	8.1	18.0	24.2	28.6	29.1	22.2	13.0	6.7	3.2

Legend: Wet → Dry

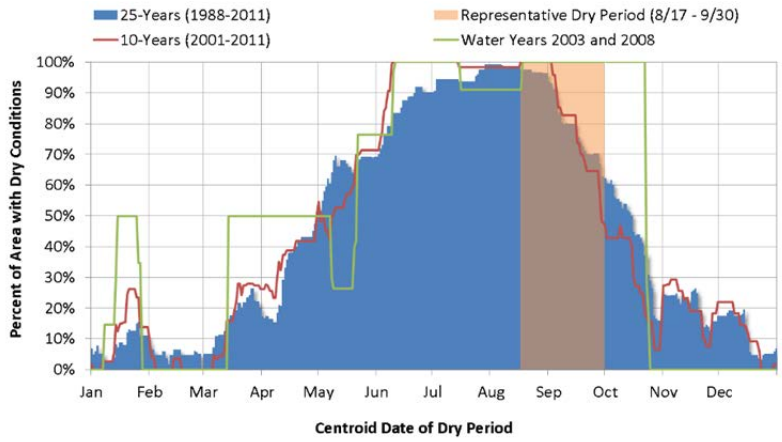

Figure 5-9. Spatiotemporal summary of non-wet weather conditions in the Lower Los Angeles River WMP area.

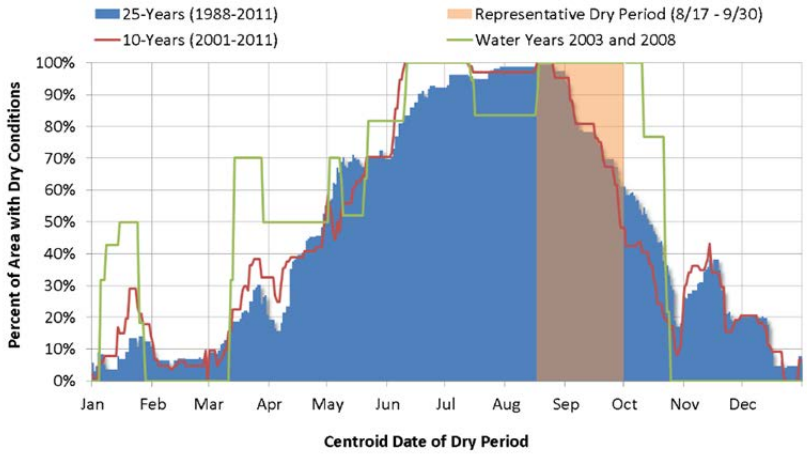

Figure 5-10. Analysis of summary of non-wet weather conditions in the Los Cerritos Channel WMP area.

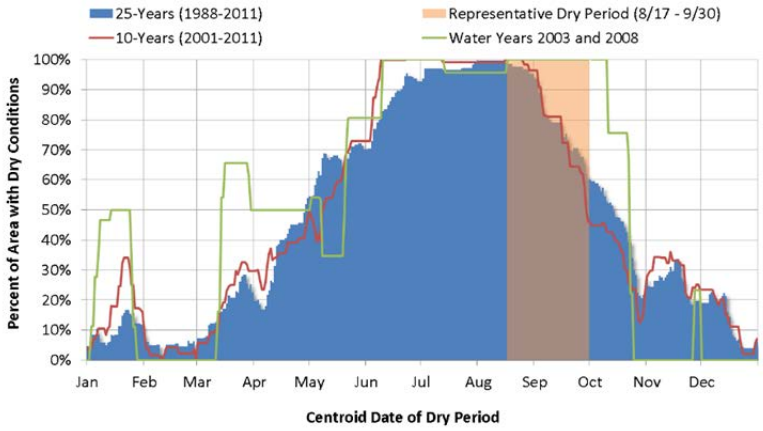

Figure 5-11. Spatiotemporal summary of non-wet weather conditions in the Lower San Gabriel River WMP area.

5.3. Calculated Required Pollutant Reductions to Achieve Final Limits

Using the average storm year (2007-08) and 90th percentile storm year (2002-03), required pollutant reductions were calculated for attainment of interim and final limitations, respectively, applicable to each WMP area. Per the RAA Guidelines, the percent reduction used to determine the control measures necessary to attain interim milestones shall be based on the average year, while the control measures for attainment of the final limits are based on the 90th percentile year.

Required load reductions were evaluated at RAA Assessment Points located at the bottom-most discharge from each WMP areas (shown in Figure 3-2 through Figure 3-4). The RAA Assessment Points represent locations where the collective discharge from each jurisdiction with each WMP area can be assessed to contribute to pollutant loads to the receiving waters. Pollutant loads outside of the WMP areas are not considered in this loading analysis at the RAA Assessment Points, although in reality other loads exist. However, transport of pollutant loads from individual jurisdictions within the WMP areas are considered, including the effect of LACFCD infrastructure and other hydraulic features that can impede flows and associated pollutant loads to the location of the RAA Assessment Points. The result is an accounting system that provides reasonable tracking and estimation of required load reductions throughout each individual WMP area so that meaningful goals can be set for BMP implementation planning.

Applicable targets for wet and dry conditions for Category 1 WQ Priorities (corresponding to the TMDLs within each watershed) are listed in Table 5-4 and Table 5-5, respectively. These targets were used to establish the daily "exceedance load" and daily "allowable load". The differences in these loads, as predicted by LSPC, were tracked across the average year and 90th percentile year and used to calculate the required pollutant reduction. While Category 1 WQ Priorities were emphasized, targets were also applied for Category 2 and Category 3 WQ Priorities. In particular, to provide a comprehensive WMP planning approach, copper, lead, zinc and *E. coli* were assessed for all RAA assessment points (even if a TMDL is not applicable).

For bacteria targets, it should be noted that Allowable Exceedance Days and high flow suspension (HFS) days were incorporated (if applicable) into the percent reduction calculation. The approach of the LA River Bacteria TMDL was used to align Exceedance Days and HFS days. The HFS applies to LLAR and LSGR but not LCC (and thus HFS days were not incorporated into the required reduction calculation for LCC). For LSGR and LCC, a bacteria TMDL has not been adopted but the RAA Guidelines state that targets and critical conditions from other TMDLs in the region should be utilized. If the Allowable Exceedance Days were removed from the percent reduction calculations for LSGR and LCC, the required reductions would increase.

Table 5-4. Applicable wet weather TMDL targets for Category 1 WQ Priorities

WMP Area	Waterbody	Pollutant	Target	Source
LLAR	LAR Reach 1 (freshwater)	Cd kg/d	$2.8x10^{-9}$ X daily storm volume (L) - 1.8	WQBEL
	LAR Reach 1 (freshwater)	Cu kg/d	$1.5x10^{-8}$ X daily storm volume (L) - 9.5	WQBEL
	LAR Reach 1 (freshwater)	Pb kg/d	$5.6x10^{-8}$ X daily storm volume (L) - 3.85	WQBEL
	LAR Reach 1 (freshwater)	Zn kg/d	$1.4x10^{-7}$ X daily storm volume (L) - 83	WQBEL
	All LLAR	DDT ug/kg TSS	1.58	Harbor Toxics TMDL
	All LLAR	PCBs ug/kg TSS	22.7	Harbor Toxics TMDL
	All LLAR	PAHs ug/kg TSS	4,022	Harbor Toxics TMDL
	LAR Reach 1 (freshwater)	*E-coli* MPN/100mL	235 (exceedances allowed during HFS days and 10 exceedance days)	WQBEL

WMP Area	Waterbody	Pollutant	Target	Source
LCC	All LCC	Cu g/d	$4.709X10^{-6}$ X daily storm volume (L)	WQBEL
	All LCC	Pb g/d	$26.852X10^{-6}$ X daily storm volume (L)	WQBEL
	All LCC	Zn g/d	$46.027X10^{-6}$ X daily storm volume (L)	WQBEL
	All LCC	DDT ug/kg TSS	1.58	Harbor Toxics TMDL
	All LCC	PCBs ug/kg TSS	22.7	Harbor Toxics TMDL
	All LCC	PAHs ug/kg TSS	4,022	Harbor Toxics TMDL
LSGR	SG Reach 2	Pb ug/L	81.34	WQBEL
	Coyote Cr.	Cu ug/L	24.71	WQBEL
	Coyote Cr.	Pb ug/L	96.99	WQBEL
	Coyote Cr.	Zn ug/L	144.57	WQBEL
	SG Reach 1 & Coyote Cr.	DDT ug/kg TSS	1.58	Harbor Toxics TMDL
	SG Reach 1 & Coyote Cr.	PCBs ug/kg TSS	22.7	Harbor Toxics TMDL
	SG Reach 1 & Coyote Cr.	PAHs ug/kg TSS	4,022	Harbor Toxics TMDL

Table 5-5. Applicable dry weather TMDL targets for Category 1 WQ Priorities

WMP Area	Waterbody	Pollutant	Target	Source
LLAR	LAR Reach 1 (freshwater)	Cu ug/L	23	WQBEL
	LAR Reach 1 (freshwater)	Pb ug/L	12	WQBEL
	LAR Reach 1 (freshwater)	*E-coli* MPN/100mL	126	WQBEL
LCC	All LCC	Cu g/d	67.2	WQBEL
	All LCC	*E-coli* MPN/100mL	126	WQBEL
LSGR	SG Reach 1	Cu ug/L	18	WQBEL
	SG Reach 1	*E-coli* MPN/100mL	126	WQBEL
	San Jose Cr. Reach 1&2	Se ug/L	5	WQBEL
	San Jose Cr. Reach 1&2	*E-coli* MPN/100mL	126	WQBEL
	Coyote Cr.	Cu kg/d	0.941	WQBEL
	Coyote Cr.	*E-coli* MPN/100mL	126	WQBEL

5.3.1. Wet-Weather Required Pollutant Reductions

The wet weather pollutant reduction targets for average and critical conditions are summarized in Table 5-6 (all WMP areas) and shown graphically in Figure 5-12 through Figure 5-15 (individual WMP areas). These analyses were used to determine the limiting pollutant. The limiting pollutant is defined as the pollutant requiring the greatest load reduction, and BMPs implemented to achieve the limiting pollutant reductions are protective of other pollutant reductions (e.g., sediment or volume reductions). In Table 5-6, the red color gradient highlights limiting pollutants, with a deeper red generally indicating a more limiting pollutant. Zinc was identified as the limiting pollutant for each WMP area[4]. The determination of limiting pollutant considered implementation actions to control the pollutant – for example, Senate Bill 346 will result in significant reductions of copper loading from brake pads. Because total source control measures are not on the horizon for zinc, it becomes the limiting pollutant instead of copper. The evaluation of copper and organics as limiting pollutants and rationale for their exclusion is described below.

Although DDT and PCBs were estimated to have high load reduction requirements to meet WQBELs, they were not identified as limiting pollutants because the maximum detection limits (MDLs) used for the analysis heavily affected the calculated required reductions. Rather than use LSPC for reduction calculations, monitoring data were used directly and many reported concentrations for DDT, PCBs, and PAHs were below MDLs, so concentrations were assumed in the model to equal half the MDL. The MDL is above the target leading to non-detects requiring reductions. Of course, toxics will be addressed by control measures implemented for zinc. The Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters Toxic Pollutants TMDL states that "implementation of other TMDLs in the watershed may contribute to the implementation of this TMDL," and implementation of the effective TMDLs in Los Angeles River and San Gabriel River are integrated within Phase I of the implementation of the toxics TMDL (LARWQCB and USEPA 2011). As a result, DDT, PCBs, and PAHs were not represented in Figure 5-12 through Figure 5-15.

Although copper was calculated to have a higher required reduction than zinc, the effect of Senate Bill 346 is expected to reduce those reductions without any implementation of structural control measures. The Brake Pad Partnership was formed in 1999 as a collaboration of cities, industry, and other entities to address the lack of information and research regarding the impact of brake debris material in the environment. After its formation, the Brake Pad Partnership commissioned several technical studies to better quantify the fate and transport of copper to San Francisco Bay including a detailed source assessment. Overall findings of the study estimated that of the anthropogenic sources of copper, approximately 35 percent are attributed to brake pad releases (BPP 2010). Even if the reduction was only half of this amount, the adjustment to the required copper reduction would still result in zinc being the limiting pollutant in LLAR, LCC, and LSGR.

After excluding organics and total copper for the reasons described previously, total zinc becomes the limiting pollutant in each of the WMP areas during the 90th percentile year. In other words, reductions of zinc during WMP implementation will drive reduction of other pollutants, particularly because the pollutant reduction plan emphasizes sediment control (other pollutants are typically transported with sediment) and retention/infiltration rather than pollutant treatment.

[4] In LSGR, a higher percent reduction for bacteria was calculated for the average year than the 90th percentile (see Figure 5-14). Although total annual rainfall in 2008 and 2003 were virtually identical over the entire SGR watershed (20.5 and 20.4 inches/year, respectively), 2003 had fewer wet days than 2008, resulting in relatively more intense events on average (about 18 percent higher). As a result, 2003 had more HFS days than 2008—exceedances during HFS days are not considered when computing the required load reduction, lowering the required reduction.

Table 5-6. Wet-weather pollutant reduction targets by WMP area with analysis of limiting pollutants[5]

WMP	Year	Organics			Metals			Bacteria
		DDT	PCB	PAH	TCu [2]	TPb	TZn [3]	E-Coli
Lower Los Angeles River (LLAR)	2003	87.3%	72.0%	0.0%	84.1%	38.6%	67.4%	23.4%
	2008	90.0%	77.9%	0.0%	82.8%	32.9%	64.9%	45.1%
Los Cerritos Channel (LCC)	2003	86.6%	70.3%	0.0%	95.6%	76.7%	90.8%	40.4%
	2008	89.6%	77.1%	0.0%	87.1%	3.6%	75.6%	47.9%
Lower San Gabriel River (LSGR)	2003	79.5%	54.6%	0.0%	40.1%	0.0%	29.3%	22.9%
	2008	91.4%	80.7%	0.0%	18.0%	0.0%	25.0%[4]	53.0%
Coyote Creek (CC)	2003	75.9%	46.8%	0.0%	37.5%	0.0%	28.3%	19.1%
	2008	91.3%	76.8%	0.0%	22.7%	0.0%	30.4%[4]	59.2%

Color ramps highlight potentially limiting (Red) vs. pollutants determined to be non-limiting for this analysis (Blue)

1. Average year is 2008 and 90th percentile year is 2003
2. Red box: Organics managed through sediment and associated metals reduction. Organic load reductions above influenced by assigned concentrations at half the MDLs (monitoring data below MDLs), and therefore are suspect and not considered limiting. Cu is not limiting after brake-pad reductions
3. Blue Box: Zinc is limiting pollutant for the 90th percentile year
4. Bacteria reduction target is lower in 2003 than 2008 because more days were classified as high-flow suspension (HFS)

[5] For the Diamond Bar jurisdiction of the San Gabriel River WMP area, a portion flows to the Santa Ana River. Since this area is open space and therefore not associated with MS4 runoff, no reductions were determined necessary. Loadings for the 90th percentile year from this area are 1.16 kg/year of total Cu, 0.87 kg/year of total Pb, 5.21 kg/year of total Zn, and 4.91x10^{12} #/year of E-coli.

RB-AR7337

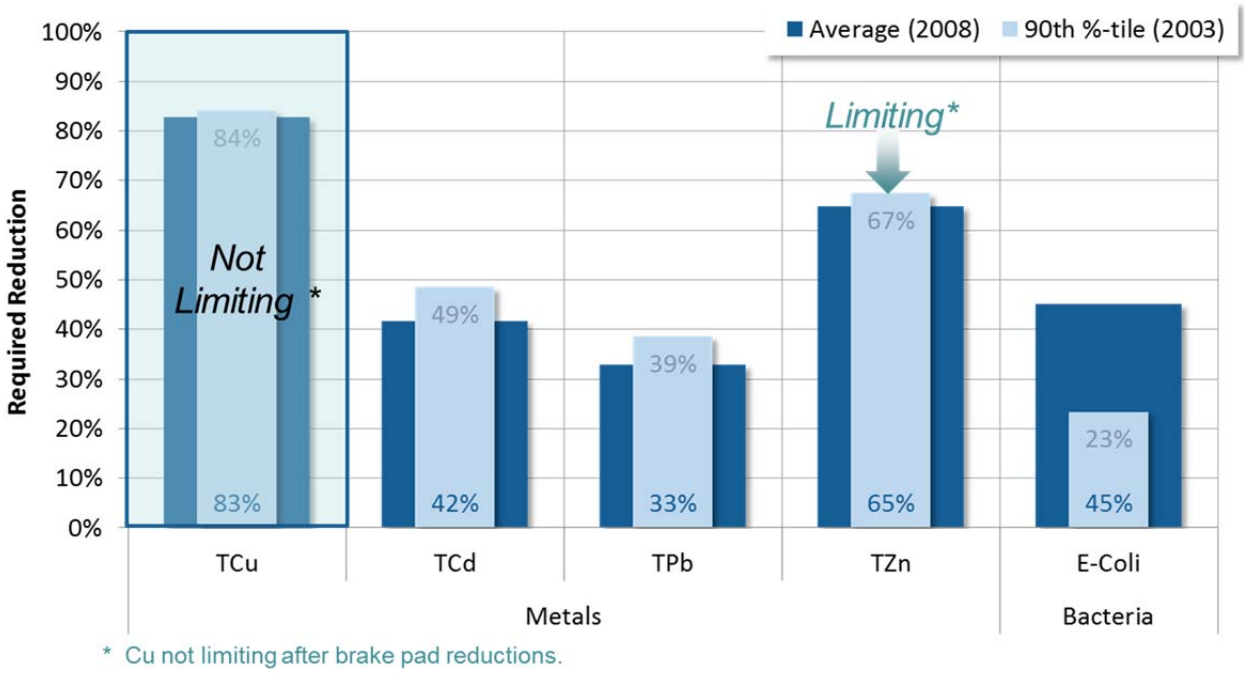

Figure 5-12. Wet-weather pollutant reduction targets and limiting pollutant for Lower Los Angeles River WMP.[6]

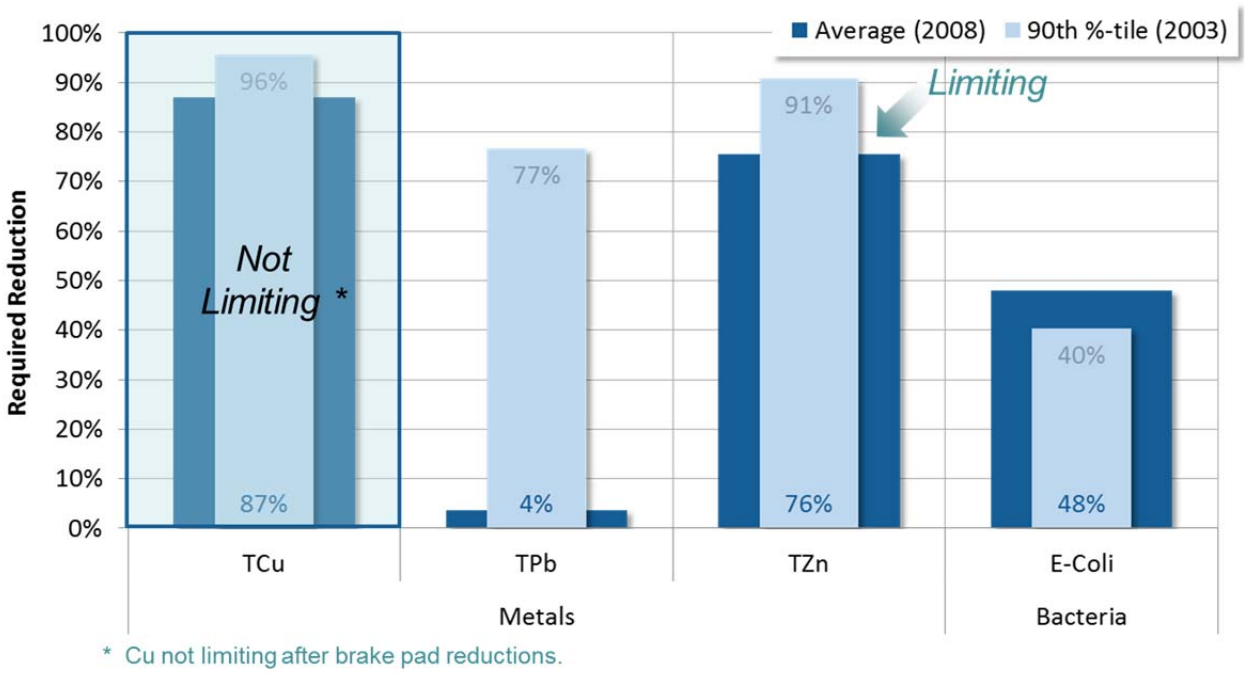

Figure 5-13. Wet-weather pollutant reduction targets and limiting pollutant for Los Cerritos Chanel WMP.

[6] Note that the Los Cerritos Channel TMDLs for Metals requires no reduction of Pb.

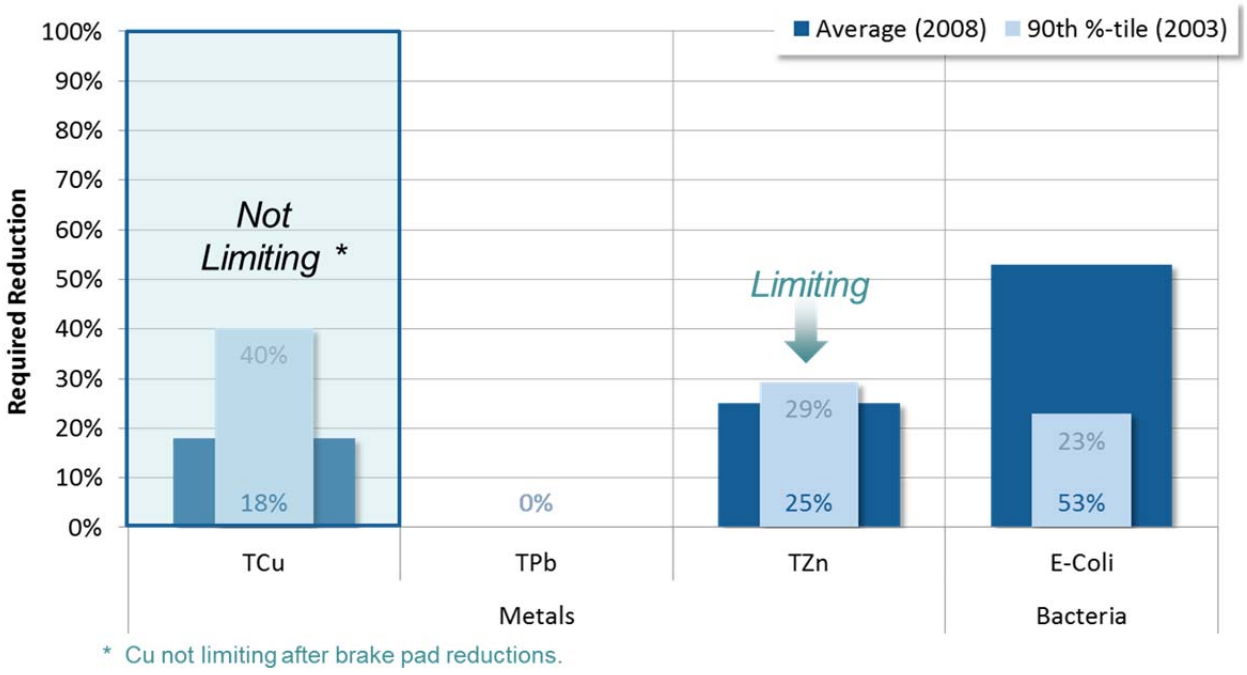

Figure 5-14. Wet-weather pollutant reduction targets and limiting pollutant for Lower San Gabriel River.

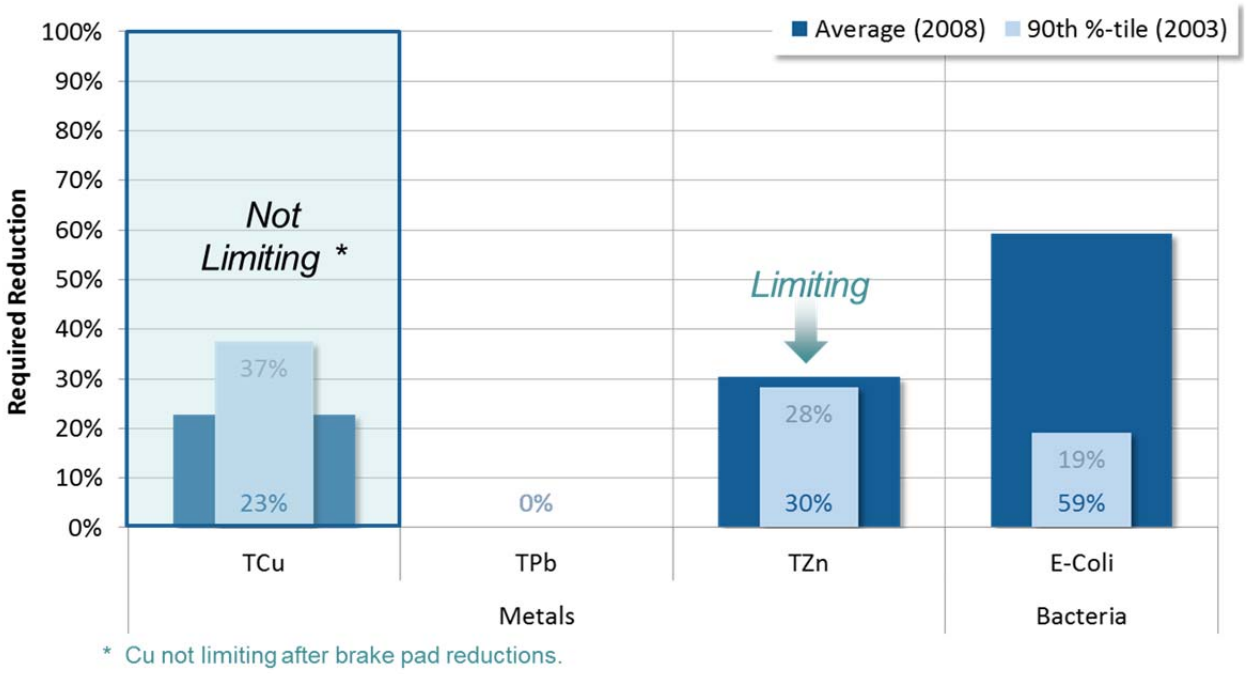

Figure 5-15. Wet-weather pollutant reduction targets and limiting pollutant for Coyote Creek.

5.3.2. Dry-Weather Pollutant Reduction Targets

Using the representative dry-weather period of August 17 through September 30, as defined in Section 5.2.3, modeled instream flow was multiplied by the observed dry weather concentrations to get existing conditions loads, which are shown in Table 5-7. Likewise, target concentrations were also multiplied by modeled instream flow to get allowable load for each waterbody, which is shown in Table 5-8. Finally, Table 5-9 summarizes dry-weather reduction targets for each listed segment for both the average year and the 90th percentile year.

For dry weather, bacteria is the limiting pollutant (not zinc) because the required reductions are much higher than other pollutants. Reductions of bacteria during WMP implementation will drive reductions of other pollutants.

Table 5-7. Existing condition dry-weather loads by water body

Existing Condition		Dry Weather Flow (cfs)		Existing Load (kg/day or MPN/day)		
Waterbody	**Pollutant**	**2003**	**2008**	**2003**	**2008**	**Mean**
LAR Reach 1 (freshwater)	Cu ug/L	99.97	65.63	6.28	4.12	5.20
LAR Reach 1 (freshwater)	Pb ug/L	99.97	65.63	0.84	0.55	0.69
LAR Reach 1 (freshwater)	*E. coli* MPN/100ml	99.97	65.63	4.79E+13	3.15E+13	3.97E+13
LCC	Cu ug/L	4.65	2.20	0.29	0.14	0.21
LCC	*E. coli* MPN/100ml	4.65	2.20	1.62E+12	7.64E+11	1.19E+12
SG Reach 1	Cu ug/L	69.04	75.36	5.05	5.51	5.28
SG Reach 1	*E. coli* MPN/100ml	69.04	75.36	3.70E+12	4.04E+12	3.87E+12
San Jose Cr. Reach 1 & 2	Se ug/L	12.54	19.62	0.06	0.09	0.07
San Jose Cr. Reach 1 & 2	*E. coli* MPN/100ml	12.54	19.62	6.72E+11	1.05E+12	8.62E+11
Coyote Cr.	Cu ug/L	19.65	15.69	1.37	1.10	1.23
Coyote Cr.	*E. coli* MPN/100ml	19.65	15.69	5.53E+12	4.41E+12	4.97E+12

Table 5-8. Allowable TMDL dry-weather loads by water body

Existing Condition		Dry Weather Flow (cfs)		Allowable Load (kg/day or MPN/day)		
Waterbody	**Pollutant**	**2003**	**2008**	**2003**	**2008**	**Mean**
LAR Reach 1 (freshwater)	Cu ug/L	99.97	65.63	5.63	3.69	4.66
LAR Reach 1 (freshwater)	Pb ug/L	99.97	65.63	2.94*	1.93*	2.43*
LAR Reach 1 (freshwater)	*E. coli* MPN/100ml	99.97	65.63	3.08E+11	2.02E+11	2.55E+11
LCC	Cu ug/L	4.65	2.20	0.07	0.07	0.07
LCC	*E. coli* MPN/100ml	4.65	2.20	1.43E+10	6.78E+09	1.06E+10
SG Reach 1	Cu ug/L	69.04	75.36	3.04	3.32	3.18
SG Reach 1	*E. coli* MPN/100ml	69.04	75.36	2.13E+11	2.32E+11	2.23E+11
San Jose Cr. Reach 1 & 2	Se ug/L	12.54	19.62	0.15*	0.24*	0.20*
San Jose Cr. Reach 1 & 2	*E. coli* MPN/100ml	12.54	19.62	3.87E+10	6.05E+10	4.96E+10
Coyote Cr.	Cu ug/L	19.65	15.69	0.94	0.94	0.94
Coyote Cr.	*E. coli* MPN/100ml	19.65	15.69	6.06E+10	4.48E+10	5.45E+10

*Existing dry-weather loads are currently below the allowable loads thus showing compliance for this pollutant.

Table 5-9. Required dry-weather percent reductions by water body

WMP	Waterbody	Pollutant	Required Dry-Weather Percent Reductions		
			2003	**2008**	**Mean**
LLAR	LAR Reach 1 (freshwater)	Cu	10%	10%	10%
	LAR Reach 1 (freshwater)	Pb	0%	0%	0%
	LAR Reach 1 (freshwater)	*E. coli*	99.36%	99.36%	99.36%
LCC	LCC	Cu	76.74%	50.85%	68.43%
	LCC	*E. coli*	99.11%	99.11%	99.11%
LSGR	Coyote Cr.	Cu	31.42%	14.11%	23.73%
	Coyote Cr.	*E. coli*	98.90%	98.90%	98.90%
	SG Reach 1	Cu	39.78%	39.78%	39.78%
	SG Reach 1	*E. coli*	94.25%	94.25%	94.25%
	San Jose Cr. Reach 1 & 2	Se	0%	0%	0%
	San Jose Cr. Reach 1 & 2	*E. coli*	94.25%	94.25%	94.25%

Color Ramp shows relative magnitude of reductions—darker means higher reductions

6. Determination of Potential BMP Capacity for RAA

The process for determining the necessary cumulative BMP capacity depends on the type of numeric goal being addressed. As shown in Figure 6-1, the volume-based (design storm) approach, necessary BMP capacity was determined through a design storm analysis. For the load-based (pollutant reduction), the analysis leveraged the optimization routines in the customized WMMS. An initial step in the RAA was a comparison of the volume reductions required by the load-based and volume-based numeric goals, to support selection of the wet weather critical conditions.

For LLAR, LCC, and LSGR, the 90th percentile WY (2002-03) weather was selected as the critical condition for wet weather.

Details on the analyses performed to determine potential BMP treatment capacity are provided in Attachment A. The attachment describes the approach for incorporating nonstructural BMPs, accounting for the effect of LACFCD infrastructure, and separating the contribution from non-MS4 sources.

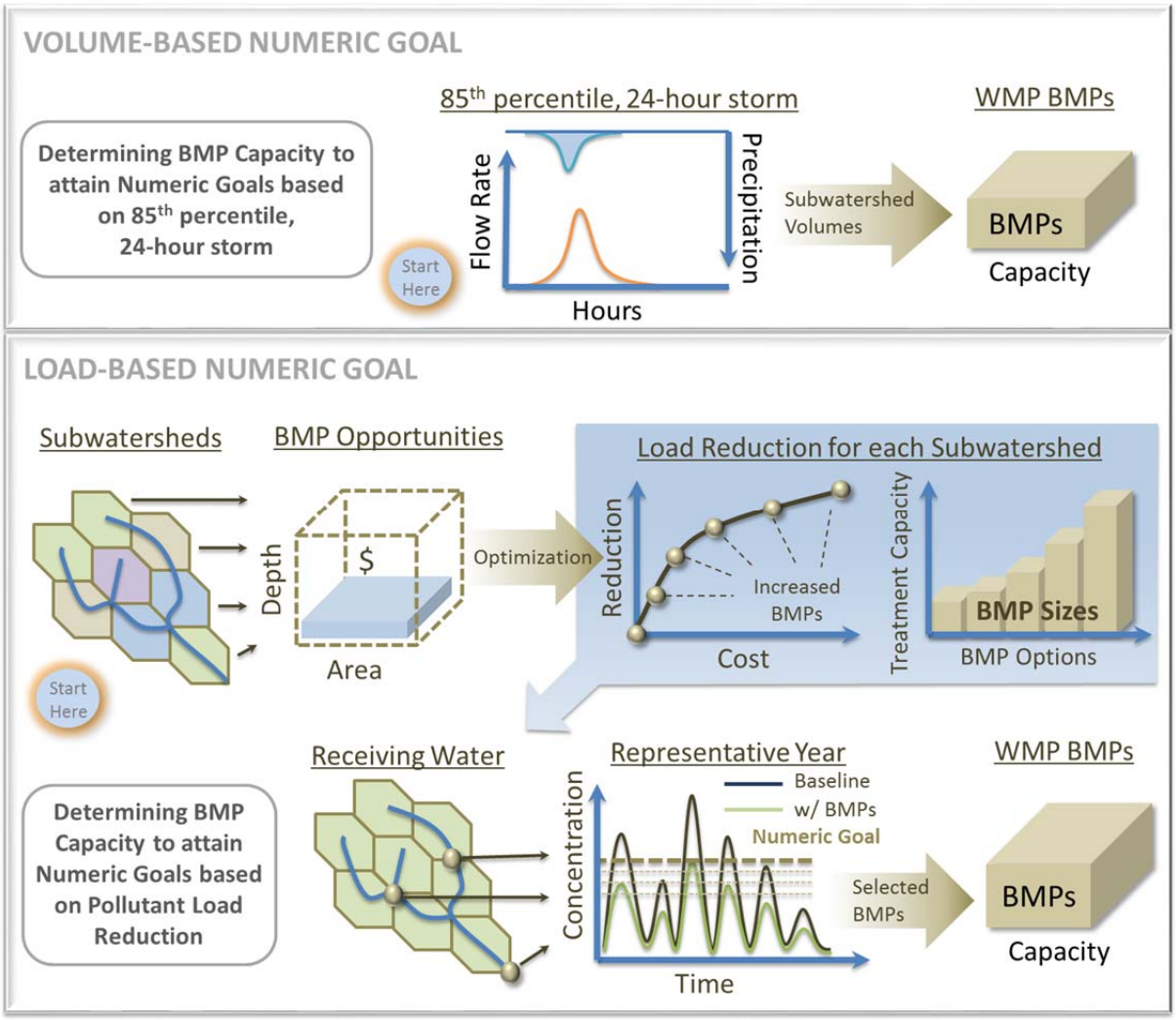

Figure 6-1. Illustration of Process for Determining Required BMP Capacities for the WMP using Volume-Based (top panel) and Load-Based (bottom panel) Numeric Goals.

7. Cumulative Volume Reduction Goals to Achieve Required Pollutant Reductions

The first output of the RAA is a series of "volume reduction goals" for each subwatershed and jurisdiction in the WMP area. WMMS was used to determine the stormwater retention volumes for each subwatershed that would achieve the required load reductions, as reported in this section. These calculated runoff reduction volumes for each subwatershed are a surrogate compliance metric for the responsible agencies. It should be noted that upon implementation, opportunities may arise where flow-through BMPs may provide similar ultimate pollutant load reduction, and may replace the need to implement volume-based reduction BMPs.

These volumes also form the basis for selection of BMPs to achieve those volume reductions, as described in Section 9 and Attachment A.

7.1. Volume Reductions for Structural BMPs

Structural BMPs were modeled using the assumptions outlined in Attachment A. BMP capacities were optimized across the entire study area to achieve the final milestone pollutant reduction requirements at each of the assessment points. Instead of summarizing optimization results in terms of BMP capacity, which is really specific to the network described in Attachment A, the results were summarized as required *annual* wet-weather retention volume (in acre-feet). This provides a volumetric basis that is (1) closely related to load reduction and (2) readily transferable as a control target for parallel BMP modeling at a finer resolution. Because the volumes were isolated to wet days, it is also not skewed by dry-weather runoff retention. The following subsections provide more details about the wet- and dry-weather analysis components.

7.1.1. Wet Weather

Using the structural BMP routing network in WMMS (described in Attachment A), the required *annual* wet-weather retention volume (in acre-feet) were calculated using the critical year time series. For milestones, the percent reduction was based on average year targets while final limits were based on critical year targets. The reported annual volumes are (1) based on required load reductions and (2) ready for BMP modeling at a finer resolution. A 10 percent load reduction was assumed to result from implementation of all nonstructural control measures outlined in the WMPs, setting the foundation of WMP implementation, and structural control measures provide additional load reduction.

Table 7-1 through Table 7-4 present incremental and cumulative retention volumes required to achieve each load reduction milestone by jurisdiction. The milestones are based on the metals TMDLs as described in Section 2. In order to calculate the incremental volume reductions for each milestone, optimization was performed for each jurisdiction to (1) emphasize BMP implementation in subwatersheds that volume reduction could most cost effectively reduce pollutants and (2) establish a cost-effective sequence of subwatersheds for each jurisdiction to achieve the milestones over time. In other words, WMMS was used to develop an implementation schedule that provides early gains in receiving water quality.

Table 7-1. Annual volume reduction goals to achieve interim and final milestones for Lower Los Angeles River WMP by jurisdiction

Jurisdiction	Total Critical Year Storm Volume Target (acre-ft/year)		
	Milestone	Incremental	Cumulative[1]
Downey	31%	143.8	143.8
	50%	221.7	365.5
	Final	360.5	726.0
Lakewood	31%	14.3	14.3
	50%	0.0	14.3
	Final	0.0	14.3
Long Beach	31%	540.7	540.7
	50%	1090.8	1,631.5
	Final	2270.1	3,901.7
Lynwood	31%	303.3	303.3
	50%	185.2	488.6
	Final	619.6	1,108.1
Paramount	31%	181.8	181.8
	50%	227.8	409.6
	Final	579.2	988.8
Pico Rivera	31%	365.3	365.3
	50%	0.0	365.3
	Final	12.0	377.3
Signal Hill	31%	32.8	32.8
	50%	106.6	139.4
	Final	58.4	197.9
South Gate	31%	229.3	229.3
	50%	343.2	572.6
	Final	940.0	1,512.6

1: Color Ramp highlights relative amount of required retention volume for milestones: darker is more, lighter is less
2: Includes full implementation of planned non-structural practices

Table 7-2. Annual volume reduction goals to achieve interim and final milestones for Los Cerritos Channel WMP by jurisdiction

Jurisdiction	Total Critical Year Storm Volume Target (acre-ft/year)		
	Milestone	Incremental	Cumulative[1]
Bellflower	10%	NS	NS
	35%	336.1	336.1
	Final	801.3	1,137.4
Cerritos	10%	NS	NS
	35%	9.7	9.7
	Final	3.2	12.9
Downey	10%	NS	NS
	35%	77.0	77.0
	Final	35.8	112.8
Lakewood	10%	NS	NS
	35%	282.4	282.4
	Final	874.8	1,157.2
Long Beach	10%	NS	NS
	35%	560.9	560.9
	Final	2115.2	2,676.1
Paramount	10%	NS	NS
	35%	278.8	278.8
	Final	353.1	631.9
Signal Hill	10%	NS	NS
	35%	269.9	269.9
	Final	52.7	322.6

1: Color Ramp highlights relative amount of required retention volume for milestones: darker is more, lighter is less
NS: Non-structural practices achieve 10% milestone

Table 7-3. Annual volume reduction goals to achieve interim and final milestones for Lower San Gabriel River WMP

Jurisdiction	Total Critical Year Storm Volume Target (acre-ft/year)		
	Milestone	Incremental	Cumulative[1]
Artesia	10%	NS	NS
	35%	1.1	1.1
	Final	0.0	1.1
Bellflower	10%	NS	NS
	35%	1.3	1.3
	Final	61.5	62.8
Cerritos	10%	NS	NS
	35%	6.6	6.6
	Final	52.8	59.4
Diamond Bar	10%	NS	NS
	35%	0.3	0.3
	Final	32.8	33.0
Downey	10%	NS	NS
	35%	4.3	4.3
	Final	259.6	263.9
Lakewood	10%	NS	NS
	35%	7.4	7.4
	Final	2.2	9.6
Long Beach	10%	NS	NS
	35%	26.9	26.9
	Final	2.3	29.2
Norwalk	10%	NS	NS
	35%	0.8	0.8
	Final	136.1	136.9
Pico Rivera	10%	NS	NS
	35%	0.2	0.2
	Final	74.8	75.1
Santa Fe Springs	10%	NS	NS
	35%	0.0	0.0
	Final	106.0	106.0
Whittier	10%	NS	NS
	35%	0.0	0.0
	Final	7.5	7.5

1: Color Ramp highlights relative amount of required retention volume for milestones: darker is more, lighter is less
NS: Non-structural practices achieve 10% milestone

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Table 7-4. Annual volume reduction goals to achieve interim and final milestones for the Coyote Creek portion of Lower San Gabriel River WMP by jurisdiction

Jurisdiction	Total Critical Year Storm Volume Target (acre-ft/year)		
	Milestone	Incremental	Cumulative[1]
Artesia	10%	NS	NS
	35%	47.9	47.9
	Final	0.0	47.9
Cerritos	10%	NS	NS
	35%	0.1	0.1
	Final	194.2	194.3
Diamond Bar	10%	NS	NS
	35%	1.0	1.0
	Final	73.0	74.0
Hawaiian Gardens	10%	NS	NS
	35%	27.0	27.0
	Final	3.4	30.4
La Mirada	10%	NS	NS
	35%	0.8	0.8
	Final	174.9	175.7
Lakewood	10%	NS	NS
	35%	17.5	17.5
	Final	8.2	25.7
Long Beach	10%	NS	NS
	35%	37.5	37.5
	Final	0.0	37.5
Norwalk	10%	NS	NS
	35%	3.0	3.0
	Final	149.5	152.5
Santa Fe Springs	10%	NS	NS
	35%	0.4	0.4
	Final	260.3	260.7
Whittier	10%	NS	NS
	35%	2.1	2.1
	Final	252.6	254.7

1: Color Ramp highlights relative amount of required retention volume for milestones: darker is more, lighter is less
NS: Non-structural practices achieve 10% milestone

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7.1.2. Dry Weather

Dry-weather reductions from non-structural BMPs were calculated using flow from representative dry period (Section 5.2) of 8/17/2003 through 9/30/2003 and 90th percentile concentrations calculated from observed data (Section 5.2.1). Similar to wet weather, a 10% load reduction is assumed to result from the cumulative effect of nonstructural BMPs. Also, the effects of a 25% reduction in irrigation of urban grass was explicitly simulated in the model to estimate the resulting associated reduction of dry weather flows at the RAA Assessment Points. Irrigation was modeled as artificial rainfall within the LSPC model as a function of the potential evapotranspiration of urban grass. Once irrigation was reduced 25%, this directly impacted a large portion of the nonstormwater discharges drivin primarily from over irrigation and impacts on dry weather flows were significant. The projected effect of non-structural and irrigation controls on dry weather flow and loads is presented in Table 7-5. Since *E. Coli* is the limiting dry weather pollutant with required reductions in excess of 90%, the remaining volume reduction not controlled by non-structural measures will be treated by the structural BMPs described in the previous section.

Table 7-5. Projected dry weather reductions from non-structural control measures

Watershed	Constituent	Quantity (Volume or Mass)			Percent Reduction Achieved	
		Baseline	NM	NS	NM	NS
Lower Los Angeles River	Flow (M Gal.)	198.3	178.5	86.6	10.0%	56.4%
	Copper (kg)	19.28	17.35	8.42	10.0%	56.4%
	Lead (kg)	2.58	2.32	1.12	10.0%	56.4%
	E. Coli (Billion MPN)	147,166	132,449	64,230	10.0%	56.4%
Los Cerritos Channel	Flow (M Gal.)	133.6	120.2	56.3	10.0%	57.8%
	Copper (kg)	12.84	11.56	5.42	10.0%	57.8%
	E. Coli (Billion MPN)	71,808	64,627	30,277	10.0%	57.8%
Lower San Gabriel River	Flow (M Gal.)	163.3	147.0	71.2	10.0%	56.4%
	Copper (kg)	18.48	16.63	8.06	10.0%	56.4%
	Selenium (kg)	2.95	2.65	1.29	10.0%	56.4%
	E. Coli (Billion MPN)	13,540	12,186	5,903	10.0%	56.4%
Coyote Creek	Flow (M Gal.)	213.4	192.0	88.4	10.0%	58.6%
	Copper (kg)	23.05	20.75	9.55	10.0%	58.6%
	E. Coli (Billion MPN)	92,887	83,599	38,491	10.0%	58.6%

NM: Non-modeled non-structural practices achieve 10% reduction

NS: Non-structural 25% irrigation reduction practices achieve an additional approximately 60% reduction

8. MS4 Volume Reduction Goals to Achieve Required Pollutant Reductions

Each jurisdiction in the Group's WMP area is subject to stormwater runoff from non-MS4 facilities. In particular, Caltrans roads and facilities regulated by nontraditional or general industrial permits contribute to the runoff volume for each subwatershed. It will be important for these entities to retain their runoff and/or eliminate their cause/contribution to receiving water exceedances. The runoff from these non-MS4 facilities was therefore estimated and subtracted from the cumulative volume reduction goal (Section 7) to establish the MS4 responsible targets as described in Attachment A.

8.1. Summary of MS4 Responsible Reduction Goals

Runoff volumes estimated for non-MS4 permitted areas and Caltrans were subtracted from the reduction target to generate the required MS4 treatment capacity shown in Table 8-1 through Table 8-4.

Table 8-1. Lower Los Angeles River Critical Year Runoff Volume from MS4 and Non-MS4 Facilities

Jurisdiction	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
Downey	726.0	654.7	71.2
Lakewood	14.3	14.3	-
Long Beach	3,901.7	3,039.6	862.1
Lynwood	1,108.1	667.9	440.2
Paramount	988.8	606.1	382.7
Pico Rivera	377.3	287.2	90.0
Signal Hill	197.9	188.9	9.0
South Gate	1,512.6	1,174.3	338.2
TOTAL	8,826.5	6,633.1	2,193.5

Table 8-2. Los Cerritos Channel Critical Year Runoff Volume from MS4 and Non-MS4 Facilities

Jurisdiction	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
Bellflower	1,137.4	990.4	147.0
Cerritos	12.9	12.9	0.0
Downey	112.8	93.0	19.8
Lakewood	1,157.2	1,152.1	5.1
Long Beach	2,676.1	1,629.8	1,046.2
Paramount	631.9	525.5	106.4
Signal Hill	322.6	284.3	38.3
TOTAL	6,050.9	4,688.0	1,364.8

Table 8-3. San Gabriel River Critical Year Runoff Volume from MS4 and Non-MS4 Facilities

Jurisdiction	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
Artesia	1.1	1.1	0.0
Bellflower	62.8	57.4	5.4
Cerritos	59.4	4.1	55.3
Diamond Bar	33.0	1.1	32.0
Downey	263.9	87.3	176.7
Lakewood	9.6	2.2	7.4
Long Beach	29.2	29.2	0.0
Norwalk	136.9	4.8	132.1
Pico Rivera	75.1	60.4	14.7
Santa Fe Springs	106.0	30.3	75.8
Whittier	7.5	7.1	0.4
TOTAL	784.6	284.9	499.7

Table 8-4. Coyote Creek Critical Year Runoff Volume from MS4 and Non-MS4 Facilities

Jurisdiction	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
Artesia	47.9	15.9	32.0
Cerritos	194.3	56.7	137.6
Diamond Bar	74.0	36.7	37.4
Hawaiian Gardens	30.4	27.1	3.4
La Mirada	175.7	124.9	50.8
Lakewood	25.7	19.7	6.0
Long Beach	37.5	0.0	37.5
Norwalk	152.5	52.5	99.9
Santa Fe Springs	260.7	12.6	248.1
Whittier	254.7	200.1	54.6
TOTAL	1,253.4	546.1	707.3

9. Pollutant Reduction Plan

The BMPs used to achieve the MS4 volume reduction goals in Section 8 are not, per se, a component of the Permit compliance determination. Instead, over time each agency will report and demonstrate that the *cumulative* effect of projects implemented over time add up to the required reductions for interim milestones and final targets (reported as "MS4 Compliance Target"). However, the initial scenario of BMPs for WMP implementation (referred to as a Pollutant Reduction Plan in the RAA Guidelines) and their costs may be the most beneficial outcome of the WMP. A detailed WMP implementation scenario is presented in Attachment B, broken down by jurisdiction and subwatershed. The volume reductions are separated among right-of-way (ROW) BMPs and Low Impact Development (LID) on public parcels (in combination with nonstructural BMPs).

The Pollutant Reduction Plan is considered an "initial" scenario because over time, through adaptive management, the responsible agencies will likely "shift" among different types of BMPs (e.g., increase implementation of green streets and reduce implementation of regional BMPs) or substitute alterative BMPs altogether (e.g., implement dry wells instead of green streets). These shifts will be supported by analyses to show the substituted BMPs provide an equivalent volume reduction as the replaced BMPs.

9.1. Existing/Planned Regional Control Measures

Existing regional BMPs play an integral part in measuring the current reductions and need for future control measures. The annual volume or load removed from the existing and planned regional control measures were subtracted from the MS4 responsible runoff to determine the remaining treatment volume required. Detailed information for the existing and planned regional control measures is found in Attachment A.

The existing and planned regional control measure information was provided for the Lower Los Angeles River and Lower San Gabriel River. The jurisdictions that were impacted are listed with the associated annual reduction provided by these facilities in Table 9-1 and Table 9-2.

Table 9-1. Lower Los Angeles River Critical Year Existing/Planned Regional BMP Runoff Volume Reductions

Jurisdiction	COMPLIANCE TARGET		
	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Existing/Planned Regional BMP Reductions (acre-ft/year)	Remaining MS4 Responsible Critical Year Storm Volume (acre-ft/year)
Lakewood	14.3	6.4	7.9
Long Beach	3,039.6	633.4	2,406.2
Signal Hill	188.9	22.7	166.2

Table 9-2. Lower San Gabriel River Critical Year Existing/Planned Regional BMP Runoff Volume Reductions

Jurisdiction	COMPLIANCE TARGET		
	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Existing/Planned Regional BMP Reductions (acre-ft/year)	Remaining MS4 Responsible Critical Year Storm Volume (acre-ft/year)
Downey	87.3	24.0	63.3

9.2. Future Control Measures for Attainment of Interim and Final Limits

The Pollutant Reduction Plans for wet and dry weather illustrate the sequencial BMP implementation strategy to attain all interim and final limits. Within each of the jurisdictions, the subwatershed subareas were individually prioritized and associated with milestones on the basis of cost-effectiveness for zinc removal. The optimization modeling results presented in Section 7 and Figure 9-1, Figure 9-2 and Figure 9-3 shown below identify the prioritization of subwatershed implementation based on the most effective combination of BMPs. The implementation schedule outlined in the Pollutant Reduction Plans for wet and dry weather are based upon this prioritization. The plans are presented in the following subsections.

9.2.1. Wet Weather

The interim and final targets are presented in total acre-feet per year that requires treatement through structural BMPs (less the non-MS4 and existing regional volumes as described in Sections 8 and 9.1). To properly capture the annual volume, BMPs are sized to the minimum volume needed to capture the target annual volume. Thus, the BMPs are presented as a volume (acre-feet) that has the ability to capture the required annual total to meet compliance.

An overall jurisdictional summary table is presented in Table 9-3 that outlines the required BMP volume to achieve compliance in the associated WMP group. The BMP volumes are the sum of existing distributed BMPs, potential green street BMPs, LID on public parcels, and remaining BMP volume that must be implemented as regional (or other) projects as necessary to meet the annual volume reduction target.

Table 9-4 through Table 9-7 outlines the jurisdiction-wide BMP volume targets necessary to meet the annual volume interim and final limits established in Section 8. Each distributed BMP was associated with a jurisdictional subwatershed and the associated implementation schedule, thus summing their impact across different interim goals. The remaining BMP volume after accounting for existing distributed BMPs is spread across right-of-way BMPs, LID on public parcels, and remaining BMP volume including potential regional projects. Priority was given to LID on public parcels, followed by right-of-way BMPs and finally other BMPs. Deatiled discussion on how the BMPs in the right-of-way and LID on public parcels were determined is found in Attachment A. Detailed tables are provided in Attachment B for each jurisdiction and associated subwatersheds. Detailed tables describing the existing distributed BMPs are found in Attachment D.

Table 9-3. Jurisdictional Final Target BMP Volumes by WMP Group

	LLAR	LCC	LSGR - SGR	LSGR - CC	
Jurisdiction	**Total BMP Volume to Achieve Compliance (acre-ft)**	**Total BMP Volume to Achieve Compliance (acre-ft)**	**Total BMP Volume to Achieve Compliance (acre-ft)**	**Total BMP Volume to Achieve Compliance (acre-ft)**	**TOTAL**
Artesia	-	-	0.1	1.1	**1.2**
Bellflower	-	118.2	5.5	-	**123.7**
Cerritos	-	1.6	0.6	6.4	**8.6**
Diamond Bar	-	-	0.2	8.9	**9.1**
Downey	83.4	10.2	17.5	-	**111.2**
Hawaiian Gardens	-	-	-	2.2	**2.2**
La Mirada	-	-	-	15.2	**15.2**
Lakewood	1.2	169.5	0.4	1.9	**173.0**
Long Beach	319.1	208.7	2.7	0.0	**530.5**
Lynwood	95.5	-	-	-	**95.5**
Norwalk	-	-	0.3	4.7	**5.0**
Paramount	76.6	55.1	-	-	**131.7**
Pico Rivera	41.2	-	10.8	-	**52.0**
Santa Fe Springs	-	-	4.9	2.1	**7.0**
Signal Hill	22.3	28.6	-	-	**50.9**
South Gate	173.0	-	-	-	**173.0**
Whittier	-	-	1.4	39.1	**40.5**
TOTAL	**812.3**	**591.9**	**44.4**	**81.6**	**1,530.2**

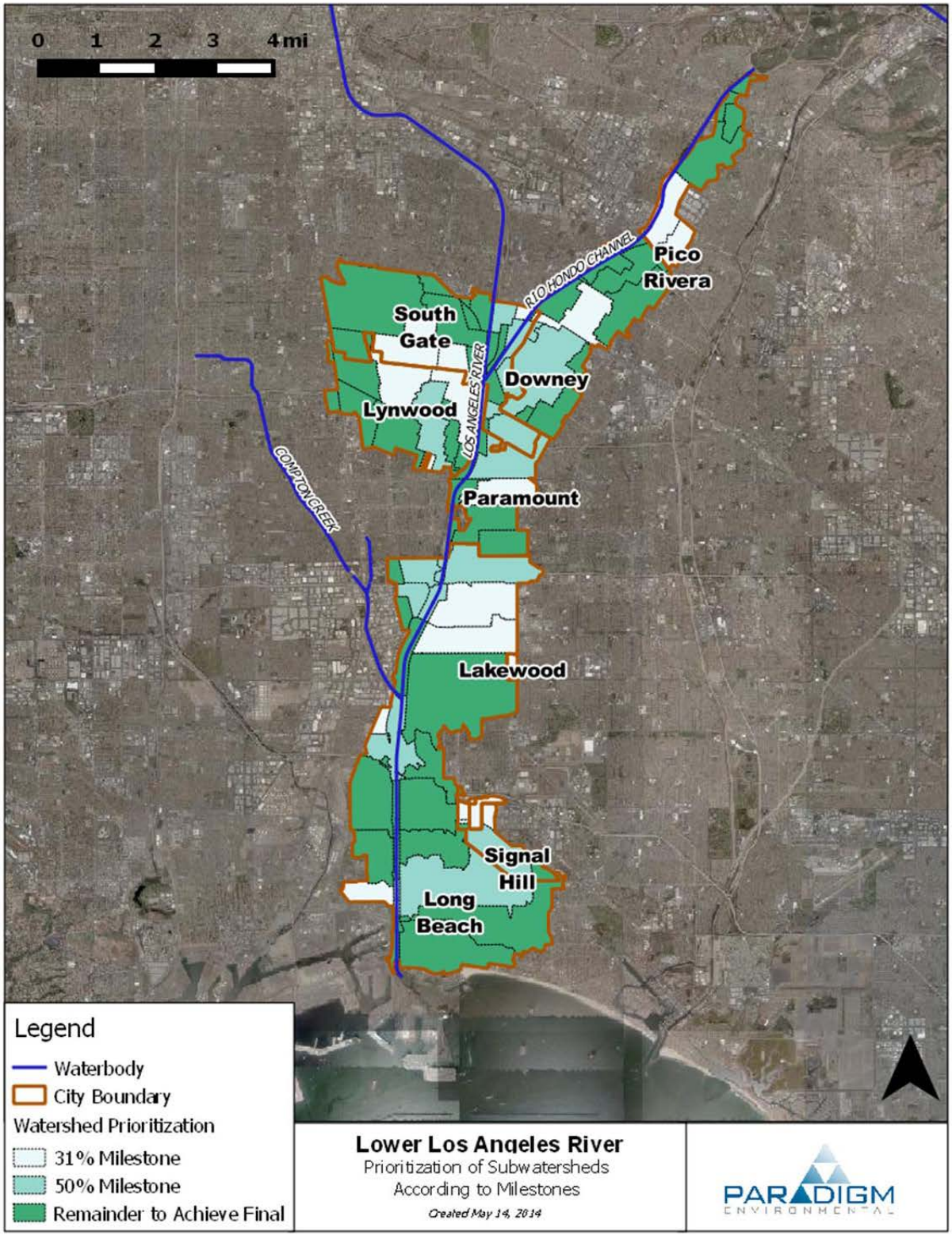

Figure 9-1. LLAR implementation areas associated with Interim and final milestones.

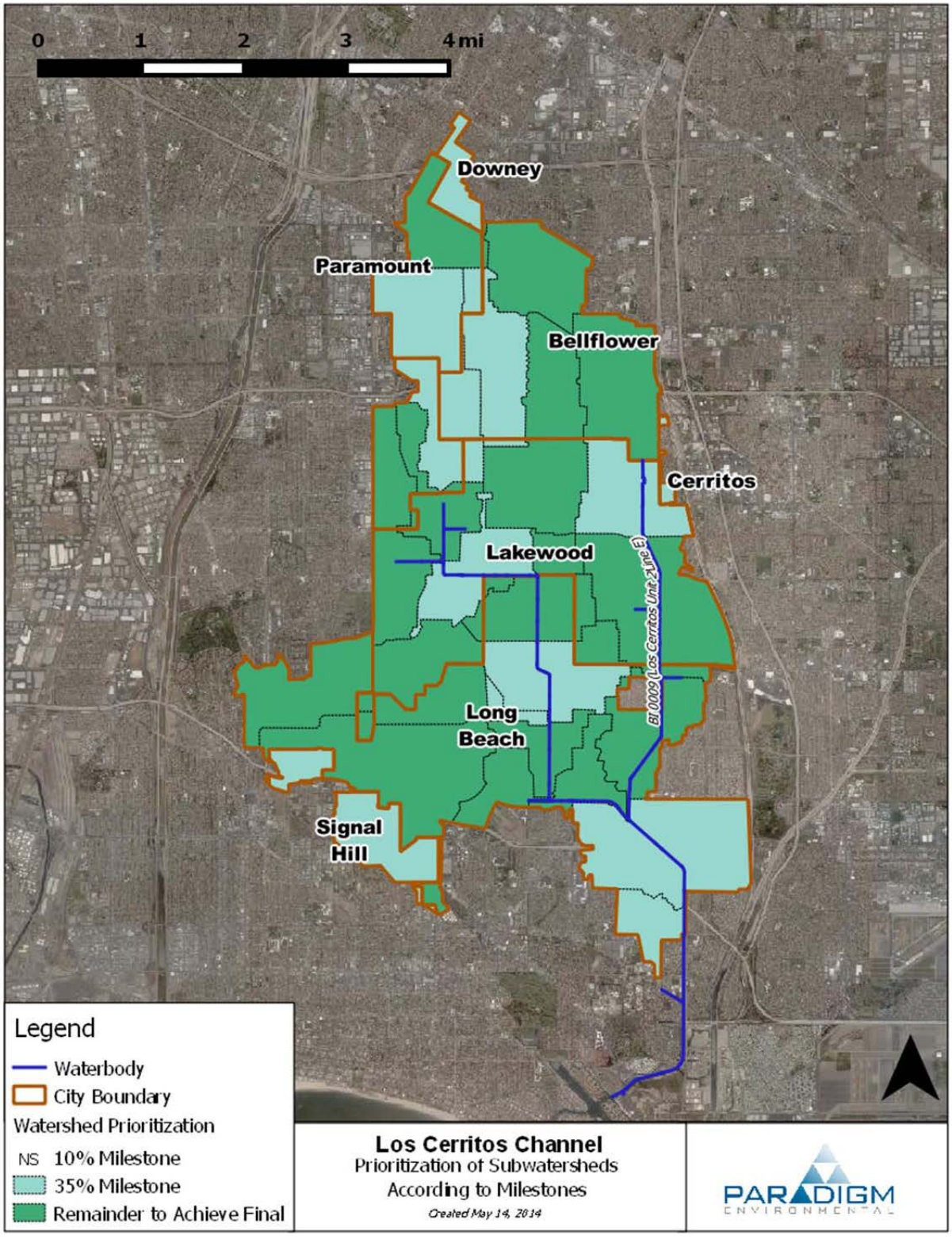

Figure 9-2. LCC implementation areas associated with Interim and final milestones.

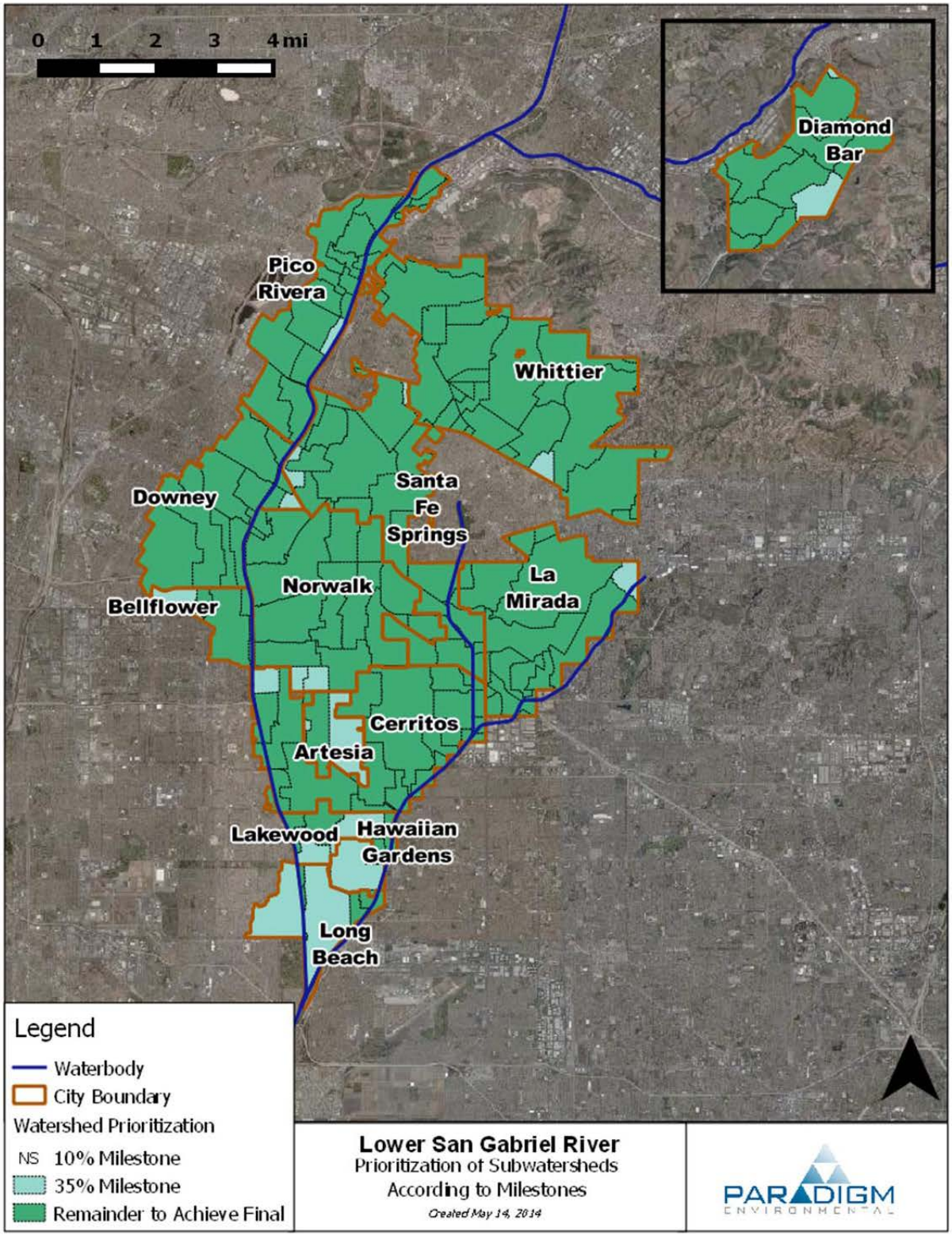

Figure 9-3. LSGR implementation areas associated with Interim and final milestones.

Table 9-4. Lower Los Angeles River Pollutant Reduction Plan for Attainment of Interim and Final Limits

Jurisdiction	Milestone	COMPLIANCE TARGET		POLLUTANT REDUCTION PLAN						
		Remaining MS4 Responsible Critical Year Storm Volume* (acre-ft/year)		Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)		Estimated Potential LID on Public Parcels Volume (acre-ft)		Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	
		Incremental	Cumulative		Incremental	Cumulative	Incremental	Cumulative	Incremental	Cumulative
Downey	31%	143.8	143.8	1.1	12.2	12.2	0.7	0.7	7.1	7.1
	50%	187.1	330.9	0.7	2.5	14.7	10.1	10.8	0.6	7.7
	Final	323.9	654.7	2.0	31.2	45.9	4.4	15.3	10.7	18.4
Lakewood	31%	7.9	7.9	NA	1.1	1.1	0.0	0.0	-	-
	50%	-	7.9		-	1.1	-	0.0	-	-
	Final	-	7.9		-	1.1	-	0.0	-	-
Long Beach	31%	6.5	6.5	NA	1.0	1.0	0.0	0.0	-	-
	50%	567.0	573.5		40.3	41.3	7.5	7.5	24.7	24.7
	Final	1,832.7	2,406.2		113.4	154.6	20.8	28.3	111.5	136.2
Lynwood	31%	235.9	235.9	NA	18.4	18.4	2.7	2.7	13.1	13.1
	50%	134.9	370.8		12.8	31.2	3.8	6.5	0.1	13.2
	Final	297.2	667.9		22.7	53.9	4.5	11.1	17.3	30.5
Paramount	31%	163.7	163.7	0.1	9.0	9.0	1.7	1.7	10.2	10.2
	50%	65.7	229.4		7.4	16.4	0.8	2.5	0.3	10.4
	Final	376.6	606.1		14.9	31.2	2.1	4.7	30.2	40.6
Pico Rivera	31%	275.3	275.2	NA	11.5	11.5	0.5	0.5	27.4	27.4
	50%	-	275.2		-	11.5	-	0.5	-	27.4
	Final	12.0	287.2		1.3	12.8	0.0	0.5	0.5	27.9
Signal Hill	31%	8.5	8.5	0.2	0.8	0.8	0.2	0.2	0.2	0.2
	50%	105.8	114.3		7.0	7.8	0.9	1.1	5.9	6.1
	Final	51.9	166.2		2.2	10.0	0.0	1.1	4.9	11.0
South Gate	31%	229.3	229.3	4.7	23.2	23.2	0.9	0.9	6.5	6.5
	50%	198.1	427.4		15.0	38.3	0.8	1.7	12.6	19.1
	Final	746.9	1,174.3		49.3	87.5	5.1	6.8	54.7	73.8

Table 9-5. Los Cerritos Channel Pollutant Reduction Plan for Attainment of Interim and Final Limits

Jurisdiction	Milestone	COMPLIANCE TARGET		POLLUTANT REDUCTION PLAN							
		Remaining MS4 Responsible Critical Year Storm Volume* (acre-ft/year)		Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)		Estimated Potential LID on Public Parcels Volume (acre-ft)		Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	
		Incremental	Cumulative		Incremental	Cumulative	Incremental	Cumulative	Incremental	Cumulative
Bellflower	10%	NS	NS		-	-	-	-	-	-
	35%	244.4	244.4	NA	15.1	15.1	1.2	1.2	16.2	16.2
	Final	746.0	990.4		43.0	58.1	3.2	4.5	39.4	55.6
Cerritos	10%	NS	NS		-	-	-	-	-	-
	35%	9.7	9.7	NA	1.0	1.0	0.0	0.0	0.5	0.5
	Final	3.2	12.9		-	1.0	-	0.0	0.1	0.6
Downey	10%	NS	NS		-	-	-	-	-	-
	35%	57.2	57.2	0.1	5.3	5.3	0.0	0.0	2.7	2.7
	Final	35.8	93.0		-	5.3	-	0.0	2.1	4.8
Lakewood	10%	NS	NS		-	-	-	-	-	-
	35%	282.4	282.4	NA	31.5	31.5	4.7	4.7	6.9	6.9
	Final	869.7	1,152.1		90.0	121.5	7.0	11.8	29.3	36.2
Long Beach	10%	NS	NS		-	-	-	-	-	-
	35%	473.5	473.5	NA	33.8	33.8	12.3	12.3	16.4	16.4
	Final	1,156.3	1,629.8		87.9	121.7	9.5	21.8	48.9	65.3
Paramount	10%	NS	NS		-	-	-	-	-	-
	35%	267.0	267.0	NA	14.3	14.3	3.0	3.0	17.1	17.1
	Final	258.5	525.5		8.5	22.8	3.5	6.4	8.7	25.8
Signal Hill	10%	NS	NS		-	-	-	-	-	-
	35%	231.6	231.6	0.0	11.2	11.2	1.2	1.2	14.2	14.2
	Final	52.7	284.3		-	11.2	-	1.2	2.0	16.2

NS: Non-structural practices achieve 10% milestone

NA: No information/not enough information provided

*Runoff from non-MS4 sources and reductions fro existing regional BMPs are excluded from compliance target (see Attachment A)

Table 9-6. San Gabriel River Pollutant Reduction Plan for Attainment of Interim and Final Limits

Jurisdiction	Milestone	COMPLIANCE TARGET		POLLUTANT REDUCTION PLAN						
		Remaining MS4 Responsible Critical Year Storm Volume* (acre-ft/year)		Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)		Estimated Potential LID on Public Parcels Volume (acre-ft)		Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	
		Incremental	Cumulative		Incremental	Cumulative	Incremental	Cumulative	Incremental	Cumulative
Artesia	10%	NS	NS	NA	-	-	-	-	-	-
	35%	1.1	1.1		-	-	0.1	0.1	-	-
	Final	-	1.1		-	-	-	0.1	-	-
Bellflower	10%	NS	NS	NA	-	-	-	-	-	-
	35%	1.3	1.3		0.2	0.2	0.0	0.0	-	-
	Final	56.1	57.4		1.5	1.8	3.7	3.7	0.0	0.0
Cerritos	10%	NS	NS	NA	-	-	-	-	-	-
	35%	-	-		-	-	-	-	-	-
	Final	4.1	4.1		0.6	0.6	0.0	0.0	-	-
Diamond Bar	10%	NS	NS	NA	-	-	-	-	-	-
	35%	-	-		-	-	-	-	-	-
	Final	1.1	1.1		0.2	0.2	-	-	-	-
Downey	10%	NS	NS		-	-	-	-	-	-
	35%	-	-		-	-	-	-	-	-
	Final	63.3	63.3	7.1	10.0	10.0	0.4	0.4	-	-
Lakewood	10%	NS	NS	NA	-	-	-	-	-	-
	35%	-	-		-	-	-	-	-	-
	Final	2.2	2.2		0.2	0.2	0.0	0.0	0.1	0.1
Long Beach	10%	NS	NS	NA	-	-	-	-	-	-
	35%	26.9	26.9		1.1	1.1	1.3	1.3	-	-
	Final	2.3	29.2		0.3	1.4	-	1.3	0.0	0.0

Jurisdiction	Milestone	COMPLIANCE TARGET		POLLUTANT REDUCTION PLAN						
		Remaining MS4 Responsible Critical Year Storm Volume* (acre-ft/year)		Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)		Estimated Potential LID on Public Parcels Volume (acre-ft)		Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	
		Incremental	Cumulative		Incremental	Cumulative	Incremental	Cumulative	Incremental	Cumulative
Norwalk	10%	NS	NS	NA	-	-	-	-	-	-
	35%	0.8	0.8		-	-	0.1	0.1	-	-
	Final	4.0	4.8		-	-	0.3	0.3	-	-
Pico Rivera	10%	NS	NS	NA	-	-	-	-	-	-
	35%	0.2	0.2		0.0	0.0	-	-	-	-
	Final	60.2	60.4		10.7	10.8	-	-	0.0	0.0
Santa Fe Springs	10%	NS	NS	NA	-	-	-	-	-	-
	35%	-	-		-	-	-	-	-	-
	Final	30.3	30.3		4.6	4.6	-	-	0.3	0.3
Whittier	10%	NS	NS	NA	-	-	-	-	-	-
	35%	0.0	0.0		-	-	-	-	0.0	0.0
	Final	7.1	7.1		1.4	1.4	-	-	-	0.0

NS: Non-structural practices achieve 10% milestone

NA: No information/not enough information provided

*Runoff from non-MS4 sources and reductions fro existing regional BMPs are excluded from compliance target (see Attachment A)

Table 9-7. Coyote Creek Pollutant Reduction Plan for Attainment of Interim and Final Limits

Jurisdiction	Milestone	COMPLIANCE TARGET		POLLUTANT REDUCTION PLAN						
		Remaining MS4 Responsible Critical Year Storm Volume* (acre-ft/year)		Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)		Estimated Potential LID on Public Parcels Volume (acre-ft)		Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	
		Incremental	Cumulative		Incremental	Cumulative	Incremental	Cumulative	Incremental	Cumulative
Artesia	10%	NS	NS	NA	-	-	-	-	-	-
	35%	15.9	15.9		-	-	1.1	1.1	-	-
	Final	-	15.9		-	-	-	1.1	-	-
Cerritos	10%	NS	NS	NA	-	-	-	-	-	-
	35%	0.1	0.1		0.0	0.0	-	-	-	-
	Final	56.6	56.7		3.0	3.1	3.4	3.4	-	-
Diamond Bar	10%	NS	NS	NA	-	-	-	-	-	-
	35%	1.0	1.0		0.3	0.3	-	-	-	-
	Final	35.6	36.7		8.0	8.2	-	-	0.7	0.7
Hawaiian Gardens	10%	NS	NS	NA	-	-	-	-	-	-
	35%	23.6	23.6		0.3	0.3	1.5	1.5	-	-
	Final	3.4	27.1		0.2	0.6	0.1	1.6	0.0	0.0
La Mirada	10%	NS	NS	NA	-	-	-	-	-	-
	35%	-	-		-	-	-	-	-	-
	Final	124.9	124.9		9.6	9.6	5.6	5.6	-	-
Lakewood	10%	NS	NS	NA	-	-	-	-	-	-
	35%	17.5	17.5		0.9	0.9	0.7	0.7	-	-
	Final	2.3	19.7		-	0.9	0.3	0.9	-	-
Long Beach	10%	NS	NS	NA	-	-	-	-	-	-
	35%	-	-		-	-	-	-	-	-
	Final	0.0	0.0		-	-	0.0	0.0	-	-

Jurisdiction	Milestone	COMPLIANCE TARGET		POLLUTANT REDUCTION PLAN						
		Remaining MS4 Responsible Critical Year Storm Volume* (acre-ft/year)		Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)		Estimated Potential LID on Public Parcels Volume (acre-ft)		Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	
		Incremental	Cumulative		Incremental	Cumulative	Incremental	Cumulative	Incremental	Cumulative
Norwalk	10%	NS	NS	NA	-	-	-	-	-	-
	35%	1.6	1.6		-	-	0.2	0.2	-	-
	Final	50.9	52.5		1.4	1.4	3.2	3.4	-	-
Santa Fe Springs	10%	NS	NS	NA	-	-	-	-	-	-
	35%	-	-		-	-	-	-	-	-
	Final	12.6	12.6		1.0	1.0	-	-	1.1	1.1
Whittier	10%	NS	NS	NA	-	-	-	-	-	-
	35%	-	-		-	-	-	-	-	-
	Final	200.1	200.1		39.0	39.0	-	-	0.0	0.0

NS: Non-structural practices achieve 10% milestone

NA: No information/not enough information provided

*Runoff from non-MS4 sources and reductions fro existing regional BMPs are excluded from compliance target (see Attachment A)

9.2.2. Dry Weather

Dry weather reductions are attained through a combination of non-structural practices and structural BMPs as they are implemented as part of the wet weather attainment of limits. As wet-weather BMPs are implemented, they serve to remove the dry-weather flows thus meeting the compliance set forth to achieve dry-weather reductions. As a summary of the dry weather analysis, Table 9-8 through Table 9-11 outline the jurisdiction-wide attainment of interim and final milestones for dry weather. The reduction from implemented BMPs compares the actual dry-weather reduction versus the compliance target.

Table 9-8. Lower Los Angeles River Dry Weather Pollutant Reduction Plan for Attainment of Interim and Final Limits

Jurisdiction	Milestone	Dry Weather *E. coli* Load Reduction	
		Compliance Target	Reduction from Implemented BMPs
Downey	31%	30.8%	65.9%
	50%	49.7%	76.9%
	Final	99.4%	99.4%
Lakewood	31%	30.8%	99.4%
	50%	49.7%	99.4%
	Final	99.4%	99.4%
Long Beach	31%	30.8%	62.1%
	50%	49.7%	74.3%
	Final	99.4%	99.4%
Lynwood	31%	30.8%	71.8%
	50%	49.7%	80.2%
	Final	99.4%	99.4%
Paramount	31%	30.8%	51.0%
	50%	49.7%	72.4%
	Final	99.4%	99.4%
Pico Rivera	31%	30.8%	71.8%
	50%	49.7%	71.8%
	Final	99.4%	99.4%
Signal Hill	31%	30.8%	69.3%
	50%	49.7%	94.9%
	Final	99.4%	99.4%
South Gate	31%	30.8%	62.8%
	50%	49.7%	75.9%
	Final	99.4%	99.4%

Table 9-9. Los Cerritos Channel Dry Weather Pollutant Reduction Plan for Attainment of Interim and Final Limits

Jurisdiction	Milestone	Dry Weather *E. coli* Load Reduction	
		Compliance Target	Reduction from Implemented BMPs
Bellflower	10%	9.9%	58.1%
	35%	34.7%	71.4%
	Final	99.1%	99.1%
Cerritos	10%	9.9%	56.4%
	35%	34.7%	99.1%
	Final	99.1%	99.1%
Downey	10%	9.9%	59.8%
	35%	34.7%	99.1%
	Final	99.1%	99.1%
Lakewood	10%	9.9%	55.6%
	35%	34.7%	69.6%
	Final	99.1%	99.1%
Long Beach	10%	9.9%	60.1%
	35%	34.7%	76.9%
	Fin al	99.1%	99.1%
Paramount	10%	9.9%	52.8%
	35%	34.7%	79.8%
	Final	99.1%	99.1%
Signal Hill	10%	9.9%	60.8%
	35%	34.7%	99.1%
	Final	99.1%	99.1%

Table 9-10. San Gabriel River Dry Weather Pollutant Reduction Plan for Attainment of Interim and Final Limits

Jurisdiction	Milestone	Dry Weather *E. coli* Load Reduction	
		Compliance Target	Reduction from Implemented BMPs
Artesia	10%	9.4%	57.6%
	35%	33.0%	94.3%
	Final	94.25%	94.25%
Bellflower	10%	9.4%	49.9%
	35%	33.0%	57.6%
	Final	94.25%	94.25%
Cerritos	10%	9.4%	43.7%
	35%	33.0%	48.1%
	Final	94.25%	94.25%
Diamond Bar	10%	9.4%	58.2%
	35%	33.0%	58.8%
	Final	94.25%	94.25%
Downey	10%	9.4%	57.4%
	35%	33.0%	58.1%
	Final	94.25%	94.25%
Lakewood	10%	9.4%	43.1%
	35%	33.0%	73.7%
	Final	94.25%	94.25%
Long Beach	10%	9.4%	46.6%
	35%	33.0%	91.6%
	Final	94.25%	94.25%
Norwalk	10%	9.4%	54.8%
	35%	33.0%	55.7%
	Final	94.25%	94.25%
Pico Rivera	10%	9.4%	51.8%
	35%	33.0%	51.9%
	Final	94.25%	94.25%
Santa Fe Springs	10%	9.4%	54.4%
	35%	33.0%	57.9%
	Final	94.25%	94.25%
Whittier	10%	9.4%	57.9%
	35%	33.0%	58.0%
	Final	94.25%	94.25%

Table 9-11. Coyote Creek Dry Weather Pollutant Reduction Plan for Attainment of Interim and Final Limits

Jurisdiction	Milestone	Dry Weather *E. coli* Load Reduction	
		Compliance Target	Reduction from Implemented BMPs
Artesia	10%	9.9%	60.9%
	35%	34.6%	85.1%
	Final	98.9%	98.9%
Cerritos	10%	9.9%	56.3%
	35%	34.6%	56.3%
	Final	98.9%	98.9%
Diamond Bar	10%	9.9%	61.3%
	35%	34.6%	65.9%
	Final	98.9%	98.9%
Hawaiian Gardens	10%	9.9%	59.7%
	35%	34.6%	96.9%
	Final	98.9%	98.9%
La Mirada	10%	9.9%	57.4%
	35%	34.6%	58.7%
	Final	98.9%	98.9%
Lakewood	10%	9.9%	60.7%
	35%	34.6%	76.5%
	Final	98.9%	98.9%
Long Beach	10%	9.9%	54.5%
	35%	34.6%	91.9%
	Final	98.9%	98.9%
Norwalk	10%	9.9%	59.2%
	35%	34.6%	60.8%
	Final	98.9%	98.9%
Santa Fe Springs	10%	9.9%	51.7%
	35%	34.6%	52.0%
	Final	98.9%	98.9%
Whittier	10%	9.9%	60.7%
	35%	34.6%	61.4%
	Final	98.9%	98.9%

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Attachment A: DETERMINATION OF BMP TREATMENT CAPACITY

Submitted to:

LLAR WMP Group LCC WMP Group LSGR WMP Group

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1. Determination of BMP Treatment Capacity

The process for determining the necessary cumulative BMP capacity depends on the type of numeric goal being addressed. As shown in Figure 1-1, the volume-based (design storm) approach, necessary BMP capacity was determined through a design storm analysis. For the load-based (pollutant reduction), the analysis leveraged the optimization routines in the customized WMMS. An initial step in the RAA was a comparison of the volume reductions required by the load-based and volume-based numeric goals, to support selection of the wet weather critical conditions.

This appendix describes key analyses conducted to determine the potential capacity of different BMPs including non-structural BMPs. In addition, it describes the approach for non-MS4 sources.

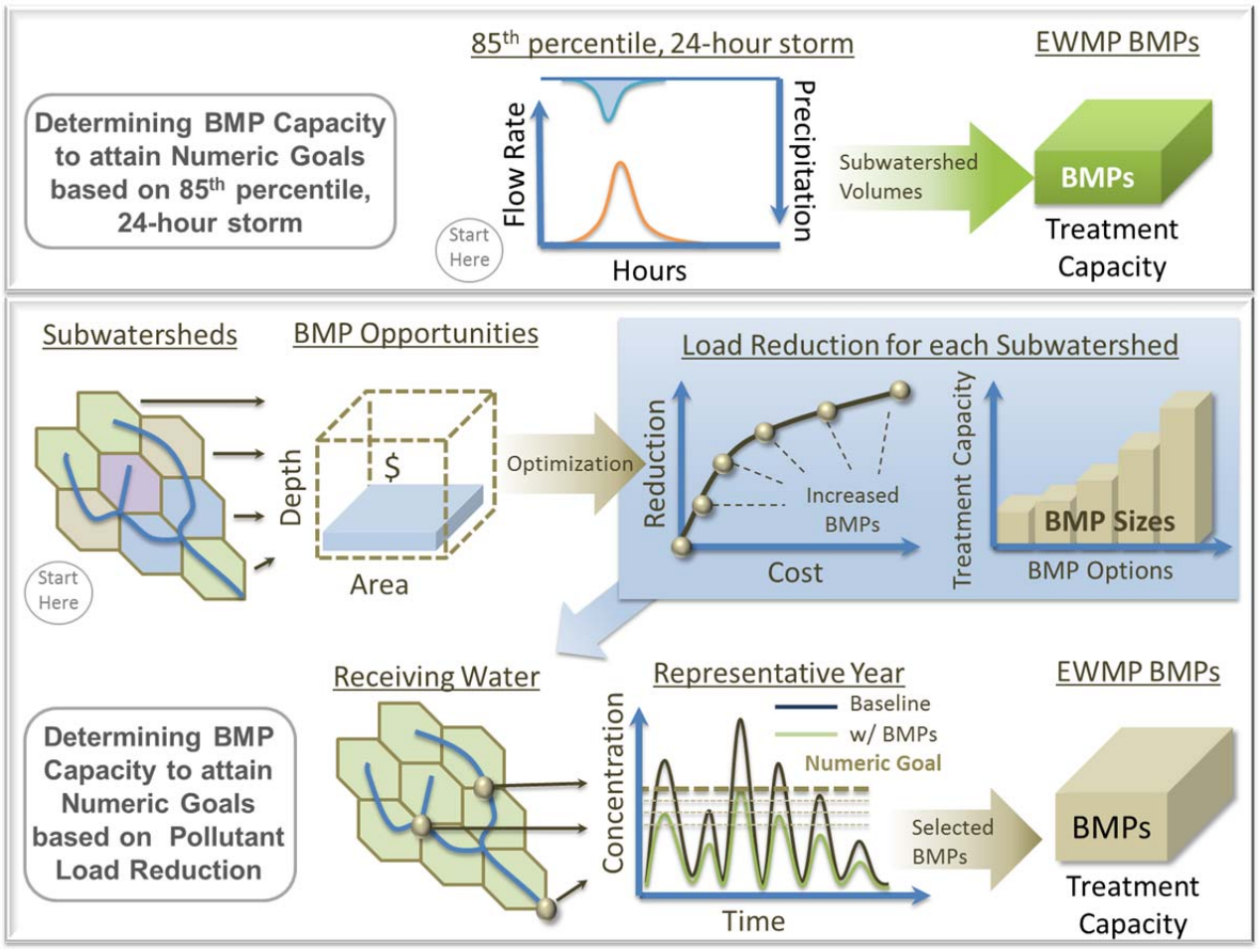

Figure 1-1. Illustration of Process for Determining Required BMP Capacities for the WMP using Volume-Based (top panel) and Load-Based (bottom panel) Numeric Goals.

1.1. Load Reduction Optimization Modeling Analysis

During development of WMMS, distributed BMPs were modeled at the subwatershed-scale using a generalized BMP treatment train. Depending on the land use type, different types of BMPs were applied. The three generalized BMP pathways were: (1) transportation, (2) residential, and (3) commercial/industrial/institutional. A conceptual schematic of the BMP network and pathways is presented in Figure 1-2 (LACDPW 2011).

For the RAA, subwatershed-scale SUSTAIN models were developed using the WMMS modeling assumptions. Each BMP from the treatment train described in Figure 1-2 was configured consistently with modeling performed during development of the WMMS system and followed the Regional Board RAA guidelines. A summary of key BMP parameters used for RAA modeling are presented in Table 1-1. Background infiltration rates were changed from those used during WMMS development (0.5 inches per hour) to site-specific infiltrations rates provided in the Los Angeles County Hydrology Manual and associated spatial datasets (LACDPW 2006). These rates also deviate somewhat from the values suggested in the RAA Guidelines (0.1 – 0.3 inches per hour); however, the data are locally-derived, published and reliable which provides adequate justification for their use.

First, SUSTAIN models were configured using the existing condition watershed model runoff timeseries and land use distributions as inputs, and benchmarked against the aggregated LSPC model results to establish baseline consistency. Second, using the SUSTAIN configuration with the respective BMP opportunities per pathway (as presented in Figure 1-2) in each subwatershed, optimization runs were formulated to maximize zinc reduction (i.e. the limiting target pollutant) while minimizing total estimated implementation cost. This resulted in a matrix of high-resolution cost-effectiveness curves for each subwatershed. Finally, a Tier-II optimization framework was configured to collectively optimize target load reductions at the downstream assessment point, with an added equitability constraint to ensure that each jurisdiction shared proportionally in the reduction effort. For the Tier-II optimization, instead of the decision variables being individual BMPs within a network like before, they were comprised of individual solutions taken off the cost-effectiveness curves at each subwatershed. The primary objective was to quantify the stormwater retention volume and load reductions provided by the collective actions occurring within each contributing jurisdiction tributary to the assessment point.

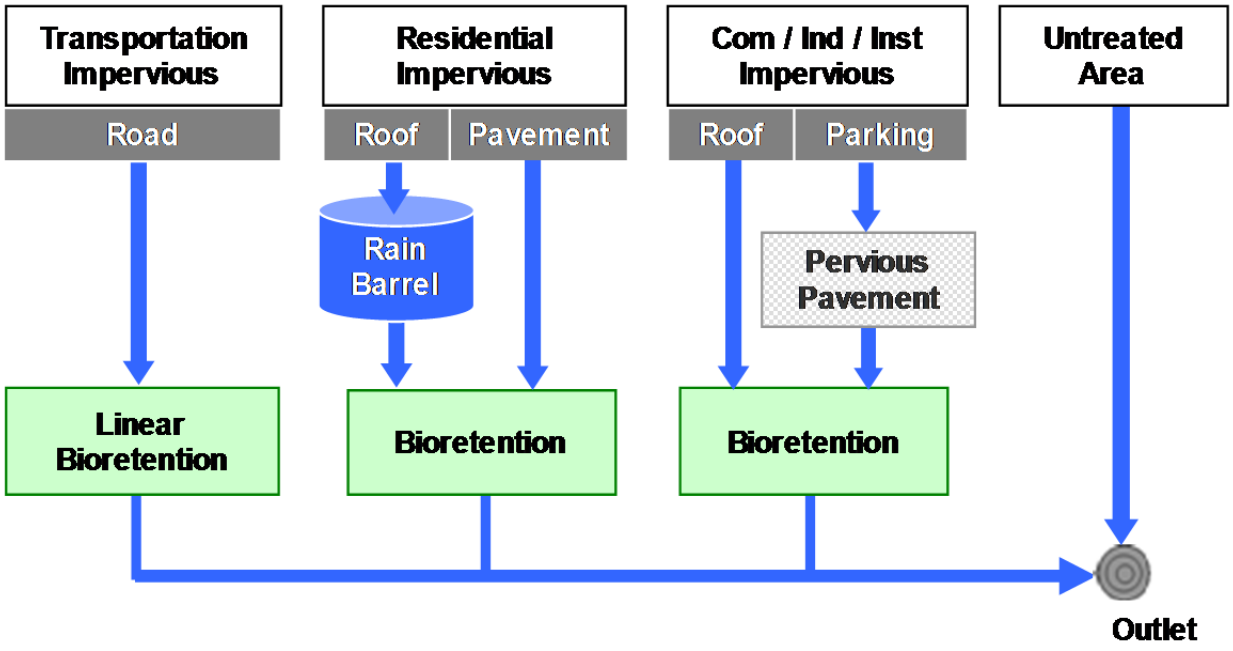

Figure 1-2. Conceptual schematic of the WMMS aggregate BMP treatment train (LACDPW 2011b).

Table 1-1. BMP parameters used in the load reduction modeling analysis

Constituent Group	Rain Barrel	Bioretention	Porous Pavement
Media Infiltration Rate (in/hr)	n/a	0.1 – 0.9	0.1 – 0.9
Substrate Layer Porosity (fraction)	n/a	0.4	0.4
Substrate Layer Field Capacity (fraction)	n/a	0.3	0.055
Substrate Layer Wilting Point (fraction)	n/a	0.1	0.05
Underdrain Gravel Porosity (fraction)	n/a	0.5	0.45
Vegetative Parameter, A (unitless)	n/a	0.6	1.0
Background Infiltration Rate (in/hr)	n/a	0.1 – 0.9	0.1 – 0.9
First Order Decay Rate (1/day)[1]	0.2 – 0.8	0.2 – 0.8	0.2 – 0.8
Underdrain Filtration Rate (%)[1]	n/a	0.5 – 0.9	0.5 – 0.9

1. Rates vary by pollutant and the type of BMP soil media

1.2. BMP Capacity Analysis for the Rights-of-Way

A key consideration for WMP implementation is the potential BMP capacity that could be provided by rights-of-way (ROW). In order to highlight the potential structural BMP implementation approaches to meet the volume targets, a BMP opportunity analysis was conducted. Two broad categories of BMPs – ROW BMPs and LID on public parcels – were used to describe the networks of BMPs needed to meet the target reductions.

This section describes how right-of-ways were evaluated for opportunities to locate BMPs and evaluate the key components that affect the ability of the ROW BMP networks to be effective: space available in the ROW, types of BMPs to site in the ROW, drainage areas that could potentially be treated by ROW BMPs, and estimated BMP infiltration rates.

Stormwater BMPs in the ROW are treatment systems arranged linearly within the street ROW and are designed to reduce runoff volumes and improve runoff water quality from the roadway and adjacent parcels. Implementing BMPs in the ROW provides an opportunity to meet water quality goals by locating BMPs in areas owned or controlled by a municipality to avoid the cost of land acquisition or establishing an easement. Implementing BMPs in the ROW allows for direct control of construction, maintenance, and monitoring activities by the responsible jurisdiction. Bioretention and permeable pavement are typically best suited for implementation in the ROW

Figure 1-3. Conceptual schematic of ROW BMPs with an underdrain (Arrows indicate water pathways).

Not all roads are suited for ROW BMP retrofits; therefore, screening is required to eliminate roads where ROW BMP retrofits are impractical or infeasible due to physical constraints. While ROW BMP retrofits can be implemented in a variety of settings, the physical characteristics of the road itself such as the road type, local topography, and depth to groundwater can significantly influence the practicality of designing and constructing these features. A screening protocol was established to identify realistic opportunities for retrofits based on the best available GIS data. The opportunities identified during this process provide the foundation for the engineering analysis to determine the volume of stormwater that can be treated by ROW BMP retrofits in the subject watersheds. This section describes the data and the screening process used to identify the best available roads for ROW BMP retrofits.

1.2.1. Data Used

To evaluate BMP opportunities and available implementation areas, several key data sets were processed and formatted. Table 1-2 outlines the data set names, formats, descriptions, and sources.

Table 1-2. Summary of Data

Data Set	Format	Description	Source
Parcels	GIS Shapefile	Outlines property boundaries and sizes	Los Angeles County (LAC) Assessor
Roads	GIS Shapefile	Shows street centerline network & classification by Topologically Integrated Geographic Encoding and Reference (TIGER)	LAC GIS Portal
Land Use	GIS Shapefile	Subdivides the region into predefined land use categories with similar runoff properties. Each individual land use feature identifies the associated percent impervious coverage.	LAC WMMS Model
Subwatersheds	GIS Shapefile	Defines drainage areas to selected outlet points	LAC WMMS Model
Slopes	GIS Shapefile	Classifies regions by the slope category	LAC WMMS Model
Soils	GIS Shapefile	Outlines spatial extents of dominant soil types	LAC GIS Portal
Jurisdictions	GIS Shapefile	Establishes city and county boundaries	LAC GIS Portal
Drainage Network	GIS Shapefile	Identifies stormwater structure layout and conveyance methods	LAC GIS Portal
Groundwater Contours	GIS Shapefile	Illustrates groundwater depth as measured from the surface	LAC BOS
Soil Runoff Coefficient Curves	PDF File	Curves characterize effect of rainfall intensity on runoff coefficient per soil type	Hydrology Manual Appendix C (LADPW 2006)
Aerial Imagery	Layer File	Orthoimage of entire region	ESRI Maps & Data Imagery
Runoff Rates	Time Series	Hourly runoff for land uses for the continuous simulation model	LAC WMMS Model

1.2.2. ROW BMP Screening

High traffic volumes, speed limits, slopes, and groundwater tables, impact the feasibility of ROW BMP implementation. Road classification data contains information typically useful for determining if the street is subject to high traffic volumes and speeds, and Census TIGER road data provides the best available road classification information for the study area. Table 1-3 shows the Master Address File (MAF)/TIGER Feature Classification Codes (MTFCC) deemed appropriate for ROW BMP retrofit opportunities. Only roads with the MTFCCs listed in Table 1-3 can be considered for ROW BMP retrofits in this screening analysis. All other roads are screened out.

Table 1-3. ROW BMP MTFCC

MTFCC	Description
S1400	Local neighborhood road, rural road, city street
S1730	Alley
S1780	Parking lot road

In addition to the screening of road types, opportunities were further screened to remove segments that have steep slopes. BMP implementation on streets with grades greater than 10 percent present engineering challenges that substantially reduce the cost effectiveness of the retrofit opportunity. From the available slope information, roads were considered as retrofit opportunities if the slope was less than 10 percent.

The final screen applied to the roads is the depth to groundwater. Implementing ROW BMPs in areas where the groundwater table is high is not recommended due to the fact that the BMPs are rendered ineffective due to their storage capacity being seriously diminished with groundwater inflow. From the groundwater contours provided, roads were eliminated as opportunities if the depth to groundwater was less than 10 feet. Attachment C highlights the areas identified with groundwater depths of 10 feet or less. The highlighted areas provide a starting point for elimination, however it should be noted that further evaluation may be necessary based on local knowledge of areas with high groundwater tables or daylighting of perched groundwater layers as identified by the jurisdictions.

The results of the ROW BMP screening are presented in Attachment C. Attachment C shows the roads available for retrofit (highlighted in green) versus all of the roads within the study area. An overall watershed map and individual jurisdictional maps for each watershed show all the identified retrofit opportunities. The maps indicate that a majority of the roads within each jurisdiction pass through the screening as potential retrofits. It should be noted that due to the coarse nature of the road classification data, only freeways, highways, and major roads were eliminated in the classification screening process. In practice, retrofitting every street that passed through the screening will likely not be feasible and adaptive management strategies will be necessary in the future to further refine the road classification data layer to more accurately identify road types suitable for ROW BMP retrofits.

The screened opportunities were used as the basis to evaluate the potential runoff volume reduction provided by ROW BMP implementations. In the following section, an engineering assessment is presented that determines the ROW BMP contributing drainage areas and the overall volume reductions achieved through ROW BMP implementation.

1.2.3. ROW BMP Configuration

The three most important assumptions necessary to evaluate BMP volume reduction performance are (1) the physical BMP configuration assumptions, (2) the contributing drainage area characteristics, and (3) the in-situ soil infiltration rates. By understanding the area draining to the BMPs and the volume capacity and function of the BMPs, an assessment can be performed to evaluate the potential of ROW retrofit BMPs to capture the required runoff volume in each subwatershed. This section summarizes the information and processes used to establish BMP configuration assumptions to be used for the runoff analysis presented in the following section.

1.2.4. BMP Assumptions Based on Green Streets

ROW BMPs consists of multiple types and combinations of stormwater treatment options. A well-established and often utilized ROW BMP is green streets. Green streets provide multiple benefits for pollutant and volume reduction and have been implemented in locations throughout the nation. In the future and as updates are made to the WMP, other ROW BMPs may be incorporated to achieve the required volume reductions.

Green streets typically consist of bioretention areas between the curb and sidewalk (herein referred to as the parkway) and/or permeable pavement within the parking lane. Prior to evaluating green street BMP treatment capacity, it is imperative to establish a configuration that can be assumed for typical implementation watershed-wide. This establishes the parkway space needed for the BMPs (plan view) and also determines the hydraulic function and storage capacity of the subsurface systems.

Bioretention systems are surface and subsurface water filtration systems, which use vegetation and underlying soils to store, filter, and reduce runoff volume while removing pollutants. Figure 1-4 represents a typical bioretention system incorporated into a green street design. Bioretention systems consist of a ponding depth and engineered soil media depth to treat runoff. Table 1-4 outlines typical widths, depths, and soil parameters associated with green street bioretention cells. Green streets were assumed to have no underdrains because the

WMP emphasizes low impact development and stormwater volume reduction to achieve pollutant load reductions.

Driveways and utilities limit the road length that can be converted into a green street. From past experience and aerial imagery review in the local watersheds, it was determined that 30 percent of the road length could be considered as the maximum possibility for conversion into bioretention area. This factor was used to limit the total length of potential green street bioretention areas. The parameters outlined above and in the table below were assumed to be the typical green street BMP implementation configuration for the screening analysis and the BMP treatment capacity evaluation described in the next section.

Table 1-4. BMP Design and Modeling Parameters for Subsequent Analyses

Component	Design Parameter	Value
Ponding Area	Depth	0.8 feet
	Width	4.0 feet
Media Layer	Depth	3.0 feet
	Porosity	0.4
Overall Profile	Effective Depth[1]	2.0 feet

[1] Effective depth is the maximum equivalent depth of water stored within the bioretention area less the depth displaced by soil media (vertical summation of surface ponding depth and void storage depth)

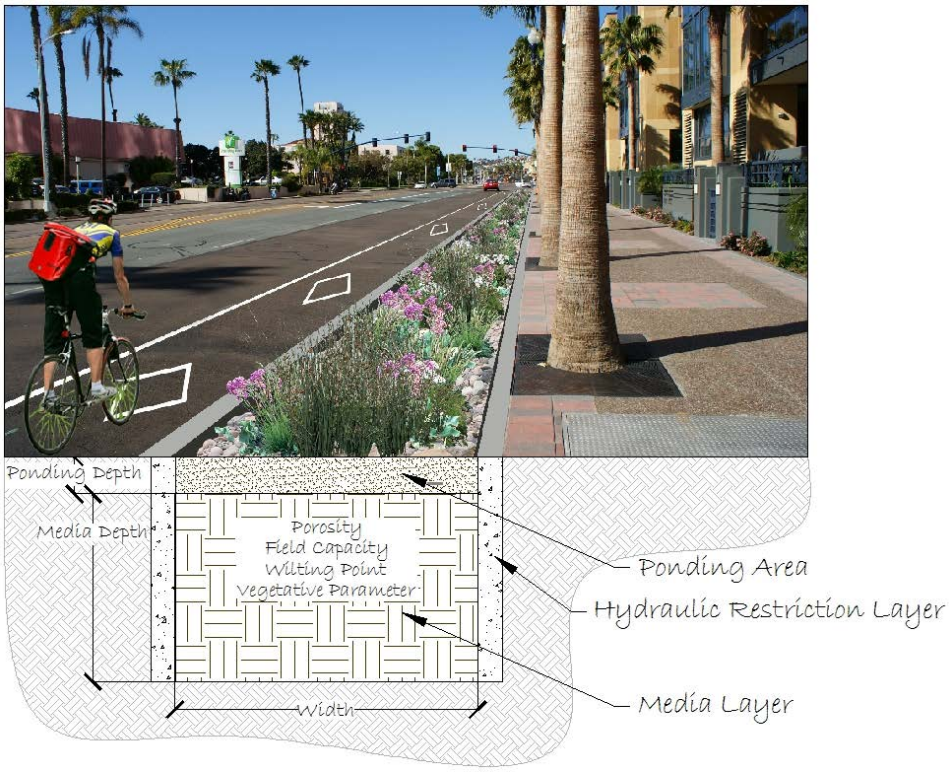

Figure 1-4. Typical bioretention section view (City of San Diego 2011).

Contributing Drainage Area Analysis

The purpose of this analysis was to realistically represent the area, type, and impervious coverage of land draining to potential green streets throughout the entire watershed. This is a critical step in WMP development because it predicts what volume of runoff can be assumed treated by green streets and what remaining (untreated) runoff must be routed to regional BMPs or addressed in other ways. The following engineering analyses were performed at a subwatershed-scale within the limits of available data and resources to estimate the maximum potential green street treatment capacity; given more detailed street-by-street drainage area data, the assumptions and results presented herein could be refined in future efforts to optimize green street treatment capacity. Figure 1-5 illustrates a simplified routing schematic used to represent the available runoff flow pathways to green street and regional BMPs throughout the watershed. The following subsections explain how each representative drainage area illustrated in Figure 1-5 was characterized.

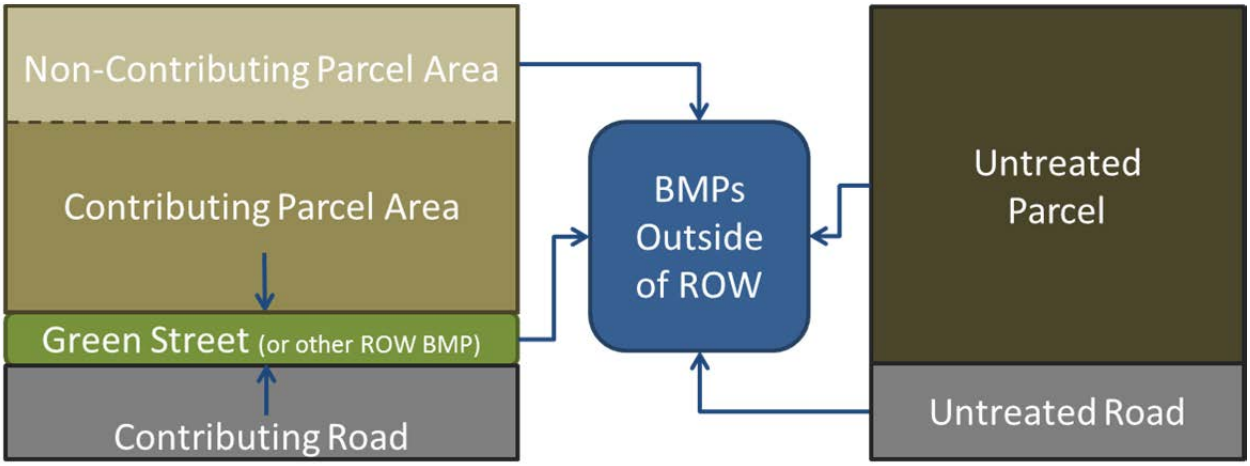

Figure 1-5. Green streets model schematic (arrows denote direction of runoff routing; figure not to scale).

Typical Parcel Size & Street Frontage Analysis

The nature of the green street analysis requires an understanding of typical parcel sizes and how much of the parcel drains to the ROW. Much of the runoff from parcels and the road drains to the ROW and is conveyed downstream through curb, gutter, and pipes. By identifying the typical parcel size, frontage length, and associated road area that drains to a candidate right-of-way area (Figure 1-6) the total area draining to potential green street retrofit opportunities was extrapolated throughout the watershed. For purposes of this study, only the high-density residential, multifamily residential, commercial, institutional, and industrial land uses were considered as contributing substantial runoff to the ROW (all other land uses contain minimal impervious area and thus contribute insubstantial runoff to the ROW).

The typical parcel size for each land use was determined by identifying all parcels for each land use. Once all the parcels were selected, the median parcel size for each land use was calculated and tabulated. This method evaluated thousands of parcels throughout the entire watershed and provided the most accurate depiction of the typical parcel size for each land use based on available data. Results are shown in Table 1-5.

Each parcel is adjacent to a portion of the ROW where the green street would be implemented. A subset of parcels approximate to the median parcel size for each land use was selected to determine the average frontage length. The portion of the selected parcels that was in contact with the ROW was measured using desktop analysis tools and averaged between all parcels of the same land use. Results are shown in Table 1-5.

Road area draining to green streets constitutes a substantial component of the total impervious drainage area. To establish road drainage areas, typical road widths were defined by sampling representative road segments located in each land use. Widths were measured from curb-to-curb using aerial orthoimagery and reported to the nearest even integer. The median sampled road width for each land use was calculated and compared with the City of Los Angeles Standard Street Dimensions (City of Los Angeles Bureau of Engineering 1999) for validation. To predict the resulting contributing road areas, the previously measured frontage length was multiplied by half the road width. Roads were assumed to be crowned; therefore, only half of the width would drain to one side of the road. Results are shown in Table 1-5.

As discussed in Section 1.2.4, only 30 percent of the frontage length could be converted into bioretention area. This factor was multiplied by the frontage length and used in limiting the total length of bioretention available within the model, as presented in Table 1-5.

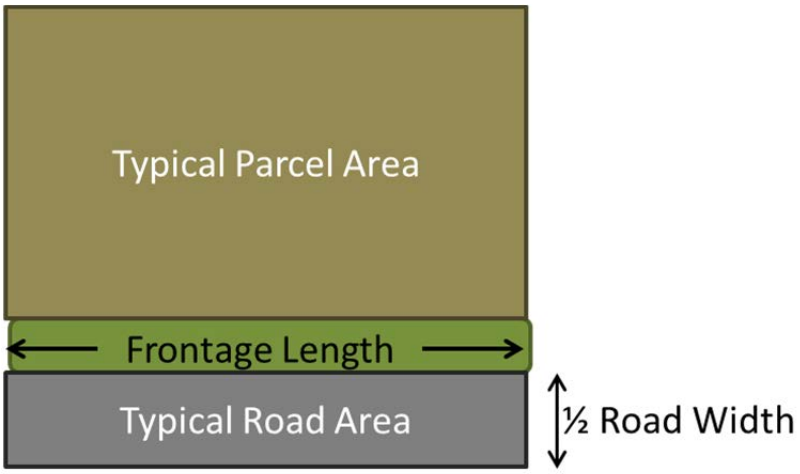

Figure 1-6. Typical parcel area, road width, road area, and frontage length schematic (figure not to scale)

Table 1-5. Typical parcel area, road area, and frontage length

Land Use	Typical Parcel Area (ft^2)	Frontage Length (ft)	Typical Road Width (ft)	Typical Road Area (ft^2)	BMP Length (ft)
High-density Residential	6,528	57	38	1,083	17
Multifamily Residential	13,526	60	30	900	18
Commercial	12,429	100	63	3,150	30
Institutional	38,215	143	37	2,646	43
Industrial	26,467	117	46	2,691	35
Other Land Use (Open Space, Vacant, etc.)	n/a[1]	100	40	2,000	30

[1] assumed not draining to ROW

Contributing Parcel Area Analysis

Many parcels will not always entirely drain to the ROW because portions can be retained on-site or flow onto an adjacent property. The actual volume of water that can be treated by a green street BMP was determined by identifying the typical proportion of the parcel that drains to the ROW (as shown in context of the model

schematic in Figure 1-7). This step also determines the area, and associated runoff, that is *not* expected to drain to green streets and is routed directly to downstream regional facilities or other practices (herein referred to as non-contributing parcel area).

The contributing areas to the green street BMPs were found using random sampling and identifying the surrounding parcel drainage patterns. Parcels were selected using a random number generator and drainage areas were determined on a desktop analysis using topography, aerial imagery, and drainage infrastructure features. The average contributing percentage was identified by evaluating multiple sites. Table 1-6 shows the percent contributing areas by land use that were determined from this analysis.

The impervious coverage of contributing parcel areas was also characterized during this step so that runoff could be simulated and routed to green streets in each land use. This was performed by tabulating the imperviousness data from the WMMS Model for each individual land use feature. The area-weighted mean impervious coverage was then calculated for each land use type. Results are tabulated for each land use in Table 1-6.

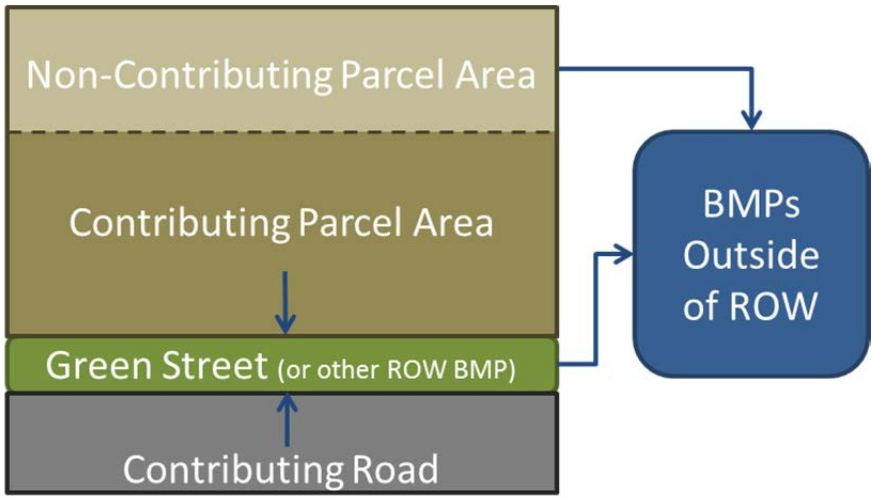

Figure 1-7. Parcel contributing area to ROW (impervious varies by land use; arrows denote direction of runoff routing; figure not to scale).

Table 1-6. Contributing area percentage by land use

Land Use	Contributing to ROW	Non-contributing to ROW	Percent Impervious
High-density Residential	80%	20%	36%
Multifamily Residential	80%	20%	60%
Commercial	80%	20%	90%
Institutional	80%	20%	72%
Industrial	35%	65%	66%
Other Land Use (Open Space, Vacant, etc.)	0%	100%	n/a

Untreated Roads Tabulation

Untreated roads consist of roadways with steep slopes, classifications not suited for green street implementation, or adjacent to open space or vacant parcels. Untreated road and associated adjacent parcel area that will ultimately drain to other BMPs was tabulated using available GIS data and screening results from Section 1.2.2 (conceptually illustrated in Figure 1-8).

Because green streets are implemented in the linear environment of the transportation corridor, it was assumed that the percentage of parcel area draining to green streets would be proportional to the percentage of suitable roads for green streets (as identified in Section 1.2.2) in each subwatershed. In other words, parcels associated with unsuitable roads were assumed to bypass green street treatment and routed directly to other facilities (these areas are defined herein as *untreated parcels*). The total treated and untreated parcel areas were reconciled with the total areas of each land use (per subwatershed) in the WMMS Model for validation and consistency.

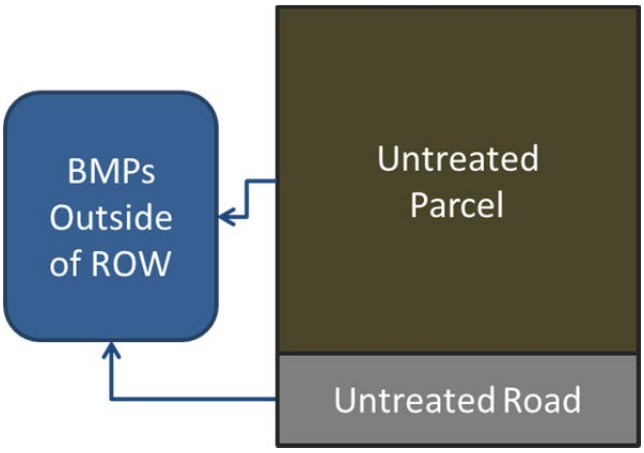

Figure 1-8. Schematic depicting untreated parcel and untreated road runoff routing (arrows denote direction of runoff routing; figure not to scale).

Summary of Contributing Drainage Areas

Results of the preceding analyses are presented in Figure 1-9. Areas that were assumed *un*treated by green streets include unsuitable roads and adjacent parcels, portions of suitable parcels that do not drain to the ROW, and predominantly pervious parcels (Open Space, Vacant, etc.), as discussed in preceding subsections; runoff from these untreated areas is assumed routed directly to regional facilities. Note that contributing areas are not necessarily proportional to contributing runoff due to variation in impervious coverage; runoff routing resulting from the preceding analyses is presented in the following section.

Given more detailed street-by-street engineering analyses, the potential area treated by green streets could be optimized, but the results below represent realistic estimates based on sound engineering judgment and currently available data and resources. Adaptive management strategies could target specific land uses that tend to bypass green street treatment (e.g. runoff, and associated treatment capacity, generated by industrial areas could be addressed through relevant industrial permits or onsite BMPs). Additional discussion on adaptive management strategies is provided in Section 8 of the main report.

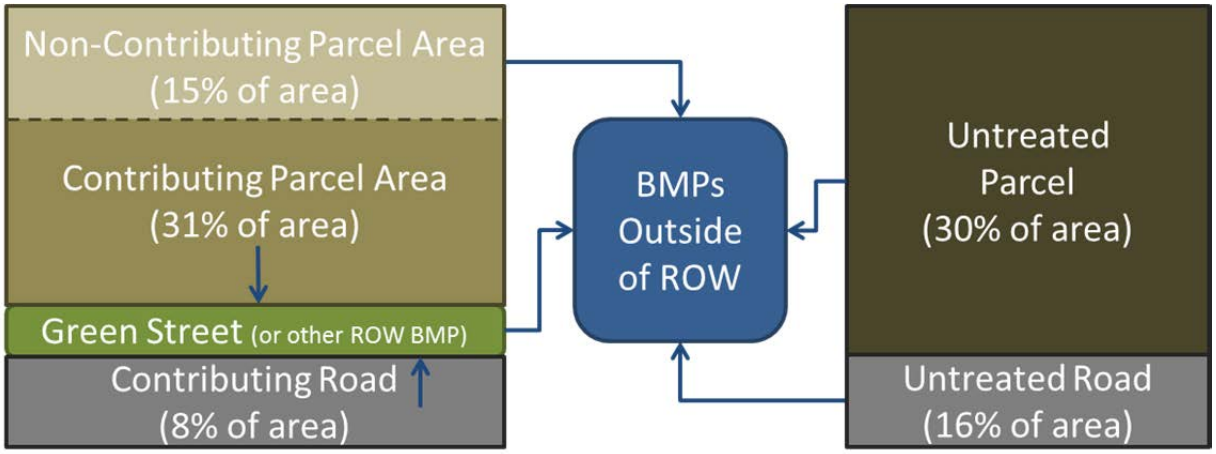

Figure 1-9. Schematic characterizing approximate distribution of routing to BMPs in the ROW for all WMP areas (arrows denote direction of runoff routing; figure not to scale).

BMP Infiltration Rates by Subwatershed

The purpose of performing the subwatershed infiltration rate analysis was to assign an average green street BMP infiltration rate to each subwatershed using soils data. Infiltration rates were assigned at the subwatershed level, which is the finest resolution at which the model performs hydrologic and water quality computations.

Soil data coverage provided through the LACDPW categorized soil unit areas into soil types. Runoff coefficient curves reported in the Hydrology Manual were developed by LACDPW for each soil type using double ring infiltrometer tests performed on areas of homogeneous runoff characteristics (LACDPW 2006). LADPW employed a sprinkling-type infiltrometer to perform the tests in each homogeneous area.

Runoff coefficient curves represent the response of the runoff coefficient (defined as the ratio of runoff to rainfall from a land area) to varying rainfall intensities. Each curve displays an inflection point representing the rainfall intensity at which substantial runoff initiates. According to LADPW (2006), each curve was assigned a minimum runoff coefficient of 0.1, "indicating that there is some runoff even at the smallest rainfall intensities." If it is assumed that substantial runoff initiates when the intensity of rainfall is greater than the soil's inherent infiltration rate, then the infiltration rate can be assumed equal to the rainfall intensity at the inflection point (less the assumed minimum runoff).

As demonstrated conceptually in Figure 1-10, the inflection point, and subsequently calculated infiltration rate, for each unique soil type in the WMP areas were identified using the runoff coefficient curves in Appendix C of the *Hydrology Manual* (LADPW 2006). Subwatershed areas were then intersected with the soil type coverage to calculate an area-weighted infiltration rate. Attachment C shows the distribution of the infiltration rates.

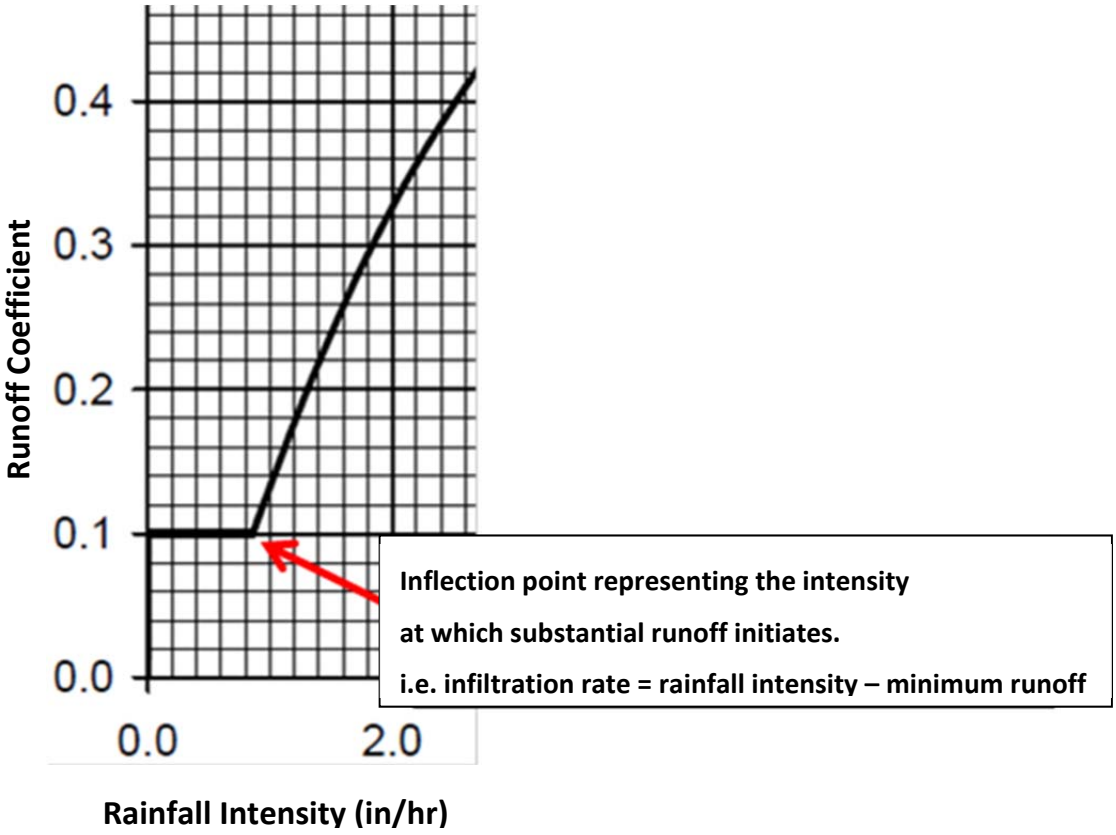

Figure 1-10. Example determination of runoff coefficient inflection point for an arbitrary soil type in Appendix C of LACDPW (2006).

1.3. LID on Public Parcels Assessment

Retrofitting public parcels with LID can be an efficient strategy for reducing stormwater runoff. This method allows municipalities the flexibility to prioritize and schedule stormwater projects to coincide with improvements that are already on the books (such as scheduled parking lot resurfacing, utility work, and public park improvements). Implementing LID on public parcels also allows municipalities the freedom to construct, inspect, and maintain BMPs without the need to purchase private property or to create stormwater easements.

The spatial extent of public parcels in each subwatershed was identified by selecting all parcels labeled as public by their assessors identification number (AIN). A total of 7,052 acres of public land was identified during this process (7% of the total WMP area). Each public parcel was assumed to implement BMPs that would treat the 85th percentile, 24-hour storm. The BMP volume was assumed to equal the 85th percentile, 24-hour storm depth times the impervious area.

LID retrofits are not feasible in all locations due to steep slopes, soil contamination hazards, and other constrains. The total runoff to be retained on public parcels was therefore discounted by 30% in order to provide a more realistic goal; this estimate was made in the lack of more detailed data, based on past LID screening exercises performed in Los Angeles County. The discount factor should be refined as actual public project sites are screened and prioritized.

1.4. Existing, Planned, and Potential BMPs

Existing and planned BMPs throughout the WMP areas were identified by the jurisdictions. These BMPs will provide capacity to reduce the annual storm runoff volume and demonstrate progress towards achieving the target runoff volume reduction.

1.4.1. Modeled Existing/Planned Subwatershed-Scale Regional BMPs

Regional BMPs that treat large portions of, or entire, subwatersheds (i.e. those with drainage areas larger than 50 acres) were modeled to quantify the impact to the upstream jurisdictions. The modeling approach and predicted performance for these specific sites is detailed in the following subsections. It is important to note that modeling was performed at a planning level coincident with the resolution of the subwatershed-scale WMMS model. Limited data were available to represent the sites, so conservative engineering assumptions were applied where appropriate. The calculated equivalent volume reductions from the BMPs can be refined during the adaptive management process once detailed design and monitoring data become available for the sites.

DeForest Wetlands Project

The DeForest Wetlands Project is located along the east bank of the Los Angeles River in the City of Long Beach and is comprised of approximately 34 acres of restored terrestrial and freshwater habitat and recreational amenities. The Project provides both groundwater recharge and surface water quality improvement. Site and modeling details are listed in Table 1-7.

Table 1-7. DeForest Wetlands Project details

Parameter	Value	Unit	Notes, Assumptions
Site Overview			
WMP Area	Lower Los Angeles River		
Location	City of Long Beach		
Status	In Development		
Compliance Targets for Contributing Subwatersheds[1]	**248.7**	**ac-ft/yr**	Subwatershed 486066
	247.6	**ac-ft/yr**	Subwatershed 486068
Given Details			
Drainage Area	1490	ac	Delineated in GIS using WMMS subwatershed boundaries
Average Annual Infiltration Volume	15-35	ac-ft/yr	Per Section 3 of the WMP
Average Annual Treated Volume	800-1000	ac-ft/yr	Per Section 3 of the WMP; assumed volume is fully treated by wetland pollutant removal mechanisms prior to discharge; assumed treated volume is in addition to infiltration volume
Annual Runoff Volume Entering Wetland[1]	1589	ac-ft/yr	WMMS output
Annual Zinc Load Entering Wetland[1]	1808	lb Zn/yr	WMMS output
Wetland Zinc Effluent Concentration	20	µg/L	Upper limit of 95% confidence interval for wetland channels, per RAA Guidelines (LARWQCB 2014)
Modeling Results			
Estimated Annual Zinc Load Reduced by Infiltration[1]	17.1	lb Zn/yr	Assumed loading associated with minimum average infiltrated runoff; assumed load sequestered in sediments and/or sorbed to underlying soils
Estimated Annual Zinc Load Reduced by Wetland Functions[1]	535	lb Zn/yr	Reduction associated with treated volume; calculated by subtracting average effluent load associated with minimum treated volume from annual influent loading
Estimated Zinc Load Reduction	30.5%		

Relative to Annual Runoff[1]			
Estimated Zinc Load Reduction Relative to Compliance Target[1]	97.7%		
Estimated Equivalent Annual Volume Reduction[1]	**243.1**	**ac-ft/yr**	Subwatershed 486066
	242.0	**ac-ft/yr**	Subwatershed 486068

[1] Indicated annual volumes are referenced to the critical year

Dominguez Gap Wetlands Project

The Dominguez Gap Wetlands Project consists of two treatment wetlands situated on the east and west banks of the Los Angeles River that features habitat and recreational amenities. The East Basin is a 37-ac facility that is dewatered manually by a pump. The West Basin primarily functions as an infiltration basin and is approximately 15 acres. Table 1-8 and Table 1-10 characterize the site and modeling details of the East and West Basins, respectively.

Table 1-8. Dominguez Gap East Wetlands Project – East Basin details

Parameter	Value	Unit	Notes, Assumptions
Site Overview			
WMP Area	Lower Los Angeles River		
Location	City of Long Beach		
Status	Complete		
Compliance Targets for Contributing Subwatersheds[1]	**346.9**	**ac-ft/yr**	Subwatershed 486014
	14.3	**ac-ft/yr**	Subwatershed 446014
Given Details			
Drainage Area	2075	ac	Delineated in GIS using WMMS subwatershed boundaries
Maximum Volume Treated per Storm Event	71	ac-ft	Per Section 3 of the WMP; assumed volume is fully treated by wetland pollutant removal mechanisms prior to discharge
Maximum Annual Volume Treated[1]	526	ac-ft/yr	Based on storm events recorded for critical year; assumed all storm event runoff volume treated up to 71 ac-ft
Annual Runoff Volume Entering Wetland[1]	913	ac-ft/yr	WMMS output
Annual Zinc Load Entering Wetland[1]	934	lb Zn/yr	WMMS output
Wetland Zinc Effluent Concentration	20	µg/L	Upper limit of 95% confidence interval for wetland channels, per RAA Guidelines (LARWQCB 2014)
Modeling Results			
Annual Zinc Load Reduced by Infiltration[1]	unknown	lb Zn/yr	Site soil information or monitored data required
Annual Zinc Load Reduced by Wetland Functions[1]	202	lb Zn/yr	Reduction associated with treated volume; calculated by subtracting average effluent load associated with minimum treated volume from annual influent loading
Zinc Load Reduction Relative to Annual Runoff[1]	22%		
Zinc Load Reduction Relative to Compliance Target[1]	55%		
Equivalent Annual Volume Reduction[1]	**191.7**	**ac-ft/yr**	Subwatershed 486014
	6.4	**ac-ft/yr**	Subwatershed 446014

[1] Indicated annual volumes are referenced to the critical year

Table 1-9. Dominguez Gap Wetlands Project – West Basin details

Parameter	Value	Unit	Notes, Assumptions
Site Overview			
WMP Area	Lower Los Angeles River		
Location	City of Long Beach		
Status	Complete		
Compliance Targets for Contributing Subwatersheds[1]	**152.0**	**ac-ft/yr**	Subwatershed 486013 (41% contributes to West Basin)
	7.4	**ac-ft/yr**	Subwatershed 486015
Given Details			
Drainage Area	299	ac	Delineated in GIS using WMMS subwatershed boundaries
Annual Runoff Volume Infiltrated	All	ac-ft/yr	Per Section 3 of the WMP, no connection to Los Angeles River
Modeling Results			
Subwatershed 486013 Annual Runoff Volume Infiltrated[1]	47%		41% of subwatershed area contributes 47% of runoff volume to the basin
Subwatershed 446015Annual Runoff Volume Infiltrated	100%		100% of subwatershed area contributing
Equivalent Annual Volume Reduction[1]	**152.0**	**ac-ft/yr**	Subwatershed 486013 (compliance target is 43% annual reduction, so meets target)
	7.4	**ac-ft/yr**	Subwatershed 446015

[1] Indicated annual volumes are referenced to the critical year

Willow Springs Park

The Willow Springs Park project will convert a public parcel to a 47-acre park. The park will contain bioswales and a water feature integrated into a recreational spaces. Table 1-10 Characterizes the site and modeling details.

Table 1-10. Willow Springs Park details

Parameter	Value	Unit	Notes, Assumptions
Site Overview			
WMP Area	Lower Los Angeles River		
Location	City of Long Beach		
Status	In Development		
Compliance Targets for Contributing Subwatersheds[1]	**26.5**	**ac-ft/yr**	Subwatershed 776012
	7.2	**ac-ft/yr**	Subwatershed 486012
Given Details			
Drainage Area	211	ac	Delineated in GIS using WMMS subwatershed boundaries
Total BMP Footprint	11	Ac	Per Section 3 of the WMP; natural channels/bioswales with very high infiltration rates
Underlying soil infiltration rates	0.9	In/hr	WMMS
Subwatershed area contributing	95%		
Modeling Results			
Maximum infiltration rate over footprint of BMP	0.83	ac-ft/hr	Assumed constant infiltration over entire footprint, applied to each time step of model runoff output draining to park – meets compliance target via infiltration
Equivalent Annual Volume Reduction[1]	**26.5**	**ac-ft/yr**	Subwatershed 776012
	7.2	**ac-ft/yr**	Subwatershed 446012

[1] Indicated annual volumes are referenced to the critical year

Discovery Park Infiltration Basin

An existing infiltration basin located at 12400 Columbia Way in the City of Downey treats runoff from approximately 51 acres (5% of the subwatershed in which the site is located). Field observations indicate that the facility has capacity to infiltration runoff at a rate of 2 in/hr (equivalent to approximately 4 ac-ft/day) in addition to detention storage. Table 1-11 reports the simplified modeling assumptions for this BMP – upon further evaluation of as-built conditions, the associated volume reduction can be refined during the adaptive management process.

Table 1-11. Discovery Park Infiltration Basin details

Parameter	Value	Unit	Notes, Assumptions
Site Overview			
WMP Area	Lower San Gabriel River		
Location	City of Downey		
Status	Complete		
Compliance Targets for Treated Subwatersheds[1]	**80.6**	**ac-ft/yr**	Subwatershed 245115
Given Details			
Drainage Area	51	ac	
Observed Infiltration Rate	4	ac-ft/day	Per Gerald Green, personal communication, 2014, February 2
Percentage of Subwatershed Contributing to BMP	5%		
Approximate Runoff Volume Draining to BMP[1]	44	ac-ft/yr	WMMS
Modeling Results			
Equivalent Annual Volume Reduction[1]	**24**	**ac-ft/yr**	Assumed constant infiltration over entire footprint, applied to each time step of model runoff output draining to park

[1] Indicated annual volumes are referenced to the critical year

Parque Dos Rios

Parque Dos Rios is located at the confluence of the Los Angeles River and Rio Hondo River. An approximately 30-ac area between the freeway and the Los Angeles River will be converted to an infiltration basin to treat additional upstream area. Currently, the site is self-retaining open space and is characterized in the baseline model as such. No further runoff volume reductions were calculated for this site; as design details are finalized for the infiltration basin improvements, associated volume reductions can be applied towards upstream jurisdictional compliance targets.

1.4.2. Identified Parcel-Scale Regional and Distributed BMPs

The jurisdictions within the WMP areas compiled detailed lists of BMPs intended to treat areas smaller than 50 acres. As with the preceding regional BMPs, these strategies represent progress towards achieving the compliance target in each respective jurisdiction. The distributed BMPs are listed in Attachment D and can be applied towards meeting the compliance targets in each jurisdiction.

The WMP groups have identified additional potential regional BMPs and these are listed in Section 3 for LCC and Section 4 for LLAR and LSGR of the respective WMP.

1.5. Non-MS4 Facility Runoff

Each jurisdiction is the Group's WMP area is subject to stormwater runoff from non-MS4 facilities. In particular, Caltrans roads and facilities regulated by nontraditional or general industrial permits contribute to the runoff volume for each subwatershed. It will be important for these entities to retain their runoff and/or eliminate their cause/contribution to receiving water exceedances. The runoff from these non-MS4 facilities was therefore estimated and subtracted from the treatment target as described below.

1.5.1. Non-MS4 Permitted Areas

Non-MS4 permitted areas were identified based on the address list of permittees on the State Water Resources Control Board (SWRCB) website. Using the address information, corresponding parcel areas were selected using the LA County Assessor Parcel Viewer and the associated GIS Shapefile. The percentage of permitted land use area relative to the total land use area was calculated and the associated non-MS4 permitted area runoff as extracted from the WMMS runoff response output.

1.5.2. Caltrans

The design storm runoff generated by Caltrans facilities was estimated using WMMS land use data. Areas labeled as Transportation consist of freeways and other extensive transportation facilities that tend to fall under Caltrans jurisdiction (versus areas labeled as Secondary Roads, which are managed by local transportation departments); these areas were assumed to be Caltrans facilities. Runoff from Transportation land uses, less runoff from any overlapping non-MS4 permitted areas identified above, was extracted from the WMMS model output for each subwatershed.

1.6. Institutional BMPs and Minimum Control Measures

It is challenging to accurately quantify most institutional BMP and minimum control measure (MCM) benefits in terms of pollutant load reductions because they generally require extensive survey and monitoring information to quantify. In addition, nonstructural BMPs may target pollutants, land uses, or populations, resulting in different load reductions depending on the implementation technique. A number of MCMs are outlined in each WMP, representing an array of practices to most effectively address pollutants at their source or affect their transport. For the purposes of the RAA, a 10% reduction was assumed to represent the cumulative impact of these practices during both wet and dry conditions. Another explicitly modeled nonstructural BMP was a goal to reduce 25% of irrigation of urban vegetation, a goal that can result from a myriad of practices ranging from public education, enforcement, incentive programs, creative water rate structures, etc. The 25% reduction in irrigation was modeled directly in LSPC and is the primary driver for dry weather flow reductions. Pollutant load reductions from these nonstructural BMPs were subtracted from loads simulated in the baseline model to quantify progress towards meeting the watershed numeric goals. Results of both the 10% reduction for collective MCMs, in addition to irrigation reduction, are presented in Section 7 of the main RAA report for both wet and dry conditions.

Attachment B: Detailed Jurisdictional Compliance Tables

Submitted to:

LLAR WMP Group LCC WMP Group LSGR WMP Group

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June 6, 2014

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B1. Lower Los Angeles River WMP Detailed Tables

B1.1. City of Downey

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
6076	Final	17.0	-	-	1.2	-	1.2
6077	Final	123.0	0.3	11.8	1.2	6.4	19.6
6079	50%	176.4	0.7	1.7	10.1	-	12.5
6082	Final	0.3	-	-	0.0	0.0	0.0
6100	50%	10.7	0.0	0.8	0.0	0.6	1.4
6102	31%	143.8	1.1	12.2	0.7	7.1	21.1
6103	Final	-	0.7	-	-	-	0.7
6104	Final	37.1	0.3	3.2	0.0	0.9	4.5
6106	Final	76.4	0.4	9.1	1.6	-	11.1
6111	Final	69.5	0.3	7.1	0.5	3.3	11.2
6113	Final	0.6	-	0.0	-	0.1	0.1
Grand Total		654.7	3.8	45.9	15.3	18.4	83.4

B1.2. City of Lakewood

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
6014	31%	7.9	-	1.1	0.0	-	1.2
Grand Total		7.9	-	1.1	0.0	-	1.2

B1.3. City of Long Beach

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
6001	Final	-	-	-	-	-	-
6002	50%	378.7	-	23.8	5.2	19.3	48.3
6003	Final	429.9	-	22.4	1.4	32.8	56.5
6004	50%	2.4	-	0.1	-	0.3	0.3
6005	31%	6.6	-	1.0	0.0	-	1.0
6006	Final	35.9	-	0.3	0.1	4.1	4.5
6007	Final	67.0	-	6.4	0.1	4.0	10.6
6008	Final	144.0	-	13.9	2.0	3.5	19.4
6009	Final	159.5	-	11.5	0.7	9.2	21.4
6010	Final	100.8	-	8.2	0.9	4.8	13.9
6011	Final	184.8	-	14.4	0.9	9.6	24.9
6012	31%	-	-	-	-	-	-
6013	50%	-	-	-	-	-	-
6014	Final	155.2	-	15.0	7.9	-	22.9
6015	31%	-	-	-	-	-	-
6016	Final	-	-	-	-	-	-
6017	50%	1.1	-	-	-	0.1	0.1
6018	Final	45.8	-	4.3	-	2.6	6.9
6065	Final	36.7	-	0.4	0.0	4.6	5.0
6066	31%	-	-	-	-	-	-
6067	50%	25.3	-	2.6	0.3	0.5	3.3
6068	31%	-	-	-	-	-	-
6069	50%	42.6	-	0.6	0.0	3.5	4.1
6070	50%	22.2	-	2.7	0.4	-	3.1
6071	50%	94.4	-	10.5	1.6	1.0	13.1
6072	50%	0.3	-	0.0	-	0.0	0.0
7016	Final	473.3	-	16.5	6.9	36.3	59.7
Grand Total		2,406.2	-	154.6	28.3	136.2	319.1

B1.4. City of Lynwood

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
6023	Final	26.3	-	1.0	0.7	1.6	3.3
6024	Final	10.6	-	0.4	-	1.1	1.4
6028	31%	11.2	-	0.8	-	0.9	1.7
6030	Final	45.2	-	4.0	2.4	-	6.4
6031	31%	133.0	-	9.9	2.0	7.5	19.4
6032	Final	60.5	-	6.0	0.4	3.4	9.8
6033	Final	113.3	-	7.4	0.2	10.7	18.2
6074	50%	134.9	-	12.8	3.8	0.1	16.8
6078	Final	-	-	-	-	-	-
6080	31%	91.7	-	7.7	0.7	4.7	13.2
6081	Final	41.3	-	4.0	0.8	0.5	5.3
6082	Final	-	-	-	-	-	-
Grand Total		667.9	-	53.9	11.1	30.5	95.5

B1.5. City of Paramount

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
6069	31%	0.0	-	-	-	-	-
6071	Final	120.7	0.0	4.9	0.9	9.9	15.6
6072	Final	172.9	0.0	7.6	1.1	13.9	22.6
6073	Final	61.4	-	1.9	0.2	4.6	6.6
6075	31%	163.7	-	9.0	1.7	10.2	20.9
6076	50%	65.7	-	7.4	0.8	0.3	8.6
6078	Final	21.7	-	0.5	0.0	1.8	2.3
6080	Final	-	-	-	-	-	-
Grand Total		606.1	0.1	31.2	4.7	40.6	76.6

B1.6. City of Pico Rivera

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
6106	31%	44.3	-	5.9	0.5	0.2	6.5
6111	Final	-	-	-	-	-	-
6112	31%	1.4	-	0.0	-	0.1	0.2
6113	31%	229.5	-	5.6	0.0	27.0	32.7
6114	Final	-	-	-	-	-	-
6115	Final	0.0	-	-	-	0.0	0.0
6116	Final	-	-	-	-	-	-
6117	Final	-	-	-	-	-	-
6126	Final	12.0	-	1.3	0.0	0.5	1.8
6129	Final	-	-	-	-	-	-
Grand Total		287.2	-	12.8	0.5	27.9	41.2

B1.7. City of Signal Hill

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
6002	50%	105.8	-	7.0	0.9	5.9	13.9
6003	Final	43.7	-	1.9	0.0	4.2	6.0
6007	Final	-	-	-	-	-	-
6009	Final	8.2	0.1	0.3	-	0.7	1.1
6011	31%	6.0	0.1	0.8	-	0.2	1.1
6012	31%	2.5	-	0.0	0.2	-	0.2
Grand Total		166.2	0.2	10.0	1.1	11.0	22.3

B1.8. City of South Gate

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
6031	31%	148.6	-	16.9	0.8	5.3	22.9
6033	Final	61.9	-	4.5	0.3	4.8	9.5
6034	Final	416.7	-	30.0	3.8	25.3	59.0
6076	50%	92.5	-	7.5	0.7	5.1	13.2
6078	Final	-	-	-	-	-	-
6079	50%	54.4	-	4.9	0.1	3.4	8.4
6080	31%	48.7	-	5.8	-	2.5	8.3
6082	Final	82.8	0.0	4.3	0.1	9.4	13.8
6083	Final	11.5	-	0.7	-	0.9	1.6
6084	Final	137.8	4.7	8.3	0.8	5.9	19.8
6085	50%	-	-	-	-	-	-
6089	Final	18.3	-	0.8	0.2	1.8	2.7
6090	Final	3.4	-	0.6	-	-	0.6
6096	31%	0.6	-	0.0	0.0	0.0	0.1
6098	31%	0.1	-	-	0.0	-	0.0
6100	50%	51.2	-	2.6	0.0	4.2	6.8
6101	31%	25.0	-	0.5	0.1	2.6	3.3
6102	31%	6.3	-	-	-	0.8	0.8
6104	Final	7.4	-	0.0	0.0	0.9	1.0
6350	Final	-	-	-	-	-	-
6351	Final	7.1	-	0.0	0.0	1.1	1.1
Grand Total		1,174.3	4.7	87.5	6.8	73.8	173.0

B2. Los Cerritos Channel WMP Detailed Tables

B2.1. City of Bellflower

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5507	Final	268.1	-	16.7	1.2	13.2	31.1
5517	Final	137.7	-	9.3	0.8	9.3	19.4
5518	Final	233.5	-	16.8	1.2	10.2	28.2
5519	35%	176.3	-	11.4	0.9	12.1	24.4
	Final	59.5	-	-	-	3.6	3.6
5523	35%	68.0	-	3.7	0.4	4.1	8.2
	Final	32.3	-	-	-	2.0	2.0
5524	Final	14.8	-	0.2	-	1.2	1.4
Grand Total		990.4	-	58.1	4.5	55.6	118.2

B2.2. City of Cerritos

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5506	Final	0.0	-	-	-	0.0	0.0
5507	35%	9.7	-	1.0	0.0	0.5	1.4
	Final	3.2	-	-	-	0.1	0.1
Grand Total		12.9	-	1.0	0.0	0.6	1.6

B2.3. City of Downey

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5524	35%	57.2	0.1	5.3	0.0	2.7	8.1
	Final	35.8	-	-	-	2.1	2.1
Grand Total		93.0	0.1	5.3	0.0	4.8	10.2

B2.4. City of Lakewood

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5506	Final	226.5	-	31.4	2.1	5.1	38.5
5507	35%	131.0	-	15.4	2.6	1.5	19.5
	Final	45.2	-	-	-	3.6	3.6
5510	Final	19.9	-	0.4	-	1.5	1.9
5512	Final	138.8	-	7.7	0.2	7.0	14.9
5514	Final	35.3	-	3.7	1.3	0.4	5.4
5515	Final	26.6	-	3.9	0.2	0.5	4.6
5516	Final	31.9	-	4.0	0.4	0.8	5.3
5517	Final	134.4	-	18.6	1.4	2.8	22.9
5519	35%	3.1	-	0.2	-	0.2	0.4
	Final	6.4	-	-	-	0.1	0.1
5520	35%	130.9	-	14.0	2.1	4.4	20.6
	Final	33.5	-	-	-	3.3	3.3
5521	Final	95.2	-	11.6	0.6	2.2	14.3
5522	Final	71.9	-	8.7	0.8	1.6	11.1
5523	35%	17.4	-	1.9	-	0.7	2.6
	Final	4.0	-	-	-	0.3	0.3
Grand Total		1,152.1	-	121.5	11.8	36.2	169.5

B2.5. City of Long Beach

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5501	35%	0.1	-	0.0	0.0	0.0	0.0
	Final	0.1	-	-	-	0.0	0.0
5502	35%	0.1	-	0.0	0.0	0.0	0.0
	Final	0.2	-	-	-	0.0	0.0
5503	35%	57.7	-	4.2	2.3	2.0	8.5
	Final	20.1	-	-	-	1.7	1.7
5504	35%	196.6	-	10.2	3.3	8.7	22.2
	Final	104.4	-	-	-	5.5	5.5
5505	Final	130.5	-	15.9	1.6	3.2	20.7
5506	Final	8.6	-	0.1	0.2	0.4	0.7
5508	Final	65.6	-	7.7	0.9	1.7	10.3
5509	Final	25.6	-	-	2.2	-	2.2
5510	Final	152.2	-	9.8	0.9	6.1	16.8
5511	Final	48.5	-	6.7	0.2	1.3	8.1
5512	Final	329.5	-	22.2	1.7	16.8	40.7
5513	35%	23.9	-	1.5	0.1	2.1	3.7
	Final	6.6	-	-	-	0.4	0.4
5514	35%	106.0	-	10.9	5.9	-	16.7
	Final	46.8	-	3.7	-	2.8	6.5
5515	Final	91.0	-	10.8	1.7	2.3	14.9
5520	Final	7.4	-	0.8	-	0.3	1.2
5521	Final	49.2	-	6.0	0.1	1.8	7.9
5522	Final	48.6	-	4.2	0.0	3.1	7.3
5523	35%	89.3	-	7.0	0.8	3.5	11.3
	Final	21.4	-	-	-	1.6	1.6
Grand Total		1,629.8	-	121.7	21.8	65.3	208.7

B2.6. City of Paramount

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5519	35%	24.0	-	1.9	0.2	1.4	3.5
	Final	11.4	-	-	-	0.6	0.6
5523	35%	243.0	-	12.4	2.8	15.7	30.9
	Final	89.6	-	-	-	4.1	4.1
5524	Final	157.5	-	8.5	3.5	4.0	16.0
Grand Total		525.5	-	22.8	6.4	25.9	55.1

B2.7. City of Signal Hill

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5510	35%	231.6	0.0	11.2	1.2	14.2	26.6
	Final	52.7	-	-	-	2.0	2.0
Grand Total		284.3	0.0	11.2	1.2	16.2	28.6

B3. Lower San Gabriel River (San Gabriel River) WMP Detailed Tables

B3.1. City of Artesia

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5109	35%	1.1	-	-	0.1	-	0.1
Grand Total		1.1	-	-	0.1	-	0.1

B3.2. City of Bellflower

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5110	Final	0.0	-	-	-	0.0	0.0
5112	Final	0.6	-	0.1	0.0	-	0.1
5113	Final	51.5	-	0.9	3.4	-	4.3
5114	Final	-	-	-	-	-	-
5115	35%	1.3	-	0.2	0.0	-	0.2
5116	Final	0.1	-	-	-	0.0	0.0
5118	Final	3.9	-	0.6	0.3	-	0.9
Grand Total		57.4	-	1.8	3.7	0.0	5.5

B3.3. City of Cerritos

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5107	Final	-	-	-	-	-	-
5108	Final	-	-	-	-	-	-
5109	Final	-	-	-	-	-	-
5110	Final	2.9	-	0.4	0.0	-	0.4
5111	Final	-	-	-	-	-	-
5112	Final	1.2	-	0.2	0.0	-	0.2
5113	Final	-	-	-	-	-	-
5116	35%	-	-	-	-	-	-
Grand Total		4.1	-	0.6	0.0	-	0.6

B3.4. City of Diamond Bar

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5197	Final	0.0	-	0.0	-	-	0.0
5198	Final	-	-	-	-	-	-
5203	Final	-	-	-	-	-	-
5204	Final	-	-	-	-	-	-
5205	Final	1.0	-	0.2	-	-	0.2
5212	Final	-	-	-	-	-	-
5213	35%	-	-	-	-	-	-
Grand Total		1.1	-	0.2	-	-	0.2

B3.5. City of Downey

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5113	Final	-	1.0	-	-	-	1.0
5114	Final	22.4	0.8	2.1	0.4	-	3.3
5115	Final	-	0.6	-	-	-	0.6
5118	Final	-	0.6	-	-	-	0.6
5119	Final	52.5	3.3	6.4	-	-	9.7
5122	35%	-	0.0	-	-	-	0.0
5124	Final	-	0.0	-	-	-	0.0
5125	Final	2.5	0.4	0.1	-	-	0.5
5126	Final	9.8	0.3	1.4	-	-	1.7
5127	Final	-	0.1	-	-	-	0.1
5128	Final	-	0.0	-	-	-	0.0
Grand Total		87.3	7.1	10.0	0.4	-	17.5

B3.6. City of Lakewood

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5105	Final	0.8	-	-	0.0	0.1	0.1
5106	35%	-	-	-	-	-	-
5107	Final	-	-	-	-	-	-
5108	Final	1.4	-	0.2	0.0	-	0.2
5110	Final	-	-	-	-	-	-
Grand Total		2.2	-	0.2	0.0	0.1	0.4

B3.7. City of Long Beach

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5102	Final	-	-	-	-	-	-
5103	35%	26.9	-	1.1	1.3	-	2.4
5104	Final	2.3	-	0.3	-	-	0.3
5105	Final	-	-	-	-	-	-
5106	Final	0.0	-	-	-	0.0	0.0
Grand Total		29.2	-	1.4	1.3	0.0	2.7

B3.8. City of Norwalk

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5109	35%	0.8	-	-	0.1	-	0.1
5116	Final	-	-	-	-	-	-
5117	Final	-	-	-	-	-	-
5118	Final	0.1	-	-	0.0	-	0.0
5120	Final	-	-	-	-	-	-
5121	Final	3.9	-	-	0.3	-	0.3
5122	Final	-	-	-	-	-	-
5124	Final	-	-	-	-	-	-
Grand Total		4.8	-	-	0.3	-	0.3

B3.9. City of Pico Rivera

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5127	Final	0.0	-	-	-	0.0	0.0
5128	Final	6.4	-	1.2	-	-	1.2
5130	Final	6.1	-	1.1	-	-	1.1
5131	Final	11.7	-	2.0	-	-	2.0
5132	Final	0.0	-	-	-	0.0	0.0
5135	Final	4.3	-	0.8	-	-	0.8
5136	Final	7.2	-	1.3	-	-	1.3
5137	35%	0.2	-	0.0	-	-	0.0
5139	Final	7.8	-	1.4	-	-	1.4
5140	Final	-	-	-	-	-	-
5141	Final	4.9	-	0.8	-	-	0.8
5142	Final	-	-	-	-	-	-
5143	Final	8.9	-	1.6	-	-	1.6
5144	Final	-	-	-	-	-	-
5145	Final	1.7	-	0.3	-	-	0.3
5147	Final	-	-	-	-	-	-
5148	Final	0.2	-	0.0	-	-	0.0
5149	Final	0.0	-	-	-	-	-
5150	Final	-	-	-	-	-	-
5151	Final	-	-	-	-	-	-
5153	Final	1.0	-	0.2	-	-	0.2
5154	Final	-	-	-	-	-	-
Grand Total		60.4	-	10.8	-	0.0	10.8

B3.10. City of Santa Fe Springs

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5120	Final	3.1	-	0.2	-	0.3	0.5
5122	Final	-	-	-	-	-	-
5123	Final	23.9	-	3.8	-	-	3.8
5127	35%	-	-	-	-	-	-
5129	Final	-	-	-	-	-	-
5130	Final	-	-	-	-	-	-
5132	Final	-	-	-	-	-	-
5133	Final	-	-	-	-	-	-
5134	Final	3.3	-	0.6	-	-	0.6
5135	Final	0.0	-	0.0	-	0.0	0.0
Grand Total		30.3	-	4.6	-	0.3	4.9

B3.11. City of Whittier

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5138	Final	7.1	-	1.4	-	-	1.4
5142	Final	-	-	-	-	-	-
5146	Final	-	-	-	-	-	-
5147	Final	-	-	-	-	-	-
5148	Final	-	-	-	-	-	-
5153	35%	0.0	-	-	-	0.0	0.0
5173	Final	-	-	-	-	-	-
Grand Total		7.1	-	1.4	-	0.0	1.4

B4. Lower San Gabriel River WMP (Coyote Creek) Detailed Tables

B4.1. City of Artesia

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5008	Final	-	-	-	-	-	-
5018	35%	15.9	-	-	1.1	-	1.1
Grand Total		15.9	-	-	1.1	-	1.1

B4.2. City of Cerritos

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5008	Final	7.7	-	-	0.9	-	0.9
5016	Final	-	-	-	-	-	-
5017	Final	4.3	-	-	0.5	-	0.5
5018	Final	14.9	-	-	1.1	-	1.1
5023	Final	-	-	-	-	-	-
5024	Final	-	-	-	-	-	-
5026	Final	5.8	-	1.0	0.0	-	1.0
5028	Final	-	-	-	-	-	-
5029	Final	4.9	-	0.3	0.2	-	0.6
5030	35%	0.1	-	0.0	-	-	0.0
5035	Final	-	-	-	-	-	-
5036	Final	1.2	-	0.2	0.0	-	0.2
5038	Final	-	-	-	-	-	-
5059	Final	15.1	-	1.6	0.5	-	2.0
5060	Final	-	-	-	-	-	-
5061	Final	2.6	-	-	0.2	-	0.2
Grand Total		56.7	-	3.1	3.4	-	6.4

B4.3. City of Diamond Bar

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5053	Final	-	-	-	-	-	-
5054	35%	1.0	-	0.3	-	-	0.3
5055	Final	8.4	-	1.2	-	0.7	1.9
5056	Final	-	-	-	-	-	-
5057	Final	-	-	-	-	-	-
5058	Final	27.2	-	6.7	-	-	6.7
Grand Total		36.7	-	8.2	-	0.7	8.9

B4.4. City of Hawaiian Gardens

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5004	Final	-	-	-	-	-	-
5007	35%	23.6	-	0.3	1.5	-	1.8
5009	Final	0.1	-	-	-	0.0	0.0
5013	Final	1.3	-	-	0.1	-	0.1
5014	Final	2.1	-	0.2	0.0	-	0.3
Grand Total		27.1	-	0.6	1.6	0.0	2.2

B4.5. City of La Mirada

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5037	Final	-	-	-	-	-	-
5038	Final	-	-	-	-	-	-
5039	Final	-	-	-	-	-	-
5040	Final	-	-	-	-	-	-
5041	Final	-	-	-	-	-	-
5042	Final	-	-	-	-	-	-
5043	Final	19.1	-	1.9	0.6	-	2.5
5044	Final	-	-	-	-	-	-
5045	35%	-	-	-	-	-	-
5059	Final	1.4	-	0.3	-	-	0.3
5060	Final	-	-	-	-	-	-
5062	Final	20.5	-	1.0	1.1	-	2.1
5063	Final	37.0	-	-	3.0	-	3.0
5064	Final	-	-	-	-	-	-
5067	Final	-	-	-	-	-	-
5069	Final	40.3	-	5.3	0.9	-	6.2
5070	Final	-	-	-	-	-	-
5073	Final	5.7	-	1.0	-	-	1.0
5074	Final	0.8	-	0.1	-	-	0.1
5080	Final	-	-	-	-	-	-
Grand Total		124.9	-	9.6	5.6	-	15.2

B4.6. City of Lakewood

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5004	Final	-	-	-	-	-	-
5007	35%	17.5	-	0.9	0.7	-	1.6
5008	Final	2.3	-	-	0.3	-	0.3
5014	Final	-	-	-	-	-	-
5015	Final	-	-	-	-	-	-
5016	Final	-	-	-	-	-	-
5017	Final	-	-	-	-	-	-
Grand Total		19.7	-	0.9	0.9	-	1.9

B4.7. City of Long Beach

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5003	Final	-	-	-	-	-	-
5004	35%	-	-	-	-	-	-
5005	Final	-	-	-	-	-	-
5007	Final	-	-	-	-	-	-
5009	Final	-	-	-	-	-	-
5013	Final	0.0	-	-	0.0	-	0.0
Grand Total		0.0	-	-	0.0	-	0.0

B4.8. City of Norwalk

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5008	35%	1.6	-	-	0.2	-	0.2
5018	Final	2.0	-	-	0.2	-	0.2
5019	Final	24.3	-	-	1.8	-	1.8
5020	Final	-	-	-	-	-	-
5021	Final	16.9	-	-	1.3	-	1.3
5022	Final	7.7	-	1.4	-	-	1.4
5024	Final	-	-	-	-	-	-
5025	Final	-	-	-	-	-	-
5060	Final	-	-	-	-	-	-
5068	Final	-	-	-	-	-	-
5071	Final	-	-	-	-	-	-
5073	Final	-	-	-	-	-	-
Grand Total		52.5	-	1.4	3.4	-	4.7

B4.9. City of Santa Fe Springs

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5019	Final	0.0	-	-	-	0.0	0.0
5020	Final	-	-	-	-	-	-
5022	Final	-	-	-	-	-	-
5024	Final	-	-	-	-	-	-
5025	Final	-	-	-	-	-	-
5060	Final	-	-	-	-	-	-
5061	Final	-	-	-	-	-	-
5062	Final	-	-	-	-	-	-
5067	Final	-	-	-	-	-	-
5068	Final	-	-	-	-	-	-
5069	Final	-	-	-	-	-	-
5071	Final	-	-	-	-	-	-
5072	Final	2.6	-	0.3	-	0.1	0.4
5073	Final	-	-	-	-	-	-
5084	Final	1.4	-	0.2	-	-	0.2
5089	Final	-	-	-	-	-	-
5092	Final	1.1	-	0.1	-	0.2	0.2
5093	Final	-	-	-	-	-	-
5094	Final	7.4	-	0.4	-	0.9	1.2
5095	35%	-	-	-	-	-	-
Grand Total		12.6	-	1.0	-	1.1	2.1

B4.10. City of Whittier

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5045	Final	0.0	-	-	-	0.0	0.0
5064	Final	-	-	-	-	-	-
5065	Final	3.7	-	0.8	-	-	0.8
5070	Final	0.0	-	-	-	0.0	0.0
5079	Final	11.7	-	2.5	-	-	2.5
5080	Final	26.0	-	5.5	-	-	5.5
5081	35%	-	-	-	-	-	-
5082	Final	0.2	-	0.0	-	-	0.0
5083	Final	-	-	-	-	-	-
5086	Final	-	-	-	-	-	-
5087	Final	20.8	-	4.1	-	-	4.1
5088	Final	24.7	-	5.4	-	-	5.4
5089	Final	0.5	-	0.1	-	-	0.1
5090	Final	0.8	-	0.2	-	-	0.2
5091	Final	5.7	-	1.1	-	-	1.1
5092	Final	8.9	-	1.7	-	-	1.7
5093	Final	0.0	-	-	-	0.0	0.0
5094	Final	0.6	-	0.1	-	0.0	0.1
5095	Final	21.1	-	3.9	-	-	3.9
5096	Final	3.8	-	0.7	-	-	0.7
5097	Final	5.2	-	1.0	-	-	1.0
5098	Final	47.9	-	8.7	-	-	8.7
5099	Final	10.6	-	1.9	-	-	1.9
5100	Final	7.3	-	1.4	-	-	1.4
5101	Final	0.6	-	0.1	-	-	0.1
Grand Total		200.1	-	39.0	-	0.0	39.1

Attachment C: Supporting Figures for Watershed Control Measures

Submitted to:

LLAR WMP Group LCC WMP Group LSGR WMP Group

Submitted by:

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9444 Balboa Ave., Suite 215
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June 6, 2014

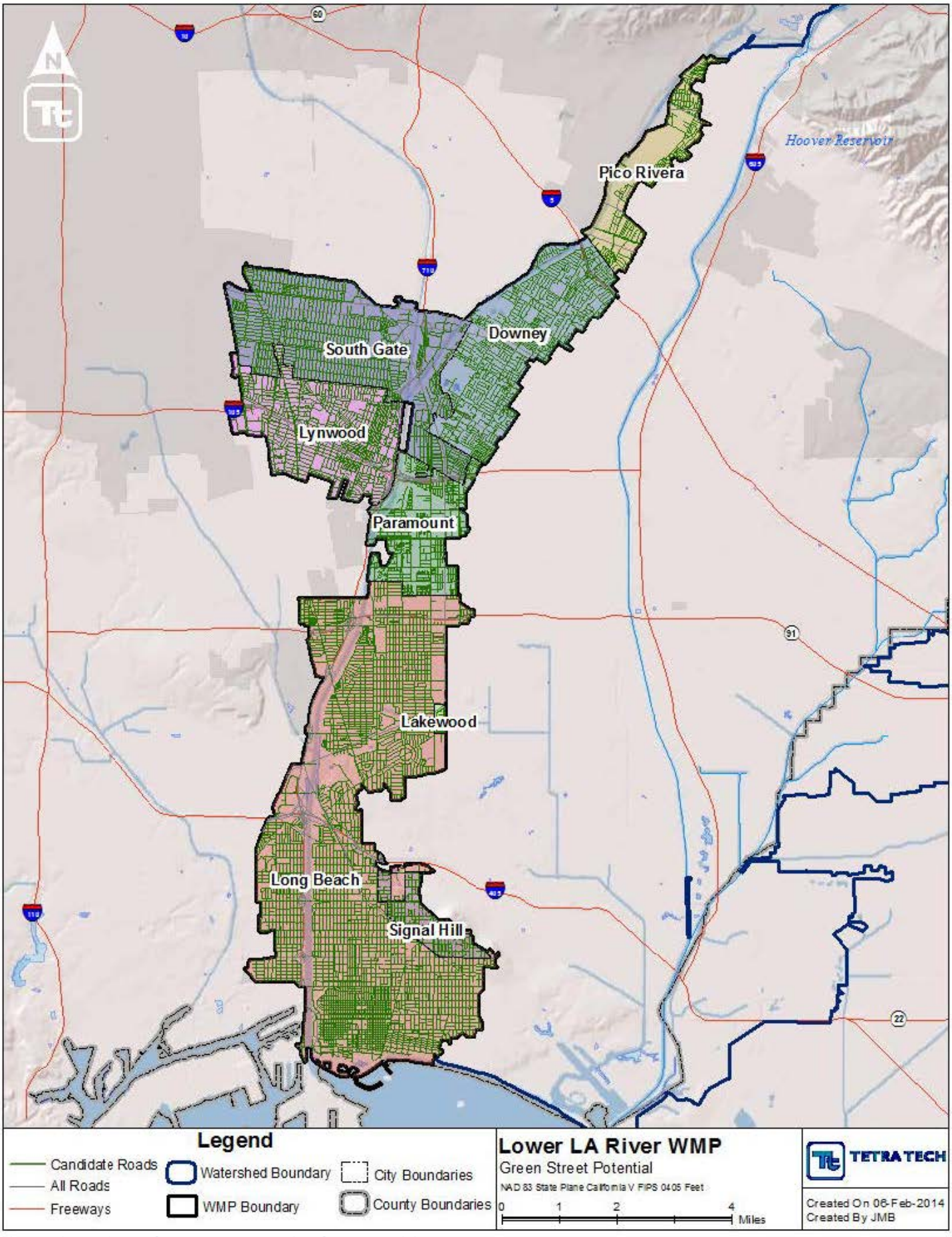

Figure 1. LLAR ROW BMP Potential Opportunities

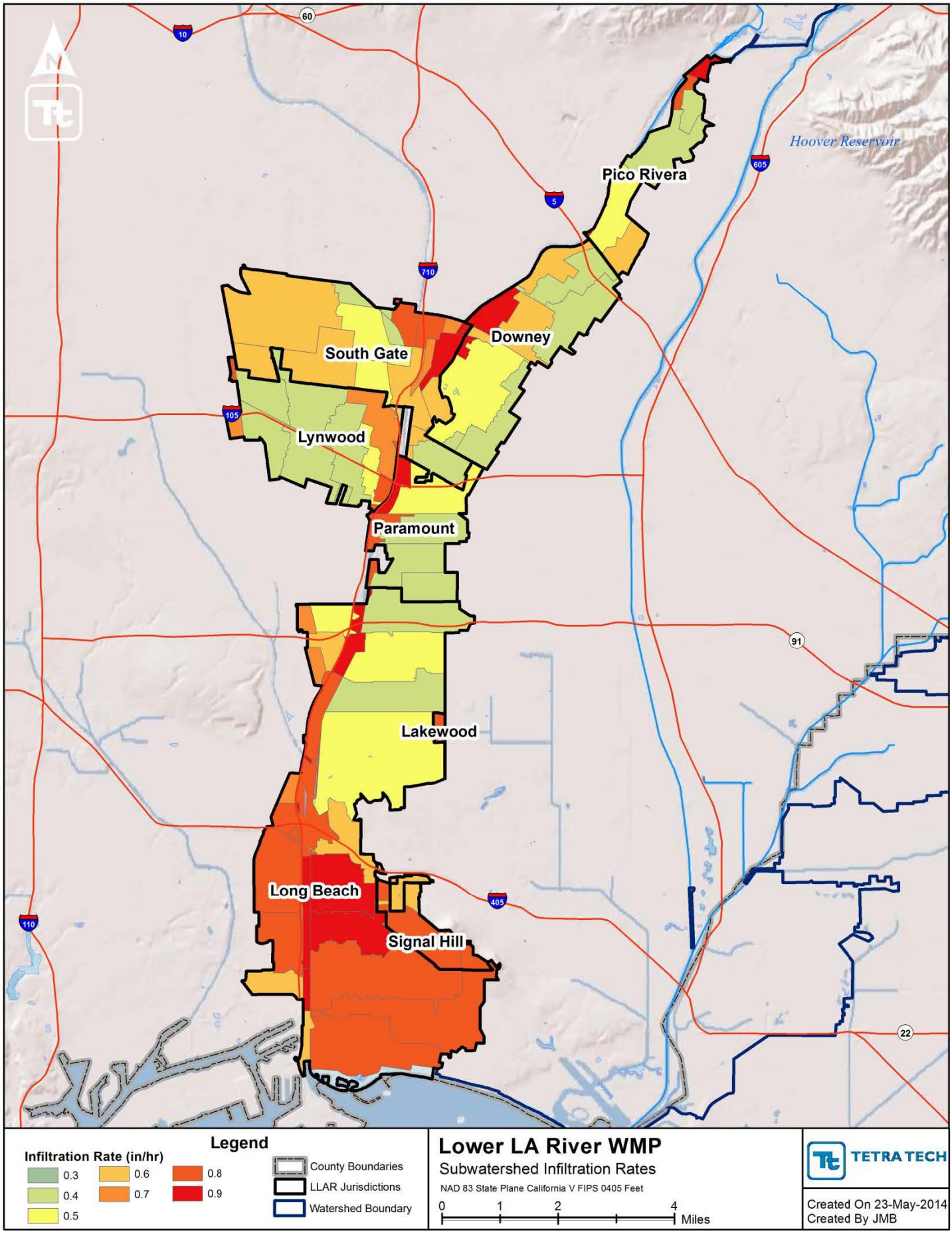

Figure 2. LLAR Subwatershed Infiltration Rates

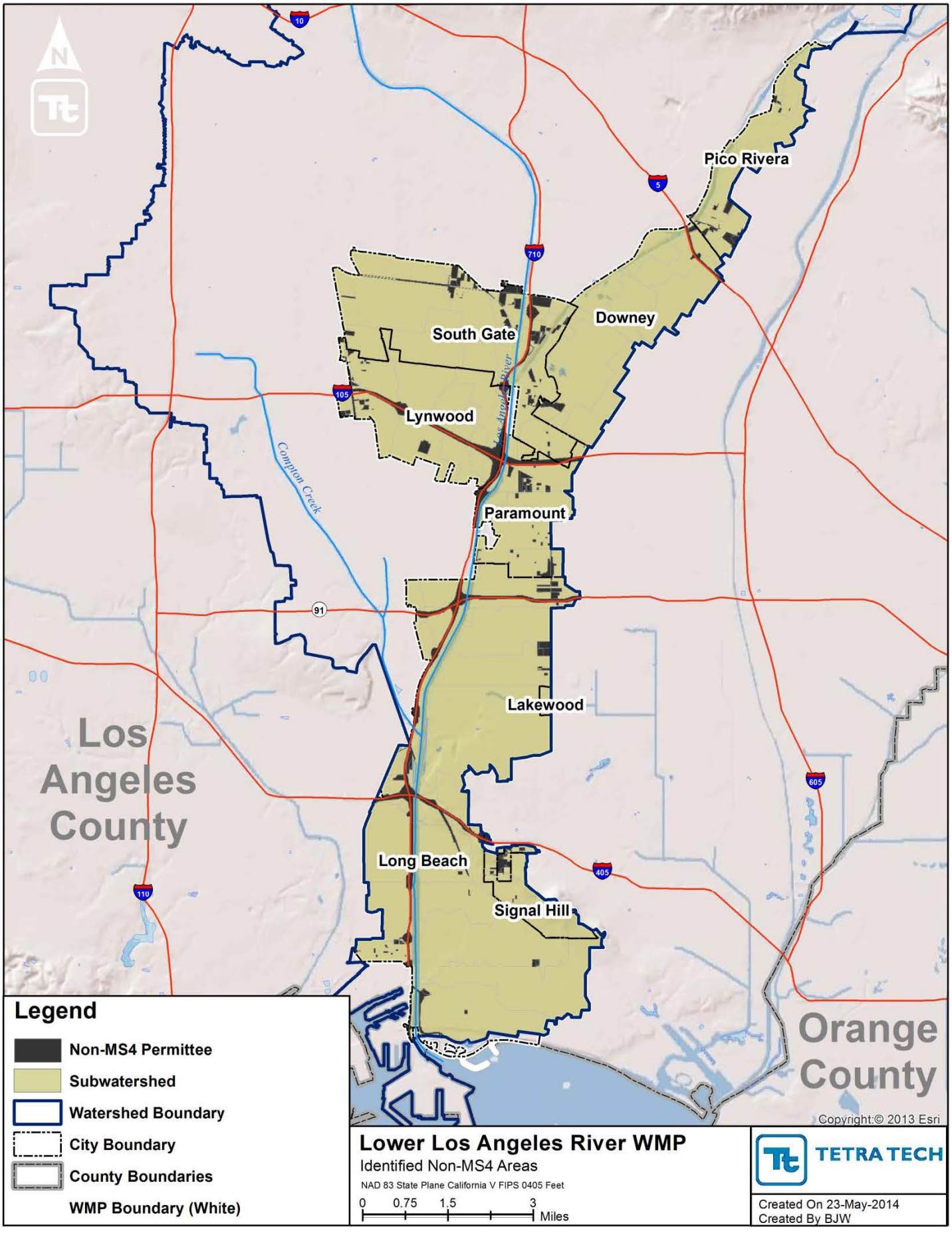

Figure 3. LLAR Non-MS4 Permittees

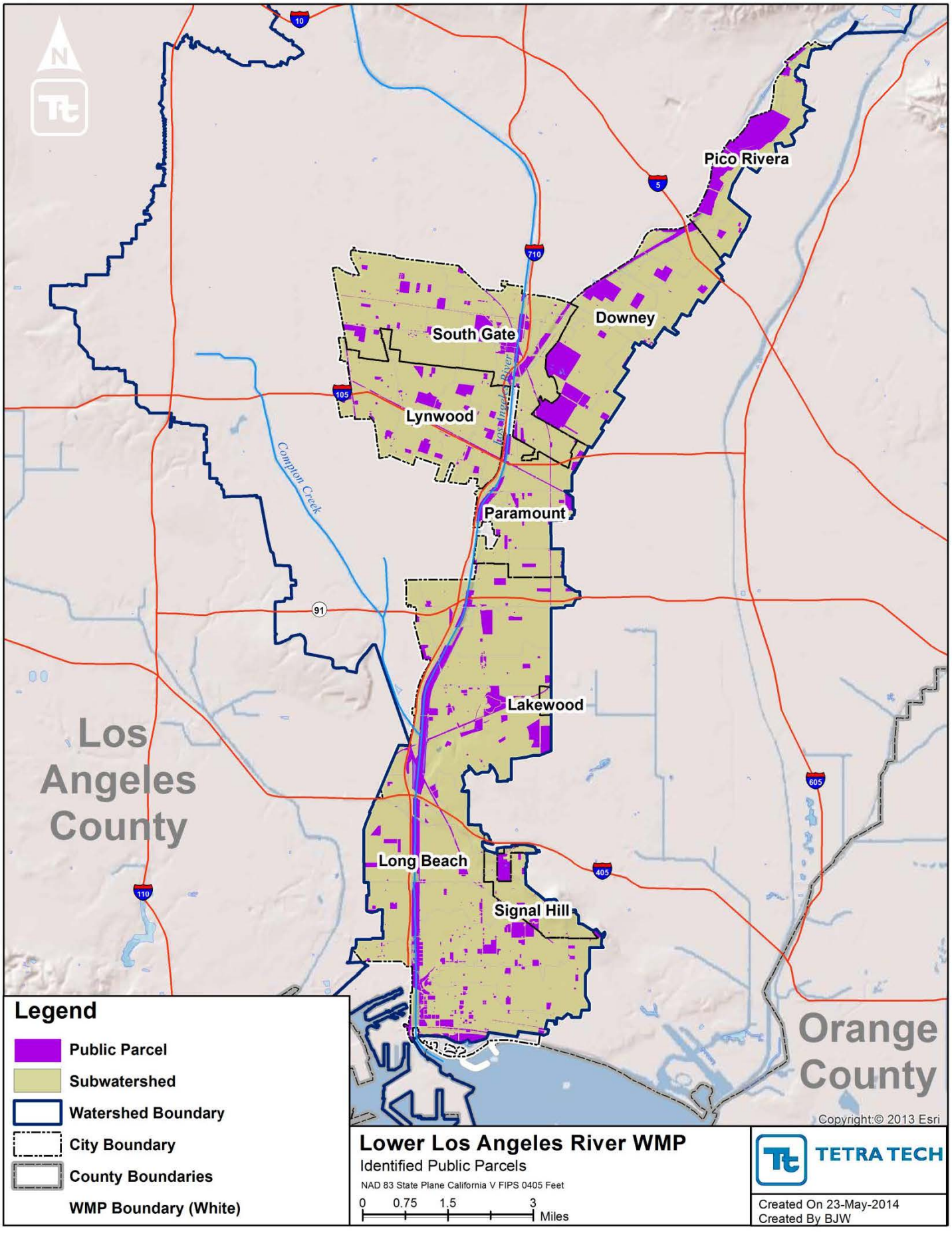

Figure 4. LLAR identified public parcels

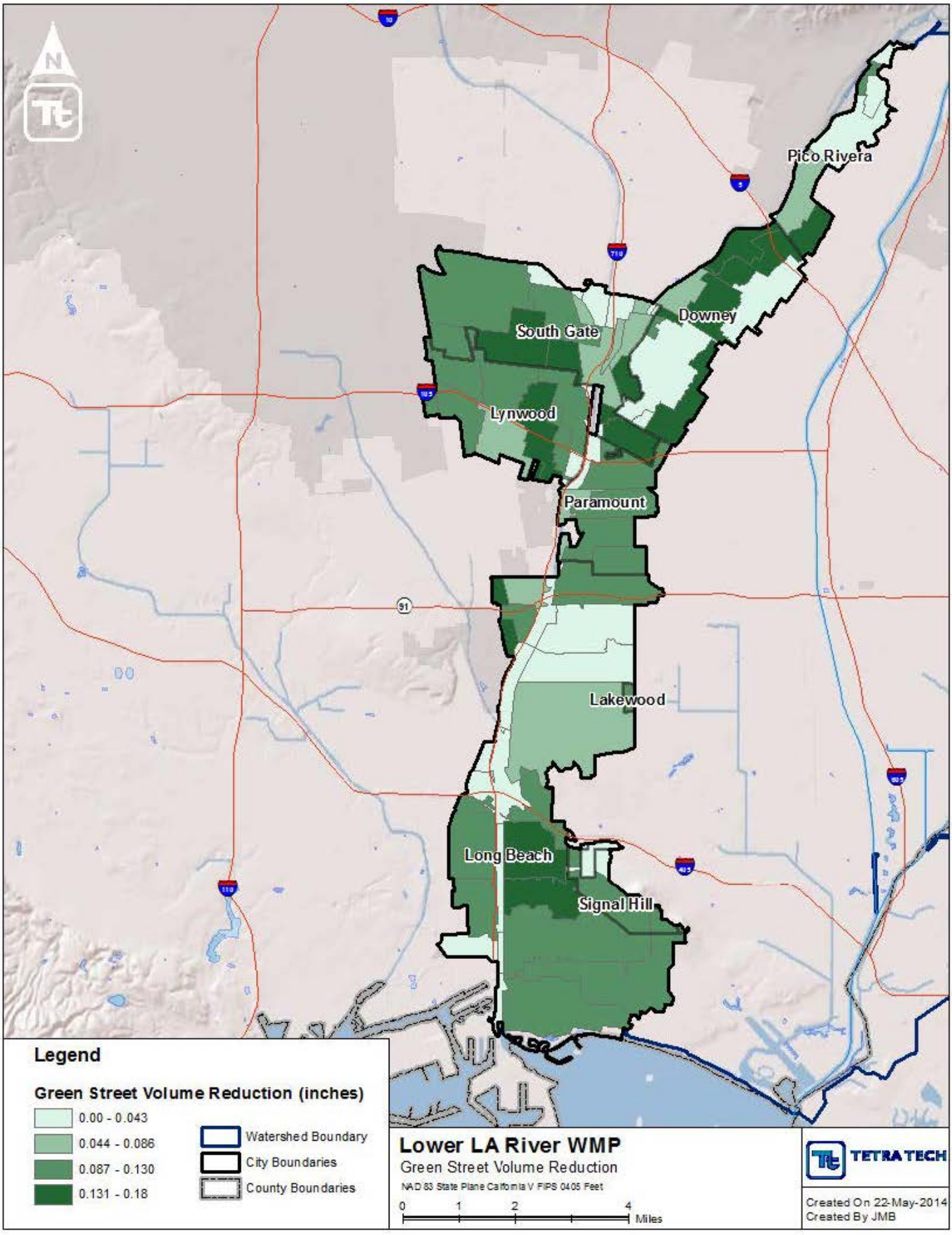

Figure 5. LLAR ROW BMP Volume Reduction

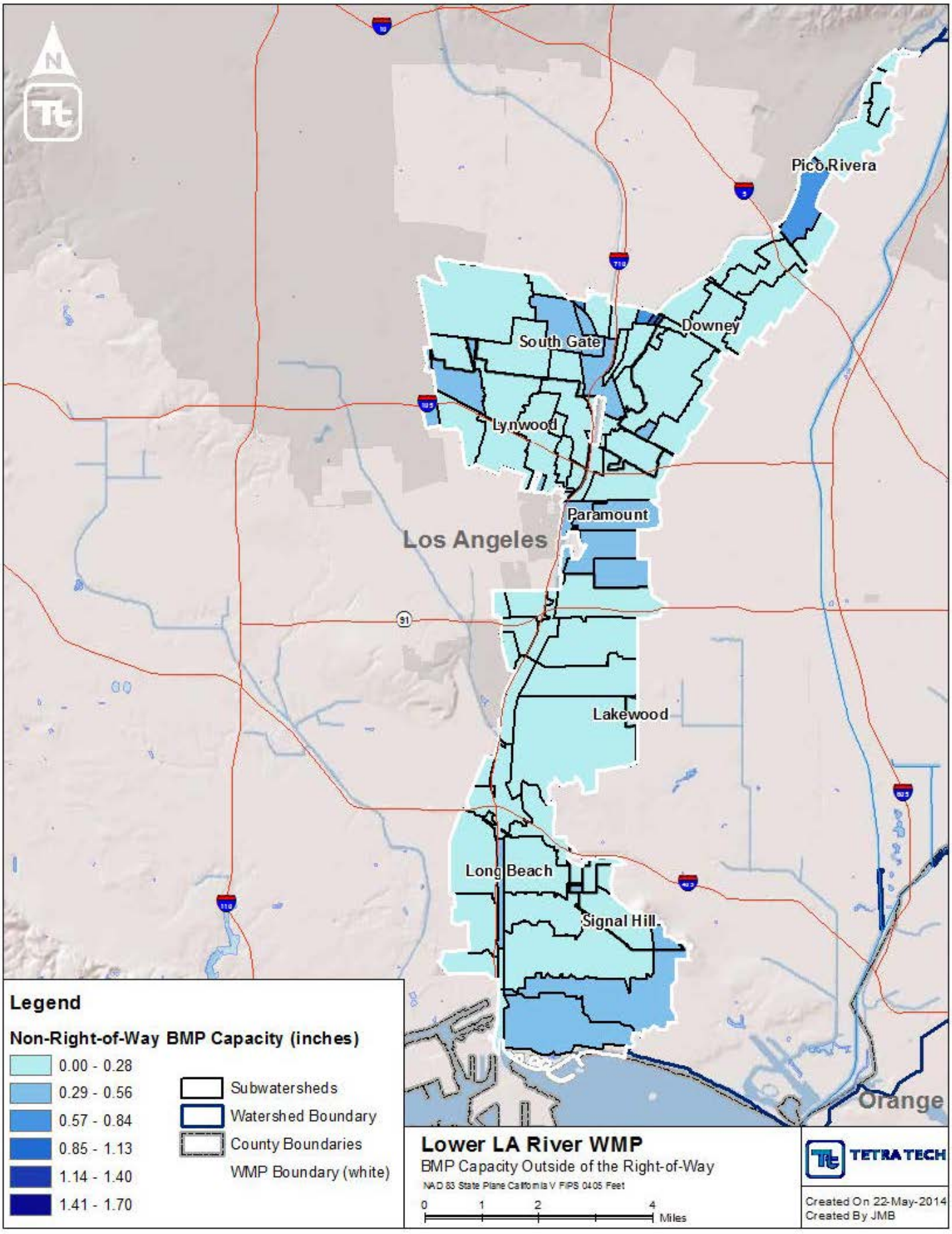

Figure 6. LLAR BMP capacity outside of the right-of-way

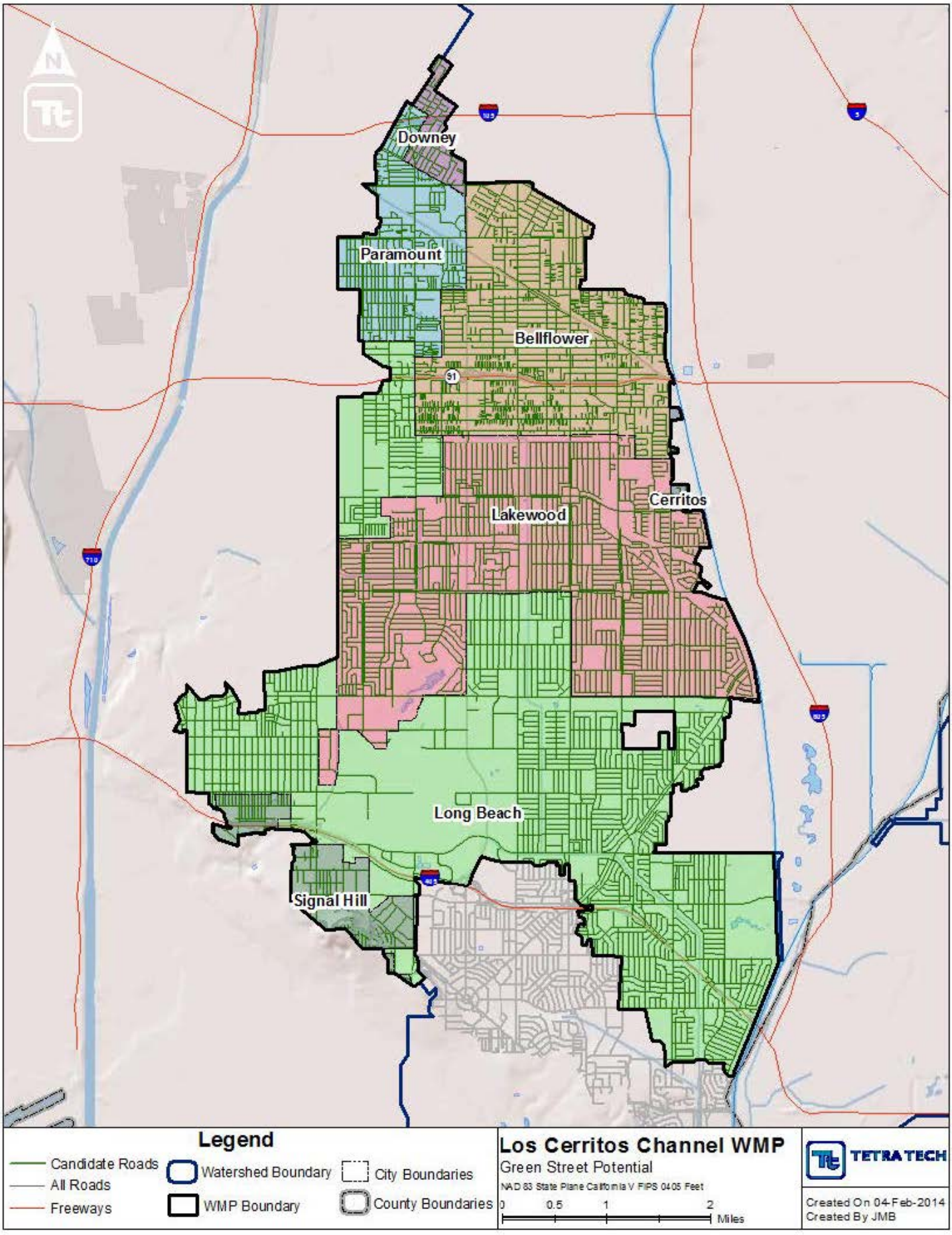

Figure 7. LCC ROW BMP Potential Opportunities

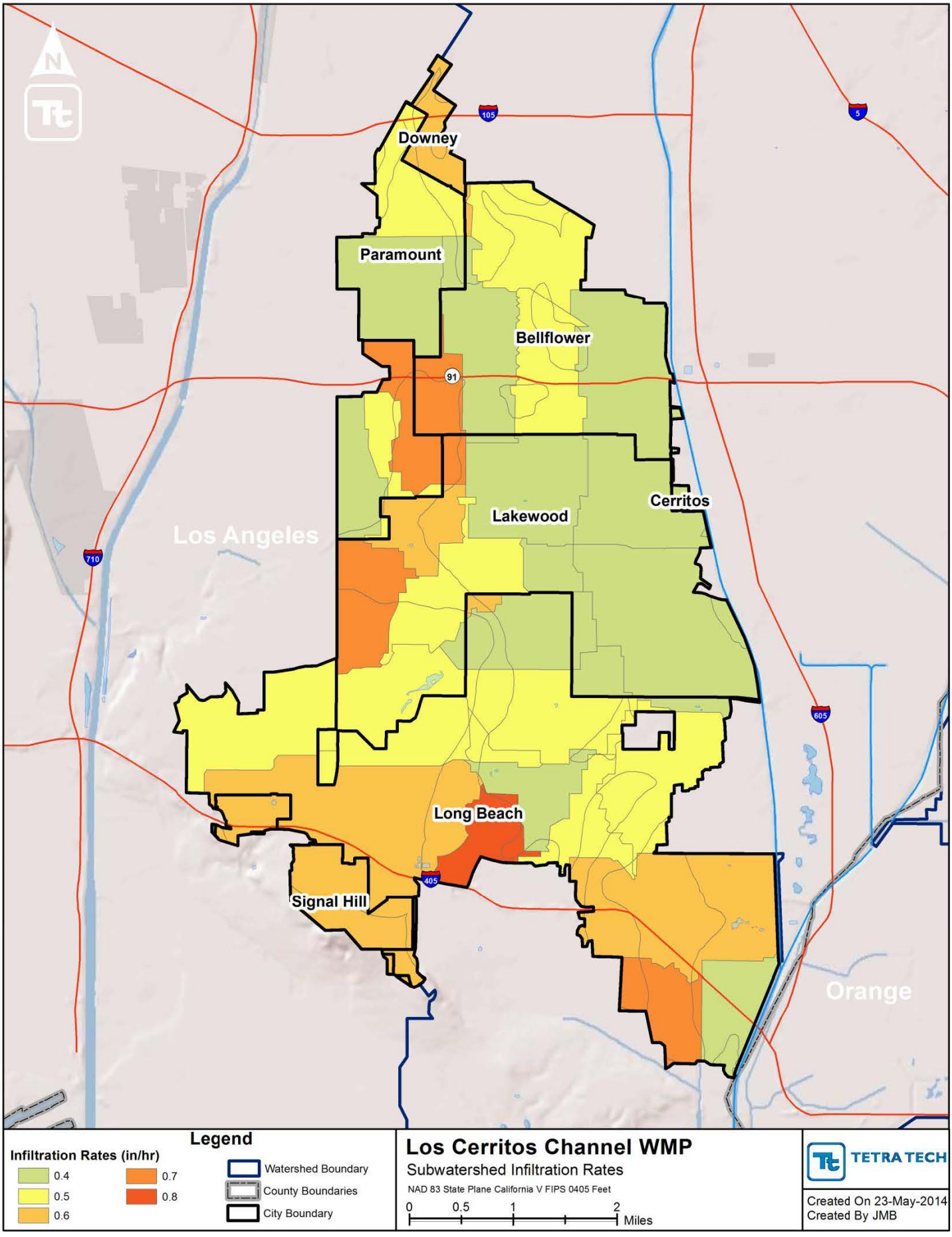

Figure 8. LCC Subwatershed Infiltration Rates

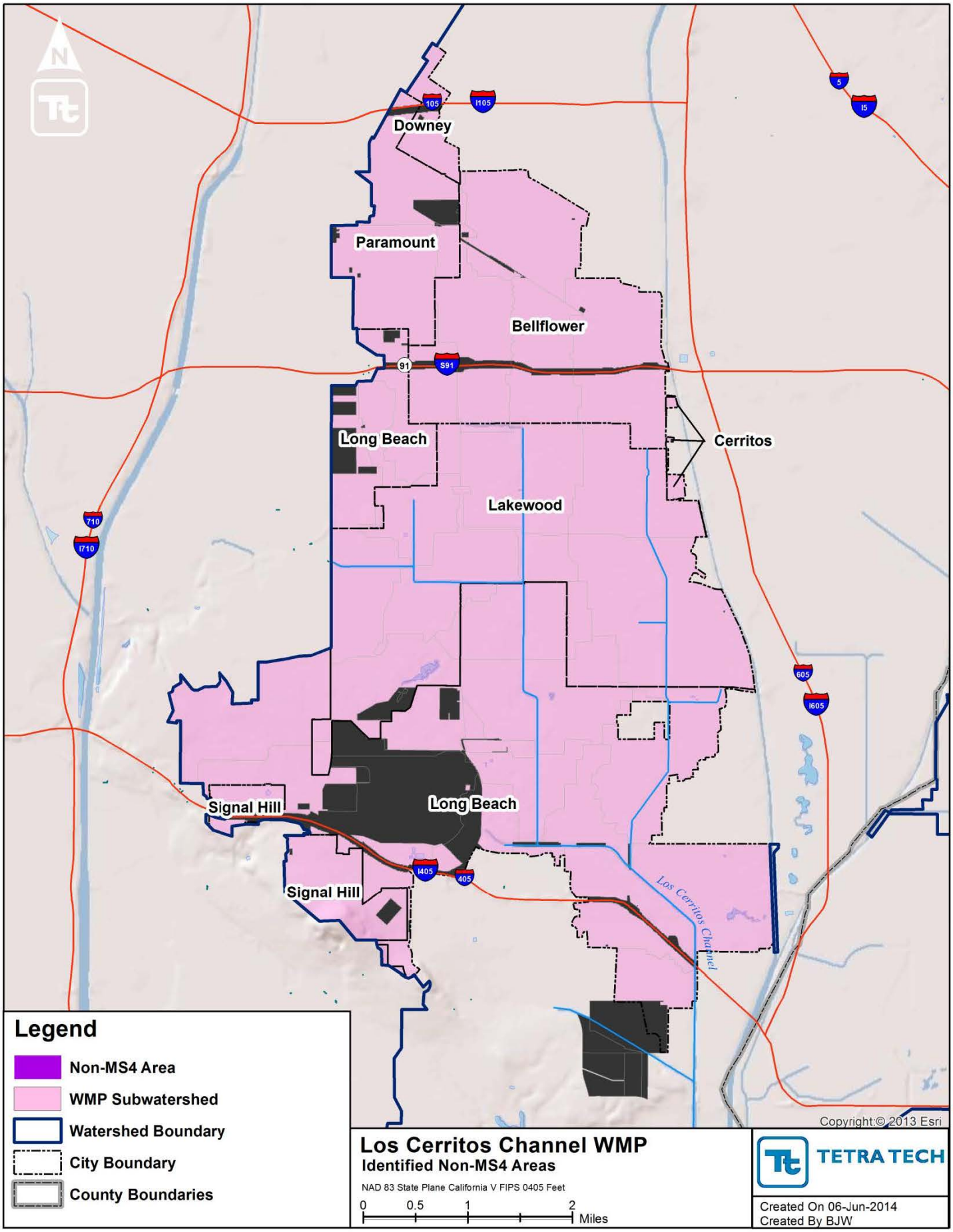

Figure 9. LCC Non-MS4 Permittees

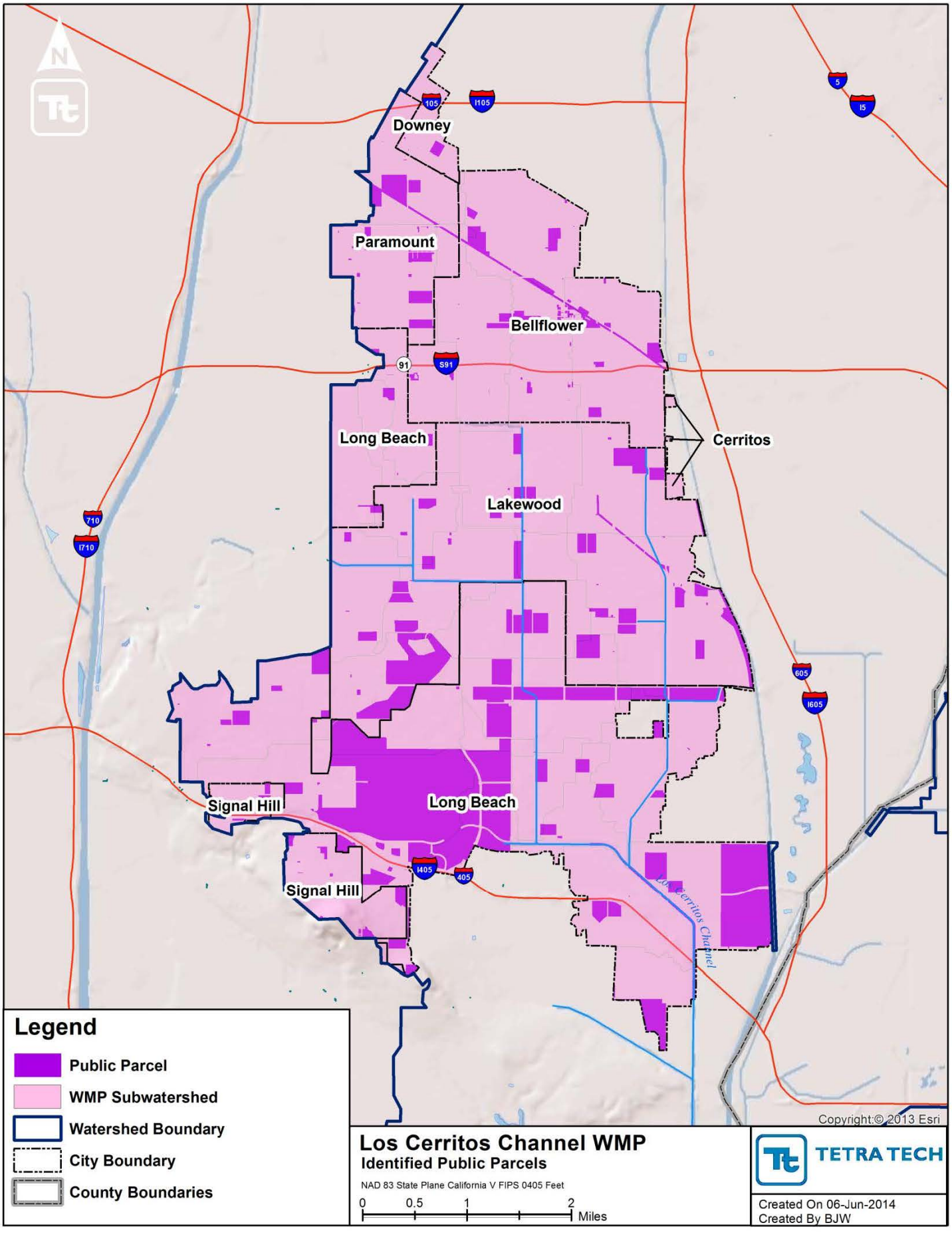

Figure 10. LCC identified public parcels

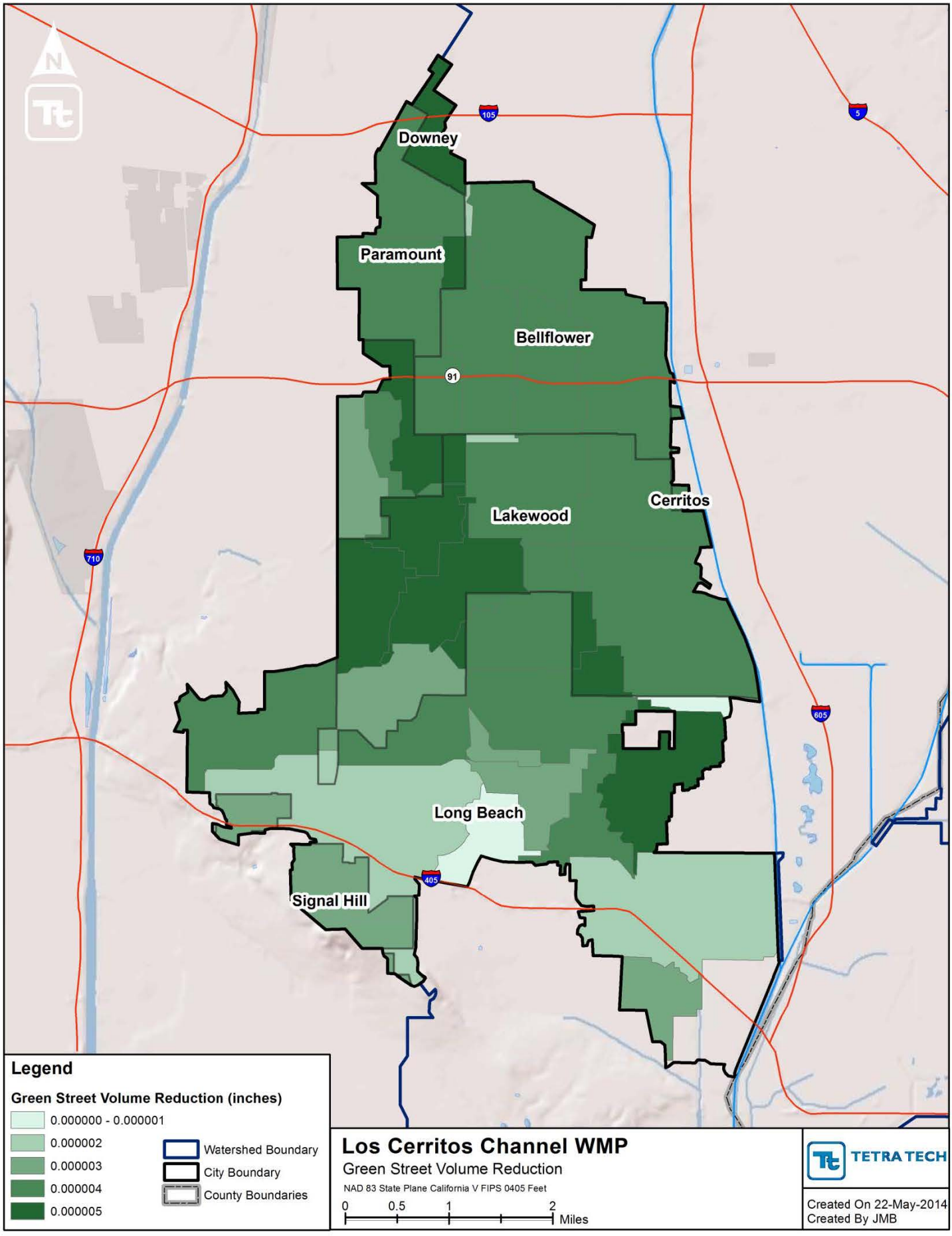

Figure 11. LCC ROW BMP Volume Reduction

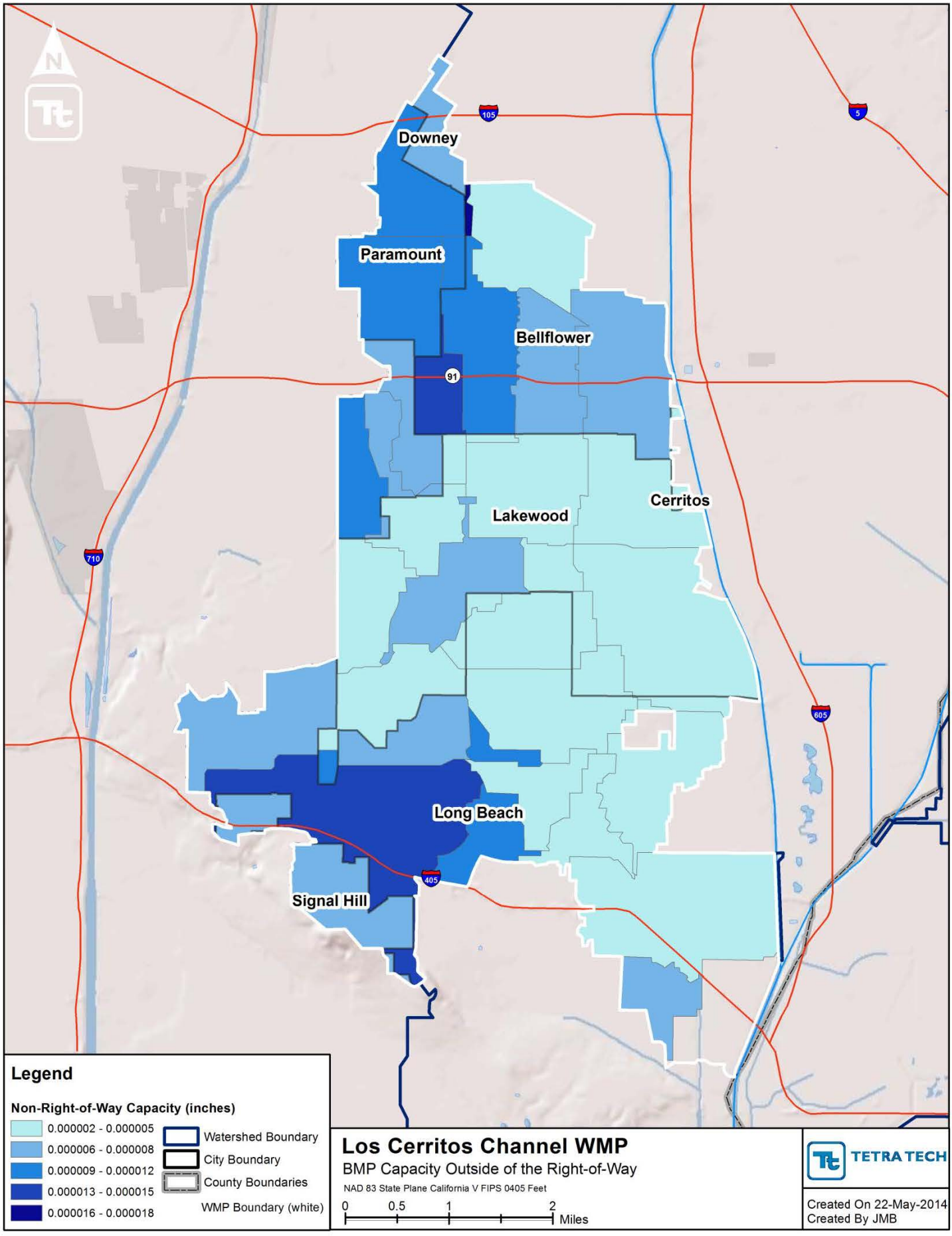

Figure 12. LCC BMP capacity outside of the right-of-way

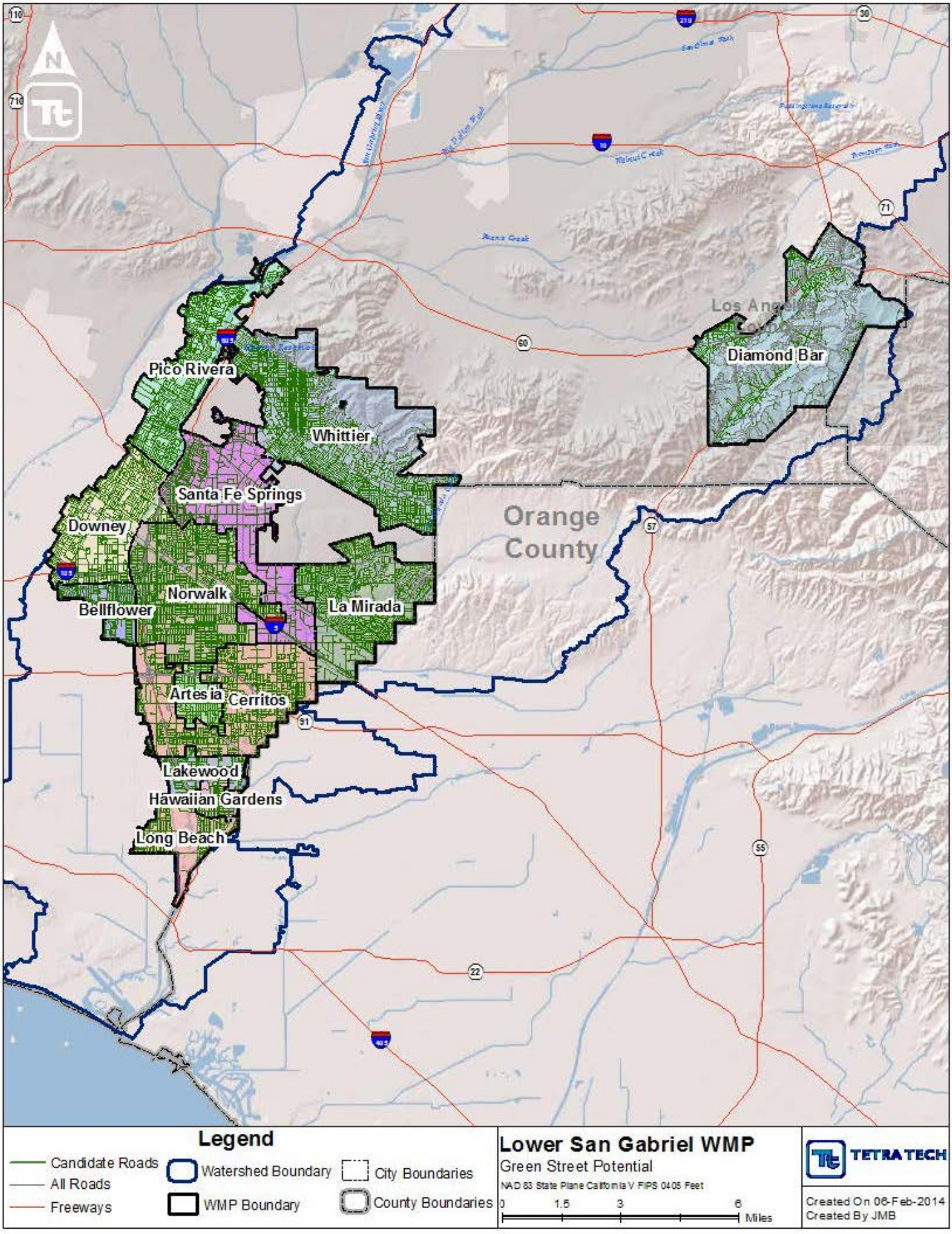

Figure 13. LSGR ROW BMP Potential Opportunities

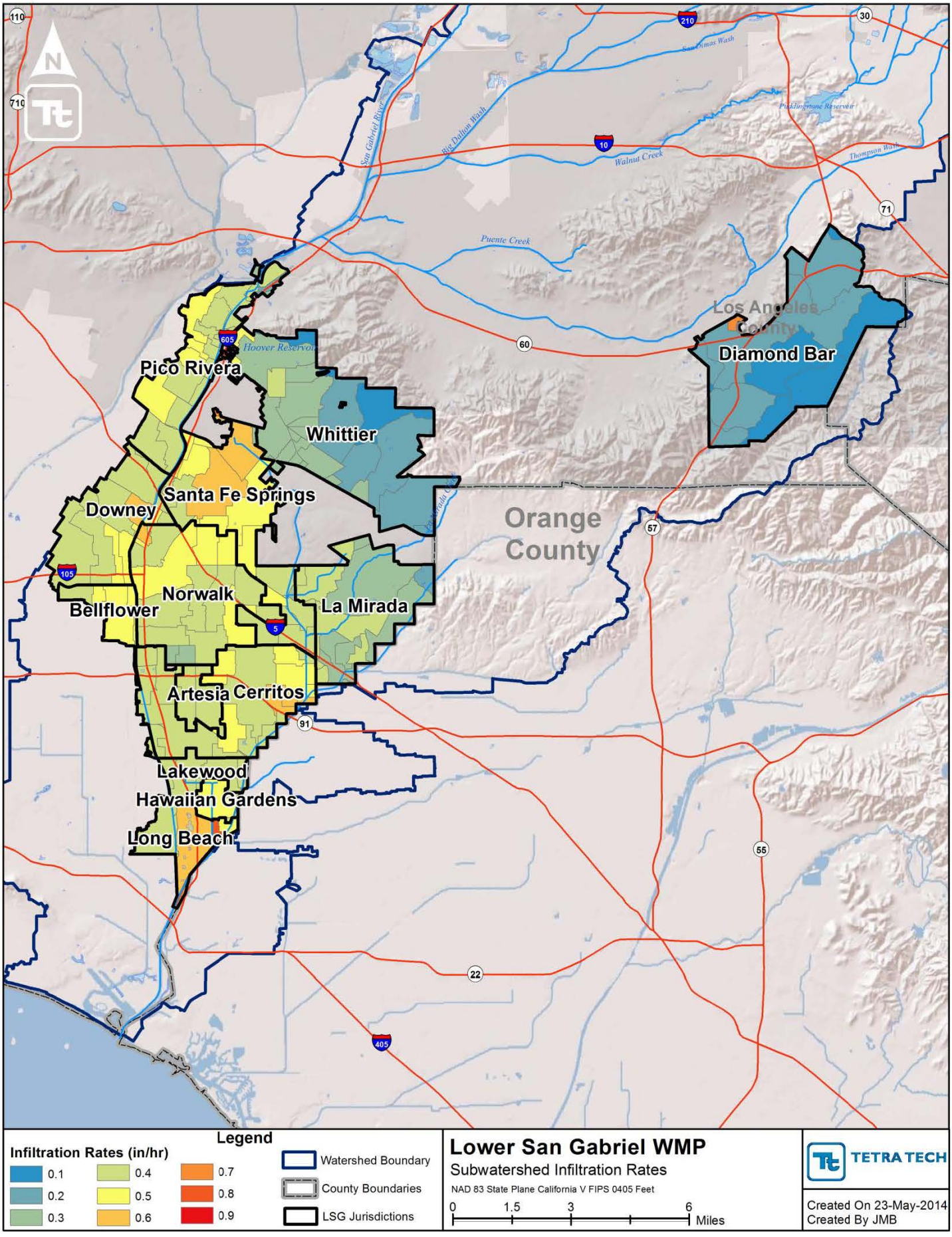

Figure 14. LSGR Subwatershed Infiltration Rates

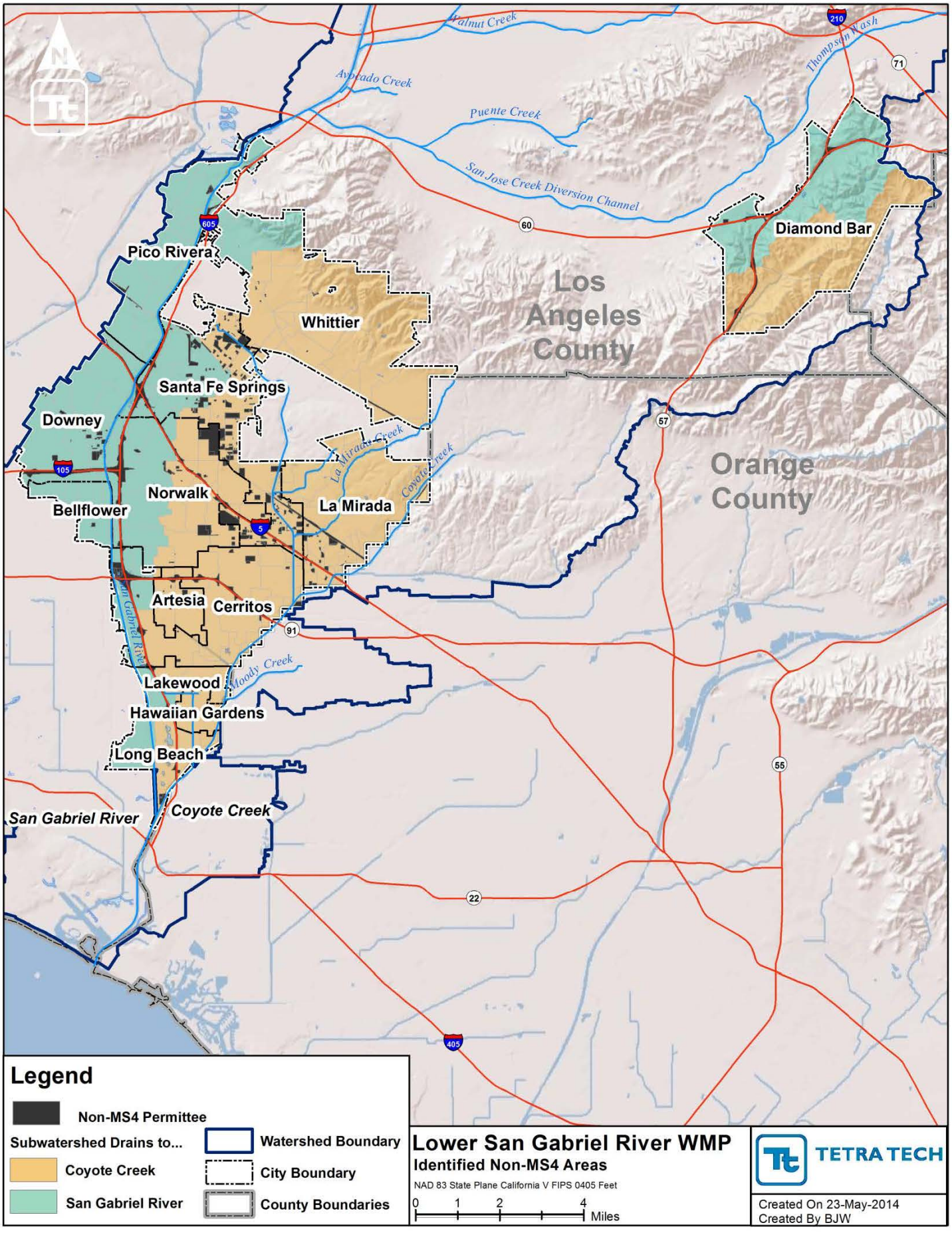

Figure 15. LSGR Non-MS4 Permittees

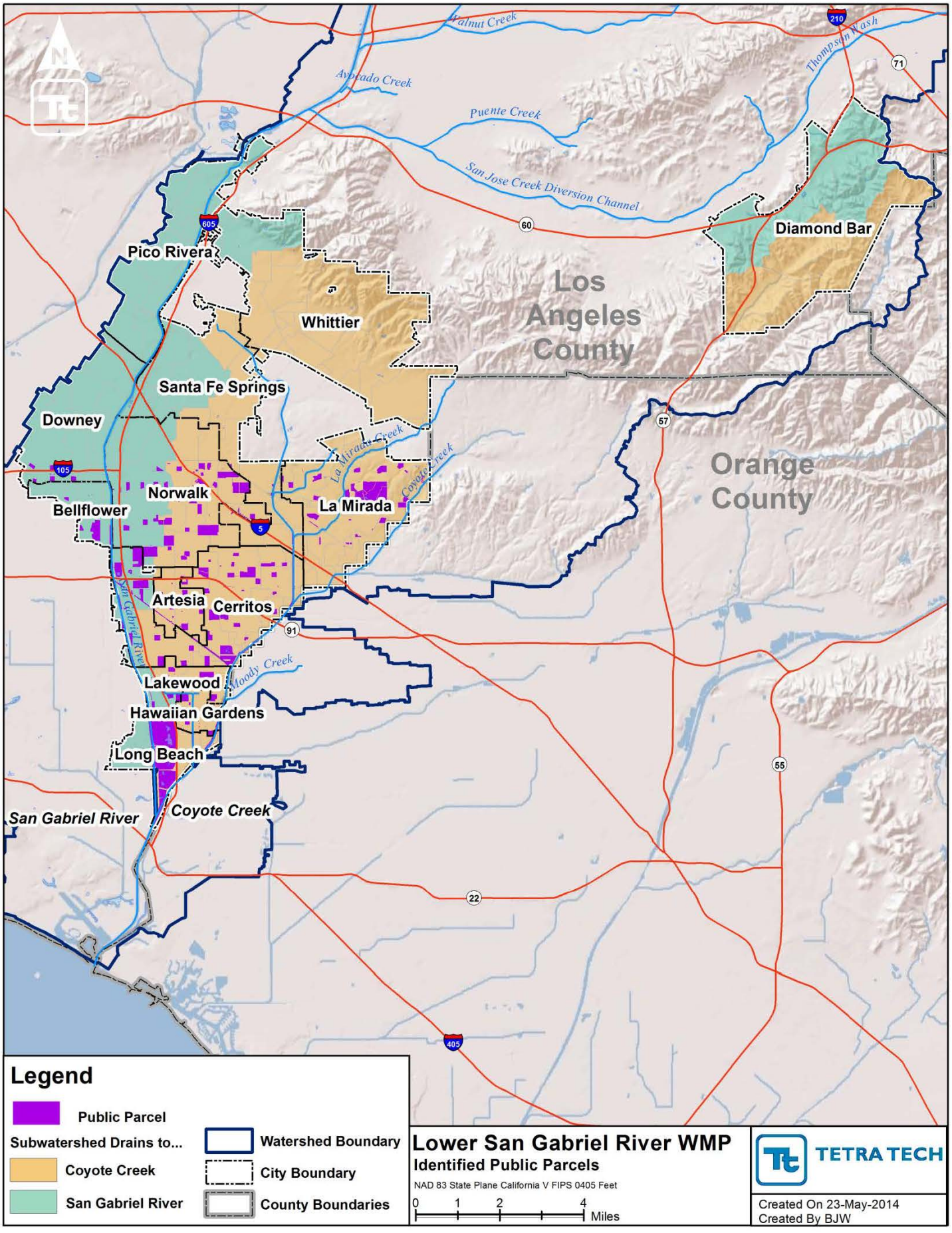

Figure 16. LSGR identified public parcels

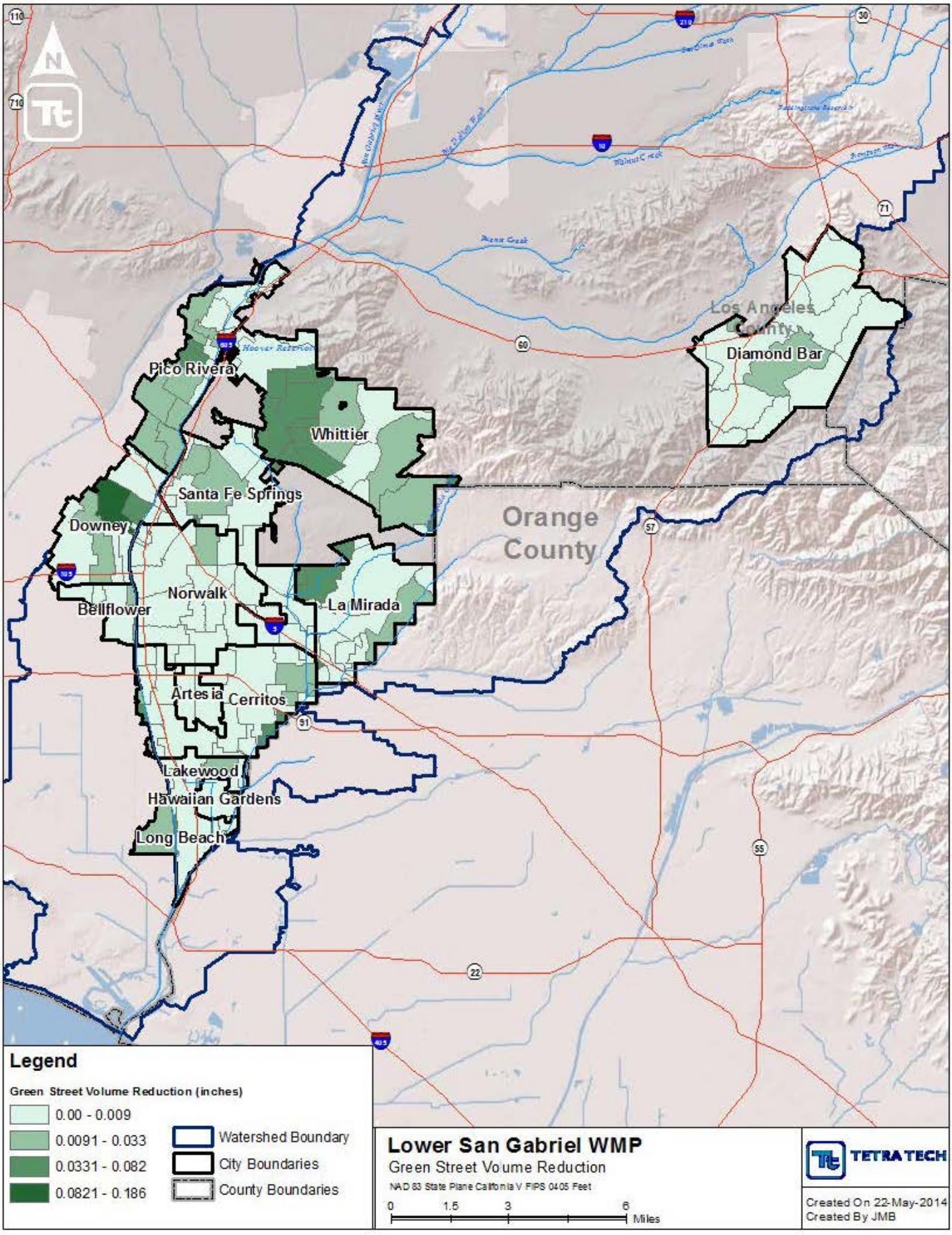

Figure 17. LSGR ROW BMP Volume Reduction

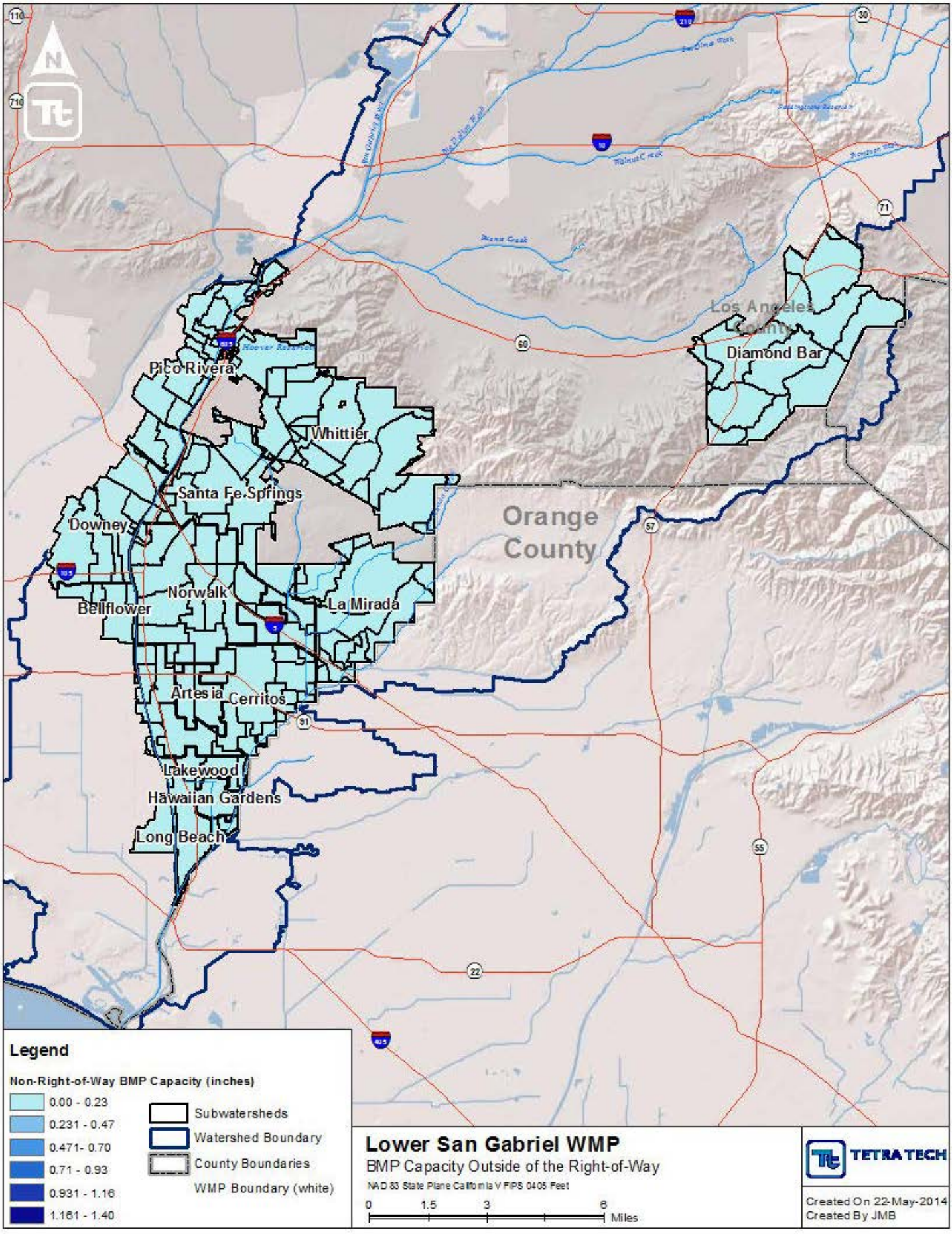

Figure 18. LSGR BMP capacity outside of the right-of-way

Attachment D: Existing and Planned BMPs

Submitted to:

LLAR WMP Group LCC WMP Group LSGR WMP Group

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June 6, 2014

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D1. Existing and Planned BMPs

The following tables summarize existing and planned BMPs in each jurisdiction.

D1.1. City of Bellflower

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Bioretention / Biofiltration	Existing	Riverview Park Infiltration Trenches	2012	10500 Somerset Blvd.	33.896662	-118.11016	105113	16	ac		
Bioretention / Biofiltration	Existing	Riverview Park Infiltration Trenches	2012	10500 Somerset Blvd.	33.896662	-118.11016	105113	16	ac		
Flow-Through Treatment BMP	Existing	Commercial Gas Station and mart	2008	14300 Bellflower Blvd	33.901581	-118.124915	105114	0.42	ac		
Flow-Through Treatment BMP	Existing	Commercial Storage	2005	10526 Rosecrans	33.902009	-118.108102	575118	19.5	ac		
Infiltration BMPs	Existing	St George Church	2012	15725 Cornuta	33.890539	-118.120735	105113	1.36	ac		
Infiltration BMPs	Existing	Autozone	2012	10239 Rosecrans	33.902265	-118.114834	105113	0.78	ac		

D1.2. City of Downey

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Flow Through Treatment BMP	Existing	8314 SECOND ST	2/14/2014		33.9409	-118.13243	245114	1322	sf	0.153	cfs
Flow Through Treatment BMP	Existing	10030 LAKEWOOD	8/17/2007		33.9477	-118.11664	245125	24560	sf	0.17	cfs
Infiltration BMP	Existing	12327 WOODRUFF AV	2/14/2014		33.91989	-118.11706	245113	6894.4	sf	430.9	cf
Infiltration BMP	Existing	12145 WOODRUFF	7/8/2008		33.92338	-118.11805	245113	3200	sf	200	cf
Infiltration BMP	Existing	9500 WASHBURN	2/14/2014		33.92366	-118.1172	245113	342000	sf	9500	cf
Infiltration BMP	Existing	9236 HALL	4/17/2007		33.92972	-118.12155	245113	411840	sf	25740	cf
Infiltration BMP	Existing	9737 IMPERIAL	6/22/2010		33.91761	-118.11961	245114	5600	sf	350	cf
Infiltration BMP	Existing	12254 BELLFLOWER	9/13/2003		33.9214	-118.1239	245114	57600	sf	3600	cf
Infiltration BMP	Existing	11904 BELLFLOWER	2/14/2014		33.92607	-118.12515	245114	5400	sf	300	cf
Infiltration BMP	Existing	11610 LAKEWOOD	9/28/2007		33.93101	-118.12594	245114	91520	sf	5720	cf
Infiltration BMP	Existing	8329 DAVIS	6/15/2010		33.9366	-118.13379	245114	12608	sf	788	cf
Infiltration BMP	Existing	8522 FIRESTONE	2/16/2005		33.93678	-118.12978	245114	105456	sf	6591	cf
Infiltration BMP	Existing	8320 FIRESTONE BLVD	1/1/2010		33.9387	-118.13176	245114	90660	sf	525	cf

RB-AR7438

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9060 IMPERIAL	4/15/2005		33.91646	-118.13532	245115	7056	sf	441	cf
Infiltration BMP	Existing	8141 DE PALMAQ	6/30/2003		33.93618	-118.1402	245115	443008	sf	27688	cf
Infiltration BMP	Existing	8317 DAVIS ST	2/14/2014		33.93683	-118.13441	245115	13920	sf	870	cf
Infiltration BMP	Existing	8333 IOWA	10/11/2001		33.93756	-118.13356	245115	9808	sf	613	cf
Infiltration BMP	Existing	8100 PHLOX	5/20/2004		33.93956	-118.13854	245115	14400	sf	900	cf
Infiltration BMP	Existing	11040 BROOKSHIRE	1/1/2014		33.93932	-118.12496	245119	1923616	sf	120226	cf
Infiltration BMP	Existing	11136 DOLLISON	6/22/2010		33.93448	-118.09613	245122	13824	sf	864	cf
Infiltration BMP	Existing	10239 PICO VISTA	4/7/2003		33.939	-118.10316	245126	2176	sf	136	cf
Infiltration BMP	Existing	10233 PICO VISTA	4/7/2003		33.93914	-118.10305	245126	2176	sf	136	cf
Infiltration BMP	Existing	10228 PICO VISTA	4/7/2003		33.93919	-118.10235	245126	5856	sf	366	cf
Infiltration BMP	Existing	10229 PICO VISTA	4/7/2003		33.93928	-118.10295	245126	2176	sf	136	cf
Infiltration BMP	Existing	10223 PICO VISTA	4/7/2003		33.93946	-118.10289	245126	2048	sf	128	cf
Infiltration BMP	Existing	10218 PICO VISTA	4/7/2003		33.93947	-118.10223	245126	5952	sf	372	cf
Infiltration BMP	Existing	10215 PICO VISTA	4/7/2003		33.93962	-118.10237	245126	2112	sf	132	cf
Infiltration BMP	Existing	10211 PICO VISTA	4/7/2003		33.93969	-118.10255	245126	2304	sf	144	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	10219 PICO VISTA	4/7/2003		33.93975	-118.10273	245126	2304	sf	144	cf
Infiltration BMP	Existing	12800 PARAMOUNT	9/16/2008		33.92108	-118.15383	246077	3168	sf	198	cf
Infiltration BMP	Existing	7930 STEWARD & GRAY	11/18/2004		33.93539	-118.14527	246077	1600	sf	100	cf
Infiltration BMP	Existing	12229 JULIUS	1/1/2006		33.93343	-118.1561	246079	944	sf	59	cf
Infiltration BMP	Existing	7845 BENARES ST	6/14/2001		33.93839	-118.14549	246079	3568	sf	223	cf
Infiltration BMP	Existing	7841 BENARES ST	6/14/2001		33.93851	-118.14537	246079	1760	sf	110	cf
Infiltration BMP	Existing	7837 BENARES ST	6/14/2001		33.93863	-118.14528	246079	1760	sf	110	cf
Infiltration BMP	Existing	7848 BENARES ST	6/14/2001		33.93863	-118.14598	246079	10640	sf	665	cf
Infiltration BMP	Existing	7833 BENARES ST	6/14/2001		33.93875	-118.14518	246079	1760	sf	110	cf
Infiltration BMP	Existing	7844 BENARES ST	6/14/2001		33.93876	-118.14591	246079	2000	sf	125	cf
Infiltration BMP	Existing	7840 BENARES ST	6/14/2001		33.93886	-118.14578	246079	2000	sf	125	cf
Infiltration BMP	Existing	11706 RIVES	6/14/2001		33.93888	-118.14506	246079	1760	sf	110	cf
Infiltration BMP	Existing	7816 BENARES ST	6/14/2001		33.93896	-118.14553	246079	9600	sf	600	cf
Infiltration BMP	Existing	7812 BENARES ST	6/14/2001		33.93904	-118.14568	246079	1760	sf	110	cf
Infiltration BMP	Existing	11726 RIVES	6/14/2001		33.93904	-118.14614	246079	1920	sf	120	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7808 BENARES ST	6/14/2001		33.93911	-118.14583	246079	1760	sf	110	cf
Infiltration BMP	Existing	7808 BENARES ST	6/14/2001		33.93919	-118.14598	246079	1760	sf	110	cf
Infiltration BMP	Existing	7821 BENARES ST	6/14/2001		33.93921	-118.14506	246079	1872	sf	117	cf
Infiltration BMP	Existing	7804 BENARES ST	6/14/2001		33.93926	-118.14613	246079	9760	sf	610	cf
Infiltration BMP	Existing	7817 BENARES ST	6/14/2001		33.93931	-118.14525	246079	1760	sf	110	cf
Infiltration BMP	Existing	7813 BENARES ST	6/14/2001		33.93938	-118.14542	246079	1760	sf	110	cf
Infiltration BMP	Existing	7809 BENARES ST	6/14/2001		33.93945	-118.14557	246079	1760	sf	110	cf
Infiltration BMP	Existing	7805 BENARES ST	6/14/2001		33.93953	-118.14572	246079	1760	sf	110	cf
Infiltration BMP	Existing	7801 BENARES ST	6/14/2001		33.93961	-118.14587	246079	9600	sf	600	cf
Infiltration BMP	Existing	7140 FIRESTONE	10/3/2005		33.94707	-118.15469	246079	24048	sf	1503	cf
Infiltration BMP	Existing	8233 FIRESTONE	6/21/2010		33.94076	-118.13358	246102	91648	sf	5728	cf
Infiltration BMP	Existing	7814 FIRESTONE	2/14/2014		33.94418	-118.14232	246102	3000	sf	125	cf
Infiltration BMP	Existing	7676 FIRESTONE	2/26/2004		33.94527	-118.144	246102	213824	sf	13364	cf
Infiltration BMP	Existing	7201 FIRESTONE	4/19/2007		33.94821	-118.15273	246102	34352	sf	2147	cf
Infiltration BMP	Existing	7360 FLORENCE	6/21/2010		33.95872	-118.141	246102	14496	sf	906	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8129 FLORENCE	6/23/2010		33.95231	-118.12677	246103	8880	sf	555	cf
Infiltration BMP	Existing	8605 GALLATIN ROAD	2/14/2014		33.95768	-118.11432	246103	85792	sf	5362	cf
Infiltration BMP	Existing	9276 DOWNEY	1/4/2007		33.95901	-118.11926	246103	6400	sf	400	cf
Infiltration BMP	Existing	8801 LAKEWOOD	7/14/2006		33.96317	-118.11498	246106	18352	sf	1147	cf
Infiltration BMP	Existing	7880 TELEGRAPH	11/14/2004		33.97112	-118.12113	246111	123104	sf	7694	cf
Permeable Pavement	Existing	9449 IMPERIAL	6/22/2010		33.91809	-118.12656	245115	32160	sf	2010	cf
Permeable Pavement	Existing	9565 FIRESTONE	6/3/2008		33.93043	-118.11175	245119	18928	sf	1183	cf
Permeable Pavement	Existing	12628 PARAMOUNT	2/14/2014		33.92329	-118.15283	246077	15000	sf	284	cf
Permeable Pavement	Existing	11555 PARAMOUNT	2/14/2014		33.94116	-118.14067	246077	8125	sf	400	cf
Permeable Pavement	Existing	8043 SECOND ST	1/1/2009		33.94254	-118.13737	246102	105023	sf	6787	cf
Permeable Pavement	Existing	9250 LAKEWOOD	2/14/2014		33.95768	-118.1153	246103	24662	sf	939	cf
Regional Detention Facility	Existing	9341 IMPERIAL	5/6/2004		33.91918	-118.12898	245115	664624	sf	41539	cf
Regional Infiltration Facility	Existing	12074 LAKEWOOD	5/22/2005		33.9257	-118.13203	245115	960800	sf	60050	cf
Regional Infiltration Facility	Existing	12002 LAKEWOOD	5/22/2005		33.9261	-118.13169	245115	605264	sf	37829	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8764 FIRESTONE	8/14/2008	6523923.595890	6523923.595890	1798908.496460	245119	20064	sf	1254	cf
Infiltration BMP	Existing	9915 DOWNEY	9/27/2005	6523909.682530	6523909.682530	1805554.600030	246103	2265	sf	142	cf
Infiltration BMP	Existing	7602 RUNDELL	1/27/2006	6514863.657960	6514863.657960	1798182.489930	246079	2265	sf	142	cf
Infiltration BMP	Existing	10403 SAMOLINE	10/3/2005	6521224.982130	6521224.982130	1804890.047210	246102	2265	sf	142	cf
Infiltration BMP	Existing	12516 DOLAN	11/18/2005	6518146.741440	6518146.741440	1794105.551200	245115	1698	sf	106	cf
Infiltration BMP	Existing	7845 QUILL	3/28/2006	6515351.811960	6515351.811960	1796427.555720	246079	1698	sf	106	cf
Infiltration BMP	Existing	10435 BIRCHDALE	5/19/2005	6524444.362750	6524444.362750	1802478.415410	245119	1132	sf	71	cf
Infiltration BMP	Existing	8538 ALBIA	9/23/2005	6520089.101510	6520089.101510	1795567.094110	245115	566	sf	35	cf
Infiltration BMP	Existing	12159 CORNUTA	9/16/2005	6525392.928460	6525392.928460	1794233.560240	245114	566	sf	35	cf
Infiltration BMP	Existing	8064 DACOSTA	7/7/2005	6523365.354910	6523365.354910	1805913.806160	246103	566	sf	35	cf
Infiltration BMP	Existing	8551 DALEN	10/6/2005	6518205.327280	6518205.327280	1792517.271110	245115	566	sf	35	cf
Infiltration BMP	Existing	8318 DINSDALE	6/15/2006	6523907.628300	6523907.628300	1804895.972630	246103	566	sf	35	cf
Infiltration BMP	Existing	12641 DOLAN	9/2/2005	6517370.498610	6517370.498610	1793094.154440	245115	566	sf	35	cf
Infiltration BMP	Existing	12837 DOWNEY	6/13/2008	6516221.544620	6516221.544620	1792552.216840	246077	566	sf	35	cf
Infiltration BMP	Existing	12608 DUNROBIN	1/1/2007	6525044.715110	6525044.715110	1792041.222140	245114	566	sf	35	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7715 GAINFORD	5/9/2006	6521302.031220	6521302.031220	1807578.393730	246106	566	sf	35	cf
Infiltration BMP	Existing	12337 HORLEY	6/20/2007	6514828.837130	6514828.837130	1797233.894880	246079	566	sf	35	cf
Infiltration BMP	Existing	12619 IBBETSON	4/7/2008	6525826.717640	6525826.717640	1791950.694670	245114	566	sf	35	cf
Infiltration BMP	Existing	12142 MARBEL	5/5/2008	6521265.537710	6521265.537710	1794924.230550	245115	566	sf	35	cf
Infiltration BMP	Existing	12228 NORLAIN	6/24/2005	6513924.473210	6513924.473210	1798288.206130	246079	566	sf	35	cf
Infiltration BMP	Existing	11733 PATTON	12/9/2005	6521629.388810	6521629.388810	1797656.681610	245114	566	sf	35	cf
Infiltration BMP	Existing	11712 PRUESS	3/29/2006	6518005.349510	6518005.349510	1799785.098800	246077	566	sf	35	cf
Infiltration BMP	Existing	8605 SAMOLINE	10/23/2006	6525562.919850	6525562.919850	1810382.622670	246106	566	sf	35	cf
Infiltration BMP	Existing	7814 SPRINGER	7/20/2005	6515325.745000	6515325.745000	1796943.250000	246079	566	sf	35	cf
Infiltration BMP	Existing	7406 THIRD	9/23/2005	6517102.209740	6517102.209740	1803992.224080	246102	566	sf	35	cf
Infiltration BMP	Existing	8836 TWEEDY	8/21/2006	6524333.205540	6524333.205540	1809897.996880	246106	566	sf	35	cf
Infiltration BMP	Existing	9702 TWEEDY	8/30/2005	6522704.033740	6522704.033740	1807211.824630	246103	566	sf	35	cf
Infiltration BMP	Existing	11414 PARAMOUNT	11/17/2006	6519592.558830	6519592.558830	1800943.348310	245115	37135	sf	2321	cf
Infiltration BMP	Existing	8077 FLORENCE AV	1/1/2009	6523000.000000	6523000.000000	1805200.000000	246103	31872	sf	1992	cf
Infiltration BMP	Existing	8351 FLORENCE	11/29/2005	6524092.726100	6524092.726100	1804613.455750	246103	8252	sf	516	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	11003 LAKEWOOD	1/1/2006	6524400.000000	6524400.000000	1799800.000000	245119	8252	sf	516	cf
Infiltration BMP	Existing	9288 LUBEC	6/21/2010	6528705.843900	6528705.843900	1803218.787040	245125	8252	sf	516	cf
Infiltration BMP	Existing	13240 BARLIN	6/24/2005	6517118.017720	6517118.017720	1789361.126310	245524	6189	sf	387	cf
Infiltration BMP	Existing	9802 BROOKSHIRE	4/24/2007	6525737.765210	6525737.765210	1805415.750650	246103	6189	sf	387	cf
Infiltration BMP	Existing	9026 SUVA	10/5/2006	6527186.692380	6527186.692380	1804858.393970	245125	6189	sf	387	cf
Infiltration BMP	Existing	7325 IRWINGROVE	4/27/2005	6518419.969630	6518419.969630	1807291.337240	246102	5158	sf	322	cf
Infiltration BMP	Existing	10064 PANGBORN	8/16/2005	6529846.676910	6529846.676910	1801177.429270	245125	5158	sf	322	cf
Infiltration BMP	Existing	8102 THIRD	3/4/2009	6520617.238210	6520617.238210	1801805.039980	246103	7616	sf	476	cf
Infiltration BMP	Existing	12200 BELLFLOWER	11/4/2008	6524061.916580	6524061.916580	1794195.827920	245114	4126	sf	258	cf
Infiltration BMP	Existing	9818 BIRCHDALE	12/28/2005	6526194.448530	6526194.448530	1804634.814020	245125	4126	sf	258	cf
Infiltration BMP	Existing	10419 BROOKSHIRE	7/30/2007	6523842.460000	6523842.460000	1803179.994160	245119	4126	sf	258	cf
Infiltration BMP	Existing	10432 BROOKSHIRE	2/14/2007	6523911.001360	6523911.001360	1803018.354450	245119	4126	sf	258	cf
Infiltration BMP	Existing	10329 CASANES	1/1/2006	6528565.218740	6528565.218740	1800358.453120	245126	4126	sf	258	cf
Infiltration BMP	Existing	13221 CORRIGAN	3/9/2006	6523120.117490	6523120.117490	1789965.324450	245114	4126	sf	258	cf
Infiltration BMP	Existing	8816 ELSTON	12/28/2005	6526840.850650	6526840.850650	1808666.263650	246103	4126	sf	258	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9278 GAINFORD	6/15/2005	6528421.969980	6528421.969980	1803000.469050	245125	4126	sf	258	cf
Infiltration BMP	Existing	7340 IRWINGROVE	12/6/2005	6518415.507880	6518415.507880	1806990.616650	246102	4126	sf	258	cf
Infiltration BMP	Existing	9055 IRWINGROVE	10/17/2006	6526414.238800	6526414.238800	1802422.724820	245119	4126	sf	258	cf
Infiltration BMP	Existing	9005 KRISTIN	1/1/2006	6524171.005660	6524171.005660	1809376.398810	246106	4126	sf	258	cf
Infiltration BMP	Existing	9015 KRISTIN	1/1/2006	6524137.396040	6524137.396040	1809320.713720	246106	4126	sf	258	cf
Infiltration BMP	Existing	10014 LA REINA	11/3/2005	6523603.973220	6523603.973220	1805275.605180	246103	4126	sf	258	cf
Infiltration BMP	Existing	8334 LEXINGTON	3/20/2006	6523900.000000	6523900.000000	1804200.000000	246103	4126	sf	258	cf
Infiltration BMP	Existing	7114 LUXOR	7/27/2005	6513446.571340	6513446.571340	1802395.175860	246100	4126	sf	258	cf
Infiltration BMP	Existing	10348 PANGBORN	10/12/2006	6529020.867850	6529020.867850	1800144.106260	245126	4126	sf	258	cf
Infiltration BMP	Existing	7268 PELLET	12/8/2005	6516203.991240	6516203.991240	1804244.566160	246104	4126	sf	258	cf
Infiltration BMP	Existing	9821 RIVES	9/12/2005	6521261.613640	6521261.613640	1807221.725140	246106	4126	sf	258	cf
Infiltration BMP	Existing	10427 STAMPS	2/27/2006	6523141.588150	6523141.588150	1803526.008280	246103	4126	sf	258	cf
Infiltration BMP	Existing	8325 TEXAS	8/30/2007	6520789.744350	6520789.744350	1799109.948610	245114	4126	sf	258	cf
Infiltration BMP	Existing	9211 ARRINGTON	6/21/2010	6527822.609270	6527822.609270	1805896.813180	245125	3095	sf	193	cf
Infiltration BMP	Existing	10372 BIRCHDALE	1/17/2006	6524786.108330	6524786.108330	1802711.833690	245119	2660	sf	166	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9509 BROCK	10/6/2005	6524084.133490	6524084.133490	1807438.122200	246103	3095	sf	193	cf
Infiltration BMP	Existing	9600 CORD	5/12/2008	6529842.639410	6529842.639410	1803668.379590	245125	3095	sf	193	cf
Infiltration BMP	Existing	10943 CORD	3/13/2007	6526539.555830	6526539.555830	1798046.595190	245119	3095	sf	193	cf
Infiltration BMP	Existing	12569 DOLAN	9/27/2006	6517675.526540	6517675.526540	1793796.546690	245115	3095	sf	193	cf
Infiltration BMP	Existing	9252A ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	3095	sf	193	cf
Infiltration BMP	Existing	9252B ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	3095	sf	193	cf
Infiltration BMP	Existing	9258A ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	3095	sf	193	cf
Infiltration BMP	Existing	9258B ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	3095	sf	193	cf
Infiltration BMP	Existing	9258C ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	3095	sf	193	cf
Infiltration BMP	Existing	9622 HALEDON	3/16/2006	6528283.868130	6528283.868130	1804260.791520	245125	3095	sf	193	cf
Infiltration BMP	Existing	11442 JULIUS	7/26/2007	6517126.240320	6517126.240320	1802109.297720	246079	3095	sf	193	cf
Infiltration BMP	Existing	10026 MATTOCK	1/1/2006	6530326.462180	6530326.462180	1801330.602850	245125	3095	sf	193	cf
Infiltration BMP	Existing	9303 PARAMOUNT	3/14/2006	6523934.101920	6523934.101920	1808355.150660	246106	3095	sf	193	cf
Infiltration BMP	Existing	8739 PARKCLIFF	1/23/2006	6516653.896010	6516653.896010	1788072.265990	245524	2063	sf	129	cf
Infiltration BMP	Existing	9303 PARROT	1/4/2007	6524270.384450	6524270.384450	1808221.036420	246106	3095	sf	193	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7313 PELLET	6/22/2010	6516478.702600	6516478.702600	1804386.841100	246104	3095	sf	193	cf
Infiltration BMP	Existing	10473 PICO VISTA	1/21/2009	6529579.260180	6529579.260180	1798825.132300	245126	3095	sf	193	cf
Infiltration BMP	Existing	7840 THIRD	8/29/2007	6519254.945150	6519254.945150	1802616.251380	246102	3095	sf	193	cf
Infiltration BMP	Existing	8347 VISTA DEL ROSA	7/26/2007	6527061.884710	6527061.884710	1808864.927170	246106	3095	sf	193	cf
Infiltration BMP	Existing	11632 ADENMOOR	6/15/2005	6524141.212380	6524141.212380	1797138.142940	245114	2063	sf	129	cf
Infiltration BMP	Existing	7124 ADWEN	12/20/2007	6513937.816490	6513937.816490	1803059.644840	246100	2063	sf	129	cf
Infiltration BMP	Existing	7258 ADWEN	1/3/2008	6515068.905460	6515068.905460	1802384.347520	246079	2063	sf	129	cf
Infiltration BMP	Existing	7646 ADWEN	10/6/2005	6517037.957040	6517037.957040	1801170.785850	246079	2063	sf	129	cf
Infiltration BMP	Existing	7702 ADWEN	5/11/2006	6517121.727310	6517121.727310	1801116.179360	246079	2063	sf	129	cf
Infiltration BMP	Existing	13032 AIRPOINT	5/14/2007	6517972.459000	6517972.459000	1790335.341940	245115	2063	sf	129	cf
Infiltration BMP	Existing	8455 ALAMEDA	8/7/2008	6519558.018350	6519558.018350	1795721.453060	245115	2063	sf	129	cf
Infiltration BMP	Existing	8632 ALAMEDA	11/2/2006	6520500.318510	6520500.318510	1795019.322380	245115	2063	sf	129	cf
Infiltration BMP	Existing	7945 ALBIA	10/11/2005	6516993.544600	6516993.544600	1797608.073070	246079	2063	sf	129	cf
Infiltration BMP	Existing	8704 ALBIA	5/28/2008	6520928.243910	6520928.243910	1795073.644330	245115	2063	sf	129	cf
Infiltration BMP	Existing	7845 ARNETT	6/18/2010	6518353.322440	6518353.322440	1801165.354440	246079	2063	sf	129	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9217 ARRINGTON	3/27/2006	6527795.727670	6527795.727670	1805838.303240	245125	2063	sf	129	cf
Infiltration BMP	Existing	7870 BAYSINGER	2/8/2008	6521311.922790	6521311.922790	1805484.679070	246102	2063	sf	129	cf
Infiltration BMP	Existing	9964 BELCHER	5/16/2007	6525622.979960	6525622.979960	1789815.793090	245113	2063	sf	129	cf
Infiltration BMP	Existing	12556 BELLDER	8/17/2007	6518567.857140	6518567.857140	1793310.793680	245115	2063	sf	129	cf
Infiltration BMP	Existing	11614 BELLFLOWER	11/7/2008	6523771.271210	6523771.271210	1797348.312220	245114	2063	sf	129	cf
Infiltration BMP	Existing	11802 BELLMAN	3/9/2007	6521898.080850	6521898.080850	1797268.375540	245114	2063	sf	129	cf
Infiltration BMP	Existing	7502 BENARES	1/30/2009	6515952.395710	6515952.395710	1801162.932420	246079	2063	sf	129	cf
Infiltration BMP	Existing	7824 BORSON	5/24/2007	6514090.231790	6514090.231790	1794571.039330	246077	2063	sf	129	cf
Infiltration BMP	Existing	7442 BROOKMILL	2/6/2006	6515991.568850	6515991.568850	1801492.813950	246079	2063	sf	129	cf
Infiltration BMP	Existing	9202 BUELL	7/21/2008	6526325.599230	6526325.599230	1799668.061170	245119	2063	sf	129	cf
Infiltration BMP	Existing	9340 BUELL	8/9/2006	6527287.659290	6527287.659290	1799162.594770	245126	2063	sf	129	cf
Infiltration BMP	Existing	8707 BYERS	3/15/2006	6521183.641890	6521183.641890	1796053.567730	245115	2063	sf	129	cf
Infiltration BMP	Existing	10446 CASANES	10/26/2006	6528470.793910	6528470.793910	1799828.787480	245126	2063	sf	129	cf
Infiltration BMP	Existing	10932 CASANES	11/17/2005	6527225.467210	6527225.467210	1797760.272650	245119	2063	sf	129	cf
Infiltration BMP	Existing	13341 CASTANA	10/28/2005	6517576.502130	6517576.502130	1788949.477410	245524	2063	sf	129	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7408 CECILIA	10/27/2005	6517829.130300	6517829.130300	1804625.827460	246102	2063	sf	129	cf
Infiltration BMP	Existing	7604 CECILIA	5/14/2007	6518455.494160	6518455.494160	1804215.794590	246102	2063	sf	129	cf
Infiltration BMP	Existing	9116 CHANEY	12/19/2005	6529189.877980	6529189.877980	1805493.817150	245125	2063	sf	129	cf
Infiltration BMP	Existing	8210 CHEYENNE	3/18/2008	6515440.785260	6515440.785260	1792057.306890	246077	2063	sf	129	cf
Infiltration BMP	Existing	9663 CLANCEY	8/17/2005	6527712.819630	6527712.819630	1804149.908320	245125	2063	sf	129	cf
Infiltration BMP	Existing	10708 CLANCEY	12/9/2005	6525546.299290	6525546.299290	1800088.746900	245119	2063	sf	129	cf
Infiltration BMP	Existing	8336 CLETA	5/8/2006	6520552.025180	6520552.025180	1798452.238760	245114	2063	sf	129	cf
Infiltration BMP	Existing	8557 CLETA	7/24/2006	6521804.225790	6521804.225790	1798033.515210	245114	2063	sf	129	cf
Infiltration BMP	Existing	8532 COLE	11/7/2005	6521000.000000	6521000.000000	1796400.000000	245115	2063	sf	129	cf
Infiltration BMP	Existing	9003 CORD	6/23/2010	6530731.156250	6530731.156250	1805583.409840	245127	2063	sf	129	cf
Infiltration BMP	Existing	9203 CORD	11/14/2008	6530209.591170	6530209.591170	1804419.169900	245125	2063	sf	129	cf
Infiltration BMP	Existing	13029 CORNUTA	5/17/2007	6525511.407030	6525511.407030	1790564.440990	245113	2063	sf	129	cf
Infiltration BMP	Existing	13102 CORNUTA	8/2/2007	6525701.503660	6525701.503660	1790504.914950	245113	2063	sf	129	cf
Infiltration BMP	Existing	13130 CORNUTA	6/25/2007	6525701.486250	6525701.486250	1790230.251310	245113	2063	sf	129	cf
Infiltration BMP	Existing	9245 DALEWOOD	9/23/2005	6532196.615620	6532196.615620	1804345.945760	245127	2063	sf	129	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	13440 DEMPSTER	10/26/2006	6516234.168650	6516234.168650	1789111.153470	245524	2063	sf	129	cf
Infiltration BMP	Existing	13448 DEMPSTER	5/10/2007	6516184.596670	6516184.596670	1789023.378330	245524	2063	sf	129	cf
Infiltration BMP	Existing	8125 DINSDALE	12/20/2005	6523223.693140	6523223.693140	1805447.514320	246103	2063	sf	129	cf
Infiltration BMP	Existing	10343 DOLAN	3/7/2007	6523688.489440	6523688.489440	1803733.392340	246103	2063	sf	129	cf
Infiltration BMP	Existing	10616 DOLAN	12/8/2005	6523091.688370	6523091.688370	1802186.196180	246103	2063	sf	129	cf
Infiltration BMP	Existing	8451 DONOVAN	10/20/2006	6518824.326830	6518824.326830	1794831.678890	245115	2063	sf	129	cf
Infiltration BMP	Existing	11915 DOWNEY	9/26/2007	6519404.158310	6519404.158310	1797577.606330	245115	2063	sf	129	cf
Infiltration BMP	Existing	12269 DOWNEY	3/16/2006	6518129.427940	6518129.427940	1795616.200900	246077	2063	sf	129	cf
Infiltration BMP	Existing	12631 DUNROBIN	1/14/2009	6524865.692630	6524865.692630	1791809.740080	245114	2063	sf	129	cf
Infiltration BMP	Existing	12644 DUNROBIN	12/27/2006	6525045.107610	6525045.107610	1791670.201830	245114	2063	sf	129	cf
Infiltration BMP	Existing	13212 DUNROBIN	3/6/2008	6525046.199690	6525046.199690	1790094.955960	245114	2063	sf	129	cf
Infiltration BMP	Existing	9018 EGLISE	6/18/2010	6530595.364130	6530595.364130	1805560.296250	245127	2063	sf	129	cf
Infiltration BMP	Existing	9252C ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9252D ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9252E ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9254A ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9254B ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9254C ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9254D ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9254E ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9258D ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9258E ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9260E ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9260A ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9260B ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9260C ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9260D ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	8902 ELSTON	6/22/2010	6526760.905110	6526760.905110	1808606.155990	246103	2063	sf	129	cf
Infiltration BMP	Existing	8420 EUCALYPTUS	11/1/2007	6518268.185230	6518268.185230	1794519.531140	245115	2063	sf	129	cf
Infiltration BMP	Existing	8543 FARM	7/14/2008	6524366.648200	6524366.648200	1802748.102990	245119	2063	sf	129	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7963 FIFTH	4/13/2007	6520492.297340	6520492.297340	1803181.748460	246103	2063	sf	129	cf
Infiltration BMP	Existing	7606 FINEVALE	7/23/2007	6522317.087820	6522317.087820	1809781.757910	246111	2063	sf	129	cf
Infiltration BMP	Existing	8740 FIRESTONE	2/5/2008	6523707.154590	6523707.154590	1799037.579000	245119	2063	sf	129	cf
Infiltration BMP	Existing	8663 FONTANA	8/11/2005	6522041.808010	6522041.808010	1796935.622550	245114	2063	sf	129	cf
Infiltration BMP	Existing	7435 FOSTORIA	8/30/2005	6517713.795360	6517713.795360	1804555.032870	246102	2063	sf	129	cf
Infiltration BMP	Existing	7611 FOSTORIA	7/5/2007	6518456.715640	6518456.715640	1804071.041810	246102	2063	sf	129	cf
Infiltration BMP	Existing	8029 FOURTH	6/15/2006	6520786.200710	6520786.200710	1802533.409070	246103	2063	sf	129	cf
Infiltration BMP	Existing	8524 GAINFORD	6/27/2008	6525485.453790	6525485.453790	1804820.431910	245125	2063	sf	129	cf
Infiltration BMP	Existing	9332 GAINFORD	7/20/2006	6528750.550820	6528750.550820	1802746.272930	245125	2063	sf	129	cf
Infiltration BMP	Existing	9330 GALLATIN	8/2/2007	6529116.628720	6529116.628720	1804180.197000	245125	2063	sf	129	cf
Infiltration BMP	Existing	12271 GLYNN	10/18/2005	6518435.603700	6518435.603700	1795389.616520	245115	2063	sf	129	cf
Infiltration BMP	Existing	9123 HALEDON	1/23/2006	6528738.408770	6528738.408770	1805747.051990	245125	2063	sf	129	cf
Infiltration BMP	Existing	7915 HARPER	2/7/2006	6520609.146350	6520609.146350	1804298.454990	246102	2063	sf	129	cf
Infiltration BMP	Existing	9108 HASTY	8/23/2006	6531133.870830	6531133.870830	1805211.202040	245127	2063	sf	129	cf
Infiltration BMP	Existing	10840 HASTY	1/16/2008	6527245.272860	6527245.272860	1798387.513250	245119	2063	sf	129	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7468 HONDO	12/31/2008	6513888.485770	6513888.485770	1797503.008930	246079	2063	sf	129	cf
Infiltration BMP	Existing	7838 HONDO	2/26/2008	6515366.533450	6515366.533450	1796561.911100	246079	2063	sf	129	cf
Infiltration BMP	Existing	7926 HONDO	7/25/2006	6515828.269550	6515828.269550	1796282.236280	246079	2063	sf	129	cf
Infiltration BMP	Existing	12023 HORTON	10/5/2005	6515547.066470	6515547.066470	1799512.855270	246079	1032	sf	64	cf
Infiltration BMP	Existing	10234 JULIUS	11/5/2009	6519723.348540	6519723.348540	1806551.787860	246102	2063	sf	129	cf
Infiltration BMP	Existing	11828 JULIUS	1/3/2008	6515976.382140	6515976.382140	1800524.752810	246079	2063	sf	129	cf
Infiltration BMP	Existing	9256 KLINEDALE	12/4/2007	6531745.367500	6531745.367500	1804500.031620	245127	2063	sf	129	cf
Infiltration BMP	Existing	9452 KLINEDALE	4/24/2008	6531257.497660	6531257.497660	1803653.019950	245127	2063	sf	129	cf
Infiltration BMP	Existing	9031 LEMORAN	1/30/2009	6529792.995960	6529792.995960	1806045.812140	245125	2063	sf	129	cf
Infiltration BMP	Existing	9910 LESTERFORD	8/3/2005	6531140.582200	6531140.582200	1801442.142180	245125	2063	sf	129	cf
Infiltration BMP	Existing	8533 LOWMAN	1/3/2008	6525796.079270	6525796.079270	1810845.309540	246106	2063	sf	129	cf
Infiltration BMP	Existing	8349 LUBEC	12/27/2006	6524776.248350	6524776.248350	1805794.753990	246103	2063	sf	129	cf
Infiltration BMP	Existing	7630 LUXOR	6/27/2005	6516552.896900	6516552.896900	1800452.817120	246079	2063	sf	129	cf
Infiltration BMP	Existing	12342 MARBEL	3/23/2006	6520586.635090	6520586.635090	1793799.804370	245115	2063	sf	129	cf
Infiltration BMP	Existing	9045 MARGARET ST	1/1/2006	6524143.176440	6524143.176440	1798109.987740	245114	2063	sf	129	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	10410 MATTOCK	10/2/2007	6529164.649420	6529164.649420	1799820.803610	245126	2063	sf	129	cf
Infiltration BMP	Existing	10615 MATTOCK	2/22/2006	6528479.681880	6528479.681880	1798952.207590	245126	2063	sf	129	cf
Infiltration BMP	Existing	9136 MELDAR	3/1/2007	6526738.891530	6526738.891530	1807241.651780	246103	2063	sf	129	cf
Infiltration BMP	Existing	7437 MULLER	10/3/2005	6518230.115820	6518230.115820	1805283.479580	246102	1032	sf	64	cf
Infiltration BMP	Existing	7452 MULLER	10/3/2005	6518271.461030	6518271.461030	1805049.518080	246102	2063	sf	129	cf
Infiltration BMP	Existing	10715 NEW	8/9/2007	6521988.945450	6521988.945450	1802370.638520	246103	2063	sf	129	cf
Infiltration BMP	Existing	10715 NEW	7/14/2008	6521988.945450	6521988.945450	1802370.638520	246103	2063	sf	129	cf
Infiltration BMP	Existing	10261 NEWVILLE	10/30/2007	6529641.666020	6529641.666020	1800383.942770	245126	2063	sf	129	cf
Infiltration BMP	Existing	10311 NEWVILLE	1/29/2009	6529538.574620	6529538.574620	1800214.882210	245126	2063	sf	129	cf
Infiltration BMP	Existing	10420 NEWVILLE	4/11/2008	6529346.061190	6529346.061190	1799529.176420	245126	2063	sf	129	cf
Infiltration BMP	Existing	10524 NEWVILLE	6/11/2007	6529062.272820	6529062.272820	1798916.257500	245126	2063	sf	129	cf
Infiltration BMP	Existing	9842 NORLAIN	3/9/2007	6519878.070320	6519878.070320	1807987.575840	246111	2063	sf	129	cf
Infiltration BMP	Existing	10403 PANGBORN	9/16/2005	6528806.561730	6528806.561730	1800136.574080	245126	2063	sf	129	cf
Infiltration BMP	Existing	10421 PANGBORN	6/5/2006	6528710.057740	6528710.057740	1799977.600600	245126	2063	sf	129	cf
Infiltration BMP	Existing	10903 PANGBORN	5/12/2008	6527497.056040	6527497.056040	1797964.159830	245119	2063	sf	129	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9508 PARAMOUNT	7/23/2007	6523724.334180	6523724.334180	1807653.518330	246106	2063	sf	129	cf
Infiltration BMP	Existing	9709 PARROT	6/20/2008	6523336.123150	6523336.123150	1806770.831150	246103	2063	sf	129	cf
Infiltration BMP	Existing	7107 PELLET	10/26/2005	6515228.221140	6515228.221140	1805197.090730	246104	2063	sf	129	cf
Infiltration BMP	Existing	10316 PICO VISTA	6/22/2010	6530326.941520	6530326.941520	1799752.739480	245126	2063	sf	129	cf
Infiltration BMP	Existing	10459 PICO VISTA	8/20/2008	6529643.308750	6529643.308750	1798930.291180	245126	2063	sf	129	cf
Infiltration BMP	Existing	11809 POMERING	1/25/2008	6515588.727520	6515588.727520	1800891.851040	246079	2063	sf	129	cf
Infiltration BMP	Existing	11821 POMERING	11/20/2008	6515535.205010	6515535.205010	1800794.072400	246079	2063	sf	129	cf
Infiltration BMP	Existing	9050 PRISCILLA	2/21/2007	6519218.937330	6519218.937330	1790014.532510	245115	2063	sf	129	cf
Infiltration BMP	Existing	8230 PURITAN	7/12/2007	6515756.650110	6515756.650110	1792196.388750	246077	2063	sf	129	cf
Infiltration BMP	Existing	8107 RAVILLER	6/22/2010	6524405.759790	6524405.759790	1808219.110840	246106	2063	sf	129	cf
Infiltration BMP	Existing	9940 RICHEON	12/26/2007	6520640.158150	6520640.158150	1807053.597690	246106	2063	sf	129	cf
Infiltration BMP	Existing	12015 RICHEON	6/21/2010	6515852.443580	6515852.443580	1799404.256870	246079	2063	sf	129	cf
Infiltration BMP	Existing	7336 RIO HONDO PL	12/26/2007	6516915.991390	6516915.991390	1804928.334260	246104	2063	sf	129	cf
Infiltration BMP	Existing	8418 RIVES	9/30/2005	6525367.917230	6525367.917230	1811575.863460	246106	1032	sf	64	cf
Infiltration BMP	Existing	11638 RIVES	11/2/2006	6517541.202300	6517541.202300	1800577.741160	246079	2063	sf	129	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	11706 RIVES	10/16/2006	6517702.333530	6517702.333530	1800238.435400	246079	2063	sf	129	cf
Infiltration BMP	Existing	12436 ROSE	11/6/2006	6520776.455000	6520776.455000	1793075.765000	245115	2063	sf	129	cf
Infiltration BMP	Existing	12033 SAMOLINE	2/22/2008	6517025.771360	6517025.771360	1798249.691900	246079	2063	sf	129	cf
Infiltration BMP	Existing	12051 SAMOLINE	9/3/2008	6516919.542440	6516919.542440	1798077.846870	246079	2063	sf	129	cf
Infiltration BMP	Existing	12302 SAMOLINE	6/22/2010	6516399.204110	6516399.204110	1796321.463670	246077	2063	sf	129	cf
Infiltration BMP	Existing	7921 SECOND	2/15/2006	6519427.915180	6519427.915180	1802349.970040	246102	2063	sf	129	cf
Infiltration BMP	Existing	9700 SHELLEYFIELD	7/17/2008	6527622.312900	6527622.312900	1804250.399390	245125	2063	sf	129	cf
Infiltration BMP	Existing	10553 SHELLEYFIELD	6/11/2008	6525493.222190	6525493.222190	1800845.190450	245119	2063	sf	129	cf
Infiltration BMP	Existing	8732 SMALLWOOD	2/16/2006	6524307.398160	6524307.398160	1810444.440300	246106	2063	sf	129	cf
Infiltration BMP	Existing	8816 SMALLWOOD	10/11/2005	6524123.348010	6524123.348010	1810138.117570	246106	2063	sf	129	cf
Infiltration BMP	Existing	9127 SONGFEST	12/1/2005	6531508.595900	6531508.595900	1805094.820630	245127	2063	sf	129	cf
Infiltration BMP	Existing	9143 STEWART & GRAY	11/30/2005	6523803.019500	6523803.019500	1796254.085000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9211 STEWART & GRAY	11/27/2006	6524190.537790	6524190.537790	1796254.765000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9112 STOAKES	8/23/2006	6526782.391540	6526782.391540	1807626.036510	246103	2063	sf	129	cf
Infiltration BMP	Existing	9533 SUVA	6/27/2006	6530409.847860	6530409.847860	1802701.771860	245125	2063	sf	129	cf

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Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9729 TRISTAN	10/18/2005	6526617.474570	6526617.474570	1804798.283870	245125	2063	sf	129	cf
Infiltration BMP	Existing	9216 TWEEDY	12/9/2005	6523630.155980	6523630.155980	1808715.397490	246106	2063	sf	129	cf
Infiltration BMP	Existing	13602 VERDURA	6/28/2007	6516296.473820	6516296.473820	1788728.235150	245524	2063	sf	129	cf
Infiltration BMP	Existing	10305 VULTEE	10/9/2006	6525949.622700	6525949.622700	1802510.250780	245119	2063	sf	129	cf
Infiltration BMP	Existing	10017 WILEY BURKE	6/22/2010	6520091.056520	6520091.056520	1807145.868160	246106	2063	sf	129	cf
Infiltration BMP	Existing	8538 ADOREE	9/26/2007	6517768.216360	6517768.216360	1792006.503470	245115	1032	sf	64	cf
Infiltration BMP	Existing	9407 ADOREE	1/1/2006	6522413.313750	6522413.313750	1791106.017430	245115	1032	sf	64	cf
Infiltration BMP	Existing	7134 ADWEN	1/1/2005	6514021.670500	6514021.670500	1803005.164870	246100	1032	sf	64	cf
Infiltration BMP	Existing	7343 ADWEN	9/4/2007	6515521.914470	6515521.914470	1802266.858280	246079	1032	sf	64	cf
Infiltration BMP	Existing	7743 ADWEN	12/5/2006	6517543.195590	6517543.195590	1801041.561520	246079	1032	sf	64	cf
Infiltration BMP	Existing	7802 ADWEN	10/18/2005	6517699.212930	6517699.212930	1800872.280990	246079	1032	sf	64	cf
Infiltration BMP	Existing	7828 ADWEN	8/4/2005	6517918.117250	6517918.117250	1800738.511970	246079	1032	sf	64	cf
Infiltration BMP	Existing	7852 ADWEN	1/9/2009	6518131.432520	6518131.432520	1800607.974520	246079	1032	sf	64	cf
Infiltration BMP	Existing	7855 ADWEN	11/23/2005	6518235.708380	6518235.708380	1800774.963010	246079	1032	sf	64	cf
Infiltration BMP	Existing	12823 AIRPOINT	6/29/2007	6518348.749200	6518348.749200	1791281.430170	245115	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8441 ALAMEDA	10/31/2005	6519442.769190	6519442.769190	1795780.926380	245115	1032	sf	64	cf
Infiltration BMP	Existing	8549 ALAMEDA	6/23/2010	6520129.148230	6520129.148230	1795426.542360	245115	1032	sf	64	cf
Infiltration BMP	Existing	8448 ALBIA	1/1/2007	6519556.734390	6519556.734390	1795840.452920	245115	1032	sf	64	cf
Infiltration BMP	Existing	8528 ALBIA	2/27/2007	6520000.245000	6520000.245000	1795612.955000	245115	1032	sf	64	cf
Infiltration BMP	Existing	9718 ALIWIN	8/2/2005	6532030.038780	6532030.038780	1804115.104340	245127	1032	sf	64	cf
Infiltration BMP	Existing	7936 ALLENGROVE	1/22/2007	6524421.678930	6524421.678930	1809567.173140	246106	1032	sf	64	cf
Infiltration BMP	Existing	8116 ALLENGROVE	12/5/2005	6525137.825210	6525137.825210	1808747.451430	246106	1032	sf	64	cf
Infiltration BMP	Existing	9166 ANGELL	9/2/2008	6520625.089300	6520625.089300	1790394.866750	245115	1032	sf	64	cf
Infiltration BMP	Existing	9351 APPLEBY	1/3/2008	6529580.566170	6529580.566170	1804445.997380	245125	1032	sf	64	cf
Infiltration BMP	Existing	9520 ARDINE	10/6/2005	6527613.323800	6527613.323800	1797533.903060	245119	1032	sf	64	cf
Infiltration BMP	Existing	7814 ARNETT	6/22/2010	6517981.553910	6517981.553910	1801095.347060	246079	1032	sf	64	cf
Infiltration BMP	Existing	7815 ARNETT	6/22/2010	6518066.490340	6518066.490340	1801237.713920	246079	1032	sf	64	cf
Infiltration BMP	Existing	7832 ARNETT	1/11/2007	6518132.684800	6518132.684800	1801021.243050	246079	1032	sf	64	cf
Infiltration BMP	Existing	8241 ARNETT	11/29/2006	6520442.071210	6520442.071210	1799867.842140	245115	1032	sf	64	cf
Infiltration BMP	Existing	7743 BAIRNSDALE	5/16/2006	6523474.546480	6523474.546480	1810551.323320	246106	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	12904 BARLIN	1/15/2009	6518150.890370	6518150.890370	1791163.941140	245115	1032	sf	64	cf
Infiltration BMP	Existing	13247 BARLIN	5/5/2005	6516868.829160	6516868.829160	1789428.146200	245524	1032	sf	64	cf
Infiltration BMP	Existing	7871 BAYSINGER	1/10/2007	6521422.493960	6521422.493960	1805635.813480	246102	1032	sf	64	cf
Infiltration BMP	Existing	8607 BAYSINGER	1/1/2005	6525304.240800	6525304.240800	1803291.716200	245119	1032	sf	64	cf
Infiltration BMP	Existing	9131 BAYSINGER	9/10/2008	6526918.982970	6526918.982970	1802474.767100	245119	1032	sf	64	cf
Infiltration BMP	Existing	9411 BAYSINGER	9/24/2007	6528736.042510	6528736.042510	1801262.782730	245126	1032	sf	64	cf
Infiltration BMP	Existing	9320 BELCHER	4/10/2007	6520600.361450	6520600.361450	1789754.109890	245115	1032	sf	64	cf
Infiltration BMP	Existing	9969 BELCHER	7/29/2009	6525669.288070	6525669.288070	1789992.480470	245113	1032	sf	64	cf
Infiltration BMP	Existing	10375 BELDER	6/22/2010	6522812.240000	6522812.240000	1803043.757460	246103	1032	sf	64	cf
Infiltration BMP	Existing	7441 BENARES	10/25/2005	6515921.019300	6515921.019300	1801396.174500	246079	1032	sf	64	cf
Infiltration BMP	Existing	7503 BENARES	1/16/2008	6516046.045620	6516046.045620	1801313.189720	246079	1032	sf	64	cf
Infiltration BMP	Existing	11014 BENFIELD	12/19/2005	6531918.630750	6531918.630750	1797937.959120	245122	1032	sf	64	cf
Infiltration BMP	Existing	8555 BIGBY	8/22/2005	6524606.668030	6524606.668030	1802914.545010	245119	1032	sf	64	cf
Infiltration BMP	Existing	9308 BIGBY	12/18/2008	6527591.908660	6527591.908660	1800839.109380	245126	1032	sf	64	cf
Infiltration BMP	Existing	9345 BIGBY	5/16/2006	6527999.312020	6527999.312020	1800803.102000	245126	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9389 BIGBY	9/20/2007	6528361.925530	6528361.925530	1800582.426270	245126	1032	sf	64	cf
Infiltration BMP	Existing	8246 BIRCHCREST	11/28/2005	6526713.325530	6526713.325530	1809350.628180	246106	1032	sf	64	cf
Infiltration BMP	Existing	10434 BIRCHDALE	12/2/2008	6524586.579650	6524586.579650	1802390.820140	245119	1032	sf	64	cf
Infiltration BMP	Existing	8812 BIRCHLEAF	5/3/2007	6527457.897210	6527457.897210	1808468.377860	246103	1032	sf	64	cf
Infiltration BMP	Existing	8912 BIRCHLEAF	10/9/2007	6527209.329660	6527209.329660	1808281.543500	246103	1032	sf	64	cf
Infiltration BMP	Existing	13330 BIXLER	3/21/2007	6516259.886220	6516259.886220	1789972.109000	245524	1032	sf	64	cf
Infiltration BMP	Existing	13411 BIXLER	9/30/2008	6515914.285010	6515914.285010	1789635.314360	245524	1032	sf	64	cf
Infiltration BMP	Existing	13425 BIXLER	8/17/2005	6515841.147610	6515841.147610	1789505.869380	245524	1032	sf	64	cf
Infiltration BMP	Existing	13454 BIXLER	5/10/2007	6515808.905200	6515808.905200	1789174.120800	245524	1032	sf	64	cf
Infiltration BMP	Existing	8220 BLANDWOOD	6/22/2010	6526086.691350	6526086.691350	1808873.058080	246103	1032	sf	64	cf
Infiltration BMP	Existing	12809 BLODGETT	1/1/2006	6518629.647540	6518629.647540	1791208.759970	245115	1032	sf	64	cf
Infiltration BMP	Existing	13026 BLODGETT	1/1/2005	6518225.401930	6518225.401930	1790248.943990	245115	1032	sf	64	cf
Infiltration BMP	Existing	13045 BLODGETT	10/6/2005	6517990.284020	6517990.284020	1790176.483690	245115	1032	sf	64	cf
Infiltration BMP	Existing	13114 BLODGETT	10/6/2005	6517888.613290	6517888.613290	1789931.616790	245115	1032	sf	64	cf
Infiltration BMP	Existing	7931 BORSON	9/6/2006	6514752.824370	6514752.824370	1794266.718830	246077	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8202 BORSON	6/5/2006	6516202.097710	6516202.097710	1793267.543860	246077	1032	sf	64	cf
Infiltration BMP	Existing	8428 BORSON	11/21/2008	6517449.915190	6517449.915190	1792528.167220	245115	1032	sf	64	cf
Infiltration BMP	Existing	8515 BORSON	3/14/2005	6517771.929480	6517771.929480	1792500.505870	245115	1032	sf	64	cf
Infiltration BMP	Existing	8345 BOYNE	6/18/2010	6519344.143470	6519344.143470	1796446.421390	245115	1032	sf	64	cf
Infiltration BMP	Existing	8402 BOYNE	1/1/2005	6519302.113240	6519302.113240	1796279.573520	245115	1032	sf	64	cf
Infiltration BMP	Existing	8525 BOYNE	7/20/2006	6520189.715440	6520189.715440	1796009.699660	245115	1032	sf	64	cf
Infiltration BMP	Existing	8528 BOYNE	2/22/2007	6520138.661540	6520138.661540	1795848.718800	245115	1032	sf	64	cf
Infiltration BMP	Existing	8613 BOYSON	1/1/2006	6520167.899980	6520167.899980	1794794.451220	245115	1032	sf	64	cf
Infiltration BMP	Existing	8647 BOYSON	7/29/2008	6520447.155570	6520447.155570	1794619.557270	245115	1032	sf	64	cf
Infiltration BMP	Existing	10216 BRANSCOMB	2/21/2007	6526794.108720	6526794.108720	1790310.156040	245113	1032	sf	64	cf
Infiltration BMP	Existing	10291 BRANSCOMB	7/25/2006	6527529.378260	6527529.378260	1790458.207730	245118	1032	sf	64	cf
Infiltration BMP	Existing	9624 BROCK	4/22/2005	6523849.153810	6523849.153810	1806723.688440	246103	1032	sf	64	cf
Infiltration BMP	Existing	12351 BROCK	9/3/2008	6516676.858850	6516676.858850	1795612.256100	246077	1032	sf	64	cf
Infiltration BMP	Existing	12608 BROCK	2/11/2005	6516008.590090	6516008.590090	1794308.259250	246077	1032	sf	64	cf
Infiltration BMP	Existing	8269 BROOKGREEN	1/1/2006	6526709.836510	6526709.836510	1808858.860970	246103	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7847 BROOKMILL	6/21/2010	6518005.266020	6518005.266020	1800484.266850	246079	1032	sf	64	cf
Infiltration BMP	Existing	8025 BROOKPARK	1/1/2005	6525207.617130	6525207.617130	1809814.105880	246106	1032	sf	64	cf
Infiltration BMP	Existing	9707 BROOKSHIRE	3/14/2005	6525762.512240	6525762.512240	1805795.982660	246103	1032	sf	64	cf
Infiltration BMP	Existing	10429 BROOKSHIRE	1/19/2005	6523911.001360	6523911.001360	1803018.354450	245119	1032	sf	64	cf
Infiltration BMP	Existing	12404 BROOKSHIRE	6/25/2007	6518808.785660	6518808.785660	1794169.944640	245115	1032	sf	64	cf
Infiltration BMP	Existing	7622 BRUNACHE	10/31/2007	6515665.309920	6515665.309920	1799097.073030	246079	1032	sf	64	cf
Infiltration BMP	Existing	8216 BRUNACHE	11/6/2007	6518414.904440	6518414.904440	1797242.748270	245115	1032	sf	64	cf
Infiltration BMP	Existing	9033 BUCKLES	6/21/2010	6523179.898540	6523179.898540	1796909.863810	245114	1032	sf	64	cf
Infiltration BMP	Existing	7540 BUELL	1/1/2004	6518499.698980	6518499.698980	1804545.470300	246102	1032	sf	64	cf
Infiltration BMP	Existing	9330 BUELL	2/15/2006	6527195.126160	6527195.126160	1799219.087810	245126	1032	sf	64	cf
Infiltration BMP	Existing	9351 BUELL	6/21/2010	6527484.251630	6527484.251630	1799288.621620	245126	1032	sf	64	cf
Infiltration BMP	Existing	9634 BUELL	3/16/2006	6528774.281270	6528774.281270	1798139.573770	245126	1032	sf	64	cf
Infiltration BMP	Existing	9067 BUHMAN	11/20/2007	6530056.595350	6530056.595350	1805336.923900	245125	1032	sf	64	cf
Infiltration BMP	Existing	9208 BUHMAN	6/16/2008	6529799.831660	6529799.831660	1804544.819190	245125	1032	sf	64	cf
Infiltration BMP	Existing	10237 CASANES	3/23/2006	6528975.248660	6528975.248660	1801017.460740	245126	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	10321 CASANES	1/1/2007	6528597.524650	6528597.524650	1800411.412530	245126	1032	sf	64	cf
Infiltration BMP	Existing	10403 CASANES	12/21/2005	6528532.829940	6528532.829940	1800305.536240	245126	1032	sf	64	cf
Infiltration BMP	Existing	10408 CASANES	1/1/2005	6528665.671960	6528665.671960	1800149.799930	245126	1032	sf	64	cf
Infiltration BMP	Existing	10812 CASANES	3/14/2005	6527610.698650	6527610.698650	1798391.295520	245119	1032	sf	64	cf
Infiltration BMP	Existing	10835 CASANES	4/1/2008	6527345.484730	6527345.484730	1798305.683780	245119	1032	sf	64	cf
Infiltration BMP	Existing	10944 CASANES	1/1/2006	6527151.352860	6527151.352860	1797710.972890	245119	1032	sf	64	cf
Infiltration BMP	Existing	8457 CAVEL	9/24/2007	6519984.576530	6519984.576530	1796420.555450	245115	1032	sf	64	cf
Infiltration BMP	Existing	9502 CECILIA	10/11/2007	6527927.079440	6527927.079440	1798327.652080	245126	1032	sf	64	cf
Infiltration BMP	Existing	9531 CECILIA	8/23/2006	6528208.236430	6528208.236430	1798317.933420	245126	1032	sf	64	cf
Infiltration BMP	Existing	9435 CEDARTREE	6/22/2010	6530636.457520	6530636.457520	1805866.234670	245127	1032	sf	64	cf
Infiltration BMP	Existing	9010 CHANEY	11/30/2005	6529789.693370	6529789.693370	1806340.793150	245125	1032	sf	64	cf
Infiltration BMP	Existing	9011 CHANEY	1/31/2006	6529640.900410	6529640.900410	1806424.653160	245125	1032	sf	64	cf
Infiltration BMP	Existing	9134 CHANEY	1/1/2005	6529119.825860	6529119.825860	1805332.958450	245125	1032	sf	64	cf
Infiltration BMP	Existing	10252 CHANEY	1/1/2006	6527373.631100	6527373.631100	1801932.130180	245119	1032	sf	64	cf
Infiltration BMP	Existing	10530 CHANEY	6/3/2008	6526461.472620	6526461.472620	1800532.795270	245119	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8355 CHARLOMA	9/16/2005	6524931.861530	6524931.861530	1806017.636180	246103	1032	sf	64	cf
Infiltration BMP	Existing	9037 CHARLOMA	9/25/2007	6527230.271760	6527230.271760	1804669.291940	245125	1032	sf	64	cf
Infiltration BMP	Existing	8565 CHEROKEE	2/14/2008	6524386.530150	6524386.530150	1802386.701010	245119	1032	sf	64	cf
Infiltration BMP	Existing	8030 CHEYENNE	1/1/2005	6514573.751210	6514573.751210	1792580.925090	246077	1032	sf	64	cf
Infiltration BMP	Existing	8117 CHEYENNE	4/10/2006	6515045.470000	6515045.470000	1792480.065000	246077	1032	sf	64	cf
Infiltration BMP	Existing	8418 CHEYENNE	1/1/2006	6516589.334020	6516589.334020	1791278.419980	245524	1032	sf	64	cf
Infiltration BMP	Existing	9303 CLANCEY	4/3/2006	6528228.489510	6528228.489510	1805319.961840	245125	1032	sf	64	cf
Infiltration BMP	Existing	10518 CLANCEY	3/9/2007	6526045.670270	6526045.670270	1800904.969960	245119	1032	sf	64	cf
Infiltration BMP	Existing	8316 CLETA	4/3/2007	6520383.826830	6520383.826830	1798544.940710	245114	1032	sf	64	cf
Infiltration BMP	Existing	8529 CLETA	1/1/2004	6521562.602410	6521562.602410	1798134.090240	245114	1032	sf	64	cf
Infiltration BMP	Existing	13113 COLDBROOK	6/13/2007	6524340.025750	6524340.025750	1790440.866070	245114	3095	sf	193	cf
Infiltration BMP	Existing	13227 COLDBROOK	2/22/2008	6524428.823880	6524428.823880	1789883.562480	245114	1032	sf	64	cf
Infiltration BMP	Existing	8554 COMOLETTE	6/21/2010	6517765.395020	6517765.395020	1791693.915800	245115	1032	sf	64	cf
Infiltration BMP	Existing	8417 CONKLIN	1/1/2006	6516931.143420	6516931.143420	1791819.671020	245524	1032	sf	64	cf
Infiltration BMP	Existing	7219 COOLGROVE	4/25/2006	6521787.460350	6521787.460350	1811479.001950	246111	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7605 COOLGROVE	6/22/2010	6522636.872680	6522636.872680	1810413.845850	246111	1032	sf	64	cf
Infiltration BMP	Existing	10210 CORD	2/12/2009	6528662.670970	6528662.670970	1801499.064930	245126	1032	sf	64	cf
Infiltration BMP	Existing	7706 COREY	6/22/2010	6515304.522120	6515304.522120	1798247.325380	246079	1032	sf	64	cf
Infiltration BMP	Existing	11708 CORRIGAN	5/30/2006	6523410.919990	6523410.919990	1796690.721900	245114	1032	sf	64	cf
Infiltration BMP	Existing	13227 CORRIGAN	4/11/2006	6523118.258510	6523118.258510	1789898.574120	245114	1032	sf	64	cf
Infiltration BMP	Existing	10809 CROSSDALE	1/30/2006	6532012.269030	6532012.269030	1798722.436870	245122	1032	sf	64	cf
Infiltration BMP	Existing	7803 DACOSTA	1/1/2006	6521705.534400	6521705.534400	1807011.928190	246106	1032	sf	64	cf
Infiltration BMP	Existing	7808 DACOSTA	3/29/2007	6521675.640660	6521675.640660	1806840.332210	246106	1032	sf	64	cf
Infiltration BMP	Existing	7826 DACOSTA	3/23/2007	6521825.889640	6521825.889640	1806744.301550	246106	1032	sf	64	cf
Infiltration BMP	Existing	8064 DACOSTA	1/6/2009	6523365.354910	6523365.354910	1805913.806160	246103	1032	sf	64	cf
Infiltration BMP	Existing	9242 DALEWOOD	5/17/2007	6532339.520890	6532339.520890	1804239.830010	245127	1032	sf	64	cf
Infiltration BMP	Existing	7044 DE PALMA	1/30/2006	6513058.006240	6513058.006240	1802286.102090	246100	1032	sf	64	cf
Infiltration BMP	Existing	7956 DE PALMA	7/28/2005	6517915.235930	6517915.235930	1799223.139650	246077	1032	sf	64	cf
Infiltration BMP	Existing	8232 DE PALMA	12/10/2008	6519342.730110	6519342.730110	1798392.424410	245115	1032	sf	64	cf
Infiltration BMP	Existing	13134 DEMING	2/6/2007	6518053.947000	6518053.947000	1789691.993030	245115	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	13240 DEMING	8/12/2005	6518068.820530	6518068.820530	1789032.682680	245115	1032	sf	64	cf
Infiltration BMP	Existing	13415 DEMPSTER	1/1/2007	6516194.546390	6516194.546390	1789419.790430	245524	1032	sf	64	cf
Infiltration BMP	Existing	13434 DEMPSTER	1/12/2006	6516258.965410	6516258.965410	1789155.039770	245524	1032	sf	64	cf
Infiltration BMP	Existing	13452 DEMPSTER	9/20/2005	6516159.819690	6516159.819690	1788979.483200	245524	1032	sf	64	cf
Infiltration BMP	Existing	7324 DINSDALE	6/21/2010	6518936.024560	6518936.024560	1807958.155410	246106	1032	sf	64	cf
Infiltration BMP	Existing	8352 DINSDALE	12/19/2005	6524191.795240	6524191.795240	1804722.231880	246103	1032	sf	64	cf
Infiltration BMP	Existing	9325 DINSDALE	7/3/2007	6528635.640220	6528635.640220	1802187.000380	245125	1032	sf	64	cf
Infiltration BMP	Existing	9812 DOLAN	1/10/2007	6524918.033470	6524918.033470	1805427.859430	246103	1032	sf	64	cf
Infiltration BMP	Existing	10410 DOLAN	9/19/2007	6523686.660150	6523686.660150	1803351.652190	245119	1032	sf	64	cf
Infiltration BMP	Existing	12522 DOLAN	12/9/2005	6518109.498100	6518109.498100	1794046.260040	245115	1032	sf	64	cf
Infiltration BMP	Existing	12634 DOLAN	4/11/2006	6517527.198260	6517527.198260	1793053.966010	245115	1032	sf	64	cf
Infiltration BMP	Existing	12712 DOLAN	4/27/2005	6517393.756980	6517393.756980	1792842.640770	245115	1032	sf	64	cf
Infiltration BMP	Existing	8740 DONOVAN	11/2/2006	6520467.711390	6520467.711390	1793463.175520	245115	1032	sf	64	cf
Infiltration BMP	Existing	6408 DOS RIOS	3/7/2007	6523246.583700	6523246.583700	1811462.058000	246111	1032	sf	64	cf
Infiltration BMP	Existing	6420 DOS RIOS	7/14/2008	6523082.430580	6523082.430580	1811381.024700	246111	1032	sf	64	cf

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Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	6449 DOS RIOS	8/23/2005	6522675.424950	6522675.424950	1811505.638050	246111	1032	sf	64	cf
Infiltration BMP	Existing	6481 DOS RIOS	8/8/2007	6522296.417970	6522296.417970	1811546.494500	246111	1032	sf	64	cf
Infiltration BMP	Existing	9532 DOWNEY	9/21/2007	6524828.225510	6524828.225510	1806555.186060	246103	1032	sf	64	cf
Infiltration BMP	Existing	12115 DOWNEY	8/12/2005	6518801.058860	6518801.058860	1796628.276370	245115	1032	sf	64	cf
Infiltration BMP	Existing	12116 DOWNEY	7/24/2008	6518985.048760	6518985.048760	1796501.621880	245115	1032	sf	64	cf
Infiltration BMP	Existing	12545 DOWNEY	7/7/2005	6517126.997680	6517126.997680	1794204.833310	246077	1032	sf	64	cf
Infiltration BMP	Existing	13620 DOWNEY	10/24/2007	6515777.167020	6515777.167020	1788934.803130	245524	1032	sf	64	cf
Infiltration BMP	Existing	9756 DOWNEY SANFORD BRIDGE	11/6/2008	6530232.905320	6530232.905320	1802732.275270	245125	1032	sf	64	cf
Infiltration BMP	Existing	12109 DUNROBIN	5/27/2008	6524849.554990	6524849.554990	1794742.565720	245114	1032	sf	64	cf
Infiltration BMP	Existing	12602 DUNROBIN	4/21/2008	6525045.021790	6525045.021790	1792096.938130	245114	1032	sf	64	cf
Infiltration BMP	Existing	13118 DUNROBIN	8/1/2008	6525045.611060	6525045.611060	1790357.500340	245114	1032	sf	64	cf
Infiltration BMP	Existing	13447 EARNSHAW	3/4/2005	6516486.580000	6516486.580000	1788881.960000	245524	1032	sf	64	cf
Infiltration BMP	Existing	12246 EASTBROOK	7/3/2007	6525290.855020	6525290.855020	1793729.113600	245114	1032	sf	64	cf
Infiltration BMP	Existing	13102 EASTBROOK	5/30/2006	6525376.065000	6525376.065000	1790509.718450	245114	1032	sf	64	cf
Infiltration BMP	Existing	13207 EASTBROOK	1/1/2006	6525181.215010	6525181.215010	1790147.343800	245114	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9010 EGLISE	6/22/2010	6530616.481070	6530616.481070	1805612.930940	245127	1032	sf	64	cf
Infiltration BMP	Existing	9124 EGLISE	1/1/2006	6530099.347460	6530099.347460	1804464.036140	245125	1032	sf	64	cf
Infiltration BMP	Existing	10228 EGLISE	6/16/2008	6528317.527320	6528317.527320	1801552.496190	245126	1032	sf	64	cf
Infiltration BMP	Existing	8432 EUCALYPTUS	6/21/2010	6518375.883890	6518375.883890	1794450.252220	245115	1032	sf	64	cf
Infiltration BMP	Existing	8451 EUCALYPTUS	11/5/2008	6518648.903650	6518648.903650	1794509.449160	245115	1032	sf	64	cf
Infiltration BMP	Existing	8449 EVEREST	9/20/2006	6518402.636450	6518402.636450	1794253.840980	245115	1032	sf	64	cf
Infiltration BMP	Existing	9036 FARM	1/1/2005	6525791.032450	6525791.032450	1801568.335890	245119	1032	sf	64	cf
Infiltration BMP	Existing	9068 FARM	1/1/2005	6526062.157630	6526062.157630	1801402.977290	245119	1032	sf	64	cf
Infiltration BMP	Existing	8334 FIFTH	6/24/2005	6522409.331110	6522409.331110	1801742.536430	245114	1032	sf	64	cf
Infiltration BMP	Existing	8540 FIFTH	1/1/2005	6523591.182480	6523591.182480	1801021.450470	245114	1032	sf	64	cf
Infiltration BMP	Existing	7238 FLORENCE	11/14/2005	6518231.298960	6518231.298960	1807648.949310	246104	1032	sf	64	cf
Infiltration BMP	Existing	8324 FONTANA	1/1/2006	6519936.868340	6519936.868340	1797701.691440	245115	1032	sf	64	cf
Infiltration BMP	Existing	7322 FOSTER BRIDGE	6/18/2010	6520302.817760	6520302.817760	1810322.849060	246111	1032	sf	64	cf
Infiltration BMP	Existing	7441 FOSTORIA	10/25/2005	6517764.674110	6517764.674110	1804520.953030	246102	1032	sf	64	cf
Infiltration BMP	Existing	7520 FOSTORIA	1/20/2006	6517974.460950	6517974.460950	1804167.759820	246102	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7639 FOSTORIA	7/27/2007	6518691.469740	6518691.469740	1803918.676960	246102	1032	sf	64	cf
Infiltration BMP	Existing	7915 FOURTH	5/29/2007	6519890.537430	6519890.537430	1803170.158590	246102	1032	sf	64	cf
Infiltration BMP	Existing	7922 FOURTH	1/1/2005	6519878.319950	6519878.319950	1802959.531390	246102	1032	sf	64	cf
Infiltration BMP	Existing	7411 FOURTH PL	9/10/2007	6517375.746060	6517375.746060	1804408.156270	246102	1032	sf	64	cf
Infiltration BMP	Existing	7519 FOURTH PL	6/23/2005	6517868.488420	6517868.488420	1804088.501010	246102	1032	sf	64	cf
Infiltration BMP	Existing	7329 GAINFORD	9/20/2007	6519599.973200	6519599.973200	1808409.397520	246111	1032	sf	64	cf
Infiltration BMP	Existing	7725 GAINFORD	6/21/2010	6521357.607460	6521357.607460	1807543.814610	246106	1032	sf	64	cf
Infiltration BMP	Existing	7735 GAINFORD	12/15/2006	6521461.236080	6521461.236080	1807480.220630	246106	1032	sf	64	cf
Infiltration BMP	Existing	7771 GAINFORD	12/3/2007	6521758.954890	6521758.954890	1807297.289390	246106	1032	sf	64	cf
Infiltration BMP	Existing	8353 GAINFORD	1/4/2007	6524689.963810	6524689.963810	1805534.024270	246103	1032	sf	64	cf
Infiltration BMP	Existing	8553 GAINFORD	4/7/2008	6525875.670020	6525875.670020	1804802.065800	245125	1032	sf	64	cf
Infiltration BMP	Existing	9114 GAINFORD	6/23/2010	6527375.967240	6527375.967240	1803418.253090	245125	1032	sf	64	cf
Infiltration BMP	Existing	8319 GALLATIN	6/23/2010	6525634.222480	6525634.222480	1807445.394810	246103	1032	sf	64	cf
Infiltration BMP	Existing	9069 GALLATIN	3/1/2005	6527846.830170	6527846.830170	1805432.059660	245125	1032	sf	64	cf
Infiltration BMP	Existing	9243 GALLATIN	6/19/2006	6528915.102070	6528915.102070	1804595.777040	245125	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8408 GALT	6/18/2010	6520848.594160	6520848.594160	1798562.646220	245114	1032	sf	64	cf
Infiltration BMP	Existing	8435 GALT	12/27/2005	6521154.530230	6521154.530230	1798569.782020	245114	1032	sf	64	cf
Infiltration BMP	Existing	9119 GARNISH	6/22/2010	6529517.516530	6529517.516530	1805110.082900	245125	1032	sf	64	cf
Infiltration BMP	Existing	9136 GARNISH	2/5/2007	6529607.954040	6529607.954040	1804869.027300	245125	1032	sf	64	cf
Infiltration BMP	Existing	9024 GAYMONT	8/28/2007	6523451.624790	6523451.624790	1809501.434890	246111	1032	sf	64	cf
Infiltration BMP	Existing	12636 GLYNN	10/25/2005	6517337.921050	6517337.921050	1793251.757000	245524	1032	sf	64	cf
Infiltration BMP	Existing	12751 GLYNN	1/1/2005	6516780.406550	6516780.406550	1792749.927780	245524	1032	sf	64	cf
Infiltration BMP	Existing	12755 GLYNN	6/18/2010	6516753.778610	6516753.778610	1792707.557200	245524	1032	sf	64	cf
Infiltration BMP	Existing	12912 GLYNN	1/1/2005	6516567.905690	6516567.905690	1791996.175300	245524	1032	sf	64	cf
Infiltration BMP	Existing	8731 GUATEMALA	10/30/2008	6523507.693960	6523507.693960	1811098.218950	246106	1032	sf	64	cf
Infiltration BMP	Existing	9203 GUATEMALA	3/23/2006	6521893.308510	6521893.308510	1810154.570390	246111	1032	sf	64	cf
Infiltration BMP	Existing	9959 GUATEMALA	6/23/2010	6518699.649950	6518699.649950	1808234.818150	246111	1032	sf	64	cf
Infiltration BMP	Existing	13537 GUNDERSON	3/3/2008	6517350.406160	6517350.406160	1787757.556610	245524	1032	sf	64	cf
Infiltration BMP	Existing	13547 GUNDERSON	6/19/2006	6517298.502270	6517298.502270	1787667.099660	245524	1032	sf	64	cf
Infiltration BMP	Existing	11538 GURLEY	5/3/2005	6520211.328840	6520211.328840	1799382.602480	245115	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	11935 GURLEY	6/18/2010	6519051.777570	6519051.777570	1797582.114550	245115	1032	sf	64	cf
Infiltration BMP	Existing	12019 GURLEY	6/18/2010	6518869.145640	6518869.145640	1797295.091770	245115	1032	sf	64	cf
Infiltration BMP	Existing	12052 GURLEY	1/10/2006	6518841.793230	6518841.793230	1796925.916150	245115	1032	sf	64	cf
Infiltration BMP	Existing	12117 GURLEY	1/1/2007	6518497.250390	6518497.250390	1796711.283370	245115	1032	sf	64	cf
Infiltration BMP	Existing	9117 HALEDON	7/31/2006	6528761.573350	6528761.573350	1805801.190120	245125	1032	sf	64	cf
Infiltration BMP	Existing	10341 HALEDON	5/1/2006	6526657.457480	6526657.457480	1801653.926760	245119	1032	sf	64	cf
Infiltration BMP	Existing	10349 HALEDON	2/8/2005	6526618.690140	6526618.690140	1801591.635520	245119	1032	sf	64	cf
Infiltration BMP	Existing	10425 HALEDON	4/14/2005	6526424.760130	6526424.760130	1801280.406410	245119	1032	sf	64	cf
Infiltration BMP	Existing	10439 HALEDON	9/30/2005	6526346.747570	6526346.747570	1801155.573630	245119	1032	sf	64	cf
Infiltration BMP	Existing	10525 HALEDON	1/28/2005	6526113.410380	6526113.410380	1800804.505840	245119	1032	sf	64	cf
Infiltration BMP	Existing	10550 HALEDON	12/19/2005	6526112.578950	6526112.578950	1800485.376650	245119	1032	sf	64	cf
Infiltration BMP	Existing	9049 HALL ROAD	4/30/2008	6523684.587500	6523684.587500	1797586.831540	245114	1032	sf	64	cf
Infiltration BMP	Existing	7215 HANNON	12/19/2008	6521498.261440	6521498.261440	1811442.204100	246111	1032	sf	64	cf
Infiltration BMP	Existing	13005 HANWELL	2/11/2009	6519590.457150	6519590.457150	1789492.134120	245115	1032	sf	64	cf
Infiltration BMP	Existing	9022 HASTY	10/13/2005	6531232.650260	6531232.650260	1805433.916070	245127	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9205 HASTY	6/22/2010	6530848.690890	6530848.690890	1804978.371330	245127	1032	sf	64	cf
Infiltration BMP	Existing	9206 HASTY	1/1/2005	6531000.691980	6531000.691980	1804885.411940	245127	1032	sf	64	cf
Infiltration BMP	Existing	9241 HASTY	1/1/2006	6530719.487200	6530719.487200	1804649.180550	245127	1032	sf	64	cf
Infiltration BMP	Existing	7736 HONDO	2/8/2005	6514830.078530	6514830.078530	1796886.774430	246079	1032	sf	64	cf
Infiltration BMP	Existing	7753 HONDO	1/24/2007	6515005.269000	6515005.269000	1796951.957630	246079	1032	sf	64	cf
Infiltration BMP	Existing	7803 HONDO	10/11/2005	6515156.509020	6515156.509020	1796903.351830	246079	1032	sf	64	cf
Infiltration BMP	Existing	7808 HONDO	6/22/2010	6515109.805390	6515109.805390	1796717.393590	246079	1032	sf	64	cf
Infiltration BMP	Existing	7814 HONDO	7/25/2008	6515161.093050	6515161.093050	1796686.379320	246079	1032	sf	64	cf
Infiltration BMP	Existing	7920 HONDO	8/21/2006	6515777.018460	6515777.018460	1796313.217950	246079	1032	sf	64	cf
Infiltration BMP	Existing	7932 HONDO	1/1/2006	6515879.568480	6515879.568480	1796251.099580	246079	1032	sf	64	cf
Infiltration BMP	Existing	9008 HORLEY	7/19/2007	6523080.991430	6523080.991430	1809910.740800	246111	1032	sf	64	cf
Infiltration BMP	Existing	9838 HORLEY	7/3/2008	6521155.061500	6521155.061500	1807271.870840	246106	1032	sf	64	cf
Infiltration BMP	Existing	12307 HORLEY	1/1/2005	6514989.782150	6514989.782150	1797487.116040	246079	1032	sf	64	cf
Infiltration BMP	Existing	11427 HORTON	11/23/2005	6517266.456490	6517266.456490	1802136.009270	246079	1032	sf	64	cf
Infiltration BMP	Existing	11553 HORTON	4/21/2005	6516872.120940	6516872.120940	1801498.085040	246079	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	11708 HORTON	10/25/2005	6516455.941870	6516455.941870	1800783.417100	246079	1032	sf	64	cf
Infiltration BMP	Existing	12646 IBBETSON	5/6/2005	6526008.756240	6526008.756240	1791650.535870	245114	1032	sf	64	cf
Infiltration BMP	Existing	8217 IMPERIAL	1/5/2009	6516889.628840	6516889.628840	1794092.786860	246077	1032	sf	64	cf
Infiltration BMP	Existing	7320 IRWINGROVE	1/1/2006	6518255.802480	6518255.802480	1807084.876440	246102	1032	sf	64	cf
Infiltration BMP	Existing	7710 IRWINGROVE	12/11/2007	6520151.425540	6520151.425540	1805902.138310	246102	1032	sf	64	cf
Infiltration BMP	Existing	12208 IZETTA	1/1/2006	6524718.745010	6524718.745010	1794118.344290	245114	1032	sf	64	cf
Infiltration BMP	Existing	12252 IZETTA	7/10/2008	6524718.900100	6524718.900100	1793666.382200	245114	1032	sf	64	cf
Infiltration BMP	Existing	12631 IZETTA	8/28/2007	6524602.625920	6524602.625920	1791809.267080	245114	1032	sf	64	cf
Infiltration BMP	Existing	10228 JULIUS	5/20/2008	6519748.327880	6519748.327880	1806603.074440	246102	1032	sf	64	cf
Infiltration BMP	Existing	10234 JULIUS	6/22/2010	6519723.348540	6519723.348540	1806551.787860	246102	1032	sf	64	cf
Infiltration BMP	Existing	11848 JULIUS	6/23/2010	6515875.825190	6515875.825190	1800351.825190	246079	1032	sf	64	cf
Infiltration BMP	Existing	11859 JULIUS	8/23/2005	6515676.490910	6515676.490910	1800355.137490	246079	1032	sf	64	cf
Infiltration BMP	Existing	11865 JULIUS	11/13/2006	6515650.173870	6515650.173870	1800309.916770	246079	1032	sf	64	cf
Infiltration BMP	Existing	12129 JULIUS	9/29/2005	6514728.334670	6514728.334670	1798846.683770	246079	1032	sf	64	cf
Infiltration BMP	Existing	9263 KLINEDALE	6/21/2010	6531573.525950	6531573.525950	1804517.918460	245127	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9205 LA REINA	11/27/2006	6525690.537020	6525690.537020	1808255.600740	246103	1032	sf	64	cf
Infiltration BMP	Existing	9251 LA REINA	8/10/2007	6525325.121400	6525325.121400	1807968.316200	246103	1032	sf	64	cf
Infiltration BMP	Existing	9260 LA REINA	6/14/2007	6525343.506110	6525343.506110	1807785.350080	246103	1032	sf	64	cf
Infiltration BMP	Existing	9633 LA REINA	9/24/2007	6524180.010720	6524180.010720	1806496.849820	246103	1032	sf	64	cf
Infiltration BMP	Existing	10026 LA REINA	1/1/2005	6523542.730590	6523542.730590	1805175.247470	246103	1032	sf	64	cf
Infiltration BMP	Existing	10219 LA REINA	5/25/2006	6522978.941790	6522978.941790	1804778.433210	246103	1032	sf	64	cf
Infiltration BMP	Existing	8346 LA VILLA	8/29/2005	6522426.709000	6522426.709000	1801414.465390	245114	1032	sf	64	cf
Infiltration BMP	Existing	9524 LA VILLA	9/27/2005	6527942.492070	6527942.492070	1797972.664540	245119	1032	sf	64	cf
Infiltration BMP	Existing	14305 LAKEWOOD	1/1/2006	6518183.322800	6518183.322800	1787270.059950	245524	1032	sf	64	cf
Infiltration BMP	Existing	8218 LANKIN	3/28/2006	6516908.705740	6516908.705740	1794755.893760	246077	1032	sf	64	cf
Infiltration BMP	Existing	13407 LAURELDALE	10/25/2005	6516128.982330	6516128.982330	1789557.891060	245524	1032	sf	64	cf
Infiltration BMP	Existing	11034 LE FLOSS	3/21/2008	6531318.633350	6531318.633350	1797718.334360	245124	1032	sf	64	cf
Infiltration BMP	Existing	9013 LEMORAN	3/16/2006	6529860.990680	6529860.990680	1806212.694780	245125	1032	sf	64	cf
Infiltration BMP	Existing	10036 LESTERFORD	1/11/2006	6530911.516090	6530911.516090	1801094.347740	245125	1032	sf	64	cf
Infiltration BMP	Existing	8355 LEXINGTON	6/15/2005	6523932.891700	6523932.891700	1804236.927600	246103	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7432 LUBEC	7/8/2005	6519806.105180	6519806.105180	1808430.037290	246111	1032	sf	64	cf
Infiltration BMP	Existing	9318 LUBEC	1/1/2006	6528946.832250	6528946.832250	1803071.454980	245125	1032	sf	64	cf
Infiltration BMP	Existing	7341 LUXOR	9/30/2005	6515165.173860	6515165.173860	1801559.243950	246079	1032	sf	64	cf
Infiltration BMP	Existing	7743 LUXOR	8/18/2006	6517197.964320	6517197.964320	1800308.569440	246079	1032	sf	64	cf
Infiltration BMP	Existing	7809 LUXOR	1/1/2006	6517239.593210	6517239.593210	1799986.863830	246079	1032	sf	64	cf
Infiltration BMP	Existing	7982 LUXOR	7/3/2007	6518306.219270	6518306.219270	1799333.376300	246077	1032	sf	64	cf
Infiltration BMP	Existing	8509 LUXOR	12/31/2008	6521183.510000	6521183.510000	1797885.775000	245114	1032	sf	64	cf
Infiltration BMP	Existing	11505 MAC GOVERN	5/1/2006	6519990.708800	6519990.708800	1799977.759420	245115	1032	sf	64	cf
Infiltration BMP	Existing	11527 MAC GOVERN	11/19/2007	6519889.562820	6519889.562820	1799806.361750	245115	1032	sf	64	cf
Infiltration BMP	Existing	8518 MANATEE	4/27/2005	6521541.591450	6521541.591450	1798287.495050	245114	1032	sf	64	cf
Infiltration BMP	Existing	12306 MARBEL	12/29/2005	6520780.434840	6520780.434840	1794110.003960	245115	1032	sf	64	cf
Infiltration BMP	Existing	12322 MARBEL	8/24/2005	6520697.258530	6520697.258530	1793976.926170	245115	1032	sf	64	cf
Infiltration BMP	Existing	10423 MATTOCK	11/21/2008	6528946.576280	6528946.576280	1799798.739650	245126	1032	sf	64	cf
Infiltration BMP	Existing	10527 MATTOCK	1/11/2007	6528618.163260	6528618.163260	1799183.483330	245126	1032	sf	64	cf
Infiltration BMP	Existing	8602 MEADOW	2/28/2008	6519007.155950	6519007.155950	1793158.643900	245115	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8606 MEADOW	10/26/2006	6519050.372960	6519050.372960	1793129.529230	245115	1032	sf	64	cf
Infiltration BMP	Existing	8739 MEADOW	12/17/2007	6520051.313480	6520051.313480	1792689.390880	245115	1032	sf	64	cf
Infiltration BMP	Existing	9106 MELDAR	4/23/2007	6526980.004600	6526980.004600	1807421.893550	246103	1032	sf	64	cf
Infiltration BMP	Existing	7819 MELVA	1/1/2005	6515811.952890	6515811.952890	1797638.263460	246079	1032	sf	64	cf
Infiltration BMP	Existing	8609 MELVA	4/6/2007	6520260.479750	6520260.479750	1795043.474460	245115	1032	sf	64	cf
Infiltration BMP	Existing	9558 METRO	4/3/2008	6531485.802060	6531485.802060	1804114.777900	245127	1032	sf	64	cf
Infiltration BMP	Existing	11711 MITLA	7/13/2005	6513453.724060	6513453.724060	1802912.278240	246100	1032	sf	64	cf
Infiltration BMP	Existing	11819 MORNING	6/21/2010	6517496.555960	6517496.555960	1799723.226450	246077	1032	sf	64	cf
Infiltration BMP	Existing	12070 MORNING	9/13/2006	6516788.931410	6516788.931410	1797957.975300	246079	1032	sf	64	cf
Infiltration BMP	Existing	8637 MORY	1/1/2005	6520217.929830	6520217.929830	1794453.857040	245115	1032	sf	64	cf
Infiltration BMP	Existing	10903 MYRTLE	10/25/2005	6520809.999180	6520809.999180	1802308.735020	246103	1032	sf	64	cf
Infiltration BMP	Existing	8208 NADA	6/29/2005	6518679.653960	6518679.653960	1797804.552950	245115	1032	sf	64	cf
Infiltration BMP	Existing	8249 NADA	2/12/2008	6519111.183860	6519111.183860	1797730.010570	245115	1032	sf	64	cf
Infiltration BMP	Existing	9458 NANCE	6/20/2005	6526752.832360	6526752.832360	1796717.105850	245119	1032	sf	64	cf
Infiltration BMP	Existing	10609 NEDRA	6/3/2005	6522752.614640	6522752.614640	1802538.434710	246103	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	10850 NEWVILLE	7/3/2007	6528159.933410	6528159.933410	1797635.549950	245119	1032	sf	64	cf
Infiltration BMP	Existing	7510 NOREN	5/23/2006	6520838.348300	6520838.348300	1809064.222230	246111	1032	sf	64	cf
Infiltration BMP	Existing	11720 NORLAIN	9/22/2006	6515696.110230	6515696.110230	1801264.632180	246079	1032	sf	64	cf
Infiltration BMP	Existing	12336 NORLAIN	8/1/2007	6513658.838460	6513658.838460	1797875.767390	246079	1032	sf	64	cf
Infiltration BMP	Existing	11628 OLD RIVER SCHOOL	1/1/2006	6515797.838400	6515797.838400	1801876.521840	246079	1032	sf	64	cf
Infiltration BMP	Existing	8521 ORANGE	3/9/2007	6519427.831130	6519427.831130	1794911.101980	245115	1032	sf	64	cf
Infiltration BMP	Existing	9255 ORIZABA	2/15/2006	6525108.451310	6525108.451310	1808168.208600	246103	1032	sf	64	cf
Infiltration BMP	Existing	9719 ORIZABA	8/8/2007	6523780.810110	6523780.810110	1806377.528150	246103	1032	sf	64	cf
Infiltration BMP	Existing	12615 ORIZABA	1/27/2006	6516062.877730	6516062.877730	1794206.618320	246077	1032	sf	64	cf
Infiltration BMP	Existing	8511 OTTO	4/12/2005	6525130.700850	6525130.700850	1804530.864040	245125	1032	sf	64	cf
Infiltration BMP	Existing	9933 PANGBORN	6/29/2006	6530067.434760	6530067.434760	1801915.181390	245125	1032	sf	64	cf
Infiltration BMP	Existing	10202 PANGBORN	1/1/2006	6529571.236640	6529571.236640	1801045.668670	245125	1032	sf	64	cf
Infiltration BMP	Existing	11009 PANGBORN	1/31/2007	6527339.080190	6527339.080190	1797691.116980	245119	1032	sf	64	cf
Infiltration BMP	Existing	9530 PARAMOUNT	7/14/2005	6523601.663290	6523601.663290	1807461.311510	246103	1032	sf	64	cf
Infiltration BMP	Existing	9624 PARAMOUNT	5/9/2005	6523328.526550	6523328.526550	1807031.980170	246103	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8603 PARROT	3/14/2006	6526080.240790	6526080.240790	1809719.746830	246106	1032	sf	64	cf
Infiltration BMP	Existing	9625 PARROT	1/1/2005	6523451.735380	6523451.735380	1806960.011690	246103	1032	sf	64	cf
Infiltration BMP	Existing	9708 PARROT	6/29/2006	6523491.321500	6523491.321500	1806678.668660	246103	1032	sf	64	cf
Infiltration BMP	Existing	12045 PARROT	6/22/2010	6517861.439330	6517861.439330	1797868.798060	246077	1032	sf	64	cf
Infiltration BMP	Existing	12751 PARROT	12/14/2006	6515222.728500	6515222.728500	1793830.999240	246077	1032	sf	64	cf
Infiltration BMP	Existing	7130 PELLET	1/27/2005	6515276.387650	6515276.387650	1804845.311440	246104	1032	sf	64	cf
Infiltration BMP	Existing	7323 PELLET	1/1/2005	6516571.171210	6516571.171210	1804327.110650	246104	1032	sf	64	cf
Infiltration BMP	Existing	7354 PELLET	1/1/2006	6516665.448760	6516665.448760	1803945.359790	246102	1032	sf	64	cf
Infiltration BMP	Existing	7861 PHLOX	9/17/2007	6518688.116640	6518688.116640	1801430.417420	246079	1032	sf	64	cf
Infiltration BMP	Existing	10620 PICO VISTA	3/7/2007	6529428.403390	6529428.403390	1798283.402620	245126	1032	sf	64	cf
Infiltration BMP	Existing	10635 PICO VISTA	8/28/2007	6529197.816790	6529197.816790	1798270.093070	245126	1032	sf	64	cf
Infiltration BMP	Existing	7530 PIVOT	11/23/2005	6516899.016370	6516899.016370	1802660.318910	246079	1032	sf	64	cf
Infiltration BMP	Existing	7709 PIVOT	10/11/2005	6517859.569570	6517859.569570	1802212.124870	246079	1032	sf	64	cf
Infiltration BMP	Existing	7753 PIVOT	6/14/2005	6518241.212950	6518241.212950	1801966.921690	246079	1032	sf	64	cf
Infiltration BMP	Existing	11974 POMERING	6/18/2010	6515116.938670	6515116.938670	1799645.797070	246079	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8732 PRICHARD ST	1/12/2009	6516786.371080	6516786.371080	1788406.289900	245524	1032	sf	64	cf
Infiltration BMP	Existing	8734 PRICHARD ST	1/12/2009	6516831.574810	6516831.574810	1788380.860770	245524	1032	sf	64	cf
Infiltration BMP	Existing	8738 PRICHARD ST	1/12/2009	6516876.454020	6516876.454020	1788355.597890	245524	1032	sf	64	cf
Infiltration BMP	Existing	8740 PRICHARD ST	1/12/2009	6516921.333860	6516921.333860	1788330.343610	245524	1032	sf	64	cf
Infiltration BMP	Existing	8240 PRISCILLA	9/13/2007	6515555.844810	6515555.844810	1791697.292180	246077	1032	sf	64	cf
Infiltration BMP	Existing	9044 PRISCILLA	8/18/2005	6519169.042140	6519169.042140	1790017.667840	245115	1032	sf	64	cf
Infiltration BMP	Existing	9060 PRISCILLA	6/21/2010	6519318.719160	6519318.719160	1790008.270400	245115	1032	sf	64	cf
Infiltration BMP	Existing	11448 PRUESS	1/1/2006	6518742.114860	6518742.114860	1801046.878700	246077	1032	sf	64	cf
Infiltration BMP	Existing	11609 PRUESS	11/16/2006	6518299.675980	6518299.675980	1800455.121300	246077	1032	sf	64	cf
Infiltration BMP	Existing	11619 PRUESS	6/10/2005	6518270.484730	6518270.484730	1800355.677990	246077	1032	sf	64	cf
Infiltration BMP	Existing	11708 PRUESS	1/18/2005	6518033.994760	6518033.994760	1799832.073440	246077	1032	sf	64	cf
Infiltration BMP	Existing	8121 PURITAN	6/5/2006	6515245.448070	6515245.448070	1792698.037730	246077	1032	sf	64	cf
Infiltration BMP	Existing	7707 QUILL	6/1/2007	6514508.683200	6514508.683200	1796937.770200	246079	1032	sf	64	cf
Infiltration BMP	Existing	8108 QUOIT	6/5/2008	6516594.034560	6516594.034560	1795288.918170	246077	1032	sf	64	cf
Infiltration BMP	Existing	9109 RAVILLER	2/6/2007	6527953.464140	6527953.464140	1804924.402110	245125	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9367 RAVILLER	1/1/2006	6529435.914270	6529435.914270	1803746.913820	245125	1032	sf	64	cf
Infiltration BMP	Existing	9728 RICHEON	6/18/2010	6521201.804800	6521201.804800	1807962.626360	246106	1032	sf	64	cf
Infiltration BMP	Existing	12217 RICHEON	1/1/2005	6514937.033870	6514937.033870	1797986.477150	246079	1032	sf	64	cf
Infiltration BMP	Existing	12336 RICHEON	1/10/2007	6514721.816510	6514721.816510	1797298.695230	246079	1032	sf	64	cf
Infiltration BMP	Existing	12342 RICHEON	1/1/2005	6514694.932100	6514694.932100	1797256.523880	246079	1032	sf	64	cf
Infiltration BMP	Existing	12352 RICHEON	10/30/2008	6514641.834370	6514641.834370	1797172.034360	246079	1032	sf	64	cf
Infiltration BMP	Existing	11010 RIO HONDO	2/6/2006	6514511.989690	6514511.989690	1805412.886430	246104	1032	sf	64	cf
Infiltration BMP	Existing	8515 RIVES	2/6/2006	6524958.575190	6524958.575190	1811619.081610	246111	1032	sf	64	cf
Infiltration BMP	Existing	8546 RIVES	6/14/2010	6524726.063490	6524726.063490	1811337.492550	246106	1032	sf	64	cf
Infiltration BMP	Existing	11828 RIVES	1/1/2006	6517020.372820	6517020.372820	1799741.223590	246079	1032	sf	64	cf
Infiltration BMP	Existing	12056 RIVES	10/7/2005	6516252.097820	6516252.097820	1798479.870770	246079	1032	sf	64	cf
Infiltration BMP	Existing	12213 RIVES	6/7/2007	6515544.034920	6515544.034920	1797794.303030	246079	1032	sf	64	cf
Infiltration BMP	Existing	12301 RIVES	1/27/2006	6515274.134590	6515274.134590	1797373.251430	246079	1032	sf	64	cf
Infiltration BMP	Existing	12542 ROSE	6/18/2010	6520775.320830	6520775.320830	1792425.734550	245115	1032	sf	64	cf
Infiltration BMP	Existing	7444 RUNDELL	9/28/2006	6514195.392880	6514195.392880	1798477.819400	246079	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7458 RUNDELL	1/1/2006	6514328.036950	6514328.036950	1798395.544300	246079	1032	sf	64	cf
Infiltration BMP	Existing	8734 RUPP	5/24/2007	6518769.625610	6518769.625610	1791861.464390	245115	1032	sf	64	cf
Infiltration BMP	Existing	9206 SAMOLINE	9/20/2006	6524105.922670	6524105.922670	1808777.784250	246106	1032	sf	64	cf
Infiltration BMP	Existing	9363 SAMOLINE	2/12/2009	6523342.697990	6523342.697990	1808041.206940	246106	1032	sf	64	cf
Infiltration BMP	Existing	9630 SAMOLINE	1/1/2006	6523000.405210	6523000.405210	1807164.143360	246103	1032	sf	64	cf
Infiltration BMP	Existing	12041 SAMOLINE	6/23/2010	6516971.702030	6516971.702030	1798170.274910	246079	1032	sf	64	cf
Infiltration BMP	Existing	10629 SHELLEYFIELD	6/21/2010	6525284.582980	6525284.582980	1800508.363190	245119	1032	sf	64	cf
Infiltration BMP	Existing	9118 SHERIDELL	6/22/2010	6528683.896100	6528683.896100	1805941.227670	245125	1032	sf	64	cf
Infiltration BMP	Existing	10042 SIDEVIEW	6/21/2010	6529464.806690	6529464.806690	1801729.923910	245125	1032	sf	64	cf
Infiltration BMP	Existing	8349 SIXTH	6/21/2010	6522706.066860	6522706.066860	1802231.249170	245114	1032	sf	64	cf
Infiltration BMP	Existing	8363 SIXTH	6/18/2010	6522832.335670	6522832.335670	1802150.209500	245114	1032	sf	64	cf
Infiltration BMP	Existing	8532 SIXTH	6/23/2010	6523697.106090	6523697.106090	1801388.440460	245119	1032	sf	64	cf
Infiltration BMP	Existing	8514 SMALLWOOD	8/24/2006	6525167.581560	6525167.581560	1811228.866910	246106	1032	sf	64	cf
Infiltration BMP	Existing	12007 SMALLWOOD	1/1/2005	6516682.861570	6516682.861570	1798786.226940	246079	1032	sf	64	cf
Infiltration BMP	Existing	12936 SMALLWOOD	7/31/2006	6513688.714060	6513688.714060	1793540.982580	246077	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9235 SONGFEST	6/14/2006	6531351.855720	6531351.855720	1804709.858310	245127	1032	sf	64	cf
Infiltration BMP	Existing	7939 SPRINGER	10/6/2006	6516193.792450	6516193.792450	1796630.732180	246079	1032	sf	64	cf
Infiltration BMP	Existing	9306 STAMPS	6/21/2010	6525546.826990	6525546.826990	1807197.501010	246103	1032	sf	64	cf
Infiltration BMP	Existing	10446 STAMPS	1/1/2005	6523214.650320	6523214.650320	1803242.228000	246103	1032	sf	64	cf
Infiltration BMP	Existing	10536 STAMPS	6/1/2006	6522871.528480	6522871.528480	1802783.838380	246103	1032	sf	64	cf
Infiltration BMP	Existing	13219 STANBRIDGE	9/17/2007	6522806.618420	6522806.618420	1790045.381220	245114	1032	sf	64	cf
Infiltration BMP	Existing	8723 STEWART & GRAY	2/11/2009	6522100.372490	6522100.372490	1796545.507760	245114	1032	sf	64	cf
Infiltration BMP	Existing	9028 STOAKES	8/17/2007	6527221.634250	6527221.634250	1807951.198320	246103	1032	sf	64	cf
Infiltration BMP	Existing	7809 SUVA	1/13/2009	6522703.875430	6522703.875430	1808490.998990	246106	1032	sf	64	cf
Infiltration BMP	Existing	7827 SUVA	1/1/2006	6522849.829890	6522849.829890	1808368.560310	246106	1032	sf	64	cf
Infiltration BMP	Existing	8564 SUVA	1/1/2006	6526403.328390	6526403.328390	1805373.281490	245125	1032	sf	64	cf
Infiltration BMP	Existing	9943 TECUM	4/11/2008	6519363.349470	6519363.349470	1808047.658450	246111	1032	sf	64	cf
Infiltration BMP	Existing	9636 TELEGRAPH	5/8/2006	6531995.042290	6531995.042290	1804929.677680	245128	1032	sf	64	cf
Infiltration BMP	Existing	7968 THIRD	6/21/2005	6519929.169700	6519929.169700	1802199.016820	246102	1032	sf	64	cf
Infiltration BMP	Existing	9819 TRISTAN	10/7/2005	6526302.584780	6526302.584780	1804524.383680	245125	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9253 TRUE	1/1/2005	6531891.994890	6531891.994890	1804462.821310	245127	1032	sf	64	cf
Infiltration BMP	Existing	8843 TWEEDY	9/12/2006	6524140.679400	6524140.679400	1809940.135780	246106	1032	sf	64	cf
Infiltration BMP	Existing	9012 TWEEDY	1/1/2005	6523977.735950	6523977.735950	1809300.273240	246106	1032	sf	64	cf
Infiltration BMP	Existing	9029 TWEEDY	1/1/2006	6523763.012330	6523763.012330	1809288.681880	246106	1032	sf	64	cf
Infiltration BMP	Existing	9612 TWEEDY	6/22/2010	6522847.016620	6522847.016620	1807449.028980	246106	1032	sf	64	cf
Infiltration BMP	Existing	9636 TWEEDY	10/11/2005	6522732.626430	6522732.626430	1807259.266340	246103	1032	sf	64	cf
Infiltration BMP	Existing	9714 TWEEDY	7/24/2006	6522647.237500	6522647.237500	1807116.822930	246103	1032	sf	64	cf
Infiltration BMP	Existing	9718 TWEEDY	9/22/2008	6522619.325230	6522619.325230	1807068.990310	246103	1032	sf	64	cf
Infiltration BMP	Existing	9730 TWEEDY	6/18/2010	6522565.360970	6522565.360970	1806976.155270	246103	1032	sf	64	cf
Infiltration BMP	Existing	13409 VERDURA	1/1/2006	6516484.588360	6516484.588360	1789346.159960	245524	1032	sf	64	cf
Infiltration BMP	Existing	8607 VIA AMORITA	1/19/2006	6524994.226680	6524994.226680	1803003.226520	245119	1032	sf	64	cf
Infiltration BMP	Existing	9356 VIA AMORITA	4/27/2005	6528170.664540	6528170.664540	1800850.979140	245126	1032	sf	64	cf
Infiltration BMP	Existing	7402 VIA RIO NIDO	2/10/2005	6518371.376580	6518371.376580	1806186.704160	246102	1032	sf	64	cf
Infiltration BMP	Existing	8303 VISTA DEL RIO	5/1/2007	6526003.249760	6526003.249760	1808077.011440	246103	1032	sf	64	cf
Infiltration BMP	Existing	8303 VISTA DEL ROSA	4/26/2007	6526763.242710	6526763.242710	1809159.607970	246106	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8351 VISTA DEL ROSA	12/19/2005	6527091.635630	6527091.635630	1808824.632820	246106	2063	sf	129	cf
Infiltration BMP	Existing	10265 VULTEE	4/24/2006	6525980.530560	6525980.530560	1802568.772980	245119	1032	sf	64	cf
Infiltration BMP	Existing	10339 VULTEE	6/18/2010	6525804.209560	6525804.209560	1802209.879860	245119	1032	sf	64	cf
Infiltration BMP	Existing	12709 VULTEE	3/9/2007	6519587.948000	6519587.948000	1791264.714830	245115	1032	sf	64	cf
Infiltration BMP	Existing	12725 WHITEWOOD	7/26/2005	6520341.668580	6520341.668580	1791179.460770	245115	1032	sf	64	cf
Infiltration BMP	Existing	9702 WILEY BURKE	6/21/2010	6521126.099980	6521126.099980	1808337.656530	246106	1032	sf	64	cf
Infiltration BMP	Existing	9750 WILEY BURKE	12/11/2006	6520822.729060	6520822.729060	1807995.132410	246106	1032	sf	64	cf
Infiltration BMP	Existing	9925 WILEY BURKE	1/10/2007	6520271.299840	6520271.299840	1807447.007570	246106	1032	sf	64	cf
Infiltration BMP	Existing	10540 WILEY BURKE	6/21/2007	6519089.326110	6519089.326110	1805048.306870	246102	1032	sf	64	cf
Infiltration BMP	Existing	10643 WOODRUFF	1/1/2006	6526887.322420	6526887.322420	1799535.375650	245119	1032	sf	64	cf
Infiltration BMP	Existing	7515 YANKEY	10/24/2006	6515115.108440	6515115.108440	1798924.389740	246079	1032	sf	64	cf
Infiltration BMP	Existing	10047 CASANES	1/1/2006	6529512.635540	6529512.635540	1801587.658100	245125	1032	sf	64	cf
Infiltration BMP	Existing	9220 CORD	1/1/2004	6530296.778820	6530296.778820	1804178.901350	245125	1032	sf	64	cf
Infiltration BMP	Existing	10040 MATTOCK	1/1/2006	6530247.042350	6530247.042350	1801200.601240	245125	1032	sf	64	cf
Infiltration BMP	Existing	10018 PANGBORN	1/1/2006	6530084.251260	6530084.251260	1801567.525640	245125	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	12053 PATTON	10/19/2004	6520642.037410	6520642.037410	1796050.004800	245115	1032	sf	64	cf
Infiltration BMP	Existing	12048 SAMOLINE	3/20/2007	6517021.712450	6517021.712450	1798014.455830	246079	2063	sf	129	cf
Infiltration BMP	Existing	7879 FLORENCE	2/14/2014	6521700.000000	6521700.000000	1806100.000000	246103	16504	sf	1032	cf
Infiltration BMP	Existing	9020 FIRESTONE	9/12/2008	6524113.023390	6524113.023390	1798572.164290	245119	70288	sf	4393	cf
Infiltration BMP	Existing	7910 FIRESTONE	6/28/2005	6519165.968790	6519165.968790	1801736.513180	246102	55686	sf	3480	cf
Infiltration BMP	Existing	7252 FIRESTONE	5/19/2004	6515489.000650	6515489.000650	1803082.633110	246079	36224	sf	2264	cf
Infiltration BMP	Existing	12256 PARAMOUNT	3/13/2006	6516813.225030	6516813.225030	1796497.685630	246077	34112	sf	2132	cf
Infiltration BMP	Existing	9462 FIRESTONE BL	2/14/2014	6526885.862260	6526885.862260	1797100.585140	245119	35437	sf	2215	cf
Infiltration BMP	Existing	8250 FIRESTONE BLVD	2/14/2014	6521000.000000	6521000.000000	1800300.000000	245115	59085	sf	3693	cf
Infiltration BMP	Existing	8018 TELEGRAPH	8/20/2004	6526800.000000	6526800.000000	1809400.000000	246106	35437	sf	2215	cf
Infiltration BMP	Existing	7447 FIRESTONE BLVD	7/9/2009	6516971.590923	6516971.590923	1803474.089243	246102	43124	sf	2192	cf
Infiltration BMP	Existing	9126 FLORENCE	4/25/2008	6526980.883730	6526980.883730	1802613.015890	245119	29248	sf	1828	cf
Infiltration BMP	Existing	11111 OLD RIVER SCHOOL	6/15/2004	6515500.000000	6515500.000000	1803800.000000	246102	27843	sf	1740	cf
Infiltration BMP	Existing	9634 WASHBURN	5/25/2004	6526574.558590	6526574.558590	1794738.334020	245118	35712	sf	2232	cf
Infiltration BMP	Existing	9475 FIRESTONE	9/20/2004	6527102.470060	6527102.470060	1797292.175990	245119	25078	sf	1567	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9125 IMPERIAL	9/17/2007	6520700.000000	6520700.000000	1792100.000000	245115	53104	sf	3319	cf
Infiltration BMP	Existing	11231 RIVES	4/25/2006	6518392.506170	6518392.506170	1802335.247680	246102	20250	sf	1266	cf
Infiltration BMP	Existing	7936 QUILL	8/23/2006	6515830.400000	6515830.400000	1795880.196930	246079	18984	sf	1187	cf
Infiltration BMP	Existing	8337 FONTANA	8/11/2005	6520206.194620	6520206.194620	1797870.434810	245114	36672	sf	2292	cf
Infiltration BMP	Existing	10225 LESTERFORD	6/22/2010	6530244.844140	6530244.844140	1800567.187010	245126	17718	sf	1107	cf
Infiltration BMP	Existing	7915 FLORENCE	8/11/2009	6522019.025220	6522019.025220	1805973.779210	246103	20192	sf	1262	cf
Infiltration BMP	Existing	11229 PARAMOUNT	3/16/2004	6519482.925030	6519482.925030	1801457.806750	246102	16453	sf	1028	cf
Infiltration BMP	Existing	8103 COLE	5/1/2007	6518213.448370	6518213.448370	1798049.118910	246077	0	sf	0	cf
Infiltration BMP	Existing	8722 BOYNE	7/1/2008	6521213.643060	6521213.643060	1795216.473800	245115	11390	sf	712	cf
Infiltration BMP	Existing	10612 LESTERFORD	6/14/2006	6529218.389270	6529218.389270	1798513.115960	245126	11390	sf	712	cf
Infiltration BMP	Existing	8444 LEXINGTON	4/24/2006	6524361.433930	6524361.433930	1803767.599820	246103	11390	sf	712	cf
Infiltration BMP	Existing	13221 BARLIN	10/10/2006	6516992.431610	6516992.431610	1789646.610200	245524	10125	sf	633	cf
Infiltration BMP	Existing	9611 GARNISH	6/7/2007	6529217.309540	6529217.309540	1803965.758960	245125	10125	sf	633	cf
Infiltration BMP	Existing	7118 PELLET	12/3/2008	6515184.074160	6515184.074160	1804905.113850	246104	10125	sf	633	cf
Infiltration BMP	Existing	9325 RIVES AM	2/14/2014	6522517.375370	6522517.375370	1808878.723180	246111	10125	sf	633	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9371 SUVA	3/13/2007	6529247.009310	6529247.009310	1803484.685240	245125	10125	sf	633	cf
Infiltration BMP	Existing	8556 FLORENCE	1/1/2006	6525137.675720	6525137.675720	1803770.147850	245125	8859	sf	554	cf
Infiltration BMP	Existing	9755 IMPERIAL	3/29/2006	6525700.000000	6525700.000000	1792200.000000	245114	8859	sf	554	cf
Infiltration BMP	Existing	10000 IMPERIAL	3/29/2006	6527246.839530	6527246.839530	1791706.604350	245118	8859	sf	554	cf
Infiltration BMP	Existing	10030 LESTERFORD	6/21/2010	6530953.991420	6530953.991420	1801165.004470	245125	8859	sf	554	cf
Infiltration BMP	Existing	7235 LUXOR	12/12/2005	6514593.326010	6514593.326010	1801941.887350	246079	8859	sf	554	cf
Infiltration BMP	Existing	8115 STEWART & GRAY	3/25/2009	6518648.406750	6518648.406750	1798495.150040	246077	11760	sf	735	cf
Infiltration BMP	Existing	9804 BROOKSHIRE	5/2/2007	6525737.765210	6525737.765210	1805415.750650	246103	7594	sf	475	cf
Infiltration BMP	Existing	7830 DANVERS	12/18/2008	6523967.248740	6523967.248740	1810379.348050	246106	7594	sf	475	cf
Infiltration BMP	Existing	8357 FLORENCE	11/29/2005	6524137.162990	6524137.162990	1804589.285090	246103	7594	sf	475	cf
Infiltration BMP	Existing	8562 FLORENCE	1/1/2006	6525210.620820	6525210.620820	1803736.004200	245125	7594	sf	475	cf
Infiltration BMP	Existing	10735 LAKEWOOD	1/19/2007	6524698.379320	6524698.379320	1800460.893140	245119	8640	sf	540	cf
Infiltration BMP	Existing	9732 ORIZABA	6/5/2008	6523842.356050	6523842.356050	1806158.297200	246103	7594	sf	475	cf
Infiltration BMP	Existing	12066 SAMOLINE	6/18/2010	6517119.562750	6517119.562750	1797806.070750	246079	7594	sf	475	cf
Infiltration BMP	Existing	7711 SECOND	6/21/2010	6518493.103400	6518493.103400	1802942.740750	246102	7594	sf	475	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9517 STOAKES	6/21/2010	6525287.319840	6525287.319840	1806612.266920	246103	7594	sf	475	cf
Infiltration BMP	Existing	12133 ANDERBERG	6/26/2009	6518010.879310	6518010.879310	1796818.463370	245115	6328	sf	396	cf
Infiltration BMP	Existing	9115 BROCK	6/21/2010	6524898.717190	6524898.717190	1808433.166330	246106	6328	sf	396	cf
Infiltration BMP	Existing	9541 CECILIA	6/23/2010	6528302.087900	6528302.087900	1798262.111790	245126	6328	sf	396	cf
Infiltration BMP	Existing	10243 CORD	11/4/2008	6528334.164460	6528334.164460	1801344.678940	245126	6328	sf	396	cf
Infiltration BMP	Existing	13108 CORNUTA	6/21/2010	6525701.475550	6525701.475550	1790449.882450	245113	6328	sf	396	cf
Infiltration BMP	Existing	8129 DACOSTA	8/5/2008	6523736.839560	6523736.839560	1805716.362640	246103	6328	sf	396	cf
Infiltration BMP	Existing	7247 DINWIDDIE	6/22/2010	6515896.418780	6515896.418780	1804170.223670	246104	6328	sf	396	cf
Infiltration BMP	Existing	12002A DOWNEY	8/24/2005	6519100.000000	6519100.000000	1797100.000000	245115	6328	sf	396	cf
Infiltration BMP	Existing	12002C DOWNEY	8/24/2005	6519100.000000	6519100.000000	1797100.000000	245115	6328	sf	396	cf
Infiltration BMP	Existing	8529 EUCALYPTUS	6/18/2010	6519136.171020	6519136.171020	1794210.333930	245115	6328	sf	396	cf
Infiltration BMP	Existing	9204 LA REINA	6/22/2010	6525799.255250	6525799.255250	1808110.827020	246103	6328	sf	396	cf
Infiltration BMP	Existing	9241 LUBEC	6/21/2010	6528410.398740	6528410.398740	1803633.947240	245125	6328	sf	396	cf
Infiltration BMP	Existing	10051 MATTOCK	9/25/2008	6530040.953970	6530040.953970	1801237.222590	245125	6328	sf	396	cf
Infiltration BMP	Existing	12273 PLANETT	6/21/2010	6518942.439290	6518942.439290	1795136.426680	245115	6328	sf	396	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9075 RAVILLER	4/9/2007	6527819.498980	6527819.498980	1805031.907810	245125	6328	sf	396	cf
Infiltration BMP	Existing	7149 ADWEN	5/31/2006	6514275.907390	6514275.907390	1803122.312290	246079	5062	sf	316	cf
Infiltration BMP	Existing	8703 ALAMEDA	9/14/2005	6520830.700880	6520830.700880	1795016.469260	245115	4594	sf	287	cf
Infiltration BMP	Existing	9242 APPLEBY	11/21/2008	6528866.478730	6528866.478730	1804798.824690	245125	5062	sf	316	cf
Infiltration BMP	Existing	9926 BELLDER	3/19/2007	6525715.329050	6525715.329050	1804487.716960	245125	5062	sf	316	cf
Infiltration BMP	Existing	11715 BELLFLOWER	6/15/2009	6523530.688010	6523530.688010	1796655.823230	245114	5062	sf	316	cf
Infiltration BMP	Existing	8019 BERGMAN	10/22/2008	6517711.829130	6517711.829130	1797726.503570	246077	5062	sf	316	cf
Infiltration BMP	Existing	8417 BIGBY	7/23/2007	6523908.146010	6523908.146010	1803525.055670	245119	5062	sf	316	cf
Infiltration BMP	Existing	10004 BIRCHDALE	1/23/2006	6525798.638290	6525798.638290	1803985.957400	245125	5062	sf	316	cf
Infiltration BMP	Existing	9951 BROOKSHIRE	6/18/2010	6525004.036100	6525004.036100	1804835.952720	246103	5062	sf	316	cf
Infiltration BMP	Existing	10927 BROOKSHIRE AV	2/14/2014	6522640.981090	6522640.981090	1800949.695110	245114	5062	sf	316	cf
Infiltration BMP	Existing	10304 CLANCEY	9/19/2008	6526762.243870	6526762.243870	1802017.295250	245119	5062	sf	316	cf
Infiltration BMP	Existing	7213 DINWIDDIE	6/21/2010	6515644.523280	6515644.523280	1804333.457340	246104	5062	sf	316	cf
Infiltration BMP	Existing	9245 DOWNEY	9/19/2007	6525582.317560	6525582.317560	1807792.114420	246103	5062	sf	316	cf
Infiltration BMP	Existing	12002B DOWNEY	8/24/2005	6519100.000000	6519100.000000	1797100.000000	245115	5062	sf	316	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	12002D DOWNEY	8/24/2005	6519100.000000	6519100.000000	1797100.000000	245115	5062	sf	316	cf
Infiltration BMP	Existing	10250 EGLISE AV	2/14/2014	6528202.138900	6528202.138900	1801366.096440	245126	5062	sf	316	cf
Infiltration BMP	Existing	8719 ELMONT	6/18/2010	6526144.563940	6526144.563940	1809393.110180	246106	5062	sf	316	cf
Infiltration BMP	Existing	9355 FLORENCE	7/30/2007	6528769.559400	6528769.559400	1801814.385750	245125	5062	sf	316	cf
Infiltration BMP	Existing	9252 GALLATIN	3/29/2006	6528859.757520	6528859.757520	1804394.594600	245125	5062	sf	316	cf
Infiltration BMP	Existing	9553 GALLATIN	7/28/2004	6530910.776140	6530910.776140	1803037.898220	245125	5062	sf	316	cf
Infiltration BMP	Existing	9724 GARNISH	1/14/2008	6529062.109120	6529062.109120	1803453.035240	245125	5062	sf	316	cf
Infiltration BMP	Existing	8610 GUATEMALA	10/24/2006	6524386.905480	6524386.905480	1811339.167280	246106	5062	sf	316	cf
Infiltration BMP	Existing	10214 HORLEY	8/14/2007	6520372.544870	6520372.544870	1806355.591210	246102	5062	sf	316	cf
Infiltration BMP	Existing	10513 JULIUS	1/22/2009	6518877.932890	6518877.932890	1805532.376750	246102	5062	sf	316	cf
Infiltration BMP	Existing	9204 LA REINA	4/18/2007	6525799.255250	6525799.255250	1808110.827020	246103	5062	sf	316	cf
Infiltration BMP	Existing	9528 LEMORAN	8/29/2008	6529000.799820	6529000.799820	1804066.473220	245125	5062	sf	316	cf
Infiltration BMP	Existing	7334 LUXOR	4/25/2007	6514999.892740	6514999.892740	1801407.207050	246079	5062	sf	316	cf
Infiltration BMP	Existing	9226 MANZANAR	7/8/2005	6526470.419470	6526470.419470	1806685.422630	246103	5062	sf	316	cf
Infiltration BMP	Existing	10524 MATTOCK	2/5/2009	6528788.349750	6528788.349750	1799096.345380	245126	5062	sf	316	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	12123 ORIZABA	12/28/2005	6517943.193960	6517943.193960	1797041.752750	245115	5062	sf	316	cf
Infiltration BMP	Existing	7130 PELLET	6/4/2008	6515276.387650	6515276.387650	1804845.311440	246104	5062	sf	316	cf
Infiltration BMP	Existing	8322 PURITAN	6/14/2007	6516164.281440	6516164.281440	1791774.558840	245524	5062	sf	316	cf
Infiltration BMP	Existing	7312 RIO FLORA	6/18/2010	6516577.089870	6516577.089870	1804589.040390	246104	5062	sf	316	cf
Infiltration BMP	Existing	9331 SAMOLINE	2/17/2006	6523511.819100	6523511.819100	1808307.819060	246106	5062	sf	316	cf
Infiltration BMP	Existing	8015 SEVENTH	8/16/2005	6521322.893520	6521322.893520	1803640.949260	246103	5062	sf	316	cf
Infiltration BMP	Existing	7821 SIXTH	12/6/2005	6519846.881130	6519846.881130	1804004.436800	246102	5062	sf	316	cf
Infiltration BMP	Existing	8409 SIXTH	12/10/2008	6523050.669740	6523050.669740	1802016.668700	245114	5062	sf	316	cf
Infiltration BMP	Existing	9317 STAMPS	1/30/2007	6525356.702810	6525356.702810	1807182.805460	246103	5062	sf	316	cf
Infiltration BMP	Existing	9322 STAMPS	3/16/2006	6525453.602600	6525453.602600	1807062.934260	246103	5062	sf	316	cf
Infiltration BMP	Existing	10443 STAMPS	5/21/2008	6523061.022110	6523061.022110	1803394.248860	246103	5062	sf	316	cf
Infiltration BMP	Existing	10517 STAMPS	6/18/2010	6522812.240000	6522812.240000	1803043.757460	246103	5062	sf	316	cf
Infiltration BMP	Existing	9444 STOAKES	5/22/2007	6525587.983230	6525587.983230	1806625.551490	246103	5062	sf	316	cf
Infiltration BMP	Existing	8329 VISTA DEL RIO	6/18/2010	6526300.133280	6526300.133280	1808123.116520	246103	5062	sf	316	cf
Infiltration BMP	Existing	8368 VISTA DEL RIO	6/1/2007	6526427.553640	6526427.553640	1807729.596630	246103	5062	sf	316	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8543 ALBIA	1/1/2006	6520215.566510	6520215.566510	1795689.212970	245115	3797	sf	237	cf
Infiltration BMP	Existing	7162 BENARES	1/1/2008	6514067.610360	6514067.610360	1802493.217160	246079	3797	sf	237	cf
Infiltration BMP	Existing	12812 BLODGETT	6/8/2009	6518629.647540	6518629.647540	1791208.759970	245115	3797	sf	237	cf
Infiltration BMP	Existing	9503 BROCK AV	2/14/2014	6524115.247920	6524115.247920	1807488.010330	246106	3797	sf	237	cf
Infiltration BMP	Existing	9045 BUCKLES	12/11/2008	6523278.581350	6523278.581350	1796905.300470	245114	3797	sf	237	cf
Infiltration BMP	Existing	10045 CHANEY	7/5/2007	6527656.534860	6527656.534860	1802672.871800	245125	3797	sf	237	cf
Infiltration BMP	Existing	8714 CHEROKEE	5/1/2007	6525056.428300	6525056.428300	1801833.489170	245119	3797	sf	237	cf
Infiltration BMP	Existing	10729 CLANCEY	7/5/2007	6525292.127080	6525292.127080	1799996.460370	245119	3797	sf	237	cf
Infiltration BMP	Existing	8215 COMOLETTE	5/18/2006	6516024.585540	6516024.585540	1792904.896040	246077	3563	sf	223	cf
Infiltration BMP	Existing	7809 DACOSTA	10/5/2007	6521756.096640	6521756.096640	1806979.884160	246106	3797	sf	237	cf
Infiltration BMP	Existing	10424 DOLAN AV	2/14/2014	6523609.999510	6523609.999510	1803226.099470	245119	3797	sf	237	cf
Infiltration BMP	Existing	12337 DUNROBIN	6/21/2010	6524854.924990	6524854.924990	1793158.910710	245114	3797	sf	237	cf
Infiltration BMP	Existing	13234 DUNROBIN	9/30/2005	6525046.618370	6525046.618370	1789885.630870	245114	3797	sf	237	cf
Infiltration BMP	Existing	12612 EASTBROOK	5/30/2006	6525374.680490	6525374.680490	1791988.629320	245114	3797	sf	237	cf
Infiltration BMP	Existing	9400 FLORENCE	7/8/2005	6528900.299250	6528900.299250	1801380.002980	245126	3797	sf	237	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7823 FOURTH PL	9/16/2005	6519381.530610	6519381.530610	1803107.418050	246102	3797	sf	237	cf
Infiltration BMP	Existing	7826 GAINFORD	10/13/2005	6521963.408230	6521963.408230	1806968.662960	246106	3797	sf	237	cf
Infiltration BMP	Existing	7909 GALLATIN	4/27/2006	6523955.572760	6523955.572760	1809190.106160	246106	3797	sf	237	cf
Infiltration BMP	Existing	9118 GARNISH	6/21/2010	6529677.777690	6529677.777690	1805040.238300	245125	3797	sf	237	cf
Infiltration BMP	Existing	12752 GLYNN	6/18/2010	6516929.257070	6516929.257070	1792615.717350	245524	3797	sf	237	cf
Infiltration BMP	Existing	9116 HALEDON	3/2/2006	6528925.738880	6528925.738880	1805732.953010	245125	3797	sf	237	cf
Infiltration BMP	Existing	12819 IBBETSON	11/23/2005	6525827.025010	6525827.025010	1791350.711010	245114	3797	sf	237	cf
Infiltration BMP	Existing	9528 LEMORAN	8/26/2008	6528914.390000	6528914.390000	1804053.870620	245125	3797	sf	237	cf
Infiltration BMP	Existing	10514 LESTERFORD	2/14/2006	6529382.491640	6529382.491640	1798787.162960	245126	3797	sf	237	cf
Infiltration BMP	Existing	9030 LUBEC	2/9/2006	6526996.357320	6526996.357320	1804242.372880	245125	3797	sf	237	cf
Infiltration BMP	Existing	9264 LUBEC	4/19/2006	6528519.099740	6528519.099740	1803331.221940	245125	3797	sf	237	cf
Infiltration BMP	Existing	8545 LUBEC ST	2/14/2014	6525866.355120	6525866.355120	1805123.134500	246103	3797	sf	237	cf
Infiltration BMP	Existing	9247 MANZANAR	10/30/2006	6526227.935330	6526227.935330	1806695.994430	246103	3797	sf	237	cf
Infiltration BMP	Existing	7866 MELVA	6/20/2006	6516126.027390	6516126.027390	1797191.628010	246079	3797	sf	237	cf
Infiltration BMP	Existing	12109 MORNING	5/16/2006	6516408.716280	6516408.716280	1797765.727430	246079	3797	sf	237	cf

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Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7332 NADA	6/18/2007	6514319.703850	6514319.703850	1800394.247560	246079	3797	sf	237	cf
Infiltration BMP	Existing	7334 NADA	6/18/2007	6514319.703850	6514319.703850	1800394.247560	246079	3797	sf	237	cf
Infiltration BMP	Existing	9821 NEWVILLE	7/30/2007	6530987.438110	6530987.438110	1802116.080780	245125	3797	sf	237	cf
Infiltration BMP	Existing	10268 NEWVILLE	4/24/2007	6529747.604150	6529747.604150	1800228.046080	245126	3797	sf	237	cf
Infiltration BMP	Existing	12280 ORIZABA	6/18/2010	6517505.248620	6517505.248620	1795784.740290	246077	3797	sf	237	cf
Infiltration BMP	Existing	10404 PANGBORN	6/18/2010	6528952.556500	6528952.556500	1800031.154520	245126	3797	sf	237	cf
Infiltration BMP	Existing	12531 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	3797	sf	237	cf
Infiltration BMP	Existing	12537 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	3797	sf	237	cf
Infiltration BMP	Existing	11994 POMERING	2/23/2005	6514993.390330	6514993.390330	1799517.781680	246079	3797	sf	237	cf
Infiltration BMP	Existing	9525 QUINN	2/8/2007	6528803.711540	6528803.711540	1799421.544220	245126	3797	sf	237	cf
Infiltration BMP	Existing	8048 QUOIT	1/21/2009	6516443.407630	6516443.407630	1795348.218010	246077	3797	sf	237	cf
Infiltration BMP	Existing	12326 SAMOLINE	8/29/2008	6516269.535370	6516269.535370	1796118.615320	246077	3797	sf	237	cf
Infiltration BMP	Existing	12504 SMALLWOOD	9/30/2008	6515227.996100	6515227.996100	1795705.820110	246079	3797	sf	237	cf
Infiltration BMP	Existing	9520 STEWART & GRAY	4/10/2008	6526628.650930	6526628.650930	1796061.800920	245118	3797	sf	237	cf
Infiltration BMP	Existing	7411 THIRD	6/2/2006	6517216.302090	6517216.302090	1804140.837740	246102	3797	sf	237	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	12706 WHITEWOOD	9/20/2007	6520505.791550	6520505.791550	1791390.733010	245115	3797	sf	237	cf
Infiltration BMP	Existing	9049 HALL ROAD	2/9/2007	6523684.587500	6523684.587500	1797586.831540	245114	2531	sf	158	cf
Infiltration BMP	Existing	7118 ADWEN	1/27/2006	6513895.884030	6513895.884030	1803086.756410	246100	2531	sf	158	cf
Infiltration BMP	Existing	13202 BARLIN	2/14/2007	6517303.317510	6517303.317510	1789688.349400	245524	2531	sf	158	cf
Infiltration BMP	Existing	10216 BELLMAN	1/5/2009	6525703.110200	6525703.110200	1803293.056930	245119	2531	sf	158	cf
Infiltration BMP	Existing	11809 BELLMAN	2/8/2006	6521732.804620	6521732.804620	1797303.369450	245114	2531	sf	158	cf
Infiltration BMP	Existing	7117 BENARES	8/10/2006	6513814.981610	6513814.981610	1802936.506930	246079	2531	sf	158	cf
Infiltration BMP	Existing	9108 BIGBY	11/23/2005	6526215.785230	6526215.785230	1801649.270450	245119	2531	sf	158	cf
Infiltration BMP	Existing	10213 BIRCHDALE	4/19/2006	6525304.414970	6525304.414970	1803562.084330	245119	2531	sf	158	cf
Infiltration BMP	Existing	9004 BIRCHLEAF	3/7/2007	6527047.235450	6527047.235450	1808159.837050	246103	2531	sf	158	cf
Infiltration BMP	Existing	13126 BLODGETT	8/18/2005	6517829.686700	6517829.686700	1789824.186060	245115	2531	sf	158	cf
Infiltration BMP	Existing	9508 BROCK	2/27/2006	6524228.012180	6524228.012180	1807355.118100	246103	2531	sf	158	cf
Infiltration BMP	Existing	7418 BROOKMILL	7/25/2008	6515791.043440	6515791.043440	1801624.672750	246079	2531	sf	158	cf
Infiltration BMP	Existing	12201 BROOKSHIRE	6/22/2010	6519506.452440	6519506.452440	1795585.950880	245115	2531	sf	158	cf
Infiltration BMP	Existing	7942 BRUNACHE	11/28/2005	6517219.149000	6517219.149000	1798061.073260	246079	2531	sf	158	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9349 CECILIA	9/25/2008	6527282.306940	6527282.306940	1798988.874460	245126	2531	sf	158	cf
Infiltration BMP	Existing	9365 CECILIA	6/18/2010	6527411.791310	6527411.791310	1798910.665650	245126	2531	sf	158	cf
Infiltration BMP	Existing	9608 CECILIA	1/1/2007	6528406.351870	6528406.351870	1798010.127160	245126	2531	sf	158	cf
Infiltration BMP	Existing	9624 CEDARTREE	8/8/2005	6531911.946630	6531911.946630	1804673.812930	245127	2531	sf	158	cf
Infiltration BMP	Existing	8519 CLETA	9/10/2007	6521470.081710	6521470.081710	1798172.541560	245114	2531	sf	158	cf
Infiltration BMP	Existing	7803 CONKLIN	9/2/2005	6513317.560580	6513317.560580	1793980.901190	246077	2297	sf	144	cf
Infiltration BMP	Existing	12816 CORNUTA	10/9/2006	6525701.592160	6525701.592160	1791350.505200	245114	2531	sf	158	cf
Infiltration BMP	Existing	8018 DANVERS	1/26/2009	6524882.345060	6524882.345060	1809453.159850	246106	2531	sf	158	cf
Infiltration BMP	Existing	8517 DEVENIR	10/11/2005	6517399.640210	6517399.640210	1791811.493450	245115	2531	sf	158	cf
Infiltration BMP	Existing	8049 DINSDALE	6/15/2006	6522974.989820	6522974.989820	1805624.556380	246103	2531	sf	158	cf
Infiltration BMP	Existing	9317 DINSDALE	11/5/2008	6528560.545810	6528560.545810	1802232.852640	245125	2531	sf	158	cf
Infiltration BMP	Existing	8510 DONOVAN	7/5/2005	6519046.837890	6519046.837890	1794446.597550	245115	2531	sf	158	cf
Infiltration BMP	Existing	8415 DONOVAN ST	2/14/2014	6518508.946270	6518508.946270	1795018.898890	245115	2531	sf	158	cf
Infiltration BMP	Existing	9635 DOWNEY	7/15/2004	6524420.085960	6524420.085960	1806308.452290	246103	2531	sf	158	cf
Infiltration BMP	Existing	9830 DOWNEY	1/1/2006	6524176.121770	6524176.121770	1805651.929490	246103	2531	sf	158	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	12718 DOWNEY	8/30/2007	6516814.229160	6516814.229160	1793075.140590	245524	2531	sf	158	cf
Infiltration BMP	Existing	12650 DUNROBIN	7/27/2007	6525045.587920	6525045.587920	1791614.482510	245114	2531	sf	158	cf
Infiltration BMP	Existing	9067 EGLISE	9/30/2005	6530265.716940	6530265.716940	1805184.414240	245127	2531	sf	158	cf
Infiltration BMP	Existing	9131 EGLISE	1/16/2009	6529904.336320	6529904.336320	1804464.041860	245125	2531	sf	158	cf
Infiltration BMP	Existing	8573 ELEVENTH	4/24/2006	6525253.900610	6525253.900610	1803595.328980	245119	2531	sf	158	cf
Infiltration BMP	Existing	9061 FARM ST	2/14/2014	6526099.027600	6526099.027600	1801582.141470	245119	2531	sf	158	cf
Infiltration BMP	Existing	7936 FOURTH	1/26/2006	6520005.666040	6520005.666040	1802880.634680	246103	2531	sf	158	cf
Infiltration BMP	Existing	7829 FOURTH PL	2/14/2014	6519381.530610	6519381.530610	1803107.418050	246102	2531	sf	158	cf
Infiltration BMP	Existing	7528 GAINFORD	6/18/2010	6520331.076350	6520331.076350	1807734.704270	246106	1266	sf	79	cf
Infiltration BMP	Existing	8150 GALLATIN	1/14/2008	6524851.065410	6524851.065410	1807922.731550	246103	2531	sf	158	cf
Infiltration BMP	Existing	9068 GALLATIN	7/18/2005	6527754.167230	6527754.167230	1805244.499940	245125	2531	sf	158	cf
Infiltration BMP	Existing	12703 GLENSHIRE	8/18/2006	6520090.968440	6520090.968440	1791341.816710	245115	2531	sf	158	cf
Infiltration BMP	Existing	8703 GUATEMALA	6/18/2010	6523747.929510	6523747.929510	1811239.685330	246111	2531	sf	158	cf
Infiltration BMP	Existing	9903 GUATEMALA	6/21/2010	6519189.043810	6519189.043810	1808530.913060	246111	2531	sf	158	cf
Infiltration BMP	Existing	9208 HALEDON	3/29/2007	6528788.981770	6528788.981770	1805412.621690	245125	2531	sf	158	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9083 HALL	12/8/2005	6524025.781090	6524025.781090	1797583.104370	245114	2531	sf	158	cf
Infiltration BMP	Existing	10348 HASTY	9/14/2006	6528480.545700	6528480.545700	1800482.839460	245126	2531	sf	158	cf
Infiltration BMP	Existing	7844 HONDO	7/8/2005	6515417.898670	6515417.898670	1796530.778030	246079	2531	sf	158	cf
Infiltration BMP	Existing	9244 HORLEY	6/22/2006	6522498.248530	6522498.248530	1809199.750130	246111	2531	sf	158	cf
Infiltration BMP	Existing	12612 IBBETSON	2/9/2007	6526008.655610	6526008.655610	1792000.536540	245114	2531	sf	158	cf
Infiltration BMP	Existing	7214 IRWINGROVE	8/17/2007	6517736.835580	6517736.835580	1807424.228480	246104	2531	sf	158	cf
Infiltration BMP	Existing	10209 JULIUS	6/21/2010	6519702.452650	6519702.452650	1806880.883230	246102	2531	sf	158	cf
Infiltration BMP	Existing	10341 JULIUS	6/4/2008	6519700.000000	6519700.000000	1806100.000000	246102	2531	sf	158	cf
Infiltration BMP	Existing	12313 JULIUS	6/21/2010	6514155.209020	6514155.209020	1797936.932020	246079	2531	sf	158	cf
Infiltration BMP	Existing	7944 KINGBEE	5/31/2007	6516311.045420	6516311.045420	1796702.710410	246079	2531	sf	158	cf
Infiltration BMP	Existing	9605 LA REINA	6/18/2010	6524325.141120	6524325.141120	1806744.664340	246103	2531	sf	158	cf
Infiltration BMP	Existing	10074 LESTERFORD	4/12/2006	6530716.286370	6530716.286370	1800772.683680	245125	2531	sf	158	cf
Infiltration BMP	Existing	9626 LUBEC	6/21/2005	6530889.535260	6530889.535260	1801910.718740	245125	2531	sf	158	cf
Infiltration BMP	Existing	7156 LUXOR	10/28/2005	6513800.826420	6513800.826420	1802169.595300	246100	2531	sf	158	cf
Infiltration BMP	Existing	9202 MANZANAR	4/13/2004	6526663.177850	6526663.177850	1806830.315690	246103	2531	sf	158	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9020 MARGARET	10/2/2006	6523822.925930	6523822.925930	1798066.530690	245114	2531	sf	158	cf
Infiltration BMP	Existing	9127 MELDAR	4/29/2004	6526710.714590	6526710.714590	1807437.827920	246103	2531	sf	158	cf
Infiltration BMP	Existing	11814 MORNING	9/2/2005	6517648.916460	6517648.916460	1799680.107480	246077	2531	sf	158	cf
Infiltration BMP	Existing	7440 MULLER	11/7/2006	6518162.654940	6518162.654940	1805120.460880	246102	2531	sf	158	cf
Infiltration BMP	Existing	12334 ORIZABA	5/5/2005	6517231.678930	6517231.678930	1795384.927500	246077	2531	sf	158	cf
Infiltration BMP	Existing	9311 OTTO	2/2/2008	6528809.245500	6528809.245500	1802513.951810	245125	2531	sf	158	cf
Infiltration BMP	Existing	10436 PANGBORN	7/6/2006	6528781.443840	6528781.443840	1799746.387720	245126	2531	sf	158	cf
Infiltration BMP	Existing	12533 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	12531 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	12531 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	12533 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	12533 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	12533 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	12535 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	12535 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	12535 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	12535 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	12537 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	12537 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	9008 PARROT	6/22/2010	6524997.125330	6524997.125330	1808680.720210	246106	2531	sf	158	cf
Infiltration BMP	Existing	9530 PARROT	10/11/2006	6523866.950960	6523866.950960	1807305.627380	246103	2531	sf	158	cf
Infiltration BMP	Existing	7125 PELLET	11/21/2005	6515366.521160	6515366.521160	1805107.133170	246104	2531	sf	158	cf
Infiltration BMP	Existing	7335 PELLET	2/15/2007	6516661.302200	6516661.302200	1804268.401510	246104	2531	sf	158	cf
Infiltration BMP	Existing	7348 PELLET	6/22/2010	6516619.400060	6516619.400060	1803975.379460	246102	2531	sf	158	cf
Infiltration BMP	Existing	10433 PICO VISTA	6/21/2010	6529704.381130	6529704.381130	1799155.408730	245126	2531	sf	158	cf
Infiltration BMP	Existing	7629 PIVOT	6/4/2008	6517523.064870	6517523.064870	1802428.507060	246079	2531	sf	158	cf
Infiltration BMP	Existing	11962 POMERING	2/24/2006	6515175.131420	6515175.131420	1799743.806870	246079	2531	sf	158	cf
Infiltration BMP	Existing	8133 PRISCILLA	6/22/2010	6515078.400000	6515078.400000	1792153.440000	246077	2531	sf	158	cf
Infiltration BMP	Existing	7603 QUILL	2/28/2007	6514155.935840	6514155.935840	1797151.984960	246079	2531	sf	158	cf
Infiltration BMP	Existing	11539 RICHEON	7/8/2005	6517174.382020	6517174.382020	1801464.078770	246079	2531	sf	158	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	6545 RIVERGROVE	10/11/2005	6520696.757140	6520696.757140	1811248.378990	246111	2531	sf	158	cf
Infiltration BMP	Existing	9320 SAMOLINE	11/3/2006	6523716.410960	6523716.410960	1808296.703240	246106	2531	sf	158	cf
Infiltration BMP	Existing	9602 SAMOLINE	11/23/2005	6523146.135200	6523146.135200	1807399.732010	246103	2531	sf	158	cf
Infiltration BMP	Existing	12015 SAMOLINE	9/29/2008	6517129.601540	6517129.601540	1798409.043860	246079	2531	sf	158	cf
Infiltration BMP	Existing	12048 SAMOLINE	6/22/2010	6517021.712450	6517021.712450	1798014.455830	246079	2531	sf	158	cf
Infiltration BMP	Existing	7962 SECOND	10/3/2007	6519694.108620	6519694.108620	1801968.426700	246102	2531	sf	158	cf
Infiltration BMP	Existing	7712 SEVERY ST	1/1/2008	6524575.222650	6524575.222650	1807124.160130	246103	2531	sf	158	cf
Infiltration BMP	Existing	7331 SHADYOAK	1/16/2009	6521597.847660	6521597.847660	1810725.646550	246111	2531	sf	158	cf
Infiltration BMP	Existing	9103 SHERIDELL	10/29/2007	6528594.889520	6528594.889520	1806159.584670	245125	2531	sf	158	cf
Infiltration BMP	Existing	8345 SIXTH	4/23/2008	6522663.428460	6522663.428460	1802257.170290	245114	2531	sf	158	cf
Infiltration BMP	Existing	9124 STOAKES	4/29/2004	6526659.033140	6526659.033140	1807538.875170	246103	2531	sf	158	cf
Infiltration BMP	Existing	9906 TECUM	8/26/2008	6519710.324270	6519710.324270	1808196.223590	246111	2531	sf	158	cf
Infiltration BMP	Existing	9520 TELEGRAPH	12/4/2008	6531301.476840	6531301.476840	1805512.099740	245127	2531	sf	158	cf
Infiltration BMP	Existing	8302 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	1840	sf	115	cf
Infiltration BMP	Existing	8304 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8306 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8308 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8310 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8312 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8314 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8316 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8318 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8320 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8322 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8324 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8326 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8328 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8330 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8332 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8334 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8336 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8338 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8340 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8342 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8344 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8346 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8348 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8350 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8352 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	7438 THIRD	11/10/2005	6517353.808450	6517353.808450	1803828.489190	246102	2531	sf	158	cf
Infiltration BMP	Existing	7955 THIRD	1/30/2006	6519871.299810	6519871.299810	1802440.525110	246103	2531	sf	158	cf
Infiltration BMP	Existing	9819 TRISTAN	11/19/2007	6526302.584780	6526302.584780	1804524.383680	245125	2531	sf	158	cf
Infiltration BMP	Existing	8555 VIA AMORITA	10/27/2008	6524751.467620	6524751.467620	1803150.610950	245119	2531	sf	158	cf
Infiltration BMP	Existing	9631 WILEY BURKE	3/27/2006	6521095.475640	6521095.475640	1808618.175130	246106	2531	sf	158	cf
Infiltration BMP	Existing	10419 WILEY BURKE	3/7/2008	6519382.492080	6519382.492080	1805731.311650	246102	2531	sf	158	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7319 ADWEN	2/22/2006	6515346.754980	6515346.754980	1802425.342900	246079	1266	sf	79	cf
Infiltration BMP	Existing	13033 AIRPOINT	6/14/2010	6517837.198260	6517837.198260	1790420.981040	245115	1266	sf	79	cf
Infiltration BMP	Existing	8446 ALAMEDA	6/24/2005	6519341.878190	6519341.878190	1795502.737620	245115	1266	sf	79	cf
Infiltration BMP	Existing	9336 APPLEBY	3/9/2006	6529377.514420	6529377.514420	1804389.744220	245125	1266	sf	79	cf
Infiltration BMP	Existing	9540 ARDINE	1/1/2006	6527800.346060	6527800.346060	1797420.079620	245119	1266	sf	79	cf
Infiltration BMP	Existing	7849 ARNETT	7/8/2005	6518395.700160	6518395.700160	1801138.921810	246079	1266	sf	79	cf
Infiltration BMP	Existing	8645 BAYSINGER	11/10/2005	6525612.031290	6525612.031290	1803108.706240	245119	1266	sf	79	cf
Infiltration BMP	Existing	9210 BELCHER	10/12/2006	6519891.840050	6519891.840050	1789806.904790	245115	1266	sf	79	cf
Infiltration BMP	Existing	9245 BELCHER	9/4/2007	6520247.532430	6520247.532430	1789967.036150	245115	1266	sf	79	cf
Infiltration BMP	Existing	10234 BELCHER	6/18/2010	6527119.239350	6527119.239350	1789810.183210	245113	1266	sf	79	cf
Infiltration BMP	Existing	10285 BELCHER	6/21/2010	6527612.081010	6527612.081010	1789959.646450	245118	1266	sf	79	cf
Infiltration BMP	Existing	10028 BELLDER	1/1/2006	6525360.965940	6525360.965940	1803913.208580	245125	1266	sf	79	cf
Infiltration BMP	Existing	10304 BELLMAN	6/1/2005	6525418.498520	6525418.498520	1803041.069680	245119	1266	sf	79	cf
Infiltration BMP	Existing	11014 BENFIELD	6/24/2008	6531918.630750	6531918.630750	1797937.959120	245122	1266	sf	79	cf
Infiltration BMP	Existing	9324 BIRCHBARK	10/7/2005	6524879.129350	6524879.129350	1807661.831210	246103	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7847 BLANDWOOD	6/29/2006	6525016.522210	6525016.522210	1811074.341940	246106	1266	sf	79	cf
Infiltration BMP	Existing	8415 BORSON	10/9/2006	6517421.536650	6517421.536650	1792735.849280	245115	1266	sf	79	cf
Infiltration BMP	Existing	8710 BOYNE	6/29/2006	6521119.595500	6521119.595500	1795272.757840	245115	1266	sf	79	cf
Infiltration BMP	Existing	8910 BROCK	2/3/2009	6525582.226600	6525582.226600	1808734.892600	246106	1266	sf	79	cf
Infiltration BMP	Existing	9702 BROCK	9/25/2006	6523765.203820	6523765.203820	1806580.253440	246103	1266	sf	79	cf
Infiltration BMP	Existing	9730 BROCK	10/16/2009	6523625.354460	6523625.354460	1806340.478590	246103	1266	sf	79	cf
Infiltration BMP	Existing	7550 BROOKMILL	9/25/2006	6516432.435790	6516432.435790	1801137.496710	246079	1266	sf	79	cf
Infiltration BMP	Existing	10360 BROOKSHIRE	8/2/2005	6524254.056510	6524254.056510	1803200.425100	245119	1266	sf	79	cf
Infiltration BMP	Existing	9336 BUELL	5/4/2007	6527241.052050	6527241.052050	1799190.479610	245126	1266	sf	79	cf
Infiltration BMP	Existing	9408 BUELL	1/1/2007	6527563.840160	6527563.840160	1798993.546660	245126	1266	sf	79	cf
Infiltration BMP	Existing	10210 CASANES	7/20/2005	6529273.829610	6529273.829610	1801143.143100	245125	1266	sf	79	cf
Infiltration BMP	Existing	10308 CASANES	6/9/2005	6528827.020030	6528827.020030	1800415.364480	245126	1266	sf	79	cf
Infiltration BMP	Existing	10845 CASANES	12/4/2007	6527288.943480	6527288.943480	1798213.890680	245119	1266	sf	79	cf
Infiltration BMP	Existing	10922 CASANES	8/3/2005	6527279.490710	6527279.490710	1797849.792160	245119	1266	sf	79	cf
Infiltration BMP	Existing	8715 CAVEL	6/22/2010	6521261.550160	6521261.550160	1795688.489420	245115	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9707 CEDARTREE	5/25/2006	6532283.863380	6532283.863380	1804587.051690	245127	1266	sf	79	cf
Infiltration BMP	Existing	10260 CHANEY	6/21/2010	6527337.911630	6527337.911630	1801874.691650	245119	1266	sf	79	cf
Infiltration BMP	Existing	10362 CHANEY	9/4/2007	6526983.558290	6526983.558290	1801306.071650	245119	1266	sf	79	cf
Infiltration BMP	Existing	9246 CLANCEY	5/1/2007	6528479.118010	6528479.118010	1805448.947460	245125	1266	sf	79	cf
Infiltration BMP	Existing	10546 CLANCEY	5/26/2005	6525904.831900	6525904.831900	1800674.595520	245119	1266	sf	79	cf
Infiltration BMP	Existing	12658 COLDBROOK	6/25/2009	6524501.637760	6524501.637760	1791525.543010	245114	1266	sf	79	cf
Infiltration BMP	Existing	8111 COMOLETTE	12/18/2006	6515465.796840	6515465.796840	1793242.397990	246077	1266	sf	79	cf
Infiltration BMP	Existing	8140 COMOLETTE	12/2/2008	6515640.775000	6515640.775000	1792943.865000	246077	1266	sf	79	cf
Infiltration BMP	Existing	8316 COMOLETTE	5/23/2005	6516475.681440	6516475.681440	1792370.081790	245524	1266	sf	79	cf
Infiltration BMP	Existing	9325 CORD	3/21/2008	6529940.912480	6529940.912480	1803762.584020	245125	1266	sf	79	cf
Infiltration BMP	Existing	7732 COREY	1/8/2009	6515481.796500	6515481.796500	1798137.416600	246079	1266	sf	79	cf
Infiltration BMP	Existing	11810 CORRIGAN	3/4/2009	6523411.287590	6523411.287590	1796210.739300	245114	1266	sf	79	cf
Infiltration BMP	Existing	10925 CROSSDALE	6/9/2005	6532012.125130	6532012.125130	1798163.740010	245122	1266	sf	79	cf
Infiltration BMP	Existing	7757 DACOSTA	6/7/2005	6521506.383470	6521506.383470	1807138.583520	246106	1266	sf	79	cf
Infiltration BMP	Existing	8324 DAVIS	6/15/2005	6520852.481770	6520852.481770	1799213.987880	245114	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8517 DEVENIR	2/19/2008	6517399.640210	6517399.640210	1791811.493450	245115	1266	sf	79	cf
Infiltration BMP	Existing	7345 DINSDALE	9/29/2005	6519203.299320	6519203.299320	1808002.090250	246111	1266	sf	79	cf
Infiltration BMP	Existing	8330 DINSDALE	6/21/2010	6524002.238290	6524002.238290	1804838.107610	246103	1266	sf	79	cf
Infiltration BMP	Existing	10340 DOLAN	8/15/2007	6523856.967630	6523856.967630	1803630.622810	245119	1266	sf	79	cf
Infiltration BMP	Existing	12260 DOLAN	4/5/2006	6518910.565000	6518910.565000	1795264.305000	245115	1266	sf	79	cf
Infiltration BMP	Existing	12521 DOLAN	7/19/2007	6517914.404040	6517914.404040	1794175.419610	245115	1266	sf	79	cf
Infiltration BMP	Existing	12621 DOLAN	8/17/2007	6517501.190610	6517501.190610	1793293.644730	245115	1266	sf	79	cf
Infiltration BMP	Existing	12308 DOWNEY	4/19/2007	6518251.608680	6518251.608680	1795363.261670	245115	1266	sf	79	cf
Infiltration BMP	Existing	12532 DOWNEY	10/11/2005	6517442.718730	6517442.718730	1794104.887260	245115	1266	sf	79	cf
Infiltration BMP	Existing	12820 DOWNEY	5/17/2007	6516486.923440	6516486.923440	1792584.707230	245524	1266	sf	79	cf
Infiltration BMP	Existing	12603 DUNROBIN	6/22/2010	6524864.880980	6524864.880980	1792095.613000	245114	1266	sf	79	cf
Infiltration BMP	Existing	12643 DUNROBIN	11/21/2006	6524865.889210	6524865.889210	1791696.268120	245114	1266	sf	79	cf
Infiltration BMP	Existing	12818 DUNROBIN	12/15/2006	6525044.191110	6525044.191110	1791331.787300	245114	1266	sf	79	cf
Infiltration BMP	Existing	12823 DUNROBIN	2/12/2008	6524866.593650	6524866.593650	1791299.463030	245114	1266	sf	79	cf
Infiltration BMP	Existing	13024 DUNROBIN	5/24/2005	6525048.058670	6525048.058670	1790633.750860	245114	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	13240 DUNROBIN	10/1/2008	6525046.731200	6525046.731200	1789833.348360	245114	1266	sf	79	cf
Infiltration BMP	Existing	13638 EARNSHAW	9/16/2005	6516330.576340	6516330.576340	1788317.037630	245524	1266	sf	79	cf
Infiltration BMP	Existing	12155 EASTBROOK	9/16/2005	6525128.882510	6525128.882510	1794289.182720	245114	2297	sf	144	cf
Infiltration BMP	Existing	9125 EGLISE	1/24/2007	6529928.564580	6529928.564580	1804520.963270	245125	1266	sf	79	cf
Infiltration BMP	Existing	10213 EGLISE	10/14/2008	6528271.447820	6528271.447820	1801803.093100	245126	1266	sf	79	cf
Infiltration BMP	Existing	8331 EVEREST	2/21/2007	6517984.856770	6517984.856770	1794526.994330	245115	1266	sf	79	cf
Infiltration BMP	Existing	9037 FARM	6/18/2010	6525882.141210	6525882.141210	1801714.480720	245119	1266	sf	79	cf
Infiltration BMP	Existing	9542 FARM	11/15/2005	6529019.221950	6529019.221950	1799423.700160	245126	1266	sf	79	cf
Infiltration BMP	Existing	8445 FIFTH	6/24/2005	6523180.907390	6523180.907390	1801530.163340	245114	1266	sf	79	cf
Infiltration BMP	Existing	8529 FIFTH	9/23/2005	6523578.003250	6523578.003250	1801288.543780	245114	1266	sf	79	cf
Infiltration BMP	Existing	9221 FOSTER	2/16/2008	6519835.324440	6519835.324440	1789377.664880	245115	1266	sf	79	cf
Infiltration BMP	Existing	9303 FOSTER	8/9/2006	6520280.515660	6520280.515660	1789513.941670	245115	1266	sf	79	cf
Infiltration BMP	Existing	9536 FOSTORIA	10/13/2005	6527900.524680	6527900.524680	1797686.001250	245119	1266	sf	79	cf
Infiltration BMP	Existing	7339 GAINFORD	11/5/2007	6519739.997490	6519739.997490	1808338.936030	246111	1266	sf	79	cf
Infiltration BMP	Existing	8426 GAINFORD	1/7/2008	6524961.213810	6524961.213810	1805124.602410	246103	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9315 GAINFORD	7/5/2005	6528715.710300	6528715.710300	1803034.881460	245125	1266	sf	79	cf
Infiltration BMP	Existing	9641 GAINFORD	10/16/2006	6530976.949360	6530976.949360	1801752.372100	245125	1266	sf	79	cf
Infiltration BMP	Existing	9357 GALLATIN	4/17/2006	6529509.957360	6529509.957360	1804133.004270	245125	1266	sf	79	cf
Infiltration BMP	Existing	8411 GALT	7/18/2007	6520931.662600	6520931.662600	1798681.676310	245114	1266	sf	79	cf
Infiltration BMP	Existing	8125 GARDENDALE	10/3/2007	6514840.842010	6514840.842010	1791988.219650	246077	1266	sf	79	cf
Infiltration BMP	Existing	7553 GLENCLIFF	11/5/2008	6521939.189570	6521939.189570	1809565.009220	246111	1266	sf	79	cf
Infiltration BMP	Existing	12615 GURLEY	9/8/2008	6516705.632650	6516705.632650	1793818.816440	246077	1266	sf	79	cf
Infiltration BMP	Existing	10557 HALEDON	3/22/2006	6525946.687500	6525946.687500	1800529.637640	245119	1266	sf	79	cf
Infiltration BMP	Existing	10714 HALEDON	7/11/2008	6525734.412480	6525734.412480	1799854.605530	245119	1266	sf	79	cf
Infiltration BMP	Existing	9101 HALL	7/19/2007	6524088.768660	6524088.768660	1797585.986810	245114	1266	sf	79	cf
Infiltration BMP	Existing	7416 HONDO	11/21/2007	6513414.170490	6513414.170490	1797767.919490	246079	1266	sf	79	cf
Infiltration BMP	Existing	7927 HONDO	1/8/2007	6515926.722240	6515926.722240	1796435.751150	246079	1266	sf	79	cf
Infiltration BMP	Existing	9228 HORLEY	7/20/2005	6522584.029360	6522584.029360	1809343.702000	246111	1266	sf	79	cf
Infiltration BMP	Existing	9929 HORLEY	6/23/2005	6520827.895940	6520827.895940	1807104.698370	246106	1266	sf	79	cf
Infiltration BMP	Existing	12316 HORLEY	1/1/2007	6515085.680000	6515085.680000	1797312.060000	246079	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	11544 HORTON	5/1/2006	6517050.314050	6517050.314050	1801482.158860	246079	1266	sf	79	cf
Infiltration BMP	Existing	12619 IBBETSON	12/26/2007	6525826.717640	6525826.717640	1791950.694670	245114	1266	sf	79	cf
Infiltration BMP	Existing	12816 IBBETSON	11/23/2005	6526008.922590	6526008.922590	1791350.504040	245114	1266	sf	79	cf
Infiltration BMP	Existing	9030 IOWA	8/29/2007	6523719.000250	6523719.000250	1797706.215730	245114	1266	sf	79	cf
Infiltration BMP	Existing	9036 IOWA	1/23/2006	6523761.535660	6523761.535660	1797679.990250	245114	1266	sf	79	cf
Infiltration BMP	Existing	7214 IRWINGROVE	2/7/2008	6517736.835580	6517736.835580	1807424.228480	246104	1266	sf	79	cf
Infiltration BMP	Existing	7425 IRWINGROVE	11/22/2005	6519037.305040	6519037.305040	1806826.286520	246102	1266	sf	79	cf
Infiltration BMP	Existing	7431 IVO	5/23/2005	6520452.019960	6520452.019960	1808862.657860	246106	1266	sf	79	cf
Infiltration BMP	Existing	12258 IZETTA	11/19/2008	6524718.529730	6524718.529730	1793607.751080	245114	1266	sf	79	cf
Infiltration BMP	Existing	11427 JULIUS	10/6/2005	6517068.729490	6517068.729490	1802337.821610	246079	1266	sf	79	cf
Infiltration BMP	Existing	7863 KINGBEE	6/2/2005	6515998.395150	6515998.395150	1797104.463380	246079	1266	sf	79	cf
Infiltration BMP	Existing	10633 LA REINA	6/7/2005	6521844.406030	6521844.406030	1802801.159980	246103	1266	sf	79	cf
Infiltration BMP	Existing	10726 LA REINA	9/20/2005	6521763.725850	6521763.725850	1802369.001800	246103	1266	sf	79	cf
Infiltration BMP	Existing	10717 LAKEWOOD	1/1/2005	6524762.764130	6524762.764130	1800632.321080	245119	1266	sf	79	cf
Infiltration BMP	Existing	13229 LAKEWOOD	8/30/2005	6518145.854860	6518145.854860	1789091.323220	245115	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8248 LANKIN	5/16/2007	6517152.534650	6517152.534650	1794608.293130	246077	1266	sf	79	cf
Infiltration BMP	Existing	13413 LAURELDALE	9/4/2007	6516097.983610	6516097.983610	1789503.029570	245524	1266	sf	79	cf
Infiltration BMP	Existing	9040 LEMORAN	9/16/2005	6529896.207920	6529896.207920	1805874.052840	245125	1266	sf	79	cf
Infiltration BMP	Existing	10225 LESTERFORD	12/22/2005	6530244.844140	6530244.844140	1800567.187010	245126	1266	sf	79	cf
Infiltration BMP	Existing	10415 LESTERFORD	6/22/2010	6529502.521580	6529502.521580	1799500.525910	245126	1266	sf	79	cf
Infiltration BMP	Existing	10730 LESTERFORD	6/8/2005	6528927.837490	6528927.837490	1798058.051080	245126	1266	sf	79	cf
Infiltration BMP	Existing	8020 LUBEC	3/8/2007	6523117.786070	6523117.786070	1806398.918760	246103	1266	sf	79	cf
Infiltration BMP	Existing	9230 LUBEC	9/30/2005	6528205.943320	6528205.943320	1803519.420650	245125	1266	sf	79	cf
Infiltration BMP	Existing	7259 LUXOR	1/1/2007	6514801.884280	6514801.884280	1801808.218080	246079	1266	sf	79	cf
Infiltration BMP	Existing	7315 LUXOR	3/16/2006	6514953.117040	6514953.117040	1801695.155730	246079	1266	sf	79	cf
Infiltration BMP	Existing	8444 LUXOR	11/10/2005	6520775.356850	6520775.356850	1797851.842110	245114	1266	sf	79	cf
Infiltration BMP	Existing	9102 MANZANAR	7/20/2005	6527192.246670	6527192.246670	1807219.965690	246103	1266	sf	79	cf
Infiltration BMP	Existing	10434 MANZANAR	6/7/2005	6523771.930100	6523771.930100	1803007.033470	245119	1266	sf	79	cf
Infiltration BMP	Existing	11109 MARBEL	7/20/2006	6523692.717760	6523692.717760	1799490.635090	245119	1266	sf	79	cf
Infiltration BMP	Existing	12108 MARBEL	1/31/2006	6521445.538760	6521445.538760	1795214.942010	245115	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7830 MELVA	1/1/2006	6515802.415360	6515802.415360	1797387.108860	246079	1266	sf	79	cf
Infiltration BMP	Existing	7844 MELVA	1/5/2006	6515910.196660	6515910.196660	1797321.983490	246079	1266	sf	79	cf
Infiltration BMP	Existing	12120 MORNING	8/14/2008	6516533.621320	6516533.621320	1797558.681060	246079	1266	sf	79	cf
Infiltration BMP	Existing	7339 NADA	7/8/2005	6514489.286480	6514489.286480	1800567.411080	246079	1266	sf	79	cf
Infiltration BMP	Existing	7351 NADA	6/23/2008	6514590.536380	6514590.536380	1800503.774190	246079	1266	sf	79	cf
Infiltration BMP	Existing	8202 NADA	1/9/2006	6518631.371590	6518631.371590	1797835.542430	245115	1266	sf	79	cf
Infiltration BMP	Existing	7415 NOREN	7/26/2005	6520794.671000	6520794.671000	1809286.272790	246111	1266	sf	79	cf
Infiltration BMP	Existing	9921 NORLAIN	11/3/2008	6519614.140210	6519614.140210	1807835.435830	246111	1266	sf	79	cf
Infiltration BMP	Existing	8127 ORANGE	6/23/2010	6517401.744430	6517401.744430	1796403.841780	246077	1266	sf	79	cf
Infiltration BMP	Existing	9554 ORIZABA	8/19/2005	6524235.753500	6524235.753500	1806817.618650	246103	1266	sf	79	cf
Infiltration BMP	Existing	12333 ORIZABA	1/23/2006	6517077.475660	6517077.475660	1795538.435260	246077	1266	sf	79	cf
Infiltration BMP	Existing	10834 PANGBORN	9/17/2007	6527760.431910	6527760.431910	1798051.772160	245119	1266	sf	79	cf
Infiltration BMP	Existing	7156 PELLET	6/22/2010	6515507.126970	6515507.126970	1804695.751890	246104	1266	sf	79	cf
Infiltration BMP	Existing	9466 PELLET	5/26/2005	6527082.799410	6527082.799410	1797550.782940	245119	1266	sf	79	cf
Infiltration BMP	Existing	10238 PICO VISTA	7/22/2008	6530559.495000	6530559.495000	1800212.246520	245126	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7706 PIVOT	6/18/2010	6517776.543940	6517776.543940	1802077.153370	246079	1266	sf	79	cf
Infiltration BMP	Existing	11951 POMERING	6/18/2010	6515072.562230	6515072.562230	1799936.867790	246079	1266	sf	79	cf
Infiltration BMP	Existing	12010 POMERING	9/20/2005	6514897.027930	6514897.027930	1799318.472210	246079	1266	sf	79	cf
Infiltration BMP	Existing	7803 PURITAN	6/22/2010	6513186.710850	6513186.710850	1793767.422040	246077	1266	sf	79	cf
Infiltration BMP	Existing	8249 QUOIT	5/17/2007	6517406.484080	6517406.484080	1795006.472870	246077	1266	sf	79	cf
Infiltration BMP	Existing	8506 RAVILLER	6/22/2010	6526200.032280	6526200.032280	1805944.598850	246103	1266	sf	79	cf
Infiltration BMP	Existing	9441 RAVILLER	10/7/2005	6529831.524430	6529831.524430	1803323.207760	245125	1266	sf	79	cf
Infiltration BMP	Existing	7110 RIO FLORA	6/1/2010	6515643.202310	6515643.202310	1805187.382260	246104	1266	sf	79	cf
Infiltration BMP	Existing	7371 RIO HONDO PL	7/11/2005	6517283.740950	6517283.740950	1804924.767440	246104	1266	sf	79	cf
Infiltration BMP	Existing	10802 RIVES	3/23/2007	6519422.470020	6519422.470020	1803623.413330	246102	1266	sf	79	cf
Infiltration BMP	Existing	11916 RIVES	2/6/2007	6516737.168290	6516737.168290	1799258.165990	246079	1266	sf	79	cf
Infiltration BMP	Existing	10912 RYERSON	7/14/2005	6515882.754330	6515882.754330	1804962.955590	246104	1266	sf	79	cf
Infiltration BMP	Existing	9505 SAMOLINE	6/21/2010	6523279.038200	6523279.038200	1807936.970620	246106	1266	sf	79	cf
Infiltration BMP	Existing	9631 SAMOLINE	9/4/2007	6522855.010000	6522855.010000	1807250.890000	246103	1266	sf	79	cf
Infiltration BMP	Existing	12030 SAMOLINE	9/23/2005	6517133.868790	6517133.868790	1798177.361600	246079	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	12238 SAMOLINE	9/8/2006	6516738.176240	6516738.176240	1796883.684630	246079	1266	sf	79	cf
Infiltration BMP	Existing	7915 SECOND	3/23/2006	6519374.854020	6519374.854020	1802382.905560	246102	1266	sf	79	cf
Infiltration BMP	Existing	7816 SEVENTH	3/27/2007	6519884.790380	6519884.790380	1804163.292550	246102	1266	sf	79	cf
Infiltration BMP	Existing	8646 SEVENTH	1/3/2006	6524439.566780	6524439.566780	1801605.289810	245119	1266	sf	79	cf
Infiltration BMP	Existing	9225 SIDEVIEW	4/24/2006	6531114.889310	6531114.889310	1804872.365930	245127	1266	sf	79	cf
Infiltration BMP	Existing	8810 SMALLWOOD	6/20/2005	6524153.815510	6524153.815510	1810188.858090	246106	1266	sf	79	cf
Infiltration BMP	Existing	9264 SONGFEST	6/10/2008	6531394.983570	6531394.983570	1804360.661210	245127	1266	sf	79	cf
Infiltration BMP	Existing	7838 SPRINGER	11/21/2006	6515530.871940	6515530.871940	1796818.950680	246079	1266	sf	79	cf
Infiltration BMP	Existing	7844 SPRINGER	3/18/2008	6515582.250000	6515582.250000	1796787.835000	246079	1266	sf	79	cf
Infiltration BMP	Existing	10517 STAMPS	8/18/2005	6522812.240000	6522812.240000	1803043.757460	246103	1266	sf	79	cf
Infiltration BMP	Existing	9520 STEWART & GRAY	2/27/2009	6526628.650930	6526628.650930	1796061.800920	245118	1266	sf	79	cf
Infiltration BMP	Existing	8840 STOAKES	7/15/2005	6527643.045070	6527643.045070	1808263.273840	245125	1266	sf	79	cf
Infiltration BMP	Existing	11831 SUSAN	5/25/2006	6514568.915250	6514568.915250	1801466.560490	246079	1266	sf	79	cf
Infiltration BMP	Existing	8354 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	1266	sf	79	cf
Infiltration BMP	Existing	8356 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8358 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	1266	sf	79	cf
Infiltration BMP	Existing	8360 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	1266	sf	79	cf
Infiltration BMP	Existing	8362 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	1266	sf	79	cf
Infiltration BMP	Existing	8364 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	1266	sf	79	cf
Infiltration BMP	Existing	8366 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	1266	sf	79	cf
Infiltration BMP	Existing	8368 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	1266	sf	79	cf
Infiltration BMP	Existing	7420 THIRD	9/20/2007	6517202.761340	6517202.761340	1803926.714420	246102	1266	sf	79	cf
Infiltration BMP	Existing	7964 THIRD	2/21/2006	6519886.681280	6519886.681280	1802225.378910	246102	1266	sf	79	cf
Infiltration BMP	Existing	9532 TWEEDY	4/20/2007	6523025.939870	6523025.939870	1807743.953100	246106	1266	sf	79	cf
Infiltration BMP	Existing	7347 VIA RIO NIDO	8/1/2007	6518199.953350	6518199.953350	1806523.073370	246104	1266	sf	79	cf
Infiltration BMP	Existing	10419 WILEY BURKE	1/2/2008	6519382.492080	6519382.492080	1805731.311650	246102	1266	sf	79	cf
Infiltration BMP	Existing	10442 WILEY BURKE	1/1/2007	6519428.439440	6519428.439440	1805422.866650	246102	1266	sf	79	cf
Infiltration BMP	Existing	12639 WOODRUFF	12/22/2006	6526127.737740	6526127.737740	1791800.878460	245113	1266	sf	79	cf
Infiltration BMP	Existing	12356 DOWNEY	4/29/2004	6518006.757310	6518006.757310	1794978.083160	245115	5062	sf	316	cf
Infiltration BMP	Existing	10613 NEWVILLE	4/21/2004	6528761.027810	6528761.027810	1798786.621380	245126	2531	sf	158	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	10627 OLD RIVER SCHOOL	7/24/2003	6515233.048270	6515233.048270	1805631.128330	246104	174752	sf	10922	cf
Infiltration BMP	Existing	9215 HALL	12/9/2002	6524758.793890	6524758.793890	1797647.866960	245113	74592	sf	4662	cf
Infiltration BMP	Existing	10933 LAKEWOOD BLVD	10/5/2005	6524600.000000	6524600.000000	1800100.000000	245119	6400	sf	400	cf
Infiltration BMP	Existing	12322 SAMOLINE	7/8/2005	6516301.814120	6516301.814120	1796169.128220	246077	4256	sf	266	cf
Infiltration BMP	Existing	12731 LAKEWOOD	9/17/2003	6519215.285000	6519215.285000	1791371.090000	245115	2128	sf	133	cf
Infiltration BMP	Existing	12739 LAKEWOOD	9/17/2003	6519200.000000	6519200.000000	1791100.000000	245115	2128	sf	133	cf
Infiltration BMP	Existing	8927 BIRCHLEAF	7/11/2006	6527008.160170	6527008.160170	1808327.449830	246103	1056	sf	66	cf
Infiltration BMP	Existing	11929 POMERING	5/1/2006	6515108.241040	6515108.241040	1800149.473170	246079	1056	sf	66	cf
Infiltration BMP	Existing	12240 WOODRUFF	3/19/2010	6526758.991120	6526758.991120	1793878.747920	245118	300224	sf	18764	cf
Infiltration BMP	Existing	12222 WOODRUFF	9/14/2009	6526625.121210	6526625.121210	1794009.479990	245118	70200	sf	4388	cf
Infiltration BMP	Existing	7624 FIRESTONE	1/1/2008	6517500.000000	6517500.000000	1802600.000000	246079	41632	sf	2602	cf
Infiltration BMP	Existing	7714 STEWART & GRAY	4/9/2007	6516397.756580	6516397.756580	1799563.749470	246079	30016	sf	1876	cf
Infiltration BMP	Existing	9637 LAKEWOOD	10/2/2008	6526780.802630	6526780.802630	1805111.536210	245125	15136	sf	946	cf
Infiltration BMP	Existing	12428 BENEDICT	6/14/2007	6525687.022380	6525687.022380	1792528.538110	245114	8080	sf	505	cf
Infiltration BMP	Existing	7774 DINSDALE	2/14/2014	6521332.495780	6521332.495780	1806385.183840	246103	4680	sf	293	cf

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Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8030 IMPERIAL HWY	2/14/2014	6515729.368090	6515729.368090	1794471.493939	246077	41789	sf	2000	cf
Infiltration BMP	Existing	9623 IMPERIAL HWY	2/14/2014	6524482.209740	6524482.209740	1792569.983950	245114	35408	sf	2213	cf
Infiltration BMP	Existing	10531 LAKEWOOD BL	2/14/2014	6525178.634060	6525178.634060	1801497.338680	245119	5840	sf	365	cf
Infiltration BMP	Existing	8121 FOURTH ST	2/14/2014	6521147.926450	6521147.926450	1802216.858440	246103	4680	sf	293	cf
Infiltration BMP	Existing	8123 FOURTH ST	2/14/2014	6521147.926450	6521147.926450	1802216.858440	246103	4680	sf	293	cf
Infiltration BMP	Existing	8555 TENTH ST	2/14/2014	6524962.328390	6524962.328390	1803501.510410	245119	4680	sf	293	cf
Infiltration BMP	Existing	9356 BUELL ST	2/14/2014	6527425.774610	6527425.774610	1799078.145910	245126	3120	sf	195	cf
Infiltration BMP	Existing	8449 COLE ST	2/14/2014	6520362.597670	6520362.597670	1796910.373080	245115	1560	sf	98	cf

D1.3. City of Lakewood

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Flow-Through Treatment BMP	Existing	Filterra Tree Wells (2)		Paramount & Arbor	33.843398	-118.159673	445521				
Infiltration BMP	Existing	Retention Basin at Cherry Cove Park			33.850296	-118.165478	446014				

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D1.4. City of Paramount

Type of BMP	Existing or Planned ?	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Bioswales	Existing	Landscape Swale	2012	Texaco/Alondra	33.889066	-118.171849	606071	37,500	sf	2109	cf
Bioswales	Existing	Landscape Swale	2012	Orange/Windmill	33.891602	-118.177436	606072	0.6	ac	1470	cf

D1.5. City of Pico Rivera

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Site-Scale Detention Basin	Existing	French drains at Smith Park	2013	6016 Rosemead Blvd				16	ac		
Site-Scale Detention Basin	Existing	French drains at Rio Vista	2013	Coffman Pico Road				7	ac		
Bioswales	Existing	Beverly Boulevard medians	2012	Beverly Blvd				5280	sf		
Permeable Pavement	Existing	Pico Park permeable pavement	2012	9528 Beverly Blvd				12	ac		
Bioswales	Existing	Telegraph Road medians	2013	Telegraph Rd from Rosemead Blvd to Eastside limit				5280	sf		
Bioswales	Planned	Paramount Blvd medians	2016	Paramount Blvd from Whittier Blvd to Mines Ave				5280	sf		
Infiltration BMPs	Planned	Two (2) Filterra Systems	2016	various				1	ac		
Infiltration BMPs	Existing	City of Pico Rivera City Hall	2011	8615 Passons Blvd				2.75	ac		
Infiltration BMPs	Existing	Rivera Park	2012	9530 Shade Lane				16	ac		

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D1.6. City of Signal Hill

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Bioretention / Biofiltration		Palm Drive Business Center	2/19/2008	2445 N Palm Drive	33.801973	-118.157962	775510	1	ac		
Bioretention / Biofiltration		Aragon Townhomes & Duplexes (City View)	3/9/2007	1902 (1890) Oribaza Ave	33.790924	-118.156725	776003	93,780	sf		
Bioretention / Biofiltration		EDCO Recycling & Transfer		2755 California Avenue	33.807881	-118.181769	776011	9,583	sf		
Bioretention / Biofiltration		EDCO Recycling & Transfer		2756 California Avenue	33.807881	-118.181769	776011	17,424	sf		
Bioretention / Biofiltration		EDCO Recycling & Transfer		2757 California Avenue	33.807881	-118.181769	776011	33,106	sf		
Bioretention / Biofiltration		EDCO Recycling & Transfer		2758 California Avenue	33.807881	-118.181769	776011	10,454	sf		
Bioretention / Biofiltration		EDCO Recycling & Transfer		2759 California Avenue	33.807881	-118.181769	776011	78,486	sf		
Bioretention / Biofiltration		2-Story Building and Parking Lot	12/28/2010	2653 Walnut Avenue	33.805754	-118.171978	776012	0.51	ac		
Bioretention / Biofiltration		EDCO Administrative Terminal	8/1/2011	950 27th Street	33.806179	-118.1812	776012	9583	sf	0.06	cfs
Bioretention / Biofiltration		EDCO Administrative Terminal	8/2/2011	951 27th Street	33.806179	-118.1812	776012	17424	sf	0.08	cfs
Bioretention / Biofiltration		EDCO Administrative Terminal	8/3/2011	952 27th Street	33.806179	-118.1812	776012	33106	sf	0.14	cfs
Bioretention / Biofiltration		EDCO Administrative Terminal	8/4/2011	953 27th Street	33.806179	-118.1812	776012	10454	sf	0.08	cfs
Bioretention / Biofiltration		Fantasy Castle	6/30/2009	2801 Walnut Ave	33.808289	118.171777		1,584	sf		
Bioswales	Existing	Fresh and Easy Neighborhood Market	11/16/2010	3300 Atlantic Avenue	33.817504	-118.184643	485510	18,000	sf	931	cf

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Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Bioswales	Existing	Fresh and Easy Neighborhood Market	11/17/2010	3301 Atlantic Avenue	33.817504	-118.184643	485510	120	sf	7	cf
Bioswales	Existing	Fresh and Easy Neighborhood Market	11/18/2010	3302 Atlantic Avenue	33.817504	-118.184643	485510	10,904	sf	542	cf
Bioswales	Existing	Signal Hill Police Station and Emergency Operation	5/26/2011	2745 Walnut Avenue	33.807067	-118.171984	775510	115,870	sf		
Bioswales	Existing	Jack in the Box	10/21/2008	802 Spring Street	33.812049	-118.182595	775510	12,000	sf		
Bioswales		Boiler Tech Warehouse	10/2/2009	2503 Cerritos Avenue	33.802564	-118.177391	776002	6,754	sf		
Bioswales		Aragon Townhomes & Duplexes (City View)	3/11/2007	1904 (1890) Oribaza Ave	33.790924	-118.156725	776003	31,100	sf		
Bioswales		Fantasy Castle	6/29/2009	2800 Walnut Ave	33.808289	118.171777		32,883	sf		
Flow-Through Treatment BMP	Existing	Petco, Party City	3/3/2009	3100 Atlantic Ave	33.813946	-118.184789	485510				
Flow-Through Treatment BMP	Existing	Petco, Party City	3/4/2009	3101 Atlantic Ave	33.813946	-118.184789	485510				
Flow-Through Treatment BMP	Existing	The Home Depot		3100 Atlantic Avenue	33.813946	-118.184789	485510	3.65	ac		
Flow-Through Treatment BMP	Existing	The Home Depot		3101 Atlantic Avenue	33.813946	-118.184789	485510	7.99	ac		
Flow-Through Treatment BMP	Existing	The Home Depot		3102 Atlantic Avenue	33.813946	-118.184789	485510	3.28	ac		

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Flow-Through Treatment BMP	Existing	The Home Depot		3103 Atlantic Avenue	33.813946	-118.184789	485510	4.79	ac		
Flow-Through Treatment BMP		Palm Drive Business Center	2/20/2008	2446 N Palm Drive	33.801973	-118.157962	775510	7,000	sf		
Flow-Through Treatment BMP	Existing	Fresh & Easy	11/17/2009	2475 Cherry Avenue	33.802363	-118.168152	775510	0.68	ac		
Flow-Through Treatment BMP	Existing	Fresh & Easy	11/18/2009	2476 Cherry Avenue	33.802363	-118.168152	775510	0.58	ac		
Flow-Through Treatment BMP	Existing	US Bank	9/17/2008	2615 Cherry Ave	33.804856	-118.167999	775510	18732	sf		
Flow-Through Treatment BMP	Existing	Signal Hill Industrial Center		2665-2745 Temple Ave	33.80648	-118.159782	775510	143,312	sf		
Flow-Through Treatment BMP	Existing	Tanker Interior Washing Facility		1710 E 29th Street	33.80935	-118.170824	775510	10,000	sf		
Flow-Through Treatment BMP	Existing	Delius Restaurant	7/14/2006	2951 Cherry Ave	33.81111	-118.168077	775510	32,000	sf		
Flow-Through Treatment BMP	Existing	Jack in the Box	10/20/2008	801 Spring Street	33.812049	-118.182595	775510	12,000	sf		

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Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Flow-Through Treatment BMP	Existing	Target (T-2319)	2/13/2007	950 E 33rd Street	33.816767	-118.181488	775510	178,600	sf		
Flow-Through Treatment BMP	Existing	Hawk Industries	5/8/2007	1245 E. 23rd Street	33.799126	-118.17577	776002	27,322	sf		
Flow-Through Treatment BMP	Existing	Hawk Industries	5/9/2007	1246 E. 23rd Street	33.799126	-118.17577	776002	1575	sf		
Flow-Through Treatment BMP		Boiler Tech Warehouse	9/30/2009	2501 Cerritos Avenue	33.802564	-118.177391	776002	6,754	sf		
Flow-Through Treatment BMP	Existing	Las Brisas II Community Housing	1/11/2006	2400-2418 California Ave	33.803504	-118.180639	776002	16,247	sf		
Flow-Through Treatment BMP	Existing	Las Brisas II Community Housing	1/12/2006	2400-2418 California Ave	33.803504	-118.180639	776002	25,047	sf		
Flow-Through Treatment BMP	Existing	Villagio	12/5/2005	2550 Gundry Ave	33.803577	-118.173289	776002	61,000	sf		
Flow-Through Treatment BMP	Existing	Villagio	12/6/2005	2551 Gundry Ave	33.803577	-118.173289	776002	30,492	sf		
Flow-Through Treatment BMP	Existing	Villagio	12/7/2005	2552 Gundry Ave	33.803577	-118.173289	776002	4,356	sf		

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Flow-Through Treatment BMP		Aragon Townhomes & Duplexes (City View)	3/6/2007	1899 (1890) Oribaza Ave	33.790924	-118.156725	776003	31,350	sf		
Flow-Through Treatment BMP		Aragon Townhomes & Duplexes (City View)	3/7/2007	1900 (1890) Oribaza Ave	33.790924	-118.156725	776003	63,400	sf		
Flow-Through Treatment BMP		In-N-Out Burger	5/27/2011	799 E. Spring Street	33.812066	-118.183197	776011	65,220	sf		
Flow-Through Treatment BMP		Shoreline Fabricators	8/1/2007	2652 Gundry Ave	33.805493	-118.173804	776012	16,300	sf		
Flow-Through Treatment BMP		Shoreline Fabricators	8/2/2007	2653 Gundry Ave	33.805493	-118.173804	776012	1,395	sf		
Flow-Through Treatment BMP		2-Story Building and Parking Lot	12/29/2010	2654 Walnut Avenue	33.805754	-118.171978	776012				
Flow-Through Treatment BMP		Islamic Center	5/29/2009	996 27th St	33.806216	-118.180729	776012	5000	sf		
Flow-Through Treatment BMP		Crescent Square Development	8/10/2007	1600-1799 Green House Place				136,955	sf		
Infiltration BMPs	Existing	Fresh & Easy	11/19/2009	2477 Cherry Avenue	33.802363	-118.168152	775510	76,143	sf		
Infiltration BMPs	Existing	US Bank	9/19/2008	2617 Cherry Ave	33.804856	-118.167999	775510	18732	sf		

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Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMPs	Planned	Applebee's	3/12/2013	899 E. Spring Street	33.812089	-118.181855	775510	23,580	sf		
Infiltration BMPs	Existing	Hawk Industries	5/10/2007	1247 E. 23rd Street	33.799126	-118.17577	776002	27,322	sf		
Infiltration BMPs		Boiler Tech Warehouse	10/1/2009	2502 Cerritos Avenue	33.802564	-118.177391	776002	6,754	sf		
Infiltration BMPs		Pacific Walk	1/4/2011	PCH and Orizaba Avenue	33.789847	-118.156748	776003	100,200	sf		
Infiltration BMPs		Pacific Walk	1/5/2011	PCH and Orizaba Avenue	33.789847	-118.156748	776003	149,015	sf		
Infiltration BMPs		Pacific Walk	1/6/2011	PCH and Orizaba Avenue	33.789847	-118.156748	776003	1,300	sf		
Infiltration BMPs		Aragon Townhomes & Duplexes (City View)	3/8/2007	1901 (1890) Oribaza Ave	33.790924	-118.156725	776003	94,750	sf		
Infiltration BMPs		Aragon Townhomes & Duplexes (City View)	3/10/2007	1903 (1890) Oribaza Ave	33.790924	-118.156725	776003	93,780	sf		
Infiltration BMPs	Planned	Willow Street Medical Office Building	12/9/2013	845 E. Willow Street	33.804664	-118.182279	776009	22,651	sf	1095	cf
Infiltration BMPs	Planned	Willow Street Medical Office Building	12/10/2013	846 E. Willow Street	33.804664	-118.182279	776009	37,304	sf	1890	cf
Infiltration BMPs		In-N-Out Burger	5/28/2011	800 E. Spring Street	33.812066	-118.183197	776011	65,220	sf	3425	cf
Infiltration BMPs		Shoreline Fabricators	8/3/2007	2654 Gundry Ave	33.805493	-118.173804	776012	16,300	sf		
Infiltration BMPs		Islamic Center	5/28/2009	995 27th St	33.806216	-118.180729	776012	5000	sf		
Infiltration BMPs	Existing	A & A Ready Mix Concrete	8/1/2007	900 E. Patterson	33.806664	-118.182206	776012	2	ac		
Permeable Pavement	Existing	US Bank	9/18/2008	2616 Cherry Ave	33.804856	-118.167999	775510	60	sf		

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Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Permeable Pavement	Existing	Hawk Industries	5/11/2007	1248 E. 23rd Street	33.799126	-118.17577	776002	5,628	sf		

D1.7. City of South Gate

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Bioretention / Biofiltration		Self Storage	9/15/2008	2405 Southern Ave	33.953436	-118.229363	796034	0.25	ac		
Bioretention / Biofiltration		Hollydale Plaza	3/30/2010	12222 Garfield Avenue	33.915655	-118.168383	796076	15,278	sf		
Bioretention / Biofiltration		Atlantic Avenue Improvements	4/21/2010	Atlantice from Abbott to Firestone	33.943066	-118.181112	796084	7.44	ac		
Bioretention / Biofiltration	Planned	azalea	11/25/2012	4641 Firestone Blvd.	33.952413	-118.187909	796084	7,328	sf	0.22	cfs
Bioswales		South Gate McDonald's	9/30/2013	3313 Tweedy Boulevard	33.945113	-118.211464	796034	5,119	sf		
Bioswales		South Gate McDonald's	10/1/2013	3314 Tweedy Boulevard	33.945113	-118.211464	796034	5,545	sf		
Bioswales		Commercial Center	10/4/2010	9200 Califlornia Avenue	33.950805	-118.206221	796034	12,367	sf		
Bioswales		Commercial Center	10/5/2010	9201 Califlornia Avenue	33.950805	-118.206221	796034	4,263	sf		
Bioswales		Hot Mix Asphalt Plant	5/11/2001	5626 Southern Avenue	33.944913	-118.168148	796083	2.7	ac		
Bioswales		Goals Soccer Centers - South Gate	2/9/2010	9599 Pinehurst Avenue	33.945107	-118.182378	796084	53,142	sf		
Flow-Through Treatment BMP	Existing	South Gate McDonald's	9/26/2013	3309 Tweedy Boulevard	33.945113	-118.211464	796034	2,394	sf		
Flow-Through Treatment BMP		South Gate McDonald's	9/28/2013	3311 Tweedy Boulevard	33.945113	-118.211464	796034	2,436	sf		

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Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Flow-Through Treatment BMP	Existing	Walgreens	7/24/2006	9830 Long Beach	33.946082	-118.215937	796034	48,725	sf		
Flow-Through Treatment BMP	Existing	King's Car Wash	11/29/2006	9801-9807 Long Beach Blvd	33.946452	-118.216775	796034	10,461	sf		
Flow-Through Treatment BMP		King's Car Wash	12/1/2006	9801-9807 Long Beach Blvd	33.946452	-118.216775	796034				
Flow-Through Treatment BMP	Existing	Sarina Townhomes	2/12/2007	9321 State Street	33.950368	-118.21325	796034	14,375	sf		
Flow-Through Treatment BMP		Commercial Center	10/6/2010	9202 Califlornia Avenue	33.950805	-118.206221	796034	16,630	sf		
Flow-Through Treatment BMP		Office Bldg	12/20/2007	3830 Firestone Blvd	33.953324	-118.201934	796034	1,000	sf		
Flow-Through Treatment BMP		Office Bldg	12/21/2007	3831 Firestone Blvd	33.953324	-118.201934	796034	112,000	sf		
Flow-Through Treatment BMP		Office Bldg	12/20/2007	3800 Firestone Blvd	33.95348	-118.202386	796034	1,000	sf		
Flow-Through Treatment BMP		Office Bldg	12/21/2007	3801 Firestone Blvd	33.95348	-118.202386	796034	112,000	sf		

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Flow-Through Treatment BMP	Planned	Calden Court Appartments	9/27/2013	8901 Calden Avenue	33.95515	-118.228736	796034	219,543	sf		
Flow-Through Treatment BMP		Hollydale Plaza	3/31/2010	12223 Garfield Avenue	33.915655	-118.168383	796076	27,381	sf		
Flow-Through Treatment BMP	Existing	Sherwin Inc	4/10/2007	5530 Borwick Ave	33.925749	-118.172611	796082	7,892	sf		
Flow-Through Treatment BMP		Hot Mix Asphalt Plant	5/10/2001	5625 Southern Avenue	33.944913	-118.168148	796083	9.5	ac		
Flow-Through Treatment BMP		Atlantic Avenue Improvements	4/22/2010	Atlantice from Abbott to Firestone	33.943066	-118.181112	796084	13.32	ac		
Flow-Through Treatment BMP		Goals Soccer Centers - South Gate	2/11/2010	9601 Pinehurst Avenue	33.945107	-118.182378	796084	70,036	sf		
Flow-Through Treatment BMP		Goals Soccer Centers - South Gate	2/12/2010	9602 Pinehurst Avenue	33.945107	-118.182378	796084	37,897	sf		
Flow-Through Treatment BMP		Goals Soccer Centers - South Gate	2/13/2010	9603 Pinehurst Avenue	33.945107	-118.182378	796084	63,400	sf		
Flow-Through Treatment BMP	Planned	azalea	11/24/2012	4640 Firestone Blvd.	33.952413	-118.187909	796084	1,583,819	sf		

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Flow-Through Treatment BMP	Existing	Interior Removal Specialist Demolition	5/21/2007	9309 Rayo Ave	33.949331	-118.17896	796089				
Flow-Through Treatment BMP		Interior Removal Specialist Demolition	5/22/2007	9310 Rayo Ave	33.949331	-118.17896	796089				
Flow-Through Treatment BMP		Interior Removal Specialist Demolition	5/23/2007	9311 Rayo Ave	33.949331	-118.17896	796089				
Flow-Through Treatment BMP		Interior Removal Specialist Demolition	5/24/2007	9312 Rayo Ave	33.949331	-118.17896	796089				
Flow-Through Treatment BMP		Petrochem Manufacturing	12/18/2006	8401 Quartz	33.957949	-118.191835	796090	162,305	sf		
Flow-Through Treatment BMP		Petrochem Manufacturing	12/19/2006	8402 Quartz	33.957949	-118.191835	796090	51,401	sf		
Infiltration BMPs		South Gate McDonald's	9/27/2013	3310 Tweedy Boulevard	33.945113	-118.211464	796034	2,394	sf		
Infiltration BMPs		South Gate McDonald's	9/29/2013	3312 Tweedy Boulevard	33.945113	-118.211464	796034	2,436	sf		
Infiltration BMPs		South Gate McDonald's	10/4/2013	3317 Tweedy Boulevard	33.945113	-118.211464	796034	3,743	sf		
Infiltration BMPs		King's Car Wash	11/30/2006	9801-9807 Long Beach Blvd	33.946452	-118.216775	796034	3,047	sf		
Infiltration BMPs		Sarina Townhomes	2/13/2007	9322 State Street	33.950368	-118.21325	796034	17,519	sf		

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMPs		Office Bldg	12/22/2007	3832 Firestone Blvd	33.953324	-118.201934	796034	112,000	sf		
Infiltration BMPs		Office Bldg	12/22/2007	3802 Firestone Blvd	33.95348	-118.202386	796034	112,000	sf		
Infiltration BMPs	Existing	Family Dollar	10/8/2012	3610 Firestone	33.95374	-118.204546	796034		sf		
Infiltration BMPs	Planned	Calden Court Appartments	9/28/2013	8902 Calden Avenue	33.95515	-118.228736	796034	219,543	sf		
Infiltration BMPs		South Gate Ward Building New Parking Lot	10/15/2010	2771 Liberty Boulevard	33.961969	-118.220918	796034	14,811	sf		
Infiltration BMPs		Sherwin Inc	4/11/2007	5531 Borwick Ave	33.925749	-118.172611	796082	7,892	sf		
Infiltration BMPs		Atlantic Avenue Improvements	4/23/2010	Atlantice from Abbott to Firestone	33.943066	-118.181112	796084	22,400	sf		
Infiltration BMPs		Batting Cages	11/4/2010	9599 Pinehurst Avenue	33.945107	-118.182378	796084	7,953	sf		
Infiltration BMPs		Goals Soccer Centers - South Gate	2/10/2010	9600 Pinehurst Avenue	33.945107	-118.182378	796084	113	sf		
Infiltration BMPs		Goals Soccer Centers - South Gate	2/14/2010	9604 Pinehurst Avenue	33.945107	-118.182378	796084	171,333	sf		
Infiltration BMPs	Planned	azalea	11/19/2012	4635 Firestone Blvd.	33.952413	-118.187909	796084	444,636	sf	31,365	cf
Infiltration BMPs	Planned	azalea	11/20/2012	4636 Firestone Blvd.	33.952413	-118.187909	796084	110,869	sf	12,946	cf
Infiltration BMPs	Planned	azalea	11/21/2012	4637 Firestone Blvd.	33.952413	-118.187909	796084	582,860	sf	72,234	cf
Infiltration BMPs	Planned	azalea	11/22/2012	4638 Firestone Blvd.	33.952413	-118.187909	796084	222,727	sf	25,348	cf
Infiltration BMPs	Planned	azalea	11/23/2012	4639 Firestone Blvd.	33.952413	-118.187909	796084	222,727	sf	64,314	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMPs	Existing	New South Central Properties, LLC	5/28/2009	8600 Rheem Ave	33.955566	-118.192042	796084	20,960	sf		
Infiltration BMPs		LA Water	8/4/2010	9415 Burtis	33.947369	-118.176109	796350	154,538	sf		
Permeable Pavement		South Gate McDonald's	10/2/2013	3315 Tweedy Boulevard	33.945113	-118.211464	796034	8,697	sf		
Permeable Pavement		South Gate McDonald's	10/3/2013	3316 Tweedy Boulevard	33.945113	-118.211464	796034	3,550	sf		

D1.8. City of Whittier

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Bioretention / Biofiltration	Planned	GWT Biolswale	2014	Greenway Trail from to	33.972121	-118.044253	895098				
Bioretention / Biofiltration	Planned	Whittier Blvd Widening and Bioswale	2017	Whittier Blvd from to							
Green Streets (Describe)	Planned	Lower Uptown reverse drains	2014	Milton, Newlin, Comstock from La Cuarta to Walnut	33.970199	-118.039721	895098		TBD		TBD
Site-Scale Detention Basin	Existing	Police Building and City Hall Storm Drainage	2010	13230 Penn St	33.974748	-118.03371	895098				

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Attachment E: SUPPORTING CALIBRATION DATA

Submitted to:

LLAR WMP Group LCC WMP Group LSGR WMP Group

Submitted by:

Tetra Tech
9444 Balboa Ave., Suite 215
San Diego, CA 92123

June 6, 2014

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1. Lower San Gabriel River

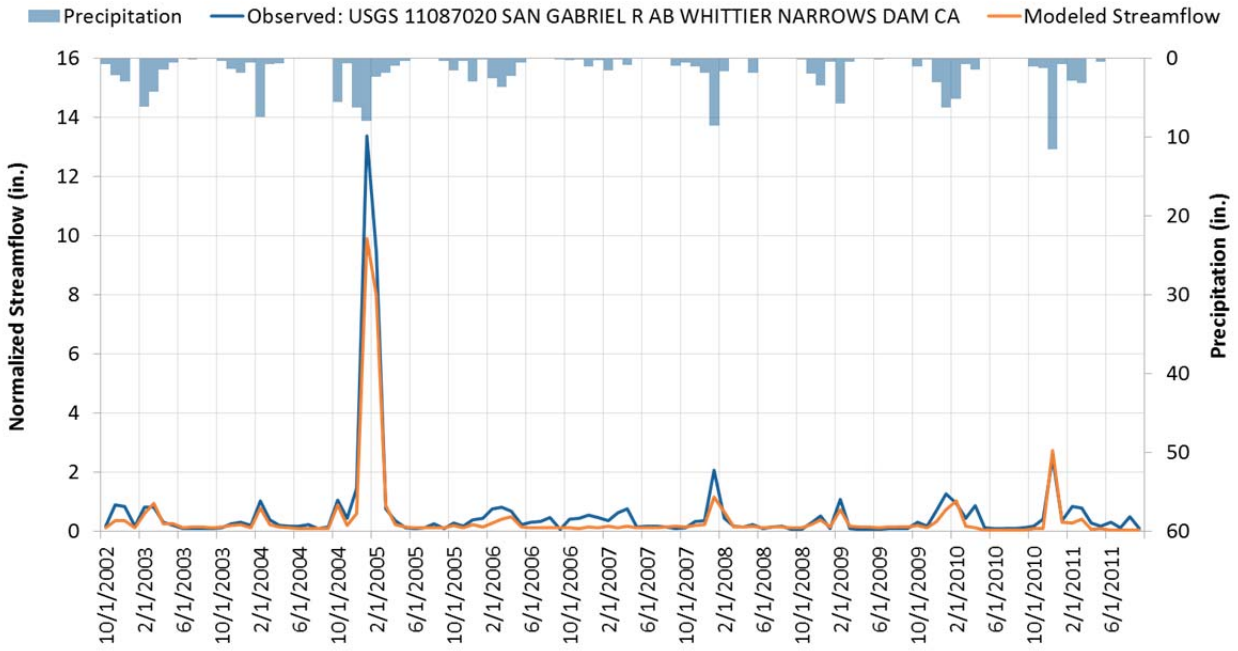

Figure 1. Monthly hydrograph for USGS 11087020 SAN GABRIEL R AB WHITTIER NARROWS DAM CA (10/1/2002 – 9/30/2011).

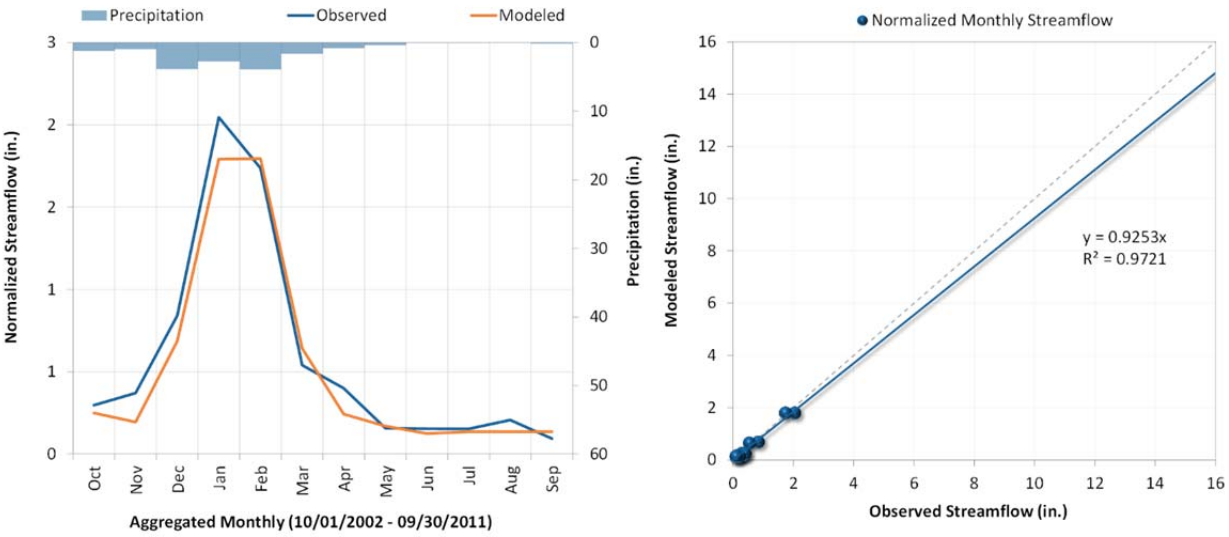

Figure 2. Aggregated monthly hydrograph for USGS 11087020 SAN GABRIEL R AB WHITTIER NARROWS DAM CA (10/1/2002 – 9/30/2011).

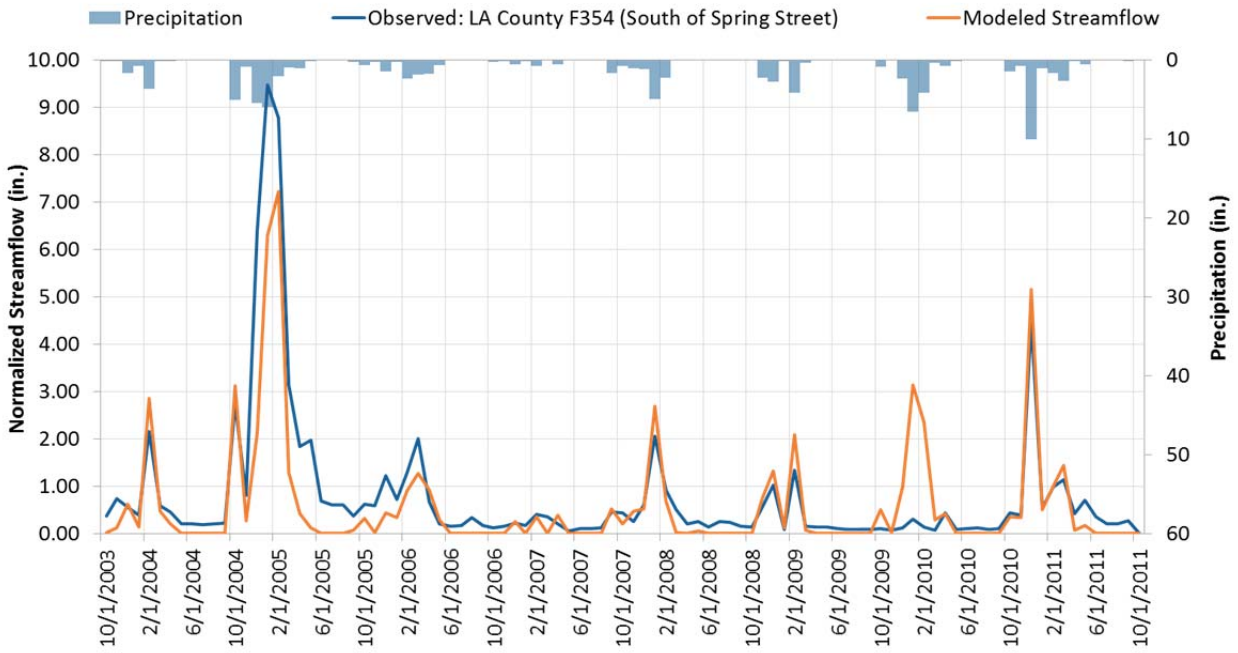

Figure 3. Monthly hydrograph for USGS 11089200 COYOTE C NR BUENA PARK CA (10/1/2003 – 9/30/2011.

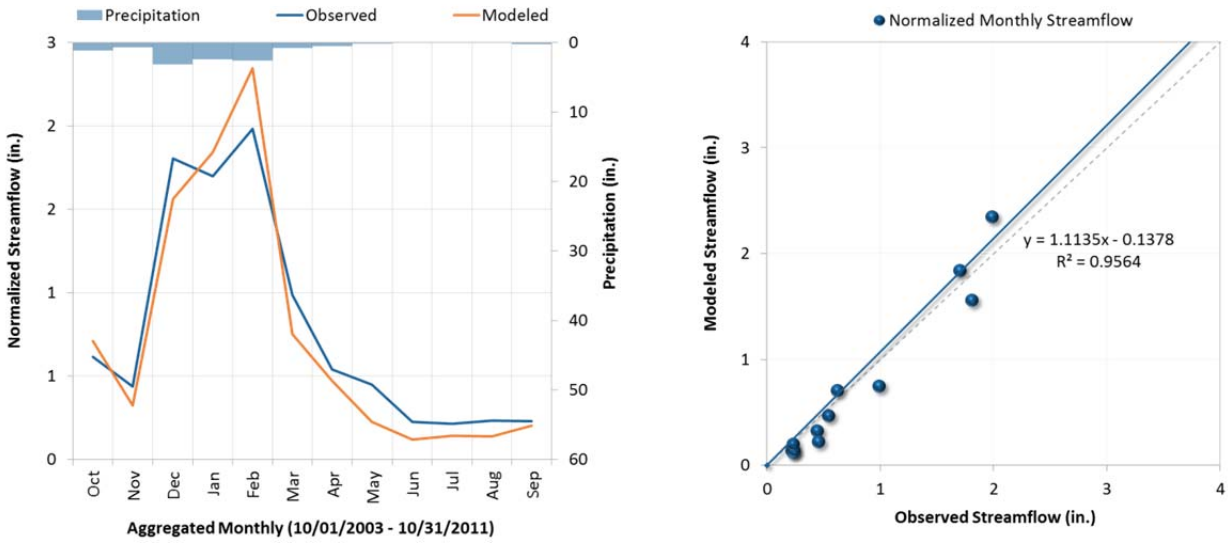

Figure 4. Aggregated monthly hydrograph for USGS 11089200 COYOTE C NR BUENA PARK CA (10/1/2003 – 9/30/2011.

Table 1. Summary of water quality data evaluated for the Lower San Gabriel River

Gage	Constituent	Minimum	Q1	Median	Q3	Maximum
S14	Total Copper (ug/l)	5.0	10.5	13.1	23.9	81.4
S13	Total Copper (ug/l)	0.5	11.8	28.1	48.3	351.0
S14	Total Lead (ug/l)	0.7	1.4	2.9	8.2	56.0
S13	Total Lead (ug/l)	0.2	1.1	10.2	19.2	147.0
S14	TSS (mg/L)	5.0	16.8	38.0	169.8	1258.0
S13	TSS (mg/L)	1.0	48.0	97.0	230.5	1556.0
S14	Total Zinc (ug/l)	19.8	36.6	61.0	86.9	440.0
S13	Total Zinc (ug/l)	1.0	62.0	135.0	241.5	2010.0
S14	Fecal Coliform (MPN/100mL)	20	300	1,300	50,000	16,000,000
S13	FC (MPN/100mL)	20	1,300	16,000	90,000	2,200,000
S14	Total Nitrogen (mg/l)	-	-	-	-	-
S13	Total Nitrogen (mg/l)	-	-	-	-	-
S14	Total Phosphorous (mg/l)	0.05	0.11	0.18	0.41	0.86
S13	Total Phosphorous (mg/l)	-	-	-	-	-

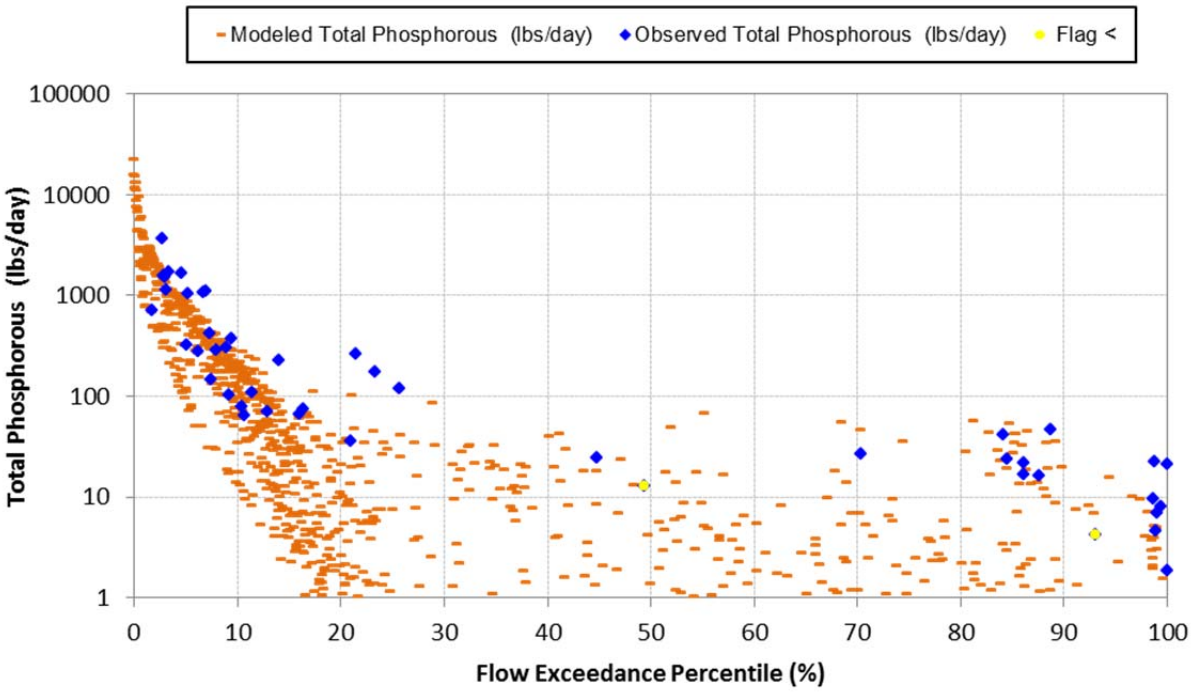

Figure 5. Simulated vs. observed load duration plots for Total Phosphorous (10/1/2002 through 9/30/2011) at San Gabriel River mass emission station S14.

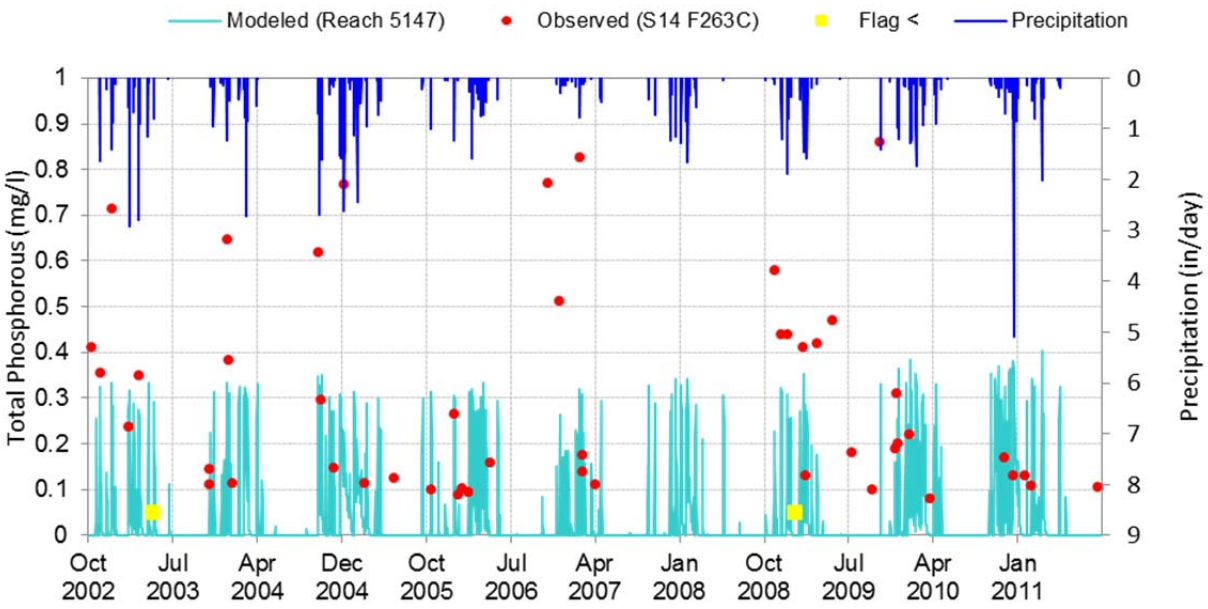

Figure 6. Simulated vs. observed time series plots for Total Phosphorous (10/1/2002 through 9/30/2011) at San Gabriel River mass emission station S14.

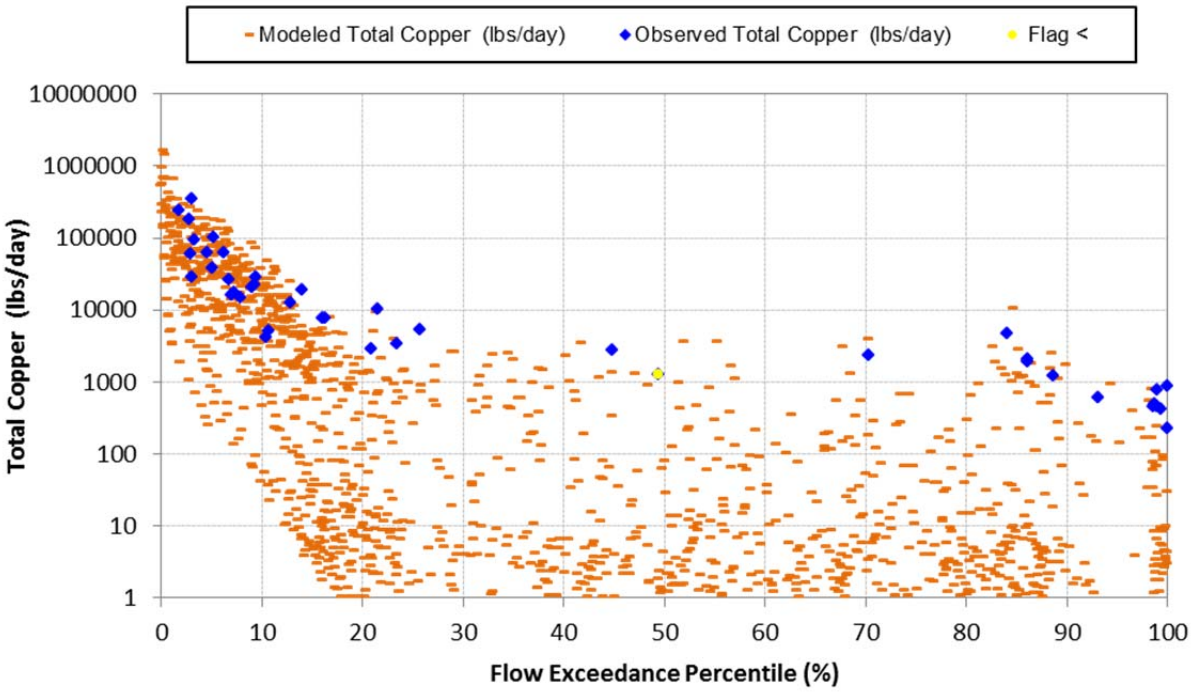

Figure 7. Simulated vs. observed load duration plots for Total Copper (10/1/2002 through 9/30/2011) at San Gabriel River mass emission station S14.

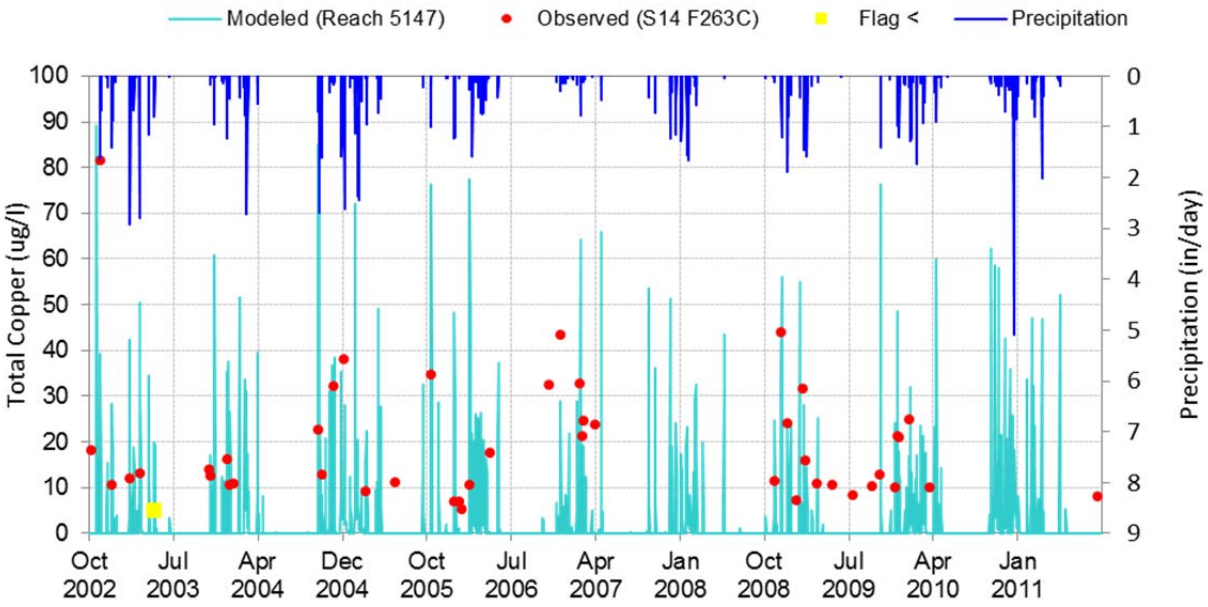

Figure 8. Simulated vs. observed timeseries plots for Total Copper (10/1/2002 through 9/30/2011) at San Gabriel River mass emission station S14.

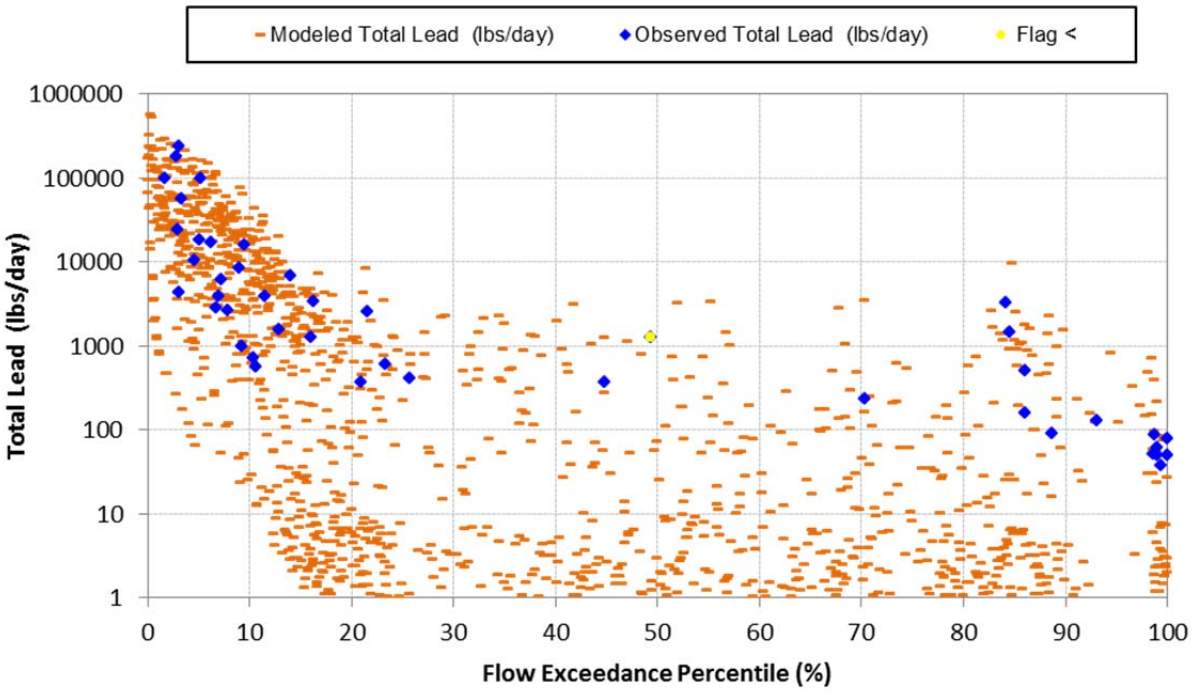

Figure 9. Simulated vs. observed load duration plots for Total Lead (10/1/2002 through 9/30/2011) at San Gabriel River mass emission station S14.

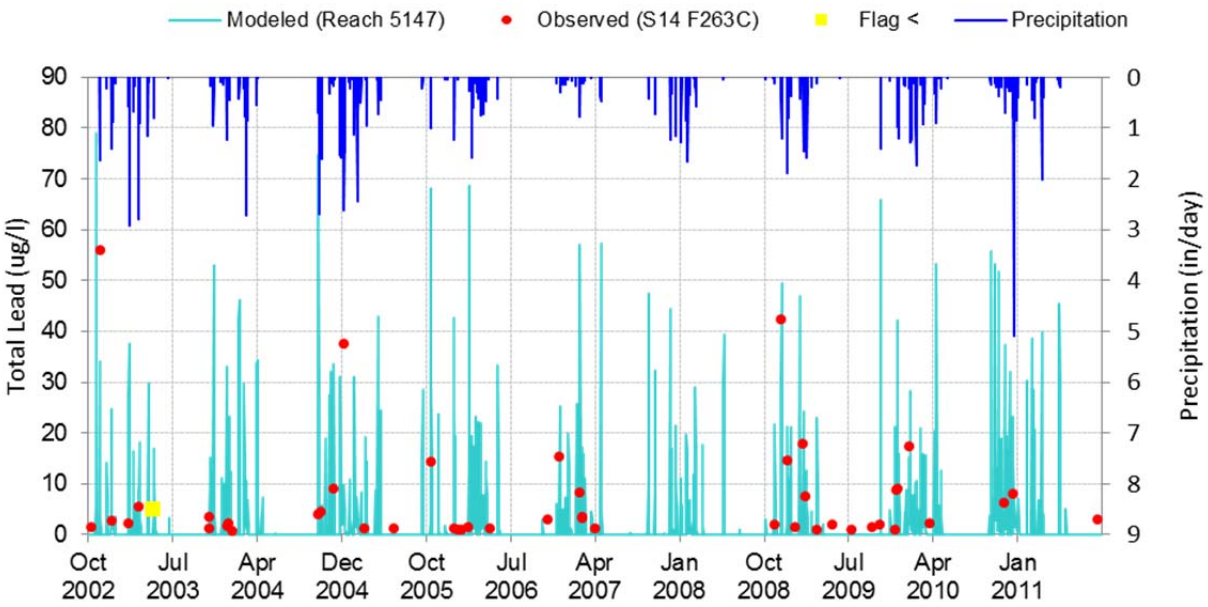

Figure 10. Simulated vs. observed timeseries plots for Total Lead (10/1/2002 through 9/30/2011) at San Gabriel River mass emission station S14.

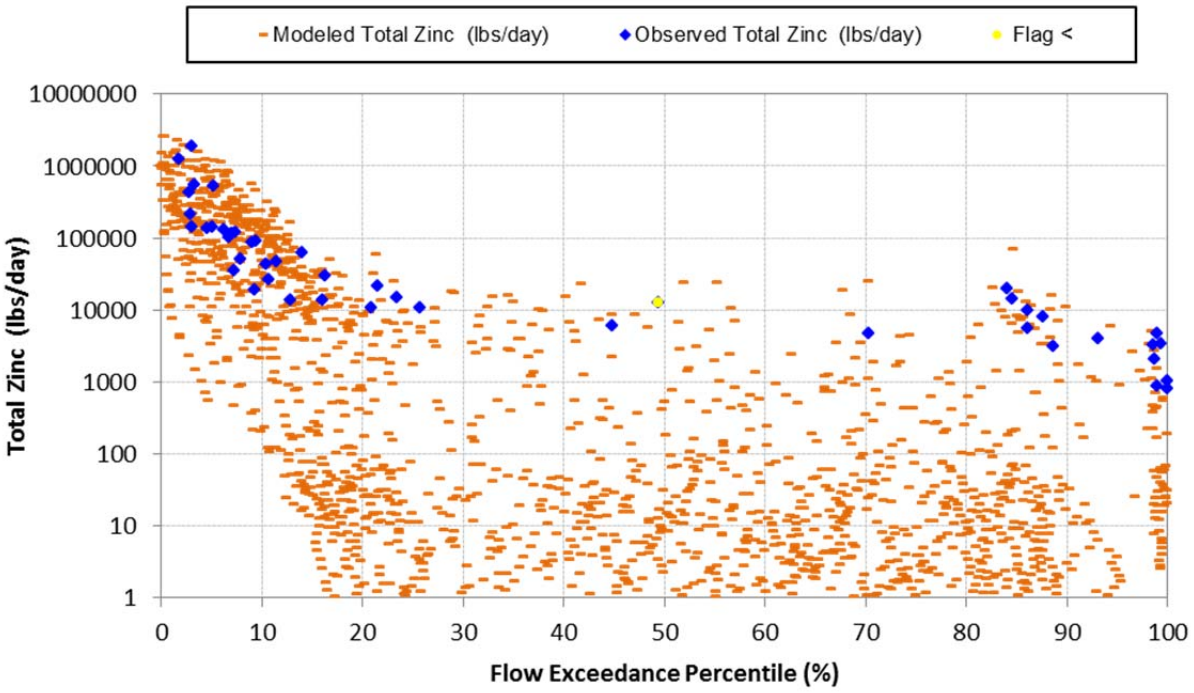

Figure 11. Simulated vs. observed load duration plots for Total Zinc (10/1/2002 through 9/30/2011) at San Gabriel River mass emission station S14.

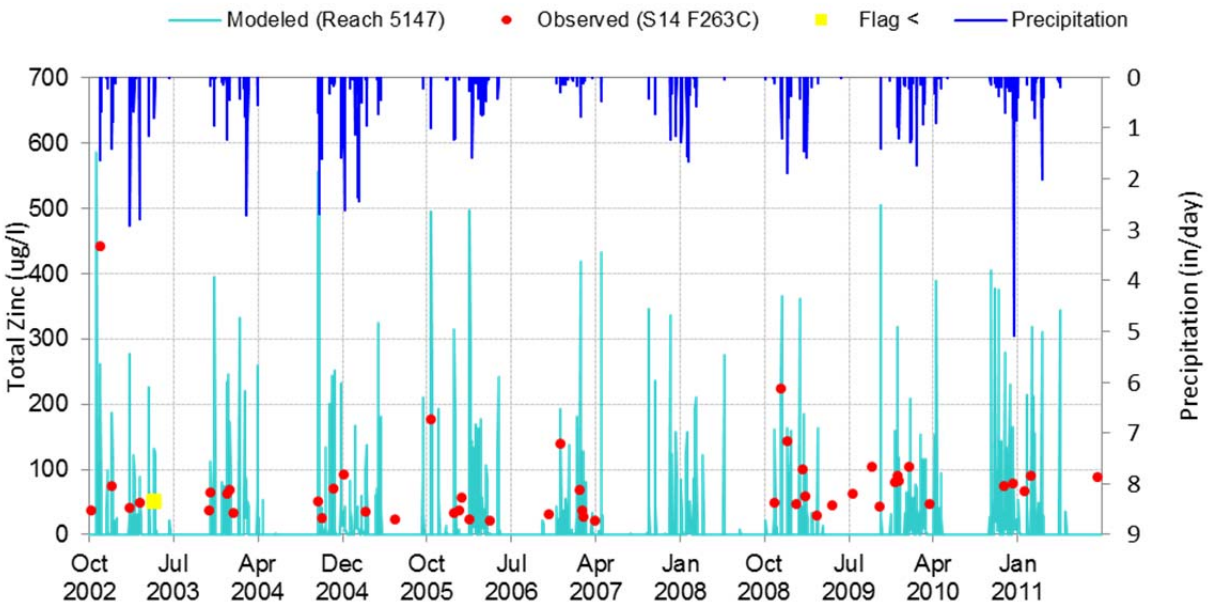

Figure 12. Simulated vs. observed timeseries plots for Total Zinc (10/1/2002 through 9/30/2011) at San Gabriel River mass emission station S14.

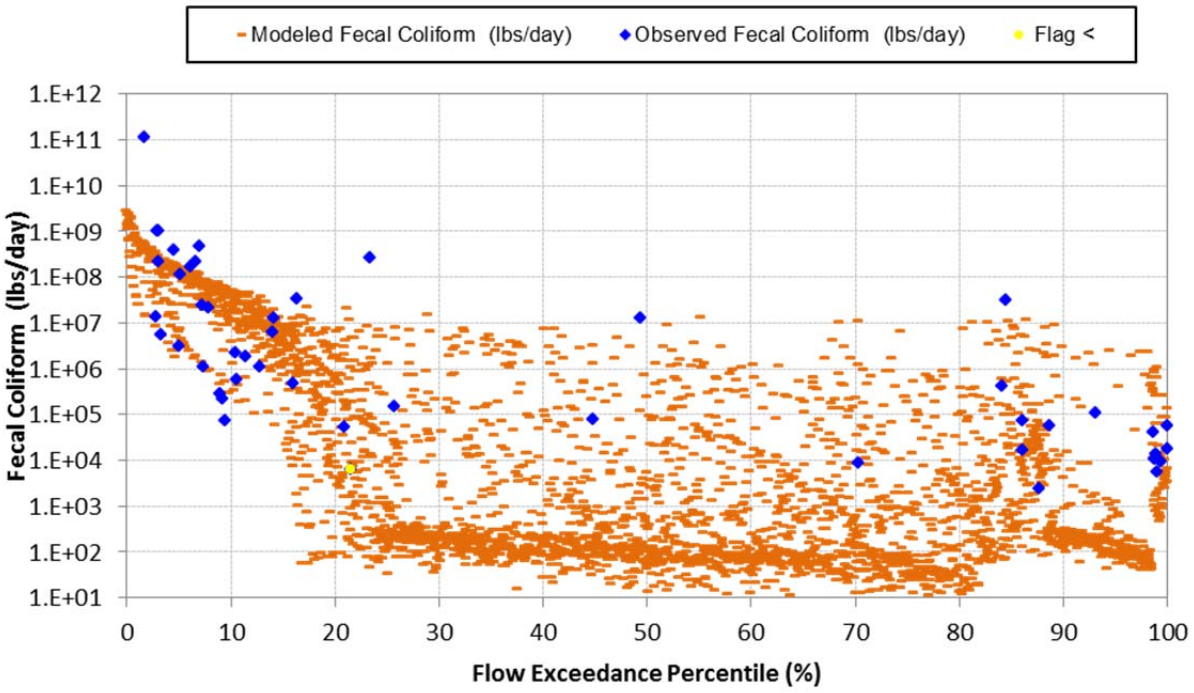

Figure 13. Simulated vs. observed load duration plots for Fecal Coliform (10/1/2002 through 9/30/2011).

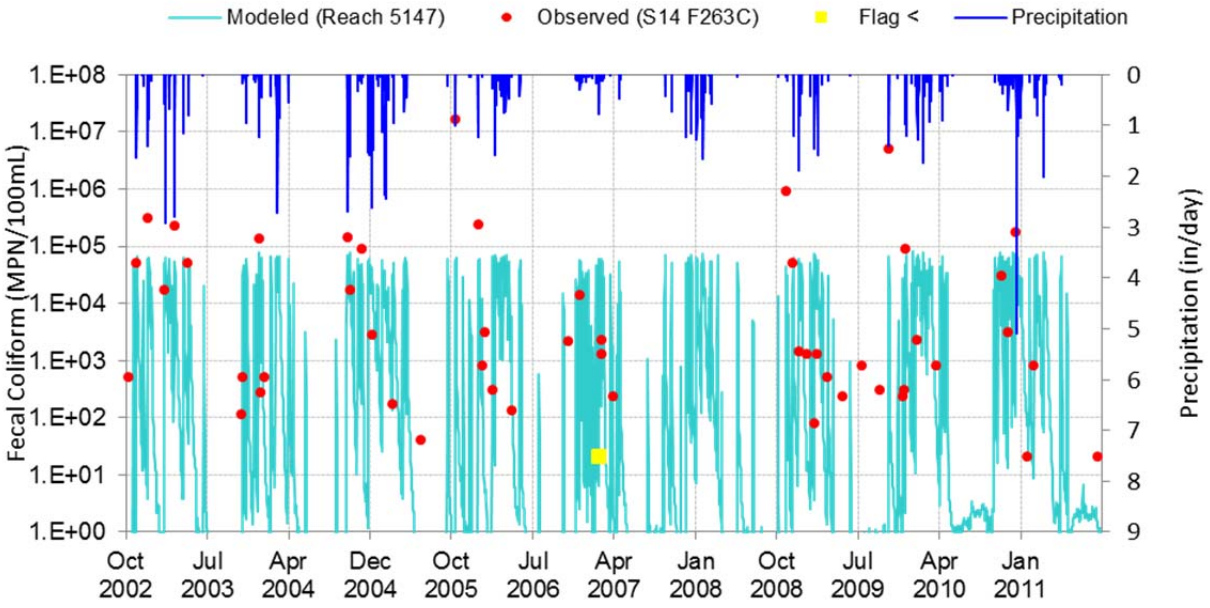

Figure 14. Simulated vs. observed timeseries plots for Fecal Coliform (10/1/2002 through 9/30/2011).

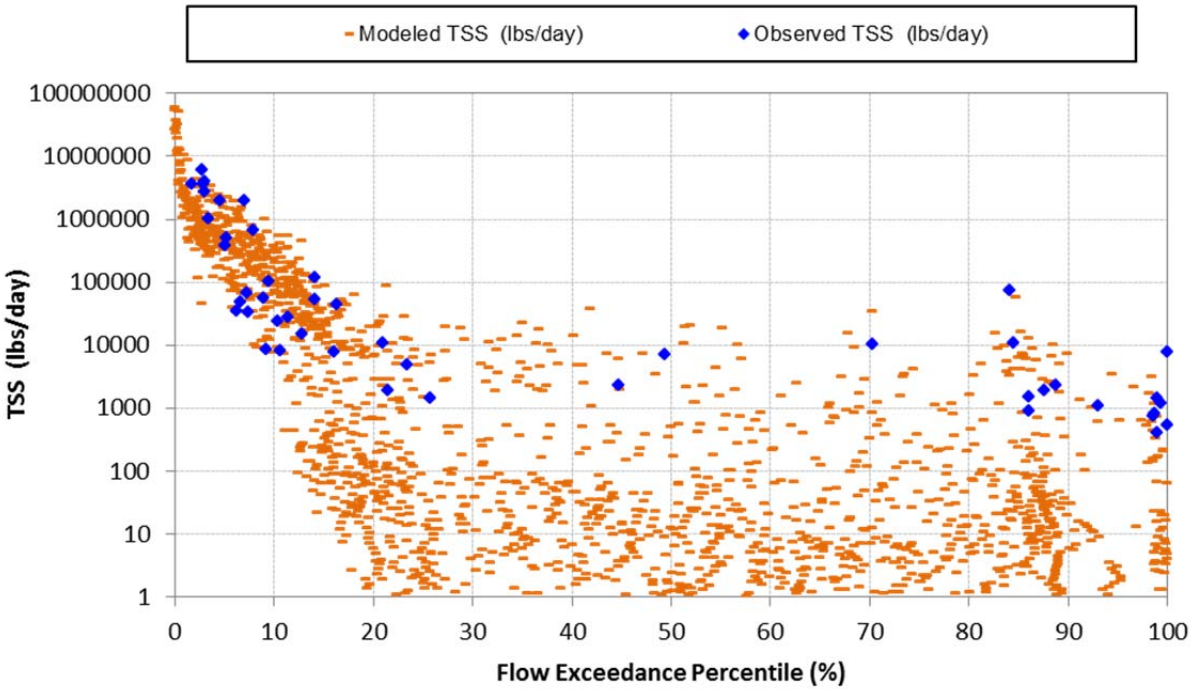

Figure 15. Simulated vs. observed load duration plots for Total Sediment (10/1/2002 through 9/30/2011).

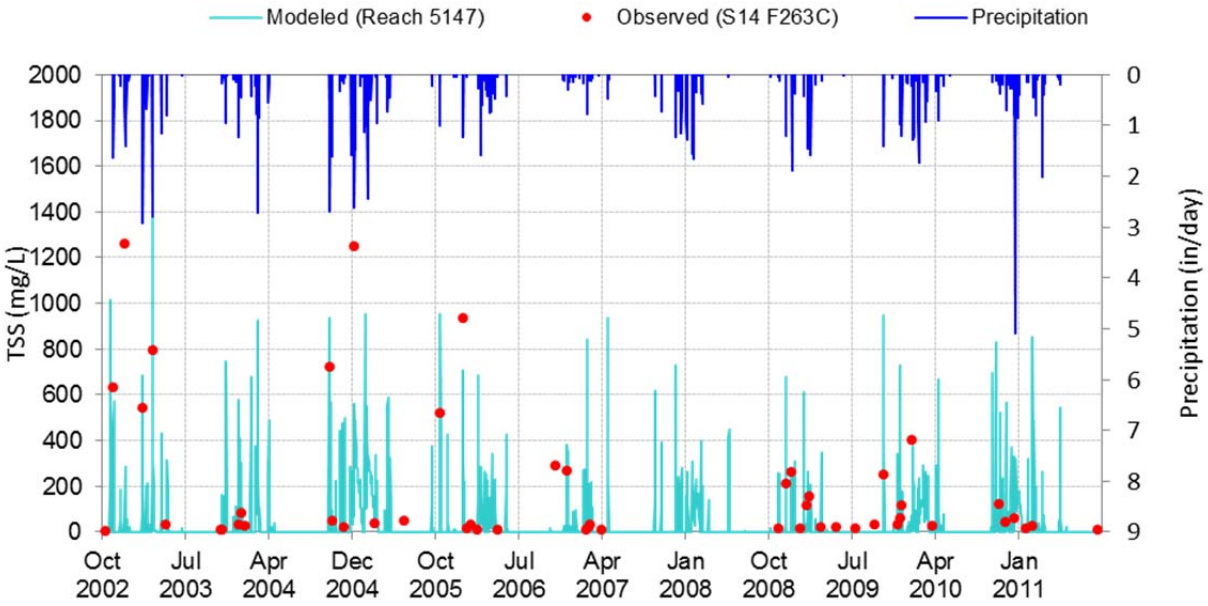

Figure 16. Simulated vs. observed time series plots for Total Sediment (10/1/2002 through 9/30/2011).

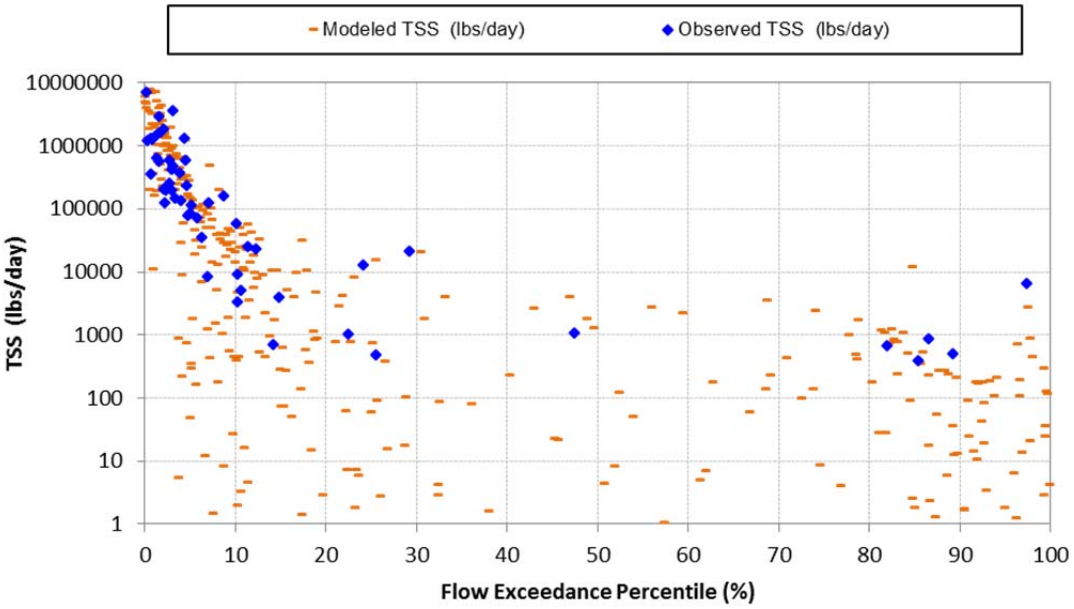

Figure 17. Simulated vs. observed load duration plots for Total Sediment (10/1/2002 through 9/30/2011) at Coyote Creek mass emission station S13.

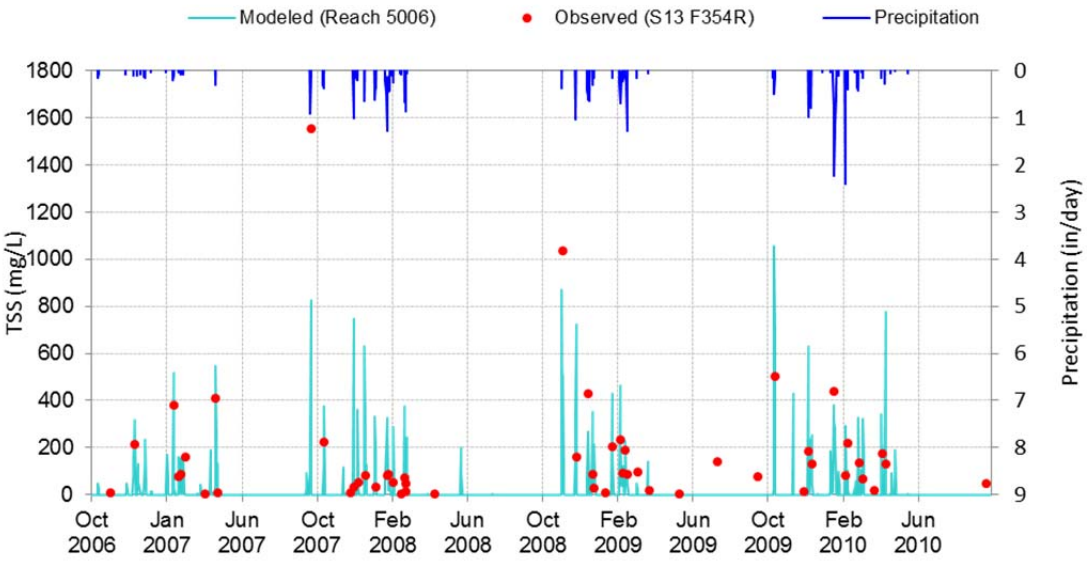

Figure 18. Simulated vs. observed timeseries plots for Total Sediment (10/1/2002 through 9/30/2011) at Coyote Creek mass emission station S13.

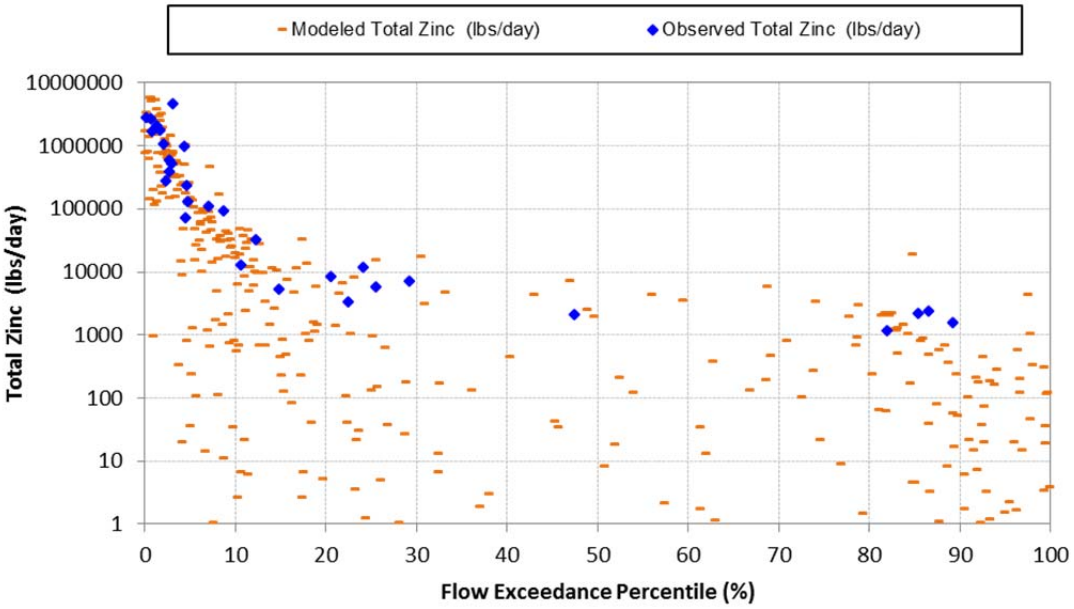

Figure 19. Simulated vs. observed load duration plots for Total Zinc (10/1/2002 through 9/30/2011) at Coyote Creek mass emission station S13.

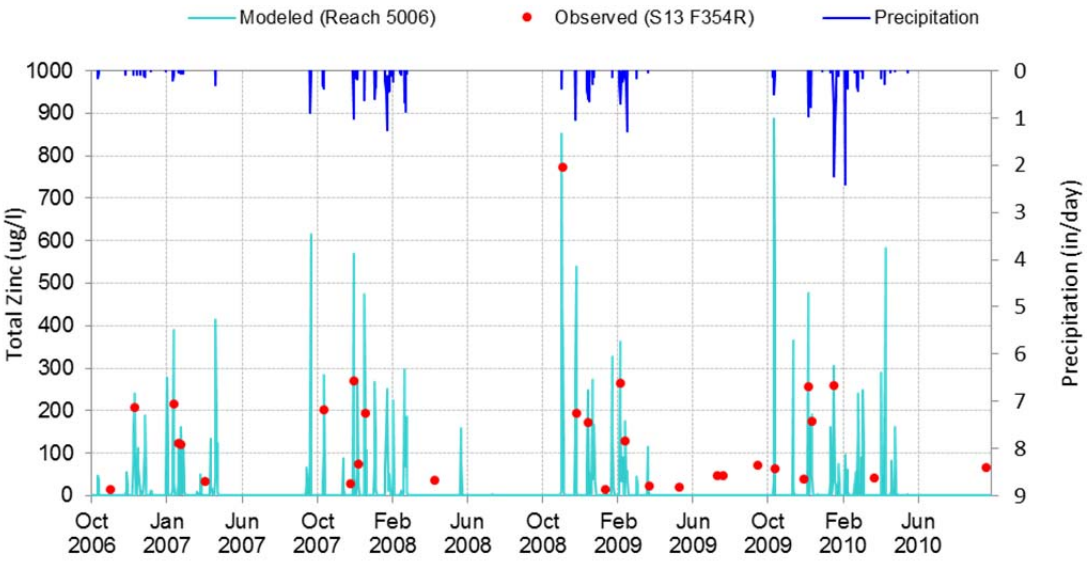

Figure 20. Simulated vs. observed timeseries plots for Total Zinc (10/1/2002 through 9/30/2011) at Coyote Creek mass emission station S13.

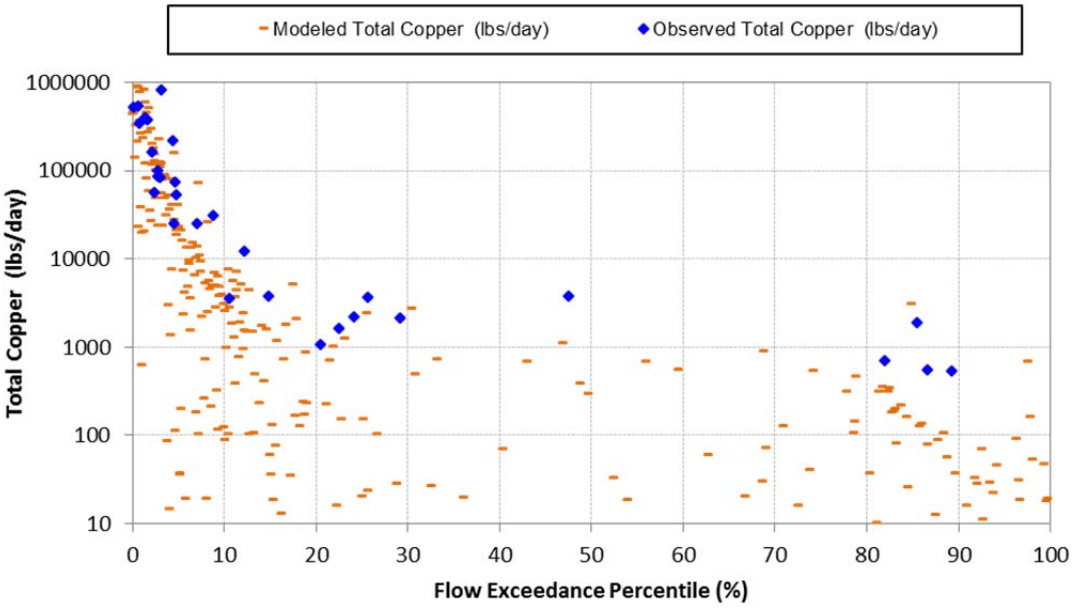

Figure 21. Simulated vs. observed load duration plots for Total Copper (10/1/2002 through 9/30/2011) at Coyote Creek mass emission station S13.

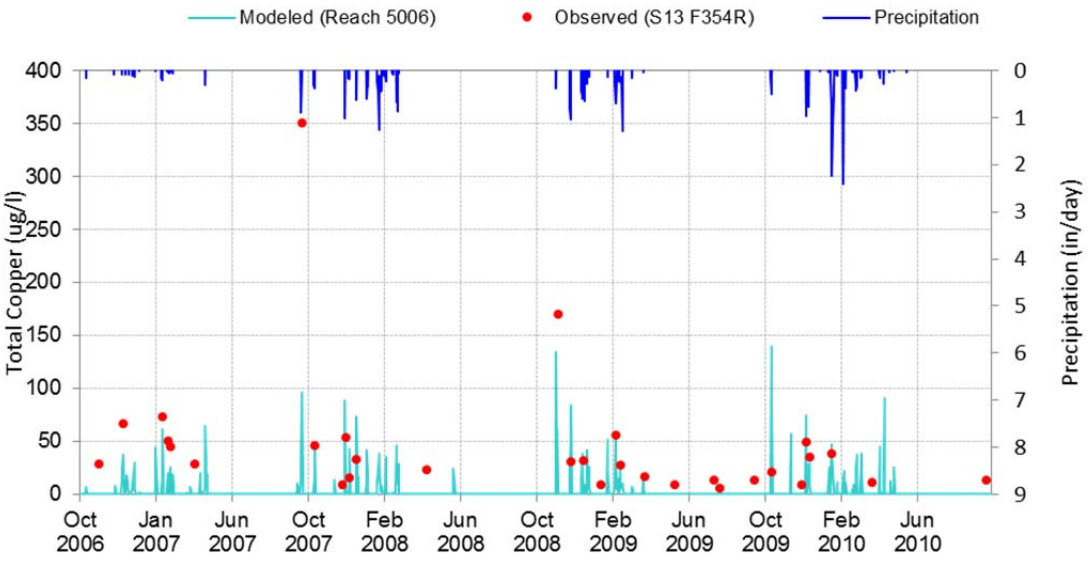

Figure 22. Simulated vs. observed timeseries plots for Total Copper (10/1/2002 through 9/30/2011) at Coyote Creek mass emission station S13.

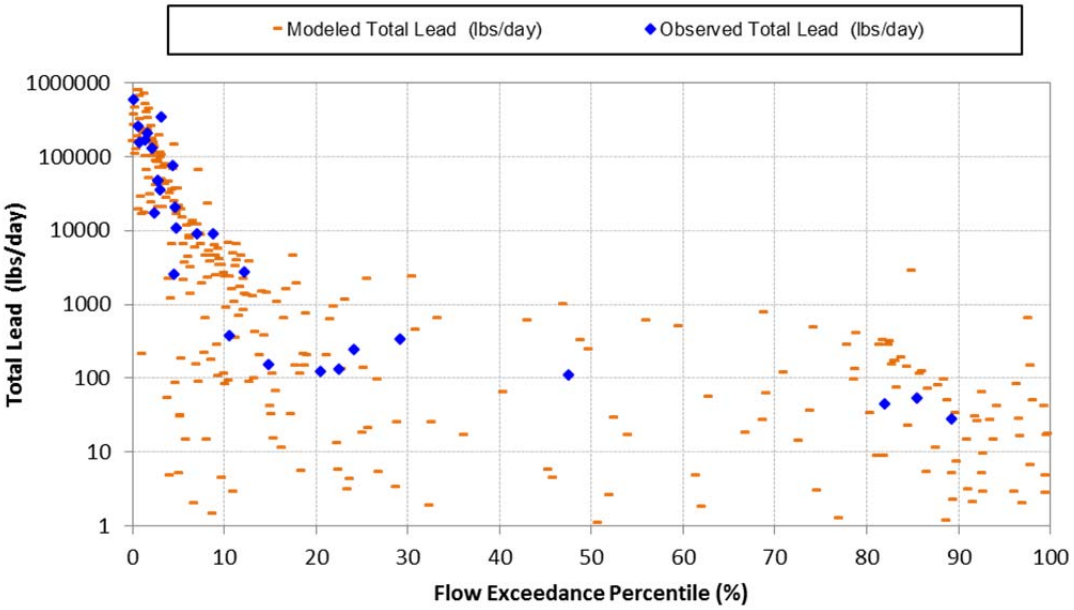

Figure 23 Simulated vs. observed load duration plots for Total Lead (10/1/2002 through 9/30/2011) at Coyote Creek mass emission station S13.

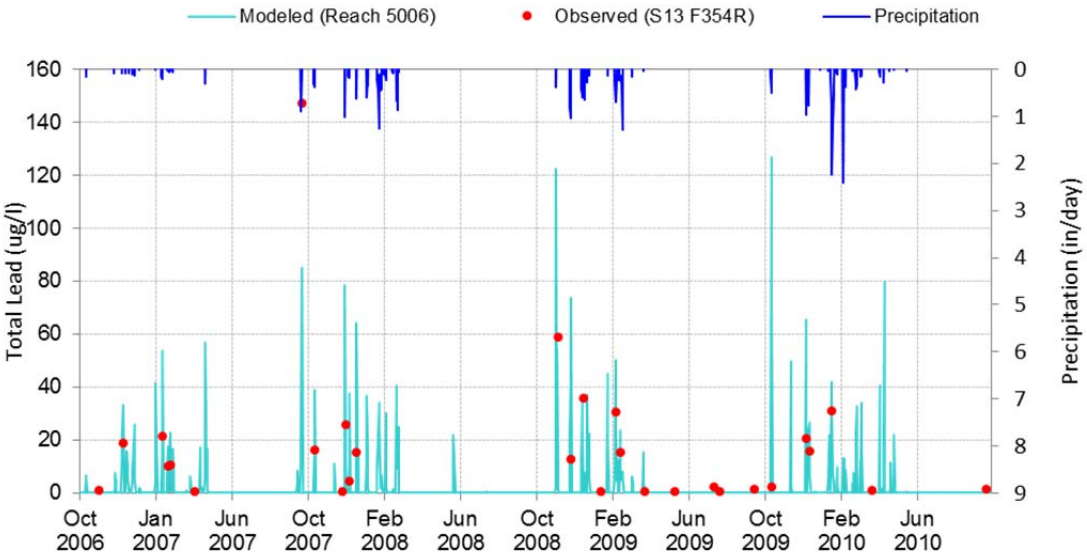

Figure 24. Simulated vs. observed timeseries plots for Total Lead (10/1/2002 through 9/30/2011) at Coyote Creek mass emission station S13.

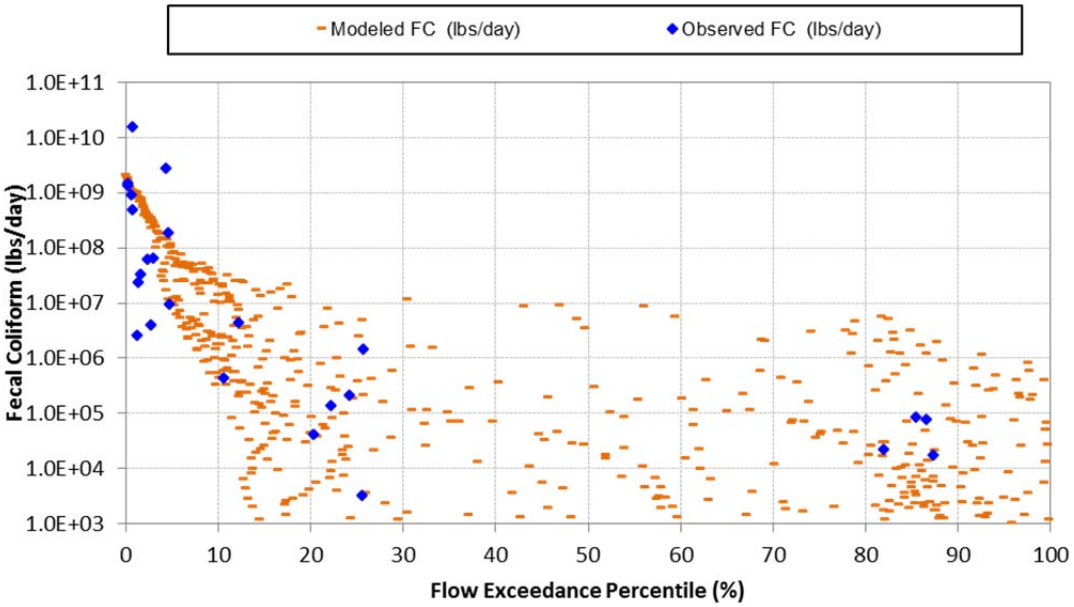

Figure 25. Simulated vs. observed load duration plots for Fecal Coliform (10/1/2002 through 9/30/2011) at Coyote Creek mass emission station S13.

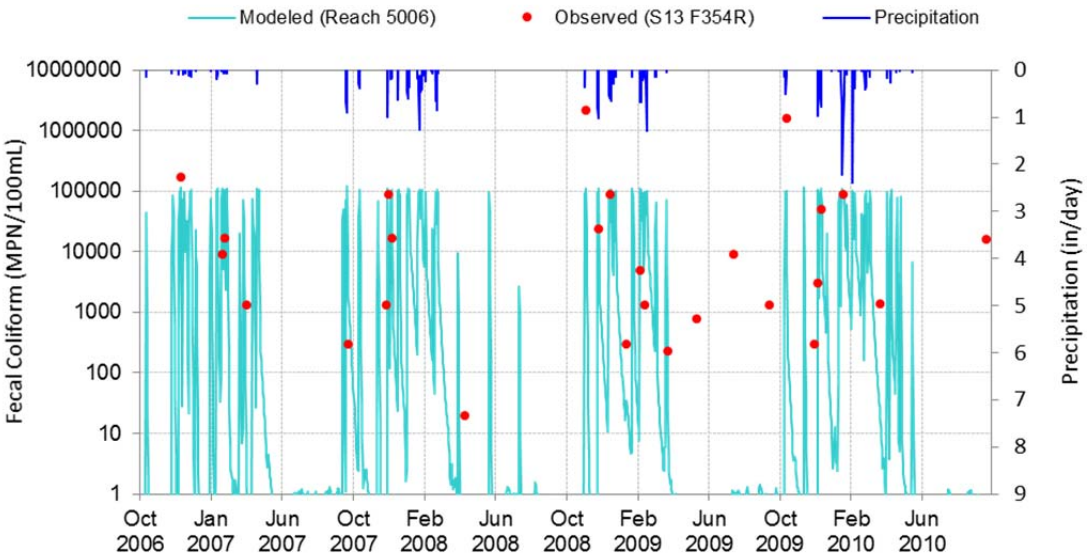

Figure 26. Simulated vs. observed timeseries plots for Fecal Coliform (10/1/2002 through 9/30/2011) at Coyote Creek mass emission station S13.

2. Lower Los Angeles River

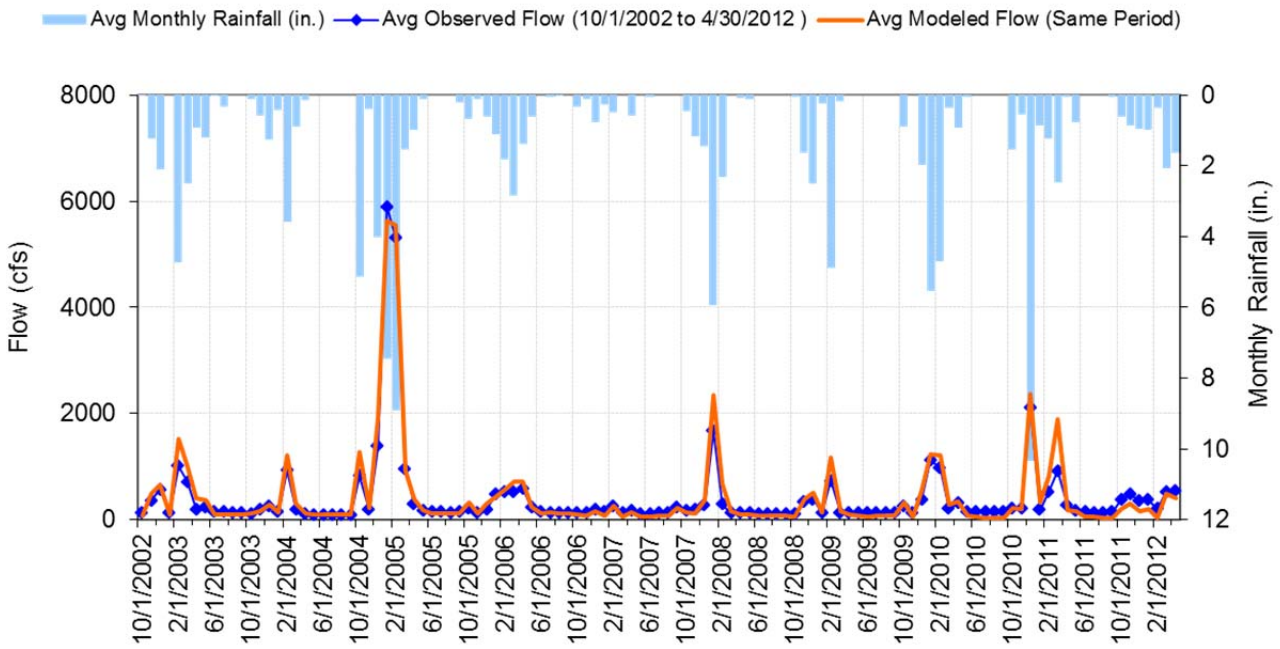

Figure 27. Monthly hydrograph for LA DPW Los Angeles River below Wardlow Road (10/1/2002 – 9/30/2011).

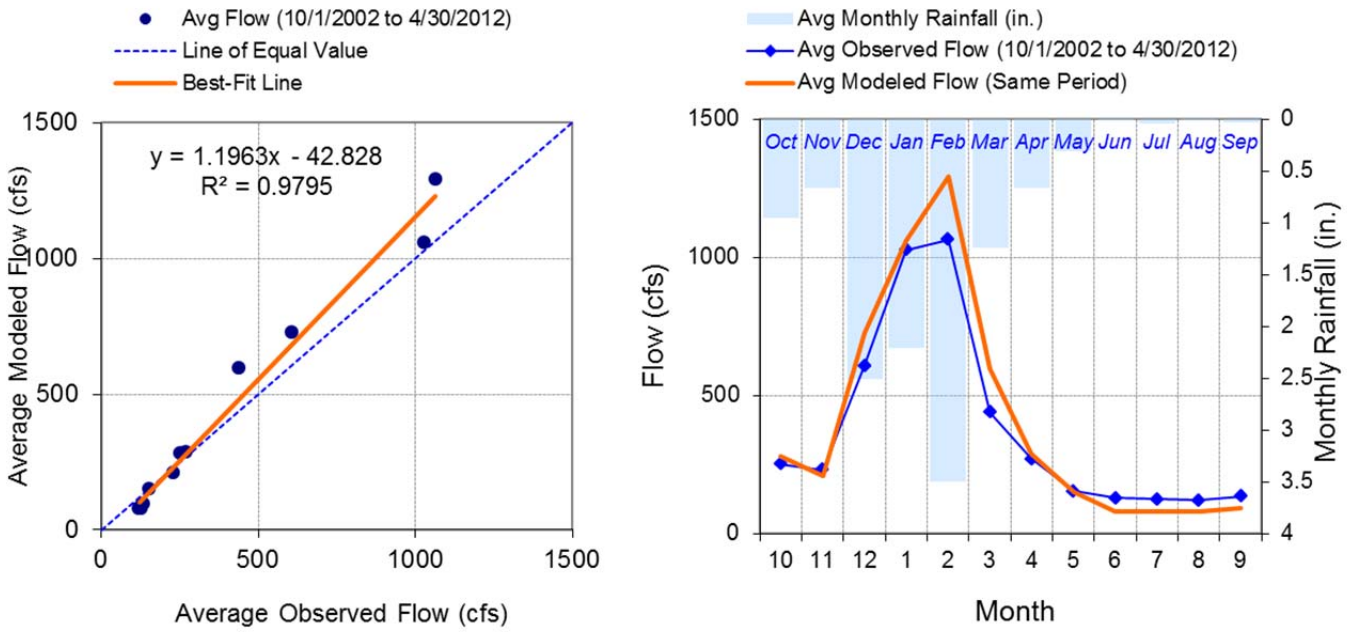

Figure 28. Aggregated monthly hydrograph for LA DPW Los Angeles River below Wardlow Road (10/1/2002 – 9/30/2011).

Table 2. Summary of water quality data evaluated for the Lower Los Angeles River

Gage	Constituent	Minimum	Q1	Median	Q3	Maximum
S10	Total Copper (ug/l)	0.5	12.975	25.8	49.55	424
S10	Total Lead (ug/l)	0.2	2.45	15.6	35.775	1070
S10	TSS (mg/L)	1	63	142.5	295	2280
S10	Total Zinc (ug/l)	22.3	63.85	124	261.75	2590
S10	Fecal Coliform (MPN/100mL)	20	500	24000	240000	24000000
S10	Total Nitrogen (mg/l)	0.03	0.60245	1.064	1.725	6.75
S10	Total Phosphorous (mg/l)	0.05	0.24	0.3785	0.538	8.24

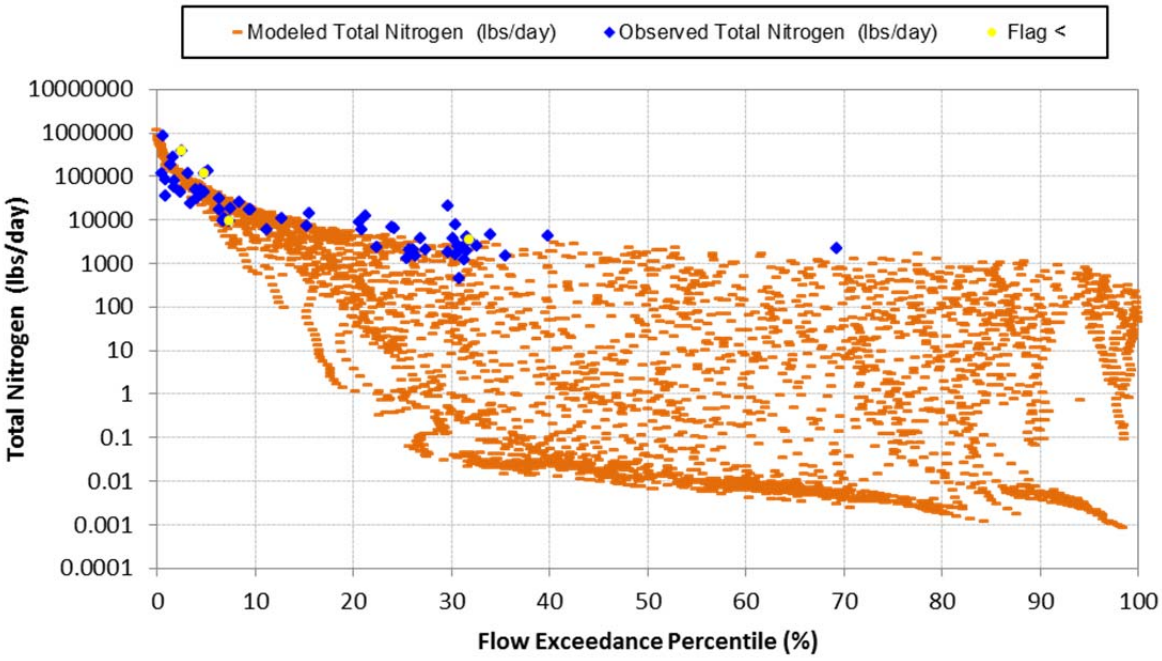

Figure 29. Simulated vs. observed time series plots for Total Nitrogen (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

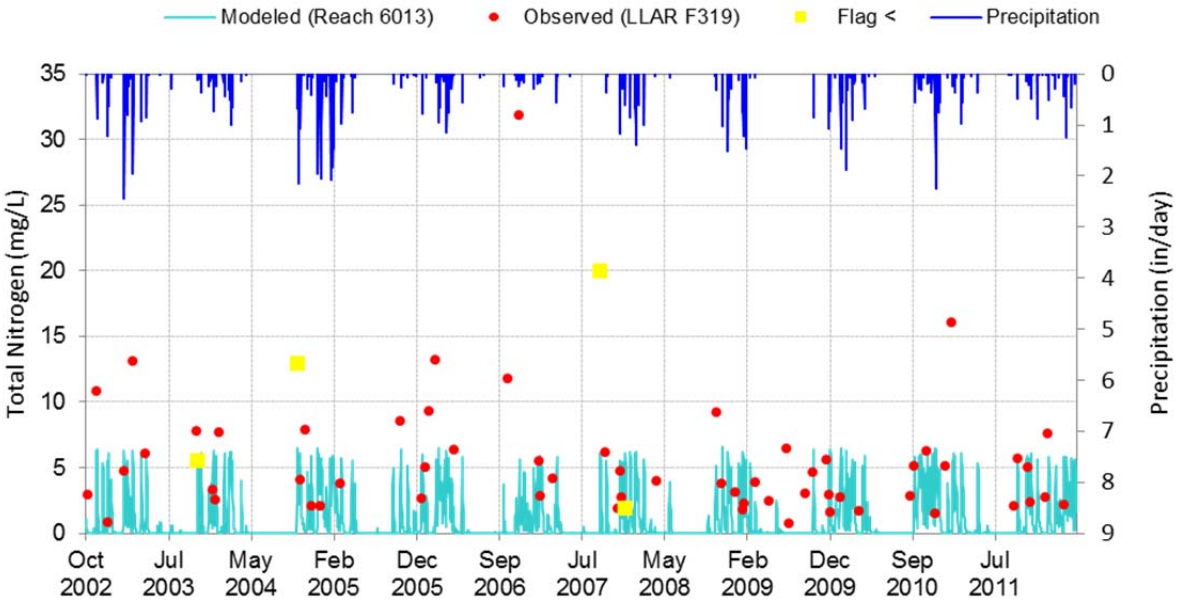

Figure 30. Simulated vs. observed time series plots for Total Nitrogen (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

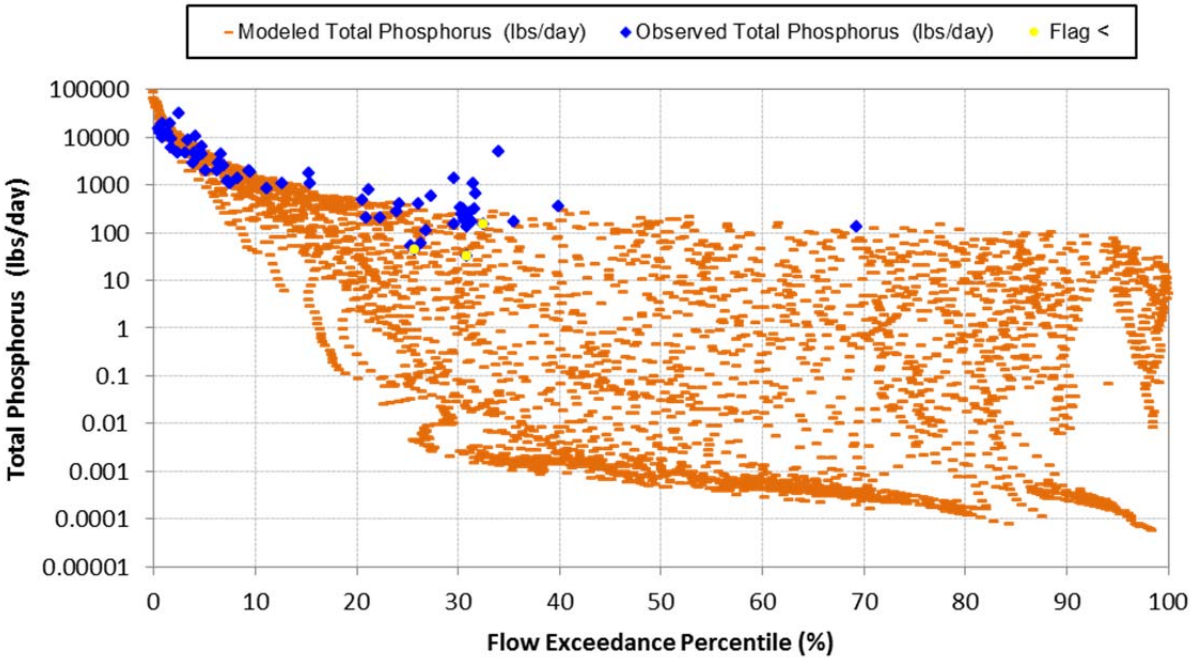

Figure 31. Simulated vs. observed load duration plots for Total Phosphorous (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

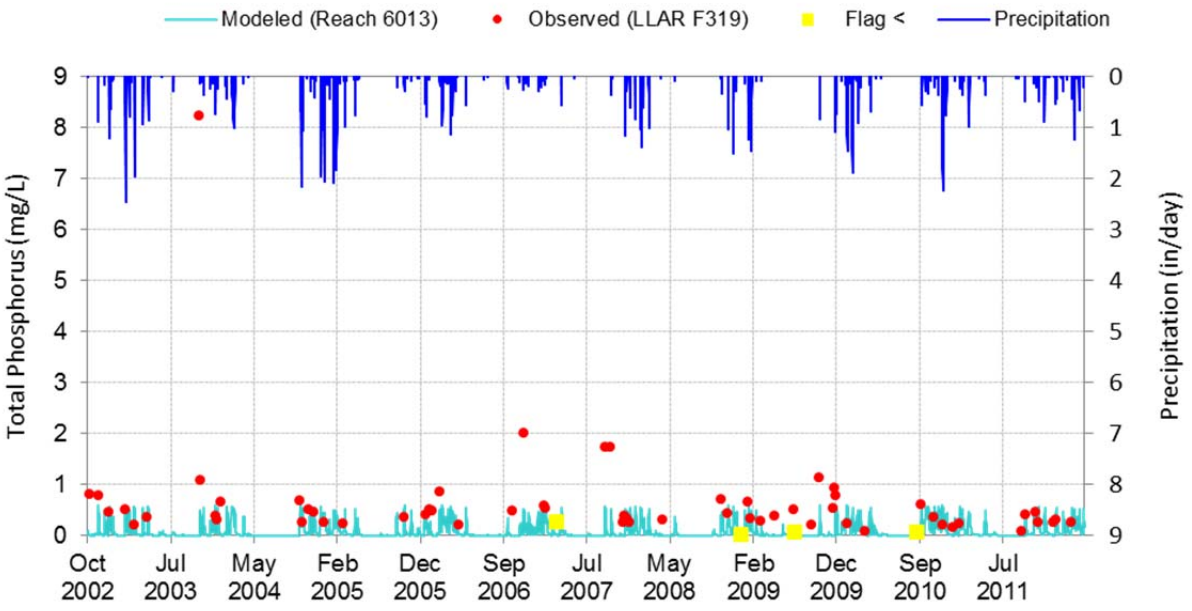

Figure 32. Simulated vs. observed time series plots for Total Phosphorous (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

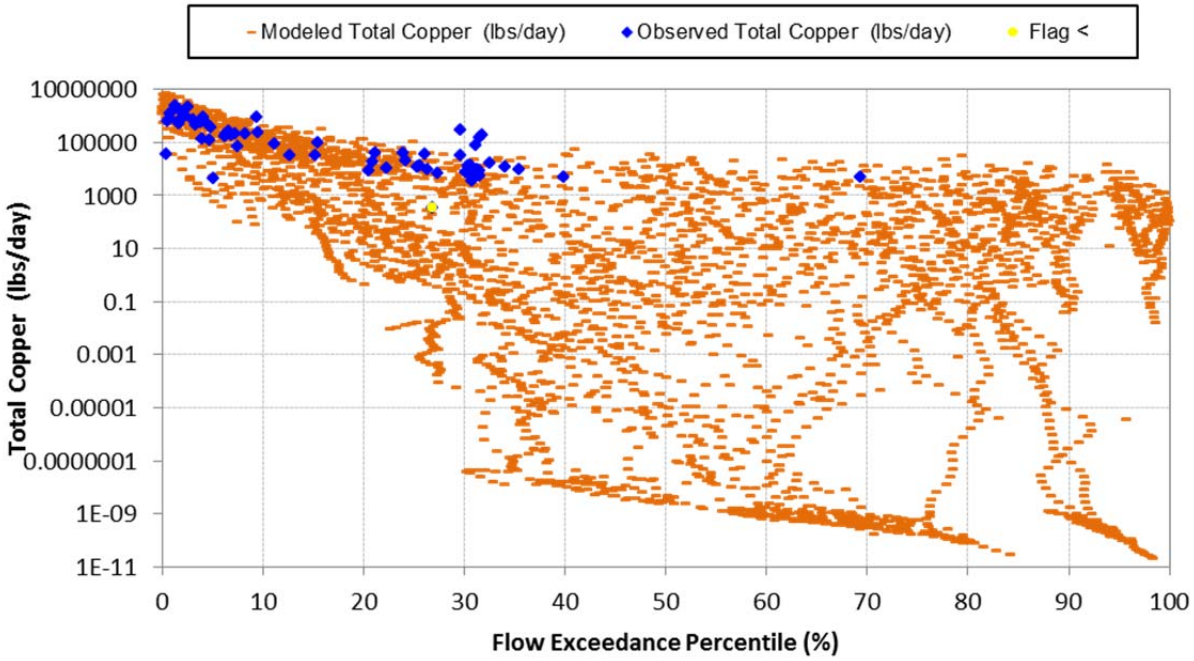

Figure 33. Simulated vs. observed load duration plots for Total Copper (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

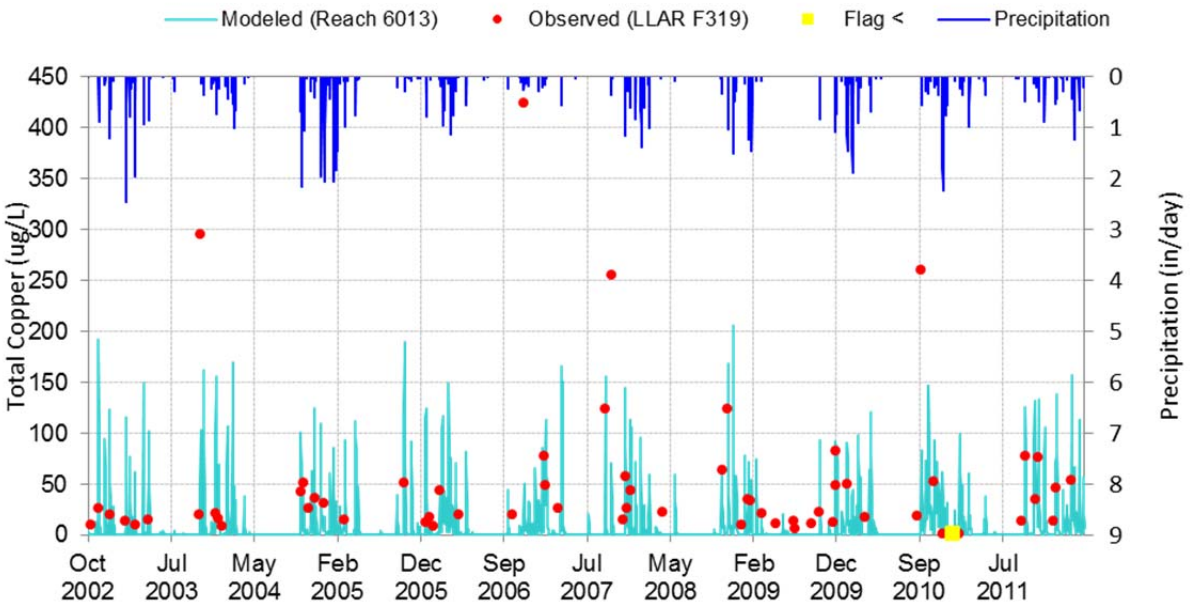

Figure 34. Simulated vs. observed timeseries plots for Total Copper (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

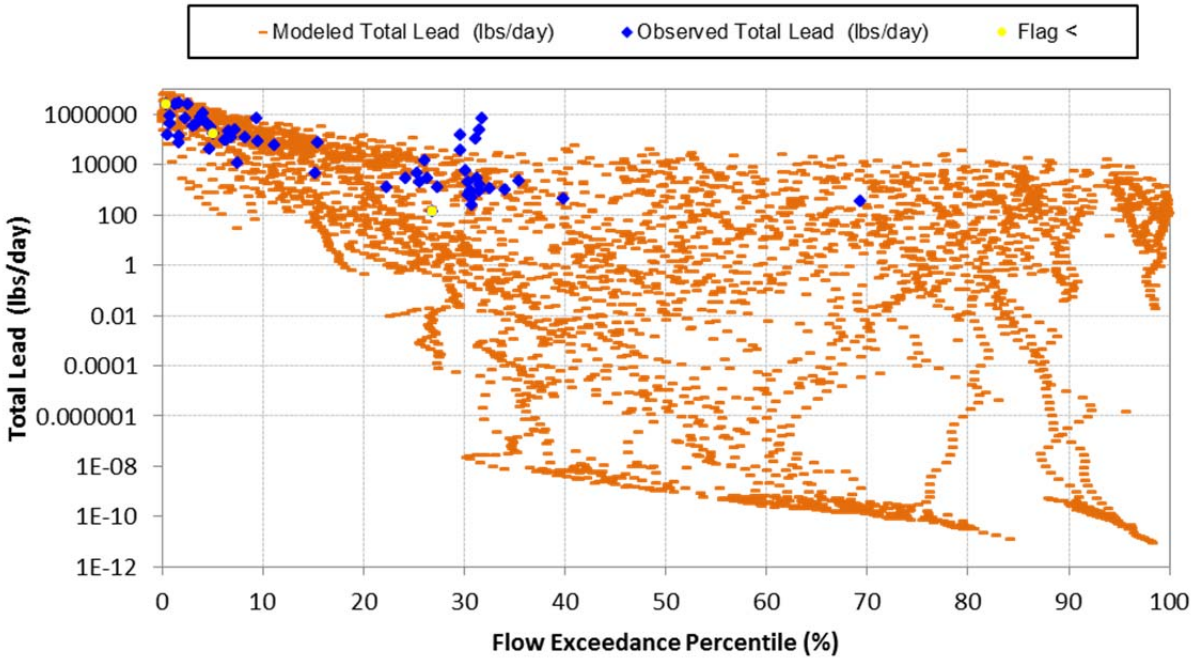

Figure 35. Simulated vs. observed load duration plots for Total Lead (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

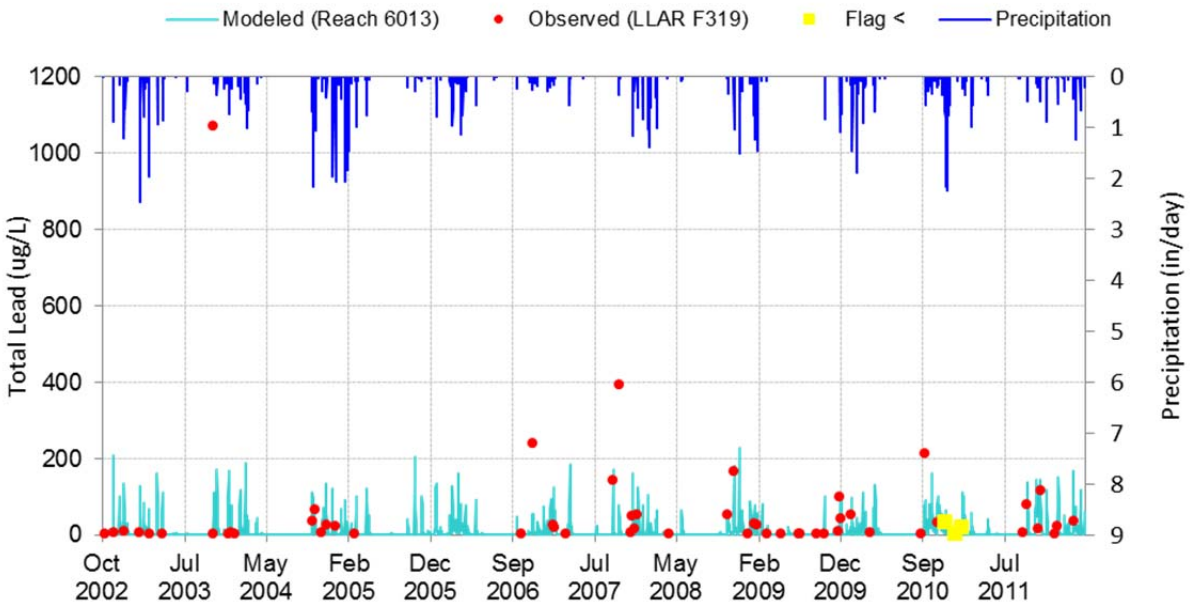

Figure 36. Simulated vs. observed timeseries plots for Total Lead (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

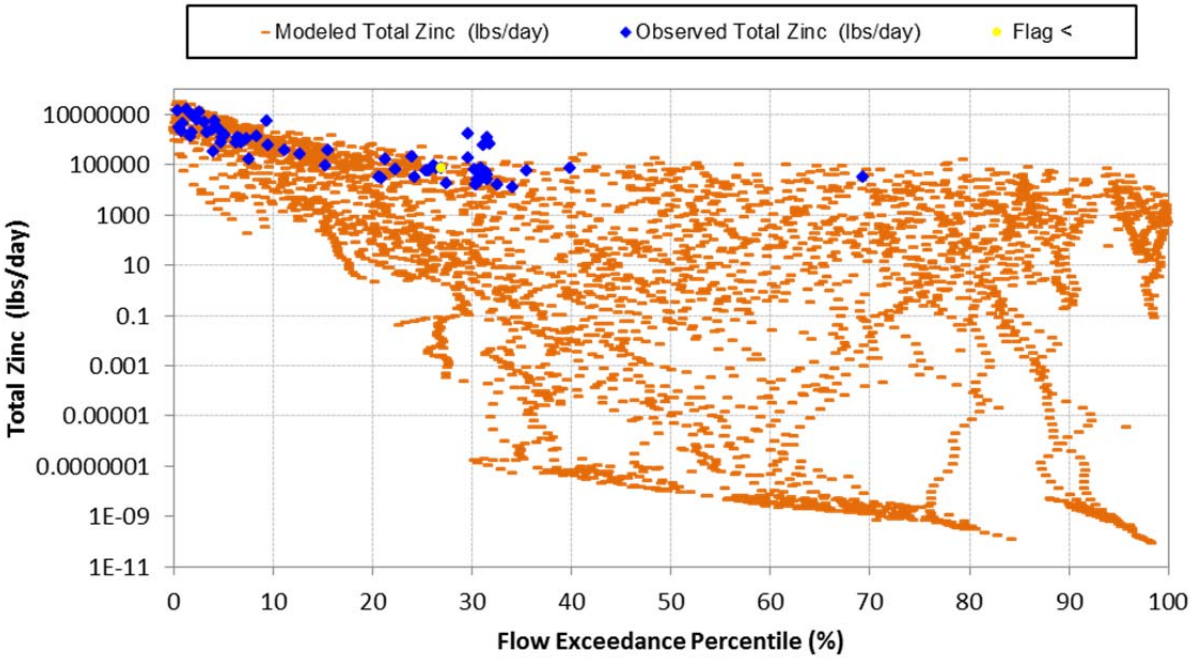

Figure 37. Simulated vs. observed load duration plots for Total Zinc (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

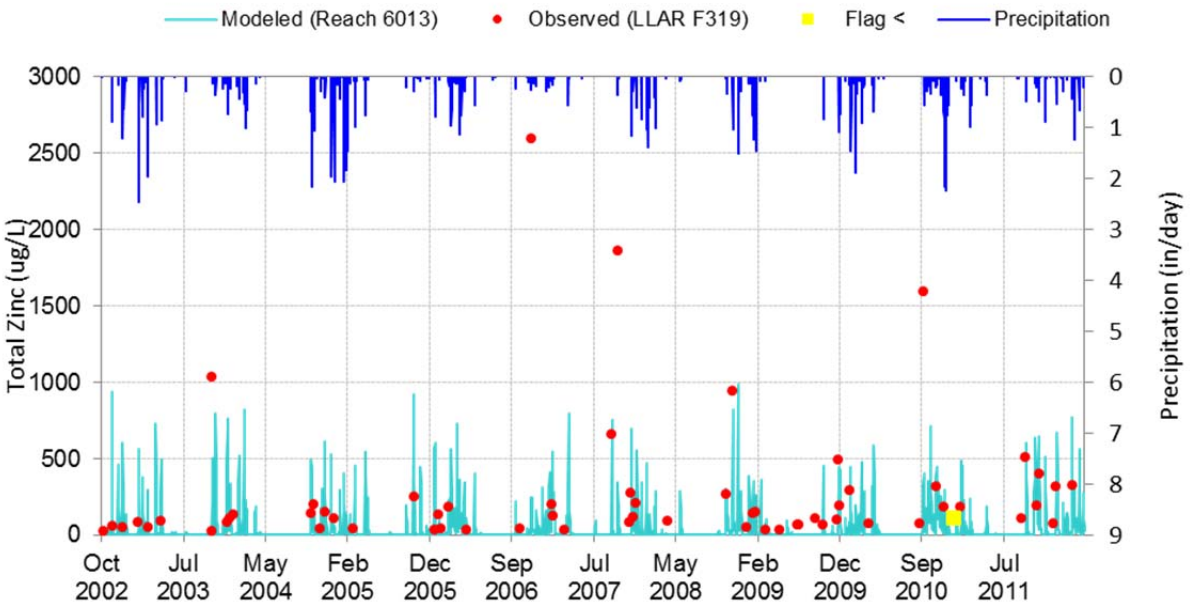

Figure 38. Simulated vs. observed timeseries plots for Total Zinc (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

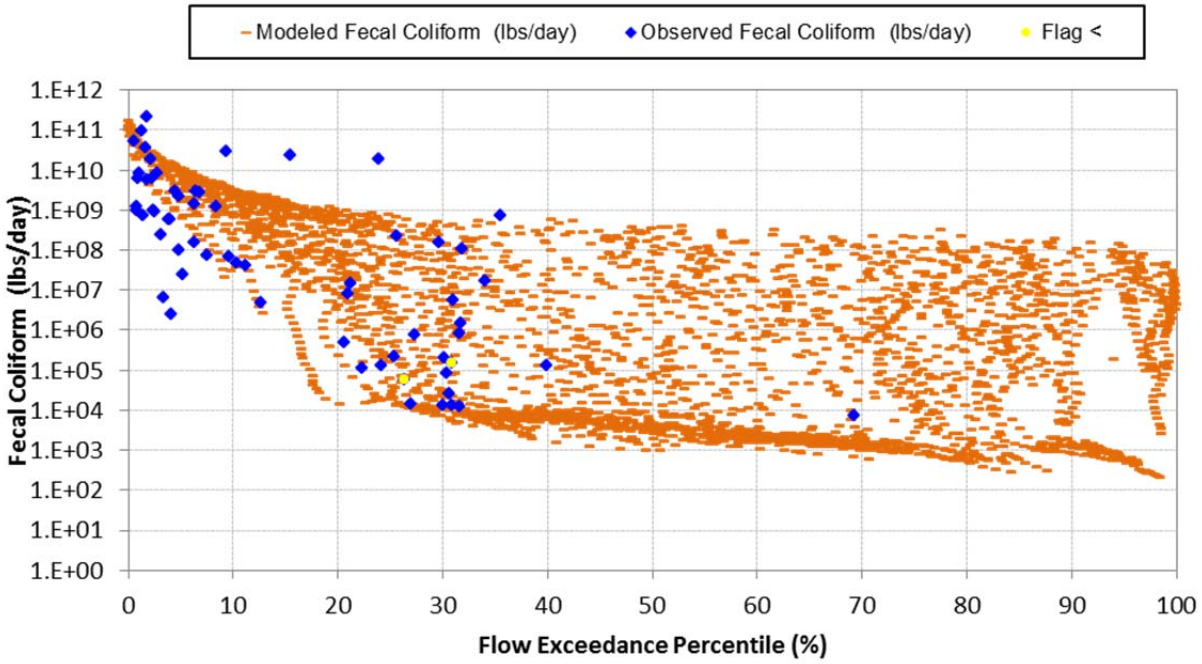

Figure 39. Simulated vs. observed load duration plots for Fecal Coliform (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

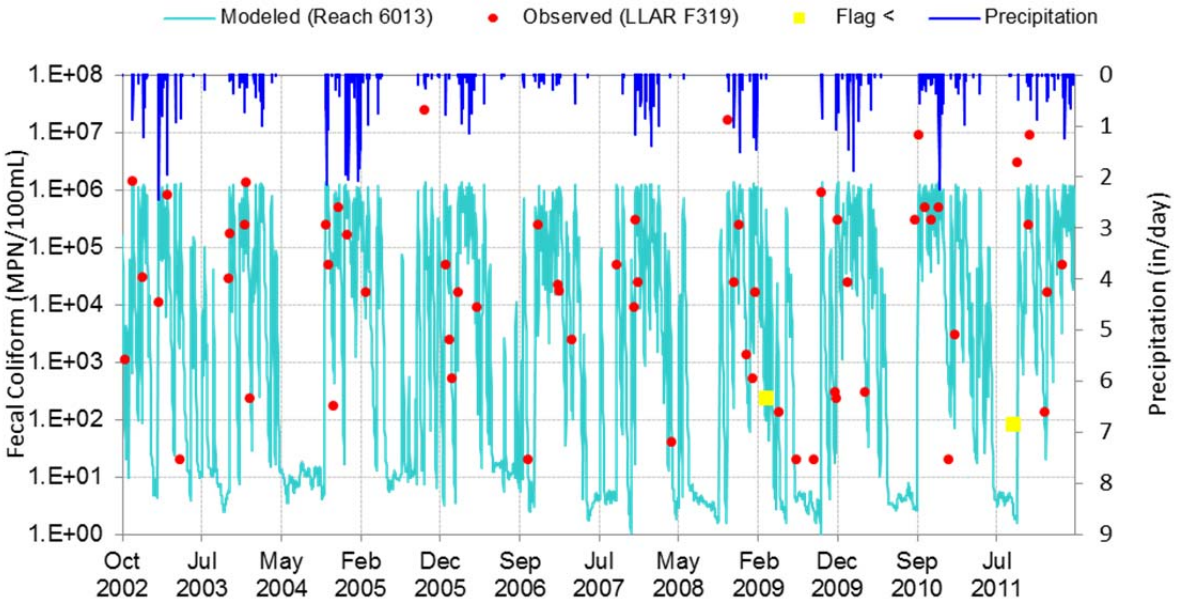

Figure 40. Simulated vs. observed timeseries plots for Fecal Coliform (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

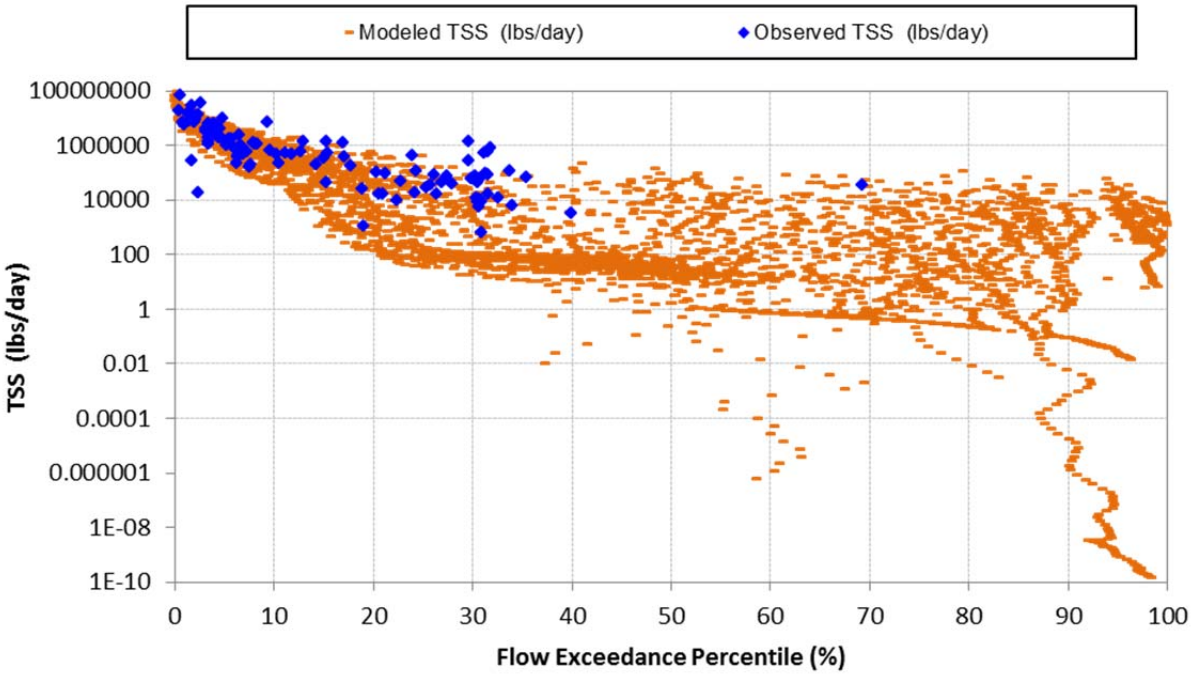

Figure 41. Simulated vs. observed load duration plots for Total Sediment (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

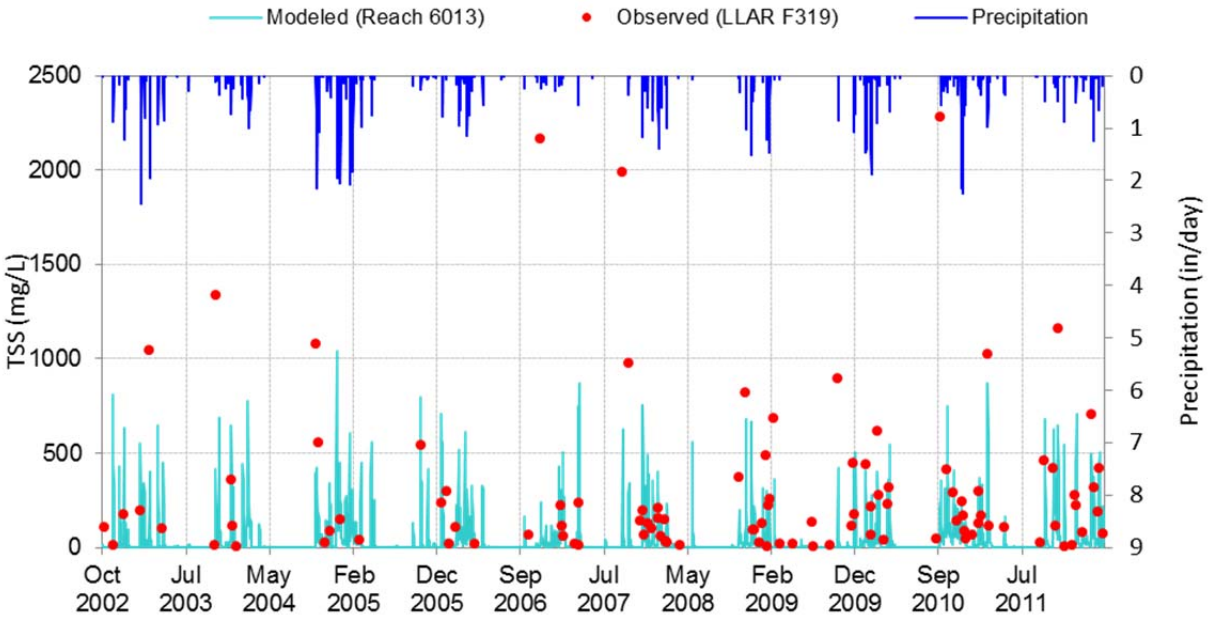

Figure 42. Simulated vs. observed time series plots for Total Sediment (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

3. Los Cerritos Channel

Table 3. Summary of water quality data evaluated for Los Cerritos Channel

Gage	Constituent	Minimum	Q1	Median	Q3	Maximum
Stearns St.	Total Copper (ug/l)	8.4	17.25	25	43.5	240
Stearns St.	Total Lead (ug/l)	0.78	3.025	17	41.75	370
Stearns St.	TSS (mg/L)	2	52.5	110	210	1700
Stearns St.	Total Zinc (ug/l)	9.5	33	180	390	2600
Stearns St.	Fecal Coliform (MPN/100mL)	18	2275	8000	28500	1600000
Stearns St.	Total Nitrogen (mg/l)	0.9	2.147	3.292	4.532	23.7
Stearns St.	Total Phosphorous (mg/l)	0.083	0.22	0.53	0.91	6.2

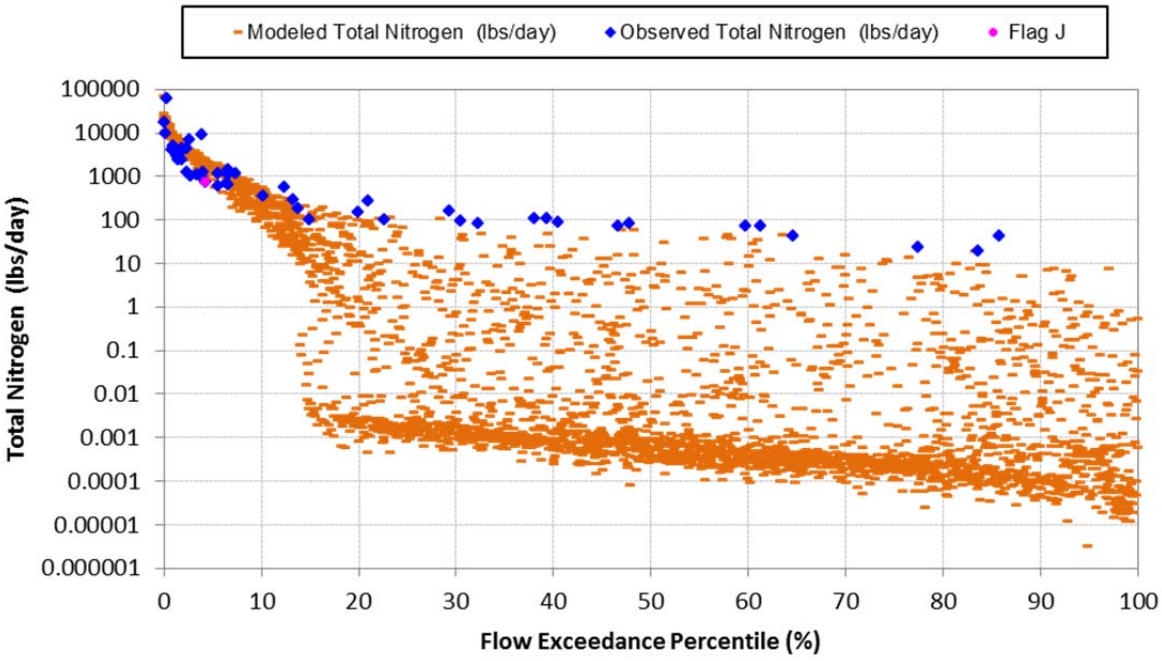

Figure 43. Simulated vs. observed time series plots for Total Nitrogen (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

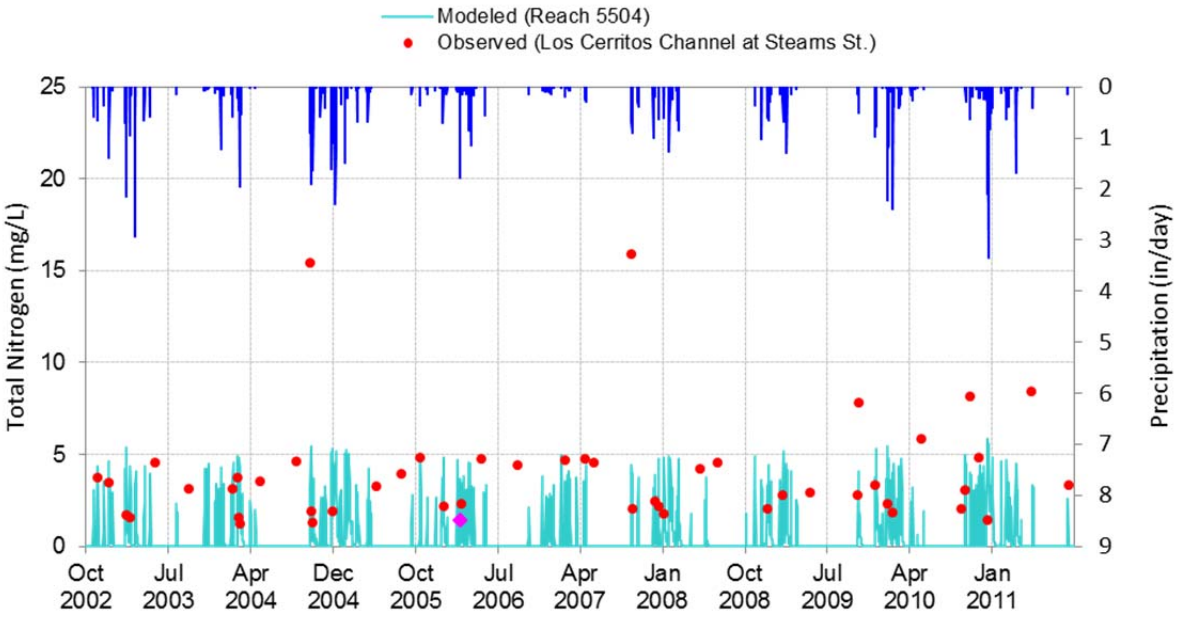

Figure 44. Simulated vs. observed time series plots for Total Nitrogen (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

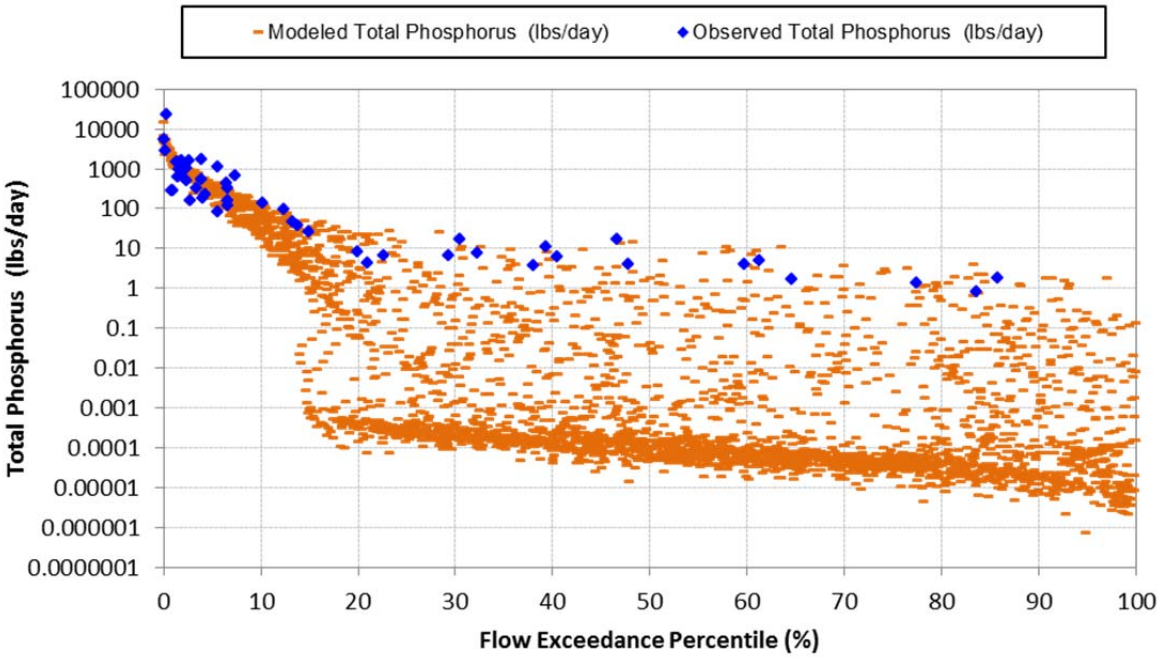

Figure 45. Simulated vs. observed load duration plots for Total Phosphorous (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

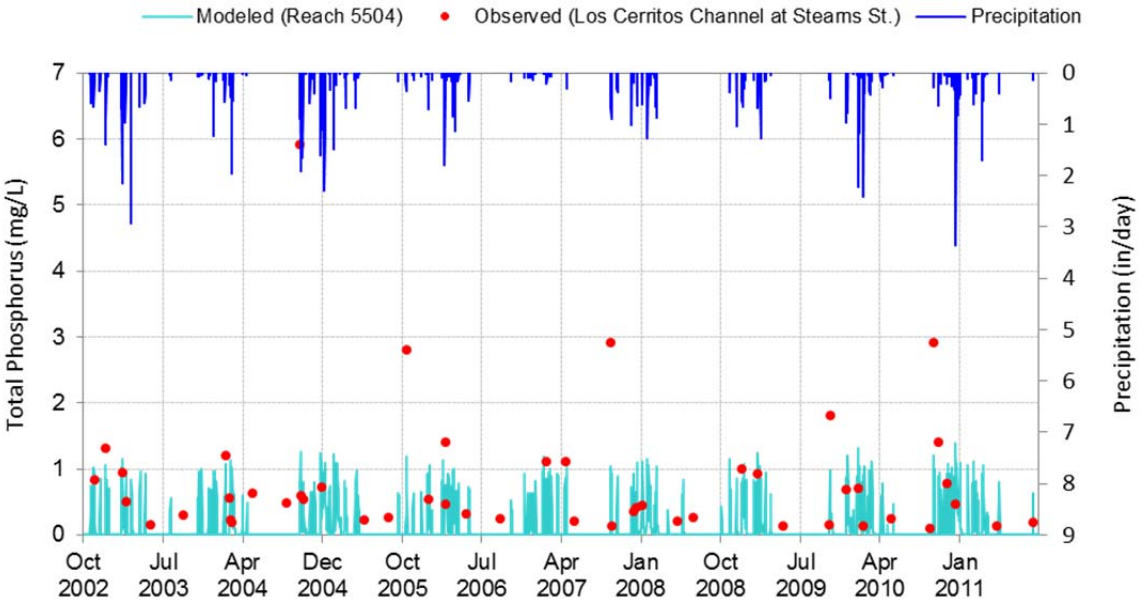

Figure 46. Simulated vs. observed time series plots for Total Phosphorous (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

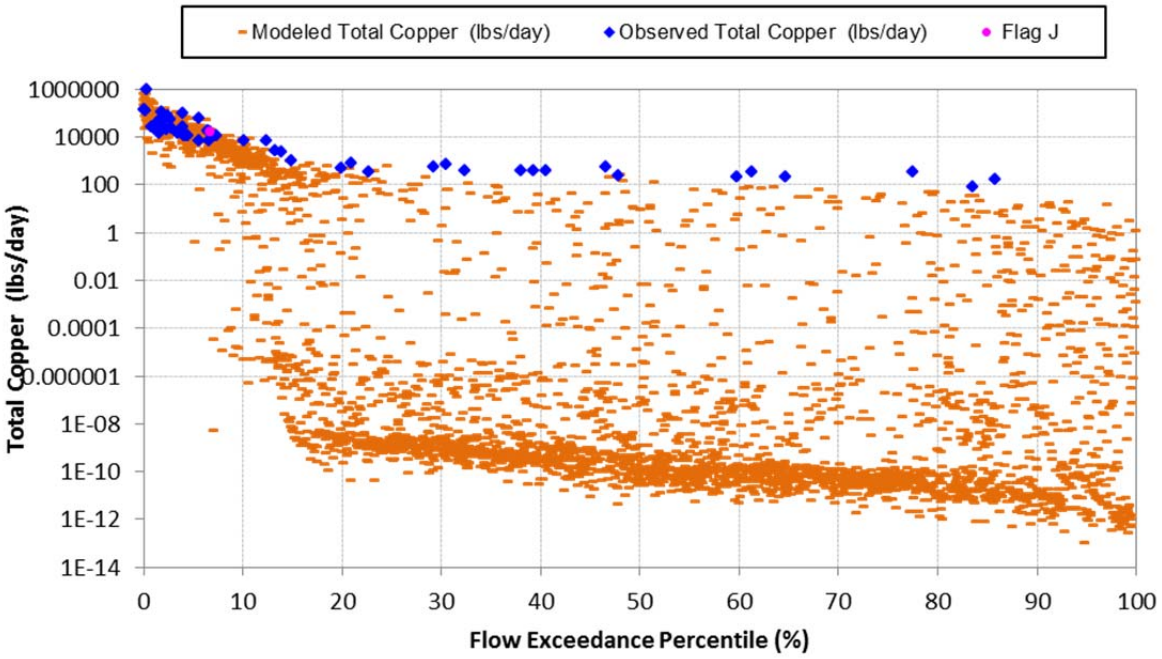

Figure 47. Simulated vs. observed load duration plots for Total Copper (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

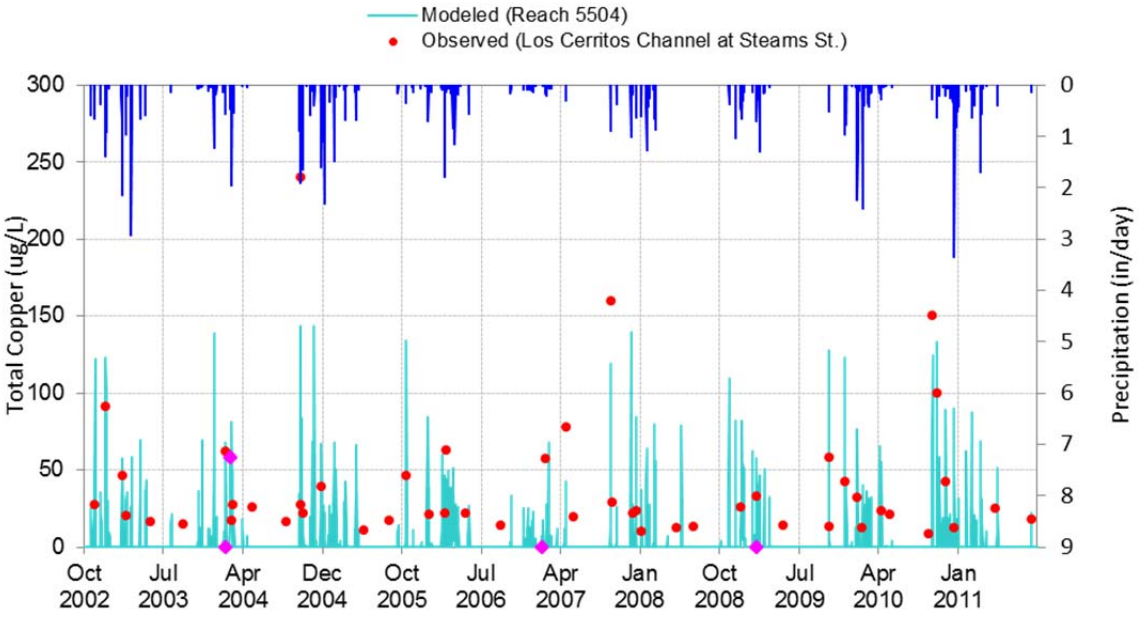

Figure 48. Simulated vs. observed timeseries plots for Total Copper (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

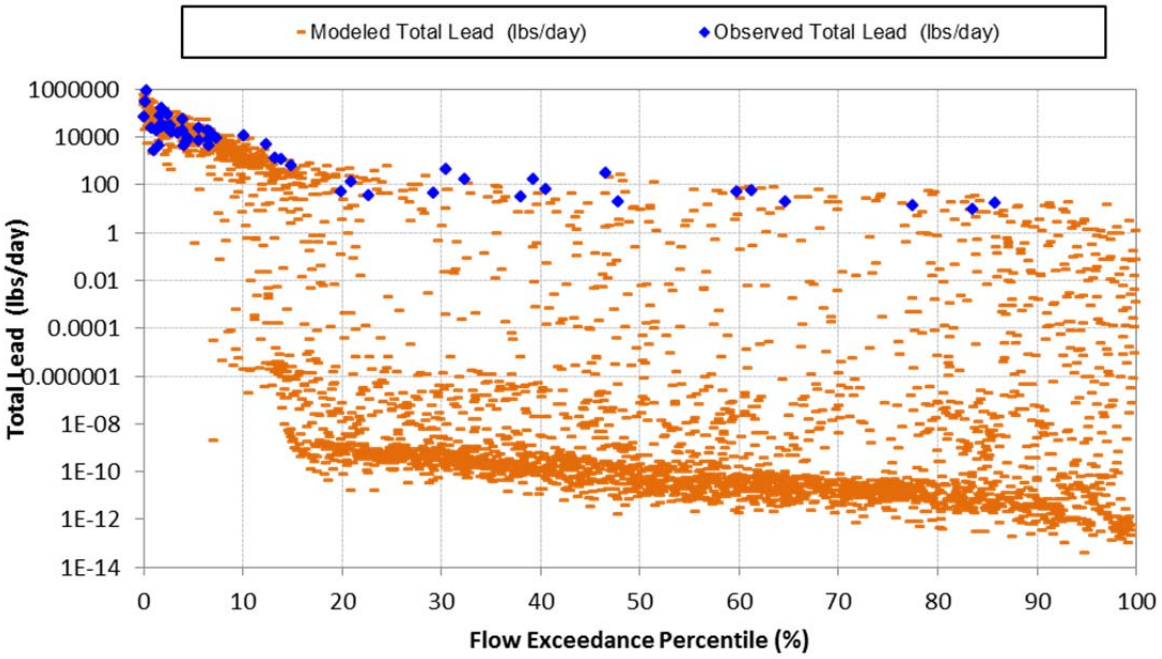

Figure 49. Simulated vs. observed load duration plots for Total Lead (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

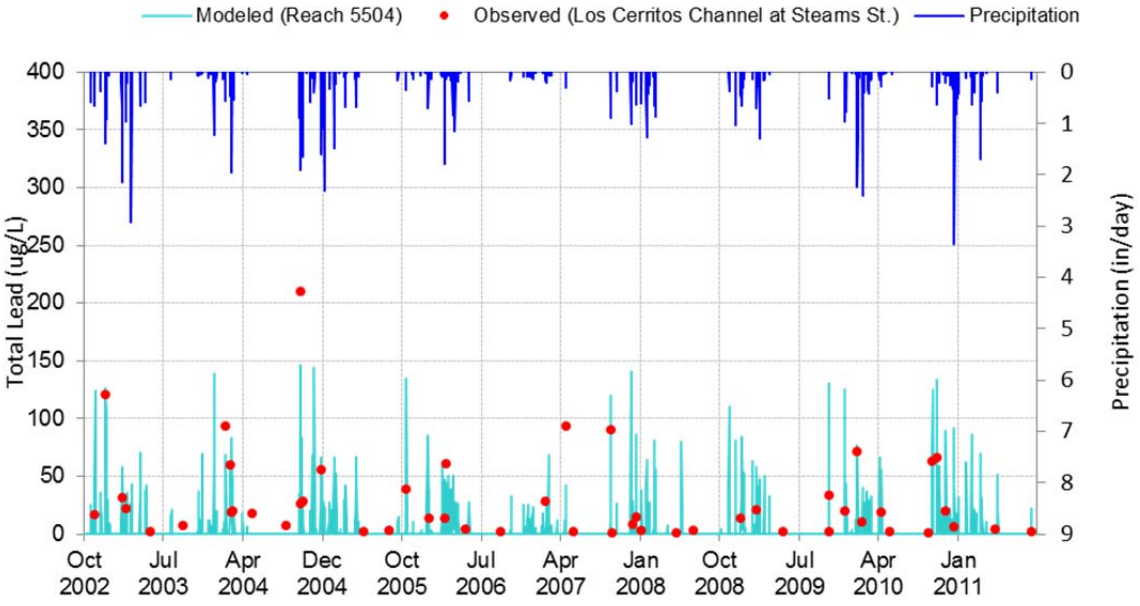

Figure 50. Simulated vs. observed timeseries plots for Total Lead (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

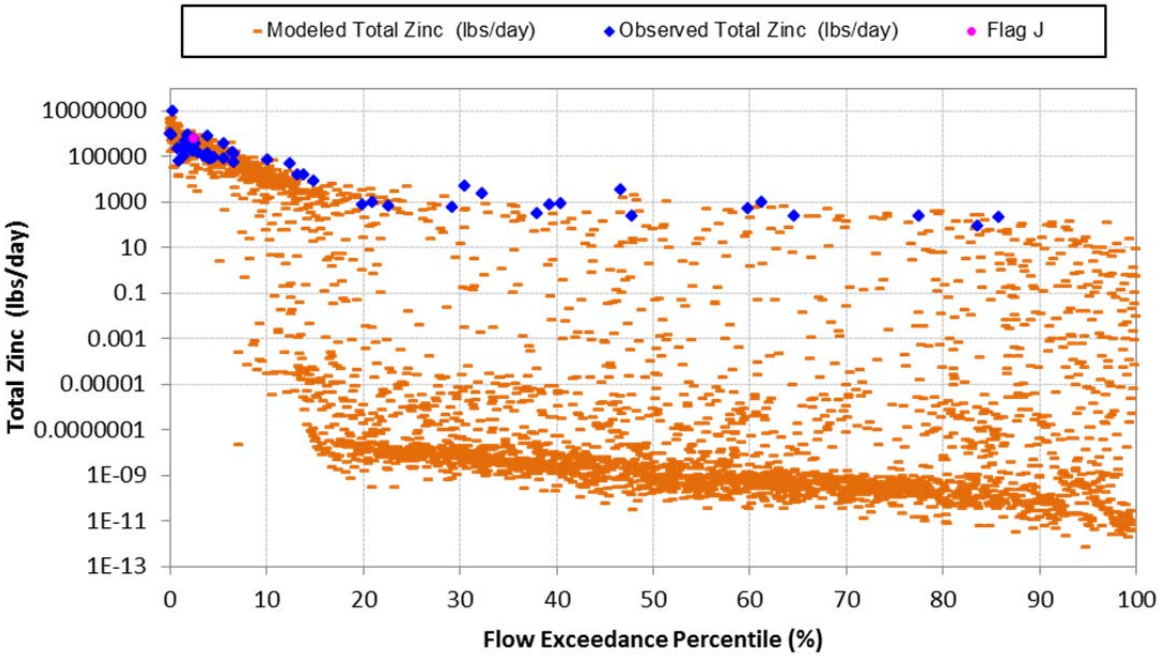

Figure 51. Simulated vs. observed load duration plots for Total Zinc (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

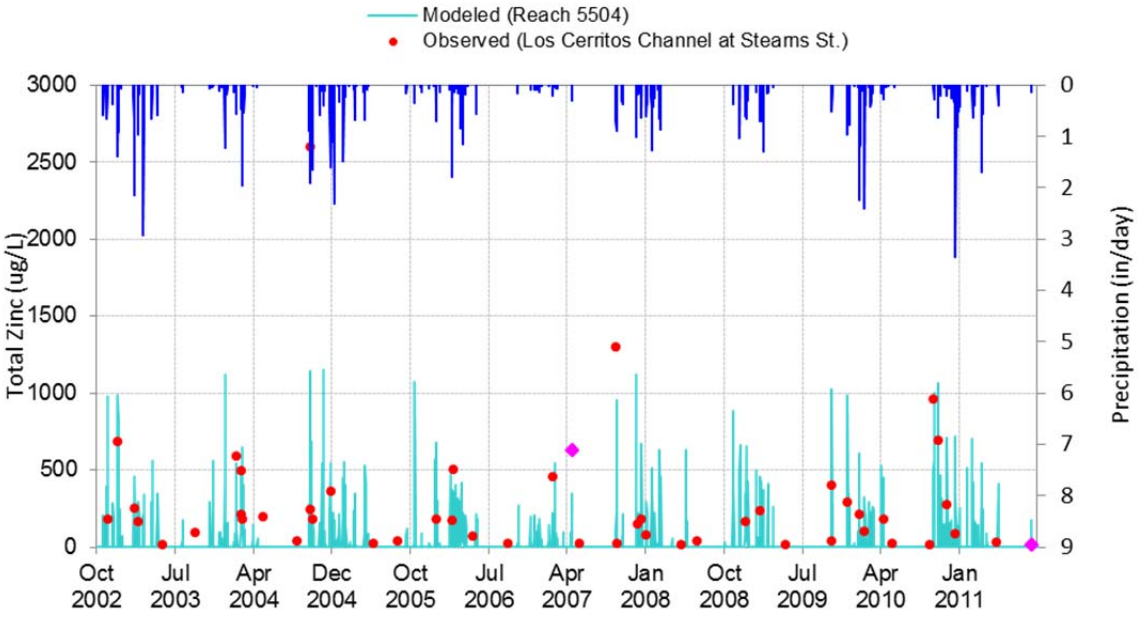

Figure 52. Simulated vs. observed timeseries plots for Total Zinc (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

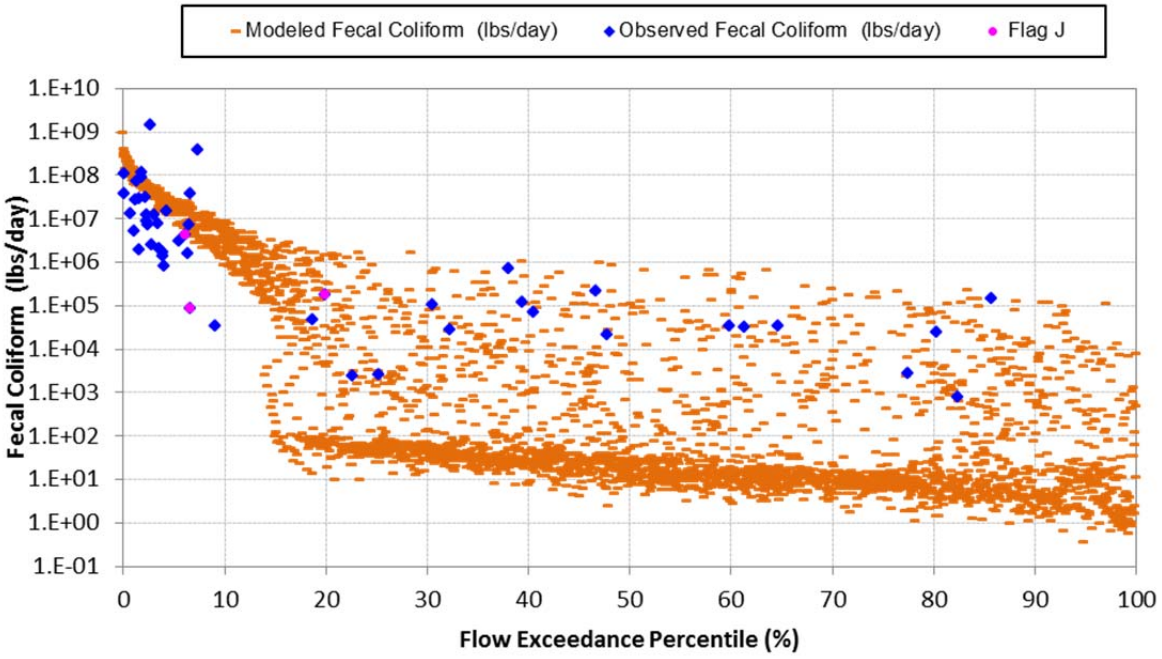

Figure 53. Simulated vs. observed load duration plots for Fecal Coliform (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

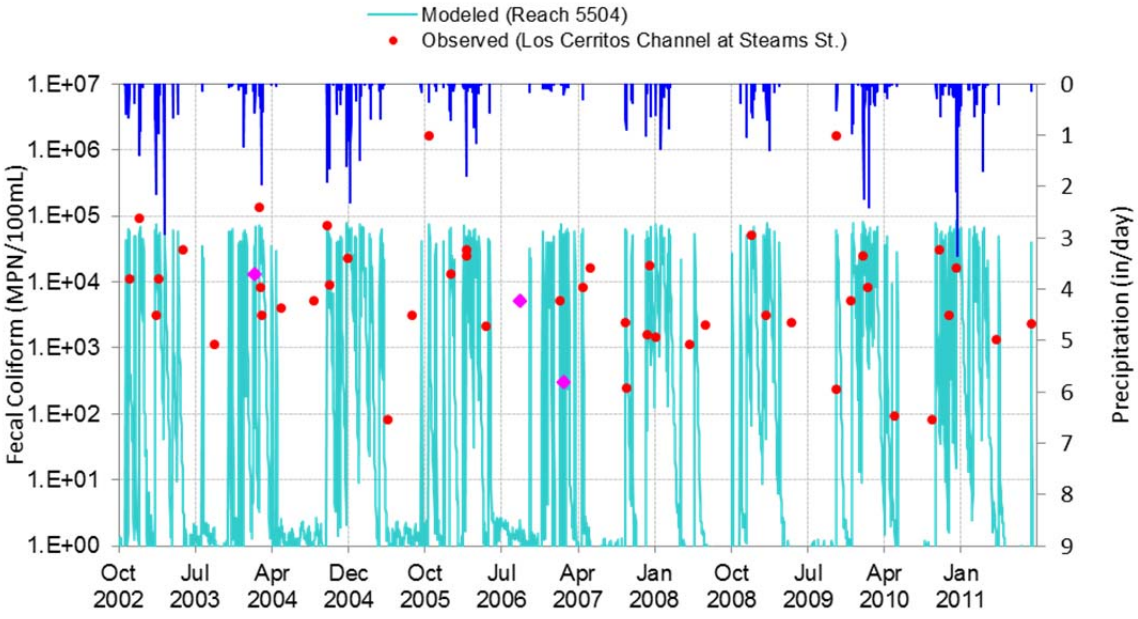

Figure 54. Simulated vs. observed timeseries plots for Fecal Coliform (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

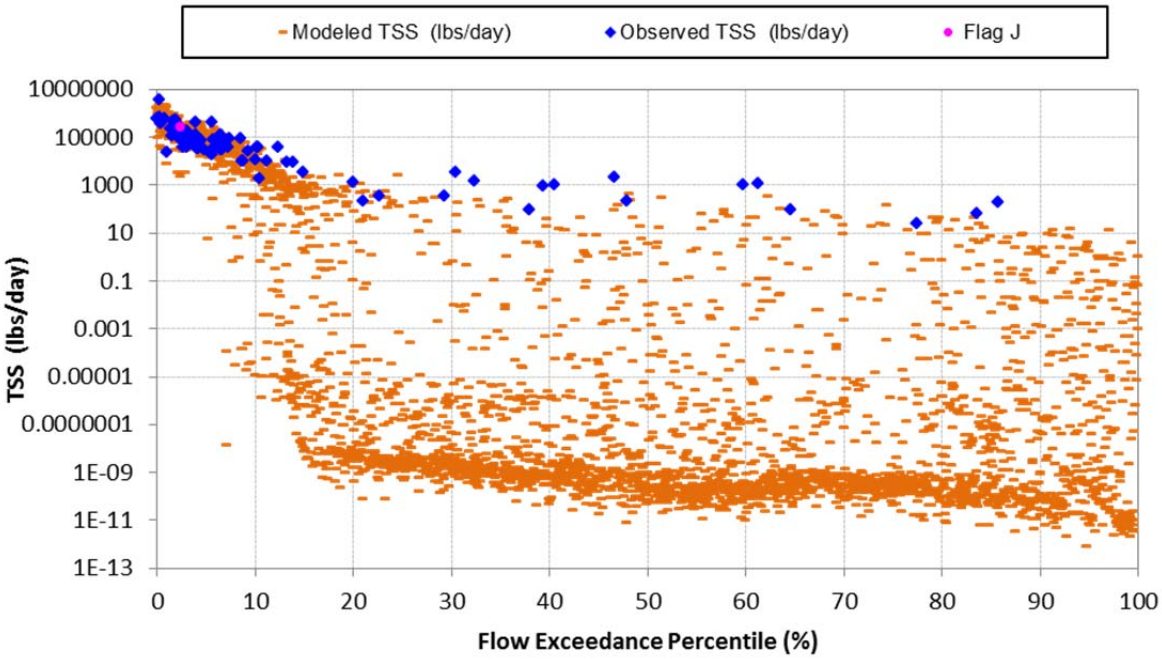

Figure 55. Simulated vs. observed load duration plots for Total Sediment (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

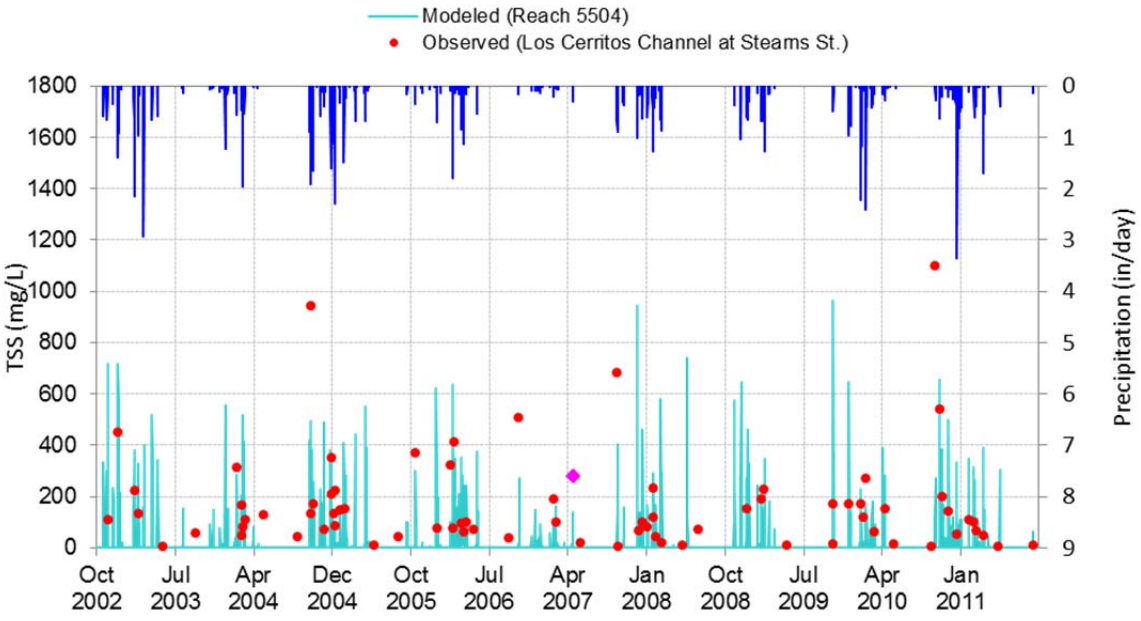

Figure 56. Simulated vs. observed time series plots for Total Sediment (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

ATTACHMENT B:

LOS CERRITOS CHANNEL SUB-BASIN EXHIBITS

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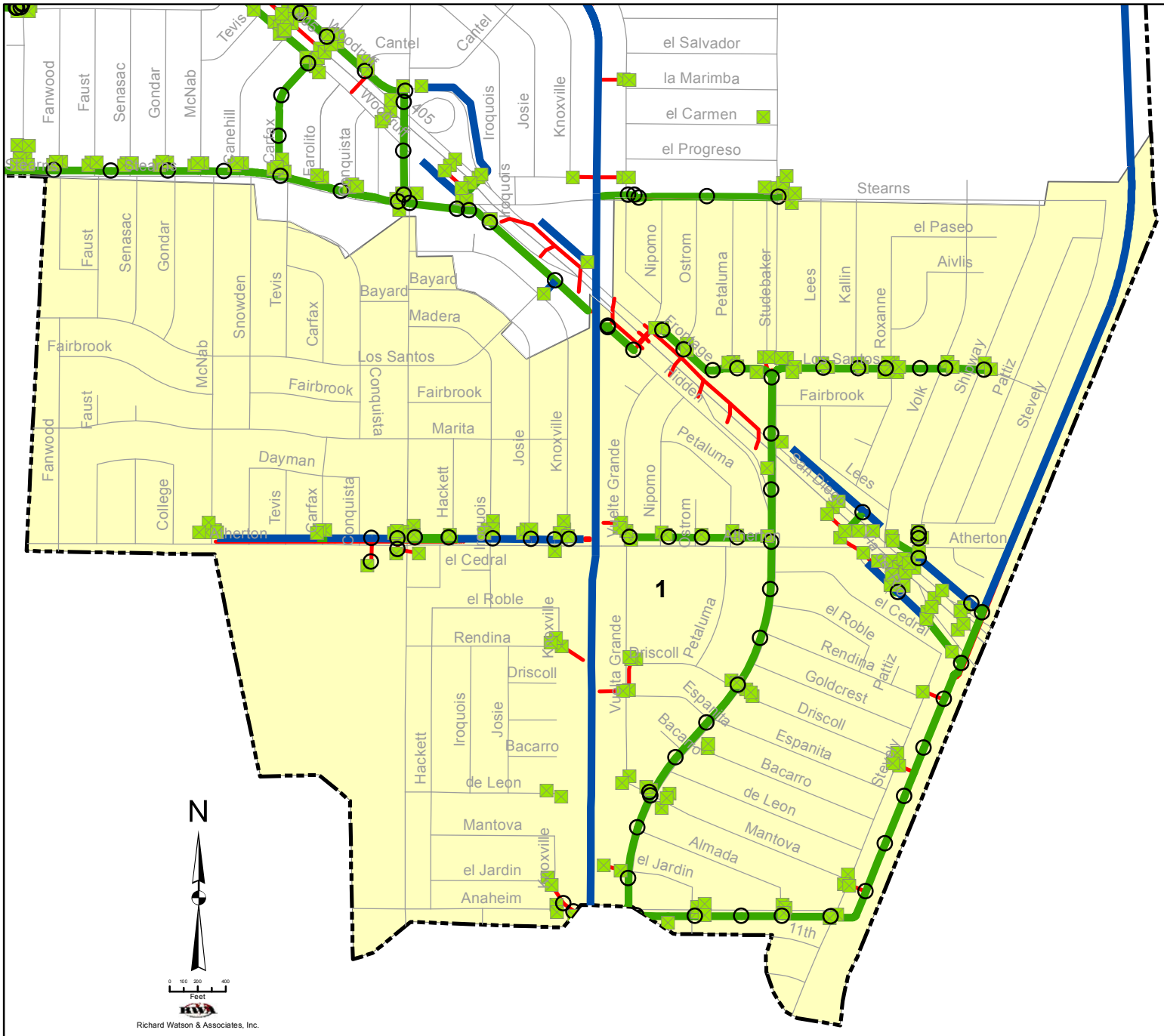
Los Cerritos Channel TMDL Sub-Basin 1



Legend

- LACFCD MH
- LACFCD Catch Basin
- LACFCD Open Channel
- LACFCD Gravity Main
- City Storm Line
- Street Centerlines

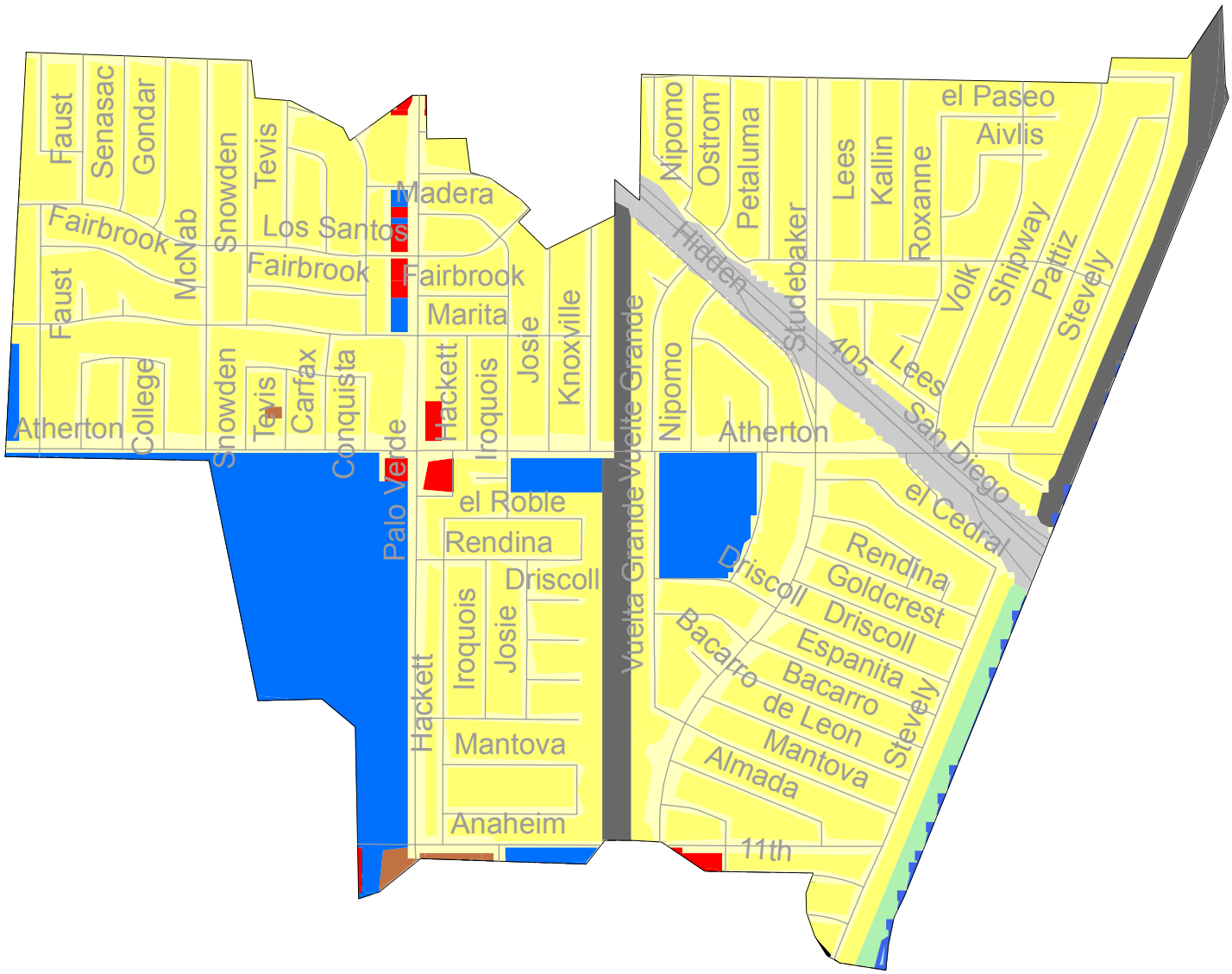
Sub-Basin	Acreage
1	720.3

RB-AR7573

Prepared by: ECKERSALL, LLC

Date: 1/13/2014

Los Cerritos Channel TMDL Sub Basin 1
Hydrologic Response Units



Legend

Hydrologic Response Units

HD SFR	Commercial	Secondary Roads	Water Bodies
LD SFRM	Institutional	Agriculture Moderate Slope D	
LD SFR Steep S	Industrial	Vacant Moderate Slope D	
MF	Transportation	Vacant Steep Slope D	

Sub Basin	Acreage	
1	720	Street Centerlines

N

0 3,250 6,500 13,000

Inches

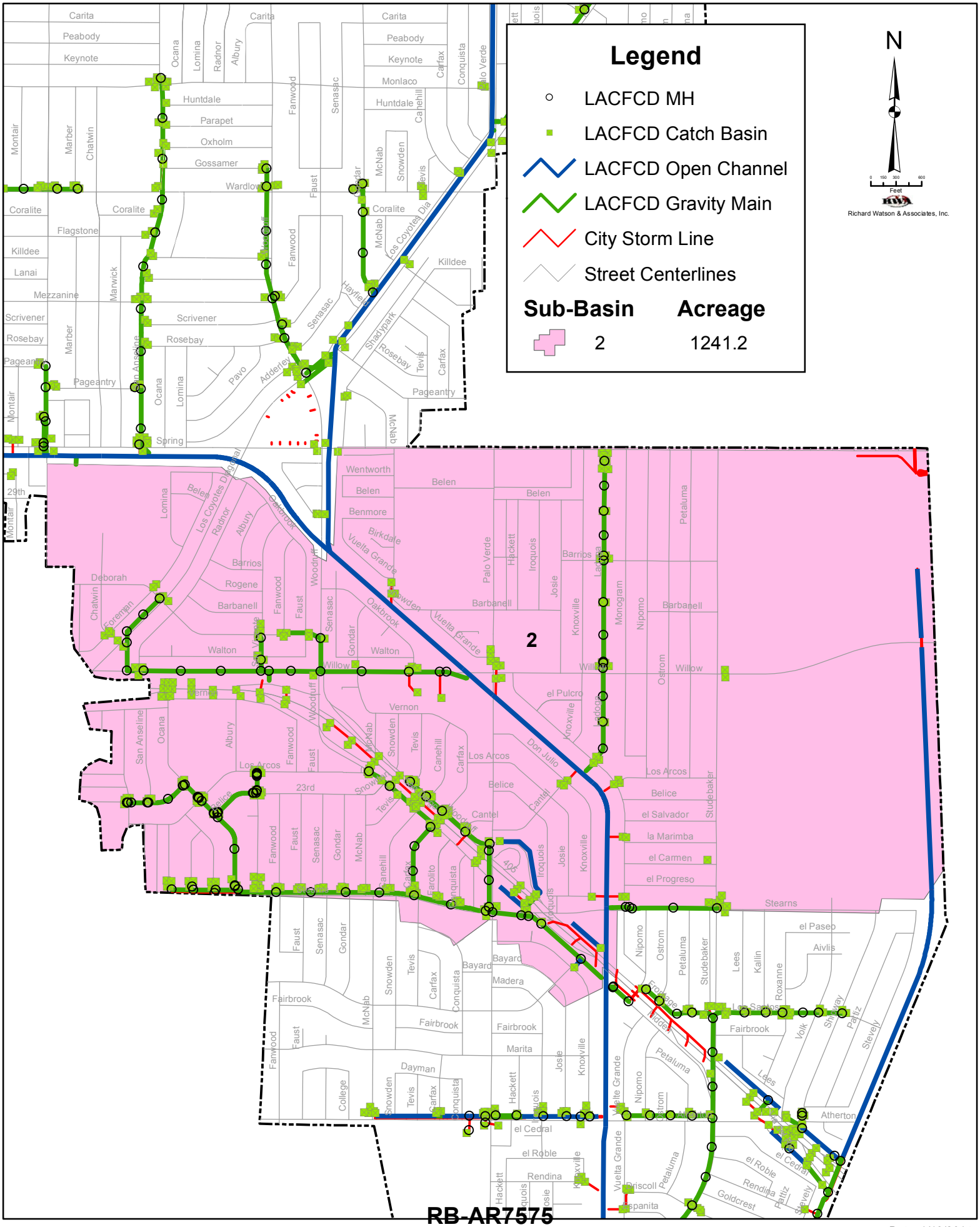
Richard Watson & Associates, Inc.

RB-AR7574

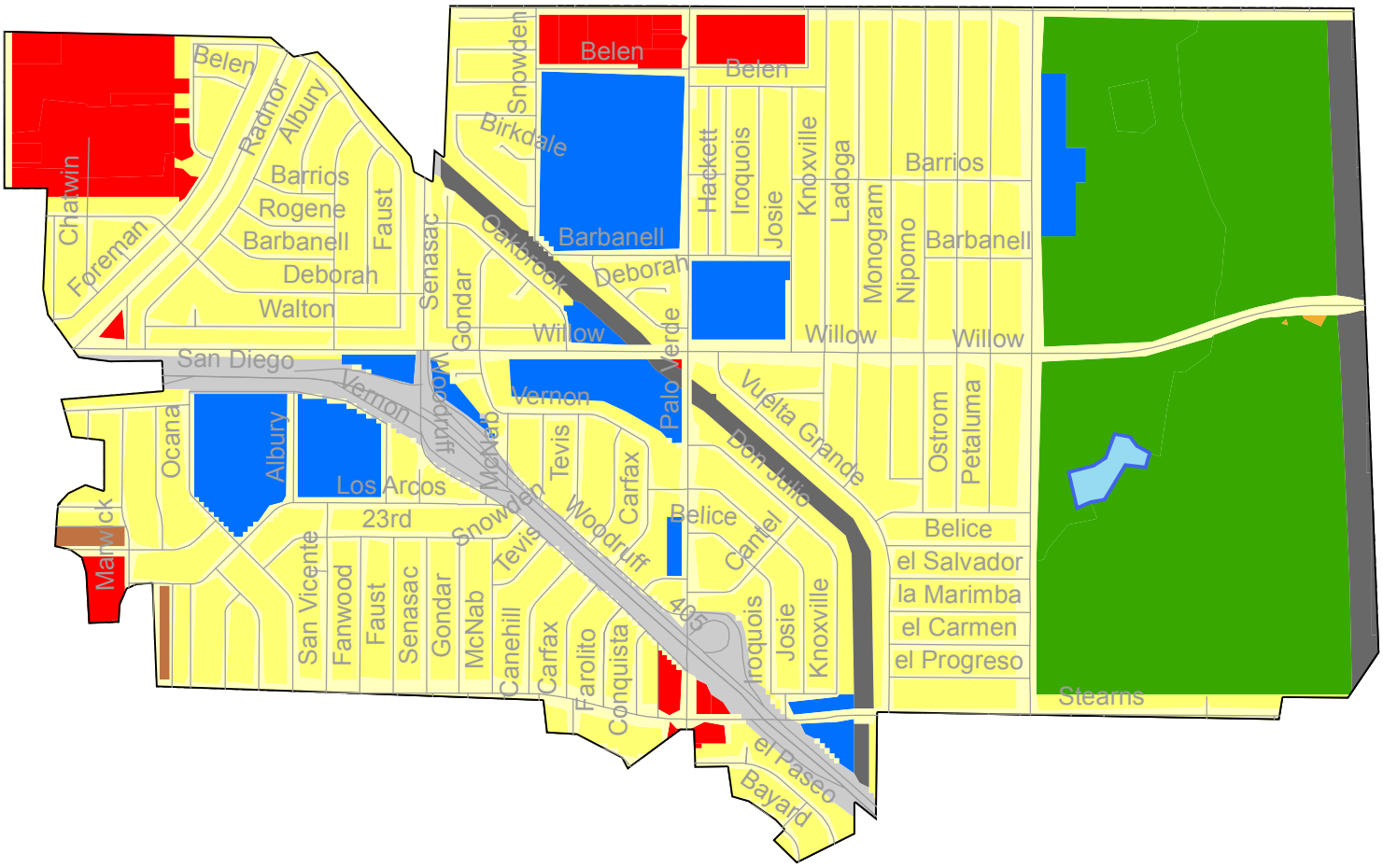
Prepared by: ECKERSALL, LLC

Date: 3/4/2014

Los Cerritos Channel TMDL Sub-Basin 2



Los Cerritos Channel TMDL Sub Basin 2
Hydrologic Response Units



Legend

Hydrologic Response Units

- HD SFR
- LD SFRM
- LD SFR Steep S
- MF
- Commercial
- Institutional
- Industrial
- Transportation
- Secondary Roads
- Agriculture Moderate Slope D
- Vacant Moderate Slope D
- Vacant Steep Slope D
- Water Bodies

Sub Basin 2

Acreage 1241

Street Centerlines

N

0 4,125 8,250 16,500
Inches

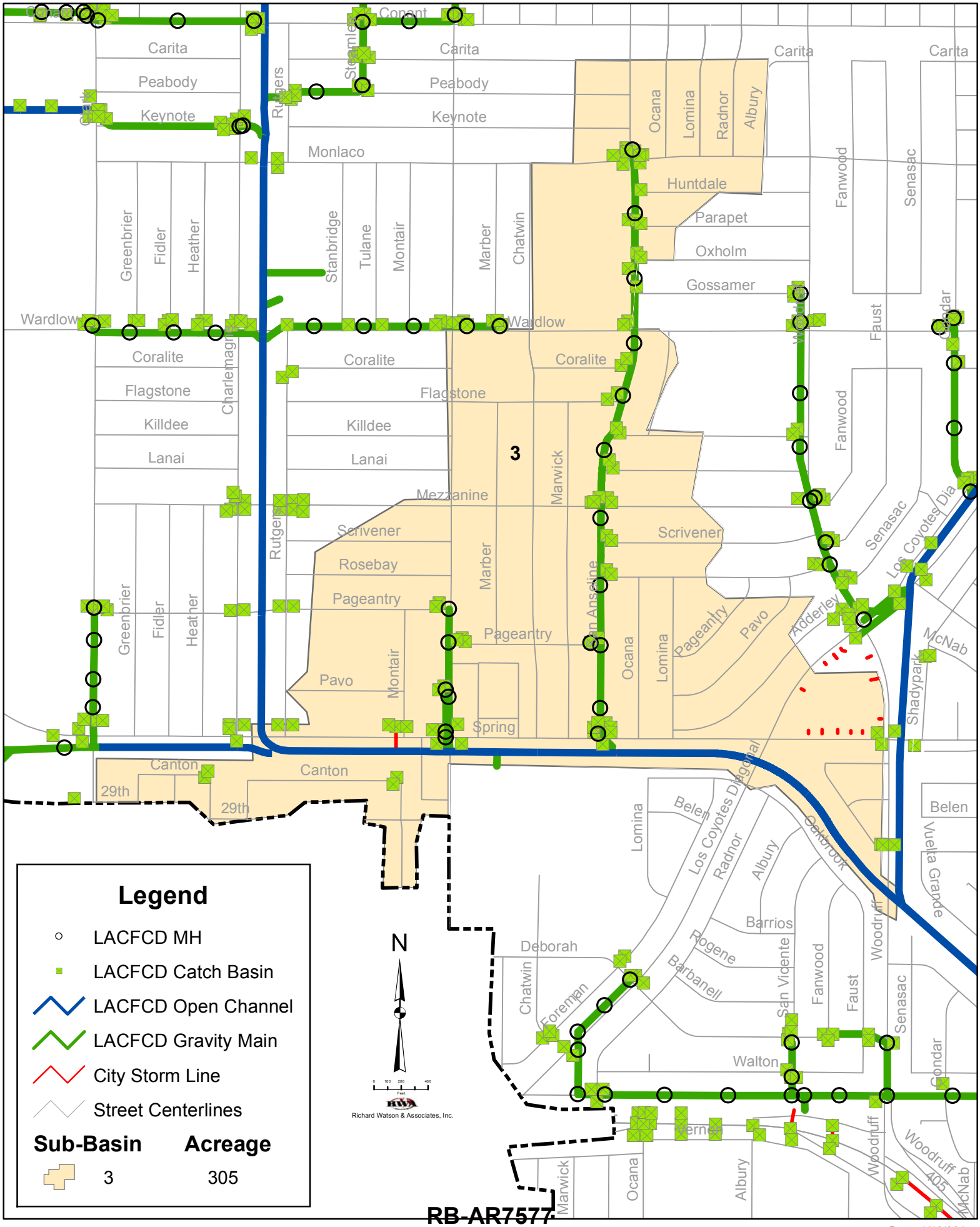
Richard Watson & Associates, Inc.

RB-AR7576

Prepared by: ECKERSALL, LLC

Date: 3/4/2014

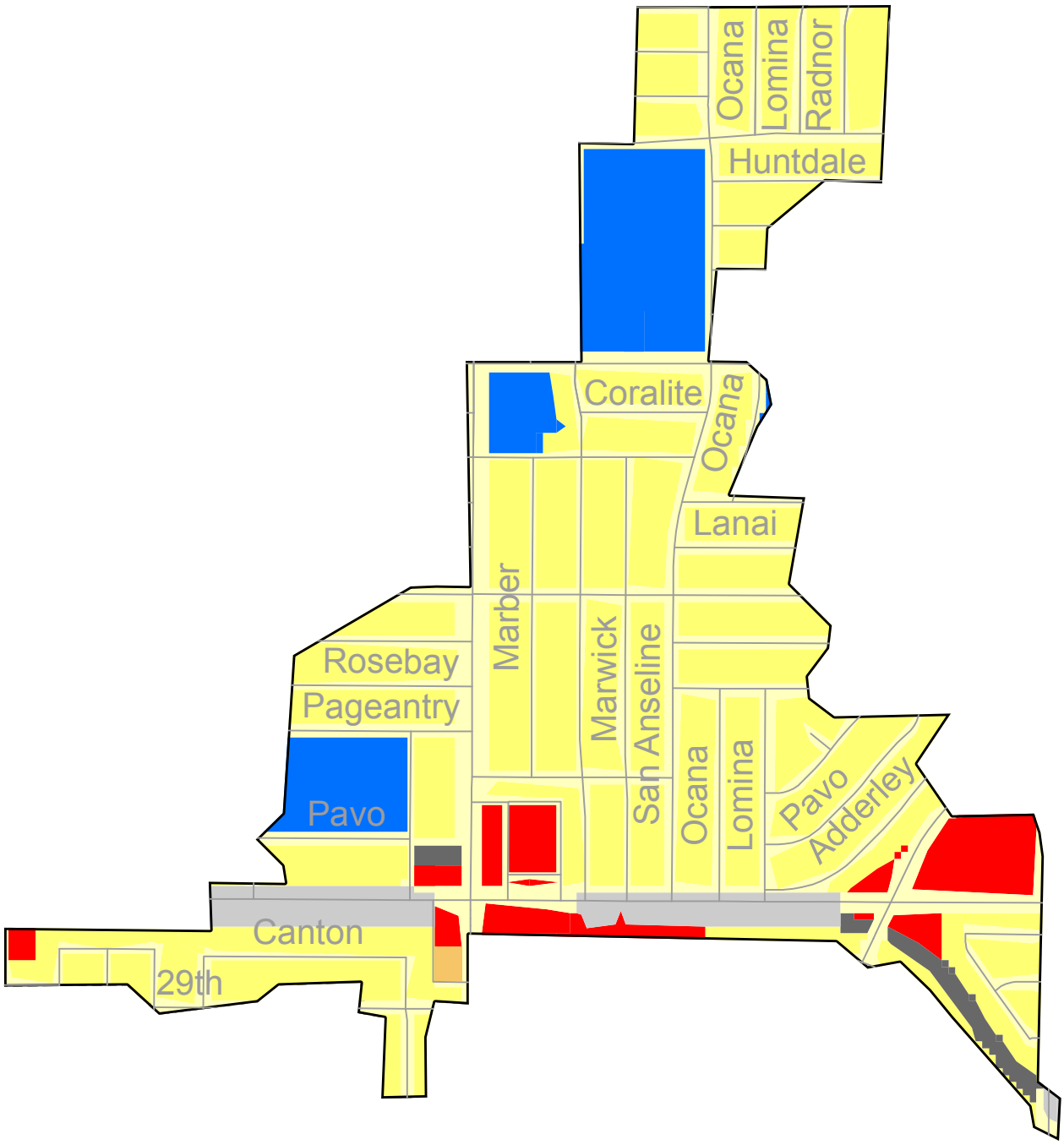
Los Cerritos Channel TMDL Sub-Basin 3



Prepared by: ECKERSALL, LLC

Date: 1/13/2014

Los Cerritos Channel TMDL Sub Basin 3
Hydrologic Response Units



Legend

Hydrologic Response Units

- HD SFR
- LD SFRM
- LD SFR Steep S
- MF
- Commercial
- Institutional
- Industrial
- Transportation
- Secondary Roads
- Agriculture Moderate Slope D
- Vacant Moderate Slope D
- Vacant Steep Slope D
- Water Bodies

Sub Basin
3

Acreage
305

Street Centerlines

N

0 2,750 5,500 11,000
Inches

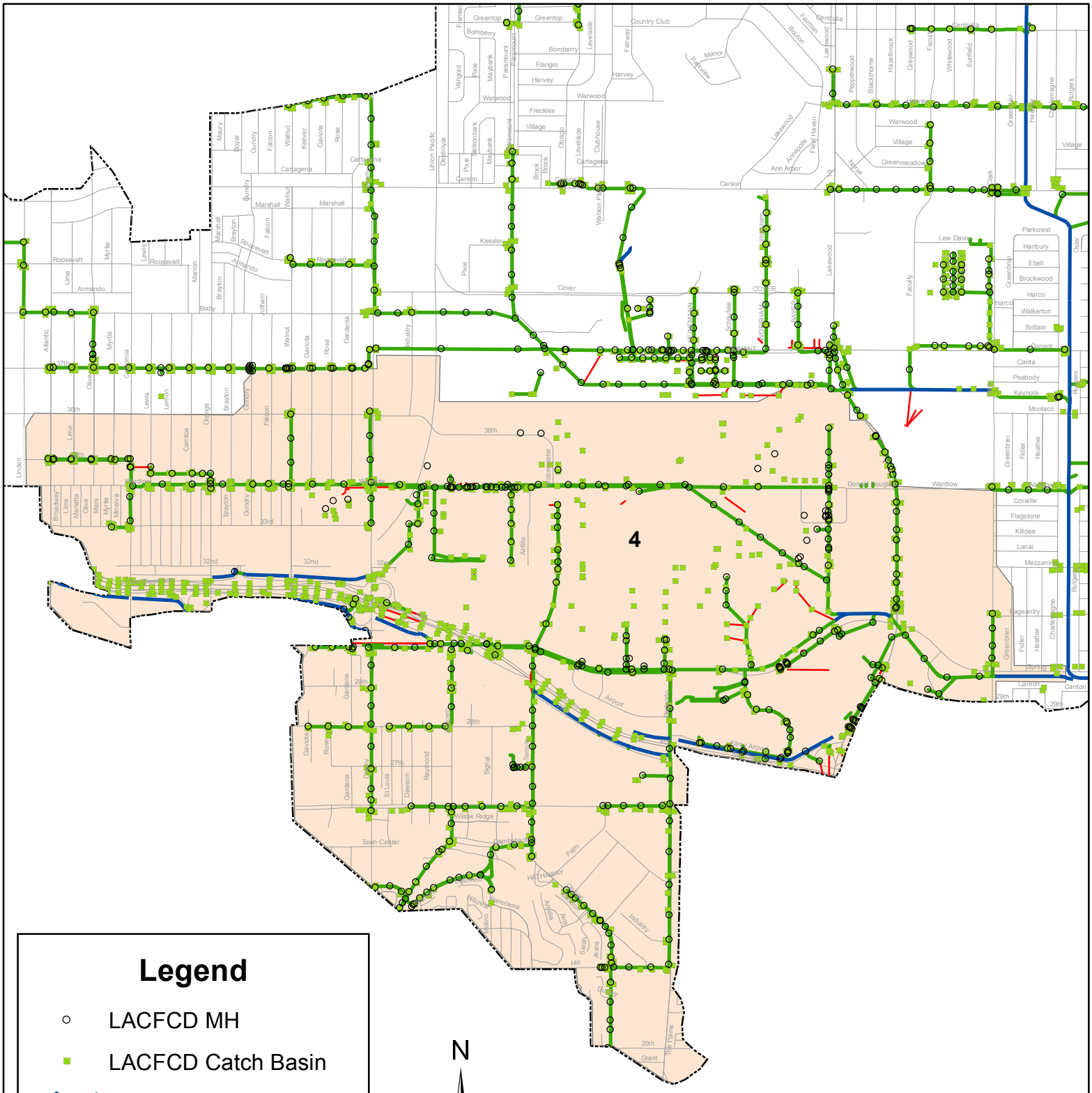
Richard Watson & Associates, Inc.

RB-AR7578

Prepared by: ECKERSALL, LLC

Date: 3/4/2014

Los Cerritos Channel TMDL Sub-Basin 4



Legend

- LACFCD MH
- LACFCD Catch Basin
- LACFCD Open Channel
- LACFCD Gravity Main
- City Storm Line
- Street Centerlines

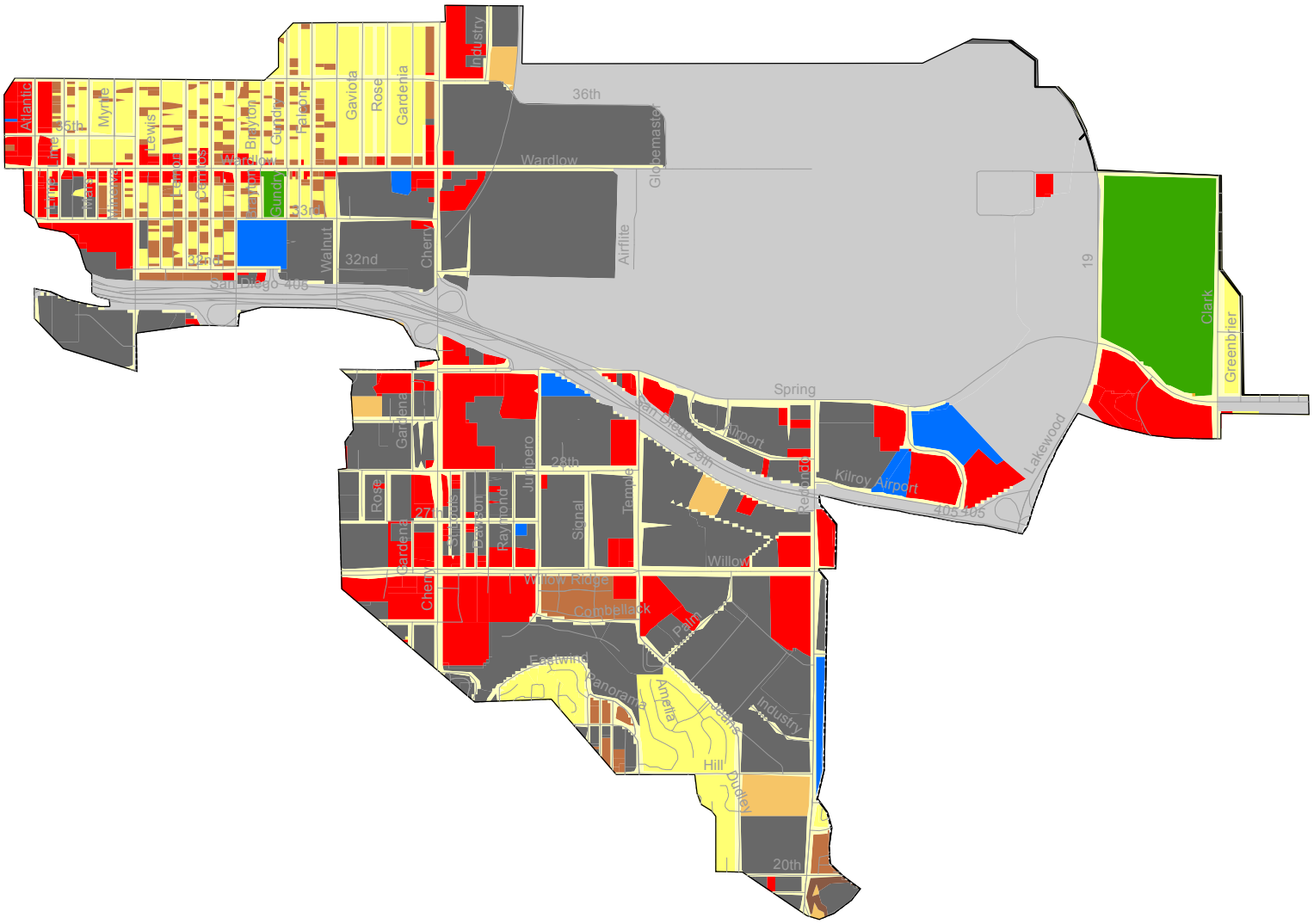
Sub-Basin	Acreage
4	2270

RB-AR7579

Prepared by: ECKERSALL, LLC

Date: 1/13/2014

Los Cerritos Channel TMDL Sub Basin 4
Hydrologic Response Units



Legend

Hydrologic Response Units

- HD SFR
- LD SFRM
- LD SFR Steep S
- MF
- Commercial
- Institutional
- Industrial
- Transportation
- Secondary Roads
- Agriculture Moderate Slope D
- Vacant Moderate Slope D
- Vacant Steep Slope D
- Water Bodies

Sub Basin
4

Acreage
2270

Street Centerlines

N

0 6,500 13,000 26,000
Inches

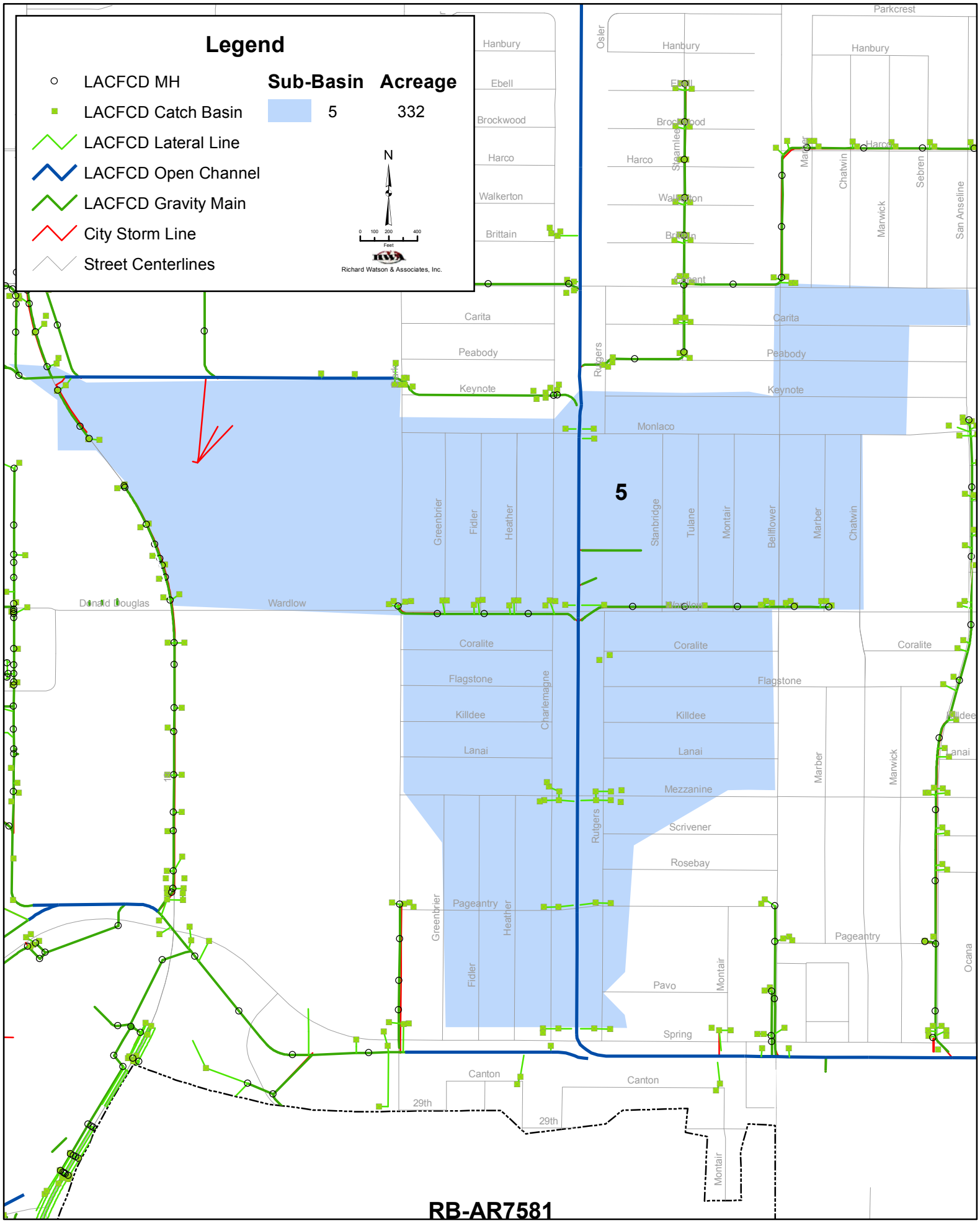
Richard Watson & Associates, Inc.

RB-AR7580

Prepared by: ECKERSALL, LLC

Date: 3/4/2014

Los Cerritos Channel TMDL Sub-Basin 5

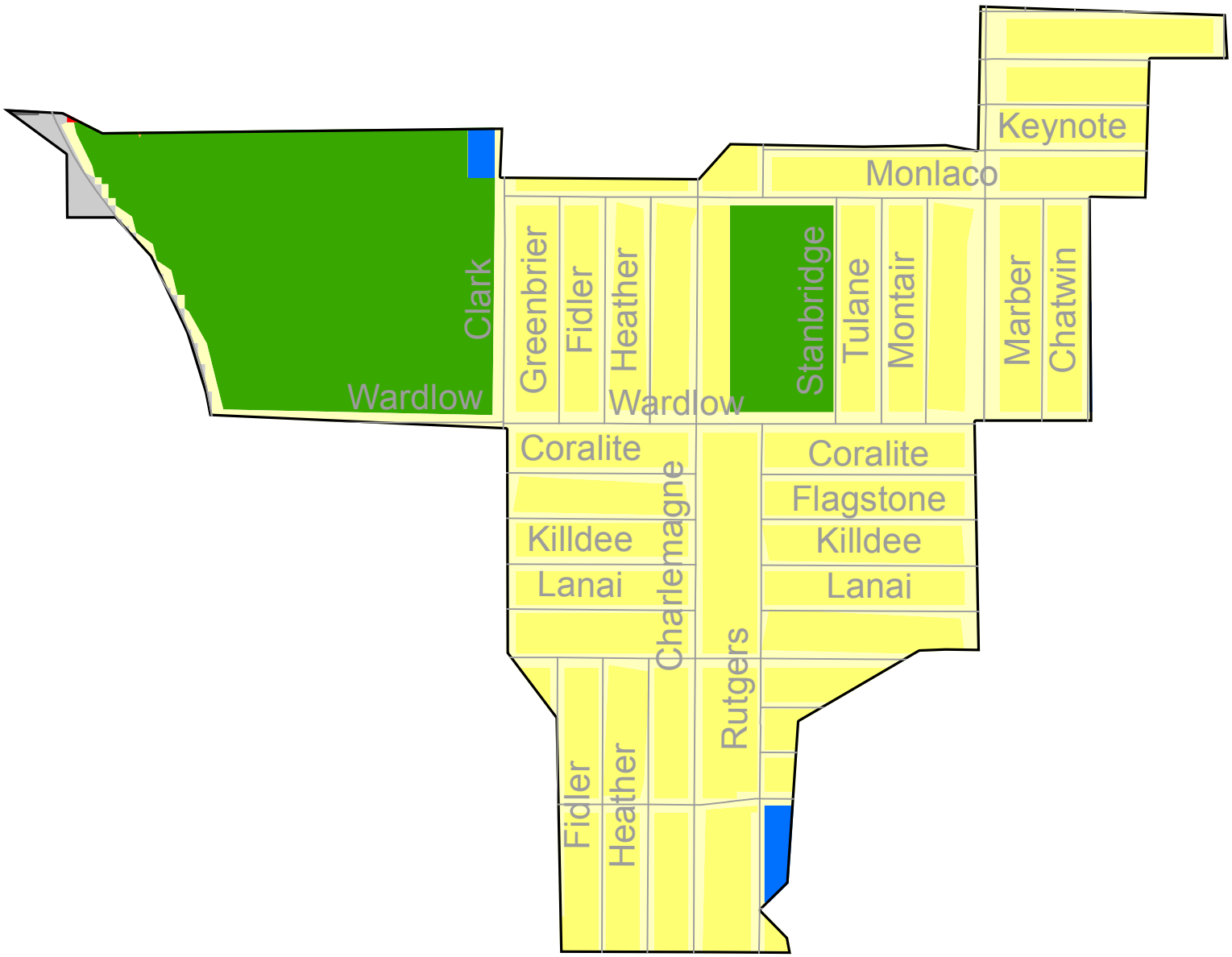


RB-AR7581

Prepared by: ECKERSALL, LLC

Date: 1/9/2014

Los Cerritos Channel TMDL Sub Basin 5
Hydrologic Response Units



Legend

Hydrologic Response Units

- HD SFR
- LD SFRM
- LD SFR Steep S
- MF
- Commercial
- Institutional
- Industrial
- Transportation
- Secondary Roads
- Agriculture Moderate Slope D
- Vacant Moderate Slope D
- Vacant Steep Slope D
- Water Bodies

Sub Basin
5

Acreage
332

Street Centerlines

N

0 2,600 5,200 10,400
Inches

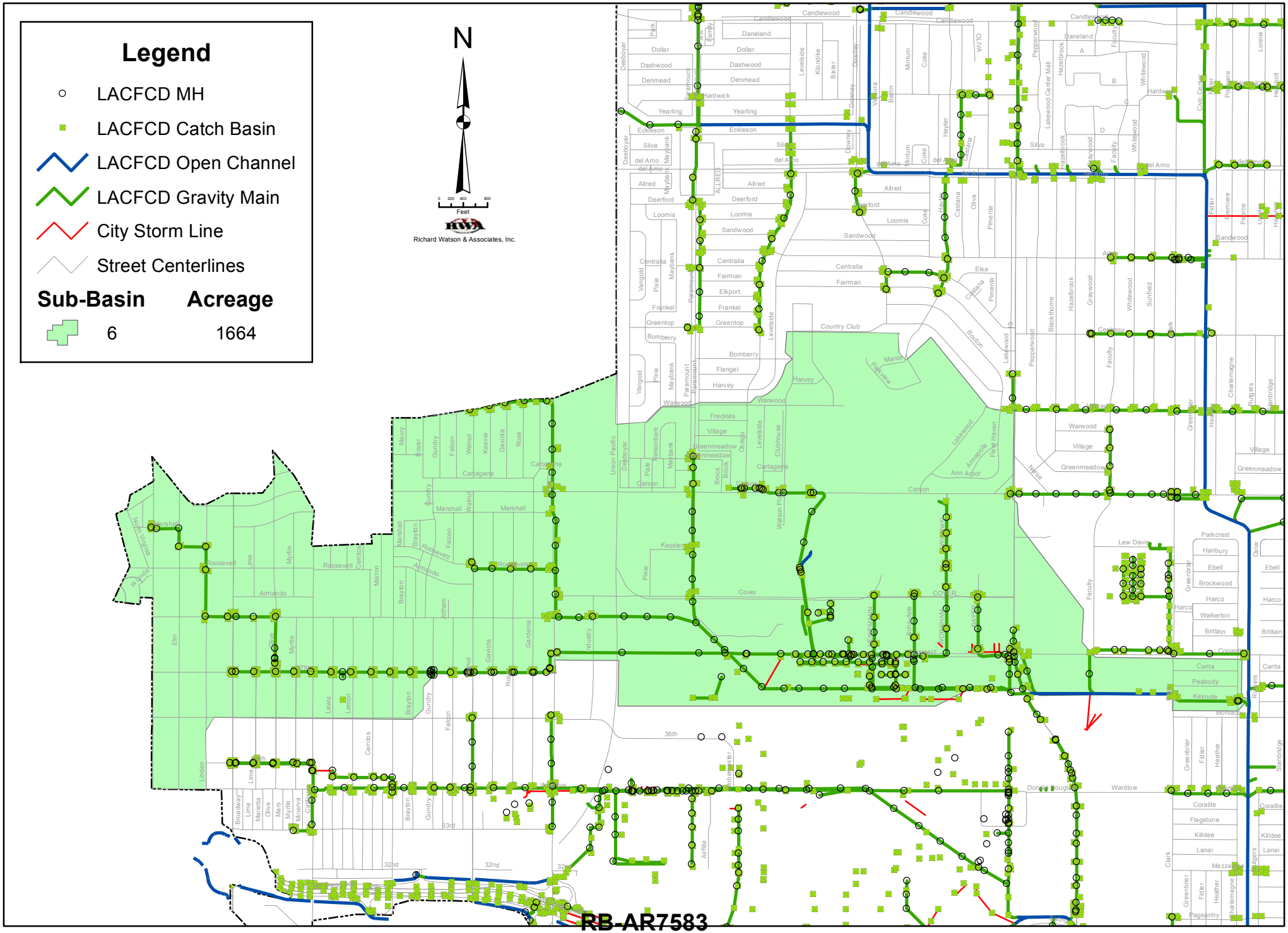
Richard Watson & Associates, Inc.

RB-AR7582

Prepared by: ECKERSALL, LLC

Date: 3/4/2014

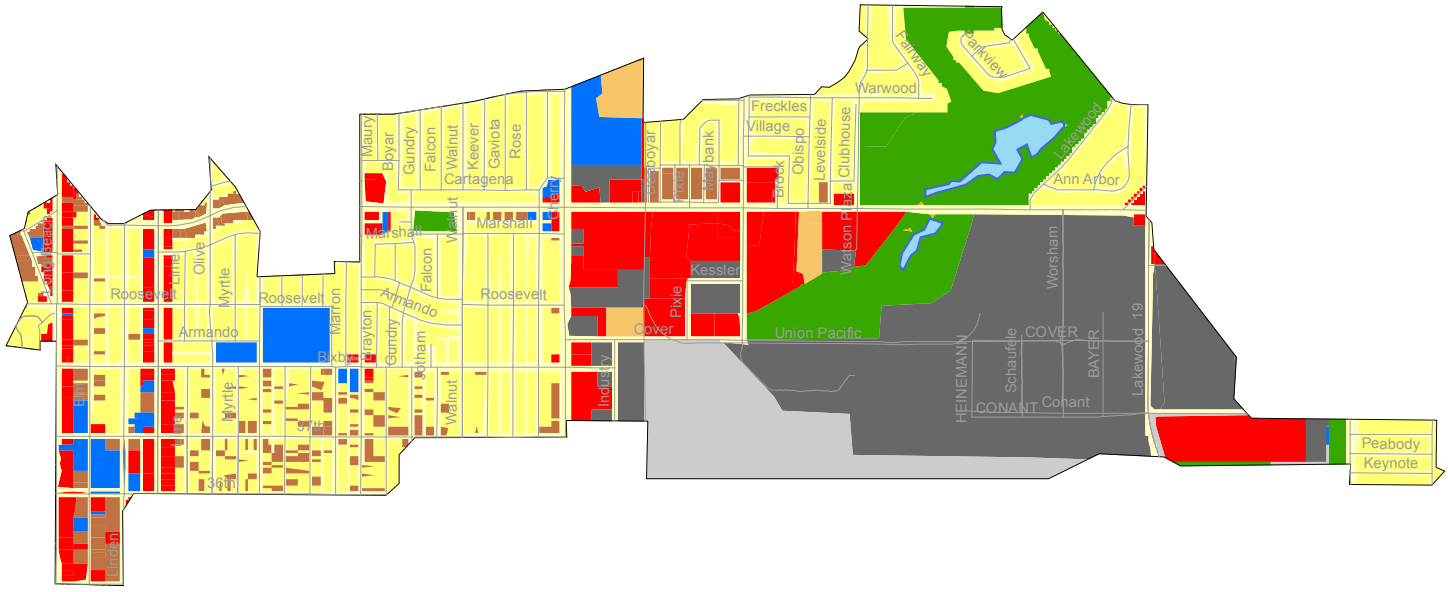
Los Cerritos Channel TMDL Sub-Basin 6



Prepared by: ECKERSALL, LLC

Date: 1/13/2014

Los Cerritos Channel TMDL Sub Basin 6
Hydrologic Response Units



Legend

Hydrologic Response Units

- HD SFR
- LD SFRM
- LD SFR Steep S
- MF
- Commercial
- Institutional
- Industrial
- Transportation
- Secondary Roads
- Agriculture Moderate Slope D
- Vacant Moderate Slope D
- Vacant Steep Slope D
- Water Bodies

Sub Basin
6

Acreage
1664

Street Centerlines

N

0 7,500 15,000 30,000
Inches

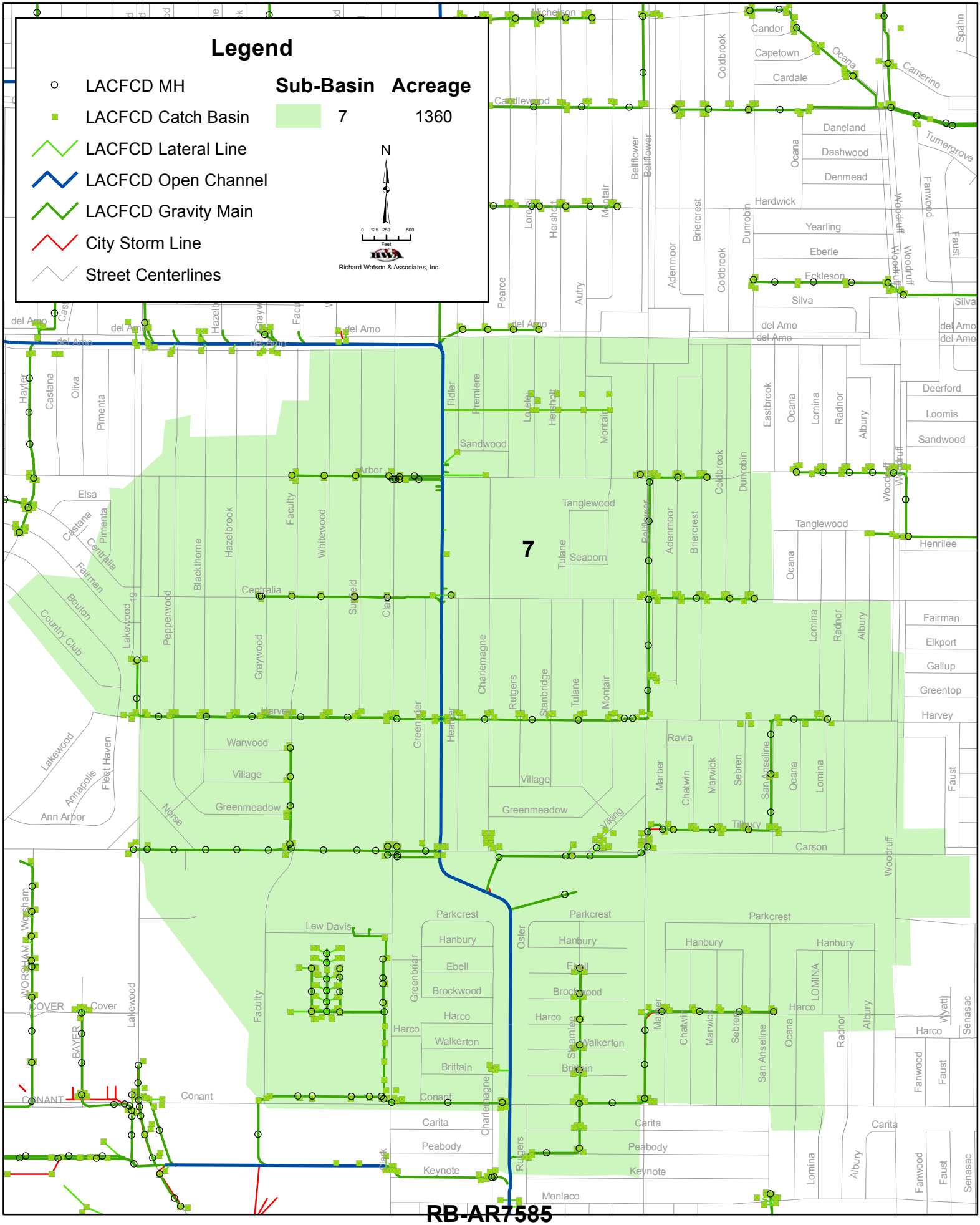
Richard Watson & Associates, Inc.

RB-AR7584

Prepared by: ECKERSALL, LLC

Date: 3/4/2014

Los Cerritos Channel TMDL Sub-Basin 7

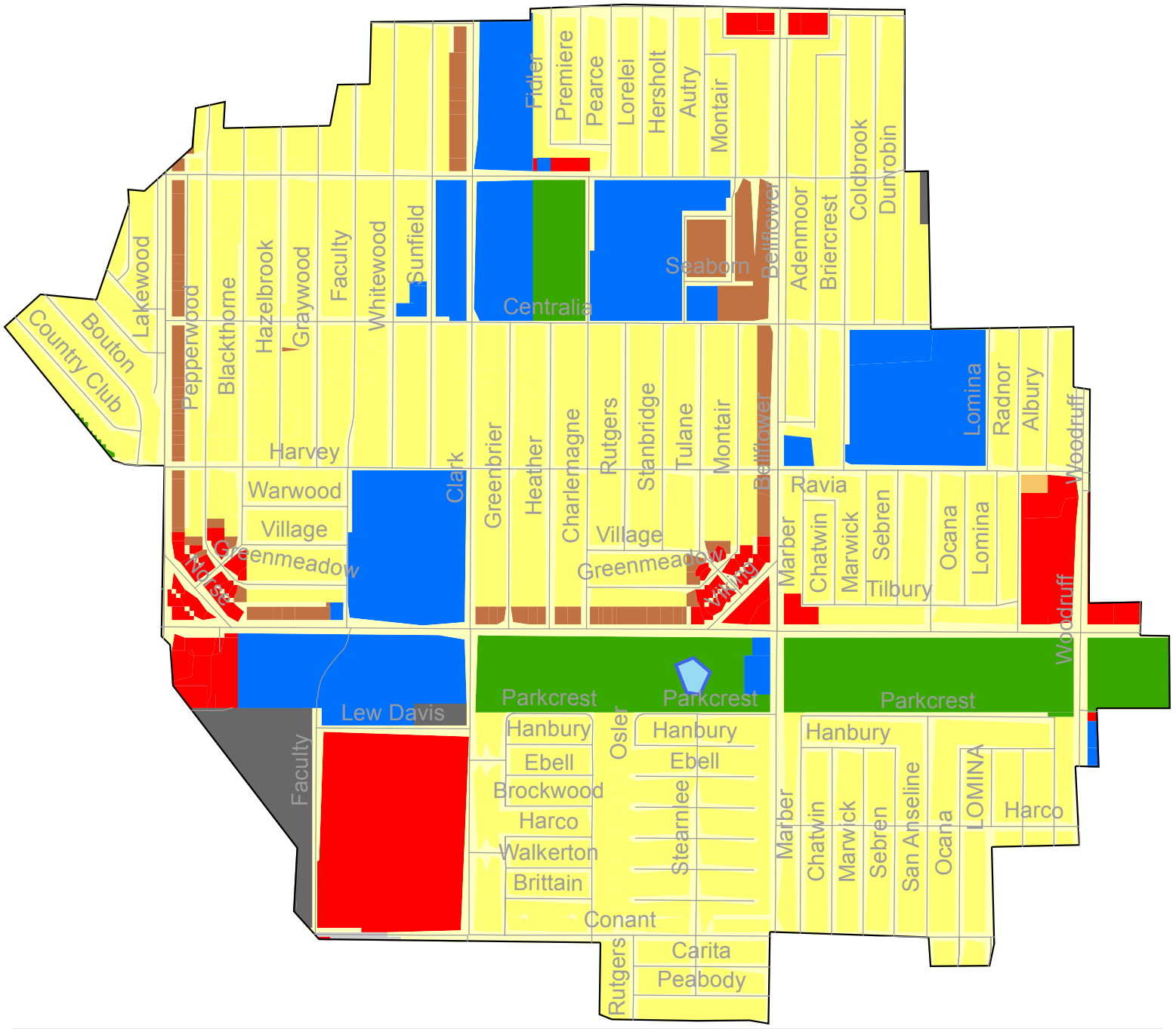


RB-AR7585

Prepared by: ECKERSALL, LLC

Date: 1/9/2014

Los Cerritos Channel TMDL Sub Basin 7
Hydrologic Response Units



Legend

Hydrologic Response Units

- HD SFR
- LD SFRM
- LD SFR Steep S
- MF
- Commercial
- Institutional
- Industrial
- Transportation
- Secondary Roads
- Agriculture Moderate Slope D
- Vacant Moderate Slope D
- Vacant Steep Slope D
- Water Bodies

Sub Basin
7

Acreage
1360

Street Centerlines

N

0 3,750 7,500 15,000
Inches

Richard Watson & Associates, Inc.

RB-AR7586

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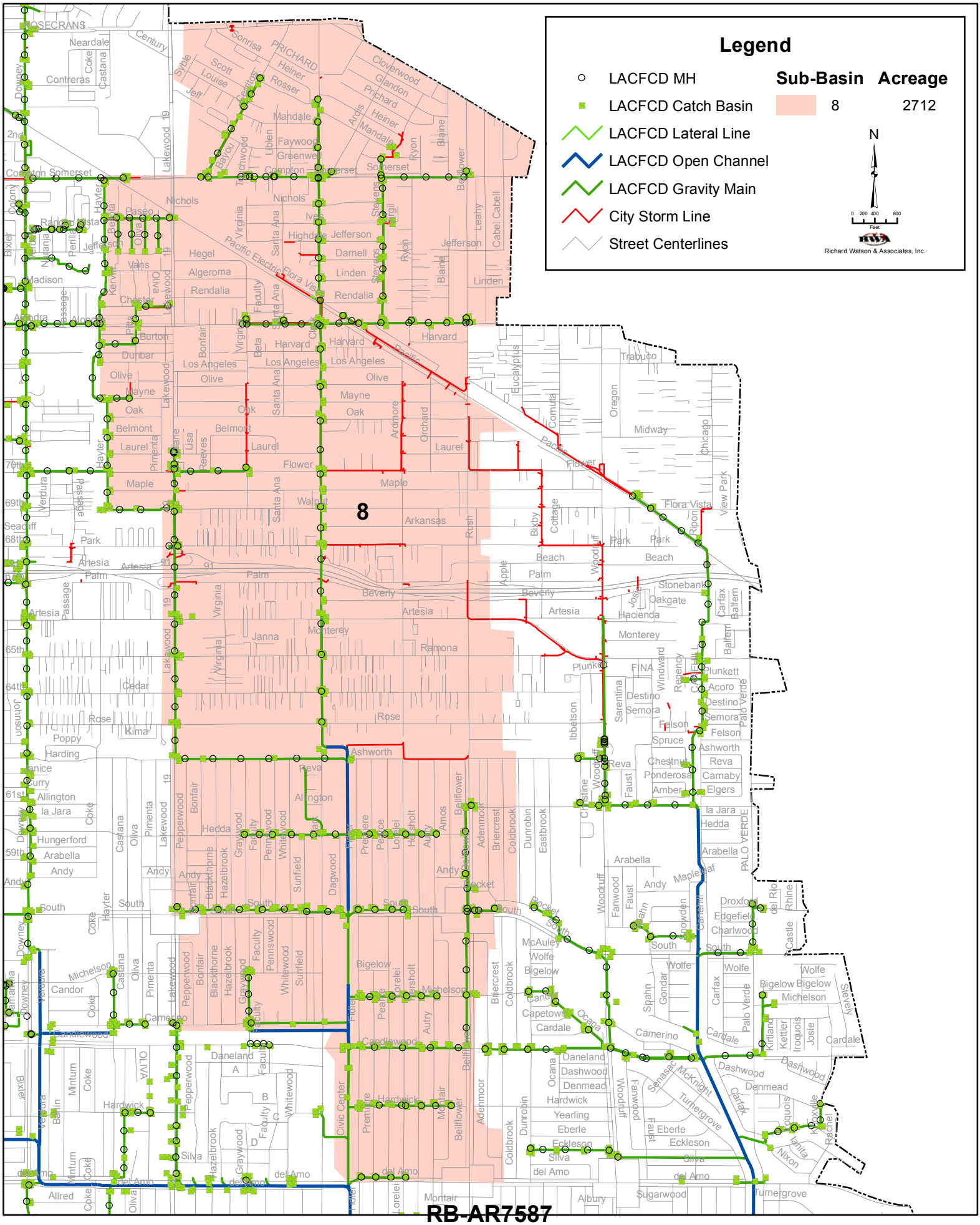
Date: 3/4/2014

Los Cerritos Channel TMDL Sub-Basin 8



RB-AR7587

Prepared by: ECKERSALL, LLC

Date: 1/9/2014

Los Cerritos Channel TMDL Sub Basin 8
Hydrologic Response Units

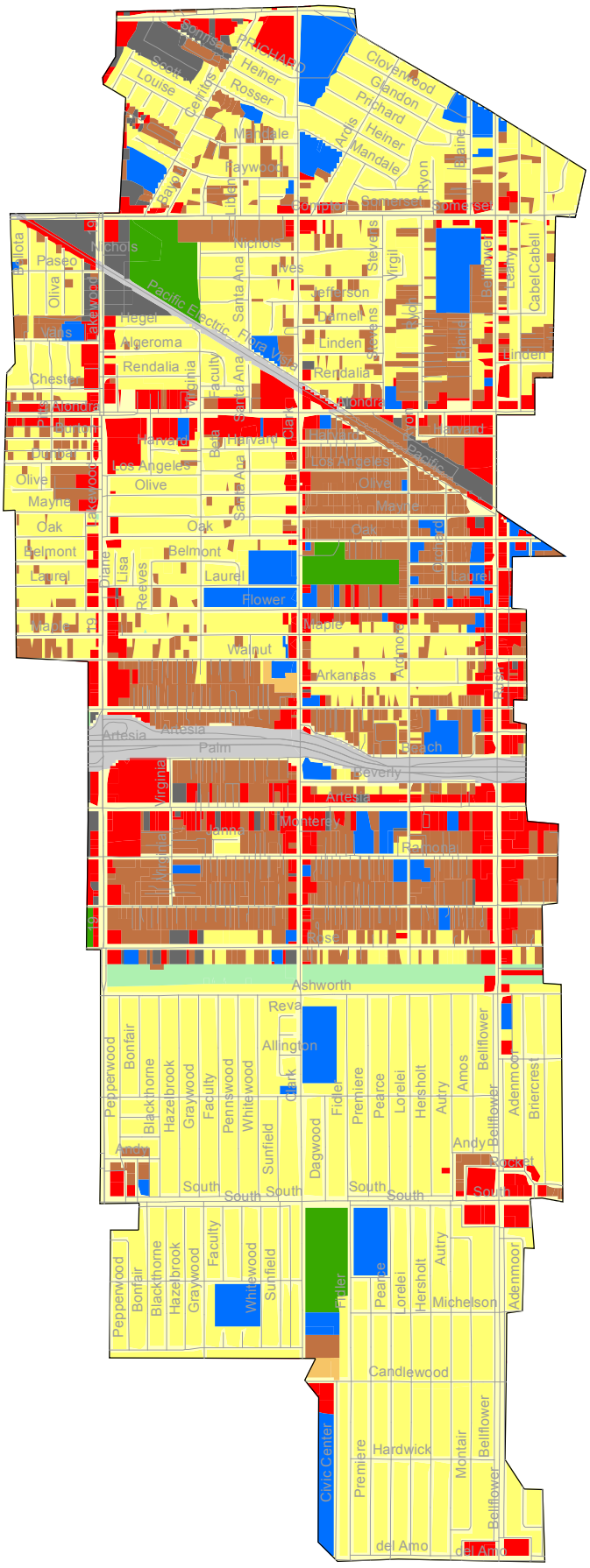
Legend

Hydrologic Response Units

- HD SFR
- LD SFRM
- LD SFR Steep S
- MF
- Commercial
- Institutional
- Industrial
- Transportation
- Secondary Roads
- Agriculture Moderate Slope D
- Vacant Moderate Slope D
- Vacant Steep Slope D
- Water Bodies

Sub Basin	Acreage
8	2712

- Street Centerlines



N

0 7,000 14,000 28,000

Inches

Richard Watson & Associates, Inc.

RB-AR7588

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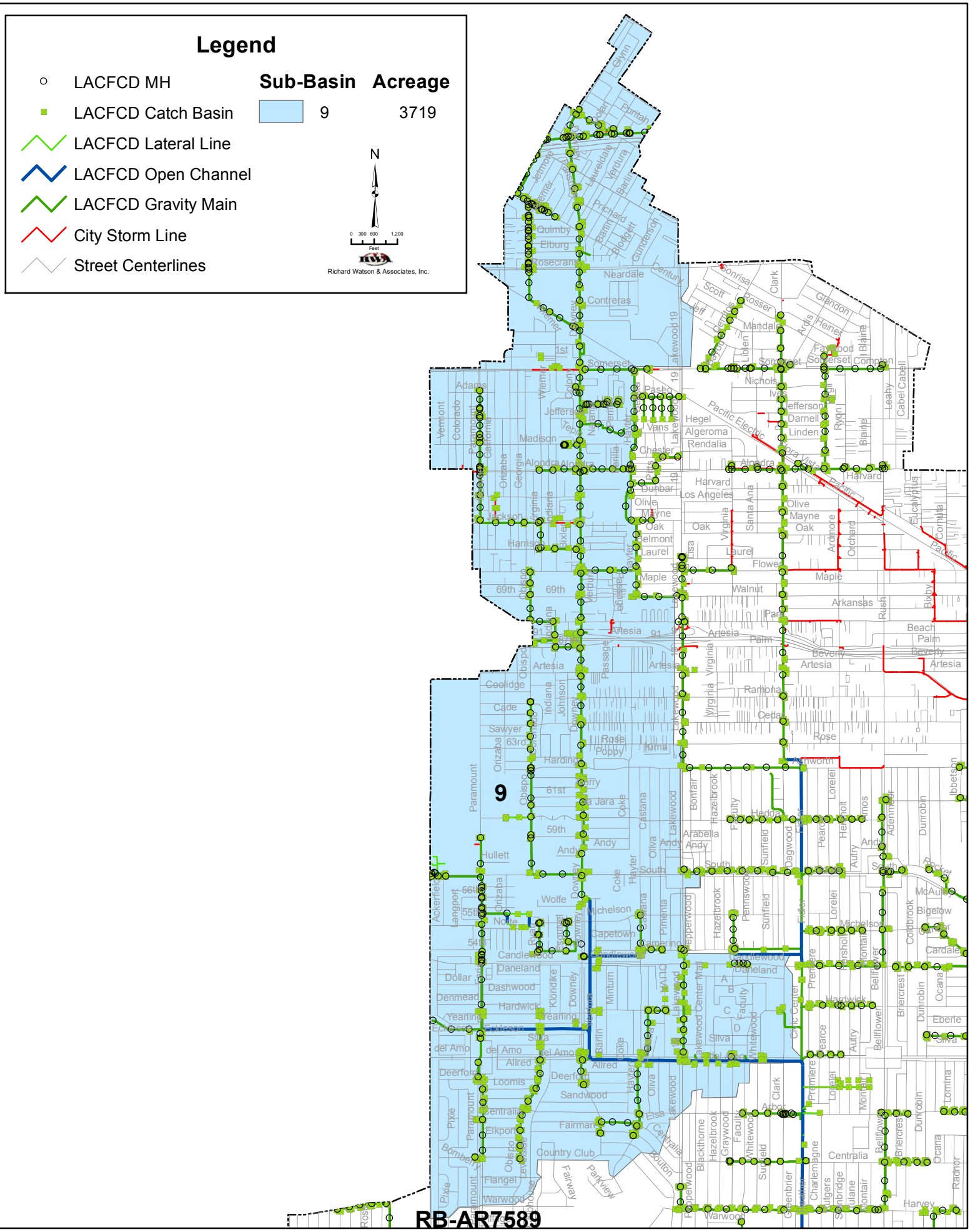
Date: 3/4/2014

Los Cerritos Channel TMDL Sub-Basin 9



Prepared by: ECKERSALL, LLC

Date: 1/9/2014

Los Cerritos Channel TMDL Sub Basin 9
Hydrologic Response Units

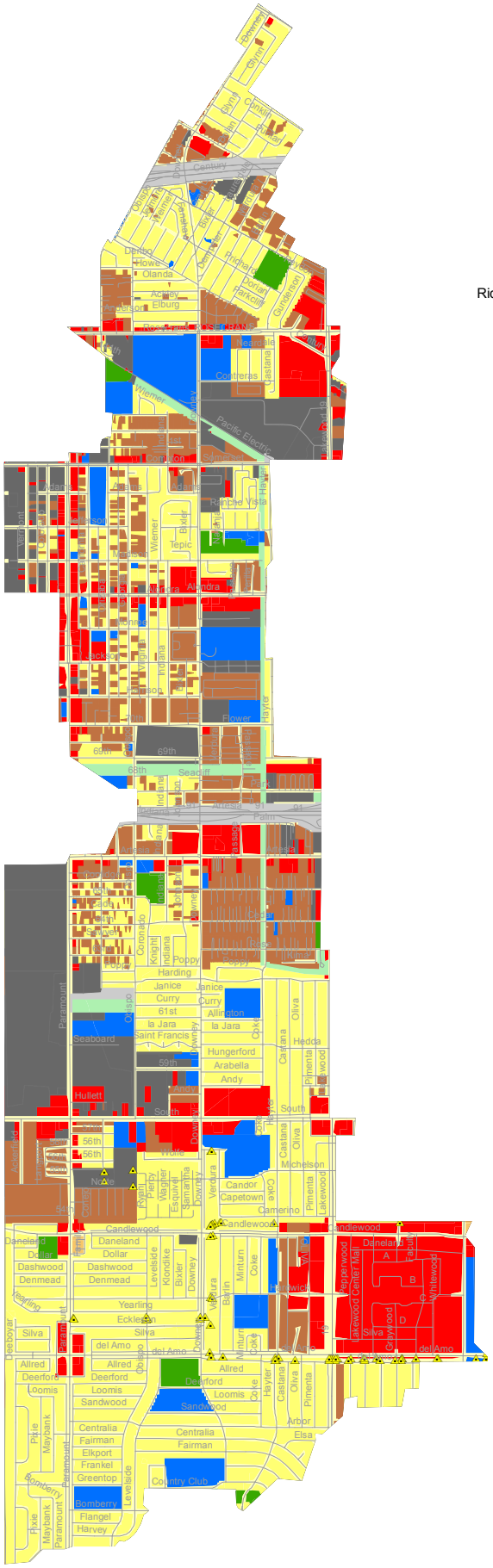
Legend

Hydrologic Response Units

- HD SFR
- LD SFRM
- LD SFR Steep S
- MF
- Commercial
- Institutional
- Industrial
- Transportation
- Secondary Roads
- Agriculture Moderate Slope D
- Vacant Moderate Slope D
- Vacant Steep Slope D
- Water Bodies

Sub Basin	Acreage
9	3718

Street Centerlines



N

0 10,000 20,000 40,000
Inches

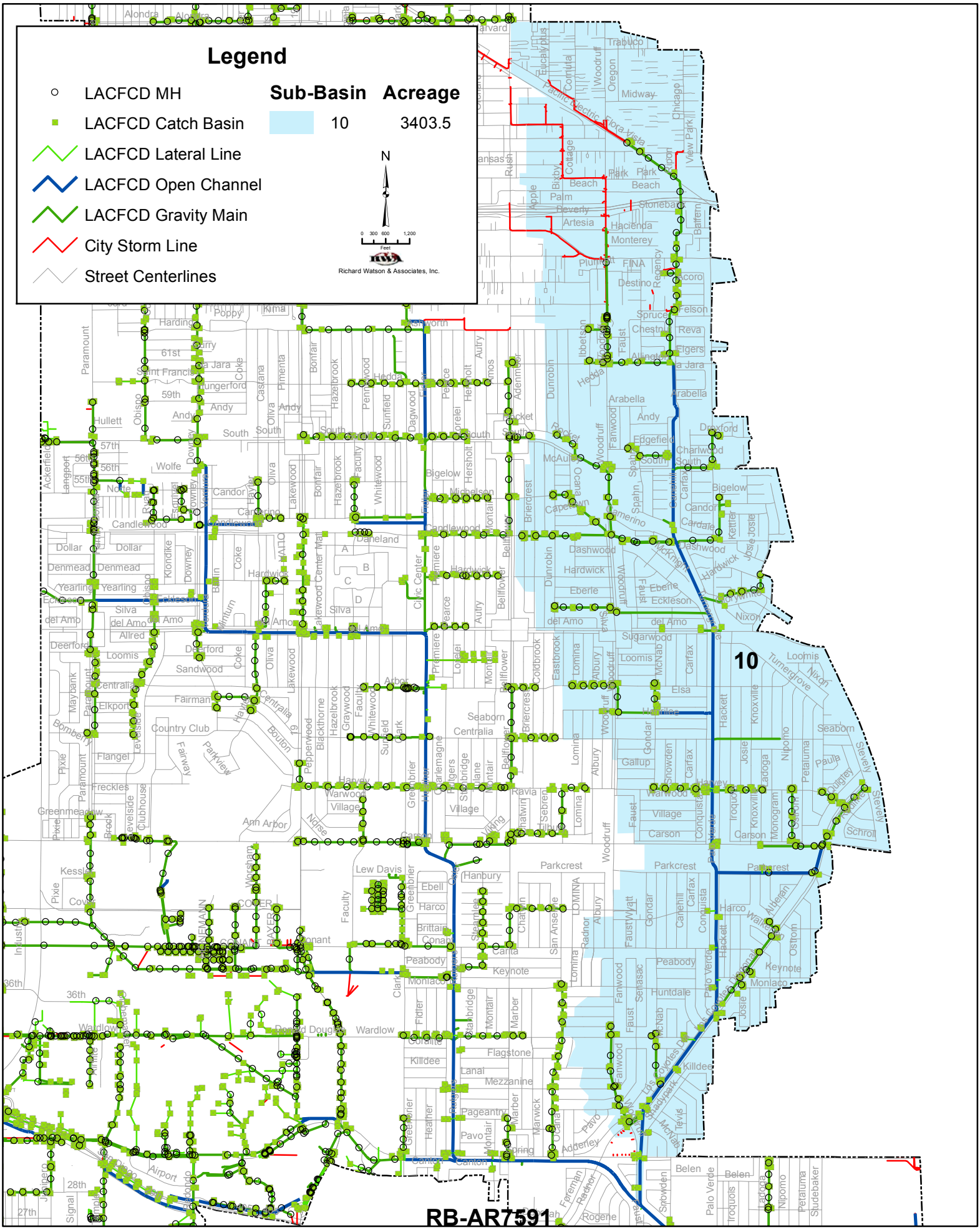
Richard Watson & Associates, Inc.

RB-AR7590

Prepared by: ECKERSALL, LLC

Date: 3/3/2014

Los Cerritos Channel TMDL Sub-Basin 10



Prepared by: ECKERSALL, LLC

Date: 1/9/2014

Los Cerritos Channel TMDL Sub Basin 10
Hydrologic Response Units

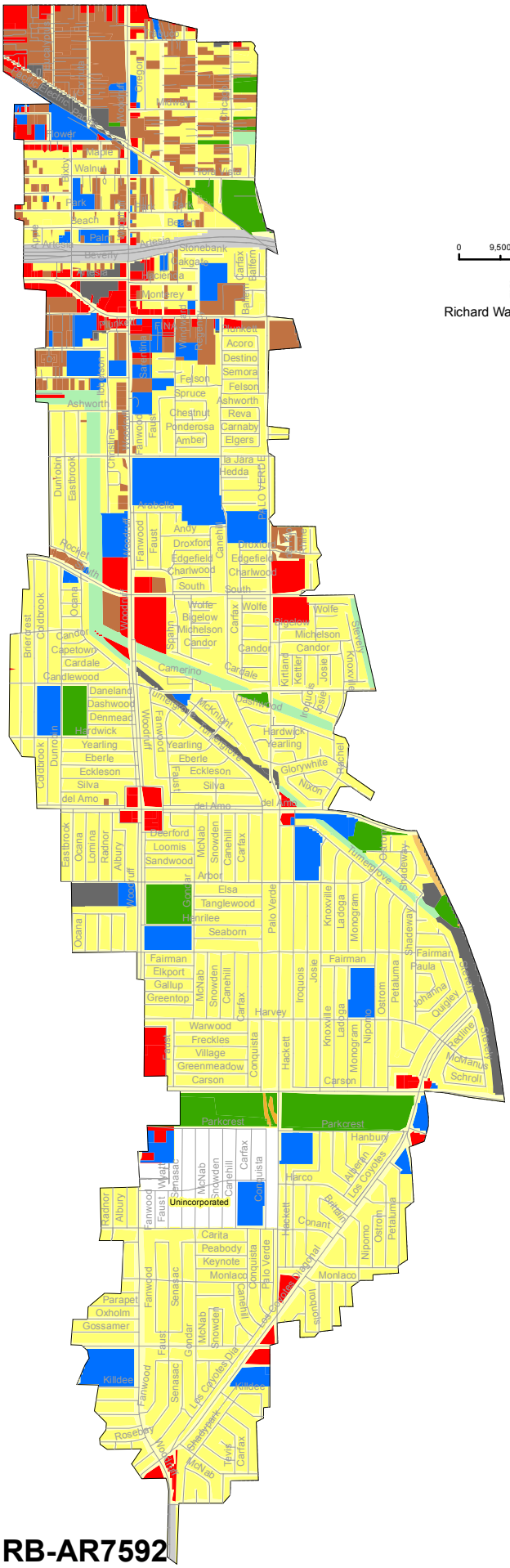
Legend

Hydrologic Response Units

- HD SFR
- LD SFRM
- LD SFR Steep S
- MF
- Commercial
- Institutional
- Industrial
- Transportation
- Secondary Roads
- Agriculture Moderate Slope D
- Vacant Moderate Slope D
- Vacant Steep Slope D
- Water Bodies

Sub Basin	Acreage
10	3403

Street Centerlines



N

0 9,500 19,000 38,000
Inches

Richard Watson & Associates, Inc.

RB-AR7592

Prepared by: ECKERSALL, LLC

Date: 3/4/2014

ATTACHMENT C:

MINIMUM CONTROL MEASURE GUIDANCE

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Watershed Management Program

MCM Guidance

DRAFT

Public Information and Participation Program

Introduction

Permit §VI.D.5.a (LA)/ §VII.F.1 (LB)

Each participating city is required to develop and implement a Public Information and Participation Program (PIPP) that includes the requirements listed in Permit §VI.D.5.a (LB §VII.F). This document provides guidance that the participating cities can follow to implement a PIPP in compliance with the Permit.

The objectives of the PIPP are to:

- Measurably increase the knowledge of the target audiences about the MS4, the adverse impacts of stormwater pollution on receiving waters and potential solutions to mitigate the impacts.
- Measurably change the waste disposal and stormwater pollution generation behavior of target audiences by developing and encouraging the implementation of appropriate alternatives.
- Involve and engage a diversity of socio-economic groups and ethnic communities in Los Angeles County to participate in mitigating the impacts of stormwater pollution.

PIPP Implementation

Permit §VI.D.5.b (LA)/§VII.F.2 (LB)

The PIPP is implemented using the following approaches:

- By participating in a County-wide PIPP,
- By participating in one or more Watershed Group sponsored PIPPs, and
- individually within its jurisdiction.

Cities participating in a County-wide or Watershed Group PIPP provide contact info for their staff responsible for stormwater public education activities to the designated PIPP coordinator. Changes in contact information are provided within 30 days of the date that the change occurred.

Public Participation

Permit §VI.D.5.c (LA)/§VII.F.3 (LB)

Public Reporting

The means for public reporting of clogged catch basin inlets and illicit discharges/dumping, faded or missing catch basin labels, and general stormwater and non-stormwater pollution prevention information is provided through the use of the countywide 888-CLEAN-LA hotline. In addition, each participating city:

- Includes the reporting information – updated when necessary – in public information and the government pages of the telephone book as they are developed or published.
- Identifies staff or departments who will serve as the contact person(s) and will make this information available on its website.
- Provides current, updated hotline contact information to the general public within its jurisdiction.

RB-AR7596

Events

Events are organized to target residents and population subgroups. The purpose of the events is to educate and involve the community in stormwater and non-stormwater pollution prevention activities, such as education seminars, clean-ups, and community catch basin stenciling.

Residential Outreach Program

Permit §VI.D.5.d (LA)/§VII.F.4 (LB)

With the exception of item 5, which is no longer an element of the countywide PIP Program, each city implements the following activities for the Residential Outreach Program as part of a countywide program:

1. Conduct stormwater pollution prevention public service announcements and advertising campaigns
2. Prepare public education materials that include information on the proper handling (i.e., disposal, storage and/or use) of:
    a. Vehicle waste fluids
    b. Household waste materials (i.e., trash and household hazardous waste, including personal care products and pharmaceuticals)
    c. Construction waste materials
    d. Pesticides and fertilizers (including integrated pest management (IPM) practices to promote reduced use of pesticides)
    e. Green waste (including lawn clippings and leaves)
    f. Animal wastes
3. Distribute activity specific stormwater pollution prevention public education materials at the following points of purchase:
    a. Automotive parts stores
    b. Home improvement centers / lumber yards / hardware stores/paint stores
    c. Landscaping / gardening centers
    d. Pet shops / feed stores
4. Maintain stormwater websites or provide links to stormwater websites via each participating city's website. This includes educational material and opportunities for the public to participate in stormwater pollution prevention and clean-up activities listed in Part VI.D.4 of the Permit.
5. Provide independent, parochial, and public schools within each participating city's jurisdiction with materials to educate school children (K-12) on stormwater pollution. Material may include videos, live presentations and other information. A useful source of materials to work with, or leverage, is other statewide agencies and associations. These associations include the State Water Board's "Erase the Waste" educational program and the California Environmental Education Interagency Network (CEEIN) to implement this requirement.
6. When implementing the above activities, use effective strategies to educate and involve ethnic communities in stormwater pollution prevention through culturally effective methods.

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Industrial/Commercial Facilities Program

Each participating city is required to implement an industrial/commercial facilities program that includes the provisions listed in Permit § VI.D.6 (LB §VII.G). This document provides guidance that the participating cities can follow to implement an industrial/commercial facilities program in compliance with the Permit.

Introduction

Permit § VI.D.6.a (LA)/ §VII.G.1 (LB)

The Industrial/Commercial Facilities Program is designed to prevent illicit discharges into the MS4 and receiving waters, reduce industrial/commercial discharges of stormwater to the maximum extent practicable, and prevent industrial/commercial discharges from the MS4 from causing or contributing to a violation of receiving water limitations. The program consists of the following components:

- Track,
- Educate,
- Inspect and
- Ensure compliance with municipal ordinances at industrial/commercial facilities determined to be critical sources of pollutants in stormwater.

Track Critical Industrial/Commercial Sources

Permit § VI.D.6.b (LA)/ §VII.G.2 (LB)

The critical sources to be tracked are listed in Table ICF-1.

Table ICF-1: Critical Sources

Facility Category	Facility	
Commercial Facilities	Restaurants	
	Automotive service facilities (including those located at automotive dealerships)	
	Retail Gasoline Outlets	
	Nurseries and Nursery Centers (Merchant Wholesalers, Nondurable Goods, and Retail Trade)	
Industrial Facilities	USEPA "Phase I" Facilities[1]	
	Other federally-mandated facilities[2]	Municipal landfills
		Hazardous waste treatment, disposal, and recovery facilities
		Industrial facilities subject to § 313 "Toxic Release Inventory" reporting requirements of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA)[3]
General Facilities	All other commercial or industrial facilities determined to potentially contribute a substantial pollutant load to the MS4.	

[1] as specified in 40 CFR §122.26(b)(14)(i)-(xi)
[2] as specified in 40 CFR §122.26(d)(2)(iv)(C)
[3] 42 U.S.C. § 11023

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Critical source facilities are tracked in an electronic database management system. The information stored for each critical source in the inventory is listed in Table ICF-2.

Table ICF-2: Inventory Information for Critical Sources

Information Category		Information
General	Name	Facility Name
	Location	Facility address
		Facility latitude and longitude coordinates
		Receiving water
	Contact	Owner/operator name
		Mailing address
		Phone number
		Email (if available)
Business Type		Standard Industrial Classification (SIC) code and/or North American Industry Classification System (NAICS) code
		Narrative description of the activities performed and/or principal products produced
Water quality		Status of exposure of materials to stormwater
		Pollutants generated by facility activities (A-ICF-1)
		Identification of whether the facility is tributary to a waterbody segment with impairments[4] for pollutants that are also generated by the facility.
Prioritization		High, medium or low. The default priority is medium.
NPDES Permit		For applicable facilities, identify coverage under the State Water Board's General NPDES Permit for the Discharge of Stormwater Associated with Industrial Activities (Industrial General Permit) or other individual or general NPDES permits or any waiver issued by the Regional or State Water Board pertaining to stormwater discharges.
		For Industrial General Permit facilities, identify whether the facility has filed a No Exposure Certification with the State Water Board.

Update Inventory

The critical sources inventory is updated at least annually. The update is accomplished through the collection of new information from sources such as field activities and readily available inter/intra-agency records (e.g. business licenses, pretreatment permits, sanitary sewer connection permits and the State Water Resources Control Board's Storm Water Multiple Application and Report Tracking System (SMARTS)).

[4] CWA § 303(d) listed or subject to a TMDL

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Prioritization

Prioritizing facilities by their potential water quality impact provides an excellent opportunity to optimize the effectiveness of the Industrial/Commercial Facilities Program. The three inventory fields under the "Water Quality" category of Table ICF-2 provide information that allows for such a facility prioritization. Based on these fields, the following tables establish a method to prioritize all industrial/commercial facilities into three graded tiers – High, Medium and Low. The City may follow an alternative prioritization method provided it results in a similar three-tiered scheme. In order to maintain a minimum inspection frequency equivalent to the mandates of the MS4 Permit, a condition must be applied to the prioritization process. This condition is explained on the following page.

Prioritization factors

Factor	Description
A	Status of exposure of materials and industrial/commercial activities to stormwater
B	Identification of whether the facility is tributary to a waterbody segment with impairments[5] for pollutants that are also generated by the facility
C	Other factors determined by the City, such as size of facility, presence of exposed soil or history of stormwater violations

Utilizing these factors, follow steps 1, 2 and 3 below:

1. Collect necessary information to evaluate factors

Factor	Initial method	Subsequent method
A	Satellite imagery	Results of stormwater inspection
B	Cross reference Table ICF-4 or 5 with tributary TMDL/ 303(d) pollutants*	Cross reference inspection results with tributary TMDL/ 303(d) pollutants
C	Varies	

* See Pages ICF-9 and 10.

2. Evaluate factors

Factor	Result	Score
A	Low or no exposure	0
	Moderate exposure	½
	Significant exposure	1
B	No**	0
	Yes***	1
C	Low	0
	Medium	½
	High	1

** No pollutant generation/impairment matches
*** ≥ 1 pollutant generation/impairment matches

3. Prioritize facilities

		C Score		
		0	**½**	**1**
A×B Score	**0**	Low	Medium	High
	½	Medium	High	High
	1	High	High	High

This method serves only as a guide to prioritization. The City may also prioritize facilities based on a qualitative assessment of factors A, B and C.

Figure ICF-1: Industrial/Commercial Facility Prioritization Scheme

[5] CWA § 303(d) listed or subject to a TMDL

Step 3 may also be expressed by the relationships A·B + C ≥ 1 → High, 1 > A·B + C > 0 → Medium and A·B + C = 0 → Low. The purpose of multiplying A and B is to scale the impact of the presence of the pollutants at a facility (B) by the likelihood that they will be discharged to the MS4 (A). Factor C quantifies water quality concerns that are independent of A or B and as such is incorporated through addition. The purpose of this numerical approach is to provide consistency to the prioritization process. It is intended solely as a guide. The City may also prioritize facilities based on a qualitative assessment of factors A, B and C as listed in Figure ICF-1.

Prioritization Condition

The facility prioritization impacts the inspection frequency. In fact the main objective of prioritizing the facilities is to adjust the inspection schedule to focus efforts on water quality priorities. The intent is not to reduce the total number of inspections. In order to maintain a total number of inspections in line with the expectations of the MS4 Permit (i.e. result in the same number of average inspections per year as a semi-quinquennial frequency), one additional condition must be imposed:

> ***The total number of low priority facilities is less than or equal to 3 times the number of high priority facilities.***
>
> *Prioritization condition*

Prioritization Frequency

The default priority for a facility is Medium. Prioritization and reprioritization may be conducted at any time based on the discretion of the City. Figure ICF-2 is a flowchart of the prioritization process.

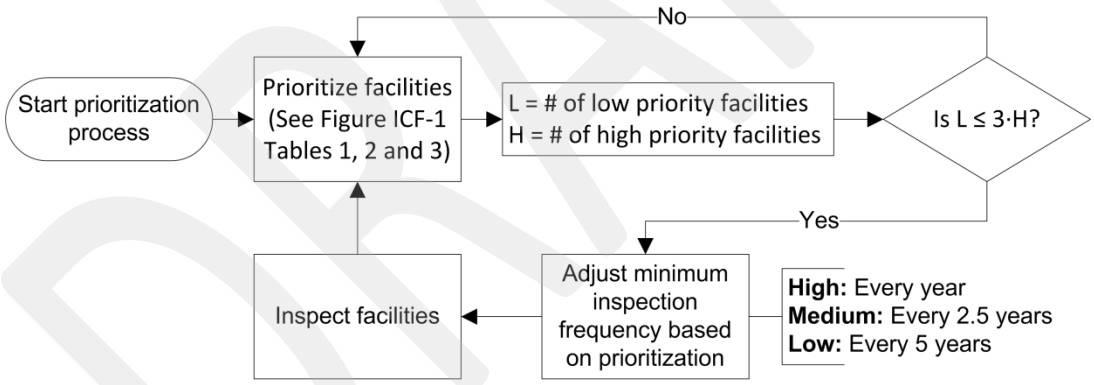

Figure ICF-2: Prioritization Process

Educate Industrial/Commercial Sources

Permit § VI.D.6.c (LA)/ §VII.G.3 (LB)

At least once during the five-year period of the MS4 Permit, the owner/operator of each of the inventoried critical sources is notified of the BMP requirements applicable to the facility/source.

Business Assistance Program

The Business Assistance Program provides technical information to businesses to facilitate their efforts to reduce the discharge of pollutants in stormwater. Assistance is targeted to select business sectors or small businesses upon a determination that their activities may be contributing substantial pollutant loads to the MS4 or receiving water. Assistance may include technical guidance and provision of educational materials. The Program includes at least one of the following components:

- **Technical Guidance** – Provide on-site technical assistance, telephone, or e-mail consultation regarding the responsibilities of businesses to reduce the discharge of pollutants, procedural requirements, and available guidance documents. Guidance methods include but are not limited to:
    - Technical guidance through the critical source inspection program. During an inspection the inspector provides to the business owner/operator 1) on-site technical assistance and 2) contact information for continued consultation. The inspector may also refer staff to relevant fact sheets from the *CASQA Industrial and Commercial BMP Handbook*.
    - Technical guidance initiated with businesses through an informational letter, email, webpage or social media. The notice provides contact information of relevant stormwater staff for business assistance as well as hyperlinks to available guidance documents such as the *CASQA Industrial and Commercial BMP Handbook*.
- **Educational Materials** – Distribute stormwater pollution prevention educational materials to operators of 1) auto repair shops, car wash facilities, restaurants and 2) mobile sources including automobile/equipment repair, washing, or detailing, power washing services, mobile carpet, drape, or upholstery cleaning services, swimming pool, water softener, and spa services, portable sanitary services and commercial applicators and distributors of pesticides, herbicides and fertilizers, if present. Material sources and distribution methods include but are not limited to:
    - Distribution method – The presence of these businesses within an agency's jurisdiction may be determined through business licenses or other readily available inter/intra-agency records.
    - Material sources – Educational materials are available at USEPA's Nonpoint Source (NPS) Outreach Toolbox at http://cfpub.epa.gov/npstbx/index.html. The toolbox is a database of nationwide public education materials that is intended for use by state and local campaigns. The toolbox contains a variety of resources to help develop an effective and targeted outreach campaign.

Inspect Critical Industrial/Commercial Sources

Modified from Permit §VI.D.6.d-e (LA)/ §VII.G.4-5(LB)

Frequency of Inspections

Following the facility prioritization method described in this guidance document, the City will inspect high priority facilities annually, medium priority facilities semi-quinquennially (once every 2.5 years) and low priority facilities quinquennially (once every five years). The frequencies may be altered by the exclusions defined in the following section. The prioritization condition on Page ICF-4 ensures at least the same average number of inspections conducted per year as the semi-quinquennial frequency defined in the MS4 Permit.

The City will conduct the first compliance inspection of industrial/commercial facilities within one year of the approval of the Watershed Management Program by the Executive Officer. There will be a minimum interval of six months between the first and the second mandatory compliance inspections.

Exclusions to the Frequency of Industrial Inspections

Exclusion of Facilities Previously Inspected by the Regional Water Board

The State Water Board's Stormwater Multiple Application and Report Tracking System (SMARTS) database[6] is reviewed at defined intervals to determine if an industrial facility has recently been inspected by the Regional Water Board. The first interval is two years after the effective date of the MS4 Permit (LA: December 28, 2014, LB: March 28,, 2016) and the second interval is four years after the effective date (LA: December 28, 2016, LB: March 28, 2018). If it is determined through the review that the Regional Water Board conducted an inspection of a facility within the prior 24 month period, then the facility does not require an inspection.

No Exposure Verification

The initial inspection identifies those facilities that have filed a No Exposure Certification with the State Water Board. Three to four years after the effective date of the MS4 Permit, a second inspection is performed for at least 25% of the facilities identified to have filed a No Exposure Certification. The purpose of this inspection is to verify the continuity of the no exposure status.

Scope of Inspections

A template inspection form is included as Attachment ICF-A.

Scope of Commercial Inspections

Commercial critical source facilities are inspected to confirm that stormwater and non-stormwater BMPs are effectively implemented in compliance with municipal ordinances. At each facility, inspectors verify that the operator is implementing effective source control BMPs for each corresponding activity. The implementation of additional BMPs is required where stormwater from the MS4 discharges to a significant ecological area (SEA), a water body subject to TMDL provisions[7], or a CWA §303(d) listed impaired water body. For those BMPs that are not adequately protective of water quality standards, additional site-specific controls may be required.

Scope of Mandatory Industrial Facility Inspections

At each industrial critical source the inspector confirms that the facility

- Has a current Waste Discharge Identification (WDID) number for coverage under the Industrial General Permit, and that a Storm Water Pollution Prevention Plan (SWPPP) is available on-site; or
- Has applied for, and has received a current No Exposure Certification for facilities subject to this requirement;
- Is effectively implementing BMPs in compliance with municipal ordinances. Facilities must implement the source control BMPs identified in Table ICF-3, unless the pollutant generating activity does not occur. Additional BMPs must be implemented where stormwater from the MS4 discharges to a water body subject to TMDL Provisions in Part VI.E of the MS4 Permit, or a CWA § 303(d) listed impaired water body. If the specified BMPs are not adequately protective of water quality standards, additional site-specific controls may be required. For critical sources that discharge to MS4s that discharge to SEAs, operators must implement additional pollutant-specific controls to reduce pollutants in stormwater runoff that are causing or contributing to

[6] SMARTS is accessible at https://smarts.waterboards.ca.gov/smarts/faces/SwSmartsLogin.jsp
[7] As described in Part VI.E of the MS4 Permit

exceedances of water quality standards.

- Applicable industrial facilities identified as not having either a current WDID or No Exposure Certification are notified that they must obtain coverage under the Industrial General Permit and will be referred to the Regional Water Board per the Progressive Enforcement Policy procedures identified in Part VI.D.2 of the MS4 Permit.

Source Control BMPs

Permit § VI.D.6.f (LA)/ §VII.G.6 (LB)

Effective source control BMPs for the activities listed in Table ICF-3 are implemented at commercial and industrial facilities, unless the pollutant generating activity does not occur:

Significant Ecological Areas (SEAs)

Permit § VI.D.6.g (LA)/ §VII.H (LB)

For critical sources that discharge to MS4s that discharge to SEAs, each Permittee will require operators to implement additional pollutant-specific controls to reduce pollutants in stormwater runoff that are causing or contributing to exceedances of water quality standards.

Progressive Enforcement

Permit § VI.D.6.h (LA)/ §VII.I (LB)

Each Permittee will implement its Progressive Enforcement Policy to ensure that Industrial / Commercial facilities are brought into compliance with all stormwater requirements within a reasonable time period. See Part VI.D.2 of the MS4 Permit for requirements for the development and implementation of a Progressive Enforcement Policy.

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Table ICF-3: Source Control BMPs at Commercial and Industrial Facilities

Pollutant-Generating Activity	BMP Description	BMP Fact Sheet*
Unauthorized Non-Storm water Discharges	Effective elimination of non-stormwater discharges	SC-10
Accidental Spills/ Leaks	Implementation of effective spills/ leaks prevention and response procedures	SC-11
Vehicle/ Equipment Fueling	Implementation of effective fueling source control devices and practices	SC-20
Vehicle/ Equipment Cleaning	Implementation of effective equipment/vehicle cleaning practices and appropriate wash water management practices	SC-21
Vehicle/ Equipment Repair	Implementation of effective vehicle/ equipment repair practices and source control devices	SC-22
Outdoor Liquid Storage	Implementation of effective outdoor liquid storage source controls and practices	SC-31
Outdoor Equipment Operations	Implementation of effective outdoor equipment source control devices and practices	SC-32
Outdoor Storage of Raw Materials	Implementation of effective source control practices and structural devices	SC-33
Storage and Handling of Solid Waste	Implementation of effective solid waste storage/ handling practices and appropriate control measures	SC-34
Building and Grounds Maintenance	Implementation of effective facility maintenance practices	SC-41
Parking/ Storage Area Maintenance	Implementation of effective parking/ storage area designs and housekeeping/ maintenance practices	SC-43
Stormwater Conveyance System Maintenance	Implementation of proper conveyance system operation and maintenance protocols	SC-44
Pollutant-Generating Activity	**BMP Description from Regional Water Board Resolution No. 98-08**	
Sidewalk Washing	1. Remove trash, debris, and free standing oil/grease spills/leaks (use absorbent material, if necessary) from the area before washing; and 2. Use high pressure, low volume spray washing using only potable water with no cleaning agents at an average usage of 0.006 gallons per square feet of sidewalk area.	
Street Washing	Collect and divert wash water to the sanitary sewer – publically owned treatment works (POTW). Note: POTW approval may be needed.	

* Source: CASQA Industrial and Commercial Stormwater BMP Handbook, 2003

Table ICF-4: Potential Pollutants from Industrial Activities*

Activity or Facility Type	Potential Pollutants								
	Sediments	Nutrients	Metals	Organics and Toxicants**	Floatable Materials	Oxygen-Demanding Substances	Oil and Grease	Bacteria	Pesticides
Vehicle & Equipment Fueling			X	X					
Vehicle & Equipment Washing and Steam Cleaning	X	X	X	X		X	X		
Vehicle & Equipment Maintenance and Repair			X	X			X		
Outdoor Loading & Unloading of Materials	X	X	X	X	X	X	X		
Outdoor Container Storage of Liquids		X	X	X		X	X		X
Outdoor Process Equipment Operations and Maintenance	X		X	X			X		
Outdoor Storage of Raw Materials, Products, and Byproducts	X	X	X	X	X	X	X		
Waste Handling & Disposal			X	X	X	X	X	X	
Contaminated or Erodible Surface Areas	X	X	X	X	X	X	X	X	
Building and Grounds Maintenance	X	X	X		X	X		X	X
Building Repair, Remodeling, and Construction	X		X		X	X			
Parking/Storage Area Maintenance			X	X	X		X		

* Source: CASQA Industrial and Commercial Stormwater BMP Handbook, 2003

** This includes all toxic pollutants other than pesticides

Table ICF-5: Potential Pollutants by Industrial/Commercial Facility Type*

Activity or Facility Type	Potential Pollutants								
	Sediments	Nutrients	Metals	Organics and Toxicants**	Floatable Materials	Oxygen-Demanding Substances	Oil and Grease	Bacteria	Pesticides
Vehicle mechanical repair, maintenance, fueling, or cleaning	X	X	X	X		X	X		
Airplane mechanical repair, maintenance, fueling, or cleaning	X	X	X	X		X	X		
Boat mechanical repair, maintenance, fueling, or cleaning	X	X	X	X		X	X		
Equipment repair, maintenance, fueling, or cleaning	X	X	X	X		X	X		
Automobile and other vehicle body repair or painting			X	X			X		
Mobile automobile or other vehicle washing	X	X	X			X	X		
Automobile (or other vehicle) parking lots and storage			X		X		X		
Retail or wholesale fueling			X	X	X		X		
Pest control services									X
Eating or drinking establishments		X		X	X	X	X	X	X
Mobile carpet, drape or furniture cleaning	X			X					
Cement mixing or cutting	X								
Masonry	X								
Painting and coating			X	X			X		
Botanical or zoological gardens and exhibits	X	X			X	X		X	X
Landscaping	X	X			X	X		X	X
Nurseries and greenhouses	X	X			X	X		X	X
Golf courses, parks and other recreational areas/facilities	X	X			X	X		X	X
Cemeteries	X	X			X	X		X	X
Pool and fountain cleaning		X	X	X	X	X		X	
Marinas			X	X	X	X	X	X	
Port-a-Potty servicing		X			X	X		X	

* Source: Orange County Drainage Area Management Plan, 2003

** This includes all toxic pollutants other than pesticides

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Planning and Land Development Program

The Cities are required to implement a Planning and Land Development program that includes the provisions listed in the MS4 Permit (LA MS4 Permit §VI.D.7, LB MS4 Permit §VII.J). This document provides guidance that the participating cities can follow to implement a Planning and Land Development program in compliance with the MS4 Permit.

Introduction

Permit §VI.D.7.a (LA)/§VII.J.1 (LB)

The Planning and Land Development Program for all New Development and Redevelopment projects subject to the MS4 Permit includes measures to:

- Lessen the water quality impacts of development by using smart growth practices such as compact development, directing development towards existing communities via infill or redevelopment, and safeguarding of environmentally sensitive areas.
- Minimize the adverse impacts from stormwater runoff on the biological integrity of Natural Drainage Systems and the beneficial uses of water bodies in accordance with requirements under CEQA (Cal. Pub. Resources Code §21000 et seq.).
- Minimize the percentage of impervious surfaces on land developments by minimizing soil compaction during construction, designing projects to minimize the impervious area footprint, and employing Low Impact Development (LID) design principles to mimic pre-development hydrology through infiltration, evapotranspiration and rainfall harvest and use.
- Maintain existing riparian buffers and enhance riparian buffers when possible.
- Minimize pollutant loadings from impervious surfaces such as roof tops, parking lots, and roadways through the use of properly designed, technically appropriate BMPs (including Source Control BMPs such as good housekeeping practices), LID Strategies, and Treatment Control BMPs.
- Properly select, design and maintain LID and Hydromodification Control BMPs to address pollutants that are likely to be generated, reduce changes to pre-development hydrology, assure long-term function, and avoid the breeding of vectors.[1]
- Prioritize the selection of BMPs to remove stormwater pollutants, reduce stormwater runoff volume, and beneficially use stormwater to support an integrated approach to protecting water quality and managing water resources in the following order of preference:
    - On-site infiltration, bioretention and/or rainfall harvest and use.
    - On-site biofiltration, off-site groundwater replenishment, and/or off-site retrofit.

[1] Treatment BMPs when designed to drain within 96 hours of the end of rainfall minimize the potential for the breeding of vectors. See California Department of Public Health *Best Management Practices for Mosquito Control in California* (2012) at http://www.westnile.ca.gov/resources.php

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Applicability *Permit §VI.D.7.b (LA)/§VII.J.2-3 (LB)*

New Development Projects

The New Development and Redevelopment categories below will require a Standard Urban Stormwater Mitigation Plan (SUSMP), also known as a Low Impact Development (LID) Plan, containing stormwater mitigation measures in compliance with MS4 Permit requirements. Development projects subject to conditioning and approval for the design and implementation of post-construction controls to mitigate stormwater pollution, prior to completion of the project(s), are listed below:

1. All development projects (including single family hillside homes) equal to 1 acre or greater of disturbed area and adding more than 10,000 square feet of impervious surface area
2. Industrial parks with 10,000 square feet or more of surface area
3. Commercial malls with 10,000 square feet or more surface area
4. Retail gasoline outlets with 5,000 square feet or more of surface area
5. Restaurants (SIC 5812) with 5,000 square feet or more of surface area
6. Parking lots with 5,000 square feet or more of impervious surface area, or with 25 or more parking spaces
7. Automotive service facilities (SIC 5013, 5014, 5511, 5541, 7532-7534 and 7536-7539) with 5,000 square feet or more of surface area
8. Projects located in or directly adjacent to, or discharging directly to a Significant Ecological Area (SEA), where the development will:
    a. Discharge stormwater runoff that is likely to impact a sensitive biological species or habitat; and
    b. Create 2,500 square feet or more of impervious surface area
9. Redevelopment projects in subject categories that meet Redevelopment thresholds identified below

Redevelopment Projects

Redevelopment projects subject to agency conditioning and approval for the design and implementation of post-construction controls to mitigate stormwater pollution, prior to completion of the project(s), are:

1. Land-disturbing activity that results in the creation or addition or replacement of 5,000 square feet or more of impervious surface area on an already developed site on development categories identified above.
2. Where Redevelopment results in an alteration to more than fifty percent of impervious surfaces of a previously existing development, and the existing development was not subject to post-construction stormwater quality control requirements, the entire project must be mitigated.
3. Where Redevelopment results in an alteration of less than fifty percent of impervious surfaces of a previously existing development, and the existing development was not subject to post-construction stormwater quality control requirements, only the alteration must be mitigated, and not the entire

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development.

4. Redevelopment does not include routine maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, original purpose of facility or emergency Redevelopment activity required to protect public health and safety. Impervious surface replacement, such as the reconstruction of parking lots and roadways which does not disturb additional area and maintains the original grade and alignment, is considered a routine maintenance activity. Redevelopment does not include the repaving of existing roads to maintain original line and grade.
5. Existing single-family dwelling and accessory structures are exempt from the Redevelopment requirements unless such projects create, add, or replace 10,000 square feet of impervious surface area.

Special Provisions

1. Street and road construction of 10,000 square feet or more of impervious surface area
    a. These projects will follow an approved green streets manual to the maximum extent practicable. Street and road construction applies to standalone streets, roads, highways, and freeway projects, and also applies to streets within larger projects. The Cities will require a Standard Urban Mitigation Plan (SUSMP), also known as a Low Impact Development (LID) Plan, containing stormwater mitigation measures in compliance with the approved green streets manual requirements.
2. Single family hillside homes will require a less extensive plan. To the extent that an agency may lawfully impose conditions, mitigation measures or other requirements on the development or construction of a single-family home in a hillside area as defined in the applicable agency's Code and Ordinances, the Cities will require that during the construction of a single-family hillside home, the following measures are implemented:
    a. Conserve natural areas
    b. Protect slopes and channels
    c. Provide storm drain system stenciling and signage
    d. Divert roof runoff to vegetated areas before discharge unless the diversion would result in slope instability
    e. Direct surface flow to vegetated areas before discharge unless the diversion would result in slope instability.

New Development/ Redevelopment Project Performance Criteria

Permit §VI.D.7.c (LA)/§VII.J.4 (LB)

Integrated Water Quality/Flow Reduction/Resources Management Criteria

All New Development and Redevelopment projects identified above will control pollutants, pollutant loads, and runoff volume emanating from the project site by: (1) minimizing the impervious surface area and (2) controlling runoff from impervious surfaces through infiltration, bioretention and/or rainfall harvest and use.

Projects will retain on-site the Stormwater Quality Design Volume (SWQDv) defined as the runoff from the 0.75-inch, 24-hour rain event or the 85th percentile, 24-hour rain event, as determined from the Los Angeles County 85th percentile precipitation isohyetal map[2], *whichever is greater*. Exceptions include technical infeasibility, opportunity for regional groundwater replenishment, local ordinance equivalence, or hydromodification, as described in the sections below.

When evaluating the potential for on-site retention, the Cities will consider the maximum potential for evapotranspiration from green roofs and rainfall harvest and use.

Alternative Compliance for Technical Infeasibility or Opportunity for Regional Groundwater Replenishment

In instances of technical infeasibility or where a project has been determined to provide an opportunity to replenish regional groundwater supplies at an offsite location, the Cities may allow projects to comply with the MS4 Permit through the alternative compliance measures as described below:

1. To demonstrate technical infeasibility, the project applicant must demonstrate that the project cannot reliably retain 100 percent of the SWQDv on-site, even with the maximum application of green roofs and rainwater harvest and use, and that compliance with the applicable post-construction requirements would be technically infeasible by submitting a site-specific hydrologic and/or design analysis conducted and endorsed by a registered professional engineer, geologist, architect, and/or landscape architect. Conditions where technical infeasibility may result including those indicated in

[2] Found at <http://ladpw.org/wrd/publication/engineering/Final_Report-Probability_Analysis_of_85th_Percentile_24-hr_Rainfall1.pdf>

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2. Table PLD- **1** below. To utilize alternative compliance measures to replenish groundwater at an offsite location, the project applicant will demonstrate *(i)* why it is not advantageous to replenish groundwater at the project site, *(ii)* that groundwater can be used for beneficial purposes at the offsite location, and *(iii)* that the alternative measures will also provide equal or greater water quality benefits to the receiving surface water than the Water Quality/Flow Reduction/Resource Management Criteria.

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Table PLD- 1: Technical Infeasibility Criteria

1.	The infiltration rate of saturated in-situ soils is less than 0.3 inch per hour and it is not technically feasible to amend the in-situ soils to attain an infiltration rate necessary to achieve reliable performance of infiltration or bioretention BMPs in retaining the SWQDv on-site.
2.	Locations where seasonal high groundwater is within 5 to 10 feet of the surface,
3.	Locations within 100 feet of a groundwater well used for drinking water,
4.	Brownfield development sites where infiltration poses a risk of causing pollutant mobilization,
5.	Other locations where pollutant mobilization is a documented concern. Pollutant mobilization is considered a documented concern at or near properties that are contaminated or store hazardous substances underground.
6.	Locations with potential geotechnical hazards
7.	Smart growth and infill or Redevelopment locations where the density and/ or nature of the project would create significant difficulty for compliance with the on-site volume retention requirement.

Alternative Compliance Measures

When a project applicant has demonstrated that it is technically infeasible to retain 100 percent of the SWQDv on-site, or is proposing an alternative offsite project to replenish regional groundwater supplies, the agency will require one of the following mitigation options:

1. On-site Biofiltration

   If using biofiltration due to demonstrated technical infeasibility, then the project must biofiltrate 1.5 times the portion of the SWQDv that is not reliably retained on-site, as calculated by Equation 1 below.

   $$B_v = 1.5 * [SWQD_v - R_V]$$ *Equation 1*

   Where:

   Bv = biofiltration volume

   SWQDv = the stormwater runoff from a 0.75 inch, 24-hour storm or the 85th percentile storm[3], *whichever is greater*.

   Rv = volume reliably retained on-site

   The MS4 Permit does not mention flowrate based biotreatment BMPs; however, proprietary biotreatment systems are often sized using flowrate rather than volume. Additionally, in cases where a pump is needed prior to entering the biotreatment BMP, the system requires sizing based on the controlled flow from the pump. Therefore, if it is infeasible to size a biotreatment BMP with volume-based calculations, the flowrate may be substituted in lieu of volume. Similarly, the flow rate must be determined using the design storm of 0.75 inch, 24-hour storm event or the 85th percentile storm[1], whichever is greater.

   Conditions for On-site Biofiltration include the following:

   a. Biofiltration systems will meet the design specifications provided in Attachment H to the MS4 Permit unless otherwise approved by the Regional Water Board Executive Officer.

[3] Found at <http://ladpw.org/wrd/publication/engineering/Final_Report-Probability_Analysis_of_85th_Percentile_24-hr_Rainfall1.pdf>

b. Biofiltration systems discharging to a receiving water that is included on the Clean Water Act section 303(d) list of impaired water quality-limited water bodies due to nitrogen compounds or related effects will be designed and maintained to achieve enhanced nitrogen removal capability. See Attachment H of the MS4 Permit for design criteria for underdrain placement to achieve enhanced nitrogen removal.

2. Offsite Infiltration

Offsite infiltration when implemented will use infiltration or bioretention BMPs to intercept a volume of stormwater runoff equal to the SWQDv, less the volume of stormwater runoff reliably retained on-site, at an approved offsite project and provide pollutant reduction (treatment) of the stormwater runoff discharged from the project site in accordance with the Water Quality Mitigation Criteria. The required offsite mitigation volume will be calculated by Equation 2 below.

$$M_v = 1.0 * [SWQD_v - R_v] \qquad \textit{Equation 2}$$

Where:

M_v = mitigation volume

$SWQD_v$ = runoff from the 0.75 inch, 24-hour storm event or the 85th percentile storm[4], *whichever is greater*

R_v = the volume of stormwater runoff reliably retained on-site.

3. Groundwater Replenishment Projects

Regional projects to replenish regional groundwater supplies at offsite locations may be proposed, provided the groundwater supply has a designated beneficial use in the Basin Plan. Regional groundwater replenishment projects must use infiltration, groundwater replenishment, or bioretention BMPs to intercept a volume of stormwater runoff equal to the SWQDv for New Development and Redevelopment projects, subject to conditioning and approval for the design and implementation of post-construction controls, within the approved project area. The projects must provide pollutant reduction (treatment) of the stormwater runoff discharged from development projects, within the project area, subject to conditioning and approval for the design and implementation of post-construction controls to mitigate stormwater pollution in accordance with the Water Quality Mitigation Criteria.

Regional groundwater replenishment projects being implemented in lieu of onsite controls will mitigate the volume as calculated using Equation 2 above.

Regional groundwater replenishment projects will be located in the same sub-watershed (defined as draining to the same HUC-12 hydrologic area in the Basin Plan) as the New Development or Redevelopment projects which did not implement on-site retention BMPs. Locations outside of the HUC-12 but within the HUC-10 subwatershed area may be considered if there are no opportunities within the HUC-12 subwatershed or if greater pollutant reductions and/or groundwater

[4] Found at <http://ladpw.org/wrd/publication/engineering/Final_Report-Probability_Analysis_of_85th_Percentile_24-hr_Rainfall1.pdf>

replenishment can be achieved at a location within the expanded HUC-10 subwatershed. *The use of a mitigation, groundwater replenishment, or retrofit project outside of the HUC-12 subwatershed is subject to the approval of the Executive Officer of the Regional Water Board*.

4. Offsite Project -Retrofit Existing Development

   Use infiltration, bioretention, rainfall harvest and use and/or biofiltration BMPs to retrofit an existing development, with similar land uses as the New Development or land uses associated with comparable or higher stormwater runoff event mean concentrations (EMCs) than the new development. Comparison of EMCs for different land uses will be based on published data from studies performed in southern California. The retrofit plan will be designed and constructed to:

   a. Intercept a volume of stormwater runoff equal to the mitigation volume (Mv) as described above in Equation 2, except biofiltration BMPs will be designed to meet the biofiltration volume or flowrate as described in Equation 1, and

   b. Provide pollutant reduction (treatment) of the stormwater runoff from the project site as described in the Water Quality Mitigation Criteria.

5. Conditions for Offsite Projects

   Project applicants seeking to utilize these alternative compliance provisions may propose other offsite projects, which the agency in which the project is located may approve if they meet the requirements of this subpart.

   a. Location of offsite projects. Offsite projects will be located in the same sub-watershed (defined as draining to the same HUC-12 hydrologic area in the Basin Plan) as the New Development or Redevelopment project. Locations outside of the HUC-12 but within the HUC-10 subwatershed area may be considered if there are no opportunities within the HUC-12 subwatershed or if greater pollutant reductions and/or groundwater replenishment can be achieved at a location within the expanded HUC-10 subwatershed. *The use of a mitigation, groundwater replenishment, or retrofit project outside of the HUC-12 subwatershed is subject to the approval of the Executive Officer of the Regional Water Board.*

   b. Project applicant must demonstrate that equal benefits to groundwater recharge can be met on the project site.

   c. A prioritized list of potential offsite mitigation, groundwater replenishment and/or retrofit projects will be developed within each agency, and when feasible, the mitigation will be directed to the highest priority project within the same HUC-12 or if approved by the Regional Water Board Executive Officer, the HUC-10 drainage area, as the New Development project.

   d. Infiltration/bioretention will be the preferred LID BMP for offsite mitigation or groundwater replenishment projects. Offsite retrofit projects may include green streets, parking lot retrofits, green roofs, and rainfall harvest and use. Biofiltration BMPs may be considered for retrofit projects when infiltration, bioretention or rainfall harvest and use is technically infeasible.

   e. The agency in which the project is located will develop a schedule for the completion of offsite projects, including milestone dates to identify, fund, design, and construct the projects. Offsite

projects will be completed as soon as possible, and at the latest, within 4 years of the certificate of occupancy for the first project that contributed funds toward the construction of the offsite project, unless a longer period is otherwise authorized by the Executive Officer of the Regional Water Board. For public offsite projects, the agency in which the project is located must provide in their annual reports a summary of total offsite project funds raised to date and a description (including location, general design concept, volume of water expected to be retained, and total estimated budget) of all pending public offsite projects. Funding sufficient to address the offsite volume must be transferred to the agency (for public offsite mitigation projects) or to an escrow account (for private offsite mitigation projects) within one year of the initiation of construction.

f. Offsite projects must be approved by the agency in which the project is located and may be subject to approval by the Regional Water Board Executive Officer, if a third-party petitions the Executive Officer to review the project. Offsite projects will be publicly noticed on the Regional Water Board's website for 30 days prior to approval.

g. The project applicant must perform the offsite projects as approved by either the agency or the Regional Water Board Executive Officer or provide sufficient funding for public or private offsite projects to achieve the equivalent mitigation stormwater volume.

6. Regional Stormwater Mitigation Program

An agency or agency group may apply to the Regional Water Board for approval of a regional or sub-regional stormwater mitigation program to substitute in part or wholly for New and Redevelopment requirements for the area covered by the regional or sub-regional stormwater mitigation program. Upon review and a determination by the Regional Water Board Executive Officer that the proposal is technically valid and appropriate, the Regional Water Board may consider for approval such a program if its implementation meets all of the following requirements:

a. Retains the runoff from the 85th percentile, 24-hour rain event or the 0.75 inch, 24-hour rain event, whichever is greater;

b. Results in improved stormwater quality;

c. Protects stream habitat;

d. Promotes cooperative problem solving by diverse interests;

e. Is fiscally sustainable and has secure funding; and

f. Is completed in five years including the construction and start-up of treatment facilities.

7. Water Quality Mitigation Criteria

All New Development and Redevelopment projects that have been approved for offsite mitigation or groundwater replenishment projects will also provide treatment of stormwater runoff from the project site. These projects will design and implement post-construction stormwater BMPs and control measures to reduce pollutant loading as necessary to:

a. Meet the pollutant specific benchmarks listed in Table PLD2 at the treatment systems outlet or prior to the discharge to the MS4, and

b. Ensure that the discharge does not cause or contribute to an exceedance of water quality standards at the agency's downstream MS4 outfall.

The project proponent may be allowed to install flow-through modular treatment systems including sand filters, or other proprietary BMP treatment systems with a demonstrated efficiency at least equivalent to a sand filter. The sizing of the flow through treatment device will be based on a rainfall intensity of 0.2 inches per hour, or the one year, one-hour rainfall intensity as determined from the most recent Los Angeles County isohyetal map, *whichever is greater*.

Table PLD- 2: Benchmarks Applicable to New Development Treatment BMPs.

Conventional Pollutants					
Pollutant	Suspended Solids mg/L	Total P mg/L	Total N mg/L	TKN mg/L	
Effluent Concentration	14	0.13	1.28	1.09	
Metals					
Pollutant	Total Cd µg/L	Total Cu µg/L	Total Cr µg/L	Total Pb µg/L	Total Zn µg/L
Effluent Concentration	0.3	6	2.8	2.5	23

New developments and redevelopments will not cause or contribute to an exceedance of applicable water quality-based effluent limitations established in the MS4 Permit pursuant to Total Maximum Daily Loads (TMDLs).

8. Hydromodification (Flow/ Volume/ Duration) Control Criteria

All New Development and Redevelopment projects located within natural drainage systems will implement hydrologic control measures, to prevent accelerated downstream erosion and to protect stream habitat in natural drainage systems. The purpose of the hydrologic controls is to minimize changes in post-development hydrologic stormwater runoff discharge rates, velocities, and duration. This will be achieved by maintaining the project's pre-project stormwater runoff flow rates and durations.

Description

Hydromodification control in natural drainage systems will be achieved by maintaining the Erosion Potential (Ep) in streams at a value of 1, unless an alternative value can be shown to be protective of the natural drainage systems from erosion, incision, and sedimentation that can occur as a result of flow increases from impervious surfaces and prevent damage to stream habitat in natural drainage system tributaries[5]. Hydromodification mitigation approaches should meet the criteria below:

a. Hydromodification control may include one, or a combination of on-site, regional or sub-regional hydromodification control BMPs, LID strategies, or stream and riparian buffer restoration measures. Any in-stream restoration measure shall not adversely affect the beneficial uses of the natural drainage systems.

b. Natural drainage systems that are subject to the hydromodification assessments and controls,

[5] See Attachment J of the MS4 Permit, "*Determination of Erosion Potential*"

as described in this section, include all drainages that have not been improved (e.g., channelized or armored with concrete, shotcrete, or rip-rap) or drainage systems that are tributary to a natural drainage system, except as provided in Exemptions to Hydromodification Controls, see below. The clearing or dredging of a natural drainage system does not constitute an "improvement."

c. Until the State Water Board or the Regional Water Board adopts a final Hydromodification Policy or criteria, the Hydromodification Control Criteria described in this section will be implemented to control the potential adverse impacts of changes in hydrology that may result from New Development and Redevelopment projects located within natural drainage systems.

Exemptions to Hydromodification Controls

New Development and Redevelopment projects may be exempt from implementation of hydromodification controls where assessments of downstream channel conditions and proposed discharge hydrology indicate that adverse hydromodification effects to beneficial uses of Natural Drainage Systems are unlikely. Conditions for exemptions include the following:

a. Projects involving replacement, maintenance or repair of an agency's existing flood control facility, storm drain, or transportation network.

b. Redevelopment Projects in the center of urban areas that do not increase the effective impervious area or decrease the infiltration capacity of pervious areas compared to the pre-project conditions.

c. Projects that have any increased discharge directly or via a storm drain to a sump, lake, area under tidal influence, into a waterway that has a 100-year peak flow (Q100) of 25,000 cfs or more, or other receiving water that is not susceptible to hydromodification impacts.

d. Projects that discharge directly or via a storm drain into concrete or otherwise engineered (not natural) channels (e.g., channelized or armored with rip rap, shotcrete, etc.), which, in turn, discharge into receiving water that is not susceptible to hydromodification impacts.

e. LID BMPs implemented on single family homes are sufficient to comply with hydromodification criteria.

Hydromodification Control Criteria

The Hydromodification Control Criteria to protect natural drainage systems are as follows:

a. Except for exemptions described above, projects disturbing an area greater than 1 acre but less than 50 acres within natural drainage systems will be presumed to meet pre-development hydrology if one of the following demonstrations is made:

    i. The project is designed to retain on-site, through infiltration, evapotranspiration, and/or harvest and use, the stormwater volume from the runoff of the 95th percentile, 24-hour storm, or

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ii. The runoff flow rate, volume, and velocity for the post-development condition do not exceed the pre-development condition for the 2-year, 24-hour rainfall event and the duration for the post-development condition is not less than the pre-development condition for the 2-year, 24-hour rainfall event. This condition may be substantiated by simple screening models, including those described in Hydromodification Effects on Flow Peaks and Durations in Southern California Urbanizing Watersheds (Hawley et al., 2011) or other models acceptable to the Executive Officer of the Regional Water Board, or

The MS4 Permit states projects will meet Hydromodification Control Criteria if "*The...duration for the post-development condition **do[es] not exceed** the pre-development condition for the 2-year, 24-hour rainfall event*." The runoff duration (Tc) is generally associated with longer values resulting in lower concern for hydromodification impacts. Implementation of LID BMPs generally results in runoff not immediately (or not at all) discharging from the site, increasing the time of concentration. Thus, the interpretation presented herein is that Hydromodification Control Criteria would be met if the runoff duration for the post-development condition is **not less than** the pre-development condition for the 2-year, 24-hour rainfall event.

iii. The Erosion Potential (Ep) in the receiving water channel will approximate 1, as determined by a Hydromodification Analysis Study and the equation presented in Attachment J of the MS4 Permit. Alternatively, agencies can opt to use other work equations to calculate Erosion Potential with Executive Officer approval.

b. Projects disturbing 50 acres or more within natural drainage systems will be presumed to meet pre-development hydrology based on the successful demonstration of one of the following conditions:

i. The site infiltrates on-site at least the runoff from a 2-year, 24hour storm event, or

ii. The runoff flow rate, volume, and velocity for the post-development condition does not exceed the pre-development condition for the 2-year, 24-hour rainfall event and the duration for the post-development condition is not less than the pre-development condition for the 2-year, 24-hour rainfall event. These conditions must be substantiated by hydrologic modeling acceptable to the Regional Water Board Executive Officer, or

iii. The Erosion Potential (Ep) in the receiving water channel will approximate 1, as determined by a Hydromodification Analysis Study and the equation presented in Attachment J of the MS4 Permit.

Alternative Hydromodification Criteria

The requirement for Hydromodification Controls will be satisfied by implementing the hydromodification requirements in the County of Los Angeles Low Impact Development Manual (2009) for all projects disturbing an area greater than 1 acre within natural drainage systems.

3. Watershed Equivalence

Regardless of the methods through which applicants implement alternative compliance measures,

the subwatershed-wide (defined as draining to the same HUC-12 hydrologic area in the Basin Plan) result of all development must be at least the same level of water quality protection as would have been achieved if all projects utilizing these alternative compliance provisions had complied with the Integrated Water Quality/Flow Reduction/Resource Management Criteria, described herein.

4. Annual Report

   Annual Reports will be provided to the Regional Water Board to include a list of mitigation project descriptions and estimated pollutant and flow reduction analyses (compiled from design specifications submitted by project applicants, as approved. Within 4 years of the MS4 Permit adoption, the Annual Reports will include a comparison of the expected aggregate results of alternative compliance projects to the results that would otherwise have been achieved by retaining on site the SWQDv.

Implementation *Permit §VI.D.7.d (LA)/§VII.J.5 (LB)*

Local Ordinance Equivalence

Alternative requirements in the local ordinances for the agencies of this WMP will provide equal or greater reduction in stormwater discharge pollutant loading and volume as would have been obtained through strict conformance with the Integrated Water Quality/Flow Reduction Resources Management Criteria, Alternative Compliance Measures for Technical Infeasibility, or Opportunity for Regional Groundwater Replenishment sections herein and, if applicable, the Hydromodification (Flow/Volume Duration) Control Criteria section herein.

Project Coordination

A process for effective approval of post-construction stormwater control measures will be developed to include:

a. Detailed LID site design and BMP review including review of BMP sizing calculations, BMP pollutant removal performance, and municipal approval; and

b. An established structure for communication and delineated authority between and among municipal departments that have jurisdiction over project review, plan approval, and project construction through memoranda of understanding or an equivalent agreement.

Maintenance Agreement and Transfer

Prior to issuing approval for final occupancy, the Cities will require that all New Development and Redevelopment projects subject to post-construction BMP requirements, with the exception of simple LID BMPs implemented on single family residences, provide an operation and maintenance plan, monitoring plan, where required, and verification of ongoing maintenance provisions for LID practices, Treatment Control BMPs, and Hydromodification Control BMPs including but not limited to: final map conditions, legal agreements, covenants, conditions or restrictions, CEQA mitigation requirements, conditional use permits, and/ or other legally binding maintenance agreements (see Attachments PLD-A and PLD-B for MCA and MCA Termination sample templates, respectively). Agencies will require maintenance records be kept on site.

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Verification at a minimum will include the developer's signed statement accepting responsibility for maintenance until the responsibility is legally transferred; and either:

a. A signed statement from the public entity assuming responsibility for BMP maintenance; or

b. Written conditions in the sales or lease agreement, which require the property owner or tenant to assume responsibility for BMP maintenance and conduct a maintenance inspection at least once a year; or

c. Written text in project covenants, conditions, and restrictions (CCRs) for residential properties assigning BMP maintenance responsibilities to the Home Owners Association; or

d. Any other legally enforceable agreement or mechanism that assigns responsibility for the maintenance of BMPs.

All development projects subject to post-construction BMP requirements will provide a plan for the operation and maintenance of all structural and treatment controls. The plan will be submitted for examination of relevance to keeping the BMPs in proper working order. Where BMPs are transferred to agency for ownership and maintenance, the plan will also include all relevant costs for upkeep of BMPs in the transfer. Operation and Maintenance plans for private BMPs will be kept on-site for periodic review by agency inspectors.

A tracking system and an inspection and enforcement program will be maintained for New Development and Redevelopment post-construction stormwater as shown in Table PLC-3. Enforcement action will be taken per the established Progressive Enforcement Policy as appropriate based on the results of the inspection. See Section for requirements for the development and implementation of a Progressive Enforcement Policy (Appendix A-3-1_PEP).

Table PLD-3: Tracking, Inspection, and Enforcement Program Components

Program	Description	Components	
GIS or other Electronic System	A GIS or other electronic system will be implemented for tracking projects that have been conditioned for post-construction BMPs.	– Municipal Project ID – State WDID No. – Project Acreage – BMP Type and Description – BMP Location (coordinates) – Date of Maintenance Agreement – Date of Acceptance	– Maintenance Records – Inspection Date and Summary – Corrective Action – Date Certificate of Occupancy Issued – Replacement or Repair Date
Inspections[6]	Inspect all development sites upon completion of construction and prior to the issuance of occupancy	Proper installation of: – LID measures, – Structural BMPs,	

[6] The inspection may be combined with other inspections provided it is conducted by trained personnel.

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	certificates.	– Treatment control BMPs, and – Hydromodification control BMPs.
Operation and Maintenance[7]	Verify proper operation and maintenance of post-construction BMPs. Inspection at least once every 2 years after project completion.	– Follow a Post-construction BMP Maintenance Inspection checklist (See Attachment PLD-C) – Assess operation and maintenance conditions relating to post-construction BMPs, including BMP repair, replacement, or re-vegetation.

Plan Certification

Each SUSMP/LID Plan should contain proper certifications. The following approach is suggested for SUSMP/LID Plan submittals:

- Form signed by the property owner/applicant stating the category in which the project falls under to easily define the NPDES requirements (see Attachment PLD-D for Form PC sample template).
- Form signed by the property owner/applicant certifying that the BMPs will be implemented, monitored, and maintained per SUSMP/LID Plan requirements (see Attachment PLD-E for Form P1 sample template).
- Form signed and stamped by a California registered civil engineer stating the proposed structural BMPs and certifying the methods and requirements are in compliance with the MS4 Permit requirements (see Attachment PLD-F for Form P2 sample template).

[7] For post-construction BMPs operated and maintained by parties other than the agency in which the BMP(s) is located, the agency will require the other parties to document proper maintenance and operations.

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Development Construction Program

The Cities are required to develop, implement and enforce a construction program that includes the provisions listed in MS4 Permit §VI.D.8 (LB §VII.K). This document provides guidance to assist the Cities in implementing a construction program in compliance with the MS4 Permit.

Objectives

Permit §VI.D.8.a (LA)/§VII.K.1 (LB)

The objectives of the construction program are to:

- Prevent illicit construction-related discharges of pollutants into the MS4 and receiving waters.
- Implement and maintain structural and non-structural BMPs to reduce pollutants in stormwater runoff from construction sites.
- Reduce construction site discharges of pollutants to the MS4 to the MEP.
- Prevent construction site discharges to the MS4 from causing or contributing to a violation of water quality standards.

Erosion and Sediment Control Ordinance

Permit §VI.D.8.b (LA)/ §VII.K.1 (LB)

The construction program requires an established, enforceable erosion and sediment control ordinance for all construction sites that disturb soil.

Applicability

Permit §VI.D.8.c (LA)/ §VII.K.1.v (LB)

The construction program addresses construction activity as defined in Table DC-1.

Table DC-1: Definitions

Construction Activity	
Definition	Any construction or demolition activity, clearing, grading, grubbing, or excavation or any other activity that results in land disturbance.
Examples	Grading, vegetation clearing, soil compaction, paving, repaving and linear underground/overhead projects (LUPs) that result in land disturbance.
Exclusions	Emergency construction required to immediately protect public health and safety, *routine maintenance* as defined below and agricultural activities.
Routine Maintenance (construction program exclusion)	
Definition	Projects required to maintain the integrity of structures, including but not limited to the following:
Examples	Maintaining the original line and grade, hydraulic capacity, or original purpose of the facility.
	Performing restoration work to preserve the original design grade, integrity and hydraulic capacity of flood control facilities.
	Performing road shoulder work, regrading dirt/gravel roadways/shoulders and cleaning out ditches.
	Update existing lines (includes replacing with new materials or pipe) and facilities to comply with applicable codes, standards, and regulations regardless if such projects result in increased capacity.
	Repair leaks
Exclusion	New lines (i.e. not associated with existing facilities and not part of a project to update or replace existing lines) or facilities constructed to comply with applicable codes, standards and regulations.

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The greater part of the construction program is dedicated to construction sites that disturb one acre or more of soil (with the exception of agricultural activities). This coincides with the size threshold for coverage under the State Water Resources Control Board's NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities. The program provisions exclusive to sites less than one acre are addressed first.

Construction Sites Less than One Acre

Permit §VI.D.8.d (LA)/§VII.K.1.vi (LB)

BMPs (< 1 acre)

Through the use of the erosion and sediment control ordinance and/or building permit, construction sites are required have in place an effective combination of erosion and sediment control BMPs from Table DC-2 to prevent erosion and sediment loss and the discharge of construction wastes.

Table DC-2: Applicable Set of BMPs for All Construction Sites

BMP Type	BMP
Erosion Controls	Scheduling
	Preservation of Existing Vegetation
Sediment Controls	Silt Fence
	Sand Bag Barrier
	Stabilized Construction Site Entrance/Exit
Nonstormwater Management	Water Conservation Practices
	Dewatering Operations
Waste Management	Material Delivery and Storage
	Stockpile Management
	Spill Prevention and Control
	Solid Waste Management
	Concrete Waste Management
	Sanitary/Septic Waste Management

Inventory (< 1 acre)

All construction sites with soil disturbing activities that require a permit, regardless of size, are identified and stored in an inventory. Existing permit databases or other tracking systems may be used to file this information. The list of permitted sites is provided to the Regional Water Board upon request.

Inspections (< 1 acre)

Construction sites are inspected on as needed based on the evaluation of the factors that are a threat to water quality. In evaluating the threat to water quality, the following factors are considered: soil erosion potential, site slope, project size and type, sensitivity of receiving water bodies, proximity to receiving water bodies, nonstormwater discharges, past record of noncompliance by the operators of the construction site and any water quality issues relevant to the particular MS4.

Enforcement (< 1 acre)

The Progressive Enforcement Policy (MS4 Permit §VI.D.2) is implemented to ensure that construction sites are brought into compliance with the erosion and sediment control ordinance within a reasonable time period.

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Construction Sites One Acre or Greater

Operators of public and private construction sites within a city's jurisdiction are required to select, install, implement, and maintain BMPs that comply with the erosion and sediment control ordinance.

Construction Site Inventory / Electronic Tracking System *Permit §VI.D.8.g (LA)/§VII.K.1.ix (LB)*

An electronic system is used to inventory all issued grading permits, encroachment permits, demolition permits, building permits, or construction permits (and any other municipal authorization to move soil and/ or construct or destruct that involves land disturbance). A database management system or GIS system is recommended. This inventory is continuously updated as new sites are permitted and sites are completed. The inventory / tracking system contains at a minimum the items listed in Table DC-3.

Table DC-3: Inventory Information for Constructions Sites

Information Type		Information
General	Name	Project Name
	Location	Site address and/or latitude and longitude coordinates
		Receiving water
	Contact	Names of owner and contractor
		Mailing addresses of owner and contractor
		Phone numbers of owner and contractor
		Emails (if available) of owner and contractor
Status		Start and end dates
		Permit approval date and anticipated completion date
		Erosion and Sediment Control Plan (ESCP) approval date
		Status of NOI submittal and CGP coverage
		Current construction phase (where feasible)
Size		Size of project and area of disturbance
Water quality		Proximity to waterbodies listed as impaired[1] by sediment related pollutants
		Proximity to waterbodies for which a sediment-related TMDL has been adopted and approved by USEPA
		Status as a significant threat to water quality (based on a consideration of factors listed in Appendix 1 to the CGP)
Inspection		Inspection frequency
Post construction		List of post-construction structural BMPs subject to O&M requirements

Construction Plan Review and Approval Procedures *Permit §VI.D.8.h (LA)/§VII.K.1.x (LB)*

Plan review procedures are developed and implemented such that the following minimum requirements are met:

- Prior to issuing a grading or building permit, each operator of a construction activity within the city's jurisdiction of which the project is located is required to prepare and submit an ESCP prior to the disturbance of land for review and written approval. The construction site operator is prohibited from commencing construction activity prior to receipt of written approval by the city of which the project is located. An ESCP is not approved unless it contains appropriate site-

[1] CWA §303(d) listed or subject to a TMDL

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specific construction site BMPs that meet the minimum requirements of the erosion and sediment control ordinance.

- ESCPs must include the elements of a Storm Water Pollution Prevention Plan (SWPPP). SWPPPs prepared in accordance with the requirements of the Construction General Permit can be accepted as ESCPs.
- At a minimum, the ESCP must address the following elements:
    - Methods to minimize the footprint of the disturbed area and to prevent soil compaction outside of the disturbed area.
    - Methods used to protect native vegetation and trees.
    - Sediment/Erosion Control.
    - Controls to prevent tracking on and off the site.
    - Nonstormwater controls (e.g., vehicle washing, dewatering, etc.).
    - Materials Management (delivery and storage).
    - Spill Prevention and Control.
    - Waste Management (e.g., concrete washout/waste management; sanitary waste management).
    - Identification of site Risk Level as identified per the requirements in Appendix 1 of the Construction General Permit.
- The ESCP must include the rationale for the selection and design of the proposed BMPs, including quantifying the expected soil loss from different BMPs.
- The ESCP must be developed and certified by a Qualified SWPPP Developer (QSD).
- All structural BMPs must be designed by a licensed California Engineer.
- The landowner or the landowner's agent must sign a statement on the ESCP as follows (see Attachment DC-A for sample OC-1 template):

  "I certify that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that submitting false and/ or inaccurate information, failing to update the ESCP to reflect current conditions, or failing to properly and/ or adequately implement the ESCP may result in revocation of grading and/ or other permits or other sanctions provided by law."

- Prior to issuing a grading or building permit, the city of which the project is located verifies that the construction site operators have existing coverage under applicable permits, including, but not limited to the State Water Board's Construction General Permit, and State Water Board 401 Water Quality Certification.
- A checklist is used to conduct and document review of each ESCP (see Attachment DC-B for the ESCP Checklist sample template).

BMP Implementation Level *Permit §VI.D.8.i (LA)/§VII.K.1.xi (LB)*

The Cities will implement technical standards for the selection, installation and maintenance of construction BMPs for all construction sites within its jurisdiction.

The BMP technical standards require:

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- The use of BMPs that are tailored to the risks posed by the project. Sites are ranked from Low Risk (Risk 1) to High Risk (Risk 3). Project risks are calculated based on the potential for erosion from the site and the sensitivity of the receiving water body. Receiving water bodies that are listed on the Clean Water Act (CWA) Section 303(d) list for sediment or siltation are considered High Risk. Likewise, water bodies with designated beneficial uses of SPWN, COLD, and MIGR are also considered High Risk. The combined (sediment/receiving water) site risk is calculated using the methods provided in Appendix 1 of the Construction General Permit. At a minimum, the BMP technical standards include requirements for High Risk sites as defined in Table DC-7.
- The use of BMPs for all construction sites, sites equal or greater to 1 acre, and for paving projects per Table DC-6 and Table DC-8.
- Detailed installation designs and cut sheets for use within ESCPs.
- Maintenance expectations for each BMP, or category of BMPs, as appropriate.

Permittees are encouraged to adopt respective BMPs from latest versions of the California BMP Handbook, Construction or Caltrans Stormwater Quality Handbooks, Construction Site Best Management Practices (BMPs) Manual and addenda. Alternatively, Permittees are authorized to develop or adopt equivalent BMP standards consistent for Southern California and for the range of activities presented in Tables DC-5 through DC-8.

The local BMP technical standards are readily available to the development community and are clearly referenced within the Cities' stormwater or development services websites, ordinances, permit approval processes and/or ESCP review forms. The local BMP technical standards are also readily available to the Regional Water Board upon request.

Local BMP technical standards are available for the BMPs listed in Tables DC-5 through DC-8.

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Table DC-4: Minimum Set of BMPs for All Construction Sites

BMP Type	BMP
Erosion Controls	Scheduling
	Preservation of Existing Vegetation
Sediment Controls	Silt Fence
	Sand Bag Barrier
	Stabilized Construction Site Entrance/Exit
Nonstormwater Management	Water Conservation Practices
	Dewatering Operations
Waste Management	Material Delivery and Storage
	Stockpile Management
	Spill Prevention and Control
	Solid Waste Management
	Concrete Waste Management
	Sanitary/Septic Waste Management

Table DC-5: Additional BMPs Applicable to Construction Sites Disturbing 1 Acre or More

BMP Type	BMP
Erosion Controls	Hydraulic Mulch
	Hydroseeding
	Soil Binders
	Straw Mulch
	Geotextiles and Mats
	Wood Mulching
Sediment Controls	Fiber Rolls
	Gravel Bag Berm
	Street Sweeping and/ or Vacuum
	Storm Drain Inlet Protection
	Scheduling
	Check Dam
Additional Controls	Wind Erosion Controls
	Stabilized Construction Entrance/ Exit
	Stabilized Construction Roadway
	Entrance/ Exit Tire Wash
Non-Storm Management	Vehicle and Equipment Washing
	Vehicle and Equipment Fueling
	Vehicle and Equipment Maintenance
Waste Management	Material Delivery and Storage
	Spill Prevention and Control

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Table DC-6: Additional Enhanced BMPs for High Risk Sites

BMP Type	BMP
Erosion Controls	Hydraulic Mulch
	Hydroseeding
	Soil Binders
	Straw Mulch
	Geotextiles and Mats
	Wood Mulching
	Slope Drains
Sediment Controls	Silt Fence
	Fiber Rolls
	Sediment Basin
	Check Dam
	Gravel Bag Berm
	Street Sweeping and/or Vacuum
	Sand Bag Barrier
	Storm Drain Inlet Protection
Additional Controls	Wind Erosion Controls
	Stabilized Construction Entrance/Exit
	Stabilized Construction Roadway
	Entrance/Exit Tire Wash
	Advanced Treatment Systems*
Nonstormwater Management	Water Conservation Practices
	Dewatering Operations (Ground water dewatering only under NPDES Permit No. CAG994004)
	Vehicle and Equipment Washing
	Vehicle and Equipment Fueling
	Vehicle and Equipment Maintenance
Waste Management	Material Delivery and Storage
	Stockpile Management
	Spill Prevention and Control
	Solid Waste Management

*Applies to public roadway projects.

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Table DC-7: Minimum Required BMPs for Roadway Paving or Repair Operation (For Private or Public Projects)

#	BMP
1.	Restrict paving and repaving activity to exclude periods of rainfall or predicted rainfall unless required by emergency conditions.
2.	Install gravel bags and filter fabric or other equivalent inlet protection at all susceptible storm drain inlets and at manholes to prevent spills of paving products and tack coat.
3.	Prevent the discharge of release agents including soybean oil, other oils, or diesel to the stormwater drainage system or receiving waters.
4.	Minimize non stormwater runoff from water use for the roller and for evaporative cooling of the asphalt.
5.	Clean equipment over absorbent pads, drip pans, plastic sheeting or other material to capture all spillage and dispose of properly.
6.	Collect liquid waste in a container, with a secure lid, for transport to a maintenance facility to be reused, recycled or disposed of properly.
7.	Collect solid waste by vacuuming or sweeping and securing in an appropriate container for transport to a maintenance facility to be reused, recycled or disposed of properly.
8.	Cover the "cold-mix" asphalt (i.e., pre-mixed aggregate and asphalt binder) with protective sheeting during a rainstorm.
9.	Cover loads with tarp before haul-off to a storage site, and do not overload trucks.
10.	Minimize airborne dust by using water spray or other approved dust suppressant during grinding.
11.	Avoid stockpiling soil, sand, sediment, asphalt material and asphalt grindings materials or rubble in or near stormwater drainage system or receiving waters.
12.	Protect stockpiles with a cover or sediment barriers during a rain.

Construction Site Inspection *Permit §VI.D.8.j (LA)/§VII.K.1.xii (LB)*

The Cities' legal authority is used to implement procedures for inspecting public and private construction sites. The inspection procedures are implemented as follows:

Inspection Frequency

- Inspect the public and private construction sites as specified in Table DC-8.
- All phases of construction are inspected as follows:
    - Prior to Land Disturbance – Prior to allowing an operator to commence land disturbance, each Permittee shall perform an inspection to ensure all necessary erosion and sediment structural and non-structural BMP materials and procedures are available per the erosion and sediment control plan.
    - During Active Construction, including Land Development[2] and Vertical Construction[3] – In accordance with the frequencies specified in Table DC-8, inspections are performed to ensure all necessary erosion and sediment structural and non-structural BMP materials and procedures are available per the erosion and sediment control plan throughout the construction process.
    - Final Landscaping / Site Stabilization[4] – At the conclusion of the project and as a condition of approving and/or issuing a Certificate of Occupancy, the constructed site is inspected to ensure that all graded areas have reached final stabilization and that all

[2] Activities include cuts and fills, rough and finished grading; alluvium removals; canyon cleanouts; rock undercuts; keyway excavations; stockpiling of select material for capping operations; and excavation and street paving, lot grading, curbs, gutters and sidewalks, public utilities, public water facilities including fire hydrants, public sanitary sewer systems, storm sewer system and/or other drainage improvement.
[3] The build out of structures from foundations to roofing, including rough landscaping.
[4] All soil disturbing activities at each individual parcel within the site have been completed.

trash, debris, and construction materials, and temporary erosion and sediment BMPs are removed.

- Based on the required frequencies above, each construction project is inspected a minimum of three times.

Table DC-8: Inspection Frequencies for Sites One Acre or Greater

Site	Inspection Frequency Shall Occur
All sites 1 acre or larger that discharge to a tributary listed by the state as an impaired water for sediment or turbidity under the CWA §303(d)	(1) when two or more consecutive days with greater than 50% chance of rainfall are predicted by NOAA[5], (2) within 48 hours of a ½-inch rain event and at (3) least once every two weeks
Other sites 1 acre or more determined to be a significant threat to water quality[6]	
All other construction sites with 1 acre or more of soil disturbance not meeting the criteria above	At least monthly

Inspection Standard Operating Procedures

Standard operating procedures are implemented, and revised as necessary, that identify the inspection procedures followed by the Cities' inspectors (see Attachment DC-C for suggested standard operating procedures). Inspections of construction sites – and the standard operating procedures – include, but are not limited to:

1. Verification of active coverage under the Construction General Permit for sites disturbing 1 acre or more, or that are part of a planned development that will disturb 1 acre or more and a process for referring non-filers to the Regional Water Board.
2. Review of the applicable ESCP and inspection of the construction site to determine whether all BMPs have been selected, installed, implemented, and maintained according to the approved plan and subsequent approved revisions (see Attachment DC-B for the ESCP Checklist sample template).
3. Assessment of the appropriateness of the planned and installed BMPs and their effectiveness.
4. Visual observation and record keeping of nonstormwater discharges, potential illicit discharges and connections, and potential discharge of pollutants in stormwater runoff.
5. Development of a written or electronic inspection report generated from an inspection checklist used in the field (see Attachment DC-D and DC-E for the Large Site and Small Site[7] Inspection Forms, respectively).
6. Tracking of the number of inspections for the inventoried construction sites throughout the reporting period to verify that the sites are inspected at the minimum frequencies listed in Table DC-8.

Enforcement *Permit §VI.D.8.k (LA)/§VII.K.1.xiii (LB)*

The Progressive Enforcement Policy is implemented to ensure that construction sites are brought into compliance with all stormwater requirements within a reasonable time period.

[5] www.srh.noaa.gov/forecast

[6] In evaluating the threat to water quality, the following factors shall be considered: soil erosion potential; site slope; project size and type; sensitivity of receiving water bodies; proximity to receiving water bodies; nonstormwater discharges; past record of non-compliance by the operators of the construction site; and any water quality issues relevant to the particular MS4.

[7] A "large site" refers to a site greater than or equal to 1 acre while a "small site" refers to a site less than one acre.

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Permittee Staff Training *Permit §VI.D.8.l(LA)/§VII.K.1.xiv(LB)*

Staff whose primary job duties are related to implementing the construction stormwater program are adequately trained.

The Cities may conduct in-house training or contract with consultants. Training is provided to the following staff positions of the MS4:

- Plan Reviewers and Permitting Staff – Staff and consultants are trained as qualified individuals, knowledgeable in the technical review of local erosion and sediment control ordinance, local BMP technical standards, ESCP requirements, and the key objectives of the State Water Board QSD program. The training is provided either internally to staff or staff is required to obtain QSD certification.
- Erosion Sediment Control/Stormwater Inspectors – Inspectors are either 1) knowledgeable in inspection procedures consistent with the State Water Board sponsored program QSD, 2) a Qualified SWPPP Practitioner (QSP) or 3) a designated person on staff trained in the key objectives of the QSD/QSP programs supervises inspection operations. The training is provided either provided internally to staff or staff is required to obtain QSD/QSP certification. Each inspector is knowledgeable of the local BMP technical standards and ESCP requirements.
- Third-Party Plan Reviewers, Permitting Staff, and Inspectors – If outside parties are utilized to conduct inspections and/or review plans, these staff are trained per the requirements listed above. Outside contractors can self-certify, providing they certify they have received all applicable training required in MS4 Permit §VI.D.8 and have documentation to that effect.

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Public Agency Activities Program

Each participating city is required to develop and implement a program for public agency facilities and activities that includes the requirements listed in MS4 Permit §VI.D.9 (LB §VII.L). This document provides guidance to assist the Cities in implementing a public agency activities program in compliance with the MS4 Permit.

Objectives

Permit §VI.D.9.a (LA)/§VII.L.1 (LB)

The objectives of the Public Agency Activities program are to:

- Minimize stormwater pollution impacts from Permittee-owned or operated facilities.
- Minimize stormwater pollution impacts from public agency activities.
- Identify opportunities to reduce stormwater pollution impacts from areas of existing development.

MS4 Permit requirements for Public Agency Facilities and Activities consist of the following components which will be discussed in more detail in the sections below:

- Public Construction Activities Management
- Public Facility Inventory
- Inventory of Existing Development for Retrofitting Opportunities
- Public Facility and Activity Management
- Vehicle and Equipment Wash Areas
- Landscape, Park, and Recreational Facilities Management
- Storm Drain Operation and Maintenance
- Streets, Roads, and Parking Facilities Maintenance
- Emergency Procedures
- Municipal Employee and Contractor Training

1. Public Construction Activities Management

Permit §VI.D.9.b (LA)/§VII.L.2 (LB)

Each participating city is required to develop and implement a Development Construction Program that meets the requirements the Development Construction Section of this WMP, and Part VI.D.8 of the LA MS4 Permit at municipally owned or operated (i.e., public or Permittee sponsored) construction projects. In addition, each participating city is required to develop and implement a Planning and Land Development Program that meets the requirements in the Planning and Land Development Section of this WMP, and the MS4 Permit at municipally owned or operated (i.e., public or Permittee sponsored) construction projects.

2. Public Facility Inventory

Permit §VI.D.9.c (LA)/§VII.L.3 (LB)

The Public Agency Activities Program requires the maintenance of an inventory of all Permittee-owned or operated (i.e., public) facilities that are potential sources of stormwater pollution. The incorporation of facility information into a GIS is recommended. Sources that are tracked include but are not limited to the following:

- Animal control facilities
- Chemical storage facilities
- Composting facilities

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- Equipment storage and maintenance facilities (including landscape maintenance-related operations)
- Fueling or fuel storage facilities (including municipal airports)
- Hazardous waste disposal facilities
- Hazardous waste handling and transfer facilities
- Incinerators
- Landfills
- Materials storage yards
- Pesticide storage facilities
- Fire stations
- Public restrooms
- Public parking lots
- Public golf courses
- Public swimming pools
- Public parks
- Public works yards
- Public marinas
- Recycling facilities
- Solid waste handling and transfer facilities
- Vehicle storage and maintenance yards
- Stormwater management facilities (e.g., detention basins)
- All other Permittee-owned or operated facilities or activities that are determined to contribute a substantial pollutant load to the MS4.

The following minimum fields of information are included in the inventory for each Permittee-owned or operated facility:

- Name of facility
- Name of facility manager and contact information
- Address of facility (physical and mailing)
- A narrative description of activities performed and potential pollution sources.
- Coverage under the Industrial General Permit or other individual or general NPDES permits or any applicable waiver issued by the Regional or State Water Board pertaining to stormwater discharges.

The inventory is updated at least once during the 5-year MS4 Permit term. The update are accomplished through collection of new information obtained through field activities or through other readily available inter and intra-agency informational databases (e.g., property management, land-use approvals, accounting and depreciation ledger account, and similar information).

3. Inventory of Existing Development for Retrofit Opportunities

Permit §VI.D.9.d (LA)/§VII.L.4 (LB)

The Public Agency Activities Program requires the development of an inventory of retrofitting opportunities. Retrofit opportunities are identified within the public right-of-way or in coordination with a TMDL implementation plan(s). The goals of the existing development retrofitting inventory are to address the impacts of existing development through regional or sub-regional retrofit projects that

reduce the discharges of stormwater pollutants into the MS4 and prevent discharges from the MS4 from causing or contributing to a violation of water quality standards as defined in the MS4 Permit.

Existing areas of development are screened to identify candidate areas for retrofitting using watershed models or other screening level tools. The areas of existing development identified during the screening process are then evaluated and ranked to prioritize retrofitting candidates. Criteria for this evaluation may include, but is not limited to the following:

- Feasibility, including general private and public land availability;
- Cost effectiveness;
- Pollutant removal effectiveness;
- Tributary area potentially treated;
- Maintenance requirements;
- Landowner cooperation;
- Neighborhood acceptance;
- Aesthetic qualities;
- Efficacy at addressing concern; and
- Potential improvements to public health and safety.

The results of this evaluation are considered in the following programs:

- Highly feasible projects expected to benefit water quality are given a high priority to implement source control and treatment control BMPs in the WMP.
- High priority retrofit projects are considered as candidates for off-site mitigation projects per LA MS4 Permit §VI.D.7.c.iii(4)(d) (LB §VII.J.4.iii(4)).
- Where feasible, the existing development retrofit program is coordinated with flood control projects and other infrastructure improvement programs per LA MS4 Permit §VI.D.9.e.ii(2) (LB §VII.L.5.ii(2)).

Site specific retrofit projects are encouraged through cooperation with private landowners. The following practices are considered in cooperating with private landowners to retrofit existing development:

- Demonstration retrofit projects;
- Retrofits on public land and easements that treat runoff from private
- developments;
- Education and outreach;
- Subsidies for retrofit projects;
- Requiring retrofit projects as enforcement, mitigation or ordinance compliance;
- Public and private partnerships;
- Fees for existing discharges to the MS4 and reduction of fees for retrofit implementation.

4. Public Facility and Activity Management

Permit §VI.D.9.e (LA)/§VII.L.5 (LB)

4.1. Industrial General Permitted Facilities

Permit §VI.D.9.e.i & §VI.D.9.e.v (LA)/§VII.L.5.i (LB)

All Permittee owned or operated facilities where industrial activities are conducted that require coverage are required to obtain coverage under the Industrial General Permit by submitting a Notice of Intent (NOI) to the State Water Resources Control Board (State Board) and preparing a Stormwater

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Pollution Prevention Plan (SWPPP). Facilities that may require coverage are listed by category in 40 Code of Federal Regulations (CFR) Section 122.26(b)(14), and include:

- Facilities subject to stormwater effluent limitations guidelines, new source performance standards, or toxic pollutant effluent standards (40 CFR Subchapter N)
- Manufacturing facilities
- Mining and oil and gas facilities
- Hazardous waste treatment, storage, or disposal facilities
- Landfills, land application sites, and open dumps that receive industrial waste
- Recycling facilities
- Steam electric generating facilities
- Transportation facilities
- Sewage treatment plants
- Certain facilities if materials are exposed to stormwater

Municipally owned or operated facilities that have obtained coverage under the IGP implement and maintain BMPs consistent with the associated SWPPP, and are therefore not required to implement and maintain the activity specific BMPs as described in the sections below.

4.2. Flood Management Projects *Permit §VI.D.9.e.ii (LA)/§VII.L.5.ii (LB)*

The following measures are implemented for municipally owned or operated flood management projects:

- Procedures are developed to assess the impacts of flood management projects on the water quality of receiving water bodies;
- Existing structural flood control facilities area evaluated to determine if retrofitting the facility to provide additional pollutant removal from stormwater is feasible.

4.3. Contracted Public Agency Activities *Permit §VI.D.9.e.iv (LA)/§VII.L.5.iv (LB)*

Any contractors hired to conduct Public Agency Activities, including, but not limited to the following must be contractually obligated to implement and maintain the activity specific BMPs outlined in the sections below:

- Storm and/or sanitary sewer system inspection and repair,
- Street sweeping,
- Trash pick-up and disposal, and
- Street and right-of-way construction and repair

It is the responsibility of each Permittee to ensure that these BMPs are being properly implemented and maintained through oversight of contracted activities. Example contractor/lessor contract language is provided in attachment PA-A.

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4.4. BMPS for Municipal Activities

Permit §VI.D.9.e.iii & Permit §VI.D.9.e.vi (LA)/§VII.L.5.iii & VII.L.5.vi (LB)

Municipal maintenance and field staff are the ones responsible for implementing effective source control BMPs[1], such as those described in Table PA-1 (or an equivalent set of BMPs) when such activities occur at municipally owned or operated facilities and field operations (i.e. project sites). These sites include, but are not limited to the facility types identified in the Public Facility Inventory, and at any area that includes the activities described in Table PA-1, or that have the potential to discharge pollutants in stormwater. The Caltrans Stormwater Quality Handbook Maintenance Staff Guide (Caltrans Handbook)[2] is an additional resource that describes BMPs to prevent the stormwater-related pollutants most likely to come from common maintenance facility operations and field activities. It provides a straightforward working-level approach to implementing BMPs for common maintenance activities by categorizing these activities into Families, and associating each Family with certain types of BMPs in Activity Cut Sheets. The activities described in Sections 5-10 below are representative of typical municipal operations, and correspond to the activities and BMPs listed in Table PA-1. Where appropriate, each section will identify the appropriate Maintenance Activity Family and corresponding Caltrans Activity Cut Sheets from this table for ease of reference.

Although Table PA-1 and the CalTrans Handbook are excellent references for selecting BMPs for some of the most common municipal activities, they may not represent a comprehensive inventory of activities encountered by maintenance staff and field personnel. Likewise, for those BMPs that are not adequately protective of water quality standards, additional site-specific BMPS may be needed. For example, the implementation of additional BMPs is required where stormwater from the storm drain system discharges to a water body subject to a TMDL, a Clean Water Act §303(d) listed water body, or a significant ecological area (SEA). Attachment PA-B contains a map of SEAs in LA County and Attachment K of the LA MS4 Permit contains a matrix of Permittees and TMDLs.

[1] BMP is defined by the California Stormwater Quality Association as "*any program, technology, process, siting criteria, operating method, measure, or device which controls, prevents, removes, or reduces pollution*". Source Control BMPs are operational practices that prevent pollution by reducing potential pollutants at the source. They typically do not require maintenance or construction, and may consist of programmatic controls such as street sweeping. Treatment Control BMPs are methods of treatment to remove pollutants from stormwater, and can include constructed treatment devices such as an infiltration basin.

[2] The handbook is available at http://www.dot.ca.gov/hq/env/stormwater/special/newsetup/_pdfs/management_ar_rwp/CTSW-RT-02-057.pdf and may also be found by entering the words "Caltrans Stormwater Quality Handbook Maintenance Staff Guide" in a web search engine.

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Table PA-1: General and Activity Specific BMPs and Their Associated Caltrans Handbook Activity Cut Sheet

Maintenance Activity Family	BMP	Caltrans Activity Cut Sheet Number
General BMPs	Scheduling and Planning	B-4
	Spill Prevention and Control	
	Sanitary/Septic Waste Management	
	Material Use	
	Safer Alternative Products	
	Vehicle/Equipment Cleaning, Fueling and Maintenance	
	Illicit Connection Detection, Reporting and Removal	
	Illegal Spill Discharge Control	
	Maintenance Facility Housekeeping Practices	
Flexible Pavement	Asphalt Cement Crack and Joint Grinding/ Sealing	B-9
	Asphalt Paving	B-10
	Structural Pavement Failure (Digouts) Grinding and Paving	B-11
	Emergency Pothole Repairs	B-13
	Sealing Operations	B-14
Rigid Pavement	Portland Cement Crack and Joint Sealing	B-15
	Mudjacking and Drilling	B-16
	Concrete Slab and Spall Repair	B-17
Slope/ Drains/ Vegetation	Shoulder Grading	B-19
	Nonlandscaped Chemical Vegetation Control	B-21
	Nonlandscaped Mechanical Vegetation Control/Mowing	B-23
	Nonlandscaped Tree and Shrub Pruning, Removal	B-24
	Fence Repair	B-25
	Drainage Ditch and Channel Maintenance	B-26
	Drain and Culvert Maintenance	B-28
	Curb and Sidewalk Repair	B-30
Litter/ Debris/ Graffiti	Sweeping Operations	B-32
	Litter and Debris Removal	B-33
	Emergency Response and Cleanup Practices	B-34
	Graffiti Removal	B-36
Landscaping	Chemical Vegetation Control	B-37
	Manual Vegetation Control	B-39
	Landscaped Mechanical Vegetation Control/ Mowing	B-40
	Landscaped Tree and Shrub Pruning, Removal	B-41
	Irrigation Line Repairs	B-42
	Irrigation (Watering), Potable and Nonpotable	B-43
Environmental	Storm Drain Stenciling	B-44
	Roadside Slope Inspection	B-45
	Roadside Stabilization	B-46
	Stormwater Treatment Devices	B-48
	Traction Sand Trap Devices	B-49
Public Facilities	Public Facilities	B-50
Bridges	Welding and Grinding	B-52
	Sandblasting, Wet Blast with Sand Injection, Hydroblasting	B-54
	Painting	B-56
	Bridge Repairs	B-57
Other Structures	Pump Station Cleaning	B-59
	Tube and Tunnel Maintenance and Repair	B-61
	Tow Truck Operations	B-63
	Toll Booth Lane Scrubbing Operations	B-64
Electrical &	Sawcutting for Loop Installation	B-65
Traffic Guidance	Thermoplastic Striping and Marking	B-67
	Paint Striping and Marking	B-68
	Raised/ Recessed Pavement Marker Application/Removal	B-70

	Sign Repair and Maintenance	B-71
	Median Barrier and Guard Rail Repair	B-73
	Emergency Vehicle Energy Attenuation Repair	B-75
Storm Maintenance	Minor Slides and Slipouts Cleanup/ Repair	B-78
Management and Support	Building and Grounds Maintenance	B-80
	Storage of Hazardous Materials (Working Stock)	B-82
	Material Storage Control (Hazardous Waste)	B-84
	Outdoor Storage of Raw Materials	B-85
	Vehicle and Equipment Fueling	B-86
	Vehicle and Equipment Cleaning	B-87
	Vehicle and Equipment Maintenance and Repair	B-88
	Aboveground and Underground Tank Leak and Spill Control	B-90

5. Vehicle and Equipment Wash Areas

Permit §VI.D.9.f (LA)/§VII.L.6 (LB)

This section corresponds to Maintenance Activity Family Management and Support and corresponding Caltrans Activity Cut Sheet B-87.

Vehicle and equipment cleaning at a municipal facility may introduce a number of potential pollutants into the storm drain system. Municipal maintenance and field staff are responsible for implementing and maintaining the activity specific BMPs listed in Table PA-1 for all fixed vehicle and equipment washing; including fire fighting and emergency response vehicles. In addition, maintenance and field staff are responsible for preventing discharges of wash water from entering the storm drain system. Table PA-2 shows the potential pollutants associated with vehicle and equipment cleaning.

Table PA-2: Potential Pollutants Generated from Cleaning Activities

Activity	**Potential Pollutants**					
Vehicle and Equipment Cleaning	Sediment	Nutrients	Trash	Metals	Oil & Grease	Organics

Discharges of wash waters to the storm drain system are prevented by implementing the following measures at existing facilities with vehicle or equipment wash areas:

- Wash water is self-contained and hauled away for proper disposal offsite.
- Wash areas are equipped with a clarifier, or an alternative pre-treatment device, and water is plumbed to the sanitary sewer in accordance with applicable waste water provider regulations.
- Wastewater from all new vehicle and equipment wash facilities, or redeveloped or replaced existing facilities is prevented from discharging to the MS4 by equipping the facility with a clarifier, or an alternative pre-treatment device, and plumbing water to the sanitary sewer in accordance with applicable waste water provider regulations, or by self-containing all water water/wash water and hauling to a point of legal disposal.

6. Landscape, Park, and Recreational Facilities Management

Permit §VI.D.9.g (LA)/ §VII.L.7 (LB)

This section corresponds to multiple Activity Cut Sheets within the Slope/Drains/Vegetation, Landscape, Environmental, and Management and Support Families.

Maintenance practices at parks and recreational facilities generally include fertilizer and pesticide applications, vegetation maintenance and disposal, irrigation, swimming pool chemical maintenance and draining, and trash and debris management. All of these maintenance practices have the potential to contribute pollutants to the storm drain system. Municipal maintenance and field staff are responsible for implementing and maintaining the activity specific BMPs listed in Table PA-1for all public right-of-

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ways, flood control facilities and open channels, lakes and reservoirs, and landscape, park, and recreational facilities and activites. Table PA-3 shows the potential pollutants associated with recreational facilities..

Table PA-3: Potential Pollutants Generated from Recreational Facilities

Activity	Potential Pollutants				
Vehicle and Equipment Cleaning	Sediment	Nutrients	Trash	Bacteria	Pesticides

6.1 Model Integrated Pest Management Program

Permit §VI.D.9.g.ii & VI.D.9.g.iii (LA)/§VII.L.7.ii & VII.L.7.iii (LB)

An IPM policy is in place to minimize pesticide and fertilizer use, and encourage the use of IPM techniques for Public Agency facilities and activities. The attached IPM Program template (Attachment PA-C), adapted from the Orange County Drainage Area Management Plan (DAMP) IPM Policy developed by the University of California, Division of Agriculture and Natural Resources, provides an example of an effective IPM program. This IPM Program template is based on regulations, management guidelines, and research-based recommendations established by federal, state and local agencies and universities with particular expertise in pest management.

As part of the IPM policy, a commitment and schedule to reduce the use of pesticides that cause impairment t of surface waters is implemented through the following procedures:

- An inventory of all pesticides used by municipal departments, divisions, and operational units is prepared and updated annually.
- Pesticides used by staff and hired contractors are quantified.
- The use of IPM alternatives is demonstrated, where feasible, to reduce pesticide use.

Municipal maintenance and field staff applying pesticides are certified in the appropriate category by the California Department of Pesticide Regulation, or are under the direct supervision of a pesticide applicator certified in the appropriate category.

7. Storm Drain Operation and Maintenance

Permit §VI.D.9.h (LA)/ §VII.L.8 (LB)

This section corresponds to the Litter/Debris/Graffiti Family: Litter and Debris Removal Cut Sheet, pg. B-33, and the Environmental Family: Storm Drain Stenciling Cut Sheet, pg. B-44

The storm drain system functions primarily to collect and convey surface runoff to receiving waters during storms in order to prevent flooding. It is a common municipal activity to maintain the storm drain system so that it functions hydraulically as intended during storms. Municipal maintenance and field staff are responsible for implementing and maintaining the activity specific BMPs listed in Table PA-1 for storm drain operation and maintenance, and ensuring that all material removed from the MS4 does not reenter the system by dewatering solid material in a contained area and disposing of liquid material in accordance with any of the following measures:

- Self-containing and hauling off for legal disposal; or
- Applying to the land without runoff; or
- Equipping with a clarifier or alternative pre-treatment device and plumbing to the sanitary sewer in accordance with applicable waste water provider regulations.

Table PA-4 shows potential pollutants generated during storm drain operation and maintenance.

Table PA-4: Potential Pollutants Generated from Storm Drain Operation and Maintenance

Activity	Potential Pollutants								
	Sediment	Nutrients	Trash	Metals	Bacteria	Oil & Grease	Organics	Pesticides	Oxygen Demanding Substances
Inspection and Cleaning of Conveyance Structures	×	×	×		×		×		×
Controlling Illicit Connections and Discharges	×	×	×	×	×	×	×	×	×
Controlling Illegal Dumping	×	×	×	×	×	×	×	×	×
Maintenance of Inlet and Outlet Structures	×		×		×	×			

7.1 Catch Basin Cleaning

Permit §VI.D.9.h.iii (LA)/ §VII.L.8.iii (LB)

There is no preferred method for cleaning catch basins as long as the method used is successful in removing accumulated sediment and debris. The methods used are determined in the field with the goal of minimizing the amount of escaped material, and preventing this material from entering the storm drain system. A template catch basin cleaning log is provided in Attachment PA-D.

7.1.1 Catch Basins Cleaning in Areas not Subject to a Trash TMDL

In areas that are not subject to a trash TMDL, catch basin inlets are prioritized based on the amount of trash generated, and inspected according to the schedule in Table PA-5.

Table PA-5: Inspection Frequencies for Catch Basin Inlets

Trash Generating Frequency	Priority	Inspection Frequency
Consistently generates the highest volumes of trash and/or debris	A	A minimum of three times during the wet season (October-April) and once during the dry season every year
Consistently generates moderate volumes of trash and/or debris	B	A minimum of once during the wet season and once during the dry season every year
Generates low volumes of trash and/or debris	C	A minimum of once per year

An inventory of catch basins is maintained and updated regularly. This inventory includes the following components:

- GPS coordinates of each catch basin
- Priorities for inspection
- Rationale or data to support catch basin priority designations
- Inspection and cleaning records

Catch basins are cleaned as necessary based on the inspections conducted. At a minimum, catch basins determined to be at least 25% full of trash are cleaned out.

7.1.2 Catch Basin Cleaning in Areas Subject to a Trash TMDL

In areas subject to a Trash TMDL, all applicable provisions of LA MS4 Permit Section VI.E (LB Part Part VIII) in conformance with the appropriate TMDL implementation schedule, are implemented. This includes an effective combination of full capture, partial capture, institutional controls, or minimum frequency of assessment and collection as described in LA MS4 Permit Section VI.E (LB Part Part VIII).

7.2 Catch Basin Labels and Open Channel Signage

Permit §VI.D.9.h.vi (LA)/ §VII.L.8.vi (LB)

All municipally owned storm drain inlets are labeled with a "No Dumping, Drains to Ocean" message, and inspected for legibility prior to the wet season (October-April) every year. Catch basins with illegible labels are recorded and re-stenciled or re-labeled within 180 days of inspection. In addition, signs referencing local code(s) that prohibit littering and illegal dumping are posted at designated public access points to open channels, creeks, urban lakes, and other relevant water bodies.

7.3 Trash Management

Permit §VI.D.9.h.iv-v & Permit §VI.D.9.h.vii (LA)/§VII.L.8.iv-v (LB)

The following Trash Management BMPs described below are employed to mitigate the impacts of anthropogenic trash on receiving waters.

7.3.1 Trash Management at Public Events

The following measures are implemented for any event in the public right of way or wherever it is foreseeable that substantial quantities of trash and litter may be generated, including events located in areas that are subject to a trash TMDL:

- Proper management of trash and litter generated; and
- Arrangement for temporary screens to be placed on catch basins; or
- Provide clean out of catch basins, trash receptacles, and grounds in the event area within one business day subsequent to the event.

7.3.2 Trash Receptacles

Covered trash receptacles are located in areas identified as high trash generation areas and maintained and cleaned out as necessary to prevent trash overflow. Examples of areas that may be considered high trash generating areas include:

- High vehicle or pedestrian traffic areas
- Commercial areas
- Industrial areas
- Construction areas
- High density residential areas
- Areas adjacent to vacant lots

7.3.3 Additional Trash Management Practices

In areas that are not subject to a trash TMDL, additional trash management practices will be employed no later than five years after the effective date of the LA MS4 Permit (4 years after the effective date of the LB MS4 Permit). Trash excluders or equivalent devices must be installed on or in catch basins or outfalls to prevent the discharge of trash to the MS4 or receiving waters, unless the installation of such BMP(s) alone will cause flooding (not due to lack of maintenance). Alternatively, additional trash BMPs

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that provide substantially equivalent removal of trash may be implemented. Additional BMPs may include, but are not limited to:

- Increased street sweeping
- Adding trash cans near trash generation sites
- Prompt enforcement of trash accumulation
- Increased trash collection on public property
- Increased litter prevention messages or trash nets within the MS4

The BMPs chosen will provide equivalent trash removal performance as excluders, and will be demonstrated though the annual report. When outfall trash capture is provided, revision of the schedule for inspection and cleanout of catch basins will also be reported in the annual report.

The State Water Resources Control Board (State Water Board) is considering the adoption of amendments to the Water Quality Control Plans for Ocean Waters of California and for the Inland Surface Water, Enclosed Bays, and Estuaries of California for Trash (Trash Amendments) citing a strong need for statewide consistency in trash management. The proposed Trash Amendments will include five elements: (1) Water Quality Objective, (2) Prohibition of Discharge, (3) Implementation, (4) Compliance Schedule, and (5) Monitoring, which will outline NPDES Permittee requirements for trash management. The development of the Trash Amendments will continue to be monitored, and any additional required trash management practices in areas not subject to a trash TMDL will be implemented per the guidance provided by these amendments.

7.4 Storm Drain Maintenance

Permit §VI.D.9.h.viii (LA)/ §VII.L.8.viii (LB)

The following BMPs constitute the Storm Drain Maintenance Program:

- Municipally-owned open channels and drainage structures are visually inspected for debris at least annually.
- Trash and debris from is removed from open channel storm drains a minimum of once per year, before the storm season.
- The discharge of contaminants is minimized during MS4 maintenance and clean outs;
- Material removed is properly disposed of by containing and hauling away for legal disposal

7.5 Infiltration from Sanitary Sewer to MS4/Preventive Maintenance

Permit §VI.D.9.h.ix (LA)/§VII.L.8.ix (LB)

Thorough, routine, preventive surveys and maintenance of both municipally owned and operated Storm Drain Systems as well as Sanitary Sewer Systems infiltration and seepage of contaminants from the sanitary sewer system into the storm drain system is prevented. Sanitary Sewer System routine preventative maintenance is described in the Sewer System Management Plan (SSMP), which is a component of the Statewide General Waste Discharge Requirements (WDR) for Sanitary Sewer Systems.

Where necessary, controls implemented to limit infiltration of seepage from sanitary sewers to the MS4 include:

- Adequate plan checking for construction and new development;
- Incident response training for its municipal employees that identify sanitary sewer spills;
- Code enforcement inspections;
- MS4 maintenance and inspections;
- Interagency coordination with sewer agencies; and

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- Proper education of its municipal staff and contractors conducting field operations on the MS4 or its municipal sanitary sewer (if applicable).

7.6 Permittee Owned Treatment Control BMPs *Permit §VI.D.9.h.x (LA)/§VII.L.8.x (LB)*

All municipally owned treatment control BMPs, including post-construction BMPs, are regularly inspected and maintained to ensure their proper operation.
Any residual water generated during BMP maintenance is disposed of using one of the following procedures:

- Hauled away and legally disposed of; or
- Applied to the land without runoff; or
- Discharged to the sanitary sewer system; or
- Treated or filtered to remove bacteria, sediments, nutrients, and meet the limitations set in Table PA-6 below prior to discharge to the storm drain system.

Table PA-6: Discharge Limitations for Dewatering Treatment BMPs

Parameter	Units	Limitation
Total Suspended Solids	Mg/L	100
Turbidity	NTU	50
Oil and Grease	Mg/L	10

8. Streets, Roads, and Parking Facilities Maintenance

Permit §VI.D.9.i(LA)/§VII.L.9 (LB)

This section corresponds to multiple Activity Cut Sheets within the Flexible Pavement, Rigid Pavement, Litter/Debris/Graffiti, Traffic Guidance, and Management and Support Families.

Streets and roads may collect litter and debris from nearby activities, as well as from vehicular traffic. They also require routine maintenance that may generate waste materials. Table PA-7 shows potential pollutants generated from street, road, and parking facilities maintenance.

Table PA-7: Potential Pollutants Generated from Street, Road, and Parking Facility Maintenance

Activity	Potential Pollutants						
	Sediment	Trash	Metals	Bacteria	Oil & Grease	Organics	Oxygen Demanding Substances
Street and Road Maintenance	✕	✕	✕		✕	✕	
Parking Facility Maintenance	✕	✕	✕	✕	✕	✕	✕

8.1 Street Sweeping *Permit §VI.D.9.i.i-ii(LA)/§VII.L.9.i-ii (LB)*

Streets and/or street segments are swept according to the following designations:

- Priority A: Streets and/or street segments that are designated as consistently generating the highest volumes of trash and/or debris should be swept at least two times per month.
- Priority B: Streets and/or street segments that are designated as consistently generating moderate volumes of trash and/or debris should be swept at least once per month.
- Priority C: Streets and/or street segments that are designated as generating low volumes of trash and/or debris shall be swept as necessary but in no case less than once per year.

8.2 Road Reconstruction *Permit §VI.D.9.iii (LA)/§VII.L.9.iii (LB)*

Projects that include roadbed or street paving, repaving, patching, digouts, or resurfacing roadbed surfaces implement the following BMPS:

- Restricting paving and repaving activities to exclude periods of rainfall or predicted rainfall unless required by emergency conditions.
- Installing sand bags or gravel bags and filter fabric at all susceptible storm drain inlets and at manholes to prevent spills of paving products and tack coat;
- Preventing the discharge of release agents including soybean oil, other oils, or diesel into the MS4 or receiving waters.
- Preventing non-stormwater runoff from water use for the roller and for evaporative cooling of the asphalt.
- Cleaning equipment over absorbent pads, drip pans, plastic sheeting or other material to capture all spillage and dispose of properly.
- Collecting liquid waste in a container, with a secure lid, for transport to a maintenance facility to be reused, recycled or disposed of properly.
- Collecting solid waste by vacuuming or sweeping and securing in an appropriate container for transport to a maintenance facility to be reused, recycled or disposed of properly.
- Covering the “cold-mix” asphalt (i.e., pre-mixed aggregate and asphalt binder) with protective sheeting during a rainstorm.
- Covering loads with tarp before haul-off to a storage site, and not overloading trucks.
- Minimizing airborne dust by using water spray during grinding.
- Avoiding the stockpiling of soil, sand, sediment, asphalt material and asphalt grindings materials or rubble in or near MS4 or receiving waters.
- Protecting stockpiles with a cover or sediment barriers during a rain.

8.3 Parking Facilities Maintenance *Permit §VI.D.9.iv (LA)/ §VII.L.9.iv (LB)*

Municipally owned parking lots that are uncovered and exposed to stormwater are kept clear of debris and excessive oil buildup by inspecting lots at least 2 times per month and cleaning at least once per month.

9. Emergency Procedures *Permit §VI.D.9.j (LA)/ §VII.L.10 (LB)*

Participating Agencies may conduct repairs of essential public service systems and infrastructure in emergency situations with a self-waiver of the provisions of the MS4 Permit as follows:

- Cities will abide by all other regulatory requirements, including notification to other agencies as appropriate.
- Where the self-waiver has been invoked, Cities will submit to the Regional Water Board Executive Officer a statement of the occurrence of the emergency, an explanation of the

circumstances, and the measures that were implemented to reduce the threat to water quality, no later than 30 business days after the situation of emergency has passed.

Minor repairs of essential public service systems and infrastructure in emergency situations (that can be completed in less than one week) are not subject to the notification provisions. Appropriate BMPs to reduce the threat to water quality will be implemented.

10. Municipal Employee and Contractor Training *Permit §VI.D.9.k (LA)/Permit §VII.L.11 (LB)*

An annual training program on the requirements of the overall stormwater management program is implemented for all municipal field staff whose interactions, jobs, and activities affect stormwater quality prior to June 30 every year. The Cities also ensure that contractors performing privatized/contracted municipal services have appropriate training in the stormwater management program. The goals of the annual training are to:

- Promote a clear understanding of the potential for municipal activities to pollute stormwater
- Identify opportunities to require, implement, and maintain appropriate BMPs in their line of work

In addition to the annual stormwater program training, the Cities implement an annual training program to train all of their employees and contractors who use or have the potential to use pesticides or fertilizers (whether or not they normally apply these as part of their work). Training programs address:

- The potential for pesticide-related surface water toxicity
- Proper use, handling, and disposal of pesticides
- Least toxic methods of pest prevention and control, including IPM
- Reduction of pesticide use

Outside contractors can self-certify, providing they certify they have received all applicable training required in the MS4 Permit and have documentation to that effect.

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Illicit Connections & Illicit Discharges Elimination Program

Each participating city is required to develop and implement an Illicit Connections & Illicit Discharge Elimination (IC/ID) Program that includes the requirements listed in Permit §VI.D.10.a (LB §VII.M). This document provides guidance to assist the Cities in implementing an IC/ID program in compliance with the Permit.

Introduction *Permit §VI.D.10.a (LA)/§VII.M.1 (LB)*

Illicit connections and illicit discharges (IC/IDs) as defined in Table ICID-1 are potential significant sources of pollutants into and from the MS4. The Illicit Connection and Illicit Discharge (IC/ID) Program provides a comprehensive process for detecting, investigating and eliminating IC/IDs in an efficient and timely manner. The program consists of the following components:

- Procedures for conducting source investigations for IC/IDs
- Procedures for eliminating the source of IC/IDs
- Procedures for public reporting of illicit discharges
- Spill response plan and
- IC/ID education and training for City staff.

The purpose of this program is to effectively prohibit illicit discharges into the MS4.

Table ICID-1: IC/IDs Defined

Prohibition	Definition	Examples
Illicit Connections	Any man-made conveyance that is connected to the MS4 without a permit, excluding roof drains and other similar type connections.	Unpermitted channels, pipelines, conduits, inlets or outlets that are connected directly to the MS4.
Illicit Discharges	Any discharge into the MS4 or from the MS4 into a receiving water that is prohibited under local, state, or federal statutes, ordinances, codes or regulations. This includes any non-stormwater discharge, except those authorized in MS4 Permit §III.A.10.2.	Sanitary wastewater, Vehicle wash water, wash-down from grease traps, motor oil, antifreeze and fuel spills into or from the MS4.

Legal Authority

Adequate Legal Authority is required to prohibit IC/IDs to the MS4 and enable enforcement capabilities to eliminate the sources of IC/IDs.

Illicit Discharge Source Investigation and Elimination *Permit §VI.D.10.b (LA)/ §VII.M.2 (LB)*

The purpose of the IC/ID Program is accomplished in part by developing clear, step-by-step written procedures for conducting investigations of illicit discharges.

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Investigation

Standardized procedures for conducting investigations to identify the source of all suspected illicit discharges are included in as an attachment (Illicit Discharge Investigation and Elimination Guidance). Procedures include the following:

- **Initiation** – Investigate the source of all observed discharges. After becoming aware of an illicit discharge, conduct an investigation to identify and locate the source within 72 hours.
- **Prioritization** – Investigate illicit discharges suspected of being sanitary sewage and/or significantly contaminated first.
- **Tracking** – Track all investigations and document the information listed in Table ICID-2.

Table ICID-2: Recorded Information for Illicit Discharge Investigations

Item	Information
1	Date(s) the illicit discharge was observed
2	Results of the investigation
3	Follow-up of the investigation
4	Date the investigation was closed

Elimination

Standardized procedures to eliminate illicit discharges once the sources are located are included as an attachment. Procedures include the following:

- **Notification** – Immediately notify the responsible party (RP)/parties of the problem and require the responsible party to initiate all necessary corrective actions to eliminate the illicit discharge.
    - If it is determined that an illicit discharge originates within an upstream jurisdiction, notify the upstream jurisdiction and the Regional Board. The Notification is conducted within 30 days of determination and information is collected regarding combined efforts to identify the source.
- **Spill response** – The Spill Response Plan is implemented when the source for illicit discharges cannot be traced to a suspected RP. Permanent solutions to such discharges are described in the following section (Flow Diversion).
- **Follow-up** – Conduct and document follow-up investigations upon notification that an illicit discharge has been eliminated to verify that it has been satisfactorily eliminated and cleaned-up.
- **Enforcement** – Enforcement procedures are included in the Progressive Enforcement Policy. The Progressive Enforcement Policy includes a list of enforcement actions.

Progressive Enforcement Policy

The Progressive Enforcement Policy is implemented to ensure that illicit discharges/ illicit connections are eliminated within a reasonable time period. The procedures are followed when the source of the nature of the discharges is known. Procedures typically include:

- Written warnings for minor violations
- Formal notice of violation with specific actions and time frames for compliance
- Compensation from the RP for any costs related to remediation, inspection, investigation, clean-up and oversight activities
- Cease and desist orders

- Civil penalties (infractions), or referral for criminal penalties or further legal action.

Flow Diversion

In the event that an ongoing illicit discharge cannot be eliminated (following the full execution of legal authority and in accordance with the Progressive Enforcement Policy) or the RPs cannot be identified, the discharge is either treated or diverted to the sanitary sewer. In either instance, the Regional Board is notified within 30 days of such determination. Notification includes the following information:

- Written plan that describes the efforts that have been undertaken to eliminate the discharge.
- Description of actions to be undertaken.
- Anticipated cost and
- Schedule for completion.

Identification and Response to Illicit Connections *Permit §VI.D.10.c (LA)/§VII.M.3 (LB)*

Illicit connections can be concentrated sources of pollutants either through direct discharge or infiltration of sewage or other prohibited discharges into the MS4. To reduce this source of pollutants, the following program is implemented for the identification of illicit connections. Key components of this program include investigating and responding in order to actively prevent and eliminate illicit connections.

Investigation

Standardized procedures for identifying illicit connections are included as an attachment (Illicit Connection Investigation Guidance). Procedures include the following:

- **Initiation** – Investigate within 21 days from the discovery or upon receiving a report of a suspected illicit connection. The elements of the investigation are listed in Table ICID-3.
- **Tracking** – Track all investigations and document the information listed in Table ICID-3.

Response

If the source investigation concludes that a connection to the MS4 is both 1) permitted or documented and 2) discharging only stormwater or nonstormwater allowed under WMP NSWD SECTION or other individual or general NPDES Permits/WDRs, then the investigation is closed and no further action is taken. Upon confirmation of a connection to the MS4 is illicit, one of two options is taken:

1. **Permit or document the connection.** The permitted or documented connection may only discharge stormwater and nonstormwater allowed under WMP NSWD SECTION or other individual or general NPDES Permits/WDRs. Retaining a record of the connection and its investigation qualifies as documentation.
2. **Eliminate the connection.** The connection is eliminated within 180 days of completion of the investigation, using formal enforcement authority if necessary.

Table ICID-3: Recorded Information for Illicit Connection Investigations

Item	Information
1	Any relevant illicit discharge information from Table ICID-2
2	Source of the connection
3	Nature and volume of the discharge through the connection
4	RP for the connection (if identified)
5	Response including any formal enforcement taken

Public Reporting of Non-Stormwater Discharges and Spills *Permit §VI.D.10.d (LA)/§VII.M.4 (LB)*

Central Point of Contact

Public reporting of illicit discharges or water quality impacts associated with discharges into or from MS4s through a central contact point are promoted, publicized, and facilitated. This includes phone numbers and an internet site for complaints and spill reporting. The reporting hotline is provided to staff to leverage the field staff that has direct contact with the MS4 in detecting and eliminating illicit discharges.

The LACFCD, in collaboration with the County, provides the central point of contact and through the 888-CLEAN-LA reporting hotline and internet site.

Open Channels

Signage is posted adjacent to open channels (see MS4 Permit IV.D.9.h.vi.(4)). The signage includes information regarding dumping prohibitions and public reporting of illicit discharges.

Complaints

Written procedures are maintained that document how complaint calls are received, and tracked to ensure that all complaints are adequately addressed in the attached form (Record Keeping & Documentation). Following the adaptive management process outlined in the MS4 Permit, the procedures are periodically evaluated to determine whether changes or updates are needed to ensure that the procedures accurately document the employed methods. After the evaluation, any identified changes will be made to the procedures.

Documentation is maintained for all complaint calls. This includes recording the location of the reported spill or IC/ ID and the actions undertaken in response the complaint, including referrals to other agencies.

Spill Response Plan *Permit §VI.D.10.e (LA)/§VII.M.5 (LB)*

A spill response plan (Attachment ICID-E) is implemented for all sewage and other spills that may discharge into its MS4. The spill response plan identifies agencies responsible for spill response and cleanup, telephone numbers and e-mail address for contacts, and contains the following:

- **Agency Coordination** – Coordinate with spill response teams throughout all appropriate departments, programs and agencies so that maximum water quality protection is provided.
- **Spill Response** – Respond to spills for containment within 4 hours of becoming aware of the

spill, except where such spills occur on private property, in which case respond within 2 hours of gaining legal access to the property. Initiate investigation of all public and employee spill complaints within one business day of receiving the complaint to assess validity.

- **Reporting** – Spills that may endanger health or the environment are reported to appropriate public health agencies and the California Emergency Management Agency (Cal EMA).

Illicit Connection and Illicit Discharge Education and Training *Permit §VI.D.10.f (LA)/§VII.M.6 (LB)*

A training program regarding the identification of IC/IDs is implemented for all municipal field staff, who, as part of their normal job responsibilities (e.g., street sweeping, storm drain maintenance, collection system maintenance, road maintenance), may come into contact with or otherwise observe an illicit discharge or illicit connection to the MS4. Contact information, including the procedure for reporting an illicit discharge, is readily available to field staff.

Applicable Staff

Table ICID-4 is a list of field programs where program staff may come into contact with or otherwise observe an illicit discharge or illicit connection to the MS4. Appropriate field staff, supervising staff and contractors involved in these programs require training in IC/ID identification and reporting following the schedule provided in Table ICID-5.

Contracted Staff

Contractors that provide these municipal services may attend city training or certify to the participating city and retain documentation that staff has received applicable training. Otherwise this provision is accomplished through a contractual requirement for contracted staff to receive the training.

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Table ICID-4: Municipal Field Programs

Main Field Program Types	Sub-Category Types/Activities
Lake Management	Fertilizer & Pesticide Management
	Mowing, Trimming/Weeding, Planting
	Managing Landscape Waste
	Controlling Litter
	Erosion Control
	Controlling Illegal Dumping
	Bacteria Control
	Monitoring
Landscape Maintenance	Mowing, Trimming/Weeding, Planting
	Irrigation
	Fertilizer & Pesticide
	Managing Landscape Waste
	Erosion Control
Roads, Streets, and Highways Operations and Maintenance	Sweeping & Cleaning
	Street Repair & Maintenance
	Bridge & Structure Maintenance
Fountains, Plazas, and Sidewalk Maintenance and Cleaning	Surface Cleaning
	Graffiti Cleaning
	Sidewalk Repair
	Controlling Litter
	Fountain Maintenance
Solid Waste Handling	Solid Waste Collection
	Waste Reduction & Recycling
	Hazardous Waste Collection
	Litter Control
Water and Sewer Utility O&M	Water Line Maintenance
	Sanitary Sewer Maintenance
	Spill/Leak/Overflow Control
Fire Department Activities	Emergency/Post-Emergency Fire Fighting Activities
	Fire Fighting Training
	Fire Station Activities

Training Schedule

The training schedule for all applicable staff is listed in Table ICID-5.

Table ICID-5: IC/ID Program Training Schedule

Category	Schedule
Current Staff	Twice during the term of the MS4 Permit
New Staff	Within 180 days of starting employment

Training Elements

The IC/ID elements addressed by the training program are listed in Table ICID-6.

Table ICID-6: Minimum IC/ID Training Program Elements

Item	Information
1	IC/ID identification, including definitions and examples
2	Investigation
3	Elimination
4	Clean-up
5	Reporting
6	Documentation

Documentation

Documentation of training program activities and training modules are retained and made available for review by the Regional Board.

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PROGRESSIVE ENFORCEMENT POLICY

2014

Stormwater Enforcement Guide

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Insert City Seal

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PROGRESSIVE ENFORCEMENT POLICY

STORMWATER ENFORCEMENT GUIDE

INTRODUCTION

This Stormwater Progressive Enforcement Policy (PEP) provides procedures to enforce provisions of the Waste Discharge Requirements for Municipal Separate Storm Sewer System (MS4) Discharges within the Coastal Watersheds of Los Angeles County, except those Discharges Originating from the City of Long Beach MS4 Order No. R4-2012-0175. Pursuant to Section VI.D.2.a of the Order, Permittees are required to develop and implement a PEP to ensure that (1) regulated Industrial/ Commercial facilities, (2) construction sites, (3) development and redevelopment sites with post-construction controls, and (4) illicit discharges are each brought into compliance with all storm water and non-storm water requirements. The PEP provides the City with a guidance for enforcing the MS4 Permit Provisions and identifies enforcement procedures designed to encourage a timely response.

PROGRESSIVE ENFORCEMENT

Progressive enforcement is an escalating series of actions that allows for the efficient and effective use of enforcement. In some situations, an informal response (written warning/inspection report) is sufficient to inform the responsible party that there is a deficiency and to require the responsible party to return to compliance. If violations continue, the enforcement response should be quickly escalated to increasingly more formal and serious actions until compliance is achieved. Progressive enforcement is not appropriate in all circumstances. For example, where there is a situation needing immediate response, immediate issuance of a cleanup and abatement order may be appropriate.

COMPLIANCE CRITERIA

The City conducts on-site compliance inspections and conducts investigations, in response to complaints, under their authority provided in their municipal code and ordinances to verify compliance. Typical noncompliance issues related to stormwater may include:

- Prohibited discharges to the storm drain system.
- Site's existing condition is likely to result in exposure of pollutants to stormwater contact and possible pollutant discharge to the storm drain system such as:
    - Poor housekeeping activities that results in pollutant exposure.
    - Unattended spills and leaks.
    - Uncovered or improperly stored wastes, materials, or other items of concern.
    - Open waste receptacles such as tallow bins, compactors, and trash bins.
    - Leaky or contaminated equipment stored or used outdoors.
    - Track-out of dirt and sediment or other materials to street or outdoor areas.
- Illicit connections to the storm drain system.
- Best Management Practices (BMPs) are not in place to address pollutant generating activities, which may include erosion and sediment controls and post construction controls.

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Complaint Response

The City may receive complaints regarding stormwater ordinance from their staff members, public, local agencies, or the Regional Water Board. The City initiates, within one business day,[1] investigation of complaints from facilities within its jurisdiction. The initial investigation includes, at minimum, a limited inspection of the facility to confirm validity of the complaint and to determine if the facility is in compliance with municipal storm water ordinance and, if necessary, to oversee corrective action. Emergency complaints are investigated immediately.

PROGRESSIVE ENFORCEMENT GUIDELINES

Informal Enforcement

The City implements professional judgment regarding the circumstances surrounding an enforcement action and chooses to resolve routine noncompliance quickly and efficiently through informal means that are not accompanied by sanctions (e.g., civil charges or penalties). When deemed appropriate, the City employs the procedures described below to correct noncompliance informally.

Written Warning/ Inspection Report

Under circumstances where an inspection reveals routine noncompliance that can be corrected within a reasonably short time, staff may choose to issue a written warning/inspection report that describes the minor deficiencies/violations and includes a schedule for correcting the noncompliance[2]. The purpose of the written warning is to give the responsible party an opportunity to comply voluntarily and thus avoid sanctions that might be imposed by an escalated enforcement response.

For residential zones, the City employs an informal enforcement process and escalates to formal enforcement actions for those residents that do not comply with stormwater regulations.

Formal Enforcement / Administrative Enforcement

In the event that the City determines, based on an inspection or illicit discharge investigation conducted, that a responsible party has failed to adequately comply with the informal enforcement process within the required timeframe, the City may initiate administrative enforcement actions or will implement enforcement actions as established through authority in its municipal code. The City's goal is to achieve compliance through an extensive inspection program, educational outreach efforts and, if necessary, the initiation of appropriate enforcement action(s). The goal of any enforcement action is to: (1) return the facility to compliance in a timely manner; (2) eliminate economic benefit realized by the noncompliant facility; and (3) punish violators and prevent future noncompliance.

Notice of Violations

Under circumstances where the responsible party has failed to comply with the informal enforcement process or where the violations are significant, the City may choose to issue a Notice of Violation (NOV). The purpose of an NOV is to inform the responsible party of the observed violations, the applicable stormwater municipal codes that the responsible party has failed to comply with and the

[1] The City may comply with the Permit by taking initial steps (such as logging, prioritizing, and tasking) to "initiate" the ingestigation within that one business day. However, the Regional Water Board would expect that the initial investigation, including a site visit, to occur within four business days (per MS4 Order No.R4-2012-0175 Section VI.D.2.b)
[2] The City may choose to issue/write inspection report on site or provide to the responsible party at a later time.

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potential consequences of failing to correct the violations. The NOV also gives the responsible party an opportunity to correct the violations described in the NOV within a specified time. Under circumstances where the responsible party fails to adequately respond to the NOV by failing to address or correct the violations noted in the NOV, the severity of the enforcement response will continue to escalate as described below.

Failure to Return to Compliance/ Second Notice of Violation

The City's municipal code stormwater ordinance authorizes assessment of administrative penalties which can be carried out by issuing a Failure to Return to Compliance Notice or second NOV . The second NOV is a stronger enforcement option which may be used in circumstances where the responsible party has failed to comply with the requirements as indicated on the first NOV.

Cease and Desist Order

In the event the City's municipal code stormwater ordinance authorizes a Cease and Desist Order (CDO), the City may issue a CDO, as an alternative to the second NOV, when immediate action by the responsible party is necessary to eliminate a continuing or threatened serious violation of the stormwater ordinance.

Misdemeanors

The City's may escalate enforcement when evidence of noncompliance indicates that the violator of the stormwater ordinance has acted intentionally with intent to cause, allow to continue or conceal a discharge in violation of the ordinance.

Issuance of Citation/Infractions

At the discretion of the City's, and as established through authority in its municipal code, the City may issue citations and/or infractions.

Cost Recovery

In the event that a complaint response or violation requires clean-up and or extensive investigation, the City has the authority, as established in the municipal code, to require the responsible party to reimburse the city or County for all costs incurred by the related violation. Cost recovery fees that may be collected include, but are not limited to, investigation, enforcement, compliance assistance, damage, control, and clean-up.

Abatement

When a responsible party fails to cease or control a nuisance condition that results in or is likely to result in further or continuing violations, the City's may request abatement of conditions on private property if necessary, or in the event of imminent danger to public safely or the environment, the City itself may abate the nuisance condition.

Permit Revocation

Sites violating the stormwater permit may be subject to permit revocation procedures as authorized in the City's municipal code.

City's/District Attorney

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Severe or continuing violations should be referred to the City's or District Attorney for consideration of criminal charges.

TIMEFRAMES FOR CORRECTING DEFICIENCIES/VIOLATIONS

Depending upon the nature of the deficiencies/violations observed, City's may specify compliance deadlines for the responsible party in the inspection report or NOV.

- Prohibited discharges: discharges are to be stopped immediately and up to two weeks. The City may require the responsible party to provide a written description of correction, long-term compliance plan.
- Illicit connection: discharge via the illicit connection are to be stopped immediately and up to two weeks. The City may require the responsible party to provide proof that connection was permanently terminated. Re-inspection typically is required.
- Pollutant exposure/prohibited conditions violations: Up to two weeks to correct violations. The City may require the responsible party to provide proof of compliance for the observed violations.

EXTENSIONS OF COMPLIANCE DEADLINES

There are instances when a responsible party is not able to comply with requirements within the time frame specified. The City may grant a reasonable extension to the responsible party if the City determines that an extension is warranted, as follows:

- A request for extension must be received in writing (mail, e-mail, fax, hand delivered, etc.) by the City no later than the last day of the initial specified compliance deadline date.
- The extension request must explain why the extension is needed and warranted, as well as include a summary of actions taken to date by the responsible party to comply with requirements of the NOV.
- No more time is provided than should reasonably be needed for the responsible party to competently correct the noted deficiencies/violations. The City grants shorter extensions during the wet season.

Appropriate reasons to grant an extension may include, but are not limited to:

- Confirmed delays due to contractor or other service provider outside of responsible party's control.
- Extensive corrections involving work that would conceivably take longer than the time frame provided.
- In general, extensions should not be granted to allow the continuation of unauthorized non-storwater discharges.

The City may require an action plan or statement to be submitted by the responsible party within the initial compliance time frame, as a condition of granting an extension. The action plan or statement should specify the corrections that are to be made and specify an anticipated time frame for completion. The action plan or statement should be signed and dated by the responsible party.

REFERRALS TO THE REGIONAL BOARD

The City may refer violations of its municipal storm water ordinance and/or California Water Code section 13260 by industrial and commercial facilities and construction site operators to the Regional Water Board provided that the City has made a good faith effort of applying enforcement procedures to achieve compliance with its own ordinance. At a minimum, the City's good faith effort must be documented with:

- Two follow-up inspections, and
- Two warning letters or notices of violation.

Referral of Violations of the General Industrial/Construction Permits

For those facilities or site operators in violation of municipal stormwater ordinances and subject to the Industrial and/or Construction General Permits (IGP/CGP), the City may escalate referral of such violations to the Regional Water Board (promptly via telephone or electronically) after one inspection and one written notice of violation (copied to the Regional Water Board) to the facility or site operator regarding the violation. In making such referrals, the City shall include, at a minimum, the following documentation:[3]

- Name of the facility or site,
- Operator of the facility or site,
- Owner of the facility or site,
- WDID Number (if applicable),
- Records of communication with the facility/site operator regarding the violation, which shall include at least one inspection report,
- The written notice of violation (copied to the Regional Water Board),
- For industrial sites, the industrial activity being conducted at the facility that is subject to the Industrial General Permit, and
- For construction sites, site acreage and Risk Factor rating.

RECORDS RETENTION

City shall maintain records, per their existing record retention policies, and make them available on request to the Regional Water Board, including inspection reports, warning letters, notices of violations, and other enforcement records, demonstrating a good faith effort to bring facilities into compliance.[4]

[3] Pursuant to Order No. R4-2012-0175 Section VI.D.2.a.v
[4] Pursuant to Order No. R4-2012-0175 Section VI.D.2.a.iii

Sources

Los Angeles County Stormwater Quality Management Program (2001)

Orange County Municipal Storm Water Drainage Area Management Plan (2003)

Sacramento County Environmental Management Department. Inspection & Enforcement Policy - Commercial/Industrial Stormwater Compliance Program (2012).

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Deficiencies/ Violation Degrees

Minor	Moderate	Major
Typically involves conditions that threaten to result in pollutant discharge to the storm system and/or waterways, if not corrected. The immediate threat to human health or the environment is low. **Examples:** **1.** Unattended automotive fluid drips and spills likely to result in moderate discharges to the storm drain system. **2.** Discharge of a moderate amount of car body wet sanding effluent from a single vehicle to outdoor pavement that has not yet impacted the storm drain system. **3.** Unattended spilled restaurant grease on outdoor pavement. Spill appears to be recent, is less than a quart, has not yet impacted the storm drain system and poor housekeeping do not appear to be habitual. **4.** Oily, uncovered engines, or other oily, possibly leaky items stored outside. **5.** Open and missing dumpster and tallow bin lids.	Typically involves less significant pollutant discharges to the storm system and/or receiving waters or conditions that threaten to result in minor to moderate pollutant discharges to the storm system and/or receiving waters. May include small or incidental discharges of hazardous or toxic substances. The violation does not present a major threat to human health and safety, but is likely to result in degradation of receiving water quality. **Examples:** **1.** Discharge of moderate amounts of automotive fluids to storm drain system results from neglected spills and poor housekeeping. **2.** Discharge of moderate amount (less than 20 gallons of diluted effluent) of auto body wet sanding effluent to storm drain system. **3.** More than a quart of spilled restaurant grease on outdoor pavement is neglected, possibly getting tracked out of trash enclosure. Neglect appears to be habitual but so far, impact to storm drain is moderate. **4.** Moderate amount of Oil/fluids leaking from improperly stored engines and parts discharge to storm drain system. **5.** Repeat minor violations may be considered moderate.	Includes significant pollutant discharges to the storm system and/or receiving waters as well as creation of conditions that threaten imminent discharge of significant pollutants to the storm system and/or receiving waters. This also includes, but is not limited to, significant discharges of hazardous or toxic substances. Major violations have the potential to present a major threat to human health or safety and/or the environment. The intent of the violator should be considered: Patterns of willful disregard for safety and the environment, recalcitrance, and repeat violations should contribute to designation of a violation as major, but are not necessary. **Examples:** **1.** Intentional discharge of waste oil to the storm drain. **2.** Discharge of significant volumes of auto body wet sanding effluent to storm drain from work on multiple vehicles, as practice. Especially where repeat violations or evidence of habitual discharge is evident. **3.** Significant amount of spilled restaurant grease is intentionally washed into storm drain, especially if hazardous degreasing agent is used. **4.** Significant amount of Oil/fluids leaking from improperly stored engines and parts discharge to storm drain system, especially if repeat violation. **5.** Repeat moderate violations may be considered major.

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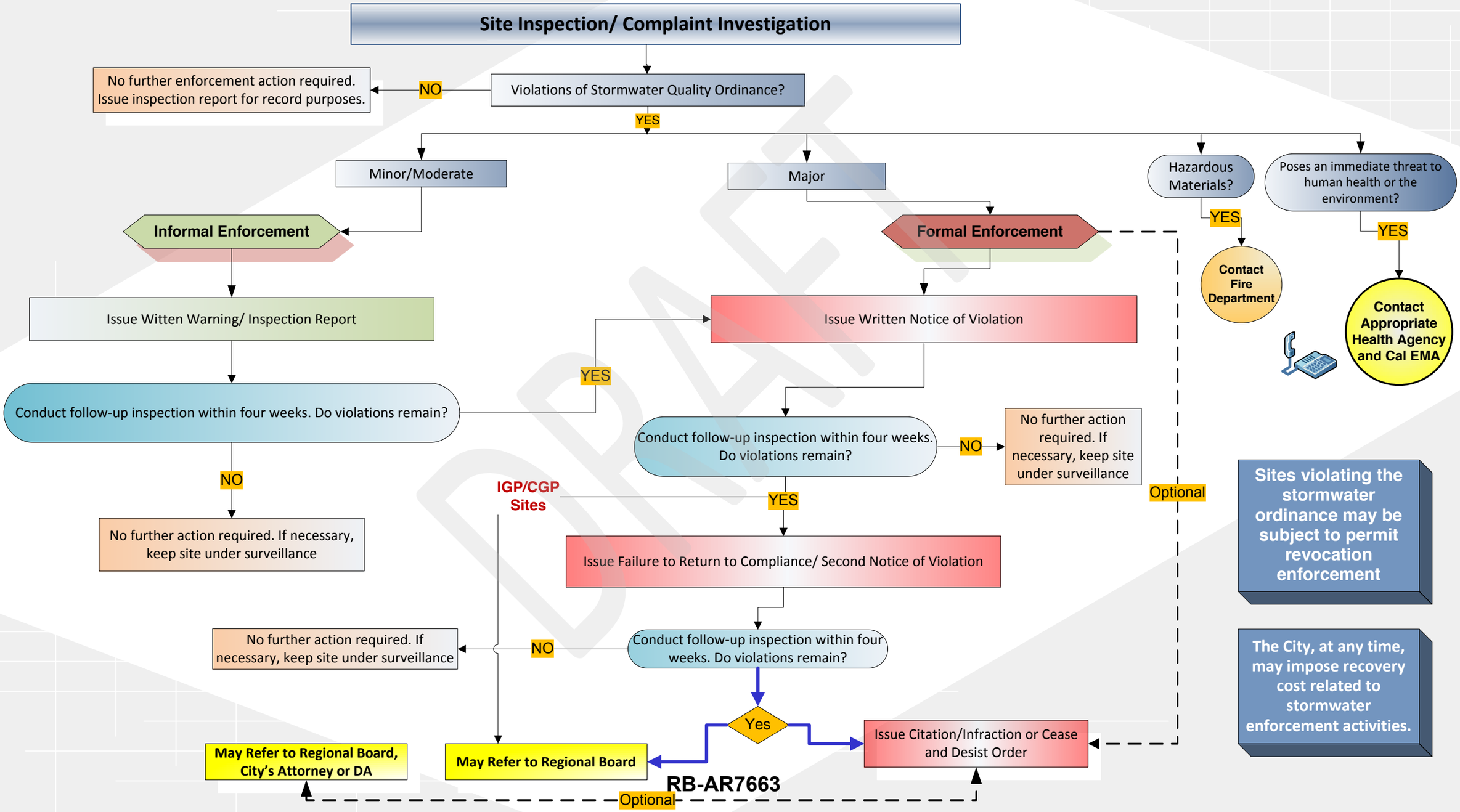
PROGRESSIVE ENFORCEMENT FLOW CHART



Watershed Management Program

Attachments to MCM Guidance

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Insert City Seal

CITY STORMWATER PROGRAM INDUSTRIAL/COMMERCIAL FACILITY INSPECTION REPORT

Facility:	Address:
Contact:	Title:
Email:	Phone:
Inspector:	Date:
Inspection Type: ☐ Routine ☐ Follow-up ☐ Response to Complaint	BMP materials provided and explained: ☐ Yes ☐ No
SIC/NAICS code and/or business type:	

Industrial Facilities Only

(1) Covered under IGP (WDID is current) or other NPDES Permit: ☐ Yes ☐ No	(2) NEC filed: ☐ Yes ☐ No	SWPPP on-site: ☐ Yes ☐ No
If (1) and (2) above are "No", notified contact of need for IGP coverage and will refer facility to Regional Board: ☐ Yes ☐ No		

CHECKLIST FOR STORMWATER BMP (BEST MANAGEMENT PRACTICE) COMPLIANCE

	BMP	Yes	No	N/A
Vehicle & Equipment Maintenance	**Fueling** - Effective fueling source control devices & practices	☐	☐	☐
	Cleaning – Effective cleaning practices & wash water management practices	☐	☐	☐
	Repair – Effective repair practices & source control devices	☐	☐	☐
Equipment Operations	**Outdoor equipment operations** – Effective source control devices & practices	☐	☐	☐
Storage & Handling	**Outdoor liquids** – Effective source controls & practices	☐	☐	☐
	Outdoor raw materials – Effective source control practices & structural devices	☐	☐	☐
	Solid waste – Effective storage & handling practices & appropriate control measures	☐	☐	☐
Facility Maintenance	**Building & grounds maintenance** – Effective maintenance practices	☐	☐	☐
	Parking & storage area maintenance – Effective designs & housekeeping/maintenance practices	☐	☐	☐
	Stormwater conveyance system maintenance – Proper operation & maintenance protocols	☐	☐	☐
	Sidewalk washing – Remove debris & free standing oil/grease. Use high pressure/low volume spray washing with potable water, no cleaning agents & average rate of 0.006 gal/ft^2.	☐	☐	☐
Spills, Leaks & Discharges	**Accidental spills/leaks** – Effective spill/leak prevention & response procedures	☐	☐	☐
	Unauthorized nonstormwater discharges – Effective elimination	☐	☐	☐

COMMENTS AND CORRECTIVE ACTIONS (IF REQUIRED)
Include description of activities performed and/or principal products produced

ENFORCEMENT: ☐ **None required** ☐ **Corrective Action Notice (complete section below)** ☐ **Other (see comments)**

CORRECTIVE ACTION NOTICE (IF REQUIRED)

If corrective actions have been noted above, then the responsible party (facility owner, occupant or person responsible) is in noncompliance with the City's Stormwater Quality Ordinance. The responsible party may be subject to enforcement actions under this ordinance if the corrective actions are not implemented by:

_____
Corrective Action Due Date

ACKNOWLEDGEMENT OF RECEIPT OF CORRECTIVE ACTION NOTICE

_____	_____	_____
Site Representative Signature	Printed Name	Date

DRAFT

Recording requested by and mail to:

Name: City of [Insert City]
Department of Public Works
ATTN: Director of Public Works

Address: [Insert City Address Line1]
[Insert City Address Line2]

Insert City Seal

********** Space Above This Line For Recorder's Use **********

MASTER COVENANT AND AGREEMENT

REGARDING ON-SITE BMP MAINTENANCE

The undersigned hereby certifies I am (we are) the owner(s) of the hereinafter legally described real property located in the City of [Insert City], County of Los Angeles, State of California (please give legal description: assessor's ID, tract no., lot no., etc.):

_____

Site Address _____

Owner(s) do hereby covenant and agree to and with the City of [Insert City]to maintain all on-site structural Best Management Practices (BMPs) in accordance with the Site Map and the Operations & Maintenance (O&M) Plan set forth in Attachment 1 hereto and incorporated herein by this reference. The specific structural BMPs are listed as follows:

_____

_____

Owner(s) shall maintain the listed drainage devices above on the property indicated and as shown on plans permitted by the City of [Insert City]in a good and functional condition to safeguard the property owners and adjoining properties from damage and pollution.

Owner(s) hereby consent to inspection of the Property by an inspector authorized by the City Manager, or his or her designee, for the purpose for verifying compliance with the provisions of this Agreement.

Owner(s) shall provide printed educational materials with any sale of the property which provide information on what stormwater management facilities are present, the type(s) and location(s) of maintenance signs that are required, and how the necessary maintenance can be performed.

Owner(s) shall provide actual notice of this Agreement and its terms to any respective successor(s) in interest to the Property prior to transfer of said interest to such successor(s) in interest. This covenant and agreement shall run with the land and shall be binding upon any future owners, encumbrances, their successors, heirs or assigns and shall continue in effect until the City of [Insert City] approves its termination.

_____ _____
(Print Name of Property Owner) (Print Name of Property Owner)

_____ _____
(Signature of Property Owner) (Signature of Property Owner)

Dated this _____ day of _____ 20 _____.

********** Space Below This Line For Notary's Use **********

ALL PURPOSE ACKNOWLEDGEMENT

State of _____ }
}
County of _____ }

On _____ before me, _____ personally appeared
(Insert Name of Notary Public and Title)
_____, who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf on which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature _____ (Seal)

Recording requested by and mail to:

Name: City of [Insert City]
Public Works Department
ATTN: Director of Public Works

Address: [Insert City Address Line1]
[Insert City Address Line2]

Insert City Seal

********** Space Above This Line For Recorder's Use **********

MASTER TERMINATION OF COVENANT AND AGREEMENT

REGARDING ON-SITE BMP MAINTENANCE

The undersigned hereby certifies I am (we are) the owner(s) of the hereinafter legally described real property located in the City of [Insert City], County of Los Angeles, State of California (please give legal description: assessor's ID, tract no, lot not, etc.):

_____

Site Address _____

We do hereby, with approval of the City of [Insert City], Engineering Division, terminate the covenant and agreement entered into with the City of [Insert City]as recorded on the _____ day of _____20_____, as Document No.

_____

_____

This covenant and agreement is terminated for the reason that:

_____

_____

_____ _____
(Print Name of Property Owner) (Print Name of Property Owner)

_____ _____
(Signature of Property Owner) (Signature of Property Owner)

Dated this _____ day of _____ 20 _____.

Termination approved by: _____ Date: _____
(Authorized City Representative)

********** Space Below This Line For Notary's Use **********

ALL PURPOSE ACKNOWLEDGEMENT

State of _____ }
}
County of _____ }

On _____ before me, _____ personally appeared
(Insert Name of Notary Public and Title)
_____, who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf on which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature _____ (Seal)

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Insert City Seal

City of [Insert City]NPDES Program

POST-CONSTRUCTION BMP VERIFICATION & INSPECTION FORM

PROJECT INFORMATION	
Facility/Project Name:	Inspection Date:
Address:	Inspector:
Contact Name:	Contact Phone:

Project Category

☐ Priority Project ☐ Small Site LID Project ☐ Single Family Residence ☐ Green Street
☐ Public Project ☐ Private Project

Project Type:

☐ Commercial ☐ Industrial ☐ Residential ☐ Multi-Use
☐ Road/Street ☐ Parking Lot ☐ Automotive repair ☐ Restaurant ☐ Other:

Operation/Maintenance:

☐ Reviewed ☐ Not Reviewed ☐ Not Available
Preparer's Name: Preparer's Title:
Address: City: Zip: Phone:

Inspection Type

☐ Prior to Certificate of Occupancy ☐ Special Investigation ☐ Response to Complaint
☐ Routine Inspection (Annual) ☐ Follow-up Inspection

CHECKLIST FOR ROUTINE SOURCE CONTROL BMPs

Requirement	No. of BMPs (if Applicable)	BMP in place per approved LID Plan/SUSMP?	Corrective Action Required
Storm Drain System Stenciling/Signage		☐ Yes ☐ No	☐ Yes ☐ No
Outdoor Material Storage Areas		☐ Yes ☐ No	☐ Yes ☐ No
Trash Storage Areas		☐ Yes ☐ No	☐ Yes ☐ No
Efficient Irrigation Systems & Landscape Design		☐ Yes ☐ No	☐ Yes ☐ No
Protect Slopes & Channels		☐ Yes ☐ No	☐ Yes ☐ No
Loading Dock Areas		☐ Yes ☐ No	☐ Yes ☐ No
Maintenance Bays		☐ Yes ☐ No	☐ Yes ☐ No
Vehicle Wash Areas		☐ Yes ☐ No	☐ Yes ☐ No
Outdoor Process Areas		☐ Yes ☐ No	☐ Yes ☐ No
Equipment Wash Areas		☐ Yes ☐ No	☐ Yes ☐ No
Fueling Areas		☐ Yes ☐ No	☐ Yes ☐ No
Hillside Landscaping		☐ Yes ☐ No	☐ Yes ☐ No
Wash-water Controls for Food Prep Areas		☐ Yes ☐ No	☐ Yes ☐ No
Community Car Wash Racks		☐ Yes ☐ No	☐ Yes ☐ No

CHECKLIST FOR STRUCTURAL BMPs

Requirement	No. of BMPs (if Applicable)	BMP in place per approved LID Plan/SUSMP?	Corrective Action Required
Infiltration Trench/Basin		☐ Yes ☐ No	☐ Yes ☐ No
Infiltration Well/Dry Well		☐ Yes ☐ No	☐ Yes ☐ No
Detention Basin		☐ Yes ☐ No	☐ Yes ☐ No
Porous Pavement		☐ Yes ☐ No	☐ Yes ☐ No
Bio-infiltration		☐ Yes ☐ No	☐ Yes ☐ No
Vegetated Swale		☐ Yes ☐ No	☐ Yes ☐ No
Bio-filtration		☐ Yes ☐ No	☐ Yes ☐ No
Proprietary Control Measure (describe):		☐ Yes ☐ No	☐ Yes ☐ No
Media Filtration		☐ Yes ☐ No	☐ Yes ☐ No
Filter Insert		☐ Yes ☐ No	☐ Yes ☐ No
Regional or Watershed BMPs		☐ Yes ☐ No	☐ Yes ☐ No
Other (describe):		☐ Yes ☐ No	☐ Yes ☐ No

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INSPECTION RESULTS:

- ☐ Visible / No Apparent Problems
- ☐ BMP Failure
- ☐ Significant Engineering / Design Flaws
- ☐ Unauthorized Modifications
- ☐ BMP Missing / Removed / Not Located
- ☐ Trash / Debris Exceeding Cap. (bypass)
- ☐ Evidence of Pollution / Dumping
- ☐ Vector Control Issues (Mosquitoes)
- ☐ Inadequate Maintenance

DESCRIPTION OF CORRECTIVE ACTION(S) REQUIRED:

CORRECTIVE ACTION NOTICE (IF REQUIRED)

If any corrective actions have been noted above, then based on this verification inspection, you are in noncompliance with Municipal Code Chapter [-]. You must implement the required corrective action(s) by:

_____
Corrective Action Due Date

After this date, your facility will be re-inspected to verify that all necessary corrective measures have been taken. FAILURE TO IMPLEMENT THE CORRECTIVE ACTION(S) WILL SUBJECT YOU TO ELEVATED ENCORCEMENT, WHICH CAN INCLUDE INFRACTION OR MISDEMEANOR PENALTIES.

ACKNOWLEDGEMENT OF RECEIPT OF CORRECTIVE ACTION NOTICE

_____	_____	_____
Contact Signature	Printed Name	Date

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STORMWATER PLANNING PROGRAM PRIORITY PROJECT CHECKLIST

FORM PC

Project Name	Owner Name	Developer Name
Project Address	Owner Address	Developer Address
Plan Check #	Owner Phone	Developer Phone

TYPE OF PROJECT

Does the proposed project fall into one of the following categories? Please check Yes/No	YES	NO
PRIORITY PROJECTS		
1. A new project equal to 1 acre or greater of disturbed area and adding more than 10,000 square feet of impervious* surface area		
2. A new industrial park with 10,000 square feet or more of surface area		
3. A new commercial mall with 10,000 square feet or more surface area		
4. A new retail gasoline outlet with 5,000 square feet or more of surface area		
5. A new restaurant (SIC 5812) with 5,000 square feet or more of surface area		
6. A new parking lot with either 5,000 ft^2 or more of impervious* surface or with 25 or more parking spaces		
7. A new automotive service facility (SIC 5013, 5014, 5511, 5541, 7532-7534 and 7536-7539) with 5,000 square feet or more of surface area		
8. Projects located in or directly adjacent to, or discharging directly to a Significant Ecological Area (SEA)*, where the development will: a. Discharge stormwater runoff that is likely to impact a sensitive biological species or habitat; and b. Create 2,500 square feet or more of impervious surface area		
9. Redevelopment*		
SPECIAL PROVISION PROJECTS		
10. Green street* project		
11. Single family hillside* home		

If checked YES, numerical criteria will apply to items 1,2,6-9 and items 3-5 (for project areas of 5,000 ft^2 or more of surface area.) If any of the boxes are checked YES, this project will require the preparation of a Low Impact Development (LID) Plan and a Maintenance Agreement Transfer*

* Defined on back.

Applicant Name

Applicant Signature

Applicant Title

Date

DRAFT

DEFINITIONS:

Impervious are those surfaces that do not allow stormwater runoff to percolate into the ground. Typical impervious surfaces include: concrete, asphalt, roofing materials, etc. However, some specially designed concrete/asphalt do allow water to percolate (pervious).

Hillside means property where the slope is 25% or greater and where grading contemplates cut or fill slopes. Single family hillside homes will require a less extensive plan. During the construction of a single-family hillside home, the following measures are implemented:

a. Conserve natural areas

b. Protect slopes and channels

c. Provide storm drain system stenciling and signage

d. Divert roof runoff to vegetated areas before discharge unless the diversion would result in slope instability

e. Direct surface flow to vegetated areas before discharge unless the diversion would result in slope instability.

Green Streets means any street and road construction of 10,000 square feet or more of impervious surface area

a. These projects will follow an approved green streets manual to the maximum extent practicable. Street and road construction applies to standalone streets, roads, highways, and freeway projects, and also applies to streets within larger projects. Stormwater mitigation measures must be in compliance with the approved green streets manual requirements.

Redevelopment means land-disturbing activities that result in the creation, addition, or replacement of 5,000 ft^2 or more of impervious surface area on an already developed site.

Redevelopment does not include routine maintenance activities that are conducted to maintain the original line and grade, hydraulic capacity, or original purpose of facility, nor does it include modifications to existing single family structures, or emergency construction activities required to immediately protect public health and safety.

Significant Ecological Area means an area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and would be disturbed or degraded by human activities and developments. Also, an area designated by the City as approved by the Regional Water Quality Control Board.

Maintenance Agreement and Transfer: All developments subject to LID and site specific plan requirements provide verification of maintenance provisions for Structural and Treatment Control BMPs, including but not limited to legal agreements, covenants, CEQA mitigation requirements, and/or conditional use permits. Verification at a minimum shall include:

- The developer's and/or owner's signed statement accepting responsibility for maintenance until the responsibility is legally transferred; and
- A signed statement from the public entity assuming responsibility for Structural or Treatment Control BMP maintenance and conduct a maintenance inspection at least once a year; or
- Written conditions in the sales or lease agreement, which requires the recipient to assume responsibility for maintenance and conduct a maintenance inspection at least once a year; or
- Written text in project conditions, covenants and restrictions (CCRs) for residential properties assigning maintenance responsibilities to the Home Owners Association for maintenance of the Structural and Treatment Control BMPs; or
- Any other legally enforceable agreement that assigns responsibility for the maintenance of post-construction Structural or Treatment Control BMPs.

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STORMWATER PLANNING PROGRAM
PRIORITY DEVELOPMENT & REDEVELOPMENT PROJECTS
PLAN CHECK # _____

FORM P1

Project Name _____	**GENERAL PROJECT CERTIFICATION**
Project Location _____	
Company Name _____	A completed original of this form must accompany all LID Plan submittals.
Address _____	
Contact Name / Title _____	
Phone / FAX / Email _____	

Best Management Practices (BMPs) have been incorporated into the design/maintenance/construction of this project to accomplish the following:

1. Minimize impacts from stormwater runoff on the biological integrity of Natural Drainage Systems and water bodies in accordance with requirements under CEQA (Cal. Pub. Resources Code § 21100), CWC § 13369, CWA § 319, CWA § 402(p), CWA § 404, CZARA § 6217(g), ESA § 7, and local government ordinances.
2. Maximize the percentage of pervious surfaces to allow more percolation of stormwater into the ground.
3. Minimize the amount of stormwater directed to impermeable surfaces and to the MS4.
4. Minimize pollution emanating from parking lots through the use of appropriate Treatment Control BMPs and good housekeeping practices.
5. Minimize breeding of Vectors
6. Reduce pollutant loads in stormwater from the development site.

I certify that this Low Impact Development Plan and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gathered/evaluated the information submitted.

Post Construction / Maintenance Certification

As the responsible party, I certify that the proposed BMPs will be implemented, monitored and maintained to ensure their continued effectiveness. In the event of a property transfer, the new owner/lessee will be notified of the BMPs in use at this site and I will include written conditions in the sales or lease agreement, which requires the new owner (or lessee) to assume responsibility for maintenance and conduct a maintenance inspection at least once a year. The information contained herein is, to the best of my knowledge and belief, true, accurate, and complete.

In consideration of the execution of City of [Insert City] approval of the proposed Low Impact Development (LID) Plan including any proposed treatment system, the applicant hereby agrees to indemnify, save and keep the City of [Insert City], its officers, agents and employees free and harmless from and against any and all claims for injury, damage, loss, liability, cost and expense of any nature whatsoever, which the City of [Insert City], its officers, agents, or employees may suffer, sustain, incur, pay out as a result of any and all actions, suits, proceedings, claims and demands which may be brought, made, or filed against the City of [Insert City], its officers, agents or employees by reason of or arising out of, or in any manner connected with any and all operations permitted by this approval. This indemnification extends to further agree that the City of [Insert City]is not responsible for any additional requirements or restrictions due to changes in regulations, policies or enforcement practices of the California Regional Water Quality Control Board, or any other applicable regulatory agencies.

Property Owner Name	Property Owner Signature
Applicant Title	Date

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PLANNING BEST MANAGEMENT PRACTICES

BMP Name	BMP Identification Number and Name	✓ if to be used
Car Wash Facility	SC-21: Vehicle and Equipment Cleaning	
Constructed Wetlands	MP-20: Wetlands	
Control of Impervious Runoff	-N/A-	
Efficient Irrigation	-N/A-	
Energy Dissipaters	EC-10: Velocity Dissipation Devices	
Extended Detention Basins	TC-22: Extended Detention Basin	
Infiltration Basins	TC-11: Infiltration Basins	
Infiltration Trenches	TC-10: Infiltration Trenches	
Inlet Trash Racks	-N/A-	
Landscape Design	EC-2: Preservation of Existing Vegetation EC-4: Hydro seeding EC-6 & EC-8: Straw & Wood Mulching	
Linings for Urban Runoff Conveyance Channels	-N/A-	
Materials Management	SC-30: Outdoor Loading/Unloading	
Media Filtration	TC-40: Media Filter	
Motor Fuel Concrete Dispensing Areas	SC-20: Vehicle and Equipment Fueling	
Motor Fuel Dispensing Area Canopy	SC-20: Vehicle and Equipment Fueling	
Water Quality Inlets	TC-50: Water Quality Inlet	
Outdoor Storage	SC-31: Outdoor Liquid Container Storage SC-33: Outdoor Storage of Raw Materials	
Porous Pavement and/or Alternative Surfaces	-N/A-	
Protect Slopes and Channels	EC-11: Slope Drains EC-12: Streambank Stabilization	
Self-Contained Areas for Vehicle or Equipment Washing, Steam Cleaning, Maintenance, Repair, or Material Processing	SC-21: Vehicle and Equipment Cleaning SC-22: Vehicle and Equipment Repair SC-32: Outdoor Equipment Operations	
Storm Drain System Stenciling and Signage	SC-34: Waste Handling and Disposal (Signage Section)	
Trash Container Areas	SC-34: Waste Handling and Disposal	
Vegetated Swales and Strips	TC-32: Bioretention	
Wet Ponds	TC-20: Wet Ponds	
Other:	• • • • •	

Please refer to the California Storm Water Best Management Practice Handbooks for more information.

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STORMWATER TREATMENT CERTIFICATION

FORM P2

SITE NAME and ADDRESS

_____

_____

_____

_____

_____

Plan Check #_____

Planning #_____

APPROXIMATE PROJECT CHARACTERISTICS

Roofed Area	_____	ft^2
Roadway/Parking Area (exposed)	_____	ft^2
Landscaped/Vegetation	_____	ft^2
Other Ground Level Impervious Areas (Ex: Outdoor work or storage areas)	_____	ft^2
Other: _____	_____	ft^2
TOTAL	_____	ft^2

STRUCTURAL/TREATMENT BMPs

(attach additional sheets as necessary) or see back

Area Designation (must correspond with plans)	**Tributary Area** (ft^2)	**Average Impervious Factor**	**Estimated Flow Rate or Volume***	**Anticipated Potential Pollutants**	**Type of BMP** (include size, make, and model, if any)	**BMP Location** (briefly describe)	**Design Treatment Flow Rate or Volume Capacity**

By stamping this form, I acknowledge that each treatment BMP is provided with adequate bypass or overflow so as not to contribute to localized flooding or soil instability.

*Flow rates and volumes based on the 0.75 inch, 24-hour rain event or the 85th percentile, 24-hour rain event, whichever is greater.

I certify that I am a Professional Civil Engineer registered in the State of California, and that the treatment methods and capacities herein comply with the requirements established by the California Regional Water Quality Control Board, Los Angeles Region, and the State Water Resources Control Board for Low Impact Development (LID) Plans.

Affix Registered Engineer Wet Ink Stamp Here:

Print Name _____ **Signature** _____ **Date** _____

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STRUCTURAL/TREATMENT BMPs

(attach additional sheets as necessary)

Area Designation (must correspond with plans)	**Tributary Area** (ft^2)	**Average Impervious Factor**	**Estimated Flow Rate or Volume***	**Anticipated Potential Pollutants**	**Type of BMP** (include size, make, and model, if any)	**BMP Location** (briefly describe)	**Design Treatment Flow Rate or Volume Capacity**

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OWNER'S CERTIFICATION
MINIMUM BMPS FOR ALL CONSTRUCTION SITES

FORM OC1

PLAN CHECK #_____

Project Name	_____	BUILDING/GRADING PERMIT NUMBER	
Project Location	_____		
Owner Name	_____	Contractor Name	_____
Address	_____	Address	_____
Phone	_____	Phone	_____
FAX/Email	_____	FAX/Email	_____

The National Pollutant Discharge Elimination System (NPDES) is the portion of the Clean Water Act that applies to the protection of receiving waters. Under permits from the Los Angeles Regional Water Quality Control Board (RWQCB), certain activities are subject to RWQCB enforcement. To meet the requirements of the Los Angeles County Municipal Stormwater Permit (CAS004001), minimum requirements for sediment control, erosion control and construction activities must be implemented on each project site. Minimum requirements include:

- **EROSION CONTROL:** Erosion from slopes and channels shall be controlled by implementing an effective combination of BMPs, such as the limiting of grading activities during the wet season; inspecting graded areas during rain events; planting and maintenance of vegetation on slopes; and covering erosion susceptible slopes.
- **SEDIMENT CONTROL:** Eroded sediments from areas disturbed by construction and from stockpiles of soil shall be retained on site to minimize sediment transport from the site to streets, drainage facilities and/or adjacent properties via runoff, vehicle tracking or wind.
- **NON-STORMWATER MANAGEMENT:** Non-stormwater runoff from equipment and vehicle washing and any other activity shall be contained at the project site.
- **WASTE MANAGEMENT:** Construction related materials, wastes, spills or residues shall be retained on site to minimize transport from the site to streets, drainage facilities or adjoining properties by wind or runoff. Runoff from equipment and vehicle washing shall be contained at construction sites unless treated to remove sediment and pollutants.

Examples of Minimum BMPs include: (1) Soil piles must be covered with tarps or plastic, (2) leaking equipment must be repaired immediately, (3) refueling must be conducted away from catch basins, (4) catch basins must be protected when working nearby, (5) vacuum all concrete saw cutting, (6) never wash concrete waste into the street, (7) keep the site clean, sweep the gutters at the end of each working day and keep a trash receptacle on site.

As the architect/engineer of record, I have selected appropriate BMPs to effectively minimize the negative impacts of this project's construction activities on stormwater quality. The project owner and contractor are aware that the selected BMPs shall be installed, monitored, and maintained to ensure their effectiveness. The BMPs not selected for implementation are redundant or deemed not applicable to the proposed construction activity.

Architect/Engineer of Record Name	Architect/Engineer of Record Signature
Title	Date

I certify that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that submitting false and/ or inaccurate information, failing to update the ESCP to reflect current conditions, or failing to properly and/ or adequately implement the ESCP may result in revocation of grading and/ or other permits or other sanctions provided by law.

Landowner or Landowner's Agent Name	Landowner or Landowner's Agent Signature
Title	Date

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EROSION AND SEDIMENT CONTROL PLAN (ESCP) REVIEW CHECKLIST

These requirements apply to all activities involving soil disturbance with the exception of agricultural activities. Applicable activities include but are not limited to grading, vegetation clearing, soil compaction, paving, re-paving and linear underground/overhead projects (LUPs).

Prior to issuing a grading or building permit, each operator of a construction activity within its jurisdiction must prepare and submit an ESCP prior to the disturbance of land.

Contact Name:	Tracking #:
Contact Title:	Site Name:
Company Name:	Site Address:
Mailing Address:	Type of Facility:
City, State, Zip:	Submittal Date:
Phone Number:	Plan Return Date:
Fax Number:	Disturbed Area:

First Review
ESCP Received on:

Review Completed on:

Second Review
ESCP Received on:

Review Completed on:

Third Review
ESCP Received on:

Review Completed on:

Fourth Review
ESCP Received on:

Review Completed on:

Fifth Review
ESCP Received on:

Review Completed on:

Sixth Review
ESCP Received on:

Review Completed on:

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ESCP REQUIREMENT	SATISFACTION			COMMENTS
	YES	NO	N/A	
General Information				
Contact information (e.g., name, address, phone, email, etc.) provided for the owner and contractor.	☐	☐	☐	
Basic site information including location, status, size of the project and area of disturbance is provided.	☐	☐	☐	
Proof of existing coverage under applicable permits, including, but not limited to the State Water Board's Construction General Permit, and State Water Board 401 Water Quality Certification.	☐	☐	☐	
Meets the minimum requirements of the jurisdictional erosion and sediment control ordinance.	☐	☐	☐	
Includes the elements of a Storm Water Pollution Prevention Plan (SWPPP) prepared in accordance with the requirements of the Construction General Permit.	☐	☐	☐	
Developed and certified by a Qualified SWPPP Developer (QSD).	☐	☐	☐	
Identifies the proximity all water bodies, water bodies listed as impaired by sediment-related pollutants, and water bodies for which a sediment-related TMDL has been adopted and approved by the USEPA.	☐	☐	☐	
Identifies any significant threat to water quality status, based on consideration of factors listed in Appendix 1 to the Construction General Permit.	☐	☐	☐	
The project start date and anticipated completion date is provided.	☐	☐	☐	
Includes Identification of site Risk Level as identified per the requirements in Appendix 1 of the Construction General Permit.	☐	☐	☐	
Contains a language signed by the landowner or the landowner's agent stating as follows: *"I certify that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that submitting false and/ or inaccurate information, failing to update the ESCP to reflect current conditions, or failing to properly and/ or adequately implement the ESCP may result in revocation of grading and/ or other permits or other sanctions provided by law."*	☐	☐	☐	

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ESCP REQUIREMENT	SATISFACTION			COMMENTS
	YES	NO	N/A	
Best Management Practices				
All structural BMPs are designed by a licensed California Engineer.	☐	☐	☐	
Includes Sediment/Erosion Control.	☐	☐	☐	
Includes controls to prevent tracking on and off the site.	☐	☐	☐	
Includes non-stormwater controls (e.g., vehicle washing, dewatering, etc.).	☐	☐	☐	
Includes Materials Management (delivery and storage).	☐	☐	☐	
Includes Spill Prevention and Control.	☐	☐	☐	
Includes Waste Management (e.g., concrete washout/waste management; sanitary waste management).	☐	☐	☐	
Includes methods to minimize the footprint of the disturbed area and to prevent soil compaction outside of the disturbed area.	☐	☐	☐	
Includes methods used to protect native vegetation and trees.	☐	☐	☐	
Includes the rationale for the selection and design of the proposed BMPs, including quantifying the expected soil loss from different BMPs.	☐	☐	☐	
Post-Construction Structural BMPs subject to Operation and Maintenance Requirements are identified.	☐	☐	☐	
Site Plan				
Full sized plans showing the site with all proposed BMPs and water quality notes have been signed and stamped with wet ink application by the appropriate individual.	☐	☐	☐	
Plan includes a title block containing at least the project name, address, and owner.	☐	☐	☐	
All figures, maps, plot plans, etc. have a legend, including a North arrow and scale.	☐	☐	☐	
All facilities are labeled for the intended function.	☐	☐	☐	
All areas of outdoor activity are labeled.	☐	☐	☐	
All structural BMPs are indicated.	☐	☐	☐	
Drainage flow information depicted.	☐	☐	☐	
Project location shown.	☐	☐	☐	
Site boundary indicated.	☐	☐	☐	

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Agency Standard Operating Procedures

Each agency will use the suggested language below to develop, implement, and revise as necessary agency-specific Standard Operating Procedures (SOPs) that identify the procedures each agency will follow.

CGP Coverage Verification

- Verification of active coverage under the Construction General Permit for sites disturbing 1 acre or more, or that are part of a planned development that will disturb 1 acre or more and a process for referring non-filers to the Regional Water Board.

Prior to releasing any permits relating to and/or allowing for construction activities on a site resulting in one (1) acre or more of soil disturbance, a Notice of Intent (NOI), a Storm Water Pollution Prevention Plan (SWPPP), and all other Permit Registration Documents (PRDs) must be filed with the Regional Water Resources Control Board (Regional Board) through the State Water Board's Storm water Multi-Application and Report Tracking System (SMARTS) website and a Waste Discharge ID (WDID) number must be obtained from the Regional Board. This requirement will be included as a condition of approval. In cases where construction activities have commenced on a qualifying site and the project has not yet filed all PRDs (along with an explanation for filing late) with the Regional Board, a Notice of Violation (NOV) will be sent to the responsible person. Any work orders released will be stopped and fines may be enforced. The Regional Board will be notified of the discharger's non-compliance. Work will not be allowed to commence until the NOI has been accepted by the Regional Board and WDID number issued.

ESCP Review

- Review of the applicable ESCP and inspection of the construction site to determine whether all BMPs have been selected, installed, implemented, and maintained according to the approved plan and subsequent approved revisions.

Prior to issuing a grading or building permit, each operator of a construction activity within its jurisdiction must prepare and submit an Erosion and Sediment Control Plan (ESCP) prior to the disturbance of land. The ESCP Requirement Checklist will be used to ensure required information is submitted by the responsible person. These requirements apply to all activities involving soil disturbance with the exception of agricultural activities. Applicable activities include but are not limited to grading, vegetation clearing, soil compaction, paving, re-paving and linear underground/overhead projects (LUPs).

BMP Assessment

- Assessment of the appropriateness of the planned and installed BMPs and their effectiveness.

Prior to releasing any permits relating to and/or allowing for construction activities on a site resulting in one (1) acre or more of soil disturbance a Qualified SWPPP Practitioner (QSP) must be identified by the developer. Prior to beginning any construction activities, the QSP must review the ESCP and determine if the following requirements are being met:

1. Erosion and sediment controls are incorporated to provide effective reduction or elimination of sediment related pollutants in stormwater discharges and authorized non-stormwater discharges from the site.

2. Sediment controls are designed to intercept and settle out soil particles that have been detached and transported by the force of water.
3. Non-stormwater control BMPs are selected to control sediment on the construction site.
4. Materials and waste management pollution control BMPs are incorporated to minimize stormwater contact with construction materials, wastes and service areas; and to prevent materials and wastes from being discharged off-site.

If the QSP identifies potential problematic areas of the ESCP, a revision to the ESCP must be submitted for review and approval.

Once the BMPs are installed, inspections must be conducted at the frequency identified in the Watershed Management Program (WMP). All BMPs not functioning as intended must be repaired, replaced, or changed to a more effective BMP. Inspection and maintenance procedures must be in accordance with the CASQA handbook.

Discharge Reporting

- Visual observation and record keeping of non-stormwater discharges, potential illicit discharges and connections, and potential discharge of pollutants in stormwater runoff.

Any non-stormwater discharges, potential illicit discharges and connections, and potential discharge of pollutants in stormwater runoff will be tracked and kept on record.

Public reporting of illicit discharges or water quality impacts associated with discharges into or from MS4s within this jurisdiction will be conducted. Multiple modes of communication are in place to allow for complaints and spill reporting. When a complaint is received it will be documented and tracked to ensure that all complaints are adequately addressed.

A Spill Response Plan will be implemented for all sewage and other spills that may discharge into the MS4 within this jurisdiction. Coordination with spill response teams will be observed throughout all appropriate departments, programs, and agencies so that maximum water quality protection is provided. All spill complaints will be investigated within one business day of receiving the complaint and a response to spills for containment will be conducted within 4 hours of becoming aware of the spill, except where such spills occur on private property, in which case the response should be within 2 hours of gaining legal access to the property. Spills that may endanger health or the environment will be reported to appropriate public health agencies and the Office of Emergency Services (OES).

A training program regarding the identification of illicit connections/illicit discharges (IC/IDs) for all municipal field staff, who, as part of their normal job responsibilities (e.g., street sweeping, storm drain maintenance, collection system maintenance, road maintenance), may come into contact with or otherwise observe an illicit discharge or illicit connection to the MS4 will be provided.

Construction Inspection Reporting and Tracking

- Development of a written or electronic inspection report generated from an inspection checklist used in the field.
- Tracking of the number of inspections for the inventoried construction sites throughout the reporting period to verify that the sites are inspected at the minimum frequencies required.

Inspections will be conducted at a frequency listed in the Watershed Management Program (WMP). Inspection checklists and/or reports will be utilized to determine and keep record of whether or not all

BMPs have been selected, installed, implemented, and maintained according to the approved plan and subsequent approved revisions. These checklists/reports will be retained for at least three (3) years following NOT approval.

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(CITY NAME) STORMWATER INSPECTION REPORT FOR CONSTRUCTION SITES

SITES ONE ACRE OR GREATER

Project Name:		Address:	
Area disturbed:		WDID:	SWPPP on-site: ☐ Yes ☐ No
Risk level: ☐ Low (Risk 1) ☐ Medium (Risk 2) ☐ High (Risk 3)		Erosion & Sediment Control Plan (ESCP) on-site: ☐ Yes ☐ No	
Phase: ☐ Prior to Land Disturbance ☐ Active construction ☐ Site stabilization			
Developer/Contractor:		Phone number:	
Contact:		Title:	
Inspector:		Date:	
Inspection: ☐ Routine (monthly and for each phase of construction) ☐ Follow-up ☐ Response to complaint		*For sites discharging to a waterbody impaired for sediment/turbidity*[i] ☐ *Routine biweekly* ☐ *Predicted rainfall* ☐ *Recent rainfall*	

CHECKLIST FOR STORMWATER BMP (BEST MANAGEMENT PRACTICE) COMPLIANCE

PHASE 1 AND 2: PRIOR TO LAND DISTURBANCE AND DURING ACTIVE CONSTRUCTION

	Comment	Yes	No	N/A
Erosion Control	1. Erosion controls are implemented in accordance with the ESCP	☐	☐	☐
	2. Erosion observed	☐	☐	☐
Sediment Control	3. Sediment controls are implemented in accordance with the ESCP	☐	☐	☐
	4. Sediment discharge observed	☐	☐	☐
Additional Controls	5. Tracking controls (tire washout, stabilized entrances, exits and roadways) are implemented in accordance with the ESCP	☐	☐	☐
	6. Sediment in roads observed	☐	☐	☐
	7. Wind erosion controls are implemented in accordance with the ESCP	☐	☐	☐
	8. Wind erosion observed	☐	☐	☐
Waste Management	9. Effective material delivery and storage practices are implemented	☐	☐	☐
	10. Spill prevention and control practices are implemented	☐	☐	☐
	11. Stockpile controls are implemented in accordance with the ESCP	☐	☐	☐
	12. Solid waste controls are implemented in accordance with the ESCP	☐	☐	☐
Nonstormwater Management	13. Vehicle and equipment washing, fueling and maintenance controls are implemented in accordance with the ESCP	☐	☐	☐
	14. Nonstormwater discharges observed	☐	☐	☐
	15. Dewatering operations covered under NPDES Permit CAG994004	☐	☐	☐
	16. Water conservation practices are implemented	☐	☐	☐

PHASE 3: FINAL LANDSCAPING/SITE STABILIZATION

Comment	Yes	No	N/A	Comment	Yes	No	N/A
1. Graded areas have reached final stabilization	☐	☐	☐	3. Temporary erosion and sediment BMPs are removed	☐	☐	☐
2. Trash, debris and construction materials are removed	☐	☐	☐	4. Post-construction BMPs are installed	☐	☐	☐

COMMENTS AND CORRECTIVE ACTIONS (IF REQUIRED):

ENFORCEMENT: ☐ **None required** ☐ **Corrective Action Notice (complete section below)** ☐ **Other (see comments)**

CORRECTIVE ACTION NOTICE (IF REQUIRED)

If corrective actions have been noted above, then the responsible party (facility owner, occupant or person responsible) is in noncompliance with the City's Stormwater Quality Ordinance. The responsible party may be subject to enforcement actions under this program if the corrective actions are not implemented by:

_____
Corrective Action Due Date

ACKNOWLEDGEMENT OF RECEIPT OF CORRECTIVE ACTION NOTICE

_____ Site Representative Signature

_____ Printed Name

_____ Date

DRAFT

[i] For sites discharging to a tributary listed by the state as an impaired waterbody for sediment or turbidity under CWA § 303(d), or determined to be a threat to water quality, inspections must be conducted (1) when two or more consecutive days with greater than 50% chance of rainfall are predicted by NOAA and (2) within 48 hours of a ½-inch rain event and (3) at least once every two weeks.

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CITY STORMWATER QUALITY PROGRAM
CONSTRUCTION SITE INSPECTION REPORT

FOR SITES LESS THAN ONE ACRE

Project:	Address:
Contact:	Title:
Contractor:	Phone:
Inspector:	Date:

CHECKLIST FOR STORMWATER BMP (BEST MANAGEMENT PRACTICE) COMPLIANCE

	Question	Yes	No	N/A
Erosion Control	1. Effective erosion controls implemented.	☐	☐	☐
	2. Erosion observed.	☐	☐	☐
Sediment Control	3. Effective sediment controls implemented.	☐	☐	☐
	4. Sediment discharge observed.	☐	☐	☐
Non-Stormwater Management	5. Water conservation practices are implemented.	☐	☐	☐
	6. Dewatering operations covered under NPDES Permit CAG994004	☐	☐	☐
Waste Management	7. Effective material delivery/storage practices and spill prevention/control practices are implemented.	☐	☐	☐
	8. Effective waste management controls are implemented.	☐	☐	☐

COMMENTS AND CORRECTIVE ACTIONS (IF REQUIRED):

ENFORCEMENT: ☐ **None required** ☐ **Corrective Action Notice (complete section below)** ☐ **Other (see comments)**

CORRECTIVE ACTION NOTICE (IF REQUIRED)

If corrective actions have been noted above, then the responsible party (facility owner, occupant or person responsible) is in noncompliance with the City's Stormwater Quality Ordinance. The responsible party may be subject to enforcement actions under this program if the corrective actions are not implemented by:

_____
Corrective Action Due Date

ACKNOWLEDGEMENT OF RECEIPT OF CORRECTIVE ACTION NOTICE

_____ Site Representative Signature

_____ Printed Name

_____ Date

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Example Lease Language for Fixed Facilities

The following is example language that can be inserted into municipal leases:

The Los Angeles Regional Water Quality Control Board (RWQCB) has issued permits which govern stormwater and non-stormwater discharges resulting from municipal activities performed by or for the Coastal Watersheds of Los Angeles County, including the Los Angeles County Flood Control District, the County of Los Angeles, and 84 incorporated cities within the coastal watersheds of Los Angeles County with the exception of Long Beach (collectively referred to as Permittees). The RWQCB Permit is a National Pollutant Discharge Elimination System (NPDES) Permit No. R4-2023-0175. A Copy of the RWQCB Permit is available for review.

In order to comply with the Permit requirements, the Permittees have developed a Watershed Management Program (WMP) which contains Public Agency Facilities and Activities Maintenance Procedures (Maintenance Procedures) with Best Management Practices (BMPs) adopted from the Caltrans Storm Water Quality Handbook Maintenance Staff Guide (Caltrans Handbook) that parties leasing municipally owned properties must adhere to. These Maintenance Procedures contain pollution prevention and source control techniques to minimize the impact of those activities upon dry-weather urban runoff, stormwater runoff, and receiving water quality.

Activities performed at the facility leased under this agreement shall conform to the RWQCB NPDES Permit, the WMP, and the CalTrans Handbook, and must be performed as described within all applicable Maintenance Procedures. The holder of this agreement shall fully understand the Maintenance Procedures applicable to activities conducted at the facility leased under this agreement prior to conducting them and maintain copies of the Maintenance Procedures at the leased facility throughout the agreement duration. The applicable Maintenance Procedures are included as Exhibit ___ of this agreement.

Evaluation of activities subject to WMP requirements performed at the facility leased under this agreement will be conducted by the city to verify compliance with Maintenance Procedures, and may be required through lessor self-evaluation as determined by the city.

Example Contract Language for Field Programs

The following is example language that can be inserted into municipal field program contracts:

The Los Angeles Regional Water Quality Control Board (RWQCB) has issued permits which govern stormwater and non-stormwater discharges resulting from municipal activities performed by or for the Coastal Watersheds of Los Angeles County, including the Los Angeles County Flood Control District, the County of Los Angeles, and 84 incorporated cities within the coastal watersheds of Los Angeles County with the exception of Long Beach (collectively referred to as Permittees). The RWQCB Permit is a National Pollutant Discharge Elimination System (NPDES) Permit No. R4-2023-0175. A Copy of the RWQCB Permit is available for review.

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In order to comply with the Permit requirements, the Permittees have developed a Watershed Management Program (WMP) which contains Public Agency Facilities and Activities Maintenance Procedures (Maintenance Procedures) with Best Management Practices (BMPs) adopted from the Caltrans Storm Water Quality Handbook Maintenance Staff Guide (Caltrans Handbook) that parties leasing municipally owned properties must adhere to. These Maintenance Procedures contain pollution prevention and source control techniques to minimize the impact of those activities upon dry-weather urban runoff, stormwater runoff, and receiving water quality.

Work performed under this CONTRACT shall conform to the RWQCB NPDES Permit, the WMP, and the CalTrans Handbook, and must be performed as described within all applicable Maintenance Procedures. The CONTRACTOR shall fully understand the Maintenance Procedures applicable to activities that are being conducted under this CONTRACT prior to conducting them and maintain copies of the Maintenance Procedures throughout the CONTRACT duration. The applicable Model Maintenance Procedures are included as Exhibit ___ of this CONTRACT.

Evaluation of activities subject to WMP requirements performed under this CONTRACT will be conducted to verify compliance with the Maintenance Procedures, and may be required through CONTRACTOR self-evaluation as determined by the city.

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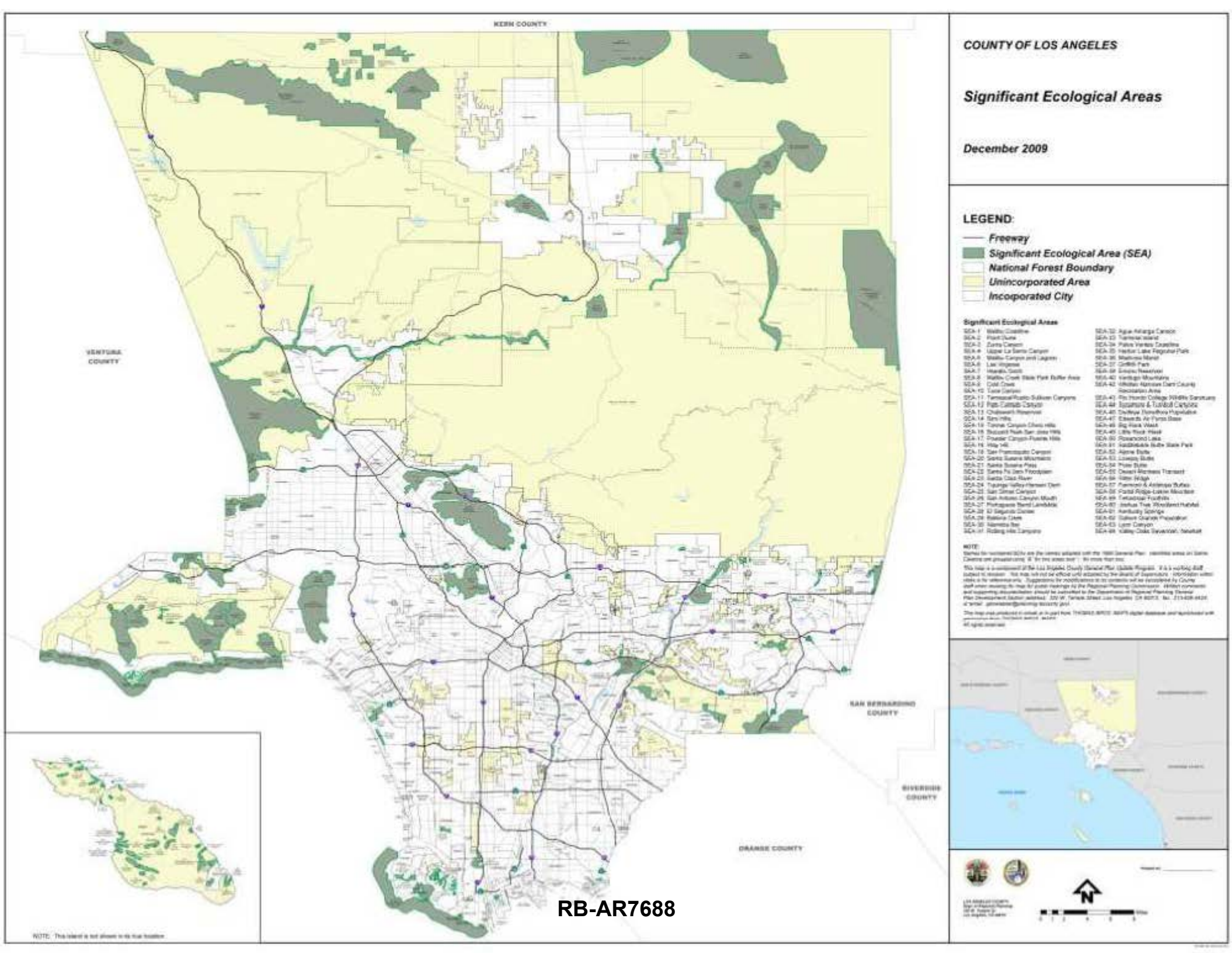
KERN COUNTY
VENTURA COUNTY
SAN BERNARDINO COUNTY
RIVERSIDE COUNTY
ORANGE COUNTY
NOTE: This island is not shown in its true location.
COUNTY OF LOS ANGELES
Significant Ecological Areas
December 2009
LEGEND:
Freeway
Significant Ecological Area (SEA)
National Forest Boundary
Unincorporated Area
Incoporated City
Significant Ecological Areas
SEA-1 Malibu Coastline
SEA-2 Point Dume
SEA-3 Zuma Canyon
SEA-4 Upper La Sierra Canyon
SEA-5 Malibu Canyon and Lagoon
SEA-6 Las Virgenes
SEA-7 Hidden Oaks
SEA-8 Malibu Creek State Park Buffer Area
SEA-9 Cold Creek
SEA-10 Liano Canyon
SEA-11 Tarmaque/Rustic Sullivan Canyons
SEA-12 Rim Cathedral Canyon
SEA-13 Chatsworth Reservoir
SEA-14 Simi Hills
SEA-15 Towsley Canyon Chiolo Hills
SEA-16 Recondo Peak San Jose Hills
SEA-17 Powder Canyon-Puente Hills
SEA-18 Hillary Hill
SEA-19 San Francisquito Canyon
SEA-20 Santa Susana Mountains
SEA-21 Agoura Modena Area
SEA-22 Santa Fe Dam Floodplain
SEA-23 Santa Clara River
SEA-24 Tujunga Valley-Hansen Dam
SEA-25 San Gabriel Canyon
SEA-26 San Antonio Canyon Mouth
SEA-27 Portuguese Bend Landslide
SEA-28 El Segundo Dunes
SEA-29 Ballona Creek
SEA-30 Marvista Bar
SEA-31 Rolling Hills Canyons
SEA-32 Agua Amarga Canyon
SEA-33 Torrance Island
SEA-34 Palos Verdes Coastline
SEA-35 Harbor Lake Regional Park
SEA-36 Madrona Marsh
SEA-37 Griffith Park
SEA-38 Encino Reservoir
SEA-40 Verdugo Mountains
SEA-42 Whittier Narrows Dam County Recreation Area
SEA-43 Rio Hondo College Wildlife Sanctuary
SEA-44 Sycamore & Turnbull Canyons
SEA-45 Dalliegh Donaldson Preserve
SEA-47 Edwards Air Force Base
SEA-48 Big Rock Wash
SEA-49 Little Rock Wash
SEA-50 Rosamond Lake
SEA-51 Saddleback Butte State Park
SEA-52 Alpine Butte
SEA-53 Lovejoy Buttes
SEA-54 Piute Buttes
SEA-55 Desert Wilderness Transect
SEA-56 Kiler Ridge
SEA-57 Fremont & Antelope Buttes
SEA-58 Portal Ridge-Liebre Mountain
SEA-59 Tehachapi Foothills
SEA-60 Joshua Tree Woodland Habitat
SEA-61 Kentucky Springs
SEA-62 Sullivan Grande Preservation
SEA-63 Lyon Canyon
SEA-64 Valley-Oaks Savannah, Newhall
NOTE:
RB-AR7688

2014

Integrated Pest Management Program

DRAFT

Developed for the City of

_____

RB-AR7689

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RB-AR7690

INTEGRATED PEST MANAGEMENT (IPM) PROGRAM IMPLEMENTATION GUIDELINES[1] FOR THE CITY OF _____

General IPM Policy

For the past few decades, the trend in pest management has been to increasingly rely on synthetic chemical pesticides. This management strategy results in the increased use of dangerous chemicals, an increase in the number of pests that can become resistant to the pesticides, as well as lead to new organisms becoming pests. Additionally, some pesticides used for terrestrial pest management have been found in waterways causing problems in the aquatic environment.

Pest control managers are now moving away from their reliance on pesticides and toward an integrated approach that combines limited pesticide use with more environmentally friendly pest control techniques. This system is known as integrated pest management (IPM), a strategy that focuses on the long-term prevention of pests through a combination of techniques, including preventative, cultural, mechanical, environmental, biological, and chemical control tactics (**Figure 1**). Multiple IPM techniques can be utilized simultaneously to control pest populations in the most effective manner possible.

A comprehensive IPM Program and Approach allows for primary focus on pollution prevention by monitoring and preventing pests as well as minimizing heavy pest infestations, which reduces the need for chemicals and/or multiple applications. The goal of the IPM Program is not to eliminate all pests, but to keep their populations at tolerable levels. In an IPM program, pesticides should be applied only when it is determined that pests are approaching damaging levels. Because this requires early detection of the pests, IPM programs utilize monitoring techniques and economic thresholds to determine when to implement control strategies. If possible, a person should be trained and assigned to scout the sites on a regular basis. Pesticides may be part of an IPM program, but they should preferably be used only after pests exceed established thresholds and applied only to the affected area (in the case of disease prevention, some modifications may be allowed). In general, all pest control strategies should be those that are least disruptive to biological control organisms (natural enemies), least hazardous to humans and the environment (including non-target organisms), and have the best likelihood of long-term effectiveness.

[1]Adapted from the Orange County Drainage Area Management Plan Integrated Pest Management Policy Developed by the University of California, Division of Agriculture and Natural Resources

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IPM practices are encouraged over the sole use of pesticides as the primary means of pest management (**Table 1**). As a part of their Municipal Activities Program, public agencies and their contractors evaluate the ability to use non-chemical IPM techniques before intensive use of pesticides. This IPM Program template outlines baseline IPM procedures that are required by the Los Angeles County Municipal Separate Storm System Permit (MS4 Permit)[2] along with additional optional IPM techniques that can be employed to implement an effective IPM program.

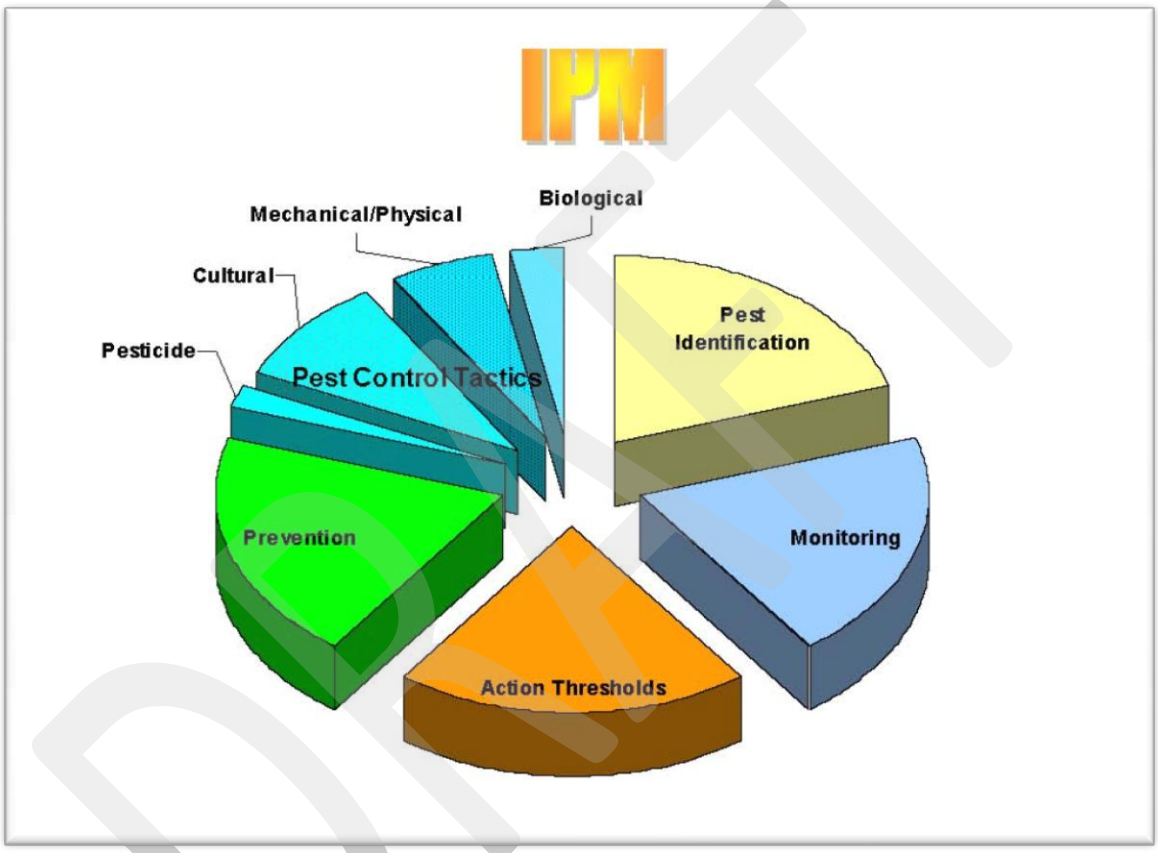

Figure 1 Components of an Integrated Pest Management Program

[2]California Regional Water Quality Control Board Los Angeles Region. 2012. Order No. R4-2012-0175 NPDES Permit No. CAS004001 Waste Discharge Requirements for Municipal Separate Storm Sewer System (MS4) Discharges within the Coastal Watersheds of Los Angeles County, except those Discharges Originating from the City of Long Beach MS4.

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Table 1 Advantages and Disadvantages of a Pesticide-Based Program Versus An IPM-Based Pest Control Program

Pesticide Based Pest Control		IPM Based Pest Control	
Advantages	**Disadvantages**	**Advantages**	**Disadvantages**
Quick suppression of pests	Not long-term	Long-term control	It may take longer to see results
	Pest control is reactive	Can be proactive in pest control actions.	Must establish thresholds
	Loss of natural controls. Often get outbreaks of other pests	Reduces disruption of natural enemies	
		Pesticides can be used (only used as a last resort)	Must have knowledge of pesticides and their effects on other organisms.
Labor is only for spraying	Extra work in cleanup	Staff becomes more knowledgeable of pests and injury symptoms	Labor is required for monitoring and regular scouting Training is required to identify pests and natural enemies
Not much preparation or follow-up needed	Need a PCA recommendation	Pest management is more organized	Must maintain a record-keeping system.
	Pesticide safety issues for applicators, public, animals More pesticides in environment Contamination of water bodies from runoff	Less exposure to pesticides Safer to the environment Reduces contamination from runoff	

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Implementation Guidelines

Enter Designated IPM Coordinator or IPM Contact Information in Box Below:

IPM Coordinator: Contact Info:

Personnel responsible for the care and maintenance of facilities under the City of _____ agree to implement a suite of basic integrated pest management procedures to meet MS4 Permit requirements[3]. The fundamental basis for the IPM program must include the following as outlined in Permit Part VI.D.9.g:

1. **Pesticides are to be used if monitoring indicates they are needed, and pesticides are applied according to applicable permits and established guidelines.**
2. **Treatments are made with the goal of removing only the target organism.**
3. **Pest controls are selected and applied in a manner that minimizes risks to human health, beneficial non-target organisms, and the environment.**
4. **The use of pesticides, including Organophosphates and Pyrethroids, does not threaten water quality.**
5. **Partnerships with other agencies and organizations are established to encourage the use of IPM.**
6. **A standardized protocol is to be used for the routine and non-routine application of pesticides (including pre-emergents), and fertilizers.**
7. **There is to be no application of pesticides or fertilizers (1) when two or more consecutive days with greater than 50% chance of rainfall are predicted by NOAA34, (2) within 48 hours of a ½-inch rain event, or (3) when water is flowing off the area where the application is to occur. This requirement does not apply to the application of aquatic pesticides or pesticides which require water for activation.**
8. **No banned or unregistered pesticides are stored or applied.**
9. **All staff applying pesticides are certified in the appropriate category by the California Department of Pesticide Regulation, or are under the direct supervision of a pesticide applicator certified in the appropriate category.**
10. **Procedures to encourage the retention and planting of native vegetation to**

[3] In addition to MS4 Permit compliance, there are extensive federal and state laws and regulations that all public agencies must be in compliance with at all times, including the California Food and Agricultural Code (FAC) and the California Code of Regulations, Title 3 (3CCR).

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reduce water, pesticide and fertilizer needs are implemented; and

11. **Pesticides and fertilizers are stored indoors or under cover on paved surfaces, or use secondary containment.**
    a. **The use, storage, and handling of hazardous materials are reduced to decrease the potential for spills.**
    b. **Storage areas are regularly inspected.**

In order to implement the above required minimum practices, the following section describes components of an effective IPM Program that can be employed:

- Pest and Symptom Identification
- Prevention
- Monitoring
- Injury Levels and Action Thresholds
- Pest Control Tactics

A number of useful IPM techniques are outlined under each component and further described in Appendix A. These techniques are known to be effective and methods can be selected from each component as necessary to achieve the IPM goals and meet MS4 Permit requirements.

Additional information on the latest IPM techniques including management of new pests in the landscape can be obtained from local UC Cooperative Extension Advisors, UC IPM Regional Advisor, or the Statewide UC IPM Web Site at www.ipm.ucdavis.edu.

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Components of an Effective IPM Program

An IPM program is a long-term, multi-faceted system to manage pests (**Figure 1**). Use of pesticides is a short-term solution to pest problems, and should be used only when the other components fail to maintain the pests or their damage below an acceptable level. Successful IPM practitioners are knowledgeable about the biology of the plants and pests, and successful IPM programs primarily use combinations of cultural practices as well as a combination of physical, mechanical and biological controls.

Pest Identification

It is important to learn to identify all stages of common pests at each site. For example, if you can identify weed seedlings, you can control them before they become larger and more difficult to control and before they flower, disseminating seeds throughout the site. It is also important to be sure that a pest is actually causing the problem. Often damage such as wilting is attributed to root disease but may actually be caused by under watering or wind damage. Appendix A lists specific techniques that can be employed to identify pests.

Prevention

Good pest prevention practices are critical to any IPM program, and can be very effective in reducing pest incidence. Numerous practices can be used to prevent pest incidence and reduce pest population buildup such as the use of resistant varieties, good sanitary practices and proper plant culture. Examples of prevention include choosing an appropriate location for planting, making sure the root system is able to grow adequately and selecting plants that are compatible with the site's environment. Appendix A lists specific techniques that can be employed to achieve pest prevention.

Monitoring

The basis of an effective IPM Program is the development and use of a regular monitoring or scouting program. Monitoring involves examining plants and surrounding areas for pests, examining tools such as sticky traps for insect pests and quantitatively or qualitatively measuring the pest population size or injury. This information can be used to determine if pest populations are increasing, decreasing, or staying the same and to determine when to use a control tactic. Weather and other environmental conditions may also play a factor in whether a pest outbreak may occur so it is important to monitor temperature and soil moisture as well.

It is important to use a systematic approach when monitoring, for example you should examine leaves of a similar age each time you check for pests, rather than looking at the older leaves on some plants and younger ones on others. Randomly looking at a plant and its leaves does not allow you to track changes in pest population or damage over time.

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It is important to establish and maintain a record-keeping system to evaluate and improve your IPM program. Records should include information such as date of examination, pests found, size and extent of the infestation, location of the infestation, control options utilized, effectiveness of the control options, labor and material costs. Appendix A lists specific techniques that can be employed to in the monitoring of pests.

Injury Levels and Action Thresholds

In order to have a way to determine when a control measure should be taken, injury levels and action thresholds must be set for each pest. An injury level is the level of unacceptable damage. For example, the injury level for a leaf-feeding beetle may be set at 30% of the leaves being damaged. Action thresholds are the set of conditions required to trigger a control action. An example of this would be finding an average of 5 or more beetles on 10 shrubs in a location. Action thresholds are set from previous experience or published recommendations and based on expected injury levels. Injury levels are often set by the public's comments. Appendix A lists specific techniques that can be employed to determine injury levels and action thresholds.

Pest Control Tactics

Integrated pest management programs use a variety of pest control tactics in a compatible manner that minimizes adverse effects to the environment. A combination of several control tactics is usually more effective in minimizing pest damage than any single control method. The type of control that an agency selects will likely vary on a case-by-case basis due to the varying site conditions.

The primary pest control tactics to choose from include:

- Cultural
- Mechanical/Physical
- Biological
- Pesticide

Appendix A lists specific pest control techniques that can be employed.

Cultural Controls

Cultural controls are modifications of normal plant care activities that reduce or prevent pests. In addition to those methods used in the pest preventions, other cultural control methods include adjusting the frequency and amount of irrigation, fertilization, and mowing height. For example, spider mite infestations are worse on water-stressed plants, over-fertilization may cause succulent growth which then encourages aphids, too low of a mowing height may thin turf and allow weeds to become established.

Mechanical/Physical Controls

Mechanical control tactics involve the use of manual labor and machinery to reduce or

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eliminate pest problems using methods such as handpicking, physical barriers, or machinery to reduce pest abundance indirectly. Examples include hand-pulling or hoeing and applying mulch to control weeds, using trap boards for snails and slugs, and use of traps for gophers.

The use of physical manipulations that indirectly control or prevent pests by altering temperature, light, and humidity can be effective in controlling pests. Although in outdoor situations these tactics are difficult to use for most pests, they can be effective in controlling birds and mammals if their habitat can be modified such that they do not choose to live or roost in the area. Examples include removing garbage in a timely manner and using netting or wire to prevent bird from roosting.

Biological Controls

Biological control practices use living organisms to reduce pest populations. These organisms are often also referred to as beneficials, natural enemies or biocontrols. They act to keep pest populations low enough to prevent significant economic damage. Biocontrols include pathogens, parasites, predators, competitive species, and antagonistic organisms. Beneficial organisms can occur naturally or can be purchased and released.

The most common organisms used for biological control in landscapes are predators, parasites, pathogens and herbivores.

- Predators are organisms that eat their prey (e.g. Ladybugs).
- Parasites spend part or all of their life cycle associated with their host. Common parasites lay their eggs in or on their host and then the eggs hatch, the larvae feed on the host, killing it (e.g. Tiny stingless wasps for aphids and whiteflies).
- Pathogens are microscopic organisms, such as bacteria, viruses, and fungi that cause diseases in pest insects, mites, nematodes, or weeds (e.g. Bacillus thuringiensis or BT).
- Herbivores are insects or animals that feed on plants. These are effective for weed control. Biocontrols for weeds eat seeds, leaves, or tunnel into plant stems (e.g. goats and some seed and stem borers).

In order to conserve naturally occurring beneficials, broad-spectrum pesticides should be avoided since the use of these types of pesticides may result in secondary pest outbreak due to the mortality of natural enemies that may be keeping other pests under control (Figure 2).

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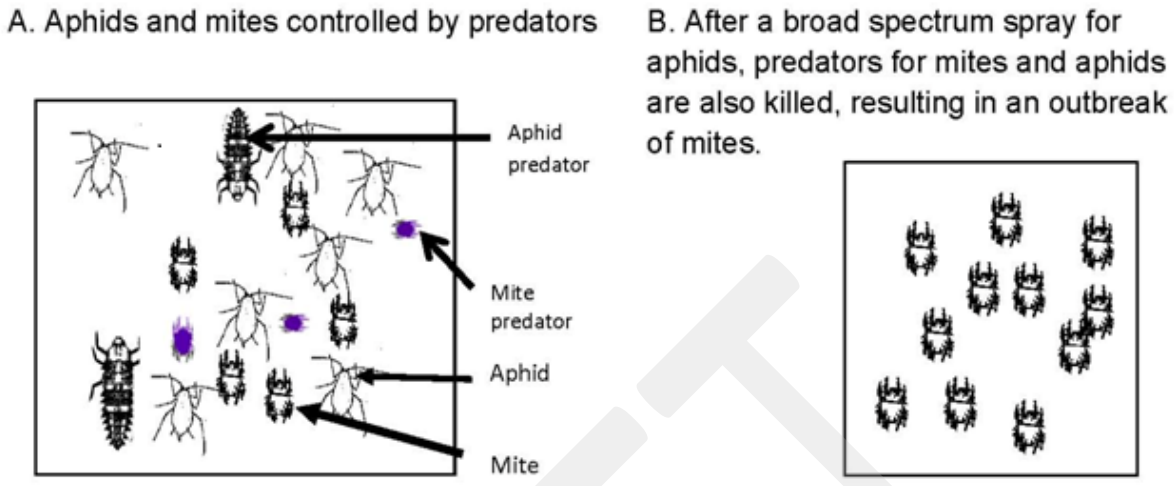

Figure 2 Example of Secondary Pest Outbreak Caused By Use of a Broad Spectrum Insecticide

Pesticide Controls

Any substance used for defoliating plants, regulating plant growth or preventing, destroying, repelling or mitigating any pest, is a pesticide. Insecticides, miticides, herbicides, fungicides, rodenticides and molluscides are all pesticides. Anything with an EPA or DPR registration number on the label is a non-exempt pesticide.

Pesticides should only be used when other methods fail to provide adequate control of pests and just before pest populations cause unacceptable damage. The overuse of pesticides can cause beneficial organisms to be killed and pest resistance to develop. When pesticides must be used, considerations should be made for how to use them most successfully. Avoid pesticides that are broad-spectrum and relatively persistent since these are the ones that can cause the most environmental damage and increase the likelihood of pesticide resistance. Always choose the most specific but least toxic to non-target organisms method.

In addition, considerations should be given to the proximity to water bodies, irrigation schedules, weather (rain or wind), etc. that are secondary factors that may result in the pesticide being moved off-site into the environment. Consideration should be made of the temporary loss of use of an area (application in a park may result in the area being sectioned off).

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Appendix A: Optional IPM Techniques to Integrate into IPM Program

The following practices are generally accepted to be effective IPM techniques. These procedures increase the long-term prevention and suppression of pest problems (insects, weeds, diseases, and vertebrates) with the minimum impact on human health, the environment, and non-target organisms. Emphasis is placed on improving cultural practices to prevent problems and utilize alternative control measures instead of broad spectrum pesticides. The following IPM techniques are divided into the following categories:

- General Pesticide Management Practices
- Pest and Symptom Identification
- Prevention
- Monitoring
- Injury Levels and Action Thresholds
- Pest Control Tactics

GENERAL PESTICIDE MANAGEMENT PRACTICES

- Maintain a complete inventory of all pesticides used and the use sites. This inventory should be updated annually.
- If pesticides are necessary, CAUTION-labeled pesticides should be considered before more toxic alternatives.
- Ensure that no banned or unregulated pesticides are stored or applied.
- Restricted use pesticides should only be used when no other alternatives are practical.
- Only small quantities of pesticides should be purchased eliminating the need for stockpiling.
- MSDSs should be regularly updated to reflect new pesticides or label changes to pesticides in storage.
- Pesticides should be used only according to label instructions.
- Weather conditions that could affect application should be considered. For example, wind conditions affect spray drift; rain may wash pesticide off of leaves.
- Pesticides should not be applied where there is a high chance of movement into water bodies; for example, they should not be applied near wetlands, streams, lakes, ponds or storm drains unless it is for an approved maintenance activity.
- In most cases, empty pesticide containers should be triple-rinsed before disposal. Particular information on the proper disposal of the pesticide and its container can be found on the label.

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- Pesticide equipment and containers should not be cleaned or rinsed in the vicinity of storm drains or other open water areas.
- Pesticides should be stored in covered areas with cement floors and in areas insulated from temperature extremes.
- Chemicals and equipment should be secured during transportation to prevent tipping or excess jarring.
- Pesticides should be transported completely isolated from people, food and clothing, for example, in the bed of the truck rather than in the passenger compartment.
- Pesticide equipment, storage containers and transportation vehicles should be inspected frequently.
- A plan for dealing with pesticide spills and accidents should be developed.
- Unless their safety is compromised, workers should immediately clean up any chemical spills according to label instructions and notify the appropriate supervisors and agencies.
- Pesticide applications on public property, which take place on school grounds, parks, or other public rights-of-way where public exposure is possible, should be posted with warning signs. The specific criteria for the signage can be found in FAC, section 12978. Pesticide applications by the Department of Transportation on public highway rights-of-way are exempt.

PEST AND SYMPTOM IDENTIFICATION

Insects, Mites, and Snails and Slugs

- Field personnel should be trained to recognize basic pests found in the landscape in the following groups: insects, mites, and mollusks.
- A licensed Pest Control Adviser can be on staff or hired to properly identify a pest and the symptoms caused by the pest.
- Field personnel can be trained to utilize disease life cycles to apply treatments when the organism can be controlled most effectively.
- Field personnel can be trained to distinguish between beneficial insects and actual pests found in the landscape (e.g. parasitizing wasps).
- Unknown samples can be submitted to the Orange County Agricultural Commissioner for identification by the county entomologist or plant pathologist.
- Abiotic or nonliving factors (wind, sunburn, air pollution, etc…) should be considered as possible causes of observed symptoms as well as biotic (living) factors.

Weeds

- Field personnel can be trained to identify common weeds in the landscape.
- Field personnel can be trained to utilize weed life cycles to properly control

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weeds such as controlling crabgrass utilizing a pre-emergent herbicide applied in mid-January.
- A licensed Pest Control Adviser can be on staff or contracted to properly identify the pest.

Diseases

- Field personnel can be trained to recognize common diseases or their signs/symptoms in the landscape.
- Field personnel can be trained to utilize disease life cycles to apply treatments when the organism can be controlled most effectively.
- Field personnel can be trained to recognize the difference between biotic and abiotic problems.
- Field personnel can be trained to understand how common diseases are spread throughout the landscape.
- Disease signs and symptoms can be sampled and submitted to the Orange County Agricultural Commissioner for identification by the county plant pathologist.
- A licensed Pest Control Adviser can be on staff or contracted to properly identify the pest.
- Photographs of disease signs and symptoms can be taken and compared to reference guides such as UC IPM's *Pests of Landscape Trees and Shrubs*.

Vertebrates

- Field personnel can be trained to recognize vertebrate pests and the damage they cause in the landscape.
- Field personnel can be trained to utilize vertebrate behavior to properly control the pest most effectively.
- Field personnel can be trained in vertebrate baiting and trapping.
- A licensed Pest Control Adviser can be on staff or contracted to properly identify vertebrate pest.

PREVENTION

Landscape Design Procedures

- Drainage, soil characteristics, water quality and availability should be considered during plant selection.
- Sun exposure, heat, and high temperature conditions should be considered during plant selection.
- Plant material should be selected based on adaptability to local climate conditions, such as those conditions common to a Mediterranean climate.
- Adequate space should be allowed for root growth, especially trees.

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- Nursery stock should be inspected and rejected if not healthy (injuries, diseased, circling roots/potbound, poor staking and/or pruning).
- Pest resistant species and cultivars should be selected.
- Plants with similar growth characteristics and irrigation requirements should be grouped together.
- Landscape design should match available irrigation technology to avoid excess water use and to minimize surface runoff.

Site Preparation and Planting Procedures

- Soil drainage properties can be assessed and compacted soils improved prior to planting.
- A soil analysis can be conducted to determine the chemical and physical properties of the existing soil and then appropriate amendments such as organic matter can be added.
- Irrigation should be installed as designed in order to avoid poor uniformity once plants are in place.
- Proper planting procedures should be followed for particular plant species to avoid planting too deeply or too shallow.
- Nursery tree stakes can be removed at planting and replaced with staking that allows trunk to flex; removing these stakes after 1 to 1.5 years.
- A soil probe or other soil moisture measurement device can be utilized to monitor soil moisture levels in existing root ball and surrounding soil during establishment period.

Water Management

- Plants should be examined weekly for symptoms of water stress and to assist in determining irrigation scheduling.
- Soil moisture can be monitored with a soil probe or soil moisture sensors to assist in scheduling irrigation.
- Evapotranspiration (ET) data or 'smart' clock technology can be utilized to schedule irrigation.
- Cyclic irrigation (short-multiple run times) can be employed to minimize surface runoff.
- Low precipitation sprinklers or low-volume systems can be utilized to reduce surface runoff.
- Systems should be inspected monthly to check for leaks, broken pipes, and clogged or broken sprinkler heads.
- Adjust sprinklers to avoid application of water directly to the trunk of trees (can promote disease) or on to concrete surfaces where it can enter storm drains.
- A hotline, email, or other dedicated method can be established for citizens to

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report leaks and broken sprinkler heads

Fertilizing Procedures

- To avoid nutrient losses below the root zone, fertilize only when plants are actively growing.
- Fertilizer should not be applied within 48 hours of a rain event to avoid losses below the root zone and in surface runoff.
- Soil analyses can be conducted in order to determine existing nutrient levels in the soil prior to fertilizing.
- Turf grass fertilizer maintenance schedules can be based on UC recommendations found online at UC Guide for Healthy Lawns: http://www.ipm.ucdavis.edu/TOOLS/TURF/MAINTAIN/fertilize.html
- Sports turf grass fertilizer maintenance guidelines can be based on UC recommendations found in *Establishing and Maintaining the Natural Turf Athletic Field (UCR ANR Publication Number: 21617)*.
- Overfertilization, especially of trees and shrubs, should be avoided to ensure plant growth is not excessively succulent making it more susceptible to pest infestations.
- Off-target fertilizer applications or spills should be cleaned up immediately by sweeping up and applying to landscape or turf or replacing in spreader or bag to ensure material does not enter storm drains.

Pruning Procedures

- Damaged or diseased wood should be regularly pruned from landscape plants.
- Trees should be pruned according to standards set forth by a professional tree care organization such as the International Society of Arboriculture.
- Plants too large for a space should be replaced instead of pruning them severely.
- Unnecessary pruning should be avoided as wounds are entry sites for decay and disease organisms.
- The age and species of the plant should be taken into account when determining the time of year to prune. For example, eucalyptus should be pruned in December and January when long-horned beetles are not active.
- Tree height reduction should be discouraged. When deemed necessary by a licensed arborist, the crown reduction method approved by a professional tree care organization should be utilized. Topping should not be done to reduce tree size.

MONITORING FOR PESTS AND PROBLEMS

Insect/Mollusk Monitoring Procedures

- Monthly visual inspections of plants for insects, mites, snail and slug damage,

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and recording results is an effective method for tracking changes and easy recall of data.

- Yellow sticky traps can be utilized to assess populations of insects.
- Insects can be dislodged from plants by shaking over a collection surface usually consisting of a clipboard with a white sheet of paper.
- If available for a particular insect, pheromone-baited traps can be utilized.
- Soil-dwelling turf insects can be brought to the surface for monitoring by flushing a specific area of soil (i.e. 2' x 2' grid) with plain water or a soapy water mixture.
- The amount of honeydew (aphids) and frass (caterpillars) present can be utilized as an indicator of population levels.

Weed Monitoring Procedures

- Landscapes can be inspected at least 4 times a year (early winter, early spring, summer and early fall) for weeds in order to determine if and when a weed problem exists.
- Site surveys can be utilized to record the location, date, and severity of weed problem for an effective method of tracking changes and easy recall of data.
    - The number of weeds encountered at periodic intervals (e.g. every 1 to 2 feet) can be counted and recorded along a straight line transecting a landscaped, area or within a selected area, for example 4 sq. ft. samples done in random places in a bed or turf area.

Disease Monitoring Procedures

- Landscapes should be regularly checked for conditions, such as overwatering and injuries, which promote disease.
- Landscapes should checked monthly for disease symptoms and signs. Disease prone plants should be checked more frequently.
- Landscape inspections should note date when disease signs and symptoms were first noticed and the current environmental conditions and soil moisture levels as an effective method of tracking changes and easy recall of data.

Vertebrate Monitoring Procedures

- Landscapes can be regularly inspected for vertebrate presence either by damage caused by animal, actual animal sightings, and/or droppings.
- Records can be kept of the absence or presence of actual vertebrates, the damage caused, and/or the presence or absence of droppings.
- Maps can be created and updated at least twice a year, recording areas of high vertebrate damage or signs (such as gopher mounds).

INJURY LEVELS AND ACTION THRESHOLDS

Insect/Mollusk Thresholds and Guidelines

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- Insect tolerance levels can be established based on the public's acceptance of damage to the landscape or a certain level of nuisance pests (i.e. ants), the actual plant species in the landscape, and long-term monitoring and knowledge of pests causing the damage.
- Thresholds can be based on levels where reasonable control of the pest can be achieved with minimum impact on the environment.
- Insect monitoring records can be utilized to establish threshold levels for the implementation of control strategies. For example, the threshold for the presence of aphids on a rose garden at City Hall is low, while in a native shrub border it might be considerably higher.

Weed Thresholds and Guidelines

- Weed tolerance levels can be established based on public safety or the public's acceptance and the resources available to manage the landscape at that level.
- Weed monitoring records can be utilized to rank the percentage of the landscape area infested (none, light, moderate, heavy, or very heavy) with weeds.
- Public areas can be ranked according to high, medium, or low level of weed control and management conducted according to levels set for each rank (see Appendix B)

Disease Thresholds and Guidelines

- Disease tolerance levels can be established based on the public's acceptance and the resources available to manage the landscape at the level required.
- Disease monitoring records can be utilized to establish threshold levels for the implementation of control strategies. For example, the threshold for the presence of powdery mildew on roses at City Hall is much lower than the threshold for its presence on Euonymus in a parking lot at a city sports park.

Vertebrate Thresholds and Guidelines

- Vertebrate tolerance levels can be established based on public safety, the public's acceptance and the resources available to manage the landscape at the level required.
- Vertebrate monitoring records can be utilized to establish threshold levels for the implementation of control strategies. For example, the threshold for the presence of gopher mounds in a sport field is zero, while in a native shrub border it might be two before a trapping strategy is implemented.

PEST CONTROL TACTICS

Insect/Mollusk Management Methods

Cultural/Mechanical/Physical Control Methods

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- Sticky barriers can be applied to trunks of trees and large shrubs to prevent ants and other wingless invertebrates from plant canopies.
- Small insect infestations can be removed by pruning infested plant parts.
- Copper bands can be installed around base of trees or planting areas where snail and slug infestations are prevalent.
- Plant canopies can be thinned to increase light penetration to expose certain soft-bodied insects (soft-scale) as well as snails and slugs to heat.
- Strong streams of water can be used to dislodge insects such as aphids and whiteflies, from leaves.
- The use of plants that snails and slugs use for shelter should be avoided.
- Avoid irrigating between 5pm and 5am when moisture remains on plant material for several hours.

Biological Control Methods

- Persistent broad-spectrum pesticides should be avoided, especially if biological control of an insect has been established by UC researchers. Examples include parasitoid wasps controlling Eugenia Psyllids, Giant Whitefly, and Ash Whitefly.
- Natural predators (beneficial insects) can be augmented with purchases of additional predators from commercially available resources.

Pesticide Control Methods

- The most selective, rather than broad-spectrum, pesticide should be used.
- If available for controlling a particular insect, biological and botanical pesticides should be selected.
- Insecticidal soaps can be utilized to control infestations of soft-bodied insects such as aphids, thrips, and immature scales.
- Horticultural oils (neem oil and narrow-range refined oils) can be utilized to control infestations of soft-bodied immature and adult insects such as aphids, scales, and whiteflies.
- Pesticides should only utilized when the potential for impacts to the environment, especially water quality, are minimized.
- Equipment should be calibrated prior to the application of the insecticide to avoid excess material being applied to the landscape environment.
- Applicators should be trained to not apply pesticides to hard surfaces and to not allow any pesticide to enter the storm drain system.
- Spot treatments should be utilized rather than broadcast methods.
- Insecticide/fertilizer combinations should only used if it is appropriate timing for BOTH the insecticide application and the fertilizer application.

Weed Management Methods

Cultural, Mechanical, and Physical Control Methods

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- Timers can be set to avoid overwatering as weeds establish in areas where soil moisture is excessive.
- Drainage can be managed to avoid wet areas.
- Weeds can be removed from a site prior to planting.
- Mower height can be adjusted to turf species and time of year.
- Mower should be washed after mowing a weedy site.
- Hand-pulling, mowing, trimmers/brushcutters, flaming, hoeing, and rototilling around landscape plants should be the main methods utilized to control annual weeds and young perennial weeds.
- Soil solarization can be utilized to control some annual and perennial weed species.
- Bare soil areas can be covered with a thick layer of mulch to suppress weeds and conserve soil moisture.
- Soil, mulch, and plant material should be weed-free before it is introduced into the landscape.

Pesticide Control Methods

- Spot treatments can be utilized rather than broadcast methods.
- Herbicide/fertilizer combinations should only used if it is appropriate timing for BOTH the herbicide application and the fertilizer application.
- Herbicides should be utilized according to established thresholds (see Appendix B).
- Organically acceptable herbicides (shown to be effective through science-based research) should be used where appropriate.
- Herbicides can be applied to the stage of weed growth most susceptible to the chemical.
- Equipment should be calibrated prior to the application of the herbicide to avoid excess material being applied to the landscape environment.

Disease Management Methods

Cultural, Mechanical, and Physical Control Methods

- Localized areas of diseased plants should be pruned out and disposed of.
- Pathogen-infested plant parts can be removed from the soil surface area to reduce certain pathogens (e.g. Camellia Petal Blight).
- Pruning tools can be sterilized (e.g. a diluted bleach solution) between plants to prevent the spread of pathogen to other plants.
- Proper irrigation and fertilization can be maintained to prevent plant stress, waterlogging, and subsequent susceptibility to disease.
- Soil solarization can be utilized to control soil pathogens in annual beds where it

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RB AR7708

is most effective.

- Mulch can be kept at least 6" from base of plants to avoid excessive moisture around crown possibly resulting in crown rots and is no deeper than 4"
- Disease-prone plants can be replaced with non-susceptible species.

Pesticide Control Methods

- Preventative fungicides and bactericides should only used where diseases can be predicted from environmental conditions and applied prior to infection or the appearance of symptoms.
- Synthetic fungicides should be used sparingly in the landscape and only in high visibility areas in order to minimize development of resistance.
- Organic fungicides and bactericides should be utilized in combination with cultural, mechanical, and physical control methods in order to improve their effectiveness.
- Copper-based fungicides should only be utilized in situations where its entry into surface runoff and storm drains is virtually impossible and after consultation with PCA and IPM coordinator.
- Mycopesticides, commercially available beneficial microorganisms, should be used where appropriate.
- Fungicides classes can be rotated to avoid resistance.

Vertebrate Management Methods

Cultural and Physical Control Methods

- Groundcovers can be maintained such that they do not harbor rats.
    - Shrubs pruned at least 1 foot from the ground (rats).
    - Sources of drinking water removed (leaky faucets, puddles).
    - Trash cans have lids and are emptied daily (rats).
    - Screens or other barriers installed under structures that have a space between soil and floor (rabbits).
- Habitat modification, based on pest biology can be used to reduce shelter. Trapping can be used for gophers when safe and practical.
- Kill traps used for ground squirrels and rabbits, should be checked daily, and put in places not accessible by children or non-target animals.
- Gas cartridges can be used for ground squirrels according to UC recommendations.

Pesticide Control Methods

- Anti-coagulant baits can be used and applied according to label and UC recommendations.
- Bait should be applied in a manner that non-target animals do not have access to

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it.

- Restricted use pesticides should only be applied by or under the direct supervision of an individual with a qualified applicators certificate (QAC). To receive a QAC, a person must take a test administered by Department of Pesticide Regulation (DPR). To obtain test materials, test schedules, and an application, see http://www.cdpr.ca.gov/docs/license/liccert.htm.

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Appendix B

Ranking public areas for weeds (or other pest) management:

Areas ranked as **HIGH** may include areas that the public sees and expects to be well-maintained. Examples are entrances to public buildings such as city hall and libraries.

These areas are allowed to use pesticides based on established thresholds.

Areas ranked as **MEDIUM** may include areas the public sees but does not expect a high level of maintenance. Examples are landscaped areas away from the entrance, recreational and picnic areas. These areas can tolerate a higher lever of weeds.

*These areas are allowed to use pesticides but the threshold is much higher and pesticides are used infrequently and only after consultation with IPM coordinato*r.

Areas ranked as **LOW** may include areas the public rarely sees or does not expect a high level of maintenance. Examples are medians, landscaped areas in parking lots, wildlands. These areas can tolerate a higher lever of weeds.

These areas are not allowed to use pesticides except in extreme cases and only after consultation with IPM coordinator.

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Example Catch Basin Cleaning Log

Catch Basin Cleaning Log			
Date	Location	Number of Catch Basins Cleaned	Total Amount Removed
Notes:			

Example of Completed Catch Basin Cleaning Log

Catch Basin Cleaning Log			
Date	Location	Number of Catch Basins Cleaned	Total Amount Removed
7/1/13	Street #1	20	55 cu. ft.
	Intersection #1	10	
	Street #2	5	
Notes:			

Drainage Inlet/Catch Basin Information		
Location		
Street:	Cross Street:	Side (N,S,E,W)
Distance:	Direction (N,S,E,W):	Inlet #:
Map #:	Grid:	
Condition		
Length of Opening:	Height of Opening:	Stencil Legible (Y/N):
Bicycle Bars (Y/N):	Grate Size:	Inlet Protection Bar (Y/N):
Treatment Control BMP (Y/N):	Type of BMP:	
Repairs Required:		

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Illicit Connection Investigations Guidance

Field Screening Techniques

If evidence of an illicit discharge is detected, as described in Section 2, and the source does not appear to be evident or above ground, investigations will be conducted to determine if the discharge is being conveyed through an illicit connection. A good source of information includes *Investigation of Inappropriate Pollutant Entries into Storm Drainage Systems* (EPA/600/R-92/238.1993, Pitt et al). General guidance follows below. These techniques can also be used if a Permittee elects to survey sections of their system for illicit connections.

Document Research

Maps of drainage facilities can be reviewed to locate upstream connections and drainage basins as an initial step to locate potential illicit connections. Other records, such as connection permits and discharge permits, can also be reviewed to determine if legal connections may be the source.

Physical Inspections

Catch basins, manholes and other facilities that can be safely investigated from the surface should be physically checked for evidence of connections. This may be a hard pipe connection, or could be a hose or other conveyance that directs a discharge into the storm drain facility. Identification of connections that exhibit evidence of suspected illicit discharges during routine site inspection (e.g., industrial, commercial or construction). Investigation is conducted to determine if the discharge is being conveyed through an illicit connection when evidence of illicit discharge is detected, and the source does not appear to be evident or above ground.

Facilities that are large enough for personnel to enter can also be physically inspected, however, entry into facilities requires strict adherence to health and safety procedures, including confined space entry procedures. In general, a space is “confined” if it is not intended for human occupancy, has limited openings for entry or exit, and has insufficient natural or mechanical ventilation. Information on safety procedures can be found in many documents, including the *Occupational Safety and Health Guidance Manual*, National Institute for Occupational Safety and Health; *OSHA Safety and Health Standards 29 CFR 1910 (General Industry)*, US Department of Labor, and *Title 8 of the California Code of Regulations, General Industry Safety Order*.

Dye Tests

Dye tests can reveal illicit connections in areas where storm drain flows are unexplained and the Permittee has access to suspect facilities. Typical dye tests consist of the addition of fluorescent dye to a floor drain or waste line from a domestic, commercial or industrial process, followed by monitoring for the dye in downstream storm drains. Permittees should conduct dye testing facility by facility (in each area where unexplained flow exists) until all facilities in the area are tested.

Smoke Tests

Smoke tests can reveal if illicit connections exist, and can reveal their source. Storm drains are sealed via sandbags or other sealing devices (plugs, etc.) and smoking incendiary devices are ignited upstream of the seal. Simultaneous inspections inside area facilities should reveal illicit connections even in the

absence of flow. As illicit discharges are intermittent, smoke tests offer real advantages over other types of illicit discharge source identification methods. However, as many legitimate connections to a storm drain may exist (roof drains, street drains, etc.) smoke may be observed extensively. This may cause some illicit connections to be missed, and create a problem with area businesses and residents as excessive smoke begins to enter private property.

T.V. Inspections

T.V. inspections can reveal if illicit connections exist, but cannot be used to view up the connection to determine the source. Robotized or otherwise mobile television cameras allow visual inspection of storm drains (pipes) too small or dangerous for personnel to enter. Although an excellent method of identifying and documenting illicit connections, T.V. inspections have high costs unless the equipment is already owned or can be borrowed from neighboring agencies.

Guidance Source

Los Angeles County Model Stormwater Quality Management Program, 2003.

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Illicit Discharge Investigation and Elimination Guidance

Introduction

Once illicit discharges/disposal are detected and identified, they must be eliminated. Sometimes the source of the spill or discharge/disposal is apparent. The incident can be removed through voluntary cleanup/termination or enforcement procedures, and steps can be taken to prevent its recurrence. These prevention methods can include education and outreach materials for residents and businesses, preventive maintenance practices for infrastructure, vehicles and equipment or additional enforcement.

When the source of the discharge is not apparent, further investigation will be necessary to eliminate it and prevent it from recurring. The following discusses methods that can be used to document the incident, determine the nature of the material, and investigate the source.

Advance Planning

An effective investigation program requires good advance planning. Sufficient staff should be trained to conduct investigations so that qualified staff are available whenever investigations are necessary. Staff should become familiar with illicit discharge investigation and sampling procedures. General guidance follows below to assist with overall planning, but should not be considered complete for proper sampling quality assurance purposes.

Equipment

Appropriate equipment for field investigations may include:

Table 1: Typical Equipment for Investigations

Equipment Type	Equipment
General	Inspection checklist
	Field data log book
	Camera
	Tape measure
	Storm drain system map
	Flashlight
Flow measurement	Ping pong ball or other light floatable
	Stopwatch
Laboratory	Graduated container
	Temperature/pH/conductivity (EC) probe
	Field test kits (e.g., Lamotte test kit)
	12 1-liter amber glass sample bottles
	12 1-liter HDPE sample bottles
	Cooler with ice for sample preservation
	Gloves
	Splash goggles/safety glasses
	Deionized water in wash bottle
First Aid	First aid kit

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Data Collection

Before entering the field, the inspection crew should locate information such as the following on a storm drain/street map for areas that will be investigated:

- All known or suspected pollutant generating activities
- Locations of NPDES dischargers
- All locations where storm drains enter open channels
- Catch basins and storm drain manholes

Visual Observation

Visual observation of the storm drain system and/or of activities on the surface can provide information on the source of illicit discharges. It is the simplest method to begin with and the least costly. Evidence of illicit discharges may only consist of visual observations because most illicit discharges are intermittent and will probably not be flowing when inspected. A field inspection crew should investigate the surface drainage system in the vicinity of suspected illicit discharges. This may include accessible areas in the public right-of-way adjacent to residences and businesses, catch basins, open channels near known points of discharge, and upstream manholes.

Photos of visual observations should be taken to aid subsequent data analysis and follow up planning. The following types of visual observations should be recorded on an investigation checklist, such as the one attached:

- Location
- General site description
- Amount, appearance of discharge/disposal
- Stains
- Structural cracking and corrosion
- Vegetative growth
- Nearby facilities with poor outside housekeeping practices
- Pipes/hoses connected to/directed toward drainage system

If the source of the discharge is determined, appropriate methods should be used to eliminate it through voluntary cleanup/termination or enforcement procedures, and steps should be taken to prevent its recurrence.

Sampling and Testing

If flow is observed, and the source of the discharge is not apparent, the crew should collect a sample and measure flow. Several tests should be conducted to determine the nature of the material. This can be compared to records of local facilities and possible pollutant generating activities as an aid in determining the possible sources of the flow.

The sample should be measured for pH, temperature and conductivity (EC). If any of these parameters are abnormal, or strong odors or flow discoloration are detected, the sample should be analyzed. This can be done with a field test kit, which will detect the presence of copper, phenols, detergents, and chlorine. Findings should be recorded on the inspection checklist.

If visual observations are abnormal and/or the field tests detect high concentrations of any constituent, the crew should consider collecting samples for laboratory analysis. The laboratory can usually supply properly cleaned sample bottles and specify either amber glass or plastic (HDPE) bottles depending on the analyses required. If there is enough flow, the field crew should fill several of each type of bottle to obtain enough sample volume for a range of analyses. If there is a limited quantity or sampling is difficult, the field crew should collect as much sample as possible so that the laboratory can run a limited set of analyses. The samples should be placed in a cooler filled with ice and transported to the lab(s) on the same day. Arrangements should be made prior to the field inspection with an analytical laboratory capable of performing the required analyses.

The laboratory analyses run on each sample should be carefully considered. Given the potential high cost for laboratory work, it is prudent to limit the number of analytical parameters (or analytes) tested for each sample. Tests may be selected based on the findings of indicator analyses, visual observations, field tests, and information collected about the types of materials processed, stored and/or spilled within each drainage area.

Guidance Source

Los Angeles County Model Stormwater Quality Management Program, 2003.

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ILLICIT CONNECTION/ ILLICIT DISCHARGE INVESTIGATION REPORT

Response Time:
☐ 1-6 hrs. ☐ 13 hrs. ☐ 24 hrs. ☐ 48 hrs.

RESPONSE

Date:	Time:	Inspector:

INVESTIGATION

Location/ Address:

Reason for Investigation: ☐ Complaint ☐ Discharge/Spill Response ☐ Visual Monitoring
☐ Other: _____

Type of Material: ☐ Hazardous ☐ Wastewater ☐ Oil/Grease ☐ Soil/ Sediment ☐ Trash ☐ Sewage
☐ Fuel (Gas/Diesel) ☐ Chemicals ☐ Other _____

Estimated Quantity: ☐ Gallons ☐ Lbs.

Entered Storm Drain System: ☐ Yes ☐ No Storm Drain Location: _____	Entered Receiving Waters: ☐ Yes ☐ No Name of Receiving Water: _____

Observations

Field Testing: ☐ Yes ☐ No Details:	Sample Collected: ☐ Yes ☐ No Details:

Direct/ Constructed Connections Found: ☐ Yes ☐ No
Details:

RESPONSIBLE PARTY

Name:

Address:	Phone/ email:

Repeat Violation? ☐ Yes ☐ No

OUTREACH MATERIAL

Outreach Material Distributed: ☐ None ☐ General Information ☐ BMP Brochure ☐ Other _____

ENFORCEMENT

Enforcement: ☐ None ☐ Written Warning ☐ Notice of Violation ☐ Citation/Infraction ☐ Cease and Desist Order

Other Actions

FOLLOW-UP VISIT

Date:	Time:	Inspector:
Discharge Stopped? ☐ Yes ☐ No		Proper Clean-Up Action Taken: ☐ Yes ☐ No

Further Action Required: ☐ Yes ☐ No
Details:

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ILLICIT CONNECTION/ ILLICIT DISCHARGE REPORTING & RESPONSE

Received by:	
Date:	Time Received:

REPORTING PARTY	
Name:	Anonymous: ☐ Yes ☐ No
Address:	Phone/email:

INCIDENT	
Date:	Time:
Location/ Address:	
Land Use: ☐ Residential ☐ Commercial ☐ Industrial ☐ Public	
Type of Material: ☐ Hazardous ☐ Wastewater ☐ Oil/Grease ☐ Sediment ☐ Trash ☐ Other _____ ☐ Unknown	
Estimated Quantity: ☐ Gallons ☐ Lbs.	
Entered Storm Drain System/ Receiving Waters? ☐ Yes ☐ No	
Description / Details	
Agencies Contacted: ☐ Office of Emergency Services ☐ HazMat Team ☐ LA County ☐ Regional Board ☐ Other	
Source Investigation Conducted? ☐ Yes ☐ No	Source Identified? ☐ Yes ☐ No
Direct/ Constructed Connections Found? ☐ Yes ☐ No	

ALLEGED RESPONSIBLE PARTY	
Name:	
Address:	Phone/ email:
Vehicle License No:	

ACTION & CLOSURE	
Referred to:	Date:
Department:	Phone/ email:
Actions Taken/ Details	

Date Closed:

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Spill Prevention Coordination

Procedures

This attachment discusses spill prevention coordination procedures that identify:

- Divisions or sections responsible for responding to reports of spills
- General and specific spill response procedures including responsible division or section
- Spill response training activities
- Activities conducted to improve spill response procedures and equipment

Divisions or Sections Responsible for Responding to Reports of Spills

Identify the divisions or sections responsible for responding to reports of spills and note divisions or sections that respond to specific types of spills such as hazardous materials spills or sewage spills. Also indicate the specific field staff who respond to spills and the level of support they provide to lead emergency response agencies and source of spill investigations.

General and Specific Spill Response Procedures

Describe or reference general spill response procedures involved in responding to complaints and identifying spills through inspections. Include the spill response process from the spill identification stage through clean up and report preparation. Copies of the forms and reports prepared to document spills should also be included. Specific procedures for hazardous materials spills, floods, and sewage spills should be referenced. Contractor support for spill events, if applicable, should also be noted.

Spill Response Training Activities

Provide an overview of all spill response training that is conducted within the various divisions and sections of the agencies.

Activities to Improve Spill Response Procedures and Equipment

List all activities conducted within the implementing agency to improve spill response procedures and update equipment. Explain how improvements are identified, prioritized, and implemented. Include a schedule of how often spill response procedures and equipment are evaluate.

Spill Investigation, Containment and Cleanup

Investigation

Depending on the location of the spill and the type of material, the appropriate department/ agency should be notified. This may include:

- Storm drain maintenance, if the spill reaches the storm drain system
- Street and road maintenance, if the spill is in the public right-of-ways
- Sewer system maintenance, if the material is from the sewage system
- Industrial waste inspection, if the material is from industrial facilities
- Fire Departments/"first responders," if the material may be hazardous
- Contractors for hazardous materials, if the material is hazardous

These departments/agencies should determine the nature of the material and the extent of the spill. If any agency determines there is a chance that the spill involves hazardous materials, then the local Administering Agency will be notified. An example of spill investigation procedures is depicted in Figure D-1. Reporting procedures for hazardous substances are discussed further in Section 5 of this Illicit Connection/Illicit Discharge Elimination model program.

Containment and Cleanup

Once the nature and extent of the spill is determined, the appropriate departments and field superintendents will be notified to contain and clean up the spill. The three types of cleanup scenarios are (1) hazardous, (2) wastewater, and (3) other non-hazardous materials.

Hazardous

Handling procedures regarding releases of hazardous or potentially hazardous substances into the environment are covered in a number of federal and state regulations, including: Comprehensive Environmental Response, Compensation and Liability Act (CERCLA); Superfund Amendments and Reauthorization Act (SARA); Resource Conservation and Recovery Act (RCRA); and multiple bills codified under Division 20 of the California Health and Safety Code. These procedures are well established and are practiced by local hazardous materials response teams - generally a local Fire Department.

Material determined to be hazardous will be contained by the appropriate hazardous material response team. The team will contact an approved contractor for cleanup. Details are contained in the local *Emergency Response Procedures* manual.

Wastewater

Field crews responding to a sewage spill or overflow should contain the spill to prevent entry of the sewage into the storm drain system or natural watercourse. This will involve a coordinated effort between the sewer, street, and storm drain maintenance crews.

To the maximum extent possible, sewage should be prevented from entering the storm drain system by covering or blocking storm drain inlets and catch basins or by containing or diverting the overflow away from open channels and other storm drain fixtures (using sandbags, inflatable dams, etc.).

In the event that raw sewage enters a storm drain catch basin, where possible the sewage should be vacuumed or pumped out of the catch basin. If a sewage overflow enters a storm drain channel, where possible the downstream channel area should be blocked, flushed with potable water and the captured water pumped to a nearby sewer manhole. Any time a sewage spill enters the storm drain system and has the potential to reach coastal waterways, the local agency and L.A. County Dept. of Health Services, Bureau of Environmental Protection must be notified (323) 881-4147.

Once the spill is contained, it should be removed and the area disinfected. Every effort should be made to ensure that the disinfectant is not discharged to the storm drain system, using methods such as those described above.

Other Non-hazardous Materials

Non-hazardous materials should generally be removed by appropriate crews with knowledge of or jurisdiction over the location of the spill, as indicated in Section D.1. Because the situations and materials will vary widely, procedures will vary as well.

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All materials should be prevented from entering waterways to the maximum extent possible. Many materials in sufficient quantities can deplete the oxygen level in receiving waters, or smother benthic communities. Typical examples of these materials include landscape waste, milk, flour, and many other organic liquids and solids or fine powders. These materials should generally be removed by first collecting and/or sweeping up all solids and disposing them in a landfill or other approved location. Liquids should be diverted to an area away from waterways where they may be removed with a vacuum truck or can soak into the ground.

Guidance Source

Los Angeles County Model Stormwater Quality Management Program, 2003.

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ATTACHMENT D:
LEGAL AUTHORITY CERTIFICATIONS

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December 6, 2013

Sam Unger, Executive Officer
California Regional Water Quality Control Board
Los Angeles Region
320 W. 4th Street, Suite 200
Los Angeles, California 90013-1105

Re: Statement of Legal Authority

Dear Mr. Unger:

This letter is provided to serve as the Statement of Legal Authority for the City of Bellflower (the "City") that must be submitted with its Annual Report pursuant to Part VI.A.2.b. of Order No. R4-2012-0175 for NPDES Permit No. CAS004001. As legal counsel for the City, it is my considered legal opinion the City has all the necessary legal authority to implement and enforce the requirements contained in 40 CFR § 122.26(d)(2)(i)(A-F) and this Order during the reporting period of July 1, 2012 through June 30, 2013, to the extent permitted by State and Federal law, subject to the limitations on municipal action under the California and United States Constitutions.

Per the requirement in Part VI.A.2.b.i., here are citations to the Bellflower Municipal Code ("BMC") for each of the following requirements found in Part VI.A.2.a:

i. *Control the contribution of pollutants to its MS4 from storm water discharges associated with industrial and construction activity and control the quality of storm water discharged from industrial and construction sites. This requirement applies both to industrial and construction sites with coverage under an NPDES permit, as well as to those sites that do not have coverage under an NPDES permit.*

BMC Sections: 13.20.090 Control of Pollutants from Industrial and Commercial Facilities, 13.20.100 Control of Pollutants from Industrial Activities, 13.20.110 Control of Pollutants from Construction Activities Requiring General Construction Activity Stormwater Permit, and 13.20.120 Control of Pollutants from Other Construction Activities

ii. *Prohibit all non-storm water discharges through the MS4 to receiving waters not otherwise authorized or conditionally exempt pursuant to Part III.A.*

BMC Sections: 13.20.050 Illicit Discharges and Nonstormwater Discharges and 13.20.080 Reduction of Pollutants in Runoff

iii. *Prohibit and eliminate illicit discharges and illicit connections to the MS4.*

BMC Sections: 13.20.050 Illicit Discharges and Nonstormwater Discharges and 13.20.070 Illicit Connections

iv. *Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4.*

BMC Section: 13.20.060 Illegal Disposal/Dumping

v. *Require compliance with conditions in Permittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows);*

BMC Section: 13.20.140 Violation, Inspection, Enforcement

vi. *Utilize enforcement mechanisms to require compliance with applicable ordinances, permits, contracts, or orders.*

BMC Section: 13.20.140 Violation, Inspection, Enforcement

vii. *Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Co-permittees;*

BMC Sections: 13.20.050 Illicit Discharges and Nonstormwater Discharges and 13.20.080 Reduction of Pollutants in Runoff

viii. *Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation;*

BMC Sections: 13.20.050 Illicit Discharges and Nonstormwater Discharges and 13.20.080 Reduction of Pollutants in Runoff

ix. *Carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with applicable municipal ordinances, permits, contracts and orders, and with the provisions of this Order, including the prohibition of non-storm water discharges into the MS4 and receiving waters.*

This means the Permittee must have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from entities discharging into its MS4;

BMC Section: 13.20.140 Violation, Inspection, Enforcement

x. *Require the use of control measures to prevent or reduce the discharge of pollutants to achieve water quality standards/receiving water limitations;*

BMC Sections: 13.20.090 Control of Pollutants from Industrial and Commercial Facilities and 13.20.130 Control of Pollutants from New Development/Redevelopment Projects

xi. *Require that structural BMPs are properly operated and maintained;*

BMC Section: 13.20.130 Control of Pollutants from New Development/Redevelopment Projects

xii. *Require documentation on the operation and maintenance of structural BMPs and their effectiveness in reducing the discharge of pollutants to the MS4.*

BMC Section: 13.20.130 Control of Pollutants from New Development/Redevelopment Projects

Per the requirement in Part VI.A.2.b.ii., the City's legal procedures available to mandate compliance with applicable municipal ordinances identified in the above section, and therefore with the conditions of the Order, can be found in BMC Section 13.20.140 Violation, Inspection, Enforcement. Here is the relevant text of that provision:

13.20.140 Violation, Inspection, Enforcement.

A. Violation of any provision of this chapter, any stormwater pollution prevention plan or any permit issued pursuant to this chapter shall be a violation per Chapter 1.08.

B. The Director of Community Development, or the Director's designees, may issue notices of violation and administrative orders to achieve compliance with the provisions of this chapter. Failure to comply with the terms and conditions of such a notice of violation or an administrative order shall constitute a violation of this chapter.

C. The violation of any provision of this chapter is hereby declared to be a nuisance, and may be abated by the City in accordance with its authority to abate nuisances.

D. The remedies listed in this chapter are not exclusive of any other remedies available to the City under any applicable Federal, State or local law and it is within the discretion of the City to seek cumulative remedies.

[...]

F. The Director of Community Development, or the Director's designees, may issue notice of violation and administrative orders to any other person who has failed to comply with either a notice of violation or other administrative order an invoice for costs (invoice of cost) for reimbursement of the City's actual costs incurred in issuing and enforcement of any provision of this chapter.

G. The Director of Community Development, or the Director's designees, may require that any person engaged in any activity and/or owning or operating any facility which may cause or contribute to stormwater pollution or contamination, illicit discharges and/or discharge of nonstormwater to the stormwater system, undertake such monitoring activities and/or analysis and furnish such reports as the officer may specify. The burden, including costs, of these activities, analysis and reports shall bear a reasonable relationship to the need for the monitoring, analysis and the benefits to be obtained.

Thus, enforcement actions can be completed administratively or judicially if necessary.

Please contact the undersigned if you have any questions.

Sincerely,

ALESHIRE & WYNDER, LLP

Joseph W. Pannone
City Attorney for the City of Bellflower

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December 3, 2013

Mr. Sam Unger, Executive Officer
California Regional Water Quality Control Board
Los Angeles Region
320 W. 4th Street, Suite 200
Los Angeles, California 90013-1105

Re: Statement of Legal Authority

Dear Mr. Unger:

This letter is provided to serve as the Statement of Legal Authority for the City of Cerritos (the "City") that must be submitted with its Annual Report pursuant to Part VI.A.2.b. of Order No. R4-2012-0175 for NPDES Permit No. CAS004001. As legal counsel for the City, I have determined that it has all the necessary legal authority to implement and enforce the requirements contained in 40 CFR § 122.26(d)(2)(i)(A-F) and this Order during the reporting period of July 1, 2012 through June 30, 2013, to the extent permitted by State and Federal law, subject to the limitations on municipal action under the California and United States Constitutions.

Per the requirement in Part VI.A.2.b.i., here are citations to the City's Municipal Code for each of the following requirements found in Part VI.A.2.a:

i. *Control the contribution of pollutants to its MS4 from storm water discharges associated with industrial and construction activity and control the quality of storm water discharged from industrial and construction sites. This requirement applies both to industrial and construction sites with coverage under an NPDES permit, as well as to those sites that do not have coverage under an NPDES permit.*

   Municipal Code Sections: 6.32.050 Construction sites requiring building permit and/or grading plan and 6.32.060 Industrial activity sites

ii. *Prohibit all non-storm water discharges through the MS4 to receiving waters not otherwise authorized or conditionally exempt pursuant to Part III.A.*

   Municipal Code Section: 6.32.030 Illicit discharges and connections

//0.0

iii. *Prohibit and eliminate illicit discharges and illicit connections to the MS4.*

Municipal Code Section: 6.32.030 Illicit discharges and connections

iv. *Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4.*

Municipal Code Sections: 6.32.030 Illicit discharges and connections and 6.32.040 Illicit disposal

v. *Require compliance with conditions in Permittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows);*

Municipal Code Sections: 6.32.010 Purpose and 6.32.080 Violation—Penalty

vi. *Utilize enforcement mechanisms to require compliance with applicable ordinances, permits, contracts, or orders.*

Municipal Code Section: 6.32.080 Violation—Penalty

vii. *Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Co-permittees;*

Municipal Code Section: 6.32.030 Illicit discharges and connections

viii. *Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation;*

Municipal Code Section: 6.32.030 Illicit discharges and connections

ix. *Carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with applicable municipal ordinances, permits, contracts and orders, and with the provisions of this Order, including the prohibition of non-storm water discharges into the MS4 and receiving waters. This means the Permittee must have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from entities discharging into its MS4;*

Municipal Code Section: 6.32.080 Violation—Penalty, subsection (D)

x. *Require the use of control measures to prevent or reduce the discharge of pollutants to achieve water quality standards/receiving water limitations;*

Municipal Code Section: 6.32.030 Illicit discharges and connections

xi. *Require that structural BMPs are properly operated and maintained;*

Municipal Code Section: 6.32.055 Urban runoff mitigation plan for new development

xii. *Require documentation on the operation and maintenance of structural BMPs and their effectiveness in reducing the discharge of pollutants to the MS4.*

Municipal Code Section: 6.32.055 Urban runoff mitigation plan for new development

Per the requirement in Part VI.A.2.b.ii., the City's legal procedures available to mandate compliance with applicable municipal ordinances identified in the above section, and therefore with the conditions of the Order, can be found in Municipal Code Section 6.32.080 Violation—Penalty. Here is the relevant text of that provision:

6.32.080 Violation—Penalty.

(A) The violation of any provision of this chapter, or failure to comply with any of the requirements of this chapter, shall constitute a misdemeanor; except that notwithstanding any other provision of this chapter, any such violation constituting a misdemeanor under this chapter may, at the sole discretion of the authorized enforcement officer, by charged and prosecuted as an infraction.

(B) In addition to the penalties provided, any condition caused or permitted to exist in violation of any of the provisions of this chapter is a threat to the public health, safety and welfare, is declared and deemed a nuisance, may be summarily abated and/or restored by the authorized enforcement officer, and/or civil action to abate, enjoin or otherwise compel the cessation of such nuisance.

(1) The cost of such abatement and restoration shall be borne by the owner of the property and the cost thereof shall be invoiced to the owner of the property. If the invoice is not paid with sixty days, a lien shall be placed upon and against the property. If the lien is not satisfied within three months, the property may be sold in satisfaction thereof in a like manner as other real property is sold under execution.

(2) If any violation of this chapter constitutes a seasonal recurrent nuisance, the authorized enforcement officer shall so declare. Thereafter such seasonal and recurrent nuisance shall be abated every year without the necessity of any further hearing.

(3) In any administrative or civil proceeding under this chapter in which the city prevails, the city shall be awarded all costs of investigation, administrative overhead, out-of-pocket expenses, costs of suit and reasonable attorney fees.

(C) Penalties for Failure to Comply with BMPs. The authorized enforcement officer shall enforce this chapter as follows:

(1) For the first failure to comply with any provision of this chapter, the authorized enforcement officer shall issue to the affected person or business a written notice which includes the following information:

(a) A statement specifying the violation committed;

(b) A specified time period within which the affected person or business must correct the failure or file a written notice disputing the notice of failure to comply;

(c) A statement of the penalty for continued noncompliance.

(2) For each subsequent failure to comply with any provision of this chapter, following written notice issued pursuant to subsection (C)(1) of this section, the authorized enforcement officer may levy a penalty of one hundred dollars each day during which a person or business fails to comply with the provisions of this chapter. Each day following written notice shall constitute a separate offense. Said penalty shall be set by the city council resolution.

[…]

Thus, enforcement actions can be completed administratively or judicially if necessary.

Please contact the undersigned if you have any questions.

Sincerely,

ALESHIRE & WYNDER, LLP

Mark W. Steres
City Attorney for the City of Cerritos

//0.0

City of Downey

FUTURE UNLIMITED

YVETTE M. ABICH GARCIA
City Attorney

December 12, 2013

Mr. Sam Unger, Executive Officer
California Regional Water Quality Control Board
Los Angeles Region
320 W. 4th Street, Suite 200
Los Angeles, CA 90013-1105

RE: Legal Authority Certification for the City of Downey

Dear Mr. Unger:

As the City Attorney for the City of Downey, I have reviewed the City's existing ordinances, applicable statutes, and/or applicable contracts and have determined that as of the date of this letter, the City can operate pursuant to the legal authority required in 40 CFR 122.26(d)(2)(i)(A)-(F) and Part VI.A.2 of Order No. R4-2012-0175, issued by the Regional Water Quality Control Board – Los Angeles Region ("RWQCB"), adopted on December 28, 2012 and entitled "Waste Discharge Requirements for Municipal Separate Storm Sewer System (MS4) Discharges within the Coastal Watersheds of Los Angeles County, except those Discharges Originating from the City of Long Beach (MS4)" [NPDES No. CAS004001] (the "2012 NPDES Permit"). Enforcement of the City's storm water ordinances can be completed administratively or, if necessary, through the judicial system.

This letter is limited to the matters contained herein, and should not be read as expressing any opinion on any other matter except on the matters expressly set forth herein.

Please call the undersigned if you have any questions.

Sincerely,

CITY OF DOWNEY

Yvette M. Abich Garcia
City Attorney

cc: John L. Hunter & Associates

RB-AR7733

ATTACHMENT P

LEGAL AUTHORITY CERTIFICATION

COUNTY OF LOS ANGELES
OFFICE OF THE COUNTY COUNSEL
648 KENNETH HAHN HALL OF ADMINISTRATION
500 WEST TEMPLE STREET
LOS ANGELES, CALIFORNIA 90012-2713

TELEPHONE
(213) 974-1923
FACSIMILE
(213) 687-7337
TDD
(213) 633-0901

JOHN F. KRATTLI
County Counsel

December 16, 2013

Mr. Samuel Unger, P.E., Executive Officer
California Regional Water Quality Control Board – Los Angeles Region
320 West 4th Street, Suite 200
Los Angeles, CA 90013-2343

Attention: Mr. Ivar Ridgeway

Re: Certification By Legal Counsel For Los Angeles County Flood Control District's Annual Report

Dear Mr. Unger:

Pursuant to the requirements of Part VI(A)(2)(b) of Order No. R4-2012-0175 (the "Order"), the Office of the County Counsel of the County of Los Angeles makes the following certification in support of the Annual Report of the Los Angeles County Flood Control District ("LACFCD"):

Certification Pursuant To Order Part VI(A)(2)(b)

"*Each Permittee must submit a statement certified by its chief legal counsel that the Permittee has the legal authority within its jurisdiction to implement and enforce the requirements contained in 40 CFR §122.26(d)(2)(i)(A-F) and this Order.*"

LACFCD has the legal authority within its jurisdiction to implement and enforce each of the requirements contained in 40 CFR §122.26(d)(2)(i)(A-F) and the Order.

Order Part VI(A)(2)(b)(i)

"*Citation of applicable municipal ordinances or other appropriate legal authorities and their relationship to the requirements of 40 CFR §122.26(d)(2)(i)(A-F) and this Order*"

Citations Of Applicable Ordinances Or Other Legal Authorities

Although many portions of State law, the Charter of the County of Los Angeles, the Los Angeles County Code and LACFCD's Flood Control District Code ("Code") are potentially applicable to the implementation and enforcement of these requirements, the primary applicable laws and ordinances are as follows:

Los Angeles County Code, Title 12, Chapter 12.80 STORMWATER AND RUNOFF POLLUTION CONTROL, including:

§12.80.010 - §12.80.360 Definitions

§12.80.370 Short title.

§12.80.380 Purpose and intent.

§12.80.390 Applicability of this chapter.

§12.80.400 Standards, guidelines and criteria.

§12.80.410 Illicit discharges prohibited.

§12.80.420 Installation or use of illicit connections prohibited.

§12.80.430 Removal of illicit connection from the storm drain system.

§12.80.440 Littering and other discharge of polluting or damaging substances prohibited.

§12.80.450 Stormwater and runoff pollution mitigation for construction activity.

§12.80.460 Prohibited discharges from industrial or commercial activity.

§12.80.470 Industrial/commercial facility sources required to obtain a NPDES permit.

§12.80.480 Public facility sources required to obtain a NPDES permit.

§12.80.490 Notification of uncontrolled discharges required.

§12.80.500 Good housekeeping provisions.

§12.80.510 Best management practices for construction activity.

§12.80.520 Best management practices for industrial and commercial facilities.

§12.80.530 Installation of structural BMPs.

§12.80.540 BMPs to be consistent with environmental goals.

§12.80.550 Enforcement—Director's powers and duties.

§12.80.560 Identification for inspectors and maintenance personnel.

§12.80.570 Obstructing access to facilities prohibited.

§12.80.580 Inspection to ascertain compliance—Access required.

§12.80.590 Interference with inspector prohibited.

§12.80.600 Notice to correct violations—Director may take action.

§12.80.610 Violation a public nuisance.

§12.80.620 Nuisance abatement—Director to perform work when—Costs.

§12.80.630 Violation—Penalty.

§12.80.635 Administrative fines.

§12.80.640 Penalties not exclusive.

§12.80.650 Conflicts with other code sections.

§12.80.660 Severability.

§12.80.700 Purpose.

§12.80.710 Applicability.

§12.80.720 Registration required.

§12.80.730 Exempt facilities.

§12.80.740 Certificate of inspection—Issuance by the director.

§12.80.750 Certificate of inspection—Suspension or revocation.

§12.80.760 Certificate of inspection—Termination.

§12.80.770 Service fees.

§12.80.780 Fee schedule.

§12.80.790 Credit for overlapping inspection programs.

§12.80.800 Annual review of fees.

Los Angeles County Code, Title 12, Chapter 12.84 LOW IMPACT DEVELOPMENT STANDARDS, including:

§12.84.410 Purpose.

§12.84.420 Definitions.

§12.84.430 Applicability.

§12.84.440 Low Impact Development Standards.

§12.84.445 Hydromodification Control.

§12.84.450 LID Plan Review.

§12.84.460 Additional Requirements.

Los Angeles County Code, Title 22 PLANNING AND ZONING, Part 6 ENFORCEMENT PROCEDURES, including:

§22.60.330 General prohibitions.

§22.60.340 Violations.

§22.60.350 Public nuisance.

§22.60.360 Infractions.

§22.60.370 Injunction.

§22.60.380 Enforcement.

§22.60.390 Zoning enforcement order and noncompliance fee.

Los Angeles County Code, Title 26 BUILDING CODE, including:

§26.103 Violations And Penalties

§26.104 Organization And Enforcement

§26.105 Appeals Boards

§26.106 Permits

§26.107 Fees

§26.108 Inspections

LACFCD Code Chapter 21 - STORMWATER AND RUNOFF POLLUTION CONTROL including:

§21.01 Purpose and Intent

§21.03 Definitions

§21.05 Standards, Guidelines, and Criteria

§21.07 Prohibited Discharges

§21.09 Installation or Use of Illicit Connections Prohibited

§21.11 Littering Prohibited

§21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity

§21.15 Notification of Uncontrolled Discharges Required

§21.17 Requirement to Monitor and Analyze

§21.19 Conflicts With Other Code Sections

§21.21 Severability

§21.23 Violation a Public Nuisance

California Government Code §6502

California Government Code §23004

California Water Code §8100 *et. seq.*

Relationship Of Applicable Ordinances Or Other Legal Authorities To The Requirements of 40 CFR §122.26(d)(2)(i)(A-F) And The Order

Although, depending upon the particular issue, there may be multiple ways in which particular sections of the County of Los Angeles' ordinances, LACFCD's ordinances, and statutes relate to the requirements contained in 40 CFR §122.26(d)(2)(i)(A-F) and the Order, the table below indicates the basic relationship with Part VI(A)(2)(a) of the Order:

Order Part VI(A)(2)(a) Items	**Primary Applicable Ordinance/Statute**
i. Control the contribution of pollutants to its MS4 from storm water discharges associated with industrial and construction activity and control the quality of storm water discharged from industrial and construction sites. This requirement applies both to industrial and construction sites with coverage under an NPDES permit, as well as to those sites that do not have coverage under an NPDES permit.	Los Angeles County Code: §12.80.410 [illicit discharge prohibited]; §12.80.450 [construction] §12.80.460 [industrial and commercial] §12.80.470 and .480 [industrial and commercial NPDES requirements] §12.84.440 [LID standards] §12.84.445 [hydromodification control] §12.84.450 [LID Plan Review] §22.60.330 [general prohibitions] §22.60.340 [violations] §22.60.350 [public nuisance] §22.60.360 [infractions] §22.60.370 [injunction] §22.60.380 [enforcement.] §22.60.390 [zoning enforcement order] §26.103 [violations and penalties]

Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
	§26.104 [enforcement] §26.106 [permits] §26.108 [inspections] LACFCD Code: §21.05 Standards, Guidelines, and Criteria §21.07 Prohibited Discharges §21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity §21.15 Notification of Uncontrolled Discharges Required §21.17 Requirement to Monitor and Analyze §21.23 Violation a Public Nuisance
ii. Prohibit all non-storm water discharges through the MS4 to receiving waters not otherwise authorized or conditionally exempt pursuant to Part III.A.	Los Angeles County Code: §12.80.410 [illicit discharge prohibited] LACFCD Code: §21.07 Prohibited Discharges
iii. Prohibit and eliminate illicit discharges and illicit connections to the MS4.	Los Angeles County Code: §12.80.410 [illicit discharge prohibited]; §12.80.420 [illicit connections prohibited] LACFCD Code: §21.05 Standards, Guidelines, and Criteria §21.07 Prohibited Discharges §21.09 Installation or Use of Illicit Connections Prohibited §21.23 Violation a Public Nuisance

Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
iv. Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4.	Los Angeles County Code: §12.80.410 [illicit discharge prohibited]; §12.80.440 [littering and other polluting prohibited] LACFCD Code: §19.07 Interference With or Placing Obstructions, Refuse, Contaminating Substances, or Invasive Species in Facilities Prohibited §21.05 Standards, Guidelines, and Criteria §21.07 Prohibited Discharges §21.09 Installation or Use of Illicit Connections Prohibited §21.11 Littering Prohibited §21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity §21.15 Notification of Uncontrolled Discharges Required §21.17 Requirement to Monitor and Analyze §21.23 Violation a Public Nuisance
v. Require compliance with conditions in Permittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows).	Los Angeles County Code: §12.80.490 [notification of uncontrolled discharge] §12.80.570 [obstructing access to facilities] §12.80.580 [compliance inspection] §12.80.610 [violation a nuisance] §12.620 [nuisance abatement] §12.80.635 [violation penalty]

Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
	§12.80.640 [penalties not exclusive] §12.84.440 [LID standards] §12.84.445 [hydromodification control] §12.84.450 [LID Plan Review] §22.60.330 [general prohibitions] §22.60.340 [violations] §22.60.350 [public nuisance] §22.60.360 [infractions] §22.60.370 [injunction] §22.60.380 [enforcement.] §22.60.390 [zoning enforcement order] §26.103 [violations and penalties] §26.104 [enforcement] §26.106 [permits] §26.108 [inspections] LACFCD Code: §19.11 Violation a Public Nuisance §21.05 Standards, Guidelines, and Criteria §21.07 Prohibited Discharges §21.09 Installation or Use of Illicit Connections Prohibited §21.11 Littering Prohibited §21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity §21.15 Notification of Uncontrolled Discharges Required §21.17 Requirement to Monitor and Analyze

Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
	§21.19 Conflicts With Other Code Sections §21.23 Violation a Public Nuisance
vi. Utilize enforcement mechanisms to require compliance with applicable ordinances, permits, contracts, or orders.	Same as item v., above
vii. Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Copermittees.	California Government Code §6502 California Government Code §23004
viii. Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation.	California Government Code §6502 California Government Code §23004
ix. Carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with applicable municipal ordinances, permits, contracts and orders, and with the provisions of this Order, including the prohibition of non-storm water discharges into the MS4 and receiving waters. This means the Permittee must have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from entities discharging into its MS4.	Los Angeles County Code: §12.80.490 [notification of uncontrolled discharge] §12.80.570 [obstructing access to facilities] §12.80.580 [compliance inspection] §12.80.610 [violation a nuisance] §12.80.620 [nuisance abatement] §12.80.635 [violation penalty] §12.80.640 [penalties not exclusive] §22.60.380 [enforcement.] §26.106 [permits] §26.108 [inspections]

Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
	LACFCD Code: §21.05 Standards, Guidelines, and Criteria §21.07 Prohibited Discharges §21.09 Installation or Use of Illicit Connections Prohibited §21.11 Littering Prohibited §21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity §21.15 Notification of Uncontrolled Discharges Required §21.17 Requirement to Monitor and Analyze §21.23 Violation a Public Nuisance
x. Require the use of control measures to prevent or reduce the discharge of pollutants to achieve water quality standards/receiving water limitations.	Los Angeles County Code: §12.80.450 [construction mitigation] §12.80.500 [good housekeeping practices] §12.80.510 [construction BMPs] §12.80.520 [industrial/commercial BMPs] §12.84.440 [LID standards] §12.84.450 [LID Plan Review] §22.60.330 [general prohibitions] §22.60.380 [enforcement.] §22.60.390 [zoning enforcement order] §26.106 [permits] §26.108 [inspections] LACFCD Code: §21.05 Standards, Guidelines, and Criteria

Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
	§21.07 Prohibited Discharges §21.09 Installation or Use of Illicit Connections Prohibited §21.11 Littering Prohibited §21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity §21.15 Notification of Uncontrolled Discharges Required §21.17 Requirement to Monitor and Analyze §21.23 Violation a Public Nuisance
xi. Require that structural BMPs are properly operated and maintained.	Los Angeles County Code: §12.80.530 [installation of structural BMPs] §22.60.380 [enforcement.] §22.60.390 [zoning enforcement order] §26.106 [permits] §26.108 [inspections] LACFCD Code: §21.05 Standards, Guidelines, and Criteria §21.07 Prohibited Discharges §21.09 Installation or Use of Illicit Connections Prohibited §21.11 Littering Prohibited §21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity §21.15 Notification of Uncontrolled Discharges Required §21.17 Requirement to Monitor and Analyze

Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
	§21.23 Violation a Public Nuisance
xii. Require documentation on the operation and maintenance of structural BMPs and their effectiveness in reducing the discharge of pollutants to the MS4.	Los Angeles County Code: §12.80.530 [installation of structural BMPs] §22.60.380 [enforcement.] §22.60.390 [zoning enforcement order] §26.106 [permits] §26.108 [inspections] LACFCD Code: §21.05 Standards, Guidelines, and Criteria §21.07 Prohibited Discharges §21.09 Installation or Use of Illicit Connections Prohibited §21.11 Littering Prohibited §21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity §21.15 Notification of Uncontrolled Discharges Required §21.17 Requirement to Monitor and Analyze §21.23 Violation a Public Nuisance

Order Part VI(A)(2)(b)(ii)

"*Identification of the local administrative and legal procedures available to mandate compliance with applicable municipal ordinances identified in subsection (i) above and therefore with the conditions of this Order, and a statement as to whether enforcement actions can be completed administratively or whether they must be commenced and completed in the judicial system.*"

The local administrative and legal procedures available to mandate compliance with the above ordinances are specified in those ordinances, particularly in:

Los Angeles County Code:

§12.80.550 Enforcement—Director's powers and duties.

§12.80.600 Notice to correct violations—Director may take action.

§12.80.610 Violation a public nuisance.

§12.80.620 Nuisance abatement—Director to perform work when—Costs.

§12.80.630 Violation—Penalty.

§12.80.635 Administrative fines.

§12.80.640 Penalties not exclusive.

§12.84.450 LID Plan Review.

§12.84.460 Additional Requirements.

Title 26, §103 Violations And Penalties

Title 26, §104 Organization And Enforcement

Title 26, §105 Appeals Boards

Title 26, §106 Permits

§22.60.330 General prohibitions.

§22.60.340 Violations.

§22.60.350 Public nuisance.

§22.60.360 Infractions.

§22.60.370 Injunction.

§22.60.380 Enforcement.

§22.60.390 Zoning enforcement order and noncompliance fee.

LACFCD Code:

§21.05 Standards, Guidelines, and Criteria

§21.07 Prohibited Discharges

§21.09 Installation or Use of Illicit Connections Prohibited

§21.11 Littering Prohibited

§21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity

§21.15 Notification of Uncontrolled Discharges Required

§21.17 Requirement to Monitor and Analyze

§21.23 Violation a Public Nuisance

LACFCD attempts to first resolve each enforcement action administratively. However, the above cited ordinances also provide LACFCD with the authority to pursue such actions in the judicial system as necessary.

Very truly yours,

JOHN F. KRATTLI
County Counsel

By
JUDITH A. FRIES
Principal Deputy County Counsel
Public Works Division

JAF:jyj

STEVEN N. SKOLNIK

Attorney at Law
15332 Antioch Street, #436
Pacific Palisades, California 90272
Telephone: (310) 459-3418 Facsimile: (310) 606-2775
E-Mail: sskolniklaw@gmail.com

December 9, 2013

Lisa Rapp, Director of Public Works
City of Lakewood
5050 Clark Avenue
Lakewood, CA 90712

Re: Order No. R4-2012-0175
NPDES No. CAS004001

Dear Ms. Rapp:

In my capacity as City Attorney for the City of Lakewood (the "City"), I hereby confirm that the City has the legal authority within its jurisdiction to implement and enforce each of the requirements contained in 40 CFR @ 122.26(d)(2)(i)(A-F) and the Order referenced above. Such legal authority is derived from Article 11, Section 7 of the California Constitution, Section 13002 of the California Water Code, and Section 5801 of the Lakewood Municipal Code, which incorporates by reference the pertinent provisions of the Los Angeles County Code.

The City is authorized to take enforcement action by administrative proceedings or in the judicial system.

Very truly yours,

Steven N. Skolnik

STATEMENT OF LEGAL AUTHORITY

Pursuant to Part VI.A.2.b. of Order No. R4-2012-0175, the City of Paramount has all the necessary legal authority to implement and enforce the requirements contained in 40 CFR § 122.26(d)(2)(i)(A-F) and this Order during the reporting period of July 1, 2012 through June 30, 2013. This is made evident by municipal code citation to each of the following requirements found in Part VI.A.2.a:

1. Control the contribution of pollutants to its MS4 from storm water discharges associated with industrial or commercial activity and control the quality of storm water discharged from industrial and commercial sites. This requirement applies both to industrial and commercial sites with coverage under an NPDES permit, as well as to those sites that do not have coverage under an NPDES permit.
   Municipal Code Section: Sec. 48-3.5. Prohibited discharges from industrial or commercial activity
2. Prohibit all non-storm water discharges through the MS4 to receiving waters not otherwise authorized or conditionally exempt pursuant to Part III.A.
   Municipal Code Section: Sec. 48-3.3. Littering and other discharge of polluting or damaging substances prohibited
3. Prohibit and eliminate illicit discharges and illicit connections to the MS4.
   Municipal Code Section: Sec. 48-3. Illicit discharges prohibited and Sec. 48-3.1. Installation or use of illicit connections prohibited
4. Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4.
   Municipal Code Section: Sec. 48-3.3. Littering and other discharge of polluting or damaging substances prohibited
5. Require compliance with applicable Permittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows);
   Municipal Code Section: Sec. 48-3.8. Notification of uncontrolled discharges required.
6. Utilize enforcement mechanisms to require compliance with applicable ordinances, permits, contracts, or orders.
   Municipal Code Section: Sec. 48-5. Enforcement - Director's powers and duties
7. Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Co-permittees;
   Municipal Code Section: Sec. 48-3.3. Littering and other discharge of polluting or damaging substances prohibited and Sec. 48-2.1. Purpose and Intent.
8. Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation;
   Municipal Code Section: Sec. 48-3.3. Littering and other discharge of polluting or damaging substances prohibited and Sec. 48-2.1. Purpose and Intent.

RB-AR7751

9. Carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with applicable municipal ordinances, permits, contracts and orders, and with the provisions of this Order, including the prohibition of non-storm water discharges into the MS4 and receiving waters. This means the Permittee must have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from entities discharging into its MS4;
   Municipal Code Section: Sec. 48-5.3. Inspection to ascertain compliance - Access
10. Require the use of control measures to prevent or reduce the discharge of pollutants to achieve water quality standards/receiving water limitations;
    Municipal Code Section: Sec. 48-5.4. Notice to correct violations - Director may take action
11. Require that structural BMPs are properly operated and maintained.
    Municipal Code Section: Sec. 48-4.1. Best management practices for construction activity, 48-42, best managerial practices for industrial and commercial facilities.
12. Require documentation on the operation and maintenance of structural BMPs and their effectiveness in reducing the discharge of pollutants to the MS4.
    Municipal Code Section: Sec. 48-4.3. Installation of structural BMPs

The City of Paramount legal procedures available to mandate compliance with applicable municipal ordinances identified in the above section, and therefore with the conditions of the Order, can be found in Section *Sec. 48-5. Enforcement - Director's powers and duties*. Violations of this section are deemed a "Public Nuisance" in section 48-5.5, where any discharge in violation of this chapter, any illicit connection, and/or any violation of runoff management requirements shall constitute a threat to public health and safety.

Signature: John E Cavanaugh.
John E. Cavanaugh, City Attorney

Date: 12-3-13

RB-AR7752

ALESHIRE & WYNDER LLP
ATTORNEYS AT LAW

Respond to Orange County
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awattorneys.com

December 3, 2013

Mr. Sam Unger, Executive Officer
California Regional Water Quality Control Board
Los Angeles Region
320 W. 4th Street, Suite 200
Los Angeles, California 90013-1105

Re: Legal Authority Statement

Dear Mr. Unger:

This letter is provided to serve as the Statement of Legal Authority for the City of Signal Hill (the "City") that must be submitted with its Annual Report pursuant to Part VI.A.2.b. of Order No. R4-2012-0175 for NPDES Permit No. CAS004001. As legal counsel for the City, I have determined that it has all the necessary legal authority to implement and enforce the requirements contained in 40 CFR § 122.26(d)(2)(i)(A-F) and this Order during the reporting period of July 1, 2012 through June 30, 2013, to the extent permitted by State and Federal law, subject to the limitations on municipal action under the California and United States Constitutions.

Per the requirement in Part VI.A.2.b.i., here are citations to the City's Municipal Code for each of the following requirements found in Part VI.A.2.a:

i. *Control the contribution of pollutants to its MS4 from storm water discharges associated with industrial and construction activity and control the quality of storm water discharged from industrial and construction sites. This requirement applies both to industrial and construction sites with coverage under an NPDES permit, as well as to those sites that do not have coverage under an NPDES permit.*

   Municipal Code Sections: 12.16.060 Illicit discharges, 12.16.100 Compliance with state and federal discharge requirements, and 12.16.112 Construction pollutant reduction

ii. *Prohibit all non-storm water discharges through the MS4 to receiving waters not otherwise authorized or conditionally exempt pursuant to Part III.A.*

Municipal Code Section: 12.16.060 Illicit discharges

iii. *Prohibit and eliminate illicit discharges and illicit connections to the MS4.*

Municipal Code Sections: 12.16.050 Illicit connections prohibited and 12.16.060 Illicit discharges

iv. *Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4.*

Municipal Code Sections: 12.16.060 Illicit discharges and 12.16.080 Littering

v. *Require compliance with conditions in Permittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows);*

Municipal Code Section: 12.16.120 Inspection and enforcement

vi. *Utilize enforcement mechanisms to require compliance with applicable ordinances, permits, contracts, or orders.*

Municipal Code Section: 12.16.120 Inspection and enforcement

vii. *Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Co-permittees;*

Municipal Code Sections: 12.16.020 Purpose and intent and 12.16.120 Inspection and enforcement

viii. *Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation;*

Municipal Code Sections: 12.16.020 Purpose and intent and 12.16.120 Inspection and enforcement

ix. *Carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with applicable municipal ordinances, permits, contracts and orders, and with the provisions of this Order, including the prohibition of non-storm water discharges into the MS4 and receiving waters. This means the Permittee must have authority to enter, monitor, inspect, take*

measurements, review and copy records, and require regular reports from entities discharging into its MS4;

Municipal Code Section: 12.16.120 Inspection and enforcement

x. *Require the use of control measures to prevent or reduce the discharge of pollutants to achieve water quality standards/receiving water limitations;*

Municipal Code Sections: 12.16.060 Illicit discharges, 12.16.114 New development/redevelopment pollutant reduction, and 12.16.116 Small site new development/ redevelopment pollutant reduction

xi. *Require that structural BMPs are properly operated and maintained;*

Municipal Code Sections: 12.16.114 New development/redevelopment pollutant reduction and 12.16.116 Small site new development/ redevelopment pollutant reduction

xii. *Require documentation on the operation and maintenance of structural BMPs and their effectiveness in reducing the discharge of pollutants to the MS4.*

Municipal Code Section: 12.16.114 New development/redevelopment pollutant reduction and 12.16.116 Small site new development/ redevelopment pollutant reduction

Per the requirement in Part VI.A.2.b.ii., the City's legal procedures available to mandate compliance with applicable municipal ordinances identified in the above section, and therefore with the conditions of the Order, can be found in Municipal Code Section 12.16.120 Inspection and enforcement. Here is the relevant text of that provision:

"12.16.120 Inspection and enforcement.

[...]

B. Enforcement.

1. Any violation of this chapter is a misdemeanor and shall be punishable by either a fine of up to one thousand dollars or six months in the county jail, or both.

2. Any person who may otherwise be charged with a misdemeanor as a result of a violation of this chapter may be charged, at the discretion of the prosecuting attorney, with an infraction punishable by a fine of not more than one

hundred dollars for the first violation, two hundred dollars for the second violation, and two hundred fifty dollars for each additional violation thereafter.

3. As a part of any sentence or other penalty imposed or the award of any damage, the court may also order that restitution be paid to the City or any injured person, or, in the case of a violator who is a minor, by the minor's parent or lawfully designated guardian or custodian. Restitution may include the amount of any reward.

4. Any person violating the provisions of this chapter shall reimburse the City for any and all costs incurred by the City in responding to, investigating, assessing, monitoring, treating, cleaning, removing, or remediating any Illicit Discharge or Pollutant from the municipal storm drain system; rectifying any Illicit Connection; or remediating any violation of this chapter.

Such costs to be paid to the City include all administrative expenses and all legal expenses, including costs and attorneys' fees, in obtaining compliance, and in litigation including all costs and attorneys' fees on any appeal. The costs to be recovered in this Section 12.16.120 shall be recoverable from any and all persons violating this chapter.

5. In the event any violation of this chapter constitutes an imminent danger to public health, safety, or the environment, the City Manager or Director, or any authorized agent thereof, may enter upon the premises from which the violation emanates, abate the violation and danger created to the public safety or the environment, and restore any premises affected by the alleged violation, without notice to or consent from the owner or occupant of the premises. An imminent danger shall include but is not limited to exigent circumstances created by the Discharge of Pollutants, where such Discharge presents a significant and immediate threat to the public health or safety, or the environment.

6. Violations of this chapter may further be deemed to be a public nuisance which may be abated by administrative or civil or criminal action in accordance with the terms and provisions of this code and state law.

7. All costs and fees incurred by the City as a result of any violation of this chapter which constitute a nuisance, including all administrative fees and expenses and legal fees and expenses, shall become a lien against the subject premises from which the nuisance emanated and a personal obligation against the owner, in accordance with Government Code Sections 38773.1 and 38773.5. The owner of record of the premises subject to any lien shall receive notice of the lien prior to recording, as required by Government Code Section 38773.1. The City Attorney is authorized to collect nuisance abatement costs or enforce a nuisance lien in an action brought for money judgment, or by delivery to the county

assessor of a special assessment against the premises in accordance with the conditions and requirements of Government Code Section 38773.5.

8. Any person acting in violation of this chapter may also be acting in violation of the Clean Water Act or the California Porter-Cologne Act (California Water Code Section 13000 et seq.) and the regulations thereunder, and other laws and regulations, and may be subject to damages, fines and penalties, including civil liability under such other laws. The City Attorney is authorized to file a citizen's suit pursuant to the Clean Water Act, seeking penalties, damages and orders compelling compliance and appropriate relief.

9. The City Attorney is authorized to file in a court of competent jurisdiction a civil action seeking an injunction against any violation or threatened or continuing violation of this chapter. Any temporary, preliminary or permanent injunction issued pursuant hereto may include an order for reimbursement to the City for all costs incurred in enforcing this chapter, including costs of inspection, investigation, monitoring, treatment, abatement, removal or remediation undertaken by or at the expense of the city, and may include all legal expenses and fees and any and all costs incurred relating to the restoration or remediation of the environment.

10. Each separate Discharge in violation of this chapter and each day a violation of this chapter exists, without correction, shall constitute a new and separate violation punishable as a separate infraction, misdemeanor and/or civil violation.

11. Whenever necessary, interagency coordination will be employed to enforce the provisions of this chapter.

12. The City may utilize any and all other remedies as otherwise provided by law."

Thus, enforcement actions can be completed administratively or judicially if necessary.

Please contact the undersigned if you have any questions.

Sincerely,

ALESHIRE & WYNDER, LLP

David J. Aleshire
City Attorney for the City of Signal Hill

ATTACHMENT E:

COORDINATED INTEGRATED MONITORING PLAN (CIMP)

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LOS CERRITOS CHANNEL
WATERSHED GROUP

Los Cerritos Channel

Coordinated Integrated Monitoring Program

Participants:

Bellflower
Cerritos
Downey
Lakewood
Long Beach
Paramount
Signal Hill
Los Angeles County Flood Control District

Prepared by:

KINNETIC LABORATORIES INCORPORATED

June 27, 2014

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ACRONYMS

ALERT	Automatic Local Evaluation in Real Time
AMEL	Average Monthly Effluent Limitation
Basin Plan	*Water Quality Control Plan for the Coastal Watersheds of Los Angeles and Ventura Counties*
BMP	Best Management Practices
BPJ	Best Professional Judgment
BOD	Biochemical Oxygen Demand 5-day @ 20 °C
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CIMP	Coordinated Integrated Monitoring Program
CL	Control Limit
COD	Chemical Oxygen Demand
CTR	California Toxics Rule
CV	Coefficient of Variation
CWA	Clean Water Act
CWC	California Water Code
Discharger	Los Angeles County MS4 Permittees
DNQ	Detected But Not Quantified
EFA	Effective Filtration Area
ELAP	California Department of Public Health Environmental Laboratory Accreditation Program
Facility	Los Angeles County MS4s
FIB	Fecal Indicator Bacteria
GIS	Geographical Information System
gpd	gallons per day
HUC	Hydrologic Unit Code
IC50	Concentration at which the organism is 50% inhibited
IC/ID	Illicit Connection and Illicit Discharge Elimination
LA	Load Allocations
LARWQCB	Regional Water Quality Control Board, Los Angeles
LID	Low Impact Development
LOEC	Lowest Observed Effect Concentration
MAL	Municipal Action Limits
MCM	Minimum Control Measure
mg/L	milligrams per Liter
MDEL	Maximum Daily Effluent Limitation
µg/L	micrograms per Liter
MEC	Maximum Effluent Concentration
MGD	Million Gallons Per Day
ML	Minimum Level
MRP	Monitoring and Reporting Program

MS4	Municipal Separate Storm Sewer System
ND	Not Detected
NOEC	No Observable Effect Concentration
NPDES	National Pollutant Discharge Elimination System
NTR	National Toxics Rule
QA	Quality Assurance
QA/QC	Quality Assurance/Quality Control
Ocean Plan	Water Quality Control Plan for Ocean Waters of California
ORI	Outfall Reconnaissance Inventory
PWS	Primary Watershed Segment
PES	Polyester-reinforced polysulfone
RAP	Reasonable Assurance Program
Regional Water Board	California Regional Water Quality Control Board, Los Angeles Region
RPA	Reasonable Potential Analysis
RWL	Receiving Water Limitations
SIP	State Implementation Policy (Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California)
SMR	Self-Monitoring Reports
SQO	Sediment Quality Objective
SSC	Suspended Sediment Concentration
State Water Board	California State Water Resources Control Board
SWS	Secondary Watershed Segment
TAC	Test Acceptability Criteria
TIE	Toxicity Identification Evaluation
TMDL	Total Maximum Daily Load
TOC	Total Organic Carbon
TRE	Toxicity Reduction Evaluation
TSD	Technical Support Document
TSS	Total Suspended Solid
TU_c	Chronic Toxicity Unit
USEPA	United States Environmental Protection Agency
WDR	Waste Discharge Requirements
WET	Whole Effluent Toxicity
WLA	Waste Load Allocations
WMA	Watershed Management Area
WMMS	Watershed Management Modeling System
WMP	Watershed Management Program
WQBELs	Water Quality-Based Effluent Limitations
WQS	Water Quality Standards
%	Percent

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COORDINATED INTEGRATED MONITORING PROGRAM
FOR THE
LOS CERRITOS CHANNEL WATERSHED GROUP

1. Introduction

A Coordinated Integrated Monitoring Program (CIMP) is required to be submitted either separately or as part of a Watershed Management Plan (WMP). The CIMP is required to integrate requirements of the current Los Angeles County MS4 Permit, the City of Long Beach MS4 permit and TMDL monitoring requirements. This plan was developed to address five primary objectives which include:

- Assess the chemical, physical, and biological impacts of discharges from the MS4s on receiving waters.
- Assess compliance with receiving water limitations and water quality-based effluent limitations (WQBELs) established to implement TMDL wet and dry weather load allocations
- Characterize pollutant loads in MS4 discharges.
- Identify sources of pollutants in MS4 discharges.
- Measure and improve the effectiveness of pollutant controls implemented under the new MS4 permits.

The approach presented in this CIMP incorporates all objectives of the MRP but provides a customized approach to address the objectives identified in the MRP for Stormwater Outfall Monitoring based upon the unique characteristics of the Los Cerritos Channel (LCC) watershed. Unlike other Watershed Management Groups (WMGs) in Los Angeles County, the LCC watershed does not receive flow from other WMGs. External contributions of contaminants are limited to atmospheric deposition originating predominantly from major transportation corridors and facilities.

Figure 1-1 provides a summary of all jurisdictions that are participating in both the Watershed Management Plan (WMP) and the CIMP. The Los Angeles County Flood Control District includes the entire area addressed by the Los Cerritos Channel WMP and CIMP.

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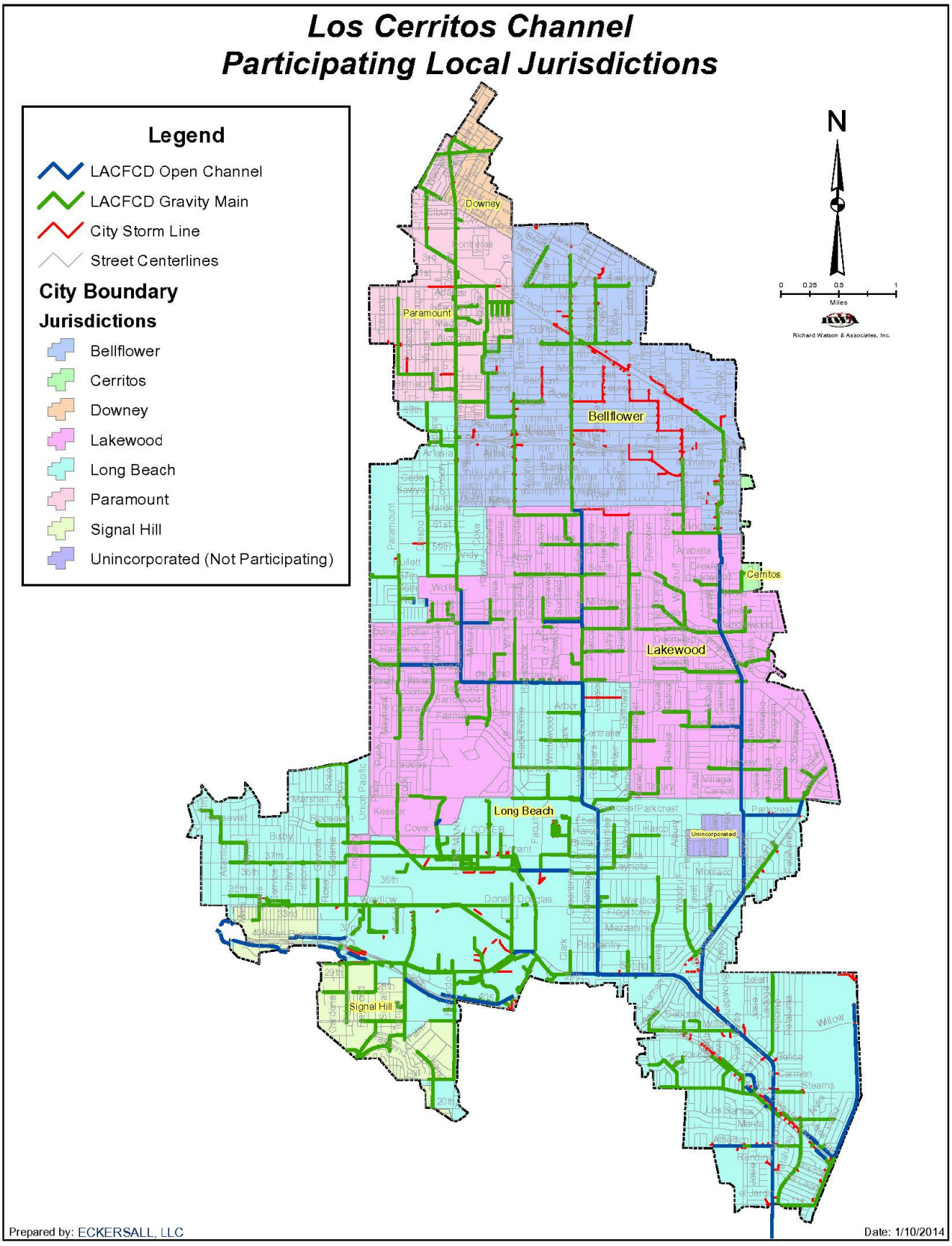

Figure 1-1. Jurisdictions Participating in the WMP and CIMP.

1.1 Monitoring Objectives

The Permit Monitoring and Reporting Program (MRP) for Los Angeles County[1] and the City of Long Beach[2] have equivalent requirements. The Los Cerritos Channel watershed is located in areas covered by both permits but the requirements differ only in terms of schedules. The City of Long Beach opted to participate in the WMP and CIMP being developed under the Los Angeles County Permit schedule but the major elements and primary objectives listed below are identical. The CIMP is required to incorporate the following elements and address the established objectives under each element.

- Receiving Water Monitoring (Wet and Dry Weather) (Part II.E.1 of the MRP)
    - Are receiving water limitations being met?
    - Are there trends in pollutant concentrations over time or during specified conditions?
    - Are designated beneficial uses fully supported as determined by water chemistry, aquatic toxicity, and bioassessment monitoring?
- Stormwater Outfall Monitoring (Part II.E. 2 of the MRP)
    - How does the quality of the permittees' discharges compare to Municipal Action Limits (MALs)?
    - Are the permittees' discharges in compliance with applicable stormwater WQBELs derived from TMDL WLAs?
    - Do the permittees' discharges cause or contribute to an exceedance of the receiving water limitations?
- Non-Stormwater Outfall Based Monitoring (Part II.E.3 of the MRP)
    - Are the permittees' discharges in compliance with non-stormwater WQBELs derived from TMDL WLAs.
    - How does the quality of the permittees' discharges compare to Non-Stormwater Action Levels?
    - Do the permittees' discharges cause or contribute to an exceedance of the receiving water limitations?
    - Do the permittees comply with the requirements of the Illicit Connection and Illegal Discharge Program?
- New Development/Re-Development Effectiveness Tracking (Part II.E.4 of the MRP)
    - Are the conditions established in building permits issued by the Permittees being met?
    - Are stormwater volumes associated with the design storm effectively retained on-site?
- Regional Studies
    - How do the permittees plan to participate in efforts to characterize the impact of the MS4 on receiving waters? Include participation in regional studies with the Southern California Stormwater Monitoring Coalition (SMC) and any special studies specified in TMDLs.

[1] Order No. R4-2012-0175, NPDES Permit No. CAS004001

[2] Order No. R4-2014-0024, NPDES Permit No. CAS004003

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1.2 Monitoring Sites and Approach

The approach presented in this CIMP incorporates all objectives of the MRP but provides a customized approach to address the objectives identified in the MRP for Stormwater Outfall Monitoring based upon the unique characteristics of the Los Cerritos Channel (LCC) watershed. Unlike other Watershed Management Groups (WMGs) in Los Angeles County, the LCC watershed does not receive flow from other WMGs. External contributions of contaminants are limited to atmospheric deposition originating predominantly from major transportation corridors and facilities.

1.2.1 Receiving Water

Receiving water quality monitoring will be conducted at the historic Los Cerritos Channel site at Stearns Street (LLAR1). Originally, this location was considered a mass emission monitoring site for the City's stormwater program since it captures runoff stormwater that originates from a large segment of the City. This site is also the compliance monitoring site for TMDL monitoring. This site is located about 100 feet downstream of a former gaging station (Figure 1-2) and effectively marks the downstream extent of freshwater influences within the Channel. During low tides, freshwater extends down to the end of the concrete-line channel below Atherton St. LCC1 marks the upper extent of tidal influence for all but the most extreme high tides. The portion of the Los Cerritos Channel listed as impaired for metals was identified as the 2.1 mile freshwater portion above the tidal prism. EPA (2010) used data from 10 years of both wet and dry weather monitoring at the LCC1 to establish the freshwater metals TMDL for the Los Cerritos Channel. This site now has a record of stormwater and dry weather water quality measurements that extend back for 13 years using consistent methods and, in most cases, consistent detection limits applicable to current receiving water limitations (RWLs).

1.2.2 Primary Watershed Segmentation (PWS) Monitoring

Stormwater outfall monitoring in the LCC watershed will be addressed by partitioning the watershed into segments that correspond to those used in the Los Cerritos Metals TMDLs to develop a model for estimating flow and pollutant loads. This allows the modeling information to be used to assist in directing sampling efforts to target areas of the watershed believed to contribute the greater loads and verify the accuracy of the model. If the monitoring program identifies a segment of the watershed as contributing significantly higher pollutants loads than the segments, then further monitoring will be conducted to further identify and isolate the source. This forensic monitoring would further partition the watershed by monitoring of Secondary Watershed Segmentation (SWS) using more portable sampling stations.

PWS sampling is intended to assist in determining whether the permittee's discharges are causing or contributing to exceedance of receiving water limitations, assess whether the permittee's discharges are in compliance with applicable WQBELs derived from TMDL WLAs and with applicable action limits. The Los Cerritos Channel watershed is highly divided with a number of separate channels contributing flow. In practice, no clear distinction exists between the end of the storm drain system and the start of tributaries or receiving waters. Restricting monitoring sites to locations considered to be "outfall" sites would limit sampling to much smaller catchments that are intended to be representative of land use throughout the LCC watershed. This monitoring approach was not considered to be an effective

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strategy for identification of the major sources of contaminants and would provide limited assistance in directing effective implementation of control measures in this watershed.

Primary Watershed Segment (PWS) sites (Figure 1-2) were selected based upon:

- LSPC modeling results from the LCC Metals TMDL (U.S. EPA 2010),
- land use characteristics within the watershed, and
- the ability to isolate major portions of the watershed.

The LSPC model was used to simulate flows and metals concentrations in Los Cerritos Channel during development of the LCC Metals TMDLs. An updated version of the LSPC serves as the basis for the Los Angeles County Watershed Management Modeling System (WMMS). The model divided the watershed into 10 sub-basins (Figure 1-2) and developed loading estimates (Figure 1-3) for each of the sub-basins. The LSPC model results provided the primary guidance for selection of appropriate watershed monitoring sites. Site selection first considered sub-basins that the model identified as the most significant sources of metals. Potential sites were considered at locations near the downstream edge of each sub-basin and where runoff from each sub-basin could be effectively isolated. Land use information for within each sub-basin was then examined to determine dominant land uses within each segment and assure that all major land uses would be effectively sampled. Lastly, sites were selected to effectively represent a large proportion of the watershed and yet avoid large disparities in the sizes of each segment such that pollutant or sediment delivery ratios[3] would not vary substantially among monitoring sites.

Sites selected as PWS sites include SB4, SB10, SB8 and SB9 (Figure 1-2; Table 1-2). Each of these isolates significant proportions of their respective sub-basins (4, 10, 8 and 9). Together, these monitoring locations allow 68% of the entire watershed to be monitored. Once implemented, pollutant loading rates for each of the PWS sites can be compared to loads measured at the downstream receiving water site (LCC1) in order to assess potential discrepancy in load contributions and determine if further implementation of control measures is warranted

SB4 is located in the Los Cerritos Channel just west of Lakewood Blvd and adjacent to the Long Beach Daugherty Airport. This site will effectively sample runoff from sub-basin 4. LSPC modeling indicated that this segment may be a significant source of both copper and zinc (Figure 1-3). Land use in this segment of the watershed (Table 1-1) is dominated equally by the Airport (classified as mixed urban in the model) and industrial land use. This segment represents approximately 13% of the entire LCC watershed.

SB10 is located in the Palo Verde Channel and will collect runoff from the sub-basin 10. This segment of the watershed is comprised largely of low density residential neighborhoods (Table 1-1) and represents 19% of the entire LCC watershed. The LSPC model predicted that this portion of the watershed would

[3] The delivery ratio of pollutant loads can be defined as the ratio of the discharged pollutant load delivered to the point of interest divided by the mass of pollutants generated at the source.

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produce moderate loads of copper, lead and zinc. This watershed is somewhat unique in its relatively large size (3403 acres) and having more than 77 percent residential land use (71% low density and 6.3% high density residential land use). Monitoring of this sub-basin is considered to be useful in validating the modeling results and providing improved estimates of trace metal loads from residential areas.

Sub-basins 8 and 9 are located in northern portion of the watershed (Figure 1-2) draining portions of Bellflower, Downey, Lakewood, Long Beach, and Paramount. LSPC modeling indicated that these two sub-basins would likely yield some of the highest loads of metals (Figure 1-3). Initial modeling indicated that sub-basin 9 was expected to have higher loads of copper, lead and zinc than most other areas. The model projected that copper and lead loading would be elevated in sub-basin 8 but this region was expected to produce slightly lower levels of zinc. Land uses in both sub-basins are predominantly residential with substantial amounts of commercial activities (Table 1-1). Together, these two sub-basins comprise over a third of the LCC watershed. Monitoring sites are located near the bottom of each of these sub-basins. SB8 is located in the Clark Channel just north of the Lakewood Civic Center and SB9 is located in the Del Amo Channel near Clark Avenue.

Monitoring at these four PWS sites will form the backbone of the program. This program allows for an adaptive process that enables resources to be focused on confirming modeling results and portions of the watershed that are significant sources of contaminants and flow. Wet weather monitoring at the LCC1 receiving water monitoring site and the four PWS sites will be used to evaluate if one or more of these segments is contributing excessive loads of key pollutants.

Potential Secondary Watershed Segment (SWS) sites for forensic monitoring have been identified within each of the four sub-basins (Figure 1-2). SWS sites are identified by the name of the sub-basin monitoring site followed by a hyphen and a sequential number for each added site. For example, potential SWS sites in sub-basin 4 are identified as SB4-1 and SB4-2.

Where possible, these sites are positioned at locations that further dissect the sub-basins. In sub-basin 4, tentative SWS sites effectively divide the sub-basin into two areas of comparable size. SWS sites isolate major, but unequal branches of the drainages within both sub-basins 8 and 9. Sub-basin 10 has a more linear configuration that required locating potential SWS sites at two locations along the length of the sub-basin. These are sites where further monitoring would be conducted if one of more of the sub-basins is identified as having high pollutant loading rates. It is not anticipated that all secondary sampling locations will require sampling and it is possible that none will require further sampling.

Any sampling initiated at these SWS sites would be conducted with temporary installations designed to allow for installation within one day. Monitoring at these sites would utilize 24-hour, time-based sampling triggered by flow. Sampling would be conducted concurrently with sampling of the long-term sub-basin watershed sites (PWS sites) and the receiving water monitoring site (LCC1).

SWS sites will utilize time-based monitoring methods to aid in isolating areas that may be contributing excessive concentrations of contaminants. If monitoring data indicate that one of the two SWS sites has elevated concentrations of any contaminant of concern, additional upstream monitoring sites will be selected based upon the configuration of the upstream storm drains and land use. Monitoring

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equipment used for the paired secondary stations would then be relocated upstream in the targeted segment to better isolate potential sources.

1.2.3 Non-Stormwater Outfall Monitoring

Non-Stormwater Outfall Based Monitoring will be conducted throughout the major open channels of the Los Cerritos Channel Watershed. Initially, all pipes exceeding 12 inches in diameter and discharging either directly into the Los Cerritos Channel receiving water or into any of the open channels will be identified in the first screening survey. By the end of 2014, the database will be refined to determine which of the 12-inch to 36-inch pipes include discharges from areas with industrial land uses. Discharge pipes less than 36 inches and determined not to incorporate runoff from industrial land use areas will be excluded from further surveys. After completing an inventory of the outfalls, two more screening surveys will be conducted by the end of 2014 to document sites with persistent and significant non-stormwater flows. Subsequently, the source ID program will utilize an array of different methods to assist in determining whether flows are the result of illicit connections/illicit discharges (IC/IDs), authorized or conditionally exempt non-stormwater flows, natural flows or unknown. These may include available drainage maps, information on existing dewatering permits or industrial discharges, and a combination of field tests and limited laboratory testing.

1.2.4 New Development/Re-Development Effectiveness Tracking

Participating agencies have developed mechanisms for tracking information related to new and re-development projects that are subject to post-construction best management practice requirements in Part VI.D.7 of the MS4 Permit.

1.2.5 Regional Studies

On behalf of the participating agencies, the Los Angeles County Flood Control District (LACFCD) will continue to provide financial and/or monitoring resources to the Southern California Stormwater Monitoring Coalition Regional Watershed Monitoring Program, also known as the Regionally Consistent and Integrated Freshwater Stream Bioassessment Monitoring Program (Bioassessment Program). The Bioassessment Program was initiated in 2009 and is structured to occur in cycles of five years. Sampling under the first cycle concluded in 2013. The next five-year cycle is scheduled to begin in 2015, with additional special study monitoring scheduled to occur in 2014.

Permittee representatives will also participate in the Southern California Stormwater Monitoring Coalition (SMC) meetings and assist in development and implementation of selected and appropriate regional studies designed to improve stormwater characterization and impact assessment.

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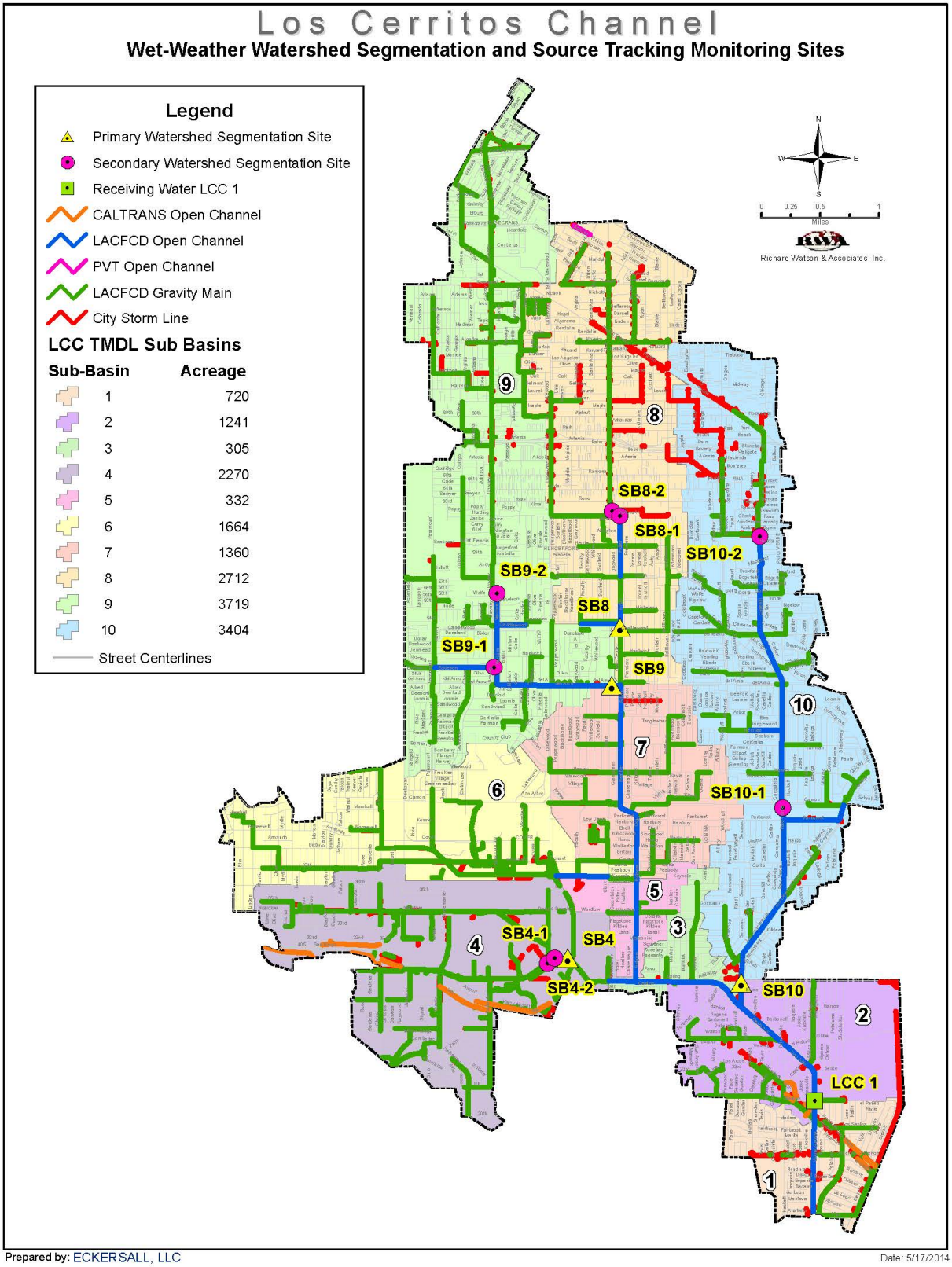
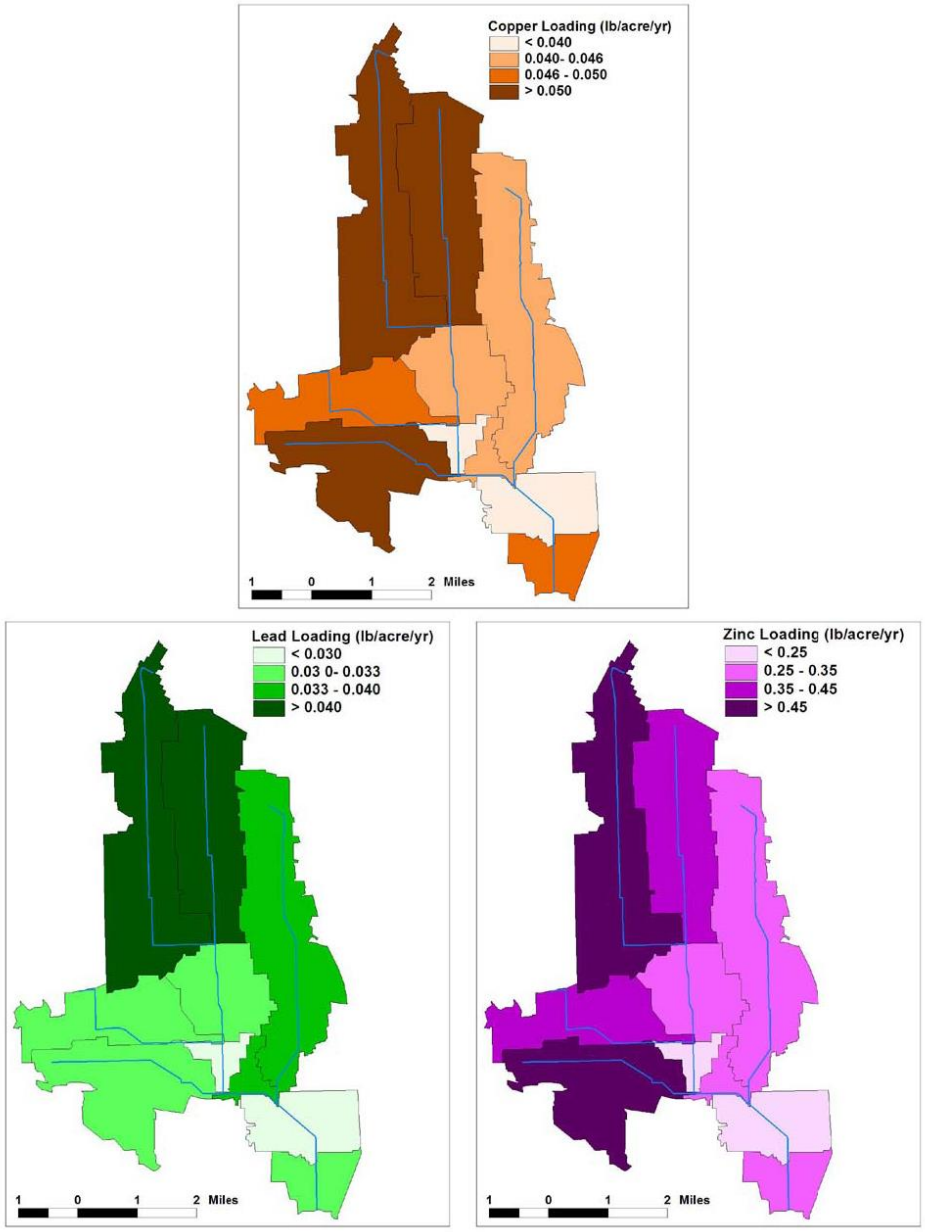


Figure 1-2. Locations of Potential Wet Weather Monitoring Sites in the Los Cerritos Channel Watershed.



Source: EPA 2010. Los Cerritos Channel Metals TMDL.

Figure 1-3. Estimated Concentrations of Metals from each Sub-basin of the Los Cerritos Channel Watershed.

Table 1-1. Summary of Land Use Associated with Monitored Segments of the Los Cerritos Channel Watershed.

	SUB-BASIN NUMBER/ACREAGE				
Land Use	4	8	9	10	TOTAL[2]
Agriculture	0	37.3	42.4	50	129.7
Commercial	352.5	506.8	709.9	371.9	1941.1
Industrial	705.8[1]	124.9	499.8	59	1389.5
HD Residential	40	371.3	490.5	212.7	1114.5
LD Residential	276.1	1,597.5	1,782.8	2,415.6	6072
Mixed Urban	752.8	13.6	120.2	142.4	1029
Open	143.5	60.4	63.9	151.5	419.3
Total Acres	2,271	2,712	3,710	3,403	12,096
		Total Watershed Acres			**17,716**
	SUB-BASIN NUMBER/%				
Land Cover	4	8	9	10	-
Agriculture	0.0	1.4	1.1	1.5	0.7
Commercial	15.5	18.7	19.1	10.9	11.0
Industrial	31.1	4.6	13.5	1.7	7.8
HD Residential	1.8	13.7	13.2	6.3	6.3
LD Residential	12.2	58.9	48.1	71.0	34.3
Mixed Urban	33.2	0.5	3.2	4.2	5.8
Open	6.3	2.2	1.7	4.5	2.4
Total %	13	15	21	19	68

HD= High Density, LD= Low Density

[1] Bolded values indicate major land uses present in each sub-basin.

[2]Land use composition for all 10 sub-basins can be accessed in the Los Cerritos Channel Metals TMDLs (EPA 2010)

Table 1-2. Monitoring Site Designation and Monitoring Function.

Site Name	Site Description	Datum NAD83		Type of Site			
				Receiving Water	TMDL	WATERSHED	
		Latitude (N)	Longitude (W)			Primary	Secondary[1]
LCC1	Stearns Street	33.79538	118.10361	**X**	**X**	**X**	
SB4	Sub-basin 4 – Spring St. Drain	33.81306	118.13953		**X**	**X**	
SB8	Sub-basin 8 – Clark Drain	33.85384	118.13226		**X**	**X**	
SB9	Sub-basin 9 – Del Amo/Downey	33.84682	118.13370		**X**	**X**	
SB10	Sub-basin 10 – Palo Verde	33.81044	118.11430		**X**	**X**	
SB4-1	Northern Sub-basin[1]	33.81316	118.14235				**X**
SB4-2	Southern Sub-basin[1]	33.81288	118.14249				**X**
SB8-1	North Clark Channel[1]	33.86848	118.13355				**X**
SB8-2	West Clark Channel[1]	33.86783	118.13225				**X**
SB9-1	West Downey Channel[1]	33.84908	118.15978				**X**
SB9-2	North Downey Channel[1]	33.85844	118.15046				**X**
SB10-1	North Palo Verde Channel[1]	33.86546	118.11160				**X**
SB10-2	Mid Palo Verde Channel	33.83210	118.10836				**X**

[1] These locations are ***tentative*** sites and will be further evaluated as part of the adaptive management of the CIMP. Monitoring at secondary sites will be dependent upon the monitoring results at each of the Primary Watershed Sites.

2 Overview of the Schedule and Sampling Frequencies for each CIMP Element

The CIMP will be implemented in a phased process (Table 2-1). Existing monitoring at LCC1 continues to be conducted, and the dry weather screening of major outfalls has commenced. Implementation of new monitoring programs and modifications to the existing monitoring program at LCC1 will be implemented beginning July 1, 2015 or 90 days after the approval of the CIMP, whichever is later.

Receiving Water Quality Monitoring

- Monitoring will occur at one Receiving Water Quality Monitoring Site, LCC1, which will also serve as the LCC Metals TMDL compliance site.
- Monitoring will be conducted during two dry weather and three wet weather events. Although the LCC Metals TMDL calls for monitoring during four storm events, monitoring of three events is considered suitable to address the objectives of both programs. This allows alignment of monitoring the Receiving Water and Stormwater Outfall Monitoring requirements of the Permit with TMDL Monitoring. Alignment of these monitoring requirements allows for a more efficient and cost effective program.
- Monitoring of the two dry weather flows will start in July 1, 2015 or 90 days after approval of the CIMP, whichever is later. Wet season monitoring will follow for three storm events during the 2015/16 wet season.
- Water quality testing during the critical dry weather flows (July) and during the first significant storm event of the year will incorporate the entire list of water quality parameters listed in Table E-2 of the MRP. Water quality testing during the remaining two wet weather events and one dry weather event will incorporate all constituents listed under water body/pollutant classifications 1, 2 and 3 (See Section 3) for the Los Cerritos Channel receiving waters. In summary, these include all constituents with existing TMDLS, those that are 303(d) listed or with sufficient data to warrant listing and constituents with a recent history or exceedances of relevant water quality criteria.
- If Table E-2 constituents are not detected at the specified Method Detection Limit (MDL) for their respective test method or if the results are below the lowest applicable water quality objective, and is not otherwise identified as being 303(d)-listed or part of an ongoing TMDL, the analyte will not be further analyzed. In accordance with the minimum requirements established in the Permit Monitoring and Reporting Program (MRP) (page E-16) parameters exceeding the lowest applicable water quality objective will continue to be analyzed for the remainder of the Order at the receiving water monitoring station.
- The Aquatic Toxicity Testing program will be initiated during the 2015 dry weather season at LCC1. Aquatic Toxicity Testing will be conducted during one dry weather monitoring event when critical low flow conditions are expected and during two storm events including the first major storm of the year.

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Primary Watershed Segmentation (PWS) Stormwater Monitoring

- Two PWS sites, SB4 and SB10, will be installed and ready for monitoring during the 2015/16 wet season. SB9 will be installed and prepared to monitor storm events during the 2016/17 wet season. SB8 will be installed in preparation for the subsequent season (2017/18) and will complete the planned array of four PWS sites.
- When possible, PWS sampling will be conducted concurrently with stormwater monitoring at LCC1. This will result in three monitored stormwater events for each PWS site as they are installed and ready for collection of flow-rated composite samples.
- Water quality testing at PWS sites will initially incorporate a list of general and conventional pollutants, *E. coli*, nutrients, and metals. A detailed list of analytes to be initially tested at PWS sites is addressed in Section 3.1 This set of constituents assures that all Category 1, 2, and 3 analytes and ancillary information needed to interpret the data are part of the initial testing. The only exception will be enterococcus which is only included at PWS sites that would discharge to marine or estuarine waters. Enterococcus was only included due to the fact that the LCC1 receiving water/mass emission site is located in an area adjacent to estuarine/marine waters.
- Additional water quality parameters listed in Table E-2 of the MRP may be incorporated based upon results of stormwater monitoring at the receiving water station, LCC1. These constituents will be added to monitoring requirements at PWS sites once an analyte is detected in stormwater runoff at LCC1 during two consecutive stormwater monitoring events. Similarly, if analytes added the PWS monitoring are not detected at PWS sites during two consecutive stormwater monitoring events, they will be removed from the required analytical list.
- Once a minimum of two seasons of wet weather monitoring data (six events) are available from a PWS site, data will be evaluated to determine if forensic monitoring is necessary to assist in source tracking and identifying upstream sources of key pollutants. Forensic monitoring would be conducted by further dividing the watershed with Secondary Watershed Segmentation (SWS) sites. Potential SWS sites have been identified for each of the four PWS sites but these sites will only be used if water quality constituents measured at the PWS sites are sufficiently elevated to warrant implementation of forensic monitoring.
- Sampling would be performed with temporary, mobile stormwater sampling stations used to take time-based composite samples and would focus on the specific analytes of concern as well as any appropriate ancillary data. Source tracking would be triggered if running averages measured at a PWS site exceeds Municipal Action Limits (MALs; Attachment G of the MRP) by more than 20% any analytes that have limits and that are required to be sampled at the PWS sites. Similarly, forensic sampling would also be conducted if the running average pollutant loading rates for Category 1 or 2 pollutants are found to exceed those measured at LCC1 (the Los Cerritos Channel receiving water/TMDL monitoring site) by more than 25%.

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Non-Stormwater Outfall Monitoring Program

- Three initial surveys will be completed. The first will focus upon verification of outfalls as identified based upon available City and County GIS records, providing baseline photographic records, assessing flow, recording observations, and field water quality measurements. An inventory of outfalls above 12 inches in diameter will be created. The second and third screening surveys will expand field water quality testing to assist in the identification and classification of the discharge.
- Information from the three initial surveys will be used to determine which outfalls have significant discharges and classify these outfalls for further investigation. Information from the three surveys such as flow rates of the discharge, flow rates in the channel, the nature of the channel-earthen or concrete, and land uses in the drainage area will be used collectively to determine significance.
- Outfalls with significant flow will be classified for further investigation. Flow measurements, observations, field water quality tests and limited laboratory tests may be used to classify the remaining outfalls as either **Suspect Discharges**, **Potential Discharges** or **Unlikely** discharges of concern. Clean outfalls with no evidence of discharges or odors during the initial surveys will be classified as **Unlikely** sources of non-stormwater discharges and will not require further investigation.
- Outfalls considered having the highest risk for illicit discharges or illegal flows will be classified as **Suspect Discharges.** This will require multiple lines of evidence indicative of potential illicit discharges or persistent high flows that represent significant contributions to the receiving waters.
- Outfalls considered to be **Suspect Discharges** will be further classified and ranked for further investigations designed to identify the sources of these discharges and to determine whether discharges are illicit, exempt, conditionally exempt, conditionally exempt but non-essential flows or unknown.
- Suspect outfalls determined to have exempt or conditionally exempt discharges will be identified in annual reports along with the measures taken to identify the sources.
- Suspect outfalls identified with conditionally exempt but non-essential flows or flows from unknown sources will be first be subject to review to determine if suitable control measures can be implemented to eliminate the discharges.
- If discharges cannot be eliminated, they will be subjected to a periodic monitoring program to document that sufficient measures are taken to control potential discharges of pollutants in the discharge.
- Source investigations for discharges from outfalls classified as suspect will be ongoing in order to meet the requirement that investigations are conducted for no less than 25% of the outfalls in the inventory by December 2015 and 100% of the outfalls in the inventory by December 2017.
- Outfalls classified as **Potential Discharges** will reassessed during the permit.
- Outfalls with obvious illicit discharges will be immediately classified as such and investigated immediately.

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Table 2-1. Schedule for Implementation of Monitoring Activities in the Los Cerritos Channel Watershed.

Task	Dry 2014	Dry 2015	Wet 2015-16	Dry 2016	Wet 2016-17	Dry 2017	Wet 2017-18	Dry 2018
Receiving Water/TMDL								
LCC1 Stearns St.	Note 6							
Chemistry[1]		2	3	2	3	2	3	2
Aquatic Toxicity		1	2	1	2	1	2	1
Primary Watershed Segments								
SB10			3		3		3	
SB4			3		3		3	
SB8							3	
SB9					3		3	
Secondary Watershed Segments[2]								
SBX-1					3		3	
SBX-2					3		3	
Non-Stormwater Outfall								
Inventory & Screen[3]	3							
Source ID[4]		Ongoing		Ongoing		Ongoing		Ongoing
Monitoring[5]				2		2		2

1. Table E-2 chemical analyses will be performed once during the first wet weather event and once during the first critical dry weather monitoring event. Constituents that exceed MDLs and available water quality objectives will continue to be monitored along with all constituents included as Category 1, 2 or 3 water body/pollutant classifications for the subject water body. Wet and dry weather chemical constituents will be separately assessed for purposes of continued monitoring. All constituents classified as category 1, 2, and 3 water body/pollutant in the water body will continue to be monitored during the permit cycle unless the constituents (primarily category 3 constituents) are shown to not be present at levels of concern on a consistent basis.
2. Initial locations of Secondary Watershed Segmentation (SWS) sites have been selected for each Primary Watershed Segment (PWS). Implementation of monitoring at SWS site will be dependent upon results of monitoring at PWS sites (e.g. exceedance of action limits).
3. Initial Inventory and Screening will be completed in three surveys before the end of 2014. One re-assessment of the Non-Stormwater Outfall Monitoring Program will be conducted prior to December 2017.
4. Investigations designed to track and classify discharges will start during the 2015 dry season. Source tracking and classification work depend upon the number of sites categorized as Suspect outfalls with evidence of significant flow.
5. Monitoring will be implemented if significant dry weather flows are identified at discharge points that are cannot be identified, are non-essential exempt flows, or identified as illicit flows that are not yet controlled. These sites will be initially monitored twice a year in conjunction with dry weather monitoring of the receiving water site.
6. Monitoring at LCC1 will continue to be conducted in accordance with the existing permit until the CIMP is approved.

3 Chemical/Physical Parameters

Section 2 of the Watershed Management Plan provides a detailed analysis of water quality priorities within the Los Cerritos Channel Watershed. Water quality priorities were established in accordance with Section C.5.a.ii of the Permit. The three Permit categories are defined as:

- **Category 1 (Highest Priority):** Water body-pollutant combinations for which water quality-based effluent limitations and/or receiving water limitations are established in Part VI.E and Attachments L through R of the Order.
- **Category 2 (High Priority):** Pollutants for which data indicate water quality impairment in the receiving water according to the State's Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List (State Listing Policy) and for which MS4 discharges may be causing or contributing to the impairment.
- **Category 3 (Medium Priority):** Pollutants for which there are insufficient data to indicate water quality impairment in the receiving water according to the State's Listing Policy, but which exceed applicable receiving water limitations contained in this Order and for which MS4 discharges may be causing or contributing to the exceedance.

These Permit categories were intended to be specific to water bodies within the watershed but, in the case of the Los Cerritos Channel, data are limited to a single point in the watershed. Table 3-1 summarizes pollutants within each category.

Table 3-1. Waterbody-Pollutant Categories for the Los Cerritos Channel Watershed.

Category	Constituents
1	copper, lead, zinc, DDT, chlordane, PCBs, PAHs
2	ammonia, bis(2)ethylhexylphthalate, *E. coli*, pH
3	MBAS, enterococcus

The primary constituents of concern in the watershed are copper, lead and zinc which are part of the Los Cerritos Channel Metals TMDLs. Chlordane, DDTs, PCBs and PAHs are incorporated due to a 303(d) listing for chlordane in sediments downstream in the tidal portion of the channel and the Harbor Toxics TMDL for which the Los Cerritos Channel is considered part of the nearshore watershed[4]. Permittees in

[4] As recognized by the footnote in Attachment K-4 of the Permit, the Cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, Signal Hill, and the LACFCD have entered into an Amended Consent Decree with the United States and the State of California, including the Regional Board, pursuant to which the Regional Board has released the aforementioned entities from responsibility for toxic pollutants in the Dominguez Channel and the Greater Los Angeles and Long Beach Harbors. Accordingly, no inference should be drawn from the submission of this CIMP or from any action or implementation taken pursuant to it that the aforementioned entities are obligated to implement the Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters Toxic Pollutants TMDL, including this CIMP or any of the TMDL's other obligations or plans, or that the aforementioned entities have waived any rights under the Amended Consent Decree.

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the nearshore watershed are separately contributing to monitoring requirements in the Harbor waters and the Los Angeles River Estuary. Therefore DDTs, PCBs and PAHs are not currently incorporated into the sampling requirements for the ME and PWS monitoring sites. Two other constituents, ammonia and pH, are 303(d) listed due to dry weather flows where extremely shallow flows cause a daily cycle of pH and result in calculated ammonia water quality criteria to be exceeded despite extremely low concentrations. Additional listings exist for minor exceedances of MBAS criteria and exceedance of coliform and enterococcus bacteria. Enterococcus bacteria are limited to LCC1 since this site discharges to an estuarine environment.

Table 3-2 summarizes the constituents that will be monitoring at the ME and PWS sites. These constituents will serve as the core of the monitoring program. In addition, sections VI.C.1.e and VI.D.1.d of the MRP require that a comprehensive list of constituents is screened once during the first major storm event of the year and once during a period of critical low flow. Results of this analytical screening process will determine which constituents need to be analyzed at the mass emission site for the remainder of the five-year cycle of the permit.

If a parameter is not detected above the Method Detection Limit (MDL) for its respective test method *or* the result is below the lowest applicable water quality objective, and is not otherwise identified as a basic monitoring requirement, a TMDL analyte or a 303(d) listing, it need not be further analyzed. If a parameter is detected exceeding the lowest applicable water quality objective during either the wet or dry weather screening then the parameter shall be analyzed for the remainder of the Order (2017) at the receiving water monitoring station where it was detected during the respective conditions (wet or dry).

Analytical tests will be reconsidered at least once during each permit cycle in order to assess the appropriateness of maintaining the analyte or suite of analyses in the testing requirements. Water quality criteria, analytical methods, analytical results consistently near detection limits, updated information with respect to sources or many other additional factors may contribute to factors may warrant reconsideration of the analyte. If an analyte is not detected at levels of concern during two consecutive monitoring events representing the same seasonal conditions, the analysis will be removed from the sampling requirements until being subject to reconsideration during the next five year Permit cycle. In order to avoid bias due to seasonal build-up/wash off, this evaluation would be limited to the comparisons of the first major storm of the season rather than data consecutive events from the same season.

Constituents requiring screening are listed in Table E-2 of the Monitoring and Reporting Program. These constituents are further broken out by major analytical groups in Table 3-3 through Table 3-9below.

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Table 3-2. Summary of Constituents to be Monitored on a Regular Basis at the Mass Emission Site (LCC1) and the Primary Watershed Segmentation (PWS) Sites.

CLASS OF MEASUREMENTS	MASS EMISSION SITE (LCC1)		PRIMARY WATERSHED SEGMENTATION (PWS) SITES
	Wet	Dry	Wet
Flow	3	2	3
Field Measurements (dissolved oxygen, pH, temperature, and specific conductivity)	3	2	3
MRP Table E-2 Constituents[1] (other than those specifically listed below)	1	1	
Aquatic Toxicity	2	1	
General and Conventional Pollutants (Table 3-3) (All except total phenols, turbidity, BOD_5, MTBE, and perchlorate, chloride and fluoride)	3	2	3
Microbiological Constituents (Table 3-4) *E.coli,* Total & Fecal Coliform, enterococcus[3]	3	2	
E.coli			3
Nutrients (Table 3-5) - none required			
Organochlorine Pesticides and PCBs (Table 3-7) Chlordane[2]	3	2	
Metals (Table 3-6) Cu, Pb, & Zn	3	2	3
Organophosphate Pesticides[4] (Table 3-8) - none required			
Semivolatile Organic Compounds (Table 3-9**)** bis(2)ethylhexylphthalate	3	2	

1. All Table E-2 constituents will be measured during the first major storm event of the season and the critical, low flow dry weather event (July) during the first year of the CIMP.
2. Chlordane components are based upon sum of chlordane-alpha, chlordane-gamma, nonachlor-alpha, nonachlor-gamma, and oxychlordane consistent with the Harbor Toxics TMDL.
3. Analysis of all Fecal Indicator Bacteria (FIBs) will only be included for LCC1 that discharges directly to the Los Cerritos Channel Estuary. Enterococcus will not be analyzed at PWS sites since they do not discharge to marine or estuarine waters.
4. No organophosphate pesticides are required as part of the baseline program.

Analytical requirements for the program are broken out by analytical test requirements since many are associated with an analytical test suite. This is most evident with the semivolatile organic compounds analyzed by EPA Method 625. Although this section identifies recommended methods for each analyte, many of the target constituents can be addressed by alternative methods. Use of alternative analytical

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methods may be preferable in cases where a larger suite of target analytes can be tested and still enable meeting minimum levels (MLs) established for each analyte. Selection of analytical methods is intended to be performance-based to allow laboratories flexibility to utilize methods that meet or exceed MLs listed in the MRP. As an example, the following tables (Table 3-7 and Table 3-8) list separate EPA methods for organochlorine pesticides and aroclors, organophosphate pesticides and semivolatile organic compounds. Some laboratories choose to use EPA Method 625 for all of these test requirements. This approach is acceptable as long as the method meets the MLs listed in Table E-2 of the MRP and meet data quality objectives consistent with the State's Surface Water Ambient Monitoring Program (SWAMP), but other laboratories will use separate test protocol for organophosphate pesticides.

The critical dry weather event is defined as the period when historical in-stream flow records are the lowest or during the historically driest month. Point measurements of dry weather flows taken in Los Cerritos Channel between 2000 and 2014 have been relatively uniform between May and September of each year, but base flows have decreased to approximately 0.5 cfs in recent years. Rainfall during the summer dry season is minimal and only briefly impacts flows in the channel. As a result, it is expected that critical dry weather flow testing could be performed anytime between May and September. Nevertheless, regional data suggest that rainfall and flows in major watersheds (Los Angeles River and San Gabriel River watersheds) are least in July. As such, critical low flow monitoring will be conducted in July.

A more accurate assessment of critical dry weather flow conditions will be completed and available by the end of the 2014 dry season. Flumes equipped with stilling wells, pressure sensors and data loggers will be constructed and installed throughout the watershed for a period of 6-8 weeks. The work is part of a State-funded Proposition 84 study[5] intended to provide detailed, continuous records of water level, flow and temperature at each site for the duration of the deployment. Four of flumes will be located at sites selected as PWS sites for this CIMP. These data will be used to determine if flow diminishes over the course of a few weeks or exhibits diurnal fluctuations as expected. Concurrent water samples will also be taken over three 24-hour time periods to analyze trace metals (especially copper, lead, and zinc) and nutrient loading. If differences are noted, forensic work will be conducted to identify and mitigate the source the discharges. Although this work is not part of the CIMP, the results of this program will be utilized to refine the "critical dry weather flow period" and to help provide guidance with respect to segments most likely to contribute higher loads of metals during dry weather conditions.

[5] Gateway Water Management Authority Agreement No. 12-423-550. Los Cerritos Channel Watershed Segmentation and Low Impact Development (LID) Project

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3.1 General and Conventional Pollutants

Most of the general and conventional pollutants listed in Table 3-3 will continue to be analyzed as part of the base monitoring requirements for both receiving water and PWS/SWS sampling. These constituents are common contaminants in stormwater from urban environments. Some, such as turbidity, are redundant and best used as surrogates under special studies. Turbidity is often used as a surrogate for suspended solids but requires calibration to the source material. Turbidity measurements are recognized to lack comparability due to differences in equipment as well as the differences between static and dynamic measurements (Anderson 2005 -USGS National Field Manual for Collection of Water Quality Data, Chapter 6.7). Total suspended solids and suspended sediment concentrations directly examine particles associated with water samples and don't suffer from the problems associated with measuring turbidity.

Other pollutants in this group have been tested in samples from LCC1 since 2000 and have not been detected. As an example, total phenols have never exceeded the ML of 0.1 mg/L in this watershed. MTBE and cyanide were analyzed during the first three years of the City of Long Beach Stormwater Monitoring Program. MTBE has only detected in 1 out of 11 samples and cyanide was never detected. Although perchlorate has not been analyzed in stormwater in the LCC watershed, industrial activities likely to result in perchlorate discharges do not exist in the watershed. Perchlorate will be screened at the receiving water site (LCC1) during the initial surveys but this contaminant is not expected to require continued analysis at any monitoring site.

In summary, sufficient evidence exists to eliminate total recoverable phenolic compounds, cyanide, turbidity and MTBE from further analysis. Perchlorate will be incorporated in the initial screening since it has not been tested but it is not expected that continued testing will be required. Most other constituents included in this list are common contaminants in stormwater runoff and will continue to be analyzed. Analysis of chloride and fluoride may be analyzed as needed to assist in differentiating potable water and groundwater sources during source tracking programs for the non-stormwater outfall monitoring program but will not be included in monitoring conducted for wet/dry weather receiving water monitoring or for monitoring of the PWS/SWS monitoring sites.

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Table 3-3. Conventional Constituents, Analytical Methods and Quantitation Limits.

CONSTITUENTS CONVENTIONAL POLLUTANTS	METHOD	Target Reporting Limits mg/L
Oil and Grease	EPA1664	5
Total Petroleum Hydrocarbon	EPA 418.1	5
Total Suspended Solids	EPA 160.2	1
Total Dissolved Solids	EPA 160.1	1
Volatile Suspended Solids	EPA 160.4	1
Total Organic Carbon	EPA 415.1	1
Biochemical Oxygen Demand	SM 5210B EPA 405.1	3
Chemical Oxygen Demand	EPA 410.1	4
Alkalinity	EPA 310.1	5
Specific Conductance	EPA 120.1	1 umho
Total Hardness	EPA 130.2	1
MBAS	EPA 425.1	0.02
Chloride	EPA300.0	2
Fluoride	EPA300.0	0.1
Perchlorate	EPA314.0	4 ug/L
Field Measurements	**METHOD**	**mg/L**
pH-field instrumentation	EPA 150.1	0 – 14
Temperature-field	In-situ	N/A
Dissolved Oxygen- field [1]	In-situ	Sensitivity to 5 mg/L

[1]Dissolved Oxygen will only be measured during dry weather surveys.

3.2 Microbiological Constituents

All four microbiological constituents used as fecal indicator bacteria (FIB) will continue to be monitored at the LCC1 Receiving Water monitoring site. Bacteria used as fecal indicators in marine waters will continue to be analyzed during wet and dry weather surveys due to being situated just above the Los Cerritos Channel Estuary. Only *E. coli* will be monitored at the four primary watershed segment sites since these are each located in freshwater portion of the watershed. Table 3-4 provides both upper and lower quantification limits for each FIB which was established to assure that quantifiable results are obtained. Upper quantitation limits are provided to assure that FIBs are quantified.

Table 3-4. Microbiological Constituents, Analytical Methods and Quantitation Limits.

BACTERIA[1]	Method	Lower Limits MPN/100ml	Upper Limits MPN/100ml
Total coliform (marine waters)	SM 9221B	<20	>2,400,000
Fecal coliform (marine waters)	SM 9221E	<20	>2,400,000
Enterococcus (marine waters)	SM 9230B/C	<20	>2,400,000
E. coli (fresh waters)	SM 9221E/ Colilert-QT	<10	>2,400,000

[1]Microbiological constituents will vary based upon sampling point. Total and fecal coliform and enterococcus will be measured only in marine waters or at locations where either the discharge point or receiving water body will impact marine waters. *E. coli* will be analyzed at sites within the freshwater portion of the watershed.

3.3 Nutrients

Nutrients (Table 3-5) are also considered as part of the base requirements for the monitoring program. These will be analyzed as part of the Table E-2 screening requirements during the first major storm event of the year and a critical dry weather sampling event at both the receiving water site (LCC1). Nutrients have not been identified as exceeding any applicable RWL to date and are therefore not scheduled to be sampled as part of the ongoing program unless required based upon the initial screening. The current monitoring plan calls for separate analysis of nitrate-N and nitrite-N. Concentrations of nitrite-N have typically been low. If data indicates that concentrations of nitrite-N remain minimal, these analytes will be combined into one analytical procedure that quantifies both nitrate-N and nitrite-N at the same time.

Table 3-5. Nutrients, analytical methods, and quantitation limits

CONSTITUENT	METHOD	REPORTING LIMIT (mg/L)
Total Kjeldahl Nitrogen (TKN)[1]	EPA 351.1	0.50
Nitrate as Nitrogen (NO_3-N)[1,2]	EPA 300.0	0.10
Nitrite as Nitrogen (NO_2-N)[1,2]	EPA 300.0	0.05
Total Nitrogen[1]	calculation	NA
Ammonia as Nitrogen (NH_3-N)	EPA 350.1	0.10
Total Phosphorus	SM 4500-P E or F	0.1
Dissolved Phosphorus	SM 4500-P E or F	0.1

1. Total Nitrogen is the sum of TKN, nitrate, and nitrite.
2. Nitrate –N and Nitrite-N may be analyzed together using EPA 300

3.4 Total and Dissolved Trace Metals

A total of 16 trace metals are listed in Table E-2 of the MRP. Analytical methods and reporting limits for these elements are summarized in Table 3-6. Most metals will be analyzed by EPA Method 200.8 using ICP-MS to provide appropriate detection limits. Hexavalent chromium and mercury both require alternative methods. Neither hexavalent chromium nor mercury is commonly analyzed as part of stormwater programs. Hexavalent chromium has been analyzed at LACFCD's mass emission monitoring sites in both the Los Angeles River (S10) and the San Gabriel River (S14) for the past eight to ten years and has not been detected. Mercury has been detected at some mass emission monitoring sites but detections are not common at any. Analytical methods and detection limits used for the monitoring have been consistent with those required in Table E-2 of the MRP.

Measurement of mercury is generally not considered to be appropriate in flow-weighted composite samples taken with autosamplers due to the volatility. This becomes more of an issue when sampling is conducted near the limits of a peristaltic pump. Despite the known issues, autosamplers have been used to take samples of stormwater runoff throughout the country and analysis of both total and dissolved mercury are required for both stormwater and dry weather compliance monitoring locations within both the Los Angeles and San Gabriel Rivers. If mercury is detected in flow-rated composite samples, it is likely that alternative sampling and analytical methods may be warranted in order to better assess the problem.

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Table 3-6. Metals Analytical Methods, and Quantitation Limits.

METALS (Dissolved & Total)	METHOD	Reporting Limit *ug/L*
Aluminum	EPA200.8	100
Antimony	EPA200.8	0.5
Arsenic	EPA200.8	0.5
Beryllium	EPA200.8	0.5
Cadmium	EPA200.8	0.25
Chromium (total)	EPA200.8	0.5
Chromium (Hexavalent)	EPA218.6	5
Copper	EPA200.8	0.5
Iron	EPA200.8	25
Lead	EPA200.8	0.5
Mercury	EPA245.1	0.2
Nickel	EPA200.8	1
Selenium	EPA200.8	1
Silver	EPA200.8	0.25
Thallium	EPA200.8	0.5
Zinc	EPA200.8	1

3.5 Organochlorine Pesticides and PCBs

Although organochlorine pesticides (OC pesticides) and PCBs are not commonly present in stormwater sampled at LCC1, they have periodically been detected at low concentrations. The analytical methods and detection limits for these compounds are summarized in Table 3-7. These compounds are specified in Table E-2 of the MRP. The MRP suggests that detection of any of these analytes in excess of the ML and/or applicable criteria will require continuation of the analysis through the period of the permit. Since this could be attributable to analytical issues, we have recommended more frequent reevaluation (refer to Section 3).

Since the OC pesticides are part of an analytical suite, detection of one compound would necessitate continuation of the entire suite. However, this would not require continuation of analysis of PCBs analyses if they are not detected in the early storm event and critical dry weather monitoring event.

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Table 3-7. Chlorinated Pesticides and PCB Analytical Methods, and Quantitation Limits

CHLORINATED PESTICIDES	METHOD	Reporting Limit ug/L
Aldrin	EPA 608, 8081A	0.005
alpha-BHC	EPA 608, 8081A	0.01
beta-BHC	EPA 608, 8081A	0.005
delta-BHC	EPA 608, 8081A	0.005
gamma-BHC (lindane)	EPA 608, 8081A	0.02
alpha-chlordane	EPA 608, 8081A	0.1
gamma-chlordane	EPA 608, 8081A	0.1
4,4'-DDD	EPA 608, 8081A	0.05
4,4'-DDE	EPA 608, 8081A	0.05
4,4'-DDT	EPA 608, 8081A	0.01
Dieldrin	EPA 608, 8081A	0.01
alpha-Endosulfan	EPA 608, 8081A	0.02
beta-Endosulfan	EPA 608, 8081A	0.01
Endosulfan sulfate	EPA 608, 8081A	0.05
Endrin	EPA 608, 8081A	0.01
Endrin aldehyde	EPA 608, 8081A	0.01
Heptachlor	EPA 608, 8081A	0.01
Heptachlor Epoxide	EPA 608, 8081A	0.01
Toxaphene	EPA 608, 8081A	0.5
POLYCHLORINATED BIPHENYLS		
Aroclor-1016	EPA 608,EPA 8082	0.5
Aroclor-1221	EPA 608,EPA 8082	0.5
Aroclor-1232	EPA 608,EPA 8082	0.5
Aroclor-1242	EPA 608,EPA 8082	0.5
Aroclor-1248	EPA 608,EPA 8082	0.5
Aroclor-1254	EPA 608,EPA 8082	0.5
Aroclor-1260	EPA 608,EPA 8082	0.5

3.6 Organophosphate Pesticides and Herbicides

Organophosphate pesticides, triamine pesticides and herbicides list in Table E-2 of the MRP are summarized in Table 3-8. Due to the fact that diazinon and chlorpyrifos are no longer available for residential use, these constituents are now rarely detected. When detected, concentrations rarely exceed available ambient water quality criteria for protection of aquatic life. Malathion, however, remains a common constituent in stormwater runoff but this pesticide is not as toxic as other organophosphate pesticides.

Two compounds in this list, atrazine and simazine, are not organophosphate pesticides but can be analyzed by EPA Method 8141a. Both are triazine herbicides which are used for control of broadleaf weeds. Based upon historical data, herbicides such as these and the three additional separately listed compounds are unlikely to require continued analysis after completion of initial screening of Table E-2

constituents. Alternative analytical methods may be considered and used as long as the established reporting limits can be met.

Table 3-8. Organophosphate Pesticides and Herbicides Analytical Methods, and Quantitation Limits

ORGANOPHOSPHATE PESTICIDES	METHOD	Reporting Limit ug/L
Atrazine	EPA507,8141A	1
Chlorpyrifos	EPA8141A	0.05
Cyanazine	EPA8141A	1
Diazinon	EPA8141A	0.01
Malathion	EPA8141A	1
Prometryn	EPA8141A	1
Simazine	EPA8141A	1
HERBICIDES		
Glyphosate	EPA547	5
2,4-D	EPA515.3	0.02
2,4,5-TP-SILVEX	EPA515.3	0.2

3.7 Semivolatile Organic Compounds (Acid, Base/Neutral)

Semivolatile organic compounds from Table E-2 of the MRP are listed in **Error! Reference source not ound.**Table 3-9 below. Acids consist mostly of phenolic compounds which are uncommon in stormwater samples. Base/neutrals include polynuclear aromatic hydrocarbons (PAHs) and phthalates. Semivolatile organic compounds were only measured during the first two years of the City of Long Beach Stormwater Monitoring Program. Very few analytes were detected and those that were detected were typically less than 10 times the reporting limit. Phthalates were among the most common semivolatile organic compounds detected and are 303(d) listed based upon measurements taken over ten years ago. Phthalates have been historically a common laboratory contaminant due to the significant use of plastic in laboratories but they are also a common environmental contaminant for the same reason.

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Table 3-9. Semivolatile Organic Compounds, Analytical Methods, and Quantification Limits.,

SEMIVOLATILE ORGANIC COMPOUNDS	METHOD	Reporting Limit
ACIDS		**ug/L**
2-Chlorophenol	EPA625	2
4-Chloro-3-methylphenol	EPA625	1
2,4-Dichlorophenol	EPA625	1
2,4-Dimethylphenol	EPA625	2
2,4-Dinitrophenol	EPA625	5
2-Nitrophenol	EPA625	10
4-Nitrophenol	EPA625	5
Pentachlorophenol	EPA625	2
Phenol	EPA625	1
2,4,6-Trichlorophenol	EPA625	10
BASE/NEUTRAL		ug/L
Acenaphthene	EPA625	1
Acenaphthylene	EPA625	2
Anthracene	EPA625	2
Benzidine	EPA625	5
1,2 Benzanthracene	EPA625	5
Benzo(a)pyrene	EPA625	2
Benzo(g,h,i)perylene	EPA625	5
3,4 Benzofluoranthene	EPA625	10
Benzo(k)fluoranthene	EPA625	2
Bis(2-Chloroethoxy) methane	EPA625	5
Bis(2-Chloroisopropyl) ether	EPA625	2
Bis(2-Chloroethyl) ether	EPA625	1
Bis(2-Ethylhexl) phthalate	EPA625	5
4-Bromophenyl phenyl ether	EPA625	5
Butyl benzyl phthalate	EPA625	10
2-Chloroethyl vinyl ether	EPA625	1
2-Chloronaphthalene	EPA625	10
4-Chlorophenyl phenyl ether	EPA625	5
Chrysene	EPA625	5
Dibenzo(a,h)anthracene	EPA625	0.1
1,3-Dichlorobenzene	EPA625	1
1,4-Dichlorobenzene	EPA625	1
1,2-Dichlorobenzene	EPA625	1
3,3-Dichlorobenzidine	EPA625	5
Diethyl phthalate	EPA625	2
Dimethyl phthalate	EPA625	2
di-n-Butyl phthalate	EPA625	10
2,4-Dinitrotoluene	EPA625	5
2,6-Dinitrotoluene	EPA625	5
4,6 Dinitro-2-methylphenol	EPA625	5

SEMIVOLATILE ORGANIC COMPOUNDS	METHOD	Reporting Limit
1,2-Diphenylhydrazine	EPA625	1
di-n-Octyl phthalate	EPA625	10
Fluoranthene	EPA625	0.05
Fluorene	EPA625	0.1
Hexachlorobenzene	EPA625	1
Hexachlorobutadiene	EPA625	1
Hexachloro-cyclopentadiene	EPA625	5
Hexachloroethane	EPA625	1
Indeno(1,2,3-cd)pyrene	EPA625	0.05
Isophorone	EPA625	1
Naphthalene	EPA625	0.2
Nitrobenzene	EPA625	1
N-Nitroso-dimethyl amine	EPA625	5
N-Nitroso-diphenyl amine	EPA625	1
N-Nitroso-di-n-propyl amine	EPA625	5
Phenanthrene	EPA625	0.05
Pyrene	EPA625	0.05
1,2,4-Trichlorobenzene	EPA625	1

4 Aquatic Toxicity Testing and Toxicity Identification Evaluations

Aquatic toxicity testing supports the identification of best management practices (BMPs) to address sources of toxicity in urban runoff. The following outlines the approach for conducting aquatic toxicity monitoring and evaluating results. Control measures and management actions to address confirmed toxicity caused by urban runoff are addressed by the WMP, either via currently identified management actions or those that are identified via adaptive management of the WMP.

The generalized approach to conducting aquatic toxicity monitoring is presented in Figure 4-1, which describes an evaluation process for each sample collected as part of routine sampling conducted twice per year in wet weather and once per year in dry weather. Monitoring begins in the receiving water and the information gained is used to identify constituents for monitoring at outfalls to support the identification of pollutants that need to be addressed in the WMP. The sub-sections below describe the process and its technical and logistical rationale.

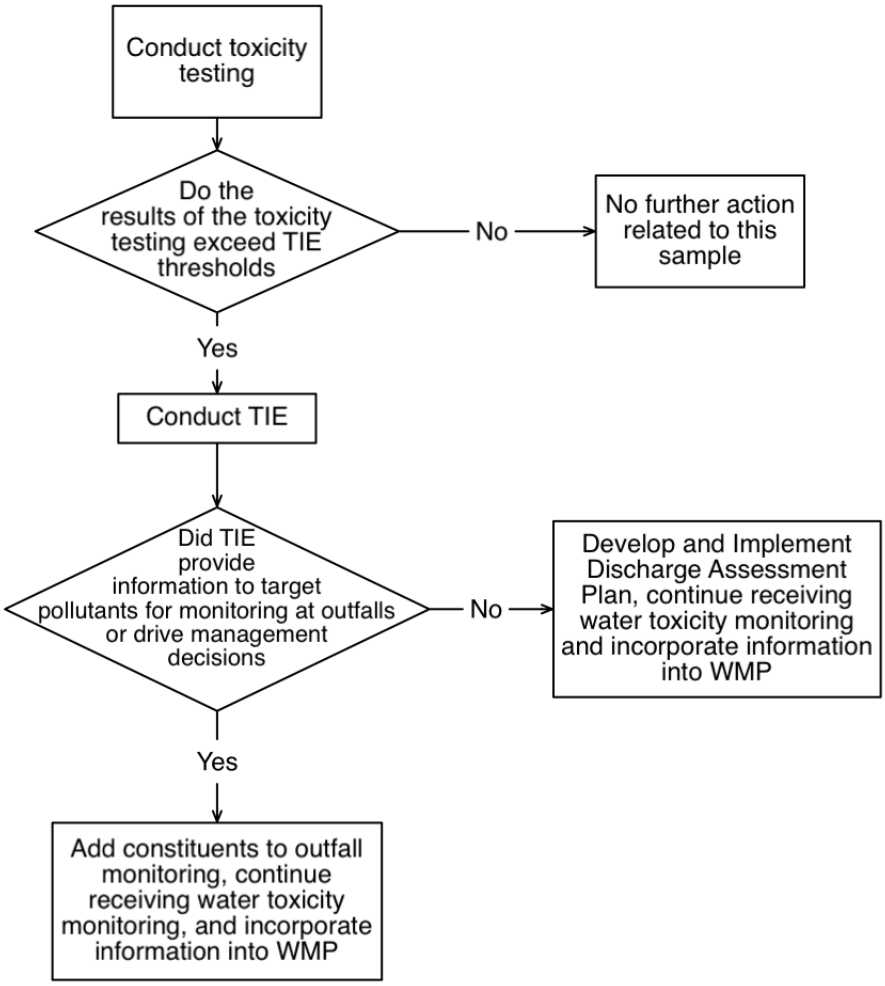

Figure 4-1. Generalized Aquatic Toxicity Assessment Process

4.1 Sensitive Species Selection

The Permit Monitoring and Reporting Program (MRP) (page E-32) states that sensitivity screening to select the most sensitive test species should be conducted unless "a sensitive test species has already been determined, or if there is prior knowledge of potential toxicant(s) and a test species is sensitive to such toxicant(s), then monitoring shall be conducted using only that test species." Previous relevant studies conducted in the watershed should be considered. Such studies may have been completed via previous MS4 sampling, wastewater NPDES sampling, or special studies conducted within the watershed.

As described in the MRP (page E-31), if samples are collected in receiving waters with salinity less than 1 part per thousand (ppt), or from outfalls discharging to receiving waters with salinity less than 1 ppt, toxicity tests should be conducted on the most sensitive test species in accordance with species and short-term test methods in *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms* (EPA/821/R-02/013, 2002; Table IA, 40 CFR Part 136). Salinities of both dry and wet weather discharges from the Los Cerritos Channel are considered to meet the freshwater criteria. During extreme high tides, salinity at the LCC1 receiving water monitoring site can exceed 1 ppt but dry weather sampling is always scheduled to avoid these extremes. The freshwater test species identified in the MRP are:

- A static renewal toxicity test with the fathead minnow, *Pimephales promelas* (Larval Survival and Growth Test Method 1000.04).
- A static renewal toxicity test with the daphnid, *Ceriodaphnia dubia* (Survival and Reproduction Test Method 1002.05).
- A static renewal toxicity test with the green alga, *Selenastrum capricornutum* (also named *Raphidocelis subcapitata*) (Growth Test Method 1003.0).

The three test species were evaluated to determine if either a sensitive test species had already been determined, or if there is prior knowledge of potential toxicant(s) and a test species is sensitive to such toxicant(s). In reviewing the available data in the Los Angeles River, Los Cerritos Channel, and the San Gabriel River watersheds, organophosphate pesticides and/or metals have been identified as problematic and are generally considered the primary aquatic life toxicants of concern found in urban runoff. Pyrethroid pesticides are known to be present in urban runoff and potentially contribute to toxicity in these waters. Tests specific to pyrethroid pesticides are simply less common. Given the knowledge of the presence of these potential toxicants in the watershed, the sensitivities of each of the three species were considered to evaluate which is the most sensitive to the potential toxicants in the watersheds.

Ceriodaphnia dubia has been reported as a sensitive test species for historical and current use pesticides and metals, and studies indicate that it is more sensitive to the toxicants of concern than *P. promelas* or *S. capricornutum*. In its aquatic life copper criteria document, the USEPA reports greater sensitivity of *C. dubia* to copper (species mean acute value of 5.93 µg/l) compared to *Pimephales promelas* (species mean acute value of 69.93 µg/l; EPA, 2007). *C. dubia's* relatively higher sensitive to metals is common across multiple metals. Researchers at the University of California, Davis also reviewed available species

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sensitivity values in developing pesticide criteria for the Central Valley Regional Water Quality Control Board. The UC Davis researchers reported higher sensitivity of *C. dubia* to diazinon and bifenthrin (species mean acute value of 0.34 µg/l and 0.105 µg/l) compared to *P. promelas* (species mean acute value of 7804 µg/l and 0.405 µg/l; Palumbo et al., 2010a, b). Additionally, a study of the City of Stockton urban stormwater runoff found acute and chronic toxicity to *C. dubia*, with no toxicity to *S. capricornutum* or *P. promelas* (Lee and Lee, 2001). The toxicity was attributed to organophosphate pesticides, indicating a higher sensitivity of *C. dubia* compared to *S. capricornutum* or *P. promelas*. *P. promelas* is generally less sensitive to metals and pesticides but has been found to be more sensitive to ammonia than *C. dubia*. However, as ammonia is not typically a constituent of concern for urban runoff and ammonia is not consistently observed above the toxic thresholds in the watershed, *P. promelas* is not considered a particularly sensitive species for evaluating the impacts of urban runoff in receiving waters in the watershed.

Selenastrum capricornutum is a species that is sensitive to herbicides; however, while sometimes present in urban runoff, measured concentrations are typically very low. Herbicides have not been identified as a potential toxicant in the watershed. *S. capricornutum* is also not considered the most sensitive species as it is not sensitive to either pyrethroids or organophosphate pesticides and is not as sensitive to metals as *C. dubia*. The *S. capricornutum* growth test can also be affected by high concentrations of suspended and dissolved solids, color and pH extremes, which can interfere with the determination of sample toxicity. As a result, it is common to manipulate the sample by centrifugation and filtration to remove solids in order to conduct the test. This process may affect the toxicity of the sample. In a study of urban highway stormwater runoff (Kayhanian et. al, 2008), the green alga response to the stormwater samples was more variable than both the *C. dubia* and the *P. promelas* and in some cases the alga growth was considered to be potentially enhanced due to the presence of stimulatory nutrients.

As *C. dubia* is identified as the most sensitive to known potential toxicant(s) typically found in receiving waters and urban runoff in the freshwater potions of the watershed and has demonstrated toxicity in programs within the watershed (CWH and ABC Laboratories, 2013), *C. dubia* is selected as the most sensitive species. The species also has the advantage of being easily maintained in in-house mass cultures. The simplicity of the test, the ease of interpreting results, and the smaller volume necessary to run the test, make the test a valuable screening tool. The ease of sample collection and higher sensitivity will support assessing the presence of ambient receiving water toxicity or long term effects of toxic stormwater over time. As such, toxicity testing will be conducted using *C. dubia*.

An alternative species of water fleas, *Daphnia magna*, may be used if the water being tested has elevated hardness. *C. dubia* test organisms are typically cultured in moderately hard waters (80-100 mg/L CaCO3) and can have increased sensitivity to elevated water hardness greater than 400 mg/L CaCO3), which is beyond their typical habitat range. Because of this, *Daphnia magna* may be substituted in instances where hardness in site waters exceeds 400 mg/L ($CaCO_3$). *Daphnia magna* is more tolerant to high hardness levels and is a suitable substitution for *C. dubia* in these instances (Cowgill and Milazzo, 1990).

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4.2 Testing Period

As wet weather conditions in the region generally persist for less than the acute and chronic testing periods (typically 48 hours and 7 days, respectively), the shorter of the two testing methods, in the case of *C. dubia* acute testing measuring survival, will be used for wet weather toxicity testing. Because storm events are short duration, chronic tests performed on wet weather samples are not representative of the conditions found in the receiving water. Acute toxicity tests are consistent with the relatively shorter exposure periods of species in the watershed to potential toxicants introduced by urban runoff during storm events. Acute testing to assess survival endpoints will be conducted in accordance with *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms* (EPA, 2002b).

Chronic toxicity tests will be used to assess both survival and reproductive/growth endpoints for *C. dubia* in dry weather samples. Chronic testing will be conducted on undiluted samples in accordance with *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms* (USEPA, 2002a).

4.3 Toxicity Endpoint Assessment and Toxicity Identification Evaluation Triggers

Acute and chronic toxicity test endpoints will be analyzed, per the MRP, using the Test of Significant Toxicity (TST) t-test approach specified by the USEPA (USEPA, 2010). The Permit specifies that the chronic in-stream waste concentration (IWC) is set at 100% receiving water for receiving water samples and 100% effluent for outfall samples. Using the TST approach, a t-value is calculated for a test result and compared with a critical t-value from USEPA's TST Implementation Document (USEPA, 2010). Follow-up triggers are generally based on the Permit specified statistical assessment as described below.

For acute *C. dubia* toxicity testing, if a statistically significant 50% difference in mortality is observed between the sample and laboratory control, a toxicity identification evaluation (TIE) will be performed. TIE procedures are discussed in detail in the following section. Experience conducting TIEs in receiving waters in the region supports using a 50% mortality trigger to provide a reasonable opportunity for a successful TIE. During TMDL monitoring in the Calleguas Creek Watershed (CCW) in 2003 and 2004, TIEs were initiated on samples exceeding the 50% threshold (the majority of which displayed 100% mortality). In that study, toxicity degraded in approximately 40% of the samples on which TIE procedures were conducted making the TIE unsuccessful (and effectively useless in pinpointing specific toxicants). Similar degradation of toxicity has been noted in tests conducted on stormwater samples from the Los Cerritos Channel mass emission monitoring site (LCC!). The Los Angeles Regional Water Quality Control Board approved monitoring program for the CCW Toxicity TMDL utilizes a 50% threshold for TIE initiation. Additionally, a 50% mortality threshold is utilized in the Ventura County MS4 Permit.

For chronic *C. dubia* toxicity testing, a TIE will be performed if a statistically significant 50% difference in mortality is observed between the sample and laboratory control. If a statistically significant 50% difference is observed in a sub-lethal endpoint between the sample and laboratory control, a confirmatory sample will be collected from the receiving water within two weeks of obtaining the results of the initial sample. If a statistically significant 50% difference in mortality or sub-lethal endpoint

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is again observed between the sample and laboratory control on the confirmatory sample, a TIE will be performed.

TIE procedures will be initiated as soon as possible after the toxicity trigger threshold is observed to reduce the potential for loss of toxicity due to extended sample storage. If the cause of toxicity is readily apparent or is caused by pathogen related mortality or epibiont interference with the test, the result will be rejected, if necessary, a modified testing procedure will be developed for future testing.

In cases where significant endpoint toxicity effects in excess of 50% are observed in the original sample, but the follow-up TIE positive control "signal" is found to not be statistically significant, the cause of toxicity will be considered non-persistent. No immediate follow-up testing is required on the sample. However, future test results will be evaluated to determine if implementation of concurrent TIE treatments are needed to provide an opportunity to identify the cause of toxicity.

4.4 Toxicity Identification Evaluation Approach

The results of toxicity testing will be used to trigger further investigations to determine the cause of observed laboratory toxicity. The primary purpose of conducting TIEs is to support the identification of management actions that will result in the removal of pollutants causing toxicity in receiving waters. Successful TIEs will direct monitoring at outfall sampling sites to inform management actions. As such, the goal of conducting TIEs is to identify pollutant(s) that should be sampled during outfall monitoring so that management actions can be identified to address the pollutant(s).

The TIE approach as described in USEPA's 1991 Methods for Aquatic Toxicity Identification is divided into three phases although some elements of the first two phases are often combined. Each of the three phases is briefly summarized below:

- Phase I utilizes methods to characterize the physical/chemical nature of the constituents, which cause toxicity. Such characteristics as solubility, volatility and filterability are determined without specifically identifying the toxicants. Phase I results are intended as a first step in specifically identifying the toxicants but the data generated can also be used to develop treatment methods to remove toxicity without specific identification of the toxicants.
- Phase II utilizes methods to specifically identify toxicants.
- Phase III utilizes methods to confirm the suspected toxicants.

A Phase I TIE will be conducted on samples that exceed a TIE trigger described in Section4.4. Water quality data will be reviewed to future support evaluation of potential toxicants. A range of sample manipulations may be conducted as part of the TIE process. The most common manipulations are described in Table 4-1. Information from previous chemical testing and/or TIE efforts will be used to determine which of these (or other) sample manipulations are most likely to provide useful information for identification of primary toxicants. TIE methods will generally adhere to USEPA procedures documented in conducting TIEs (USEPA, 1991, 1992, 1993a-b).

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Table 4-1. Phase I and II Toxicity Identification Evaluation Sample Manipulations

TIE Sample Manipulation	Expected Response
pH Adjustment (pH 7 and 8.5)	Alters toxicity in pH sensitive compounds (i.e., ammonia and some trace metals)
Filtration or centrifugation	Removes particulates and associated toxicants
Ethylenediamine-Tetraacetic Acid (EDTA)	Chelates trace metals, particularly divalent cationic metals
Sodium thiosulfate (STS) addition	Reduces toxicants attributable to oxidants (i.e., chlorine) and some trace metals
Piperonyl Butoxide (PBO)	Reduces toxicity from organophosphate pesticides such as diazinon, chlorpyrifos and malathion, and enhances pyrethroid toxicity
Carboxylesterase addition(1)	Hydrolyzes pyrethroids
Temperature adjustments(2)	Pyrethroids become more toxic when test temperatures are decreased
Solid Phase Extraction (SPE) with C18 column	Removes non-polar organics (including pesticides) and some relatively non-polar metal chelates
Sequential Solvent Extraction of C18 column	Further resolution of SPE-extracted compounds for chemical analyses
No Manipulation	Baseline test for comparing the relative effectiveness of other manipulations

1 Carboxylesterase addition has been used in recent studies to help identify pyrethroid-associated toxicity (Wheelock et al., 2004; Weston and Amweg, 2007). However, this treatment is experimental in nature and should be used along with other pyrethroid-targeted TIE treatments (e.g., PBO addition).

2 Temperature adjustments are another recent manipulation used to evaluate pyrethroid-associated toxicity. Lower temperatures increase the lethality of pyrethroid pesticides. (Harwood, You and Lydy, 2009)

The Watershed Group will identify the cause(s) of toxicity using a selection of treatments in Table 4-1 and, if possible, using the results of water column chemistry analyses. After any initial assessments of the cause of toxicity, the information may be used during future events to modify the targeted treatments to more closely target the expected toxicant or class of toxicants. Moreover, if the toxicant or toxicant class is not initially identified, toxicity monitoring during subsequent events will confirm if the toxicant is persistent or a short-term episodic occurrence.

As the primary goals of conducting TIEs is to identify pollutants for incorporation into outfall monitoring, narrowing the list of toxicants following Phase I TIEs via Phase II/III TIEs is not necessary if the toxicant class determined during the Phase I TIE is sufficient for 1) identifying additional pollutants for outfall monitoring and/or 2) identifying control measures. Thus, if the specific pollutant(s) or classes of pollutants (e.g., metals that are analyzed via EPA Method 200.8) are identified then sufficient information is available to incorporate the additional pollutants into outfall monitoring and to start implementation of control measures to target the additional pollutants.

Phase II TIEs may be utilized to identify specific constituents causing toxicity in a given sample if the results of Phase I TIE testing and a review of available chemistry data fails to provide information necessary to identify constituents that warrant additional monitoring activities or management actions to identify likely sources of the toxicants and lead to elimination of the sources of these contaminants. Phase III TIEs will be conducted following any Phase II TIEs.

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TIEs will be considered inconclusive if 1) the toxicity is persistent (i.e., observed in the positive control), and 2) the cause of toxicity cannot be attributed to a class of constituents (e.g., insecticides, metals, etc.) that can be targeted for monitoring.

The TIE is considered conclusive if:

- a combination of causes that act in a synergistic or additive manner are identified
- toxicity can be removed with a treatment or combination of the TIE treatments
- analysis of water quality data collected during the same event identifies the pollutant or analytical class of pollutants

Note that the MRP (page E-33) allows a TIE Prioritization Metric (as described in Appendix E of the Stormwater Monitoring Coalition's Model Monitoring Program) for use in ranking sites for TIEs. Information is currently not available to determine whether a prioritization metric will be warranted. If toxicity results indicate the need for development of a prioritization metric, a strategy will be developed and structured through the WMP adaptive management process. The suggested prioritization approach will be developed through the CIMP adaptive management process described in the CIMP annual report.

4.5 Discharge Assessment

The Watershed Management Group will prepare a brief Discharge Assessment Plan if TIEs conducted on consecutive sampling events are inconclusive. The discharge assessment will be conducted after consecutive inconclusive TIEs, rather than after one, because of inherit variability associated with the toxicity and TIE testing methods.

The Discharge Assessment Plan will consider the observed potential toxicants in the receiving water and associated urban runoff discharges above known species effect levels and the relevant exposure periods compared to the duration of the observed toxicity. The Discharge Assessment Plan will reexamine the following issues:

- Is additional receiving water toxicity monitoring necessary to better evaluate the spatial extent of receiving water toxicity?
- Should different test species be considered? If a species is proposed that is different than the species utilized when receiving water toxicity was observed, justification for the substitution will be provided.
- Is the number and location of monitoring sites suitable for understanding their impacts to the observed receiving water toxicity?
- What program adjustments are necessary to facilitate a better understanding of the cause of toxicity? Examine the number of monitoring events to be conducted, a schedule for conducting the monitoring, and a process for evaluating the completion of the assessment monitoring.

The Discharge Assessment Plan will be submitted to Los Angeles Regional Water Board for comment within 60 days of receipt of notification of the second consecutive inconclusive result. If no comments

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are received within 30-days, it will be assumed that the approach is appropriate for the given situation and the Plan should be implemented within 90-days of submittal.

4.6 Follow Up on Toxicity Testing Results

The MRP (page E-33) indicates the following actions should be taken when a toxicant or class of toxicants is identified through a TIE:

1. Group Members shall analyze for the toxicant(s) during the next scheduled sampling event in the discharge from the outfall(s) upstream of the receiving water location.
2. If the toxicant is present in the discharge from the outfall at levels above the applicable receiving water limitation, a toxicity reduction evaluation (TRE) will be performed for that toxicant.

The list of constituents monitored at outfalls identified in the CIMP will be modified based on the results of the TIEs. Monitoring for those constituents will occur as soon as feasible following the completion of a successful TIE (i.e., the next monitoring event that is at least 45 days following the toxicity laboratory's report transmitting the results of a successful TIE).

The requirements of the TREs will be met as part of the adaptive management process in the WMPs rather than the CIMP. The identification and implementation of control measures to address the causes of toxicity are tied to management of the stormwater program, not the CIMP. It is expected that the requirements of TREs will only be conducted for toxicants that are not already addressed by an existing Permit requirement (i.e., TMDLs) or existing or planned management actions.

4.7 Summary of Aquatic Toxicity Monitoring

The approach to conducting aquatic toxicity monitoring as described in the previous sections is summarized in detail in Figure 4-2. The intent of the approach is to identify the cause of toxicity observed in receiving water to the extent possible with the toxicity testing tools available, thereby directing outfall monitoring for the pollutants causing toxicity with the ultimate goal of supporting the development and implementation of management actions.

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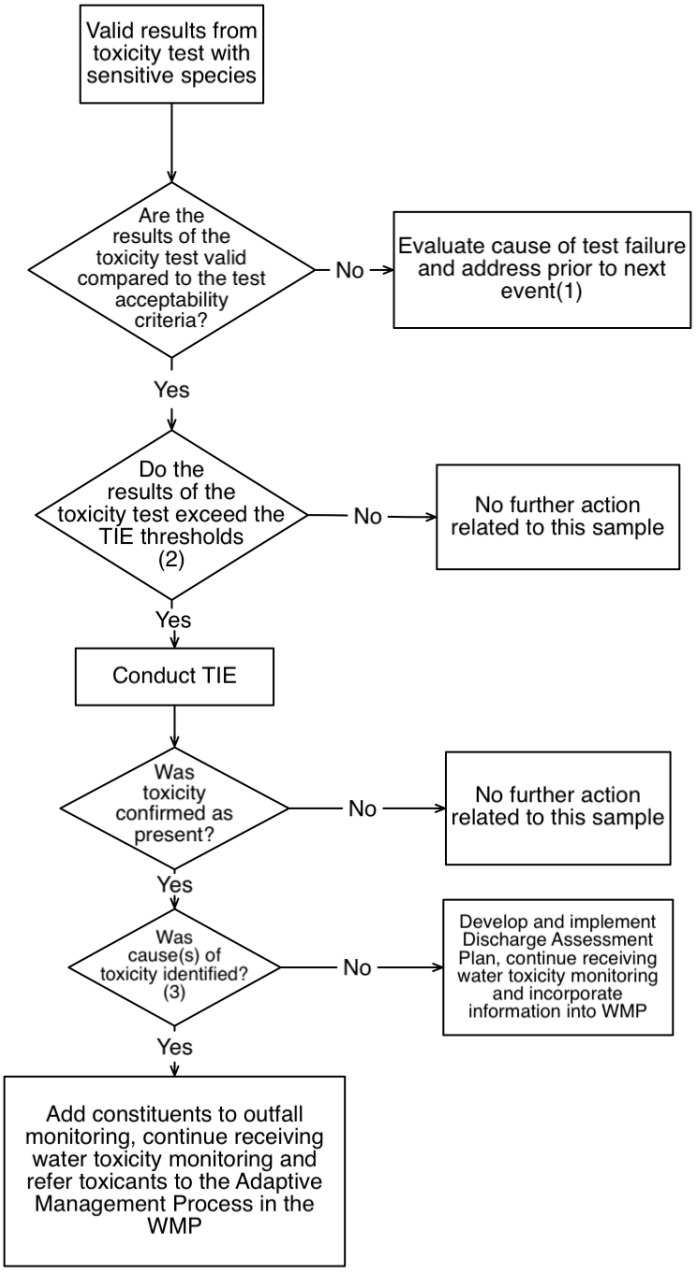

1. **Test failure includes pathogen or epibiont interference which should be addressed prior to the next toxicity sampling event.**
2. **The TIE threshold is >50% mortality in an acute (wet weather) or chronic (dry weather) sample. If a >50% effect in a sub-lethal endpoint for a chronic test is observed a follow up sample will be initiated within two weeks of the completion of the initial sample collection. If the follow up sample exhibits a greater than 50% effect, a TIE will be initiated.**
3. **The goal of conducting the Phase I TIE is to identify the cause of toxicity so that outfall monitoring can incorporate the toxicant(s) into the list of constituents monitored during outfall monitoring. Thus, if the specific toxicant(s) or the analytical classes of toxicants (i.e., metals that are analyzed via EPA Method 200.8) are identified, sufficient information is available to inform the addition of pollutants to the list of pollutants monitoring during outfall monitoring.**

Figure 4-2. Detailed Aquatic Toxicity Assessment Process

5 Receiving Water Quality Monitoring (Wet and Dry Weather)

Receiving water quality monitoring will primarily be conducted with automated stormwater monitoring equipment detailed in Appendix A. Water samples for bacteria, oil and grease, , petroleum hydrocarbons, and volatile organic compounds must be collected separately as grab samples. Appendix A also discussed manual collection of water samples when required. This section addresses both the equipment and protocol used for collection of flow-weighted and time-weighted composite samples. Figure 1-2 will serve as the Receiving Water and TMDL compliance monitoring location for the Los Cerritos Channel. The monitoring equipment provides continuous records of rainfall at this site as well as flow during storm events. This site monitors and records all flows exceeding 18 cfs. Flow estimates are based upon a rating curve established for a former gaging station located approximately 100 feet upstream.

During dry weather monitoring, manual flow measurements are required to obtain instantaneous estimates of flow rates. Measurements are taken at a position where flow is relative uniform over a distance of 10 to 20 feet. Measurements are taken to determine to average width of the flowing water and the depth of water at the center of the flow. Water velocities are recorded by the time required for particles to travel a measured distance along the channel. The velocity of water flow is multiplied by the cross-sectional area of the channel to estimate flow. Since the channel approximates a triangular form, the cross-sectional area of the flowing water is calculated as ½ of the depth at the center of the channel multiplied by the width of flowing water. Dry weather flows have averaged approximately 0.5 cfs during the past five years.

5.1 Sampling Frequency and Mobilization Requirements

Monitoring of receiving water quality will be performed three times a year during the wet season and two times a year during dry weather conditions. Screening for Table E-2 constituents listed in the MRP will be conducted during the first significant storm of the year and during a critically dry weather period. Large sampling volumes are required to incorporate all analytical tests and associated QA/QC needed for Table E-2 constituents, bioassay tests and to provide sufficient volumes should TIEs be required. Due to these requirements, mobilization criteria for the initial wet weather events will differ from subsequent events.

Mobilization of field crews will typically start when a there is both a 70% probability of rainfall within 24 hours of the arrival of a predicted storm event and Quantitative Precipitation Forecasts (QPFs) indicate that a minimum of 0.25 inches will occur within a 24-hour time period. Due to the importance of the first storm event of the year, crews will be mobilized to prepare the site (or sites) for monitoring 24 hours in advance of any events with at least a 50% probability of rainfall and QPFs of at least 0.20 inches within a 24-hour time period. If weather forecasts for the first storm of the season indicate

development of a condition known as a "cut-off low"[6], partial field teams may initially be deployed to prepare stations since such conditions create highly unpredictable situations that have the potential to suddenly move onshore with higher than expected rainfall. Full mobilization will require an upgrade in the local forecast to a predicted rainfall of at least 0.25 inches with a minimum probability of 70% within 12 hours of the event. For the purposes of this CIMP, weather forecasts and Quantitative Precipitation Forecasts (QPFs) provided by the Los Angeles/Oxnard National Weather Service and the California Nevada River Forecast Center will be used to assess whether mobilization criteria are met.

Once the screening phase has been completed for Table E-2 constituents, storm events will be considered suitable for monitoring given a minimum of 72 hours (3 days) with cumulative rainfall of less than 0.1 inches of rainfall within the watershed. Evaluation of antecedent rainfall conditions will initially be based upon Los Angeles County ALERT (Automatic Local Evaluation in Real Time) stations and rain gauges within or near the Los Cerritos Channel Watershed and rainfall measured at LCC1. The rain gauge located at Signal Hill City Hall (#335) will serve as the primary site for evaluation of antecedent conditions. The rain gauge installed at LCC1 will serve as the secondary site if the primary site is inoperable or unavailable. As the Primary Watershed Segmentation (PWS) sites come on line, these sites will also be used to evaluate antecedent conditions. Assessment of antecedent conditions will be based upon average rainfall measured at sites located within the watershed boundaries and that are known to be fully operable. Due to anticipated reductions in required stormwater volumes, monitoring of subsequent storm events will be based upon weather forecasts predicting rainfall of 0.25 inches at probability of at least 70% within 24 hours of the predicted event. Once crews are mobilized for a storm event, rainfall must exceed a minimum of 0.25 inches and provide sufficient rainfall to project objectives. One of the three storm events to be sampled at the LCC1 Receiving Water Monitoring Site is only intended to address the requirements of the metals TMDL. At this site, a minimum rainfall event of 0.15 to 0.25 inches would be expected fulfill sampling requirements for the TMDL constituents and provide a representative flow-composite sample due to the fact that the watershed is highly impervious.

Two monitoring events are required during dry weather conditions. There has been no indication that seasonal trends exist with respect to dry weather flows in the Los Cerritos Channel Watershed but data from the ongoing Proposition 84 study will provide information to evaluate if seasonality in flow exists in different areas of the watershed. Based upon existing information, dry weather monitoring at the LCC1 Receiving Water Monitoring Site will be conducted once in late spring/early summer (May to June) and again towards the end of the dry season in September/October. This will be consistent with historical dry weather sampling conducted under the City of Long Beach NPDES Permit. During the dry season, the only restriction on sampling will be that total rainfall over the 72 hour time period preceding the sampling event does not exceed 0.1 inches. In practice, rainfall is very rare during the summer months. With the exception of unusual periods when hurricanes developing off of Baja California cause some

[6] A closed upper-level low which has become completely displaced (cut off) from basic westerly current, and moves independently of that current. Cutoff lows may remain nearly stationary for days, or on occasion may move westward opposite to the prevailing flow aloft (i.e., retrogression).

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precipitation to spin north, rainfall events are very infrequent. When practical, dry weather monitoring will be conducted during periods with less than 0.1 inches of rain occur over the previous week.

5.2 Sampling Constituents

With minor exceptions, chemical analyses are scheduled to be conducted for all analytes listed in Table 3-3 through Table 3-9 during the first significant rainfall of the season and again during a period of critical low flow. Chemical constituents not detected in excess of their respective Method Detection Limits (MDLs) or that do not exceed available water quality standards will be considered for removal during subsequent surveys. Adjustments to the list of analytical tests will be assessed separately for wet and dry weather sampling requirements. Since the initial screening event may be followed too quickly for the data to be received and fully evaluated, the field team must be prepared to collect water samples for the testing the full set of Table E-2 constituents during the second sampling event.

Most of the general and conventional pollutants listed in Table 3-3 will continue to be analyzed as part of the base monitoring requirements for continued monitoring for both receiving waters and for the metals TMDL. The only pollutants considered for elimination will be cyanide, total phenols, perchlorate, and MTBE. Analysis of chloride and fluoride will continue to be used to assist in the interpretation of potential potable water sources during in association with the non-stormwater screening program. In addition, microbiological constituents (Table 3-4), nutrients (Table 3-5), chlordane compounds listed in Table 3-7 and TMDL metals (Table 3-6) will continue to be part of the ongoing monitoring at LLC1.

As noted in the previous section, it has been determined that adequate data exist to determine which of the three freshwater species are considered to be most sensitive during both storm events and dry weather periods. Available literature and local data indicate that the most sensitive bioassay test species is *Ceriodaphnia dubia*. The prior section on Aquatic Toxicity Testing and TIEs goes into detail as to species selection and the overall approach recommended for measuring toxicity in the receiving waters and strategies to eliminate any sources of toxicity. During wet weather conditions, bioassay tests will be performed based upon exposure to 100 percent test waters over a 48-hour time period since this time exposure is deemed to be more consistent with the duration of typical storm events. Since exposure times during the dry season are much long, dry weather testing will utilize 7-day chronic toxicity tests that assess both survival and reproductive endpoints for *C. dubia*. Chronic testing will also be conducted on 100 percent undiluted samples. Table 5-1 provides sample volumes necessary for toxicity tests (both wet and dry weather) as well as minimum volumes necessary to fulfill Phase I TIE testing if necessary. As detailed in the previous section, the sublethal endpoints will be assessed using EPA's TST procedure to determine if there is a statistically significant 50% difference between sample controls and the test waters and ultimately determine if further testing should be is necessary.

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Table 5-1. Toxicity Test Volume Requirements for Aquatic Toxicity Testing as part of the Los Cerritos Channel Coordinated Integrated Monitoring Program.

Test Organism	Toxicity Test Type	Test Concentration	Volume Required for Initial Screen (L)	Minimum Volume Required for TIE (L)[1]
Freshwater Tests for Samples with Salinity < 1.0 ppt				
Daphnid Water Flea (Ceriodaphnia dubia)	48-Hour Acute Survival 7-day Chronic Survival and Reproduction	100% only	1.5	10
Sample Receipt Water Quality	--	--	1.0	--
Total volume required per event for samples with salinity < 1.0 ppt;			2.5	a

[1] Minimum volumes for TIE are for Phase 1 characterization testing only. The additional volume collected for potential TIE testing can be held in refrigeration (4°C in the dark, no head space) and shipped to the laboratory at a later date if needed.

Note: The NPDES permit targets a 36-hr holding time for initiation of testing but allows a maximum holding time of 72-hr if necessary.

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6 Primary Watershed Segmentation (PWS) Sites

6.1 Sampling Frequency and Mobilization Requirements

The sampling frequency and mobilization requirements for the stormwater outfall sites will be consistent with monitoring conducted at the LCC1. A total of three storm events will be monitored at each site once they are installed. Monitoring will be concurrent with LCC1 monitoring in order to allow for comparison of pollutant loading rates associated with each segment relative to ultimate pollutant loads measured at the LCC1 site.

6.2 PWS Sampling Constituents

Constituents monitored at each PWS site will include all TMDL constituents as well as general and conventional constituents necessary to assist in evaluation of the data (Table 6-1). Constituents included in the MAL list and monitored at the outfall sites will be included in an annual MAL Assessment Report reported as part of the Annual Report. The MAL Assessment Report will summarize the monitoring data in comparison to the applicable MALs, and identify those subwatersheds where the running average concentrations of these constituents exceed the MALs by twenty percent or more.

Table 6-1. Constituents Monitored at Primary Watershed Segment (PWS) Sites.

CONSTITUENTS CONVENTIONAL POLLUTANTS	METHOD	TARGET REPORTING LIMITS mg/L
Total Suspended Solids	EPA 160.2	1
Total Dissolved Solids	EPA 160.1	1
Volatile Suspended Solids	EPA 160.4	1
Total Organic Carbon	EPA 415.1	1
Chemical Oxygen Demand	EPA 410.1	4
Alkalinity	EPA 310.1	5
Specific Conductance	EPA 120.1	1
Total Hardness	EPA 130.2	1
MBAS	EPA 425.1	0.02
Chloride	EPA300.0	2
Fluoride	EPA300.0	0.1
METALS (Dissolved & Total)	**METHOD**	**ug/L**
Copper	EPA200.8	0.5
Lead	EPA200.8	0.5
Zinc	EPA200.8	1

7 Secondary Watershed Segmentation (SWS) Sites (Wet Weather)

Secondary Watershed Segmentation (SWS) sites will be monitored with portable equipment that will be used to assist in tracking sources of constituents found to be elevated at one of the Primary Watershed Segmentation sites. The portable monitoring stations will consist of a battery powered autosamplers triggered by sensors installed in the channel to detect the start of flow. Once triggered, the samplers

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will take time-weighted samples for a 24-hour period. The autosamplers will be set to take 200 mL samples every 15 minutes while is present in the channel. All sample composite bottles and materials contacting the water will be identical to those used for each of the "permanent" or fixed monitoring sites.

SWS sites are expected to be deployed above PWS sites where specific contaminants are found to be elevated. Tentative locations (Figure 1-2) have been established at sites in each subwatershed should PWS monitoring data indicate that forensic monitoring is necessary to further isolate areas contributing excessive pollutant loads. The selected sites further segment the subwatersheds into two areas and are designed to be monitored concurrently with the SWS site. Pre-selection of candidate SWS sites was intended to facilitate implementation of forensic monitoring by clearly identifying the next step if conditions are met that trigger further testing.

SWS monitoring will be triggered if the running average of any MAL constituent is exceeded by 20 percent or if the running average of MAL or TMDL constituents at a PWS site exceeds the running average at other PWS sites by more than 20 percent. SWS sites would focus on monitoring the specific constituent of concern and any additional data necessary to help interpret the results. For example, if the constituent of concern is a trace metal, monitoring at SWS sites would include both TSS and hardness.

8 Non-Stormwater (NSW) Outfall Monitoring

Detailed objectives of the screening and monitoring process (Section IX.A, page E-23 of the MRP) include the following:

1. Develop criteria or other means to ensure that all outfalls with significant non-stormwater discharges are identified and assessed during the term of this Order.

2. For outfalls determined to have significant non-stormwater flow, determine whether flows are the result of illicit connections/illicit discharges (IC/IDs), authorized or conditionally exempt non-stormwater flows, natural flows, or from unknown sources.

3. Refer information related to identified IC/IDs to the IC/ID Elimination Program (Part VI.D.10 of the Order) for appropriate action.

4. Based on existing screening or monitoring data or other institutional knowledge, assess the impact of non-stormwater discharges (other than identified IC/IDs) on the receiving water.

5. Prioritize monitoring of outfalls considering the potential threat to the receiving water and applicable TMDL compliance schedules.

6. Conduct monitoring or assess existing monitoring data to determine the impact of non-stormwater discharges on the receiving water.

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7. Conduct monitoring or other investigations to identify the source of pollutants in non-stormwater discharges.

8. Use results of the screening process to evaluate the conditionally exempt non-stormwater discharges identified in Parts III.A.2 and III.A.3 of the Order and take appropriate actions pursuant to Part III.A.4.d of the Order for those discharges that have been found to be a source of pollutants. Any future reclassification will occur per the conditions in Parts III.A.2 or III.A.6 of the Order.

9. Maximize the use of Permittee resources by integrating the screening and monitoring process into existing or planned CIMP efforts.

Ultimately, the NSW program is intended to establish a process for identifying outfalls that serve as potential sources of contaminants. Sites where initial screening indicates the potential for discharges of a magnitude considered to have the potential to cause or contribute to exceedances of receiving water limitations will require further efforts to classify the discharges and determine appropriate actions, if any.

In cases where flow or other factors show evidence of potential discharges of concern, the program will take further action to determine if the flows are illicit, exempt, conditionally exempt, conditionally exempt but non-essential, or if the source(s) of the discharge cannot be identified (unknown). Illicit discharges require immediate action and, if they cannot be eliminated, monitoring will be implemented until such time that the illicit discharge can be eliminated. Discharges classified as conditionally exempt but non-essential or unknown also require ongoing monitoring.

The following sections summarize the elements of the program and processes to ultimately eliminate major sources of non-stormwater discharges.

8.1 Non-Stormwater Outfall Screening and Monitoring Program

The NSW Outfall Screening and Monitoring Program will consist of a screening phase designed to initially classify outfalls into one of three categories. Three screening surveys will be conducted starting in the summer of 2014 to identify outfalls or other discharges that are considered to be significant and persistent sources of non-stormwater flow to either the open channels or receiving waters.

The initial survey will focus on completing an inventory of all outfalls (refer to Appendix E) to receiving waters. Outfalls greater than 12-inches in diameter (or equivalent) will be photographed and documented. All minor outfalls[7] (outfalls less than 36-inches in diameter or equivalent) without

[7] Minor municipal separate storm sewer outfall (or ‘‘minor outfall’’) means a municipal separate storm sewer outfall that discharges from a single pipe with an inside diameter of less than 36 inches or its equivalent (discharge from a single conveyance other than circular pipe which is associated with a drainage area of less than 50 acres); or for MS4s that receive stormwater from lands zoned for industrial activity (based on comprehensive zoning plans or the equivalent), an outfall that discharges from a single pipe with an inside diameter of less than 12 inches or from its equivalent (discharge from other than a circular pipe associated with a drainage area of 2 acres or less)

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evidence of the presence of industrial activities will be maintained in the database but will be considered as not requiring any further action.

If while in the process of conducting any of the site inspections, the inspection team encounters a transitory discharge, such as a liquid or oil spill, the problem will be immediately referred to the appropriate local jurisdiction for clean-up or response. If it is not readily apparent which jurisdictional authority has responsibility, the discharge will be reported to the WMG technical committee chair.

Information from all three screening surveys will be consolidated to assist in the identification and ranking of outfalls considered to have significant NSW discharges. Multiple lines of evidence will be considered when assessing the significance of a discharge. Data from the field screening program such as flow measurements, general observations and *in-situ* water quality information will be given primary consideration but land uses within the drainage area will also be considered.

A combination of field observations, flow measurements and field water quality measurements collected during the screening surveys will be used to classify outfalls into one of the following three categories that will determine further actions (Figure 8-1):

1. **Suspect Discharge** – Outfalls with persistent high flows during at least two out of three visits and with high severity on one or more physical indicators (odors, oil deposits, etc.). Outfalls in this category require prioritization and further investigation.

2. **Potential Discharge** - Flowing or non-flowing outfalls with presence of two or more physical indicators. Outfalls in this category are considered to be low priority but will be continue to be monitored periodically to determine if the sites are subject to less frequent, discharges or determine if actions can be taken to reduce or eliminate the factors that lead to the site being considered a potential source of contaminants.

3**. Unlikely Discharge** - Non-flowing outfalls with no physical indicators of an illicit discharge. Outfalls within this classification would be not be subject to any further screening.

Initial screening activities will emphasize use of field water quality instrumentation and/or simple field test kits to assist in classifying discharges. Collection of water samples for limited laboratory testing may be incorporated into the program as requirements for more complex, accurate and scientifically supportable data become necessary to characterize non-stormwater discharges and provide scientifically supportable data to track the source of these discharges. The Center for Watershed Protection and Pitt (2004) provide an evaluation of twelve analytes for assistance in determining the source of NSW discharges (Table 8-2). Three of the analytes can be measured with *in-situ* instrumentation. Others can be analyzed relatively inexpensively by use of field test kits or can be analyzed in an ELAP-certified laboratory. In addition, three to five of the listed tests are often considered sufficient to screen for illicit discharges. Ammonia, MBAS, fluoride (assuming tap water is fluorinated), and potassium are considered to confidently differentiate between sewage, wash water, tap water and industrial wastes. Incorporation of *in-situ* measurement of temperature, pH, TDS/salinity,

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turbidity and dissolved oxygen can further assist in characterizing and tracking the source(s) of an NSW discharge.

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Table 8-1. Outline of the NSW Outfall Screening and Monitoring Program.

Element	Description	Timing of Completion
1. Outfall Screening	Because data required to implement the NSW Outfall Program are not available, the Permittees will implement a screening process to determine which outfalls exhibit significant NSW discharges and those that do not require further investigation. Data will be recorded on Outfall Reconnaissance Investigation (ORI) forms and in the associated database.	The Outfall Screening process is currently being implemented. Identification of obvious illicit discharges will be immediately addressed. Otherwise, the Outfall Screening process will be completed prior to starting source investigations.
2. Identification of outfalls with significant NSW discharge (Part IX.C of the MRP)	Data from the Outfall Screening process will be used to categorize MS4 outfalls on the basis of discharge flow rates, field water quality and physical observations.	Concurrent with Outfall Screening December 28, 2014 with Annual CIMP Report
3. Inventory of Outfalls with NSW discharge (Part IX.D of the MRP)	Develop an inventory of all major MS4 outfalls, identify outfalls with known NSW discharges and identify outfalls with no flow requiring no further assessment.	Concurrent with Outfall Screening December 28, 2014 with Annual CIMP Report
4. Prioritized source investigation (Part IX.E of the MRP)	Use the data collected during the Outfall Screening process to further prioritize outfalls for source investigations.	Prioritization for Source Investigation will be occur after completion of Outfall Screening
5. Identify sources of significant NSW discharges (Part IX.F of the MRP)	For outfalls exhibiting significant NSW discharges, Permittees will perform source investigations per the established prioritization.	Complete source investigations for 25% of the outfalls with significant NSW discharges by December 28, 2015 and 100% by December 28, 2017
6. Monitoring NSW discharges exceeding criteria (Part IX.G of the MRP)	Monitor outfalls determined to convey significant NSW discharges comprised of either unknown or conditionally exempt non-essential discharges, or illicit discharges that cannot be abated.	Monitoring will commence within 90 days of completing the source investigations

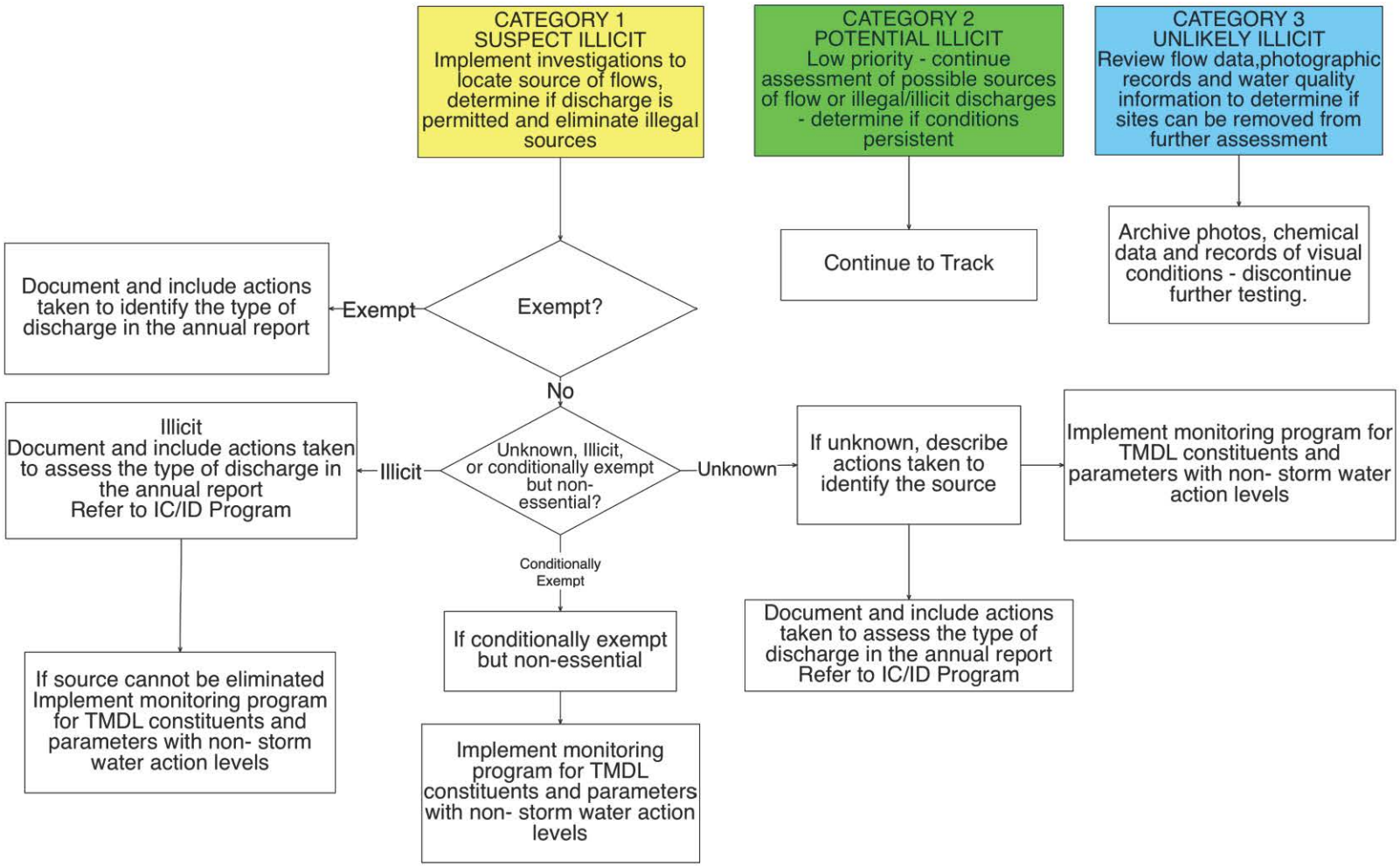

Figure 8-1. Flow Diagram of NSW Outfall Program after Classifying Outfalls during Initial Screening.

Table 8-2. Potential Indicator Parameters for Identification of Sources of NSW Discharges.

Indicator Parameters	
Ammonia	E. coli
Boron	Fluoride
Chlorine	Hardness
Color	pH - Field
Conductivity-Field	Potassium
Detergents – Surfactants (MBAS or fluorescence)	Turbidity

Based upon CWP and Pitt 2004. Illicit Discharge Detection and Elimination A Guidance Manual for Program Development and Technical Assessments

8.1.1 Identification of Outfalls with Significant Non-Stormwater Discharges

Existing monitoring data or institutional knowledge (Objective 4) are not available to allow identification of outfalls with significant NSW discharges. The screening program is necessary to collect information necessary to identify outfalls with potentially significant NSW discharges. The outfall screening includes collection of information necessary to provide an accurate inventory of the major outfalls, assess flow from each outfall and in the receiving waters, determine the general characteristics of the receiving waters (e.g. is flow present, does the flow from the outfall represent a large proportion of the flow, is it an earthen or lined channel), and record general observations indicative of possible illicit discharges. The initial screening survey(s) will also be used to refine the inventory information required in Section 8.1.2.

The outfall screening process has already been initiated in order to meet the established schedule for completion of 25% of the source identification work. Once the screening process is completed Permittees are required to identify MS4 outfalls with "significant" NSW discharges. The MRP (Section IX.C.1) indicates that significant NSW discharges may be determined based upon one or more of the following characteristics:

a. Discharges from major outfalls subject to dry weather TMDLs.

b. Discharges for which existing monitoring data exceeds Non-Stormwater Action Levels (NALs) identified in Attachment G of the Order.

c. Non-stormwater discharges that have caused or have the potential to cause overtopping of downstream diversions.

d. Discharges exceeding a proposed threshold discharge rate as determined by the Permittee.

Most of these characteristics are either unlikely to differentiate significant NSW discharges or the information will not be available when the screening process is completed. Multiple lines of evidence derived from flow measurements, observations and *in-situ* water quality information recorded on the Outfall Reconnaissance Investigation (ORI) forms used during the screening process will be used to determine "significant" NSW discharges and appropriately rank sites for source investigations. The

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relative magnitude of the discharges, persistence of the flow, visual and physical characteristics recorded at each site, and land uses associated with the drainage may also be considered. Characteristics of the receiving waters (flow, channel characteristics –hard or soft-bottom, etc.) at the discharge location will also be considered when determining the relative significance of NSW discharges. The most important consideration is whether the discharge has the potential to cause or contribute to exceedance of receiving water quality limitations. Factors that provide the best insight with respect to these impacts will receive the greatest weight when establishing the list of "significant" NSW discharges.

8.1.2 Inventory of MS4 Outfalls with Non-Stormwater Discharges

Part VII.A of the MRP requires that the CIMP plan(s) include a map(s) and/or database of the MS4 that includes the elements listed in Table 8-3. Most required elements are complete and being submitted with this CIMP. Elements requiring further development include the Effective Impervious Area, information on the length of open channels and underground pipes equal to or greater than 18 inches, and the drainage areas associated with each outfall. Subbasins used for the WMMS model are currently associated with each outfall within that subbasin. If an outfall is identified as a significant source of NSW discharges, drainage areas for each targeted outfall will be refined and updated in the database. Additional information such as documenting presence of significant NSW discharges, links to a database documenting water quality measurements at sites with significant NSW discharges will be updated annually and submitted with the CIMP annual report.

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Table 8-3. Basic Database and Mapping Information for the Watershed.

Database Element	Status	
	Complete	Schedule
1. Surface water bodies within the Permittee(s) jurisdiction	X	
2. Sub-watershed (HUC 12) boundaries	X	
3. Land use overlay	X	
4. Effective Impervious Area (EIA) overlay (if available)		Will provide if available
5. Jurisdictional boundaries	X	
6. The location and length of all open channel and underground pipes 18 inches in diameter or greater (with the exception of catch basin connector pipes)	X[1]	
7. The location of all dry weather diversions	X	
8. The location of all major MS4 outfalls within the Permittee's jurisdictional boundary. Each major outfall shall be assigned an alphanumeric identifier, which must be noted on the map	X[2]	
9. Notation of outfalls with significant non-stormwater discharges (to be updated annually)	X	ongoing
10. Storm drain outfall catchment areas for each major outfall within the Permittee(s) jurisdiction	X[3]	ongoing
11. Each mapped MS4 outfall shall be linked to a database containing descriptive and monitoring data associated with the outfall. The data shall include:[4]		
a. Ownership	X	
b. Coordinates	X	
c. Physical description	X	
d. Photographs of the outfall, where possible to provide baseline information to track operation and maintenance needs over time	X	
e. Determination of whether the outfall conveys significant non-stormwater discharges		ongoing
f. Stormwater and non-stormwater monitoring data		ongoing

1. Locations are identified but the length of all open channel and underground pipes are not fully documented.
2. Attributes in the shapefile contain a Unique ID for all outfalls greater than 12" in diameter.
3. Catchments for each outfall are included as the area of the subbasins associated with each outfall. Several outfalls may drain these subbasins. Data will be developed as needed to resolve the drainage areas specific to each outfall.
4. Efforts are ongoing to define ownership and maintenance responsibility. As data become available, information regarding the conveyance of NSW and associated water quality data will be added to the database. Information will be updated based upon the three screening surveys.

As a component of the inventory and screening process, Permittees are required to document the physical attributes of MS4 outfalls determined to have significant non-stormwater discharges. Table 8-4 summarizes the minimum physical attributes required to be recorded and linked to the outfall database.

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These data will be maintained using the Outfall Reconnaissance Inventory (ORI) field form and associated database (Appendix C) developed by CWP and Pitt (2004). Data entry can be accomplished by completing the ORI form while conducting the screening survey. Current forms are shown in the Appendix D but may be modified as the parameters and database are modified to provide different information more relevant to the NSW program.

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Table 8-4. Minimum Physical Attributes Recorded during the Outfall Screening Process.

Database Element
a. Date and time of last visual observation or inspection
b. Outfall alpha-numeric identifier
c. Description of outfall structure including size (e.g., diameter and shape)
d. Description of receiving water at the point of discharge (e.g., natural, soft-bottom with armored sides, trapezoidal, concrete channel)
e. Latitude/longitude coordinates
f. Nearest street address
g. Parking, access, and safety considerations
h. Photographs of outfall condition
i. Photographs of significant non-stormwater discharge (or indicators of discharge) unless safety considerations preclude obtaining photographs
j. Estimation of discharge rate
k. All diversions either upstream or downstream of the outfall
l. Observations regarding discharge characteristics such as turbidity, odor, color, presence of debris, floatables, or characteristics that could aid in pollutant source identification
m. Observations regarding the receiving water such as flow, channel type, hard/soft bottom. (added minimum attribute.

8.1.3 Prioritized Source Identification

After completion of the initial reconnaissance survey and the two additional screening surveys, sites will be ranked based upon both initial flow observations from the reconnaissance inventory and the classifications assigned during each of the screening surveys. Source investigations will be scheduled to be conducted at sites categorized as Potential Illicit discharges.

The MRP (IX.E.1) states that prioritization of source investigations should be based upon the following items in order of importance.

a. Outfalls discharging directly to receiving waters with WQBELs or receiving water limitations in the TMDL provisions for which final compliance deadlines have passed.

b. All major outfalls and other outfalls that discharge to a receiving water subject to a TMDL shall be prioritized according to TMDL compliance schedules.

c. Outfalls for which monitoring data exist and indicate recurring exceedances of one or more of the Action Levels identified in Attachment G of this Order.

d. All other major outfalls identified to have significant non-stormwater discharges.

Additional information from the screening process will be used to refine priorities. Sites with evidence of higher, more frequent flow, presence of odors or stains will be assigned higher priorities for source investigations.

8.1.4 Identify Source(s) of Significant Non-Stormwater Discharges

The screening and source identification component of the program is intended to identify the source or sources of contaminants contributing to an NSW discharge. The prioritized list of major outfalls with significant NSW discharges will be used to direct investigations starting with outfalls deemed to present the greatest risk to the receiving water body.

The Order requires the WMG to develop a source identification schedule based on the prioritized list of outfalls exhibiting significant NSW discharges. Source investigations will be conducted for no less than 25% of the outfalls in the inventory by December 2015 and 100% of the outfalls in the inventory by December 2017.

Part IX.A.2 of the MRP requires Permittees to classify the source investigation results into one of four endpoints: illicit connections/illicit discharges (IC/IDs), authorized or conditionally exempt non-stormwater flows, natural flows, or from unknown sources. If source investigations indicate the source is illicit or unknown, the Permittee will document actions to eliminate the discharge and implement monitoring if the discharge cannot be eliminated.

If the source of a discharge is found to be attributable to natural flows or authorized conditionally exempt NSW discharge, the Permittee must identify the basis for the determination (natural flows) and identify the NPDES permitted discharger. If the source is found to be a conditionally exempt but non-essential discharge, monitoring is required to determine whether the discharge should remain conditionally exempt or be prohibited.

Source investigations will be conducted using a variety of different approaches depending upon the initial screening results, land use within the area drained by the discharge point, and the availability of drainage maps. Any additional water quality sampling will emphasize analysis of simple indicators, most of which can be either taken to a laboratory or analyzed in the field using field test kits. Such testing would only be conducted as needed to differentiate major sources of flows or to assist in assessing mixed sources rather than detailed characterization of the discharge. Investigations may include:

- Tracking of dry weather flows from the location where they are first observed in an upstream direction along the conveyance system.
- Collection of additional water samples for analysis of NWS indicators for assistance in differentiating major categories of discharges such as tap water, groundwater, wash waters and industrial wastewaters.
- Compiling and reviewing available resources including past monitoring and investigation data, land use/MS4 maps, aerial photography, existing NPDES discharge permits and property ownership information.

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If source tracking efforts indicate that the discharge originates from a jurisdiction upstream of the boundaries of the LCC WMP, the appropriate jurisdiction and the Regional Board will be notified in writing of the discharge within 30 days of the determination. All existing information regarding documentation and characterization of the data, contribution determination efforts, and efforts taken to identify its source will be included.

Investigations will be concluded if authorized, natural, or essential conditionally exempt flows are found to be the source of the discharge. If the discharge is determined to be due to non-essential conditionally exempt, illicit, or unknown discharges, further investigations will be considered to assess whether the discharge can be eliminated. Alternatively, if the discharges are either non-essential conditionally exempt or of an unknown source, additional investigations may be conducted to demonstrate that it is not causing or contributing to receiving water impairments.

8.1.5 Monitor Non-Stormwater Discharges Exceeding Criteria

As required in the MRP (Part II.3.3), outfalls with significant NSW discharges that remain unaddressed after source identification will be monitored. The objectives of the non-stormwater outfall based monitoring program include the following:

a. Determine whether a Permittee's discharge is in compliance with applicable NSW WQBELs derived from TMDL WLAs,

b. Determine whether a Permittee's discharge exceeds NSW action levels, as described in Attachment G of the Order,

c. Determine whether a Permittee's discharge contributes to or causes an exceedance of receiving water limitations

d. Assist a Permittee in identifying illicit discharges as described in Part VI.D.10 of the Order.

After completion of source investigations, outfalls found to convey NSW discharges that could not be abated and were identified as illicit, conditionally exempt but non-essential or unknown will be monitored. Monitoring will be initiated within 90 days of completing the source investigations or as soon as the first scheduled dry weather survey. Conducting NSW monitoring at the same time as receiving water dry weather monitoring will be more cost effective and allow evaluation of whether the NSW discharges are causing or contributing to any observed exceedances of water quality objectives in the receiving water.

Monitoring of NSW discharges is expected to undergo substantial changes from year to year as the result of ongoing actions taken to control or eliminate these discharges. As NSW discharges are addressed, monitoring of the discharges will no longer be required. In addition, if monitoring demonstrates that discharges do not exceed any WQBELs, non-stormwater action levels, or water quality standards for pollutants identified on the 303(d) list after the first year, monitoring of the pollutants meeting all receiving water limitations will be no longer be necessary. Due to potential frequent adjustments in the number and location of outfalls requiring monitoring and pollutants

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requiring monitoring, the annual CIMP report is expected to communicate adjustments in the number and locations of monitored discharges, pollutants being monitored and justifications for any adjustments.

8.1.5.1 Monitoring Parameters and Frequency

The MRP (Section IX.G.1) specifies the minimum parameters for monitoring of NSW discharges. Determination of monitoring parameters at each site requires consideration of a number of factors applicable to each site. Monitoring parameters will include:

a. Flow,

b. Pollutants assigned a WQBEL or receiving water limitation to implement TMDL Provisions for the respective receiving water, as identified in Attachments L - R of the Order,

c. Other pollutants identified on the CWA section 303(d) List for the receiving water or downstream receiving waters,

d. Pollutants identified in a TIE conducted in response to observed aquatic toxicity during dry weather at the nearest downstream receiving water monitoring station (LCC1) during the last sample event or, where the TIE conducted on the receiving water sample was inconclusive, aquatic toxicity. If the discharge exhibits aquatic toxicity, then a TIE shall be conducted.

e. Other parameters in Table E-2 identified as exceeding the lowest applicable water quality objective at LCC1 (the nearest downstream receiving water station) per Part VI.D.1.d.

The MRP (Part IX.G.2-4) specifies the following monitoring frequency for NSW outfall monitoring:

- For outfalls subject to a dry weather TMDL, the monitoring frequency shall be per the approved TMDL monitoring plan or as otherwise specified in the TMDL or as specified in an approved CIMP.
- For outfalls not subject to dry weather TMDLs, approximately quarterly for first year.
- Monitoring can be eliminated or reduced to twice per year, beginning in the second year of monitoring if pollutant concentrations measured during the first year do not exceed WQBELs, NALs or water quality standards for pollutants identified on the 303(d) List.

While a monitoring frequency of four times per year is specified in the Permit, it is inconsistent with the dry weather receiving water monitoring requirements. The receiving water monitoring requires two dry weather monitoring events per year. Additionally, during the term of the current Permit, outfalls are required to be screened at least once and those with significant NSW discharges will be subject to a source investigation. As a result, the LCC WMG recommends that NSW outfall monitoring events be conducted twice per year. The NSW outfall monitoring events will be coordinated with the dry weather receiving water monitoring events to provide better opportunities to determine if the NSW discharges are causing or contributing to any observed exceedances of water quality objectives in the receiving water.

Any monitoring required will be performed using grab samples (refer to Appendix A for field sampling procedures) rather than automated samplers. Bacteria, which are expected to be the limiting factor at many sites during dry weather, require collection by grab methods and delivery to the laboratory within 6 hours. Based upon the much reduced variability experienced in measurements of dry weather flows associated with ongoing monitoring programs, measured concentrations of other analytes are not expected to vary significantly over a 24-hour period.

9 New Development/Re-Development Effectiveness Tracking

Each of the cities in the watershed will maintain an electronic database to track qualifying new development and re-development projects that are subject to the Planning and Land Development Programs of Part VI.D.7 of Order No. R4 2012- 0175 and Part VII.J of Order No. R4 2014-0024. The electronic databases contain the information listed in Table 9-1 that includes details about the project and the design of onsite and offsite best management practices, as well as descriptions of the required information.

To promote consistency across the watershed and facilitate future planning and research within the watershed, all of the cities within the watershed are subscribing to MS4Front, a web-based software system designed to streamline record keeping for MS4 permits and assists with annual reporting. The cities concluded that although it is a sophisticated management tool, it is flexible and relatively easy to use. The existing tracking programs will be converted to MS4Front.

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Table 9-1. Information Required in the New Development/Re-Development Tracking Database.

	Required Information	Description
General Site Information	Project Name and Developer Name	Brief name of project and developer information (e.g. name, address, and phone number).
	Project Location and Map	Coordinates and map of the project location. The map should be linked to the GIS storm-drain map required in part VII.A of the Permit.
	Documentation of issuance of requirements to the developer	Date that the project developer was issued the Permit requirements for the project (e.g. conditions of approval).
	Date of Certificate of Occupancy	Date that the Certificate of Occupancy was issued.
On-site BMP Sizing Information	85th percentile storm event (inches per 24 hours)	85th percentile storm depth for the project location calculated using the Analysis of 85th Percentile 24-hour Rainfall Depths Within the County of Los Angeles.
	95th percentile storm event (inches per 24 hours)	95th percentile storm depth for the project location calculated using the *Analysis of 85th Percentile 24-hour Rainfall Depths Within the County of Los Angeles*. Only applies if the project drains directly to a natural drainage system[8] and is subject to hydromodification control measures.
	Project design storm (inches per 24 hours)	The design storm for each BMP as calculated using the Analysis of 85th Percentile 24-hour Rainfall Depths Within the County of Los Angeles.
	Projects design volume (gallons or MGD)	The design storm volume (design storm multiplied by tributary area and runoff coefficient) for each BMP.
	Percent of design storm volume to be retained on site	The percentage of the design volume which on-site BMPs will retain.
	Other design criteria required to meet hydromodification requirements for projects that directly drain to natural water bodies	Information relevant to determine if the project meets hydromodification requirements as described in the Permit e.g., peak flow and velocity in natural water body, peak flow from project area in mitigated and unmitigated condition, etc.). Only applies if the project drains directly to a natural drainage system.
	One -year, one-hour storm intensity as depicted on the most recently issued isohyetal map published by the Los Angeles County Hydrologist for flow-through BMPs	If flow-through BMPs (e.g., sand filters, media filters) for water quality are used at the project, provide the one-year, one-hour storm intensity at the project site from the most recent isohyetal map issued by LA County.
Off-site BMP Information	Location and maps of off-site mitigation, groundwater replenishment, or retrofit sites	If any off-site mitigation is used, provide locations and maps linked to the GIS storm-drain map required in part VII.A of the Permit.
	Design volume for water quality mitigation treatment BMPs	The calculated design volume, If water quality mitigation is required.
	Percent of design storm volume to be infiltrated at an off-site mitigation or groundwater replenishment project site	The percentage of the design volume which off-site mitigation or groundwater replenishment will retain.
	Percent of design storm volume to be retained or treated with biofiltration at an off-site retrofit project	The percentage of the design volume which off-site biofiltration will retain or treat.

[8] A natural drainage system is defined as a drainage system that has not been improved (e.g., channelized or armored). The clearing or dredging of a natural drainage system does not cause the system to be classified as an improved drainage system.

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10 Reporting

Reporting will normally consist of Annual CIMP Reports and semi-annual data reports. Discharge Assessment Plans will be only submitted if TIEs are found to produce inconsistent results during two consecutive tests. These include the following reports:

Annual CIMP Reports

Annual CIMP monitoring reports are required to be submitted to the Regional Water Board Executive Officer by December 15th of each year in the form of three compact disks (CD). The reporting period will cover July 1 through June 30. The annual reporting process is intended to meet the following objectives.

Summary information allowing the Regional Board to assess:

a. Each Permittee's participation in one or more Watershed Management Programs.
b. The impact of each Permittee(s) stormwater and non-stormwater discharges on the receiving water.
c. Each Permittee's compliance with receiving water limitations, numeric water quality-based effluent limitations, and non-stormwater action levels.
d. The effectiveness of each Permittee(s) control measures in reducing discharges of pollutants from the MS4 to receiving waters.
e. Whether the quality of MS4 discharges and the health of receiving waters is improving, staying the same, or declining as a result watershed management program efforts, and/or TMDL implementation measures, or other Minimum Control Measures.
f. Whether changes in water quality can be attributed to pollutant controls imposed on new development, re-development, or retrofit projects.

Data Submittals

Analytical data reports are required to be submitted to the Regional Board on a semi-annual basis in accordance with the Southern California Municipal Storm Water Monitoring Coalition's Standardized Data Transfer Formats. These reports are required to be subject to verification and validation prior to submittal. They are to cover monitoring periods of July 1 through December 31 for the mid-year report and January 1- June 30 for the end of year report These data reports should summarize:

- Exceedances of applicable WQBELs, receiving water limitations, or any available interim action levels or other aquatic toxicity thresholds.
- Basic information regarding sampling dates, locations, or other pertinent documentation.

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Discharge Assessment Plan

A Discharge Assessment Plan is applicable only if TIEs are conducted during two consecutive events and the results are inclusive for each. A Discharge Assessment Plan will be submitted to Los Angeles Regional Water Board for comment within 60 days of receipt of notification of the second consecutive inconclusive TIE result. If no comments are received within 30-days, it will be assumed that the approach is appropriate for the given situation and the Plan should be implemented within 90-days of submittal.

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APPENDIX A

AUTOMATED STORMWATER MONITORING EQUIPMENT

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1 Automated Stormwater Monitoring Equipment

Monitoring of stormwater runoff at the Mass Emission (ME) sites and Stormwater Outfall Monitoring sites will require use of automated stormwater sampling equipment. This section addresses equipment and sampling procedures that will be used for LCC1, PWS and SWS sites.

Flow-weighted and time-weighted sampling will require similar equipment with minor exceptions at upstream, stormwater outfall monitoring sites. Similar equipment will be necessary regardless of the selected sampling approach. Time-weighted composite samples simply allow for more mobile installations that do not require flow meters, rain gauges, solar panels, or communication equipment. In lieu of communications equipment, such sites require added field personnel to monitor and track performance of the equipment along with added sensors to trigger the equipment to initiate the sampling.

For purposes of this CIMP, it is assumed that all sites requiring collection of flow-weighted composite samples will be established as "permanent" or "long-term" sites with appropriate security to protect the equipment and intake structures from debris coming down the stream or vandalism. As noted, collection of time-weighted samples will be utilize the same types of autosamplers and composite containers but will not include flow meters, rain gauges and telecommunication packages. Monitoring stations designed to take time-weighted composite samples will require sensors to detect initial flows and trigger the sampler. This will allow for use of smaller security enclosures that can temporally be secured at a site or, if necessary, equipment can be deployed in a manhole.

Fixed monitoring sites will utilize automated stormwater sampling stations that incorporate an autosampler (American Sigma or Isco), a datalogger/flow module to monitor flow and pace the autosampler, a rain gauge to monitor and record local rainfall, and telecommunications to allow for remote monitoring and control of each site. Sites without access to AC power will be powered by deep-cycle marine batteries. Sites without direct access to AC power will utilize solar panels to provide the energy needed to maintain the charge on two deep cycle batteries used to power the autosampler, flow meter and datalogger. Providing reliable telecommunications for real-time access to data and to provide command and control functionality has greatly improved efficiency and contributed to improved stormwater data.

Both types of automated stormwater monitoring systems considered for this monitoring program use peristaltic pumping systems. When appropriate measures are taken, it has been demonstrated that these types of systems are capable of collecting blanks that are uncontaminated and high quality, reproducible data using detection limits appropriate to water quality criteria. In order to accomplish this, extreme care must be taken to avoid introduction of contaminants.

Requirements include:

- Assuring that all materials coming into contact with the samples are intrinsically low in trace metals and do not adsorb/absorb metals or other target.

- Materials coming into contact with the sample water are subjected to intensive cleaning using standardized protocol and subjected to systematic blanking to demonstrate and document that blanking standards are met.
- All cleaned sampling equipment and bottles are appropriately tracked so that blanking data can be associated with all component deployed in the field.
- Samples are collected, processed and transported taking care to avoid contamination from field personnel or their gear, and
- Laboratory analysis is conducted in a filtered air environment using ultrapure reagents.

Table 2-1 of the USGS National Field Manual (http://pubs.water.usgs.gov/twri9A/) provides a summary of acceptable materials for use sampling organic and inorganic constituents. The stormwater monitoring stations will primarily utilize 20-L borosilicate glass media bottles for the composite samples, FEP tubing for the sample hose and either 316 SS or Teflon-coated intake strainers. Ten (10) liter borosilicate glass media bottles will be considered for sites where required sample volumes are low and lower sample volumes are acceptable. The peristaltic hose is a silicone-base material that is necessary for operation of the autosamplers. The peristaltic hose can be as source of silica which is not a target compound.

Although the technical limitations of autosamplers are often cited, they still provide the most practical method for collecting representative samples of stormwater runoff for characterization of water quality and have been heavily utilized for this purpose for the past 20 years. The alternative, manual sampling, is generally not practical for collection of flow-weighted composite samples from a large number of sites or for sampling events that occur over an extended period of time. Despite the known drawbacks, autosamplers combined with accurate flow metering remain the most common and appropriate tool for monitoring stormwater runoff.

1.1 Sampler Intake Strainer, Intake Tubing and Flexible Pump Tubing

Intake strainers will be used to prevent small rocks and debris from being drawn into the intake tubing and causing blockages or damage to the pump and peristaltic pump tubing. Strainers will be constructed of a combination of Teflon and 316 stainless or simply stainless steel. The low profile version is typically preferred to provide greater ability to sample shallow flows. Although high grade stainless steel intake strainers are not likely to impact trace metal measurements, it is preferable to use strainers coated with a fluoropolymer coating. If the stainless steel intake is not coated, the strainer will not be subjected to cleaning with acids. Cleaning will be limited to warm tap water, laboratory detergents and MilliQ water rinses.

Tubing comprised of 100% FEP (Fluorinated Ethylene Propylene) will be used for the intake tubing. Several alternative fluoropolymer products are available but 3/8" ID solid FEP tubing has the chemical characteristics suitable for sampling metals and organics at low levels and appropriate physical characteristics. The rigidity of FEP tubing provides resistance to collapse at high head differentials but still is manageable for tight configurations.

The peristaltic hose used in autosamplers is a medical-grade silicon product. The specifications for the peristaltic pump hoses used in these samplers are unique to the samplers. It is very important that hose specified and provided by the manufacturers of the autosamplers be used. Minor

differences in the peristaltic hose can cause major deterioration in performance of the samplers. Use of generic peristaltic pump hose from other sources can lead to problems with the ability to calibrate the samplers and maintain intake velocities of greater than 2.5 feet per second with higher lift requirements.

The peristaltic hose is connected to the FEP tubing and fed through the pump head leaving the minimum amount necessary to feed the peristaltic pump hose into the top of the composite bottle. The composite container will always have a lid to prevent dust from settling in the container.

1.2 Composite Containers

The composite containers used for monitoring must be demonstrated to be free of contaminants of interest at the desired levels (USEPA 1996). Containers constructed of fluoropolymers (FEP, PTFE), conventional or linear polyethylene, polycarbonate, polysulfone, polypropylene, or ultrapure quartz are considered optimal for metals but borosilicate glass has been shown to be suitable for both trace metals and organics at limits appropriate to EPA water quality criteria. High capacity borosilicate media bottles (20-liters or ~5-gallons) are preferred for storm monitoring since they can be cleaned and suitably blanked for analysis of both metals and organic compounds. The transparency of the bottles is also a useful feature when subsampling and cleaning the containers for reuse.

Figure 1. Composite Bottle with Label and installed Tubing inside Brute® Container.

These large media bottles are designed for stoppers and thus do not come with lids. Suitable closure mechanisms must be fabricated for use during sampling, transport and storage of clean bottles. The preferred closure mechanism is a Teflon® stopper fitted with a Viton® O-ring (2 3/8" - I.D. x 23/4"- O.D.) that seals the lid against the media bottle. A polypropylene clamp (Figure 2) is used to seal the Teflon® stopper and O-ring to the rim of the composite sample bottle. Two polypropylene bolts with wing-nuts are used to maintain pressure on the seal or to assist in removal of the lid.

Every composite bottle requires one solid lid for use in protecting the bottle during storage and transport. A minimum of one Teflon® stopper should be available for each monitoring site during storm events. Each field sampling crew should have additional stoppers with holes ("sampling stopper") that would be available if a sampling stopper is accidentally contaminated during bottle changes or original installations.

Figure 2. Composite bottle showing bottle bag used for transport and lifting.

The holes in the sampling stoppers should be minimally larger than the external diameter of the peristaltic hose. If a tight fit exists, the pressure created when water is pumped into the bottle will cause the hose to be ejected and the sampling event will to be abandoned.

Transporting composite bottles is best accomplished by use of 10-gallon Brute® containers to both protect them from breakage and simplify handling. They also provide additional capacity for ice while transporting full bottles to the laboratory or subsampling site.

Bottle bags (Figure 2) are also useful in allowing full bottles to be handled easier and reduce the need to contact the bottles near the neck. They are important for both minimizing the need to handle the neck of the bottle and are also an important Health and Safety issue. The empty bottles weigh 15 pounds and they hold another 40 pounds of water when full. These can be very slippery and difficult to handle when removing them from the autosamplers. Bags can be easily fabricated out of square-mesh nylon netting with nylon straps for handles. Use of bottle bags allows two people to lift a full bottle out of the ice in the autosampler and place it in a Brute® container. Whether empty or full, suitable restraints should be provided whenever the 20-L composite bottles and Brute® containers are being transported.

1.3 Flow Monitoring

Retrieval of flow-weighted stormwater samplers requires the ability to accurately measure flow over the full range of conditions that occur at the monitoring site. The ability to accurately measure flow at an outfall site should be carefully considered during the initial site selection process. Hydraulic characteristics necessary to allow for accurate flow measurement include a relatively straight and uniform length of pipe or channel without major confluences or other features that would disrupt establishment of uniform flow conditions. The actual measurement site should be located sufficiently downstream from inflows to the drainage system to achieve well-mixed conditions across the channel. Ideally, the flow sensor and sample collection inlet should be placed a minimum of five pipe diameters upstream and ten pipe diameters downstream of any confluence to minimize turbulence and ensure well-mixed flow. The latest edition of the *Isco Open Channel Flow Measurement Handbook* (Walkowiak 2008) is an invaluable resource to assist in selection of the most appropriate approach for flow measurements and information on the constraints of each method.

The existing mass emission site has an established flow rating curve (Stage-Flow relationships) that only requires measurement of water level to estimate flow. Additional sites requiring flow monitoring are expected to utilize area-velocity sensors that use Doppler-based sensors to measure

the velocity of water in the conveyance, a pressure sensor to measure water depth, and information regarding channel dimensions to allow for real-time flow measurements to pace the autosamplers.

1.4 Rainfall Gauges

Electronic tipping bucket rain gauges will be installed at each fixed monitoring location to provide improved assessment of rainfall in the smaller drainages. Use of a localized rain gauge provides better representation of conditions at the site. A variety of quality instruments are available but all require substantial maintenance to ensure maintenance of high data quality.

Tipping bucket rain gauges with standard 8-inch diameter cones will be used at each site. These provide 1 tip per 0.01" of rain and have an accuracy of ± 2% up to 2"/hr. The accuracy of tipping bucket rain gauges can be impacted by very intense rainfall events but errors are more commonly due to poor installation.

Continuous data records will be maintained throughout the wet season with data being output and recorded for each tip of the bucket. The rainfall data is downloaded at the same rate as the flow and stormwater monitoring events.

1.5 Power

Stormwater monitoring equipment can generally be powered by battery or standard 120VAC. If 120VAC power is unavailable, external, sealed deep-cycle marine batteries will be used to power the monitoring site. Even systems with access to 120VAC will be equipped with batteries that can provide backup power in case of power outages during an event. All batteries will be placed in plastic marine battery cases to isolate the terminals and wiring. A second battery will be provided at each site to support the telecommunication packages. Sites relying on battery power will also be equipped with a solar panel to assure that a full charge is available when needed for a storm event.

1.6 Telecommunication for System Command/Control and Data Access

The ability to remotely communicate with the monitoring equipment has been shown to provide efficient and representative sampling of stormwater runoff. Remote communication facilitates preparation of stations for storm events and making last minute adjustments to sampling criteria based upon the most recent forecasts. Communication with the sites also reduces the number of field visits by monitoring personnel. Remote two-way communication with monitoring sites allows the project manager (storm control) to make informed decisions during the storm as to the best allocations of human resources among sampling sites. By remotely monitoring the status of each monitoring site, the manager can more accurately estimate when composite bottles will fill and direct field crews to the site to avoid disruptions in the sampling. Real time access to flow, sampling and rainfall data also provides important information for determining when sampling should be terminated and crews directed to collect and process the samples. Increases in both efficiency and sample quality make two-way communication with monitoring stations a necessity for most monitoring programs.

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APPENDIX B

CLEANING AND BLANKING PROTOCOL

FOR

EQUIPMENT AND SUPPLIES USED IN COLLECTION OF FLOW OR TIME-WEIGHTED COMPOSITES

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CLEANING PROTOCOL FOR:

20-L Borosilicate Glass Composite Bottles (Media Bottles) and Closures

1.0 SCOPE

This Standard Operating Procedure (SOP) describes the procedures for the cleaning of 20-liter composite sample bottles and the related equipment necessary to complete the task. The purpose of these procedures is to ensure that the sample bottles are contaminant-free and to ensure the safety of the personnel performing this procedure.

2.0 APPLICATION

This SOP applies to all laboratory activities that comprise the cleaning of 20-liter composite sample bottles and stoppers.

3.0 HEALTH AND SAFETY CONSIDERATIONS

The cleaning of 20-liter composite-sample bottles and associated equipment involves hazardous materials. Skin contact with all materials and solutions should be minimized by wearing appropriate personal protective equipment (PPE) including: chemical-resistant gloves, laboratory coats, chemical-resistant aprons, and goggles. To ensure that you are aware of the hazards involved, the material safety data sheets (MSDSs) for nitric acid and laboratory detergents should be reviewed before beginning any of these procedures.

Note: Preparations should be made to contain and neutralize any spillage of acid. Be aware of the location of absorbent, neutralizing, and containment materials in the bottle cleaning area.

4.0 DEFINITIONS

4.1 **Composite sample bottle** - 20 liter borosilicate glass bottle that is used with autosamplers to collect a stormwater composite sample.

4.2 **Stopper** - a Teflon® cap used to seal the composite sample bottle (either solid, or drilled with holes for the silicon inlet tubing).

4.3 **O-Ring** - Viton O-ring 23/8"- I.D. x 23/4"- O.D. that is located around the base of stopper.

4.4 **Clamp** - Polypropylene clamp, 2 bolts, and wing nuts specifically designed to fasten the stopper and the O-ring to the rim of the composite sample bottle.

4.5 **De-ionized (DI) water** - commercial de-ionized water (12-13 Megohm/cm)

4.6 **Laboratory Detergent** - 2% solution of Contrad 70® or Micro-90® detergent

5.0 EQUIPMENT

5.1 Instrumentation:

1) Peristaltic pump with a protocol-cleaned sub-sampling hose setup

5.2 Reagents:

1) ACS Reagent Grade nitric acid in a 2 Normal solution (2N HNO_3)

2) Contrad 70® non-phosphate laboratory detergent

3) Contrad 70® anti-foaming agent

4) Micro-90® non-phosphate laboratory detergent

5) Baking soda or equivalent to neutralize acid

6) pH paper

5.3 Apparatus:

1) Bottle Rolling Rack

2) DI Rinse Rack

3) Yellow Neutralization Drip Bucket

4) Neutralization Tank

5.4 Documentation:

The status of each composite sample bottle must be tracked. Bottles should be washed in batches of 10, 20, or 30 and the status of each batch must be made apparent to all personnel by posting a large status label (including the start date) with each batch. This will ensure that all required soak times have been attained and that each bottle was subjected to the proper cleaning procedures. Information on each batch of bottles cleaned (including bottle number, QA batch, date cleaning started, date finished, date blanked, and cleaning technicians) should be entered in the **Bottle Cleaning Log Sheet**.

6.0 CLEANING PROCEDURES

Care must be taken to ensure that no contaminants are introduced at any point during this procedure. If the wash is not performed with this in mind, the possibility for the introduction of contaminants (i.e., from dust, dirty sub-sampling tubing tips, dirty fingers/gloves, automobile emissions, etc.) is increased significantly.

6.1 Teflon® Bottle Stoppers with Holes and Field Extras:

To be performed whenever required for field use.

1) Wash with laboratory detergent using a clean all-plastic brush.

2) Rinse thoroughly (minimum of three times) with tap water.

3) Rinse thoroughly (minimum of three times) with DI water.

4) Wash three times with 2N nitric acid squirt bottle.

5) Rinse thoroughly (minimum of three times) with DI water.

6) Allow to dry in a dust-free environment.

7) Store in two sealed clean Ziploc® bags.

6.2 NPS 20 liter composite sample bottle Cleaning:

6.2.1 Preliminary Bottle Cleaning:

Bottles should undergo a preliminary rinse with tap water as soon as possible after they are available. This includes dumping any remaining stormwater into a sanitary drain and rinsing the bottles and stoppers. This prevents material from adhering to the interior surface of the bottle.

6.2.2 **48 Hour Soak:** Place the bottle to be cleaned into a secondary containment bucket. Prepare a 2% solution of laboratory detergent with tap water directly in the bottle. Note: Since laboratory detergent is a foaming solution, add 3/4 of the tap water first, add the detergent, then add the rest of the water. Should excessive foam be generated, a few drops of Contrad 70® anti-foaming agent may be added. **Make sure that the bottle is filled to the rim and scrub the rim with an all-plastic scrub brush.** Scrub a Teflon® stopper with 2% solution of laboratory detergent and place stopper over the full bottle so overflowing happens. This will allow both the stopper and the bottle to soak for 48 hours. After the 48 hour soak, this solution may be may be retained for reuse (i.e., siphoned into other dirty bottles) or it can be poured off into a sanitary drain.

6.2.3 Teflon® Bottle Stopper and O-ring Cleaning:

This procedure should be performed prior to the bottle washing process so that the stopper can follow the bottle through the acid wash.

1) Rinse thoroughly (minimum of three times) with tap water.

2) Rinse thoroughly (minimum of three times) with DI water.

3) Store temporarily in a similarly cleaned

6.2.4 **Tap Water Rinse:** Tap water rinses detergent better than DI water. Flush upside down bottle with tap water for 20 sec. Rinse each bottle 3 times with tap water being careful not to contaminate the clean surfaces.

6.2.5 **DI Rinse:** Rinse the top and neck of the bottles with DI water using a squirt bottle and then rinse upside down for three minutes on the DI rinse rack for bottles. Make sure to tip bottles from side to side for a more thorough rinsing. Allow 1-2 minutes for the bottles

to drain as much as possible. Rinse each stopper with DI water squirt bottle 3 times (being careful not to touch the clean surfaces).

6.2.6 **Acid Wash:** Note that it is important to Wash the bottle with 2N nitric acid according to the following procedure:

1) Place the empty bottle near the 2N nitric acid carboy and peristaltic pump. The location should be able to safely contain a spill if the 20L bottle breaks.

2) Pump acid into the bottle using the peristaltic pump fitted with a protocol-cleaned sub-sampling hose setup

3) Fill the bottle slightly more than half full.

4) Place a protocol-cleaned solid Teflon® stopper (with a properly seated O-ring) (Refer to Section 6.2.3 above) on the bottle and clamp it securely.

5) **Carefully** lift and place the bottle on the roller rack and check for leakage from the stopper. Neutralize any spillage. Often small leaks can be corrected by a slight tightening of the clamp. Roll the bottles for twenty minutes.

6) Pump the acid into another bottle for rolling or back into the 2N nitric acid carboy.

6.2.7 **DI Rinse for Sub-sampling Hose**: After use, the sub-sampling hose setup should be rinsed by pumping 1-2 gallons of DI water through the hoses and into a neutralization tank. Carefully rinse the outside of the hose to remove any acid that may be on the exterior of the hose. pH paper should be used to insure that the fluid in and on the hose is 6.8 or higher. Continue rinsing until your reach neutral pH. Store hose in a clean, large plastic bag between uses. Dispose of rinsate in accordance with all federal, state, and local regulations

6.2.8 **DI Rinse for Bottles**: Allow the bottles to drain into a yellow neutralization bucket for at least 1 minute. Place four bottles at a time on the DI rinse rack and rinse for 5 minutes. Move bottles around to ensure complete and thorough rinsing. Rinse the outside of the bottle with tap water. Allow bottles to drain for 2 minutes.

6.2.9 **DI Rinse for Stoppers**: Rinse caps thoroughly 3 times over neutralization tank. Place on a clean surface where the clean side of the stopper will not be contaminated.

6.3 **Storage:** Clamp a stopper (one that went through the entire cleaning procedure) on the bottle. Properly label the bottle as to the date cleaned and by whom and place on the bottle storage rack or in a secondary containment bucket in a safe area. Also, fill out the **Bottle Cleaning Log Sheet**.

7.0 QUALITY ASSURANCE REQUIREMENTS

7.1 The NPS 20 liter sample bottles must be evaluated ("blanked") for contaminants after they have completed the decontamination procedure. The analytical laboratory performing

the evaluation should supply Milli-Q® water that is used as a blanking rinsate, and sample bottles for the appropriate constituents of concern. This evaluation will be accomplished by randomly blanking 10% of the washed bottles, or 1 bottle per batch (whichever is greater) and having the blanking rinsate analyzed by the laboratory for the appropriate constituents.

7.2 If any of the bottles fail the analyses (concentration of any analytes are at or above the limit of detection), all of the bottles from that batch must be decontaminated. Again, 10% of these bottles must be subjected to the blanking process as described-above.

7.3 If results of the evaluation process show that the bottles are not contaminant-free, the cleaning procedure must be re-evaluated. Consult with the Quality Assurance/Quality Control Officer to determine the source of contamination.

CLEANING PROTOCOL FOR:

Miscellaneous Laboratory Equipment used for Cleaning and Blanking

1.0 SCOPE

This Standard Operating Procedure describes the procedures for cleaning the miscellaneous items necessary to complete the tasks of cleaning 20- liter composite sample bottles and hoses. The purpose of these procedures is to ensure that the items are contaminant-free and to ensure the safety of the personnel performing this procedure.

2.0 APPLICATION

This SOP applies to all laboratory activities that comprise the cleaning of ancillary items necessary to complete the tasks of cleaning 20 liter composite sample bottles and NPS hoses.

3.0 HEALTH AND SAFETY CONSIDERATIONS

The cleaning of the following items may involve contact with hazardous materials. Skin contact with all materials and solutions should be minimized by wearing appropriate personal protective equipment (PPE) including: chemically-resistant protective gloves, laboratory coats, chemically-resistant aprons, and goggles. In addition, to ensure that you are aware of the hazards involved and of any new revisions to the procedure, the material safety data sheets (MSDSs) for nitric acid and the laboratory detergent should be reviewed before beginning any of these procedures.

4.0 DEFINITIONS

4.1 Polyethylene Squirt Bottles - ½ and 1 liter squirt bottles for washing and/or rinsing with DI water or nitric acid.

4.2 Polycarbonate and Polyethylene De-ionized Water Jugs - For holding DI water.

4.3 Polyethylene Bucket - For holding tap water, DI water or detergent solutions during hose washing procedures.

4.4 Four-inch Teflon® Connector - For connecting two lengths of silicon peristaltic tubing together.

4.5 Four-inch Silicon Connector - For connecting two lengths of Teflon® hose together.

4.6 Orange Polypropylene Hose Caps - For placing over the ends of clean Teflon® hose to prevent contamination.

4.7 De-ionized (DI) water - Commercial de-ionized water

4.8 Laboratory Detergent - 2% solution of Contrad 70® or Micro-90® detergent.

5.0 EQUIPMENT

5.1 Instrumentation: Not applicable.

5.2 Reagents:

1) ACS Reagent Grade nitric acid as a 2 Normal solution (2N HNO_3)

2) Micro-90® non-phosphate laboratory detergent

3) Contrad 70® non-phosphate laboratory detergent

4) Contrad 70® anti-foaming agent.

5) pH paper or pH meter

6) Baking soda ($NaHCO_3$) or equivalent to neutralize acid

5.3 Apparatus:

1) Clean polyethylene squirt bottles.

2) Clean polyethylene trays or 2000 ml glass beakers.

3) Neutralization Tank

5.4 Documentation:

Label each squirt bottle, DI jug, storage container holding clean items, etc. as to the date each was cleaned and the initials of the cleaning technician.

6.0 CLEANING PROCEDURES

Care must be taken to ensure that no contaminants are introduced at any point during these procedures. If the wash is not performed with this in mind, the possibility for the introduction of contaminants (i.e., from dirty sinks, dirty counter tops, dirty fingers/gloves, dirty hose ends, etc.) is increased significantly.

Rinsing properly is essential to ensure proper cleaning. This is done by squirting the liquid over the item to be cleaned in a top-down fashion, letting the water flow off completely **before** applying the next rinse. Rinse the item in this fashion **a minimum** of three times. **Numerous rinses of relatively small volumes are much better than one or two rinses of higher volume.** Be aware of handling: use clean gloves (it is best if they have gone through the same prior wash as the item to be rinsed) and rinse off the fingers prior to grasping the item to be cleaned. Try to grasp the item in a slightly different place between rinses so ones fingers do not cover a portion of the item throughout the rinses.

6.1 Polyethylene Squirt Bottles:

1) Soak in a 2% solution of laboratory detergent in a protocol-cleaned bucket for 48 hours.

2) Rinse thoroughly (minimum of three times) with tap water.

3) Rinse thoroughly (minimum of three times) with DI water.

4) Wash three times with 2N (10%) nitric acid.

5) Rinse thoroughly (minimum of three times) with DI water. Neutralize and dispose of rinsate in accordance with all federal, state, and local regulations.

6.2 Polycarbonate and Polyethylene DI Water Jugs:

1) Fill to the rim with a 2% solution of laboratory detergent, cap the jug, and let soak for 48 hours. Wash cap with an all-plastic scrub brush after soak.

2) Rinse thoroughly (minimum of three times) with tap water.

3) Rinse thoroughly (minimum of three times) with DI water.

4) Wash three times with 2N (10%) nitric acid.

5) Rinse thoroughly (minimum of three times) with DI water. Neutralize and dispose of rinsate in accordance with all federal, state, and local regulations.

6.3 Polyethylene Bucket:

1) Fill to the rim with a 2% solution of laboratory detergent and let soak for 48 hours.

2) Rinse thoroughly (minimum of three times) with tap water.

3) Rinse thoroughly (minimum of three times) with DI water.

4) Wash three times with 2N (10%) nitric acid squirt bottle.

5) Rinse thoroughly (minimum of three times) with DI water. Neutralize and dispose of rinsate in accordance with all federal, state, and local regulations. **Label as to the date cleaned and initial**.

6.4 Four-inch Teflon® and Silicon Hose Connectors and Orange Polypropylene Hose Caps. The purpose of the four-inch sections of Teflon® and silicon hose is to connect longer lengths of each type of hose together during the hose cleaning procedures. The orange polypropylene hose caps are for the ends of cleaned FEP hoses to prevent contamination prior to use in the field or laboratory.

1) Using a 2% solution of laboratory detergent, soak the four-inch sections of FEP hose, silicon tubing, and orange caps for 48 hours.

2) Rinse thoroughly with tap water (minimum of three rinses).

3) Rinse thoroughly with DI water (minimum of three rinses).

4) Using a squirt bottle filled with 2N (10%) HNO_3, thoroughly rinse the interior and exterior of the connectors and caps thoroughly OR, roll/agitate them in a shallow layer of 2N (10%) HNO_3

in a laboratory detergent cleaned glass beaker or other appropriate, clean container for a more thorough washing.

5) Thoroughly rinse connectors and caps with DI water (minimum of three rinses). Neutralize and dispose of rinsate in accordance with all federal, state, and local regulations. Keep clean connectors and caps in a similarly cleaned (or certified clean) widemouth glass jar or detergent-cleaned resealable bag and **label as clean, date cleaned, and initial**.

NPS 20-Liter Bottle Subsampling Procedure

1.0 Scope

This Standard Operating Procedure (SOP) describes the procedures for the compositing and sub-sampling of non-point source (NPS) 20 liter sample bottles. The purpose of these procedures is to ensure that the sub-samples taken are representative of the entire water sample in the 20-L bottle (or bottles). In order to prevent confusion, it should be noted that in other KLI SOPs relating to 20-L bottles they are referred to as "composite" bottles because they are a composite of many small samples taken over the course of a storm; in this SOP the use of "compositing" generally refers to the calculated combining of more than one of these 20-L "composite" bottles.

2.0 Application

This SOP applies to all laboratory activities that comprise the compositing and sub-sampling of NPS 20 liter sample bottles.

3.0 Health and Safety Considerations

The compositing and sub-sampling of NPS 20 liter sample bottles may involve contact with contaminated water. Skin contact with sampled water should be minimized by wearing appropriate protective gloves, clothing, and safety glasses. Avoid hand-face contact during the compositing and sub-sampling procedures. Wash hands with soap and warm water after work is completed.

4.0 Definitions

4.1 **20 liter sample bottle:** 20 liter borosilicate glass bottle that is used to collect multiple samples over the course of a storm (a composite sample).

4.2 **Large-capacity stirrer**: Electric motorized "plate" that supports a 20 liter bottle and facilitates the mixing of sample water within the bottle by means of spinning a pre-cleaned magnetic stir-bar which is introduced into the bottle.

4.3 **Stir-bar**: Teflon-coated magnetic "bar" approximately 2-3 inches in length which is introduced into a 20 liter bottle and is spun by the stirrer, thereby creating a vortex in the bottle and mixing the sample. Pre-cleaned using cleaning protocols provided in KLI SOP for *Cleaning Procedures for Miscellaneous Items Related to NPS Sampling*.

4.4 **Sub-sampling hose**: Two ~3-foot lengths of Teflon tubing connected by a ~2-foot length of silicon tubing. Pre-cleaned using cleaning protocols provided in SOP for *Teflon Sample Hose and Silicon Peristaltic Tubing Cleaning Procedures*. Used with a peristaltic pump to transfer sample water from the 20-L sample bottle to sample analyte containers.

4.6 **Volume-to-Sample Ratio (VSR):** A number that represents the volume of water that will flow past the flow-meter before a sample is taken (usually in liters but can also be in kilo-cubic feet for river deployments). For example, if the VSR is 1000 it means that every time 1000 liters passes

the flow-meter the sampler collects a sample (1000 liters of flow per 1 sample taken). Note: The VSR indicates when a sample should be taken and is NOT an indication of the sample size.

5.0 EQUIPMENT

5.1 Instrumentation: Not applicable

5.2 Reagents: Not applicable.

5.3 Apparatus

1) Large capacity stirrer.

2) Stir bar.

3) Sub-sampling hose.

4) Peristaltic pump.

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APPENDIX C

QUALITY ASSURANCE/QUALITY CONTROL

1. Quality Assurance/Quality Control

Elements of a Quality Assurance and Quality Control (QA/QC) Plan have been incorporated into the CIMP in order to detail critical activities conducted to assure that both chemical and physical measurements meet the standard of quality needed to evaluate measurements at levels relevant to applicable water quality criteria. With many different monitoring programs being implemented within the region, comparability should remain of the primary goals of the QA/QC monitoring program. The Intergovernmental Task Force on Monitoring Water Quality (ITFM, 1995) defines comparability as the "characteristics that allow information from many sources to be of definable or equivalent quality so that it can be used to address program objectives not necessarily related to those for which the data were collected."

One important aspect of comparability is the use of analytical laboratories that are accredited under a program such as the National Environmental Laboratory Accreditation Program (NELAP), California's Environmental Laboratory Accreditation Program (ELAP) or a well-qualified research laboratory. In addition, the laboratory should be a participant in a laboratory proficiency and intercalibration program. Laboratories have not been selected for this program but participation in the Stormwater Monitoring Coalition's (SMC) intercalibration program will be a primary consideration. Unfortunately, the SMC has not fully completed implementation of a program the full range of analyses included in the MRP Table E-2 list.

Evaluation of data quality will be based upon protocols provided in the *National Functional Guidelines for Inorganic Superfund Data Review (USEPA540-R-10-011)* (USEPA 2010), *National Functional Guidelines for Superfund Organic Methods Data Review (EPA540/R-08-01),* and the *Guidance on the Documentation and Evaluation of Trace Metals Data Collected for Clean Water Act Compliance Monitoring (EPA/821/B/95/002)* (USEPA 1996).

The sections that follow address activities associated with both field sampling and laboratory analyses. Quality assurance activities start with procedures designed to assure that errors introduced in the field sampling and subsampling processes are minimized. Field QA/QC samples are collected and used to evaluate potential contamination and sampling error introduced into a sample prior to its submittal to the analytical laboratory. Laboratory QA/QC activities are used to provide information needed to assess potential laboratory contamination, analytical precision and accuracy, and representativeness.

1.1.1 Sample Handling, Containers and Holding Times.

Table **1** provides a summary of the types of sample volumes, container types, preservation and holding times for each analytical method. Analytical methods requiring the same preservation and container types may be transferred to the laboratory in one container in order to minimize handling prior to transfer to the laboratory.

RB-AR7855

Table 1. Constituents, Sample Container, Preservation and Holding Times.

Analyte	EPA Method Number	Holding Time	Container Size	Container Type	Preservation	Minimum Level/ Resolution	Units
Conventionals							
pH	150.1	15 minutes		glass or PE	none	+/- 0.1	std. units
Oil and Grease	1664A	28 days	1 L	Glass	HCl	5	mg/L
TPH	418.1	28 days	1 L	Glass	HCl	5	mg/L
Total Phenols	420.1	28 days	500mL-1 L	Glass	H_sSO_4	5	mg/L
Cyanide	SM4500-CN-E	14 days	500 mL	HDPE	NaOH	0.003	mg/L
Turbidity	SM2130B	48 hours	100-250mL	Glass	4-6°C	1	NTU
TSS	160.2	7 days	1 L	HDPE	4-6°C	4	mg/L
SSC[1]	ASTMD3977B	7 days	1 L	HDPE	4-6°C	4	mg/L
TDS	160.1	7 days	1 L	HDPE	4-6°C	1	mg/L
VSS	160.4	7 days	1 L	HDPE	4-6°C	1	mg/L
TOC; DOC	415.1	28 days	250 mL	glass	4°C and HCl or H_2SO_4 to pH<2	1	mg/L
BOD_5	SM5210B	48 hours	600mL-1L	HDPE	4-6°C	3	mg/L
COD	410.1	28 days	20-250 mL	Glass	H_sSO_4	4	mg/L
Alkalinity	SM 2320B	Filter ASAP, 14 days	100-250 mL	HDPE	4-6°C	1	mg/L
Conductivity	SM 2510	28 days	100-250 mL	HDPE	4°C; filter if hold time >24 hours	1	µmho/cm
Hardness	130.2	6 months	100-250 mL	HDPE	and HNO_3 or H_2SO_4 to pH<2	1	mg/L
MBAS	425.1	48 hours	250-500 mL	HDPE	4-6°C	0.02	mg/L
Chloride	300	28 days	250-500 mL	HDPE	4-6°C	2	mg/L
Fluoride	300	28 days	250-500 mL	HDPE	4-6°C	0.1	mg/L
Perchlorate	314.0	28 days	100-250 mL	HDPE	4-6°C	4	µg/L
Volatile Organics							
MTBE	624	14 days	3 40mL VOA	Glass	HCl	1	µg/L

Analyte	EPA Method Number	Holding Time	Container Size	Container Type	Preservation	Minimum Level/ Resolution	Units
Bacteria							
Total Coliform	SM9221B	6 hr-8 hr	100 mL	Sterile HDPE	4-6°C	20-2,400,000	MPN/100mL
Fecal Coliform	SM9221B	6 hr-8 hr	100 mL	Sterile HDPE	4-6°C	20-2,400,000	MPN/100mL
Enterococcus	SM9230B or C	6 hr-8 hr	100 mL	Sterile HDPE	4-6°C	20-2,400,000	MPN/100mL
E. coli	SM 9223 COLt	6 hr-8 hr	100 mL	Sterile HDPE	4-6°C	20-2,400,000	MPN/100mL
Nutrients							
TKN	351.1	28 days	500mL-1L	Amber glass	H_sSO_4	0.5	mg/L
Nitrate-N	300	48 hours	50-125mL	HDPE	4-6°C	0.1	mg/L
Nitrite-N	300	48 hours	50-125mL	HDPE	4-6°C	0.05	mg/L
Total Nitrogen	Calculation					NA	mg/L
Ammonia-N	350.1	28 days	500mL-1L	Amber glass	H_sSO_4	0.1	mg/L
Total Phosphorus	SM4500-P,EorF	28 days	100-250 mL	glass	H_sSO_4	0.1	mg/L
Dissolved Phosphorus	SM4500-P,EorF	28 days	100-250 mL	glass	4-6°C	0.1	mg/L
Organic Compounds (pesticides and herbicides)							
Organochlorine Pesticides & PCBs	608	7days:40days	1L	Amber glass	4-6°C	0.005-0.5	µg/L
Organophosphate Pesticides	507	14days	1L	Amber glass	$Na_sS_2O_3$ 4-6°C	0.01-1	µg/L
Glyphosate	547	14days	250mL	Amber glass	$Na_sS_2O_3$ 4-6°C	5	µg/L
Chlorinated Acids	515.3	14days	250mL	Amber glass	$Na_sS_2O_3$ 4-6°C		
2,4-D						0.02	µg/L
2,4,5-TP-Silvex						0.2	µg/L
Semivolatile Organic Compounds	625;8270D	7days;40days	1L	Amber glass	4-6°C	0.05-10	µg/L

Metals (Total and Dissolved)

Analyte	EPA Method Number	Holding Time	Container Size	Container Type	Preservation	Minimum Level/ Resolution	Units
Aluminum	200.8	If practical, filter immediately after subsampling. Otherwise filter in laboratory for dissolved fraction and preserve not more than 24 hours after subsampling; 6 months to analysis	250 to500 mL	HDPE	4°C and HNO_3 to pH<2	100	µg/L
Antimony	200.8					0.5	µg/L
Arsenic	200.8					0.5	µg/L
Beryllium	200.8					0.5	µg/L
Cadmium	200.8					0.25	µg/L
Chromium (Total)	200.8					0.5	µg/L
Copper	200.8					0.5	µg/L
Iron	200.8					25	µg/L
Lead	200.8					0.5	µg/L
Nickel	200.8					1	µg/L
Selenium	200.8					1	µg/L
Silver	200.8					0.25	µg/L
Thallium	200.8					0.5	µg/L
Zinc	200.8					1	µg/L
Chromium (Hexavalent)	218.6	Filter as above 24 hours	250 ml	HDPE	4°C	5	µg/L
Mercury	245.1	Filter as above 28 days	250 ml	Glass or Teflon	4°C and HNO_3 to pH<2	0.2	µg/L

Abbreviations

TSS=Total Suspended Solids
SSC=Suspended Sediment Concentration
TDS=Total Dissolved Solids
TPH=Total Petroleum Hydrocarbons
VSS=Volatile Suspended Solids
TOC=Total Organic Carbon
BOD_5=Five-day Biochemical Oxygen Demand
COD=Chemical Oxygen Demand
MBAS=Methylene Blue Active Substances
MTBE= Methyl Tertiary Butyl Ether
TKN=Total Kjeldahl Nitrogen
PCBs=Polychlorinated Biphenyls

1.1.2 Precision, Bias, Accuracy, Representativeness, Completeness, and Comparability

The overall quality of analytical measurements is assessed through evaluation of precision, accuracy/bias, representativeness, comparability and completeness. Precision and accuracy/bias are measured quantitatively. Representativeness and comparability are both assessed qualitatively. Completeness is assessed in both quantitative and qualitative terms. The following sections examine how these measures are typically applied.

1.1.2.1 Precision

Precision provides an assessment of mutual agreement between repeated measurements. These measurements apply to field duplicates, laboratory duplicates, matrix spike duplicates, and laboratory control sample duplicates. Monitoring of precision through the process allows for the evaluation of the consistency of field sampling and laboratory analyses.

The Relative Percent Difference (RPD) will be used to evaluate precision based upon duplicate samples. The RPD is calculated for each pair of data is calculated as:

$$RPD=[(x_1-x_2)*100]/[(x_1+x_2)/2)$$

Where:

x_1=concentration or value of sample 1 of the pair

x_2=concentration or value of sample 2 of the pair

In the case of matrix spike/spike duplicate, RPDs are compared with measurement quality objectives (MQOs) established for the program. MQOs will be established to be consistent with the most current SWAMP objectives in the SWAMP Quality Assurance Project Plan (2008) including the most recent updates as well as consultations with the laboratories performing the analyses. In the case of laboratory or field duplicates, values can often be near or below the established reporting limits. The most current SWAMP guidelines rely upon matrix spike/spike duplicate analyses for organic compounds instead of using laboratory duplicates since one or both values are often below detection limits or are near the detection limits. In such cases, RPDs do not provide useful information.

1.1.2.2 Bias

Bias is the systematic inherent in a method or caused by some artifact or idiosyncrasy of the measurement system. Bias may be either positive or negative and can emanate from a number of different points in the process. Although both positive and negative biases may exist concurrently in the same sample, the net bias is all that can be reasonably addressed in this project. Bias is preferably measured through analysis of spiked samples so that matrix effects are incorporated.

1.1.2.3 Accuracy

Accuracy is a measure of the closeness of a measurement or the average of a number of measurements to the true value. Accuracy includes of a combination of random error as measured by precision and systematic error as measured by bias. An assessment of the accuracy of measurements is based on determining the percent difference between measured values and known or "true" values applied to surrogates, Matrix Spikes (MS), Laboratory Control Samples (LCS) and Standard Reference Materials (SRM). Surrogates and matrix spikes evaluate matrix interferences on analytical performance, while laboratory control samples, standard reference materials and blank spikes (BS) evaluate analytical performance in the absence of matrix effects.

Assessment of the accuracy of measurements is based upon determining the difference between measured values and the true value. This is assessed primarily through analysis of spike recoveries or certified value ranges for SRMs. Spike recoveries are calculated as Percent Recovery according to the following formula:

$$\text{Percent Recovery} = [(t-x)/\alpha]*100\%$$

Where:

t=total concentration found in the spiked sample

x=original concentration in sample prior to spiking, and

α=actual spike concentration added to the sample

1.1.2.4 Representativeness, Comparability and Completeness

Representativeness is the degree to which data accurately and precisely represents the natural environment. For stormwater runoff, representativeness is first evaluated based upon the automated flow-composite sample and the associated hydrograph. To be considered as representative, the autosampler must have effectively triggered to capture initial runoff from the pavement and the composite sample should:

- be comprised of a minimum number of aliquots over the course of the storm event,
- effectively represent the period of peak flow,
- contain flow-weighted aliquots from over 80% of the total runoff volume, and
- demonstrate little or no evidence of "stacking".

Stacking occurs when the sampling volume is set too low and commands back up in the memory of an autosampler causing it to continuously cycle until it catches up with the accumulation of total flow measured by the stormwater monitoring station.

Representativeness is also assessed through the process of splitting or subsampling 20 L composite bottles into individual sample containers being sent to the laboratory. The first subsamples removed from the composite bottle should have the same composition as the last. Subsampling should be conducted in accordance with guidance in the subsampling SOP. This SOP is based upon use of large laboratory magnetic stir plate, an autosampler, and precleaned subsampling hoses to

minimize variability. Sample splitting can introduce a substantial amount of error especially if significant quantities of coarse sediments (greater than 250 µm) represent as significant fraction of the suspended sediments. Use of a USGS Teflon churns or Decaport cone splitter may also be used but would require development of a separate SOP.

Comparability is the measure of confidence with which one dataset can be compared to another. The use of standardized methods of chemical analysis and field sampling and processing are ways of insuring comparability. Application of consistent sampling and processing procedures is necessary for assuring comparability among data sets. Thorough documentation of these procedures, quality assurance activities and a written assessment of data validation and quality are necessary to provide others with the basic elements to evaluate comparability.

Completeness is a measure of the percentage of the data judged valid after comparison with specific validation criteria. This includes data lost through accidental breakage of sample containers or other activities that result in irreparable loss of samples. Implementation of standardized Chain-of-Custody procedures which track samples as they are transferred between custodians is one method of maintaining a high level of completeness.

A high level of completeness is essential to all phases of this study due to the limited number of samples. Of course, the overall goal is to obtain completeness of 100%, however, a realistic data quality indicator of 95% insures an adequate level of data return.

1.1.3 Laboratory Quality Assurance/Quality Control

The quality of analytical data is dependent on the ways in which samples are collected, handled and analyzed. Data Quality Objectives provide the standards against which the data are compared to determine if they meet the quality necessary to be used to address program objectives. Data will be subjected to a thorough verification and validation process designed to evaluate project data quality and determine whether data require qualification.

The three major categories of QA/QC checks are accuracy, precision, and contamination were discussed in the previous section. As a minimum, the laboratory will incorporate analysis of method blanks, and matrix spike/spike duplicates with each analytical batch. Laboratory duplicates will be analyzed for analytical tests where matrix spike/spike duplicate are not analyzed. Use of Certified Reference Materials (CRM) or Standard Reference Materials (SRM) is also recommended as these allow assessment of long term performance of the analytical methods so that representativeness can be assessed. Laboratories often use an internal CRM that is analyzed with each batch to evaluate any potential long-term shift in performance of the analytical procedures. Recommended minimum quality control samples will be based upon SWAMP QAPP (2008) and the associated 2013 Quality Control and Sample Handling Tables for water (http://www.swrcb.ca.gov/water_issues/programs/swamp/mqo.shtml).

1.1.4 Field QA/QC

1.1.4.1 Blanks

A thorough system of blanking is an essential element of monitoring. Much of the blanking processes are performed well in advance of the actual monitoring in order to demonstrate that all equipment expected to contact water is free of contaminants at the detection limits established for the program. Equipment components are cleaned in batches. Subsamples from each cleaning batch are rinsed with Type 1 laboratory blank water and submitted to the laboratory for analysis. If hits are encountered in any cleaning batch, the entire batch is put back through the cleaning and blanking process until satisfactory results are obtained. If contaminants are measured in the blanks, it is often prudent to reexamine the cleaning processes and equipment or materials used in the cleaning process. Equipment requiring blanks and the frequency of blanks is summarized below and in Table 2.

Table 2. Summary of Blanking Requirements for Field Equipment.

System Component	Blanking Frequency
Intake Hose	One per batch
Peristaltic Pump Hose	One per batch[1] or 10% for batches greater than 10
Composite Bottles	One per batch or 10% for batches greater than 10
Subsampling Pump Hose	One per batch or 10% for batches greater than 10
Laboratory Sample Containers	2% of the lot[2] or batch, minimum of one
Capsule Filter Blank[3]	One per batch or 10% for batches greater than 10
Churn/Cone Splitter[4]	When field cleaning is performed, process one blank per session

[1] A batch is a group of samples that are cleaned at the same time and in the same manner.

[2] If decontaminated bottles are sent directly from the manufacturer, the batch would be the lot designated by the manufacturer in their testing of the bottles.

[3] If filtration is performed in the laboratory, the capsule filter blanks would be considered part of laboratory QA/QC.

[4] This is applicable to use of a churn or cone splitter to subsample flow-weighted composite samples into individual containers. Splitting may be performed by the sampling team in a protected, clean area or by the laboratory.

1.1.4.2 Field Duplicates

Composite subsampling duplicates associated with flow-weighted composite samples are often referred to as field duplicates but, in fact, they are subsampling replicates. These replicates help assess combined variability associated with subsampling from the composite container and variability associated with the analytical process. They are evaluated against the same criteria as used for laboratory duplicates.

1.1.5 Equipment Cleaning, Blanking and Tracking

Sample collection, handling, and processing materials can contribute and/or sorb trace elements within the time scales typical for collection, processing and analysis of runoff samples. Sampling artifacts are especially important when measured concentrations that are at or near analytical detection limits (Horowitz 1997). Therefore, great care is required to collect and process samples in a manner that will minimize potential contamination and variability in the sampling process (Breault and Granato 2000).

Sampling conducted to measure dissolved metals and other trace contaminants at levels relevant to EPA water quality criteria requires documentation that all sampling equipment is free of contamination and that the processes used to obtain and handle samples do not introduce contamination. This requires documentation that methods used to collect, process and analyze the samples do not introduce contamination. Documentation for the CIMP includes written procedures provided in Appendix B for cleaning all components of the sampling system, blanking processes necessary to verify that system components and sample handling are not introducing contamination, and a system of tracking deployment of protocol-cleaned equipment in the field as described in this section.

All composite containers and equipment used for sample collection in the field and/or sample storage in the laboratory will be decontaminated and cleaned prior to use. These include the FEP tubing, Teflon® lids, strainers and hoses/fittings that are used in the subsampling process (USGS 1993). Personnel assigned to clean and handle the equipment are thoroughly trained and familiar with the cleaning, blanking, and tracking procedures. In addition, all field sampling staff will be trained to be familiar with these processes so that they have a better understanding of the importance of using clean sampling procedures and the effort required to eliminate sources of contamination.

Sample contamination has long been considered one of the most significant problems associated with measurement of dissolved metals and may be accentuated with use of High Resolution Mass Spectroscopy (HRMS) methods for trace levels of organic constituents at levels three orders of magnitude lower than conventional GCMS methods. One of the major elements of QA/QC documentation is establishing that clean sampling procedures are used throughout the process and that all equipment used to collect and process the water samples are free of contamination.

Cleaning protocols are consistent with ASTM (2008) standard D5088 – 02 that covers cleaning of sampling equipment and sample bottles. The generalized cleaning process is based upon a series of washings that typically start with tap water with a phosphate-free detergent, a tap water rinse, soaking in a 10% solution of reagent grade nitric acid, and a final series of rinses with ASTM Type 1 water. Detailed procedures for decontamination of sampling equipment are provided in Appendix A. In addition, Appendix G of the most recent Caltrans Stormwater Monitoring Guidance Manual (Caltrans, 2013) provides alternative cleaning procedure that incorporate use of methylene chloride to remove potential organic contaminants. Experience indicates that this step can be eliminated and still result in blanking data suitable for most target organic contaminants. Addition of this cleaning step or a comparable step to address organic contaminants may be necessary if satisfactory equipment blanks cannot be attained. Significant issues exist with respect to use of

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methylene chloride. This chemical is highly toxic, must be handled and disposed as a hazardous waste and is difficult to fully remove from the 20-L media bottles used as composite containers.

In order to account for any contamination introduced by sampling containers, blanks must be collected for composite bottles and laboratory bottles used for sample storage for trace contaminants. A sampling container blank is prepared by filling a clean container with blank water and measuring the concentrations of selected constituents (typically metals and other trace contaminants for composite bottles and metals analysis only for metals storage bottles). Blanking of the 20-L composite bottles will be performed by using the minimum amount of blank water necessary for the selected analytical tests. This is typically requires one to two liters. The bottle is capped and then manipulated to assure that all surfaces up to the neck of the bottle are rinsed. The water is then be allowed to sit for a minimum of one hour before decanting the rinse water into sample containers. In order to provide adequate control, media bottles are labelled and tracked. All media bottles cleaned and blanked in one batch are tracked to allow for recall if laboratory analyses reveal any contamination. Further tracking is required in the field to document where bottles from each cleaning batch are used and to assist in tracking of any contamination that might be detected after bottles have been deployed since laboratory turnaround in the middle of the storm season may require use of decontaminated bottles prior to receiving the results of the blank analyses.

Selected constituents for blanking will be dependent upon the list of contaminants with reasonable potential to be present at levels that could impact sample results. Minimum parameters used for blank analyses will include total recoverable trace metals, TDS, TOC and nutrients. Analysis of total metals will allow for detection of any residual metal contamination which will be of concern for all sampling. Nutrients, particularly nitrogen compounds, will assure that residual nitrogen from acid cleaning has been fully removed. TDS and TOC are useful for accessing presence of any residual contaminants. Additional blanking may be added when sampling other constituents with ultra-low analytical methods. These blanks may be submitted "blind" to the laboratory by field personnel or prepared internally by the laboratory.

Certified pre-cleaned QC-grade laboratory containers can be used. These bottles are cleaned using acceptable protocol for the intended analysis and tracked by lots. They come with standard certification forms that document the concentration to which the bottles are considered "contaminant-free" but these concentrations are not typically suitable for program reporting limits required for measurement of dissolved metals. Manufacturers may provide an option of certification to specific limits required by a project but it is preferable to purchase the QC bottles that are tracked by lot and conduct internal blanking studies. Lots not meeting project requirements should be returned to the manufacturer and exchanged for containers from another lot. At least 2% of the bottles in any "lot" or "batch" should be blanked at the program detection limits with a minimum frequency of one bottle per batch. A batch is considered to be a group of samples that are cleaned at the same time and in the same manner; or, if decontaminated bottles are sent directly from the manufacturer, the batch would be the lot designated by the manufacturer in their testing of the bottles. Cleaned bottles are stored in a clean area with lids properly secured.

Subsampling hoses consist of a length of peristaltic hose with short lengths of FEP tubing attached to each end. These are required to be cleaned inside and out since the FEP tubing is immersed in the composite bottle during the subsampling process. Once cleaned, the ends of the subsampling hoses are bagged. All hoses associated with the batch are then stored in large zip-lock containers labeled to identify the cleaning batch. Blanking of subsampling hoses is conducted as part of the composite bottle blanking process. A clean subsampling hose is used to decant blank water from the 20-L composite bottles into clean laboratory containers. Detection of any contaminants in the bottle blanks therefore requires that the subsampling hoses also are subjected another decontamination process. After cleaning, the subsampling hoses should only be handled while wearing clean, powder-free nitrile gloves.

APPENDIX D

NON-STORMWATER IC/ID AND OUTFALL TRACKING

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Operation Procedures	
Illicit Discharge Detection & Elimination: Initial Outfall Screening	
Purpose:	This provides a basic checklist for field crews conducting initial survey of storm drainage system outfalls for use in identification of illicit discharges

Reference: Brown et al., *Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments,* Center for Watershed Protection, Ellicott City, 2004.

Planning Considerations:

- ❑ Employees should have reviewed and understand the information presented in Chapter 11 of the reference manual
- ❑ Inspections are to occur during dry weather (no runoff producing precipitation in last 72 hours)
- ❑ Conduct inspections with at least two staff per crew
- ❑ Conduct inspections during low groundwater (if appropriate).
- ❑ Complete ***Site Info section on Outfall Reconnaissance Inventory Form*** before leaving the office. Additional forms should be available for undocumented outfalls

Field Methods:

- ❑ Ensure outfall is accessible.
- ❑ Inspect outfall only if safe to do so.
- ❑ Characterize the outfall by recording information on the ***LCC Outfall Reconnaissance Inventory Form.***
- ❑ Photograph the outfall with a digital camera (use dry erase board to identify outfall).
- ❑ Enter flow information on form if dry weather flow is present and ***easily*** obtained. If not, provide rough estimate of flow.
- ❑ Document clean, dry outfalls for potential elimination during future screening programs.
- ❑ Water samples will not be collected during the initial survey. In-situ measurements of temperature, conductivity, and pH should be taken if significant flow is present.
- ❑ Do not enter private property without permission.
- ❑ Photograph each site with the site identification written on the dry erase board.

Equipment List:

1. System map
2. Outfall Reconnaissance Inventory Forms
3. City identification or business cards
4. Digital camera (spare batteries)
5. Cell phone
6. GPS unit
7. Clip board and pencils
8. Dry erase board and pens
9. Hand Mirror
10. Flashlight (spare batteries)
11. Disposable gloves
12. Folding wood ruler or comparable
13. Temperature, Conductivity probe
14. pH probe/strips
15. ***Ammonia test strips***
16. ***Ten1-liter (polyethylene) sample bottles***
17. Watch with second hand
18. Calculator
19. Hand sanitizer
20. Safety vests
21. First aid kit
22. ***Cooler***
23. Permanent marker

Bolded, italicized items will only be needed for later surveys. No water quality samples will be taken for laboratory analysis during the first survey.

LOS CERRITOS CHANNEL OUTFALL RECONNAISSANCE INVENTORY/ SAMPLE COLLECTION FIELD SHEET

Section 1: Background Data

Subbasin:		Outfall ID:	
Today's date:		Time (Military):	
Investigators:		Form completed by:	
Temperature (°F):	Rainfall (in.): Last 24 hours: Last 48 hours:		
Latitude:	Longitude:	GPS Unit:	GPS LMK #:
Camera:		Photo #s:	

Land Use in Drainage Area (Check all that apply):

☐ Industrial ☐ Open Space

☐ Ultra-Urban Residential ☐ Institutional

☐ Suburban Residential Other: _____

☐ Commercial Known Industries: _____

Notes (e.g.., origin of outfall, if known):

Section 2: Outfall Description

LOCATION	MATERIAL	SHAPE		DIMENSIONS (IN.)	SUBMERGED
☐ **Closed Pipe**	☐ RCP ☐ CMP ☐ PVC ☐ HDPE ☐ Steel ☐ Other: _____	☐ Circular ☐ Elliptical ☐ Box ☐ Other: _____	☐ Single ☐ Double ☐ Triple ☐ Other: _____	Diameter/Dimensions: _____	In Water: ☐ No ☐ Partially ☐ Fully With Sediment: ☐ No ☐ Partially ☐ Fully
☐ **Open drainage**	☐ Concrete ☐ Earthen ☐ rip-rap ☐ Other: _____	☐ Trapezoid ☐ Parabolic ☐ Other: _____		Depth: _____ Top Width: _____ Bottom Width: _____	
☐ **In-Stream**	**(applicable when collecting samples)**				
Flow Present?	☐ Yes ☐ No	***If No, Skip to Section 5***			
Flow Description (If present)	☐ Trickle ☐ Moderate ☐ Substantial				

Section 3: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS				
PARAMETER		**RESULT**	**UNIT**	**EQUIPMENT**
☐Flow #1	Volume		Liter	Bottle
	Time to fill		Sec	
☐Flow #2	Flow depth		In	Tape measure
	Flow width	____' ____"	Ft, In	Tape measure
	Measured length	____' ____"	Ft, In	Tape measure
	Time of travel		S	Stop watch
Temperature			°F	Meter
pH			pH Units	Meter
Ammonia			mg/L	Test strip

Los Cerritos Channel Outfall Reconnaissance Inventory Field Sheet

Section 4: Physical Indicators for Flowing Outfalls Only

Are Any Physical Indicators Present in the flow? ☐ Yes ☐ No *(If No, Skip to Section 5)*

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (1-3)		
Odor	☐	☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas ☐ Sulfide ☐ Other:	☐ 1 – Faint	☐ 2 – Easily detected	☐ 3 – Noticeable from a distance
Color	☐	☐ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other:	☐ 1 – Faint colors in sample bottle	☐ 2 – Clearly visible in sample bottle	☐ 3 – Clearly visible in outfall flow
Turbidity	☐	See severity	☐ 1 – Slight cloudiness	☐ 2 – Cloudy	☐ 3 – Opaque
Floatables -Does Not Include Trash!!	☐	☐ Sewage (Toilet Paper, etc.) ☐ Suds ☐ Petroleum (oil sheen) ☐ Other:	☐ 1 – Few/slight; origin not obvious	☐ 2 – Some; indications of origin (e.g., possible suds or oil sheen)	☐ 3 - Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls

Are physical indicators that are not related to flow present? ☐ Yes ☐ No *(If No, Skip to Section 6)*

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
Outfall Damage	☐	☐ Spalling, Cracking or Chipping ☐ Peeling Paint ☐ Corrosion	
Deposits/Stains	☐	☐ Oily ☐ Flow Line ☐ Paint ☐ Other:	
Abnormal Vegetation	☐	☐ Excessive ☐ Inhibited	
Poor pool quality	☐	☐ Odors ☐ Colors ☐ Floatables ☐ Oil Sheen ☐ Suds ☐ Excessive Algae ☐ Other:	
Pipe benthic growth	☐	☐ Brown ☐ Orange ☐ Green ☐ Other:	

Section 6: Overall Outfall Characterization

☐ Unlikely ☐ Potential (presence of two or more indicators) ☐ Suspect (one or more indicators with a severity of 3) ☐ Obvious

Section 7: Data Collection

1. Sample for the lab?	☐ Yes	☐ No	
2. If yes, collected from:	☐ Flow	☐ Pool	
3. Intermittent flow trap set?	☐ Yes	☐ No	If Yes, type: ☐ OBM ☐ Caulk dam

Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)?

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APPENDIX E

MAJOR AND MINOR OUTFALLS TO THE LOS CERRITOS CHANNEL WATERSHED

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Major Outfalls (=>36 inches) in the Los Cerritos Channel Watershed

LDISCHARGE POINT	DESCRIPTION	DISCHARGE POINT LATITUDE	DISCHARGE POINT LONGITUDE	OWNER	SIDE (R/L)	DISTANCE FROM CHANNEL STARTING POINT (km)	JURISDICTION	MODEL SUB WATERSHED	UNIQUE ID	PHOTO UNIQUE ID	CHANNEL UNIQUE ID
CLARK CHANNEL											
N. Charlemagne Ave/E. Pageantry St	36" Discharge	33.81315	-118.12997	Long Beach	R	1.925	Long Beach	BI9A-5	BI9A-5-001		CC-0.273
N. Rutgers Ave/E. Pageantry St	36" Discharge	33.81317	-118.12970	Long Beach	L	1.927	Long Beach	BI9A-5	BI9A-5-002		CC-0.275
N Charlemagne Ave/E. Mezzanine Way	72" Discharge	33.81519	-118.12998	Long Beach	R	2.141	Long Beach	BI9A-5	BI9A-5-003		CC-0.494
N Rutgers Ave/E. Mezzanine Way	54" Discharge	33.81519	-118.12971	Long Beach	L	2.152	Long Beach	BI9A-5	BI9A-5-004		CC-0.507
3343 Rutgers Ave/E. Wardlow Rd	36" Discharge	33.81791	-118.12970	UNK	L	2.449	Long Beach	BI9A-5	BI9A-5-005		CC-0.793
N. Charlemagne Ave/E. Wardlow Rd	42" Discharge	33.81870	-118.12997	LACFCD	R	2.528	Long Beach	BI9A-5	BI9A-5-006		CC-0.877B
N. Rutgers Ave/E. Wardlow Rd	42" Discharge	33.81869	-118.12971	LACFCD	L	2.528	Long Beach	BI9A-5	BI9A-5-007		CC-0.877A
N. Charlemagne/E. Monlaco Rd	150" Discharge	33.82273	-118.12977	LACFCD	R	2.993	Long Beach	BI9A-5	BI9A-5-015		CC-1.342
N. Rutgers Ave/E. Keynote St	63" Discharge	33.82355	-118.12967	LACFCD	L	3.070	Long Beach	BI9A-4	BI9A-4-001		CC-1.419
E. Conant St/N. Charlemagne Ave	39" Discharge	33.82505	-118.12990	LACFCD	R	3.238	Long Beach	BI9A-4	BI9A-4-002		CC-1.586
Carson St/N. Bellflower Blvd	63" Discharge	33.83124	-118.13056	LACFCD	L	3.960	Long Beach	BI9A-4	BI9A-4-007		CC-2.309

Carson St/N. Greenbrier Rd	48" Discharge	33.83215	-118.13235	LACFCD	R	4.164	Long Beach	BI9A-4	BI9A-4-008		CC-2.512
Carson St/N. Greenbrier Rd	45" Discharge	33.83233	-118.13233	LACFCD	R	4.206	Long Beach	BI9A-4	BI9A-4-011		CC-2.555
Harvey Way/N. Greenbrier Rd	51" Discharge	33.83612	-118.13233	LACFCD	R	4.599	Long Beach	BI9A-4	BI9A-4-016		CC-2.948
Harvey Way/Heather Rd	81" Discharge	33.83613	-118.13205	LACFCD	L	4.602	Long Beach	BI9A-4	BI9A-4-017		CC-2.950
E. Centralia St/N. Greenbrier Rd	42" Discharge	33.83954	-118.13225	LACFCD	R	4.976	Long Beach	BI9A-3	BI9A-3-001		CC-3.324A
E. Centralia St/Heather Rd	42" Discharge	33.83951	-118.13206	LACFCD	L	4.976	Long Beach	BI9A-3	BI9A-3-002		CC-3.324B
E. Arbor Rd/Clark Ave	36" Discharge	33.84300	-118.13226	LACFCD	R	5.348	Long Beach	BI9A-3	BI9A-3-007		CC-3.696
E. Arbor Rd/Clark Ave	39" Discharge	33.84297	-118.13225	LACFCD	R	5.357	Long Beach	BI9A-3	BI9A-3-008		CC-3.705
4763 Fidler Ave/Del Amo Blvd	36" Discharge	33.84500	-118.13203	Long Beach	L	5.586	Long Beach	BI9A-3	BI9A-3-011		CC-3.934
Del Amo Blvd/Fidler Ave	138" Discharge	33.84697	-118.13223	LACFCD	C	5.807	Lakewood	BI9A-3	BI9A-3-014		CC-4.155
Civic Center/Clark Ave	36" Discharge	33.84922	-118.13228	LACFCD	R	6.052	Lakewood	BI9A-2	BI9A-2-002		CC-4.413
Candlewood St/Fidler Ave	57" Discharge	33.85360	-118.13219	LACFCD	L	6.521	Lakewood	BI9A-2	BI9A-2-009		CC-4.882
Candlewood St/Fidler Ave	126" Discharge	33.85379	-118.13221	LACFCD		6.586	Lakewood	BI9A-1	BI9A-1-002		CC-4.916
Candlewood St/Clark Ave	72" Discharge	33.85442	-118.13226	LACFCD	R	6.625	Lakewood	BI9A-1	BI9A-1-003		CC-4.986
5443 Fidler Ave/Michelson St	36" Discharge	33.85618	-118.13213	LACFCD	L	6.818	Lakewood	BI9A-1	BI9A-1-008	BI9A-1-007	CC-5.179
Clark Ave/Michelson St	126" Discharge	33.85684	-118.13225	LACFCD		6.889	Lakewood	BI9A-1	BI9A-1-010		CC-5.250
South St/Fidler Ave	39" Discharge	33.86017	-118.13219	LACFCD	L	7.255	Lakewood	BI9A-1	BI9A-1-013		CC-5.616A

South St/Dagwood Ave	57" Discharge	33.86017	-118.13232	LACFCD	R	7.255	Lakewood	BI9A-1	BI9A-1-014		CC-5.616B
											CC-5.652
South St/Dagwood Ave	132" Discharge	33.86046	-118.13225	LACFCD	C	7.290	Lakewood	BI9A-1	BI9A-1-017		CC-5.651
Hedda St/Fidler Ave	39" Discharge	33.86411	-118.13232	LACFCD	L	7.696	Lakewood	BI9A-1	BI9A-1-018		CC-6.057B
Hedda St/Fidler Ave	39" Discharge	33.86409	-118.13234	LACFCD	R	7.696	Lakewood	BI9A-1	BI9A-1-019		CC-6.057A
Ashworth St/Fidler Ave	75" Discharge	33.86780	-118.13235	LACFCD	R	8.109	Lakewood	BI9A-1	BI9A-1-022		CC-6.469
Ashworth St/Fidler Ave	132" Discharge	33.86836	-118.13233	Lakewood	L	8.162	Lakewood	BI9A-1	BI9A-1-025		CC-6.522
Clark Ave/Ashworth St	87" Discharge	33.86848	-118.13355	LACFCD		8.282	Lakewood	BI9A-1	BI9A-1-026		CC-6.643
DEL AMO CHANNEL											
Del Amo Blvd/Whitewood Ave	36" Discharge	33.84696	-118.13552	UNK	L	0.286	Lakewood	BI9B-2	BI9B-2-003	BI9B-2-003	DAC-0.331
Del Amo Blvd/Faculty Ave	36" Discharge	33.84696	-118.13695	LACFCD	L	0.421	Lakewood	BI9B-2	BI9B-2-004	BI9B-2-004	DAC-0.466
Del Amo Blvd/Graywood Ave	42" Discharge	33.84698	-118.13783	LACFCD	L	0.508	Lakewood	BI9B-2	BI9B-2-005	BI9B-2-005	DAC-0.554
Del Amo Blvd/Graywood Ave	36" Discharge	33.84699	-118.13797	LACFCD	L	0.516	Lakewood	BI9B-2	BI9B-2-006	BI9B-2-005	DAC-0.561
Del Amo Blvd/Hazelbrook Ave	36" Discharge	33.84694	-118.19539	LACFCD	L	0.664	Lakewood	BI9B-2	BI9B-2-010	BI9B-2-010	DAC-0.709
Del Amo Blvd/Blackthorne Ave	36" Discharge	33.84697	-118.14041	LACFCD	R	0.737	Lakewood	BI9B-2	BI9B-2-011	BI9B-2-011	DAC-0.782

Del Amo Blvd/N. Blackthorne Ave	18" Discharge	33.84698	-118.14024	LACFCD	L	0.7388	Lakewood	BI9B-2	BI9B-2-012		DAC-0.784
Del Amo Blvd/N. Pepperwood Ave	36" Discharge	33.84699	-118.14126	LACFCD	L	0.820	Lakewood	BI9B-2	BI9B-2-014	BI9B-2-014	DAC-0.865
Del Amo Blvd/Lakewood Blvd	36" Discharge	33.84701	-118.14200	LACFCD	L	0.902	Lakewood	BI9B-2	BI9B-2-016	BI9B-2-016	DAC-0.947
Del Amo Blvd/Lakewood Blvd	45" Discharge	33.84699	-118.14226	LACFCD	L	0.917	Lakewood	BI9B-2	BI9B-2-018	BI9B-2-018	DAC-0.963
Del Amo Blvd/Lakewood Blvd	36" Discharge	33.84700	-118.14255	UNK	L	1.960	Lakewood	BI9B-2	BI9B-2-020	BI9B-2-020	DAC-1.004
Del Amo Blvd/Hayter Ave	48" Discharge	33.84702	-118.14598	LACFCD	L	1.253	Lakewood	BI9B-2	BI9B-2-024	BI9B-2-024	DAC-1.253
Del Amo Blvd/Hayter Ave	45" Discharge	33.84684	-118.14629	LACFCD	R	1.289	Lakewood	BI9B-2	BI9B-2-027	BI9B-2-027	DAC-1.334B
Del Amo Blvd/Downey Ave	48" Discharge	33.84703	-118.15051	LACFCD	R	1.666	Lakewood	BI9B-2	BI9B-2-029	BI9B-2-029	DAC-1.711
Downey Ave/Eckleson St	114" Discharge	33.84884	-118.15047	LACFCD		1.911	Lakewood	BI9B-2	BI9B-2-032		DAC-1.911
DOWNEY CHANNEL											
Candlewood St/Downey Ave	42" Discharge	33.853717	-118.150524	UNK	R	0.551	Lakewood	BI447A	BI447A-003	BI447A-003	DNC-0.5514
Candlewood St/Downey Ave	42" Discharge	33.854243	-118.150513	UNK	R	0.609	Lakewood	BI447A	BI447A-005	BI447-005	DNC-0.6093
Candlewood St/Downey Ave	42" Discharge	33.854297	-118.150527	Lakewood	R	0.618	Lakewood	BI447A	BI447A-006	BI447A-006	DNC-0.618
Candlewood St/Downey Ave	72" Discharge	33.854368	-118.150421	Lakewood	L	0.624	Lakewood	BI447A	BI447A-007	BI447A-007	DNC-0.624
Saint Pancratius Pl/Verdura Ave	117" Discharge	33.858402	-118.150459	Lakewood	L	1.072	Lakewood	BI447A	BI447A-008		DNC-1.072B

Saint Pancratius Pl/Verdura Ave	117" Discharge	33.858405	-118.15051	Lakewood	R	1.072	Lakewood	BI447A	BI447A-009		DNC-1.072A
Candlewood St/Downey Ave	72" Discharge	33.854382	-118.15029	Lakewood		0.633	Lakewood	BI447A	BI447A-010		DNC-0.796
Obispo Ave/Eckleson St	36" Discharge	33.849078	-118.154687	LACFCD	R	2.332	Lakewood	BI9B-1	BI9B-1-004		DNC-2.332
Obispo Ave/Eckleson St	60" Discharge	33.849074	-118.154747	LACFCD	R	2.336	Lakewood	BI9B-1	BI9B-1-005		DNC-2.336
Obispo Ave/Eckleson St	36" Discharge	33.849083	-118.154825	UNK	R	2.347	Lakewood	BI9B-1	BI9B-1-006		DNC-2.347
Obispo Ave/Eckleson St	48" Discharge	33.849183	-118.154825	UNK	L	2.347	Lakewood	BI9B-1	BI9B-1-007		DNC-2.347
Paramount Blvd/Eckleson St	66" Discharge	33.849146	-118.159614	LACFCD	L	2.804	Lakewood	BI9B-1	BI9B-1-008	BI9B-1-008	DNC-2.804A
Paramount Blvd/Eckleson St	66" Discharge	33.849096	-118.159614	LACFCD	R	2.804	Lakewood	BI9B-1	BI9B-1-009	BI9B-1-008	DNC-2.804B
LOS CERRITOS CHANNEL											
Knoxville Ave/E. Atherton St	36" Discharge (1 of 3)	33.78867	-118.10368	Long Beach	R	7.386	Long Beach	LCERR-5	LCERR-5-003		LCC-0.030
Knoxville Ave/E. Atherton St	36" Discharge (2 of 3)	33.78884	-118.10370	Long Beach	R	7.386	Long Beach	LCERR-5	LCERR-5-004		LCC-0.031
Knoxville Ave/E. Atherton St	36" Discharge (3 of 3)	33.78902	-118.10369	Long Beach	R	7.387	Long Beach	LCERR-5	LCERR-5-005		LCC-0.032
Vuelta Grande Ave/E. Atherton St	42" Discharge	33.78917	-118.10331	Long Beach	L	7.417	Long Beach	LCERR-5	LCERR-5-006		LCC-0.062
2040 Knoxville Ave	48" Discharge (1 of 3)	33.79319	-118.10369	LACFCD	R	7.876	Long Beach	LCERR-5	LCERR-5-007		LCC-0.521
2040 Knoxville Ave	48" Discharge (2 of 3)	33.79336	-118.10368	LACFCD	R	7.877	Long Beach	LCERR-5	LCERR-5-008		LCC-0.522

2040 Knoxville Ave	48" Discharge (3 of 3)	33.79356	-118.10369	LACFCD	R	7.878	Long Beach	LCERR-5	LCERR-5-009		LCC-0.523
Vuelta Grande Ave/N. Hidden Ln	42" Discharge	33.79304	-118.10333	LACFCD	L	7.899	Long Beach	LCERR-5	LCERR-5-010		LCC-0.544
Vuelta Grande Ave/E. Stearns St	48" Discharge	33.79565	-118.10330	LACFCD	L	8.135	Long Beach	LCERR-4	LCERR-4-001		LCC-0.780
Vuelta Grande Ave/E. la Marimba St	36" Discharge	33.79793	-118.10332	Long Beach	L	8.387	Long Beach	LCERR-4	LCERR-4-004		LCC-1.032
2372 Knoxville Ave/E. Cantel St	36" Discharge	33.80000	-118.10472	Long Beach	R	8.682	Long Beach	LCERR-4	LCERR-4-007		LCC-1.327
6400 Willow St/Palo Verde Ave	42" Discharge	33.80262	-118.10779	Long Beach	L	9.071	Long Beach	LCERR-4	LCERR-4-008		LCC-1.716
6220 Willow St/Palo Verde Ave	48" Discharge	33.80304	-118.10890	PVRT	R	9.181	Long Beach	LCERR-4	LCERR-4-009		LCC-1.826
Spring St/San Anseline Ave	66" Discharge	33.81035	-118.12130	LACFCD	L	0.725	Long Beach	LCERR-3	LCERR-3-002		LCC-3.388
Spring St/Bellflower Blvd	36" Discharge	33.81043	-118.12552	LACFCD	L	1.115	Long Beach	LCERR-3	LCERR-3-006		LCC-3.778
Spring St/Montair Ave	45" Discharge	33.81014	-118.12680	Long Beach	R	1.230	Long Beach	LCERR-3	LCERR-3-009		LCC-3.892
Heather Rd/Spring St	45" Discharge	33.81026	-118.13101	UNK	R	0.135	Long Beach	LCERR-2	LCERR-2-002		LCC-4.301A
Clark Ave/Spring St	96" Discharge	33.81034	-118.13376	LACFCD	C	0.392	Long Beach	LCERR-2	LCERR-2-004		LCC-4.558

N. Lakewood Blvd/E. Spring St	96" Discharge	33.81303	-118.13950	LACFCD		1.077	Long Beach	LCERR-2	LCERR-2-007		LCC-5.221
Lakewood Blvd/Spring St	36" Discharge	33.81306	-118.13949	LACFCD	L	1.045	Long Beach	LCERR-2	LCERR-2-005		LCC-5.229
Spring St/Lakewood Blvd	54" Discharge	33.81313	-118.14033	LACFCD	R	1.135	Long Beach	LCERR-2	LCERR-2-006		LCC-5.319
Spring St/Lakewood Blvd	108" Discharge	33.81316	-118.14235	LACFCD	L	1.322	Long Beach	LCERR-1	LCERR-1-001		LCC-5.506
Spring St/Lakewood Blvd	120" Discharge	33.81288	-118.14249	LACFCD	R	1.341	Long Beach	LCERR-1	LCERR-1-002		LCC-5.525
WARDLOW CHANNEL											
Clark Ave/Keynote St	228" Discharge	33.82331	-118.13408	LACFCD		5.885	Long Beach	BI9C	BI9C-001		WC-5.883
Lakewood Blvd	36" Discharge	33.82333	-118.13822	LACFCD	L	6.194	Long Beach	BI9C	BI9C-004		WC-6.264
Lakewood Blvd	42" Discharge	33.82332	-118.14130	LACFCD	L	6.482	Long Beach	BI9C	BI9C-005		WC-6.555
Lakewood Blvd	228" Discharge	33.82332	-118.14165	LACFCD		6.520	Long Beach	BI9A-5	BI9A-5-017		WC-6.586
PALO VERDE CHANNEL											
WOODRUFF AVE / SPRING ST	54" Discharge	33.81090	-118.11427	Long Beach	R	0.430	Long Beach	BI9E-2	BI9E-2-006		PVC-0.430
3055 SHADYPARK DR/McNab Ave	36" Discharge	33.81224	-118.11410	Long Beach	L	0.584	Long Beach	BI9E-2	BI9E-2-007		PVC-0.584

LOS CERRITOS DRAIN LINE E / LOS COYOTES DIA/E.Pagentry St	36" Discharge (1 of 2)	33.81329	-118.11409	LACFCD	R	0.723	Long Beach	BI9E-2	BI9E-2-009		PVC-0.723
LOS CERRITOS DRAIN LINE E / LOS COYOTES DIA/E.Pagentry St	36" Discharge (2 of 2)	33.81359	-118.11407	LACFCD	R	0.727	Long Beach	BI9E-2	BI9E-2-010		PVC-0.727
LOS COYOTES DIA / GONDAR AVE	48" Discharge	33.81550	-118.11258	LACFCD	R	0.987	Long Beach	BI9E-2	BI9E-2-014		PVC-0.987
6228 WARDLOW RD/Los Coyotes Dia W	36" Discharge	33.81864	-118.10980	Long Beach	R	1.426	Long Beach	BI9E-2	BI9E-2-016		PVC-1.426
Los Coyotes Dia/Conquista Ave	42" Discharge	33.82054	-118.10802	Long Beach	L	1.684	Long Beach	BI9E-2	BI9E-2-019		PVC-1.684
PALO VERDE AVE / LOS COYOTES DIA	36" Discharge (1 of 2)	33.82110	-118.10793	LACFCD	L	1.748	Long Beach	BI9E-2	BI9E-2-021		PVC-1.747
PALO VERDE AVE / LOS COYOTES DIA	36" Discharge (2 of 2)	33.82110	-118.10793	LACFCD	L	1.748	Long Beach	BI9E-2	BI9E-2-022		PVC-1.748
3778 PALO VERDE AVE/Harco St	36" Discharge	33.82715	-118.10795	LACFCD	L	2.434	Long Beach	BI9E-2	BI9E-2-026		PVC-2.434
3788 CONQUISTA AVE/Harco St	48" Discharge	33.82758	-118.10811	LACFCD	R	2.470	LA County(LBC-254)	BI9E-2	BI9E-2-027		PVC-2.470
Palo Verde Ave/E. Parkcrest St	72" Discharge	33.83025	-118.10793	LACFCD	L	2.778	Los Angeles County	BI9E-2	BI9E-2-028		PVC-2.778A
	72" Discharge	33.83026	-118.10793	LACFCD	L	2.7779	Los Angeles County	BI9E-2	BI9E-2-029		PVC-2.778B
Carson St/Palo Verde Ave	48" Discharge	33.83232	-118.10832	Long Beach	L	3.008	Long Beach	BI9E-1	BI9E-1-034		PVC-3.008
Harvey Way/Palo Verde Ave	36" Discharge	33.83585	-118.10829	LACFCD	L	3.418	Lakewood	BI9E-1	BI9E-1-006	BI9E-1-006	PVC-3.417
Harvey Way/Palo Verde Ave	36" Discharge	33.83592	-118.10840	LACFCD	R	3.418	Lakewood	BI9E-1	BI9E-1-007	BI9E-1-007	PVC-3.418

Harvey Way/Palo Verde Ave	36" Discharge	33.83613	-118.10839	LACFCD	R	3.438	Lakewood	BI9E-1	BI9E-1-008	BI9E-1-008	PVC-3.437
Centralia St/Palo Verde Ave	48" Discharge	33.83948	-118.10822	LACFCD	L	3.827	Lakewood	BI9E-1	BI9E-1-013	BI9E-1-013	PVC-3.827
Henrilee Lateral/Conquista Ave	6'x7' Trap Channel Discharge	33.84132	-118.10834	LACFCD	R	4.017	Lakewood	BI9E-1	BI9E-1-032	BI9E-1-032	PVC-4.017
Turnergrove Dr/Silva St	48" Discharge (1 of 2)	33.84822	-118.10873	LACFCD	R	4.793	Lakewood	BI9E-1	BI9E-1-025	BI9E-1-025	PVC-4.793
Turnergrove Dr/Silva St	48" Discharge (2 of 2)	33.84824	-118.10873	LACFCD	R	4.795	Lakewood	BI9E-1	BI9E-1-026	BI9E-1-025	PVC-4.795
Palo Verde Ave/Carfax Ave	48" Discharge	33.84925	-118.10918	LACFCD	L	4.905	Lakewood	BI9E-1	BI9E-1-027	BI9E-1-027	PVC-4.905
Candlewood St/Carfax Ave	51" Discharge	33.85309	-118.11127	LACFCD	L	5.368	Lakewood	BI9E-1	BI9E-1-030	BI9E-1-030	PVC-5.368
Candlewood St/Carfax Ave	54" Discharge	33.85313	-118.11142	LACFCD	R	5.374	Lakewood	BI9E-1	BI9E-1-031	BI9E-1-031	PVC-5.374
South St/Canehill Ave	63" Discharge	33.85820	-118.11151	LACFCD	L	5.960	Lakewood	BI446B	BI446B-004	BI446B-004	PVC-5.960
South St/Canehill Ave	42" Discharge	33.85854	-118.11148	LACFCD	L	6.004	Lakewood	BI446B	BI446B-007	BI446B-007	PVC-6.004
Snowden Ave/Charlwood St	36" Discharge	33.85921	-118.11171	LACFCD	R	6.080	Lakewood	BI446B	BI446B-008	BI446B-000	PVC-6.080
Allington St/Canehill Ave	72" Discharge	33.86546	-118.11160	LACFCD	L	6.792	Lakewood	BI446B	BI446B-011	BI446B-011	PVC-6.793B
Allington St/Canehill Ave	75" Discharge	33.86546	-118.11161	LACFCD	R	6.792	Lakewood	BI446B	BI446B-012	BI446B-011	PVC-6.793A

Minor Outfalls (12-36 inches) in the Los Cerritos Channel Watershed

DISCHARGE POINT	EFFLUENT DESCRIPTION	DISCHARGE POINT LATITUDE	DISCHARGE POINT LONGITUDE	OWNER	SIDE (L/R)	DISTANCE FROM CHANNEL STARTING POINT (km)	JURISDICTION	MODEL SUB WATERSHED	UNIQUE ID	PHOTO UNIQUE ID	CHANNEL UNIQUE ID
CLARK CHANNEL											
Charlemagne Ave/Spring St	24" Discharge	33.81081	-118.13000	LACFCD	R	1.662	Long Beach	LCERR-3	LCERR-3-011		CC-0.009A
Rutgers Ave/Spring St	18" Discharge	33.81079	-118.12973	LACFCD	L	1.662	Long Beach	LCERR-3	LCERR-3-012		CC-0.009B
N. Charlemagne Ave/E. Wardlow Rd	18" Discharge	33.81895	-118.12994	Long Beach	R	2.565	Long Beach	BI9A-5	BI9A-5-008		CC-0.914B
E. Wardlow Rd/N. Rutgers Ave	18" Discharge	33.81897	-118.12970	Long Beach	L	2.565	Long Beach	BI9A-5	BI9A-5-009		CC-0.914A
Stanbridge Ave/E. Wardlow Rd	24" Discharge	33.81936	-118.12971	LACFCD	L	2.612	Long Beach	BI9A-5	BI9A-5-010		CC-0.961
E. Monlaco Rd/N. Rutgers Ave	18" Discharge	33.82216	-118.12968	Long Beach	L	2.924	Long Beach	BI9A-5	BI9A-5-012		CC-1.273
E. Monlaco Rd/N. Rutgers Ave	18" Discharge	33.82236	-118.12967	Long Beach	L	2.941	Long Beach	BI9A-5	BI9A-5-013		CC-1.290A
E. Monlaco Rd/N. Charlemagne Ave	18" Discharge	33.82233	-118.12995	Long Beach	R	2.941	Long Beach	BI9A-5	BI9A-5-014		CC-1.290B
E. Conant St/N. Charlemagne Ave	15" Discharge	33.82498	-118.12992	Long Beach	R	3.239	Long Beach	BI9A-4	BI9A-4-003		CC-1.587
E. Conant St/N. Charlemagne Ave	15" Discharge	33.82517	-118.12992	Long Beach	R	3.256	Long Beach	BI9A-4	BI9A-4-004		CC-1.605
N. Charlemagne Ave/E. Brittain St	24" Discharge	33.82604	-118.12991	Long Beach	R	3.354	Long Beach	BI9A-4	BI9A-4-005		CC-1.703
Carson St/N. Bellflower Blvd	12" Discharge	33.83070	-118.12970	LACFCD	L	3.865	Long Beach	BI9A-4	BI9A-4-006		CC-2.214
Carson St/N. Greenbrier Rd	24" Discharge	33.83223	-118.13231	Long Beach	R	4.168	Long Beach	BI9A-4	BI9A-4-009		CC-2.517A
Carson St/Heather Rd	24" Discharge	33.83223	-118.13210	Long Beach	L	4.168	Long Beach	BI9A-4	BI9A-4-010		CC-2.517B
Carson St/N. Greenbrier Rd	24" Discharge	33.83246	-118.13231	Long Beach	R	4.211	Long Beach	BI9A-4	BI9A-4-012		CC-2.560A
Carson St/Heather Rd	24" Discharge	33.83246	-118.13209	Long Beach	L	4.211	Long Beach	BI9A-4	BI9A-4-013		CC-2.560B
Harvey Way/Heather Rd	18" Discharge	33.83606	-118.13204	Long Beach	L	4.598	Long Beach	BI9A-4	BI9A-4-014		CC-2.947A

Harvey Way/Heather Rd	18" Discharge	33.83606	-118.13232	Long Beach	R	4.598	Long Beach	BI9A-4	BI9A-4-015		CC-2.947B
Harvey Way/N. Greenbrier Rd	18" Discharge	33.83620	-118.13231	Long Beach	R	4.610	Long Beach	BI9A-4	BI9A-4-018		CC-2.958A
Harvey Way/Heather Rd	18" Discharge	33.83620	-118.13205	Long Beach	L	4.610	Long Beach	BI9A-4	BI9A-4-019		CC-2.958B
E. Centralia St/N. Greenbrier Rd	18" Discharge	33.83969	-118.13227	Long Beach	R	4.994	Long Beach	BI9A-3	BI9A-3-003		CC-3.342A
E. Centralia St/Heather Rd	18" Discharge	33.83967	-118.13203	Long Beach	L	4.994	Long Beach	BI9A-3	BI9A-3-004		CC-3.342B
E. Centralia St/Pan American Park	15" Discharge	33.84087	-118.13202	Long Beach	L	5.129	Long Beach	BI9A-3	BI9A-3-005		CC-3.477
E. Arbor Rd/Pan American Park	15" Discharge	33.84154	-118.13203	Long Beach	L	5.205	Long Beach	BI9A-3	BI9A-3-006		CC-3.554
E. Arbor Rd/N. Charlemagne	24" Discharge	33.84312	-118.13202	Long Beach	L	5.379	Long Beach	BI9A-3	BI9A-3-009		CC-3.728
E. Arbor Rd./Fidler Ave	30" Discharge	33.84351	-118.13202	Long Beach	L	5.416	Long Beach	BI9A-3	BI9A-3-010		CC-3.764
Del Amo Blvd/Fidler Ave	33" Discharge	33.84693	-118.13217	LACFCD	L	5.801	Lakewood	BI9A-3	BI9A-3-012	BI9A-3-012	CC-4.149
Del Amo Blvd/Fidler Ave	18" Discharge	33.84701	-118.13216	UNK	L	5.802	Lakewood	BI9A-3	BI9A-3-013	BI9A-3-013	CC-4.150
Del Amo Blvd/Civic Center Way	30" Discharge	33.84721	-118.13220	UNK	L	5.834	Lakewood	BI9A-2	BI9A-2-001		CC-4.182
Civic Center/Del Amo Blvd	24" Discharge	33.84984	-118.13231	UNK	R	6.123	Lakewood	BI9A-2	BI9A-2-003		CC-4.484
Civic Center Way/Hardwick St	30" Discharge	33.85077	-118.13222	LACFCD	L	6.215	Lakewood	BI9A-2	BI9A-2-004		CC-4.575
Civic Center Way/Candlewood St	12" Discharge	33.85243	-118.13229	UNK	R	6.401	Lakewood	BI9A-2	BI9A-2-007		CC-4.762
Civic Center Way/Candlewood St	18" Discharge	33.85268	-118.13229	Lakewood	R	6.422	Lakewood	BI9A-2	BI9A-2-008		CC-4.783
Candlewood St/Clark Ave	18" Discharge	33.85382	-118.13222	LACFCD	R	6.545	Lakewood	BI9A-1	BI9A-1-001		CC-4.906
Candlewood St/Clark Ave	12" Discharge	33.85493	-118.13235	UNK	R	6.674	Lakewood	BI9A-1	BI9A-1-004		CC-5.035
Clark Ave/Michelson St	12" Discharge	33.85577	-118.13230	UNK	R	6.774	Lakewood	BI9A-1	BI9A-1-005		CC-5.135
Clark Ave/Michelson St	12" Discharge	33.85594	-118.13231	UNK	R	6.791	Lakewood	BI9A-1	BI9A-1-006		CC-5.151
Clark Ave/Michelson St	12" Discharge	33.85612	-118.13231	UNK	R	6.807	Lakewood	BI9A-1	BI9A-1-007		CC-5.168
Clark Ave/Michelson St	12" Discharge	33.85631	-118.13231	UNK	R	6.834	Lakewood	BI9A-1	BI9A-1-009		CC-5.194
Fidler Ave/Bigelow St	12" Discharge	33.85765	-118.13232	UNK	R	6.981	Lakewood	BI9A-1	BI9A-1-011		CC-5.342
Clark Ave/South St	24" Discharge	33.85968	-118.13228	Lakewood	R	7.192	Lakewood	BI9A-1	BI9A-1-012		CC-5.553
South St/Dagwood Ave	20" Discharge	33.86046	-118.13233	UNK	R	7.289	Lakewood	BI9A-1	BI9A-1-015		CC-5.649
South St/Fidler Ave	30" Discharge	33.86045	-118.13219	UNK	L	7.291	Lakewood	BI9A-1	BI9A-1-016		CC-5.652
Hedda St/Fidler Ave	15" Discharge	33.86417	-118.13221	UNK	L	7.697	Lakewood	BI9A-1	BI9A-1-020		CC-6.058

Hedda St/Fidler Ave	15" Discharge	33.86427	-118.13221	UNK	L	7.708	Lakewood	BI9A-1	BI9A-1-021		CC-6.089
Ashworth St/Fidler Ave	15" Discharge	33.86783	-118.13225	Lakewood	L	8.112	Lakewood	BI9A-1	BI9A-1-023		CC-6.472
Ashworth St/Fidler Ave	15" Discharge	33.86799	-118.13227	Lakewood	L	7.708	Lakewood	BI9A-1	BI9A-1-024		CC-6.485
DEL AMO CHANNEL											
Del Amo Blvd/Fidler Ave	24" Discharge	33.84697	-118.13290	UNK	L	0.079	Lakewood	BI9B-2	BI9B-2-001	BI9B-2-001	DAC-0.079
Del Amo Blvd/Whitewood Ave	24" Discharge	33.84697	-118.13540	Lakewood	L	0.283	Lakewood	BI9B-2	BI9B-2-002	BI9B-2-002	DAC-0.328
Del Amo Blvd/Graywood Ave	18" Discharge	33.84680	-118.13791	Long Beach	R	0.517	Lakewood	BI9B-2	BI9B-2-007	BI9B-2-007	DAC-0.562
Del Amo Blvd/Graywood Ave	15" Discharge	33.84680	-118.13827	Long Beach	R	0.538	Lakewood	BI9B-2	BI9B-2-008	BI9B-2-008	DAC-0.583
Del Amo Blvd/Graywood Ave	15" Discharge	33.84680	-118.13930	Long Beach	R	0.554	Lakewood	BI9B-2	BI9B-2-009	BI9B-2-009	DAC-0.599
Del Amo Blvd/Hazelbrook Ave	36" Discharge	33.84694	-118.13953		L	0.6642	Lakewood	BI9B-2	BI9B-2-010		DAC-0.709
Del Amo Blvd/Blackthorne Ave	18" Discharge	33.84680	-118.14030	Long Beach	R	0.742	Lakewood	BI9B-2	BI9B-2-013	BI9B-2-013	DAC-0.784
Del Amo Blvd/N. Blackthorne Ave	18" Discharge	33.84698	-118.14024	LACFCD	L	0.739	Lakewood	BI9B-2	BI9B-2-012	BI9B-2-012	DAC-0.787
Del Amo Blvd/N. Pepperwood Ave	15" Discharge	33.84681	-118.14139	Long Beach	R	0.836	Lakewood	BI9B-2	BI9B-2-015	BI9B-2-015	DAC-0.881
Del Amo Blvd/Lakewood Blvd	15" Discharge	33.84682	-118.14225	Long Beach	R	0.908	Lakewood	BI9B-2	BI9B-2-017	BI9B-2-017	DAC-0.953
Del Amo Blvd/Lakewood Blvd	18" Discharge	33.84700	-118.14241	Long Beach	L	0.924	Lakewood	BI9B-2	BI9B-2-019	BI9B-2-019	DAC-0.970
Del Amo Blvd/Lakewood Blvd	12" Discharge	33.84689	-118.14267	Lakewood	L	1.005	Lakewood	BI9B-2	BI9B-2-021	BI9B-2-021	DAC-1.005
Del Amo Blvd/Lakewood Blvd	18" Discharge	33.84681	-118.14264	Long Beach	R	1.961	Lakewood	BI9B-2	BI9B-2-022	BI9B-2-021	DAC-1.006
Del Amo Blvd/Oliva Ave	30" Discharge	33.84683	-118.14493	UNK	R	1.207	Lakewood	BI9B-2	BI9B-2-023	BI9B-2-023	DAC-1.252
Del Amo Blvd/Hayter Ave	30" Discharge	33.84686	-118.14618	UNK	R	1.289	Lakewood	BI9B-2	BI9B-2-026	BI9B-2-026	DAC-1.324
Del Amo Blvd/Hayter Ave	30" Discharge	33.84701	-118.14623	UNK	L	1.279	Lakewood	BI9B-2	BI9B-2-025	BI9B-2-025	DAC-1.334A
Del Amo Blvd/Verdura Ave	24" Discharge	33.84705	-118.14970	UNK	L	1.614	Lakewood	BI9B-2	BI9B-2-028	BI9B-2-028	DAC-1.659
Del Amo Blvd/Downey Ave	18" Discharge	33.84723	-118.15061	UNK	R	1.693	Lakewood	BI9B-2	BI9B-2-030	BI9B-2-030	DAC-1.738
DOWNEY CHANNEL											
Hardwick St/Downey Ave	30" Discharge	33.85025	-118.15041	UNK	L	0.165	Lakewood	BI447A	BI447A-001		DNC-0.165
Hardwick St/Downey Ave	30" Discharge	33.85031	-118.15054	UNK	R	0.173	Lakewood	BI447A	BI447A-002	BI447A-002	DNC-0.173
Candlewood St/Downey Ave	24" Discharge	33.85372	-118.15039	UNK	L	0.554	Lakewood	BI447A	BI447A-004	BI447A-004	DNC-0.554

Downey Ave/Eckleson St	18" Discharge	33.84919	-118.15089	Lakewood	L	1.985	Lakewood	BI9B-1	BI9B-1-001		DNC-1.985
Downey Ave/Eckleson St	21" Discharge	33.84920	-118.15121	UNK	L	2.019	Lakewood	BI9B-1	BI9B-1-002		DNC-2.019
Downey Ave/Eckleson St	18" Discharge	33.84908	-118.15121	UNK	R	2.022	Lakewood	BI9B-1	BI9B-1-003		DNC-2.022
LOS CERRITOS CHANNEL											
Knoxville Ave/E. el Progreso St	24" Discharge	33.79599	-118.10369	Long Beach	R	8.172	Long Beach	LCERR-4	LCERR-4-002		LCC-0.817
Vuelta Grande Ave/Stearns St	24" Discharge	33.79599	-118.10328	Long Beach	L	8.173	Long Beach	LCERR-4	LCERR-4-003		LCC-0.818
Vuelta Grande Ave/Los Arcos St	33" Discharge	33.79944	-118.10356	Long Beach	L	8.555	Long Beach	LCERR-4	LCERR-4-005		LCC-1.199
Vuelta Grande Ave/Ladoga Ave	21" Discharge	33.80006	-118.10427	LACFCD	L	8.649	Long Beach	LCERR-4	LCERR-4-006		LCC-1.294
Vuelta Grande Ave/Snowden Ave	24" Discharge	33.80557	-118.11188	Long Beach	L	9.678	Long Beach	LCERR-4	LCERR-4-010		LCC-2.323
Spring St/Lomina Ave	21" Discharge	33.81012	-118.12110	LACFCD	R	0.721	Long Beach	LCERR-3	LCERR-3-001		LCC-3.384
Spring St/San Anseline Ave	18" Discharge	33.81036	-118.12163	LACFCD	L	0.759	Long Beach	LCERR-3	LCERR-3-003		LCC-3.422
Spring St/Bellflower Blvd	21" Discharge	33.81013	-118.12411	LACFCD	R	1.000	Long Beach	LCERR-3	LCERR-3-004		LCC-3.663
Spring St/Bellflower Blvd	15" Discharge	33.81041	-118.12514	LACFCD	L	1.085	Long Beach	LCERR-3	LCERR-3-005		LCC-3.748
Spring St/Montair Ave	15" Discharge	33.81042	-118.12562	LACFCD	L	1.135	Long Beach	LCERR-3	LCERR-3-007		LCC-3.798
Spring St/Montair Ave	18" Discharge	33.81041	-118.12674	Long Beach	L	1.222	Long Beach	LCERR-3	LCERR-3-008		LCC-3.885
Charlemagne Ave/Spring St	15" Discharge	33.81051	-118.13042	Long Beach	L	0.078	Long Beach	LCERR-2	LCERR-2-001		LCC-4.245
Heather Rd/Spring St	24" Discharge	33.81023	-118.13107	Long Beach	R	0.135	Long Beach	LCERR-2	LCERR-2-003		LCC-4.301B
WARDLOW CHANNEL											
Clark Ave/Keynote St	18" Discharge	33.82335	-118.13495	Long Beach	L	5.885	Long Beach	BI9C	BI9C-002		WC-5.964
Clark Ave/Keynote St	18" Discharge	33.82337	-118.13574	Long Beach	L	5.918	Long Beach	BI9C	BI9C-003		WC-6.038
Lakewood Blvd	18" Discharge	33.82331	-118.14151	Long Beach	L	6.519	Lakewood	BI9A-5	BI9A-5-016		WC-6.571
SOUTH OF ATHERTON											
Vuelta Grande Ave/Espanita St	30" Discharge	33.78581	-118.10343	Long Beach	L	7.049	Long Beach	LCERR-5	LCERR-5-001		LCC-7049.1
Vuelta Grande Ave/E. Driscoll St	30" Discharge	33.78644	-118.10384	Long Beach	R	7.116	Long Beach	LCERR-5	LCERR-5-002		LCC-7116.2
PALO VERDE CHANNEL											
WOODRUFF AVE / VUELTA GRANDE AVE	24" Discharge	33.80836	-118.11435	Long Beach	R	0.156	Long Beach	BI9E-2	BI9E-2-001		PVC-0.156

6036 SPRING ST/Woodruff Ave	15" Discharge	33.81039	-118.11423	Long Beach	L	0.377	Long Beach	BI9E-2	BI9E-2-002		PVC-0.377
WOODRUFF AVE / SPRING ST	18" Discharge	33.81039	-118.11432	Long Beach	R	0.378	Long Beach	BI9E-2	BI9E-2-003		PVC-0.378
SPRING ST / WOODRUFF AVE	18" Discharge	33.81064	-118.11431	LACFCD	R	0.408	Long Beach	BI9E-2	BI9E-2-004		PVC-0.408
SPRING ST / WOODRUFF AVE	15" Discharge	33.81065	-118.11431	Long Beach	R	0.408	Long Beach	BI9E-2	BI9E-2-005		PVC-0.408
3128 LOS COYOTES DIA/E. Pageantry St	24" Discharge	33.81311	-118.11411	LACFCD	R	0.705	Long Beach	BI9E-2	BI9E-2-008		PVC-0.705
3143 LOS COYOTES DIA/E. Pagentry St	30" Discharge	33.81394	-118.11397	Long Beach	R	0.775	Long Beach	BI9E-2	BI9E-2-011		PVC-0.775
3142 LOS COYOTES DIA/E. Pagentry St	21" Discharge	33.81406	-118.11376	Long Beach	L	0.792	Long Beach	BI9E-2	BI9E-2-012		PVC-0.792
3169 LOS COYOTES DIA/N. Hayfield Dr	15" Discharge	33.81449	-118.11347	Long Beach	R	0.848	Long Beach	BI9E-2	BI9E-2-013		PVC-0.848
3302 LOS COYOTES DIA/Metz St	21" Discharge	33.81666	-118.11144	Long Beach	L	1.154	Long Beach	BI9E-2	BI9E-2-015		PVC-1.154
3425 LOS COYOTES DIA/Canehill Ave	21" Discharge	33.81940	-118.10913	Long Beach	R	1.527	Long Beach	BI9E-2	BI9E-2-017		PVC-1.527
LOS COYOTES DIA / PALO VERDE AVE	21" Discharge	33.82048	-118.10807	Long Beach	L	1.676	Long Beach	BI9E-2	BI9E-2-018		PVC-1.676
LOS COYOTES DIA / PALO VERDE AVE	18" Discharge	33.82081	-118.10792	LACFCD	L	1.721	Long Beach	BI9E-2	BI9E-2-020		PVC-1.721
PALO VERDE AVE/E. Monlaco Rd	24" Discharge	33.82224	-118.10796	Long Beach	R	1.878	Long Beach	BI9E-2	BI9E-2-023		PVC-1.878
Palo Verde Ave/E. Keynote St	27" Discharge	33.82280	-118.10793	Long Beach	L	1.937	Long Beach	BI9E-2	BI9E-2-024		PVC-1.937
3702 CONQUISTA AVE/Palo Verde Ave	27" Discharge	33.82505	-118.10798	Long Beach	R	2.201	Long Beach	BI9E-2	BI9E-2-025		PVC-2.201
Carson St/Palo Verde Ave	12" Discharge	33.83210	-118.10836	Long Beach		2.985	Long Beach	BI9E-1	BI9E-1-001		PVC-2.985
Carson St/Palo Verde Ave	18" Discharge	33.83235	-118.10832	Long Beach	L	3.009	Long Beach	BI9E-1	BI9E-1-002		PVC-3.009
Carson St/Palo Verde Ave	18" Discharge	33.83241	-118.10833	UNK	L	3.030	Lakewood	BI9E-1	BI9E-1-033	BI9E-1-033	PVC-3.030
Carson St/Palo Verde Ave	30" Discharge	33.83240	-118.10843	UNK	R	3.031	Lakewood	BI9E-1	BI9E-1-003	BI9E-1-003	PVC-3.031
4139 Palo Verde Ave/Harvey Way	18" Discharge	33.83433	-118.10831	UNK	L	3.228	Lakewood	BI9E-1	BI9E-1-004	BI9E-1-004	PVC-3.228
4222 Conquista Ave/Harvey Way	18" Discharge	33.83500	-118.10841	UNK	R	3.300	Lakewood	BI9E-1	BI9E-1-005	BI9E-1-005	PVC-3.300
Harvey Way/Palo Verde Ave	18" Discharge	33.83611	-118.10829	Lakewod	L	3.438	Lakewood	BI9E-1	BI9E-1-009	BI9E-1-009	PVC-3.438
Harvey Way/Palo Verde Ave	18" Discharge	33.83615	-118.10828	UNK	L	3.444	Lakewood	BI9E-1	BI9E-1-010	BI9E-1-010	PVC-3.444
Centralia St/Palo Verde Ave	15" Discharge	33.83775	-118.10824	UNK	L	3.622	Lakewood	BI9E-1	BI9E-1-011	BI9E-1-011	PVC-3.622

Centralia St/Palo Verde Ave	15" Discharge	33.83936	-118.10822	UNK	R	3.804	Lakewood	BI9E-1	BI9E-1-012	BI9E-1-012	PVC-3.804
Centralia St/Palo Verde Ave	24" Discharge	33.83947	-118.10842	UNK	R	3.824	Lakewood	BI9E-1	BI9E-1-014	BI9E-1-014	PVC-3.824
Centralia St/Palo Verde Ave	15" Discharge	33.83958	-118.10822	UNK	L	3.829	Lakewood	BI9E-1	BI9E-1-015	BI9E-1-015	PVC-3.829
Conquista Ave/Arbor Rd	15" Discharge	33.84135	-118.10821	UNK	L	4.020	Lakewood	BI9E-1	BI9E-1-016	BI9E-1-016	PVC-4.020
Arbor Rd/Palo Verde Ave	15" Discharge	33.84306	-118.10820	UNK	L	4.208	Lakewood	BI9E-1	BI9E-1-017	BI9E-1-017	PVC-4.208
Arbor Rd/Palo Verde Ave	24" Discharge	33.84326	-118.10841	UNK	R	4.228	Lakewood	BI9E-1	BI9E-1-018	BI9E-1-018	PVC-4.228
Arbor Rd/Palo Verde Ave	30" Discharge	33.84327	-118.10841	UNK	L	4.229	Lakewood	BI9E-1	BI9E-1-019	BI9E-1-019	PVC-4.229
Arbor Rd/Palo Verde Ave	18" Discharge	33.84332	-118.10820	UNK	L	4.235	Lakewood	BI9E-1	BI9E-1-020	BI9E-1-020	PVC-4.235
Arbor Rd/Palo Verde Ave	15" Discharge	33.84507	-118.10822	UNK	L	4.434	Lakewood	BI9E-1	BI9E-1-021	BI9E-1-021	PVC-4.434
Del Amo Blvd/Palo Verde Ave	15" Discharge	33.84685	-118.10819	UNK	L	4.628	Lakewood	BI9E-1	BI9E-1-022	BI9E-1-022	PVC-4.628
Del Amo Blvd/Palo Verde Ave	18" Discharge	33.84713	-118.10821	LACFCD	L	4.659	Lakewood	BI9E-1	BI9E-1-023	BI9E-1-023	PVC-4.659
Del Amo Blvd/Palo Verde Ave	24" Discharge	33.84714	-118.10836	LACFCD	R	4.659	Lakewood	BI9E-1	BI9E-1-024	BI9E-1-024	PVC-4.660
5023Carfax Ave/E. Hardwick St	18" Discharge	33.85007	-118.10960	UNK	L	4.962	Lakewood	BI9E-1	BI9E-1-028	BI9E-1-028	PVC-4.962
6251 McKnight Dr/Chesteroark Dr	24" Discharge	33.85057	-118.11001	UNK	R	5.075	Lakewood	BI9E-1	BI9E-1-029	BI9E-1-029	PVC-5.075
Candlewood St/Carfax Ave	24" Discharge	33.85321	-118.11132	UNK	L	5.403	Lakewood	BI446B	BI446B-001		PVC-5.403
Candlewood St/Cardale St	30" Discharge	33.85389	-118.11155	Lakewood	L	5.489	Lakewood	BI446B	BI446B-002		PVC-5.489
Candlewood St/Capetown St	27" Discharge	33.85441	-118.11167	Lakewood	R	5.543	Lakewood	BI446B	BI446B-003	BI446B-003	PVC-5.543
South St/Canehill Ave	18" Discharge	33.85822	-118.11172	UNK	R	5.970	Lakewood	BI446B	BI446B-005		PVC-5.970
South St/Canehill Ave	12" Discharge	33.85827	-118.11172	Lakewod	R	5.980	Lakewood	BI446B	BI446B-006		PVC-5.980

Los Angeles Regional Water Quality Control Board

October 29, 2014

Los Cerritos Channel Watershed Management Group
(See Distribution List)

REVIEW OF THE LOS CERRITOS CHANNEL WATERSHED MANAGEMENT GROUP'S DRAFT WATERSHED MANAGEMENT PROGRAM, PURSUANT TO PART VI.C OF THE LOS ANGELES COUNTY MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) PERMIT (NPDES PERMIT NO. CAS004001; ORDER NO. R4-2012-0175) AND PART VII.C OF THE LONG BEACH MS4 PERMIT (NPDES PERMIT NO. CAS004003; ORDER NO. R4-2014-0024)

Dear Los Cerritos Channel Watershed Management Group:

The Regional Water Board has reviewed the draft Watershed Management Program (WMP) submitted on June 30, 2014 by the Los Cerritos Channel Watershed Management Group. This program was submitted pursuant to the provisions of NPDES Permit No. CAS004001 (Order No. R4-2012-0175), which authorizes discharges from the municipal separate storm sewer system (MS4) operated by 86 municipal Permittees within Los Angeles County (hereafter, LA County MS4 Permit). The LA County MS4 Permit allows Permittees the option to develop either a Watershed Management Program (WMP) or Enhanced Watershed Management Program (EWMP) to implement permit requirements on a watershed scale through customized strategies, control measures, and best management practices (BMPs). Development of a WMP or EWMP is voluntary and may be developed individually or collaboratively.

NPDES Permit No. CAS004003 (Order No. R4-2014-0024) authorizes MS4 discharges from the City of Long Beach (hereafter, Long Beach MS4 Permit). The Long Beach MS4 Permit similarly allows for the City of Long Beach to develop either a WMP or EWMP to implement permit requirements, with the option of collaborating with LA County MS4 Permit Permittees. For simplicity, this letter and its enclosures cite provisions in the LA County MS4 Permit, though the City of Long Beach is a member of the Los Cerritos Channel Watershed Management Group and is permitted under its own individual permit.

The purpose of a WMP or EWMP is for a Permittee to develop and implement a comprehensive and customized program to control pollutants in MS4 discharges of stormwater and non-stormwater to address the highest water quality priorities. These include complying with the required water quality outcomes of Part V.A (Receiving Water Limitations) and Part VI.E and Attachments L through R (Total Maximum Daily Load (TMDL) Provisions) of the LA County MS4 Permit. If a Permittee opts to develop a WMP or EWMP, the WMP or EWMP must meet the requirements, including conducting a Reasonable Assurance Analysis (RAA), of Part VI.C (Watershed Management Programs) of the LA County MS4 Permit and must be approved by the Regional Water Board.

RB-AR7889

As stated above, on June 30, 2014, the Los Cerritos Channel Watershed Management Group (Group) submitted a draft WMP to the Regional Water Board pursuant to Part VI.C.4.c of the LA County MS4 Permit.

The Regional Water Board has reviewed the draft WMP and has determined that, for the most part, the draft WMP includes the elements and analysis required in Part VI.C of the LA County MS4 Permit. However, some revisions to the Group's draft WMP are necessary. The Regional Water Board's comments on the draft WMP, including detailed information concerning necessary revisions to the draft WMP, are found in Enclosure 1 and Enclosure 2. The LA County MS4 Permit includes a process through which necessary revisions to the draft WMP can be made (Part VI.C.4 in the LA County MS4 Permit). The process requires that a final WMP, revised to address Regional Board comments identified in the enclosures, must be submitted to the Regional Water Board not later than three months after comments are received by the Permittees on the draft program. Please make the necessary revisions to the draft WMP as identified in the enclosures to this letter and submit the revised WMP as soon as possible and no later than **January 29, 2015.**

The revised WMP must be submitted to losangeles@waterboards.ca.gov with the subject line "LA County MS4 Permit – Revised Draft LCC WMP" with a copy to Ivar.Ridgeway@waterboards.ca.gov and Chris.Lopez@waterboards.ca.gov.

If the necessary revisions are not made, the MS4 Permittees within the LCC Watershed Management Area will be subject to the baseline requirements in Part VI.D of the Order and shall demonstrate compliance with receiving water limitations pursuant to Part V.A and with applicable interim and final water quality-based effluent limitations (WQBELs) in Part VI.E and Attachment Q pursuant to subparts VI.E.2.d.i.(1)-(3) and VI.E.2.e.i.(1)-(3), respectively.

Until the draft Los Cerritos Channel WMP is approved, the Permittees are required to:

(a) Continue to implement all watershed control measures in its existing storm water management programs, including actions within each of the six categories of minimum control measures consistent with Title 40, Code of Federal Regulations, section 122.26(d)(2)(iv);
(b) Continue to implement watershed control measures to eliminate non-storm water discharges through the MS4 that are a source of pollutants to receiving waters consistent with Clean Water Act section 402(p)(3)(B)(ii); and
(c) Target implementation of watershed control measures in (a) and (b) above to address known contributions of pollutants from MS4 discharges to receiving waters.

In addition on June 30, 2014, the Group submitted a draft Coordinated Integrated Monitoring Program (CIMP) to the Regional Water Board pursuant to Part IV.C of Attachment E of the LA County MS4 Permit. The Regional Water Board review and comments on the draft CIMP will be provided under separate cover.

If you have any questions, please contact Mr. Chris Lopez of the Storm Water Permitting Unit by electronic mail at Chris.Lopez@waterboards.ca.gov or by phone at (213) 576-6674. Alternatively, you may also contact Mr. Ivar Ridgeway, Chief of the Storm Water Permitting Unit, by electronic mail at Ivar.Ridgeway@waterboards.ca.gov or by phone at (213) 620-2150.

Sincerely,

Samuel Unger

Samuel Unger, P.E.
Executive Officer

Enclosures:
Enclosure 1 – Summary of Comments and Necessary Revisions
Enclosure 2 – Comments on Reasonable Assurance Analysis

cc: Richard Watson, Richard Watson & Associates, Inc.

Enclosure 1 to October 29, 2014 Letter Regarding the Los Cerritos Channel Watershed Management Group's Draft Watershed Management Program

Summary of Comments and Necessary Revisions to the Draft Watershed Management Program

LA County MS4 Permit Provision*	Regional Water Board Staff Comment and Necessary Revision
Part VI.C.5.a.ii.(2)-(3) (Category 2 and 3 Pollutants – Receiving Water Limitations)	The Group should clearly identify the applicable receiving water limitations for the Category 2 and 3 pollutants it has identified in Tables 2-11 and 2-12 of the draft WMP by referring back to Table 2-3. Table 2-12 includes a column for "Standard of Exceedance" and identifies the document where the standard is found, but not the standard itself. However, it appears that all of the applicable receiving water limitations are included in Table 2-3, Including those for the "Low Priority Pollutants" listed in Table 2-13.
Part VI.C.5.a.iv.(2) (Prioritization – Ammonia)	The draft WMP notes that ammonia has been proposed for delisting and therefore will not be addressed. To justify this position, the Group should present the data demonstrating that there is no longer an impairment due to ammonia to support delisting.
Part VI.C.5.b.iv.(1)(a)(ii) (Minimum Control Measures – Industrial/Commercial Facilities Program)	The Group proposes to alter the commercial and industrial facility inspection frequencies in Parts VI.D.6.d and VI.D.6.e of the LA County MS4 Permit. The proposed modification includes a prioritization process in which the member Cities rate applicable facilities as high, medium, or low priority. High priority facilities are inspected more frequently and low priority facilities are inspected less frequently. The prioritization scheme included in Figure ICF-1 prioritizes facilities by their potential water quality impact. However, the draft WMP also notes that Cities "may follow an alternative prioritization method provided it results in a similar three-tiered scheme." The revised WMP should ensure, and explicitly state, that any alternative prioritization method used by a City must also be based on water quality impact. Furthermore, the draft WMP also notes that Cities can prioritize and reprioritize facilities at any time based on their discretion. The Group should revise their draft WMP to clearly state when the initial prioritization of facilities will occur. Additionally, the Group should be explicitly clear that

LA County MS4 Permit Provision*	Regional Water Board Staff Comment and Necessary Revision
	during any reprioritization, the ratio of low priority to high priority facilities must always remain at 3:1 or lower to maintain inspection frequencies identified in the draft WMP.
Part VI.C.5.a.iv.(2)(a) (Prioritization)	Where data indicate impairment or exceedances of RWLs and the findings from the source assessment implicate discharges from the MS4, the Permit requires a strategy for controlling pollutants that is sufficient to achieve compliance as soon as possible. Although Section 5.0 describes compliance with RWLs and Section 6.0 includes an implementation schedule, the program needs to more clearly demonstrate that the compliance schedule described in Section 5.0 ensures compliance is "as soon as possible."
Part VI.C.5.b.iv.(4)(b)-(c) (Selection of Watershed Control Measures)	The RAA identifies potential areas for green street conversion and assumes a 30% conversion of the road length in the suitable areas; however, the specific locations and projects are not identified. Although it may not be possible to provide detailed information on specific projects at this time, the WMP should at least commit to the construction of the necessary number of projects within specific subbasins to ensure compliance with permit requirements per applicable compliance schedules.
Watershed Control Measures Part VI.C.5.b.iv.(4)(c)	The draft WMP does not include clear information on the nature, scope, and timing of implementation of all its watershed control measures. Regional Water Board staff recognizes the amount of information that the Group has provided on watershed control measures in its draft WMP. However, this information at times lacks specificity or is interspersed within different sections of the draft WMP (e.g. street sweeping is discussed in the draft WMP's chapter on strategy, but not in the chapter on control measures). Regional Water Board staff suggests that the Group construct a concise table or other organized listing of all its discussed control measures that contains the required information. This would clarify the descriptions that the Group includes in Sections 3 and 4 of its draft WMP.

LA County MS4 Permit Provision*	Regional Water Board Staff Comment and Necessary Revision
Part VI.C.5.b.iv.(4)(c) (Watershed Control Measures – Enhanced Street Sweeping)	The description of the enhanced street sweeping program lacks detail. It is discussed in Section 3 as part of the group's strategy, but details regarding implementation do not appear to be included in Section 4. In particular, since the City of Long Beach does not use vacuum or regenerative street sweepers, as indicated in Table 3-3, the WMP should be clear as to what enhancement to street sweeping the City of Long Beach will implement.
Part VI.C.5.b.iv.(4)(c) (Watershed Control Measures – SB 346 Copper Reductions)	The draft WMP appears to rely mostly on the phase-out of copper in automotive brake pads, via approved legislation SB 346, to achieve the necessary copper load reductions. Given the combination of other Cu sources identified in various LA TMDLs such as building materials, other vehicle wear, air deposition from fuel combustion and industrial facilities, and that SB 346 progressively phases out Cu content in brakes of new cars (5% by weight until 2021, 0.5% by weight until 2025), then other structural and non-structural BMPs may still be needed to reduce Cu loads sufficiently to achieve compliance deadlines for interim and/or final WQBELs.

LA County MS4 Permit Provision*	Regional Water Board Staff Comment and Necessary Revision
Part VI.C.5.b.iv.(4)(d) (Watershed Control Measures – Milestones)	The MS4 Permit requires that the WMP provide specificity with regard to structural and non-structural BMPs, including the number, type, and location(s), etc. adequate to assess compliance. In a number of cases, additional specificity on the number, type and general location(s) of watershed control measures as well as the timing of implementation for each is needed. Section 6 of the draft WMP includes a four-phase WMP implementation schedule for control measures (MCMs, source control measures, stormwater capture, etc.). Some of these actions are listed as, "encourage the use of ..." (e.g., p. 6-6); greater specificity is required as to what actions will be taken by the group to encourage these actions by others. Items in the schedule only reference the year (or years) that a measure or milestone will be implemented. This should be revised to include more specific and/or exact dates where appropriate. Furthermore, some items discussed as control measures do not appear to have milestones within the implementation schedule (e.g., enhanced street sweeping in Table 6-4). Additionally, many items in the implementation schedule are ongoing measures that are not new interim milestones (e.g. MCMs, implementation of SB 346, enhanced street sweeping, etc.). For transparency, Regional Water Board staff recommends that ongoing measures clearly be separated from interim milestones for structural controls and non-structural BMPs in the implementation schedule. Regional Water Board staff recognizes uncertainties may complicate establishment of specific implementation dates, however there should at least be more specificity on actions within the current and next permit terms to ensure that the following interim requirements are met: (1) a 10% reduction in metals loads during wet weather and a 30% reduction in dry weather by 2017 and (2) a 35% reduction in metals loads during wet weather and a 70% reduction during dry weather by 2020.

LA County MS4 Permit Provision*	Regional Water Board Staff Comment and Necessary Revision
Part VI.C.5.b.iv.(4)(e) (Watershed Control Measures – Permittee Responsibilities)	For MCMs and NSW discharge screening control measures, the draft WMP clearly lists responsibilities in Table 4-3. However, for other control measures, it is harder to identify Permittee responsibilities. The WMP Implementation Schedule groups together all actions that are being implemented. Although City specific items are marked (e.g. Skylinks Golf Course), it is hard to clearly read amongst the other group actions. The WMP could be improved by including a separate schedule for each City. Table 6-8 also breaks down control measure implementation; however, this is broken up into sub-basins rather than by City, making the responsibilities not immediately clear.
Part VI.C.5.b.iv.(5)(c) (Selection of Watershed Control Measures)	For waterbody-pollutant combinations not addressed by TMDLs, the MS4 Permit requires that the plan demonstrate using the reasonable assurance analysis (RAA) that the activities and control measures to be implemented will achieve applicable receiving water limitations as soon as possible. The RAA demonstrates the control measures would be adequate to comply with the limitations/deadlines for the "limiting pollutants" for TMDLs and concludes that this will ensure compliance for all other pollutants of concern. However, it does not address the question of whether compliance with limitations for pollutants not addressed by TMDLs could be achieved in a shorter time frame.
Part VI.C.5.b.iv.(5) (Reasonable Assurance Analysis – Limiting Pollutants)	The RAA identifies zinc and *E. coli* as the limiting pollutants for wet weather and dry weather, respectively. They note that these two pollutants will drive reductions of other pollutants. If the Group believes that that this approach demonstrates that activities and control measures will achieve applicable receiving water limitations, it should explicitly state and justify this for the category 2 and 3 pollutants. (This appears to have been done for category 1 pollutants and E. coli in Tables 5-6 and 5-9 and Figure 5-13, but not for other categories 2 and 3 pollutants.)

LA County MS4 Permit Provision*	Regional Water Board Staff Comment and Necessary Revision
Part VI.C.5.b.iv.(5) (Reasonable Assurance Analysis – New Non-Structural Controls)	The draft WMP assumes a 10% pollutant reduction from new non-structural controls. Although 10% is a modest fraction of the overall controls necessary, additional support for this assumption should be provided, particularly since the group appears to be relying almost entirely on these controls for near-term pollutant reductions to achieve early interim milestones/deadlines. Additionally, as part of the adaptive management process, the Permittees should commit to evaluate this assumption during program implementation and develop alternate controls if it becomes apparent that the assumption is not supported.
Part VI.C.5.b.iv.(5) (Reasonable Assurance Analysis – Irrigation Reductions)	For dry weather, the WMP assumes a 25% reduction in irrigation (RAA, section 7.1.2). Additional support should be provided for this assumption, particularly since the group appears to be relying almost entirely on this non-structural BMP for near-term pollutant reductions to meet early interim milestones/deadlines. Additionally, as part of the adaptive management process, the Permittees need to commit to evaluate this assumption during program implementation and develop alternate controls if it becomes apparent that the assumption is not supported.
Part VI.C.5.b.iv.(5) (Reasonable Assurance Analysis – Regional BMPs)	Section 1.4.2 of Attachment A to the RAA points out that additional potential regional BMPs were identified to provide the remaining BMP volume noted in Table 9-5. It indicates they can be found in Section 3 of the WMP. It is unclear if the RAA is referring to the "First Order Major BMP Sites" listed in Table 4-5 and the "Second Order Major BMP Sites" listed in Table 4-6. The RAA should clarify that sufficient sites were identified. Additionally, the WMP should mention how these sites relate to the RAA.

LA County MS4 Permit Provision*	Regional Water Board Staff Comment and Necessary Revision
Part VI.C.5.b.iv.(5) (Reasonable Assurance Analysis – Permitted Industrial Facilities)	The draft WMP, including the RAA, excludes stormwater runoff from non-MS4 facilities within the WMA from the stormwater treatment target. In particular, industrial facilities that are permitted by the Water Boards under the Industrial General Permit or an individual stormwater permit were identified and subtracted from the treatment target. Regional Water Board staff recognizes that this was done with the assumption that these industrial facilities will retain their runoff and/or eliminate their cause/contribution to receiving water exceedances, as required by their respective NPDES permit. However, it is important that the Group's actions under its Industrial/Commercial Facilities Program—including tracking critical industrial sources, educating industrial facilities regarding BMP requirements, and inspecting industrial facilities—ensure that all industrial facilities are implementing BMPs as required.

LA County MS4 Permit Provision*	Regional Water Board Staff Comment and Necessary Revision
Part VI.C.5.b.iv.(5) (Reasonable Assurance Analysis – Caltrans Facilities)	The draft WMP, including the RAA, takes a similar approach for areas under the jurisdiction of the California Department of Transportation (Caltrans). Caltrans facilities that are permitted under the Caltrans MS4 permit (Order No. 2012-0011-DWQ) were also identified and subtracted from the treatment target. It should be noted that the Amendment to the Caltrans Permit (Order WQ 2014-0077-DWQ) includes provisions to address TMDL requirements throughout the state. Revisions to Attachment IV of the Caltrans Permit require that Caltrans prioritize all TMDLs for implementation of source control measures and BMPs, with prioritization being "consistent with the final TMDL deadlines to the extent feasible." Additionally, the Caltrans Permit also includes provisions for collaborative implementation through Cooperative Implementation Agreements between Caltrans and other responsible entities to conduct work to comply with a TMDL. By contributing funds to Cooperative Implementation Agreements and/or the Cooperative Implementation Grant Program, Caltrans may receive credit for compliance units, which are needed for compliance under the Caltrans Permit. In a similar manner, the LA County MS4 Permit includes provisions for Permittees to control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other MS4 owners—such as Caltrans—to successfully implement the provisions of the Order (see Parts VI.A.2.a.viii and VI.A.4.a.iii). Therefore, the Group should ensure that it is closely coordinating with appropriate Caltrans District staff regarding the identification and implementation of watershed control measures to achieve water quality requirements (i.e. applicable Receiving Water Limitations and WQBELs). Regional Water Board staff recognizes that the Group has taken the initial steps for such collaboration since Caltrans participates in the Group and the draft WMP notes Caltrans in its strategies for runoff reduction and total suspended solids reduction.
Part VI.C.5.b.iv.(6) (Legal Authority)	Attachment D to the draft WMP includes a copy of legal certifications for all Group members except for Long Beach. The legal certifications for Long Beach should be submitted in the revised WMP.

LA County MS4 Permit Provision*	Regional Water Board Staff Comment and Necessary Revision
Part VI.C.5.c.iii.(3) (Compliance Schedules – Bacteria)	The draft WMP proposes a final compliance date of September 2040 for *E. coli* and *Enterococcus*. However, the Group does not provide sufficient justification for this date. Additionally, milestones and a schedule of dates for achieving milestones are not defined for these two pollutants. In revising its draft WMP, the Group should evaluate compliance schedules of bacteria TMDLs that have been established within the region and modify the proposed compliance schedule for these pollutants to include interim milestones and dates for their achievement and a final compliance date that is as soon as possible. Justification for the final compliance date as well as interim milestones should also be included.
Part VI.C.5.c.iii.(3) (Compliance Schedules – Ammonia and pH)	The draft WMP does not propose milestones or final compliance dates for ammonia and pH, which were both identified as Category 2 pollutants. The WMP should include milestones and compliance dates for these pollutants and address them through watershed control measures, or alternatively, provide the data to support delisting (in the case of ammonia) and to support that exceedances of pH outside the acceptable range are due to natural causes.
Figures and Symbols in Draft WMP	Some figures in the draft WMP are distorted. Examples include: - Figures 1-2 and 1-3 (on pages 1-6 and 1-8, respectively) have legends that are missing information - Table 4-4 (on page 4-13) does not display Figure ICF- 1 - Mathematical symbols used on pages 5-4 and 5-5 do not correctly display

*Equivalent provisions are also found in the Long Beach MS4 Permit

Los Angeles Regional Water Quality Control Board

TO: Los Cerritos Channel Watershed Management Group

FROM: C.P. Lai, Ph.D., P.E. and Thanhloan Nguyen
LOS ANGELES REGIONAL WATER QUALITY CONTROL BOARD

DATE: October 29, 2014

SUBJECT: COMMENTS ON REASONABLE ASSURANCE ANALYSIS REPORT FOR LOS CERRITOS CHANNEL WATERSHED MANAGEMENT AREA

This memorandum contains comments on the Reasonable Assurance Analysis (RAA), submitted on June 29, 2014, by the Los Cerritos Channel Watershed Management Group.

A. General comments on the draft Reasonable Assurance Analysis (RAA) of the Watershed Management Program (WMP).

1. The Los Cerritos Channel Watershed Management Area (LCC WMA) is subject to interim and final water quality-based effluent limitations pursuant to Attachment Q, Part A "Los Cerritos Channel Metals TMDL" for both wet and dry weather conditions. By September 30, 2017, which aligns with the end of Phase 1 of the proposed implementation schedule in the draft WMP, the LCC WMA is required to demonstrate that 30% of the total drainage area served by the storm drain system is effectively meeting the dry weather metals WLAs and 10% of the total drainage area served by the storm drain system is effectively meeting the wet-weather metals WLAs. For the most part, during Phase 1 the selected watershed control measures to address water quality priorities and achieve applicable WQBELs include existing planning for implementation of SB 346 to remove copper in brake pads and other ongoing non-structural BMPs and source control measures. There is uncertainty in the ability of these BMPs to meet the required reductions by the end of Phase 1. Additional support for the anticipated pollutant load reductions from these non-structural BMPs and source control measures over the next two to three years should be provided to increase the confidence that these measures can achieve the near-term interim WQBELs by September 2017.

2. LCC WMA is also subject to Category 2 priority pollutants, including coliform bacteria. The LCC WMP proposes to address bacteria with the same runoff reduction and stormwater capture measures proposed for Category 1 pollutants as well as ongoing implementation of minimum control measures. However, this might not be effective enough in reducing bacteria loading. The LCC WMP acknowledges that it will address bacteria more directly during the second and third adaptive management cycles. The LCC WMP should include a more specific strategy to implement pollutant controls necessary to address this and other Category 2 pollutants earlier.

B. Modeling comments regarding analysis of copper, lead, zinc, DDT, PCB, PAH, and bacteria concentrations/loads in Attachment A of the draft Los Cerritos Channel WMP:

1. The model predicted stormwater runoff volume is used as a surrogate for required pollutant load reductions for wet weather conditions. Thus, the predicted flow volume becomes a very important parameter for evaluating required volume reductions and BMP scenarios; however, there was not available flow data for Los Cerritos Channel to conduct a hydrology calibration assessment. The necessary hydrology data should be collected for Los Cerritos Channel so that model calibration/validation can be conducted during the adaptive management process.

2. While we understand that there is significant reliance on a volume-based approach, the predicted baseline concentrations and loads for all modeled pollutants of concern, including TSS, should be presented in summary tables for wet weather conditions. This model output should be available, since it is the basis for the percent reductions in pollutant load presented in Table 5-6. (See Table 5. Model Output for Both Process-based BMP Models and Empirically-based BMP Models, pages 20-21 of the RAA Guidelines).

3. Further, the differences between baseline concentrations/loads and allowable concentrations/loads should be presented in time series for each pollutant under long-term continuous simulation and as a summary of the differences between pollutant concentrations/loads and allowable concentrations/loads for the critical wet weather period. (See Table 5. Model Output for Both Process-based BMP Models and Empirically-based BMP Models, pages 20-21 of the RAA Guidelines).

4. We note that modeling was not conducted for organics (DDT, PCBs, and PAHs). It is not clear why these pollutants were not modeled or why previous modeling of these pollutants could not be used, such as that conducted during the development of the Dominguez Channel and Greater LA and Long Beach Harbor Waters Toxic Pollutants TMDL. An explanation for the lack of modeling is needed.

5. The report presents the existing runoff volumes, required volume reductions and proposed volume reductions from BMP scenarios to achieve the 85th percentile, 24-hour volume retention standard for each major watershed area. The same information on the runoff volume associated with the 85th percentile, 24-hour event and the proposed runoff volume reduction from each BMP scenario also needs to be presented for each modeled subbasin (e.g., a series of tables similar to 8-1 through 8-4 and 9-4 through 9-7). See Table 5 of the RAA Guidelines. Additionally, more explanation is needed as to what constitutes the "incremental" and "cumulative" critical year storm volumes in tables 9-4 through 9-7 and how these values were derived from previous tables.

6. The report needs to present the same information, if available, for non-stormwater runoff. Alternatively, the report should include a commitment to collect the necessary data in each watershed area, through the non-stormwater outfall screening and monitoring program, so that the model can be re-calibrated during the adaptive management process to better characterize non-stormwater flow volumes and to demonstrate that proposed volume retention BMPs will capture 100 percent of non-stormwater that would otherwise be discharged through the MS4 in each watershed area.

RB-AR7902

7. The ID number for each of the subwatersheds from the model input file should be provided and be shown in the simulation domain to present the geographic relationship of subwatersheds, within each watershed area, that are simulated in the LSPC model.

RB-AR7903

November 20, 2014

Los Cerritos Channel Watershed Management Group
(See Distribution List)

REVIEW OF THE LOS CERRITOS CHANNEL WATERSHED MANAGEMENT GROUP'S DRAFT COORDINATED INTEGRATED MONITORING PROGRAM, PURSUANT TO PART VI.B AND ATTACHMENT E PART IV.B OF THE LOS ANGELES COUNTY MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) PERMIT (NPDES PERMIT NO. CAS004001; ORDER NO. R4-2012-0175) AND PART VII.B AND ATTACHMENT E, PART IV.B OF THE CITY OF LONG BEACH MS4 PERMIT (NPDES PERMIT NO. CAS004003; ORDER NO. R4-2014-0024)

Dear Los Cerritos Channel Watershed Management Group:

The Regional Water Board has reviewed the draft Coordinated Integrated Monitoring Program (CIMP) submitted on June 30, 2014 by the Los Cerritos Channel (LCC) Watershed Management Group (WMG). This program was submitted pursuant to the provisions of NPDES Permit No. CAS004001 (Order No. R4-2012-0175), which authorizes discharges from the municipal separate storm sewer system (MS4) operated by 86 municipal Permittees within Los Angeles County (hereafter, LA County MS4 Permit).

The LA County MS4 Permit allows Permittees the option to develop and implement, in coordination with an approved Watershed Management Program per Part VI.C, a customized monitoring program that achieves the five Primary Objectives set forth in Part II.A of Attachment E and includes the elements set forth in Part II.E of Attachment E. Customized monitoring programs may be developed on an individual jurisdictional basis, referred to as an Integrated Monitoring Program (IMP), or a on watershed basis, referred to as a CIMP. These programs must be approved by the Executive Officer of the Regional Water Board.

NPDES Permit No. CAS004003 (Order No. R4-2014-0024) authorizes discharges from the MS4 operated by the City of Long Beach (hereafter, Long Beach MS4 Permit). The Long Beach MS4 Permit similarly allows the City of Long Beach to develop either an IMP or CIMP to implement Permit requirements, with the option of collaborating with LA County MS4 Permit Permittees. For simplicity, this letter and its enclosures cite provisions in the LA County MS4 Permit even though the City of Long Beach is a member of the LCC WMG and is permitted under its own individual Permit.

The Regional Water Board has reviewed the draft CIMP and has determined that, for the most part, the CIMP includes the elements set forth in Part II.E and will achieve the Primary Objectives set forth in Part II.A of Attachment E of the LA County MS4 Permit. However, some

additions and revisions to the CIMP are necessary. The Regional Water Board's comments on the CIMP, including detailed information concerning necessary additions and revisions to the CIMP, are found in Enclosure 1 and Enclosure 2.

Please make the necessary additions and revisions to the CIMP as identified in the enclosures to this letter and submit the revised CIMP as soon as possible and no later than **February 18, 2015.** The revised CIMP must be submitted to losangeles@waterboards.ca.gov with the subject line "LA County MS4 Permit – Revised LCC CIMP" with a copy to Ivar.Ridgeway@waterboards.ca.gov and Chris.Lopez@waterboards.ca.gov.

Upon approval of the revised CIMP by the Executive Officer, the Permittees must prepare to commence their monitoring program within 90 days. If the necessary revisions are not made, the Permittees must comply with the Monitoring and Reporting Program (MRP) and future revisions thereto, in Attachment E of the LA County MS4 Permit and Attachment E of the Long Beach MS4 Permit.

Until the Permittees' CIMP is approved by the Executive Officer, the monitoring requirements pursuant to Order No. 01-182 and MRP CI 6948, Order No. 99-060 and MRP CI 8052 and pursuant to approved TMDL monitoring plans shall remain in effect for the Permittees.

If you have any questions, please contact Mr. Chris Lopez of the Storm Water Permitting Unit by electronic mail at Chris.Lopez@waterboards.ca.gov or by phone at (213) 576-6674. Alternatively, you may also contact Mr. Ivar Ridgeway, Chief of the Storm Water Permitting Unit, by electronic mail at Ivar.Ridgeway@waterboards.ca.gov or by phone at (213) 620-2150.

Sincerely,

Samuel Unger

Samuel Unger, P.E.
Executive Officer

Enclosures:
Enclosure 1 – Summary of Comments and Necessary Revisions to Draft CIMP
Enclosure 2 – Comments on Aquatic Toxicity Testing
Los Cerritos Channel WMG Distribution List

cc: Richard Watson, Richard Watson & Associates, Inc.

Enclosure 1 – Summary of Comments and Necessary Revisions to Draft CIMP

Los Cerritos Channel Watershed Management Group

CIMP Reference	MRP Element/ Reference (Attachment E)	Comment and Necessary Revision
Receiving Water Monitoring		
Section 2 (Metals TMDL Monitoring)	Part II.A.2	The draft CIMP indicates on page 12 that monitoring for the LCC Metals TMDL will include monitoring of three wet weather events per year instead of the minimum of four events recommended in the TMDL. The frequency for monitoring metals should be increased to four wet weather events to be consistent with the recommendations listed in the TMDL. Wet-weather monitoring results from the first year may be evaluated to determine whether reducing the frequency to three wet-weather events per year would still provide sufficient data. The LCC Watershed Management Group may request a reduction in frequency on the basis of this data evaluation.
Section 3 (Constituent Removal) – Chemical/Physical Parameters	Part VI.C.1.e and Part VI.D.1.d	The draft CIMP states on page 17 that, "[i]f an analyte is not detected at levels of concern during two consecutive monitoring events representing the same seasonal conditions, the analysis will be removed from the sampling requirements until being subject to reconsideration during the next five year Permit cycle." It is not clear whether this statement applies only to constituents in Table E-2 of Attachment E that are not otherwise identified as a basic monitoring requirement, a TMDL analyte or a 303(d) listing for Los Cerritos Channel. If this statement applies broadly to all constituents, including basic monitoring requirements, TMDL analytes and 303(d) listings, it should be removed from the CIMP. Part VI.C.1.e and Part VI.D.1.d of the MRP do not specify or include language for the removal of these constituents from the monitoring requirements.
Section 3 (Receiving Water Monitoring)	Part C.1.d and Part D.1.c	Table 3-2 (page 18) does not include ammonia in its list of constituents to be monitored. Regional Water Board staff note that the Group does not intend to address this pollutant since it has been proposed for delisting. To support this position, the Group has been asked to present data demonstrating that there is no longer an impairment due to ammonia.

CIMP Reference	MRP Element/ Reference (Attachment E)	Comment and Necessary Revision
		Table 3-2 should include and note the appropriate frequencies of analysis for Table E-2 constituents that are detected above the lowest applicable water quality objective during the 1st year of monitoring.
Section 3.1 (Suspended Solids)	Part XIV	The Group should consider monitoring Suspended Sediment Concentration (SSC) in addition to TSS, since an integral part of the Group's pollutant reduction strategy involves the reduction of discharged solids from the MS4.
Section 3.4 (Mercury)	Part XIV	Table 3-6 (page 24) indicates that the EPA Method 245.1 will be used to analyze Mercury. This method is inadequately sensitive. The draft CIMP should be revised to use either EPA Method 245.7 or 1631E to ensure sufficiently sensitive minimum levels that are comparable to the water quality criteria.
Section 3.5 (PCBs)	Part XIV	Table 3-7 (page 25) indicates that PCBs will monitored by testing for aroclors. Monitoring for PCBs in sediment or water should be reported as the summation of aroclors and a minimum of 40 (and preferably at least 50) congeners. See Table C8 in the state's Surface Water Ambient Monitoring Program's Quality Assurance Program Plan (Page 72 of Appendix C), which can be downloaded at http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/qapp/qaprp082209.pdf for guidance. It is preferable samples be analyzed using EPA Methods 8270 or 1668C (as appropriate), and High Resolution Mass Spectrometry.
Outfall Monitoring		
Section 1.2.2 (Primary Watershed Segmentation Monitoring)	Part II.A.2	The implementation plan for the Los Cerritos Channel Metals TMDL requires MS4 Permittees to demonstrate a progressive reduction in pollutant loading at milestones in 2017, 2020, and 2023. The first milestone is in 2017, and at that time the Permittees shall demonstrate that 30% of the total drainage area served by the storm drain system is effectively meeting the dry-weather WLAs and 10% of the total drainage area served by the storm drain system is effectively meeting the wet-weather WLA. The draft CIMP uses primarily watershed segmentation stormwater monitoring locations for stormwater drain outfall monitoring (i.e. SB4, SB8, SB9, and SB10). Each of the four locations will be phased-in over 3 years, with all 4 stations operational by 2018. However, the plan should be revised to phase-in SB9 and SB8 before 2016/2017 and 2017/18, respectively,

CIMP Reference	MRP Element/ Reference (Attachment E)	Comment and Necessary Revision
		to ensure that compliance with the TMDL can be demonstrated. These two sub-basin monitoring locations represent over 33% of the watershed, with modeling indicating that SB9 and SB8 were expected to have higher concentrations of metals than other areas.
Section 8.1.2 (Maps and Databases)	Part VII.A	Table 8-3 (page 51) indicates the status of basic database and mapping information for the watershed. All of the completed mapping information as listed in Part VII.A of the MRP should be included and submitted in the revised CIMP.

ENCLOSURE 2
COMMENTS ON AQUATIC TOXICITY TESTING
LOS CERRITOS CHANNEL CIMP

Part XII.G.1. (Page E-30) and Part XII.G.2. (Page E-30) of the Monitoring and Reporting Program states that Permittees shall conduct aquatic toxicity monitoring utilizing the critical life stage chronic toxicity test methods listed. The draft CIMP does not propose use of critical life stage chronic toxicity test methods for assessment of toxicity in wet weather samples and instead proposes use of acute toxicity test methods. This is not acceptable; the appropriate chronic toxicity test method listed in the MRP must be used and both survival and sublethal endpoints must be reported. We suggest the group consult the State Water Resources Control Board 2011 publication, "Implementation Guidance: Toxicity Testing for Stormwater" to gain insight on how to run chronic toxicity tests on wet weather samples.

Part VIII.B.1.c.vi. (Page E-23) and Part VIII.G.1.d. (Page 27) of the Monitoring and Reporting Program states that where the TIE conducted at the downstream receiving water monitoring station was inconclusive then aquatic toxicity shall be monitored at the representative upstream outfall(s). The draft CIMP does not propose conducting this required outfall toxicity monitoring.

While development of the proposed Discharge Assessment Plan (DAP) will be useful, it cannot take the place of the required outfall toxicity monitoring following an inconclusive TIE in the receiving water. And, while there may be situations where TIEs cannot be resolved due to non-persistent toxicity and no further action on that sample can be pursued, inconclusive TIEs often result from a lack of following well-defined procedures rather than non-persistent toxicity. As mentioned elsewhere in this comment letter, including pyrethroids in the TIE procedure will reduce the occurrence of inconclusive TIEs as will including chemical testing for Fipronil and its degradates for comparison to U.S. EPA benchmarks.

Additionally, the toxicity flowcharts do not show the need to proceed to outfall toxicity testing should a TIE of a toxic receiving water sample be inconclusive and instead focus on the response to non-persistent toxicity. We strongly recommend a more cohesive approach whereby the Group develops a Toxicity Assessment Plan analogous to the Discharge Assessment Plan currently proposed in the CIMP.

Part XII.I.1. (Page E-33) of the Monitoring and Reporting Program states that a toxicity test sample is immediately subject to TIE procedures if either survival or sublethal endpoints demonstrate a Percent Effect value equal to or greater than 50% at the Instream Waste Concentration. The draft CIMP does not propose to perform a TIE when at least a 50% sublethal effect is seen but instead proposes to first collect a confirmatory sample two weeks later.

This is not an acceptable approach. The CIMP seems to be implying that chronic toxicity has some inherent non-persistent quality to it that makes the results unreliable. It also implies that chronic toxicity is of lesser importance. Although it would be hard to generalize to all possible situations, the fact that a large number of invertebrates (or fish) living in a receiving water can survive an ambient pollutant concentration but are impacted in terms of growth or reproduction means that the population as a whole will be impacted, and could eventually collapse. Some species living in the receiving water

have very short lifespans and during critical times of the year may be prey for other organisms that will in turn be impacted by their population decline.

Suggested Special Study: The 2013 study released by the California Stormwater Quality Association (CASQA) entitled "Review of Pyrethroid, Fipronil and Toxicity Monitoring Data from California Urban Watersheds" reviewed stormwater data from studies conducted during 2005 - 2012 and highlighted the toxicity impacts from use of pesticides not currently required to be monitored for by the MRP. We suggest the group begin monitoring for these chemicals in the receiving water and, in addition, assess toxicity using the 2002 acute toxicity testing protocol (EPA-821-R-02-012) with the amphipod *Hyalella azteca* as the test organism. *H. azteca* is known to be much more sensitive to pyrethroids than is *Ceriodaphnia dubia*, while the latter is useful for its sensitivity to OP pesticides. The two species together may also prove to be more useful in detecting toxicity from fipronil. And, should 50% or greater effect be detected in the toxicity test, we suggest a procedure to incorporate pyrethroids into the subsequent TIE be documented (three possible treatments have been identified by researchers, see http://www.pubfacts.com/detail/20018342/Focused-toxicity-identification-evaluations-to-rapidly-identify-the-cause-of-toxicity-in-environment). While fipronil does not have a TIE procedure identified currently, chemical testing for the parameter (and degradates) and comparison to U.S. EPA Office of Pesticide Program's aquatic life benchmarks at http://www.epa.gov/oppefed1/ecorisk_ders/aquatic_life_benchmark.htm will aid in determining the cause(s) of toxicity in order to follow up with outfall testing of the parameter(s) with the ultimate goal of removing the source. This approach will also help minimize inconclusive TIE results which would lead to required toxicity testing in the representative upstream outfall(s).

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LOS CERRITOS CHANNEL
WATERSHED GROUP

Los Cerritos Channel
Watershed Management Program

Bellflower Cerritos Downey Lakewood Long Beach Paramount Signal Hill Los Angeles County Flood Control District

We Serve to Protect our Coastal Waters

Prepared by: RICHARD WATSON & ASSOCIATES, INC.
Stormwater Quality Planning

RB-AR7912

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LIST OF ACRONYMS

BMPs – Best Management Practices

CALTRANS – California Department of Transportation

CASQA – California Stormwater Quality Association

CIMP – Coordinated Integrated Monitoring Plan

DEHP - Bis (2-ethylhexyl)phthalate

EWMP – Enhanced Watershed Management Program

Long Beach Permit - Order No. R4-2014-0024 (NPDES Permit No. CAS004003, *Waste Discharge Requirements for Municipal Separate Storm Sewer System Discharges from the City of Long Beach)*

Los Angeles Permit - Order No. R4-2012-0175 (NPDES Permit No. CAS004001, *Waste Discharge Requirements for Municipal Separate Storm Sewer System [MS4] Discharges within the Coastal Watersheds of Los Angeles County, Except those Discharges Originating from the City of Long Beach MS4)*

LCC – Los Cerritos Channel

MCMs – Minimum Control Measures

MEP – Maximum Extent Practicable

NPDES – National Pollutant Discharge Elimination System

RWL – Receiving Water Limitations

Regional Water Board – Los Angeles Regional Water Quality Control Board

TAC – Technical Advisory Committee

TMDL – Total Maximum Daily Load

TSS – Total Suspended Solids

WAGs – Watershed Authority Groups

Watershed Group – Los Cerritos Channel Watershed Group

WMP – Watershed Management Program

WQP – Water Quality Priority

WQBELs – Water Quality Based Effluent Limitations

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Watershed Group – Los Cerritos Channel Watershed Group

WMP – Watershed Management Program

WQP – Water Quality Priority

WQBELs – Water Quality Based Effluent Limitations

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Executive Summary

The Permittees of the Los Cerritos Channel (LCC) Freshwater Watershed (Watershed), a portion of the Los Cerritos Channel and Alamitos Bay Watershed Management Area, have developed this Watershed Management Program (WMP) as specified in Order R4-2012-0175. This WMP sets forth a plan to achieve pollutant reductions in the waterbodies of the LCC Watershed. It serves as the Implementation Plan for the Los Cerritos Channel Metals TMDLs. The associated Coordinated Integrated Monitoring Plan (CIMP) serves as the Coordinated Monitoring Plan for the Metals TMDL. In addition to the CIMP, the WMP is accompanied by a reasonable assurance analysis (RAA) based upon the Watershed Management Modeling System previously developed by the Los Angeles County Flood Control District (LACFCD) in collaboration with USEPA. The WMP is a long-term planning document that takes a comprehensive look at the LCC Watershed, including land uses, the municipal separate storm sewer system (MS4), existing and planned control measures, and historical monitoring data. It lays the groundwork for expanding upon Permittees' existing water quality management programs and provides the flexibility necessary to allow the Permittees to respond to new issues or concerns that might arise in the course of routine monitoring or as the result of emerging topics in stormwater science.

The LCC Permittees began working together to address water quality in late 2008 by forming a Technical Committee in response to a draft of the EPA-established Metals TMDLs for the LCC Watershed. The Group, now known as the Los Cerritos Channel Watershed Group, is comprised of the Cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill, as well as the Los Angeles County Flood Control District and, informally, the California Department of Transportation (Caltrans). The Group originally entered into Memoranda of Agreement (MOAs) in 2010, with the Gateway Water Management Authority (GWMA) acting as fiduciary agent. The Group is covered by the Los Angeles County MS4 Permit (Order No. R4-2012-0175, adopted November 8, 2012), except for the City of Long Beach, which is covered by the City of Long Beach MS4 Permit (NPDES Permit Order No. R4-2014-0024, adopted February 6, 2014). Both Permits are on five-year renewal cycles. Caltrans is regulated by a separate statewide permit, which was adopted September 19, 2012 and became effective on July 1, 2013. It too is on a five-year cycle. Since the adoption of the new Los Angeles MS4 Permit, the Watershed Group has worked to analyze the range of stormwater management alternatives contained in the Permit for addressing targeted stormwater pollutants in the Los Cerritos Channel.

The Los Cerritos Channel Watershed Group has considered how best to develop a WMP to implement the requirements of the Permits on a watershed scale through each Permittee's stormwater management program and through customized strategies, control measures, and best management practices (BMPs). The Watershed Group has revisited strategies, control measures, and BMPs and concludes that addressing water quality impairments within the Watershed should be based on a multi-faceted approach, initially focused on source control, runoff reduction, and total suspended solids (TSS) reduction. Members of the Watershed Group have been particularly focused on true source control (pollution prevention) because major sources of copper, lead, and zinc are released into the atmosphere, which results in widespread deposition on impervious surfaces such as streets, highways, parking lots, and rooftops. In

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addition, these metals are directly deposited onto roadways and other surfaces from motor vehicle components such as brakes, wheel weights, and tires. In addition, the Watershed Group's strategy includes low impact development (LID) and green streets, operational source control methods (including enhanced street sweeping), and capture and infiltration and/or capture and use of stormwater, with treatment controls considered the method of last resort, since they are the least effective and most costly water quality improvement methods.

Each of the Cities in the Watershed Group contributed either directly or indirectly to efforts by the California Stormwater Quality Association (CASQA) and Sustainable Conservation to develop and negotiate SB 346 – the passage of which is a milestone that will significantly reduce the level of copper in metropolitan area waters throughout the state through reduction of copper in vehicle brake pads. Members of the Watershed Group look forward to working with CASQA next to address zinc in vehicle tires. The Department of Toxic Substances Control (DTSC) has newly adopted Safer Consumer Product Regulations that will be a future method by which zinc in tires could potentially be addressed. These two true source control efforts will address two of the Watershed's major pollutants of concern. Although, due to the DTSC's schedule for addressing pollutants, it will be a few years before the Watershed Group would be able to address zinc through the Safer Consumer Product Regulations, Group Members can work in the interim to gain support for including zinc in DTSC's list of pollutants of concern on a future list. Group Members will also work to address local sources of zinc.

The Los Cerritos Channel Metals TMDLs established waste load allocations (WLAs) for copper, lead, and zinc during wet weather and copper during dry weather. Total lead limits were based upon maintenance of historical concentrations, and total lead concentrations and loads remain in compliance with the TMDL limits. Elevated concentrations of total recoverable aluminum, copper, lead, and zinc are commonly associated with elevated sediment concentrations during storm events. Aluminum is expected to be elevated during storm events due to its natural abundance in soils and is not considered to be a major pollutant of concern. Concentrations of dissolved copper and zinc commonly exceed freshwater quality criteria during storm events, and are the two metals of primary concern. The Watershed Group expects to see reductions in copper loading soon, due to implementation of SB 346. Brake pad manufacturers have already begun to significantly reduce the amount of copper in vehicle brake pads.

Los Cerritos Channel Watershed Group Permittees are fortunate to have 13 years of data already collected by the City of Long Beach at its Stearns Street mass emission monitoring site. Major elements incorporated in Long Beach's monitoring and reporting program include, 1) mass emission monitoring during storm events, 2) monitoring of dry-weather discharges at each mass emission site, and 3) special studies. Data from the Long Beach monitoring program is intended to support decisions needed to refine BMPs for the reduction of pollutant loading and the protection and enhancement of beneficial use of the receiving waters.

The Long Beach mass emission monitoring program is intended to characterize stormwater discharges, identify contaminants of concern and develop pollutant load estimates for each major watershed. Flow-rated, whole storm composite samples are obtained and analyzed for major constituents of concern that include conventional constituents, total and dissolved metals, organochlorine pesticides, and organophosphate pesticides. For the past two years, this has also included pyrethroid pesticides, and, for the past year, Fipronil. Trends over the past 10 years

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have been examined for principal contaminants of concern. Concentrations of contaminants measured in both wet- and dry-weather discharges are compared with various receiving water quality criteria. For purposes of analysis, water quality criteria or objectives were used to provide reference points for assessing the relative importance of various stormwater contaminants, although specific receiving water studies are necessary to quantify the presence and magnitude of any actual water quality impacts.

Part VI.C.5.a of the Los Angeles MS4 Permit requires Permittees to identify the water quality priorities within each Watershed Management Area (WMA) that will be addressed by a WMP. It further requires Permittees to designate three categories of priority pollutants that will be addressed: Category 1 (Highest Priority), Category 2 (High Priority), and Category 3 (Medium Priority). Highest Priority pollutants are those for which water quality-based effluent limitations and/or receiving water limitations are established in the Order. High Priority are those pollutants for which water quality data indicate a water quality impairment in the receiving water according to the California's Clean Water Act (CWA) Section 303(d) List for which MS4 discharges may be causing or contributing to the impairment, but which are not being addressed through TMDLs. The third category is not as clear-cut. It is defined to include pollutants for which there are insufficient data to indicate water quality impairment, but which exceed applicable receiving water limitations. This LCC WMP identifies Category 1 and Category 2 pollutants, and proposes a screening process to separate medium priority (Category 3) pollutants from those the Watershed Group considers to be low priority at this time.

In implementing this WMP, the Watershed Group will select control measures that will facilitate cost-effective implementation of the Water Quality Improvement Strategy specified in Section 3 of this Program. Section 4 of the Program includes a summary of the assessment of each minimum control measure (MCM) program, as well as a determination as to whether the Permittees will implement the MCM provisions as explicitly stated or with modifications to focus on specific water quality problems. Information on how compliance with receiving water limitations can be achieved through stormwater capture is in Section 5 of this WMP, with further details in the RAA that was prepared collectively for three watersheds – the LCC, Lower Los Angeles River, and Lower San Gabriel River Watersheds – because several cities are in two or three of these watersheds and the cities wanted consistency within the jurisdictions. The RAA is described in Section 8 and found in Attachment A.

The Watershed Group has begun implementation of the CIMP by conducting three field screenings of non-stormwater outfalls. Full implementation of the CIMP is proposed to commence within 90 days after approval of the CIMP by the Executive Officer of the Regional Board or by July 1, 2015, whichever is later. The schedule provides for commencing monitoring on July 1, 2015 as starting monitoring part way through a complete monitoring year or missing the first storms of the year would not be productive. Formal implementation of the Los Cerritos Channel WMP will begin upon approval of the final Program pursuant to Table 9 of Order No. R4-2012-0175.

The LCC Watershed Group has developed its implementation schedules based on guidance in the Permit that specifies that compliance schedules and interim milestone dates be used to measure progress toward addressing the highest water quality priorities and achieving applicable water quality-based effluent limitations. The schedules in this WMP will allow the

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Watershed Group to measure progress on a watershed scale every two years as part of an adaptive management process. Schedules have been initially developed for the strategies, control measures, and BMPs to be implemented on a watershed scale and on municipal roles in planning and implementing these projects (See Section 6 of this WMP). The Watershed Group is emphasizing a watershed approach to addressing water quality problems within the Watershed.

The overall implementation schedule for the LCC WMP is strongly influenced by TMDL final compliance dates and target dates for Category 2 and 3 pollutants, the Watershed Group's Water Quality Improvement Strategy, and the need to establish a stable and sustainable stormwater funding source in Los Angeles County and California to pay for the expensive stormwater capture and stormwater treatment facilities anticipated to be necessary to meet water quality standards in a timely manner. Final wet-weather compliance target dates for Category 1, 2, and 3 pollutants are shown in Section 2 and Section 6 of this Program (see Tables 2-9 through 2-12 and 6-1). Schedules for jurisdictional projects will be added to the schedules during adaptive management review as cities plan and program implementation of green streets, LID, and other local projects. The initial schedule contained in this WMP covers a 26-year period and is structured into eight three-year phases and a two-year phase. The schedule assumes a 2015 start date and is based on an anticipated 5-year permit renewal cycle (see Tables in Section 6 of this Program).

The Los Cerritos Channel Watershed Group looks forward to continuing to work together, and with the Regional Water Board, to achieve pollutant reductions in the waterbodies of the Watershed. Prior to 2012, MS4 permits required cities and agencies to implement a series of BMPs such as street sweeping and catch basin cleaning to demonstrate compliance. With the adoption of the fourth term MS4 permit by the Regional Water Board on November 8, 2012, the emphasis shifted to a watershed-based effort that includes the goals of achieving specific pollutant targets as runoff leaves the storm drain system and enters the Los Cerritos Channel. This Watershed Management Program, together with its accompanying RAA and CIMP, constitutes the first step in that watershed-based effort.

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1.0 Introduction and Background

1.1 Introduction

The Los Cerritos Channel (LCC) Watershed (Watershed) is a small, urbanized watershed comprising 17,711 acres in the Los Cerritos Channel and Alamitos Bay Watershed Management Area. The Permittees in the Watershed have been working together since late 2008 to address water quality issues in the Watershed. The Watershed includes the Cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill, as well as 94 acres of unincorporated land. After formalizing their partnership in 2010, these Permittees came together as the Los Cerritos Channel Technical Committee, and are now known as the Los Cerritos Channel Watershed Group. Since then, the Los Angeles County of Flood Control District (LACFCD) has joined the Watershed Group, and the California Department of Transportation (Caltrans) participates with the Group on an informal basis.

The Los Cerritos Channel Watershed Group has chosen to develop a Watershed Management Program (WMP) as a collaborative effort pursuant to Part VI.C. of Order No. R4-2012-0175 (National Pollutant Discharge Elimination System [NPDES] Permit No. CAS004001, *Waste Discharge Requirements for Municipal Separate Storm Sewer System [MS4] Discharges within the Coastal Watersheds of Los Angeles County, Except those Discharges Originating from the City of Long Beach MS4*, or "Los Angeles County Permit") and Part VII.C. of Order No. R4-2014-0024 (NPDES Permit No. CAS004003, *Waste Discharge Requirements for Municipal Separate Storm Sewer System Discharges from the City of Long Beach*, or "Long Beach Permit") to implement the requirements of the Order on a watershed scale through customized strategies and control measures and continued implementation of the applicable minimum control measures (MCMs) specified in Part VI.D. of the Order No. R4-2012-0175 and Part VI. C of Order No. R4-2014-0024. This voluntary approach to compliance with the Order will allow the Permittees the flexibility of addressing the highest watershed priorities first and allow the Permittees to develop a Coordinated Integrated Monitoring Program (CIMP) that matches the unique nature of the Watershed through watershed segmentation and forensic monitoring to locate the primary sources of pollutants within the Watershed. The customized strategies and control measures presented in this Program will be implemented both on a watershed and sub-basin basis and, where applicable, through each Permittee's stormwater management program.

Consistent with the Order, the WMP is designed to ensure that, over time, discharges from the Watershed Group's MS4s will achieve applicable water quality based effluent limitations (WQBELs) in Part VI.E. of the Permit, including the Los Cerritos Channel Metals Total Maximum Daily Loads (TMDLs) (Attachment Q of the Permit) and the Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters Toxic Pollutants TMDL (Attachment N of the Permit), not cause or contribute to exceedances of receiving water limitations in Parts V.A and VI.E of the Order or the applicable TMDLs, and not include non-stormwater discharges that are effectively prohibited by Part III.A. of the Order. Control measures will be implemented to reduce the discharge of pollutants to the maximum extent practicable. (MEP).

Consistent with Part VI.C.5-C.8, the WMP:

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1. Prioritizes water quality issues;
2. Identifies and implements strategies, control measures, and best management practices (BMPs) to achieve required water quality outcomes;
3. Executes an integrated monitoring program and assessment program;
4. Modifies strategies, control measures, and BMPs, as necessary, based on analysis of monitoring data collected, to ensure that applicable water quality-based effluent limitations and receiving water limitations and other milestones set forth in the WMP are achieved in the required timeframes; and
5. During the preparation of this WMP, the Los Cerritos Channel Watershed Group held a joint stakeholder meeting with the Lower San Gabriel River Watershed Committee. The Groups held the joint meeting on April 30 to seek stakeholder input, partially because several cities are in both watersheds and partially because the Regional Water Board's June 2013 Basin Plan Amendment addressed the Metals TMDLs for both watersheds and included a common implementation schedule. The joint presentation included descriptions of the watersheds, the overall approach to the WMPs, water quality priorities, monitoring, the Reasonable Assurance Analysis, strategies, control measures, schedules, priority pollutants, regional projects, and next steps. The presentation was followed by a valuable question and answer session.

Even though the Los Cerritos Watershed Group has chosen to propose a WMP – not an Enhanced Watershed Management Program (EWMP) – it will evaluate opportunities through the adaptive management process for collaboration on multi-benefit regional projects that collectively, wherever feasible, retain all non-stormwater runoff and all stormwater runoff from the 85th percentile 24-hour storm event for the drainage area tributary to the projects while achieving other benefits, such as water supply.

The WMP also addresses compliance with receiving water limitations not otherwise addressed by a TMDL. For pollutants with the same fate and transport mechanisms as pollutants addressed by a specified TMDL, the planned control measures will be designed to address both the TMDL pollutants and the other pollutants identified as having the same fate and transport mechanisms. A major example of this is the total suspended solids (TSS) reduction measures discussed in Section 3.4, which will address metals and legacy organics. In this case, both sets of pollutants are subject to a TMDL, but the TMDLs address different areas and have different compliance dates. The control measures designed to address the TMDL with the earlier compliance date will also reduce the loading of pollutants subject to the TMDL with the later compliance date.

The development of this WMP is based on an assumption that the current requirements will withstand the appeals to the State Water Board and possible litigation. However, the Los Cerritos Watershed Group recognizes that there could be some future changes to the requirements in Order No. R4-2012-0175. For instance, in a letter dated July 8, 2013, the State Water Board invited comments on the following two questions:

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1. Is the watershed management program/enhanced watershed management program alternative contained in the Los Angeles MS4 Permit an appropriate approach to revising the receiving water limitations in MS4 permits?
2. If not, what revisions to the watershed management program/enhanced watershed management program alternative of the Los Angeles MS4 Permit would make the approach a viable alternative for receiving water limitations in MS4 permits?

Numerous entities provided comments on WMPs/EWMPs as an alternative approach. Previously, based on comments provided during the public comment period prior to Permit adoption, Los Angeles Regional Water Quality Control Board (Regional Water Board) staff proposed the use of WMPs/EWMPs, and the Regional Water Board members voted unanimously to include them in the Los Angeles MS4 Permit.

Pursuant to 303(d) listings for the Los Cerritos Channel for copper, zinc, and lead, and to a 13-year time schedule imposed by a 1999 Consent Decree between USEPA and local environmental groups (*Heal the Bay, et al v. Browner et al*), USEPA established the Los Cerritos Channel Total Maximum Daily Loads for Metals on March 17, 2010. Since USEPA does not establish implementation plans or implementation schedules for its TMDLs, development of both was necessary for the Los Cerritos Channel. The Regional Water Board agreed to adopt a Basin Plan Amendment including general implementation plans and schedules for the Los Cerritos Channel Metals TMDLs. This WMP will serve as a detailed implementation plan for addressing the Los Cerritos Channel Metals TMDLs. The Basin Plan Amendment was adopted by the Regional Water Board on June 6, 2013. It was approved by the State Water Board on March 4, 2014. It became effective with approval by the Office of Administrative Law on October 13, 2014.

The WMP is a compliance-oriented water quality management tool to be used to facilitate improvement of surface water quality and provide opportunities to increase local water supplies. As stated in the Fact Sheet for the Los Angeles MS4 Permit, "the purpose of Watershed Management Programs is to provide a framework for Watershed Group members to implement the requirements of [permits] in an integrated and collaborative fashion to address water quality priorities on a watershed scale." The program is designed to facilitate watershed-based stormwater management planning using an adaptive management approach that allows for strategic planning and integration of water quality goals with water supply benefits.

Development of a WMP, with its associated monitoring program and Reasonable Assurance Analysis, is expensive, and its implementation will be both costly and rigorous. In acknowledgement of that fact, the Regional Water Board included incentives in the Permit to encourage participation in WMP or EWMP programs. One such incentive is the provision that, through implementation of a WMP, Permittees may comply with receiving water limitations, including water quality based effluent limitations.

1.2 The Watershed

The Los Cerritos Channel Watershed comprises a predominantly urban land area of approximately 17,711 acres (27.7 square miles) (See Figure 1-1).

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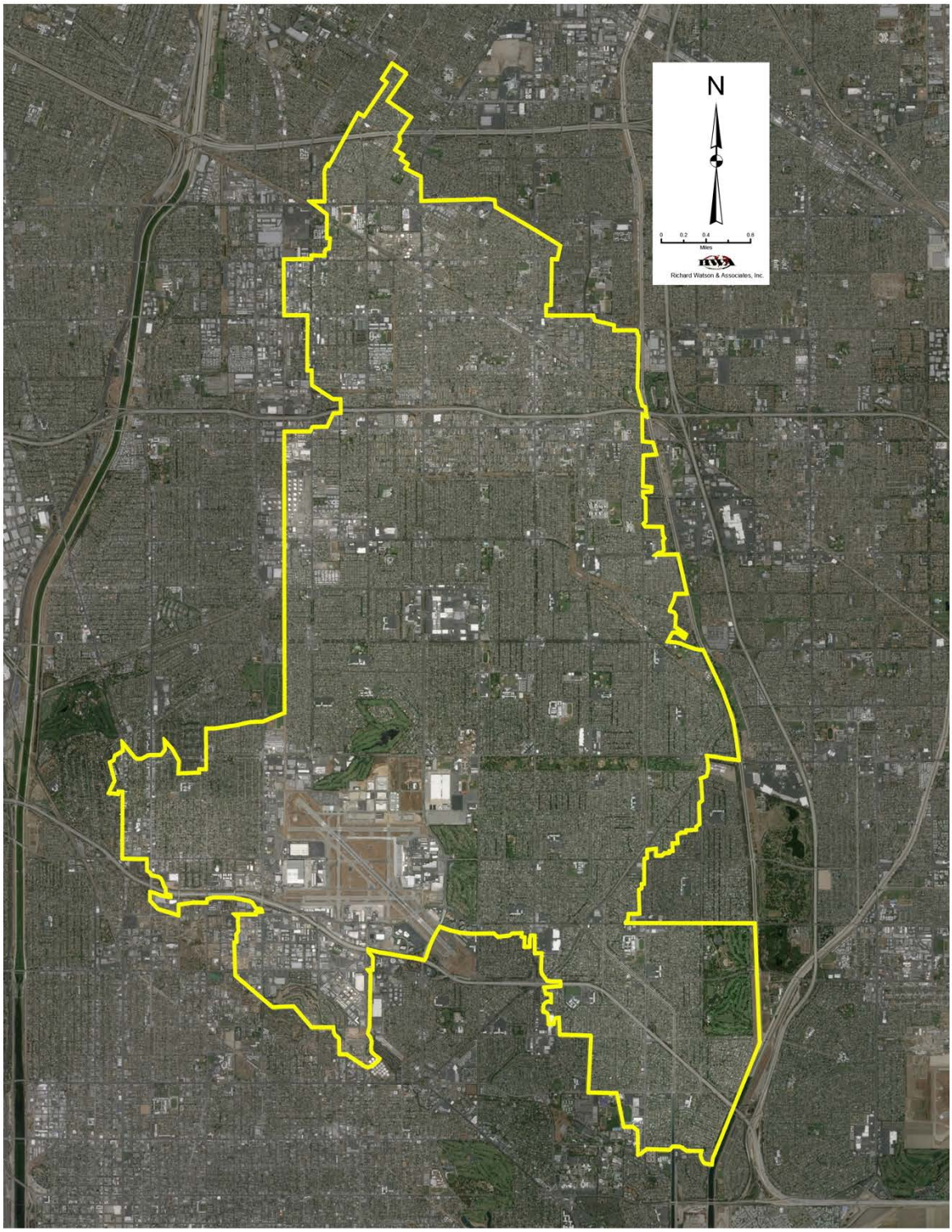
Figure 1-1. Los Cerritos Channel Watershed



The Watershed extends from just north of I-105 in Downey south to Atherton Street in Long Beach, where the Channel discharges into the Los Cerritos Channel Estuary, which, in turn, discharges through Marine Stadium and Alamitos Bay to San Pedro Bay. The Watershed includes ten MS4 Permittees

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regulated under three MS4 permits: the Los Angeles MS4 Permit, the Long Beach MS4 Permit, and the Caltrans Permit. Seven Cities and the Los Angeles County Flood Control District (LACFCD) are participating formally together in development of a WMP and a CIMP. (See Figure 1-2.) The entire Watershed is within the LACFCD. Caltrans is participating informally as of January 2015, since a Memorandum of Understanding (MOU) has not yet been signed. Completion of an MOU and formal participation on the part of Caltrans is anticipated in the future. The total area covered by the WMP includes approximately 17,199 acres. Approximately 498 acres of Caltrans property regulated under a statewide MS4 permit and a 94-acre unincorporated area with a separate WMP are excluded from this WMP. The following table provides a breakdown of the land area within the Los Cerritos Channel Watershed by Permittee.

Table 1-1: Los Cerritos Channel Watershed Land Area by Permittee

Permittee	Land Area (Acres)[1,]	Percentage of Total Area
Bellflower	2,818.4	15.91%
Cerritos	57.6	0.33%
Downey	245.0	1.38%
Lakewood	4,802.7	27.12%
Long Beach	7,535.4	42.55%
Paramount	1,128.9	6.37%
Signal Hill	530.7	3.00%
Caltrans	498.0[1]	2.81%
County FCD	NA[2]	NA
Total:	**17,616.7**	**100%**

[1] Caltrans average subtracted from city areas.

[2] County of Los Angeles' 94-acre area within the Los Cerritos Channel and Alamitos Bay Watershed Management Area is not included in this WMP.

The County of Los Angeles and the LACFCD have prepared a separate WMP and CIMP for the 94-acre unincorporated area and other LACFCD service areas within portions of the Los Cerritos Channel and Alamitos Bay Watershed Management Area.

The Los Cerritos Channel itself is an open flood control channel. The Cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill, and a small portion of unincorporated Los Angeles County are located within the area that drains to the Channel. It is a concrete-lined freshwater channel until it reaches approximately Atherton Road, where the Channel's tidal prism begins. A small marina located in the Estuary is used for recreational purposes. Average dry-weather flows in the Channel were 2.35 cubic feet per second (cfs) when the Metals TMDLs were established, with storm event flows recorded as high as a historical maximum of 1,460 cfs. Dry weather flows have subsequently decreased, due in part to the water conservation efforts by cities within the Watershed.

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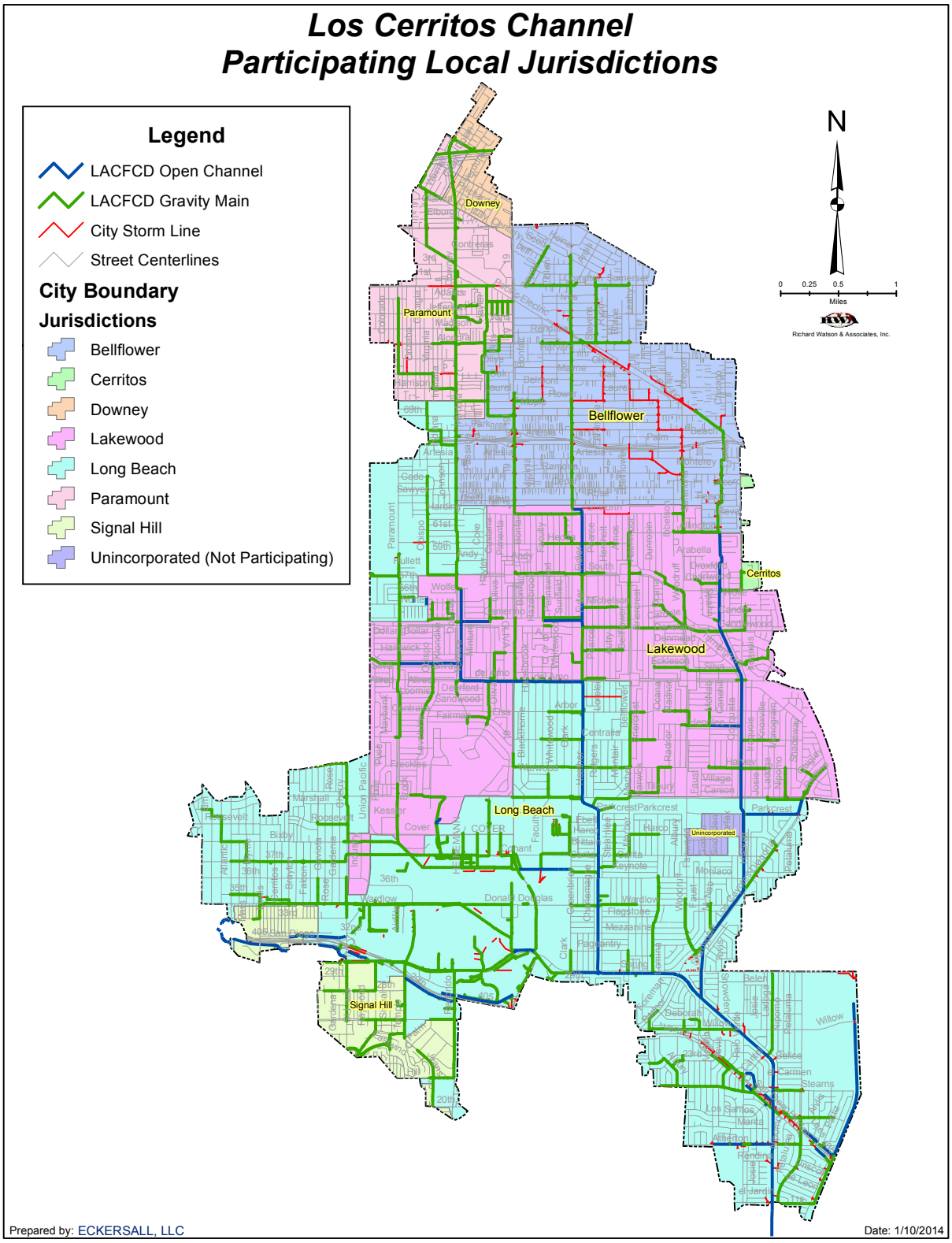
Figure 1-2. Los Cerritos Channel Participating Local Agencies



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The portion of the Los Cerritos Channel listed as impaired for metals is the approximately 2.1-mile long freshwater portion above the tidal prism. Approximately 44 percent of the Watershed is located in the eastern part of the City of Long Beach, with the remaining 56 percent located outside the City of Long Beach in the other jurisdictions in the Watershed.

Land use within the Watershed is 93% urban, including approximately 60% residential, 9% mixed urban, 15% commercial, and 9% industrial. Open space accounts for approximately 6% of land use in the Watershed, with agriculture comprising <1% of land use. The following table reproduced from the *Los Cerritos Channel Total Maximum Daily Loads for Metals* illustrates the specific land use percentages in the Watershed:

Table 1-2: Los Cerritos Channel Watershed Land Use Percentages

Land Cover Type	No. of Acres[1]	Percentage of Watershed
Agriculture	137.1	0.8%
Commercial	2,668.6	15.1%
High Density Residential	1,228.5	6.9%
Industrial	1,615.0	9.1%
Low Density Residential	9,278.9	52.4%
Mixed Urban	1,665.8	9.4%
Open Space	1,097.9	6.2%
Water	18.9	0.1%
Total	**17,710.7**	**100%**

[1] Includes 94 acres of unincorporated area and 498 acres of Caltrans properties.

These land uses were converted into hydrological response units as part of development of the Watershed Modeling System (WMMS) for the County of Los Angeles. (See Figure 1-3)

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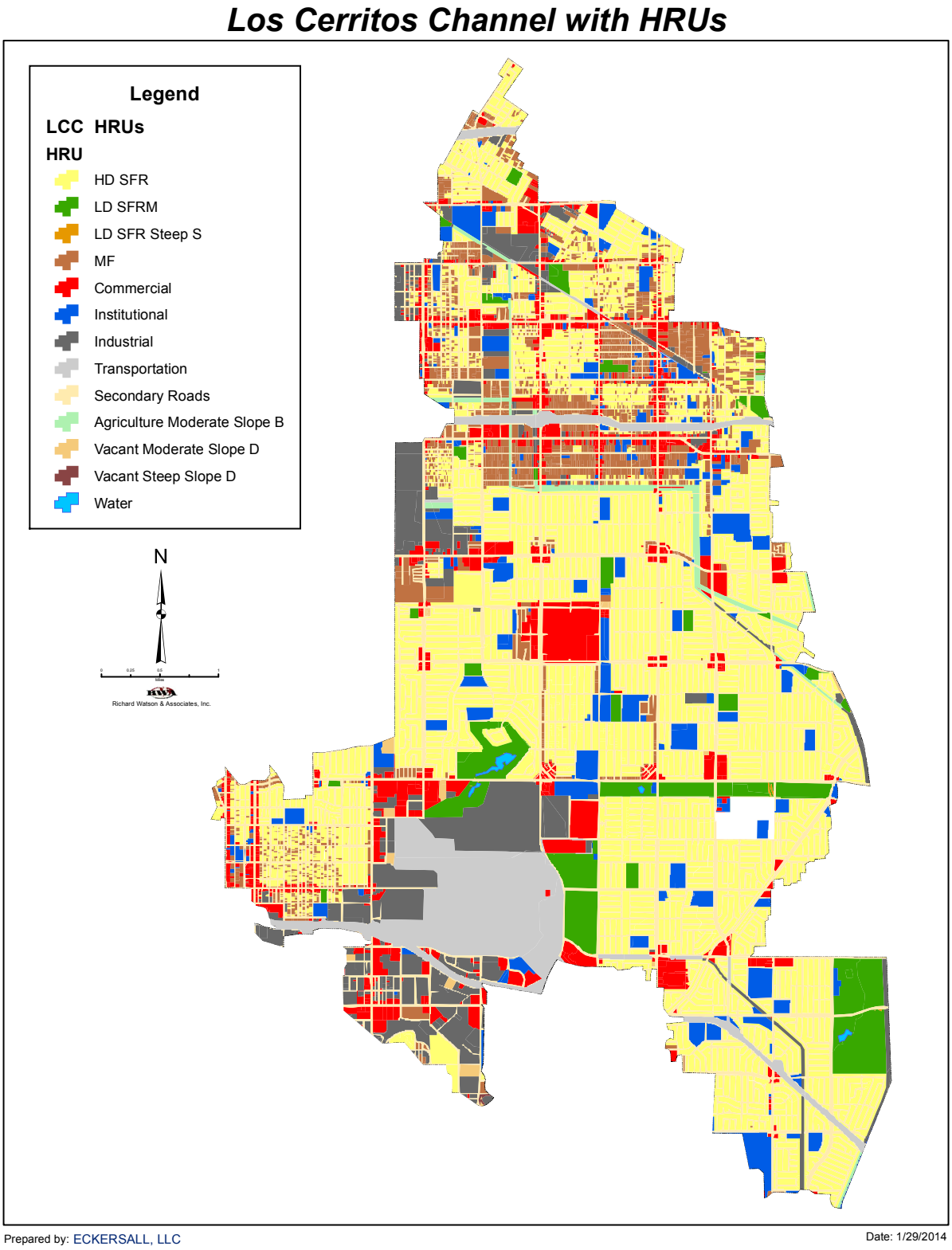
Figure 1-3 LCC Hydrologic Response Units



1.3 Water Quality Issues and the History of Water Quality Regulation

The MS4 Permits require Permittees to identify water quality priorities that will be addressed by a WMP. These priorities are to include water quality-based effluent limitations and/or receiving water limitations, as well as an evaluation of existing water quality conditions, including characterization of stormwater and non-stormwater discharges. The Permits further require Permittees to designate three categories of pollutants: Category 1 (Highest Priority), Category 2 (High Priority), and Category 3 (Medium Priority). The requirements for the first two designations are clear in terms of the level of impairment that relates to each. However, the third category, which includes pollutants for which there are insufficient data to indicate water quality impairment, is quite broad and does not distinguish between medium priority and low priority pollutants. In order to identify Category 3 pollutants, the Los Cerritos Channel Watershed Group has developed a screening process to distinguish between medium priority pollutants and those the Group considers to be low priority. See Section 2.2 of this Program for detailed descriptions of the Category 1, 2, and 3 pollutants for the Los Cerritos Channel WMP.

The State of California has established water quality standards based on three components: 1) beneficial uses, as defined by the Regional Water Board in the Basin Plan; 2) narrative and/or numeric water quality objectives; and 3) an antidegradation policy. For certain pollutants, USEPA has established numeric criteria that serve as water quality standards for California's inland surface waters. (California Toxics Rule, 40 CFR 131.38).

In 1990, USEPA established Phase I of the municipal National Pollutant Discharge Elimination System (NPDES) program, which, in part, required operators of medium and large MS4s (generally serving populations of 100,000 or more) to implement stormwater management programs. These programs require addressing a variety of water quality–related issues, including:

- Structural control maintenance
- Areas of significant development or redevelopment
- Roadway runoff management
- Flood control related to water quality issues
- Municipally owned operations such as landfills and wastewater treatment plants
- Municipally owned hazardous waste treatment, storage, or disposal sites
- Application of pesticides, herbicides, and fertilizers
- Illicit discharge detection and elimination
- Regulation of sites classified as associated with industrial activity
- Construction site and post-construction site runoff control
- Public education and outreach

Section 303(d) of the federal Clean Water Act (CWA) requires each State to "identify those waters within its boundaries for which the effluent limitations are not stringent enough to implement any water quality objective applicable to such waters." The CWA further requires States to establish priority rankings for waterbody-pollutant combinations on the 303(d) Listing of Impaired Waters, and to establish TMDLs for those waters. A TMDL is defined in the CWA as "the sum of the individual waste

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load allocations for point sources and load allocations for nonpoint sources and natural background." The CWA requires TMDLs to be set at levels "necessary to achieve all applicable water quality standards" in the Channel (Source: *Los Cerritos Channel Total Maximum Daily Loads for Metals, March 2010*.) TMDLs also are required to account for seasonal variations and include a margin of safety to account for any lack of knowledge regarding the relationships between effluent limitations and water quality. USEPA included in the Los Cerritos Channel Metals TMDLs an explicit margin of safety equal to 10% of the loading capacity or existing load available for wet-weather allocations.

The State Water Resources Control Board and the nine Regional Water Quality Control Boards are responsible for preparing lists of impaired waterbodies for the 303(d) list and for preparing TMDLs in California. Both processes are subject to USEPA approval. If USEPA does not approve a State-submitted TMDL, it is required to establish a TMDL for that waterbody. The Regional Water Boards are responsible for issuing NPDES permits and state-specified Waste Discharge Requirements.

During the 1996 and 1998 303(d) listing cycles, the Los Angeles Regional Water Board identified over 700 waterbody-pollutant combinations in the region for which TMDLs are required. As a result of a consent decree approved between USEPA, Heal the Bay, and NRDC, a 13-year schedule for development of TMDLs in the Los Angeles region was established on March 22, 1999. The Consent Decree combined the over 700 waterbody-pollutant combinations into 92 TMDL analytical units. Because of the high volume of TMDLs required, which the State was going to be unable to complete and adopt within the 13-year consent decree deadline, USEPA established some of these TMDLs – including those for Analytical Unit 84, which is for metals listings in Los Cerritos Channel.

1.4 History of Water Quality Impairments in Los Cerritos Channel

The Los Cerritos Channel was included on the 1998, 2002, 2006, and 2010 California Clean Water Act Section 303(d) lists as impaired for copper, lead, and zinc. Dry-weather runoff in the Los Cerritos Channel comes largely from groundwater inflow and discharges to the MS4s from illicit connections, excess irrigation, and other residential and commercial practices. Wet-weather metals sources are generally associated with the accumulation and wash-off of metals on the land surface. The volume of wet-weather loading varies with storm size.

In addition to the metals impairments for which TMDLs have been established, the Channel has been listed through the years as impaired for aluminum, bis(2-ethylhexyl)phthalate, coliform bacteria, trash, and pH, although none of these impairments are currently subject to TMDL requirements. Also, the Watershed was included in the nearshore area for the Greater Harbor Toxics TMDLs, which lists impairments for copper, lead, zinc, DDT (fish tissue), PCBs (fish tissue), chlordane (fish tissue), PAHs (fish tissue), and toxicity (sediment). See Section 2.0 for a detailed discussion of water quality issues within the Watershed and the priority pollutants to be addressed through implementation of this WMP.

At the time the Metals TMDLs were adopted in 2010, there were 68 NPDES permittees in the Los Cerritos Channel Watershed, including MS4 permits, the Caltrans permit, general construction and general industrial stormwater permits, those regulated under minor NPDES permits, and general NPDES

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permits. Individual metals sources in the watershed include vehicle brake pads, vehicle tire wear, building materials, pesticides, erosion of paint, and aerial deposition of emissions from industrial facilities.

As part of development of the Los Cerritos Channel Total Maximum Daily Loads for Metals, USEPA defined ten sub-basins within the Watershed (See Figure 1-4). Since Order No. R4-2012-0175 specifies that WMPs should reflect sub-watersheds defined in TMDLs, this program emphasizes implementation by sub-basin rather than the sub-watersheds defined in WMMS. The sub-watersheds aggregate to the sub-basins that will facilitate use of Reasonable Assurance Analysis (RAA) sub-watershed information as the WMP is implemented on a sub-basin basis.

Runoff to the Channel is regulated as a point source discharge in the permits; however, there are both point source and nonpoint source contributions to metals loadings in the Channel. Nonpoint sources are those that discharge via sheet flow or natural discharges, or from unregulated sites such as schools. These loadings from a variety of anthropogenic and natural sources accumulate in the Watershed and are washed into the Channel through rainfall. Sources include urban debris, erosion of susceptible materials, agricultural practices, and atmospheric deposition. The percentage of copper contribution from vehicle brake pads in the Los Cerritos Channel is significant. Copper particles are deposited onto land areas by direct deposition and are released into the air during brake pad use and subsequently deposited onto impervious surfaces and transported into water bodies through stormwater and urban runoff.

The Basin Plan for the Los Angeles Region defines one existing beneficial use (wildlife habitat [WILD]) and two intermittent beneficial uses (noncontact water recreation [REC2] and warm water habitat [WARM]) for Los Cerritos Channel. For development of the Los Cerritos Channel Metals TMDLs, USEPA assessed water quality using data from the City of Long Beach stormwater program and five additional samples provided by Kinnetic Laboratories, Inc. Metals data were collected from the Stearns Street monitoring site in the City of Long Beach, above the tidewater in the Los Cerritos Channel. Flow rates based on flow velocity and channel dimensions were used to calculate total flow following storm events. Dry-weather and wet-weather metals concentrations were compared to California Toxics Rule (CTR) values using hardness measured for each sampling event to assess the frequency of exceedances of the CTR criteria for copper, lead, and zinc in Los Cerritos Channel. Monitoring indicates exceedances for copper in dry weather, but not for lead or zinc. In wet weather, monitoring indicates exceedances for copper and zinc. A dry-weather TMDL was developed for copper, and wet-weather TMDLs were developed for copper, lead, and zinc. However, the wet-weather lead TMDL requires no further reductions.

The latest Los Angeles County MS4 Permit (Order No. R4-2012-0175) was adopted by the Los Angeles Regional Water Quality Control Board on November 8, 2012 and became effective December 28, 2012. This Permit covers 86 co-permittees, including 84 incorporated cities, the County of Los Angeles, and the LACFCD, and is on a five-year renewal cycle. The City of Long Beach MS4 Permit (NPDES Permit Order No. R4-2014-0024) was adopted on February 6, 2014, and is also on a five-year renewal cycle. It covers the City of Long Beach portions of the watershed.

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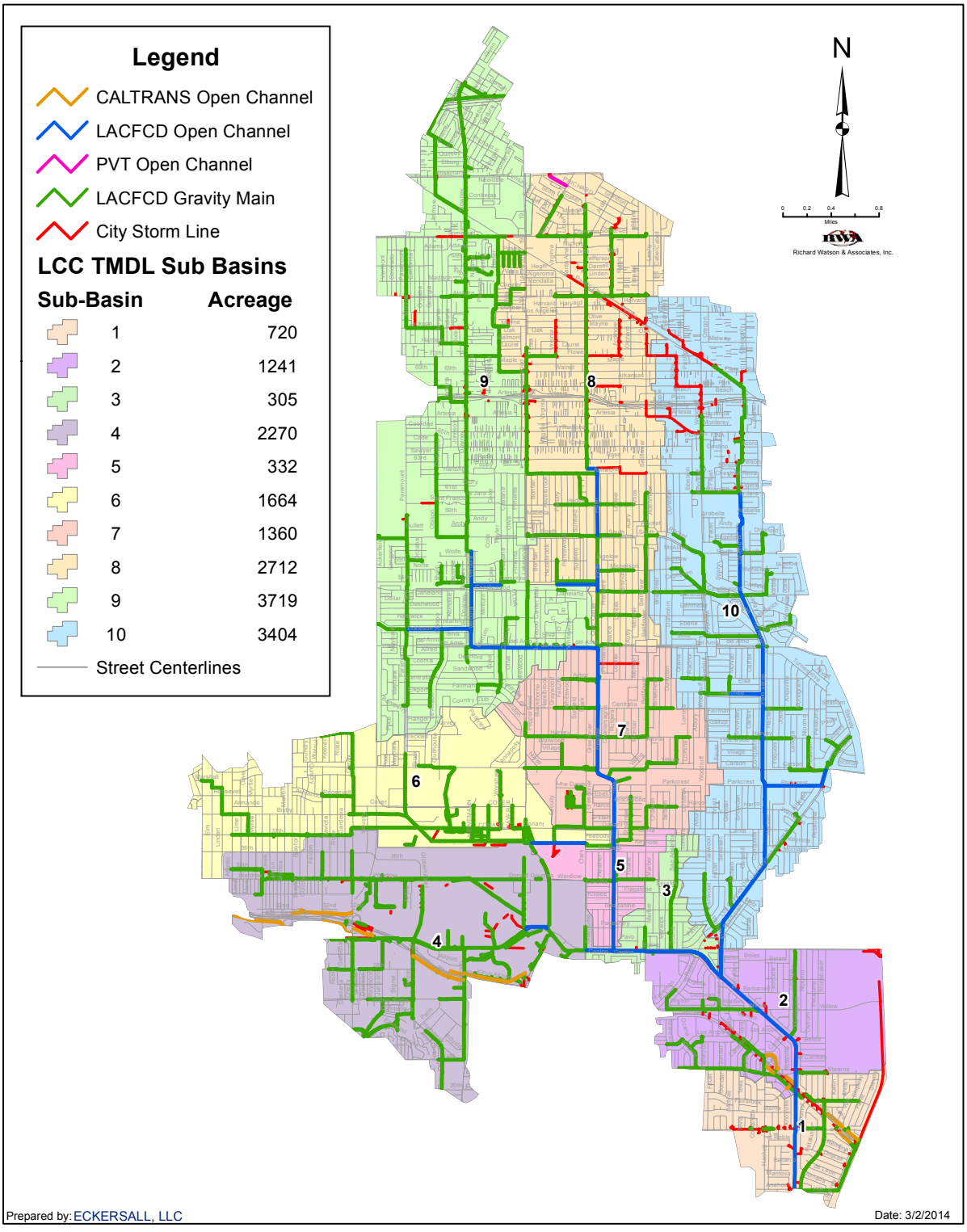
Figure 1-4. Los Cerritos Channel Sub-basins



1.5 Organizing to Address Water Quality

As noted above, the Los Cerritos Channel Watershed Group has been working together since late 2008, when the group organized in response to a draft of the EPA-established Metals TMDLs for the freshwater portion of the Los Cerritos Channel Freshwater Watershed. The participating agencies, together with the Gateway Water Management Authority (GWMA), which acts as the fiduciary agent for the Watershed Group, entered into memoranda of agreement in 2010. Because of this history of working together to address water quality issues in the watershed, and because of its organizational arrangements with GWMA, the Watershed Group has chosen to continue its focus on the Los Cerritos Channel portion of the Los Cerritos Channel and Alamitos Bay Watershed Management Area, while taking into account water quality impairments in the Los Cerritos Channel Estuary and the Greater Los Angeles/Long Beach Harbor to which the Los Cerritos Channel Watershed may be contributing.

Since the adoption of the new MS4 Permit, the Watershed Group has comprehensively analyzed the range of stormwater management alternatives in the new Permit for addressing targeted stormwater pollutants in the Los Cerritos Channel. The Watershed Group elected to continue working together in a multi-agency effort to prepare a WMP and CIMP. The draft program plan was submitted to the Regional Water Board on June 29, 2014.

Cities implementing all aspects of the approved program will, with some exceptions, be deemed in compliance – at least for an interim period – with the receiving water numerical discharge limits. Under the Permit there is also protection from third party litigation risks for agencies participating in a WMP.

1.6 Metals TMDLs

The USEPA-established *Los Cerritos Channel Total Maximum Daily Load for Metals* (March 17, 2010) includes the problem statement, numeric targets, source analysis, loading capacity, load allocations (LAs), waste load allocations (WLAs), and margin of safety, but does not include an implementation plan or schedule. As noted earlier, the Regional Water Board has adopted and the State Water Board has approved a Basin Plan Amendment that includes a general implementation plan and a schedule.

The Cities in the Watershed Group have contributed to the effort by the California Stormwater Quality Association (CASQA) and Sustainable Conservation to develop the legislation that ultimately became SB 346. It requires incremental reduction in the amount of copper in vehicle brake pads. Implementation of SB 346 will, over time, significantly reduce the level of copper in urban waters throughout the state. As noted previously, a significant percentage of the copper loading to the Los Cerritos Channel is due to copper in brake pads. Implementation of SB 346 should assist Watershed Group member cities and agencies to reduce copper loadings in their jurisdictions. This represents an example of “true source control,” which is the most cost-effective way to achieve pollutant reductions.

Table 1-3 lists applicable interim and final water quality based effluent limitations established by the Implementation Schedule for the Los Cerritos Channel Metals TMDLs.

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Table 1-3: Implementation Schedule for LCC Metals TMDL

TMDL Order	WQBEL	Interim/Final	Compliance Date
Metals TMDLs 2010-2026	Dry Weather[1] 30% of drainage area	Interim	9/30/2017
	70% of drainage area	Interim	9/30/2020
	100% of drainage area	Interim	9/30/2023
	Wet Weather[1] 10% of drainage area	Interim	9/30/2017
	35% of drainage area	Interim	9/30/2020
	65% of drainage area	Interim	9/30/2023
	100% of drainage area	Final	9/30/2026

[1] An Implementation Schedule for the Los Cerritos Channel Metals TMDLs was approved by the Regional Water Board on June 6, 2013 in Attachment B to Resolution No. R13-004.

1.7 MS4 Permit Requirements

Section VI.E.3 of the Los Angeles County MS4 Permit provides a framework for developing implementation plans for USEPA-established TMDLs by requiring Permittees subject to waste load allocations (WLAs) to propose and implement best management practices that will be effective in achieving compliance with USEPA-established numeric WLAs. A CIMP is required to be submitted either separately or as part of a WMP. The Watershed Group's CIMP is required to integrate requirements of the current Los Angeles County MS4 Permit, the City of Long Beach MS4 Permit, and TMDL monitoring requirements.

On June 6, 2013, the Los Angeles Regional Water Board adopted Resolution No. R13-004 that amended the Water Quality Control Plan for the Los Angeles Region to incorporate implementation plans for the TMDLs for Metals in the Los Cerritos Channel and for Metals and Selenium in the San Gabriel River and Impaired Tributaries. Attachment B to the Resolution specifies an interim compliance date of September 30, 2017, which is after the anticipated approval date for the WMP, but is approximately three months prior to the expiration date for the Los Angeles County MS4 Permit. Attachment B also specifies two additional interim compliance dates in 2020 and 2023 and a final compliance date of September 30, 2026. Pursuant to Section VI.E.3 of the Order, the WMP will become the Implementation Plan for the EPA-established Los Cerritos Channel TMDLs for Metals.

The new MS4 Permit requires that participating agencies prepare individual Letters of Intent to participate in development of a WMP. The member agencies of the LCC Watershed Group each prepared and submitted such letters.

1.8 Overview of WMP Strategy

The Los Cerritos Channel Watershed Group member agencies continue to engage in a number of required control measures that were initiated prior to commencement of WMP development and that have continued throughout the WMP development process. In addition, the Watershed Group has concluded that the best way to address water quality impairments within the Los Cerritos Channel

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receiving waters is to implement a multi-faceted WMP strategy utilizing each member agency's stormwater management program along with customized strategies, control measures, and BMPs at the watershed and sub-basin levels. The initial focus will be on true source control, runoff reduction, and total suspended solids (TSS) reduction. Once those options have been pursued, Watershed Permittees will pursue LID and green streets, operational source control, capture and infiltration, capture and use, and treatment controls (See Figure 3-1 in Section 3.0). However, planning for additional measures will occur concurrently with implementation of true source control measures.

True source control – reducing or eliminating a pollutant at its source – is a critical component of this strategy. Its effectiveness is simple: if pollutants are not generated or released, they will not be available for transport to the receiving waters. The Watershed Group has focused particularly on true source control because major sources of copper, lead, and zinc are released into the atmosphere, resulting in widespread deposition on impervious surfaces such as streets, highways, parking lots, and rooftops, in addition to the direct deposition that occurs on streets, highways, parking lots, and driveways. Copper is being addressed through the implementation of SB 346.

The Watershed Group is planning to work with CASQA to address a major source of zinc – automotive tires. The Department of Toxic Substances Control (DTSC) adopted new Safer Consumer Product Regulations that establish a process for identifying, prioritizing, and eliminating or reducing Chemicals of Concern in Priority Products. Because the requirements for inclusion on the initial priority product list are restrictive, these regulations cannot be used to reduce zinc in tires until after January 1, 2016. However, the Watershed Group will be able to work with CASQA and others to develop a well-supported petition to support the addition of zinc in tires as a product-chemical combination on the Priority Products List.

The Watershed Group will also emphasize TSS reduction. Reducing total suspended solids in the receiving waters should result in a significant reduction of metals and legacy organics, since both groups of pollutants adhere to sediment. This initial emphasis on TSS reduction should reduce the volume of water that ultimately needs to be captured and infiltrated or used to achieve standards for metals and legacy organics. The Watershed Group also will implement an enhanced street sweeping and parking lot sweeping program within the upper Palo Verde Channel sub-basin and/or the upper Clark Channel sub-basin during the first phase of implementation of this plan.

The runoff reduction strategy will initially focus on reduction of dry-weather runoff to substantially improve water quality during dry-weather days. This will involve a combination of water conservation and improvements in landscape irrigation efficiency to eliminate or greatly reduce overspray and runoff that provides a transport mechanism to carry pollutants to the storm drain system and into the receiving waters of the Los Cerritos Channel. Watershed Group members will use their Public Outreach Programs and Public Agency Activities Programs to promote and monitor operational source control measures that address priority pollutants within the Watershed. Runoff reduction will also involve dry-weather diversions to either the sanitary sewer system or infiltration/evapotranspiration facilities, such as infiltration trenches and rain gardens.

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Reducing runoff during wet weather is challenging and costly. The Watershed is essentially built-out and will be partially dependent on redevelopment to create opportunities for wet-weather runoff reduction. However, member agencies will implement green streets; retrofit low impact development (LID) components at key locations; and reduce directly connected impervious areas. In addition, member agencies will implement capture and use and capture and infiltrate measures to the maximum extent practicable.

Because of the depth to the drinking water aquifer and the widespread presence of clay lenses throughout the Watershed, implementation of a capture and infiltrate strategy will be challenging. The Watershed Group has attempted to locate initial potential water capture facilities in locations where captured stormwater can be treated, if necessary, and used for irrigation if infiltration is not feasible. These locations include local parks and golf courses and, potentially, school sites. To date, thirteen first order water capture sites have been identified. The three initial projects are planned for two park locations and a golf course, locations that will be particularly helpful in bringing the upper portions of sub-basins 4, 8, and 10 into compliance with the Waste Load Allocations in the Metals TMDLs and reduce the loads of other priority pollutants with similar fate and transport mechanisms.

The Watershed Group will also implement operational source control measures. These measures include street sweeping and cover and containment, as well as education and outreach efforts to encourage public and private sector entities to reduce or eliminate the discharge of pollutants or to reduce or prevent the contact of pollutants with rainwater and/or urban runoff.

Except for vegetative treatment associated with LID and green streets, MS4 treatment control is generally viewed by the Watershed Group as a last resort to be used when true source control, runoff reduction, TSS reduction, and operational source control are not sufficient. The Permittees anticipate that much of the treatment control implemented in the Watershed will be associated with implementation of LID ordinances and green streets policies. Further, although enhanced street sweeping should be sufficient to control direct and indirect deposition of zinc on arterials and residential streets, control of zinc from industrial sources may require the installation of targeted treatment controls. The need for installation of treatment control facilities will be continually re-evaluated through the adaptive management process required by Order No. R4-2012-0175 and explained in Section 10 of this Program.

The adaptive management process will be key to successful implementation of the Los Cerritos Channel Watershed Management Program. The Watershed Group will utilize management techniques set forth in this Program, assess and monitor for results, and refine program components, as necessary. For further details on the Watershed Group's multi-pronged strategy, including its Financial Strategy, please see Section 3.0 of this Program.

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2.0 Identification of Water Quality Priorities

2.1 Water Quality Characterization

2.1.1 Introduction

The Permittees within the Los Cerritos Channel Watershed are fortunate to have 13 years of data collected by the City of Long Beach at its Stearns Street mass emission monitoring site. This monitoring site was established pursuant to the City's individual MS4 permit first adopted in 1999

Major elements incorporated in Long Beach's monitoring and reporting program include 1) mass emission monitoring during storm events, 2) monitoring of dry weather discharges at each mass emission site, and 3) special studies. Special studies were included in the original permit to provide the flexibility necessary to allow the program to respond to new issues or concerns that might arise in the course of routine monitoring or as the result of emerging topics in stormwater science. Special studies were generally intended to improve assessment of impacts on receiving water, identify sources and sinks for contaminants, and assess compliance with TMDL targets and water quality objectives. The City has developed a variety of special studies during the past 13 years. In addition, the City has incorporated analysis of additional pollutants of concern based upon changes that have occurred with respect to pesticides that are available for residential use. Data from the monitoring program is intended to support decisions necessary to refine BMPs for the reduction of pollutant loading and the protection and enhancement of beneficial use of the receiving waters.

Mass emission monitoring is specified to be conducted at four sites during four wet weather storm events each year, including the Stearns Street site for the Los Cerritos Channel. The 1999 permit allowed for a phased implementation process with monitoring of the Los Cerritos Channel site starting in the second year of the program. An automated monitoring station was first installed and operable for the 2000/2001 wet season. Dry season monitoring was started in June 2001.

Storm Water Runoff at the Los Cerritos Channel Monitoring Station

The Stearns Street monitoring station serves as both a mass emission monitoring site for the City of Long Beach stormwater monitoring program and as the compliance point for the Los Cerritos Metals

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TMDL. The storm water monitoring station is installed in a steel utility box located on the west side of the channel south of Stearns Street. Water level/flow sensors and Teflon/FEP tubing for water sampling are installed on the bottom of the large concrete lined channel. The sensors and intake tubing pass through conduit to protect against the high flows and debris passing through the channel. Flow rates based upon measured water levels and a stage-flow rating curve used at an adjacent gauging station that is no longer in service.

This sampling site is normally above tidewater on Los Cerritos Channel. During extreme tides that typically occur during the dry weather surveys, this site can be impacted by backwater conditions. This has been remedied in recent years by scheduling dry weather sampling for periods that have less extreme tidal ranges.

The Long Beach mass emission monitoring program was developed to characterize stormwater discharges, identify contaminants of concern and develop pollutant load estimates for each major watershed. Monitoring is required to be conducted during the first significant rainfall event of the season. Flow-rated, whole storm composite samples are obtained and analyzed for major constituents of concern which include conventional constituents, total and dissolved metals. For the past two years, this has also included pyrethroid pesticides, and, for the past year, Fipronil.. A more comprehensive set of constituents was analyzed during the earlier years of the program. These included extensive screening for semivolatile organics (acid, base and neutral compounds), MBTE, and larger suites of both triazine pesticides and trace metals. The analytical set was selectively reduced after these compounds failed to occur at levels exceeding Minimum Levels (MLs) or where concentrations did not exceed any available and appropriate water quality standards. Toxicity testing using sea urchin fertilization tests and water flea survival and reproduction is conducted on composite storm samples. Toxicity tests during the earlier years of the program also included mysids but tests conducted at that time were not as sensitive as either the sea urchin fertilization test or the water flea tests. As with the chemical constituents, toxicity testing using mysids was suspended in lieu of the more sensitive tests. Phase 1 Toxicity Identification Evaluations (TIEs) are required to be performed on all samples that exhibit toxicity in excess of predetermined trigger values. The TIE process is used to determine the likely contaminants contributing to the observed toxicity.

Dry weather monitoring at Stearns Street consists of inspections conducted at the mass emission site and the collection and analysis of dry weather discharges over 24-hour periods. Monitoring is required to be conducted twice during each dry season. Sampling is typically conducted in September just prior to the storm season and in May following several weeks of dry weather. This element of the program is intended to assist in identification of pollutants of concern, assess the impacts that these pollutants might have on biological communities in the receiving waters and identify the sources of these contaminants such that they can be effectively controlled or eliminated. Dry weather discharge samples

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are subjected to the same chemical analysis and toxicity testing procedures as used for storm water monitoring.

2.1.2 Summary of Water Quality Conditions in the Los Cerritos Channel Freshwater Receiving Waters

The following sections discuss the quality of stormwater and dry weather discharges from the mass emission monitoring site. Concentrations of contaminants measured in both wet and dry weather discharges were compared with various receiving water quality criteria. Temporal trends over the past 13 years were examined for principal contaminants of concern. Data from the Stearns Street site were examined in great detail in order to assess progress towards meeting established Waste Load Allocations in the Los Cerritos Channel Metals TMDLs. The toxicity of both storm water and dry weather discharges are summarized for the duration of this time period. Water quality data associated with stormwater runoff (Table 2-1) and dry weather discharges (Table 2-2) are summarized for the most common contaminants of concern. Benchmarks used to evaluate receiving waters are summarized in Table 2-3 and Table 2-4.

For the purpose of this analysis, water quality criteria or objectives were used to provide reference points for assessing the relative importance of various stormwater contaminants, though specific receiving water studies are necessary to quantify the presence and magnitude of any actual water quality impacts. Ultimately, specific beneficial uses of the receiving water body should be considered when selecting the appropriate benchmarks.

Water quality criteria used as benchmarks in freshwater environments are summarized in Table 2-3 Criteria applicable to saline conditions are summarized separately in Table 2-4. These reference water quality criteria are useful for screening Event Mean Concentrations (EMCs) generated for most of the major constituents measured as part of this program. Most importantly, these benchmarks are only intended to serve as a tool to assist with the interpretation of the storm water quality data. Exceedances of these receiving water quality benchmarks do not necessarily indicate impairment. Other factors such as dilution, duration and transformation in the receiving waters must also be considered. Nevertheless they can be extremely useful in screening for analytes that might have greater potential to impact receiving waters and/or warrant more consideration in development of BMPs and implementation of source control strategies.

For comparative purposes, an EMC was considered to be an exceedance if the value was higher than any of the reference or benchmark values. In using these benchmarks, it is important that the source of the specific criterion is considered. For instance, metals concentrations derived from California Toxics Rule (CTR) freshwater criteria for protection of aquatic life are based upon dissolved concentrations and are often a function of hardness. Values listed in Table 2-3 are based upon a default hardness of 100 mg/L

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which is consistent with tabulated values provided in the CTR. Evaluation of any possible exceedance of hardness-dependent criterion is based upon the actual hardness EMC for the site and event therefore the criterion will change. Hardness measured during wet weather events is typically far less than 100 mg/L while hardness associated with dry weather events will be substantially higher. For metals with criteria dependent upon hardness, CTR criteria tend to be much higher for dry weather discharges since elevated hardness encountered during the dry season tends to mitigate potential toxicity of these metals. Saltwater objectives listed for metals under the CTR are also based upon dissolved concentrations while those listed under the California Ocean Plan are based upon total recoverable measurements. Although Ocean Plan numbers are used for comparative purposes, the marine and estuarine receiving waters in the Los Cerritos Channel Estuary would only be subject to the CTR saltwater values since both Alamitos Bay and San Pedro Bay are considered enclosed bays and estuaries. Water quality criteria provided in the Los Angeles Basin Plan are primarily based upon Title 22 drinking water standards. For two of the key organophosphate pesticides, the only available water quality criteria are those proposed by the California Department of Fish and Game (Siepmann and Finlayson, 2002). UC Davis (Faria et al. 2010; Fojut et al. 2012) has recently provided a series of reports that suggest new acute and chronic water quality criteria for a series of pesticides that include various pyrethroids and organophosphate pesticides.

Both acute and chronic water quality criteria are used in this evaluation. Due to the limited period of discharge, the acute criteria are considered most applicable to storm water. Dry weather discharges are most appropriately compared against chronic criteria (CCCs or daily maxima).

2.1.2.1 Wet Season Water Quality

The water quality criteria for pH included in the Los Angeles Basin Plan (CRWQCB, Los Angeles, 1994) indicate that surface waters should be maintained in the range of 6.5 to 8.5. Elevated pH is extremely atypical due to the acidic nature of rainfall. It is unusual to have storm water with measured pH values greater than the upper Basin Plan limit of 8.5 but historically a small percentage of storm water samples have exceeded the upper standard of 8.5.

Although care is taken to get accurate pH measurements, it is well known that accurate measurements in water with low ionic strength are difficult to obtain due to instability and slow response times. It is possible that some historical measurements were impacted by this problem. Sensors and measurement techniques for addressing water with low ionic strength have improved over the past decade.

The total coliform, fecal coliform and enterococcus single sample benchmarks are commonly exceeded during wet weather sampling events. Grab samples taken for bacteria during storm events most often exceed Basin Plan water quality criteria but also have shown a tremendous degree of variability. This can be attributed to both extreme variability that can occur over the course of a storm event and even

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extreme short-term variability that is common when taking field duplicates. Although the variation is substantial, overall concentrations of fecal indicator bacteria (FIBs) in storm water average about 104 mpn/100 ml for both Enterococcus and fecal coliform. *E. coli* have not been directly measured as part of the storm water monitoring program, however, fecal coliform concentrations provide an upper estimate of the *E. coli* in the water samples. The monitoring program will be transitioning to *E.coli.*

Over the past 13 years, four total recoverable metals including aluminum, copper, lead and zinc have frequently exceeded benchmark reference values. Criteria for total recoverable aluminum exist for drinking water (Basin Plan criteria) and aquatic life as a nonpriority pollutant (Table 2-3). Elevated levels of aluminum are normal during storm events due to naturally high levels in soils and the increased loads of sediment.

Concentrations of total recoverable copper, lead, and zinc measured in runoff at the Stearns Street site have frequently exceeded Ocean Plan criteria over the past thirteen years of the stormwater monitoring program.

Chlorinated pesticides continue to be uncommon in storm water runoff from the Stearns Street mass emission site. When detected, concentrations of detected compounds have typically been low (less than 10 times the reporting limit). Although largely banned or restricted throughout industrialized nations, these legacy pesticides persist in the environment.

The banning of residential, nonprofessional use of diazinon and chlorpyrifos resulted in these contaminants no longer being measureable in most storm water samples. Lower detection limits were implemented in the middle of the 2010/2011 monitoring season. The detection limits for chlorpyrifos dropped from 0.05 µg/L to 0.002 µg/L and the detection limits for diazinon dropped from 0.01 µg/L to 0.0015 µg/L. Use of the lower detection limits resulted in chlorpyrifos being detected in runoff from the Los Cerritos Channel. However, concentrations remain below the benchmark concentrations developed by California Department of Fish and Wildlife.

Pyrethroid pesticides have largely replaced diazinon and chlorpyrifos for pest control in the urban environment. Pyrethroids were not added to the analytical suite until mid-season during 2010/2011. Pyrethroid pesticides have been analyzed in wet weather runoff from the Stearns Street site for the past three years. The presence of bifenthrin, cyfluthrin, cypermethrin and permethrin are of primary concern. Although permethrin is consistently measured at the highest concentrations, this compound is the least toxic of these four pyrethroid pesticides.

These pesticides are known to be highly toxic with several compounds causing a toxic response to *Hyalella* at levels as low as 0.002 µg/L (2 ng/L), which is near the detection limit for many of these compounds. Many of the pyrethroids were measured at concentrations that would be expected to

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cause toxicity to *Hyalella* or *Americamysis* but generally low enough that *Ceriodaphnia* would not be expected to show impacts. It is also unlikely that pyrethroid toxicity would be measureable using the standard suite of WET tests being proposed for use in the new Los Angeles County and City of Long Beach MS4 NPDES permits.

Although pyrethroid pesticides are a recognized concern, the short and long-term impacts of these compounds are not well understood. These compounds are extremely difficult to measure since they are highly hydrophobic and tend to adhere to surfaces. In stormwater, pyrethroids tend to partition to suspended solids reducing bioavailability (Yang et al. 2006).

Since these compounds are highly hydrophobic, they are best known for the toxicity that they exert on the benthos. The environmental toxicity of these compounds was first established using amphipod tests that are conducted using sediment. Tests were later modified to use amphipods for water testing. Although these compounds typically have a half-life in water that ranges from days to months, it is expected that they may persist much longer in the sediments. Recently, Lao et al. (2010) identified the presence of pyrethroid pesticides in sediment sampled in the Ballona Creek Estuary. Levels measured in the sediments were considered sufficient to have caused observed toxicity to *Eohaustorius, which* is an amphipod common in marine and estuarine environments.

2.1.2.2 Dry Season Water Quality

With the exception of organophosphate pesticides, water quality of dry weather discharges has not changed substantially since the start of the program in 2000. Dry season water quality has not tended to vary greatly between sites or sampling dates. The most significant changes continue to be decreases in the volume of dry weather discharges.

Exceedance of pH criteria remains one of the most common occurrences during dry weather. These exceedances typically occur only in drainages with open concrete channels. These excursions are not observed in waters that enter the storm drains or receiving waters directly from pipes. Extensive testing conducted in the Los Cerritos Channel during the 2010/2011 season demonstrated natural cycling of pH in any shallow, low flow channel with the presence of algae. Controlling these fluctuations would require enclosing the channel or eliminating flow during the dry seasons. Enclosure of the channels would impact bacterial concentrations by eliminating the sanitizing effects of sunlight that helps to control bacteria.

Exceedances of dissolved metals criteria during dry weather are largely limited to copper in waters from the Los Cerritos Channel. In addition, exceedances of dissolved copper criteria are mostly due to the CTR saltwater criteria. During the dry season, hardness values average 184 mg/L. As a result, water quality criteria for hardness dependent metals are elevated which results in few exceedances of the dissolved copper criterion. At this level of hardness, the CTR freshwater dissolved copper criterion is equal to 15.1 µg/L.

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Low levels of four pyrethroid compounds caused exceedances of draft criteria during dry weather however most were detected at concentrations between the Method Detection Limit and the Reporting Limit. Since the criteria proposed by Fojut et al. (2012) are below the reporting limits, these detections were considered to be exceedances. Bifenthrin was the only pyrethroid pesticide detected above reporting limits during the dry weather surveys. With the exception of these pyrethroid pesticides, organic constituents (aroclors, chlorinated pesticides, and organophosphate pesticides) are typically undetected in dry weather samples.

2.1.3 Toxicity Results

The following sections summarize the results of bioassay tests conducted during both dry and wet weather periods at the Stearns Street monitoring site between the year 2000 and 2013. Figure 2-5 and Figure 2-7 summarize chronic toxicity of stormwater to sea urchin fertilization and water flea reproduction, respectively, throughout the thirteen years of the City's monitoring program. Figure 2-4 and Figure 2-6 provides similar summaries of dry weather chronic toxicity for urchins and water fleas, respectively.

Sea urchins have shown more instances of moderate to high (>8 TUc) wet weather toxicity than have water fleas (Figure 2-5 and Figure 2-7).

Figure 2-7 shows a virtual absence of wet weather water flea toxicity after the 2001/2002 storm season at Stearns Street, except minor to moderate reproductive effects in 2004/2005. In the 2008/2009 program, instances of elevated reproductive toxicity were attributed to statistical artifacts due to very low within-test variability. Data from the 2009/2010 and continuing into the 2012/2013 monitoring programs continues to show that water flea toxicity is almost undetectable in wet weather samples.

There was some suggestion in the toxicity data from early monitoring periods that seasonal flushing may have been a factor affecting the variability in storm water toxicity. Early years of the program suggested that *Ceriodaphnia* toxicity was usually somewhat elevated in early versus late storms, but this pattern was not evident in later years. Toxicity to sea urchins has varied widely over the storm seasons allow generally lower toxicity was encountered since 2006 yet occasional toxicity has been encountered at levels as high as 16 TUc or more (Figure 2-5). Since the 2004/2005 storm season water flea toxicity has dropped to near undetectable levels while the sea urchin toxicity has been more sporadic with toxicity increasing slightly in the 2011/2012 and 2012/2013 storm seasons.

Sources of toxicity were examined by comparing measured toxicity with toxicity predicted based upon the chemical analysis of key toxicants. The predicted acute toxicity of the sample is calculated from the measured concentrations of the chemical constituents and their corresponding EC50 or LC50. Expected water flea toxicity was calculated based upon LC50s for zinc, chlorpyrifos and diazinon. Earlier testing implicated these analytes as the primary toxicants contributing to mortality and reproduction. Expected

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toxicity for the sea urchin fertilization test was calculated based upon EC50 data for zinc and copper. With few exceptions, concentrations of these two metals were found to be sufficient to explain the most of the toxicity observed in the sea urchin fertilization tests.

2.1.3.1 Test of Significant Toxicity (TST)

The Test of Significant Toxicity (TST) is a statistical approach to analyze whole effluent tests (WET) and ambient toxicity data that is being developed by the U.S. Environmental Protection Agency. The State Water Resources Board has proposed a draft policy to implement statewide use of the TST approach. The new policy is intended to provide a consistent approach to monitoring toxicity in discharges to inland surface waters, enclosed bays, and estuaries. The potential impacts of incorporating the TST approach into storm water programs have not been fully evaluated.

The TST is designed to be used as a two-concentration data analysis of the sample contrasting receiving water, also referred to as the critical concentration, with a control concentration. Once WET tests are completed, results are analyzed with the TST calculator to assess if the sample was toxic. The TST approach is intended to determine if a sample at the critical concentration and the control within a WET test differ by an acceptable amount. This method yields a simple yes/no as to whether or not a sample is considered toxic.

Table 2-5 provides a comparison of use of the NOEC and TST methods for initiation of Toxicity Identification Evaluations (TIE) using the results of water flea reproduction tests conducted in waters from the Los Cerritos Channel over the past three years. Application of the TST indicated presence of significant toxicity in four of 15 bioassay tests. Only one of these also exceeded an effect level of 50%, which would require immediate implementation of TIE testing under the new Los Angeles County MS4 permit. This was a dry weather sample taken in May 2013.

For the 2012/2013 Los Cerritos Channel season data from all water flea reproduction tests (storm water and dry weather tests) were subjected to both analytical approaches. All storm water samples for water flea reproduction passed using both the NOEC and TST approach. However, use of the TST approach would have triggered an additional TIE test for the Los Cerritos Channel site for a dry weather test in May 2013. This sample had minor evidence of toxicity with a TUc of 2.0. Under the program guidelines, this was minor toxicity was not sufficient to warrant TIE testing.

2.1.4 TMDLS

The Los Cerritos Channel Metals TMDLs established WLAs for total copper, lead and zinc during wet weather and total copper during dry weather. Total lead limits were based upon maintenance of historical concentrations. Total lead concentrations and loads remain compliant with the TMDL limits. Total copper exceeds existing targets by factors ranging from 1.9 to 8. Total zinc exceeds target levels by

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factors of 1.4 to 5.9. Both total lead and total zinc concentrations show evidence of steady decreases in concentration over the past 13 years. During dry weather periods, both concentrations and loads of total copper are declining. The combination of these factors has resulted in dry weather copper loads within the Los Cerritos Channel declining to levels that are less than 20% of the WLA. The copper dry-weather loading capacity (TMDL) for Los Cerritos Channel was established based upon the following calculation: 19.1 µg/L X 2.35 cfs X 0.00539 (conversion factor) = 0.242 lbs/day or 109.7 grams/day. The TMDL objectives are expressed as total recoverable metals.

Dry weather flows have dramatically declined in recent years (Figure 2-3) presumably due to better water conservation efforts. The average flow measured at the Los Cerritos Channel monitoring site has been consistently under 0.5 cfs since 2009. At the same time, concentrations of total copper have significantly declined. The combination of these factors resulted in dry weather copper loads in the Los Cerritos Channel declining to levels that are less than 20% of the WLA.

The wet weather load capacities for total copper, total lead, and total zinc were calculated based upon storm volumes and the following concentrations:

Total copper = 9.8 ug/L
Total lead = 55.8 ug/L
Total zinc = 95.6 ug/L

Table 2-6 provides a summary of the TMDL load limitations for copper, lead and zinc along with storm volumes, calculated loads, and exceedance factors for storm events from 2011 through 2013. As noted above, measured loads of total copper exceed the TMDL limits by a factor of 1.9 to 8.0. Similarly, measured loads of zinc exceed the TMDL limitation by factors ranging from 1.4 to 5.9. Load limits established for total lead were based upon assuring that historical conditions were not exceeded. Lead loads have not exceeded a factor of 0.8 (or 80%) of the limit established in the TMDL. This suggests that the historical decline in lead concentrations is continuing. A comparison of concentrations of total copper, lead and zinc prior to the TMDLs and after the TMDLs (Figure 2-1) shows little evidence of changes for metals over this short time but the concentrations of total lead do show less variability in recent time. In contrast, the concentrations for total copper and zinc show substantial variability in post TMDL measurements.

Figure 2-2 provides a more detailed examination of trends over time. Graphics on the left side of the page separate conditions before and after implementation of the TMDLs while those on the right side of the page simply illustrate long-term trends. Flows associated with monitored events are relatively consistent although there is some suggestion that flows associated with these events have slightly increased over time.

Concentrations of total copper have been relatively stable but both total lead and total zinc concentrations show evidence of decreases in concentration over the past 13 years. Wet weather loads show similar but more muted trends as a result of increase in storm volumes. Apparent decreases in

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total zinc loads after implementation of the TMDL are of interest but are likely an artifact of the limited post-TMDL data set.

Necessary decreases in concentrations of total copper are best illustrated by examination of the distributional characteristics of total copper concentrations. All measurements of total copper have exceeded the limit established in the TMDL. In order to meet TMDL requirements, total copper concentrations will need to be reduced by more than 70%.

2.1.5 Summary of Monitoring Results

Monitoring of storm water runoff and dry weather flows at the Los Cerritos Channel Stearns Street mass emission site over the past 13 years has resulted in the identification of a relatively small list of constituents of concern. Elevated concentrations of total recoverable aluminum, copper, lead and zinc are commonly associated with storm water discharges due to increased sediment loads. Concentrations of these metals are typically associated with elevated sediment concentrations during storm events. Aluminum is expected to be elevated during storm events simply due to the natural abundance of this metal in soils. Although aluminum temporarily exceeds drinking water quality criteria during storm events, it is not considered to be a major constituent of concern. Concentrations of total recoverable lead are also elevated during storm events but concentrations of dissolved lead consistently meet existing water quality objectives. As a result, the Los Cerritos Channel Metals TMDL established a WLA for total recoverable lead based upon existing loads for both anti-degradation purposes and to assure that downstream waters are protected. Concentrations of dissolved copper and zinc commonly exceed freshwater water quality criteria [California Toxics Rule (CTR) Criteria Maximum Concentrations (CMS)] during storm events and are the two metals of primary concern. Long-term trends suggest that both lead and zinc have been declining slightly during the past decade but concentrations of copper remain relatively steady. Concentrations of copper are expected to decline with reductions in the copper content of brake pads. Recent information from the Washington State Department of Ecology and NSF International indicate that significant reduction of copper in brake pads have already begun (See California Stormwater Quality Association Technical Memo in Attachment D).

Two organophosphate pesticides, diazinon and chlorpyrifos, were commonly detected in storm water runoff before 2002-2003 when they were banned for residential use. By 2006, concentrations of both compounds declined to levels below benchmarks established by California Fish and Wildlife. These compounds are no longer considered to be constituents of concern.

Fecal Indicator Bacteria (FIBs) tend to be elevated in receiving waters during both wet and dry weather, but concentrations increase substantially during storm events. Concentrations of fecal coliform range from 10^4 to 10^5 MPN/100 ml during storm events.

Exceedance of pH criteria is common during periods of dry weather. A year-long study identified a consistent daily cycle of increasing pH during the day and decreasing concentrations at night that was attributed to low flows and intensive algal production. When storm events occur, pH concentrations become relative stable and remain within water quality objectives.

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Organochlorine pesticides are not common in stormwater discharges from the Los Cerritos Channel but, when detected, concentrations are typically near detection limits. In most cases, measured values range from near at concentrations within 10 times the reporting limits.

In recent years, monitoring was extended to incorporate pyrethroid pesticides. Four of these compounds, bifenthrin, cyfluthrin, cypermethrin and permethrin are of primary concern. Initial studies indicate that concentrations measured during storm events are sufficient to produce a toxic response to more sensitive bioassay species. These compounds are also present in dry weather flows but concentrations are diminished.

A general trend of reduced toxicity has been observed for both stormwater and dry weather flows from the Los Cerritos Channel Freshwater watershed. Thirteen years of bioassay testing during both wet and dry weather indicates that toxicity is decreasing in both frequency and intensity. Decreases in toxicity are most evident during periods of dry weather with tests conducted with water fleas showing the most improvement. Decreases in toxicity were attributed to the elimination of residential uses of diazinon and chlorpyrifos. Bioassays using the sea urchin fertilization test have shown similar improvements. A number of TIEs have been conducted during this time period and in all cases results of the TIEs have shown that toxicity was caused by cationic metals. Cationic metals are simply metals in an ionic form with positive charges. These may include forms of the more common metals present in runoff (cadmium, copper, nickel, lead and zinc).

Comparisons of the actual toxicity versus expected toxicity calculated from the concentrations of key toxicants confirmed that metals were the most likely cause of toxicity in the sea urchin fertilization test. Concentrations of dissolved metals, particularly zinc and copper, measured in stormwater samples were typically sufficient to explain observed toxicity.

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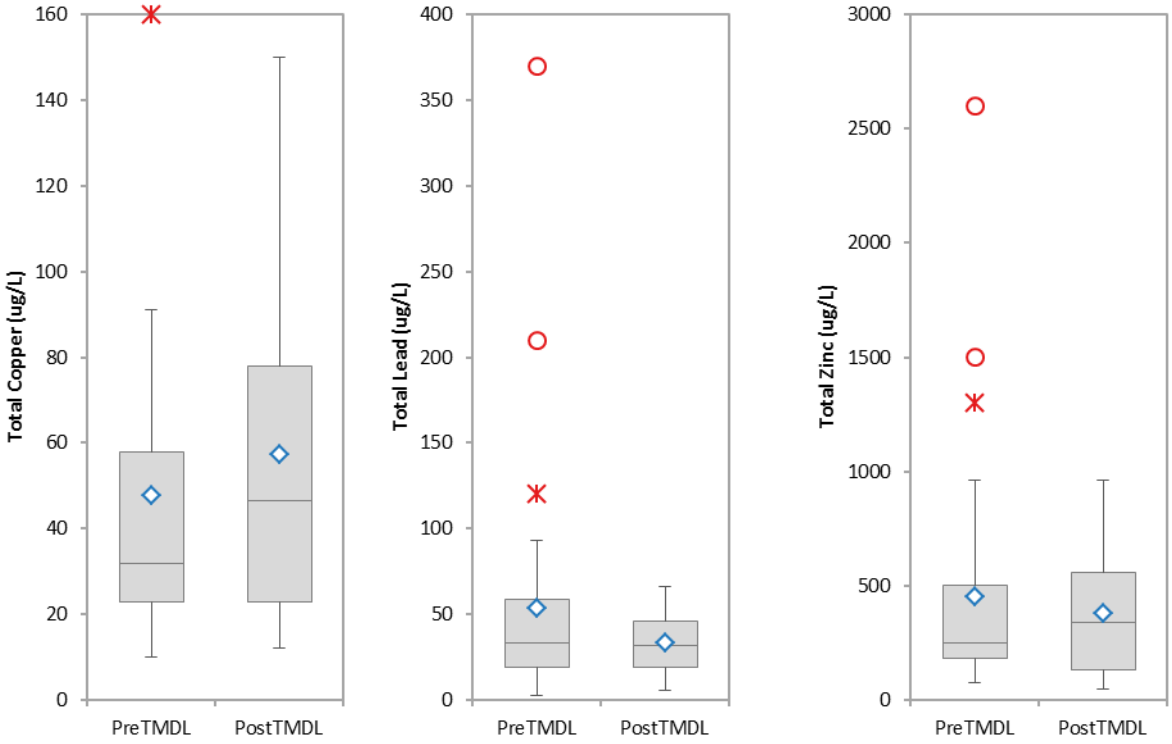


Figure 2-1. Box Plots showing the Distribution of Total Copper, Lead and Zinc before and after TMDL Implementation at the Los Cerritos Channel Monitoring Site (PreTMDL=35 samples, PostTMDL=10 samples)

Box plots display the minimum, 1st quartile, median, mean and 3rd quartile are displayed together with both limits (the ends of the "whiskers") beyond which values are considered anomalous. The mean is displayed with blue ◊ and a black line corresponds to the median. Limits are calculated as follows:

Lower limit: Linf = X(i) such that {X(i) – [Q1 – 1.5 (Q3 – Q1)]} is minimum and X(i) = Q1 – 1.5 (Q3 – Q1).

Upper limit: Lsup = X(i) such that {X(i) - [Q3 + 1.5 (Q3 – Q1)]} is minimum and X(i) = Q3 + 1.5 (Q3 – Q1)

Values that are outside the [Q1 - 3 (Q3 – Q1); Q3 + 3 (Q3 – Q1)] interval are displayed with the * symbol. Values that are in the [Q1 - 3 (Q3 – Q1); Q1 – 1.5 (Q3 – Q1)] or the [Q3 + 1.5 (Q3 – Q1); Q3 + 3 (Q3 – Q1)] intervals are displayed with the "o" symbol.

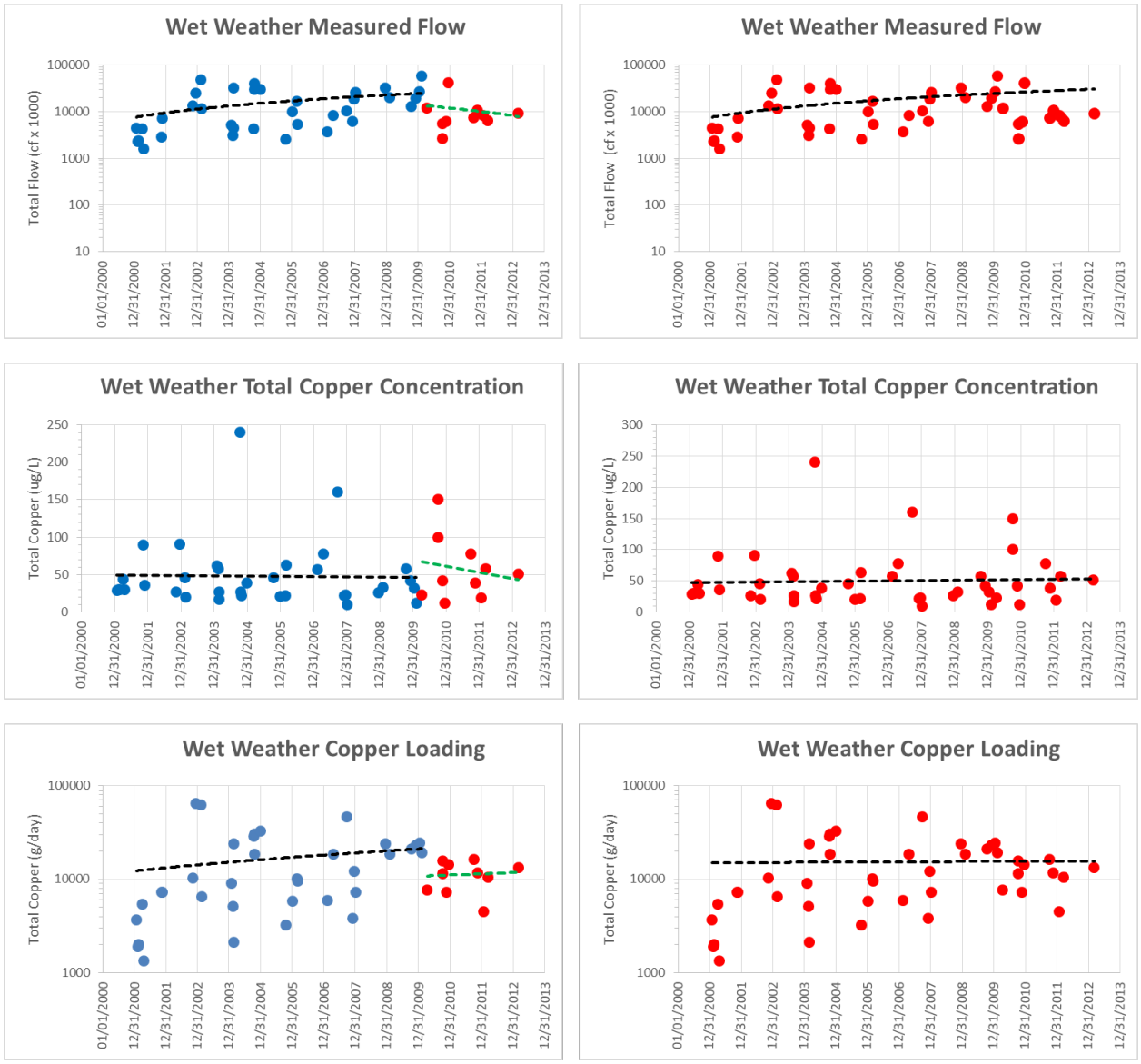
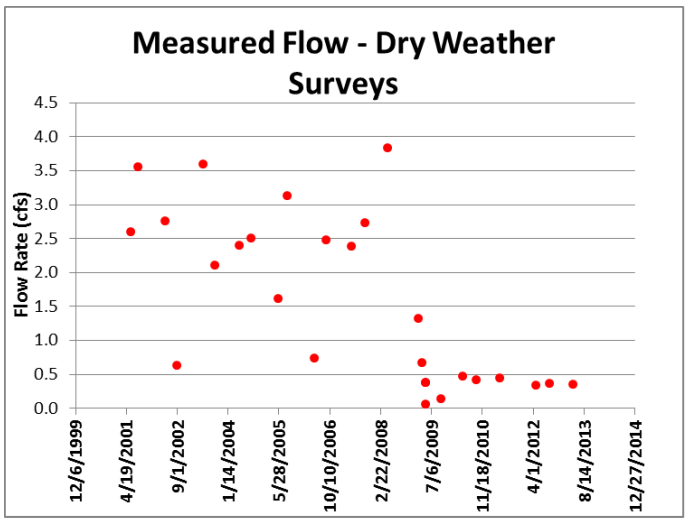
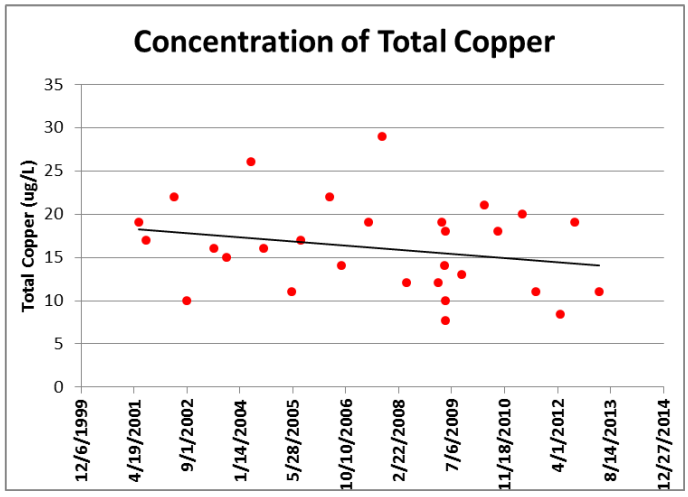


Figure 2-2. Stormwater Flow, Concentration and Loads for Total Copper, Zinc and Lead at the Los Cerritos Channel Station.

RB-AR7956





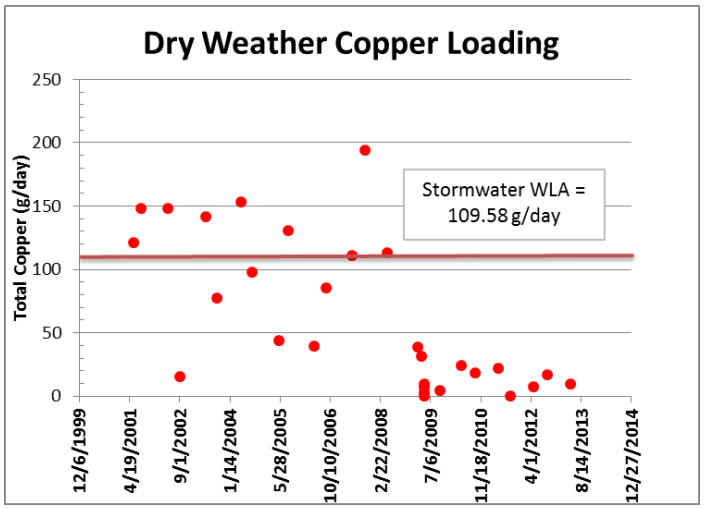


Figure 2-3. Dry Weather Flow, Total Copper Concentrations and Total Copper Loading at the Los Cerritos Channel Monitoring Site

RB-AR7957

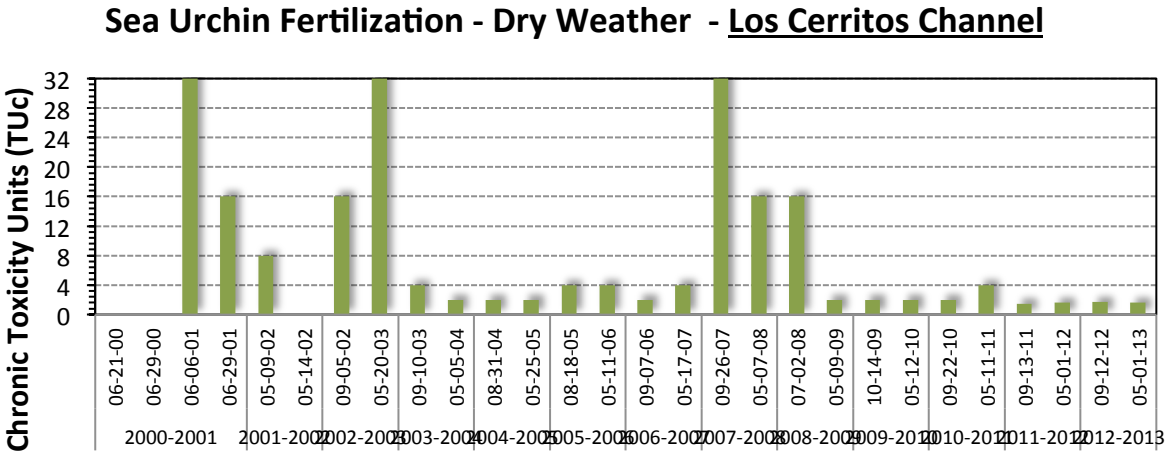


Figure 2-4. Chronic Toxicity of Dry Weather Discharge to Sea Urchin Fertilization 2000 to 2013.

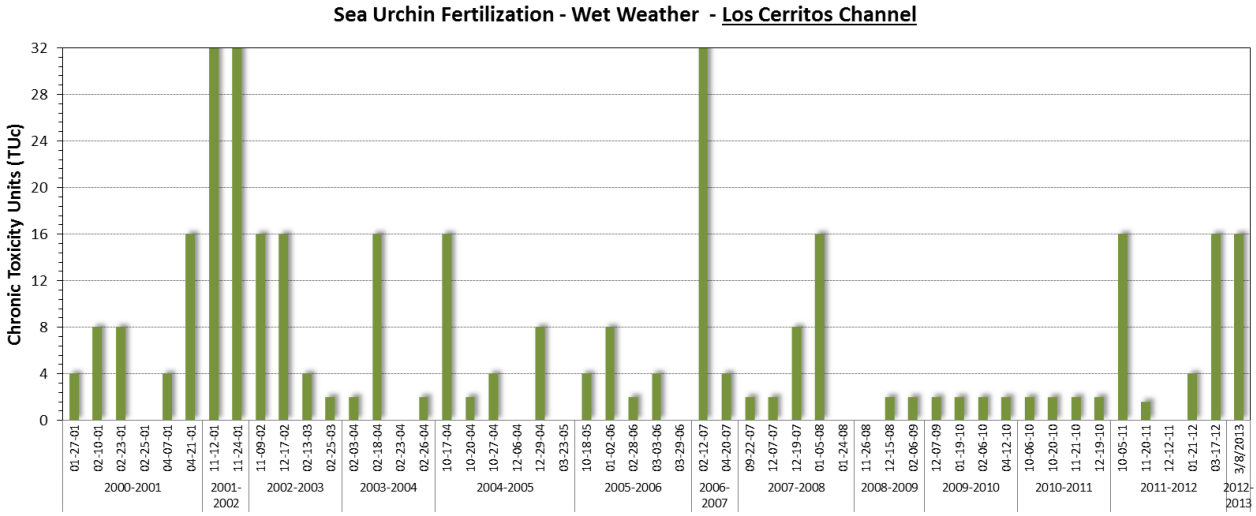


Figure 2-5. Chronic Toxicity of Stormwater Discharge to Sea Urchin Fertilization 2000 to 2013.

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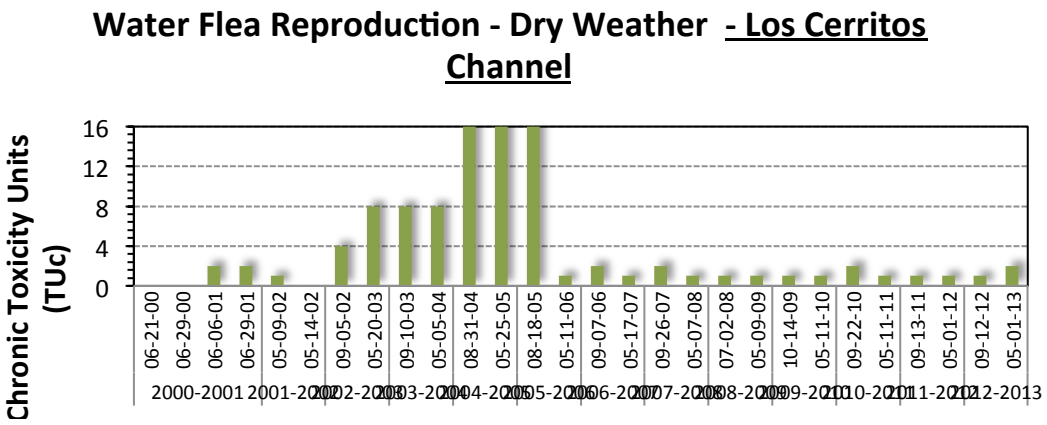

Figure 2-6. Chronic Toxicity of Dry Weather Discharge to Water Flea Reproduction 2000 to 2013.

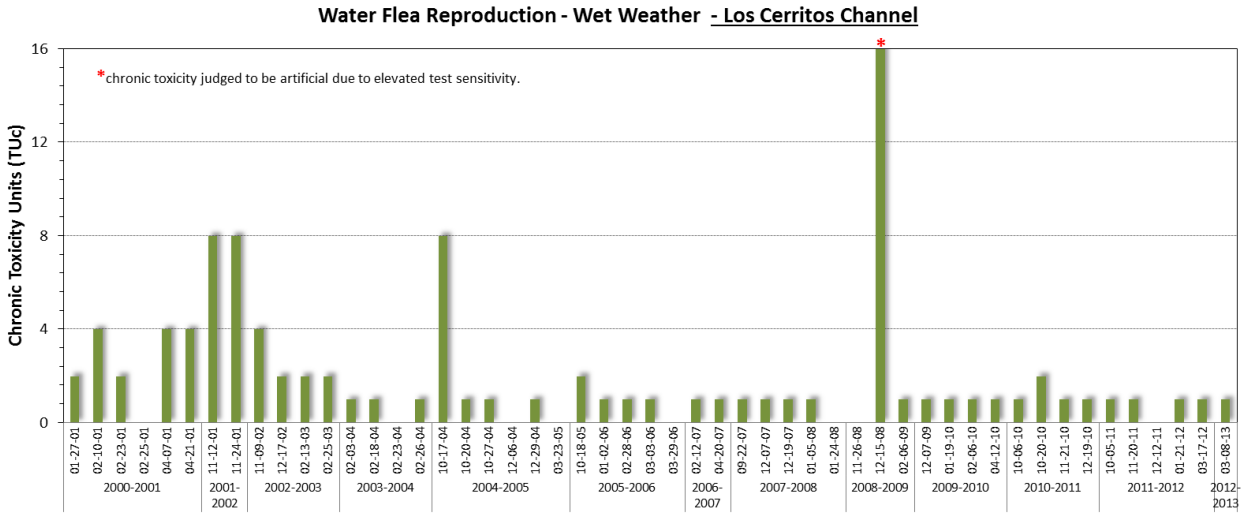

Figure 2-7. Chronic Toxicity of Stormwater Discharge to Water Flea Reproduction 2000 to 2013

3.0 Water Quality Improvement Strategy

3.1 Overall Multi-Pronged Strategy

The Los Cerritos Channel Watershed Group (Watershed Group) has considered how best to develop a watershed management program to implement the requirements of Part VI.C.1.a of Order No. R4-2012-0175 and Part VI.C.1.a of Order no. R4-2014-0024 on a watershed scale through each Permittee's stormwater management program and through customized strategies, control measures, and best management practices (BMPs).

The Watershed Group has revisited strategies, control measures, and BMPs that it has discussed during the last five years and has concluded that addressing water quality impairments within the Los Cerritos Channel receiving waters should be based on a multi-faceted strategy initially focused on source control, runoff reduction, and total suspended solids (TSS) reduction. If pollutants are not generated or released, they will not be available for transport to the receiving waters. In addition, if soils can be stabilized, sediment controlled, and dry-weather runoff and initial flushes of stormwater runoff eliminated or greatly reduced, the major transportation mechanisms will be eliminated or greatly reduced, and many fewer pollutants will reach the receiving waters.

The Los Cerritos Channel Watershed Group plans to implement a water quality improvement hierarchy based on true source control, runoff reduction, and TSS reduction. Moving up the pyramid, treatment controls will constitute the smallest component of the overall program, as source control, reduction, LID and green streets, operational source control, capture and infiltration, and capture and use are all more effective methods for improving water quality.

3.2 Source Control Strategy

Members of the Watershed Group are interested in both "true source control" (pollution prevention) and "operational source control." The Watershed Group has been particularly focused on true source control because major sources of copper, lead, and zinc are released into the atmosphere, which results in widespread deposition on impervious surfaces such as streets, highways, parking lots, and rooftops. In addition, these metals are discharged directly onto streets, highways, parking lots, and driveways from motor vehicle components such as brakes, wheel weights, and tires.

Each of the cities within the watershed contributed either directly or indirectly to the effort by the California Stormwater Quality Association (CASQA) and Sustainable Conservation to develop

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and negotiate the legislative proposal that ultimately became SB 346, which was adopted by the legislature in 2010 and signed by the Governor on September 25, 2010 as Chapter 307 of the Statutes of 2010. The passage of SB 346 is a milestone that will significantly reduce the level of copper in metropolitan area waters throughout the state since vehicle brake pads constitute the single largest source of copper in metropolitan environments (See Figure 3-2.) SB 346 requires incremental reduction in the amount of copper in vehicle brake pads with key milestone dates of January 1, 2021, when most brake pads sold in California will be required to contain less than 5% copper by weight and January 1, 2025, when most brake pads will be required to contain less than 0.5% copper by weight. (See Figure 3-3.) Indications from the major brake pad friction materials manufacturers are that they are planning, where feasible, to go straight to a "zero" copper pad where no copper is intentionally added to the pad. They will do this in order to reduce the multi-million dollar costs that would result from two friction materials reformulations within a few years.

Figure 3-1. Water Quality Improvement Hierarchy

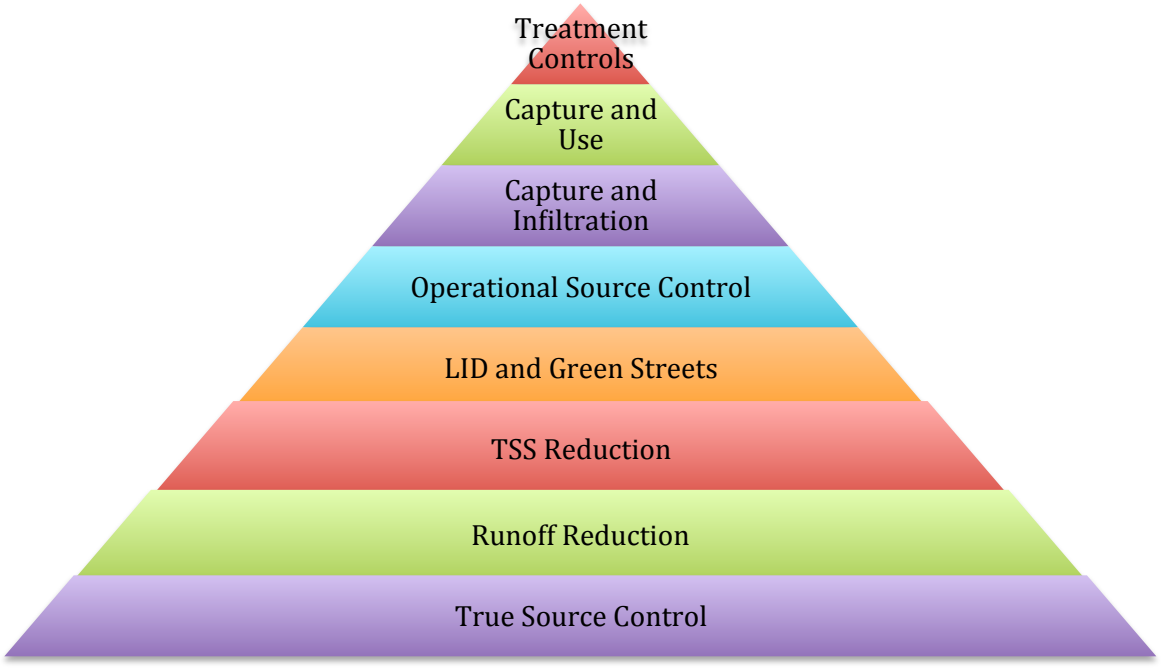

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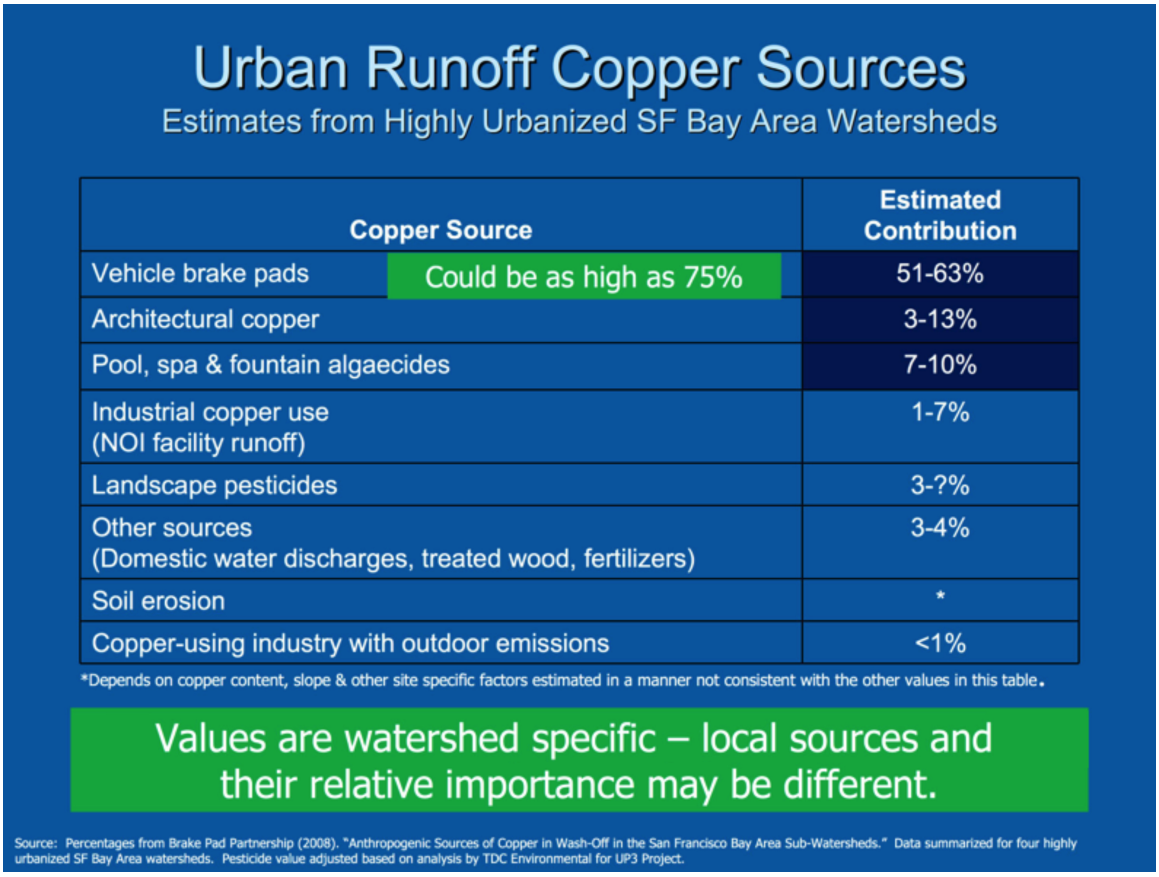
Figure 3-2



Source: Percentages from Brake Pad Partnership (2008). "Anthropogenic Sources of Copper in Wash-off in the San Francisco Bay Area Sub-Watersheds." Data summarized for four highly urbanized SF Bay Area Watersheds. Pesticide value adjusted based on analysis by TDC Environmental for UP3 Project.

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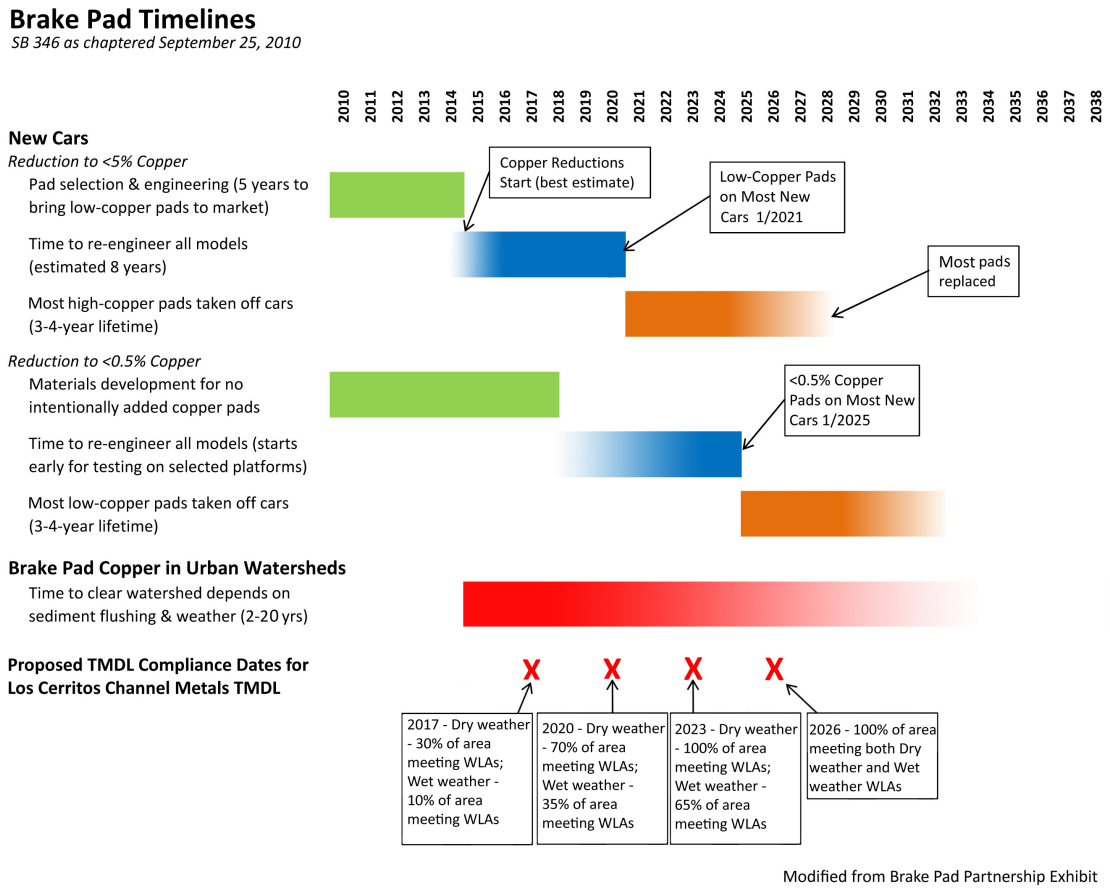
Figure 3-3



Modified from Brake Pad Partnership Exhibit

To improve its understanding of the potential impacts of SB 346, the Watershed Group commissioned a study, "Estimate of Urban Runoff Copper Reduction in Los Angeles County from the Brake Pad Copper Reductions Mandated by SB 346." (See Attachment D.) This estimate relied on available information, which was largely developed through a lengthy collaboration among brake pad manufacturers, government agencies, and environmental groups in the Brake Pad Partnership. The estimate examined three scenarios: a one-step reduction in copper, a two-step reduction in copper, and an aftermarket exemption for 0.5% copper. Scenario one showed a 60% reduction in urban runoff copper reduction from brake pads alone by 2024 and a 61% reduction by 2028. Scenario two showed a 45% reduction by 2024 and a 60% reduction by 2028. Scenario three showed a 39% reduction by 2024 and a 49% reduction by 2028. A CASQA subcommittee is proposing to update these estimates in 2015 by incorporating new baseline copper concentrations data for new vehicles from Washington State, brake pad industry guidance on various assumptions used in the estimate, and the fraction of all brake pad formulations certified as containing less than 0.5% copper. All brake pads sold in California after January 1, 2014 are to be certified and marked with edge codes indicating this compliance level. As of November 7, 2014, 4,679 brake pads have been certified by NSF International, the

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organization that certifies the measurement of copper in brake friction materials. The edge codes will provide information on copper content and the requirement that on and after January 1, 2014 any motor vehicle brake friction materials sold in California must contain no more than 0.1 percent by weight of the following materials: cadmium and its compounds, chromium (VI) salts, lead and its compounds, mercury and its compounds, and asbestiform fibers. There is a limited exception for depletion of inventories, but that exception ends December 31, 2023. The copper reduction study and an accompanying spreadsheet of calculations were reviewed with staff of the Los Angeles Regional Water Board in connection with the development and adoption of an Amendment to the Water Quality Control Plan for the Los Angeles Region to Incorporate Implementation Plans for the Total Maximum Daily Loads for Metals in the Los Cerritos Channel and for Metals and Selenium in the San Gabriel River and Impaired Tributaries.

The results of the study are reflected in the Reasonable Assurance Analysis (RAA) performed to demonstrate that the activities and control measures identified in the Watershed Management Program will ensure that Permittee MS4 discharges will achieve applicable water quality-based effluent limitations for copper.

The Watershed Group has concluded that the most cost-effective and long-lasting way to solve water pollution problems is to develop state-wide or regional control measures that will encourage or require, if necessary, product substitution or material substitution at the manufacturing stage. This can be a complex and time-consuming process, but the payoff in water quality improvement can be tremendous.

The members of the Watershed Group are now looking forward to working with the California Stormwater Quality Association to address a major source of zinc – tires. The Department of Toxic Substances Control (DTSC) adopted new Safer Consumer Product Regulations that became effective October 1, 2013. These regulations contain a process for identifying and prioritizing Chemicals of Concern in Priority Products containing these constituents, as well as a process for eliminating or reducing the adverse impacts of Chemicals of Concern in Priority Products. It will apply to most consumer products placed into the stream of commerce in California. It specifically applies to adverse environmental impacts, including adverse water quality impacts, and it contains a petition process for identification and prioritization of chemicals and projects. CASQA, supported by Los Angeles River Watershed permittees, has started the process of conducting research and building a file of critical information to support the designation of zinc in tires as a future priority product/constituent combination. The initial product of this effort is a zinc literature survey that discusses major and minor sources of zinc as documented in scientific literature from around the world.

The cost and effectiveness relationships between true source control, operational source control, and treatment control are shown in Figure 3-4, prepared for CASQA.

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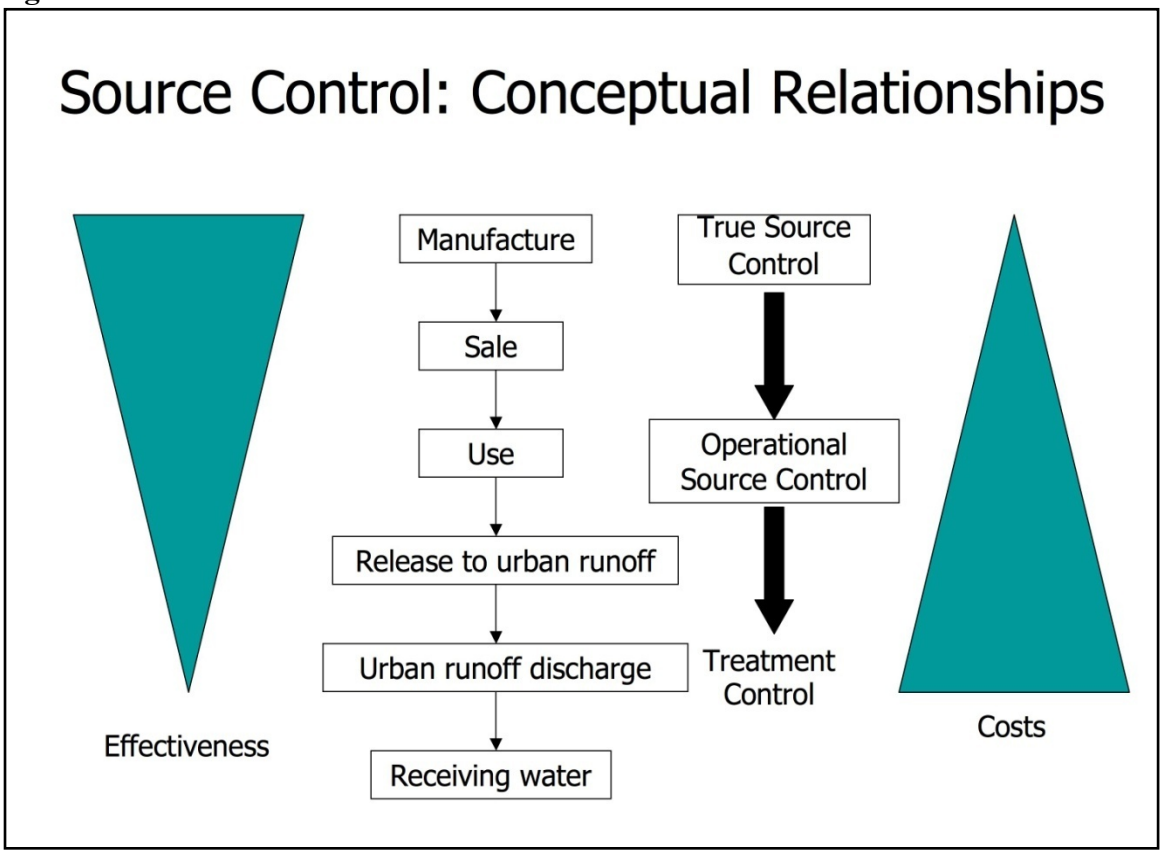
Figure 3-4



Source: California Stormwater Quality Association (CASQA)

Because the requirements for inclusion on the initial priority product list are quite restrictive, the regulations cannot be used to control zinc in tires until after January 1, 2016. However, the Watershed Group and others will be able to utilize the next two years to work with CASQA and others to develop a well-supported petition to support the addition of zinc in tires as a product-chemical combination on the Priority Products List.

Operational source control involves such measures as street sweeping and working with public and private entities to reduce or eliminate the discharge of pollutants. The Permittees within the watershed will use their Public Outreach Programs and Public Agency Activities Programs to promote and monitor operational source control measures addressing priority pollutants within the Watershed.

The Industrial General Permit, readopted on April 1, 2014, will help control zinc associated with industrial processes. However, it does not regulate outdoor sources of zinc such as galvanized chain link fences and roofs that are common at industrial facilities, but not directly associated with industrial processes.

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Permittees will also address outdoor sources of zinc and other metals partially through the following runoff reduction strategy. Capturing and infiltrating and/or using runoff will interrupt the transport of these metals to receiving waters.

3.3. Runoff Reduction Strategy

In conjunction with true source control (prevention of pollutants at the source) and operational source control, the Watershed Group will implement a runoff reduction strategy that initially will focus on reduction of dry-weather runoff that will result in substantial water quality improvements during dry-weather days (approximately 330 days per year on average). This will be accomplished through a combination of water conservation and improvements in landscape irrigation efficiency to eliminate or greatly reduce overspray and runoff that provides a transport mechanism to carry pollutants to the storm drain system and hence to the receiving waters of the Los Cerritos Channel. Strategic location of green street elements will also help reduce dry-weather runoff.

The Watershed Group will give both short-term and long-term emphasis to dry-weather runoff reduction in order to reduce or eliminate runoff as a mechanism to transport metals from industrial facilities, roads, parking lots, and driveways to the Los Cerritos Channel receiving waters. Water conservation measures will be emphasized in order to reduce the potential for dry-weather runoff. The Watershed Group has already realized reductions in runoff due to the application of water conservation measures. Water conservation and improved irrigation practices will be supplemented by: a) the diversion of dry-weather discharges to facilities designed to store and infiltrate water, and b) a reduction in directly connected imperious surfaces over time.

Reducing runoff during wet weather is a challenging and costly undertaking. The Watershed is essentially built-out and will be primarily dependent on redevelopment to create opportunities for wet-weather runoff reduction. However, the member agencies will endeavor to incorporate green infrastructure into redevelopment projects, implement green streets, retrofit LID components at key locations, capture and use or infiltrate stormwater, and reduce directly connected impervious areas to the extent reasonably feasible. Wet weather runoff reduction is a long-term measure that will be addressed in later phases of the implementation plan as grant funds become available. After source control and runoff reduction, members of the Watershed Group will look to sediment control, direct infiltration, capture and infiltration, capture and use, and treatment controls. (See Figure 3-1, the Water Quality Improvement Hierarchy that is central to the Water Quality Improvement Strategy of the Los Cerritos Channel Freshwater Watershed.)

Areas tributary to well-maintained BMPs designed to capture and infiltrate or capture and use the runoff from an 85th percentile, 24-hour storm should be deemed to be in compliance with

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the assumptions and requirements of the WLAs for Watershed Management Programs as well as for Enhanced Watershed Programs.

The members of the Watershed Group propose to collaborate with water purveyors and their planning departments to use local water conservation requirements and implementation of AB 1881, the Water Conservation in Landscaping Act, to reduce both dry-weather and wet-weather runoff. AB 1881 was approved in the fall of 2006 with a requirement that the Department of Water Resources (DWR) update the model local water efficient landscape ordinance adopted by the Department in the early 1990s pursuant to Chapter 1145 of the Statutes of 1990. The updated model ordinance was promulgated by the Department on September 10, 2009. The Act required that not later than January 1, 2010, local agencies either adopt the updated model ordinance or another water efficient landscape ordinance at least as effective in conserving water as the updated model ordinance. By January 31, 2010, each local agency was required to notify the DWR whether it had adopted its own water efficient landscape ordinance or the updated model ordinance.

AB 1881 encourages the capture and retention of stormwater onsite to improve water use efficiency and water quality. It includes a requirement for a landscape water budget that establishes the maximum amount of water to be applied through an irrigation system. The model ordinance applies to new construction and rehabilitated landscapes for public agency projects and private development projects with a landscape area equal to or greater than 2,500 square feet, as well as developer-installed new construction and rehabilitated landscapes in single family and multi-family projects requiring a building or landscape permit, plan check, or design review. Since the watershed cities are largely built-out, the requirements will generally be limited to public projects and redevelopment projects, but every reduction in landscape irrigation should assist in reducing metal loads.

The majority of cities in the Watershed Group have already adopted water conservation ordinances that require the immediate conservation of water, usually as a progressive scale based on drought levels. These cities have also adopted landscape irrigation efficiency ordinances.

In addition, the Caltrans Stormwater Management Plan (SWMP) specifies requirements for the implementation of BMPs for State transportation projects (Caltrans 2003). Whenever a Caltrans project results in stormwater runoff to receiving waters or a storm drain system owned by another permittee, Caltrans is required to consider approved treatment systems (referred to as Category III BMPs) and, where feasible, to install them. Approved treatment systems vary, but Caltrans maximizes the use of biofilters or bioswales to reduce runoff and pollutant loads. Other approved treatment systems include infiltration basins, detention basins, traction sand traps, and dry weather flow diversions. Continued implementation of these requirements will provide

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water quality benefits over the long term. It may be possible to further increase the use of structural BMPs to maximize infiltration onsite.

Reductions in dry-weather flows in recent years demonstrate that voluntary and mandatory reductions in irrigation have already had a significant impact. The average dry-weather runoff between 2001 and 2009, as measured at Stearns Street, was 2.35 cfs. It is now less than 0.5 cfs. This means that there has been a 78% reduction from the average flows between 2001 and 2009. The RAA modeled an average 2003 dry-weather flow of 4.65 cfs and an average 2008 dry-weather flow of 2.20 cfs, and the existing measured dry-weather flow is 89% lower than the modeled 2003 dry-weather flows and 77% lower than the modeled 2008 dry-weather flows. This indicates that current dry-weather pollutant loads are significantly less than the modeled 2003 and 2008 daily pollutant loads. Continued restrictions on irrigation, replacement of turf, and installation of more efficient irrigation equipment in response to runoff restrictions will result in further reductions in irrigation and runoff.

3.4 Total Suspended Solids Reduction Strategy

After reviewing the "Wet-Weather Modeling Analysis" subsection of the Linkage Analysis in the Los Cerritos Channel Total Maximum Daily Loads for Metals, the Watershed Group concluded that beyond the Minimum Control Measures, runoff reduction, and implementation of SB 346, initial implementation of its multi-pronged strategy should focus on TSS reduction. This conclusion is based on statements in the TMDLs document. The wet-weather Modeling Analysis discussion in the TMDLs stated that "To assess the link between the sources of sediment, metals, and the impaired waters, a modeling system was utilized that simulates land-use based sources of sediment and associated metals loads and the hydrologic and hydraulic processes that affect delivery." It went on to say that "Loading processes for metals (copper, lead, and zinc) for each land use were represented through their association with sediment." These statements about the modeling process describe the bases for the metals TMDLs and indicate that initial WMP measures implemented in the watershed should focus on TSS reductions. Reducing TSS in the receiving waters should result in a significant reduction of metals and legacy organics in the receiving waters since both groups of pollutants adhere to sediment. The greater the reduction in TSS, the greater the reduction in metals and legacy organics. Initial emphasis on TSS reduction should reduce the volume of water that ultimately needs to be captured and infiltrated or used to achieve standards for the Category 1 pollutants being addressed by the WMP – namely metals and legacy organics. This would make implementation of the WMP more cost-efficient.

Table 3-1 below, and the accompanying box plots on the following page, provide a summary of TSS concentrations at the Stearns Street monitoring site over a 13-year period, based on 74 wet-weather observations and 25 dry-weather observations.

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Table 3-1. Summary statistics of TSS (mg/L) measured at the Los Cerritos Channel Stearns Street mass emission and TMDL monitoring site.

Statistic	Wet Weather	Dry Weather
No. of observations	74	25
Minimum	17	2
Maximum	1700	128
1st Quartile	96	7.5
Median	155	13
3rd Quartile	260	41
Mean	227	27
Standard deviation (n-1)	256	30

Although the Reasonable Assurance Analysis is assuming only a 5% reduction in TSS through implementation of the TSS Reduction Strategy, the Watershed Group is actually targeting a reduction in the wet-weather mean concentration of TSS at Stearns Street from 227 mg/l to 150 mg/l. This target seems reasonable in light of TSS concentrations in other developed watersheds. It would be a 34% reduction in the mean concentration of TSS. Since the wet-weather mean sediment load is greatly influenced by the larger loads associated with large storms, to significantly reduce the TSS load in the channel, the Watershed Group will need to adequately address sediment concentrations resulting from larger storms. Implementation of this strategy will be assessed through the adaptive management process.

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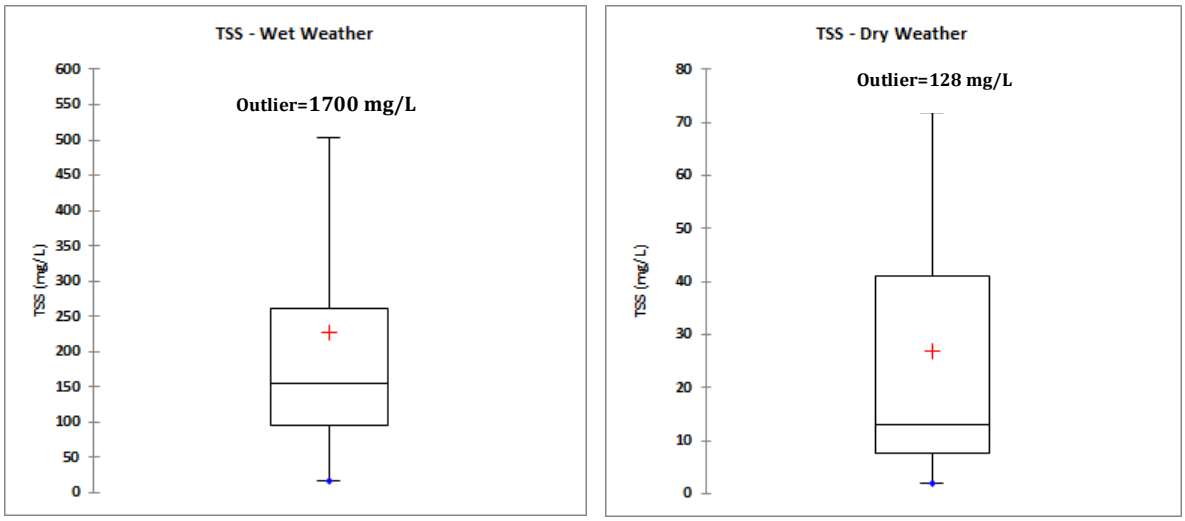
Table 3-2. Box Plots of Wet and Dry Weather TSS Concentrations at the Los Cerritos Channel Stearns Street Mass Emissions and TMDL Monitoring Site



Dark center line is the median (50th percentile), the red plus sign is the arithmetic average, the upper end of the box is the third quartile or Q3 (75th percentile), the lower end of the box is the first quartile or Q2 (25th percentile), the upper whisker is (Q3 + 1.5*(Q3-Q1)), the lower whisker is (Q1-1.5* (Q3-Q1).

The TSS Load Reduction Strategy is targeted at accelerating reductions of Category 1 pollutants addressed by the Los Cerritos Channel Metals TMDLs and the Greater Harbor Toxics TMDLs. It will also help to address bacteria loading within the watershed. The final compliance date for the Los Cerritos Channel TMDLs is September 30, 2026, and the final compliance date for the Greater Harbor Toxics TMDLs is March 23, 2032. The Watershed Group believes that TSS reduction, combined with true source control (discussed in Section 3.2), low impact development, green streets, and implementation of minimum control measures will constitute a strong and effective initial implementation of the WMP. The combination of these measures will facilitate compliance with interim milestones while providing time for funding measures to be put in place to pay for the design, construction, and operation of stormwater capture and low flow diversion facilities and to develop working relationships with water and wastewater agencies.

The core of this program is the Group's soil stabilization/sediment control strategy, described in Section 3.5 of the WMP. Two key components of this strategy are implementation of enhanced erosion and sediment control at construction sites, in accordance with each city's Development Construction Program (see Section 4.3.2), and stabilization of exposed soil not associated with construction sites. As noted above, the Group recognizes that the total sediment load in the Channel is closely associated with infrequent larger storms. For this reason, the Group's soil stabilization/sediment control program will emphasize soil stabilization and, for the larger sources of exposed sediment in each jurisdiction, supplemental sediment control measures. The

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Group intends to reduce the sediment load from the watershed, as measured at the Stearns Street monitoring station, by at least 20% by 2020. The Watershed Group considers this is a reasonable target given the magnitude of exposed dirt in the watershed. Such a reduction would result in significant reductions in the loads of metals, legacy organics, and bacteria.

In preparation for addressing exposed soil not associated with construction sites, various member cities have conducted initial assessments of exposed soil within these jurisdictions. The assessments indicated that the City of Signal Hill has the highest percentage of exposed dirt in the Watershed due to a number of factors, including slopes and the impacts of current and historic oil production. Therefore, the initial focus for TSS reduction will be on sub-basin 4 (See Figure 1-4 and Attachment B), which includes portions of Signal Hill and Long Beach. An initial analysis of exposed dirt not associated with construction in the portion of Signal Hill in the Los Cerritos Channel Watershed indicates that it totals approximately 3.06 million square feet (70.3 acres), or 13.2% of the city area within the Watershed. This is a much higher proportion of exposed dirt than in any other city in the Watershed. In addition, Signal Hill has greater local relief than the other cities within the Watershed and hence a higher probability of significant erosion and discharge of sediment than other portions of the Watershed. Furthermore, sub-basin 4 was modeled as being the number one source of zinc in the Watershed during development of the Metals TMDLs by USEPA.

The City of Signal Hill has agreed to develop a model vacant lot ordinance designed to reduce the discharge of sediment from the City. Development of the ordinance will consider elements of a vacant lot landscaping ordinance adopted by the City of Whittier and Signal Hill's own ordinances dealing with Storage Yards and Outdoor Storage Areas and with Trucking Yard Performance Standards. The Whittier Ordinance defines different types of vacant lots and specifies landscaping, irrigation, and maintenance requirements for lots. Lots smaller than one-half acre must be fully landscaped with draught tolerant or xeroscape material that requires no or little water after the first three years of growth. For lots one-half acre or larger, a minimum five-foot wide landscaped planter is required adjacent to public rights-of-way, except alleys, using the same landscaping materials used in the smaller lots. Perimeter barrier fences are also required behind the planters. The model ordinance will specifically focus on erosion and sediment control. It will also likely utilize the compliance plan approach used in the Signal Hill ordinances as a tool to build consensus on how best to reduce erosion and the discharge of sediment. The Signal Hill ordinances include a procedure for City review of properties for compliance with provisions of the ordinances. The City then prepares compliance plans for non-compliant properties and allows property owners to prepare alternative compliance plans for City approval.

The initial assessments conducted have indicated that two of the other potential major sources of exposed soil within portions of the watershed are beyond the direct control of the cities. These are Caltrans rights-of-way and transmission line rights-of-way. Caltrans rights-of-way are

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found in Sub-basins 1, 2, 4, 8, 9, and 10. Transmission line rights-of-way are found in sub-basins 1, 2, 8, 9, and 10. Since Caltrans is a participant in the Watershed Group, the cities will work with Caltrans to ensure that its rights-of-way are stabilized in a timely manner. However, since the public and private utilities whose rights-of-way must be stabilized are not members of the Watershed Group, negotiations with the utilities on how best to keep sediment from their rights-of-way out of the storm drain system will be necessary. This process has already begun with meetings held with representatives of Southern California Edison.

3.4.1 Soil Stabilization/Sediment Control

The Watershed Group plans a major, multi-faceted program to control sediment to implement its TSS Reduction Strategy and because metals (Category 1 Priority Pollutants) are ubiquitous within the area due to atmospheric deposition. These metals adhere to sediment and are transported to receiving waters by rainfall and urban runoff. The approaches to sediment control proposed for use in the watershed include enhanced erosion and sediment control at construction sites, stabilization of exposed soil not associated with construction sites, enhanced street sweeping, and enhanced parking lot sweeping.

Since the area is built out, there is limited construction at any given time. However, enhanced erosion and sediment control at all construction sites involving disturbed soil of one-acre or more is mandated by the current State Construction General Permit that became effective on July 1, 2010. In addition, the Permittees will require an effective combination of erosion and sediment controls for construction sites of less than one acre, consistent with Part IV.D.8.d of Order No. R4-2012-0175. They also will employ erosion and sediment control on publicly owned areas with exposed soil, and will encourage and/or require private property owners to stabilize exposed soil on vacant lots and other privately owned sites. These practices will first be employed in the Phase I sub-watersheds (See Section 6).

Cities throughout the Watershed will consider the adoption of vacant lot ordinances that will contain landscaping as well as erosion control and sediment control, based on experience with a pilot ordinance proposed for adoption by the City of Signal Hill, to help with initial implementation of the TSS Reduction Strategy.

Caltrans will stabilize exposed soil within its rights-of-way in order to reduce the transport of metals in runoff from its facilities and to sequester legacy lead that can be transported by wind as well as water.

3.4.2 Enhanced Street Sweeping

Enhanced street sweeping will be especially important until the sources of metals in atmospheric deposition are controlled. Metals are deposited on streets, highways, and parking lots directly from cars and trucks and also across the Watershed by atmospheric deposition.

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Much of the critical sediment for transporting metals to receiving waters is very fine and not picked up by traditional broom sweepers.

Street sweeping is getting renewed attention as an operational best management practice to reduce the discharge of sediment and metals. New vacuum sweepers and regenerative sweepers are quite effective at removing fine particles from streets and parking lots. The U.S. Navy is one of the agencies examining the use of high-efficiency sweepers to remove metals from its facilities. In May 2008, the Navy's Space and Naval Warfare Systems Command (SPAWAR) Systems Center in San Diego made a presentation entitled, "Metals Load Reduction in Storm Water Using High-Efficiency Sweepers" to a Joint Services Environmental Management Conference. The Navy observed that there are numerous widespread sources of metals, some of which are not easily controlled. The Navy is responsible for large areas with many discharge points. The Navy was concerned that stormwater metals concentrations, particularly copper and zinc, commonly exceed storm or process water discharge compliance requirements, since metals accumulate in sediments and receiving water impacts occur at low concentrations.

The Navy focused on street sweeping as a potentially effective BMP for reducing the adverse impact of metals on receiving waters because: 1) it can be applied to large areas, 2) particles on the ground are a source of stormwater copper and zinc, and 3) new sweeper technologies may be capable of removing significant amounts of particles, and, therefore, metals. The Navy's early tests showed that some particles swept off the ground were relatively high in copper and zinc and that these particles were a source of dissolved metals. The SPAWAR Systems Center concluded that high efficiency sweepers could remove significant amounts of metals before they become entrained in stormwater and that sweeping provides a potentially useful wide-area BMP.

The use of high-efficiency sweepers as an area-wide BMP for metals appears to be particularly applicable for the Los Cerritos Channel drainage area because indirect atmospheric deposition and direct deposition from motor vehicles are primary sources of metals in the Watershed.

As a result of the Navy's research and other recent research into the effectiveness of high-efficiency vacuum and regenerative sweepers, the Watershed Group has concluded that the timely use of well-maintained, high-efficiency sweepers could constitute a deemed compliant BMP for metals in the same way that the use of certified full-capture devices does for trash. Therefore, the Watershed Group proposes to implement an enhanced street and parking lot sweeping program within the upper portion of the Palo Verde Channel sub-basin and the upper portion of the Clark Channel sub-basin during the first phase of implementation of this plan.

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In addition, Caltrans conducts roadway and roadside cleanup operations to provide safe highway conditions and to maintain a neat and clean appearance. Sweeping operations are scheduled at the discretion of the Maintenance Supervisor based on the accumulation of trash and debris. Depending on traffic, weather, and available resources, sweeping frequencies are based on collecting a minimum of 1/2 cubic yard and a maximum of 1 cubic yard of material per mile swept. Debris on the roadway that may constitute a traffic hazard is removed immediately upon discovery or notification. Caltrans uses mechanical broom sweepers that meet the specifications needed to sweep in the highly traveled freeway environment and to pick up the variety of materials found on a the freeway shoulder or median. Caltrans, in cooperation with the other Watershed Group members, will reevaluate its sweeping policy with the goal of improving the efficiency of metals removal.

3.5 Runoff Capture and Infiltrate or Use Strategy

The Los Cerritos Channel Watershed Group chose not to pursue an Enhanced Watershed Management Program, largely because of its knowledge of the depth to the drinking water aquifer and the widespread presence of clay lenses throughout the watershed. The combination of these factors will make implementation of a capture and infiltrate strategy challenging. Therefore, the Group has attempted to locate potential water capture facilities in locations where the captured stormwater can be treated, if necessary, and used for irrigation if infiltration is not feasible. These locations include local parks and golf courses where irrigation is needed (See Section 4.5.2 and Figure 4-1). The Group is also looking at utility right-of-way sites where captured water could be used for nursery or garden plot irrigation, as well as at school sites (See Section 4.5.2 and Figure 4-2). To date, thirteen water capture sites have been identified, primarily in upper and middle portions of the watershed (See Section 4.5 for the location of these sites). Implementation of projects at these sites will be phased in over time, as needed and as funding is available. The initial stormwater capture projects are planned for locations in Mayfair Park in the City of Lakewood, Caruthers Park in the City of Bellflower, and Skylinks Golf Course in the City of Long Beach. Projects at these sites will capture non-stormwater runoff and first flush stormwater discharges from the upper portions of sub-basins 4, 8, and 10, as defined in the Los Cerritos Channel TMDL for Metals in the Cities of Bellflower, Lakewood, Long Beach, and Signal Hill. The Mayfair Park project will also capture discharges from the middle portion of sub-basin 8 in the City of Lakewood. These locations will be particularly helpful in bringing the upper portions of these sub-basins into compliance with waste load allocations in the Metals TMDLs and reduce the loads of other priority pollutants with similar fate and transport characteristics. The next three sites will be in Heartwell Park and Skylinks Golf Course in the City of Long Beach. These sites will serve sub-basins 6, 7, and 10. In addition to the use of major stormwater capture facilities, the Permittees will accomplish additional stormwater capture and infiltration through implementation of LID ordinances and Green Streets policies. Implementation of projects through the use of these ordinances and policies will be scattered across the built-out watershed because they will be dependent on the initiation and completion

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of redevelopment projects and road reconstruction projects. However, over a sustained period of time, they should contribute significantly to non-stormwater and stormwater infiltration and interruption of the runoff transport mechanisms.

3.6 Treatment Control Strategy

Except for vegetative treatment associated with LID, MS4 treatment control is generally viewed by the Watershed Group as a last resort to be used when true source control and operational source control, runoff reduction, and sediment control are not sufficient to comply with water quality-based effluent limits based on the assumptions and requirements of TMDLs applicable to the Watershed, or other applicable water quality objectives. This view is based on the conceptual relationships shown in Figure 3-4 in Section 3.2. Treatment control before discharge into receiving waters tends to be less effective and more costly than source control, especially true source control, which was why CASQA and Sustainable Conservation spent so much time and money getting SB 346 adopted and signed into law. Removing the very small particles of copper emitted by brake pads from stormwater discharges would have been very difficult, inconsistent, and extremely expensive. Similar relationships are associated with the treatment of other pollutants such as zinc, pesticides, and bacteria. In addition to the current measures to reduce copper in brake pads, the Watershed Group is acutely aware that the removal of lead from leaded gasoline and the banning of the sale of diazinon and chlorpyrifos in urban California have already had positive effects on water quality and reduced the costs of future treatment control. The Permittees are also keenly aware that some treatment control is likely to be necessary to achieve compliance in a timely manner.

The Cities will be complying with the proposed trash amendments to the Water Quality Control Plan for Inland Surface Water, Enclosed Bays, and Estuaries in California when the amendments are adopted by the State Water Resources Control Board and become effective. The strategy for compliance with the amendments will have to be developed after the draft Watershed Management Program has been submitted to the Regional Water Board because the proposed amendments have just been released for public comment and will not be adopted until later in 2015. The proposed amendments contain compliance options similar to those in the Los Angeles River Trash TMDL, but with the opportunity to focus on high trash generation areas.

The Permittees anticipate that much of the treatment control implemented in the Watershed will be associated with implementation of LID ordinances and Green Streets policies. They also anticipate that some treatment control may be necessary to achieve zinc waste load allocations. Although enhanced street sweeping should be sufficient to control direct and indirect deposition of zinc on arterials and residential streets, control of zinc from industrial sources may require the installation of targeted treatment controls since the capture and infiltration or capture and use of both non-stormwater and stormwater discharges will be a long-term and expensive process. In addition, Permittees are not certain how effective implementation of the

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new Industrial General Permit will be with respect to the reduction of zinc in stormwater discharges. This uncertainty is magnified by the recognition that many zinc sources at industrial facilities are not related to industrial processes and therefore not regulated by the Industrial General Permit.

The need for installation of treatment control facilities will be continually re-evaluated through the adaptive management process required by Order Nos. R4-2012-0175 and R4-2014-0024 and explained in Section 10 of this plan. The Permittees are confident that a continuation of the implementation of SB 346, enhanced street sweeping, dry-weather runoff reduction, and TSS reduction will be sufficient to meet the September 30, 2017 and the September 30, 2020 milestones in the Los Cerritos Channel Total Maximum Daily Loads for Metals. However, compliance with the September 23, 2023 interim milestone and the September 30, 2026 final compliance date may require treatment controls if there is any delay in implementation of SB 346, or if stormwater Permittees are not successful in using the petition process in the Safer Consumer Products Regulations to control zinc in tires. In addition, if new regulations promulgated by the Department of Pesticides Regulation are not successful in reducing pyrethroids in stormwater discharges, effective treatment control measures may have to be developed and implemented.

3.7 Financial Strategy

This financial strategy is provided to meet the development and implementation requirements for this WMP in accordance with Order No. R4-2012-0175 and Order No. R4-2014-0024. The cost estimates provided herein are preliminary and based on the best science available to date. The estimates are also subject to revision as new information becomes available, including as the projects are refined over the implementation period.

Financing the implementation of the Water Quality Improvement Strategy for the Los Cerritos Channel Watershed is the greatest challenge confronting the agencies in the Watershed. In the absence of stormwater utility fees, the agencies have no dedicated revenue streams to pay for the stormwater capture BMPs anticipated if the agencies in the Watershed were to depend on stormwater capture and treatment controls to achieve compliance. Therefore, to be able to sufficiently reduce pollutant loads to meet water quality objectives, the Watershed is going to pursue a multi-pronged financial strategy to match the multi-pronged Water Quality Improvement Strategy. In addition, the Watershed is coordinating the proposed implementation schedule (see Section 6) with the financial strategy.

The Watershed Group has considered the recommendations in the City Managers' Stormwater Funding Options report in developing this financial strategy. The City Managers' report addresses options open to the agencies in Los Angeles County after the County Board of Supervisors chose not to move forward on a proposed stormwater fee that would have generated approximately $295 million annually. A critical component of the report is the

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observation that moving forward with a stormwater fee vote would likely occur after June 2015, which means that the first funds might not be available until property tax payments are received in 2017. Therefore, the Watershed Group will strongly emphasize minimum control measures, source control, runoff reduction, and TSS reduction through the end of the current permit cycle. If a fee structure similar to the proposal presented to the Board of Supervisors in 2013 were adopted, the Los Cerritos Channel Watershed could expect annual revenues of approximately $2.7 million from a pro-rata distribution of the funds allocated to the Cities in the Watershed starting in 2017, plus a possible $3.4 million for the portion of the fee allocated to the Watershed Authority Groups (WAGs) if the Cities and the applicable WAGs allocated money to the watersheds on a proportional basis.

Assuming a total of approximately $6 million per year available from a funding source based on the proposed Clean Water, Clean Beaches funding initiative, the Watershed could expect approximately $60 million to be available over 10 years and $150 million over 25 years. However, these amounts would not be sufficient to pay for expensive stormwater capture and dry-weather low flow diversions to the sanitary sewer if the agencies had to depend on such projects to come into compliance with receiving water limitations and water quality-based effluent limitations specified in Order No. R4-2012-0175. Estimates provided by Tetra Tech and Paradigm Environmental in the Reasonable Assurance Analysis for this WMP indicate that the volume of water capture capacity within the Watershed could be 209 acre-feet (AF) in 2020 and 592 acre-feet in 2026. According to the RAA, the 209 AF capture value is equivalent to achieving a 35% load reduction by September 20, 2020. The 592 AF in water capture volume was modeled as capture/treatment volume required to achieve the final load reduction requirements of the Metals TMDLs in 2026. These estimates assume total dependence on water capture and that implementation of other measures does not significantly reduce pollutant discharges to the receiving waters.

For cost estimation purposes, this WMP initially assumes that the Watershed could ultimately require the capacity to capture and infiltrate or use 592 AF of water. This estimate is based on the Reasonable Assurance Analysis performed to demonstrate that the activities and control measures proposed in this WMP will achieve compliance with applicable compliance deadlines during the permit term. Based on cost estimates for constructing underground compact concrete stormwater capture facilities with a capacity of eight acre-feet, such a requirement could cost $332 million for construction of these facilities between now and September 30, 2026. This represents an average cost of $18,745 per acre, which is approximately $989 more than the estimated compliance cost of $17,756 per acre for the City of San Diego (under a different permit with fewer TMDLs) and $9,212 less than the estimated costs of $27,957 per acre for the City of Los Angeles (under the same permit). This estimate is a planning level cost estimate. No preliminary engineering has been completed. Costs could be reduced significantly by implementation of effective source control measures, TSS reduction measures, the implementation of green streets, and the implementation of low impact development.

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Implementation of these alternative control measures will be continuously monitored, and future costs will be re-estimated during each adaptive management review.

As the City Manager Work Group notes in its Stormwater Funding Options report, "the Los Angeles region faces critical, very costly, and seriously underfunded stormwater and urban runoff water quality challenges." The latest MS4 permits, Order No. R4-2012-0175 and Order No. R4-2014-0024, have greatly magnified the cost challenges. The absence of a stable stormwater funding mechanism not tied to municipal General Funds is becoming even more critical. For that reason, the City Manager Committees of the California Contract Cities Association and the League of California Cities, Los Angeles County Division, formed a Work Group to review stormwater funding options after the County's proposed Clean Water, Clean Beaches funding initiative failed to move forward. The Work Group found that funding stormwater programs is so complex and dynamic, and the water quality improvement measures so costly, that Permittees cannot depend on a single funding option at this time. The City Managers' report includes a variety of recommendations, including: organizational recommendations; education and outreach program recommendations; recommendations for legislation; Clean Water, Clean Beaches recommendations; local funding options; and recommendations for the Regional Water Board.

Watershed Group members have been involved in development of the recommendations, and the Group proposes to consider the recommendations of the City Managers Work Group and to work with its recommendations to do what is necessary to develop long-term solutions to stormwater quality funding. In the meantime, the Watershed Group will focus on the local funding options presented in the report to secure the needed funding for initial implementation of the WMP.

During the early years of implementation, the Permittees anticipate having to depend largely on local fees such as commercial/industrial inspection fees, General Fund expenditures, and, potentially, Clean Water State Revolving Fund program financing agreements to fund implementation of the Water Quality Improvement Strategy. The Watershed Group will seek opportunities to leverage the limited funds available. It will do this by financially supporting efforts of others, such as the California Stormwater Quality Association (CASQA), to seek State approval of true source control measures such as implementation of the Safer Consumer Product Regulations adopted by the Department of Toxic Substances Control in 2013. The Watershed Group will also support programs to increase water conservation, reduce dry-weather discharges to the storm drain system, and reduce TSS during wet weather. Successfully accomplishing these efforts could reduce the money needed in the long term to capture and/or treat stormwater discharges to comply with TMDLs and meet water quality objectives.

In addition, although Caltrans District 7 has only been participating informally in the Watershed Group, the Group's consultants have been in communication with Caltrans Headquarters regarding implementation of Attachment IV of the Caltrans Permit and the future possibility of

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working together on one or more projects through a Cooperative Implementation Agreement. There have also been discussions concerning the possible future Cooperative Implementation Grant Program that could be administered by the State Water Board. The Group will continue to closely coordinate with appropriate Caltrans District and Headquarters staff regarding the identification and implementation of watershed control measures to achieve water quality requirements as well as funding opportunities.

Concurrently, the Watershed Group proposes to work with the California Contract Cities, the Los Angeles County Division of the League of California Cities, and others to educate elected officials and voters about the water quality problems facing the region and the need to develop an equitable financing mechanism to fund the programs and facilities necessary to come into compliance with water quality regulations.

Legislative solutions will be necessary to clarify the application of Proposition 218 to fees for stormwater projects. AB 2403 has provided some assistance. It changed the definition of water in the Proposition 218 Omnibus Implementation Act of 1997 to make it possible to levee a fee to fund the capture and infiltration or capture and use of stormwater without the need for a vote of property owners as the general electorate. The Watershed Group will also support local and statewide efforts to amend Proposition 218 to have all stormwater fees treated in the same manner as water, sewage, and refuse fees. The Watershed Group, and/or its member agencies, will also seek grants to implement rainwater capture and reuse or capture and infiltrate projects on publicly owned property, including grants resulting from the passage of Proposition 1 on November 4, 2014. The Water Bond designated $200 million specifically for multi-benefit stormwater management projects, and funds for several other provisions could provide additional funds for stormwater quality projects.

In the long term, financing the Water Quality Improvement Strategy for the Los Cerritos Channel Watershed will require establishing dependable revenue streams for local water quality programs. Accomplishing this formidable task will require the cooperation of many entities, including business and environmental organizations and the Regional Water Board.

3.8 Uncertainties

There are many uncertainties associated with the implementation of this Watershed Management Program that could impact future program costs, availability of funding, and future risks. These uncertainties will be at least partially addressed through experience and implementation of the adaptive process discussed in Section 10. However, they will continue to exist throughout the life of the Program. The Watershed's communities have already made significant investments in stormwater quality programs. For example, the City of Signal Hill has seen its stormwater compliance budget grow by 260% during the last decade (from $250,000 in 2004 to $650,000 in 2014). By contrast, the City's general fund budget grew by 20% during this same time frame, with general inflation increasing by 31% during this ten-year period.

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Permittees fear greatly increased costs in the future because of new permit requirements, and they are concerned that they do not know exactly what the costs will be or where they will get the money.

The majority of the Watershed's communities have relied on general fund revenues to finance their stormwater programs. These monies face competition from other critical municipal services, including public safety (police, sheriff, fire, paramedics), parks, and street maintenance programs. This is primarily due to the uncertainties created by Proposition 218. The State's Constitution was amended in 1996 to require votes by either property owners or the general electorate on many parcel based taxes and fees. The *Jarvis v. City of Salinas* case, heard in 1999 in the 6th Appellate Court, resulted in the ruling that stormwater fees must follow the election requirements found in Proposition 218. This has made the adoption of stormwater fees very difficult statewide. However, despite the challenges of implementing stormwater fees caused by Proposition 218, some Cities have been able to fund portions of their stormwater programs with new fees. For instance, in 2004, the City of Signal Hill relied upon the Proposition 218 protest hearing process to increase revenues for trash reduction programs in stormwater. This fee annually collects approximately $96,000, which is used to fund trash related implementation costs for the Signal Hill stormwater quality program. AB 2403 made adoption of some stormwater fees easier, but only for fees funding stormwater use projects.

Uncertainties Associated with Long-Term Costs

This Program places great emphasis on source control (pollution prevention), runoff reduction, and erosion and sediment control as cost-efficient means of reducing pollutant loads to come into compliance with TMDLs and other water quality standards. There is a substantial degree of uncertainty associated with these control measures because they are partially dependent on the adoption and implementation of State legislation and local ordinances. Adoption and implementation of these measures, in turn, are dependent upon understanding complex storm water quality issues and upon commitment to implementing measures and enforcing legislation and ordinances. There are also many uncertainties associated with the implementation of structural control measures such as green streets, low impact development, stormwater capture facilities, and treatment control facilities. The success and efficiencies of these projects will be impacted by factors such as the infiltration rates of soils, the presence of clay lenses, the existence of high water tables, and the presence of existing underground utilities. There could also be changes in water quality standards and other regulations that would impact long-term costs.

Uncertainties Associated with Available Funding

As noted in the draft *Stormwater Funding Options* report discussed above in Section 3.7, there are many uncertainties associated with future funding for stormwater quality programs in Los Angeles County and elsewhere in California, since they are functionally orphaned utilities.

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Stormwater programs were not treated like water, sewer, and refuse utilities in Proposition 218 and therefore face much steeper hurdles in developing stable, sustainable revenue streams. The decision in the recent *Griffith v. Pajaro Valley Water Management Agency* case (as codified in AB 2403) provides some relief for projects directly associated with water supply and use, but the decision does nothing to assist funding of the majority of stormwater quality programs and projects. An amendment to Article XIIID of the California Constitution would be needed to fully treat funding of stormwater quality programs on par with water, sewer, and refuse utilities.

The decision by the Los Angeles Board of Supervisors in 2013 not to move forward with the proposed stormwater fee created more uncertainty for stormwater quality programs in Los Angeles County. Two of the reasons that the Board of Supervisors decided not to move forward with the proposed fee were that cities did not strongly support the fee and several groups, such as school districts, the business community, and others - including some cities - had concerns with the structure of the fee and the timing of the process. As noted above, the City Managers Committees of the California Contract Cities Association and the League of California Cities, Los Angeles County Division, responded to the decision by the Board of Supervisors by convening a meeting of stakeholders. The City Managers' group undertook development of the *Stormwater Funding Options* Report in light of the extraordinary costs expected to result from implementing the Watershed Management Programs and Enhanced Watershed Management Programs specified in the new Los Angeles Area Municipal Stormwater Permit. The *Stormwater Funding Options* Report presents a range of recommendations, but the outcome of these recommendations is not known at this time, adding to the uncertainties associated with future funding availability.

Another potential source of funding is grant funding. Over the last few years stormwater programs have received some project funds from grants funded by Proposition 40, 50, and 84. However, most of these grant funds have been spent or committed. The passage of Proposition 1 authorizes another $7.12 billion in general obligation funds for water quality supply, treatment, and storage projects. However, the total amount that will be available for stormwater projects is not known at this time. Neither is the rate at which funds will be made available known at this time. However, we do know that the Governor's proposed 2015-2016 State Budget only directly specifies that the State Water Board will receive $0.6 million for stormwater management, and the Department of Water Resources will receive $32.8 million for the Integrated Regional Water Management Program.

Uncertainties Associated with Future Risks

In addition to current uncertainties associated with costs and funding, there are multiple uncertainties associated with the possibility of missing compliance dates. The first TMDL standards compliance dates for the LCC Watershed will be the interim metals milestones of 2017, 2020, and 2023, and the final compliance date of September 30, 2026. The final non-TMDL water quality standard target compliance date is projected to be sometime in 2040. Thus,

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there will be many deadlines that must be met despite limited resources. Member agencies will need to set priorities and seek funding in order to meet the various compliance deadlines.

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4.0 Selection of Watershed Control Measures

4.1 Control Measure Objectives

As required by Part III.C.5 of Order No. R4-2012-0175, the specific objectives of the control measures in this WMP include:

(1) Prevention or elimination of non-stormwater discharges to the MS4 that are a source of pollutants from the MS4 to receiving waters;

(2) Implementation of pollutant controls necessary to achieve all applicable interim and final water quality-based effluent limitations and/or receiving water limitations pursuant to corresponding compliance schedules; and

(3) Ensuring that discharges from the MS4 do not cause or contribute to exceedances of receiving water limitations.

In addition, a general objective is the selection of control measures that will facilitate cost-effective implementation of the Water Quality Improvement Strategy specified in Section 3 of this WMP.

4.2 Existing and Planned Control Measures

4.2.1 Control Measures in Effect

The control measures currently in effect are primarily the various control measures programs specified in Order No. 01-182, including the following:

- Public Information and Participation Program,
- Industrial/Commercial Facilities Control Program,
- Development Planning Program,
- Development Construction Program,
- Public Agency Activities Program, and
- Illicit Connection and Illicit Discharge Elimination Program

In addition, as shown in Table 4-5, all seven Cities sweep residential, commercial, and industrial areas on at least a weekly basis.

4.2.2 Existing Planning for Control Measures

As noted in Section 3.2, the Cities in the Watershed have contributed to the planning for implementation of SB 346 to largely remove copper in brake pads by January 1, 2025, 21 months before

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the final compliance date for the copper TMDL for the Los Cerritos Channel Freshwater Watershed established by USEPA.

The Watershed Group also worked with Regional Water Board staff on the development of a Basin Plan Amendment to add an implementation plan and an implementation schedule for the Los Cerritos Channel TMDL for Metals into the Water Quality Control Plan for the Los Angeles Region. This amendment was adopted by the Regional Water Board on June 6, 2013, and approved by the State Water Board on February 6, 2014.

In addition, the Watershed Group has been discussing the use of the Safer Consumer Product Regulations adopted by the Department of Toxic Substances Control to reduce the zinc content of automobile and truck tires after 2016. The Group has also been reviewing local sources of zinc in preparation for developing local control measures for zinc as part of the first adaptive management review process.

4.3 Minimum Control Measures

The Minimum Control Measures (MCMs) are baseline WCMs required for all Permittees. The MCMs are defined in the MS4 Permit (excluding modifications set forth in an approved WMP) and are generally implemented individually by each Permittee. The objectives of the MCMs are to 1) result in a significant reduction in pollutants discharged into receiving waters and 2) satisfy the requirements of 40 CFR §122.26(d)(2)(iv). The MCMs are separate from enhanced Targeted Control Measures, which are developed by the Watershed Group and included in the WMP to specifically address water quality priorities (WQPs).

The MS4 Permit allows the modification of several MCMs programs, so long as the modified actions are set forth in the approved WMP and are consistent with 40 CFR §122.26(d)(2)(iv). The modifications are based on an assessment to identify opportunities for focusing resources on WQPs. The term “modifications” refers only to instances where language from the MS4 Permit MCM provisions is removed and/or replaced. Any control measures that are strictly enhancements of the existing programs (i.e. do not conflict with the MS4 Permit MCM provisions) are included in the separate category of Targeted WCMs.

The following sections include a summary of the assessment of each MCM program as well as a determination as to whether each Participating Agency will implement the MCM provisions 1) as explicitly stated in the corresponding section of the MS4 Permit or 2) with modifications to focus resources on WQPs. Independent of the determinations made, the agencies may consider additional MCM modifications through the Adaptive Management Process. Implementation of the MCMs will follow the approval of this WMP by the Regional Board Executive Officer following MS4 Permit §VI.D.1.b.

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4.3.1 Los Angeles County Flood Control District Minimum Control Measures

The LACFCD will implement the MCMs as defined from §VI.D.1 to §VI.D.4 of the MS4 Permit.

4.3.2. Assessment of Minimum Control Measures (Cities Only)

Pursuant to MS4 Permit §VI.C.5.b.iv.(1).(a), the following section is an assessment of the MS4 Permit MCMs, intended to identify opportunities for focusing resources on WQPs.

4.3.2.1. Development Construction Program

4.3.2.1.1. Assessment

Although controlling sediment is not a WQP, the reduction of sediment through an effective Development Construction Program will address WQPs. This is because sediment mobilizes other pollutants, including many of the WQP pollutants. As such the Development Construction Program is an integral component of each City's jurisdictional stormwater management program.

Compared to the prior MS4 Permit, the current Permit expands the provisions for the Development Construction Program. This expansion includes additional or enhanced requirements for plan review, site tracking, inspection frequencies, inspection standards, Best Management Practice (BMP) implementation and employee training. If implemented effectively, these enhancements will aid in the control of sediment within the Watershed, and consequently, will address WQPs. As such, no modifications to the provisions of the Development Construction Program have been identified.

4.3.2.1.2. Determination

The Cities will implement the MCMs as defined in §VI.D.8 of the MS4 Permit. To assist the Cities in the development and implementation of a jurisdictional program, a guidance document is included in Attachment E.

4.3.2.2. Industrial/Commercial Facilities Program

4.3.2.2.1. Assessment

The MS4 Permit provisions for the Industrial/Commercial Facilities Program provide opportunities for customization to address WQPs. Specifically, §VI.D.6.e.i.4 states that industrial inspection frequencies may be modified through the WMP development process. The Cities propose modifying the inspection frequencies of both industrial and commercial facilities based on a facility prioritization scheme that considers WQPs. For example, facilities that are deemed to have a high potential to discharge metals (a WQP pollutant) may be prioritized as "High" and inspected more frequently while facilities that have a small likelihood to adversely impact WQPs may be prioritized as "Low" and inspected less frequently.

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4.3.2.2.2 Determination

Sections VI.D.6.d and VI.D.6.e of the MS4 Permit will be replaced with the language in Table 4-4, which is located below in subsection 4.3.4 *New Fourth Term Permit Minimum Control Measures (Cities Only)*and is identified as MCM-ICF-3.

In order to provide clarity to the Cities, one combined guidance document has been prepared for the Program, with the prioritization and revised inspection frequencies included – see Attachment E. The document is also intended to assist the Cities in the development and implementation of a jurisdictional program.

The Permittee Industrial/Commercial Facilities will include tracking of critical sources and educating industrial facility managers with the intent of ensuring that all industrial facilities are implementing BMPs as required.

4.3.2.3. Illicit Connection and Illicit Discharges Elimination Program

4.3.2.3.1. Assessment

The purpose of the Illicit Connection and Illicit Discharges Elimination (ICID) Program is to detect, investigate and eliminate IC/IDs to the MS4. In order to address WQPs, a potential modification to MS4 Permit provisions would be the inclusion of a proactive approach for the detection of illicit discharges. However such an approach will be addressed through non-stormwater outfall based screening monitoring as outlined in the MRP. Also, such activities do not conflict with the MS4 Permit provisions for an IC/ID Program, and as such would be classified as a Targeted Control Measure. As such there is no need to modify the base provisions of the program.

4.3.2.3.1 Determination

The Cities will implement the MCMs as defined in §VI.D.10 of the MS4 Permit. To assist the Cities in the development and implementation of a jurisdictional program, a guidance document is included in Attachment E.

4.3.2.4 Planning and Land Development Program

4.3.2.4.1. Assessment

Following MS4 Permit §VI.C.5.b.iv.1.a, the Planning and Land Development Program was not assessed for potential modifications.

4.3.2.4.2. Determination

The Cities will implement the MCMs as defined in §VI.D.7 of the MS4 Permit. To assist the Cities in the development and implementation of a jurisdictional program, a guidance document is included in Attachment E.

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4.3.2.5 Public Agency Activities Program

4.3.2.5.1 Assessment

The Public Agency Activities Program is divided into several sub-programs. Many of the MS4 Permit provisions within the sub-programs consist of baseline BMPs that do not suggest modification. The sub-programs that do suggest a prioritized approach – such as street sweeping and catch basin cleaning frequencies – already provide this opportunity (frequencies are based on a City's assessment of trash and debris generation). The Public Facility Inventory sub-program also provides a prioritization opportunity, based on the tracking data obtained for each facility. However, since these facilities are not subject to regular "public agency" inspections as in the Industrial/Commercial Facilities Program, there is little utility in incorporating such a prioritization. The provisions of the public construction activities sub-program are considered an integral component of the jurisdictional stormwater program, for the reasons explained in the assessment of the Development Construction Program provisions. In summary there is no need to modify the MS4 Permit provisions of the program.

4.3.2.5.2 Determination

The Cities will implement the MCMs as defined in §VI.D.9 of the MS4 Permit. To assist the Cities in the development and implementation of a jurisdictional program, a guidance document is included in Attachment E.

4.3.2.6 Public Information and Participation Program

4.3.2.6.1 Assessment

The MS4 Permit allows a City to implement the requirements of the Public Information and Participation Program (PIPP) 1) by participating in a Countywide effort, 2) by participating in a Watershed Group effort, 3) individually within its jurisdiction or 4) through a combination of these approaches. The Cities will implement the PIPP following a combination of approaches. Consequently some clarifications of the MS4 Permit provisions are necessary.

In terms of modifications to address WQPs, the MS4 Permit provisions for the PIPP are not particularly prescriptive, thus allowing the Cities the flexibility to focus efforts on WQPs through the development of the program. As such, there is no need to modify the MS4 permit provisions of the program.

4.3.2.6.2 Determination

The table below provides clarification on elements of the MS4 Permit provisions for the PIPP:

Table 4-1: Elements of the PIPP

Permit section	Clarification
§VI.D.5.c.(i) Public Participation	Each City will participate in a Countywide sponsored PIPP to provide a means for public reporting of clogged catch basin inlets and illicit discharges/dumping, faded or missing catch basin labels, and general stormwater and non-stormwater pollution prevention information.
§VI.D.5.d Residential Outreach Program	Each City will work in conjunction with a Countywide sponsored PIPP to implement the Residential Outreach Program. Elements of program that will not be administered or implemented by the County will be addressed

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	individually by each City. Through the adaptive management process, PIPP participation may develop into a watershed group or individual effort, or some combination of these approaches.

In order to provide clarity to the Cities, one combined guidance document has been prepared for the Program, with the approach for each provision (i.e. joint or individual effort) included – see Attachment E. The document is also intended to assist the Cities in the development and implementation of a jurisdictional program.

4.3.2.7 Progressive Enforcement and Interagency Coordination

4.3.2.7.1 Assessment

Following MS4 Permit §VI.C.5.b.iv.1.a, the Progressive Enforcement and Interagency Coordination Program was not assessed for potential modifications.

4.3.2.7.2 Determination

The Cities will implement the MCMs as defined in §VI.D.2 of the MS4 Permit. To assist the Cities in the development and implementation of a jurisdictional program, a guidance document is included in Attachment E.

4.3.3 Third Term Permit Minimum Control Measures

Until the WMP is approved by the Executive Officer of the Regional Board, the MCM provisions of the prior third term MS4 permit continue to be implemented by the participating agencies. Some of the MCMs of the current MS4 Permit are relatively unchanged carry-overs from the prior third term permit. The remaining MCMs are either enhancements of the third term MCMs or entirely new provisions. These new and enhanced fourth term MCMs are described in the following section.

4.3.4 New Fourth Term Permit Minimum Control Measures (Cities Only)

Part VI.D of the MS4 Permit (the MCM provisions) introduces many new provisions and program elements to be developed and incorporated within each participating agency's jurisdictional stormwater program. This section briefly describes the new and enhanced MCMs required for the Cities (City MCMs), excluding those required for the LACFCD in §VI.D.4. An MCM is considered new if it was not required by the prior MS4 Permit and is considered enhanced if it is an enhancement of a related provision of the prior MS4 Permit.

The details of each provision may be found in the relevant sections of the MS4 Permit, which are included. Unless an alternate date is provided in the MS4 Permit or in this section, the adoption date for the City MCMs coincides with the approval of the WMP by the Regional Board's Executive Officer.

4.3.4.1 Structural Controls

The new and enhanced MCMs consist primarily of nonstructural control measures, with the marked exception of the Planning and Land Development provisions, described as follows.

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LID and Hydromodification

MS4 Permit §VI.D.7

The LID and hydromodification provisions of the Planning and Land Development program are a significant enhancement from the prior MS4 Permit. The implementation of structural LID BMPs at new developments throughout the watershed will appreciably decrease the effective impervious area, reducing flow and, consequently, pollutant loads. The program is unique in that it will increase in effectiveness over time as more and more existing developments are redeveloped and bound to the LID/hydromodification requirements.

Trash Excluder Installation

MS4 Permit §VI.D.9.h.vii.(1)

In areas that are not subject to a trash TMDL, the Public Agency Activities Program includes a requirement to install excluders (or equivalent devices) on or in Priority A (see §VI.D.9.h.iii.(1))) area catch basins or outfalls to prevent the discharge of trash to the MS4. For LA MS4 Permittees, the deadline is no later than four years after the effective date of the Permit. This provision may be supplanted by the statewide trash amendments for the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California, which propose the installation of full-capture devices in the high priority land use areas of industrial, commercial, high-density residential and public transportation stations. A proposed final staff report was released on December 31, 2014, but no hearing date has been scheduled.

4.3.4.2 Nonstructural Controls

Table 4-3 lists the new and enhanced nonstructural City MCMs as well as the new and enhanced NSWD measures. The BMP effectiveness from Table 4-3 is based on similar BMPs listed in Tetra Tech's CLRP for Chollas Creek Watershed in San Diego County, 2012. The correlation of BMP effectiveness with WQPs is based on Table 4-2. The pages following Table 4-3 describe each of the listed controls.

Table 4-2 Pollutant Category versus Water Quality Classification

Waterbody-pollutant classification	Type of pollutant								
	Bacteria	Metals	Organics	Sediment	Pesticides	Nutrients	Oil and grease	Dissolved minerals	Trash
Category 1		✗	✗		✗				
Category 2	✗		✗			✗			✗
Category 3	✗		✗						

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Table 4-3: New Fourth Term MS4 Permit Nonstructural MCMs (Cities only) and NSWDs

#	WCM Category/ID	WCM	BMP effectiveness with respect to WQPs					Agency							
			Category I	Category II	Category III	Sediment reduction	Volume or flow reduction	Bellflower	Cerritos	Downey	Flood Control	Lakewood	Long Beach	Paramount	Signal Hill
		Planning and Land Development													
1	MCM-PLD-1	Amend development regulations to facilitate LID implementation	◈	◆	◆	◆	◆	✗	✗	✗	✗	✗	✗	✗	✗
2	MCM-PLD-2	Post-construction BMP tracking, inspections, and enforcement	◈	◈	◈	◈	◈	✗	✗	✗	✗	✗	✗	✗	✗
		Existing Development													
3	MCM-ICF-1	Increase in facility types inspected and number of inspections conducted	◈	◈	◈	◈	◈	✗	✗	✗	✗	✗	✗	✗	✗
4	MCM-ICF-2	Business assistance program and BMP notification	◈	◈	◈	◈	◈	✗	✗	✗	✗	✗	✗	✗	✗
5	MCM-ICF-3 (TCM-ICF-1)	Prioritize facilities/inspections based on water quality priorities	◈	◈	◈	◈	◈	✗	✗	✗	✗	✗	✗	✗	✗
		Construction													
6	MCM-DC-1	Enhanced plan review program	◈	◈	◈	◆	◈	✗	✗	✗	✗	✗	✗	✗	✗
7	MCM-DC-2	Enhanced inspection standards and BMP requirements	◈	◈	◈	◆	◈	✗	✗	✗	✗	✗	✗	✗	✗

#	WCM Category/ID	WCM	BMP effectiveness with respect to WQPs					Agency							
			Category I	Category II	Category III	Sediment reduction	Volume or flow reduction	Bellflower	Cerritos	Downey	Flood Control	Lakewood	Long Beach	Paramount	Signal Hill
8	MCM-DC-3	Increased inspection frequencies	◈	◈	◈	◆	◈	✗	✗	✗	✗	✗	✗	✗	✗
9	MCM-TRA-1	Enhanced staff training program	◈	◈	◈	◆	◈	✗	✗	✗	✗	✗	✗	✗	✗
		Illicit Discharge Detection/Elimination													
10	MCM-ICID-1	Enhanced IC/ID enforcement and written procedures	◈	◈	◈	◈	◈	✗	✗	✗	✗	✗	✗	✗	✗
11	NSWD-1	Outfall screening and source investigations	◈	◈	◈	◈	◆	✗	✗	✗	✗	✗	✗	✗	✗
12	MCM-TRA-1	Enhanced staff/contractor training	◈	◈	◈	◈	◈	✗	✗	✗	✗	✗	✗	✗	✗
		Dry weather runoff reduction													
13	NSWD-1	Outfall screening and source investigations	◈	◈	◈	◈	◆	✗	✗	✗	✗	✗	✗	✗	✗
14	NSWD-2	Enhanced conditions for NSWDs, including irrigation reduction	◆	◆	◆	◆	◆	✗	✗	✗	✗	✗	✗	✗	✗
		Public Information and Participation													
15	MCM-PIP-1	Stormwater resources on City website	◈	◈	◈	◈	◈	✗	✗	✗	✗	✗	✗	✗	✗

#	WCM Category/ID	WCM	BMP effectiveness with respect to WQPs					Agency							
			Category I	Category II	Category III	Sediment reduction	Volume or flow reduction	Bellflower	Cerritos	Downey	Flood Control	Lakewood	Long Beach	Paramount	Signal Hill
		Public Agency Activities													
16	MCM-PAA-1	Enhanced BMP requirements for fixed facility/field activities	◈	◈	◈	◈	◈	✗	✗	✗	✗	✗	✗	✗	✗
17	MCM-PAA-2	Reprioritization of catch basins and clean-out frequencies	◆	◈	◈	◆	◇	✗	✗	✗	✗	✗	✗	✗	✗
18	MCM-PAA-3	Integrated Pest Management Program	◈	◈	◈	◇	◇	✗	✗	✗	✗	✗	✗	✗	✗
19	MCM-PAA-4	Enhanced measures to control infiltration from sanitary sewers	◇	◆	◆	◇	◇	✗	✗	✗	✗	✗	✗	✗	✗
20	MCM-PAA-5	Inspection and maintenance of Permittee owned treatment controls	◈	◈	◈	◈	◈	✗	✗	✗	✗	✗	✗	✗	✗
21	MCM-TRA-1	Enhanced inspector/staff training	◈	◈	◈	◈	◈	✗	✗	✗	✗	✗	✗	✗	✗

✗ – To be implemented by agency within current MS4 Permit term. MCM – Minimum Control Measure. NSWD – Non-stormwater discharge measure.

◆ Primary pollutant reduction ◈ Secondary pollutant reduction ◇ Pollutant not addressed

BMP effectiveness ratings based on similar BMPs listed in Tetra Tech's CLRP for Chollas Creek Watershed in San Diego County, 2012.

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Enhanced Staff/Contractor Training Programs MCM-TRA-1

MS4 Permit §VI.D.7.d.iv.(b), §VI.D.8.l, §VI.D.9.k, §VI.D.10.f

Measures introduced:

- Prescriptive staff training requirements to the Development Construction, Illicit Connections and Illicit Discharges Elimination and Public Agency Activities Programs. For example, relevant staff involved with the Construction Program must be knowledgeable in procedures consistent with the State Water Board sponsored Qualified SWPPP Practitioner/Developer (QSP/QSD) program.
- Inspections of structural BMPs under the Planning and Land Development Program must be conducted by trained personnel.
- Outside contractors are bound to the same training standards as in-house staff

These new and enhanced provisions will increase the overall effectiveness of the Jurisdictional Stormwater Management Programs (JSWMPs).

Amend Development Regulations to Facilitate LID Implementation MCM-PLD-1

MS4 Permit §VI.C.4.c.i, §VI.D.7.d.i

The participating agencies have developed and adopted LID ordinances and Green Street Policies. These measures will facilitate LID implementation.

Post-Construction BMP Tracking, Inspections, and Enforcement MCM-PLD-2

MS4 Permit: §VI.D.7.d.iv

The Cities must track post-construction BMPs, conduct BMP verification and maintenance inspections and follow the Progressive Enforcement Policy in cases of non-compliance. This will improve the effectiveness of the Planning and Land Development program.

Increase in Facility Types Inspected and Number of Inspections Conducted MCM-IFC-1

MS4 Permit: §VI.D.6.d, §VI.D.6.e, also affected by NPDES No. CAS000001, the State Water Resources Control Board's (SWRCB) Industrial General Permit (IGP)

Measures introduced:

- Inspect nurseries and nursery centers
- Perform follow-up *No Exposure Verification* inspections for at least 25% of industries that have filed a *No Exposure Certification (NEC)*
- Inspect light industrial facilities. Under the SWRCB's IGP adopted on April 1, 2014, light industries previously excluded from coverage under the IGP must now obtain coverage. Light industry is defined as SICs 20, 21, 22, 23, 2434, 25, 265, 267, 27, 283, 285, 30, 31 (except 311), 323, 34 (except 3441), 35, 36, 37 (except 373), 38, 39 and 4221-4225. This includes facilities ubiquitous in industrial zones such as warehouses and machine shops. Although many of these

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facilities will likely qualify for the NEC, the type and number of facilities requiring inspection under the MS4 Permit will still increase.

These new and enhanced measures will increase the effectiveness of the Industrial/Commercial Facilities Program.

Business Assistance Program and BMP Notification MCM-IFC-2

MS4 Permit: §VI.D.6.c

Measures introduced:

- Notify industrial/commercial owner/operators of applicable BMP requirements.
- Implement a Business Assistance Program to provide technical information to businesses to facilitate their efforts to reduce the discharge of pollutants in stormwater. The business assistance program described in the prior LA MS4 Permit was an optional provision.

These new and enhanced measures will increase the effectiveness of the Industrial/Commercial Facilities Program.

Prioritize Facilities/Inspections Based on Water Quality Priorities MCM-IFC-3 (TCM-ICF-1)

MS4 Permit: Modified MCM (replaces §VI.D.6.d, §VI.D.6.e)

A program has been developed to prioritize industrial/commercial facilities based on their potential to adversely impact WQPs. The resulting prioritization scheme determines the inspection frequency, replacing the uniform inspection frequency provided in the MS4 Permit. This allows Cities to concentrate efforts on WQPs. Sections VI.D.6.d and VI.D.6.e of the MS4 Permit will be replaced with the language presented in Table 4-4 below.

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Table 4-4

Replaces §VI.D.6.d and §VI.D.6.e of the MS4 Permit

VI.D.6.d Prioritize Critical Industrial/Commercial Sources

VI.D.6.d.i Prioritization Method

Prioritizing facilities by potential water quality impact provides an opportunity to optimize the effectiveness of the Industrial/Commercial Facilities Program and to focus efforts on water quality priorities. The inventory fields in Part VI.D.6.b.ii provide information that allows for such a facility prioritization. Based on these fields, Figure ICF-1 establishes a method for each City to prioritize all industrial/commercial facilities into three tiers – High, Medium and Low. A City may follow an alternative prioritization method provided it is based on water quality impact and results in a similar three-tiered scheme.

Prioritization factors

Factor	Description
A	Status of exposure of materials and industrial/commercial activities to stormwater
B	Identification of whether the facility is tributary to a waterbody segment with impairments[1] for pollutants that are also generated by the facility
C	Other factors determined by the City, such as size of facility, presence of exposed soil or history of stormwater violations

Utilizing these factors, follow steps 1, 2 and 3 below:

1. Collect necessary information to evaluate factors

Factor	Initial method	Subsequent method
A	Satellite imagery	Results of stormwater inspection
B	Cross reference Table A-ICF-1 with tributary TMDL/ 303(d) pollutants	Cross reference inspection results with tributary TMDL/ 303(d) pollutants
C	Varies	

2. Evaluate factors

Factor	Result	Score
	Low or no exposure	0
A	Moderate exposure	½
	Significant exposure	1
B	No*	0
	Yes**	1
	Low	0
C	Medium	½
	High	1

3. Prioritize facilities

		C Score		
		0	**½**	**1**
A×B Score	**0**	Low	Medium	High
	½	Medium	High	High
	1	High	High	High

This method serves only as a guide to prioritization. The City may also prioritize facilities based on a qualitative assessment of factors A, B and C.

* No pollutant generation/impairment matches.

** ≥ 1 pollutant generation/impairment matches.

Figure ICF-1: Industrial/Commercial Facility Prioritization Scheme

Step 3 in Figure ICF-1 may also be expressed by the relationships A·B + C ≥ 1 → High, 1 > A·B + C > 0 → Medium and A·B + C = 0 → Low. The purpose of multiplying A and B is to scale the impact of the presence of the pollutants at a facility (B) by the likelihood that they will be discharged to the MS4 (A). Factor C quantifies water quality concerns

[1] CWA §303(d) listed or subject to a TMDL

Table 4-4

Replaces §VI.D.6.d and §VI.D.6.e of the MS4 Permit

that are independent of A or B and as such is incorporated through addition. The purpose of this numerical approach is to provide consistency to the prioritization process. It is intended solely as a guide. The City may also prioritize facilities based on a qualitative assessment of factors A, B and C as listed in Figure ICF-1.

VI.D.6.d.i.(1) Prioritization Condition

The following condition will be met during the prioritization process: ***The total number of low priority facilities is less than or equal to 3 times the number of high priority facilities.*** This condition is applied to maintain a minimum inspection frequency as explained in Section VI.D.6.e.i.

VI.D.6.d.i.(2) Prioritization Frequency

The default priority for a facility is Medium. Facilities will be reprioritized as necessary following the results of routine inspections. The City may also use any readily available information that clarifies potential water quality impacts (e.g., satellite imagery) in order to prioritize a facility before the initial inspection. Reprioritization may also be conducted at any time as new water quality-based information on a facility becomes available. During reprioritization, the ratio of low priority to high priority facilities will remain at 3:1 or lower. Figure ICF-2 is a flowchart of the prioritization process.

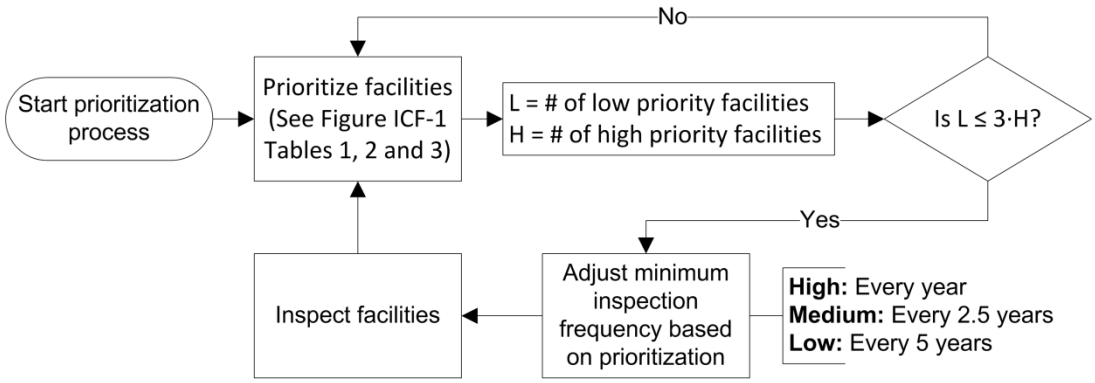

Figure ICF-2

VI.D.6.e Inspect Critical Industrial/Commercial Sources

VI.D.6.e.i Frequency of Industrial/Commercial Inspections

Following the facility prioritization method in Part VI.D.6.d.i, each City will inspect high priority facilities annually, medium priority facilities semi-quinquennially (once every 2.5 years) and low priority facilities quinquennially (once every five years). The frequencies may be altered by the exclusions defined in Part VI.D.6.e.i.(1). The condition in Part VI.D.6.d.i.(1) ensures at least the same average number of inspections conducted per year as the semi-quinquennial frequency defined in the MS4 Permit.

Each City will conduct the first compliance inspection for all industrial/commercial facilities within one year of the approval of the WMP. A minimum interval of 6 months between the first and the second mandatory compliance inspection is required.

VI.D.6.e.i.(1) Exclusions to the Frequency of Industrial Inspections

VI.D.6.e.i.(1).(a) Exclusion of Facilities Previously Inspected by the Regional Water Board

Each City will review the State Water Board's Stormwater Multiple Application and Report Tracking System (SMARTS) database at defined intervals to determine if an industrial facility has recently been inspected by the Regional Water Board. The first interval will occur approximately 2 years after the effective date of the Order. The

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Table 4-4

Replaces §VI.D.6.d and §VI.D.6.e of the MS4 Permit
City does not need to inspect the facility if it is determined that the Regional Water Board conducted an inspection of the facility within the prior 24-month period. The second interval will occur approximately 4 years after the effective date of the Order. Likewise, the City does not need to inspect the facility if it is determined that the Regional Water Board conducted an inspection of the facility within the prior 24-month period. **VI.D.6.e.i.(1).(b) No Exposure Verification** As a component of the first mandatory inspection, each City will identify those facilities that have filed a No Exposure Certification with the State Water Board. Approximately 3 to 4 years after the effective date of the Order, each City will evaluate its inventory of industrial facilities and perform a second mandatory compliance inspection at a minimum of 25% of the facilities identified to have filed a No Exposure Certification. The purpose of this inspection is to verify the continuity of the no exposure status. **VI.D.6.e.ii Scope of Industrial/Commercial Inspections** **VI.D.6.e.ii.(1) Scope of Commercial Inspections** Each City will inspect all commercial facilities to confirm that stormwater and non-stormwater BMPs are being effectively implemented in compliance with municipal ordinances. At each facility, inspectors will verify that the operator is implementing effective source control BMPs for each corresponding activity. Each City will require implementation of additional BMPs where stormwater from the MS4 discharges to a significant ecological area (SEA), a waterbody subject to TMDL provisions in Part VI.E, or a CWA §303(d) listed impaired water body. Likewise, for those BMPs that are not adequately protective of water quality standards, a City may require additional site-specific controls. **VI.D.6.e.ii.(2) Scope of Industrial Inspections** Each City will confirm that each industrial facility: a) Has a current Waste Discharge Identification (WDID) number for coverage under the Industrial General Permit, and that a Stormwater Pollution Prevention Plan (SWPPP) is available on-site; or b) Has applied for, and has received a current No Exposure Certification for facilities subject to this requirement; c) Is effectively implementing BMPs in compliance with municipal ordinances. Facilities must implement the source control BMPs identified in Table 10, unless the pollutant generating activity does not occur. The Cities will require implementation of additional BMPs where stormwater from the MS4 discharges to a waterbody subject to TMDL Provisions in Part VI.E, or a CWA §303(d) listed impaired water body. Likewise, if the specified BMPs are not adequately protective of water quality standards, a City may require additional site-specific controls. For critical sources that discharge to MS4s that discharge to SEAs, each City will require operators to implement additional pollutant-specific controls to reduce pollutants in stormwater runoff that are causing or contributing to exceedances of water quality standards. d) Applicable industrial facilities identified as not having either a current WDID or No Exposure Certification will be notified that they must obtain coverage under the Industrial General Permit and will be referred to the Regional Water Board per the Progressive Enforcement Policy procedures identified in Part VI.D.2.

Enhanced Plan Review Program

MCM-DC-1

MS4 Permit: §VI.D.8.h, §VI.D.8.i

In general the MS4 Permit introduces provisions that conform to the SWRCB's Construction General Permit. For construction sites one acre or greater, measures include the following:

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- Construction activity operators must submit Erosion and Sediment Control Plans (ESCPs) prior to grading permit issuance, developed and certified by a QSD to SWPPP standards.
- Operators must propose minimum BMPs that meet technical standards. The cities must provide these standards.
- Develop procedures and checklists to review and approve relevant construction plans.

These new and enhanced measures will increase the effectiveness of the Development Construction Program, which in turn is expected to reduce TSS loading into the MS4. TSS reduction is an integral component in addressing WQPs.

Enhanced Inspection Standards/BMP Requirements at Construction Sites MCM-DC-2

MS4 Permit: §VI.D.8.d, §VI.D.8.i, §VI.D.8.j

Measures introduced:

- Ensure BMPs from the ESCPs are properly installed and maintained.
- Ensure the minimum BMPs for sites less than one acre are installed and maintained.
- Develop and implement standard operating procedures for City stormwater inspections of construction sites.
- Require activity-specific BMPs for paving projects.

These new and enhanced measures will increase the effectiveness of the Development Construction Program, which in turn is expected to reduce TSS loading into the MS4. TSS reduction is an integral component in addressing WQPs.

Increased Inspection Frequencies MCM-DC-3

MS4 Permit: §VI.D.8.j

The inspection frequency for construction sites one acre or more has significantly increased. The prior LA MS4 Permit required a minimum of one inspection during the rainy season. The current MS4 Permit requires monthly inspections year-round, as well as mandatory inspections based on the phase of construction. This enhanced measure will increase the effectiveness of the Development Construction Program, which in turn is expected to reduce TSS loading into the MS4. TSS reduction is an integral component in addressing WQPs.

Enhanced IC/ID Enforcement and Written Program Procedures MCM-ICID-1

MS4 Permit: §VI.D.2, §VI.D.10

Measures introduced:

- Develop and implement a Progressive Enforcement Policy that applies to the IC/ID Elimination, Development Construction, Planning and Land Development and Industrial/Commercial Facilities Programs. The Progressive Enforcement Policy is an augmentation of the policy listed

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in the prior LA MS4 Permit, which was restricted to the Industrial/Commercial Facilities Program.

- Maintain written procedures for receiving complaints, conducting investigations and responding to spills.

These new and enhanced measures will increase the effectiveness of the IC/ID Elimination program, as well as the related enforcement components of the Development Construction, Planning and Land Development and Industrial/Commercial Facilities Programs.

Stormwater Resources on City Website MCM-PIP-1

MS4 Permit: §VI.D.5.d.i.(4)

Measures introduced:

- The MS4 Permit introduces a requirement to maintain a stormwater webpage or provide links to stormwater websites via the City's website. The website (in-house or linked) will include:
  - Educational material and
  - Opportunities for the public to participate in stormwater pollution prevention and clean-up activities.

Enhanced BMP Requirements for Fixed Facility/Field Activities MCM-PAA-1

MS4 Permit: §VI.D.9.e

Measures introduced:

- Implement effective source control BMPs for 65 specific pollutant-generating activities such as mudjacking, shoulder grading and spall repair.
- Contractually require hired contractors to implement and maintain the activity specific BMPs. Conduct oversight of contractor activities to ensure the BMPs are implemented and maintained.

These new and enhanced measures will increase the effectiveness of the Public Agency Activities program.

Reprioritization of Catch Basins and Clean-Out Frequencies MCM-PAA-2

MS4 Permit: §VI.D.9.h.iii

In areas not subject to a trash TMDL, measures introduced include the following:

- Determine priority areas and update the map of catch basins with GPS coordinates and priority.
- Include the rationale or data to support the priority designations.

These new and enhanced measures will increase the effectiveness of the Public Agency Activities program.

Integrated Pest Management Program MCM-PAA-3

MS4 Permit: §VI.D.9.g

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The MS4 Permit introduces entirely new, prescriptive requirements to implement an Integrated Pest Management (IPM) Program for public agency activities and at public facilities. These requirements include adopting and verifiably implementing policies, procedures and/or ordinances that support the IPM program. Intertwined with the IPM provisions are additional requirements to control and minimize the use of fertilizers. These new and expansive measures will increase the effectiveness of the Public Agency Activities program and address WQPs.

Enhanced Measures to Control Infiltration from Sanitary Sewers MCM-PAA-4

MS4 Permit: §VI.D.9.ix

The MS4 Permit introduces specific requirements to control infiltration from the sanitary sewer into the MS4. The measures include adequate plan checking, preventative maintenance, spill response, enforcement, interagency coordination and staff/contractor education. The requirements may be fulfilled through implementation of a Sewer System Management Plan in accordance with the Statewide General Waste Discharge Requirements for Sanitary Sewer Systems.

Inspection and Maintenance of Permittee-Owned Treatment Controls MCM-PAA-5

MS4 Permit: §VI.D.9.x

The MS4 Permit introduces requirements to implement an inspection and maintenance program for all Permittee owned treatment control BMPs, including post-construction treatment control BMPs. This measure will increase the effectiveness of the Public Agency Activities program.

4.4 Non-Stormwater Discharge Control Measures

4.4.1 Non-Structural Control Measures

Section 3.3 discusses the Watershed's overall runoff reduction strategy. The principal non-stormwater control measure being implemented in the Watershed is water conservation. Many of the municipal water conservation programs within the Watershed were stimulated by the approval of AB 1881, the Water Conservation in Landscaping Act, in 2006. The current drought has provided additional incentive to conserve water. The results of water conservation programs within the watershed are now seen in dry-weather monitoring at the Stearns Street monitoring site above the discharge point from the freshwater channel into the Estuary at Atherton Street in Long Beach. The average dry-weather flow at Stearns Street was estimated in the Metals TMDLs to be 2.35 cfs based on sampling during the 2001-2009 time frame. Current data indicates that average dry-weather flows are less than 0.5 cfs.

The second non-structural measure implemented within the Watershed is improved irrigation practices to reduce the amount of water used and the discharge of excess water to the storm drain system. Continued improvements by municipalities and education of residents and businesses should further reduce non-stormwater discharges.

In addition, the Industrial/Commercial Facilities Inspection Program and the Construction Site Inspection Program will be used to reduce non-stormwater discharges.

4.4.2 Structural Control Measures

Physically modifying irrigation systems to substitute sub-surface irrigation for surface irrigation and realigning spray leads to prevent overspray onto sidewalks and streets will be implemented over time at public facilities, as funding becomes available. In addition, residents and businesses will be encouraged to make similar improvements to further reduce non-stormwater discharges.

4.5 TMDL Control Measures

4.5.1 Non-Structural Control Measures

Since the only TMDLs currently applicable to the Los Cerritos Channel are the Metals TMDLs established by USEPA and the Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters Toxic Pollutants TMDL adopted by the Regional Water Board, the TMDL non-structural control measures implemented in and for the Watershed will relate to metals and legacy organics. As noted in Section 3, these measures will emphasize source control and TSS reduction. The two metals requiring reductions according to the Los Cerritos Channel Metals TMDLs are copper and zinc. There is also a TMDL for lead. However, after review and replication of a translator study, EPA concluded that no further lead reductions are required. The majority of copper reduction is anticipated to come from implementation of SB 346, which requires the reduction in most brake pads sold in California to 5% copper in 2021 and 0.5% in 2025.

Another significant source of copper is copper-based algaecides. These are used frequently to treat swimming pools. If the phase-out of copper in brake pads does not bring the Watershed into compliance with copper waste load allocations, Permittees will use outreach programs to encourage residents to stop using copper-based algaecides. Also, additional local non-structural controls such as regulating copper roofs, cooper roof gutters, and downspouts may be needed. However, this may not be necessary because many of the friction material manufacturers are moving directly to no copper added brake pads by 2021. This possibility was analyzed as scenario one in the “Estimate of Urban Runoff Copper Reduction in Los Angeles County from Brake Pad Copper Reduction Mandated by SB 346.” In addition, the California Stormwater Quality Association recently released a Technical Memo entitled, “Brake Pad Copper Reduction – Metrics for Tracking Progress.” This memo describes recent progress in removal of copper from brake pads, and describes metrics that will be used to track future reductions. (See Attachment D.)

Reduction of zinc discharges to the receiving waters is also likely to involve non-structural measures. As discussed in Section 3 and above in Section 4.2.2, the Watershed Group is planning to work with others to use the Department of Toxic Substances Control’s Safer Consumer Product Regulations to reduce the zinc in tires, one of the greatest sources of zinc in the metropolitan area. The Permittees may also find it necessary to adopt ordinances to regulate local sources of zinc, including the widespread outdoor use of galvanized metal, another major source of zinc.

In addition, the Watershed Group is monitoring the research related to the potential of reducing lead in aviation gasoline, or Avgas, that is used in piston engine aircraft, primarily general aviation aircraft.

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USEPA has estimated that approximately 50% of lead in metropolitan atmospheric deposition comes from Avgas. A reduction of lead in Avgas could result in a further reduction of lead in the Los Cerritos Channel Watershed because the City of Long Beach is home to many general aviation aircraft.

Implementation of the TSS reduction strategy discussed in Section 3.0 will involve both non-structural and structural measures. The non-structural measures are likely to be ordinances that require landscaping, erosion control, and sediment control on vacant lots and other significant sources of exposed dirt. There will also likely be agreements developed between Cities and electrical utilities regarding erosion and sediment control in transmission line rights-of-way.

The proposed enhanced sweeping will use a combination of regenerative and vacuum sweepers. Major arterials, major intersections, median curbs, commercial, and industrial areas will be swept more frequently in the month preceding the rainy season. In addition, owners of private parking lots will initially be encouraged to enhance their sweeping programs. Ultimately, parking lot sweeping ordinances may be necessary to ensure that parking lots are swept sufficiently well to remove the fine metal particles resulting from atmospheric deposition and direct deposition from tire wear and braking, as well as other fine sediment particles. The need for future ordinances will be considered during the initial adaptive management process. Several Watershed Group members have already begun using regenerative and vacuum sweepers that are better able to capture fine particles (See Table 4-**5**, Street Sweeping Survey Table below.) The City of Long Beach continues to use broom sweepers, but has begun considering possible modifications to its street sweeping program. However, recent elections resulted in a new mayor and several new members of the City Council, and concluding the street sweeping review has been delayed. Any changes to the Long Beach street sweeping program will be addressed through the adaptive management process.

The RAA has assumed that non-structural control measures will result in a 10% pollutant reduction. The Watershed Group believes this is a conservative assumption. Implementation of SB 346 is projected to reduce copper pollution by over 60%. In addition, the Group has already seen a tremendous reduction in dry-weather runoff due primarily to non-structural control measures such as irrigation reduction requirements. Also, implementation of the TSS reduction strategy is expected to reduce TSS discharges to the Los Cerritos Channel by 20% by 2020. This will greatly reduce the sediment transport mechanism for metals, legacy organics, and bacteria, and thereby reduce pollutant loads. The Group also expects future reductions in zinc through the application of the Safer Consumer Product Regulations for tires and a reduction in zinc discharges through the coating of exposed zinc surfaces over time. Enhancement of street sweeping practices, such as median sweeping, intersection sweeping, and frequency of sweeping certain areas, are expected to further reduce copper, zinc, sediment, and trash. In addition, the plastic bag bans currently being implemented are anticipated to reduce plastics in the receiving waters. Industrial inspections will also reduce a number of pollutants.

As recognized by a footnote to Table K-7 and other tables in Attachment K of the Permit, the Participating Agencies have entered into an Amended Consent Decree with the United States and the State of California, including the Regional Board. The footnote specifically states: “The requirements of this Order to implement the obligations of [the Dominguez Channel and Greater Los Angeles and Long

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Beach Harbor Waters Toxic Pollutants TMDL] do not apply to a Permittee to the extent that it is determined that the Permittee has been released from that obligation pursuant to the Amended Consent Decree entered in *United States v. Montrose Chemical Corp.*, Case No. 90-3122 AAH (JRx)." The submission of this WMP and its associated CIMP and any action or implementation taken pursuant to it shall not constitute a waiver of any such release of obligations established by that Amended Consent Decree.

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Table 4-5: Los Cerritos Channel Street Sweeping Survey

City	Type of Sweeper	Frequency			Ordinance that restricts parking on a sweeping day	Does your city utilize any special procedures for sweeping major intersections? If yes, please describe those procedures.	Does your city have a program for municipal parking lot sweeping? If it does, please list the frequency/schedule	Does your city have requirements for private parking lots?
		Residential	Commercial	Industrial				
Bellflower	Vacuum	Weekly	Weekly	Weekly	Yes	Regular sweeping at intersections	Parking lots are swept once per week	No
Cerritos	Regenerative	Weekly	Weekly	Weekly	Yes	No	Yes. All City lots are swept once per week	No
Downey	Regenerative	Weekly	2x per week	Weekly	Yes	No	Yes – weekly in early morning	No
Lakewood	Regenerative	Weekly	Weekly	Weekly	Yes	Major intersections swept early morning before traffic	Yes-weekly	No
Long Beach	Broom Sweepers	Weekly	Weekly	Weekly	Yes	No	---	---
Paramount	Regenerative	Weekly	Weekly	Weekly	Yes	Major intersections are swept twice weekly	City owned lots of Parks and City facilities are swept once per week	No
Signal Hill	Regenerative	Weekly	Weekly	Weekly	Yes	All major intersections are swept	Upon request	Yes (see Municipal Code 12.16.060)

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4.5.2 Structural Control Measures

The initial structural measures to control TMDL pollutants are anticipated to be low flow diversions and water capture measures, including green streets, LID, and stormwater capture and infiltrate or use facilities that will also capture non-stormwater discharges. As noted in Section 3.5, the implementation of green streets and LID projects will generally be dependent on the initiation and completion of redevelopment projects and road construction projects in the largely built-out Watershed.

Permittees within the Watershed are currently looking for opportunities to construct green streets. One approach has been the incorporation of green street elements into proposed regional corridor projects. One example is the proposed Lakewood Boulevard Corridor Capacity Enhancement Project. The City of Lakewood is proposing a complete streets project on Lakewood Boulevard from Del Amo Boulevard at the southern City limits to the northern City limits just north of Ashworth Street. The City of Lakewood portion of the project is approximately 1.5 miles in length. This is the first phase of a regional corridor that may eventually extend from Long Beach through Bellflower and Downey to Pico Rivera. The primary focus of the project is to increase the capacity of Lakewood Boulevard through multimodal methods including enhancing transit capacity, and adding bike lanes and pedestrian walkways, as well as increasing intersection capacity through additional turn lanes and strengthening pavement to accommodate for the additional transit and automobile traffic. The Lakewood Public Works Department is working with its consultants to develop Lakewood Boulevard into a green complete street.

As part of the complete streets project, Lakewood Boulevard will include, to the "maximum extent practicable," infiltration stormwater treatment Best Management Practices (BMPs) in compliance with the Los Angeles County MS4 Permit and City of Lakewood Low Impact Development (LID) Ordinance and Green Streets Policy.

The project is in the conceptual stage, and it is being planned to provide approximately 200,000 square feet of stormwater treatment. Methods of treatment are anticipated to consist primarily of vegetated bio-swales, bio-infiltration basins, and infiltration trenches, with curb cuts to allow water to flow into the facilities. A meandering median swale to allow bio-infiltration as well as parkway bio-swales will be included throughout much of the project length. Other stormwater treatment BMPs, where feasible, may include rain gardens, porous pavement, and other LID treatment methods.

In addition to providing stormwater treatment BMPs, the project proposes to replace the existing irrigated turf with drought adaptive trees and shrubs to minimize water use. This planting will reduce irrigation, maintenance, and plant waste, which also provides the added benefits of reducing the project area's "carbon footprint." The irrigation system would be modified for low volume use and future recycled water when available.

The Gateway COG TAC, which guides the use of Gateway COG Measure R regional funds, has approved $2.6 million for preliminary design, environmental clearance, and final design. The TAC's approval will go to the METRO Board for final approval in May.

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Completion of major water capture and use projects, with infiltration when feasible, will be dependent on available funding. The Watershed Group has identified 13 first order (Highest Priority) sites for such projects in public parks and golf courses, plus eight second order sites in utility easements. These sites are listed in Tables 4-5 and 4-6 and shown in Figures 4-1 and 4-2. As noted in Section 3.5, the Watershed Group has identified the first six sites to be addressed and will be pursuing funding to complete initial designs for three of these sites in preparation for seeking grant funding. Assuming an average capacity of eight acre-feet (AF), the Watershed Group anticipated that the first 13 water capture and use projects could have a total stormwater capture capacity of 104 AF and the second eight could add another 64 AF of stormwater capture, if they can be constructed underground within the transmission line rights-of-way. The need for additional centralized water capture will be evaluated through the adaptive management process.

These first and second order major BMP sites are proposed to handle 168 acre-feet of the 204.5 acre-feet of potential regional BMP volume shown in Table 9-5 of the RAA. The Watershed Group has identified sufficient potential additional BMP sites at schools in the Watershed. However, these sites have not been included in the WMP at this time because negotiations with school districts have only just begun. The Group has also identified potential sites involving private property, but these sites may not be necessary. Further additional Regional BMP sites will be evaluated through the adaptive management process. In addition, the Group expects the regional capture volume to be reduced through implementation of source control measures.

The need for additional sites will be influenced by the effectiveness of non-structural control measures such as implementation of SB 346, the runoff reduction program, the TSS reduction program, and the implementation of green streets and other LID projects. If additional major underground water capture facilities are needed, they also will be located under parks, golf courses, utility easements, and schools to the extent feasible. Each adaptive management process cycle will provide additional specific information on the number, type, and location of structural and non-structural BMPs. Additional information on the anticipated timing of BMPs is found in Section 6.

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Table 4-6: Potential Los Cerritos Channel Watershed First Order Major BMP Sites

(Public Park and Golf Courses)

No.	Name	Latitude	Longitude	WMMS Sub-watershed	Sub-basin
1	Potential Progress Park BMP Site (Paramount)	33.892402°	-118.150910°	5523	SB 9
2	Potential Bike Trail @ Clark Ave BMP Site (Bellflower)	33.890138°	-118.133766°	5518	SB 8
3	Potential Sims Park BMP Site (Bellflower)	33.883770°	-118.133772°	5517	SB 8
4	Potential Mayfair Park BMP Site (Lakewood)	33.857028°	-118.132101°	5517	SB 10
5	Potential Caruthers Park BMP Site (Bellflower)	33.878452°	-118.111056°	5507	SB 10
6	Potential Heartwell Park Palo Verde Channel BMP Site (Long Beach)	33.830487°	-118.108951°	5505	SB 10
7	Potential Long Beach Junior Golf Course BMP Site (Long Beach)	33.830422°	-118.104780°	5505	SB 10
8	Potential Heartwell Park Clark Channel BMP Site (Long Beach)	33.830761°	-118.129573°	5514	SB 7
9	Potential Pan American Park BMP Site (Long Beach)	33.842283°	-118.131496°	5514	SB 7
10	Potential Skylinks Wardlow Channel BMP Site (Long Beach)	33.822990°	-118.135062°	5515	SB 6
11	Potential Wardlow Park BMP Site (Long Beach)	33.821295°	-118.129327°	5511	SB 5

12	Potential Skylinks LCC BMP Site (Long Beach)	33.812905°	-118.138772°	5509	SB 4
13	Potential Reservoir Park BMP Site (Signal Hill)	33.818430°	-118.174593°	5510	SB 4

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Table 4-7: Potential Los Cerritos Channel Watershed Second Order Major BMP Sites

(Transmission Rights-of-Way)

No.	Name	Latitude	Longitude	WMMS Sub-watershed	Sub-basin
1	Potential Transmission R-O-W BMP Site [East of Downey Avenue in Paramount]	33.899399°	-118.152599°	5524	SB 9
2	Potential Transmission R-O-W BMP Site [Dunbar/Mayne in Bellflower]	33.886455°	-118.147181°	5519	SB 8/9
3	Potential Transmission R-O-W BMP Site [South of Paramount on Downey Ave. in Bellflower]	33.879384°	-118.151030°	5523	SB 9
4	Potential Transmission R-O-W BMP Site [East of Clark Ave. in Lakewood]	33.868742°	-118.133477°	5517	SB 8
5	Potential Transmission R-O-W BMP Site [East of Lakewood Blvd. in Lakewood]	33.868338°	-118.141666°	5517	SB 8
6	Potential Transmission R-O-W BMP Site [West of Community Gardens in Lakewood]	33.854136°	-118.113120°	5507	SB 10
7	Potential Transmission R-O-W BMP Site [Candlewood East of Woodruff in Lakewood]	33.852845°	-118.114556°	5506	SB 10
8	Potential Transmission R-O-W [West of Palo Verde Channel in Lakewood]	33.849443°	-118.109604°	5506	SB 10

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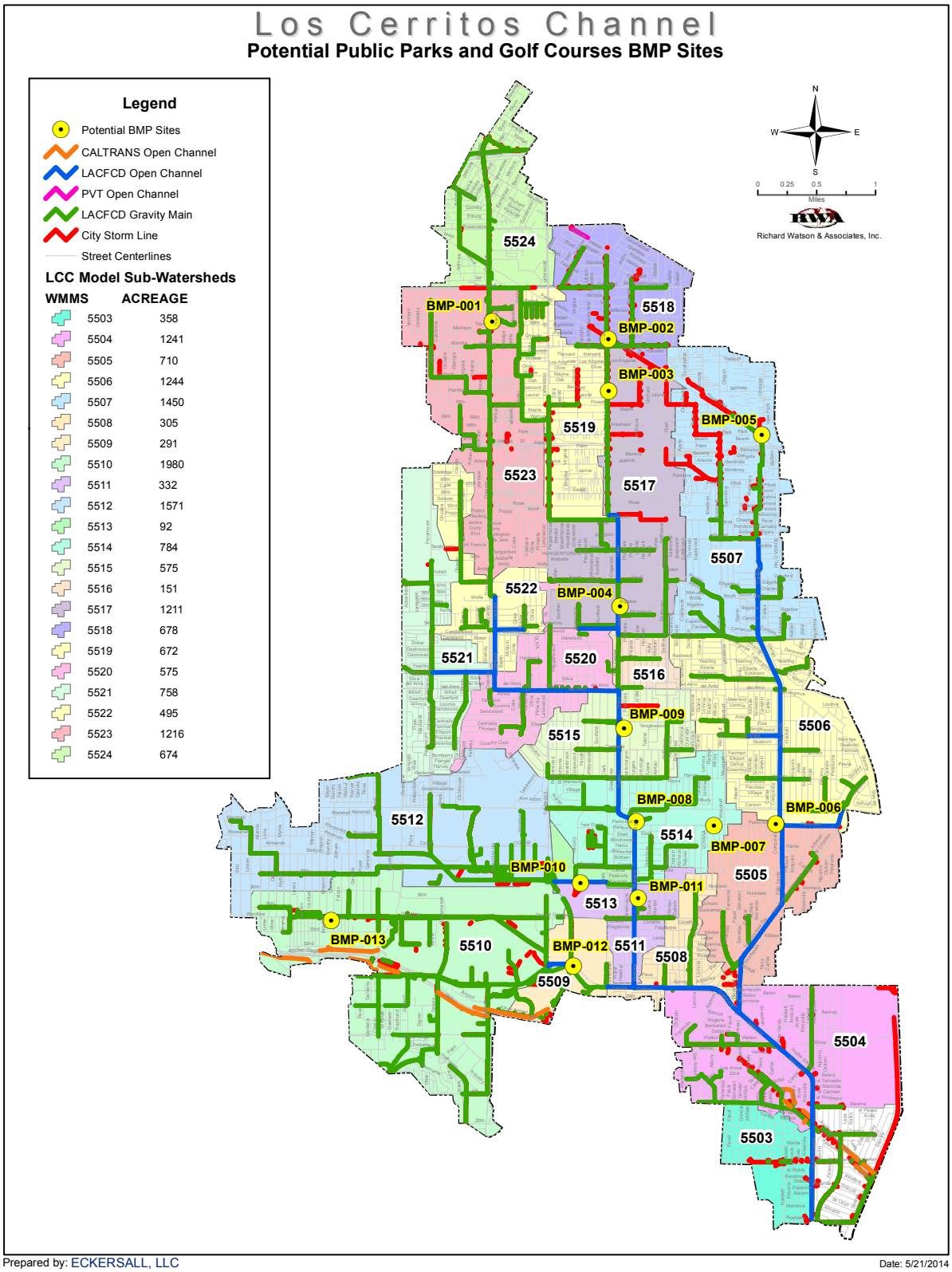

Figure 4-1: LCC Potential Public Parks and Golf Course BMP Sites

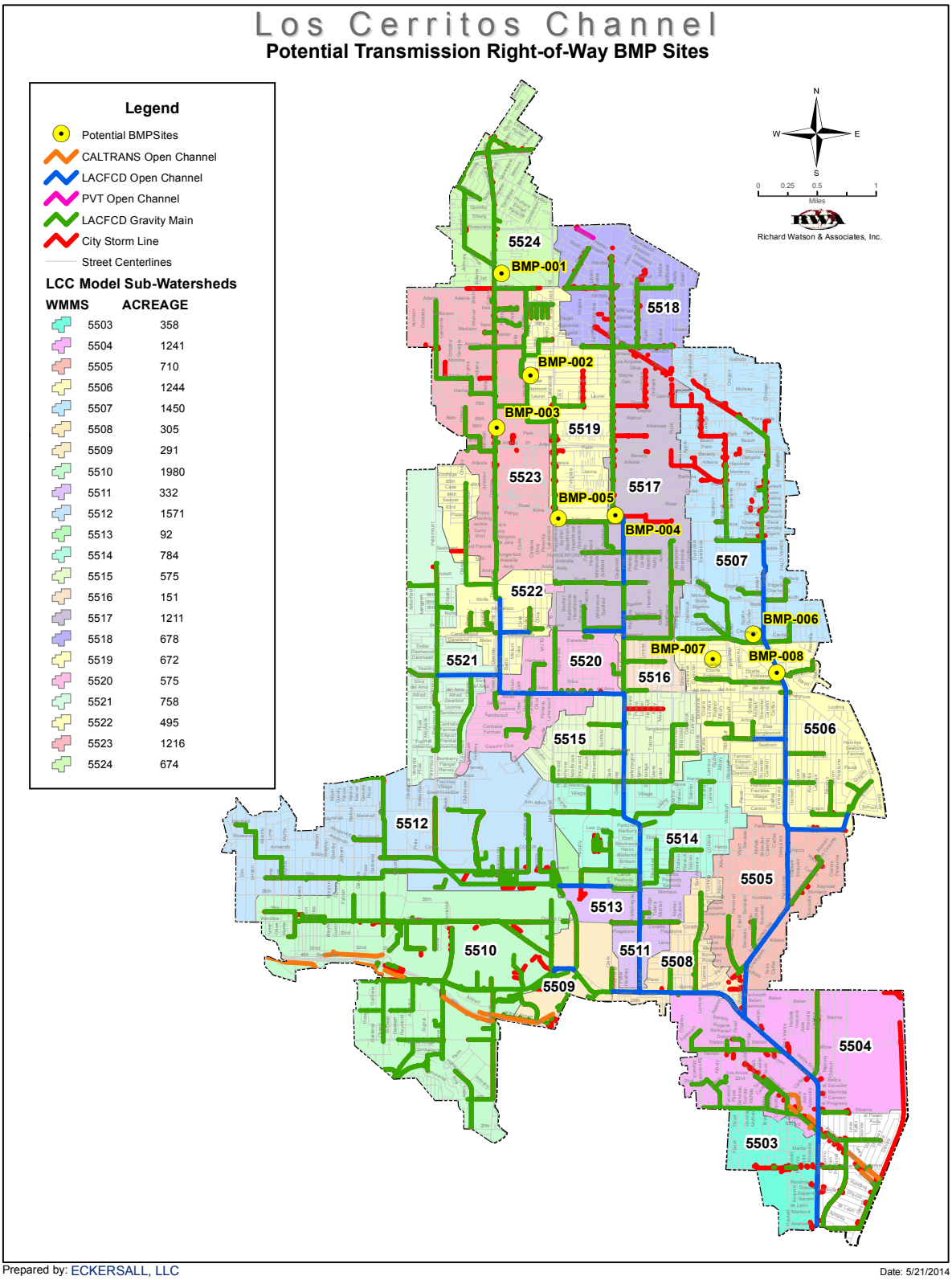

Figure 4-2: LCC Potential Transmission ROW BMP Sites

4.6 Non-TMDL Impaired Waters Control Measures

4.6.1 Non-Structural Control Measures

The non-structural control measures implemented to address non-TMDL impaired waters will focus on implementation of minimum control measures, particularly commercial/industrial inspections, construction inspections, business outreach, and residential outreach. In addition, the Watershed Group will monitor and support, where appropriate, extended producer responsibility and packaging reductions proposed by the California Product Stewardship Council. Future bacteria control measures will be evaluated through the adaptive management process.

4.6.2 Structural Control Measures

The primary structural measures to control trash will be installation of full capture devices in priority land use areas pursuant to the State Water Board trash amendments when they are adopted. The Watershed Group proposes to work with the Regional Water Board regarding the requirements in Order Part VI.D.9.h.vii(1) related to installation of trash excluders in light of the proposed trash amendments. Future bacteria control measures will be enacted through the adaptive management process.

4.7 Control Measures for Non-Impairment Pollutants

4.7.1 Non-Structural Control Measures

The non-structural control measures to be implemented to control non-impairment pollutants consist primarily of TSS reduction and the full range of minimum control measures, especially the inspection and outreach measures. The Watershed Group will also emphasize true source control and operational source control to reduce the release of potential pollutants. The Group will also monitor and support, when appropriate, extended producer responsibility, including take-back measures that will reduce the probability of pollutant releases.

4.7.2 Structural Control Measures

The Watershed Group is not proposing any special structural control measures to address non-impairment pollutants. Rather, it will depend on LID, green streets, stormwater capture, and other structural measures implemented to address TMDL and non-TMDL requirements to also help control non-impairment pollutants indicated by monitoring results.

4.8 Control Measures To Be Implemented at the Watershed and Sub-Watershed Levels

4.8.1 Non-Structural Control Measures

The non-structural control measures being implemented at the Watershed and sub-watershed scales involve the development of model ordinances, support for true source control and operational source

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control measures, coordination of business outreach and residential outreach, and preliminary design of proto-type water-capture facilities.

4.8.2 Structural Control Measures

Structural measures to be implemented at the Watershed and sub-watershed scales will likely include water capture devices. These will likely be sub-watershed projects developed pursuant to specific MOUs between the benefitting agencies. If a regional or sub-regional stormwater fee is established, construction of Watershed and/or subwatershed projects will become much more feasible. However, Memoranda of Understanding would be required to determine the allocation of benefits and agreement on funding.

4.9 Control Measures To Be Implemented at the Jurisdictional Level

4.9.1 Non-Structural Control Measures

Individual jurisdictions within the Watershed will be responsible for implementation of minimum control measures. They will also be responsible for model ordinances and adopting appropriate targeted implementation ordinances, such as ordinances to implement the TSS Reduction Strategy. In addition, they will be asked to support source control measures such as extended producer responsibility, when appropriate, and to comment on proposed legislation and/or regulations.

4.9.2 Structural Control Measures

Individual jurisdictions will be responsible for installation and maintenance of green streets and LID measures. They may also construct water capture and water treatment facilities when grants are available or sustainable stormwater fee measures have been implemented.

4.10 Overview of Implementation Responsibilities

The Watershed Management Program has been designed to emphasize multi-jurisdictional watershed cooperation to the extent feasible. Individual jurisdictions are responsible for implementation of minimum control measures and enhanced street sweeping, as well as the implementation of green street policies and LID ordinances. Jurisdictions discharging to planned major water capture facilities will be responsible for design and construction of the water capture facilities pursuant to agreements to be developed prior to initiating design and construction. Jurisdictional responsibilities for design of the initial major water capture facilities are shown in Tables 6-5, 6-7, 6-9, and 6-11, and jurisdictional responsibilities by sub-basin are shown in Table 6-12.

The LACFCD will work with the Watershed group in its efforts to address source controls; assess, develop, and pursue funding for structural BMPs, and promote the use of water reuse and infiltration. As regional project scopes are further refined, the LACFCD will contribute to the WMP projects on a case-by-case basis, agreed upon with the Watershed Group.

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5.0 Compliance with Receiving Water Limitations

This section explains how the Watershed Group believes it will come into compliance with receiving water limitations. Additional information on how compliance can be achieved through stormwater capture is contained in the Reasonable Assurance Analysis (RAA) prepared for the Lower Los Angeles River, the Los Cerritos Channel, and the Lower San Gabriel River Watersheds. This RAA is described in Section 8 and found in Attachment A.

5.1 Compliance with Receiving Water Limitations Addressed by a TMDL

5.1.1 Copper

The Los Cerritos Channel TMDL for copper contains interim compliance dates of September 30, 2017, September 30, 2020, and September 30, 2023, as well as a final compliance date of September 30, 2026, for both dry weather and wet weather. Current monitoring indicates that the Watershed has already achieved compliance with water quality standards for copper during dry weather, most likely due to the recent large reduction in average dry-weather flows from 2.35 cfs to less than 0.5 cfs at Stearns Street.

The wet-weather compliance date for 2017 requires that 10% of the total drainage area served by the storm drain system effectively meets the wet-weather WLAs. The RAA prepared by Tetra Tech with the assistance of Paradigm Environmental indicates that the Watershed will meet the 2017 interim milestone through implementation of non-structural control measures, including the targeted total suspended solids (TSS) reduction program. The Watershed Group will demonstrate this reduction either by a 10% reduction in loadings as measured at the Stearns Street monitoring site or by monitoring results demonstrating that a sub-basin containing 10% or more of the drainage area served by the storm drain system meets the wet weather WLAs for copper. For September 30, 2020, during the next 5-year permit cycle, the requirement is that 35% of the total drainage area served by the storm drain system effectively meet the wet-weather WLAs. The Watershed Group expects this to be met by the cumulative impacts of implementation of SB 346, implementation of the TSS reduction strategy, implementation of green streets policies and LID ordinances, and implementation of stormwater capture and infiltrate and/or use projects, enhanced street-sweeping, and continued implementation of minimum control measures. These same measures will result in compliance with the 2023 interim milestone and the 2026 final compliance requirements.

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5.1.2 Lead

There is no dry-weather TMDL for lead, and the Los Cerritos Channel Lead TMDL requires no wet-weather reduction in lead loads. It requires only maintenance of existing conditions to ensure that freshwater quality for lead does not degrade below current levels and to ensure that lead levels in downstream sediments do not increase in the future.

5.1.3 Zinc

There is no dry-weather TMDL for zinc.

The wet-weather compliance date for 2017 requires that 10% of the total drainage area served by the storm drain system effectively meets the wet-weather WLAs. The RAA prepared by Tetra Tech with the assistance of Paradigm Environmental indicates that the Watershed will meet the 2017 interim milestone through implementation of non-structural control measures, including the targeted TSS reduction program. The Watershed Group will demonstrate this reduction either by a 10% reduction in loadings as measured at the Stearns Street monitoring site or by monitoring results demonstrating that a sub-basin containing 10% or more of the drainage area served by the storm drain system meets the wet weather WLA for zinc. For September 30, 2020, during the next 5-year permit cycle, the requirement is that 35% of the total drainage area served by the storm drain system effectively meet the wet-weather WLAs. The Watershed Group expects this to be met by cumulative impacts of implementation of the TSS reduction strategy, implementation of green streets policies and LID ordinances, and implementation of stormwater capture and infiltrate and/or use projects, enhanced street-sweeping, and continued implementation of minimum control measures. In addition, the Watershed Group proposes to work with CASQA to petition the Department of Toxic Substances Control to regulate zinc in tires through the Safer Consumer Product Regulations that became effective October 1, 2013. These same measures will result in compliance with the 2023 interim milestone and the 2026 final compliance requirements.

The cities will also be addressing multiple local sources of zinc, particularly galvanized metal, which is almost ubiquitous in the urban environment.

5.1.4 Harbor Toxics TMDL

The Greater Harbor Toxics TMDL includes requirements to reduce copper, lead, zinc, DDT, PCBs, chlordane, PAHs, and sediment toxicity. All of these pollutants will be addressed by measures implemented to address metals in the Los Cerritos Channel since three are the same metals in the Los Cerritos Channel Metals TMDLs, four are legacy organics that will also be addressed by the measures to address metals in the Los Cerritos Channel, and the last one is a condition produced by the other pollutants. All of the pollutants adhere to sediment, which is the focus of the TSS Reduction Strategy.

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5.2 Compliance with Receiving Water Limitations Not Otherwise Addressed by a TMDL

5.2.1 Impairment Pollutants in the Same Class as Those Addressed in a TMDL

Although coliform bacteria and enterococcus are weakly associated with sediment, the Watershed Group has concluded that none of the Category 2 or Category 3 pollutants are in the same class as those pollutants addressed by a TMDL.

5.2.2 Impairment Pollutants Not in the Same Class as Those Addressed in a TMDL

This WMP addresses five impairment pollutants not in the same class as those addressed in a TMDL. These are the Category 2 pollutants ammonia, bis(2-ethylhexyl)phthalate (DEHP), coliform bacteria, trash, and pH. Ammonia is proposed for delisting, and the Watershed Group does not propose to address it at this time. (See Section 2 for more details.)

Bis(2-ethylhexyl)phthalate is a plasticizer associated with plastic trash so it will be addressed with trash. The Watershed Group proposes to address trash through the process outlined in the State Water Board's proposed trash amendments to the California Ocean Plan and the Inland Surface Waters, Enclosed Bays, and Estuaries Plan. Once the State Water Board adopts these amendments, this WMP will be amended through the adaptive management process to specify in more detail how the Watershed will meet trash and DEHP water quality standards.

The Proposed *Final Staff Report for the Amendments to the Water Quality Control Plan for the Ocean Waters of California to Control Trash* and *Part 1 Trash Provisions of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California* will apply to all surface waters of the State and specify a time schedule of 10 years from the first implementing permit, but no later than 15 years from the effective date of the Trash Amendments. Because trash will be addressed in accordance with the Trash Amendments, the Watershed Group believes that its proposed 10-year schedule to meet trash and DEHP water quality standards is as soon as the standards can realistically be met.

The 303(d) list includes coliform bacteria (now *E. coli*), which will be partially addressed by runoff reduction and stormwater capture. It will also be addressed by ongoing implementation of several of the minimum control measures. In order to address coliform bacteria (*E. coli*) as soon as possible, the Watershed Group plans to first address dry-weather bacteria. The Group plans to do this through further reductions in dry-weather flows through implementation of LID ordinances and green streets policies and through dry-weather diversion to sanitary sewers or to infiltration or bioretention facilities. Further reductions in dry-weather flows (now averaging less than 0.5 cfs at Stearns Street) will reduce dry-weather bacteria exceedances and possibly

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eliminate them in 10 years. This is as soon as realistically possible to eliminate dry weather flows. Eliminating bacteria exceedance during dry weather would bring the channel into compliance with *E.* coli standards for approximately 90% of the year. The Watershed Group proposes to address bacteria more directly during the second and third adaptive management reviews after members have had a chance to review the effectiveness of runoff reduction and ongoing implementation of minimum control measures on *E. coli* counts in the receiving waters. The Group will then evaluate the potential need for alternative measures. The only way the Permittees currently know to reduce wet-weather bacteria exceedances is to obtain a high-flow suspension and to capture stormwater. Twenty to twenty-five years will be needed to design, fund, and build enough capacity to significantly reduce wet-weather bacteria exceedances. Therefore, the Watershed Group believes that 2040 is as soon as wet-weather bacteria standards can be realistically met.

The Permittees do not propose addressing ammonia and pH in the watershed through control measures. Rather, as noted in Section 2, they believe there is sufficient documentation to delist them. The last impairment is a condition – not a pollutant. It is a pH exceedance associated with shallow water flowing over a concrete surface and sunshine. It is a natural dry-weather condition. The Watershed Group proposes to work with Regional Water Board staff on a way to delist pH since it is a natural condition – not a pollutant.

5.2.3 Non-Impairment Pollutants

The only Category 3 pollutants included in this WMP are MBAS and enterococcus. Enterococcus is not a freshwater problem. It is included in the WMP because the principal monitoring site for the Watershed (Stearns Street) is located just upstream of the saline Los Cerritos Channel Estuary. It will be addressed in the same manner as *E. coli* is addressed.

The Watershed Group believes that it may be able to come into compliance with MBAS standards sooner because of the limited number of exceedances and the low level of the exceedances (see Table 2-12). The member cities will use the inspection process to educate maintenance organizations and individuals about not letting detergents and other cleaning products enter the storm drain. The Group is going to target eliminating MBAS exceedances by 2020. The Group believes that it should be possible to change the behavior of the target audience in five years. If the data do not demonstrate success by the time of the second adaptive management review, the Group will implement other measures. Table 2-12 continues to show a final wet weather compliance date of 2025 in case education and inspection measures are not sufficient to achieve compliance with water quality standards.

5.3 Total Suspended Solids Reduction Quantification

Although expected pollutant reductions resulting from the TSS reduction program are not modeled empirically within WMMS, a rudimentary quantification of the program's potential

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effectiveness may be calculated through the application of the Revised Universal Soil Loss Equation (RUSLE). The RUSLE is defined as

$$\boldsymbol{A = RKLS}$$

where

$\boldsymbol{A}$ = Spatially and temporally averaged soil loss per unit area per unit time. The result is expressed in the units elected for $\boldsymbol{K}$ and $\boldsymbol{R}$.

$\boldsymbol{R}$= Rainfall-runoff erosivity factor (per unit time, generally one year),

$\boldsymbol{K}$= Soil erodibility factor (mass per unit area – an area density – generally tons per acre),

$\boldsymbol{L}$= Slope length factor and

$\boldsymbol{S}$= Slope steepness factor.

Using local values of $\boldsymbol{R}$, $\boldsymbol{K}$ and $\boldsymbol{LS}$ obtained through maps available on the State Water Resources Control Board's website for the Construction General Permit[1],

$$\boldsymbol{R \approx 40\ year^{-1}}$$
$$\boldsymbol{K \approx 0.32\ \frac{tons}{acre}}$$ and
$$\boldsymbol{LS \approx 0.45}$$

giving

$$\boldsymbol{A = \left(40\ year^{-1}\right)\left(0.32\ \frac{tons}{acre}\right)0.45}$$
$$\boldsymbol{A = 5.76\ \frac{tons}{acre\ year}}.$$

Following the CGP Risk assessment procedures, 5.76 tons per acre year is within the "low sediment risk" designation.

During the cooperative preparation of the Lower San Gabriel River, Lower Los Angeles River and Los Cerritos Channel WMPs, several participating agencies provided estimates of exposed soil within their jurisdiction that were not related to construction activities. The City of Bellflower field-verified these estimates, which totaled approximately 18 acres or about 0.5% of the City. Following the calculated value for $\boldsymbol{A}$, this equates to approximately 100 tons of soil loss per year.The City of Signal Hill determined that 70.3 acres of the 531 acres within the city that drain to the Los Cerritos Channel consists of undeveloped vacant land (13%)—however this is an anomalous circumstance specific to the City. Applying the 70.3 acres to Signal Hill and extrapolating the 0.5% to the remaining area of the Los Cerritos Channel Watershed (17,179 acres), the soil loss tonnage is

[1] http://www.waterboards.ca.gov/water_issues/programs/stormwater/constpermits.shtml

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$$M_{TSS} = fWA = (0.005 \cdot 17,179\ acres + 70.3\ acres)\left(5.76\ \frac{tons}{acre\ year}\right)$$

$$M_{TSS} \approx 156\ \text{acres}\ \left(5.76\ \frac{tons}{acre\ year}\right)$$

$$M_{TSS} \approx 900\ \frac{tons}{acre\ year}$$

where

$M_{TSS} =$ Estimated annual soil loss within the watershed in tons,
$f =$ Estimated fraction of exposed soil (non-construction) within a given urbanized area and
$W =$ Watershed area.

Historical monitoring results from the watershed suggest that approximately 1.8 grams of zinc adheres to every kilogram of TSS, so that the zinc discharge M_{Zn} associated with M_{TSS} is

$$M_{Zn} \approx \left(\frac{1.8}{1000}\right) M_{TSS}$$
$$M_{Zn} \approx \left(\frac{1.8}{1000}\right)\left(900\ \frac{tons}{year}\right)\left(\frac{2000\ lbs}{1\ ton}\right)$$
$$M_{Zn} \approx 3,200\ \frac{lbs}{year}\ or\ 1,450\ \frac{kg}{year}.$$

The RAA predicts an annual zinc loading of 2,607 kg for the average storm year. Assuming that within the term of the MS4 Permits the TSS Reduction Strategy approaches an effectiveness goal of 10% (145 kg/year), this would equate to a load reduction of **5.5%**. Equivalently, an effectiveness of 20% corresponds to a load reduction of **11%** and an effectiveness of 30% corresponds to a reduction of **16.5%**. Reductions of this magnitude provide support for the 10% load reduction assumed for non-modeled controls. Further development of the TSS Reduction program is anticipated to meaningfully aid in the achievement of targeted load reductions.

5.4 Addressing Limiting Pollutants Drives Other Pollutant Reduction

The identification of limiting pollutants – *E. coli* in dry weather and zinc in wet weather – in sub-sections 5.3.1 and 5.3.2 of the Reasonable Assurance Analysis (RAA) was intended to identify the most challenging pollutants so that the Permittees could develop control measures to address these pollutants that would also address other pollutants. These control measures will especially address the category 2 and 3 pollutants – with the exception of ammonia and pH that are proposed for delisting (see Section 2).

All Category 2 and Category 3 pollutants will be addressed through the program described above to greatly reduce or eliminate dry-weather discharges in the channel system as soon as

possible, perhaps within 10 years. Each reduction in dry-weather discharges will reduce the transport mechanism that carries trash, bacteria, and MBAS downstream. Furthermore, as the dry-weather discharges approach zero, the algal mat will be reduced and the diurnal cycling of pH reduced or eliminated. This, in turn, will reduce or eliminate ammonia exceedances.

The LID, green streets, and water capture facilities constructed to address zinc, the wet weather limiting pollutant, will also address other pollutants. LID and green street facilities will reduce the transport mechanism and capture trash and MBAS, as well as bacteria. The regional and sub-regional water capture facilities will involve pre-treatment that will capture trash and other suspended materials. The facilities will also capture dissolved material that will be filtered as the water infiltrates or be removed if the water is treated for surface irrigation.

In addition, trash and Bis(2-ethylhexyl) phthalate (DEHP), a plasticizer associated with and addressed with trash, are partially addressed through street sweeping, which, in addition to keeping sediment out of the storm drain system, also helps keep trash out of the storm drain system. Further, as explained above, DEHP and trash will also be addressed by implementation of the Proposed Trash Amendments that will apply to the Los Cerritos Channel and its tributaries. The Watershed Group believes that through this approach of activities and control measures it will achieve applicable receiving water limitations for Category 2 and Category 3 pollutants.

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6.0 Implementation Schedules

Formal implementation of the Los Cerritos Channel WMP will begin upon approval of the final program plan pursuant to Table 9 of Order No. R4-2012-0175. For planning purposes, the Watershed Group is projecting final plan approval by March or April of 2015. The schedule provides for commencing monitoring on July 1, 2015 as starting monitoring part way through a complete monitoring year or missing the first storms of the year would not be productive. The implementation schedule is strongly influenced by TMDL final wet-weather compliance dates and target dates for Category 2 and Category 3 pollutants, the Watershed Group's Water Quality Improvement Strategy, and the need to establish a stable and sustainable stormwater funding source in Los Angeles County to pay for the expensive stormwater capture and stormwater treatment facilities anticipated to be necessary to meet water quality standards in a timely manner.

At this time it is not possible to identify all projects and schedule their implementation. For instance, although the RAA identifies areas for green street construction and assumes a 30% conversion of road length in suitable areas, it will take time to identify and schedule construction of individual green streets projects. The watershed cities are currently working with the Gateway Council of Governments (Gateway COG) to identify future arterial and intersection projects in the COG's Strategic Transportation Plan with potential for installation of green street measures. Even though not all projects can be specified and scheduled at this time, the Permittees, consistent with the Water Quality Improvement Hierarchy shown in Figure 3-1 and the overall Water Quality Improvement Strategy discussed in Section 3, will construct the necessary mix of water capture facilities, green streets, LID projects, and treatment controls in the various sub-basins to supplement the true source control, runoff reduction, and TSS reduction measures to ensure compliance with permit requirements per applicable compliance schedules. The mix of measures will be periodically adjusted through the adaptive management process.

Furthermore, the LACFCD will work with the Watershed Group in its efforts to address source controls; assess, develop, and pursue funding for structural BMPs, and promote the use of water reuse and infiltration. As regional project scopes are further refined, the LACFCD will contribute to the WMP projects on a case-by-case basis, agreed upon with the Watershed Group.

The overall implementation schedule for the Los Cerritos Channel Watershed Management Program is based, in part, on the implementation schedule in the Los Cerritos Channel Metals TMDLs and the Greater Harbor Toxics TMDLs. For other pollutants, the implementation schedules are based on the schedules for TMDLs in other watersheds. Final wet-weather compliance target dates for Category 1, 2, and 3 pollutants are shown in Table 6-1 as well as tables, 2-9, 2-10, 2-11, and 2-12 in Section 2. Interim milestone targets occurring between July 1, 2014 and December 28, 2022 are shown in Table 6-2.

Table 6-1: Final Compliance Dates for Category 1, 2, and 3 Pollutants

Date	Target
September 2025	Target compliance date for trash and Bis(2-ethylhexyl)phthalate and MBAS

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September 2026	Final compliance date for LCC Metals TMDLs
March 2032	Final compliance date for Harbor Toxics TMDL
September 2040	Target compliance date for bacteria

Table 6-2: Interim Milestone Targets Between December 28, 2012 and December 28, 2017*

Date	Target
September 30, 2016	10% of the Watershed meeting Basin Plan standard of 0.5 mg/L for MBAS
September 30, 2016	Installation of full-capture trash control devices serving 10% of the high priority land uses in the watershed to address trash and Bis(2-ethylhexyl)phthalate**
March 23, 2017	Greater Harbor Responsible Parties complete Phase I of Implementation Plan and Sediment Management Plan
September 30, 2017	For the LCC Metals TMDLs, 30% of the drainage area served by storm drain system effectively meeting dry-weather WLAs and 10% of drainage area served by storm drain system meeting wet-weather WLAs or equivalent redirections in total loads at Stearns Street monitoring site.
September 30, 2017	Installation of full-capture trash control devices serving 20% of the high priority land uses in the watershed to address trash and Bis(2-ethylhexyl)phthalate**
September 30, 2017	20% of the watershed meeting Basin Plan standard of 0.5 mg/l for MBAS

* Additional milestone information in Tables 6-4 through 6-11.

** Assuming adoption of proposed Trash Amendments in Spring 2015.

Part VI.C.5.c provides guidance for inclusion of implementation schedules into the WMP. Compliance schedules for TMDLs are to be incorporated into the program schedule. Compliance schedules and interim milestone dates are to be used to measure progress toward addressing the highest water quality priorities and achieving applicable water quality-based effluent limitations. Schedules must be adequate to measure progress on a watershed scale every two years as part of an adaptive management process. Schedules are to be developed for the strategies, control measures, and BMPs to be implemented by each Permittee within its jurisdiction and for those that will be implemented by multiple Permittees on a watershed scale. The current schedule focuses on regional projects to be implemented on a watershed scale and on municipal roles in planning and implementing these projects. Schedules for jurisdictional projects will be added to the schedules during adaptive management review as cities plan and program implementation of green streets, LID, and other local projects. Several of the measures in the

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Implementation Schedule include encouraging actions by other entities. Depending on the measure, this encouragement will be done through outreach efforts and/or implementation of inspection programs.

The initial schedule contained in this WMP covers a 26-year period and is structured into eight three-year phases and a two-year phase. These schedules assume a 2015 start date and are based on an anticipated 5-year permit renewal cycle. Table 3 is an implementation summary for the period 2015 through 2040. The table summarizes information for Phases 1-4 (2015-2026) and a schedule for planning Phases 5-9 (2027-2040). It shows the interim milestone and final compliance dates for the metals TMDLs as well as anticipated interim milestone and final compliance dates for the State Water Board's trash amendments. At this time it contains only one compliance date for the Greater Harbor Toxics TMDL. The Watershed Group will review data from the Greater Harbor Regional Monitoring Coalition monitoring of East San Pedro Bay during the first two adaptive management reviews to develop a schedule, if needed, for measures to address Greater Harbor Toxics TMDL pollutants not already addressed.

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Table 6-3
Summary WMP Implementation and Milestone Schedule[1]

2015-2017 Phase 1 (See Tables 6-4, 6-5, and 6-12 for schedules, milestones, and sub-basin implementation measures)[2]

Q2, 2015 – Anticipated Adoption of Trash Amendment

Q3, 2015 – Anticipated Effective Date of Trash Amendment

September 30, 2016 –Anticipated Interim Trash Amendment Milestone

September 30, 2016 – Interim MBAS Milestone

March 23, 2017 – Completion of Phase I of Implementation Plan and Sediment Management Plan for Greater Harbor Toxics TMDL

July 1, 2017 – Report of Waste Discharge (ROWD) Due

September 30, 2017 –Anticipated Interim Trash Amendment Milestone

September 30, 2017 – Interim Metals TMDL Milestone

September 30, 2017 – Interim MBAS Milestone

2018-2020 Phase 2 (See Tables 6-6, 6-7, and 6-12 for schedules, milestones, and sub-basin implementation measures)[1, 2]

September 30, 2018 – Anticipated Interim Trash Amendment Milestone

September 30, 2018 – Interim MBAS Milestone

September 30, 2019 – Anticipated Interim Trash Amendment Milestone

September 30, 2019 – Interim MBAS Milestone

September 30, 2020 – Anticipated Interim Trash Amendment Milestone

September 30, 2020 – Interim MBAS Milestone

September 30, 2020 – Interim Metals TMDL Milestone

2021-2023 Phase 3 (See Tables 6-8, 6-9, and 6-12 for schedules, milestones, and implementation measures)[3]

September 30, 2021 – Anticipated Interim Trash Amendment Milestone

September 30, 2021 – Interim MBAS Milestone

[1] Schedule based on 5-year permit renewal schedule
[2] Phases 1 and 2 are detailed as action plans subject to availability of funds for design and construction of green streets and stormwater capture devices.
[3] Phase 3 will be converted to an action plan as part of a 2017 Report of Waste Discharge (ROWD).

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July 2022 – Anticipated ROWD Due Date

September 30, 2022 – Anticipated Interim Trash Amendment Milestone

September 30, 2022 – Interim MBAS Milestone

September 30, 2023 – Anticipated Interim Trash Amendment Milestone

September 30, 2023 – Interim Metals TMDLs Milestone

September 30, 2023 – Interim MBAS Milestone

2024-2026 Phase 4 (See Tables 6-10, 6-11, and 6-12 for schedules, milestones, and implementation measures)[4]

September 30, 2024 – Anticipated Interim Trash Amendment Milestone

September 30, 2024 – Interim MBAS Milestone

September 30, 2025 – Anticipated Interim Trash Amendment Final Compliance Date

September 30, 2025 – Final MBAS Compliance Target Date

July 2026 – Anticipated ROWD Due Date

September 30, 2026 – Final Metals TMDLs Compliance Date

2027-2029 Phase 5 (To Be Planned During Phase 3)[5]

2030–2032 Phase 6 (To Be Planned During Phase 4)[6]

2033-2035 Phase 7 (To Be Planned During Phase 5)[7]

2036-2038 Phase 8 (To Be Planned in Phase 6)[8]

2039-2040 Phase 9 (To Be Planned in Phase 7)[9]

Tables 6-4 through 6-11 provide more information about activities during phases 1-4 (2015-2026). They demonstrate the progressive implementation of the WMP, beginning with planning and ordinance development and moving to design and construction, subject to the availability of funding. The schedule for phases 2-4 will be reviewed and refined during the first adaptive management review.

[4] Phase 4 will be converted to an action plan as part of the expected 2022 ROWD.
[5] Phase 5 will be converted to an action plan as part of the expected 2022 ROWD.
[6] Phase 6 will be converted to an action plan as part of the expected 2027 ROWD.
[7] Phase 7 will be converted to an action plan as part of the expected 2032 ROWD.
[8] Phase 8 will be converted to an action plan as part of the expected 2032 ROWD.
[9] Phase 9 will be converted to an action plan as part of the expected 2037 ROWD.

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Table 6-4
WMP Implementation Schedule – Ongoing Measures
Phase 1 (2015-2017)

Minimum Control Measures

- Public Information and Participation Program
- Industrial/Commercial Facilities Control Program[1]
- Development of Planning Program
- Development of Controls Program
- Public Agencies Activities Program
- Illicit Connection and Illicit Discharge Elimination Program
- Preparation of a targeted industrial inspection component for metals by City of Paramount

True Source Control and Operational Source Control[1]
(Emphasis on Category 1 pollutants)

- Implementation of SB 346
- Implementation of SB 757
- Support development and Implementation of Safer Consumer Products Regulations
- Monitoring of USEPA Proposed Rulemaking to further reduce or remove lead from aviation gasoline
- Monitoring of California Product Stewardship Council Proposals, especially for Extended Producer Responsibility and other true source control measures
- Outreach to industries potentially contributing zinc to Watershed by all municipalities to encourage control of non-industrial process source of zinc.

TSS Reduction (Soil Stabilization/Sediment Control)[1]

- Implementation of model TSS reduction ordinance(s) by City of Signal Hill (2016-2017)
- Enhanced erosion and sediment control at construction sites
- Stabilization of exposed soil not associated with construction sites
- Enhanced street sweeping.

Runoff Reduction and Stormwater Capture[1]

- Jurisdictional planning for green streets Support State legislation to resolve liability issues raised by school administrators in order to facilitate construction of water capture facilities under school athletic fields and playgrounds (2015-2016)
- Encourage Cities and water purveyors to work together to implement stormwater capture and use or infiltration facilities consistent with AB 2403Encourage the use of permeable pavements in parking lots
- Encourage the use of cisterns and rain barrels to reduce the discharge of roof stormwater runoff

[1] Refer to Table 6-12 for implementation by sub-basin.

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Trash Reduction and Control[1]

- Watershed Group coordination with California Product Stewardship Council to reduce trash through reduction of packing materials and implementation of take-back programs
- Research regarding grant opportunities by Watershed Group to pay for installation of full capture systems for high priority land use areas

Stormwater Financing

- Encourage California Contract Cities and League of California Cities, Los Angeles County Division to organize as recommended in the Stormwater Funding Options report to secure sustainable water quality funding in Los Angeles County.
- Improve public education and outreach by Watershed Cities to inform residents, businesses, and others about stormwater program requirements and funding issues.
- Encourage State legislature to adopt a "per tire" zinc control fee with monies made available to local government to construct stormwater capture and/or treatment control facilities to reduce the discharge of zinc to receiving waters
- Encourage inclusion of more money for stormwater quality management in future State water bonds and transportation bond measures
- Encourage Cities to support adoption of a regional stormwater fee

Priority Sub-basin Targets[2]

Targets	Acreage[3]	% LCC Watershed[3]
Sub-basin 4	2,270.6	12.80
Sub-basin 8	2,711.8	15.30
Sub-basin 10	3,403.1	19.20
		47.30

[2] See Figure 1-4 and Attachment B. Special attention given to control measures serving priority sub-basins during this phase.

[3] Based on EPA TMDL acreages that include Caltrans and County acreages

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Table 6-5
WMP Implementation Schedule – Measures with Interim Milestones
Phase 1 (2015-2017)

TSS Reduction (Soil Stabilization/Sediment Control)[1]

- Adoption of model TSS reduction ordinances by City of Signal Hill (Q4, 2015)
- Consideration of possible adoption of TSS reduction ordinances by other Cities within the Watershed (Q4, 2016)
- Consideration and possible adoption of parking lot sweeping ordinances by Cities within Watershed (Q4, 2016)

Runoff Reduction and Stormwater Capture[1]

- Development of prototype design of biofiltration and infiltration chamber for streets with wider parkways by City of Lakewood (Q3, 2015)
- Development of prototype design of biofiltration and infiltration chamber for streets with narrow parkways by City of Paramount (Q4, 2015)
- Development of concept plan for stormwater capture project at Mayfair Park by Cities of Lakewood and Bellflower (Q2, 2016)
- Development of concept plan for stormwater project at Skylinks Golf Course by Cities of Long Beach and Signal Hill (Q4, 2015)
- Development of a process for allocating costs to design and construct regional stormwater capture projects (Q4, 2015)
- Construction of low flow diversion to infiltration/evapotranspiration facility or sanitary sewers for one headwater outfall (Q3, 2016)
- Construction of low flow diversion to infiltration/evapotranspiration facility or sanitary sewer for one headwater outfall (Q3, 2017)
- Construction of initial stormwater capture facility, if funding available (Q3, 2017)

Trash Reduction and Control[1]

- Inventory by Cities in Watershed of catch basins in high priority land use areas pursuant to Trash Amendments adopted by State Water Board (Q1, 2016)[1]
- Installation of full capture systems by Cities in 10% of catch basins serving high priority land use areas within the Watershed portions of each City, subject to the availability of funding (Q3, 2016)[1]
- Installation of full capture systems by Cities in 20% of catch basins serving high priority land use areas within the Watershed portions of each City, subject to the availability of funding (Q3, 2017)[1]

[1] Presuming adoption of trash amendments by State Water Board in spring of 2015.

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Treatment Control

- Installation of two tree box filters by the City of Downey, funded partially through a Proposition 84 grant received by the Gateway Water Management Agency (Q3, 2016)
- Installation of two tree box filters by City of Signal Hill, partially funded by a Proposition 84 grant received by the Gateway Water Management Agency (Q3, 2016)

Priority Sub-basin Targets[2]

Targets	Acreage[3]	% LCC Watershed[3]
Sub-basin 4	2,270.6	12.80
Sub-basin 8	2,711.8	15.30
Sub-basin 10	3,403.1	19.20
		47.30

[2] See Figure 1-4 and Attachment B. Special attention given to control measures serving priority sub-basins during this phase.

[3] Based on EPA TMDL acreages that include Caltrans and County acreages

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Table 6-6
WMP Implementation Schedule – Ongoing Measures
Phase 2 (2018-2020)

Minimum Control Measures

- Public Information and Participation Program
- Industrial/Commercial Facilities Control Program[4]
- Development Planning Program
- Development Controls Program
- Public Agencies Activities Program
- Illicit Connection and Illicit Discharge Elimination Program

True Source Control and Operational Source Control[5]
(Emphasis on Category 1 pollutants)

- Implementation of SB 346
- Implementation of SB 757
- Implementation of Safer Consumer Products Regulations to reduce zinc in tires
- Monitoring of USEPA Rulemaking to further reduce or remove lead from aviation gasoline
- Monitoring of California Product Stewardship Council Proposals, especially for Extended Producer Responsibility and other true source control measures
- Outreach to industries potentially contributing zinc to Watershed by all municipalities to encourage control of non-industrial process source of zinc.
- Outreach to restaurants and markets to encourage control of potential sources of bacteria
- Outreach to pet owners to clean up after their pets to reduce sources of bacteria

TSS Reduction (Soil Stabilization/Sediment Control)[2]

- Implementation of adopted TSS reduction ordinance(s) by Cities in Watershed
- Implementation of adopted parking lot sweeping ordinances by Cities in Watershed
- Implementation of agreements with utilities
- Enhanced erosion and sediment control at construction sites
- Stabilization of exposed soil not associated with construction sites
- Enhanced street sweeping
- Enhanced parking lot sweeping

Runoff Reduction and Stormwater Capture[2]

- Jurisdictional planning for green streets
- Implementation of biofiltration and infiltration chambers for streets with wider parkways by Cities, subject to availability of funding
- Implementation of biofiltration and infiltration chambers for streets with narrow parkways by Cities, subject to availability of funding

[4] Initial emphasis on facilities that are probable metals and trash sources.
[5] Refer to Table 6-12 for implementation by sub-basin.

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- Encourage Cities and water purveyors to work together to implement stormwater capture and use or infiltration facilities consistent with AB 2403
- Encourage the use of permeable pavements in parking lots
- Encourage the use of cisterns and rain barrels to reduce the discharge of roof stormwater runoff

Trash Reduction and Control

- Watershed Group coordination with California Product Stewardship Council to reduce trash through reduction of packing materials and implementation of take-back programs
- Research regarding grant opportunities by Watershed Group to pay for full capture devices for catch basins in high priority land use areas

Stormwater Financing

- To Be Determined

Priority Sub-basin Targets[6]

Targets	Acreage[7]	% LCC Watershed[3]
Sub-basin 4	2,270.6	12.80
Sub-basin 7	1,359.7	7.68
Sub-basin 8	2,711.8	15.30
Sub-basin 9	3,709.3	20.90
Sub-basin 10	3,403.1	19.20
		65.88

[6] See Figure 1-4 and Attachment B. Special attention given to control measures serving priority sub-basins during this phase.
[7] Based on EPA TMDL acreages that include Caltrans and County acreages

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Table 6-7
WMP Implementation Schedule – Measures with Interim Milestones
Phase 2 (2018-2020)

Runoff Reduction and Stormwater Capture[2]

- Implementation of stormwater capture project at Mayfair Park by Cities of Lakewood and Bellflower, subject to availability of funding (Q3, 2019)
- Implementation of stormwater project at Skylinks Golf Course by Cities of Long Beach and Signal Hill, subject to availability of funding (Q3, 2019)
- Development of concept plan for stormwater capture device at Caruthers Park by the City of Bellflower (Q4, 2018)
- Development of concept plan for stormwater capture at Heartwell Park (Clark Channel) by Long Beach, Bellflower, Lakewood, and Paramount, subject to availability of funding (Q3, 2020)
- Development of concept plan for stormwater capture at Heartwell Park (Palo Verde Channel) by Cities of Bellflower, Lakewood, and Paramount, subject to availability of funding (Q2, 2018)
- Development of concept plan for stormwater capture at Skylinks Golf Course by Cities of Long Beach and Lakewood (Q2, 2018)

Trash Reduction and Control

- Installation of full capture systems by Cities in 30% of catch basins serving high priority land use areas within the Watershed portions of each City, subject to the availability of funding (Q3 2018)
- Installation of full capture systems by Cities in 40% of catch basins serving high priority land use areas within the Watershed portions of each City, subject to the availability of funding (2019)[1] (Q3 2019)
- Installation of full capture systems by Cities in 50% of catch basins serving high priority land use areas within the Watershed portions of each City, subject to the availability of funding (2020)[2] (Q3 2020)

	Priority Sub-basin Targets[2]	
Targets	Acreage[3]	% LCC Watershed[3]
Sub-basin 4	2,270.6	12.80
Sub-basin 7	1,359.7	7.68
Sub-basin 8	2,711.8	15.30
Sub-basin 9	3,709.3	20.90
Sub-basin 10	3,403.1	19.20
		65.88

[1] Presuming adoption of trash amendments by State Water Board in Spring 2015
[2] See Figure 1-4 and Attachment B. Special attention given to control measures serving priority sub-basins during this phase.
[3] Based on EPA TMDL acreages that include Caltrans and County acreages

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Table 6-8
WMP Implementation Schedule – Ongoing Measures
Phase 3 (2021-2023) Tentative Plan

Minimum Control Measures

- Public Information and Participation Program
- Industrial/Commercial Facilities Control Program[4]
- Development Planning Program
- Development Controls Program
- Public Agencies Activities Program
- Illicit Connection and Illicit Discharge Elimination Program

True Source Control and Operational Source Control[5]
(Emphasis on Category 1 pollutants)

- Implementation of SB 346
- Implementation of SB 757
- Implementation of Safer Consumer Products Regulations to reduce zinc in tires
- Monitoring of USEPA Rulemaking to further reduce or remove lead from aviation gasoline
- Monitoring of California Product Stewardship Council Proposals, especially for Extended Producer Responsibility and other true source control measures
- Outreach to industries potentially contributing zinc to Watershed by all municipalities to encourage control of non-industrial process source of zinc.
- Outreach to restaurants and markets to encourage control of potential sources of bacteria
- Outreach to pet owners to clean up after their pets to reduce sources of bacteria

TSS Reduction (Soil Stabilization/Sediment Control)[2]

- Implementation of adopted TSS reduction ordinance(s) by Cities in Watershed
- Implementation of adopted parking lot sweeping ordinances by Cities in Watershed
- Implementation of agreements with utilities
- Enhanced erosion and sediment control at construction sites
- Stabilization of exposed soil not associated with construction sites
- Enhanced street sweeping
- Enhanced parking lot sweeping

Runoff Reduction and Stormwater Capture[2]

- Jurisdictional planning for green streets
- Implementation of biofiltration and infiltration chambers for streets with wider parkways by Cities, subject to availability of funding
- Implementation of biofiltration and infiltration chambers for streets with narrow parkways by Cities, subject to availability of funding

[4] Initial emphasis on facilities that are probable metals and trash sources.
[5] Refer to Table 6-12 for implementation by sub-basin.

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- Encourage Cities and water purveyors to work together to implement stormwater capture and use or infiltration facilities consistent with AB 2403
- Encourage the use of permeable pavements in parking lots
- Encourage the use of cisterns and rain barrels to reduce the discharge of roof stormwater runoff

Trash Reduction and Control

- Watershed Group coordination with California Product Stewardship Council to reduce trash through reduction of packing materials and implementation of take-back programs
- Research regarding grant opportunities by Watershed Group to pay for installation of full capture systems for catch basins in high priority land use areas

Stormwater Financing

- To Be Determined

Priority Sub-basin Targets[6]

Targets	Acreage[7]	% LCC Watershed[3]
Sub-basin 5	331.6	1.87
Sub-basin 6	1,663.7	9.39
Sub-basin 7	1,359.7	7.68
Sub-basin 9	3,709.3	20.90
		39.84

[6] See Figure 1-4 and Attachment B. Special attention given to control measures serving priority sub-basins during this phase.

[7] Based on EPA TMDL acreages that include Caltrans and County acreages

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Table 6-9
WMP Implementation Schedule –Measures with Interim Milestones
Phase 3 (2021-2023) Tentative Plan

Runoff Reduction and Stormwater Capture[2]

- Implementation of stormwater capture project at Heartwell Park (Clark Channel) by Cities of Long Beach, Bellflower, Lakewood, and Paramount, subject to availability of funding (Q3, 2021)
- Implementation of stormwater project at Heartwell Park (Palo Verde Channel) by Cities of Bellflower and Lakewood, subject to availability of funding (Q3, 2021)
- Implementation of stormwater capture device at Caruthers Park by City of Bellflower, subject to availability of funding (Q3, 2022)
- Development of concept plan for stormwater capture at Reservoir Park by City of Signal Hill (Q2, 2022)
- Development of concept plan for stormwater capture at Progress Park by City of Paramount (Q2, 2022)
- Development of concept plan for stormwater capture at Wardlow Park by City of Long Beach (Q3, 2023)

Trash Reduction and Control

- Installation of full capture systems by Cities in 60% of catch basins serving high priority land use areas within the Watershed portion of each City, subject to the availability of funding (Q3, 2021)[1]
- Installation of full capture systems by Cities in 70% of catch basins serving high priority land use areas within the Watershed portion of each City, subject to the availability of funding (Q3, 2022)[3]
- Installation of full capture systems by Cities in 80% of catch basins serving high priority land use areas within the Watershed portion of each City, subject to the availability of funding (Q3, 2023)[3]

Stormwater Financing

- To Be Determined

	Priority Sub-basin Targets[2]	
Targets	Acreage[3]	% LCC Watershed[3]
Sub-basin 5	331.6	1.87
Sub-basin 6	1,663.7	9.39
Sub-basin 7	1,359.7	7.68
Sub-basin 9	3,709.3	20.90
		39.84

[1] Presuming adoption of trash amendments by State Water Board in Spring 2015.

[2] See Figure 1-4 and Attachment B. Special attention given to control measures serving priority sub-basins during this phase.

[3] Based on EPA TMDL acreages that include Caltrans and County acreages

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Table 6-10
WMP Implementation Schedule – Ongoing Measures
Phase 4 (2024-2026) Tentative Plan

Minimum Control Measures

- Public Information and Participation Program
- Industrial/Commercial Facilities Control Program[1]
- Development Planning Program
- Development Controls Program
- Public Agencies Activities Program
- Illicit Connection and Illicit Discharge Elimination Program

True Source Control and Operational Source Control[2]
(Emphasis on Category 1 pollutants)

- Implementation of SB 346
- Implementation of SB 757
- Implementation of Safer Consumer Products Regulations to reduce zinc in tires
- Implementation of USEPA Rulemaking to further reduce or remove lead from aviation gasoline
- Monitoring of California Product Stewardship Council Proposals, especially for Extended Producer Responsibility and other true source control measures
- Outreach to industries potentially contributing zinc to Watershed by all municipalities to encourage control of non-industrial process source of zinc.
- Outreach to restaurants and markets to encourage control of potential sources of bacteria
- Outreach to pet owners to clean up after their pets to reduce sources of bacteria

TSS Reduction (Soil Stabilization/Sediment Control)[2]

- Implementation of adopted TSS reduction ordinance(s) by Cities in Watershed
- Implementation of adopted parking lot sweeping ordinances by Cities in Watershed
- Implementation of agreements with utilities
- Enhanced erosion and sediment control at construction sites
- Stabilization of exposed soil not associated with construction sites
- Enhanced street sweeping
- Enhanced parking lot sweeping

Runoff Reduction and Stormwater Capture[2]

- Jurisdictional implementation for green streets
- Implementation of biofiltration and infiltration chambers for streets with wider parkways by Cities, subject to availability of funding
- Implementation of biofiltration and infiltration chambers for streets with narrow parkways by Cities, subject to availability of funding
- Encourage Cities and water purveyors to work together to implement stormwater capture and use or infiltration facilities consistent with AB 2403
- Encourage the use of permeable pavements in parking lots

[1] Initial emphasis on facilities that are probable metals and trash sources.
[2] Refer to Table 6-12 for implementation by sub-basin.

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- Encourage the use of cisterns and rain barrels to reduce the discharge of roof stormwater runoff

Trash Reduction and Control

- Watershed Group coordination with California Product Stewardship Council to reduce trash through reduction of packing materials and implementation of take-back programs
- Research regarding grant opportunities by Watershed Group to pay for installation of full capture systems for catch basins in high priority land use areas (ongoing)

Stormwater Financing

- To Be Determined

Priority Sub-basin Targets[3]

Targets	Acreage[4]	% LCC Watershed[3]
Sub-basin 1	719.6	4.06
Sub-basin 2	1,241.1	7.00
Sub-basin 3	305.0	1.72
Sub-basin 5	331.6	1.87
Sub-basin 6	1,663.7	9.39
		24.04

[3] See Figure 1-4 and Attachment B. Special attention given to control measures serving priority sub-basins during this phase.

[4] Based on EPA TMDL acreages that include Caltrans and County acreages

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Table 6-11
WMP Implementation Schedule – Measures with Interim Milestones
Phase 4 (2024-2026) Tentative Plan

Runoff Reduction and Stormwater Capture[2]

- Implementation of stormwater capture device at Reservoir Park by the City of Signal Hill, subject to availability of funding (Q3, 2024)
- Implementation of stormwater capture project at Progress Park by City of Paramount, subject to availability of funding (Q3, 2024)
- Implementation of stormwater capture project at Wardlow Park by City of Long Beach, subject to availability of funding (Q3, 2025)
- Development of concept plan for stormwater capture facility at Sims Park by City of Bellflower (2Q, 2024)
- Development of concept plan for stormwater capture facility at Pan American Park by City of Long Beach (2Q, 2024)
- Development of concept plan for stormwater capture facility at Long Beach Junior Golf Course by City of Long Beach (2Q, 2024)

Trash Reduction and Control

- Installation of full capture systems by Cities in 90% of catch basins serving high priority land use areas within the Watershed portion of each City, subject to the availability of funding (Q3, 2024)[5]
- Installation of full capture systems by Cities in 100% of catch basins serving high priority land use areas within the Watershed portion of each City, subject to the availability of funding (Q3, 2025)[3]

Stormwater Financing

- To Be Determined

	Priority Sub-basin Targets[6]	
Targets	Acreage[7]	% LCC Watershed[3]
Sub-basin 1	719.6	4.06
Sub-basin 2	1,241.1	7.00
Sub-basin 3	305.0	1.72
Sub-basin 5	331.6	1.87
Sub-basin 6	1,663.7	9.39
		24.04

[5] Presuming adoption of trash amendments by State Water Board in Spring 2015.

[6] See Figure 1-4 and Attachment B. Special attention given to control measures serving priority sub-basins during this phase.

[7] Based on EPA TMDL acreages that include Caltrans and County acreages

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Table 6-12

Sub-Basin Implementation Measures

Target Sub-basin	Acreage	True Source Control BMPs	Runoff Reduction	Operational Source Ctrl BMPs	Sediment Control	Treatment Ctrl BMPs
Sub-basin 1 [Phase 4] (2024-2026) Responsible Jurisdiction: Long Beach	719.6 ac (4.06% of LCC watershed)	Copper reduction through implementation of SB 346 Lead reduction through implementation of SB 757 Lead reduction through implementation of EPA Rulemaking to further reduce or remove lead from aviation gasoline Zinc reduction through implementation of Safer Consumer Product Alternatives regulations	Reduction of landscape irrigation runoff through implementation of AB 1881 Seek grants for construction of capture and infiltration/use structural BMPs Promote installation of cisterns and rain barrels Installation of green street measures at key locations Seek grants for LID retrofit projects Promote use of porous pavement & distributed capture and infiltration structural BMPs	Outreach to priority industries identified as having high probability of generating copper, lead, or zinc, trucking companies, facilities with large parking lots, and automotive repair facilities to encourage implementation of cover and containment BMPs. Promote coating of exposed galvanized metal Implement requirements for coated galvanized metal for use when exposed	Enhanced street sweeping with vacuum and regenerative sweepers[8] Enhanced erosion and sediment control at construction sites Stabilization of exposed soils not associated with construction sites Implementation of TSS Reduction Ordinances Implementation of Parking Lot Sweeping Ordinances	Distributed LID measures associated with development projects Installation of green street measures at key locations Installation of full capture systems in catch basins in high priority land use areas Others to be determined

[8] Potential Measure; the City of Long Beach is not currently using regenerative or vacuum sweepers

Target Sub-basin	Acreage	True Source Control BMPs	Runoff Reduction	Operational Source Ctrl BMPs	Sediment Control	Treatment Ctrl BMPs
Sub-basin 2 [Phase 2] (2024-2026) Responsible Jurisdiction: Long Beach	1,241.1 ac (7% of LCC watershed)	Copper reduction through implementation of SB 346 Lead reduction through implementation of SB 757 Lead reduction through implementation of EPA Rulemaking to further reduce or remove lead from aviation gasoline Zinc reduction through implementation of Safer Consumer Product Alternatives regulations	Reduction of landscape irrigation runoff through implementation of AB 1881 Seek grants for construction of capture and infiltration/use structural BMPs Promote installation of cisterns and rain barrels Installation of green street measures at key locations Seek grants for LID retrofit projects Promote use of porous pavement & distributed capture and infiltration structural BMPs	Outreach to priority industries identified as having high probability of generating copper, lead, or zinc, trucking companies, facilities with large parking lots, and automotive repair facilities to encourage implementation of cover and containment BMPs Promote coating of exposed galvanized metal Implement requirements for coated galvanized metal for use when exposed	Enhanced street sweeping with vacuum and regenerative sweepers[1] Enhanced erosion and sediment control at construction sites Stabilization of exposed soils not associated with construction sites Implementation of TSS Reduction Ordinances Implementation of Parking Lot Sweeping Ordinances	Distributed LID measures associated with development projects Installation of green street measures at key locations Installation of full capture systems in catch basins in high priority land use areas Others to be determined

[1] Potential Measure; the City of Long Beach is not currently using regenerative or vacuum sweepers

Target Sub-basin	Acreage	True Source Control BMPs	Runoff Reduction	Operational Source Ctrl BMPs	Sediment Control	Treatment Ctrl BMPs
Sub-basin 3 [Phase 4] (2024-2026) Responsible Jurisdiction: Long Beach	305 ac (1.72% of LCC watershed)	Copper reduction through implementation of SB 346 Lead reduction through implementation of SB 757 Lead reduction through implementation of EPA Rulemaking to further reduce or remove lead from aviation gasoline Zinc reduction through implementation of Safer Consumer Product Alternatives regulations	Reduction of landscape irrigation runoff through implementation of AB 1881 Seek grants for construction of capture and infiltration/use structural BMPs Promote installation of cisterns and rain barrels Installation of green street measures at key locations Seek grants for LID retrofit projects Promote use of porous pavement & distributed capture and infiltration structural BMPs	Outreach to priority industries identified as having high probability of generating copper, lead, or zinc, trucking companies, facilities with large parking lots, and automotive repair facilities to encourage implementation of cover and containment BMPs Promote coating of exposed galvanized metal Implement requirements for coated galvanized metal for use when exposed	Enhanced street sweeping with vacuum and regenerative sweepers[1] Enhanced erosion and sediment control at construction sites Stabilization of exposed soils not associated with construction sites Implementation of TSS Reduction Ordinances Implementation of Parking Lot Sweeping Ordinances	Distributed LID measures associated with development projects Installation of green street measures at key locations Installation of full capture systems in catch basins in high priority land use areas Others to be determined

[1] Potential Measure; the City of Long Beach is not currently using regenerative or vacuum sweepers

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Target Sub-basin	Acreage	True Source Control BMPs	Runoff Reduction	Operational Source Ctrl BMPs	Sediment Control	Treatment Ctrl BMPs
Sub-basin 4 [Phases 1 & 2] (2015-2020) Responsible Jurisdictions: Long Beach and Signal Hill	2,270.6 ac (12.8% of LCC watershed)	Copper reduction through implementation of SB 346 Lead reduction through implementation of SB 757 Lead reduction through implementation of EPA Proposed Rulemaking to further reduce or remove lead from aviation gasoline Zinc reduction through implementation of Safer Consumer Product Alternatives regulations	Reduction of landscape irrigation runoff through implementation of AB 1881 Seek grants for construction of capture and infiltration/use structural BMPs Promote installation of cisterns and rain barrels Installation of green street measures at key locations Seek grants for LID retrofit projects Promote use of porous pavement & distributed capture and infiltration structural BMPs Implementation of Stormwater Capture Project at Skylinks Golf Course (Phase 2)[2] Implementation of Stormwater Capture at Reservoir Park (Delayed until Phase 4)[2]	Outreach to priority industries identified as having high probability of generating copper, lead, or zinc, trucking companies, facilities with large parking lots, and automotive repair facilities to encourage implementation of cover and containment BMPs Promote coating of exposed galvanized metal Implement requirements for coated galvanized metal for use when exposed	Enhanced street sweeping with vacuum and regenerative sweepers[1] Enhanced erosion and sediment control at construction sites Stabilization of exposed soils not associated with construction sites Implementation of TSS Reduction Ordinances (Phase 2) Implementation of Parking Lot Sweeping Ordinances (Phase 2)	Distributed LID measures associated with development project Installation of green street measures at key locations Installation of full capture systems in catch basins in high priority land use areas Others to be determined

[1] Potential Measure for part of sub-basin; the City of Long Beach is not currently using regenerative or vacuum sweepers
[2] Subject to availability of funding

RB-AR8042

Target Sub-basin	Acreage	True Source Control BMPs	Runoff Reduction	Operational Source Ctrl BMPs	Sediment Control	Treatment Ctrl BMPs
Sub-basin 5 [Phases 3 & 4] (2021-2026) Responsible Jurisdiction: Long Beach	331.6 ac (1.87% of LCC watershed)	Copper reduction through implementation of SB 346 Lead reduction through implementation of SB 757 Lead reduction through implementation of EPA Proposed Rulemaking to further reduce or remove lead from aviation gasoline Zinc reduction through implementation of Safer Consumer Product Alternatives regulations	Reduction of landscape irrigation runoff through implementation of AB 1881 Seek grants for construction of capture and infiltration/use structural BMPs Promote installation of cisterns and rain barrels Installation of green street measures at key locations Seek grants for LID retrofit projects Promote use of porous pavement & distributed capture and infiltration structural BMPs	Outreach to priority industries identified as having high probability of generating copper, lead, or zinc, trucking companies, facilities with large parking lots, and automotive repair facilities to encourage implementation of cover and containment BMPs Promote coating of exposed galvanized metal Implement requirements for coated galvanized metal for use when exposed	Enhanced street sweeping with vacuum and regenerative sweepers[1] Enhanced erosion and sediment control at construction sites Stabilization of exposed soils not associated with construction sites Implementation of TSS Reduction Ordinances Implementation of Parking Lot Sweeping Ordinances	Distributed LID measures associated with development project Installation of green street measures at key locations Installation of full capture systems in catch basins in high priority land use areas Others to be determined

[1] Potential Measure; the City of Long Beach is not currently using regenerative or vacuum sweepers

RB-AR8043

Target Sub-basin	Acreage	True Source Control BMPs	Runoff Reduction	Operational Source Ctrl BMPs	Sediment Control	Treatment Ctrl BMPs
Sub-basin 6 [Phases 3 & 4] (2021-2026) Responsible Jurisdictions: Lakewood and Long Beach	1,663.7 ac (9.39% of LCC watershed)	Copper reduction through implementation of SB 346 Lead reduction through implementation of SB 757 Monitor USEPA Proposed Rulemaking to further reduce or remove lead from aviation gasoline Prepare petition for control of zinc in tires through Safer Consumer Product Regulations	Reduction of landscape irrigation runoff through implementation of AB 1881 Seek grants for construction of capture and infiltration/use structural BMPs Promote installation of cisterns and rain barrels Installation of green street measures at key locations Seek grants for LID retrofit projects Promote use of porous pavement & distributed capture and infiltration structural BMPs Implementation of Stormwater Capture Project at Skylinks Golf Course (Phase 3)[2]	Outreach to priority industries identified as having high probability of generating copper, lead, or zinc, trucking companies, facilities with large parking lots, and automotive repair facilities to encourage implementation of cover and containment BMPs Promote coating of exposed galvanized metal Develop specifications and requirements for coated galvanized metal for use when exposed	Enhanced street sweeping with vacuum and regenerative sweepers[1] Enhanced erosion and sediment control at construction sites Stabilization of exposed soils not associated with construction sites Implementation of TSS Reduction Ordinances Implementation of Parking Lot Sweeping Ordinances	Distributed LID measures associated with development projects Installation of green street measures at key locations Installation of full capture systems in catch basins in high priority land use areas Others to be determined

[1] Potential Measure for part of sub-basin; the City of Long Beach is not currently using regenerative or vacuum sweepers

[2] Subject to availability of funding

RB-AR8044

Target Sub-basin	Acreage	True Source Control BMPs	Runoff Reduction	Operational Source Ctrl BMPs	Sediment Control	Treatment Ctrl BMPs
Sub-basin 7 [Phases 2 & 3] (2018-2023) Responsible Jurisdictions: Lakewood and Long Beach	1,359.7 ac (7.68% of LCC watershed)	Copper reduction through implementation of SB 346 Lead reduction through implementation of SB 757 Lead reduction through implementation of EPA Rulemaking to further reduce or remove lead from aviation gasoline Zinc reduction through implementation of Safer Consumer Product Alternatives regulations	Reduction of landscape irrigation runoff through implementation of AB 1881 Seek grants for construction of capture and infiltration/use structural BMPs Promote installation of cisterns and rain barrels Installation of green street measures at key locations Seek grants for LID retrofit projects Promote use of porous pavement & distributed capture and infiltration structural BMPs Implementation of Stormwater Capture Project at Heartwell Park (Phase 3)[2] Implementation of Stormwater Capture Project at Pan American Park (Delayed until Phase 4)[2]	Outreach to priority industries identified as having high probability of generating copper, lead, or zinc, trucking companies, facilities with large parking lots, and automotive repair facilities to encourage implementation of cover and containment BMPs Promote coating of exposed galvanized metal Implement requirements for coated galvanized metal for use when exposed	Enhanced street sweeping with vacuum and regenerative sweepers[1] Enhanced erosion and sediment control at construction sites Stabilization of exposed soils not associated with construction sites Implementation of TSS Reduction Ordinances Implementation of Parking Lot Sweeping Ordinances	Distributed LID measures associated with development project Installation of green street measures at key locations Installation of full capture systems in catch basins in high priority land use areas Others to be determined

[1] Potential Measure for part of sub-basin; the City of Long Beach is not currently using regeneration or vacuum sweepers
[2] Subject to availability of funding

RB-AR8045

Target Sub-basin	Acreage	True Source Control BMPs	Runoff Reduction	Operational Source Ctrl BMPs	Sediment Control	Treatment Ctrl BMPs
Sub-basin 8 [Phases 1 & 2] (2015-2020) Responsible Jurisdictions: Bellflower and Lakewood	2,711.8 ac (15.3% of LCC watershed)	Copper reduction through implementation of SB 346 Lead reduction through implementation of SB 757 Monitor USEPA Proposed Rulemaking to further reduce or remove lead from aviation gasoline Prepare petition for control of zinc in tires through Safer Consumer Product Regulations	Reduction of landscape irrigation runoff through implementation of AB 1881 Seek grants for construction of capture and infiltration/use structural BMPs Promote installation of cisterns and rain barrels Installation of green street measures at key locations Seek grants for LID retrofit projects Promote use of porous pavement & distributed capture and infiltration structural BMPs Implementation of Stormwater Capture Project at Mayfair Park (Phase 2)[1]	Outreach to priority industries identified as having high probability of generating copper, lead, or zinc, trucking companies, facilities with large parking lots, and automotive repair facilities to encourage implementation of cover and containment BMPs Promote coating of exposed galvanized metal Develop specifications and requirements for coated galvanized metal for use when exposed	Enhanced street sweeping with vacuum and regenerative sweepers Enhanced erosion and sediment control at construction sites Stabilization of exposed soils not associated with construction sites Implementation of TSS Reduction Ordinances (Phase 2) Implementation of Parking Lot Sweeping Ordinances (Phase 2)	Distributed LID measures associated with development projects Installation of green street measures at key locations Installation of full capture systems in catch basins in high priority land use areas Others to be determined

[1] Subject to availability of funding

RB-AR8046

Target Sub-basin	Acreage	True Source Control BMPs	Runoff Reduction	Operational Source Ctrl BMPs	Sediment Control	Treatment Ctrl BMPs
Sub-basin 9 [Phases 2 & 3] (2018-2023) Responsible Jurisdictions: Bellflower, Downey, Long Beach, and Paramount	3,709.3 ac (20.9% of LCC watershed)	Copper reduction through implementation of SB 346 Lead reduction through implementation of SB 757 Lead reduction through implementation of EPA Proposed Rulemaking to further reduce or remove lead from aviation gasoline Zinc reduction through implementation of Safer Consumer Product Alternatives regulations	Reduction of landscape irrigation runoff through implementation of AB 1881 Seek grants for construction of capture and infiltration/use structural BMPs Promote installation of cisterns and rain barrels Installation of green street measures at key locations Seek grants for LID retrofit projects Promote use of porous pavement & distributed capture and infiltration structural BMPs Implementation of stormwater capture project at Progress Park (Delayed until Phase 4)[2]	Outreach to priority industries identified as having high probability of generating copper, lead, or zinc, trucking companies, facilities with large parking lots, and automotive repair facilities to encourage implementation of cover and containment BMPs Promote coating of exposed galvanized metal Implement requirements for coated galvanized metal for use when exposed	Enhanced street sweeping with vacuum and regenerative sweepers[1] Enhanced erosion and sediment control at construction sites Stabilization of exposed soils not associated with construction sites Implementation of TSS Reduction Ordinances Implementation of Parking Lot Sweeping Ordinances	Distributed LID measures associated with development project Installation of green street measures at key locations Installation of full capture systems in catch basins in high priority land use areas Others to be determined

[1] Potential Measure for part of sub-basin; the City of Long Beach is not currently using regenerative or vacuum sweepers
[2] Subject to availability of funding

RB-AR8047

Target Sub-basin	Acreage	True Source Control BMPs	Runoff Reduction	Operational Source Ctrl BMPs	Sediment Control	Treatment Ctrl BMPs
Sub-basin 10 [Phases 1 & 2] (2015-2020) Responsible Jurisdictions: Bellflower, Cerritos, Lakewood, and Long Beach	3,403.1 ac (19.2% of LCC watershed)	Copper reduction through implementation of SB 346 Lead reduction through implementation of SB 757 Monitor USEPA Proposed Rulemaking to further reduce or remove lead from aviation gasoline Prepare petition for control of zinc in tires through Safer Consumer Product Regulations	Reduction of landscape irrigation runoff through implementation of AB 1881 Seek grants for construction of capture and infiltration/use structural BMPs Promote installation of cisterns and rain barrels Installation of green street measures at key locations Seek grants for LID retrofit projects Promote use of porous pavement & distributed capture and infiltration structural BMPs Implementation of Stormwater Capture Project at Caruthers Park (Phase 2)[2] Implementation of Stormwater Capture Project at Heartwell Park (Delayed until Phase 3)[2]	Outreach to priority industries identified as having high probability of generating copper, lead, or zinc, trucking companies, facilities with large parking lots, and automotive repair facilities to encourage implementation of cover and containment BMPs Promote coating of exposed galvanized metal Develop specifications and requirements for coated galvanized metal for use when exposed	Enhanced street sweeping with vacuum and regenerative sweepers[1] Enhanced erosion and sediment control at construction sites Stabilization of exposed soils not associated with construction sites Implementation of TSS Reduction Ordinances (Phase 2) Implementation of Parking Lot Sweeping Ordinances (Phase 2)	Distributed LID measures associated with development projects Installation of green street measures at key locations Installation of full capture systems in catch basins in high priority land use areas Others to be determined

[1] Potential Measure for part of sub-basin; the City of Long Beach is not currently using regenerative or vacuum sweepers
[2] Subject to availability of funding

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7.0 Legal Authority

This section covers information, such as documentation and references/links to water quality ordinances for each participating agency, that demonstrates adequate legal authority to implement and enforce Watershed Control Measures (WCMs) identified in this plan and as required in Section VI.D.5.b.iv.6 of the MS4 Permit. The goal of these WCMs is to create an efficient program that focuses on Watershed priorities by meeting the following objectives:

- Prevent or eliminate non-stormwater discharges to the MS4 that are a source of pollutants from the MS4 to receiving waters.
- Implement pollutant controls necessary to achieve all applicable interim and final water quality-based effluent limitations and/or receiving water limitations pursuant to corresponding compliance schedules.
- Ensure that discharges from the MS4 do not cause or contribute to exceedances of receiving water limitations.

The WCMs include the minimum control measures, non-stormwater discharge measures and targeted control measures (i.e. controls to address TMDL and 303(d) listings). Since the requirement to incorporate these WCMs is an element of the MS4 Permits, the legal authority to implement them results from each agency's legal authority to implement the NPDES MS4 Permit.

Copies of seven participating agencies' legal authority certifications from their respective chief legal counsels can be found in Attachment F. The City of Long Beach's MS4 permit is on a separate timeline and a legal authority letter will be submitted separately. A status report will be included in the Long Beach separate area WMP when submitted. Certifications shall be prepared annually. Table 7-1 includes the section that covers water quality ordinances for each agency with a reference link.

Table 7-1 Water Quality Ordinance Language

City	Water Quality Ordinance	Reference
Bellflower	Title 13 - Public Services, Chapter 13.20, Stormwater and Runoff Pollution Control	http://qcode.us/codes/bellflower
13.20.030 Purpose and Intent (B) - *The intent of this chapter is to enhance and protect the water quality of the receiving waters of the United States in a manner that is consistent with the Clean Water Act and acts amendatory thereof or supplementary thereto, to applicable implementing regulations and the municipal NPDES permit and any amendment, revision, or re-issuance thereof.*		
Cerritos	Title 6 - Health and Sanitation, Chapter 6.32, Stormwater and Urban Runoff Pollution Prevention Controls	http://www.codepublishing.com/ca/cerritos.html
6.32.010 Purpose (C) - *Reducing pollutants in storm water and urban runoff to the maximum extent practicable. (Ord. 777 § 1 (part), 1997)*		
Downey	Article V- Sanitation, Chapter 7, Stormwater and Urban Runoff Pollution and Conveyance Controls	http://qcode.us/codes/downey/

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Section 5701. Watershed Management Program - *Notwithstanding other provisions in the Downey Municipal Codes, the MS4 Permit requires the City of Downey to implement the Watershed Management Program (WMP), and any subsequent amendments, are hereby incorporated into this Ordinance by reference. (Added by Ord. 1142, adopted 02-11-03; amended by Ord. 1320, adopted 11-12-13).*		
Lakewood	Article 05 (V) - Sanitation-Health, Chapter 8, Stormwater and Urban Runoff Pollution Control	http://weblink.lakewoodcity.org/weblink8/
5800 - Adoption of the Los Angeles County Stormwater Runoff Pollution Control Ordinance - *Except as otherwise provided in this Chapter, the stormwater runoff pollution control ordinance of the County of Los Angeles contained in Chapter 12.80 of Title 12 - Environmental Protection of the Los Angeles County Code relating to control of pollutants carried by stormwater and runoff adopted by the County of Los Angeles on June 9, 1998, is hereby adopted and made a part hereof as though set forth in full. The same shall hereafter constitute the Stormwater and Runoff Pollution Control Ordinance of the City of Lakewood relating to the control of pollutants carried by stormwater and runoff and discharging into receiving water of the United States.*		
Long Beach	Volume II-Title 18-Building and Construction, Chapter 18.61, NPDES and SUSMP Regulations	http://library.municode.com/index.aspx?clientId=16115
18.61.010 Purpose - *The purpose of this chapter is to provide regulations and give legal effect to certain requirements of the National Pollutant Discharge Elimination System (NPDES) permit issued to the City of Long Beach, and the subsequent requirements of the Standard Urban Storm Water Mitigation Plan (SUSMP), mandated by the California Regional Water Quality Control Board, Los Angeles Region (RWQCB). The intent of these regulations is to effectively prohibit non-storm water discharges into the storm drain systems or receiving waters and to require source control BMPs to prevent or reduce the discharge of pollutants into storm water to the maximum extent practicable.*		
Paramount	Chapter 48 - Urban Stormwater Management	http://www.paramountcity.com/code.cfm?task=detail2&ID=20
Sec. 48-2.1. Purpose and intent - *The purpose of this chapter is to protect the health and safety of the residents of the city by protecting the beneficial uses of receiving waters within the city from pollutants carried by storm water and non-storm water discharges. The intent of this chapter is to enhance and protect the water quality of the receiving waters of the city and the United States, consistent with the Act. (Ord. No. 892)* Sec. 48-2.2. Applicability of this chapter - *The provisions of this chapter shall apply to the discharge, deposit or disposal of any storm water and/or runoff to the storm drain system and/or receiving waters within any incorporated area covered by a NPDES municipal storm water permit. (Ord. No. 892)*		
Signal Hill	Chapter 12.16- Stormwater/ Urban Runoff	http://www.amlegal.com/library/ca/signalhill.shtml
12.16.020 Purpose and Intent - *The purpose of this chapter is to protect the public health, welfare and safety and to reduce the quantity of pollutants being discharged to the waters of the United States through: (D) The protection and enhancement of the quality of the waters of the United States in a manner consistent with the provisions of the Clean Water Act;*		
LACFCD	Flood Control District Code, Chapter 21 - Stormwater and Runoff Pollution Control	https://library.municode.com/index.aspx?clientId=16274
21.01 - Purpose and Intent - *The purpose and intent of this chapter is to regulate the stormwater and non-stormwater discharges to the facilities of the Los Angeles County Flood Control District for the protection of those facilities, the water quality of the waters in and downstream of those facilities, and the quality of the water that is being stored in water-bearing zones underground.*		

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8.0 Los Cerritos Channel Watershed Reasonable Assurance Analysis (RAA)

A key element of the WMP is the Reasonable Assurance Analysis (RAA), which is used to demonstrate "that the activities and control measures…will achieve applicable WQBELs and/or RWLs with compliance deadlines during the Permit term" (NPDES Permit Order No. R4-2012-0175, Section C.5.b.iv.(5); NPDES Permit Order No. R4-2014-0024, Section C.5.h.vii.(2)). Attachment A presents the revised RAA for the Los Cerritos Channel Watershed. While the Permits prescribe the RAA as a quantitative demonstration that control measures will be effective, the RAA also promotes a modeling process to identify and prioritize potential control measures to be implemented by the WMP. In other words, the RAA not only demonstrates the cumulative effectiveness of BMPs to be implemented, it also supports their selection. Furthermore, the RAA incorporates the applicable compliance dates and milestones for attainment of the WQBELs and RWLs, and therefore supports BMP scheduling.

The Watershed Management Modeling System (WMMS) was used to develop this RAA. WMMS is specified in the Permits as an optional tool to conduct the RAA. The Los Angeles County Flood Control District (LACFCD), through a joint effort with U.S. Environmental Protection Agency (USEPA), developed the WMMS specifically to support informed decisions associated with managing stormwater. The ultimate goal of the WMMS is to identify cost-effective water quality improvement projects through an integrated, watershed-based approach.

On March 25, 2014, the Los Angeles Regional Water Quality Control Board (Regional Board) issued "RAA Guidelines" (LARWQCB 2014) to provide information and guidance to assist permittees in development of the RAA. Attachment A provides appropriate documentation on the modeling assumptions that meet the RAA Guidelines.

The RAA describes the process for identifying milestones within the current and next Permit periods, as well as final milestones to meet applicable TMDLs. Modeling was performed to quantify necessary load reductions to achieve the milestones. Based on these load reduction targets, a pollutant reduction plan was established that outlines the types and sequencing of BMPs for each jurisdiction to achieve milestones throughout the schedule. The RAA provides a detailed list of the capacities needed for BMPs over time, incorporating the existing BMPs and control measures identified in the WMP. These recommendations serve as goals for each jurisdiction to seek opportunities for implementation over time, but strategies may change as opportunities for more cost-effective BMPs are identified throughout the schedule.

The RAA notes that flow monitoring data for the Los Cerritos Channel is required in order to evaluate simulated flow conditions against observed data. This data will be used to better characterize non-

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stormwater flow volumes to demonstrate that proposed volume retention BMPs will capture non-stormwater that would otherwise be discharged through the MS4 in the watershed Area.

Although it is impossible to guarantee a 100% capture of non-stormwater because of the possibility of an accident or the discharge of fire fighting discharges near the bottom of the Watershed, as explained elsewhere in this WMP, the current average dry-weather flows at Stearns Street are less than 0.5 cfs, and the Watershed Group is proposing to eliminate dry-weather flows. A current Proposition 84 project in the Watershed has discovered that periodic higher volume discharges do occur. These are being investigated, and it may be that they are permitted discharges that would not be subject to the non-stormwater discharge prohibitions. In any case, the Watershed Group is committed to monitor dry-weather flows to the extent practicable to provide data for a possible model recalibration during an adaptive management process.

The RAA for the Los Cerritos Channel Watershed is included in Attachment A.

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9.0 Coordinated Integrated Monitoring Program (CIMP)

The option of preparing a Coordinated Integrated Monitoring Program (CIMP) is provided in Attachment E of Order No. R4-2012-0175 and Attachment E of Order No. R4-2014-0024.

A Coordinated Integrated Monitoring Program (CIMP) is required to be submitted either separately or as part of a Watershed Management Plan (WMP). The CIMP is required to integrate requirements of the current Los Angeles County MS4 Permit, the City of Long Beach MS4 Permit, and TMDL monitoring requirements. This plan was developed to address five primary objects that include:

- Assess the chemical, physical, and biological impacts of discharges from the MS4s on receiving waters
- Assess compliance with receiving water limitations water limitations and water quality-based effluent limitations (WQBELs) established to implement TMDL wet and dry weather load allocations
- Characterize pollutant loads in MS4 discharges
- Identify sources of pollutants in MS4 discharges
- Measure and improve the effectiveness of pollutant controls implemented under the new MS4 permits.

The approach presented in the CIMP for the Los Cerritos Channel Watershed incorporates all objectives of the Attachment E Monitoring and Reporting Program (MRP) but provides a customized approach to address the objectives identified in the MRP for Stormwater Outfall Monitoring based upon the unique characteristics of the Los Cerritos Channel Watershed. Unlike other Watershed Management Groups (WMGs) in Los Angeles County, the LCC Watershed does not receive flow from other WMGs. External contributions of contaminants are limited to atmospheric deposition originating predominantly from major transportation corridors and facilities.

To facilitate review by the Regional Water Board, the CIMP for the Los Cerritos Channel Watershed has been prepared as a separate document and will be submitted separately. It addresses the MRP objectives related to:

- Receiving Water Monitoring
- Stormwater Outfall Monitoring
- Non-stormwater Outfall-Based Monitoring
- New Development/Redevelopment Effectiveness Training
- Regional Studies

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Section 10.0 Adaptive Management Process

10.1 Summary of Considerations for Adaptive Management Review

The adaptive management process is a critical component of the WMP; it makes the program much more than a static plan that could soon become outdated. "Adaptive Management" is another name for what the National Research Council (NRC) called "Adaptive Implementation" in its 2001 report entitled Assessing the TMDL Approach to Water Quality Management. The Council defined adaptive implementation as "a cyclical process in which TMDL plans are periodically assessed for their achievement of water quality standards including designated uses." The Council stated that, "if the implementation of the plan is not achieving the designated uses, scientific data and information should be used to revise the plan." The process envisioned by the National Research Council is presented in Figure 10-1.

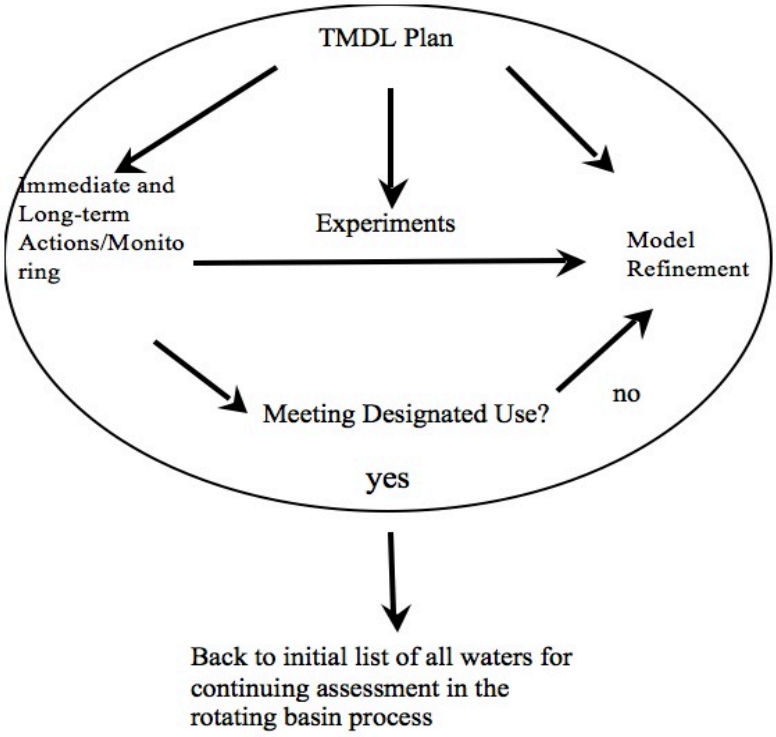

FIGURE 10-1. NRC Adaptive Implementation Flowchart
(Source: National Resource Council, *Assessing the TMDL Approach to Water Quality Management*, 2001.)

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The adaptive management process mandated by Order No. R4-2012-0175 extends the concept beyond TMDLs. It also includes all 303(d) listings of impairment and other exceedances of water quality standards (See Section 2 of this WMP).

In developing the adaptive management component of this WMP, the Watershed Group has leaned heavily on the thoughtful analysis of adaptive implementation by the Committee to Assess the Scientific Basis of the Total Maximum Daily Load Approach to Water Pollution Reduction that was assembled by the NRC to prepare its 2001 report. The Committee suggested that the adaptive implementation process should begin with initial actions that have a high degree of certainty and that future actions be based on 1) continued monitoring to determine how a waterbody responds to actions taken, and 2) carefully designed experiments in the watershed. The Committee appropriately referred to this approach as "a concurrent process of action and learning." The NRC Committee suggested a mix of actions, including immediate actions and an array of possible long-term actions. The Committee recognized that regardless of what immediate actions were taken, there may not be an immediate response in waterbody or biological conditions due to lag times between actions and responses – especially when pollutants are tightly bound to sediments. The Committee suggested that waterbodies be monitored to establish the trajectory of measured water quality criteria. The Committee described longer-term actions as those that show promise, but need further evaluation and development. Given the absence of dedicated revenue streams for funding stormwater quality projects within the watershed, the Watershed Group believes that developing funding sources for implementing longer-term actions is vital. The projected costs are much too great to be funded out of municipal General Fund budgets without adversely impacting other municipal programs.

The NRC Committee envisioned "success monitoring" following implementation action, such that if monitoring indicated a waterbody was meeting water quality standards, no further implementation actions would be taken and the waterbody would be returned to an "all waters" list where it would be monitored as part of a rotating basin process. The Committee also suggested that one of the most important applications of success monitoring data is to revise and improve the initial TMDL forecast over time. This concept is consistent with the application of TMDL reopeners to modify TMDLs based on new data and improved understanding of the underlying science. Stormwater is highly variable and episodic, leading to greater uncertainty in stormwater modeling. Over time this uncertainty can be reduced as monitoring data is gathered and physical, chemical, and biological processes are better understood.

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10.2 Process for Modifications to Watershed Management Program Resulting from Adaptive Management Review

Section VI.C.8.a I of Order No. R4-2012-0175 requires that Permittees implement an adaptive management process, every two years from the date of program approval, adapting the Watershed Management Program to become more effective based on several factors. This process fulfills the requirement in Part V.A.4 of the Order to address continuing exceedances of receiving water limitations.

The three key factors cited in the permit for consideration during the adaptive management process are the following compliance-related factors:

1) Progress toward achieving interim and/or final water quality-based effluent limitations and/or receiving water limitations in Part VI.E. and Attachments L through R, according to compliance schedules;

2) Progress toward achieving improved water quality in MS4 discharges and achieving receiving water limitations through implementation of the watershed control measures based on an evaluation of outfall-based monitoring data and receiving water monitoring data;

3) Achievement of interim milestones.

The Order also specifies four process-oriented factors that may be considered during the Adaptive Management Process, including:

1) Re-evaluation of the water quality priorities identified for the WMA based on more recent water quality data for discharges from the MS4 and the receiving water(s) and a reassessment of sources of pollutants in MS4 discharges;

2) Availability of new information and data from sources other than the Permittees' monitoring program(s) and a reassessment of sources of pollutants in MS4 discharges;

3) Regional Water Board recommendations; and

4) Recommendations for modifications in the Watershed Management Program solicited through a public participation process.

In addition, the Order indicates that the adaptive process is not limited to the enumerated factors. Any other relevant factors may also be considered.

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10.3 Los Cerritos Channel Adaptive Management Process

The adaptive management process for the Los Cerritos Channel Watershed is based on the experience of the municipalities and Caltrans working together to address the Los Cerritos Channel Metals TMDLs first proposed by USEPA in November 2008 and the working relationship established among the Permittees in the years since. In reality, the bi-annual process that will result in submission of an adaptive management report to the Regional Water Board every two years after approval of the WMP will be a continuous process.

Data from the receiving monitoring, watershed segmentation, and forensic monitoring components of the customized Coordinated Integrated Monitoring Program – as well as documentation of soil stabilization and sediment control and documentation of runoff reduction – will provide the critical basis for implementation of the adaptive management process during this permit cycle. Additional critical information will come from implementation of SB 346, development and implementation of zinc source control measures, implementation of Low Impact Development Ordinances and Green Streets Policies, documentation of trash control measures, documentation of runoff reduction measures, documentation of outreach programs, assessment of street sweeping effectiveness, and implementation of local and sub-watershed treatment control measures.

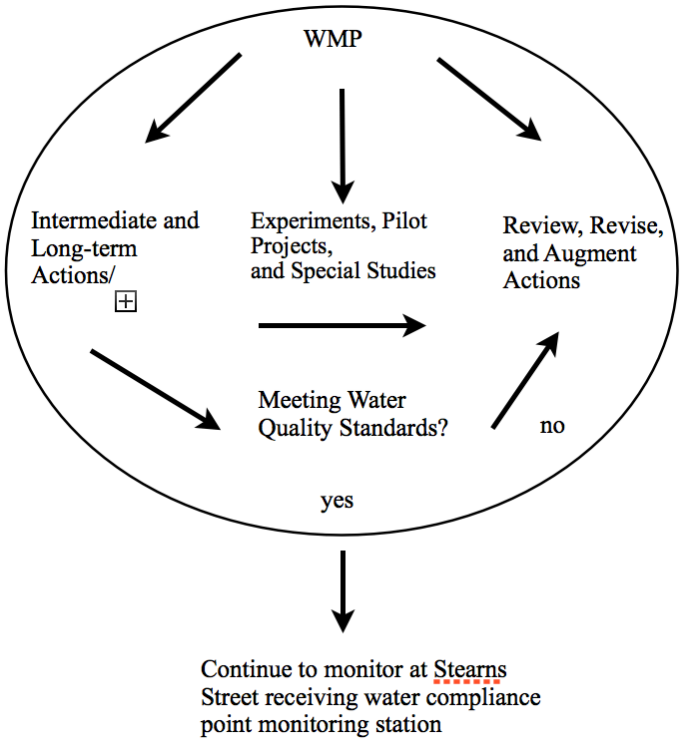

Figure 10-2. Los Cerritos Watershed Management Program Adaptive Management Flowchart

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In addition to the three compliance-related factors and the four process-oriented factors specified in Order No. R4-2012-0175, the Los Cerritos Channel Adaptive Management process will include evaluation of key assumptions, immediate and possible long-term actions, updates of maps and databases, and a discussion of stormwater funding measures. These factors include:

1) Evaluation of Immediate Actions, including:
   a) Minimum Control Measures implementation
   b) TSS Reduction Program implementation
   c) Dry-Weather Runoff Reduction Program implementation
   d) Proposition 84 Los Cerritos Channel Watershed Segmentation and LID Planning Project
   e) Targeted Enhanced Street Sweeping Program implementation
   f) Local No or Low Copper Brake Pad Education Program implementation
   g) Local No or Low Copper Pool Algaecide Education Program implementation
   h) Agreements for Locations of Initial Water Capture Devices
   i) Preliminary Design of Initial Capture Devices
   j) Safer Consumer Product Regulations support efforts
   k) EPA's Airport Lead Monitoring Study and FAA's Unleaded Avgas Transition Plan monitoring
   l) Monitoring of Greater Harbor Toxics TMDLs Regional Monitoring Coalition
   m) Water Control Policy for Developing California's Clean Water Act Section 303(d) List implementation monitoring
   n) Funding measure development monitoring
   o) Status of grant funding for stormwater capture projects

2) Evaluation or Re-evaluation of Long-Term Actions, including:
   a) Minimum control measures and other applicable immediate actions
   b) Low Impact Development Ordinances
   c) Green Streets Policies
   d) Full-capture trash control devices implementation
   e) Targeted installation of porous pavement
   f) Development and implementation of measures to reduce the release of zinc from municipal facilities and operations

3) Evaluation of Possible Long-Term Actions, including:
   a) Stormwater Capture and Infiltration Program implementation
   b) Stormwater Capture and Use Program implementation
   c) Additional dry-weather flow and targeted constituent monitoring with associated forensic monitoring (extension of Prop 84 project)

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d) Sand filter installation
e) Efforts to encourage the use of coated galvanized metal for exterior applications

4) Updating and refinement of storm drain, channel, and outfall mapping

5) Updating and refinement of storm drain, channel, and outfall database

6) Updating and refinement of land use mapping

7) Updating and refinement of land use database

The evaluation of key assumptions will include a review and evaluation of the assumptions of a 10% pollutant reduction for non-structural controls and a 25% reduction in irrigation. If it becomes apparent that either assumption is not supported, the Permittees commit to developing alternative controls.

10.4 Adaptive Management Process Reporting Program

Each adaptive management report will be structured based on the following topical outline:

- Executive Summary
- Assessment of progress toward achieving WQBELs and/or RWLs
- Assessment of progress toward achieving improved water quality in MS4 discharges
- Assessment of progress toward achievement of interim milestones
- Evaluation of water quality priorities
- Assessment of new information for sources other than the CIMP
- Assessment of Regional Water Board Recommendations
- Assessment of recommendations to the WMP from watershed stakeholders and the public
- Modifications to the WMP
- Updates and refinements to storm drain, channel, and outfall database
- Updates and refinements to land use database

The adaptive management report will be incorporated in the Annual Reports due on or before December 15th of the year in which a bi-annual anniversary of WMP approval occurs and as part of the Report of Waste Discharge due July 1, 2017.

Water quality data, information on the development and implementation of source control measures, sediment control, runoff reduction, BMP implementation, and program effectiveness will be gathered and accumulated annually in preparation for reporting on implementation of the adaptive management process every two years and future potential re-evaluation of the Reasonable Assurance Analysis.

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11.0 Reporting Program

11.1 Annual Report

The Watershed Group plans to eventually move to an integrated Watershed Annual Report. However, in the near future, annual reports will be submitted by individual Permittees. For now, the Watershed Group will prepare a WMP annual report to be attached to each participating agency's MS4 annual report for submittal to the Regional Water Board Executive Officer in an electronic format on or before December 15th. The WMP annual reports will present a summary of information that will allow the Regional Board to assess the implementation and effectiveness of the Watershed Management Program[1] The CIMP Annual Report will ultimately be attached to the integrated annual report. For now, copies of it will be attached to the individual MS4 annual reports.

The reporting process is intended to meet the following objectives:

- Each Permittee's participation in one or more Watershed Management Programs.
- The impact of each Permittee's stormwater and non-stormwater discharges on the receiving water.
- Compliance with receiving water limitations, numeric water quality-based effluent limitations, and non-stormwater action levels.
- The effectiveness of control measures in reducing discharges of pollutants from the MS4 to receiving waters.
- Whether the quality of MS4 discharges and the health of receiving waters is improving, staying the same, or declining as a result watershed management program efforts, and/or TMDL implementation measures, or other Minimum Control Measures.
- Whether changes in water quality can be attributed to pollutant controls imposed on new development, re-development, or retrofit projects.

Each report will include summaries for each of the following seven sections as required by the MS4 Permit:

1) Stormwater Control Measures – Including estimated cumulative change in percent EIA Since effective date of the Permit; summary of new development/re-development, retrofit, and other projects designed to intercept stormwater runoff constructed during the reporting year, including estimated total runoff volume captured; summary of actions taken to comply with the approved WMP; summary of riparian/wetlands restoration projects; summary of other MCMs as Permittee deems relevant; and status of multi-year projects continuing into subsequent years.

[1] Annual reports will cover the previous July 1st through June 30th time period.

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2) Effectiveness Assessment of Stormwater Control Measures – Including summary of rainfall data for the reporting year; hydrographs or flow data for applicable storms; and assessments and comparisons of water quality data, including summaries as to whether or not water quality is improving, staying the same, or declining;
3) Non-Stormwater Control Measures – Including estimates of the number of major outfalls within a Permittee's jurisdiction; number of outfalls screened for significant non-stormwater discharges for reporting year and cumulatively; and attribution of outfalls with confirmed significant non-stormwater discharges
4) Effectiveness Assessment of Non-Stormwater Control Measures – Including summary of the effectiveness of control measures implemented
5) Integrated Monitoring Compliance Report – Including summary of identified exceedances of outfall-based stormwater monitoring data, wet weather receiving water monitoring data, dry weather receiving water data and non-stormwater outfall monitoring data; summary of TIE data, if applicable; and description of efforts taken to mitigate and/or eliminate stormwater and non-stormwater discharges that exceed applicable WQBELs or action levels, if applicable
6) Adaptive Management Strategies – Including summary of effective control measures and of less effective control measures; description of significant changes to control measures anticipated to be made in the next year and a rationale for those changes; a detailed description of control measures to be applied to new development or redevelopment projects disturbing more than 50 acres; and status of all multi-year efforts not completed in the current year that will continue
7) Supporting Data and Information – Include a summary of all monitoring data and associated meta data

The participating agencies will submit annual reports as required by the MS4 Permit. The Regional Board is currently preparing a reporting format. Once available, the reporting form will be incorporated into the WMP as an appendix.

11.2 Watershed Summary Information

The WMP Annual Report will include information specified in Section XVII.B of Attachment E of Order No. R4-2012-0175 and Section XVII.A of Attachment E Order No. R4-2014-0024 in odd year Annual Reports. This information will include information related to:

- Watershed Management Area Information
- Sub-watershed (HUC-12) Description
- Permittees' Drainage Areas within the Watershed

The Watershed Group may reference the WMP in the odd-year report, when the required information is already included or addressed in the WMP, to satisfy baseline information requirements.

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11.3 TMDL Reporting

The Watershed Group will report progress of TMDL implementation per schedules in Section XIX of Attachment E of Order No. R4-2012-0175 and Order No. R4-2014-0024. The TMDL reporting that will be addressed is the Los Cerritos Channel Metals TMDLs. Section XIX.F of Attachment E specifies two types of annual reports related to the TMDL:

- Annual Monitoring Reports
- Annual Progress Reports

Both reports are due December 15 annually and will be incorporated into the CIMP Annual Reports required by Section XV of Attachment E.

11.4 Report of Waste Discharge

In accordance with Title 23, Division 3, Chapter 9 of the California Code of Regulations and Title 40, Part 122 of the Code of Federal Regulations, each Discharger shall file a Report of Waste Discharge (ROWD) as application for issuance of new waste discharge requirements no later than 180 days prior to the Order expiration date – December 28, 2017. The Watershed Group proposes to submit the ROWD on behalf of the Permittees within the Watershed on or before July 1, 2017.

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ATTACHMENT A:

REASONABLE ASSURANCE ANALYSIS FOR LOWER LOS ANGELES RIVER, LOS CERRITOS CHANNEL, AND LOWER SAN GABRIEL RIVER

Reasonable Assurance Analysis for Lower Los Angeles River, Los Cerritos Creek, and Lower San Gabriel River

Submitted to:

LLAR WMP Group LCC WMP Group LSGR WMP Group

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January 15, 2015

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1. Introduction

The Municipal Separate Storm Sewer System Permit (Permits) for Los Angeles County[1] and the City of Long Beach[2] includes optional provisions for a Watershed Management Program (WMP) that allows permittees the flexibility to customize their stormwater programs to achieve compliance with applicable receiving water limitations (RWLs) and water quality based effluent limitations (WQBELs) through implementation of control measures. A key element of each WMP is the Reasonable Assurance Analysis (RAA), which is used to demonstrate "that the activities and control measures…will achieve applicable WQBELs and/or RWLs with compliance deadlines during the Permit term" (NPDES Permit Order No. R4-2012-0175, Section C.5.b.iv.[5], page 64; NPDES Permit Order No. R4-2014-0024, Section C.5.h.vii.[2]). This report presents the Reasonable Assurance Analysis (RAA) for the Lower Los Angeles River (LLAR), Los Cerritos Channel (LCC), and Lower San Gabriel River (LSGR) WMPs.

While the Permits prescribe the RAA as a quantitative demonstration that control measures (best management practices [BMPs]) will be effective, the RAA also promotes a modeling process to identify and prioritize potential control measures to be implemented by the WMP. In other words, the RAA not only demonstrates the cumulative effectiveness of BMPs to be implemented, it also supports their *selection*. Furthermore, the RAA incorporates the applicable compliance dates and milestones for attainment of the WQBELs and RWLs, and therefore supports BMP scheduling.

On March 25, 2014, the Los Angeles Regional Water Quality Control Board (Regional Board) issued "RAA Guidelines" (LARWQCB 2014) to provide information and guidance to assist permittees in development of the RAA. The approach herein is consistent with the RAA Guidelines.

This report is organized in nine sections, as follows:

- Section 1: Introduction
- Section 2: Applicable Interim and Final Requirements
- Section 3: Modeling System to be used for the RAA
- Section 4: Current/Baseline Pollutant Loading
- Section 5: Estimated Required Pollutant Reductions
- Section 6: Determination of BMP Capacity for RAA
- Section 7: Cumulative Volume Reduction Goals to Achieve Required Reductions
- Section 8: Pollutant Reduction Plan
- Section 9: References

[1] National Pollutant Discharge Elimination System Permit Order No. R4-2012-0175

[2] National Pollutant Discharge Elimination System Permit Order No. R4-2014-0024

2. Applicable Interim and Final Requirements

The WMPs for LLAR, LCC, and LSGR follow the process in the Permits and identify the Water Quality Priorities (WQ Priorities) including the highest (Category 1) Water Quality Priorities which are subject to Total Maximum Daily Loads (TMDLs) and WQBELs. Practically all of these TMDLs include associated compliance schedules that are considered in this RAA. The TMDL and WMP milestones/compliance dates establish the pace at which BMPs must be implemented. Traditionally, the approach of TMDL implementation plans has been focused on *final* TMDL compliance, whereas the Permit compliance paths offered to WMPs increase emphasis on *milestones*. In line with the RAA Guidelines, for all final TMDL and TMDL/WMP milestones that occur in the next two Permit cycles, the combination of BMPs expected to result in attainment of the corresponding Permit limits are identified.

The TMDL milestones for the LLAR, LCC, and LSGR WMP areas are shown in Table 2-2 through Table 2-4. The Permits require each WMP to provide reasonable assurance for the TMDL milestones that occur in the current Permit term. If applicable TMDLs do not prescribe a milestone in the current Permits, a milestone must be established. The array of TMDLs creates a potentially complicated sequence based on multiple pollutants, and thus this RAA includes a limiting pollutant analysis. As described in Section 5, the identified limiting pollutant for wet weather is zinc for LLAR, LCC, and LSGR. As such, the wet weather milestones for the Los Angeles River, Los Cerritos Channel, and San Gabriel River Metals TMDLs establish the pace of stormwater BMP implementation. The wet weather milestones established for the current Permits include the following:

- **Lower Los Angeles River:** Achieve 31% of the required reduction by September 30, 2017. This milestone was created for the WMP, as the metals TMDL includes a 25% milestone in 2012 (prior to the current Permit term) and a 50% milestone in 2024 (beyond the current Permit term). Achievement of this milestone for zinc provides reasonable assurance of achieving a similar or greater reduction for other WQ Priorities.
- **Los Cerritos Channel:** Achieve 10% of the required reduction[3] by September 30, 2017. This milestone is directly from the metals TMDL. Achievement of this milestone for zinc provides reasonable assurance of achieving a similar or greater reduction for other WQ Priorities.
- **Lower San Gabriel River:** Achieve 10% of the required reduction by September 30, 2017. This milestone is directly from the metals TMDL. Achievement of this milestone for zinc provides reasonable assurance of achieving a similar or greater reduction for other WQ Priorities.

The pollutant reduction plan to achieve these milestones is described in Section 8, along with the plan to achieve the milestones for the next Permit term (achieve 35% of the required reduction in LCC and LSGR and achieve 50% of the required reduction in LLAR). A summary of the milestones within the current and next Permit terms and final milestone based on final TMDLs are summarized in Table 2-1. The required reductions that form the basis of the milestones are calculated in Section 5.

[3] The interim milestones are expressed in terms of the *required* reduction not total reduction (e.g., if the required reduction to attain final limits is 50%, then the 10% milestone equates to a 5% reduction). These reductions are calculated in Section 5.

Table 2-1. Summary of schedule for interim and final milestones

WMP Area	Milestone 1 (2017)	Milestone 2 (interim date of applicable metals TMDL)	Milestone 3 (final date of applicable metals TMDL)
LLAR	31%	50%	100%
LCC	10%	35%	100%
LSGR	10%	35%	100%

Table 2-2. Schedule of TMDL milestones for the Lower LA River

TMDL	Constituents	Compliance Goal	Weather Condition	Compliance Dates and Compliance Milestone (Bolded numbers indicated milestone deadlines within the current Permit term) [1]									
				2012	**2013**	**2014**	**2015**	**2016**	2020	2024	2028	2032	2037
LAR Nutrients	Ammonia-N, Nitrate-N, Nitrite-N, Nitrate-N+Nitrite-N	Meet WQBELs	All	Pre 2012									
				Final									
LAR Trash	Trash	% Reduction	All	9/30	9/30	9/30	9/30	9/30					
				70%	80%	**90%**	**96.70%**	**100%**					
LAR Metals	Copper, Lead	% of MS4 area Meets WQBELs	Dry	1/11					1/11	1/11			
				50%					75%	100%			
	Copper, Lead, Zinc, Cadmium	% of MS4 area Meets WQBELs	Wet	1/11						1/11	1/11		
				25%						50%	100%		
LA River Bacteria	*E. coli*	Meet WQBELs	Wet and Dry[2]										3/23
													Final
Dominguez Channel and LA/LB Harbors Toxics	Sediment: DDTs, PCBs, Copper, Lead, Zinc, PAHs	Meet WQBELs	All	12/28								3/23	
				Interim								Final	
Long Beach City Beaches and LAR Estuary Bacteria	Total Coliform, Fecal Coliform, Enterococcus	Meet WLAs	All	USEPA TMDLs, which do not contain interim milestones or implementation schedule. The Permits allow MS4 Permittees to propose a schedule in a WMP.									

[1] The Permit term is assumed to be five years from the Los Angeles County Permit effective date or December 27, 2017.

[2] The schedule for attaining the dry weather Bacteria TMDL is not shown in Table 3-2, which is stepwise by reach/segment and depends on whether a Load Reduction Strategy is developed for implementation.

Table 2-3. Schedule of TMDL milestones for Los Cerritos Channel WMP

TMDL	Constituents	Compliance Goal	Weather Condition	Compliance Dates and Compliance Milestone (Bolded numbers indicated milestone deadlines within the current Permit term) [1]									
				2012	**2013**	**2014**	**2015**	**2016**	2017	2020	2023	2026	2032
Los Cerritos Channel Metals	Copper	% Load Reduction or % of MS4 area Meets WQBELs	Dry						9/30	9/30			
									30%	70%	100%		
	Copper, Lead, Zinc	% Load Reduction or % of MS4 area Meets WQBELs	Wet						9/30	9/30			
									10%	35%	70%	100%	
Dominguez Channel and LA/LB Harbors Toxics	Sediment: DDTs, PCBs, Copper, Lead, Zinc, PAHs	Meet WQBELs	All	12/28									3/23
				Interim									Final

[1] The Permit term is assumed to be five years from the Los Angeles County Permit effective date or December 27, 2017.

Table 2-4. Schedule of TMDL milestones for the Lower San Gabriel River WMP

TMDL	Constituents	Compliance Goal	Weather Condition	Compliance Dates and Compliance Milestone (Bolded numbers indicated milestone deadlines within the current Permit term) [1]									
				2012	**2013**	**2014**	**2015**	**2016**	2017	2020	2023	2026	2032
San Gabriel River Metals	Copper, Selenium	% Load Reduction or % of MS4 area Meets WQBELs	Dry						9/30	9/30			
									30%	70%	100%		
	Copper, Lead, Zinc	% Load Reduction or % of MS4 area Meets WQBELs	Wet						9/30	9/30			
									10%	35%	70%	100%	
Dominguez Channel and LA/LB Harbors Toxics	Sediment: DDTs, PCBs, Copper, Lead, Zinc, PAHs	Meet WQBELs	All	12/28									3/23
				Interim									Final

[1] The Permit term is assumed to be five years from the Los Angeles County Permit effective date or December 27, 2017.

3. Modeling System used for the RAA

The Watershed Management Modeling System (WMMS) was used to develop this RAA. WMMS is specified in the Permits as a potential tool to conduct the RAA. The Los Angeles County Flood Control District (LACFCD), through a joint effort with U.S. Environmental Protection Agency (USEPA), developed WMMS specifically to support informed decisions associated with managing stormwater. The ultimate goal of WMMS is to identify cost-effective water quality improvement projects through an integrated, watershed-based approach. The WMMS encompasses Los Angeles County's coastal watersheds of approximately 3,100 square miles, representing 2,566 subwatersheds (Figure 3-1). As described in the following subsections, WMMS is a modeling system that incorporates three tools: (1) the watershed model for prediction of long-term hydrology and pollutant loading, (2) a BMP model, and (3) a BMP optimization tool to support regional, cost-effective planning efforts. A version of WMMS is available for public download from LACFCD.

The version of WMMS to be used for the RAA in the LLAR, LLC, and LSGR WMPs is customized from the public download version, including the following modification/enhancements:

- Updates to meteorological records to represent the last 10 years (per the RAA Guidelines) and to allow for simulation of the design storm;
- Calibration adjustments to incorporate the most recent 10 years of water quality data collected at the nearby mass emission station;
- Application of a second-tier of BMP optimization using System for Urban Stormwater Treatment and Analysis INtegration (SUSTAIN), which replaces the Nonlinearity-Interval Mapping Scheme (NIMS) component of WMMS.
- Optimization of BMP effectiveness for removal of bacteria pollutants (rather than metals only); and
- Updates to Geographic Information System (GIS) layers, as available.

The subwatersheds in the LLAR, LLC, and LSGR WMP areas that are represented by WMMS are shown in Figure 3-2 through Figure 3-4, which include modifications to confine to jurisdictional boundaries included in these WMP areas. Also shown are the "RAA assessment points", which are used to calculate required load reductions (described in Section 5).

3.1. Watershed Model - LSPC

The watershed model included within WMMS is the Loading Simulation Program C++ (LSPC) (Shen et al. 2004; Tetra Tech and USEPA 2002; USEPA 2003). LSPC is a watershed modeling system for simulating watershed hydrology, erosion, and water quality processes, as well as in-stream transport processes. LSPC also integrates a geographic information system (GIS), comprehensive data storage and management capabilities, and a data analysis/post-processing system into a convenient PC-based Windows environment. The algorithms of LSPC are identical to a subset of those in the Hydrologic Simulation Program–FORTRAN (HSPF) model with selected additions, such as algorithms to dynamically address land use change over time. Another advantage of LSPC is that there is no inherent limit to the size and resolution of the model than can be developed, making it an attractive option for modeling the Los Angeles region watersheds. USEPA's Office of Research and Development (Athens, Georgia) first made LSPC available as a component of USEPA's National TMDL Toolbox (http://www.epa.gov/athens/wwqtsc/index.html). LSPC has been further enhanced with expanded capabilities since its original public release.

The WMMS development effort culminated in a comprehensive watershed model of the Los Angeles County Flood Control District that includes the unique hydrology and hydraulics of the system and characterization of water quality loading, fate, and transport for all the key TMDL constituents (LACDPW 2010a, 2010b). Since the original development of the WMMS LSPC model, Los Angeles County personnel have independently updated the model with meteorological data through April 2012.

To support the objectives of the WMPs, jurisdictional boundaries were also intersected with the WMMS LSPC model subwatersheds resulting in a finer resolution spatial unit for modeling. Model land use was then resampled using this subwatershed-jurisdiction intersect, properly distributing land use categories at the jurisdictional level for attributing sources, while maintaining hydrologic connectivity within the watershed model. This refinement introduced a new layer of resolution, facilitating the rollup of modeled results by jurisdiction to better support source attribution and implementation responsibilities among the participating entities.

Figure 3-1. WMMS model domain and represented land uses and slopes by subwatershed

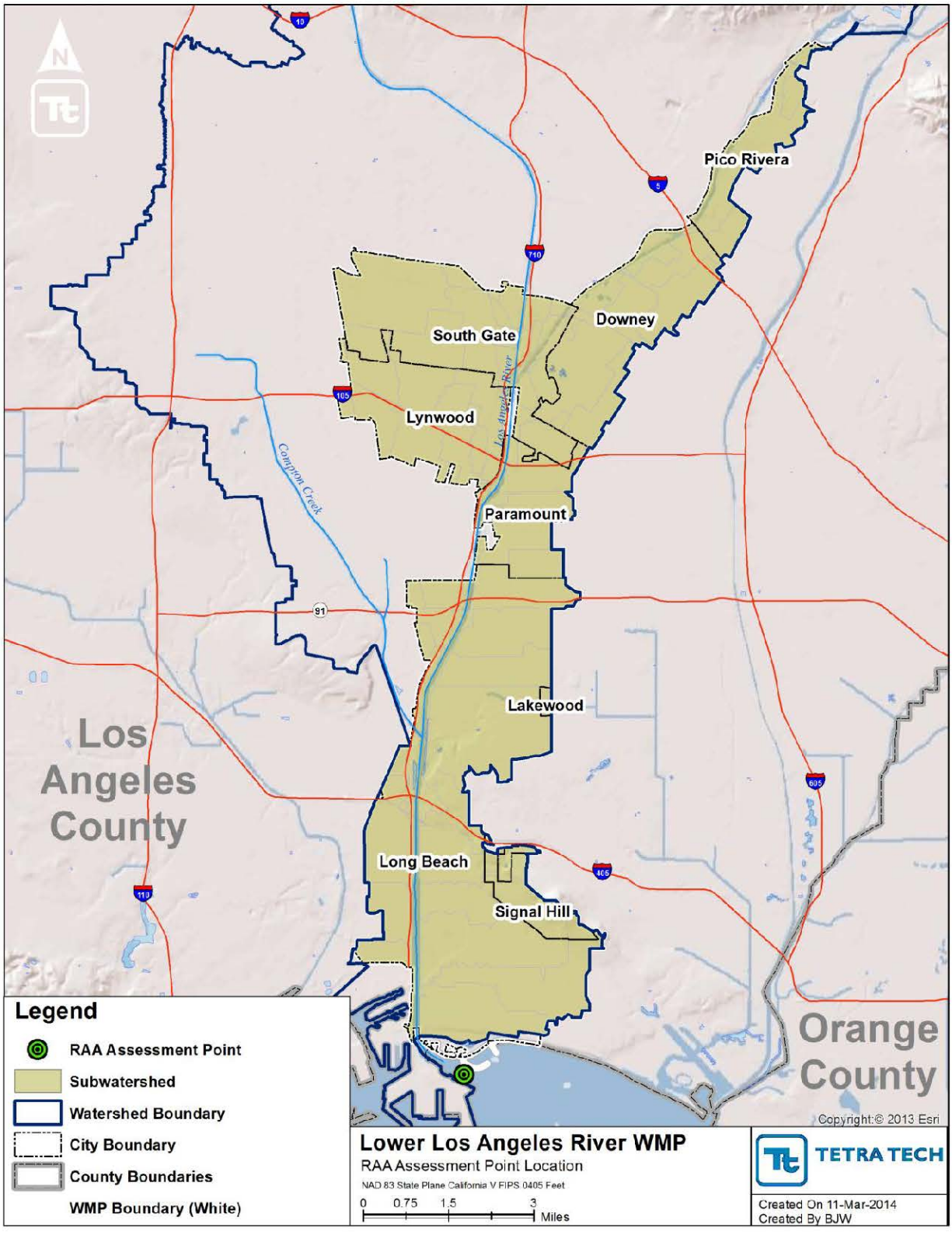

Figure 3-2. Lower LA River WMP Area subwatersheds represented by WMMS

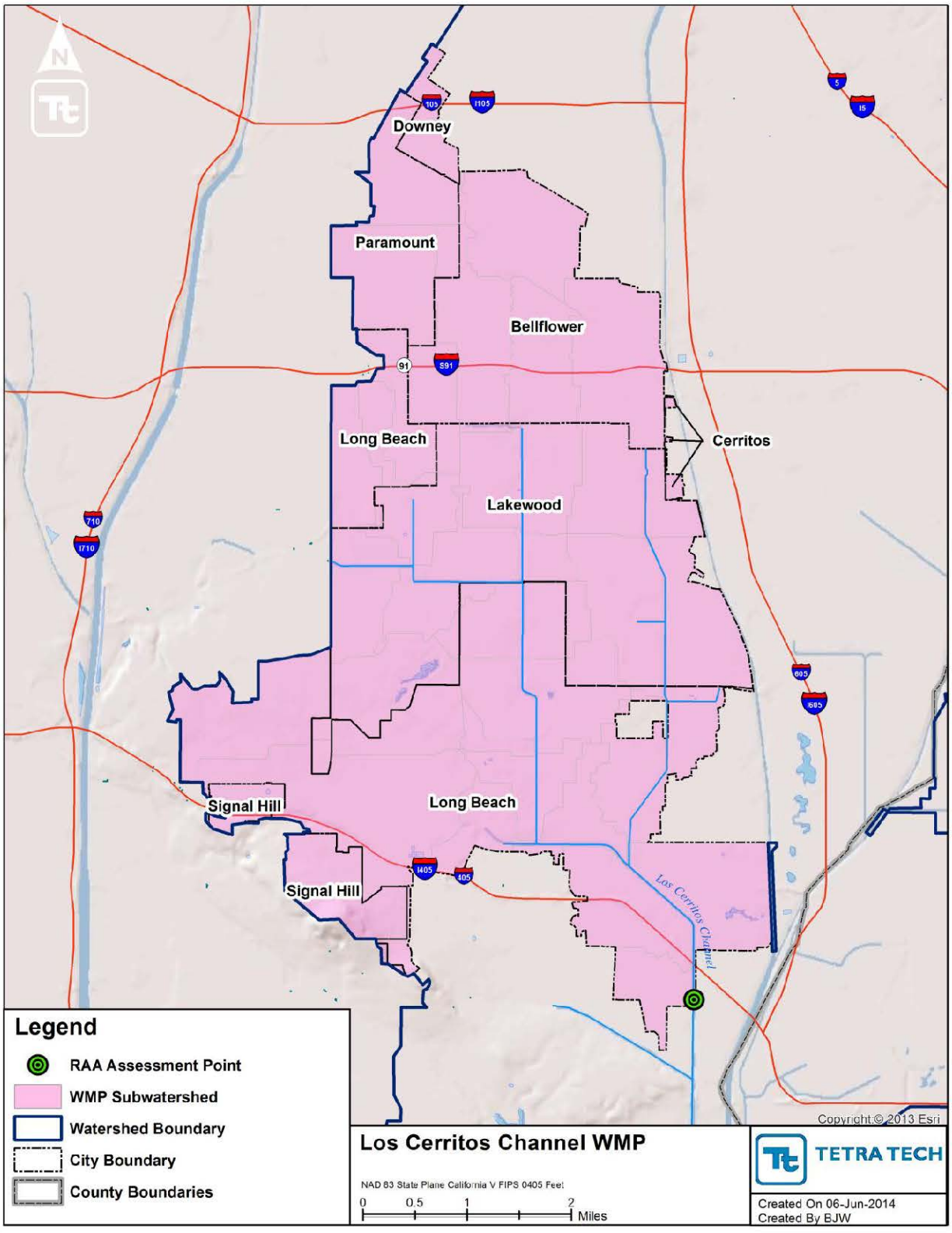

Figure 3-3. Los Cerritos WMP Area subwatersheds represented by WMMS

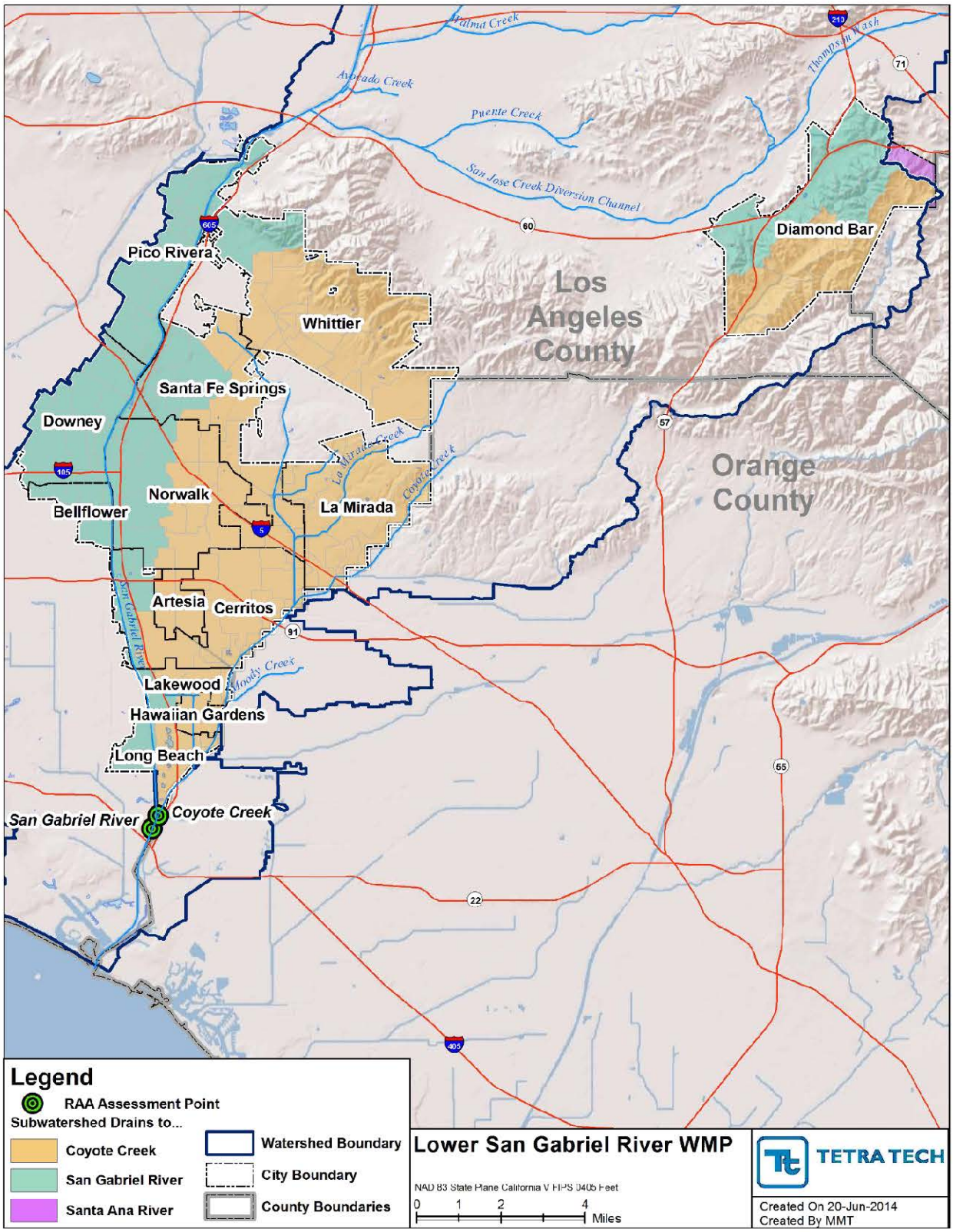

Figure 3-4. Lower San Gabriel River WMP Area subwatersheds represented by WMMS

3.2. Small-Scale BMP Model – SUSTAIN

The System for Urban Stormwater Treatment and Analysis INtegration (SUSTAIN) was developed by USEPA to support practitioners in developing cost-effective management plans for municipal storm water programs and evaluating and selecting BMPs to achieve water resource goals (USEPA, 2009). It was specifically developed as a decision-support system for selection and placement of BMPs at strategic locations in urban watersheds. It includes a process-based continuous simulation BMP module for representing flow and pollutant transport routing through various types of structural BMPs. Users are given the option to select from various algorithms for certain processes (e.g., flow routing, infiltration, etc.) depending on available data, consistency with coupled modeling assumptions, and the level of detail required. Figure 2-3 shows images from the SUSTAIN model user interface and documentation depicting some of the available BMP simulation options in a watershed context.

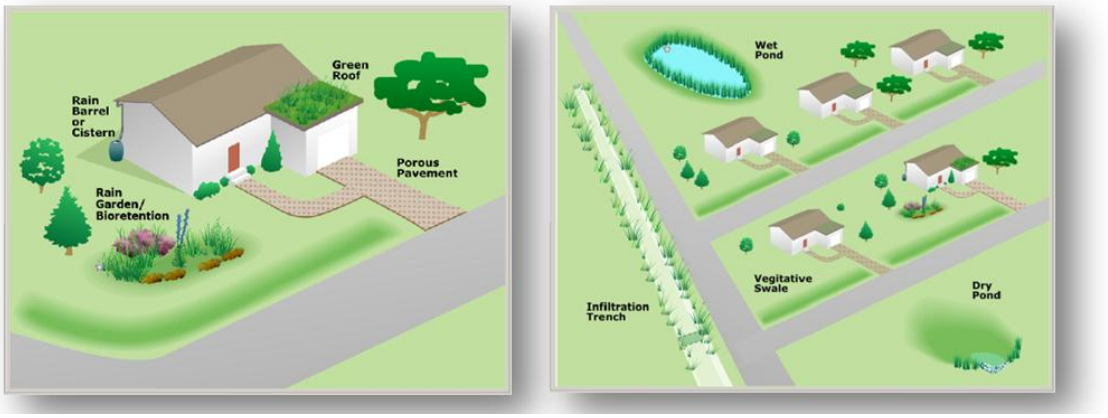

Figure 2-3. SUSTAIN model interface illustrating some available BMPs in watershed settings

SUSTAIN extends the capabilities and functionality of traditionally available models by providing integrated analysis of water quantity, quality, and *cost factors*. The SUSTAIN model in WMMS includes a cost database comprised of typical BMP component cost data from a number of published sources including BMPs constructed and maintained in Los Angeles County. SUSTAIN considers certain BMP properties as "decision variables," meaning that they are permitted to change within a given range during model simulation to support BMP selection and placement optimization. As BMP size changes, so do cost and performance. SUSTAIN runs iteratively to generate a cost-effectiveness curve comprised of optimized BMP combinations within the modeled study area (e.g., the model evaluates the optimal width and depth of certain BMPs to determine the most cost-effective configurations for planning purposes).

3.3. Large-Scale BMP Optimization Tool – NIMS/SUSTAIN

WMMS was specifically designed to dynamically evaluate effectiveness of BMPs implemented in subwatersheds for meeting downstream RWLs while maximizing cost-benefit. WMMS employs optimization based on an algorithm names Nonlinearity-Interval Mapping Scheme (NIMS) to navigate through the many potential scenarios of BMP strategies and identify the strategies that are the most cost effective (Zou et al. 2010). Given the relatively small spatial scale of the WMP area, NIMS was not applied for this study. Instead, a two-tiered approach was applied using the NSGA-II solution technique available in SUSTAIN. For Tier 1, treatment capacities were optimized for each contributing segment, which resulted in unique cost-effectiveness curves for each segment based on available opportunities therein. For Tier 2, the search space was composed of Tier 1 solutions, thereby streamlining the search process. The resulting Tier 2 curve represents the optimal large scale solution because it is comprised of optimized Tier 1 solutions. This approach is especially useful for prioritizing areas for management for scheduling implementation milestones as described in Section 8.

4. Current/Baseline Pollutant Loading

The LSPC model within WMMS was reconfigured and recalibrated specifically for the WMP areas to provide an estimate of current/existing pollutant loads from jurisdictions within the WMPs. Reconfiguration of model subwatersheds was performed to provide specific accounting of loadings from individual jurisdictions. Calibrations were performed to meet specifications of the RAA Guidelines (LARWQCB 2014).

4.1. Model Calibration to Existing Conditions

The LSPC watershed model was originally calibrated for hydrology using a regional approach relying on USGS observed daily streamflow datasets through Water Year (WY) 2006 (LACDPW 2010a). Water Quality was then calibrated using small-scale, land use level water quality monitoring data to develop representative event mean concentrations by land use (LACDPW 2010b). Model performance was also validated at the mass emissions monitoring stations in the context of a county-wide modeling effort. The calibration period for the original WMMS LSPC model began in 1996 and ended in 2006. For the RAA, an analysis was performed to evaluate performance of the LSPC model as it relates to the LLAR, LCC, and LSGR watersheds to understand and benchmark its applicability for use as a baseline condition. The evaluation of monitoring data was extended beyond the original WMMS-LSPC calibration to include the period from 10/1/2001 through 9/30/2011 incorporating both the average year (WY 2008) and 90th percentile (WY 2003) year.

Data available for the LACDPW water quality and hydrologic monitoring stations, S10 and F319 were used to reexamine simulated water quality and hydrology conditions in LA River. The two stations are co-located just south of the West Wardlow Road overpass and drain approximately 800 square miles, or nearly the entire LA River watershed. The monitoring stations were selected for comparison due to their location near the outlet of the LA River watershed, which encompasses the aggregate contributions of all upstream pollutant sources. The selected flow gage, F319, was also used to calibrate the WMMS LSPC model and, therefore, links the current and previous efforts. Water quality and hydrologic records for WYs 2003–2011 were compared to the simulated watershed model output to determine the necessary model parameter adjustments to establish an up-to-date model calibration. The locations of these two gages are presented in Figure 4-1. Statistical summaries and flow regime analysis of the water quality monitoring datasets from the Los Angeles River mass emission station S10 are presented in Attachment E.

Watershed model simulation of existing water quality conditions for the LCC watershed were evaluated for WYs 2003–2011 using data collected at the City of Long Beach Stearns Street monitoring location, just north of interstate 405. The water quality monitoring location is positioned at the WMP hydrologic outlet and captures the cumulative watershed loading effects impacting water quality conditions in this 27 square mile portion of the LCC watershed. No flow monitoring data are available in the watershed, thus simulated flow conditions could not be evaluated against observed data for LCC. The location of the water quality monitoring is presented in Figure 4-1 below and statistical summaries of the monitoring dataset are presented in Attachment E.

For the LSGR, hydrology was re-assessed at two monitoring locations using available data from WYs 2001-2011 The two monitoring locations selected include USGS 11087020 San Gabriel River at Whittier Narrows Dam CA and the LACDPW streamflow gage F354 located along Coyote Creek south of Spring Street (coincident with mass emission station S13). The USGS gage was selected for continuity with the development and calibration of the original WMMS LSPC modeling system. The primary monitoring location selected to calibrate water quality for LSGR was the LA County mass emission station S14. The San Gabriel River Monitoring Station is located below San Gabriel River Parkway in Pico Rivera. At this location the upstream tributary area is 450 square miles (LACDPW 2013). A second mass emission station, the Coyote Creek Monitoring Station (S13) located below Spring Street in the lower San Gabriel River watershed was also used to validate the water quality calibration. The locations of these two gages are presented below in Figure 4-1. Statistical summaries and flow regime analysis of the water quality monitoring datasets from the San Gabriel River and Coyote Creek mass emission stations S14 and S13 are presented in Attachment E.

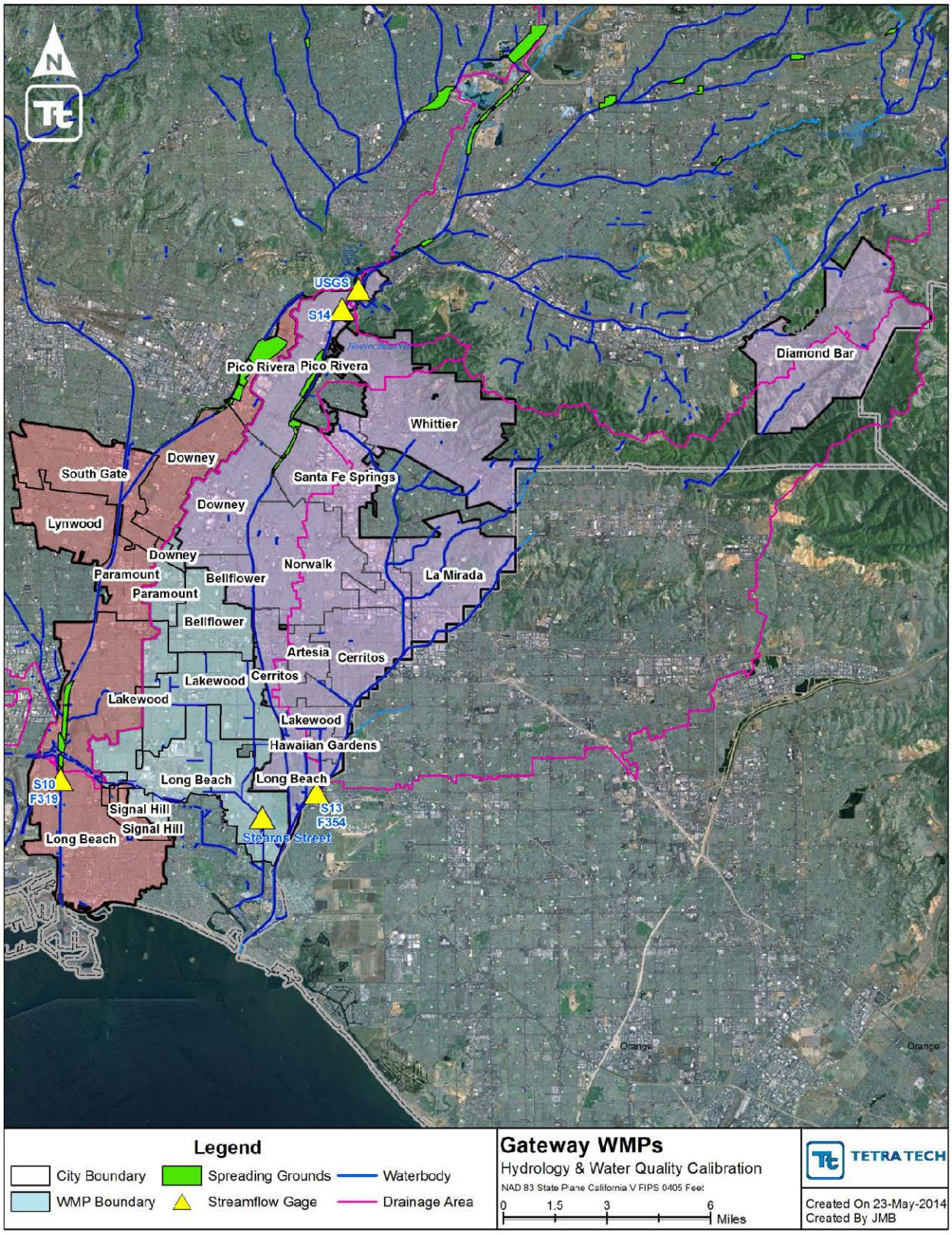

Figure 4-1. WMP groups hydrology and water quality calibration sites.

To demonstrate the ability to predict the effect of watershed processes and management actions, model calibration and validation are necessary and critical steps in any model application. Acceptable model calibration criteria for

benchmarking an RAA were developed by the Regional Board and are listed below in Table 4-1 (LARWQCB 2014). The objectives of establishing model assessment criteria are to ensure the calibrated model reflects all the model conditions and properly utilizes the available modeling parameters, thus yielding meaningful results. The lower bound of "Fair" level of agreement listed in Table 4-1 is considered a target tolerance for the model calibration process.

Table 4-1. Model assessment criteria from the RAA Guidelines

Constituent Group	Percent Difference Between Modeled and Observed		
	Very Good	Good	Fair
Hydrology / Flow	0 – 10	>10 – 15	>15 – 25
Sediment	0 – 20	>20 – 30	>30 – 40
Water Quality	0 – 15	>15 – 25	>25 – 35
Pesticides / Toxics	0 – 20	>20 – 30	>30 – 40

4.1.1. Hydrology Calibration

Table 4-2 and Table 4-3 present the hydrology calibration assessment for the Lower Los Angeles River and Lower San Gabriel River gages, respectively. Nash-Sutcliffle efficiency is a correlation coefficient commonly used in hydrological modeling to measure how well a model predicts temporal variation. A value of 1.0 means a perfect match between modeled and observed. A value of 0 means that the computed mean of observed data is as good a predictor as the model. A negative value means that the data-mean is a better predictor than the model. Because the Regional Board guidance only required annual average flow volume metric, evaluating Nash-Sutcliffe helped to demonstrate that the model also performed well at predicting *intra-annual* flow variablilty.

Table 4-2. Summary of model hydrology calibration performance for Lower Los Angeles River

Water Quality Parameter	Model Period	Hydrology Parameter	Modeled vs. Observed Volume (% Error)	Regional Board Guidance Assessment
In-stream flow at Los Angeles River below Wardlow Road (LA DPW F319)	10/1/2002 – 9/30/2011	Flow Volume	8.72	Very Good
		Nash-Sutcliffe	0.680	n/a

Table 4-3. Summary of model hydrology calibration performance for Lower San Gabriel River

Water Quality Parameter	Model Period	Hydrology Parameter	Modeled vs. Observed Volume (% Error)	Regional Board Guidance Assessment
In-stream flow at SAN GABRIEL R AB WHITTIER NARROWS DAM CA (USGS 1108702)	10/1/2001 – 9/30/2011	Flow Volume	-3.31	Very Good
		Nash-Sutcliffe	0.64	n/a
Coyote Creek near Spring Street (LA DPW F354)	10/1/2003 – 9/30/2011	Flow Volume	-6.17	Very Good
		Nash-Sutcliffe	0.62	n/a

4.1.2. Water Quality Calibration

Water quality calibration for the LLAR, LCC, and LSGR incorporated sampling from LA County mass emission stations at S10 (LA River), Strearns Street (LCC), and S13 and S14 along Coyote Creek and the San Gabriel River, respectively. The updated observed concentration data collected at these sites were used to refine the calibration and benchmark model performance. Daily observed loads were calculated by multiplying observed concentration and daily observed flow. Daily loads were estimated for LCC using simulated flows due to the lack of observed data. The percent error between this daily observed load and the daily modeled load was then calculated for each constituent. The results of this evaluation at the two gages are presented in Table 4-4 through Table 4-7.

Table 4-4. Summary of model performance by constituent at the Los Angeles River (S10) monitoring location

Water Quality Parameter	Sample Count	Modeled vs. Observed Load (% Error)	Regional Board Guidance Assessment
Total Sediment	91	-6.8	Very Good
Total Copper	58	-3.4	Very Good
Total Zinc	58	-18.1	Good
Total Lead	52	-0.1	Very Good
Fecal Coliform	57	-5.1	Very Good
Total Nitrogen	58	-4.0	Very Good
Total Phosphorous	57	6.9	Very Good

Table 4-5. Summary of model performance by constituent at Los Cerritos Channel (Stearns St.) monitoring location

Water Quality Parameter	Sample Count	Modeled vs. Observed Load (% Error)	Regional Board Guidance Assessment
Total Sediment	85	2.7	Very Good
Total Copper	57	-2.1	Very Good
Total Zinc	56	1.5	Very Good
Total Lead	57	2.2	Very Good
Fecal Coliform	55	1.0	Very Good
Total Nitrogen	56	17.5	Good
Total Phosphorous	56	-0.4	Very Good

Table 4-6. Summary of model performance by constituent at the San Gabriel River (S14) monitoring location

Water Quality Parameter	Sample Count	Modeled vs. Observed Load (% Error)	Regional Board Guidance Assessment
Total Sediment	45	8.57	Very Good
Total Copper	42	-9	Very Good
Total Zinc	44	16.1	Very Good
Total Lead	44	-3.97	Very Good
Fecal Coliform	43	1.85	Very Good
Total Nitrogen	*Not evaluated at this location*		
Total Phosphorous	44	-2.27	Very Good

Table 4-7. Summary of model performance by constituent at the Coyote Creek (S13) monitoring location

Water Quality Parameter	Sample Count	Modeled vs. Observed Load (% Error)	Regional Board Guidance Assessment
Total Sediment	42	1.28	Very Good
Total Copper	27	-28.9	Fair
Total Zinc	27	-32.44	Fair
Total Lead	25	-1.58	Very Good
Fecal Coliform	24	-34.48	Fair
Total Nitrogen	*Not evaluated at this location*		
Total Phosphorous			

Two fecal coliform samples were removed from the observed dataset at the San Gabriel River S14 mass emission station prior to performing the load calculation. These two samples appear to be outliers in the dataset with concentration values 10-100x greater than the remaining samples. These observations occurred on 10/17/2005 and 10/13/2009.

For pollutants not explicitly represented in the WMMS LSPC model, and for dry weather analysis, 90th percentile concentrations were calculated based on observed monitoring data at the LACDPW mass emission sites. The 90th percentile concentration was used for compliance with the Regional Board RAA guidelines (LARWQCB 2014). A summary of the 90th percentile concentrations for each constituent and waterbody are presented below in Table 4-8. For subsequent load reduction analyses, these concentrations were assumed for all wet or dry weather conditions they were assigned to represent existing conditions within their respective watersheds.

Table 4-8. 90th percentile concentrations assumed for non-modeled pollutants

Waterbody	Pollutant	Wet Weather	Dry Weather	90th Percentile Concentration	Units
Los Angeles River (S10)	DDT	●		0.005[1]	ug/L
	PCBs	●		0.0325[1]	ug/L
	PAHs	●		0.835[1]	ug/L
	Cadmium	●		4.8	ug/l
	Copper		●	25.68	ug/l
	Lead		●	3.43	ug/l
	E. coli		●	19,600	MPN/100 mL
Los Cerritos Channel (Stearns)	DDT	●		0.005[1]	ug/L
	PCBs	●		0.0325[1]	ug/L
	PAHs	●		0.835[1]	ug/L
	Copper		●	25.4	ug/l
	E. coli		●	14,200	MPN/100 mL
San Gabriel River (S14)	DDT	●		0.005[1]	ug/L
	PCBs	●		0.0325[1]	ug/L
	PAHs	●		0.835[1]	ug/L
	Copper		●	29.89	ug/l
	Selenium		●	4.77	ug/l
	E. coli		●	2,190	MPN/100 mL
Coyote Creek (S13)	DDT	●		0.005[1]	ug/L
	PCBs	●		0.0325[1]	ug/L
	PAHs	●		0.835[1]	ug/L
	Copper		●	28.54	ug/l
	E. coli		●	11,500	MPN/100 mL

[1] DDT, PCBs and PAHs were below MDL, so concentrations were assumed half MDL.

4.2. Current Best Management Practices/Minimum Control Measures

It is important to note the model calibration incorporates local stormwater BMPs implemented through late 2012 into the baseline condition. The only BMPs/control devices that were explicitly incorporated into the baseline model were the Dominguez Gap basins. All other BMPs, which individually were assumed to have a small effect on water quality at the watershed scale, are implicitly represented in the baseline condition. BMPs implemented in 2013 can be categorized as WMP implementation measures and their volume/load reductions are a component of the pollutant reduction plan for attaining interim and final milestones.

5. Estimated Required Pollutant Load Reductions

This section provides a description of the process for identifying critical conditions and calculating required load reductions to meet interim and final limitations.

5.1. Selected Average (Interim) and Critical (Final) Conditions

The RAA Guidelines specify that average conditions shall be used to establish load reductions for interim milestones and critical conditions shall be used to establish load reductions for final limits. In addition, the Permits provide two pathways for addressing WQ Priorities (see Figure 5-1):

- Volume-based: Retain the standard runoff volume from the 85th percentile, 24-hour storm
- Load-based: Achieve the necessary pollutant load reductions to attain Permit limits

Both types of numeric goals were evaluated as part of this RAA.

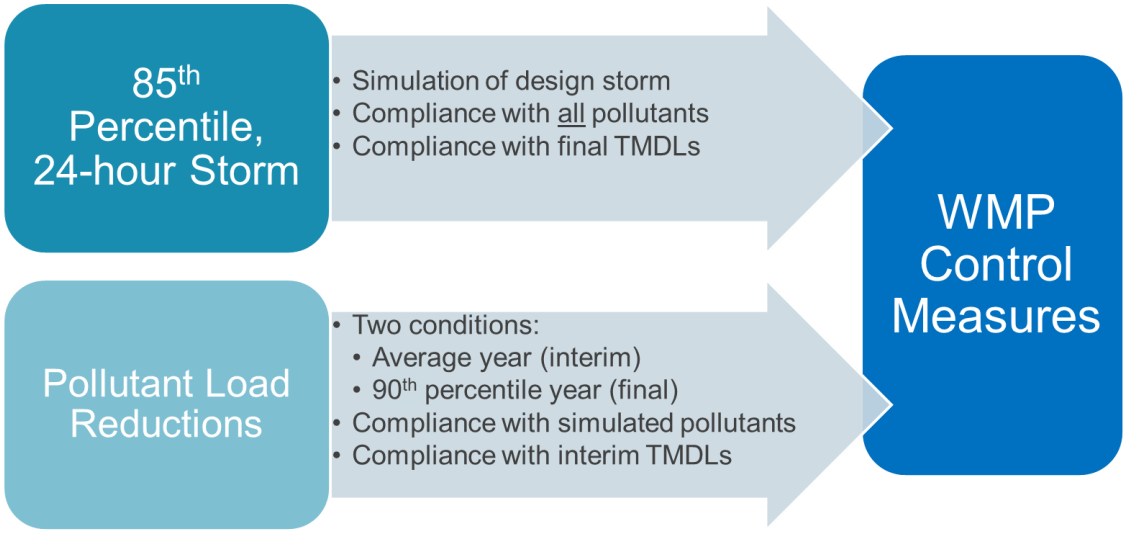

Figure 5-1. Two Types of Numeric Goals and WMP Compliance Paths according to the Permits

5.2. Representative Conditions for Wet Weather

Two approaches were considered and ultimately used in the RAA to represent wet weather critical conditions: the 90th percentile wet year and 85th percentile, 24-hour (design) storm, as described in the following subsections.

5.2.1. Average and 90th Percentile Wet Years

This RAA is based on continuous simulation, and a "representative" year-long time period was selected to represent average and critical conditions, which allows the modeling to capture the variability of rainfall and storm sizes/conditions. For LLAR, LCC, and LSGR, WY2008 was selected as the representative year for average conditions and WY2003 was selected as the representative year for the 90th percentile critical wet conditions.

To select these average and critical years for the RAA, the following steps were taken:

1. **Calculated key rainfall metrics for the last 25-years:** the average and critical years were identified by aggregating data from available rain gages across the entire Los Angeles River and San Gabriel River watersheds (LCC is in between, so the analysis for LLAR and LSGR also applies to LLC). For

comparison, other regional watersheds were also analyzed and presented. The two key metrics evaluated were: (1) total annual rainfall, and (2) average rainfall per wet day (with wet days defined as days with rainfall totals greater than 0.1 inches). The first is clearly an indicator of volume, while the second is an indicator of rainfall intensity. To evaluate long-term conditions, the analysis covered 25 water years (WY) from 1987 through 2011—the total rainfall for each precipitation gage was area-weighted and aggregated into annual totals by water year (i.e. previous October through current September).

2. **Selected years from the most recent 10-years that are most representative of average and 90th percentile**: per the RAA Guidelines, the most recent 10-year period represented in the available data were used to develop the RAA. Table 5-1 and Table 5-2 show average rainfall volumes and intensities (inches per wet day), respectively, for the most recent 10 years compared against the entire 25-years. Both the average and 90th percentile values were compared across the 10- and 25-year records. For the San Gabriel River, 2007-08 is a representative average year based on both the rainfall volume (Table 5-1) and intensity (Table 5-2) metrics. Because BMP performance is typically intensity-dependent, average rainfall per wet day (Table 5-2) was selected as a better metric for use in determining the 90th percentile than annual average rainfall (Table 5-1), which led to selection of 2002-03 as the critical year.

It should be noted that wet weather conditions were also reflective on the definition of dry/wet days. As described in Section 5, for analysis of non-bacteria pollutants (including the limiting pollutant zinc) days with greater than 90th percentile daily average flow were flagged as "wet," which aligns with the critical condition used for the LAR and LSGR metals TMDLs.

5.2.2. 85th Percentile, 24-hour Storm

The design storm is identified in the RAA Guidelines as an acceptable critical condition, and capture of design storm volumes by BMPs is a specified compliance metric in the Permits for TMDLs. The design storm was evaluated and used as a wet weather critical condition for the RAA. As described above, the design storm is a volume-based standard. Each subwatershed within each WMP area has a unique 85th percentile runoff volume, due to varying rainfall amounts and land characteristics (imperviousness, soils, slope, and the like). The rainfall depths associated with the 85th percentile, 24-hour storm are shown in Figure 5-2, based on rolling 24-hour intervals for the 25-year period between October 1, 1987 and September 30, 2011. Within the WMP area, the 85th percentile rainfall depth values range between 0.72 and 1.08 inches.

To determine the "standard volume" associated the design storm, initial conditions were set in LSPC to reflect representative conditions at the start of the simulation, along with regionally derived infiltration rates, and 85th percentile rainfall depths were used as rainfall boundary conditions. At each location the storm distribution presented in Figure 5-3 was used to temporally distribute the 24-hour rainfall volumes (LACDPW 2006). The model was then run to predict the associated runoff volumes for each subwatershed in the WMP area. Those runoff volumes represent the volumes that would need to be retained in order to attain the numeric goals associated with the 85th percentile, 24-hour storm.

Shown in Figure 5-4 are the rainfall depths and runoff depths (runoff volume divided by subwatershed area) associated with the design storm for each subwatershed in the WMP areas. About 50 percent of the subwatersheds in all three WMP areas experiences 0.4 inches or more of runoff under the 85th percentile, 24-hour storm, while about 10 percent of the area experiences about 0.55 inches or more of runoff. Figure 5-5 summarizes the total design storm volumes (in acre-feet) for each jurisdiction. The runoff depths for each subwatershed in the WMP area are graphically shown in Figure 5-6, Figure 5-7, and Figure 5-8.

Table 5-1. Average Rainfall Depths (Water Years 2002–2011 vs. 25-year Average and 90th Percentile)

Year	Average Rainfall Totals (in./year)				
	Ballona Creek	Dominguez Channel	Malibu Creek	San Gabriel River	Los Angeles River
2001-02	25.4	19.1	28.1	30.6	30.5
2002-03	17.1	13.9	20.8	23	20.4
2003-04	10.2	8.1	9.2	13.7	11.2
2004-05	39.3	28.4	42.6	49.6	46.7
2005-06	14.1	9.8	16.9	17.9	17.5
2006-07	4.3	3.1	6.8	6.4	5.8
2007-08	13.2	11.9	18.6	19.4	17.5
2008-09	9.6	8.5	12.3	14.6	12.5
2009-10	16.8	14.9	20.3	24.1	20.5
2010-11	21.2	18.5	25.3	28.5	25.7
Avg. (1987-2011)	15.9	12.5	18.4	20.7	19.2
90th %ile (1987-2011)	30.8	22.9	34.7	37.8	36.9

Red Box: WMP Watersheds. Blue highlighted cells are the two years in each basin with the smallest difference from the 25-year average. Orange cells have the smallest difference from the 90th percentile of the 25-year record.

Table 5-2. Average Rainfall Intensity (Water Years 2002–2011 vs. 25-year Average and 90th Percentile)

Year	Average Rainfall Per Wet Day (in./wet day)				
	Ballona Creek	Dominguez Channel	Malibu Creek	San Gabriel River	Los Angeles River
2001-02	0.36	0.32	0.41	0.42	0.36
2002-03	0.79	0.66	0.88	0.92	0.84
2003-04	0.61	0.48	0.61	0.66	0.58
2004-05	0.98	0.69	1.03	1.07	1.03
2005-06	0.53	0.41	0.61	0.64	0.61
2006-07	0.31	0.27	0.39	0.41	0.37
2007-08	0.56	0.52	0.68	0.76	0.71
2008-09	0.49	0.48	0.56	0.65	0.57
2009-10	0.64	0.6	0.71	0.82	0.72
2010-11	0.62	0.58	0.73	0.76	0.7
Avg. (1987-2011)	0.59	0.52	0.67	0.72	0.66
90th %ile (1987-2011)	0.78	0.66	0.91	0.97	0.89

Red Box: WMP Watersheds. Blue highlighted cells are the two years in each basin with the smallest difference from the 25-year average. Orange cells have the smallest difference from the 90th percentile of the 25-year record.

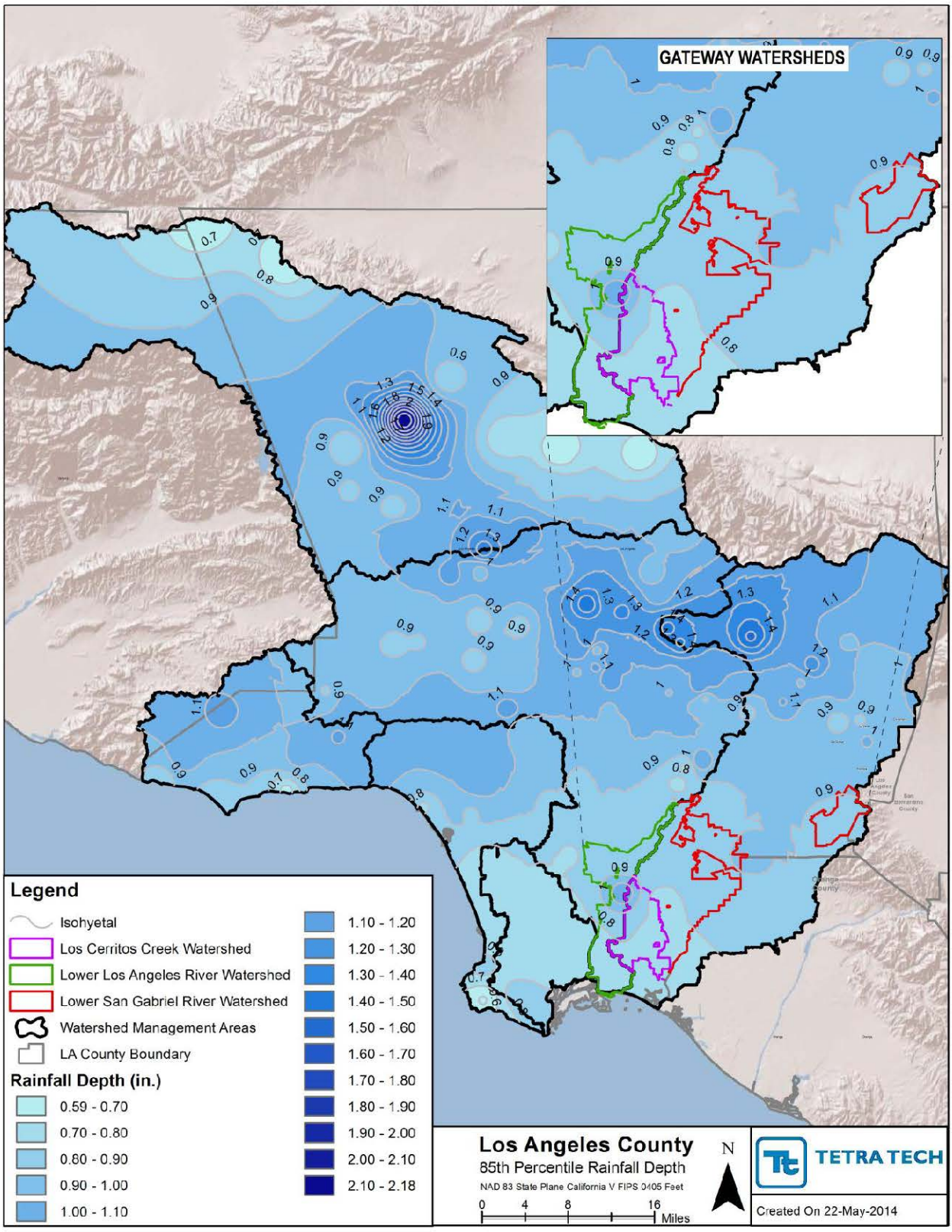

Figure 5-2. Rainfall depths associated with the 85th percentile, 24-hour storm.

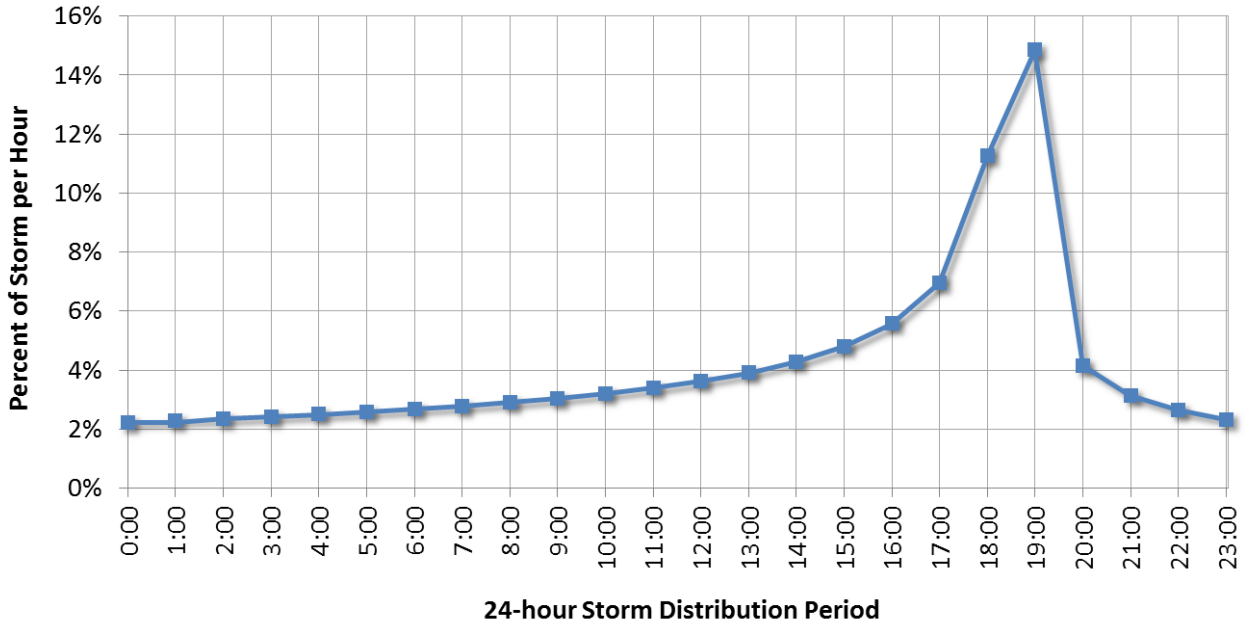

Figure 5-3. Temporal Distribution for 85th Percentile 24-hour Storm for LSPC Simulation.

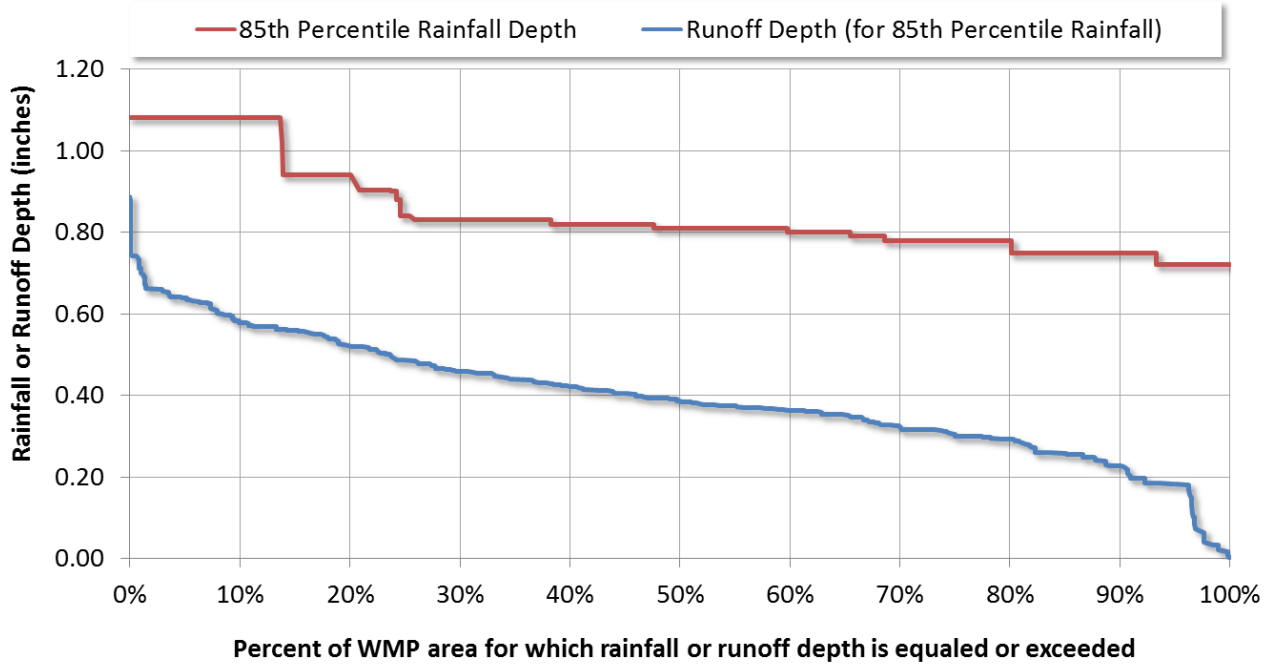

Figure 5-4. Rainfall and Runoff Depths Associated with 85th Percentile Rainfall in the WMP subwatersheds.

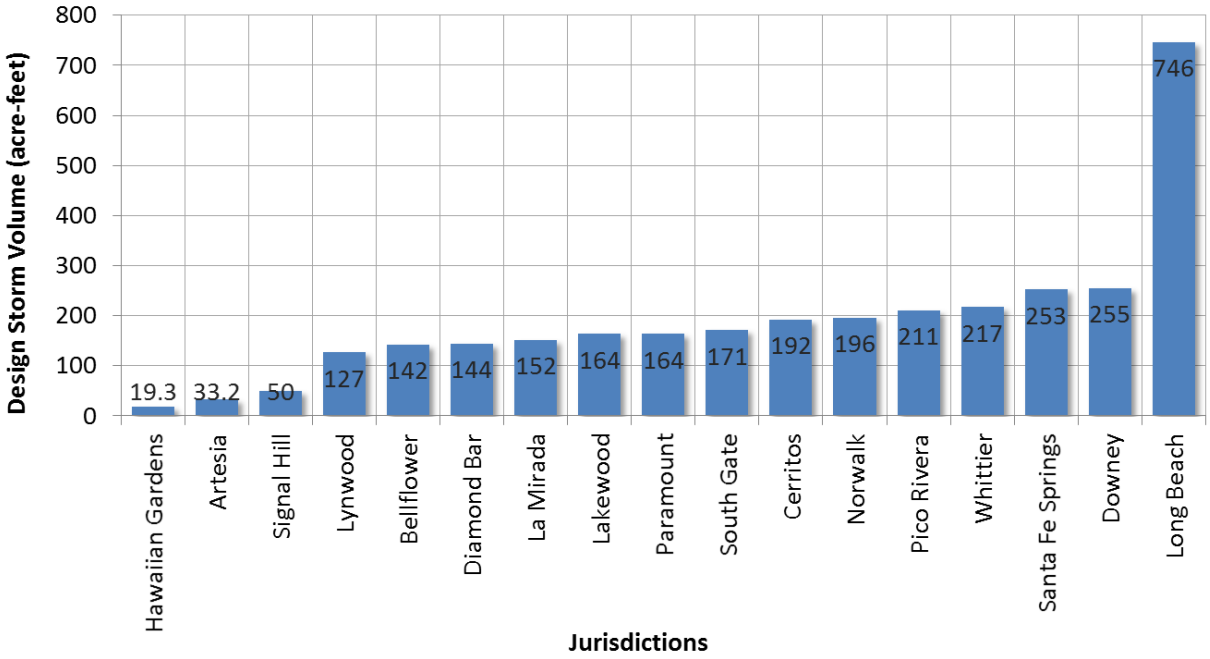

Figure 5-5. Runoff Volume Associated with the 85th Percentile, 24-hour Storm (by jurisdiction).

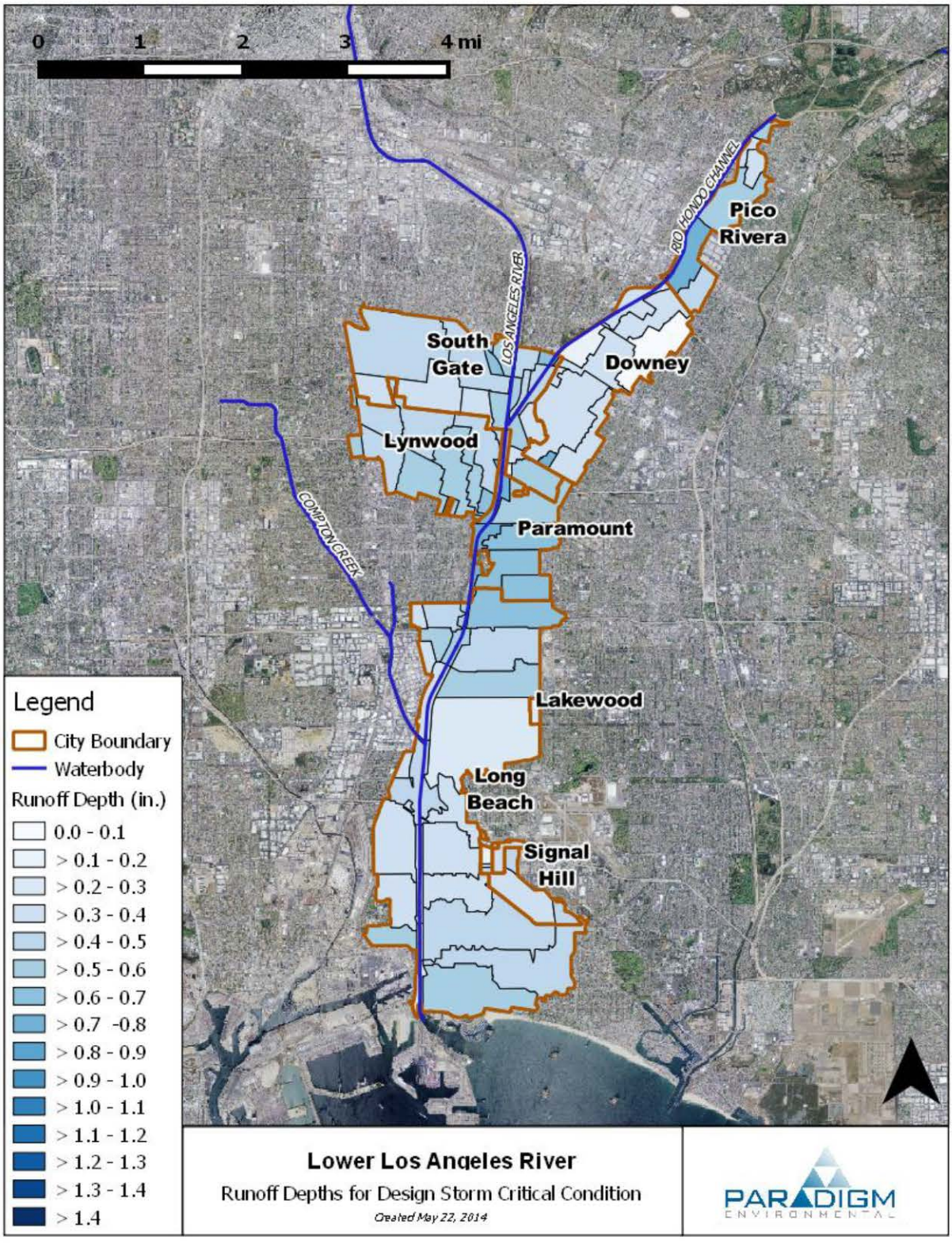

Figure 5-6. Runoff Associated with the 85th Percentile, 24-hour Storm for Lower Los Angeles River.

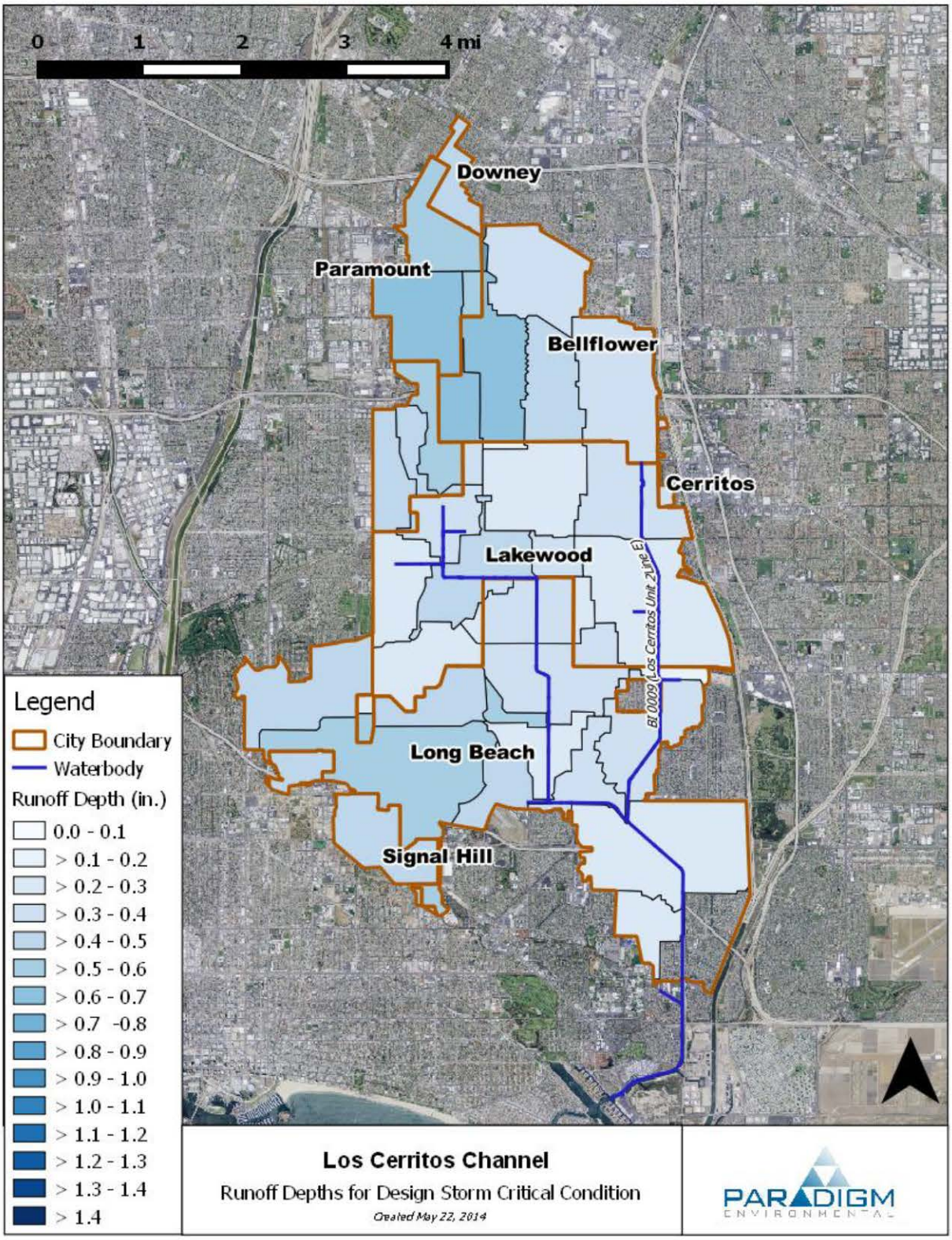

Figure 5-7. Runoff Associated with the 85th Percentile, 24-hour Storm for Los Cerritos Channel.

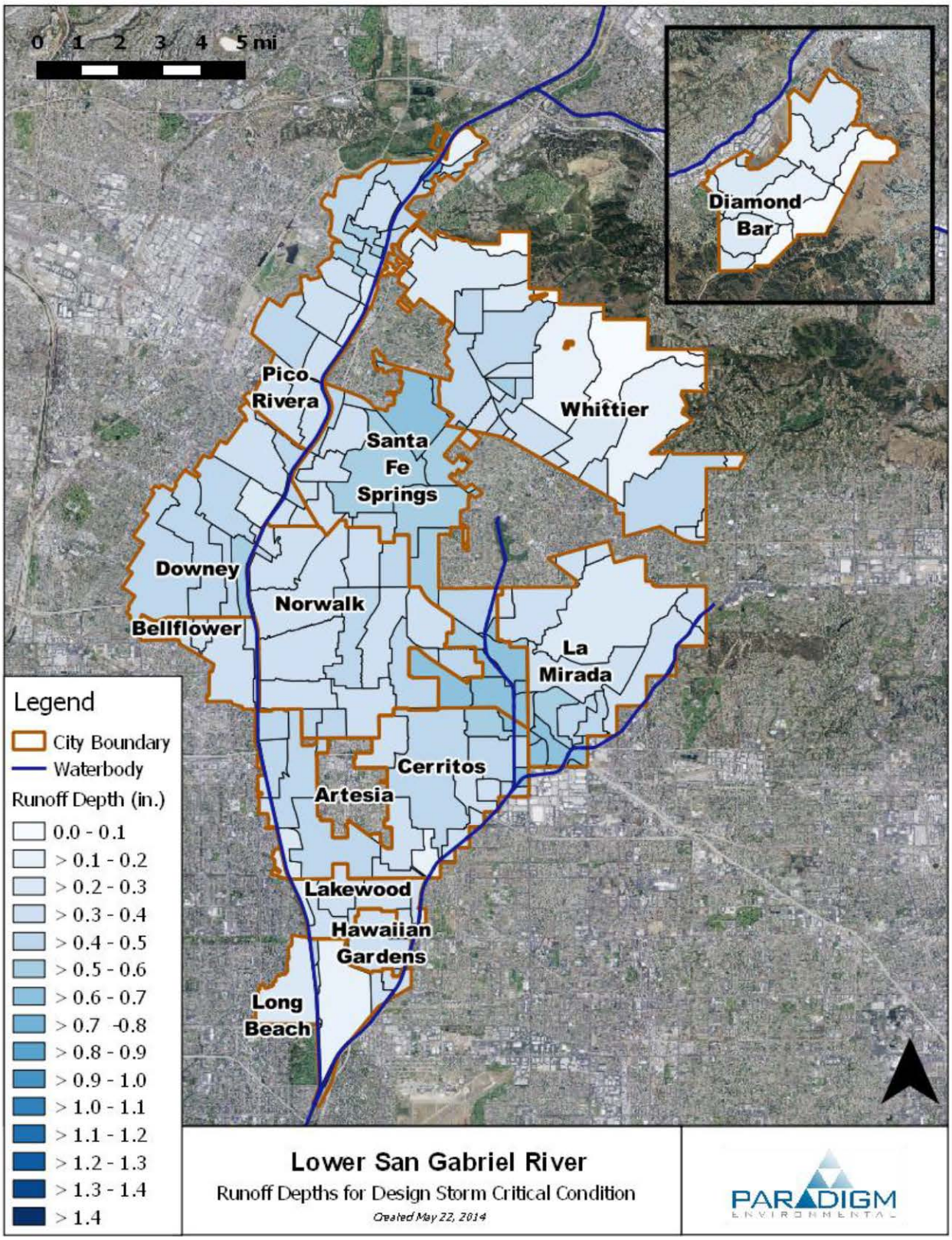

Figure 5-8. Runoff Associated with the 85th Percentile, 24-hour Storm for Lower San Gabriel River.

5.2.3. Representative Conditions for Dry Weather

Although clearly defined definitions exist for wet periods, definitions for dry periods are less clearly defined. Wet weather periods are either defined in terms of rainfall or instream flow. For bacteria, a wet day is one with a rainfall total greater than 0.1 inches plus the three subsequent days, while metals criteria define wet days as those with instream flow above the 90th percentile. One seemingly intuitive way of defining a dry period is simply to use the "non-wet" days represented as the inverse of wet days. However, summary of model results indicate some residual influence of wet weather among the "non-wet" days. This presents some challenges for estimating loads and evaluating dry weather compliance because BMP planning would be better served by choosing design conditions that are more influenced by natural background baseflow and/or anthropogenic activities such as point source discharges or dry weather runoff from irrigation (instead of post-rain event interflow).

The RAA Guidelines recommend using the most recent 10 years of data for modeling scenarios to ensure that the plans are based on a representative range of wet and dry conditions. Regional precipitation and instream flow patterns are highly variable; therefore, a representative dry period is one that consistently represents minimal influence to wet weather conditions. To identify a representative dry period, the analysis covered 25 WYs from 1987 through 2011. The following steps were taken:

1. The total rainfall for each precipitation gage in the study area was summarized and classified into wet and non-wet periods according to the bacteria criteria definition for wet weather (i.e. days with rainfall > 0.1 inches plus the three subsequent days).
2. Dry periods were evaluated on a monthly time scale. Table 5-3 shows the average number of consecutive 30-day dry periods, counted by month of the associated mid-interval date, for each of the rainfall gages within the three WMP areas over the 25 years of rainfall evaluated. The color-ramp indicates relative dryness, with red being driest. Table 5-3 indicates that on average, the months of June, July, and August are the driest months in the year, averaging 24-30 consecutive dry intervals. Note that because this table counts mid-interval dates by month, values approaching 30 actually indicate continuous dry intervals approaching 60 days (15 days on either side of the 30 day interval).
3. Select periods within the average and critical year were identified for dry weather simulations. The areal coverage or non-wet intervals in the two selected representative years (2008 and 2003) were compared against the 10-year period (2001-2011) and the long-term 25-year period (1998-2011). Figure 5-9, Figure 5-10, and Figure 5-11 show the selected representative dry period against summaries of non-wet weather conditions in the LLAR, LCC, and LSGR WMP areas, respectively. Within the two selected years, the 45-day period between 8/17 and 9/30 was found to be the most representative of dry weather conditions because (1) no rainfall occurred at any of the gages throughout all three WMP areas, (2) it was during a time of the year that was historically shown to experience the least amount of spatially-weighted rainfall in a year, and (3) it was late in the summer following an extended period of no rainfall for both 2003 and 2008.

The identified periods between 8/17 and 9/20 during the average and critical years were used for subsequent dry weather simulations for the dry weather component of the RAA.

Table 5-3. Consecutive 30-day Dry Periods per month by WMP and rainfall gage (10/1/1987 – 9/30/2011)

WMP	StaID	Average Number of Consecutive 30-Day Dry Intervals Per Month (10/1/1987 – 9/30/2011)											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Los Cerritos Channel	D1254	2.2	1.9	6.2	11.9	22.3	25.2	28.9	28.9	21.4	12.7	7.8	4.4
	D1255	2.8	1.8	4.4	8.8	20.3	25.1	29.7	29.8	21.8	13.0	7.3	2.9
	D225	3.0	2.3	6.3	10.5	20.6	24.7	28.8	29.5	21.4	13.1	9.1	3.6
	D388	2.1	1.3	3.8	8.5	18.6	24.0	27.6	29.2	21.0	12.3	5.1	3.2
	D415	1.9	1.2	5.7	9.6	19.0	24.0	28.1	29.1	23.4	13.1	8.9	3.7
Lower Los Angeles River	D1113	4.2	2.5	8.3	9.8	19.5	24.4	28.1	27.8	23.6	13.7	8.8	4.5
	D1114	1.6	1.1	4.0	8.9	19.6	25.1	29.7	29.6	20.8	12.3	5.5	3.0
	D1256	2.1	1.4	4.8	10.4	20.5	24.6	28.8	29.8	23.5	14.2	6.2	3.1
	D291	3.3	1.1	5.0	8.8	19.4	24.4	28.7	28.4	21.9	11.6	4.6	3.5
	D388	2.1	1.3	3.8	8.5	18.6	24.0	27.6	29.2	21.0	12.3	5.1	3.2
	D415	1.9	1.2	5.7	9.6	19.0	24.0	28.1	29.1	23.4	13.1	8.9	3.7
Lower San Gabriel River	D106	4.2	0.6	6.0	10.9	19.7	24.6	28.6	29.0	23.9	14.0	8.2	4.0
	D1088	2.2	1.0	3.8	9.0	17.6	24.1	28.5	29.0	20.9	12.6	5.9	2.7
	D1095	2.4	0.5	4.4	10.0	19.2	24.6	28.6	29.1	21.2	14.2	7.1	4.2
	D1114	1.6	1.1	4.0	8.9	19.6	25.1	29.7	29.6	20.8	12.3	5.5	3.0
	D1254	2.2	1.9	6.2	11.9	22.3	25.2	28.9	28.9	21.4	12.7	7.8	4.4
	D1255	2.8	1.8	4.4	8.8	20.3	25.1	29.7	29.8	21.8	13.0	7.3	2.9
	D1256	2.1	1.4	4.8	10.4	20.5	24.6	28.8	29.8	23.5	14.2	6.2	3.1
	D1257	2.0	0.5	4.5	10.6	18.9	24.4	28.6	29.8	21.2	10.3	5.7	3.0
	D1271	1.8	1.6	3.9	9.4	18.1	24.4	28.6	29.7	21.6	11.7	7.3	3.4
	D156	3.0	1.5	5.2	10.1	19.2	24.6	28.5	29.3	21.0	13.4	7.2	5.0
	D17	1.7	1.2	5.2	9.1	17.5	22.4	28.6	29.0	22.6	11.3	5.2	3.7
	D225	3.0	2.3	6.3	10.5	20.6	24.7	28.8	29.5	21.4	13.1	9.1	3.6
	D269	1.8	0.5	4.2	8.1	18.0	24.2	28.6	29.1	22.2	13.0	6.7	3.2

Legend: Wet → Dry

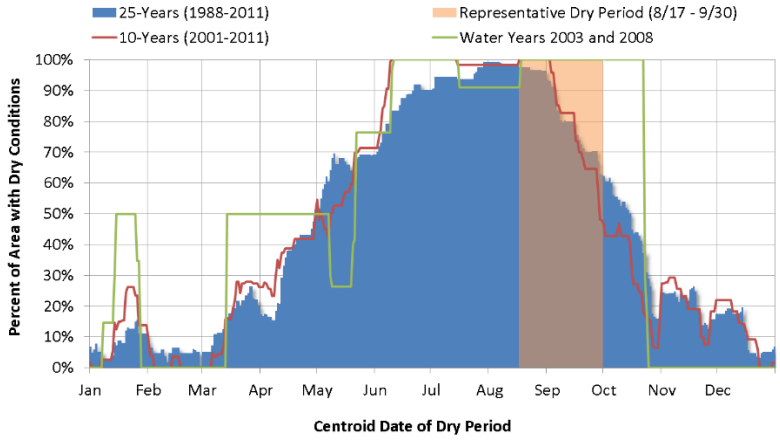

Figure 5-9. Spatiotemporal summary of non-wet weather conditions in the Lower Los Angeles River WMP area.

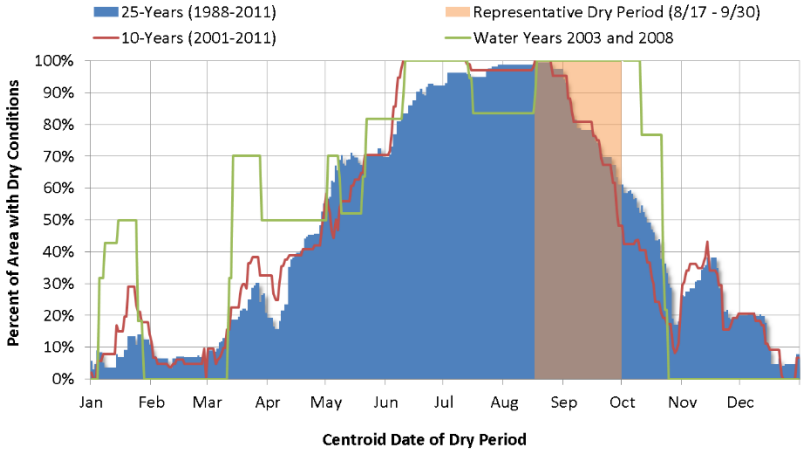

Figure 5-10. Analysis of summary of non-wet weather conditions in the Los Cerritos Channel WMP area.

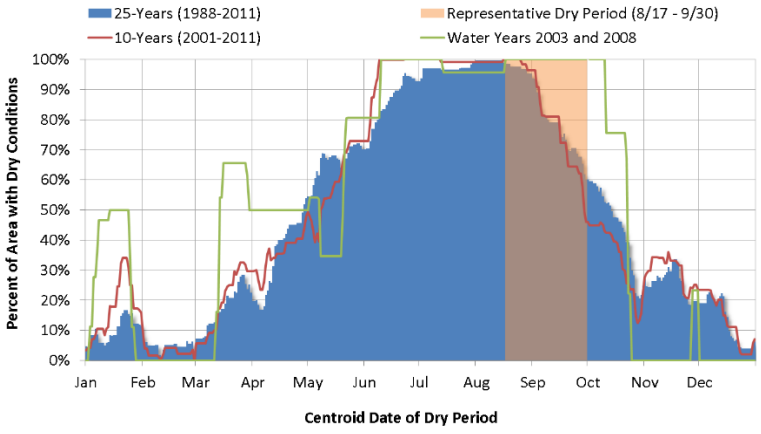

Figure 5-11. Spatiotemporal summary of non-wet weather conditions in the Lower San Gabriel River WMP area.

5.3. Calculated Required Pollutant Reductions to Achieve Final Limits

Using the average storm year (2007-08) and 90th percentile storm year (2002-03), required pollutant reductions were calculated for attainment of interim and final limitations, respectively, applicable to each WMP area. Per the RAA Guidelines, the percent reduction used to determine the control measures necessary to attain interim milestones shall be based on the average year, while the control measures for attainment of the final limits are based on the 90th percentile year.

Required load reductions were evaluated at RAA Assessment Points located at the bottom-most discharge from each WMP areas (shown in Figure 3-2 through Figure 3-4). The RAA Assessment Points represent locations where the collective discharge from each jurisdiction with each WMP area can be assessed to contribute to pollutant loads to the receiving waters. Pollutant loads outside of the WMP areas are not considered in this loading analysis at the RAA Assessment Points, although in reality other loads exist. However, transport of pollutant loads from individual jurisdictions within the WMP areas are considered, including the effect of LACFCD infrastructure and other hydraulic features that can impede flows and associated pollutant loads to the location of the RAA Assessment Points. The result is an accounting system that provides reasonable tracking and estimation of required load reductions throughout each individual WMP area so that meaningful goals can be set for BMP implementation planning.

Applicable targets for wet and dry conditions for Category 1 WQ Priorities (corresponding to the TMDLs within each watershed) are listed in Table 5-4 and Table 5-5, respectively. These targets were used to establish the daily "exceedance load" and daily "allowable load". The differences in these loads, as predicted by LSPC, were tracked across the average year and 90th percentile year and used to calculate the required pollutant reduction. While Category 1 WQ Priorities were emphasized, targets were also applied for Category 2 and Category 3 WQ Priorities. In particular, to provide a comprehensive WMP planning approach, copper, lead, zinc and *E. coli* were assessed for all RAA assessment points (even if a TMDL is not applicable).

For bacteria targets, it should be noted that Allowable Exceedance Days and high flow suspension (HFS) days were incorporated (if applicable) into the percent reduction calculation. The approach of the LA River Bacteria TMDL was used to align Exceedance Days and HFS days. The HFS applies to LLAR and LSGR but not LCC (and thus HFS days were not incorporated into the required reduction calculation for LCC). For LSGR and LCC, a bacteria TMDL has not been adopted but the RAA Guidelines state that targets and critical conditions from other TMDLs in the region should be utilized. If the Allowable Exceedance Days were removed from the percent reduction calculations for LSGR and LCC, the required reductions would increase.

Table 5-4. Applicable wet weather TMDL targets for Category 1 WQ Priorities

WMP Area	Waterbody	Pollutant	Target	Source
LLAR	LAR Reach 1 (freshwater)	Cd kg/d	$2.8x10^{-9}$ X daily storm volume (L) - 1.8	WQBEL
	LAR Reach 1 (freshwater)	Cu kg/d	$1.5x10^{-8}$ X daily storm volume (L) - 9.5	WQBEL
	LAR Reach 1 (freshwater)	Pb kg/d	$5.6x10^{-8}$ X daily storm volume (L) - 3.85	WQBEL
	LAR Reach 1 (freshwater)	Zn kg/d	$1.4x10^{-7}$ X daily storm volume (L) - 83	WQBEL
	All LLAR	DDT ug/kg TSS	1.58	Harbor Toxics TMDL
	All LLAR	PCBs ug/kg TSS	22.7	Harbor Toxics TMDL
	All LLAR	PAHs ug/kg TSS	4,022	Harbor Toxics TMDL
	LAR Reach 1 (freshwater)	*E-coli* MPN/100mL	235 (exceedances allowed during HFS days and 10 exceedance days)	WQBEL

WMP Area	Waterbody	Pollutant	Target	Source
LCC	All LCC	Cu g/d	$4.709X10^{-6}$ X daily storm volume (L)	WQBEL
	All LCC	Pb g/d	$26.852X10^{-6}$ X daily storm volume (L)	WQBEL
	All LCC	Zn g/d	$46.027X10^{-6}$ X daily storm volume (L)	WQBEL
	All LCC	DDT ug/kg TSS	1.58	Harbor Toxics TMDL
	All LCC	PCBs ug/kg TSS	22.7	Harbor Toxics TMDL
	All LCC	PAHs ug/kg TSS	4,022	Harbor Toxics TMDL
LSGR	SG Reach 2	Pb ug/L	81.34	WQBEL
	Coyote Cr.	Cu ug/L	24.71	WQBEL
	Coyote Cr.	Pb ug/L	96.99	WQBEL
	Coyote Cr.	Zn ug/L	144.57	WQBEL
	SG Reach 1 & Coyote Cr.	DDT ug/kg TSS	1.58	Harbor Toxics TMDL
	SG Reach 1 & Coyote Cr.	PCBs ug/kg TSS	22.7	Harbor Toxics TMDL
	SG Reach 1 & Coyote Cr.	PAHs ug/kg TSS	4,022	Harbor Toxics TMDL

Table 5-5. Applicable dry weather TMDL targets for Category 1 WQ Priorities

WMP Area	Waterbody	Pollutant	Target	Source
LLAR	LAR Reach 1 (freshwater)	Cu ug/L	23	WQBEL
	LAR Reach 1 (freshwater)	Pb ug/L	12	WQBEL
	LAR Reach 1 (freshwater)	*E-coli* MPN/100mL	126	WQBEL
LCC	All LCC	Cu g/d	67.2	WQBEL
	All LCC	*E-coli* MPN/100mL	126	WQBEL
LSGR	SG Reach 1	Cu ug/L	18	WQBEL
	SG Reach 1	*E-coli* MPN/100mL	126	WQBEL
	San Jose Cr. Reach 1&2	Se ug/L	5	WQBEL
	San Jose Cr. Reach 1&2	*E-coli* MPN/100mL	126	WQBEL
	Coyote Cr.	Cu kg/d	0.941	WQBEL
	Coyote Cr.	*E-coli* MPN/100mL	126	WQBEL

5.3.1. Wet-Weather Required Pollutant Reductions

The wet weather pollutant baseline loading and reduction targets for average and critical conditions are summarized in Table 5-6 and Table 5-7 respetively (all WMP areas) and shown graphically in Figure 5-12 through Figure 5-15 (individual WMP areas). These analyses were used to determine the limiting pollutant. The limiting pollutant is defined as the pollutant requiring the greatest load reduction, and BMPs implemented to achieve the limiting pollutant reductions are protective of other pollutant reductions (e.g., sediment or volume reductions). In Table 5-6. Wet-weather pollutant baseline loading by WMP area with analysis of limiting pollutants

WMP	Year[1]	Organics (kg)			Metals (kg)			Bacteria (Billion #)[1]
		DDT	PCB	PAH	TCu [2]	TPb	TZn [3]	E-Coli
Lower Los Angeles River (LLAR)	2003	0.12	0.77	19.80	2,437	2,464	11,153	2.78E+07
	2008	0.09	0.61	15.59	1,935	1,968	8,878	5.46E+07
Los Cerritos Channel (LCC)	2003	0.07	0.45	11.60	1,611	1,719	7,481	2.55E+08
	2008	0.05	0.35	9.13	505	386	2,607	2.40E+08
Lower San Gabriel River (LSGR)	2003	0.06	0.42	10.80	768	544	3,805	2.06E+06
	2008	0.05	0.33	8.50	393	337	2,512	1.98E+06
Coyote Creek (CC)	2003	0.11	0.71	18.20	1,640	1,197	8,373	6.57E+05
	2008	0.09	0.56	14.33	839	736	5,450	6.72E+06

Color ramps highlight potentially limiting (Red) vs. pollutants determined to be non-limiting for this analysis (Blue)

1. LLAR, LSGR, CC bacteria loads are for bacteria wet-days and exclude high flow suspension (HFS) days.
   LCC bacteria loads are for bacteria wet-days
2. Red box: Organics managed through sediment and associated metals reduction. Organic load reductions above influenced by assigned concentrations at half the MDLs (monitoring data below MDLs), and therefore are suspect and not considered limiting. Cu is not limiting after brake-pad reductions
3. Blue Box: Zinc is limiting pollutant for the 90th percentile year
4. Metals loads are for wet-weather days (90th percentile flow and greater)
5. Organics are summarized on an annual basis

Table 5-7, the red color gradient highlights limiting pollutants, with a deeper red generally indicating a more limiting pollutant. Zinc was identified as the limiting pollutant for each WMP area[4]. The determination of limiting pollutant considered implementation actions to control the pollutant – for example, Senate Bill 346 will result in significant reductions of copper loading from brake pads. Because total source control measures are not on the horizon for zinc, it becomes the limiting pollutant instead of copper. The evaluation of copper and organics as limiting pollutants and rationale for their exclusion is described below.

Although DDT and PCBs were estimated to have high load reduction requirements to meet WQBELs, they were not identified as limiting pollutants because the maximum detection limits (MDLs) used for the analysis heavily affected the calculated required reductions. Rather than use LSPC for reduction calculations, monitoring data were used directly and many reported concentrations for DDT, PCBs, and PAHs were below MDLs, so concentrations were assumed in the model to equal half the MDL. The MDL is above the target leading to non-detects requiring reductions. Of course, toxics will be addressed by control measures implemented for zinc. The Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters Toxic Pollutants TMDL states that

[4] In LSGR, a higher percent reduction for bacteria was calculated for the average year than the 90th percentile (see Figure 5-14). Although total annual rainfall in 2008 and 2003 were virtually identical over the entire SGR watershed (20.5 and 20.4 inches/year, respectively), 2003 had fewer wet days than 2008, resulting in relatively more intense events on average (about 18 percent higher). As a result, 2003 had more HFS days than 2008—exceedances during HFS days are not considered when computing the required load reduction, lowering the required reduction.

"implementation of other TMDLs in the watershed may contribute to the implementation of this TMDL," and implementation of the effective TMDLs in Los Angeles River and San Gabriel River are integrated within Phase I of the implementation of the toxics TMDL (LARWQCB and USEPA 2011). As a result, DDT, PCBs, and PAHs were not represented in Figure 5-12 through Figure 5-15.

Although copper was calculated to have a higher required reduction than zinc, the effect of Senate Bill 346 is expected to reduce those reductions without any implementation of structural control measures. The Brake Pad Partnership was formed in 1999 as a collaboration of cities, industry, and other entities to address the lack of information and research regarding the impact of brake debris material in the environment. After its formation, the Brake Pad Partnership commissioned several technical studies to better quantify the fate and transport of copper to San Francisco Bay including a detailed source assessment. Overall findings of the study estimated that of the anthropogenic sources of copper, approximately 35 percent are attributed to brake pad releases (BPP 2010). Even if the reduction was only half of this amount, the adjustment to the required copper reduction would still result in zinc being the limiting pollutant in LLAR, LCC, and LSGR.

After excluding organics and total copper for the reasons described previously, total zinc becomes the limiting pollutant in each of the WMP areas during the 90th percentile year. In other words, reductions of zinc during WMP implementation will drive reduction of other pollutants, particularly because the pollutant reduction plan emphasizes sediment control (other pollutants are typically transported with sediment) and retention/infiltration rather than pollutant treatment.

Plots showing the differences between the baseline loads, allowable loads, and exceedance loads are shown in Attachment F.

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Table 5-6. Wet-weather pollutant baseline loading by WMP area with analysis of limiting pollutants

WMP	Year[1]	Organics (kg)			Metals (kg)			Bacteria (Billion #)[1]
		DDT	PCB	PAH	TCu [2]	TPb	TZn [3]	E-Coli
Lower Los Angeles River (LLAR)	2003	0.12	0.77	19.80	2,437	2,464	11,153	2.78E+07
	2008	0.09	0.61	15.59	1,935	1,968	8,878	5.46E+07
Los Cerritos Channel (LCC)	2003	0.07	0.45	11.60	1,611	1,719	7,481	2.55E+08
	2008	0.05	0.35	9.13	505	386	2,607	2.40E+08
Lower San Gabriel River (LSGR)	2003	0.06	0.42	10.80	768	544	3,805	2.06E+06
	2008	0.05	0.33	8.50	393	337	2,512	1.98E+06
Coyote Creek (CC)	2003	0.11	0.71	18.20	1,640	1,197	8,373	6.57E+05
	2008	0.09	0.56	14.33	839	736	5,450	6.72E+06

Color ramps highlight potentially limiting (Red) vs. pollutants determined to be non-limiting for this analysis (Blue)

6. LLAR, LSGR, CC bacteria loads are for bacteria wet-days and exclude high flow suspension (HFS) days. LCC bacteria loads are for bacteria wet-days
7. Red box: Organics managed through sediment and associated metals reduction. Organic load reductions above influenced by assigned concentrations at half the MDLs (monitoring data below MDLs), and therefore are suspect and not considered limiting. Cu is not limiting after brake-pad reductions
8. Blue Box: Zinc is limiting pollutant for the 90th percentile year
9. Metals loads are for wet-weather days (90th percentile flow and greater)
10. Organics are summarized on an annual basis

Table 5-7. Wet-weather pollutant reduction targets by WMP area with analysis of limiting pollutants[5]

WMP	Year	Organics			Metals			Bacteria
		DDT	PCB	PAH	TCu [2]	TPb	TZn [3]	E-Coli
Lower Los Angeles River (LLAR)	2003	87.3%	72.0%	0.0%	84.1%	38.6%	67.4%	23.4%
	2008	90.0%	77.9%	0.0%	82.8%	32.9%	64.9%	45.1%
Los Cerritos Channel (LCC)	2003	86.6%	70.3%	0.0%	95.6%	76.7%	90.8%	40.4%
	2008	89.6%	77.1%	0.0%	87.1%	3.6%	75.6%	47.9%
Lower San Gabriel River (LSGR)	2003	79.5%	54.6%	0.0%	40.1%	0.0%	29.3%	22.9%
	2008	91.4%	80.7%	0.0%	18.0%	0.0%	25.0%[4]	53.0%
Coyote Creek (CC)	2003	75.9%	46.8%	0.0%	37.5%	0.0%	28.3%	19.1%
	2008	91.3%	76.8%	0.0%	22.7%	0.0%	30.4%[4]	59.2%

Color ramps highlight potentially limiting (Red) vs. pollutants determined to be non-limiting for this analysis (Blue)

1. Average year is 2008 and 90th percentile year is 2003
2. Red box: Organics managed through sediment and associated metals reduction. Organic load reductions above influenced by assigned concentrations at half the MDLs (monitoring data below MDLs), and therefore are suspect and not considered limiting. Cu is not limiting after brake-pad reductions
3. Blue Box: Zinc is limiting pollutant for the 90th percentile year
4. Bacteria reduction target is lower in 2003 than 2008 because more days were classified as HFS

[5] For the Diamond Bar jurisdiction of the San Gabriel River WMP area, a portion flows to the Santa Ana River. Since this area is open space and therefore not associated with MS4 runoff, no reductions were determined necessary. Loadings for the 90th percentile year from this area are 1.16 kg/year of total Cu, 0.87 kg/year of total Pb, 5.21 kg/year of total Zn, and 4.91x10^{12} #/year of E-coli.

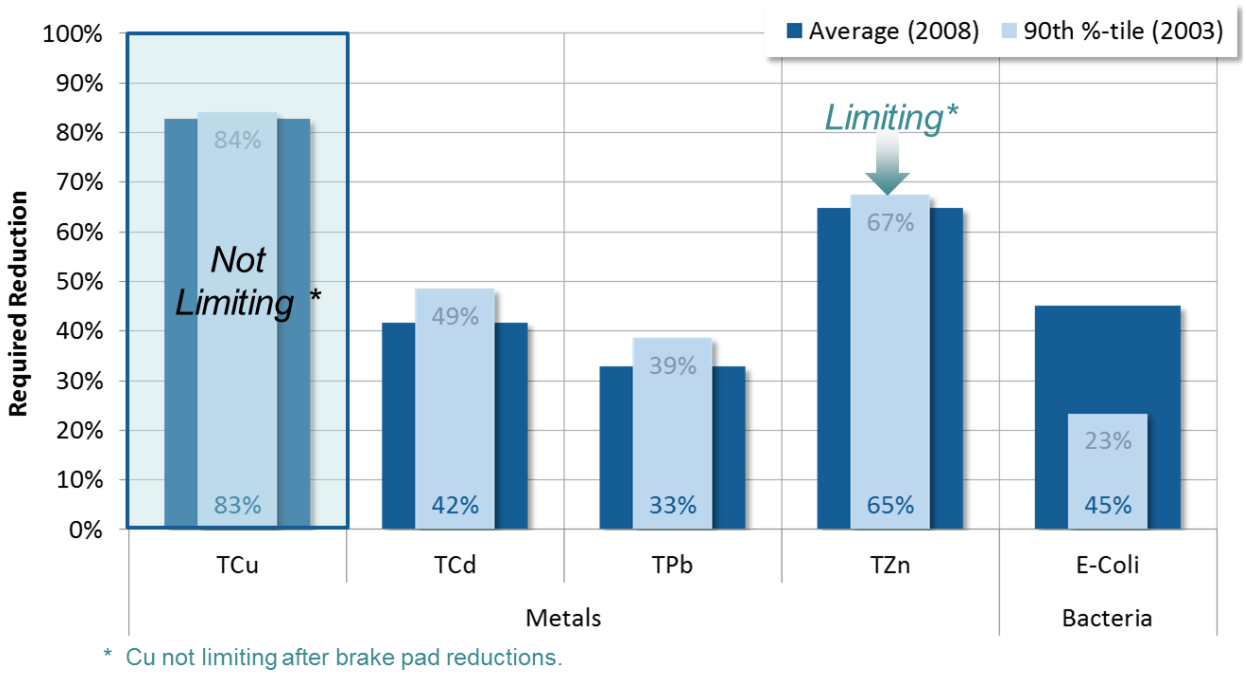

Figure 5-12. Wet-weather pollutant reduction targets and limiting pollutant for Lower Los Angeles River WMP.[6]

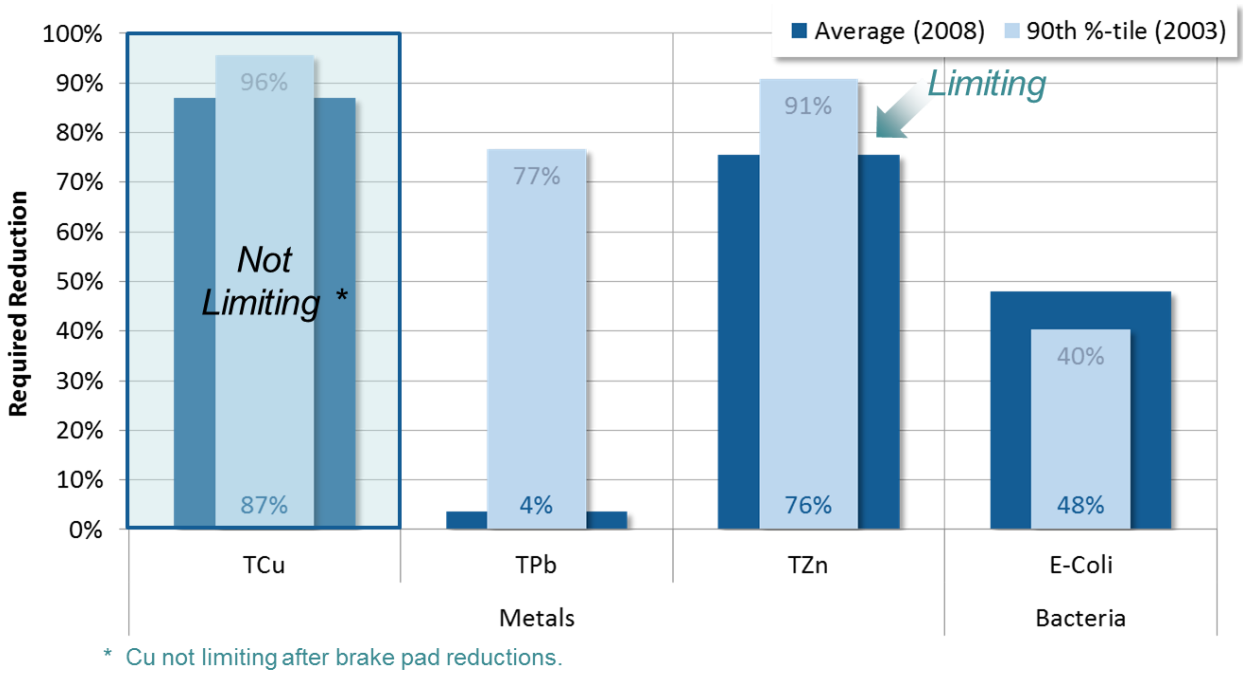

Figure 5-13. Wet-weather pollutant reduction targets and limiting pollutant for Los Cerritos Chanel WMP.

[6] Note that the Los Cerritos Channel TMDLs for Metals requires no reduction of Pb.

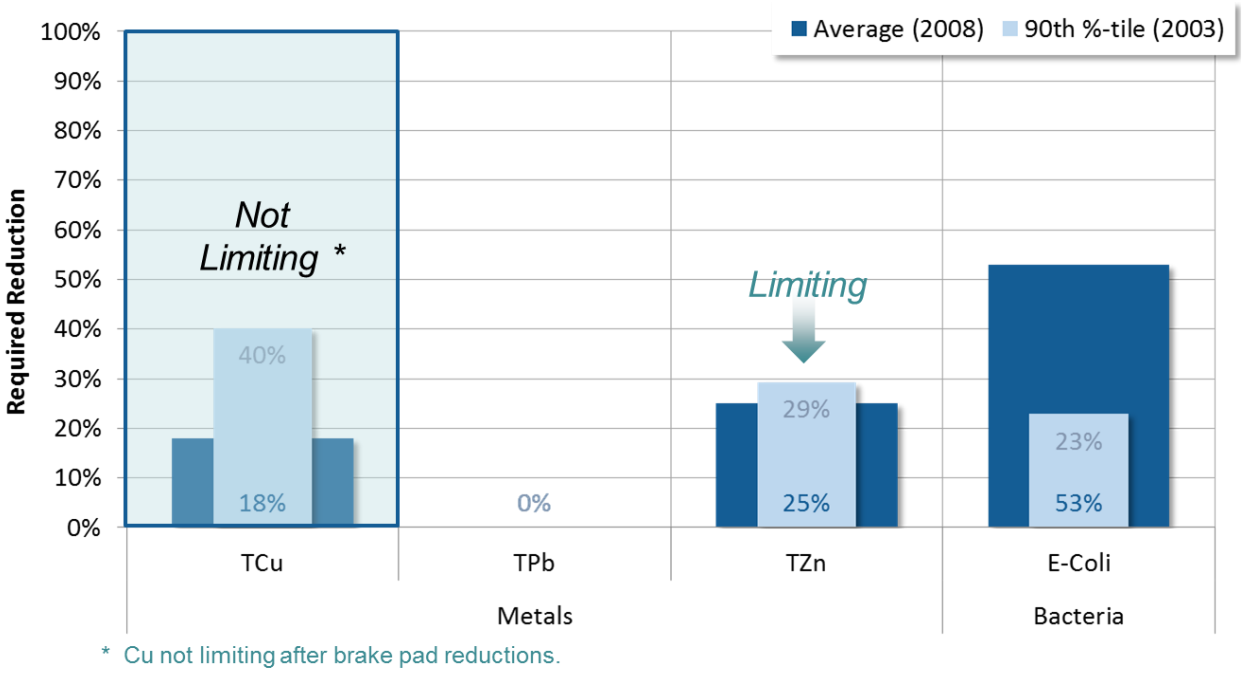

Figure 5-14. Wet-weather pollutant reduction targets and limiting pollutant for Lower San Gabriel River.

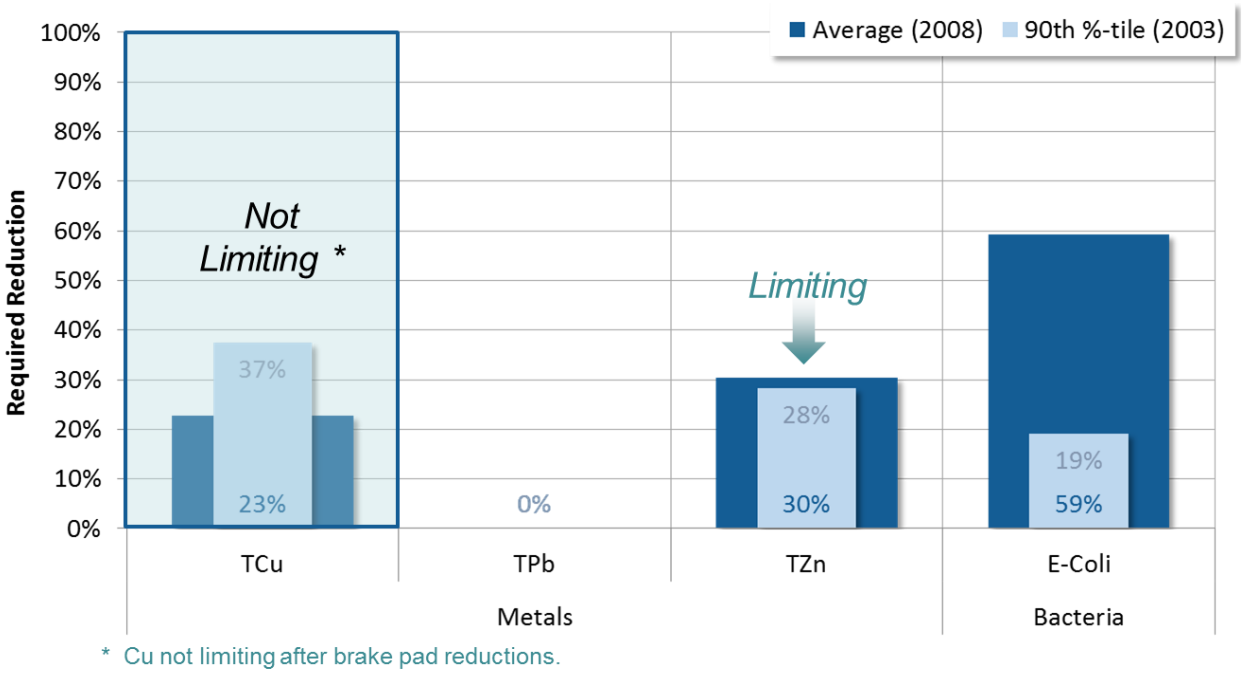

Figure 5-15. Wet-weather pollutant reduction targets and limiting pollutant for Coyote Creek.

5.3.2. Dry-Weather Pollutant Reduction Targets

Using the representative dry-weather period of August 17 through September 30, as defined in Section 5.2.3, modeled instream flow was multiplied by the observed dry weather concentrations to get existing conditions loads, which are shown in Table 5-8. Likewise, target concentrations were also multiplied by modeled instream flow to get allowable load for each waterbody, which is shown in Table 5-9. Finally, Table 5-10 summarizes dry-weather reduction targets for each listed segment for both the average year and the 90th percentile year.

For dry weather, bacteria is the limiting pollutant (not zinc) because the required reductions are much higher than other pollutants. Reductions of bacteria during WMP implementation will drive reductions of other pollutants.

Table 5-8. Modeled existing condition dry-weather loads by water body

Existing Condition		Dry Weather Flow (cfs)		Existing Load (kg/day or MPN/day)		
Waterbody	**Pollutant**	**2003**	**2008**	**2003**	**2008**	**Mean**
LAR Reach 1 (freshwater)	Cu ug/L	99.97	65.63	6.28	4.12	5.20
LAR Reach 1 (freshwater)	Pb ug/L	99.97	65.63	0.84	0.55	0.69
LAR Reach 1 (freshwater)	*E. coli* MPN/100ml	99.97	65.63	4.79E+13	3.15E+13	3.97E+13
LCC	Cu ug/L	4.65	2.20	0.29	0.14	0.21
LCC	*E. coli* MPN/100ml	4.65	2.20	1.62E+12	7.64E+11	1.19E+12
SG Reach 1	Cu ug/L	69.04	75.36	5.05	5.51	5.28
SG Reach 1	*E. coli* MPN/100ml	69.04	75.36	3.70E+12	4.04E+12	3.87E+12
San Jose Cr. Reach 1 & 2	Se ug/L	12.54	19.62	0.06	0.09	0.07
San Jose Cr. Reach 1 & 2	*E. coli* MPN/100ml	12.54	19.62	6.72E+11	1.05E+12	8.62E+11
Coyote Cr.	Cu ug/L	19.65	15.69	1.37	1.10	1.23
Coyote Cr.	*E. coli* MPN/100ml	19.65	15.69	5.53E+12	4.41E+12	4.97E+12

Table 5-9. Allowable TMDL dry-weather loads by water body

Existing Condition		Dry Weather Flow (cfs)		Allowable Load (kg/day or MPN/day)		
Waterbody	**Pollutant**	**2003**	**2008**	**2003**	**2008**	**Mean**
LAR Reach 1 (freshwater)	Cu ug/L	99.97	65.63	5.63	3.69	4.66
LAR Reach 1 (freshwater)	Pb ug/L	99.97	65.63	2.94*	1.93*	2.43*
LAR Reach 1 (freshwater)	*E. coli* MPN/100ml	99.97	65.63	3.08E+11	2.02E+11	2.55E+11
LCC	Cu ug/L	4.65	2.20	0.07	0.07	0.07
LCC	*E. coli* MPN/100ml	4.65	2.20	1.43E+10	6.78E+09	1.06E+10
SG Reach 1	Cu ug/L	69.04	75.36	3.04	3.32	3.18
SG Reach 1	*E. coli* MPN/100ml	69.04	75.36	2.13E+11	2.32E+11	2.23E+11
San Jose Cr. Reach 1 & 2	Se ug/L	12.54	19.62	0.15*	0.24*	0.20*
San Jose Cr. Reach 1 & 2	*E. coli* MPN/100ml	12.54	19.62	3.87E+10	6.05E+10	4.96E+10
Coyote Cr.	Cu ug/L	19.65	15.69	0.94	0.94	0.94
Coyote Cr.	*E. coli* MPN/100ml	19.65	15.69	6.06E+10	4.48E+10	5.45E+10

*Existing dry-weather loads are currently below the allowable loads thus showing compliance for this pollutant.

Table 5-10. Required dry-weather percent reductions by water body

WMP	Waterbody	Pollutant	Required Dry-Weather Percent Reductions		
			2003	**2008**	**Mean**
LLAR	LAR Reach 1 (freshwater)	Cu	10%	10%	10%
	LAR Reach 1 (freshwater)	Pb	0%	0%	0%
	LAR Reach 1 (freshwater)	*E. coli*	99.36%	99.36%	99.36%
LCC	LCC	Cu	76.74%	50.85%	68.43%
	LCC	*E. coli*	99.11%	99.11%	99.11%
LSGR	Coyote Cr.	Cu	31.42%	14.11%	23.73%
	Coyote Cr.	*E. coli*	98.90%	98.90%	98.90%
	SG Reach 1	Cu	39.78%	39.78%	39.78%
	SG Reach 1	*E. coli*	94.25%	94.25%	94.25%
	San Jose Cr. Reach 1 & 2	Se	0%	0%	0%
	San Jose Cr. Reach 1 & 2	*E. coli*	94.25%	94.25%	94.25%

Color Ramp shows relative magnitude of reductions—darker means higher reductions

6. Determination of Potential BMP Capacity for RAA

The process for determining the necessary cumulative BMP capacity depends on the type of numeric goal being addressed. As shown in Figure 6-1, the volume-based (design storm) approach, necessary BMP capacity was determined through a design storm analysis. For the load-based (pollutant reduction), the analysis leveraged the optimization routines in the customized WMMS. An initial step in the RAA was a comparison of the volume reductions required by the load-based and volume-based numeric goals, to support selection of the wet weather critical conditions.

For LLAR, LCC, and LSGR, the 90th percentile WY (2002-03) weather was selected as the critical condition for wet weather.

Details on the analyses performed to determine potential BMP treatment capacity are provided in Attachment A. The attachment describes the approach for incorporating nonstructural BMPs, accounting for the effect of LACFCD infrastructure, and separating the contribution from non-MS4 sources.

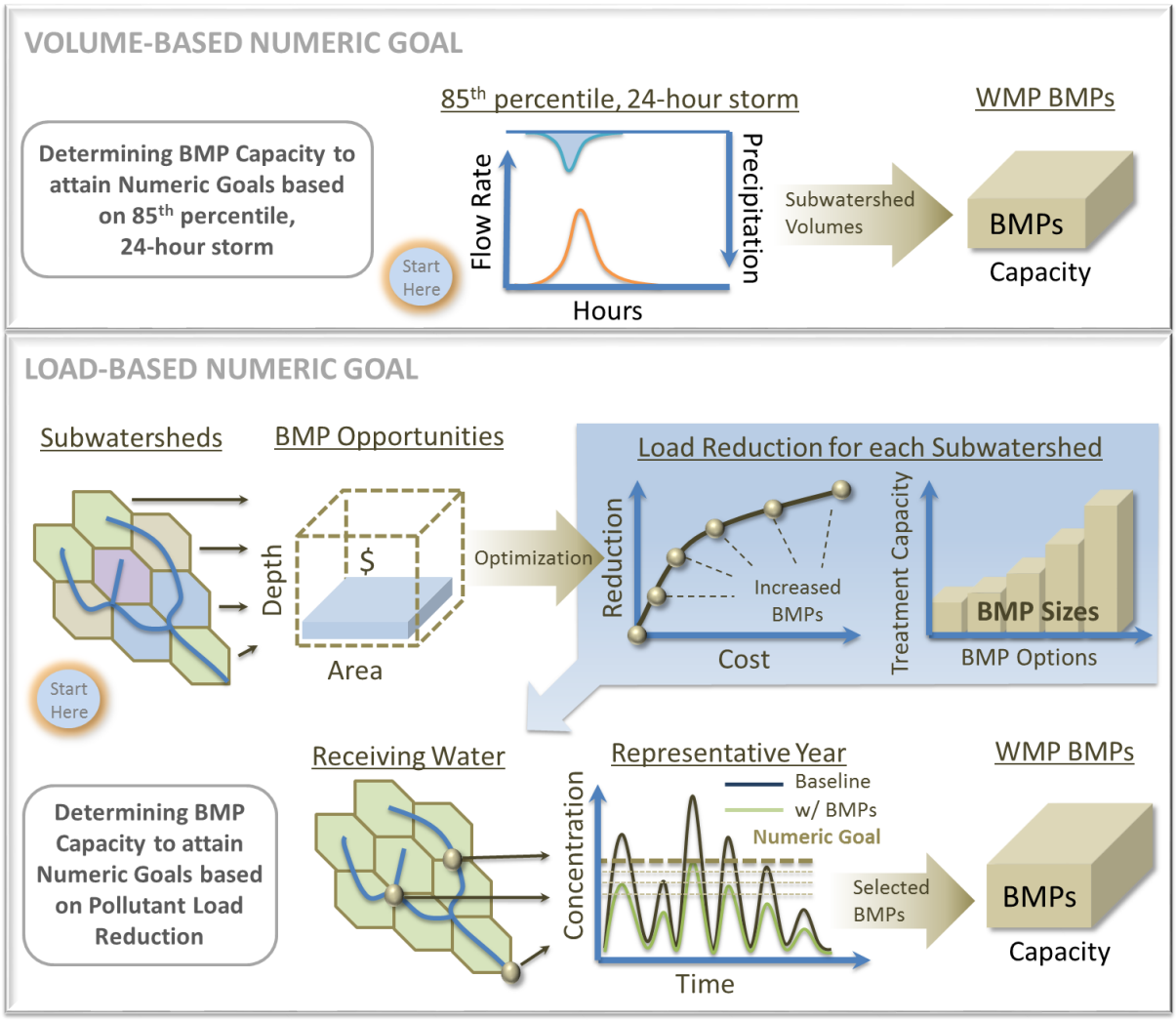

Figure 6-1. Illustration of Process for Determining Required BMP Capacities for the WMP using Volume-Based (top panel) and Load-Based (bottom panel) Numeric Goals.

7. Cumulative Volume Reduction Goals to Achieve Required Pollutant Reductions

The first output of the RAA is a series of "volume reduction goals" for each subwatershed and jurisdiction in the WMP area. WMMS was used to determine the stormwater retention volumes for each subwatershed that would achieve the required load reductions, as reported in this section. These calculated runoff reduction volumes for each subwatershed are a surrogate compliance metric for the responsible agencies. It should be noted that upon implementation, opportunities may arise where flow-through BMPs may provide similar ultimate pollutant load reduction, and may replace the need to implement volume-based reduction BMPs.

These volumes also form the basis for selection of BMPs to achieve those volume reductions, as described in Section 9 and Attachment A.

7.1. Volume Reductions for Structural BMPs

Structural BMPs were modeled using the assumptions outlined in Attachment A. BMP capacities were optimized across the entire study area to achieve the final milestone pollutant reduction requirements at each of the assessment points. Instead of summarizing optimization results in terms of BMP capacity, which is really specific to the network described in Attachment A, the results were summarized as required *annual* wet-weather retention volume (in acre-feet). This provides a volumetric basis that is (1) closely related to load reduction and (2) readily transferable as a control target for parallel BMP modeling at a finer resolution. Because the volumes were isolated to wet days, it is also not skewed by dry-weather runoff retention. The following subsections provide more details about the wet- and dry-weather analysis components.

7.1.1. Wet Weather

Using the structural BMP routing network in WMMS (described in Attachment A), the required *annual* wet-weather retention volume (in acre-feet) were calculated using the critical year time series. For milestones, the percent reduction was based on average year targets while final limits were based on critical year targets. The reported annual volumes are (1) based on required load reductions and (2) ready for BMP modeling at a finer resolution. A 10 percent load reduction was assumed to result from implementation of all nonstructural control measures outlined in the WMPs, setting the foundation of WMP implementation, and structural control measures provide additional load reduction.

Table 7-1 through Table 7-4 present incremental and cumulative retention volumes required to achieve each load reduction milestone by jurisdiction. The milestones are based on the metals TMDLs as described in Section 2. In order to calculate the incremental volume reductions for each milestone, optimization was performed for each jurisdiction to (1) emphasize BMP implementation in subwatersheds that volume reduction could most cost effectively reduce pollutants and (2) establish a cost-effective sequence of subwatersheds for each jurisdiction to achieve the milestones over time. In other words, WMMS was used to develop an implementation schedule that provides early gains in receiving water quality.

Table 7-1. Annual volume reduction goals to achieve interim and final milestones for Lower Los Angeles River WMP by jurisdiction

Jurisdiction	Total Critical Year Storm Volume Target (acre-ft/year)		
	Milestone	Incremental	Cumulative[1]
Downey	31%	143.8	143.8
	50%	221.7	365.5
	Final	360.5	726.0
Lakewood	31%	14.3	14.3
	50%	0.0	14.3
	Final	0.0	14.3
Long Beach	31%	540.7	540.7
	50%	1090.8	1,631.5
	Final	2270.1	3,901.7
Lynwood	31%	303.3	303.3
	50%	185.2	488.6
	Final	619.6	1,108.1
Paramount	31%	181.8	181.8
	50%	227.8	409.6
	Final	579.2	988.8
Pico Rivera	31%	365.3	365.3
	50%	0.0	365.3
	Final	12.0	377.3
Signal Hill	31%	32.8	32.8
	50%	106.6	139.4
	Final	58.4	197.9
South Gate	31%	229.3	229.3
	50%	343.2	572.6
	Final	940.0	1,512.6

1: Color Ramp highlights relative amount of required retention volume for milestones: darker is more, lighter is less
2: Includes full implementation of planned non-structural practices

Table 7-2. Annual volume reduction goals to achieve interim and final milestones for Los Cerritos Channel WMP by jurisdiction

Jurisdiction	Total Critical Year Storm Volume Target (acre-ft/year)		
	Milestone	Incremental	Cumulative[1]
Bellflower	10%	NS	NS
	35%	336.1	336.1
	Final	801.3	1,137.4
Cerritos	10%	NS	NS
	35%	9.7	9.7
	Final	3.2	12.9
Downey	10%	NS	NS
	35%	77.0	77.0
	Final	35.8	112.8
Lakewood	10%	NS	NS
	35%	282.4	282.4
	Final	874.8	1,157.2
Long Beach	10%	NS	NS
	35%	560.9	560.9
	Final	2115.2	2,676.1
Paramount	10%	NS	NS
	35%	278.8	278.8
	Final	353.1	631.9
Signal Hill	10%	NS	NS
	35%	269.9	269.9
	Final	52.7	322.6

1: Color Ramp highlights relative amount of required retention volume for milestones: darker is more, lighter is less
NS: Non-structural practices achieve 10% milestone

Table 7-3. Annual volume reduction goals to achieve interim and final milestones for Lower San Gabriel River WMP

Jurisdiction	Total Critical Year Storm Volume Target (acre-ft/year)		
	Milestone	Incremental	Cumulative[1]
Artesia	10%	NS	NS
	35%	1.1	1.1
	Final	0.0	1.1
Bellflower	10%	NS	NS
	35%	1.3	1.3
	Final	61.5	62.8
Cerritos	10%	NS	NS
	35%	6.6	6.6
	Final	52.8	59.4
Diamond Bar	10%	NS	NS
	35%	0.3	0.3
	Final	32.8	33.0
Downey	10%	NS	NS
	35%	4.3	4.3
	Final	259.6	263.9
Lakewood	10%	NS	NS
	35%	7.4	7.4
	Final	2.2	9.6
Long Beach	10%	NS	NS
	35%	26.9	26.9
	Final	2.3	29.2
Norwalk	10%	NS	NS
	35%	0.8	0.8
	Final	136.1	136.9
Pico Rivera	10%	NS	NS
	35%	0.2	0.2
	Final	74.8	75.1
Santa Fe Springs	10%	NS	NS
	35%	0.0	0.0
	Final	106.0	106.0
Whittier	10%	NS	NS
	35%	0.0	0.0
	Final	7.5	7.5

1: Color Ramp highlights relative amount of required retention volume for milestones: darker is more, lighter is less
NS: Non-structural practices achieve 10% milestone

Table 7-4. Annual volume reduction goals to achieve interim and final milestones for the Coyote Creek portion of Lower San Gabriel River WMP by jurisdiction

Jurisdiction	Total Critical Year Storm Volume Target (acre-ft/year)		
	Milestone	Incremental	Cumulative[1]
Artesia	10%	NS	NS
	35%	47.9	47.9
	Final	0.0	47.9
Cerritos	10%	NS	NS
	35%	0.1	0.1
	Final	194.2	194.3
Diamond Bar	10%	NS	NS
	35%	1.0	1.0
	Final	73.0	74.0
Hawaiian Gardens	10%	NS	NS
	35%	27.0	27.0
	Final	3.4	30.4
La Mirada	10%	NS	NS
	35%	0.8	0.8
	Final	174.9	175.7
Lakewood	10%	NS	NS
	35%	17.5	17.5
	Final	8.2	25.7
Long Beach	10%	NS	NS
	35%	37.5	37.5
	Final	0.0	37.5
Norwalk	10%	NS	NS
	35%	3.0	3.0
	Final	149.5	152.5
Santa Fe Springs	10%	NS	NS
	35%	0.4	0.4
	Final	260.3	260.7
Whittier	10%	NS	NS
	35%	2.1	2.1
	Final	252.6	254.7

1: Color Ramp highlights relative amount of required retention volume for milestones: darker is more, lighter is less
NS: Non-structural practices achieve 10% milestone

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7.1.2. Dry Weather

Dry-weather reductions from non-structural BMPs were calculated using flow from representative dry period (Section 5.2) of 8/17/2003 through 9/30/2003 and 90th percentile concentrations calculated from observed data (Section 5.2.1). Similar to wet weather, a 10% load reduction is assumed to result from the cumulative effect of nonstructural BMPs. Also, the effects of a 25% reduction in irrigation of urban grass was explicitly simulated in the model to estimate the resulting associated reduction of dry weather flows at the RAA Assessment Points. Irrigation was modeled as artificial rainfall within the LSPC model as a function of the potential evapotranspiration of urban grass. Once irrigation was reduced 25%, this directly impacted a large portion of the nonstormwater discharges drivin primarily from over irrigation and impacts on dry weather flows were significant. The projected effect of non-structural and irrigation controls on dry weather flow and loads is presented in Table 7-5. Since *E. Coli* is the limiting dry weather pollutant with required reductions in excess of 90%, the remaining volume reduction not controlled by non-structural measures will be treated by the structural BMPs described in the previous section.

Table 7-5. Projected dry weather reductions from non-structural control measures

Watershed	Constituent	Quantity (Volume or Mass)			Percent Reduction Achieved	
		Baseline	NM	NS	NM	NS
Lower Los Angeles River	Flow (M Gal.)	198.3	178.5	86.6	10.0%	56.4%
	Copper (kg)	19.28	17.35	8.42	10.0%	56.4%
	Lead (kg)	2.58	2.32	1.12	10.0%	56.4%
	E. Coli (Billion MPN)	147,166	132,449	64,230	10.0%	56.4%
Los Cerritos Channel	Flow (M Gal.)	133.6	120.2	56.3	10.0%	57.8%
	Copper (kg)	12.84	11.56	5.42	10.0%	57.8%
	E. Coli (Billion MPN)	71,808	64,627	30,277	10.0%	57.8%
Lower San Gabriel River	Flow (M Gal.)	163.3	147.0	71.2	10.0%	56.4%
	Copper (kg)	18.48	16.63	8.06	10.0%	56.4%
	Selenium (kg)	2.95	2.65	1.29	10.0%	56.4%
	E. Coli (Billion MPN)	13,540	12,186	5,903	10.0%	56.4%
Coyote Creek	Flow (M Gal.)	213.4	192.0	88.4	10.0%	58.6%
	Copper (kg)	23.05	20.75	9.55	10.0%	58.6%
	E. Coli (Billion MPN)	92,887	83,599	38,491	10.0%	58.6%

NM: Non-modeled non-structural practices achieve 10% reduction

NS: Non-structural 25% irrigation reduction practices achieve an additional approximately 60% reduction

8. MS4 Volume Reduction Goals to Achieve Required Pollutant Reductions

Each jurisdiction in the Group's WMP area is subject to stormwater runoff from non-MS4 facilities. In particular, Caltrans roads and facilities regulated by nontraditional or general industrial permits contribute to the runoff volume for each subwatershed. It will be important for these entities to retain their runoff and/or eliminate their cause/contribution to receiving water exceedances. The runoff from these non-MS4 facilities was therefore estimated and subtracted from the cumulative volume reduction goal (Section 7) to establish the MS4 responsible targets as described in Attachment A.

8.1. Summary of MS4 Responsible Reduction Goals

Runoff volumes estimated for non-MS4 permitted areas and Caltrans were subtracted from the reduction target to generate the required MS4 treatment capacity shown in Table 8-1 through Table 8-4.

Table 8-1. Lower Los Angeles River Critical Year Runoff Volume from MS4 and Non-MS4 Facilities

Jurisdiction	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
Downey	726.0	654.7	71.2
Lakewood	14.3	14.3	-
Long Beach	3,901.7	3,039.6	862.1
Lynwood	1,108.1	667.9	440.2
Paramount	988.8	606.1	382.7
Pico Rivera	377.3	287.2	90.0
Signal Hill	197.9	188.9	9.0
South Gate	1,512.6	1,174.3	338.2
TOTAL	8,826.5	6,633.1	2,193.5

Table 8-2. Los Cerritos Channel Critical Year Runoff Volume from MS4 and Non-MS4 Facilities

Jurisdiction	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
Bellflower	1,137.4	990.4	147.0
Cerritos	12.9	12.9	0.0
Downey	112.8	93.0	19.8
Lakewood	1,157.2	1,152.1	5.1
Long Beach	2,676.1	1,629.8	1,046.2
Paramount	631.9	525.5	106.4
Signal Hill	322.6	284.3	38.3
TOTAL	6,050.9	4,688.0	1,364.8

Table 8-3. San Gabriel River Critical Year Runoff Volume from MS4 and Non-MS4 Facilities

Jurisdiction	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
Artesia	1.1	1.1	0.0
Bellflower	62.8	57.4	5.4
Cerritos	59.4	4.1	55.3
Diamond Bar	33.0	1.1	32.0
Downey	263.9	87.3	176.7
Lakewood	9.6	2.2	7.4
Long Beach	29.2	29.2	0.0
Norwalk	136.9	4.8	132.1
Pico Rivera	75.1	60.4	14.7
Santa Fe Springs	106.0	30.3	75.8
Whittier	7.5	7.1	0.4
TOTAL	784.6	284.9	499.7

Table 8-4. Coyote Creek Critical Year Runoff Volume from MS4 and Non-MS4 Facilities

Jurisdiction	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
Artesia	47.9	15.9	32.0
Cerritos	194.3	56.7	137.6
Diamond Bar	74.0	36.7	37.4
Hawaiian Gardens	30.4	27.1	3.4
La Mirada	175.7	124.9	50.8
Lakewood	25.7	19.7	6.0
Long Beach	37.5	0.0	37.5
Norwalk	152.5	52.5	99.9
Santa Fe Springs	260.7	12.6	248.1
Whittier	254.7	200.1	54.6
TOTAL	1,253.4	546.1	707.3

9. Pollutant Reduction Plan

The BMPs used to achieve the MS4 volume reduction goals in Section 8 are not, per se, a component of the Permit compliance determination. Instead, over time each agency will report and demonstrate that the *cumulative* effect of projects implemented over time add up to the required reductions for interim milestones and final targets (reported as "MS4 Compliance Target"). However, the initial scenario of BMPs for WMP implementation (referred to as a Pollutant Reduction Plan in the RAA Guidelines) and their costs may be the most beneficial outcome of the WMP. A detailed WMP implementation scenario is presented in Attachment B, broken down by jurisdiction and subwatershed. The volume reductions are separated among right-of-way (ROW) BMPs and Low Impact Development (LID) on public parcels (in combination with nonstructural BMPs).

The Pollutant Reduction Plan is considered an "initial" scenario because over time, through adaptive management, the responsible agencies will likely "shift" among different types of BMPs (e.g., increase implementation of green streets and reduce implementation of regional BMPs) or substitute alterative BMPs altogether (e.g., implement dry wells instead of green streets). These shifts will be supported by analyses to show the substituted BMPs provide an equivalent volume reduction as the replaced BMPs.

9.1. Existing/Planned Regional Control Measures

Existing regional BMPs play an integral part in measuring the current reductions and need for future control measures. The annual volume or load removed from the existing and planned regional control measures were subtracted from the MS4 responsible runoff to determine the remaining treatment volume required. Detailed information for the existing and planned regional control measures is found in Attachment A.

The existing and planned regional control measure information was provided for the Lower Los Angeles River and Lower San Gabriel River. The jurisdictions that were impacted are listed with the associated annual reduction provided by these facilities in Table 9-1 and Table 9-2.

Table 9-1. Lower Los Angeles River Critical Year Existing/Planned Regional BMP Runoff Volume Reductions

Jurisdiction	COMPLIANCE TARGET		
	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Existing/Planned Regional BMP Reductions (acre-ft/year)	Remaining MS4 Responsible Critical Year Storm Volume (acre-ft/year)
Lakewood	14.3	6.4	7.9
Long Beach	3,039.6	633.4	2,406.2
Signal Hill	188.9	22.7	166.2

Table 9-2. Lower San Gabriel River Critical Year Existing/Planned Regional BMP Runoff Volume Reductions

Jurisdiction	COMPLIANCE TARGET		
	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Existing/Planned Regional BMP Reductions (acre-ft/year)	Remaining MS4 Responsible Critical Year Storm Volume (acre-ft/year)
Downey	87.3	24.0	63.3

RB-AR8117

9.2. Future Control Measures for Attainment of Interim and Final Limits

The Pollutant Reduction Plans for wet and dry weather illustrate the sequencial BMP implementation strategy to attain all interim and final limits. Within each of the jurisdictions, the subwatershed subareas were individually prioritized and associated with milestones on the basis of cost-effectiveness for zinc removal. The optimization modeling results presented in Section 7 and Figure 9-1, Figure 9-2 and Figure 9-3 shown below identify the prioritization of subwatershed implementation based on the most effective combination of BMPs. The implementation schedule outlined in the Pollutant Reduction Plans for wet and dry weather are based upon this prioritization. The plans are presented in the following subsections.

9.2.1. Wet Weather

The interim and final targets are presented in total acre-feet per year that requires treatement through structural BMPs (less the non-MS4 and existing regional volumes as described in Sections 8 and 9.1). To properly capture the annual volume, BMPs are sized to the minimum volume needed to capture the target annual volume. Thus, the BMPs are presented as a volume (acre-feet) that has the ability to capture the required annual total to meet compliance.

An overall jurisdictional summary table is presented in Table 9-3 that outlines the required BMP volume to achieve compliance in the associated WMP group. The BMP volumes are the sum of existing distributed BMPs, potential green street BMPs, LID on public parcels, and remaining BMP volume that must be implemented as regional (or other) projects as necessary to meet the annual volume reduction target.

Table 9-4 through Table 9-7 outlines the jurisdiction-wide BMP volume targets necessary to meet the annual volume interim and final limits established in Section 8. Each distributed BMP was associated with a jurisdictional subwatershed and the associated implementation schedule, thus summing their impact across different interim goals. The remaining BMP volume after accounting for existing distributed BMPs is spread across right-of-way BMPs, LID on public parcels, and remaining BMP volume including potential regional projects. Priority was given to LID on public parcels, followed by right-of-way BMPs and finally other BMPs. The incremental column shows the total additional BMP volume required for each milestone while the cumulative measures the total BMP volume required by each milestone to hit the final compliance targets. Deatiled discussion on how the BMPs in the right-of-way and LID on public parcels were determined is found in Attachment A. Detailed tables are provided in Attachment B for each jurisdiction and associated subwatersheds. Detailed tables describing the existing distributed BMPs are found in Attachment D.

RB-AR8118

Table 9-3. Jurisdictional Final Target BMP Volumes by WMP Group

	LLAR	LCC	LSGR - SGR	LSGR - CC	
Jurisdiction	**Total BMP Volume to Achieve Compliance (acre-ft)**	**Total BMP Volume to Achieve Compliance (acre-ft)**	**Total BMP Volume to Achieve Compliance (acre-ft)**	**Total BMP Volume to Achieve Compliance (acre-ft)**	**TOTAL**
Artesia	-	-	0.1	1.1	**1.2**
Bellflower	-	118.2	5.5	-	**123.7**
Cerritos	-	1.6	0.6	6.4	**8.6**
Diamond Bar	-	-	0.2	8.9	**9.1**
Downey	83.4	10.2	17.5	-	**111.2**
Hawaiian Gardens	-	-	-	2.2	**2.2**
La Mirada	-	-	-	15.2	**15.2**
Lakewood	1.2	169.5	0.4	1.9	**173.0**
Long Beach	319.1	208.7	2.7	0.0	**530.5**
Lynwood	95.5	-	-	-	**95.5**
Norwalk	-	-	0.3	4.7	**5.0**
Paramount	76.6	55.1	-	-	**131.7**
Pico Rivera	41.2	-	10.8	-	**52.0**
Santa Fe Springs	-	-	4.9	2.1	**7.0**
Signal Hill	22.3	28.6	-	-	**50.9**
South Gate	173.0	-	-	-	**173.0**
Whittier	-	-	1.4	39.1	**40.5**
TOTAL	**812.3**	**591.9**	**44.4**	**81.6**	**1,530.2**

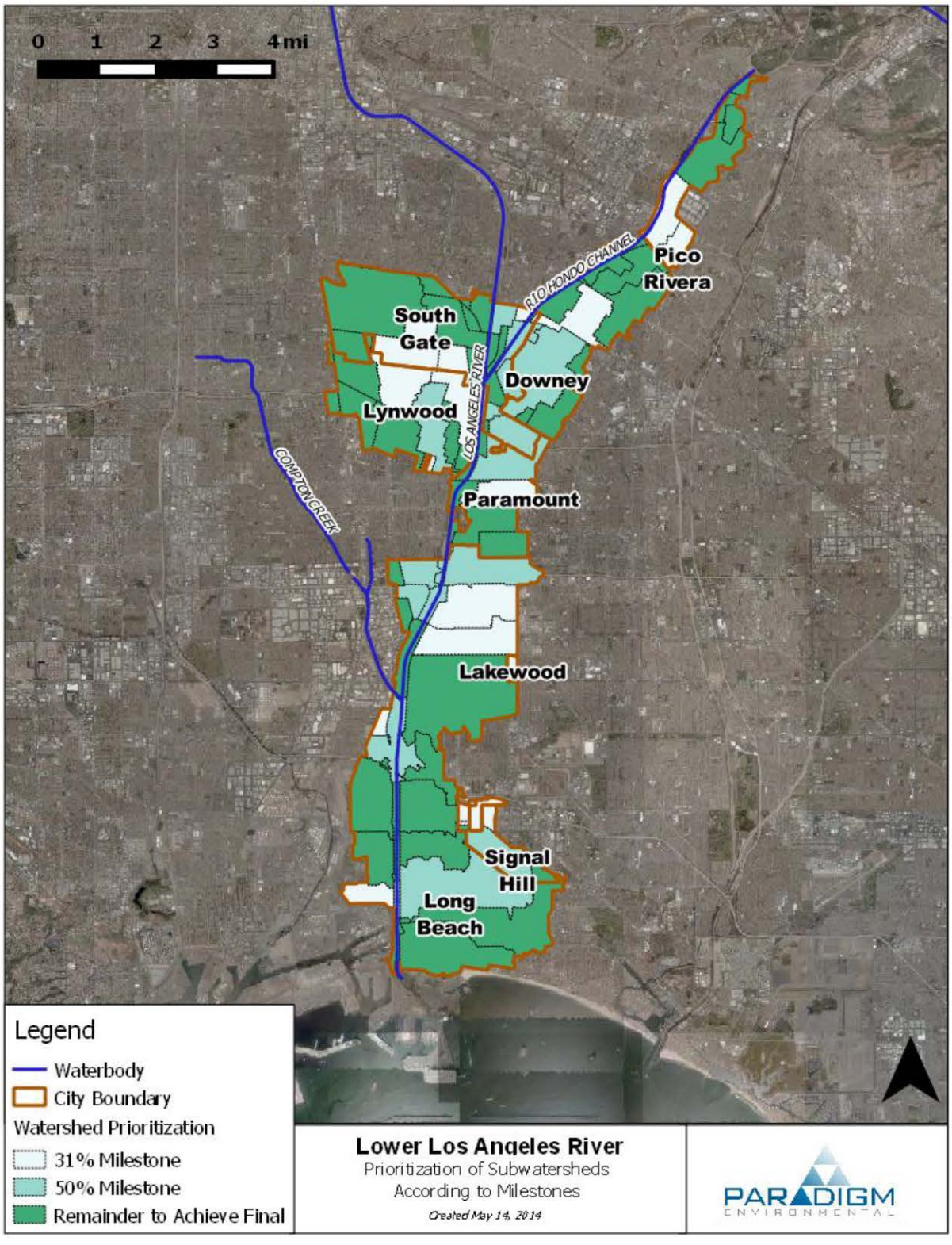

Figure 9-1. LLAR implementation areas associated with Interim and final milestones.

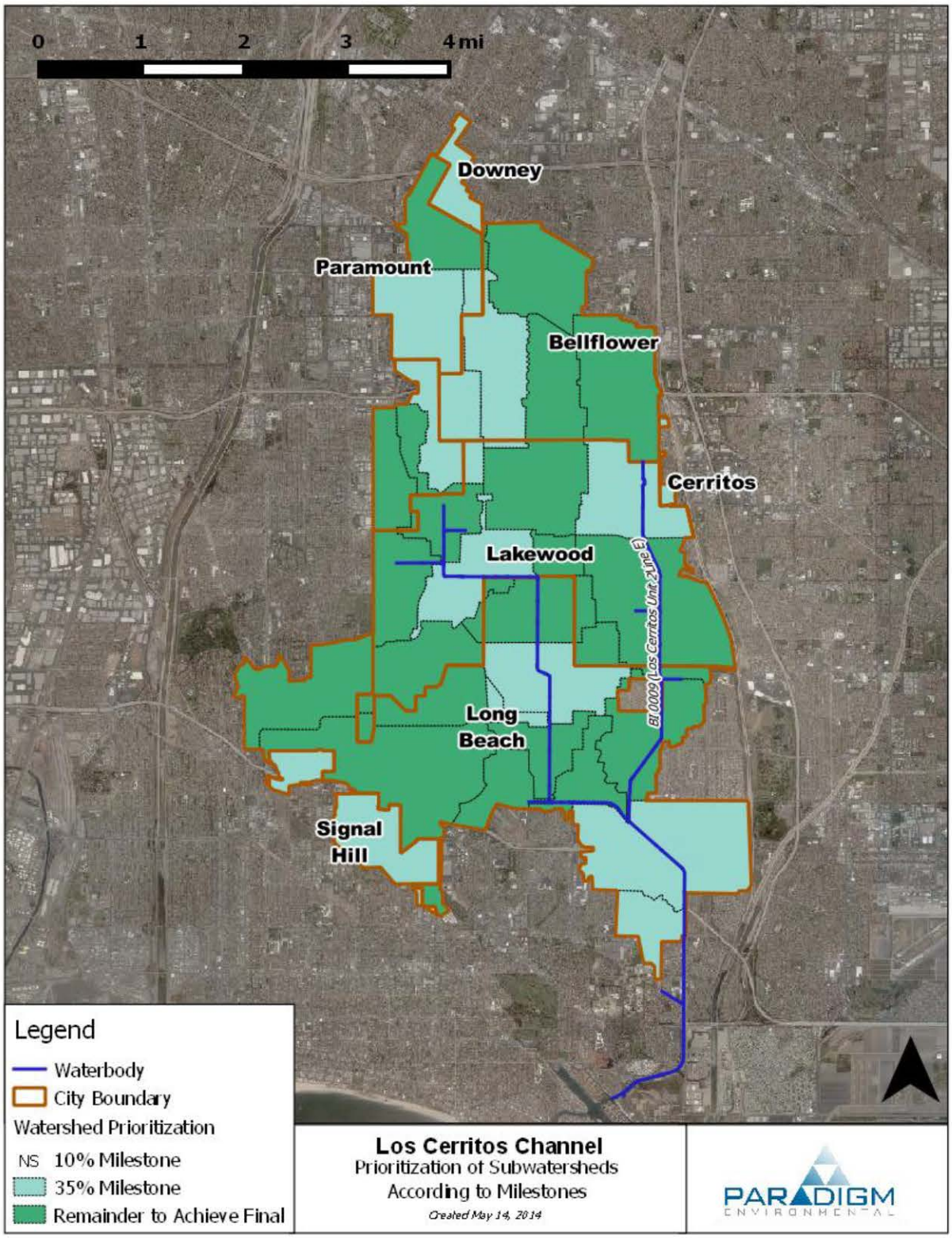

Figure 9-2. LCC implementation areas associated with Interim and final milestones.

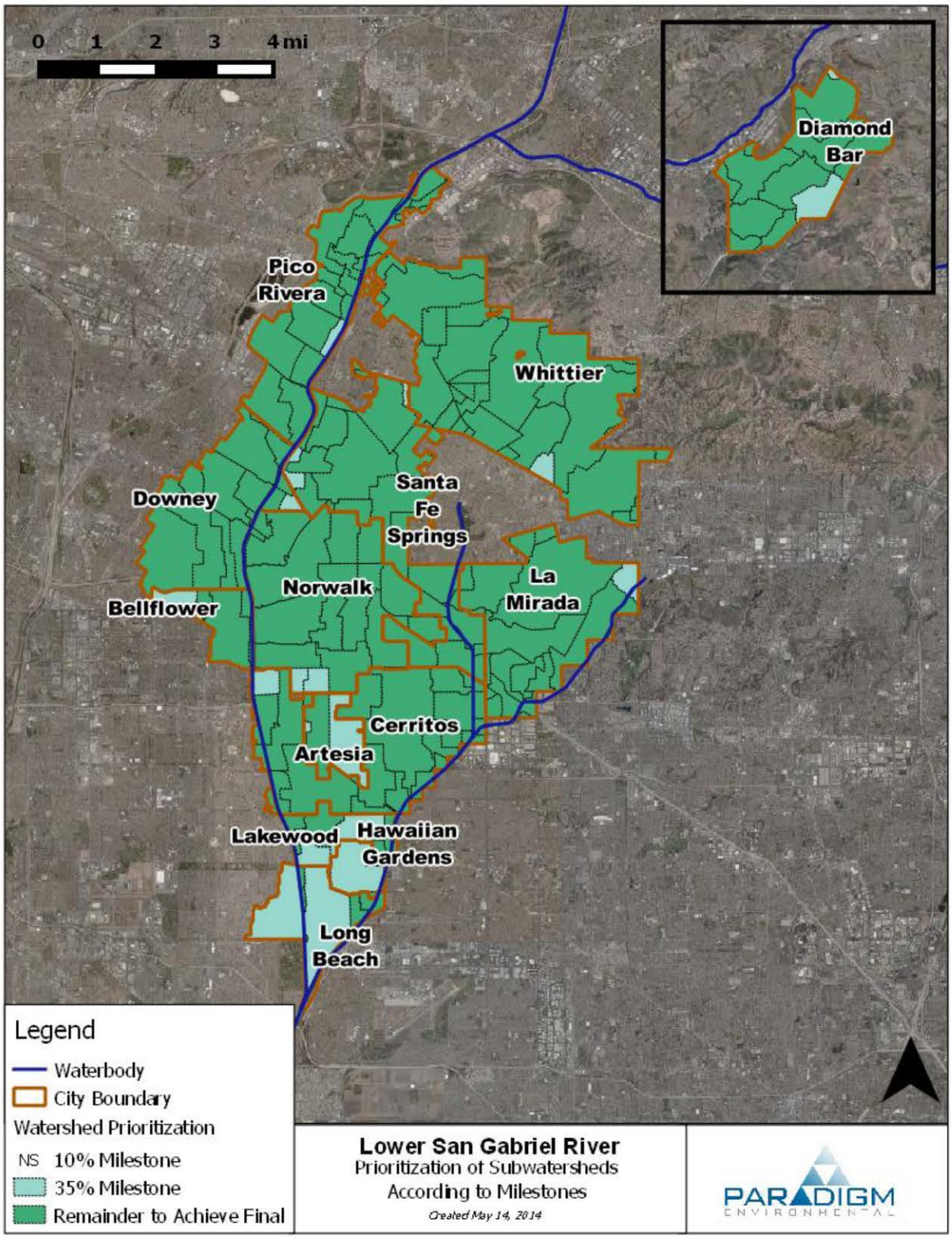

Figure 9-3. LSGR implementation areas associated with Interim and final milestones.

Table 9-4. Lower Los Angeles River Pollutant Reduction Plan for Attainment of Interim and Final Limits

Jurisdiction	Milestone	COMPLIANCE TARGET		POLLUTANT REDUCTION PLAN						
		Remaining MS4 Responsible Critical Year Storm Volume* (acre-ft/year)		Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)		Estimated Potential LID on Public Parcels Volume (acre-ft)		Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	
		Incremental	Cumulative		Incremental	Cumulative	Incremental	Cumulative	Incremental	Cumulative
Downey	31%	143.8	143.8	1.1	12.2	12.2	0.7	0.7	7.1	7.1
	50%	187.1	330.9	0.7	2.5	14.7	10.1	10.8	0.6	7.7
	Final	323.9	654.7	2.0	31.2	45.9	4.4	15.3	10.7	18.4
Lakewood	31%	7.9	7.9	NA	1.1	1.1	0.0	0.0	-	-
	50%	-	7.9		-	1.1	-	0.0	-	-
	Final	-	7.9		-	1.1	-	0.0	-	-
Long Beach	31%	6.5	6.5	NA	1.0	1.0	0.0	0.0	-	-
	50%	567.0	573.5		40.3	41.3	7.5	7.5	24.7	24.7
	Final	1,832.7	2,406.2		113.4	154.6	20.8	28.3	111.5	136.2
Lynwood	31%	235.9	235.9	NA	18.4	18.4	2.7	2.7	13.1	13.1
	50%	134.9	370.8		12.8	31.2	3.8	6.5	0.1	13.2
	Final	297.2	667.9		22.7	53.9	4.5	11.1	17.3	30.5
Paramount	31%	163.7	163.7	0.1	9.0	9.0	1.7	1.7	10.2	10.2
	50%	65.7	229.4		7.4	16.4	0.8	2.5	0.3	10.4
	Final	376.6	606.1		14.9	31.2	2.1	4.7	30.2	40.6
Pico Rivera	31%	275.3	275.2	NA	11.5	11.5	0.5	0.5	27.4	27.4
	50%	-	275.2		-	11.5	-	0.5	-	27.4
	Final	12.0	287.2		1.3	12.8	0.0	0.5	0.5	27.9
Signal Hill	31%	8.5	8.5	0.2	0.8	0.8	0.2	0.2	0.2	0.2
	50%	105.8	114.3		7.0	7.8	0.9	1.1	5.9	6.1
	Final	51.9	166.2		2.2	10.0	0.0	1.1	4.9	11.0
South Gate	31%	229.3	229.3	4.7	23.2	23.2	0.9	0.9	6.5	6.5
	50%	198.1	427.4		15.0	38.3	0.8	1.7	12.6	19.1
	Final	746.9	1,174.3		49.3	87.5	5.1	6.8	54.7	73.8

Table 9-5. Los Cerritos Channel Pollutant Reduction Plan for Attainment of Interim and Final Limits

Jurisdiction	Milestone	COMPLIANCE TARGET		POLLUTANT REDUCTION PLAN							
		Remaining MS4 Responsible Critical Year Storm Volume* (acre-ft/year)		Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)		Estimated Potential LID on Public Parcels Volume (acre-ft)		Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	
		Incremental	Cumulative		Incremental	Cumulative	Incremental	Cumulative	Incremental	Cumulative
Bellflower	10%	NS	NS		-	-	-	-	-	-
	35%	244.4	244.4	NA	15.1	15.1	1.2	1.2	16.2	16.2
	Final	746.0	990.4		43.0	58.1	3.2	4.5	39.4	55.6
Cerritos	10%	NS	NS		-	-	-	-	-	-
	35%	9.7	9.7	NA	1.0	1.0	0.0	0.0	0.5	0.5
	Final	3.2	12.9		-	1.0	-	0.0	0.1	0.6
Downey	10%	NS	NS		-	-	-	-	-	-
	35%	57.2	57.2	0.1	5.3	5.3	0.0	0.0	2.7	2.7
	Final	35.8	93.0		-	5.3	-	0.0	2.1	4.8
Lakewood	10%	NS	NS		-	-	-	-	-	-
	35%	282.4	282.4	NA	31.5	31.5	4.7	4.7	6.9	6.9
	Final	869.7	1,152.1		90.0	121.5	7.0	11.8	29.3	36.2
Long Beach	10%	NS	NS		-	-	-	-	-	-
	35%	473.5	473.5	NA	33.8	33.8	12.3	12.3	16.4	16.4
	Final	1,156.3	1,629.8		87.9	121.7	9.5	21.8	48.9	65.3
Paramount	10%	NS	NS		-	-	-	-	-	-
	35%	267.0	267.0	NA	14.3	14.3	3.0	3.0	17.1	17.1
	Final	258.5	525.5		8.5	22.8	3.5	6.4	8.7	25.8
Signal Hill	10%	NS	NS		-	-	-	-	-	-
	35%	231.6	231.6	0.0	11.2	11.2	1.2	1.2	14.2	14.2
	Final	52.7	284.3		-	11.2	-	1.2	2.0	16.2

NS: Non-structural practices achieve 10% milestone

NA: No information/not enough information provided

*Runoff from non-MS4 sources and reductions fro existing regional BMPs are excluded from compliance target (see Attachment A)

Table 9-6. San Gabriel River Pollutant Reduction Plan for Attainment of Interim and Final Limits

Jurisdiction	Milestone	COMPLIANCE TARGET		POLLUTANT REDUCTION PLAN						
		Remaining MS4 Responsible Critical Year Storm Volume* (acre-ft/year)		Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)		Estimated Potential LID on Public Parcels Volume (acre-ft)		Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	
		Incremental	Cumulative		Incremental	Cumulative	Incremental	Cumulative	Incremental	Cumulative
Artesia	10%	NS	NS	NA	-	-	-	-	-	-
	35%	1.1	1.1		-	-	0.1	0.1	-	-
	Final	-	1.1		-	-	-	0.1	-	-
Bellflower	10%	NS	NS	NA	-	-	-	-	-	-
	35%	1.3	1.3		0.2	0.2	0.0	0.0	-	-
	Final	56.1	57.4		1.5	1.8	3.7	3.7	0.0	0.0
Cerritos	10%	NS	NS	NA	-	-	-	-	-	-
	35%	-	-		-	-	-	-	-	-
	Final	4.1	4.1		0.6	0.6	0.0	0.0	-	-
Diamond Bar	10%	NS	NS	NA	-	-	-	-	-	-
	35%	-	-		-	-	-	-	-	-
	Final	1.1	1.1		0.2	0.2	-	-	-	-
Downey	10%	NS	NS		-	-	-	-	-	-
	35%	-	-		-	-	-	-	-	-
	Final	63.3	63.3	7.1	10.0	10.0	0.4	0.4	-	-
Lakewood	10%	NS	NS	NA	-	-	-	-	-	-
	35%	-	-		-	-	-	-	-	-
	Final	2.2	2.2		0.2	0.2	0.0	0.0	0.1	0.1
Long Beach	10%	NS	NS	NA	-	-	-	-	-	-
	35%	26.9	26.9		1.1	1.1	1.3	1.3	-	-
	Final	2.3	29.2		0.3	1.4	-	1.3	0.0	0.0

Jurisdiction	Milestone	COMPLIANCE TARGET		POLLUTANT REDUCTION PLAN						
		Remaining MS4 Responsible Critical Year Storm Volume* (acre-ft/year)		Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)		Estimated Potential LID on Public Parcels Volume (acre-ft)		Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	
		Incremental	Cumulative		Incremental	Cumulative	Incremental	Cumulative	Incremental	Cumulative
Norwalk	10%	NS	NS	NA	-	-	-	-	-	-
	35%	0.8	0.8		-	-	0.1	0.1	-	-
	Final	4.0	4.8		-	-	0.3	0.3	-	-
Pico Rivera	10%	NS	NS	NA	-	-	-	-	-	-
	35%	0.2	0.2		0.0	0.0	-	-	-	-
	Final	60.2	60.4		10.7	10.8	-	-	0.0	0.0
Santa Fe Springs	10%	NS	NS	NA	-	-	-	-	-	-
	35%	-	-		-	-	-	-	-	-
	Final	30.3	30.3		4.6	4.6	-	-	0.3	0.3
Whittier	10%	NS	NS	NA	-	-	-	-	-	-
	35%	0.0	0.0		-	-	-	-	0.0	0.0
	Final	7.1	7.1		1.4	1.4	-	-	-	0.0

NS: Non-structural practices achieve 10% milestone

NA: No information/not enough information provided

*Runoff from non-MS4 sources and reductions fro existing regional BMPs are excluded from compliance target (see Attachment A)

Table 9-7. Coyote Creek Pollutant Reduction Plan for Attainment of Interim and Final Limits

Jurisdiction	Milestone	COMPLIANCE TARGET		POLLUTANT REDUCTION PLAN						
		Remaining MS4 Responsible Critical Year Storm Volume* (acre-ft/year)		Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)		Estimated Potential LID on Public Parcels Volume (acre-ft)		Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	
		Incremental	Cumulative		Incremental	Cumulative	Incremental	Cumulative	Incremental	Cumulative
Artesia	10%	NS	NS	NA	-	-	-	-	-	-
	35%	15.9	15.9		-	-	1.1	1.1	-	-
	Final	-	15.9		-	-	-	1.1	-	-
Cerritos	10%	NS	NS	NA	-	-	-	-	-	-
	35%	0.1	0.1		0.0	0.0	-	-	-	-
	Final	56.6	56.7		3.0	3.1	3.4	3.4	-	-
Diamond Bar	10%	NS	NS	NA	-	-	-	-	-	-
	35%	1.0	1.0		0.3	0.3	-	-	-	-
	Final	35.6	36.7		8.0	8.2	-	-	0.7	0.7
Hawaiian Gardens	10%	NS	NS	NA	-	-	-	-	-	-
	35%	23.6	23.6		0.3	0.3	1.5	1.5	-	-
	Final	3.4	27.1		0.2	0.6	0.1	1.6	0.0	0.0
La Mirada	10%	NS	NS	NA	-	-	-	-	-	-
	35%	-	-		-	-	-	-	-	-
	Final	124.9	124.9		9.6	9.6	5.6	5.6	-	-
Lakewood	10%	NS	NS	NA	-	-	-	-	-	-
	35%	17.5	17.5		0.9	0.9	0.7	0.7	-	-
	Final	2.3	19.7		-	0.9	0.3	0.9	-	-
Long Beach	10%	NS	NS	NA	-	-	-	-	-	-
	35%	-	-		-	-	-	-	-	-
	Final	0.0	0.0		-	-	0.0	0.0	-	-

Jurisdiction	Milestone	COMPLIANCE TARGET		POLLUTANT REDUCTION PLAN						
		Remaining MS4 Responsible Critical Year Storm Volume* (acre-ft/year)		Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)		Estimated Potential LID on Public Parcels Volume (acre-ft)		Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	
		Incremental	Cumulative		Incremental	Cumulative	Incremental	Cumulative	Incremental	Cumulative
Norwalk	10%	NS	NS	NA	-	-	-	-	-	-
	35%	1.6	1.6		-	-	0.2	0.2	-	-
	Final	50.9	52.5		1.4	1.4	3.2	3.4	-	-
Santa Fe Springs	10%	NS	NS	NA	-	-	-	-	-	-
	35%	-	-		-	-	-	-	-	-
	Final	12.6	12.6		1.0	1.0	-	-	1.1	1.1
Whittier	10%	NS	NS	NA	-	-	-	-	-	-
	35%	-	-		-	-	-	-	-	-
	Final	200.1	200.1		39.0	39.0	-	-	0.0	0.0

NS: Non-structural practices achieve 10% milestone

NA: No information/not enough information provided

*Runoff from non-MS4 sources and reductions fro existing regional BMPs are excluded from compliance target (see Attachment A)

9.2.2. Dry Weather

Dry weather reductions are attained through a combination of non-structural practices and structural BMPs as they are implemented as part of the wet weather attainment of limits. As wet-weather BMPs are implemented, they serve to remove the dry-weather flows thus meeting the compliance set forth to achieve dry-weather reductions. As a summary of the dry weather analysis, Table 9-8 through Table 9-11 outline the jurisdiction-wide attainment of interim and final milestones for dry weather. The reduction from implemented BMPs compares the actual dry-weather reduction versus the compliance target.

Table 9-8. Lower Los Angeles River Dry Weather Pollutant Reduction Plan for Attainment of Interim and Final Limits

Jurisdiction	Milestone	Dry Weather *E. coli* Load Reduction	
		Compliance Target	Reduction from Implemented BMPs
Downey	31%	30.8%	65.9%
	50%	49.7%	76.9%
	Final	99.4%	99.4%
Lakewood	31%	30.8%	99.4%
	50%	49.7%	99.4%
	Final	99.4%	99.4%
Long Beach	31%	30.8%	62.1%
	50%	49.7%	74.3%
	Final	99.4%	99.4%
Lynwood	31%	30.8%	71.8%
	50%	49.7%	80.2%
	Final	99.4%	99.4%
Paramount	31%	30.8%	51.0%
	50%	49.7%	72.4%
	Final	99.4%	99.4%
Pico Rivera	31%	30.8%	71.8%
	50%	49.7%	71.8%
	Final	99.4%	99.4%
Signal Hill	31%	30.8%	69.3%
	50%	49.7%	94.9%
	Final	99.4%	99.4%
South Gate	31%	30.8%	62.8%
	50%	49.7%	75.9%
	Final	99.4%	99.4%

Table 9-9. Los Cerritos Channel Dry Weather Pollutant Reduction Plan for Attainment of Interim and Final Limits

Jurisdiction	Milestone	Dry Weather *E. coli* Load Reduction	
		Compliance Target	Reduction from Implemented BMPs
Bellflower	10%	9.9%	58.1%
	35%	34.7%	71.4%
	Final	99.1%	99.1%
Cerritos	10%	9.9%	56.4%
	35%	34.7%	99.1%
	Final	99.1%	99.1%
Downey	10%	9.9%	59.8%
	35%	34.7%	99.1%
	Final	99.1%	99.1%
Lakewood	10%	9.9%	55.6%
	35%	34.7%	69.6%
	Final	99.1%	99.1%
Long Beach	10%	9.9%	60.1%
	35%	34.7%	76.9%
	Fin al	99.1%	99.1%
Paramount	10%	9.9%	52.8%
	35%	34.7%	79.8%
	Final	99.1%	99.1%
Signal Hill	10%	9.9%	60.8%
	35%	34.7%	99.1%
	Final	99.1%	99.1%

Table 9-10. San Gabriel River Dry Weather Pollutant Reduction Plan for Attainment of Interim and Final Limits

Jurisdiction	Milestone	Dry Weather *E. coli* Load Reduction	
		Compliance Target	Reduction from Implemented BMPs
Artesia	10%	9.4%	57.6%
	35%	33.0%	94.3%
	Final	94.25%	94.25%
Bellflower	10%	9.4%	49.9%
	35%	33.0%	57.6%
	Final	94.25%	94.25%
Cerritos	10%	9.4%	43.7%
	35%	33.0%	48.1%
	Final	94.25%	94.25%
Diamond Bar	10%	9.4%	58.2%
	35%	33.0%	58.8%
	Final	94.25%	94.25%
Downey	10%	9.4%	57.4%
	35%	33.0%	58.1%
	Final	94.25%	94.25%
Lakewood	10%	9.4%	43.1%
	35%	33.0%	73.7%
	Final	94.25%	94.25%
Long Beach	10%	9.4%	46.6%
	35%	33.0%	91.6%
	Final	94.25%	94.25%
Norwalk	10%	9.4%	54.8%
	35%	33.0%	55.7%
	Final	94.25%	94.25%
Pico Rivera	10%	9.4%	51.8%
	35%	33.0%	51.9%
	Final	94.25%	94.25%
Santa Fe Springs	10%	9.4%	54.4%
	35%	33.0%	57.9%
	Final	94.25%	94.25%
Whittier	10%	9.4%	57.9%
	35%	33.0%	58.0%
	Final	94.25%	94.25%

Table 9-11. Coyote Creek Dry Weather Pollutant Reduction Plan for Attainment of Interim and Final Limits

Jurisdiction	Milestone	Dry Weather *E. coli* Load Reduction	
		Compliance Target	Reduction from Implemented BMPs
Artesia	10%	9.9%	60.9%
	35%	34.6%	85.1%
	Final	98.9%	98.9%
Cerritos	10%	9.9%	56.3%
	35%	34.6%	56.3%
	Final	98.9%	98.9%
Diamond Bar	10%	9.9%	61.3%
	35%	34.6%	65.9%
	Final	98.9%	98.9%
Hawaiian Gardens	10%	9.9%	59.7%
	35%	34.6%	96.9%
	Final	98.9%	98.9%
La Mirada	10%	9.9%	57.4%
	35%	34.6%	58.7%
	Final	98.9%	98.9%
Lakewood	10%	9.9%	60.7%
	35%	34.6%	76.5%
	Final	98.9%	98.9%
Long Beach	10%	9.9%	54.5%
	35%	34.6%	91.9%
	Final	98.9%	98.9%
Norwalk	10%	9.9%	59.2%
	35%	34.6%	60.8%
	Final	98.9%	98.9%
Santa Fe Springs	10%	9.9%	51.7%
	35%	34.6%	52.0%
	Final	98.9%	98.9%
Whittier	10%	9.9%	60.7%
	35%	34.6%	61.4%
	Final	98.9%	98.9%

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Attachment A: DETERMINATION OF BMP TREATMENT CAPACITY

Submitted to:

LLAR WMP Group LCC WMP Group LSGR WMP Group

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January 15, 2015

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1. Determination of BMP Treatment Capacity

The process for determining the necessary cumulative BMP capacity depends on the type of numeric goal being addressed. As shown in Figure 1-1, the volume-based (design storm) approach, necessary BMP capacity was determined through a design storm analysis. For the load-based (pollutant reduction), the analysis leveraged the optimization routines in the customized WMMS. An initial step in the RAA was a comparison of the volume reductions required by the load-based and volume-based numeric goals, to support selection of the wet weather critical conditions.

This appendix describes key analyses conducted to determine the potential capacity of different BMPs including non-structural BMPs. In addition, it describes the approach for non-MS4 sources.

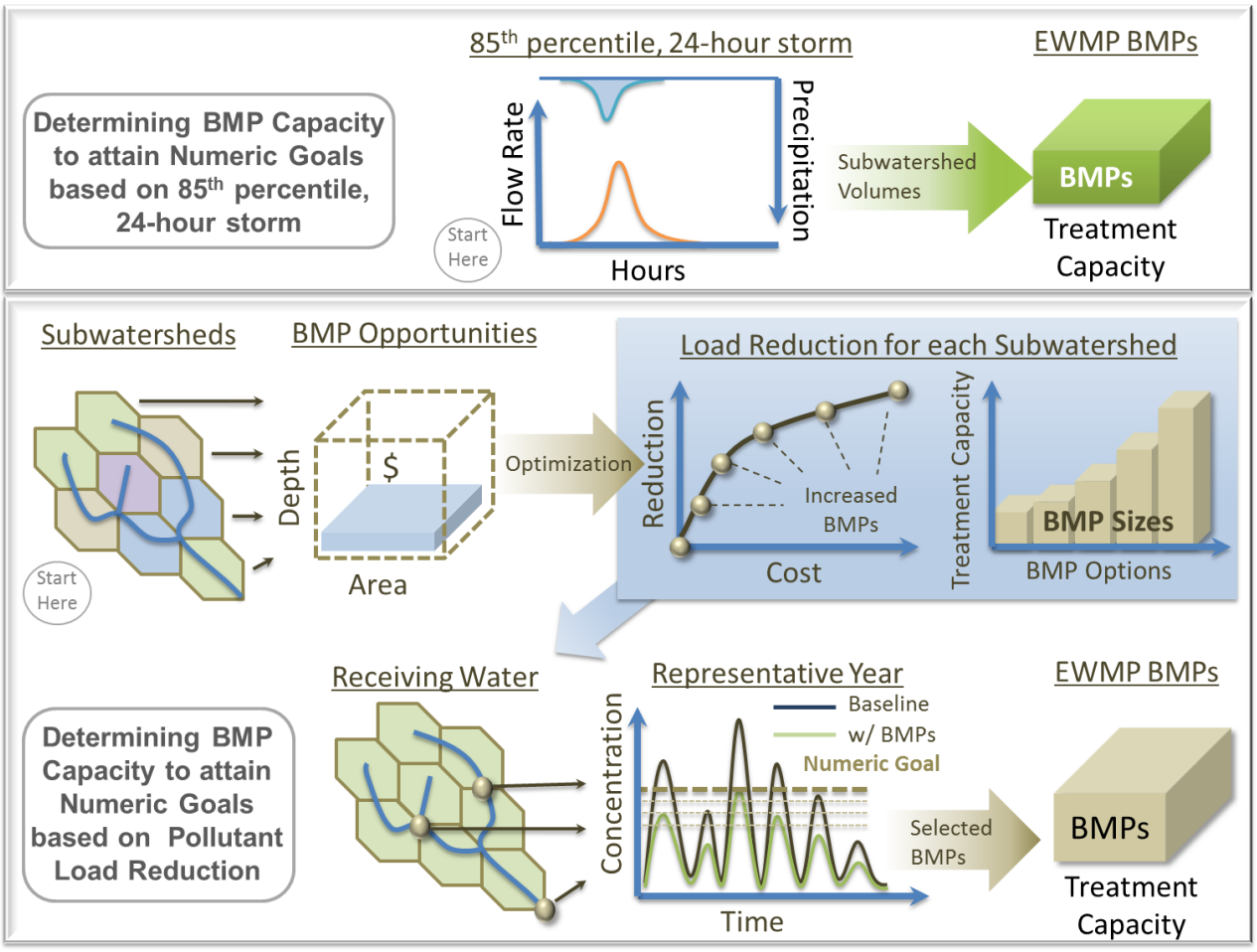

Figure 1-1. Illustration of Process for Determining Required BMP Capacities for the WMP using Volume-Based (top panel) and Load-Based (bottom panel) Numeric Goals.

1.1. Load Reduction Optimization Modeling Analysis

During development of WMMS, distributed BMPs were modeled at the subwatershed-scale using a generalized BMP treatment train. Depending on the land use type, different types of BMPs were applied. The three generalized BMP pathways were: (1) transportation, (2) residential, and (3) commercial/industrial/institutional. A conceptual schematic of the BMP network and pathways is presented in Figure 1-2 (LACDPW 2011).

For the RAA, subwatershed-scale SUSTAIN models were developed using the WMMS modeling assumptions. Each BMP from the treatment train described in Figure 1-2 was configured consistently with modeling performed during development of the WMMS system and followed the Regional Board RAA guidelines. A summary of key BMP parameters used for RAA modeling are presented in Table 1-1. Background infiltration rates were changed from those used during WMMS development (0.5 inches per hour) to site-specific infiltrations rates provided in the Los Angeles County Hydrology Manual and associated spatial datasets (LACDPW 2006). These rates also deviate somewhat from the values suggested in the RAA Guidelines (0.1 – 0.3 inches per hour); however, the data are locally-derived, published and reliable which provides adequate justification for their use.

First, SUSTAIN models were configured using the existing condition watershed model runoff timeseries and land use distributions as inputs, and benchmarked against the aggregated LSPC model results to establish baseline consistency. Second, using the SUSTAIN configuration with the respective BMP opportunities per pathway (as presented in Figure 1-2) in each subwatershed, optimization runs were formulated to maximize zinc reduction (i.e. the limiting target pollutant) while minimizing total estimated implementation cost. This resulted in a matrix of high-resolution cost-effectiveness curves for each subwatershed. Finally, a Tier-II optimization framework was configured to collectively optimize target load reductions at the downstream assessment point, with an added equitability constraint to ensure that each jurisdiction shared proportionally in the reduction effort. For the Tier-II optimization, instead of the decision variables being individual BMPs within a network like before, they were comprised of individual solutions taken off the cost-effectiveness curves at each subwatershed. The primary objective was to quantify the stormwater retention volume and load reductions provided by the collective actions occurring within each contributing jurisdiction tributary to the assessment point.

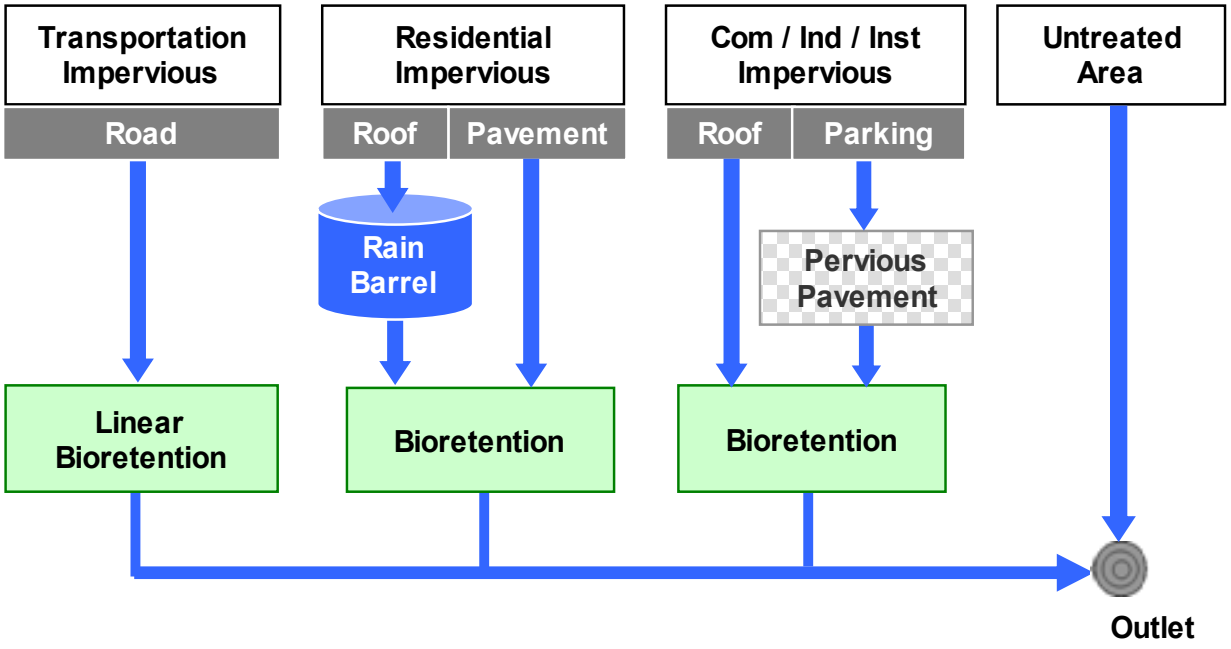

Figure 1-2. Conceptual schematic of the WMMS aggregate BMP treatment train (LACDPW 2011b).

Table 1-1. BMP parameters used in the load reduction modeling analysis

Constituent Group	Rain Barrel	Bioretention	Porous Pavement
Media Infiltration Rate (in/hr)	n/a	0.1 – 0.9	0.1 – 0.9
Substrate Layer Porosity (fraction)	n/a	0.4	0.4
Substrate Layer Field Capacity (fraction)	n/a	0.3	0.055
Substrate Layer Wilting Point (fraction)	n/a	0.1	0.05
Underdrain Gravel Porosity (fraction)	n/a	0.5	0.45
Vegetative Parameter, A (unitless)	n/a	0.6	1.0
Background Infiltration Rate (in/hr)	n/a	0.1 – 0.9	0.1 – 0.9
First Order Decay Rate (1/day)[1]	0.2 – 0.8	0.2 – 0.8	0.2 – 0.8
Underdrain Filtration Rate (%)[1]	n/a	0.5 – 0.9	0.5 – 0.9

1. Rates vary by pollutant and the type of BMP soil media

1.2. BMP Capacity Analysis for the Rights-of-Way

A key consideration for WMP implementation is the potential BMP capacity that could be provided by rights-of-way (ROW). In order to highlight the potential structural BMP implementation approaches to meet the volume targets, a BMP opportunity analysis was conducted. Two broad categories of BMPs – ROW BMPs and LID on public parcels – were used to describe the networks of BMPs needed to meet the target reductions.

This section describes how right-of-ways were evaluated for opportunities to locate BMPs and evaluate the key components that affect the ability of the ROW BMP networks to be effective: space available in the ROW, types of BMPs to site in the ROW, drainage areas that could potentially be treated by ROW BMPs, and estimated BMP infiltration rates.

Stormwater BMPs in the ROW are treatment systems arranged linearly within the street ROW and are designed to reduce runoff volumes and improve runoff water quality from the roadway and adjacent parcels. Implementing BMPs in the ROW provides an opportunity to meet water quality goals by locating BMPs in areas owned or controlled by a municipality to avoid the cost of land acquisition or establishing an easement. Implementing BMPs in the ROW allows for direct control of construction, maintenance, and monitoring activities by the responsible jurisdiction. Bioretention and permeable pavement are typically best suited for implementation in the ROW

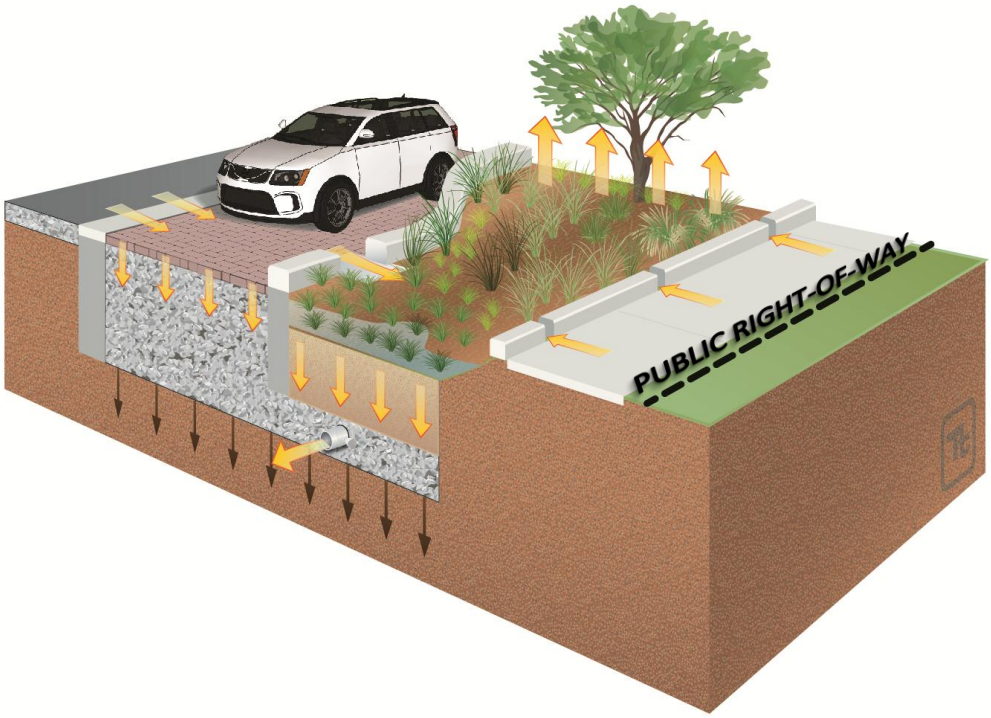

Figure 1-3. Conceptual schematic of ROW BMPs with an underdrain (Arrows indicate water pathways).

Not all roads are suited for ROW BMP retrofits; therefore, screening is required to eliminate roads where ROW BMP retrofits are impractical or infeasible due to physical constraints. While ROW BMP retrofits can be implemented in a variety of settings, the physical characteristics of the road itself such as the road type, local topography, and depth to groundwater can significantly influence the practicality of designing and constructing these features. A screening protocol was established to identify realistic opportunities for retrofits based on the best available GIS data. The opportunities identified during this process provide the foundation for the engineering analysis to determine the volume of stormwater that can be treated by ROW BMP retrofits in the subject watersheds. This section describes the data and the screening process used to identify the best available roads for ROW BMP retrofits.

1.2.1. Data Used

To evaluate BMP opportunities and available implementation areas, several key data sets were processed and formatted. Table 1-2 outlines the data set names, formats, descriptions, and sources.

Table 1-2. Summary of Data

Data Set	Format	Description	Source
Parcels	GIS Shapefile	Outlines property boundaries and sizes	Los Angeles County (LAC) Assessor
Roads	GIS Shapefile	Shows street centerline network & classification by Topologically Integrated Geographic Encoding and Reference (TIGER)	LAC GIS Portal
Land Use	GIS Shapefile	Subdivides the region into predefined land use categories with similar runoff properties. Each individual land use feature identifies the associated percent impervious coverage.	LAC WMMS Model
Subwatersheds	GIS Shapefile	Defines drainage areas to selected outlet points	LAC WMMS Model
Slopes	GIS Shapefile	Classifies regions by the slope category	LAC WMMS Model
Soils	GIS Shapefile	Outlines spatial extents of dominant soil types	LAC GIS Portal
Jurisdictions	GIS Shapefile	Establishes city and county boundaries	LAC GIS Portal
Drainage Network	GIS Shapefile	Identifies stormwater structure layout and conveyance methods	LAC GIS Portal
Groundwater Contours	GIS Shapefile	Illustrates groundwater depth as measured from the surface	LAC BOS
Soil Runoff Coefficient Curves	PDF File	Curves characterize effect of rainfall intensity on runoff coefficient per soil type	Hydrology Manual Appendix C (LADPW 2006)
Aerial Imagery	Layer File	Orthoimage of entire region	ESRI Maps & Data Imagery
Runoff Rates	Time Series	Hourly runoff for land uses for the continuous simulation model	LAC WMMS Model

1.2.2. ROW BMP Screening

High traffic volumes, speed limits, slopes, and groundwater tables, impact the feasibility of ROW BMP implementation. Road classification data contains information typically useful for determining if the street is subject to high traffic volumes and speeds, and Census TIGER road data provides the best available road classification information for the study area. Table 1-3 shows the Master Address File (MAF)/TIGER Feature Classification Codes (MTFCC) deemed appropriate for ROW BMP retrofit opportunities. Only roads with the MTFCCs listed in Table 1-3 can be considered for ROW BMP retrofits in this screening analysis. All other roads are screened out.

Table 1-3. ROW BMP MTFCC

MTFCC	Description
S1400	Local neighborhood road, rural road, city street
S1730	Alley
S1780	Parking lot road

In addition to the screening of road types, opportunities were further screened to remove segments that have steep slopes. BMP implementation on streets with grades greater than 10 percent present engineering challenges that substantially reduce the cost effectiveness of the retrofit opportunity. From the available slope information, roads were considered as retrofit opportunities if the slope was less than 10 percent.

The final screen applied to the roads is the depth to groundwater. Implementing ROW BMPs in areas where the groundwater table is high is not recommended due to the fact that the BMPs are rendered ineffective due to their storage capacity being seriously diminished with groundwater inflow. From the groundwater contours provided, roads were eliminated as opportunities if the depth to groundwater was less than 10 feet. Attachment C highlights the areas identified with groundwater depths of 10 feet or less. The highlighted areas provide a starting point for elimination, however it should be noted that further evaluation may be necessary based on local knowledge of areas with high groundwater tables or daylighting of perched groundwater layers as identified by the jurisdictions.

The results of the ROW BMP screening are presented in Attachment C. Attachment C shows the roads available for retrofit (highlighted in green) versus all of the roads within the study area. An overall watershed map and individual jurisdictional maps for each watershed show all the identified retrofit opportunities. The maps indicate that a majority of the roads within each jurisdiction pass through the screening as potential retrofits. It should be noted that due to the coarse nature of the road classification data, only freeways, highways, and major roads were eliminated in the classification screening process. In practice, retrofitting every street that passed through the screening will likely not be feasible and adaptive management strategies will be necessary in the future to further refine the road classification data layer to more accurately identify road types suitable for ROW BMP retrofits.

The screened opportunities were used as the basis to evaluate the potential runoff volume reduction provided by ROW BMP implementations. In the following section, an engineering assessment is presented that determines the ROW BMP contributing drainage areas and the overall volume reductions achieved through ROW BMP implementation.

1.2.3. ROW BMP Configuration

The three most important assumptions necessary to evaluate BMP volume reduction performance are (1) the physical BMP configuration assumptions, (2) the contributing drainage area characteristics, and (3) the in-situ soil infiltration rates. By understanding the area draining to the BMPs and the volume capacity and function of the BMPs, an assessment can be performed to evaluate the potential of ROW retrofit BMPs to capture the required runoff volume in each subwatershed. This section summarizes the information and processes used to establish BMP configuration assumptions to be used for the runoff analysis presented in the following section.

1.2.4. BMP Assumptions Based on Green Streets

ROW BMPs consists of multiple types and combinations of stormwater treatment options. A well-established and often utilized ROW BMP is green streets. Green streets provide multiple benefits for pollutant and volume reduction and have been implemented in locations throughout the nation. In the future and as updates are made to the WMP, other ROW BMPs may be incorporated to achieve the required volume reductions.

Green streets typically consist of bioretention areas between the curb and sidewalk (herein referred to as the parkway) and/or permeable pavement within the parking lane. Prior to evaluating green street BMP treatment capacity, it is imperative to establish a configuration that can be assumed for typical implementation watershed-wide. This establishes the parkway space needed for the BMPs (plan view) and also determines the hydraulic function and storage capacity of the subsurface systems.

Bioretention systems are surface and subsurface water filtration systems, which use vegetation and underlying soils to store, filter, and reduce runoff volume while removing pollutants. Figure 1-4 represents a typical bioretention system incorporated into a green street design. Bioretention systems consist of a ponding depth and engineered soil media depth to treat runoff. Table 1-4 outlines typical widths, depths, and soil parameters associated with green street bioretention cells. Green streets were assumed to have no underdrains because the

WMP emphasizes low impact development and stormwater volume reduction to achieve pollutant load reductions.

Driveways and utilities limit the road length that can be converted into a green street. From past experience and aerial imagery review in the local watersheds, it was determined that 30 percent of the road length could be considered as the maximum possibility for conversion into bioretention area. This factor was used to limit the total length of potential green street bioretention areas. The parameters outlined above and in the table below were assumed to be the typical green street BMP implementation configuration for the screening analysis and the BMP treatment capacity evaluation described in the next section.

Table 1-4. BMP Design and Modeling Parameters for Subsequent Analyses

Component	Design Parameter	Value
Ponding Area	Depth	0.8 feet
	Width	4.0 feet
Media Layer	Depth	3.0 feet
	Porosity	0.4
Overall Profile	Effective Depth[1]	2.0 feet

[1] Effective depth is the maximum equivalent depth of water stored within the bioretention area less the depth displaced by soil media (vertical summation of surface ponding depth and void storage depth)

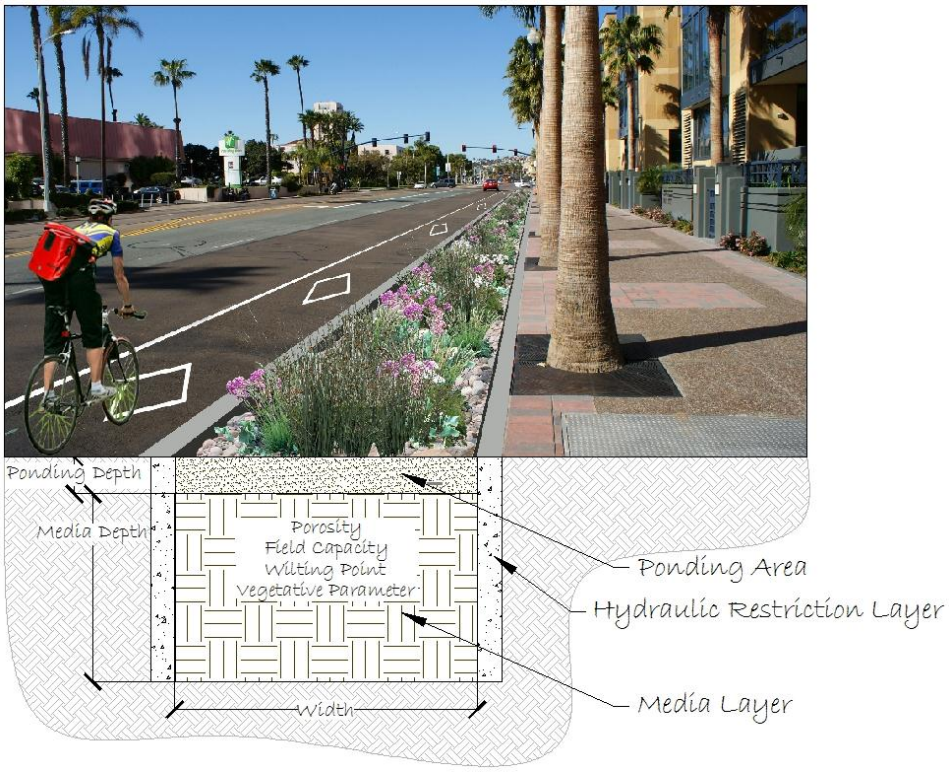

Figure 1-4. Typical bioretention section view (City of San Diego 2011).

Contributing Drainage Area Analysis

The purpose of this analysis was to realistically represent the area, type, and impervious coverage of land draining to potential green streets throughout the entire watershed. This is a critical step in WMP development because it predicts what volume of runoff can be assumed treated by green streets and what remaining (untreated) runoff must be routed to regional BMPs or addressed in other ways. The following engineering analyses were performed at a subwatershed-scale within the limits of available data and resources to estimate the maximum potential green street treatment capacity; given more detailed street-by-street drainage area data, the assumptions and results presented herein could be refined in future efforts to optimize green street treatment capacity. Figure 1-5 illustrates a simplified routing schematic used to represent the available runoff flow pathways to green street and regional BMPs throughout the watershed. The following subsections explain how each representative drainage area illustrated in Figure 1-5 was characterized.

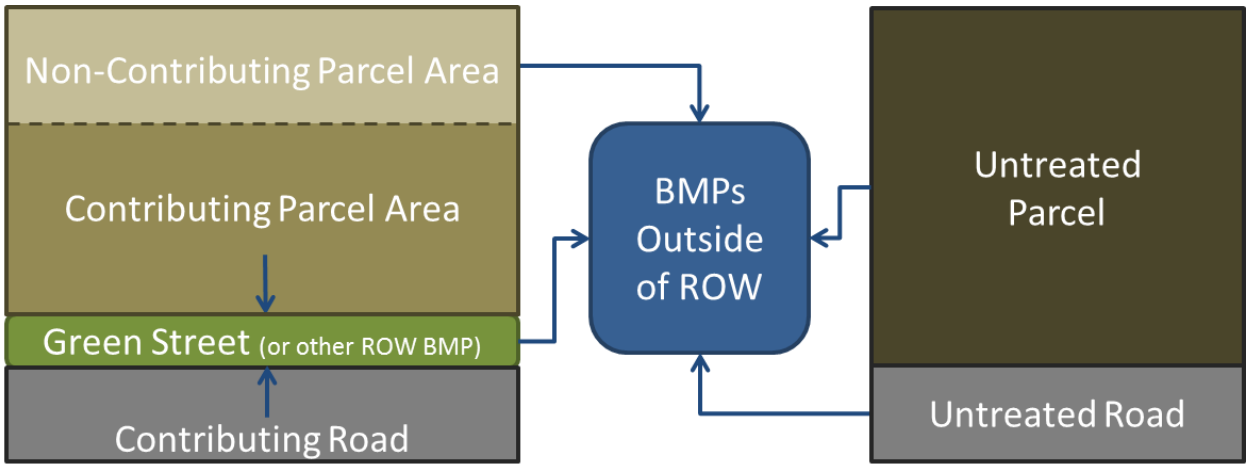

Figure 1-5. Green streets model schematic (arrows denote direction of runoff routing; figure not to scale).

Typical Parcel Size & Street Frontage Analysis

The nature of the green street analysis requires an understanding of typical parcel sizes and how much of the parcel drains to the ROW. Much of the runoff from parcels and the road drains to the ROW and is conveyed downstream through curb, gutter, and pipes. By identifying the typical parcel size, frontage length, and associated road area that drains to a candidate right-of-way area (Figure 1-6) the total area draining to potential green street retrofit opportunities was extrapolated throughout the watershed. For purposes of this study, only the high-density residential, multifamily residential, commercial, institutional, and industrial land uses were considered as contributing substantial runoff to the ROW (all other land uses contain minimal impervious area and thus contribute insubstantial runoff to the ROW).

The typical parcel size for each land use was determined by identifying all parcels for each land use. Once all the parcels were selected, the median parcel size for each land use was calculated and tabulated. This method evaluated thousands of parcels throughout the entire watershed and provided the most accurate depiction of the typical parcel size for each land use based on available data. Results are shown in Table 1-5.

Each parcel is adjacent to a portion of the ROW where the green street would be implemented. A subset of parcels approximate to the median parcel size for each land use was selected to determine the average frontage length. The portion of the selected parcels that was in contact with the ROW was measured using desktop analysis tools and averaged between all parcels of the same land use. Results are shown in Table 1-5.

Road area draining to green streets constitutes a substantial component of the total impervious drainage area. To establish road drainage areas, typical road widths were defined by sampling representative road segments located in each land use. Widths were measured from curb-to-curb using aerial orthoimagery and reported to the nearest even integer. The median sampled road width for each land use was calculated and compared with the City of Los Angeles Standard Street Dimensions (City of Los Angeles Bureau of Engineering 1999) for validation. To predict the resulting contributing road areas, the previously measured frontage length was multiplied by half the road width. Roads were assumed to be crowned; therefore, only half of the width would drain to one side of the road. Results are shown in Table 1-5.

As discussed in Section 1.2.4, only 30 percent of the frontage length could be converted into bioretention area. This factor was multiplied by the frontage length and used in limiting the total length of bioretention available within the model, as presented in Table 1-5.

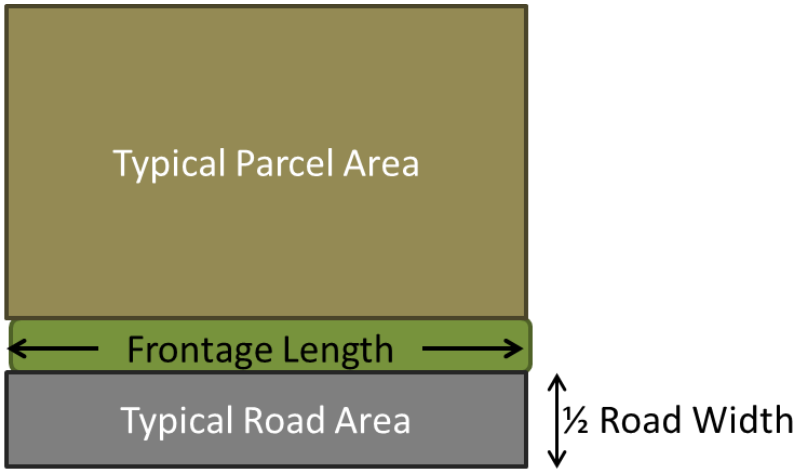

Figure 1-6. Typical parcel area, road width, road area, and frontage length schematic (figure not to scale)

Table 1-5. Typical parcel area, road area, and frontage length

Land Use	Typical Parcel Area (ft^2)	Frontage Length (ft)	Typical Road Width (ft)	Typical Road Area (ft^2)	BMP Length (ft)
High-density Residential	6,528	57	38	1,083	17
Multifamily Residential	13,526	60	30	900	18
Commercial	12,429	100	63	3,150	30
Institutional	38,215	143	37	2,646	43
Industrial	26,467	117	46	2,691	35
Other Land Use (Open Space, Vacant, etc.)	n/a[1]	100	40	2,000	30

[1] assumed not draining to ROW

Contributing Parcel Area Analysis

Many parcels will not always entirely drain to the ROW because portions can be retained on-site or flow onto an adjacent property. The actual volume of water that can be treated by a green street BMP was determined by identifying the typical proportion of the parcel that drains to the ROW (as shown in context of the model

schematic in Figure 1-7). This step also determines the area, and associated runoff, that is *not* expected to drain to green streets and is routed directly to downstream regional facilities or other practices (herein referred to as non-contributing parcel area).

The contributing areas to the green street BMPs were found using random sampling and identifying the surrounding parcel drainage patterns. Parcels were selected using a random number generator and drainage areas were determined on a desktop analysis using topography, aerial imagery, and drainage infrastructure features. The average contributing percentage was identified by evaluating multiple sites. Table 1-6 shows the percent contributing areas by land use that were determined from this analysis.

The impervious coverage of contributing parcel areas was also characterized during this step so that runoff could be simulated and routed to green streets in each land use. This was performed by tabulating the imperviousness data from the WMMS Model for each individual land use feature. The area-weighted mean impervious coverage was then calculated for each land use type. Results are tabulated for each land use in Table 1-6.

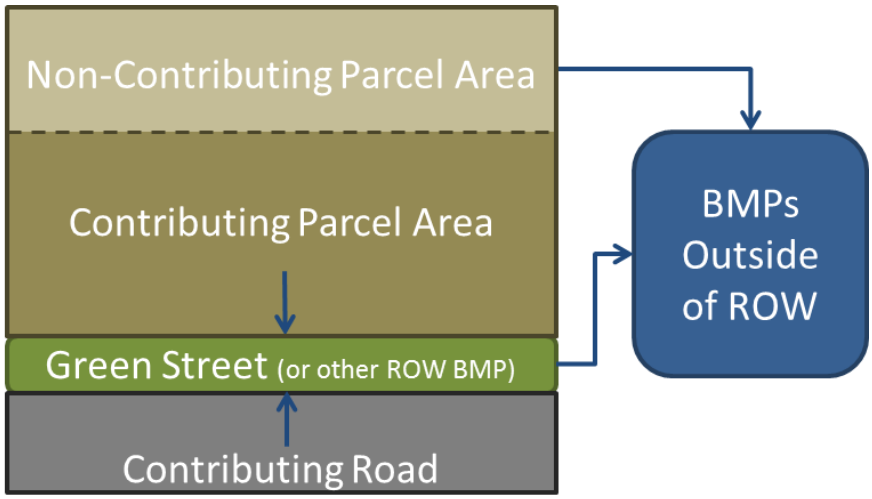

Figure 1-7. Parcel contributing area to ROW (impervious varies by land use; arrows denote direction of runoff routing; figure not to scale).

Table 1-6. Contributing area percentage by land use

Land Use	Contributing to ROW	Non-contributing to ROW	Percent Impervious
High-density Residential	80%	20%	36%
Multifamily Residential	80%	20%	60%
Commercial	80%	20%	90%
Institutional	80%	20%	72%
Industrial	35%	65%	66%
Other Land Use (Open Space, Vacant, etc.)	0%	100%	n/a

Untreated Roads Tabulation

Untreated roads consist of roadways with steep slopes, classifications not suited for green street implementation, or adjacent to open space or vacant parcels. Untreated road and associated adjacent parcel area that will ultimately drain to other BMPs was tabulated using available GIS data and screening results from Section 1.2.2 (conceptually illustrated in Figure 1-8).

Because green streets are implemented in the linear environment of the transportation corridor, it was assumed that the percentage of parcel area draining to green streets would be proportional to the percentage of suitable roads for green streets (as identified in Section 1.2.2) in each subwatershed. In other words, parcels associated with unsuitable roads were assumed to bypass green street treatment and routed directly to other facilities (these areas are defined herein as *untreated parcels*). The total treated and untreated parcel areas were reconciled with the total areas of each land use (per subwatershed) in the WMMS Model for validation and consistency.

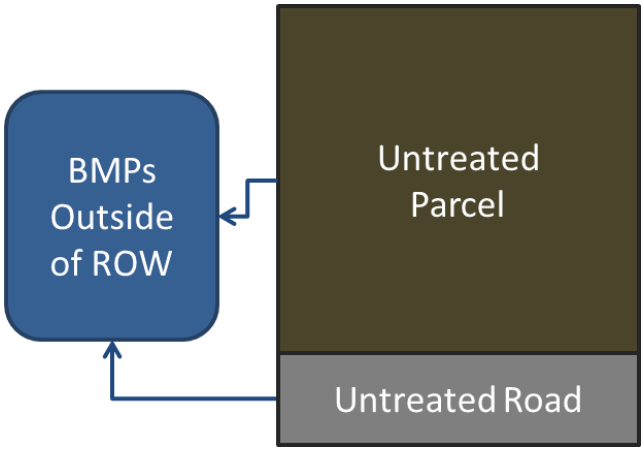

Figure 1-8. Schematic depicting untreated parcel and untreated road runoff routing (arrows denote direction of runoff routing; figure not to scale).

Summary of Contributing Drainage Areas

Results of the preceding analyses are presented in Figure 1-9. Areas that were assumed *un*treated by green streets include unsuitable roads and adjacent parcels, portions of suitable parcels that do not drain to the ROW, and predominantly pervious parcels (Open Space, Vacant, etc.), as discussed in preceding subsections; runoff from these untreated areas is assumed routed directly to regional facilities. Note that contributing areas are not necessarily proportional to contributing runoff due to variation in impervious coverage; runoff routing resulting from the preceding analyses is presented in the following section.

Given more detailed street-by-street engineering analyses, the potential area treated by green streets could be optimized, but the results below represent realistic estimates based on sound engineering judgment and currently available data and resources. Adaptive management strategies could target specific land uses that tend to bypass green street treatment (e.g. runoff, and associated treatment capacity, generated by industrial areas could be addressed through relevant industrial permits or onsite BMPs). Additional discussion on adaptive management strategies is provided in Section 8 of the main report.

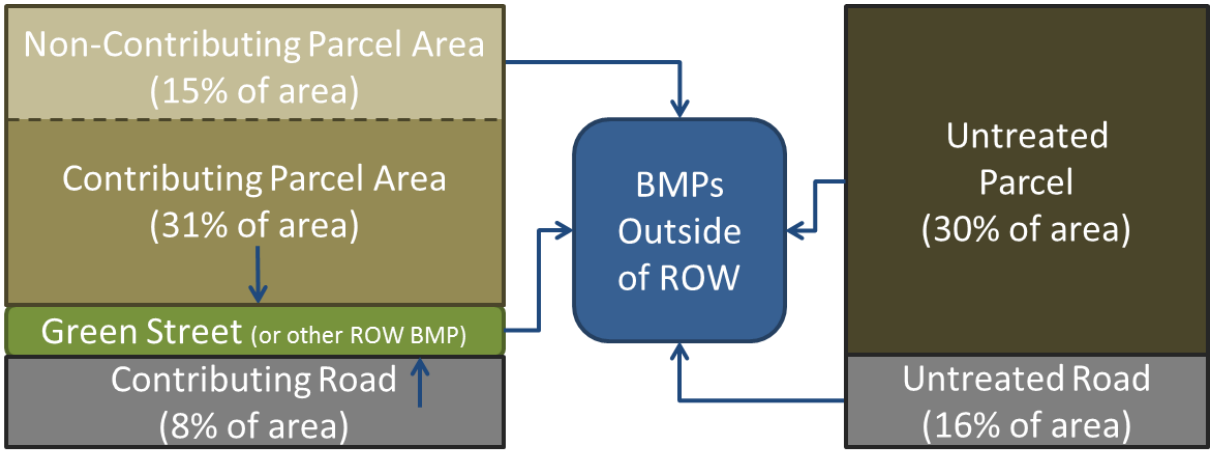

Figure 1-9. Schematic characterizing approximate distribution of routing to BMPs in the ROW for all WMP areas (arrows denote direction of runoff routing; figure not to scale).

BMP Infiltration Rates by Subwatershed

The purpose of performing the subwatershed infiltration rate analysis was to assign an average green street BMP infiltration rate to each subwatershed using soils data. Infiltration rates were assigned at the subwatershed level, which is the finest resolution at which the model performs hydrologic and water quality computations.

Soil data coverage provided through the LACDPW categorized soil unit areas into soil types. Runoff coefficient curves reported in the Hydrology Manual were developed by LACDPW for each soil type using double ring infiltrometer tests performed on areas of homogeneous runoff characteristics (LACDPW 2006). LADPW employed a sprinkling-type infiltrometer to perform the tests in each homogeneous area.

Runoff coefficient curves represent the response of the runoff coefficient (defined as the ratio of runoff to rainfall from a land area) to varying rainfall intensities. Each curve displays an inflection point representing the rainfall intensity at which substantial runoff initiates. According to LADPW (2006), each curve was assigned a minimum runoff coefficient of 0.1, "indicating that there is some runoff even at the smallest rainfall intensities." If it is assumed that substantial runoff initiates when the intensity of rainfall is greater than the soil's inherent infiltration rate, then the infiltration rate can be assumed equal to the rainfall intensity at the inflection point (less the assumed minimum runoff).

As demonstrated conceptually in Figure 1-10, the inflection point, and subsequently calculated infiltration rate, for each unique soil type in the WMP areas were identified using the runoff coefficient curves in Appendix C of the *Hydrology Manual* (LADPW 2006). Subwatershed areas were then intersected with the soil type coverage to calculate an area-weighted infiltration rate. Attachment C shows the distribution of the infiltration rates.

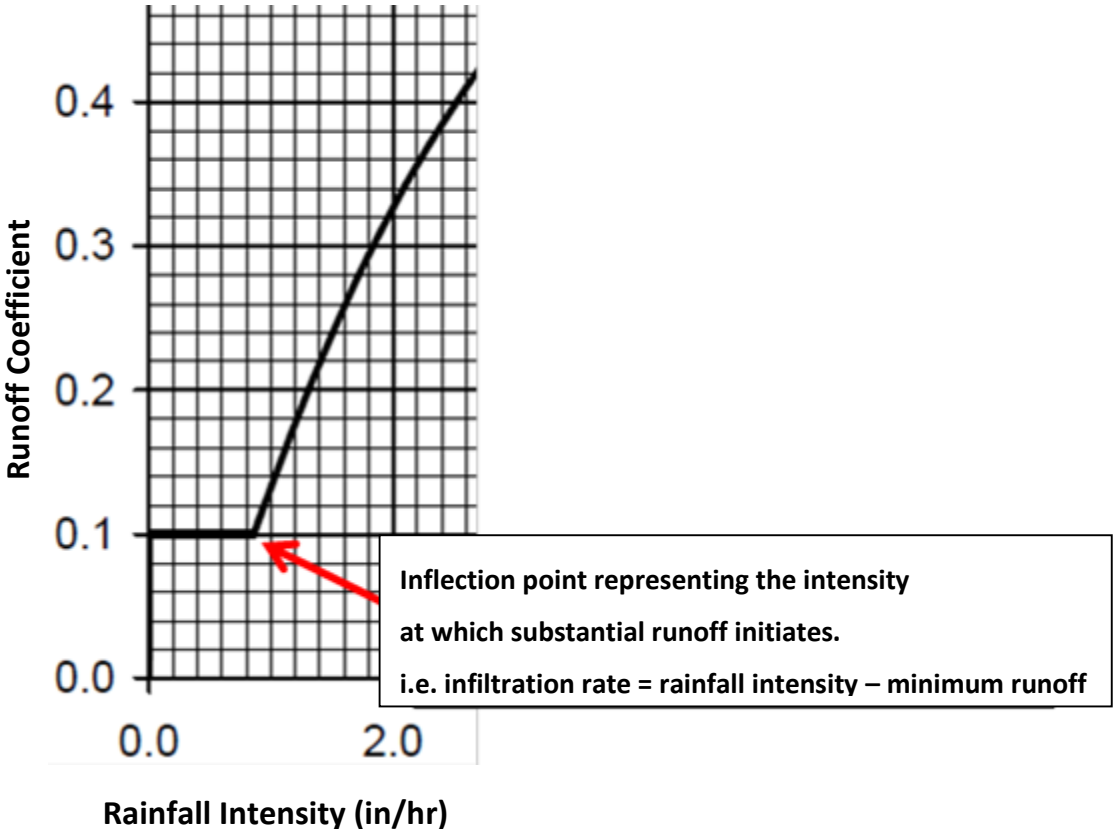

Figure 1-10. Example determination of runoff coefficient inflection point for an arbitrary soil type in Appendix C of LACDPW (2006).

1.3. LID on Public Parcels Assessment

Retrofitting public parcels with LID can be an efficient strategy for reducing stormwater runoff. This method allows municipalities the flexibility to prioritize and schedule stormwater projects to coincide with improvements that are already on the books (such as scheduled parking lot resurfacing, utility work, and public park improvements). Implementing LID on public parcels also allows municipalities the freedom to construct, inspect, and maintain BMPs without the need to purchase private property or to create stormwater easements.

The spatial extent of public parcels in each subwatershed was identified by selecting all parcels labeled as public by their assessors identification number (AIN). A total of 7,052 acres of public land was identified during this process (7% of the total WMP area). Each public parcel was assumed to implement BMPs that would treat the 85th percentile, 24-hour storm. The BMP volume was assumed to equal the 85th percentile, 24-hour storm depth times the impervious area.

LID retrofits are not feasible in all locations due to steep slopes, soil contamination hazards, and other constrains. The total runoff to be retained on public parcels was therefore discounted by 30% in order to provide a more realistic goal; this estimate was made in the lack of more detailed data, based on past LID screening exercises performed in Los Angeles County. The discount factor should be refined as actual public project sites are screened and prioritized.

1.4. Existing, Planned, and Potential BMPs

Existing and planned BMPs throughout the WMP areas were identified by the jurisdictions. These BMPs will provide capacity to reduce the annual storm runoff volume and demonstrate progress towards achieving the target runoff volume reduction.

1.4.1. Modeled Existing/Planned Subwatershed-Scale Regional BMPs

Regional BMPs that treat large portions of, or entire, subwatersheds (i.e. those with drainage areas larger than 50 acres) were modeled to quantify the impact to the upstream jurisdictions. The modeling approach and predicted performance for these specific sites is detailed in the following subsections. It is important to note that modeling was performed at a planning level coincident with the resolution of the subwatershed-scale WMMS model. Limited data were available to represent the sites, so conservative engineering assumptions were applied where appropriate. The calculated equivalent volume reductions from the BMPs can be refined during the adaptive management process once detailed design and monitoring data become available for the sites.

DeForest Wetlands Project

The DeForest Wetlands Project is located along the east bank of the Los Angeles River in the City of Long Beach and is comprised of approximately 34 acres of restored terrestrial and freshwater habitat and recreational amenities. The Project provides both groundwater recharge and surface water quality improvement. Site and modeling details are listed in Table 1-7.

Table 1-7. DeForest Wetlands Project details

Parameter	Value	Unit	Notes, Assumptions
Site Overview			
WMP Area	Lower Los Angeles River		
Location	City of Long Beach		
Status	In Development		
Compliance Targets for Contributing Subwatersheds[1]	**248.7**	**ac-ft/yr**	Subwatershed 486066
	247.6	**ac-ft/yr**	Subwatershed 486068
Given Details			
Drainage Area	1490	ac	Delineated in GIS using WMMS subwatershed boundaries
Average Annual Infiltration Volume	15-35	ac-ft/yr	Per Section 3 of the WMP
Average Annual Treated Volume	800-1000	ac-ft/yr	Per Section 3 of the WMP; assumed volume is fully treated by wetland pollutant removal mechanisms prior to discharge; assumed treated volume is in addition to infiltration volume
Annual Runoff Volume Entering Wetland[1]	1589	ac-ft/yr	WMMS output
Annual Zinc Load Entering Wetland[1]	1808	lb Zn/yr	WMMS output
Wetland Zinc Effluent Concentration	20	µg/L	Upper limit of 95% confidence interval for wetland channels, per RAA Guidelines (LARWQCB 2014)
Modeling Results			
Estimated Annual Zinc Load Reduced by Infiltration[1]	17.1	lb Zn/yr	Assumed loading associated with minimum average infiltrated runoff; assumed load sequestered in sediments and/or sorbed to underlying soils
Estimated Annual Zinc Load Reduced by Wetland Functions[1]	535	lb Zn/yr	Reduction associated with treated volume; calculated by subtracting average effluent load associated with minimum treated volume from annual influent loading
Estimated Zinc Load Reduction	30.5%		

RB-AR8151

Relative to Annual Runoff[1]			
Estimated Zinc Load Reduction Relative to Compliance Target[1]	97.7%		
Estimated Equivalent Annual Volume Reduction[1]	**243.1**	**ac-ft/yr**	Subwatershed 486066
	242.0	**ac-ft/yr**	Subwatershed 486068

[1] Indicated annual volumes are referenced to the critical year

Dominguez Gap Wetlands Project

The Dominguez Gap Wetlands Project consists of two treatment wetlands situated on the east and west banks of the Los Angeles River that features habitat and recreational amenities. The East Basin is a 37-ac facility that is dewatered manually by a pump. The West Basin primarily functions as an infiltration basin and is approximately 15 acres. Table 1-8 and Table 1-10 characterize the site and modeling details of the East and West Basins, respectively.

Table 1-8. Dominguez Gap East Wetlands Project – East Basin details

Parameter	Value	Unit	Notes, Assumptions
Site Overview			
WMP Area	Lower Los Angeles River		
Location	City of Long Beach		
Status	Complete		
Compliance Targets for Contributing Subwatersheds[1]	**346.9**	**ac-ft/yr**	Subwatershed 486014
	14.3	**ac-ft/yr**	Subwatershed 446014
Given Details			
Drainage Area	2075	ac	Delineated in GIS using WMMS subwatershed boundaries
Maximum Volume Treated per Storm Event	71	ac-ft	Per Section 3 of the WMP; assumed volume is fully treated by wetland pollutant removal mechanisms prior to discharge
Maximum Annual Volume Treated[1]	526	ac-ft/yr	Based on storm events recorded for critical year; assumed all storm event runoff volume treated up to 71 ac-ft
Annual Runoff Volume Entering Wetland[1]	913	ac-ft/yr	WMMS output
Annual Zinc Load Entering Wetland[1]	934	lb Zn/yr	WMMS output
Wetland Zinc Effluent Concentration	20	µg/L	Upper limit of 95% confidence interval for wetland channels, per RAA Guidelines (LARWQCB 2014)
Modeling Results			
Annual Zinc Load Reduced by Infiltration[1]	unknown	lb Zn/yr	Site soil information or monitored data required
Annual Zinc Load Reduced by Wetland Functions[1]	202	lb Zn/yr	Reduction associated with treated volume; calculated by subtracting average effluent load associated with minimum treated volume from annual influent loading
Zinc Load Reduction Relative to Annual Runoff[1]	22%		
Zinc Load Reduction Relative to Compliance Target[1]	55%		
Equivalent Annual Volume Reduction[1]	**191.7**	**ac-ft/yr**	Subwatershed 486014
	6.4	**ac-ft/yr**	Subwatershed 446014

[1] Indicated annual volumes are referenced to the critical year

Table 1-9. Dominguez Gap Wetlands Project – West Basin details

Parameter	Value	Unit	Notes, Assumptions
Site Overview			
WMP Area	Lower Los Angeles River		
Location	City of Long Beach		
Status	Complete		
Compliance Targets for Contributing Subwatersheds[1]	**152.0**	**ac-ft/yr**	Subwatershed 486013 (41% contributes to West Basin)
	7.4	**ac-ft/yr**	Subwatershed 486015
Given Details			
Drainage Area	299	ac	Delineated in GIS using WMMS subwatershed boundaries
Annual Runoff Volume Infiltrated	All	ac-ft/yr	Per Section 3 of the WMP, no connection to Los Angeles River
Modeling Results			
Subwatershed 486013 Annual Runoff Volume Infiltrated[1]	47%		41% of subwatershed area contributes 47% of runoff volume to the basin
Subwatershed 446015Annual Runoff Volume Infiltrated	100%		100% of subwatershed area contributing
Equivalent Annual Volume Reduction[1]	**152.0**	**ac-ft/yr**	Subwatershed 486013 (compliance target is 43% annual reduction, so meets target)
	7.4	**ac-ft/yr**	Subwatershed 446015

[1] Indicated annual volumes are referenced to the critical year

Willow Springs Park

The Willow Springs Park project will convert a public parcel to a 47-acre park. The park will contain bioswales and a water feature integrated into a recreational spaces. Table 1-10 Characterizes the site and modeling details.

Table 1-10. Willow Springs Park details

Parameter	Value	Unit	Notes, Assumptions
Site Overview			
WMP Area	Lower Los Angeles River		
Location	City of Long Beach		
Status	In Development		
Compliance Targets for Contributing Subwatersheds[1]	**26.5**	**ac-ft/yr**	Subwatershed 776012
	7.2	**ac-ft/yr**	Subwatershed 486012
Given Details			
Drainage Area	211	ac	Delineated in GIS using WMMS subwatershed boundaries
Total BMP Footprint	11	Ac	Per Section 3 of the WMP; natural channels/bioswales with very high infiltration rates
Underlying soil infiltration rates	0.9	In/hr	WMMS
Subwatershed area contributing	95%		
Modeling Results			
Maximum infiltration rate over footprint of BMP	0.83	ac-ft/hr	Assumed constant infiltration over entire footprint, applied to each time step of model runoff output draining to park – meets compliance target via infiltration
Equivalent Annual Volume Reduction[1]	**26.5**	**ac-ft/yr**	Subwatershed 776012
	7.2	**ac-ft/yr**	Subwatershed 446012

[1] Indicated annual volumes are referenced to the critical year

Discovery Park Infiltration Basin

An existing infiltration basin located at 12400 Columbia Way in the City of Downey treats runoff from approximately 51 acres (5% of the subwatershed in which the site is located). Field observations indicate that the facility has capacity to infiltration runoff at a rate of 2 in/hr (equivalent to approximately 4 ac-ft/day) in addition to detention storage. Table 1-11 reports the simplified modeling assumptions for this BMP – upon further evaluation of as-built conditions, the associated volume reduction can be refined during the adaptive management process.

Table 1-11. Discovery Park Infiltration Basin details

Parameter	Value	Unit	Notes, Assumptions
Site Overview			
WMP Area	Lower San Gabriel River		
Location	City of Downey		
Status	Complete		
Compliance Targets for Treated Subwatersheds[1]	**80.6**	**ac-ft/yr**	Subwatershed 245115
Given Details			
Drainage Area	51	ac	
Observed Infiltration Rate	4	ac-ft/day	Per Gerald Green, personal communication, 2014, February 2
Percentage of Subwatershed Contributing to BMP	5%		
Approximate Runoff Volume Draining to BMP[1]	44	ac-ft/yr	WMMS
Modeling Results			
Equivalent Annual Volume Reduction[1]	**24**	**ac-ft/yr**	Assumed constant infiltration over entire footprint, applied to each time step of model runoff output draining to park

[1] Indicated annual volumes are referenced to the critical year

Parque Dos Rios

Parque Dos Rios is located at the confluence of the Los Angeles River and Rio Hondo River. An approximately 30-ac area between the freeway and the Los Angeles River will be converted to an infiltration basin to treat additional upstream area. Currently, the site is self-retaining open space and is characterized in the baseline model as such. No further runoff volume reductions were calculated for this site; as design details are finalized for the infiltration basin improvements, associated volume reductions can be applied towards upstream jurisdictional compliance targets.

1.4.2. Identified Parcel-Scale Regional and Distributed BMPs

The jurisdictions within the WMP areas compiled detailed lists of BMPs intended to treat areas smaller than 50 acres. As with the preceding regional BMPs, these strategies represent progress towards achieving the compliance target in each respective jurisdiction. The distributed BMPs are listed in Attachment D and can be applied towards meeting the compliance targets in each jurisdiction.

The WMP groups have identified additional potential regional BMPs and these are listed in Section 3 for LCC and Section 4 for LLAR and LSGR of the respective WMP.

1.5. Non-MS4 Facility Runoff

Each jurisdiction is the Group's WMP area is subject to stormwater runoff from non-MS4 facilities. In particular, Caltrans roads and facilities regulated by nontraditional or general industrial permits contribute to the runoff volume for each subwatershed. It will be important for these entities to retain their runoff and/or eliminate their cause/contribution to receiving water exceedances. The runoff from these non-MS4 facilities was therefore estimated and subtracted from the treatment target as described below.

1.5.1. Non-MS4 Permitted Areas

Non-MS4 permitted areas were identified based on the address list of permittees on the State Water Resources Control Board (SWRCB) website. Using the address information, corresponding parcel areas were selected using the LA County Assessor Parcel Viewer and the associated GIS Shapefile. The percentage of permitted land use area relative to the total land use area was calculated and the associated non-MS4 permitted area runoff as extracted from the WMMS runoff response output.

1.5.2. Caltrans

The design storm runoff generated by Caltrans facilities was estimated using WMMS land use data. Areas labeled as Transportation consist of freeways and other extensive transportation facilities that tend to fall under Caltrans jurisdiction (versus areas labeled as Secondary Roads, which are managed by local transportation departments); these areas were assumed to be Caltrans facilities. Runoff from Transportation land uses, less runoff from any overlapping non-MS4 permitted areas identified above, was extracted from the WMMS model output for each subwatershed.

1.6. Institutional BMPs and Minimum Control Measures

It is challenging to accurately quantify most institutional BMP and minimum control measure (MCM) benefits in terms of pollutant load reductions because they generally require extensive survey and monitoring information to quantify. In addition, nonstructural BMPs may target pollutants, land uses, or populations, resulting in different load reductions depending on the implementation technique. A number of MCMs are outlined in each WMP, representing an array of practices to most effectively address pollutants at their source or affect their transport. For the purposes of the RAA, a 10% reduction was assumed to represent the cumulative impact of these practices during both wet and dry conditions. Another explicitly modeled nonstructural BMP was a goal to reduce 25% of irrigation of urban vegetation, a goal that can result from a myriad of practices ranging from public education, enforcement, incentive programs, creative water rate structures, etc. The 25% reduction in irrigation was modeled directly in LSPC and is the primary driver for dry weather flow reductions. Pollutant load reductions from these nonstructural BMPs were subtracted from loads simulated in the baseline model to quantify progress towards meeting the watershed numeric goals. Results of both the 10% reduction for collective MCMs, in addition to irrigation reduction, are presented in Section 7 of the main RAA report for both wet and dry conditions.

Attachment B: Detailed Jurisdictional Compliance Tables

Submitted to:

LLAR WMP Group LCC WMP Group LSGR WMP Group

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January 15, 2015

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B1. Lower Los Angeles River WMP – MS4 vs Non-MS4

B1.1. City of Downey

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
6076	17.1	17.0	0.1
6077	123.0	123.0	-
6079	210.3	176.4	33.9
6082	0.3	0.3	-
6100	11.4	10.7	0.7
6102	143.8	143.8	-
6103	0.0	-	0.0
6104	37.1	37.1	-
6106	100.2	76.4	23.9
6111	82.1	69.5	12.6
6113	0.6	0.6	0.0
Grand Total	726.0	654.7	71.2

B1.2. City of Lakewood

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
6014	14.3	14.3	-
Grand Total	14.3	14.3	-

B1.3. City of Long Beach

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
6001	17.7	0.0	17.7
6002	387.5	378.7	8.8
6003	430.0	429.9	0.1
6004	3.4	2.4	1.0
6005	29.9	6.6	23.3
6006	55.9	35.9	20.0
6007	110.5	67.0	43.5
6008	172.5	144.0	28.5
6009	160.5	159.5	1.1
6010	128.3	100.8	27.5
6011	202.2	184.8	17.4
6012	7.2	0.0	7.2
6013	152.0	12.3	139.6
6014	346.9	346.9	-
6015	7.4	4.3	3.1
6016	3.0	0.0	3.0
6017	1.9	1.1	0.9
6018	49.3	45.8	3.5
6065	89.8	36.7	53.2
6066	248.7	202.6	46.1
6067	83.9	25.3	58.6
6068	247.6	222.5	25.1
6069	102.2	42.6	59.6
6070	83.4	22.2	61.2
6071	276.3	94.4	181.9
6072	0.3	0.3	-
7016	503.6	473.3	30.3
Grand Total	3,901.7	3,039.6	862.1

B1.4. City of Lynwood

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
6023	40.3	26.3	13.9
6024	16.1	10.6	5.4
6028	11.2	11.2	-
6030	168.8	45.2	123.6
6031	145.5	133.0	12.5
6032	115.7	60.5	55.2
6033	130.0	113.3	16.6
6074	185.2	134.9	50.4
6078	59.8	0.0	59.8
6080	146.6	91.7	54.9
6081	76.8	41.3	35.5
6082	12.2	0.0	12.2
Grand Total	1,108.1	667.9	440.2

B1.5. City of Paramount

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
6069	0.0	0.0	-
6071	157.1	120.7	36.4
6072	183.8	172.9	10.9
6073	124.1	61.4	62.6
6075	181.8	163.7	18.1
6076	227.8	65.7	162.1
6078	112.3	21.7	90.6
6080	1.9	0.0	1.9
Grand Total	988.8	606.1	382.7

B1.6. City of Pico Rivera

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
6106	86.5	44.3	42.2
6111	0.0	0.0	0.0
6112	5.9	1.4	4.5
6113	272.8	229.5	43.3
6114	0.0	0.0	-
6115	0.0	0.0	-
6116	0.0	0.0	-
6117	0.0	0.0	-
6126	12.0	12.0	-
6129	0.0	0.0	-
Grand Total	377.3	287.2	90.0

B1.7. City of Signal Hill

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
6002	106.6	105.8	0.8
6003	43.7	43.7	-
6007	6.4	0.0	6.4
6009	8.3	8.2	0.1
6011	6.3	6.0	0.3
6012	26.6	25.2	1.4
Grand Total	197.9	188.9	9.0

B1.8. City of South Gate

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
6031	148.6	148.6	-
6033	70.0	61.9	8.1
6034	422.9	416.7	6.3
6076	125.9	92.5	33.4
6078	0.0	0.0	-
6079	68.9	54.4	14.6
6080	48.7	48.7	-
6082	137.6	82.8	54.7
6083	36.2	11.5	24.7
6084	159.7	137.8	21.9
6085	67.8	0.0	67.8
6089	35.7	18.3	17.4
6090	43.8	3.4	40.4
6096	0.6	0.6	-
6098	0.1	0.1	-
6100	80.6	51.2	29.4
6101	25.0	25.0	-
6102	6.3	6.3	-
6104	7.4	7.4	-
6350	18.6	0.0	18.6
6351	8.2	7.1	1.0
Grand Total	1,512.6	1,174.3	338.2

B2. Lower Los Angeles River WMP – Compliance Tables

B2.1. City of Downey

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
6076	Final	17.0	-	-	1.2	-	1.2
6077	Final	123.0	0.3	11.8	1.2	6.4	19.6
6079	50%	176.4	0.7	1.7	10.1	-	12.5
6082	Final	0.3	-	-	0.0	0.0	0.0
6100	50%	10.7	0.0	0.8	0.0	0.6	1.4
6102	31%	143.8	1.1	12.2	0.7	7.1	21.1
6103	Final	-	0.7	-	-	-	0.7
6104	Final	37.1	0.3	3.2	0.0	0.9	4.5
6106	Final	76.4	0.4	9.1	1.6	-	11.1
6111	Final	69.5	0.3	7.1	0.5	3.3	11.2
6113	Final	0.6	-	0.0	-	0.1	0.1
Grand Total		654.7	3.8	45.9	15.3	18.4	83.4

B2.2. City of Lakewood

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
6014	31%	7.9	-	1.1	0.0	-	1.2
Grand Total		7.9	-	1.1	0.0	-	1.2

B2.3. City of Long Beach

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
6001	Final	-	-	-	-	-	-
6002	50%	378.7	-	23.8	5.2	19.3	48.3
6003	Final	429.9	-	22.4	1.4	32.8	56.5
6004	50%	2.4	-	0.1	-	0.3	0.3
6005	31%	6.6	-	1.0	0.0	-	1.0
6006	Final	35.9	-	0.3	0.1	4.1	4.5
6007	Final	67.0	-	6.4	0.1	4.0	10.6
6008	Final	144.0	-	13.9	2.0	3.5	19.4
6009	Final	159.5	-	11.5	0.7	9.2	21.4
6010	Final	100.8	-	8.2	0.9	4.8	13.9
6011	Final	184.8	-	14.4	0.9	9.6	24.9
6012	31%	-	-	-	-	-	-
6013	50%	-	-	-	-	-	-
6014	Final	155.2	-	15.0	7.9	-	22.9
6015	31%	-	-	-	-	-	-
6016	Final	-	-	-	-	-	-
6017	50%	1.1	-	-	-	0.1	0.1
6018	Final	45.8	-	4.3	-	2.6	6.9
6065	Final	36.7	-	0.4	0.0	4.6	5.0
6066	31%	-	-	-	-	-	-
6067	50%	25.3	-	2.6	0.3	0.5	3.3
6068	31%	-	-	-	-	-	-
6069	50%	42.6	-	0.6	0.0	3.5	4.1
6070	50%	22.2	-	2.7	0.4	-	3.1
6071	50%	94.4	-	10.5	1.6	1.0	13.1
6072	50%	0.3	-	0.0	-	0.0	0.0
7016	Final	473.3	-	16.5	6.9	36.3	59.7
Grand Total		2,406.2	-	154.6	28.3	136.2	319.1

B2.4. City of Lynwood

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
6023	Final	26.3	-	1.0	0.7	1.6	3.3
6024	Final	10.6	-	0.4	-	1.1	1.4
6028	31%	11.2	-	0.8	-	0.9	1.7
6030	Final	45.2	-	4.0	2.4	-	6.4
6031	31%	133.0	-	9.9	2.0	7.5	19.4
6032	Final	60.5	-	6.0	0.4	3.4	9.8
6033	Final	113.3	-	7.4	0.2	10.7	18.2
6074	50%	134.9	-	12.8	3.8	0.1	16.8
6078	Final	-	-	-	-	-	-
6080	31%	91.7	-	7.7	0.7	4.7	13.2
6081	Final	41.3	-	4.0	0.8	0.5	5.3
6082	Final	-	-	-	-	-	-
Grand Total		667.9	-	53.9	11.1	30.5	95.5

B2.5. City of Paramount

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
6069	31%	0.0	-	-	-	-	-
6071	Final	120.7	0.0	4.9	0.9	9.9	15.6
6072	Final	172.9	0.0	7.6	1.1	13.9	22.6
6073	Final	61.4	-	1.9	0.2	4.6	6.6
6075	31%	163.7	-	9.0	1.7	10.2	20.9
6076	50%	65.7	-	7.4	0.8	0.3	8.6
6078	Final	21.7	-	0.5	0.0	1.8	2.3
6080	Final	-	-	-	-	-	-
Grand Total		606.1	0.1	31.2	4.7	40.6	76.6

B2.6. City of Pico Rivera

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
6106	31%	44.3	-	5.9	0.5	0.2	6.5
6111	Final	-	-	-	-	-	-
6112	31%	1.4	-	0.0	-	0.1	0.2
6113	31%	229.5	-	5.6	0.0	27.0	32.7
6114	Final	-	-	-	-	-	-
6115	Final	0.0	-	-	-	0.0	0.0
6116	Final	-	-	-	-	-	-
6117	Final	-	-	-	-	-	-
6126	Final	12.0	-	1.3	0.0	0.5	1.8
6129	Final	-	-	-	-	-	-
Grand Total		287.2	-	12.8	0.5	27.9	41.2

B2.7. City of Signal Hill

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
6002	50%	105.8	-	7.0	0.9	5.9	13.9
6003	Final	43.7	-	1.9	0.0	4.2	6.0
6007	Final	-	-	-	-	-	-
6009	Final	8.2	0.1	0.3	-	0.7	1.1
6011	31%	6.0	0.1	0.8	-	0.2	1.1
6012	31%	2.5	-	0.0	0.2	-	0.2
Grand Total		166.2	0.2	10.0	1.1	11.0	22.3

B2.8. City of South Gate

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
6031	31%	148.6	-	16.9	0.8	5.3	22.9
6033	Final	61.9	-	4.5	0.3	4.8	9.5
6034	Final	416.7	-	30.0	3.8	25.3	59.0
6076	50%	92.5	-	7.5	0.7	5.1	13.2
6078	Final	-	-	-	-	-	-
6079	50%	54.4	-	4.9	0.1	3.4	8.4
6080	31%	48.7	-	5.8	-	2.5	8.3
6082	Final	82.8	0.0	4.3	0.1	9.4	13.8
6083	Final	11.5	-	0.7	-	0.9	1.6
6084	Final	137.8	4.7	8.3	0.8	5.9	19.8
6085	50%	-	-	-	-	-	-
6089	Final	18.3	-	0.8	0.2	1.8	2.7
6090	Final	3.4	-	0.6	-	-	0.6
6096	31%	0.6	-	0.0	0.0	0.0	0.1
6098	31%	0.1	-	-	0.0	-	0.0
6100	50%	51.2	-	2.6	0.0	4.2	6.8
6101	31%	25.0	-	0.5	0.1	2.6	3.3
6102	31%	6.3	-	-	-	0.8	0.8
6104	Final	7.4	-	0.0	0.0	0.9	1.0
6350	Final	-	-	-	-	-	-
6351	Final	7.1	-	0.0	0.0	1.1	1.1
Grand Total		1,174.3	4.7	87.5	6.8	73.8	173.0

B3. Los Cerritos Channel WMP – MS4 vs Non-MS4

B3.1. City of Bellflower

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5507	305.0	268.1	36.9
5517	154.4	137.7	16.7
5518	235.2	233.5	1.7
5519	289.1	235.8	53.2
5523	138.8	100.4	38.5
5524	14.8	14.8	-
Grand Total	1,137.4	990.4	147.0

B3.2. City of Cerritos

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5506	0.0	0.0	-
5507	12.9	12.9	0.0
Grand Total	12.9	12.9	0.0

B3.3. City of Downey

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5524	112.8	93.0	19.8
Grand Total	112.8	93.0	19.8

B3.4. City of Lakewood

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5506	226.6	226.5	0.0
5507	176.3	176.3	-
5510	20.7	19.9	0.8
5512	143.1	138.8	4.3
5514	35.3	35.3	-
5515	26.6	26.6	-
5516	31.9	31.9	-
5517	134.4	134.4	-
5519	9.5	9.5	-
5520	164.5	164.5	-
5521	95.2	95.2	-
5522	71.9	71.9	-
5523	21.4	21.4	-
Grand Total	1,157.2	1,152.1	5.1

B3.5. City of Long Beach

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5501	0.3	0.3	0.0
5502	0.5	0.2	0.2
5503	78.2	77.8	0.4
5504	349.2	300.9	48.2
5505	133.3	130.5	2.8
5506	8.6	8.6	0.0
5508	74.6	65.6	9.0
5509	129.3	25.6	103.7
5510	807.6	152.2	655.3
5511	50.5	48.5	2.0
5512	454.0	329.5	124.5
5513	32.5	30.5	2.0
5514	153.5	152.8	0.7
5515	91.0	91.0	-
5520	7.4	7.4	-
5521	108.7	49.2	59.5
5522	50.8	48.6	2.2
5523	146.4	110.7	35.7
Grand Total	2,676.1	1,629.8	1,046.2

B3.6. City of Paramount

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5519	36.5	35.4	1.2
5523	343.3	332.6	10.7
5524	252.1	157.5	94.6
Grand Total	631.9	525.5	106.4

B3.7. City of Signal Hill

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5510	322.6	284.3	38.3
Grand Total	322.6	284.3	38.3

B4. Los Cerritos Channel WMP - Compliance Tables

B4.1. City of Bellflower

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5507	Final	268.1	-	16.7	1.2	13.2	31.1
5517	Final	137.7	-	9.3	0.8	9.3	19.4
5518	Final	233.5	-	16.8	1.2	10.2	28.2
5519	35%	176.3	-	11.4	0.9	12.1	24.4
	Final	59.5	-	-	-	3.6	3.6
5523	35%	68.0	-	3.7	0.4	4.1	8.2
	Final	32.3	-	-	-	2.0	2.0
5524	Final	14.8	-	0.2	-	1.2	1.4
Grand Total		990.4	-	58.1	4.5	55.6	118.2

B4.2. City of Cerritos

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5506	Final	0.0	-	-	-	0.0	0.0
5507	35%	9.7	-	1.0	0.0	0.5	1.4
	Final	3.2	-	-	-	0.1	0.1
Grand Total		12.9	-	1.0	0.0	0.6	1.6

B4.3. City of Downey

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5524	35%	57.2	0.1	5.3	0.0	2.7	8.1
	Final	35.8	-	-	-	2.1	2.1
Grand Total		93.0	0.1	5.3	0.0	4.8	10.2

B4.4. City of Lakewood

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5506	Final	226.5	-	31.4	2.1	5.1	38.5
5507	35%	131.0	-	15.4	2.6	1.5	19.5
	Final	45.2	-	-	-	3.6	3.6
5510	Final	19.9	-	0.4	-	1.5	1.9
5512	Final	138.8	-	7.7	0.2	7.0	14.9
5514	Final	35.3	-	3.7	1.3	0.4	5.4
5515	Final	26.6	-	3.9	0.2	0.5	4.6
5516	Final	31.9	-	4.0	0.4	0.8	5.3
5517	Final	134.4	-	18.6	1.4	2.8	22.9
5519	35%	3.1	-	0.2	-	0.2	0.4
	Final	6.4	-	-	-	0.1	0.1
5520	35%	130.9	-	14.0	2.1	4.4	20.6
	Final	33.5	-	-	-	3.3	3.3
5521	Final	95.2	-	11.6	0.6	2.2	14.3
5522	Final	71.9	-	8.7	0.8	1.6	11.1
5523	35%	17.4	-	1.9	-	0.7	2.6
	Final	4.0	-	-	-	0.3	0.3
Grand Total		1,152.1	-	121.5	11.8	36.2	169.5

B4.5. City of Long Beach

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5501	35%	0.1	-	0.0	0.0	0.0	0.0
	Final	0.1	-	-	-	0.0	0.0
5502	35%	0.1	-	0.0	0.0	0.0	0.0
	Final	0.2	-	-	-	0.0	0.0
5503	35%	57.7	-	4.2	2.3	2.0	8.5
	Final	20.1	-	-	-	1.7	1.7
5504	35%	196.6	-	10.2	3.3	8.7	22.2
	Final	104.4	-	-	-	5.5	5.5
5505	Final	130.5	-	15.9	1.6	3.2	20.7
5506	Final	8.6	-	0.1	0.2	0.4	0.7
5508	Final	65.6	-	7.7	0.9	1.7	10.3
5509	Final	25.6	-	-	2.2	-	2.2
5510	Final	152.2	-	9.8	0.9	6.1	16.8
5511	Final	48.5	-	6.7	0.2	1.3	8.1
5512	Final	329.5	-	22.2	1.7	16.8	40.7
5513	35%	23.9	-	1.5	0.1	2.1	3.7
	Final	6.6	-	-	-	0.4	0.4
5514	35%	106.0	-	10.9	5.9	-	16.7
	Final	46.8	-	3.7	-	2.8	6.5
5515	Final	91.0	-	10.8	1.7	2.3	14.9
5520	Final	7.4	-	0.8	-	0.3	1.2
5521	Final	49.2	-	6.0	0.1	1.8	7.9
5522	Final	48.6	-	4.2	0.0	3.1	7.3
5523	35%	89.3	-	7.0	0.8	3.5	11.3
	Final	21.4	-	-	-	1.6	1.6
Grand Total		1,629.8	-	121.7	21.8	65.3	208.7

B4.6. City of Paramount

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5519	35%	24.0	-	1.9	0.2	1.4	3.5
	Final	11.4	-	-	-	0.6	0.6
5523	35%	243.0	-	12.4	2.8	15.7	30.9
	Final	89.6	-	-	-	4.1	4.1
5524	Final	157.5	-	8.5	3.5	4.0	16.0
Grand Total		525.5	-	22.8	6.4	25.9	55.1

B4.7. City of Signal Hill

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5510	35%	231.6	0.0	11.2	1.2	14.2	26.6
	Final	52.7	-	-	-	2.0	2.0
Grand Total		284.3	0.0	11.2	1.2	16.2	28.6

B5. Lower San Gabriel River (San Gabriel River) WMP – MS4 vs Non-MS4

B5.1. City of Artesia

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5109	1.1	1.1	-
Grand Total	1.1	1.1	-

B5.2. City of Bellflower

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5110	0.0	0.0	-
5112	0.7	0.6	0.2
5113	56.8	51.5	5.3
5114	0.0	0.0	-
5115	1.3	1.3	-
5116	0.1	0.1	-
5118	3.9	3.9	-
Grand Total	62.8	57.4	5.4

B5.3. City of Cerritos

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5107	0.0	0.0	-
5108	0.0	0.0	-
5109	40.7	0.0	40.7
5110	2.9	2.9	-
5111	6.8	0.0	6.8
5112	2.3	1.2	1.2
5113	0.0	0.0	-
5516	6.6	0.0	6.6
Grand Total	59.4	4.1	55.3

B5.4. City of Diamond Bar

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5197	0.0	0.0	-
5198	0.0	0.0	-
5203	12.6	0.0	12.6
5204	3.8	0.0	3.8
5205	1.0	1.0	-
5212	15.3	0.0	15.3
5213	0.3	0.0	0.3
Grand Total	33.0	1.1	32.0

B5.5. City of Downey

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5113	0.0	0.0	-
5114	78.3	22.4	55.9
5115	80.6	0.0	80.6
5118	0.0	0.0	0.0
5119	52.5	52.5	-
5122	4.3	0.0	4.3
5124	0.0	0.0	0.0
5125	38.4	2.5	35.8
5126	9.8	9.8	-
5127	0.0	0.0	-
5128	0.0	0.0	-
Grand Total	263.9	87.3	176.7

B5.6. City of Lakewood

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5105	0.8	0.8	-
5106	7.4	0.0	7.4
5107	0.0	0.0	-
5108	1.4	1.4	-
5110	0.0	0.0	-
Grand Total	9.6	2.2	7.4

B5.7. City of Long Beach

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5102	0.0	0.0	-
5103	26.9	26.9	-
5104	2.3	2.3	-
5105	0.0	0.0	-
5106	0.0	0.0	-
Grand Total	29.2	29.2	-

B5.8. City of Norwalk

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5109	0.8	0.8	-
5116	0.5	0.0	0.5
5117	14.5	0.0	14.5
5118	3.7	0.1	3.5
5120	39.1	0.0	39.1
5121	41.5	3.9	37.6
5122	34.7	0.0	34.7
5124	2.2	0.0	2.2
Grand Total	136.9	4.8	132.1

B5.9. City of Pico Rivera

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5127	0.0	0.0	-
5128	10.9	6.4	4.5
5130	6.2	6.1	0.1
5131	17.2	11.7	5.5
5132	0.0	0.0	-
5135	4.3	4.3	-
5136	7.2	7.2	-
5137	0.2	0.2	-
5139	7.8	7.8	-
5140	0.0	0.0	-
5141	4.9	4.9	-
5142	0.0	0.0	-
5143	8.9	8.9	-
5144	3.8	0.0	3.8
5145	1.7	1.7	-
5147	0.0	0.0	-
5148	0.2	0.2	0.0
5149	0.0	0.0	-
5150	0.3	0.0	0.3
5151	0.3	0.0	0.3
5153	1.0	1.0	-
5154	0.0	0.0	-
Grand Total	75.1	60.4	14.7

B5.10. City of Santa Fe Springs

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5120	3.1	3.1	0.0
5122	11.0	0.0	11.0
5123	80.0	23.9	56.2
5127	0.0	0.0	0.0
5129	4.5	0.0	4.5
5130	1.7	0.0	1.7
5132	0.0	0.0	-
5133	0.1	0.0	0.1
5134	5.6	3.3	2.3
5135	0.0	0.0	-
Grand Total	106.0	30.3	75.8

B5.11. City of Whittier

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5138	7.1	7.1	-
5142	0.0	0.0	0.0
5146	0.4	0.0	0.4
5147	0.0	0.0	-
5148	0.0	0.0	-
5153	0.0	0.0	-
5173	0.0	0.0	-
Grand Total	7.5	7.1	0.4

B6. Lower San Gabriel River (San Gabriel River) WMP – Compliance Tables

B6.1. City of Artesia

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5109	35%	1.1	-	-	0.1	-	0.1
Grand Total		1.1	-	-	0.1	-	0.1

B6.2. City of Bellflower

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5110	Final	0.0	-	-	-	0.0	0.0
5112	Final	0.6	-	0.1	0.0	-	0.1
5113	Final	51.5	-	0.9	3.4	-	4.3
5114	Final	-	-	-	-	-	-
5115	35%	1.3	-	0.2	0.0	-	0.2
5116	Final	0.1	-	-	-	0.0	0.0
5118	Final	3.9	-	0.6	0.3	-	0.9
Grand Total		57.4	-	1.8	3.7	0.0	5.5

B6.3. City of Cerritos

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5107	Final	-	-	-	-	-	-
5108	Final	-	-	-	-	-	-
5109	Final	-	-	-	-	-	-
5110	Final	2.9	-	0.4	0.0	-	0.4
5111	Final	-	-	-	-	-	-
5112	Final	1.2	-	0.2	0.0	-	0.2
5113	Final	-	-	-	-	-	-
5116	35%	-	-	-	-	-	-
Grand Total		4.1	-	0.6	0.0	-	0.6

B6.4. City of Diamond Bar

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5197	Final	0.0	-	0.0	-	-	0.0
5198	Final	-	-	-	-	-	-
5203	Final	-	-	-	-	-	-
5204	Final	-	-	-	-	-	-
5205	Final	1.0	-	0.2	-	-	0.2
5212	Final	-	-	-	-	-	-
5213	35%	-	-	-	-	-	-
Grand Total		1.1	-	0.2	-	-	0.2

B6.5. City of Downey

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5113	Final	-	1.0	-	-	-	1.0
5114	Final	22.4	0.8	2.1	0.4	-	3.3
5115	Final	-	0.6	-	-	-	0.6
5118	Final	-	0.6	-	-	-	0.6
5119	Final	52.5	3.3	6.4	-	-	9.7
5122	35%	-	0.0	-	-	-	0.0
5124	Final	-	0.0	-	-	-	0.0
5125	Final	2.5	0.4	0.1	-	-	0.5
5126	Final	9.8	0.3	1.4	-	-	1.7
5127	Final	-	0.1	-	-	-	0.1
5128	Final	-	0.0	-	-	-	0.0
Grand Total		87.3	7.1	10.0	0.4	-	17.5

B6.6. City of Lakewood

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5105	Final	0.8	-	-	0.0	0.1	0.1
5106	35%	-	-	-	-	-	-
5107	Final	-	-	-	-	-	-
5108	Final	1.4	-	0.2	0.0	-	0.2
5110	Final	-	-	-	-	-	-
Grand Total		2.2	-	0.2	0.0	0.1	0.4

B6.7. City of Long Beach

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5102	Final	-	-	-	-	-	-
5103	35%	26.9	-	1.1	1.3	-	2.4
5104	Final	2.3	-	0.3	-	-	0.3
5105	Final	-	-	-	-	-	-
5106	Final	0.0	-	-	-	0.0	0.0
Grand Total		29.2	-	1.4	1.3	0.0	2.7

B6.8. City of Norwalk

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5109	35%	0.8	-	-	0.1	-	0.1
5116	Final	-	-	-	-	-	-
5117	Final	-	-	-	-	-	-
5118	Final	0.1	-	-	0.0	-	0.0
5120	Final	-	-	-	-	-	-
5121	Final	3.9	-	-	0.3	-	0.3
5122	Final	-	-	-	-	-	-
5124	Final	-	-	-	-	-	-
Grand Total		4.8	-	-	0.3	-	0.3

B6.9. City of Pico Rivera

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5127	Final	0.0	-	-	-	0.0	0.0
5128	Final	6.4	-	1.2	-	-	1.2
5130	Final	6.1	-	1.1	-	-	1.1
5131	Final	11.7	-	2.0	-	-	2.0
5132	Final	0.0	-	-	-	0.0	0.0
5135	Final	4.3	-	0.8	-	-	0.8
5136	Final	7.2	-	1.3	-	-	1.3
5137	35%	0.2	-	0.0	-	-	0.0
5139	Final	7.8	-	1.4	-	-	1.4
5140	Final	-	-	-	-	-	-
5141	Final	4.9	-	0.8	-	-	0.8
5142	Final	-	-	-	-	-	-
5143	Final	8.9	-	1.6	-	-	1.6
5144	Final	-	-	-	-	-	-
5145	Final	1.7	-	0.3	-	-	0.3
5147	Final	-	-	-	-	-	-
5148	Final	0.2	-	0.0	-	-	0.0
5149	Final	0.0	-	-	-	-	-
5150	Final	-	-	-	-	-	-
5151	Final	-	-	-	-	-	-
5153	Final	1.0	-	0.2	-	-	0.2
5154	Final	-	-	-	-	-	-
Grand Total		60.4	-	10.8	-	0.0	10.8

B6.10. City of Santa Fe Springs

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5120	Final	3.1	-	0.2	-	0.3	0.5
5122	Final	-	-	-	-	-	-
5123	Final	23.9	-	3.8	-	-	3.8
5127	35%	-	-	-	-	-	-
5129	Final	-	-	-	-	-	-
5130	Final	-	-	-	-	-	-
5132	Final	-	-	-	-	-	-
5133	Final	-	-	-	-	-	-
5134	Final	3.3	-	0.6	-	-	0.6
5135	Final	0.0	-	0.0	-	0.0	0.0
Grand Total		30.3	-	4.6	-	0.3	4.9

B6.11. City of Whittier

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5138	Final	7.1	-	1.4	-	-	1.4
5142	Final	-	-	-	-	-	-
5146	Final	-	-	-	-	-	-
5147	Final	-	-	-	-	-	-
5148	Final	-	-	-	-	-	-
5153	35%	0.0	-	-	-	0.0	0.0
5173	Final	-	-	-	-	-	-
Grand Total		7.1	-	1.4	-	0.0	1.4

RB-AR8189

B7. Lower San Gabriel River WMP (Coyote Creek) – MS4 vs Non-MS4

B7.1. City of Artesia

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5008	0.0	0.0	-
5018	47.9	15.9	32.0
Grand Total	47.9	15.9	32.0

B7.2. City of Cerritos

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5008	41.7	7.7	34.0
5016	0.0	0.0	-
5017	4.3	4.3	-
5018	49.7	14.9	34.8
5023	0.0	0.0	-
5024	48.7	0.0	48.7
5026	5.8	5.8	0.1
5028	12.2	0.0	12.2
5029	4.9	4.9	-
5030	0.1	0.1	0.0
5035	3.8	0.0	3.8
5036	2.2	1.2	1.0
5038	0.0	0.0	-
5059	16.0	15.1	0.8
5060	0.0	0.0	-
5061	4.9	2.6	2.3
Grand Total	194.3	56.7	137.6

B7.3. City of Diamond Bar

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5053	0.0	0.0	-
5054	1.0	1.0	-
5055	8.4	8.4	-
5056	10.6	0.0	10.6
5057	26.8	0.0	26.8
5058	27.2	27.2	-
Grand Total	74.0	36.7	37.4

B7.4. City of Hawaiian Gardens

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5004	0.0	0.0	-
5007	27.0	23.6	3.4
5009	0.1	0.1	-
5013	1.3	1.3	-
5014	2.1	2.1	-
Grand Total	30.4	27.1	3.4

B7.5. City of La Mirada

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5037	0.0	0.0	-
5038	1.1	0.0	1.1
5039	7.5	0.0	7.5
5040	2.1	0.0	2.1
5041	2.0	0.0	2.0
5042	0.0	0.0	0.0
5043	34.8	19.1	15.7
5044	0.8	0.0	0.8
5045	0.8	0.0	0.8
5059	1.4	1.4	-
5060	0.9	0.0	0.9
5062	40.4	20.5	19.9
5063	37.0	37.0	-
5064	0.0	0.0	-
5067	0.0	0.0	-
5069	40.3	40.3	-
5070	0.0	0.0	-
5073	5.7	5.7	-
5074	0.8	0.8	-
5080	0.0	0.0	-
Grand Total	175.7	124.9	50.8

B7.6. City of Lakewood

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5004	0.0	0.0	-
5007	17.5	17.5	0.0
5008	8.2	2.3	5.9
5014	0.0	0.0	-
5015	0.0	0.0	-
5016	0.0	0.0	-
5017	0.0	0.0	-
Grand Total	25.7	19.7	6.0

B7.7. City of Long Beach

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5003	0.0	0.0	0.0
5004	37.5	0.0	37.5
5005	0.0	0.0	-
5007	0.0	0.0	-
5009	0.0	0.0	-
5013	0.0	0.0	-
Grand Total	37.5	0.0	37.5

B7.8. City of Norwalk

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5008	3.0	1.6	1.3
5018	36.0	2.0	34.0
5019	41.5	24.3	17.2
5020	0.0	0.0	-
5021	43.4	16.9	26.5
5022	28.7	7.7	21.0
5024	0.0	0.0	-
5025	0.0	0.0	-
5060	0.0	0.0	-
5068	0.0	0.0	-
5071	0.0	0.0	-
5073	0.0	0.0	-
Grand Total	152.5	52.5	99.9

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B7.9. City of Santa Fe Springs

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5019	0.0	0.0	-
5020	27.7	0.0	27.7
5022	13.5	0.0	13.5
5024	0.0	0.0	-
5025	31.2	0.0	31.2
5060	28.9	0.0	28.9
5061	0.0	0.0	-
5062	2.6	0.0	2.6
5067	19.4	0.0	19.4
5068	6.1	0.0	6.1
5069	2.3	0.0	2.3
5071	50.5	0.0	50.5
5072	2.6	2.6	-
5073	23.5	0.0	23.5
5084	1.4	1.4	-
5089	19.8	0.0	19.8
5092	1.1	1.1	-
5093	22.1	0.0	22.1
5094	7.4	7.4	-
5095	0.4	0.0	0.4
Grand Total	260.7	12.6	248.1

B7.10. City of Whittier

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5045	0.0	0.0	-
5064	0.0	0.0	-
5065	3.7	3.7	-
5070	0.0	0.0	-
5079	18.5	11.7	6.8
5080	52.6	26.0	26.5
5081	2.1	0.0	2.1
5082	6.8	0.2	6.6
5083	0.0	0.0	-
5086	1.7	0.0	1.7
5087	21.0	20.8	0.2
5088	25.0	24.7	0.3
5089	0.6	0.5	0.1
5090	0.8	0.8	-
5091	6.6	5.7	0.9
5092	13.8	8.9	4.9
5093	0.0	0.0	-
5094	0.6	0.6	-
5095	24.2	21.1	3.1
5096	3.8	3.8	-
5097	5.2	5.2	-
5098	48.7	47.9	0.7
5099	11.3	10.6	0.7
5100	7.3	7.3	-
5101	0.6	0.6	-
Grand Total	254.7	200.1	54.6

B8. Lower San Gabriel River WMP (Coyote Creek) – Compliance Tables

B8.1. City of Artesia

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5008	Final	-	-	-	-	-	-
5018	35%	15.9	-	-	1.1	-	1.1
Grand Total		15.9	-	-	1.1	-	1.1

B8.2. City of Cerritos

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5008	Final	7.7	-	-	0.9	-	0.9
5016	Final	-	-	-	-	-	-
5017	Final	4.3	-	-	0.5	-	0.5
5018	Final	14.9	-	-	1.1	-	1.1
5023	Final	-	-	-	-	-	-
5024	Final	-	-	-	-	-	-
5026	Final	5.8	-	1.0	0.0	-	1.0
5028	Final	-	-	-	-	-	-
5029	Final	4.9	-	0.3	0.2	-	0.6
5030	35%	0.1	-	0.0	-	-	0.0
5035	Final	-	-	-	-	-	-
5036	Final	1.2	-	0.2	0.0	-	0.2
5038	Final	-	-	-	-	-	-
5059	Final	15.1	-	1.6	0.5	-	2.0
5060	Final	-	-	-	-	-	-
5061	Final	2.6	-	-	0.2	-	0.2
Grand Total		56.7	-	3.1	3.4	-	6.4

B8.3. City of Diamond Bar

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5053	Final	-	-	-	-	-	-
5054	35%	1.0	-	0.3	-	-	0.3
5055	Final	8.4	-	1.2	-	0.7	1.9
5056	Final	-	-	-	-	-	-
5057	Final	-	-	-	-	-	-
5058	Final	27.2	-	6.7	-	-	6.7
Grand Total		36.7	-	8.2	-	0.7	8.9

B8.4. City of Hawaiian Gardens

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5004	Final	-	-	-	-	-	-
5007	35%	23.6	-	0.3	1.5	-	1.8
5009	Final	0.1	-	-	-	0.0	0.0
5013	Final	1.3	-	-	0.1	-	0.1
5014	Final	2.1	-	0.2	0.0	-	0.3
Grand Total		27.1	-	0.6	1.6	0.0	2.2

B8.5. City of La Mirada

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5037	Final	-	-	-	-	-	-
5038	Final	-	-	-	-	-	-
5039	Final	-	-	-	-	-	-
5040	Final	-	-	-	-	-	-
5041	Final	-	-	-	-	-	-
5042	Final	-	-	-	-	-	-
5043	Final	19.1	-	1.9	0.6	-	2.5
5044	Final	-	-	-	-	-	-
5045	35%	-	-	-	-	-	-
5059	Final	1.4	-	0.3	-	-	0.3
5060	Final	-	-	-	-	-	-
5062	Final	20.5	-	1.0	1.1	-	2.1
5063	Final	37.0	-	-	3.0	-	3.0
5064	Final	-	-	-	-	-	-
5067	Final	-	-	-	-	-	-
5069	Final	40.3	-	5.3	0.9	-	6.2
5070	Final	-	-	-	-	-	-
5073	Final	5.7	-	1.0	-	-	1.0
5074	Final	0.8	-	0.1	-	-	0.1
5080	Final	-	-	-	-	-	-
Grand Total		124.9	-	9.6	5.6	-	15.2

B8.6. City of Lakewood

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5004	Final	-	-	-	-	-	-
5007	35%	17.5	-	0.9	0.7	-	1.6
5008	Final	2.3	-	-	0.3	-	0.3
5014	Final	-	-	-	-	-	-
5015	Final	-	-	-	-	-	-
5016	Final	-	-	-	-	-	-
5017	Final	-	-	-	-	-	-
Grand Total		19.7	-	0.9	0.9	-	1.9

B8.7. City of Long Beach

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5003	Final	-	-	-	-	-	-
5004	35%	-	-	-	-	-	-
5005	Final	-	-	-	-	-	-
5007	Final	-	-	-	-	-	-
5009	Final	-	-	-	-	-	-
5013	Final	0.0	-	-	0.0	-	0.0
Grand Total		0.0	-	-	0.0	-	0.0

B8.8. City of Norwalk

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5008	35%	1.6	-	-	0.2	-	0.2
5018	Final	2.0	-	-	0.2	-	0.2
5019	Final	24.3	-	-	1.8	-	1.8
5020	Final	-	-	-	-	-	-
5021	Final	16.9	-	-	1.3	-	1.3
5022	Final	7.7	-	1.4	-	-	1.4
5024	Final	-	-	-	-	-	-
5025	Final	-	-	-	-	-	-
5060	Final	-	-	-	-	-	-
5068	Final	-	-	-	-	-	-
5071	Final	-	-	-	-	-	-
5073	Final	-	-	-	-	-	-
Grand Total		52.5	-	1.4	3.4	-	4.7

B8.9. City of Santa Fe Springs

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5019	Final	0.0	-	-	-	0.0	0.0
5020	Final	-	-	-	-	-	-
5022	Final	-	-	-	-	-	-
5024	Final	-	-	-	-	-	-
5025	Final	-	-	-	-	-	-
5060	Final	-	-	-	-	-	-
5061	Final	-	-	-	-	-	-
5062	Final	-	-	-	-	-	-
5067	Final	-	-	-	-	-	-
5068	Final	-	-	-	-	-	-
5069	Final	-	-	-	-	-	-
5071	Final	-	-	-	-	-	-
5072	Final	2.6	-	0.3	-	0.1	0.4
5073	Final	-	-	-	-	-	-
5084	Final	1.4	-	0.2	-	-	0.2
5089	Final	-	-	-	-	-	-
5092	Final	1.1	-	0.1	-	0.2	0.2
5093	Final	-	-	-	-	-	-
5094	Final	7.4	-	0.4	-	0.9	1.2
5095	35%	-	-	-	-	-	-
Grand Total		12.6	-	1.0	-	1.1	2.1

B8.10. City of Whittier

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5045	Final	0.0	-	-	-	0.0	0.0
5064	Final	-	-	-	-	-	-
5065	Final	3.7	-	0.8	-	-	0.8
5070	Final	0.0	-	-	-	0.0	0.0
5079	Final	11.7	-	2.5	-	-	2.5
5080	Final	26.0	-	5.5	-	-	5.5
5081	35%	-	-	-	-	-	-
5082	Final	0.2	-	0.0	-	-	0.0
5083	Final	-	-	-	-	-	-
5086	Final	-	-	-	-	-	-
5087	Final	20.8	-	4.1	-	-	4.1
5088	Final	24.7	-	5.4	-	-	5.4
5089	Final	0.5	-	0.1	-	-	0.1
5090	Final	0.8	-	0.2	-	-	0.2
5091	Final	5.7	-	1.1	-	-	1.1
5092	Final	8.9	-	1.7	-	-	1.7
5093	Final	0.0	-	-	-	0.0	0.0
5094	Final	0.6	-	0.1	-	0.0	0.1
5095	Final	21.1	-	3.9	-	-	3.9
5096	Final	3.8	-	0.7	-	-	0.7
5097	Final	5.2	-	1.0	-	-	1.0
5098	Final	47.9	-	8.7	-	-	8.7
5099	Final	10.6	-	1.9	-	-	1.9
5100	Final	7.3	-	1.4	-	-	1.4
5101	Final	0.6	-	0.1	-	-	0.1
Grand Total		200.1	-	39.0	-	0.0	39.1

Attachment C: Supporting Figures for Watershed Control Measures

Submitted to:

LLAR WMP Group LCC WMP Group LSGR WMP Group

Submitted by:

Tetra Tech
9444 Balboa Ave., Suite 215
San Diego, CA 92123

June 6, 2014

Figure 1. LLAR Downey Subwatershed IDs

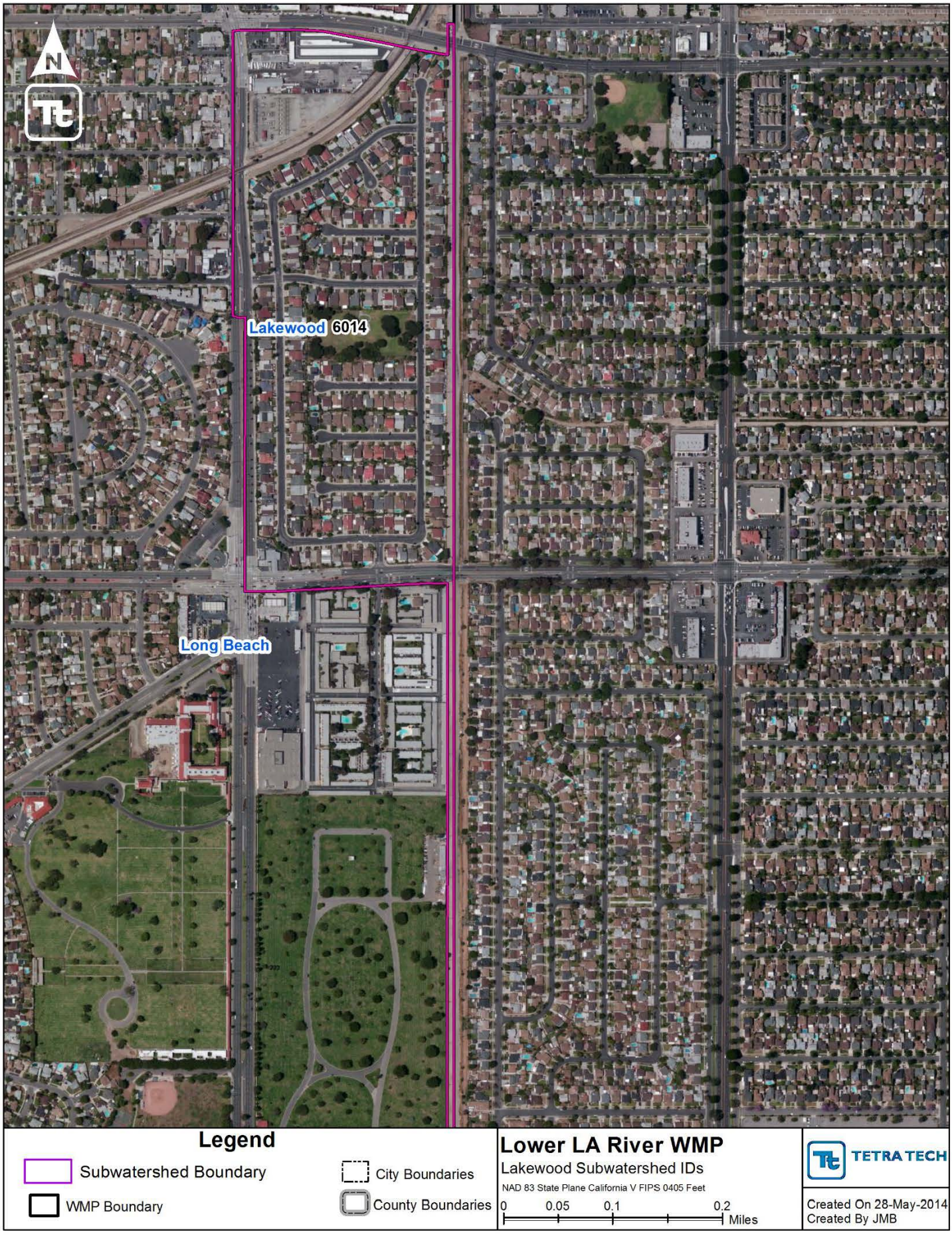

Figure 2. LLAR Lakewood Subwatershed IDs

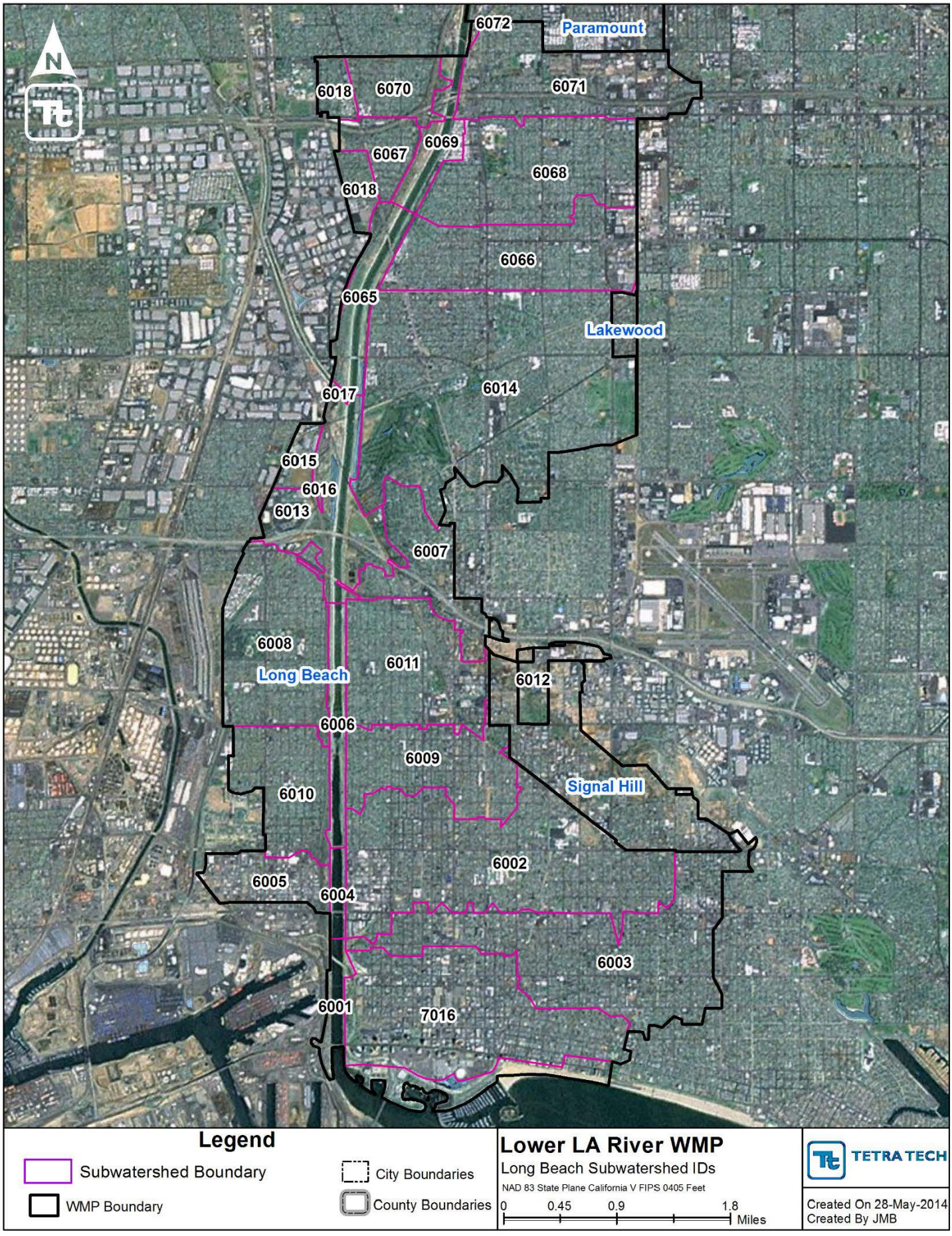

Figure 3. LLAR Long Beach Subwatershed IDs

Figure 4. LLAR Lynwood Subwatershed IDs

Figure 5. LLAR Paramount Subwatershed IDs

Figure 6. LLAR Pico Rivera Subwatershed IDs

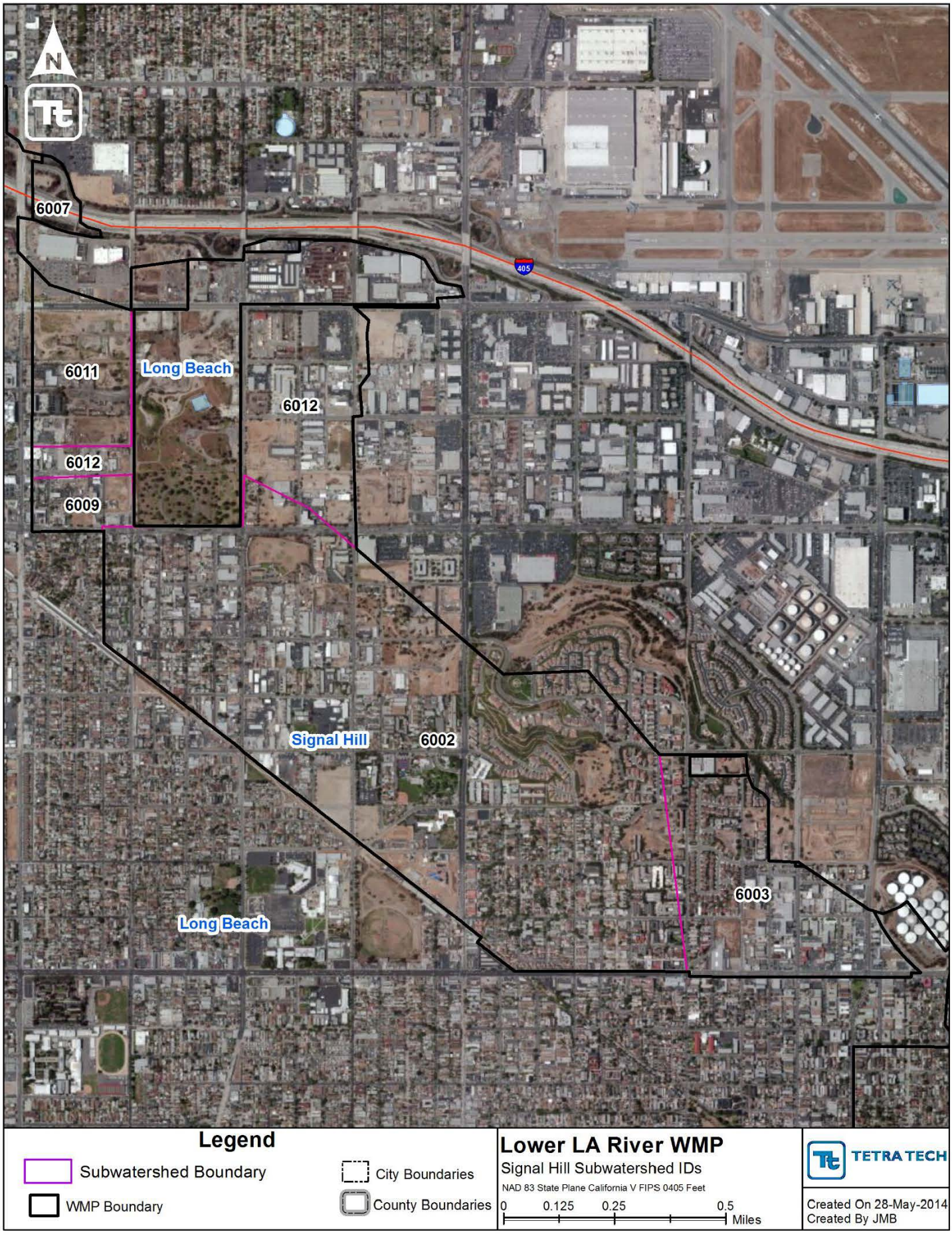

Figure 7. LLAR Signal Hill Subwatershed IDs

Figure 8. LLAR South Gate Subwatershed IDs

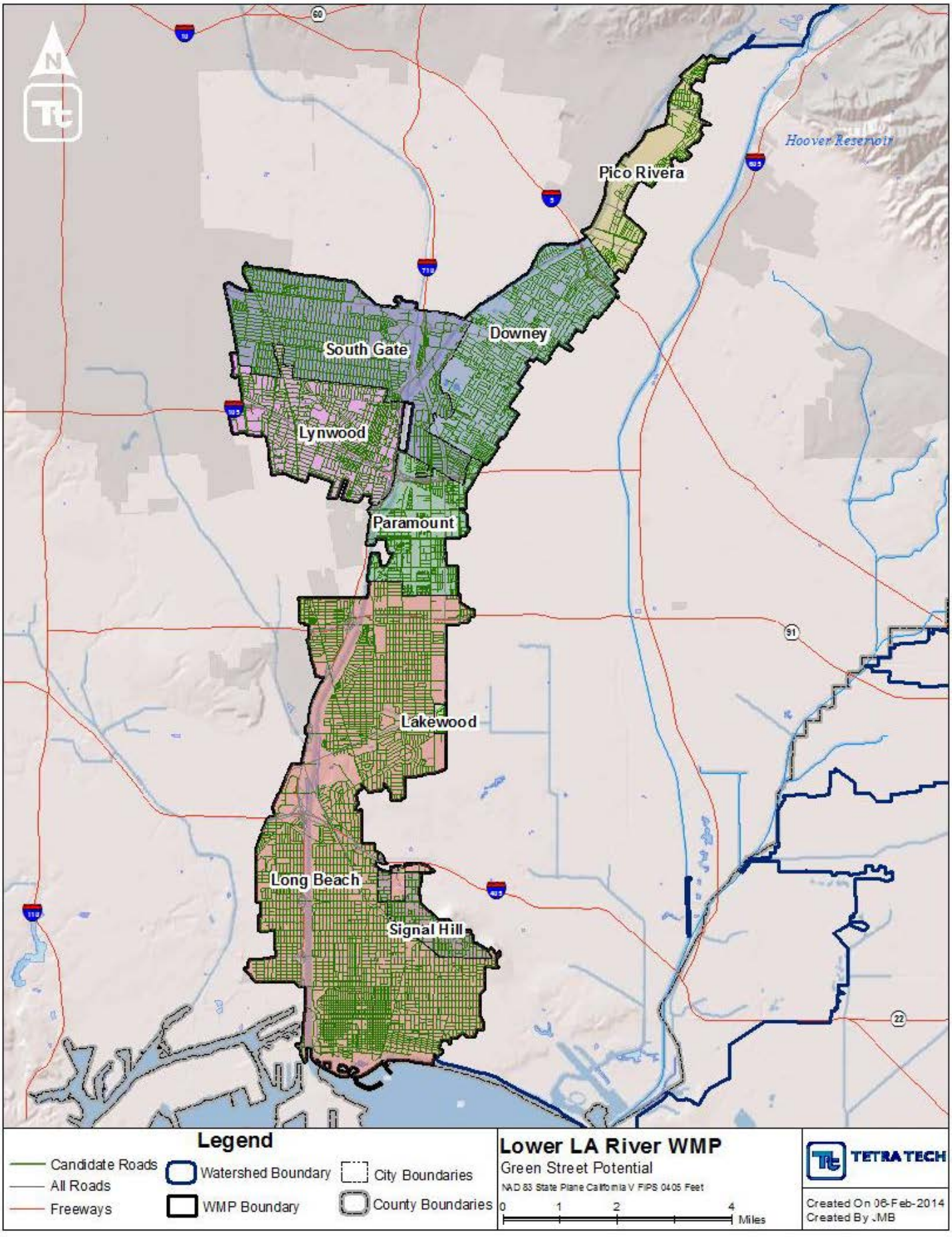

Figure 9. LLAR ROW BMP Potential Opportunities

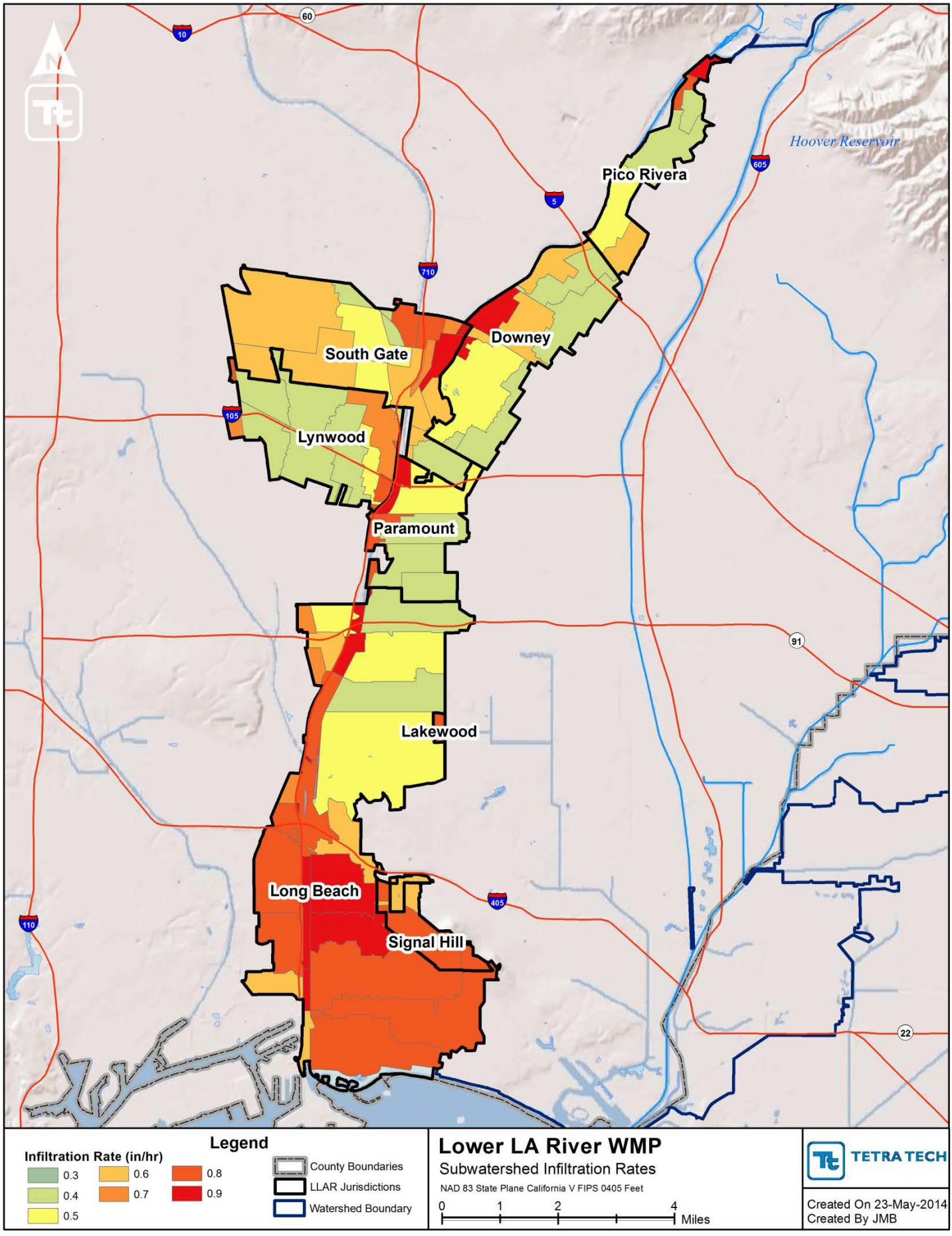

Figure 10. LLAR Subwatershed Infiltration Rates

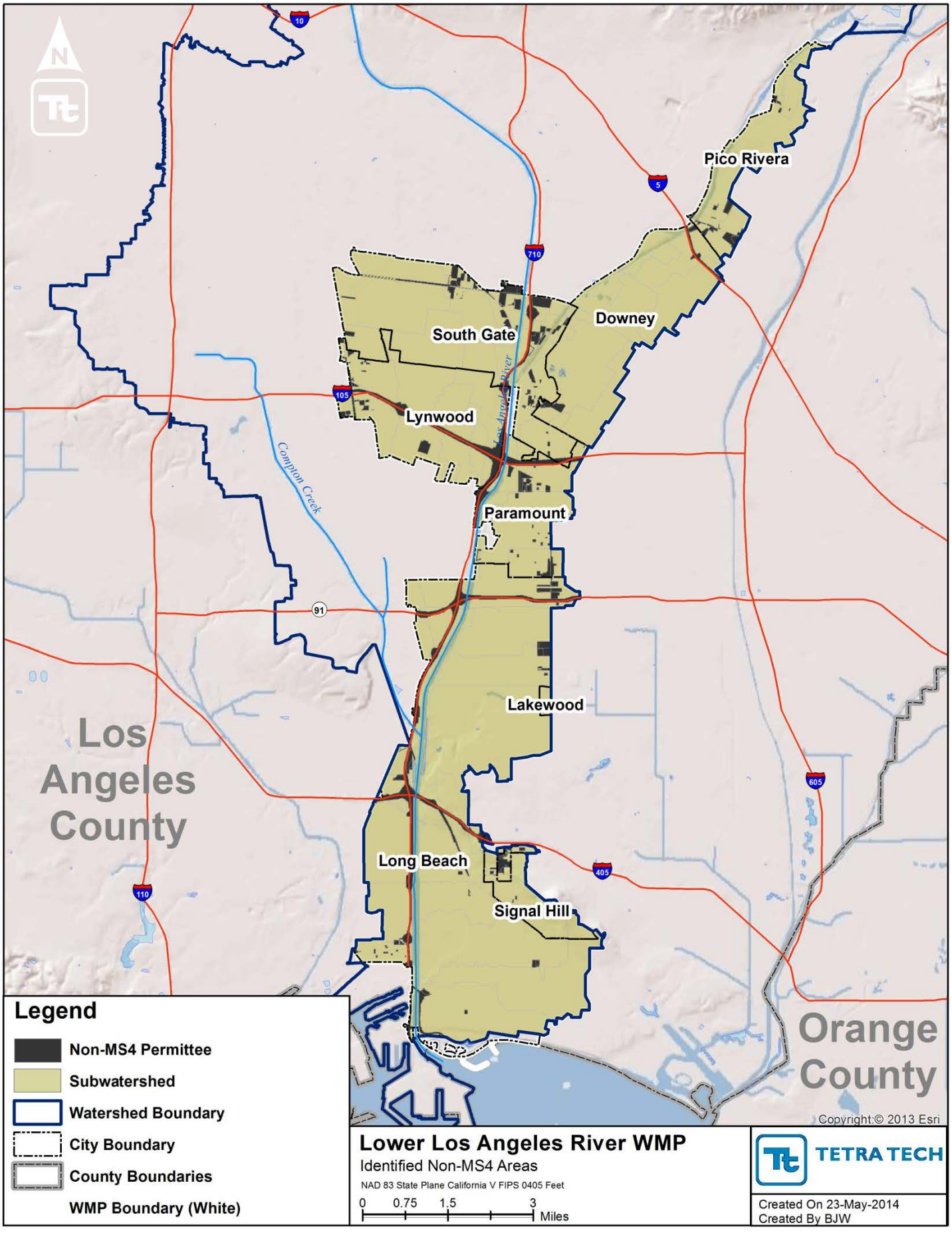

Figure 11. LLAR Non-MS4 Permittees

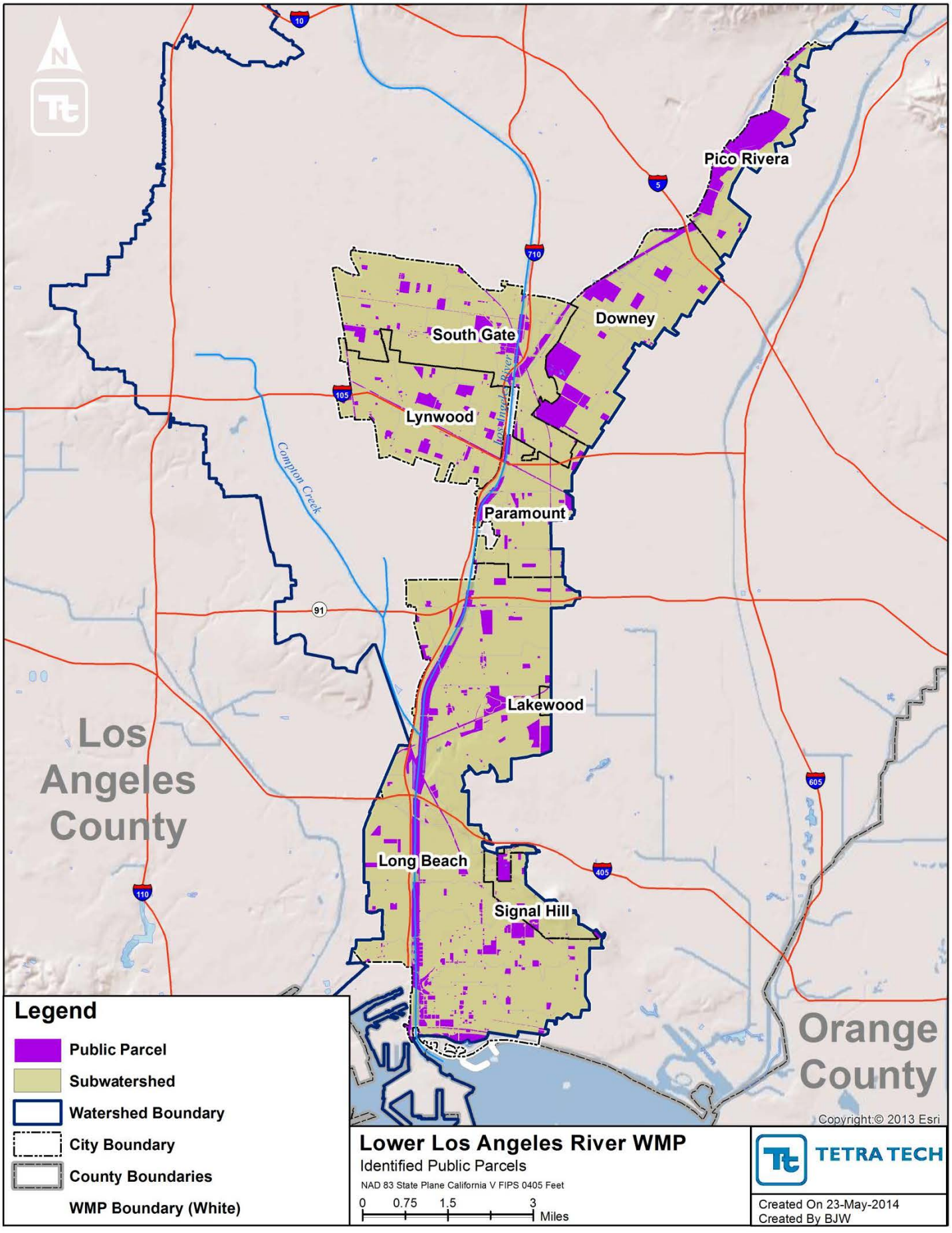

Figure 12. LLAR identified public parcels

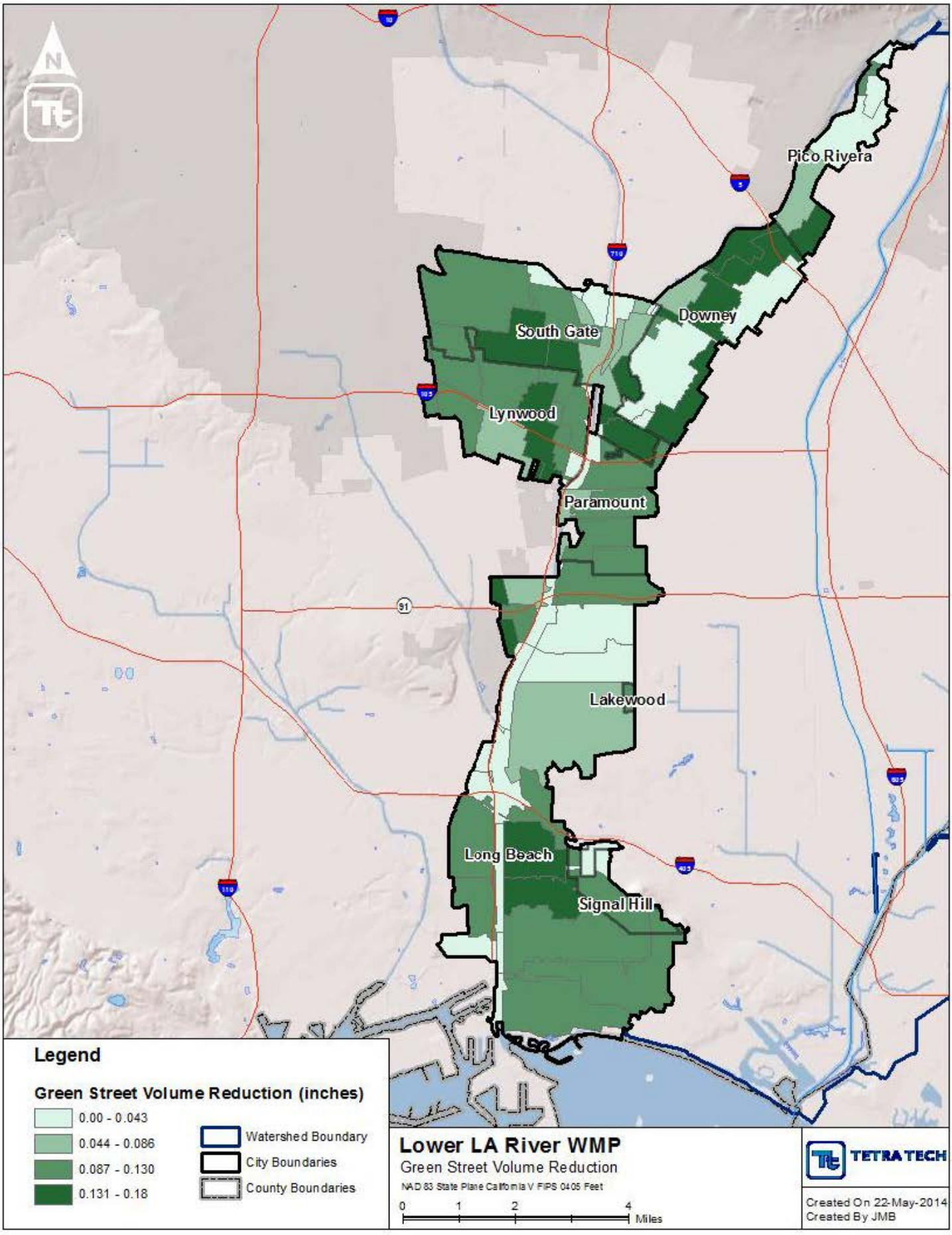

Figure 13. LLAR ROW BMP Volume Reduction

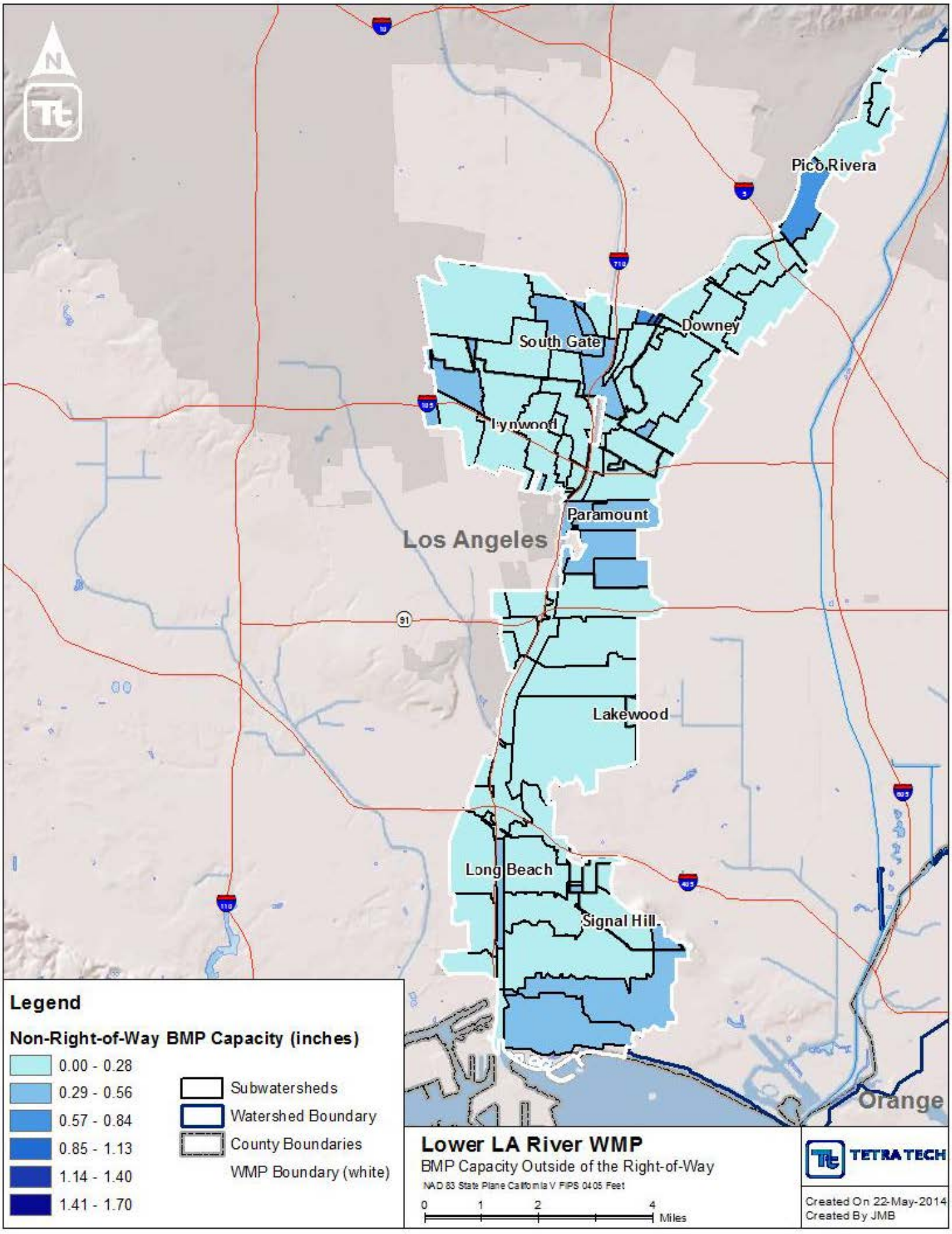

Figure 14. LLAR BMP capacity outside of the right-of-way

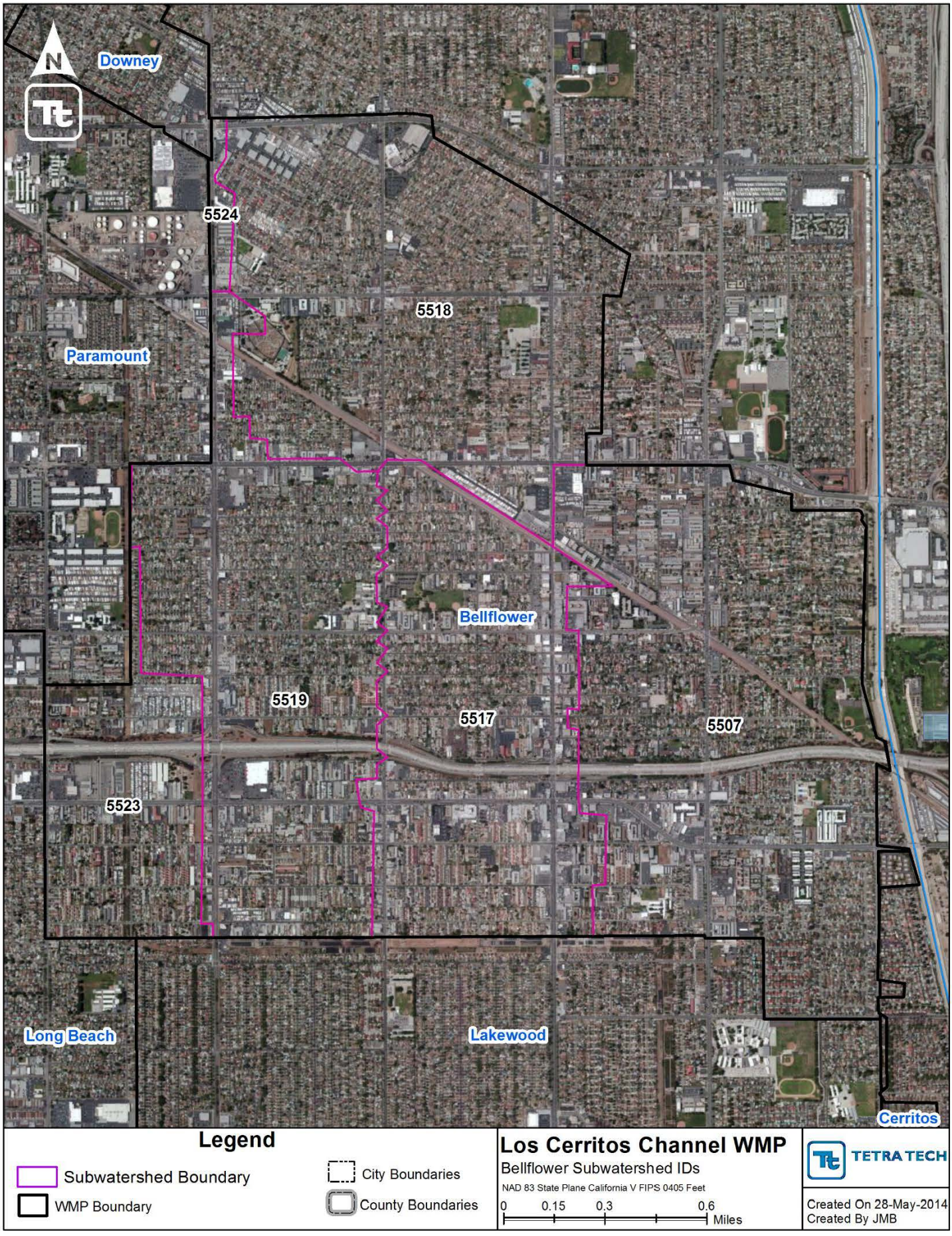

Figure 15. LCC Bellflower Subwatershed IDs

Figure 16. LCC Cerritos Subwatershed IDs

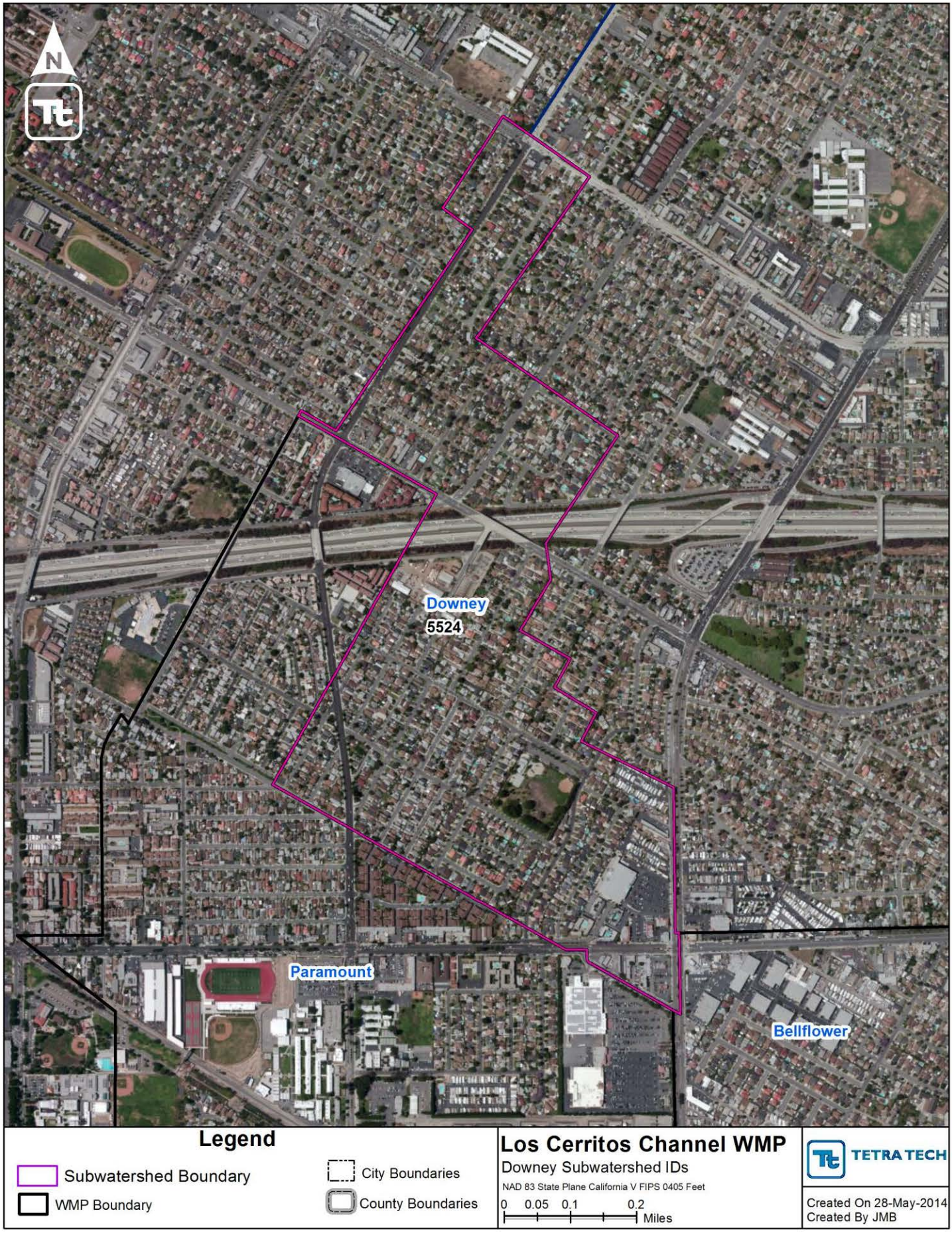

Figure 17. LCC Downey Subwatershed IDs

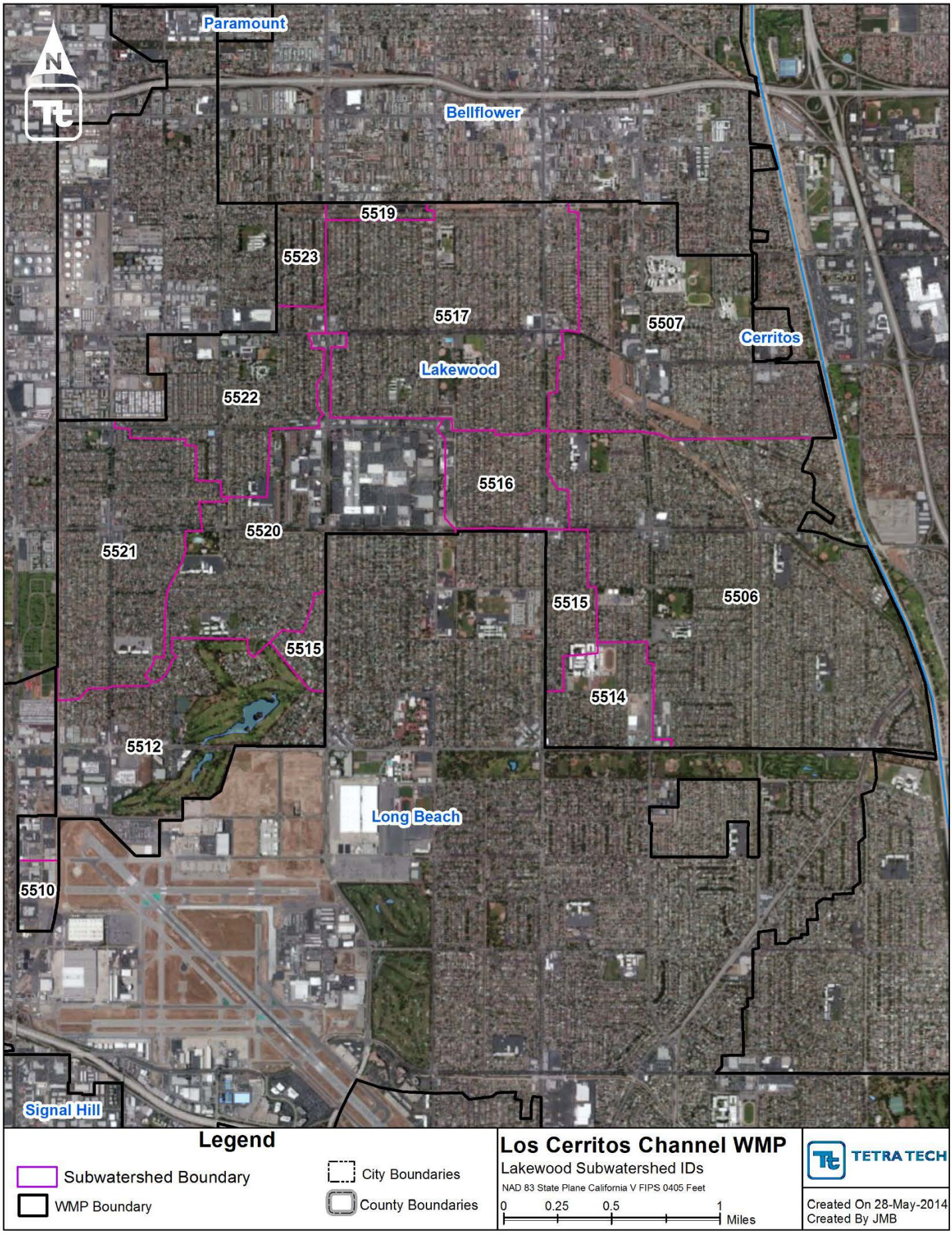

Figure 18. LCC Lakewood Subwatershed IDs

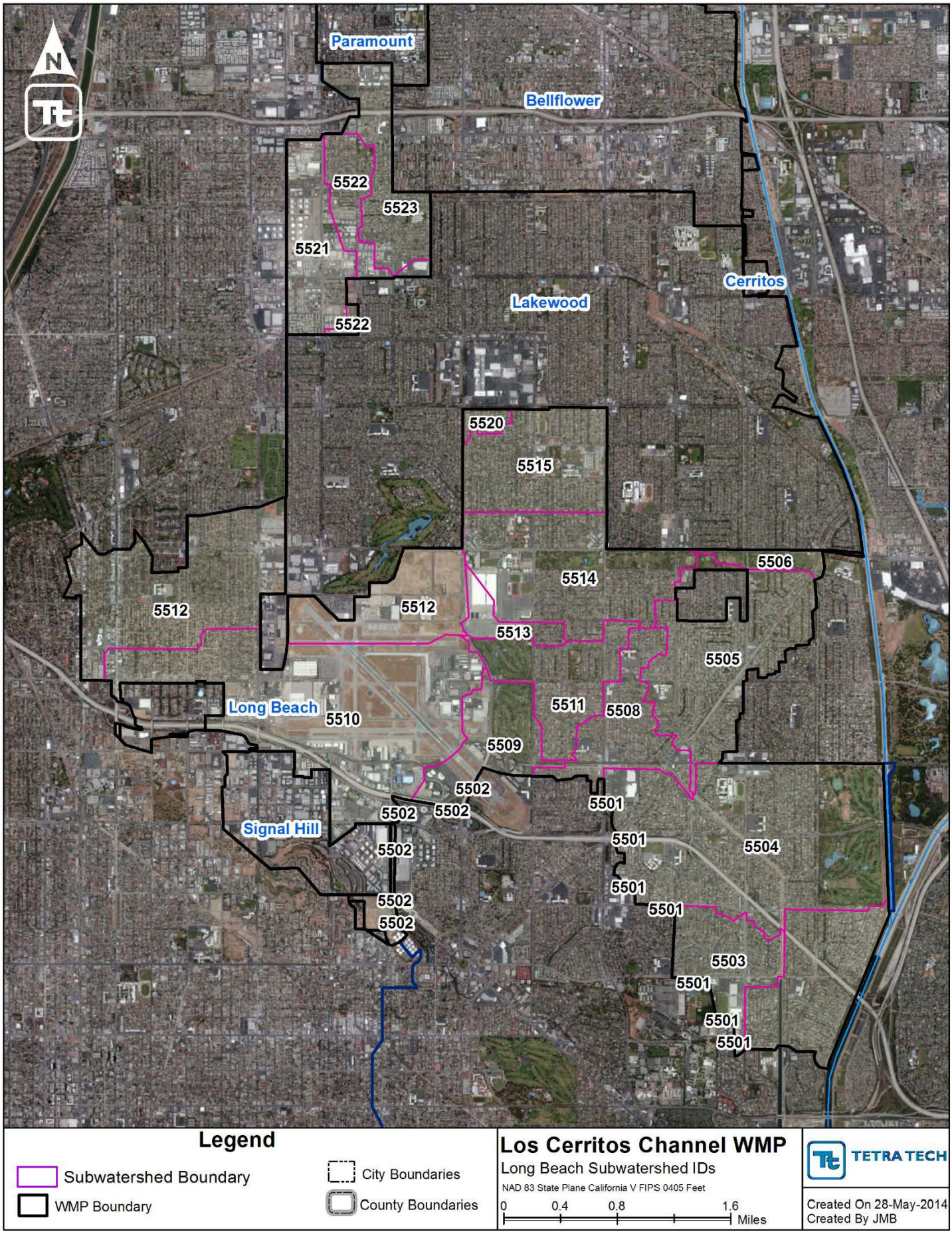

Figure 19. LCC Long Beach Subwatershed IDs

Figure 20. LCC Paramount Subwatershed IDs

Figure 21. LCC Signal Hill Subwatershed IDs

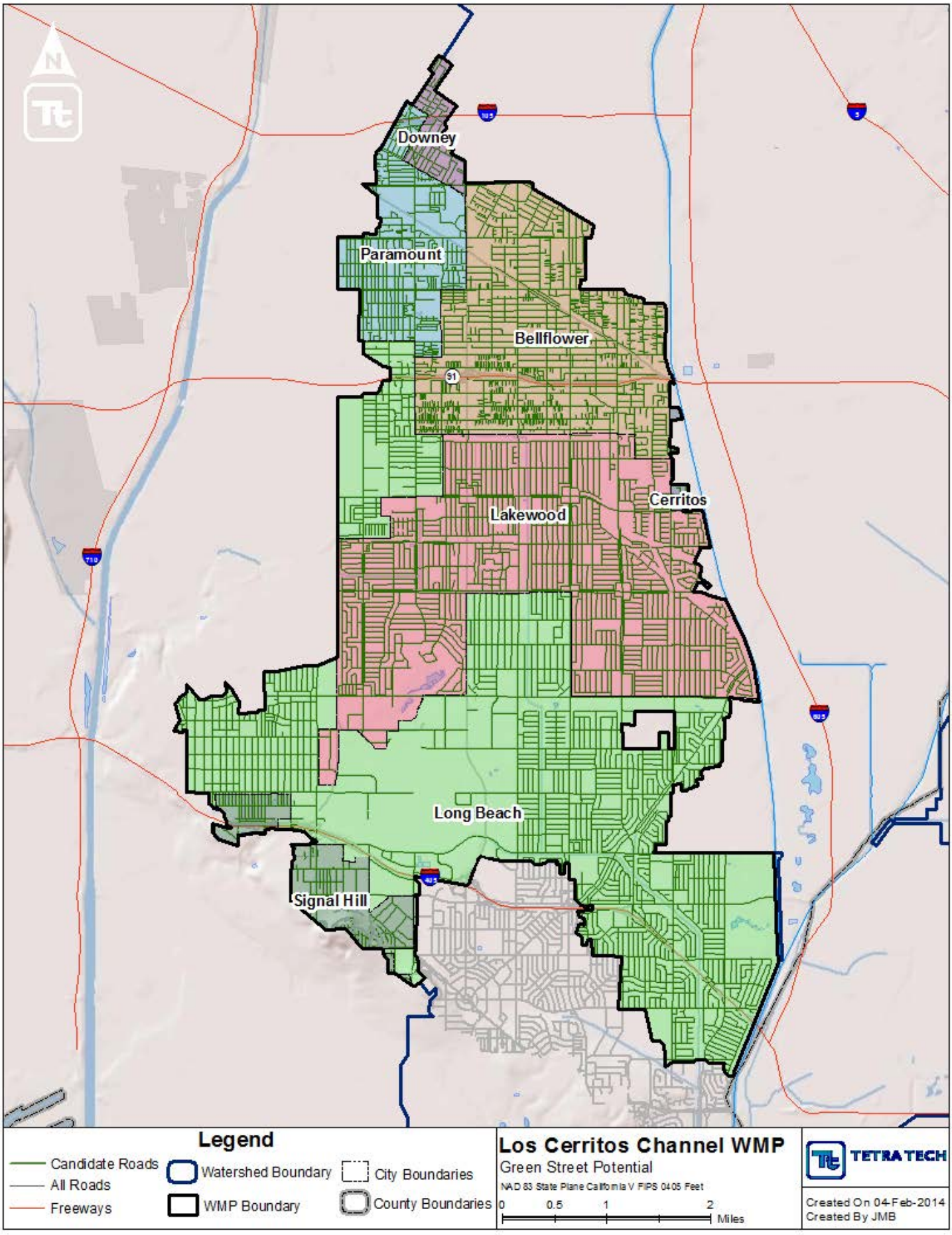

Figure 22. LCC ROW BMP Potential Opportunities

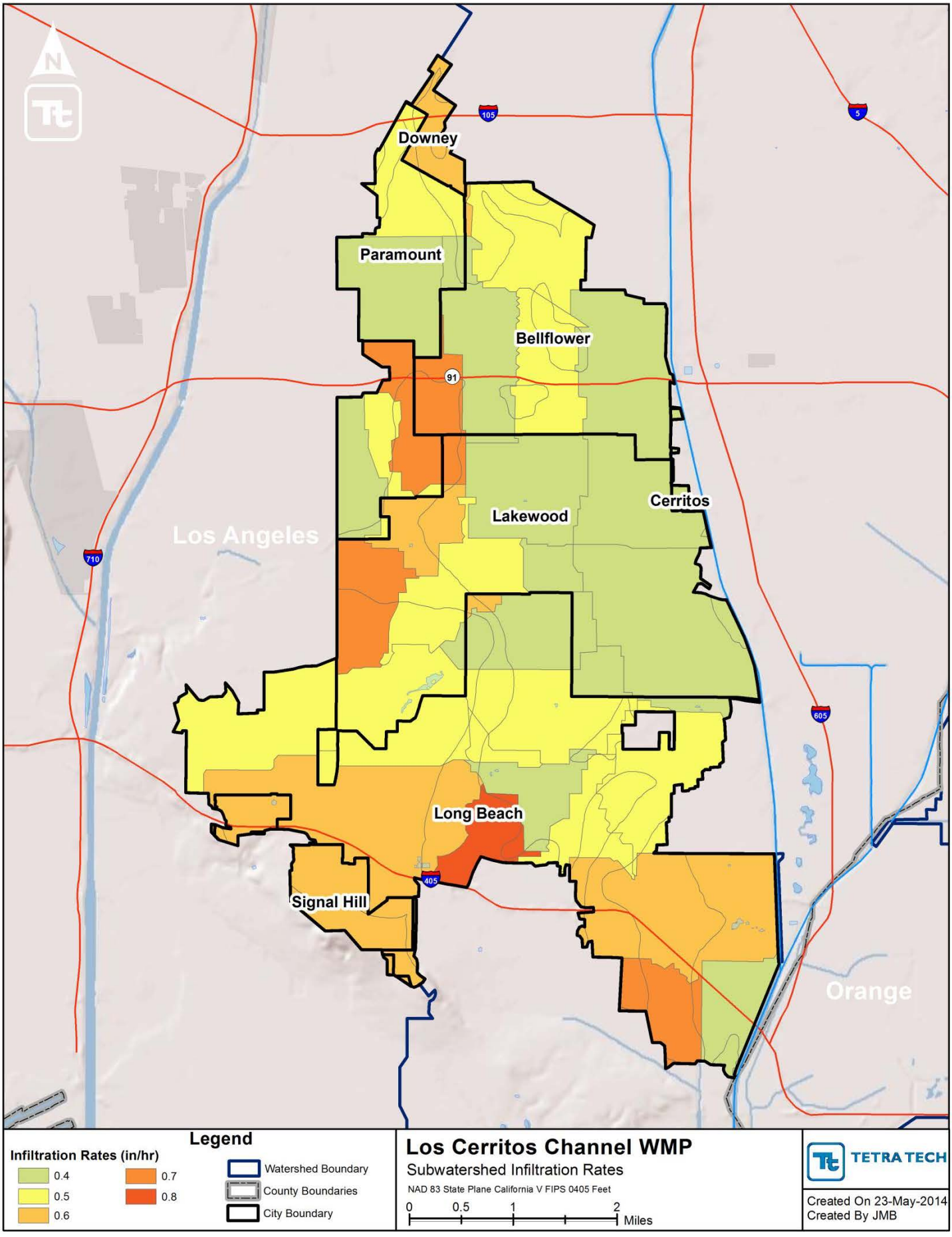

Figure 23. LCC Subwatershed Infiltration Rates

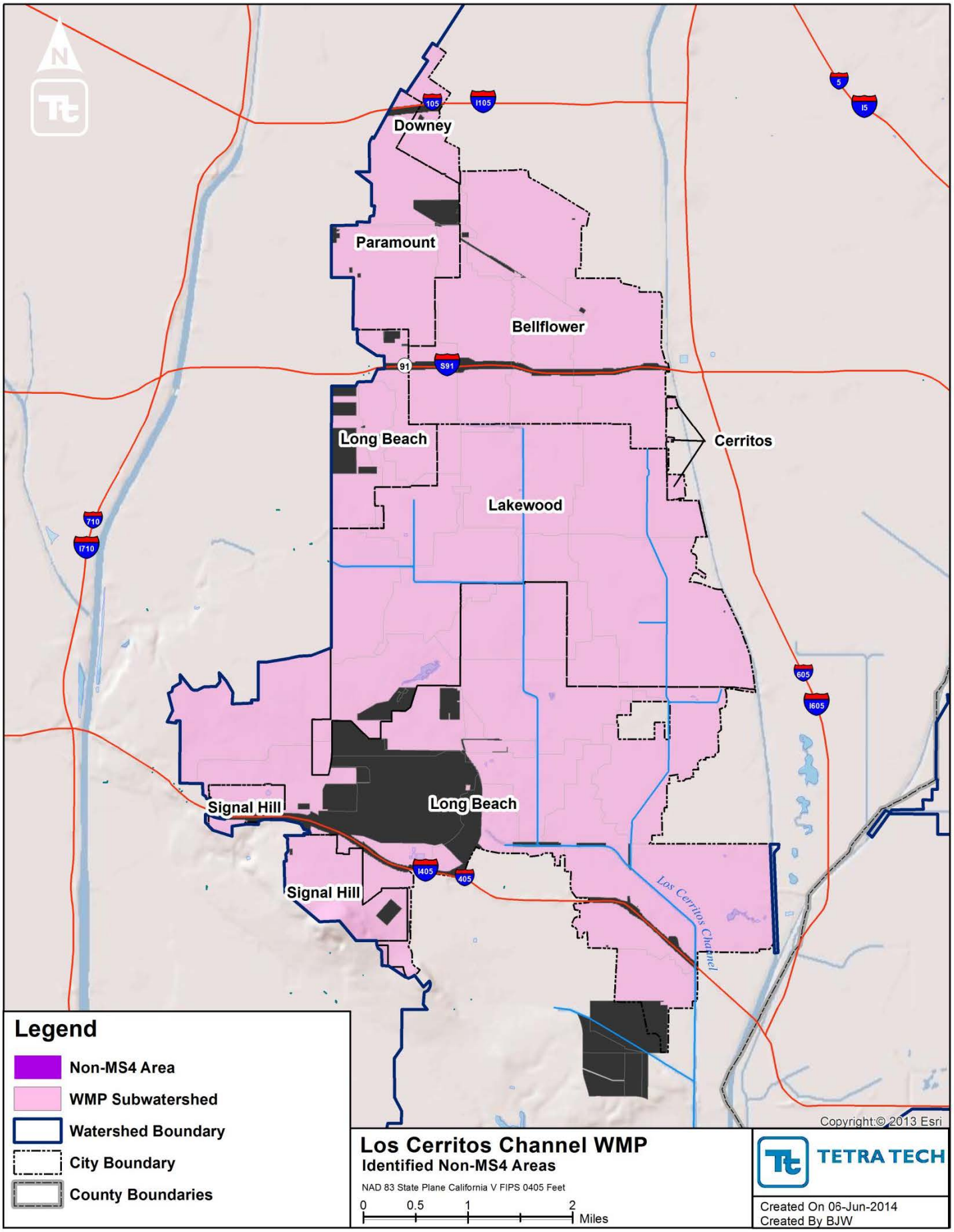

Figure 24. LCC Non-MS4 Permittees

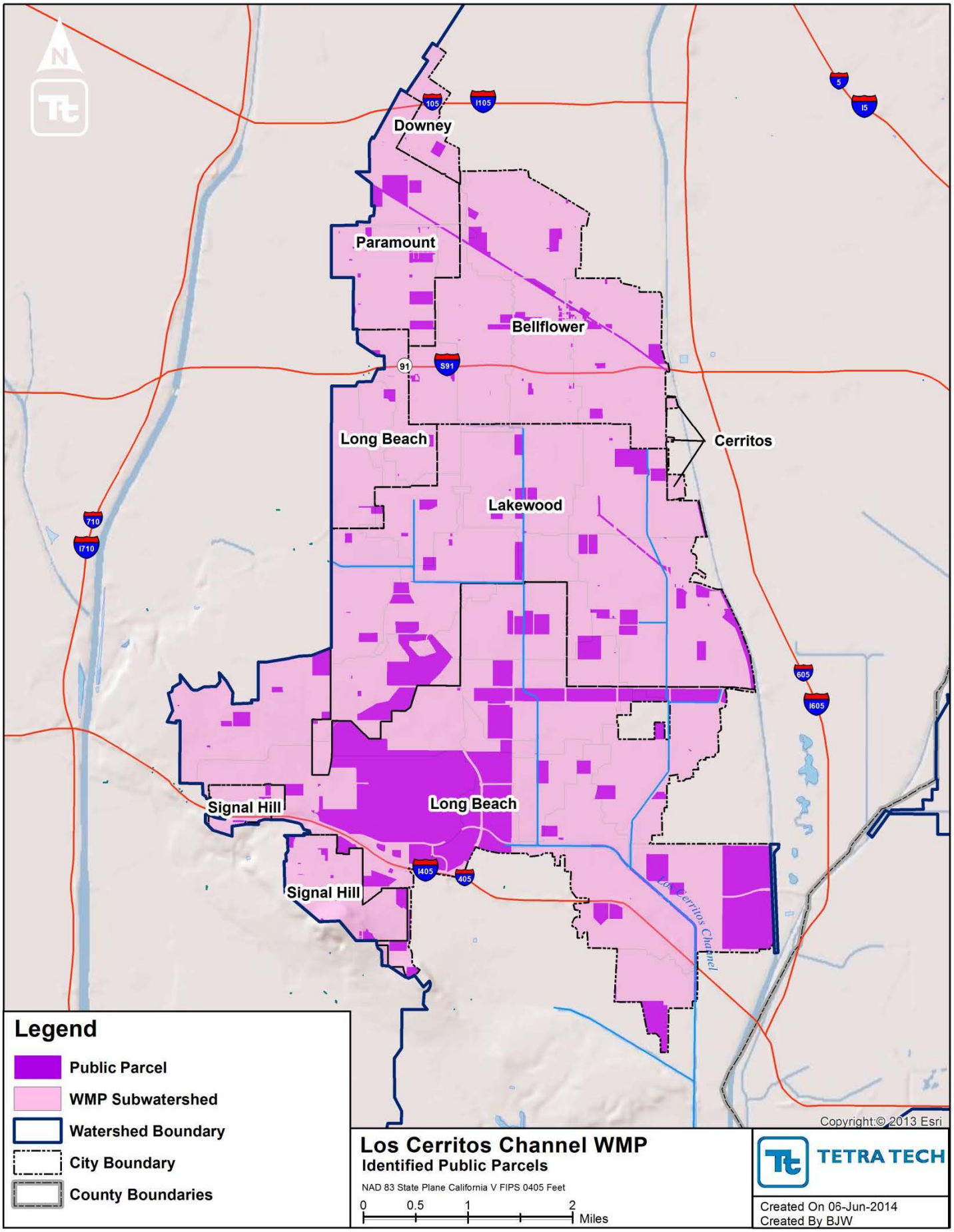

Figure 25. LCC identified public parcels

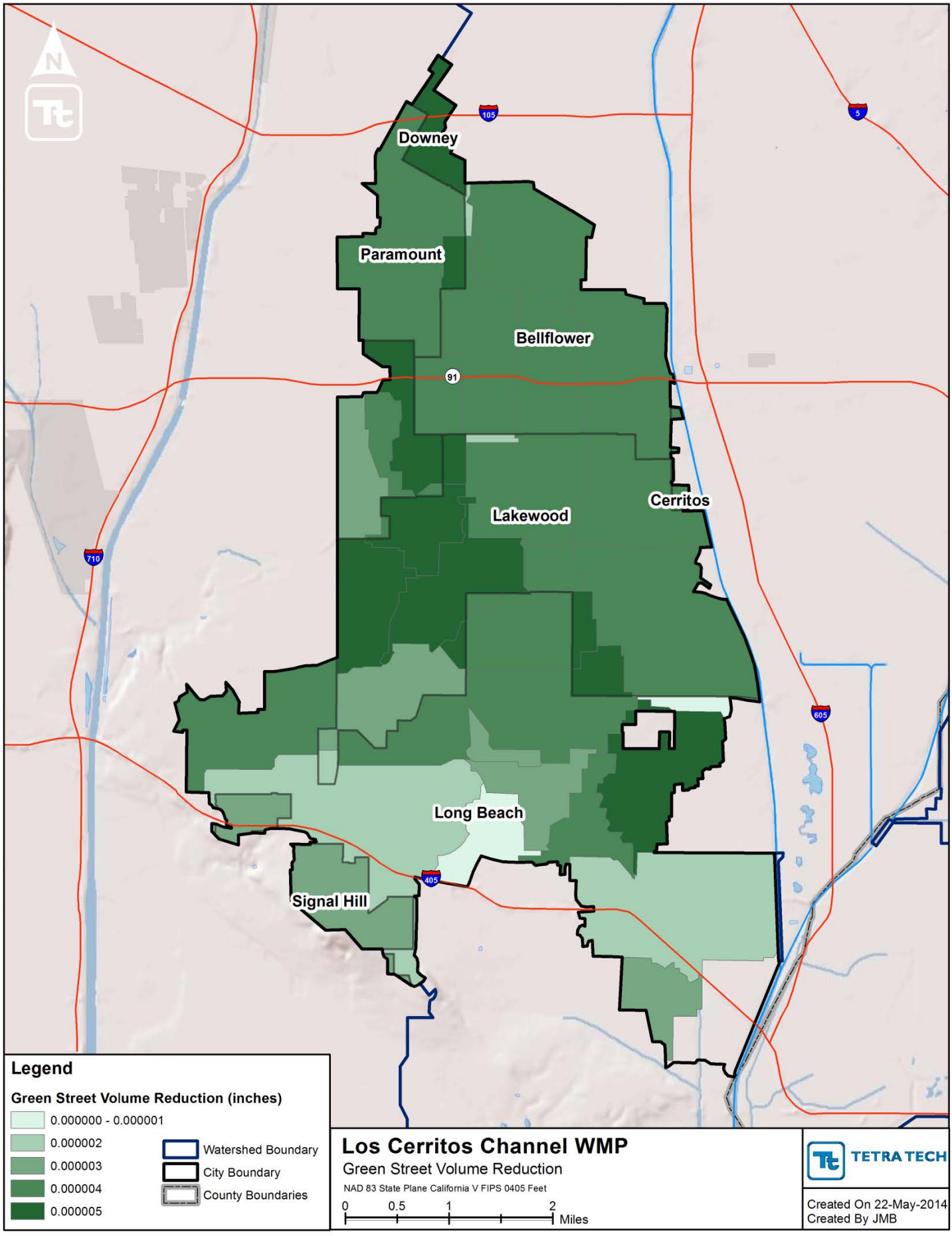

Figure 26. LCC ROW BMP Volume Reduction

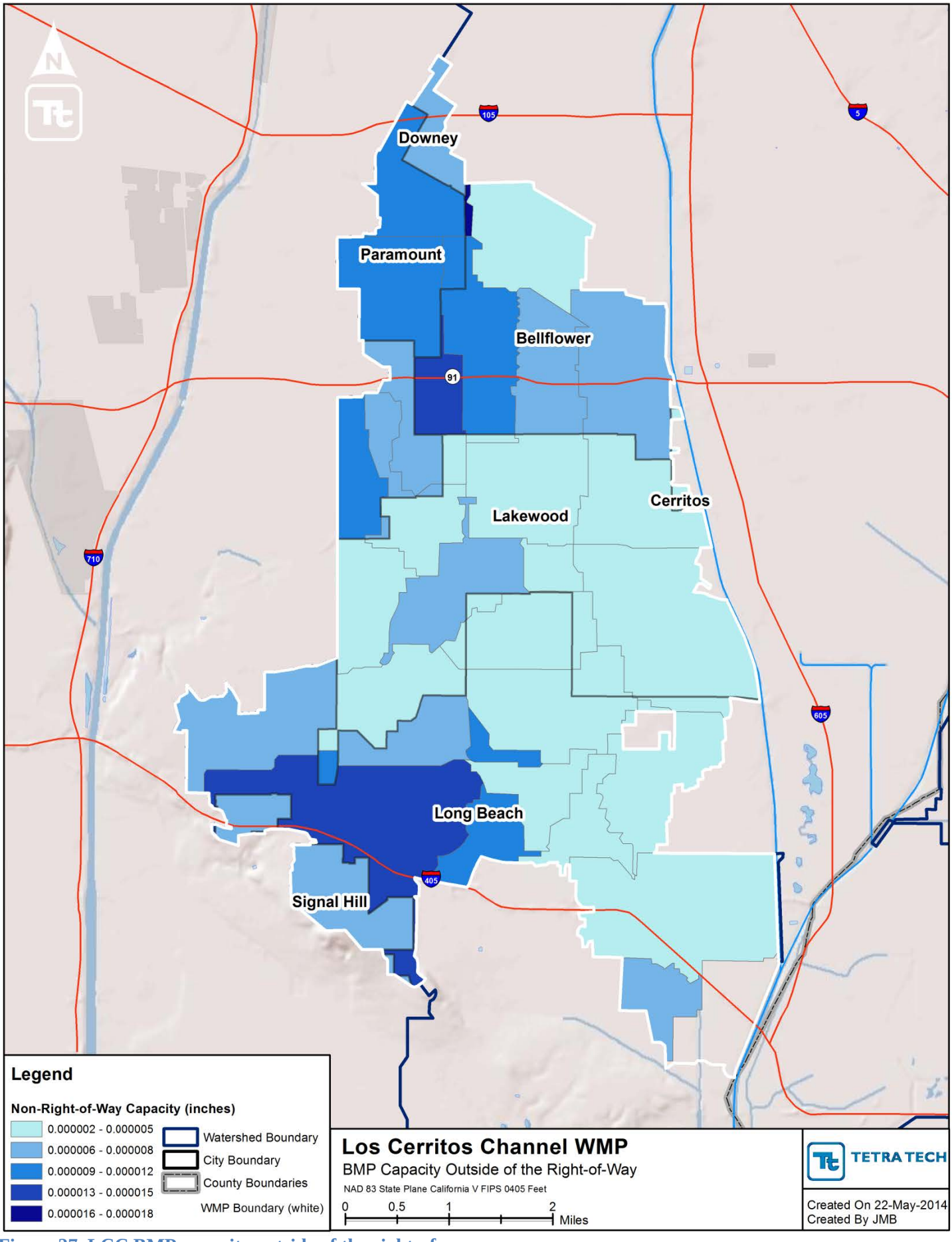

Figure 27. LCC BMP capacity outside of the right-of-way

Figure 28. LSGR (SGR) Artesia Subwatershed IDs

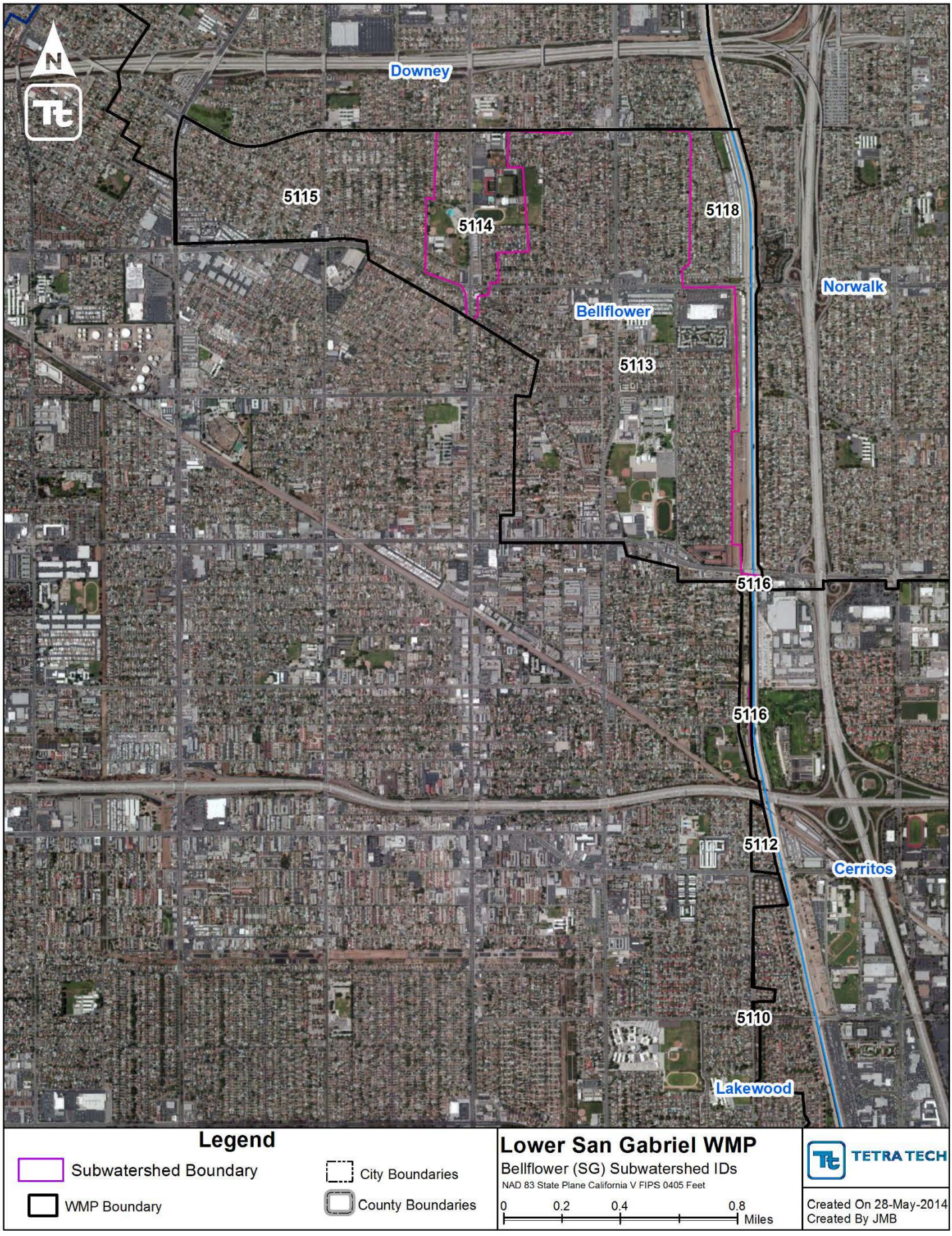

Figure 29. LSGR (SGR) Bellflower Subwatershed IDs

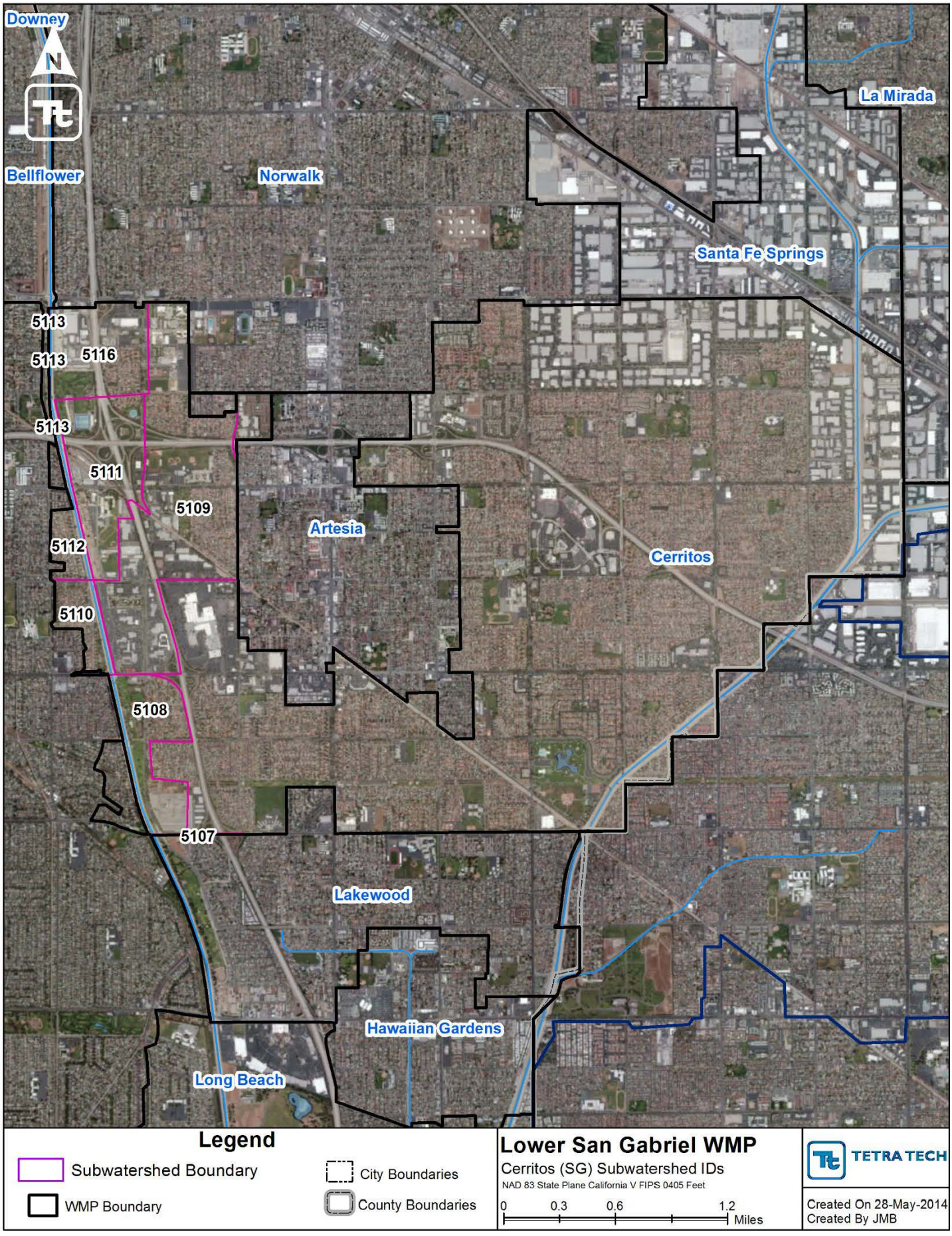

Figure 30. LSGR (SGR) Cerritos Subwatershed IDs

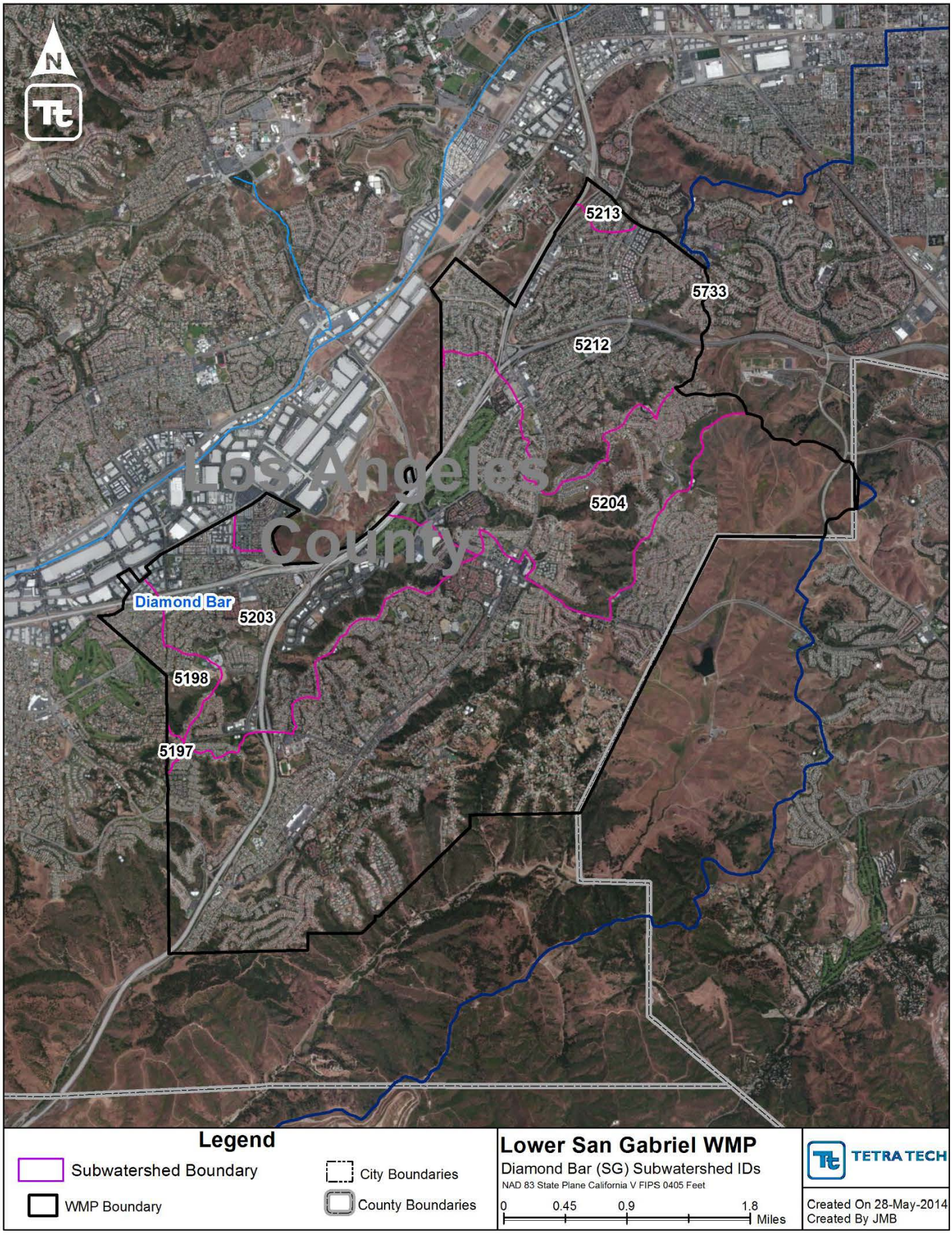

Figure 31. LSGR (SGR) Diamond Bar Subwatershed IDs

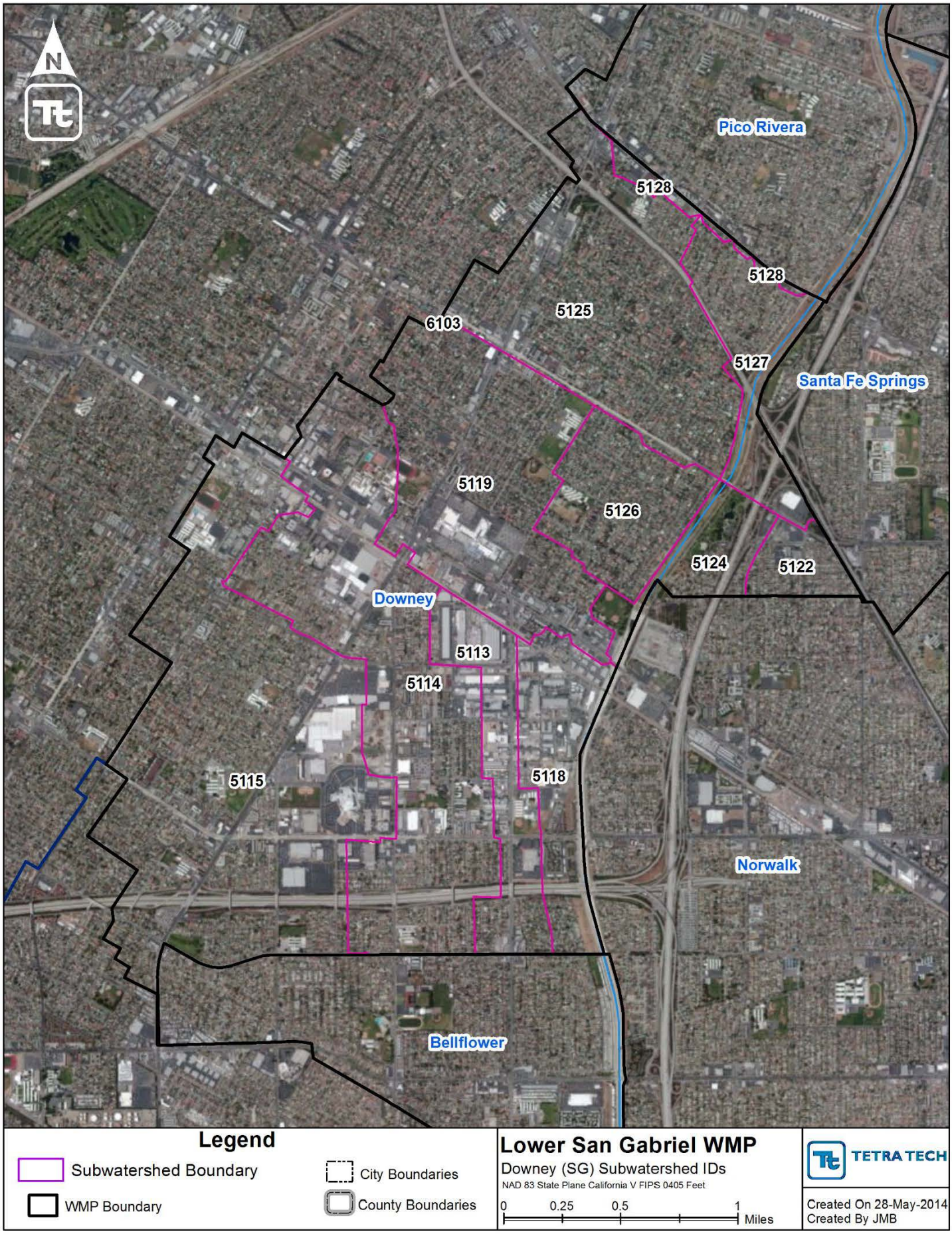

Figure 32. LSGR (SGR) Downey Subwatershed IDs

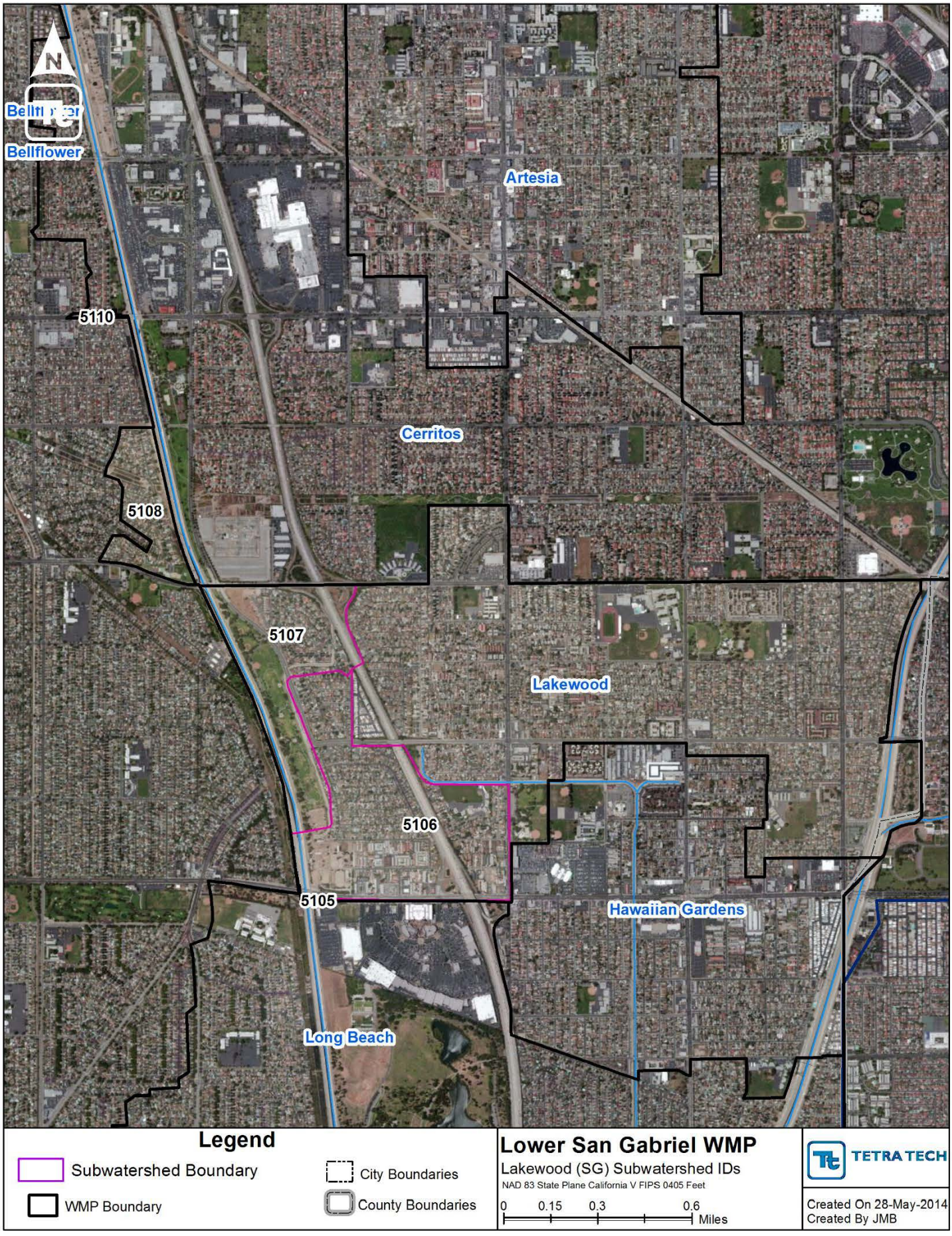

Figure 33. LSGR (SGR) Lakewood Subwatershed IDs

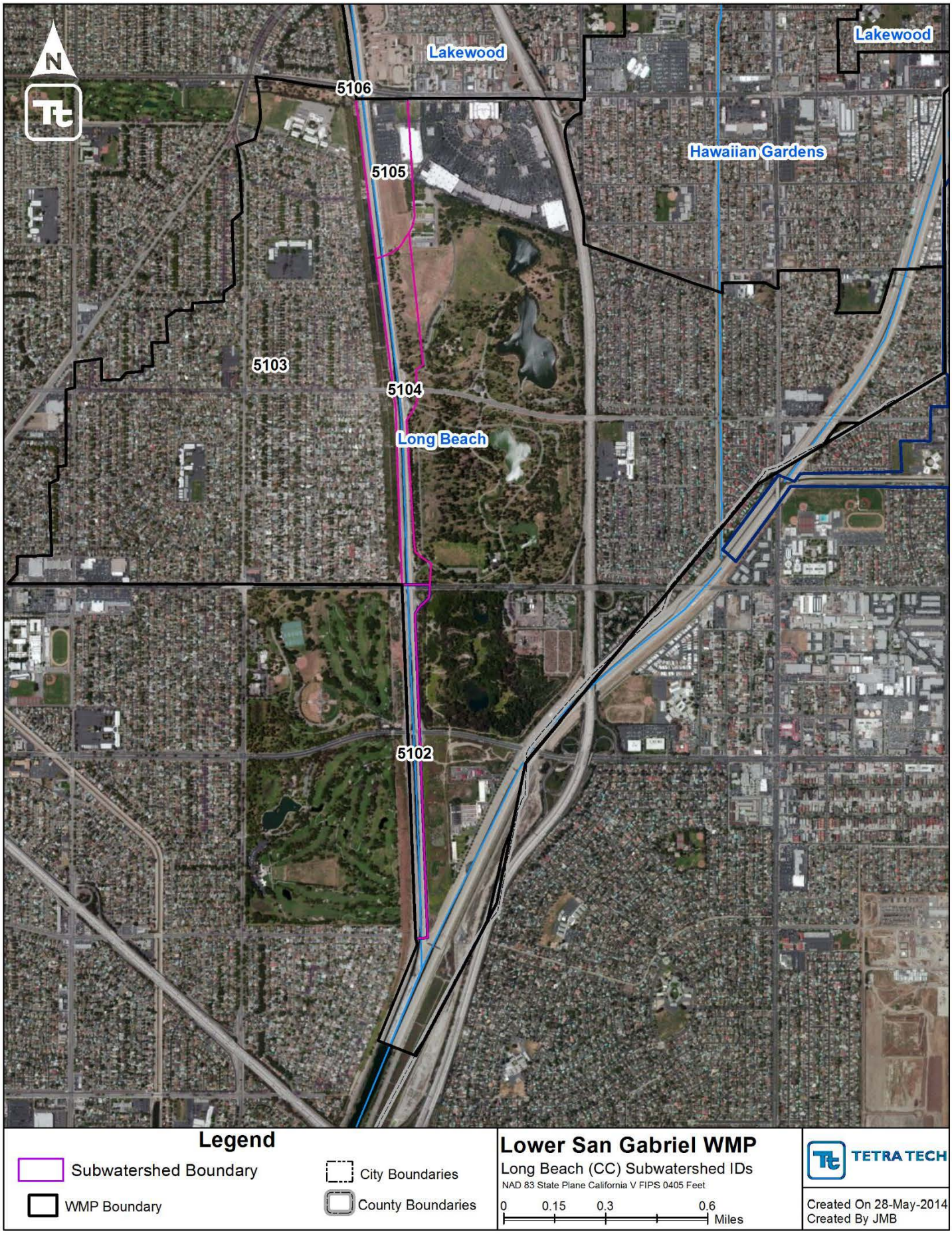

Figure 34. LSGR (SGR) Long Beach Subwatershed IDs

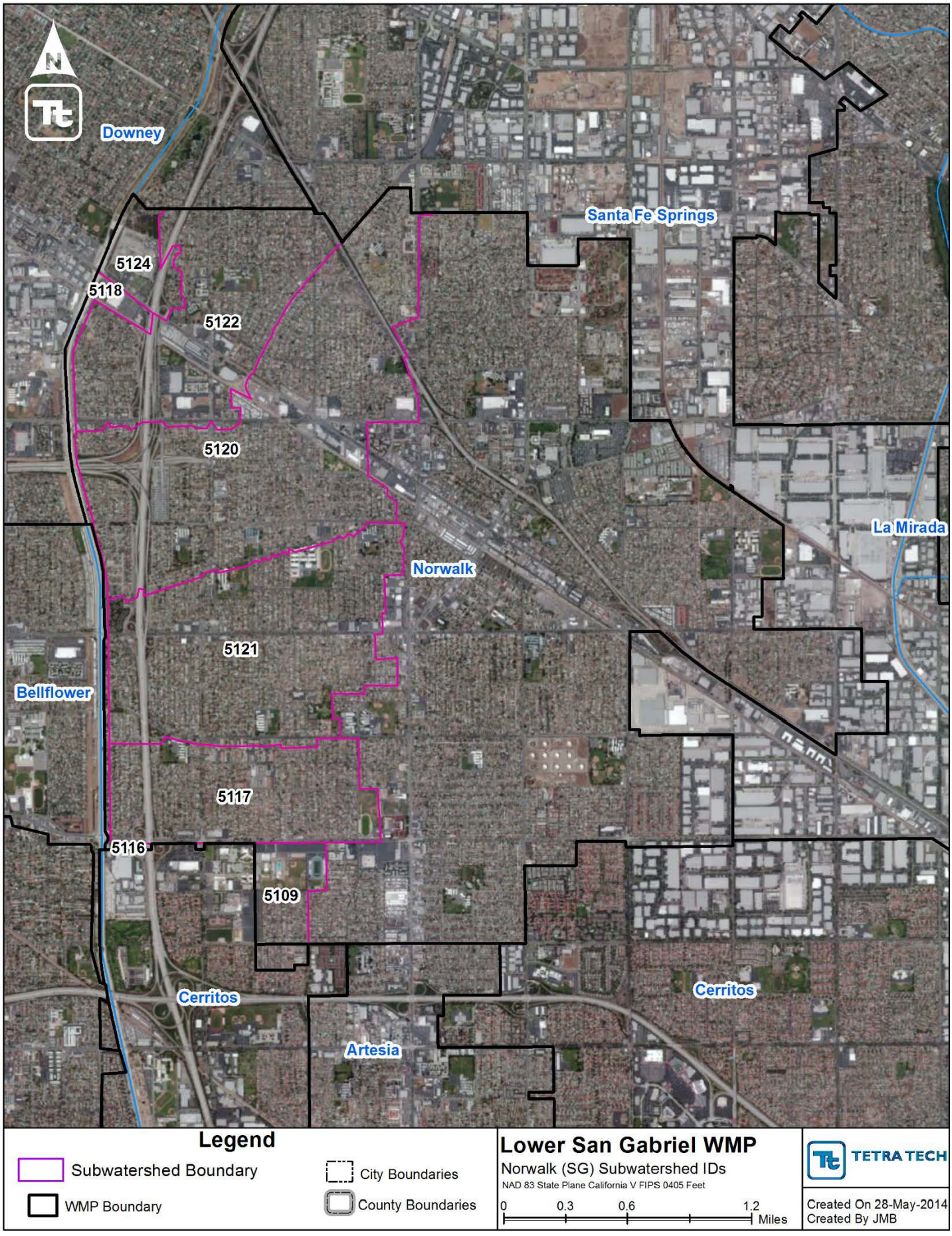

Figure 35. LSGR (SGR) Norwalk Subwatershed IDs

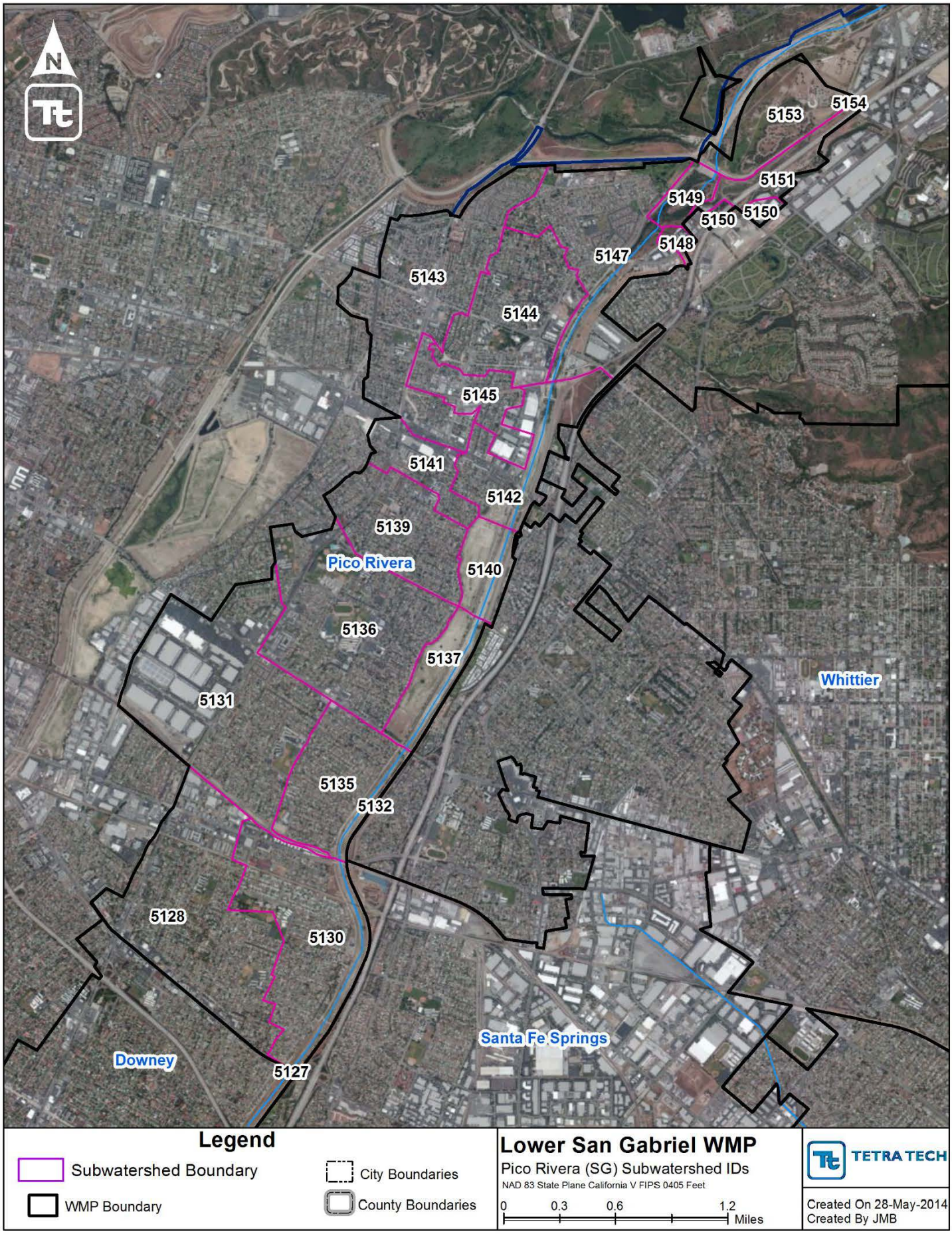

Figure 36. LSGR (SGR) Pico Rivera Subwatershed IDs

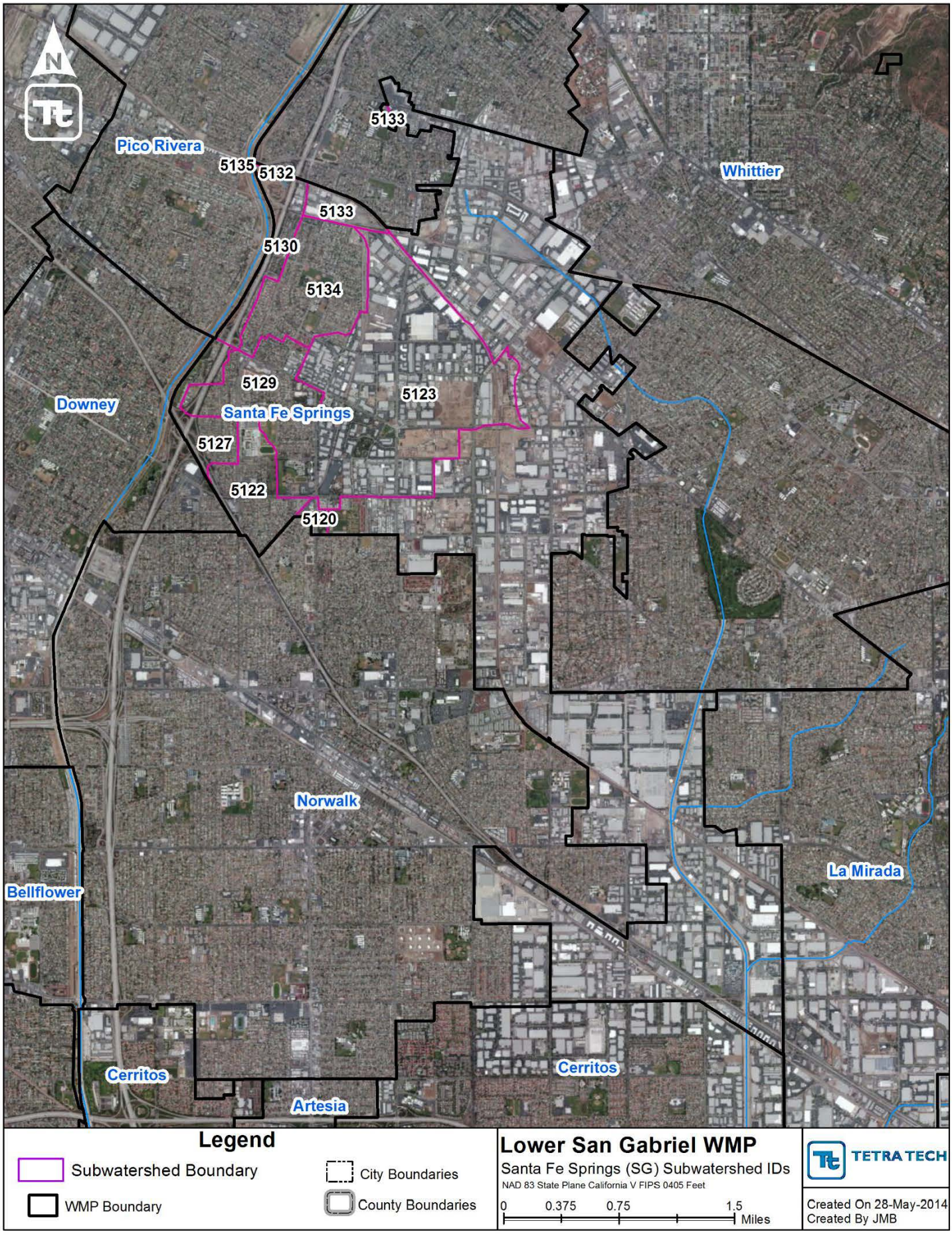

Figure 37. LSGR (SGR) Santa Fe Springs Subwatershed IDs

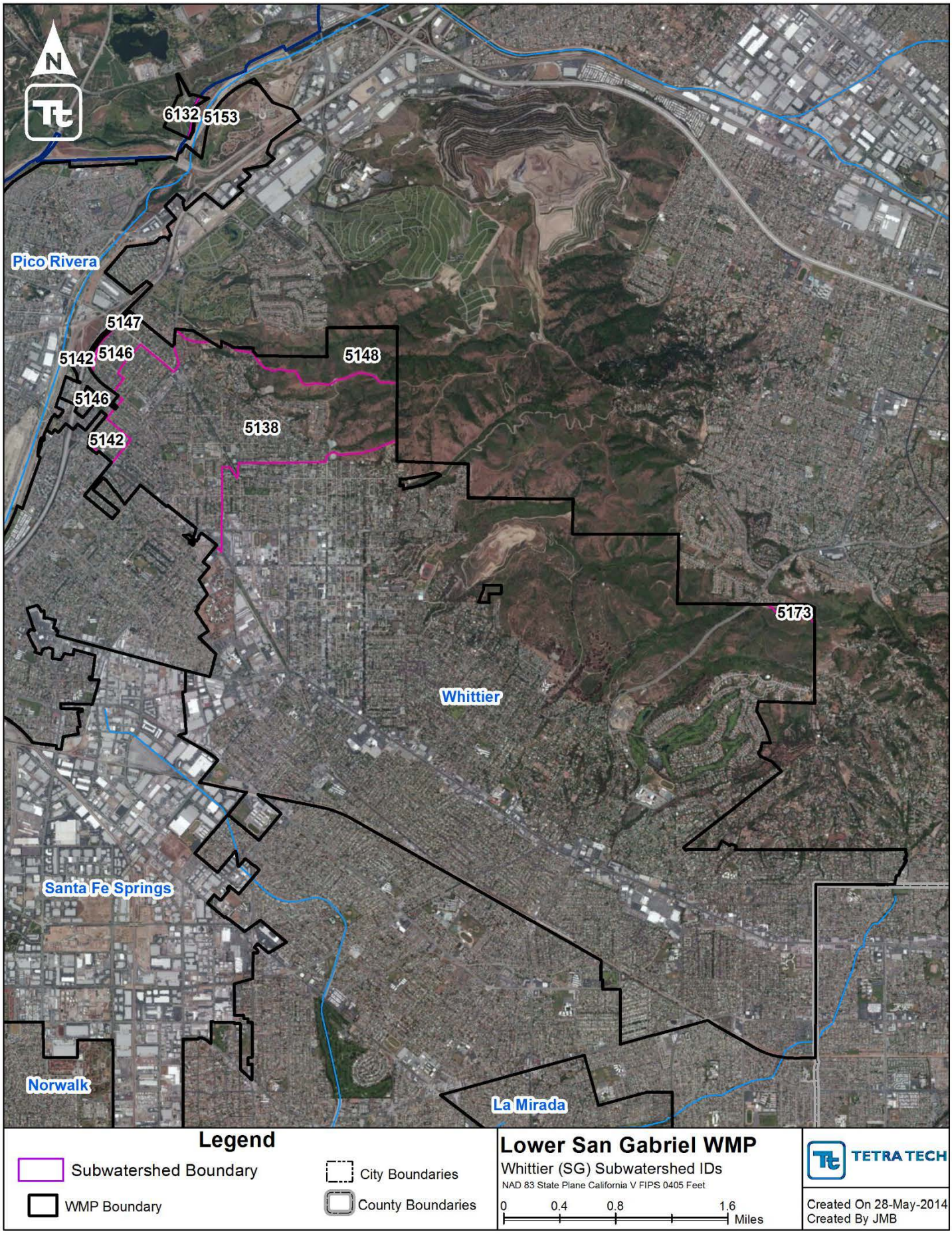

Figure 38. LSGR (SGR) Whittier Subwatershed IDs

Figure 39. LSGR (CC) Artesia Subwatershed IDs

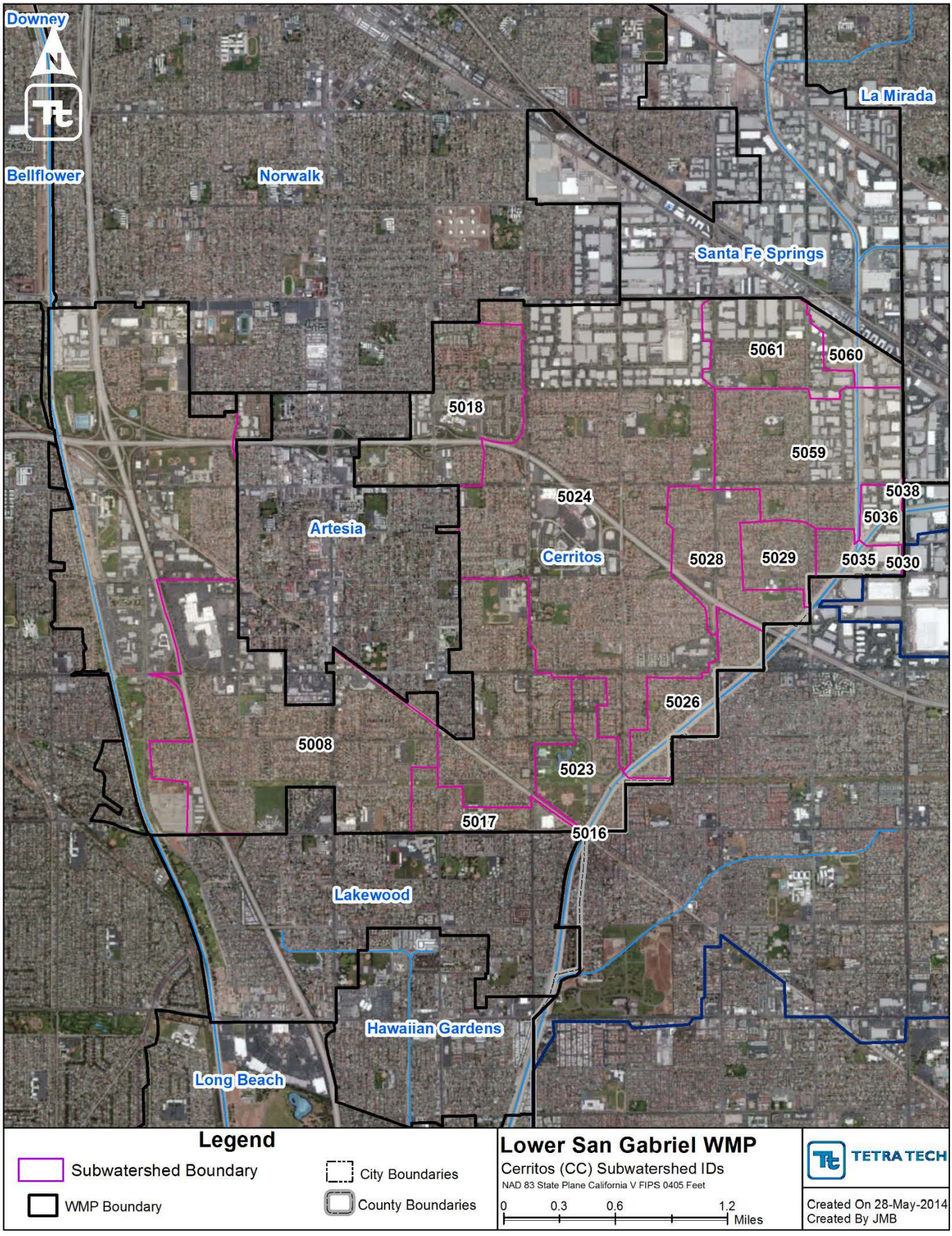

Figure 40. LSGR (CC) Cerritos Subwatershed IDs

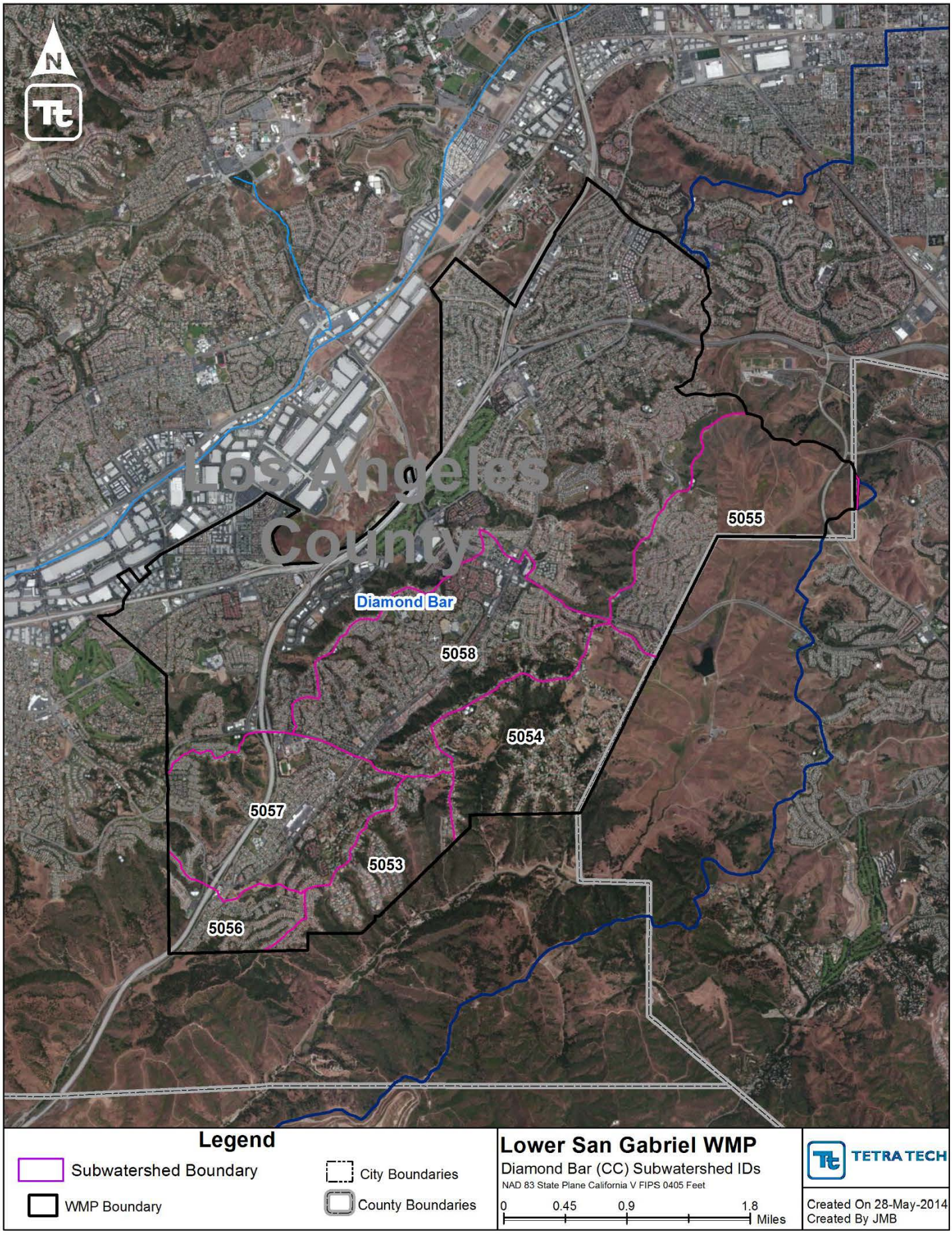

Figure 41. LSGR (CC) Diamond Bar Subwatershed IDs

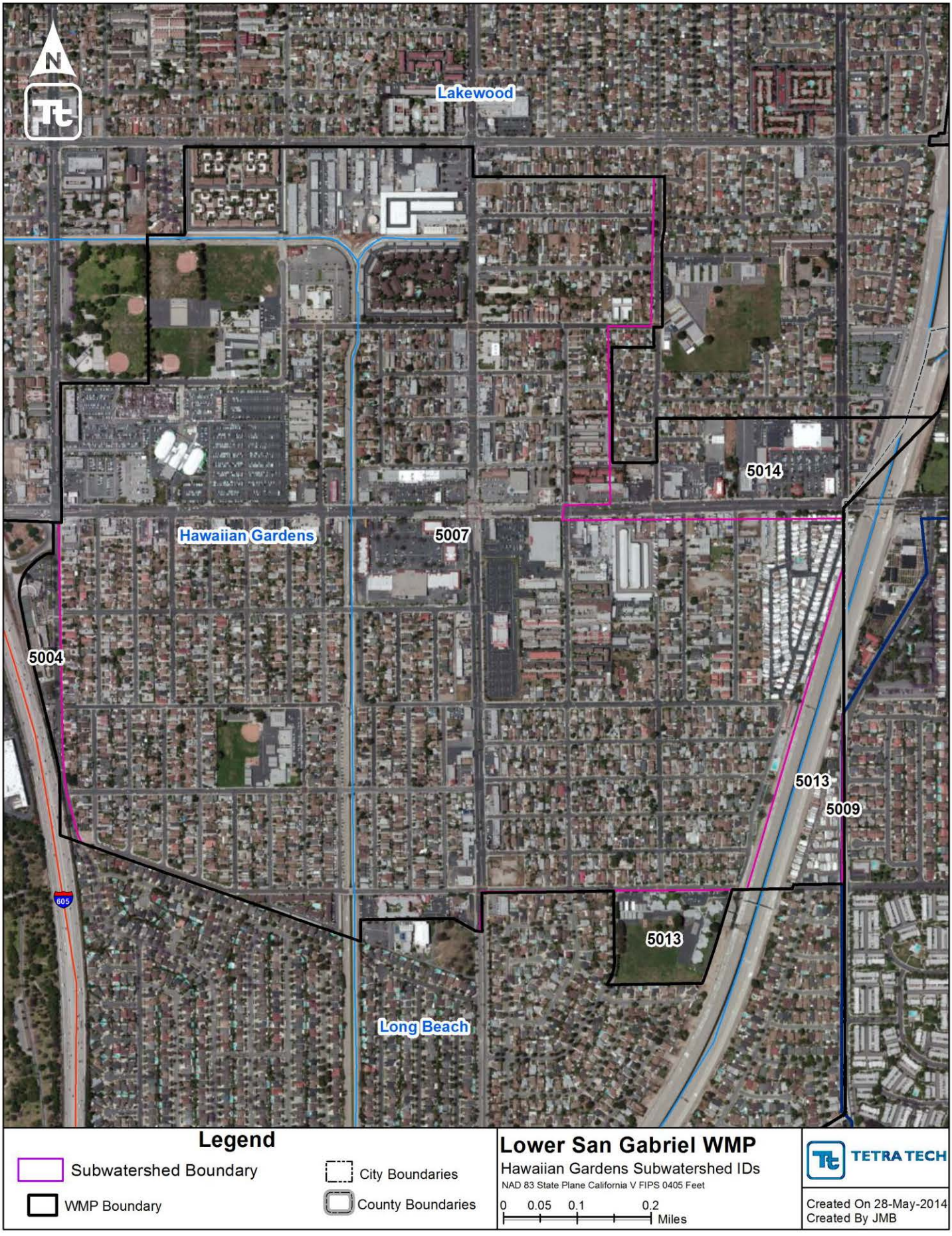

Figure 42. LSGR (CC) Hawaiian Gardens Subwatershed IDs

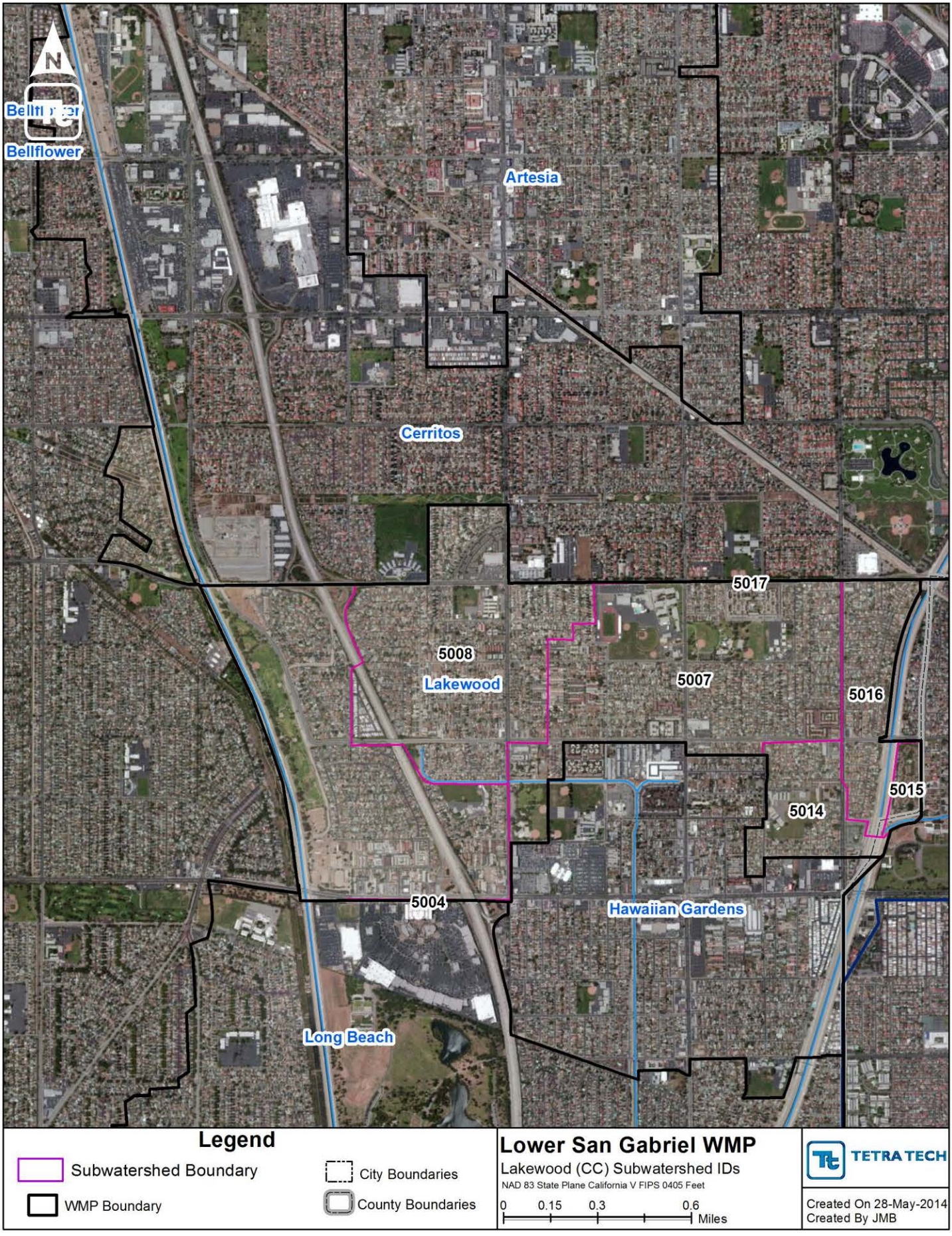

Figure 43. LSGR (CC) Lakewood Subwatershed IDs

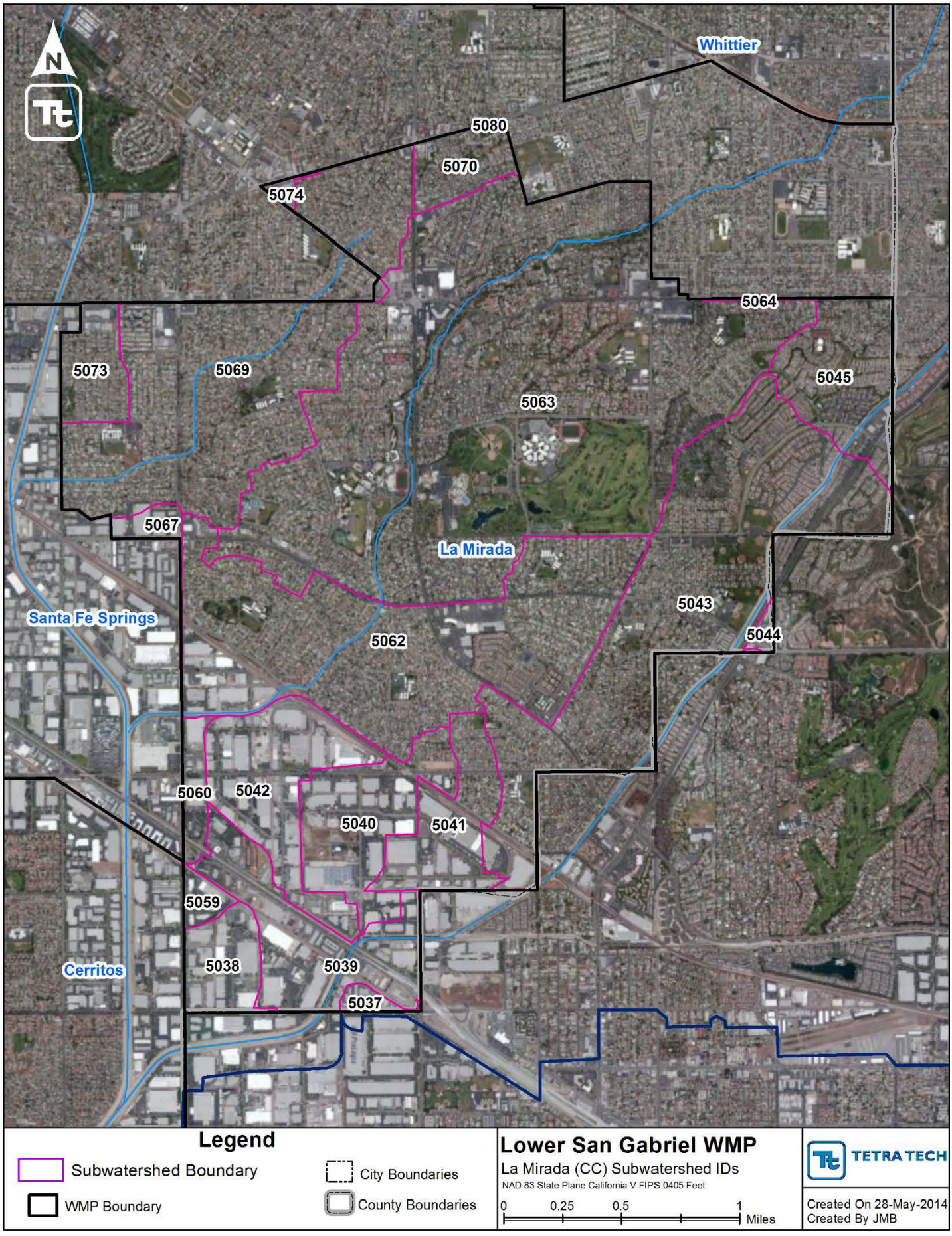

Figure 44. LSGR (CC) La Mirada Subwatershed IDs

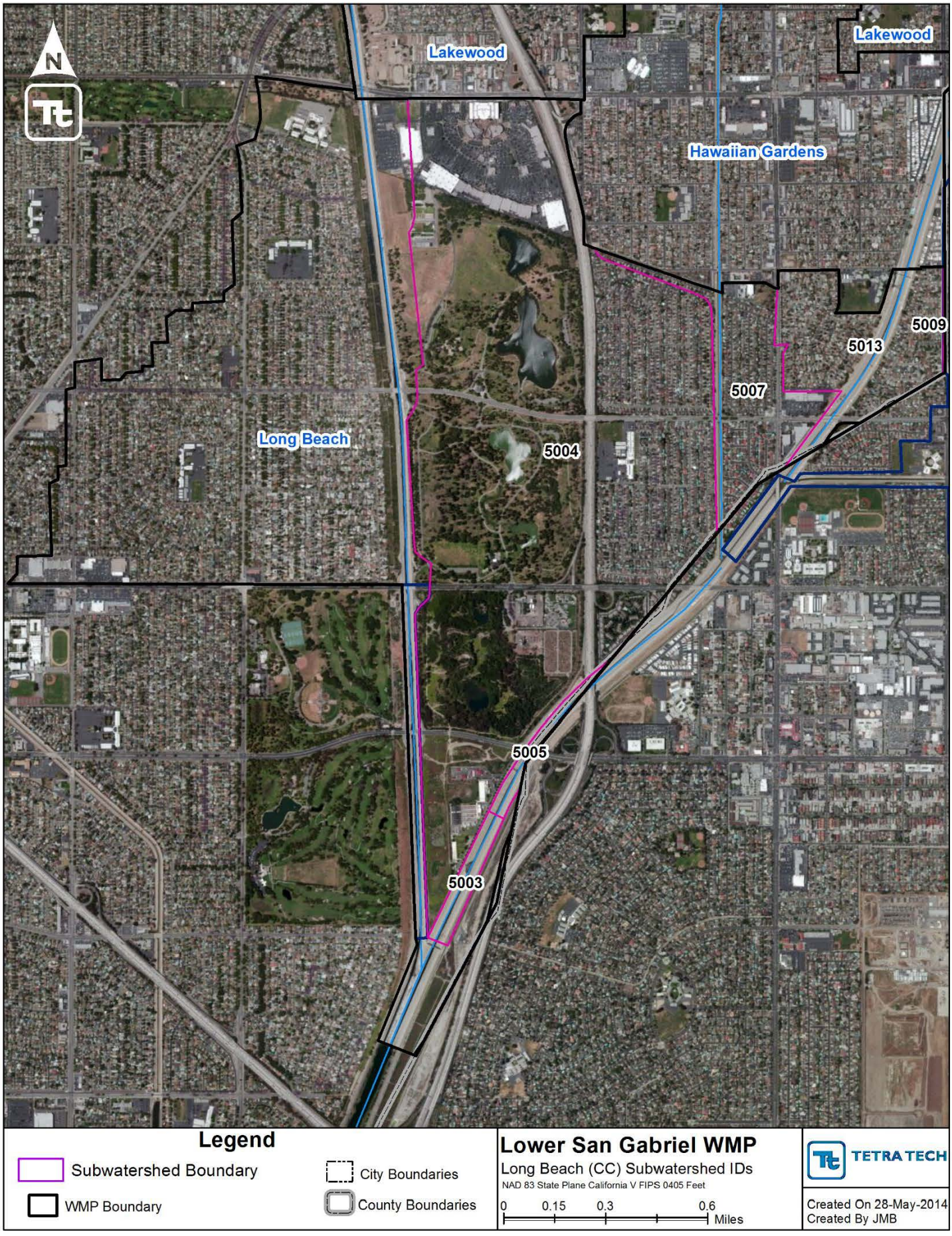

Figure 45. LSGR (CC) Long Beach Subwatershed IDs

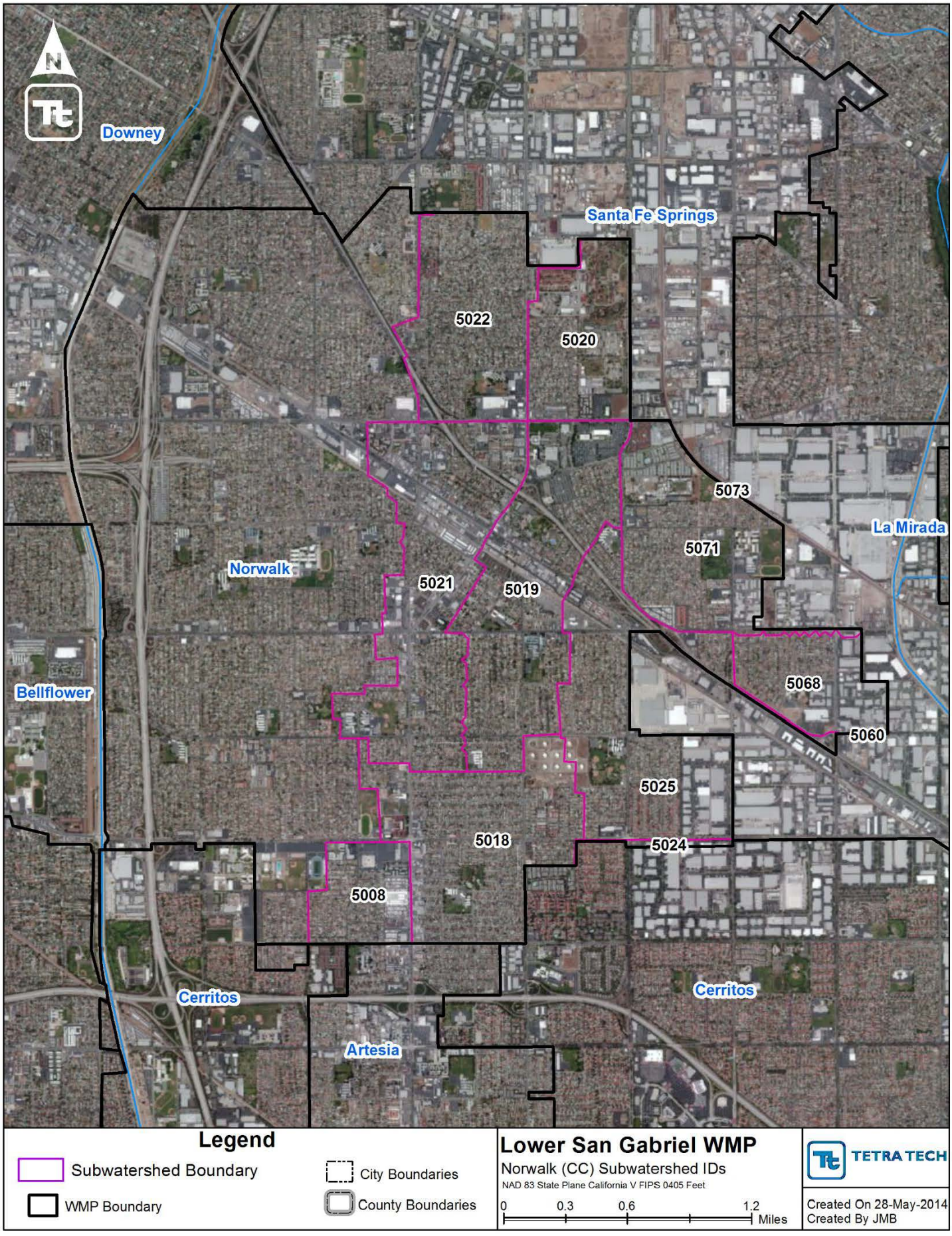

Figure 46. LSGR (CC) Norwalk Subwatershed IDs

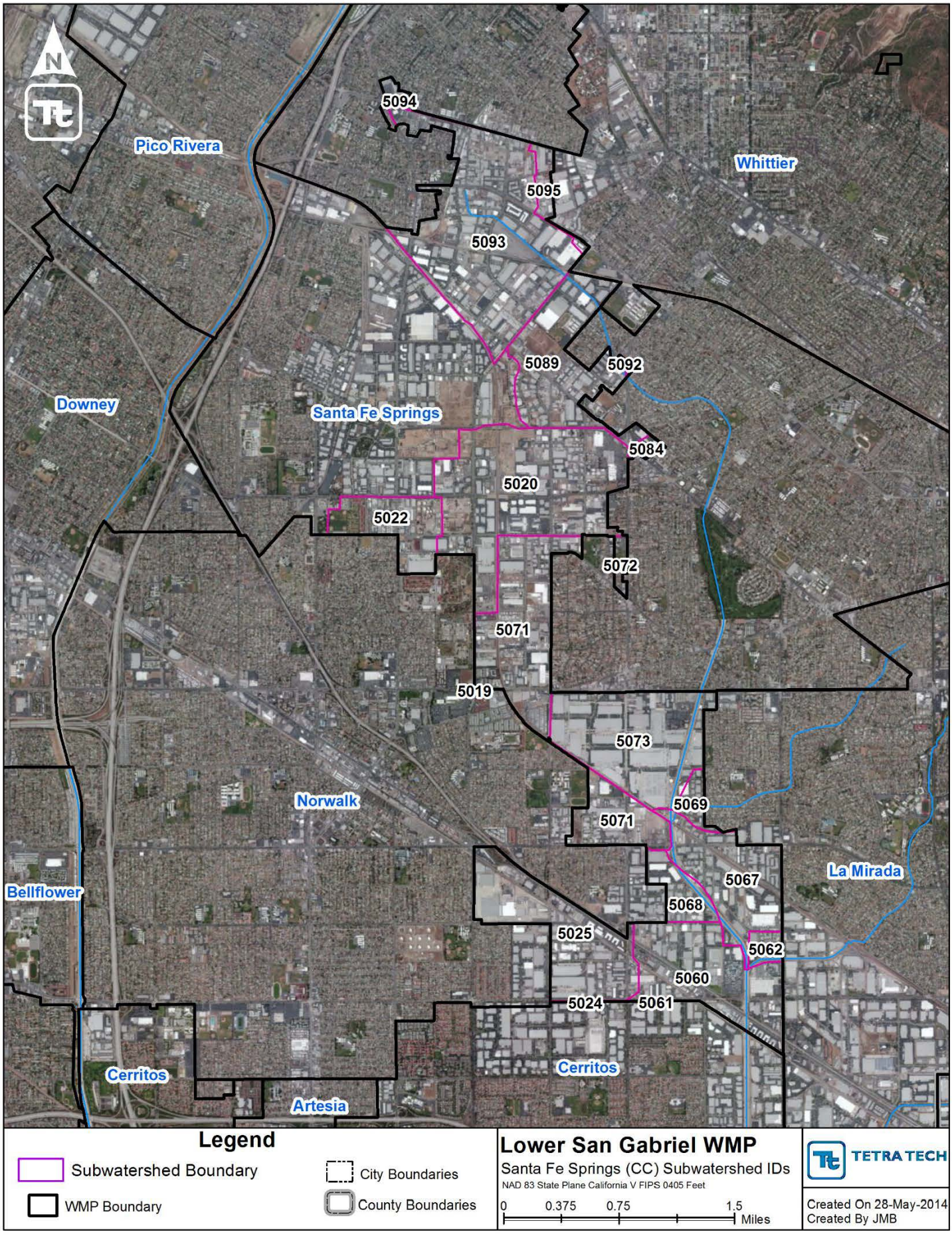

Figure 47. LSGR (CC) Santa Fe Springs Subwatershed IDs

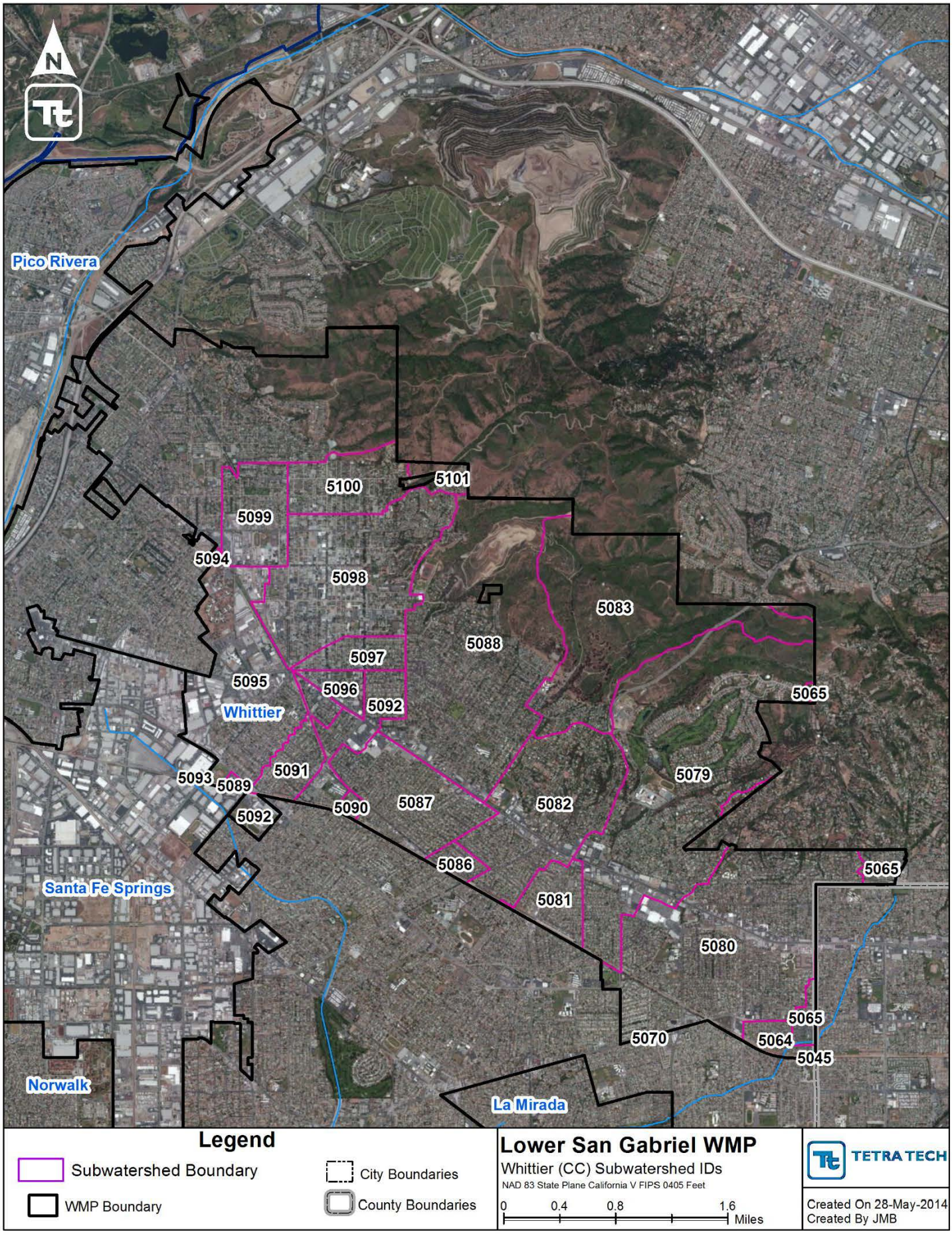

Figure 48. LSGR (CC) Whittier Subwatershed IDs

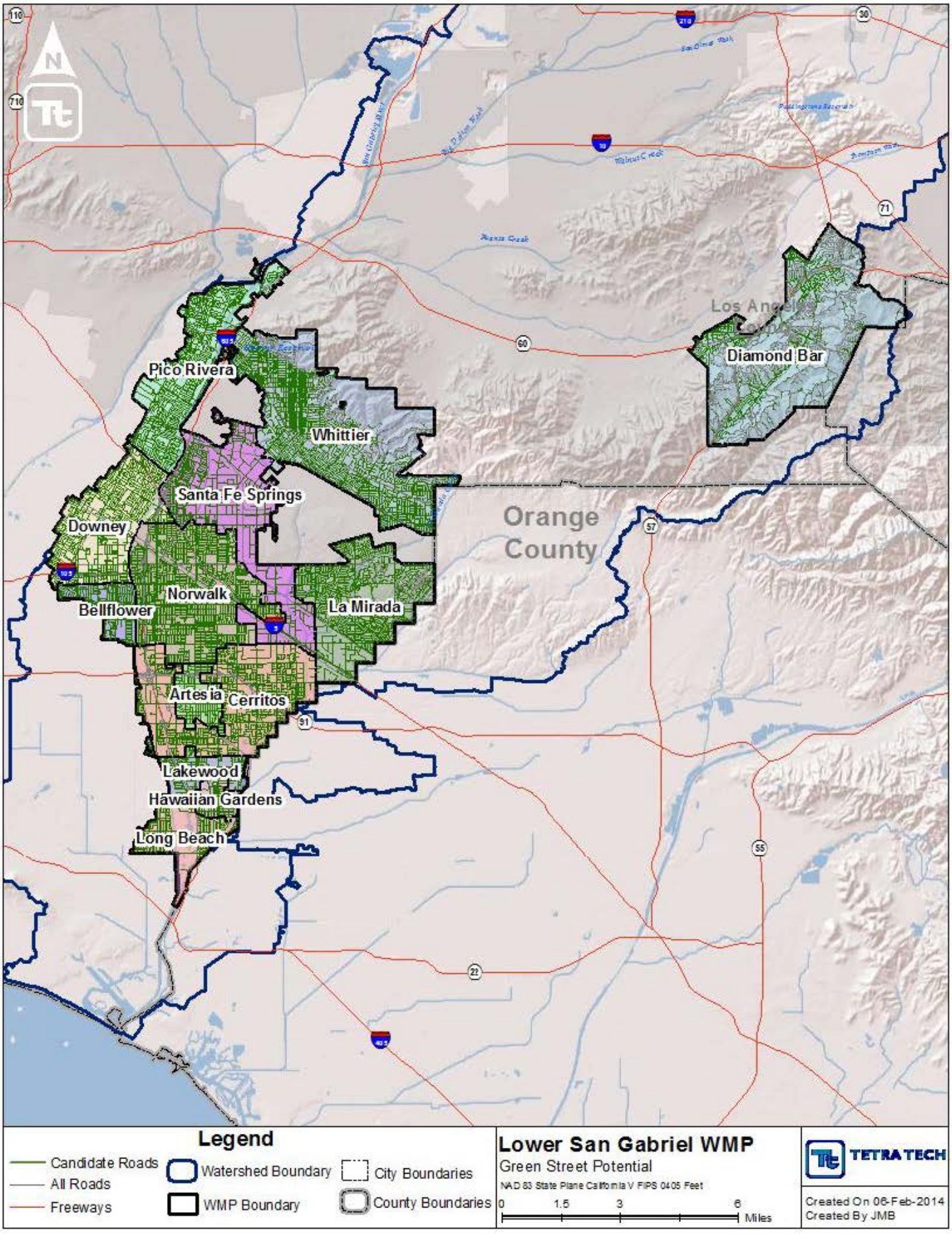

Figure 49. LSGR ROW BMP Potential Opportunities

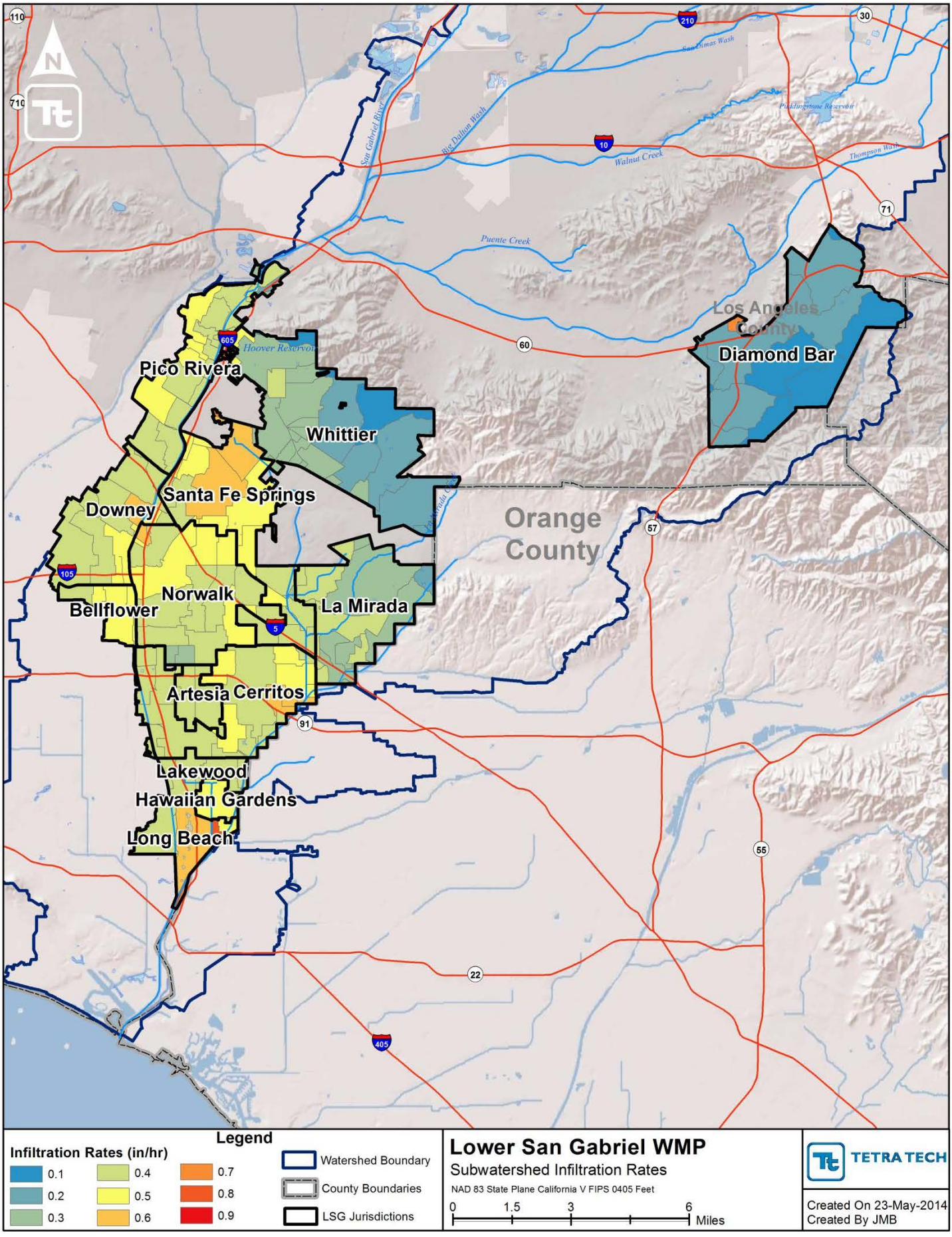

Figure 50. LSGR Subwatershed Infiltration Rates

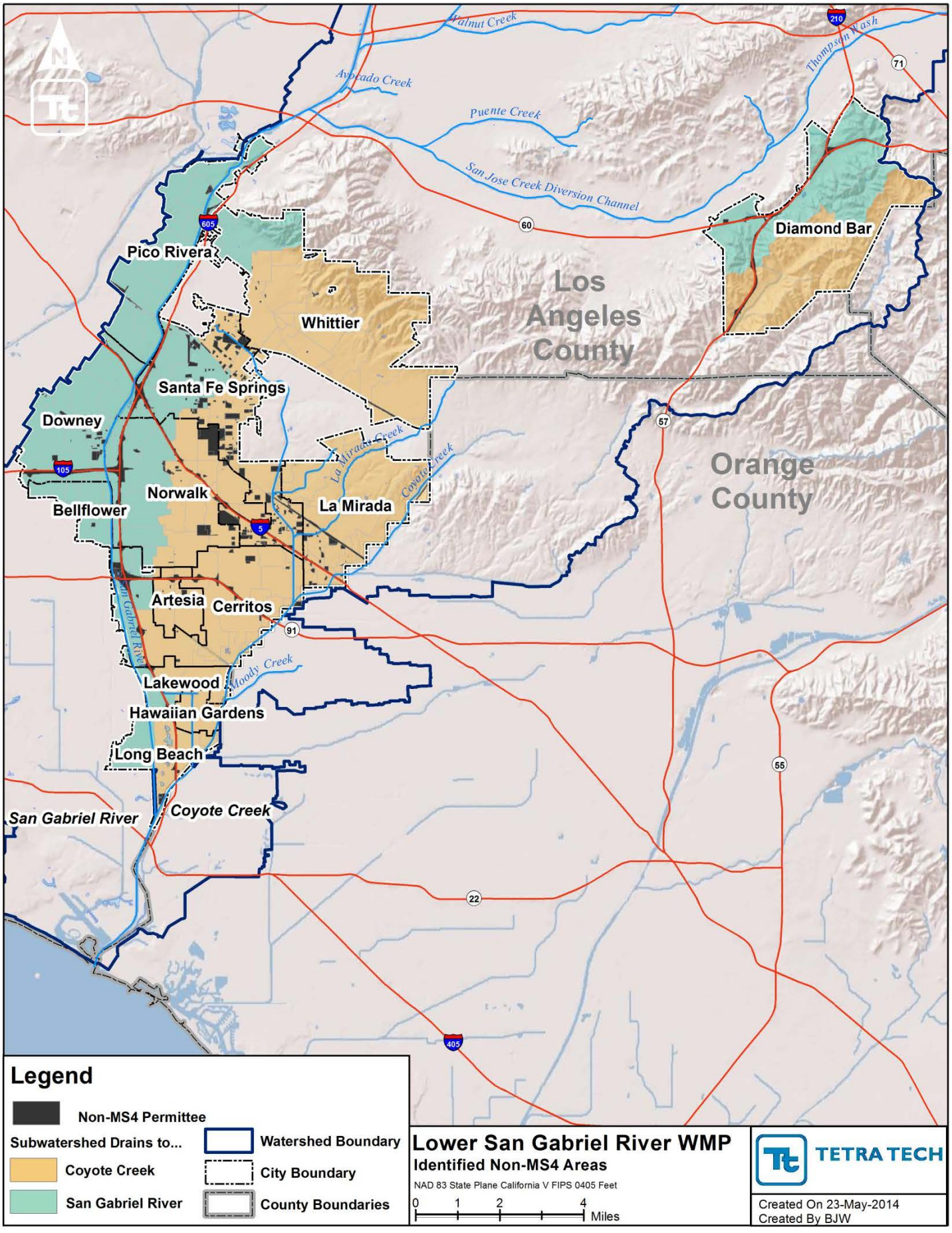

Figure 51. LSGR Non-MS4 Permittees

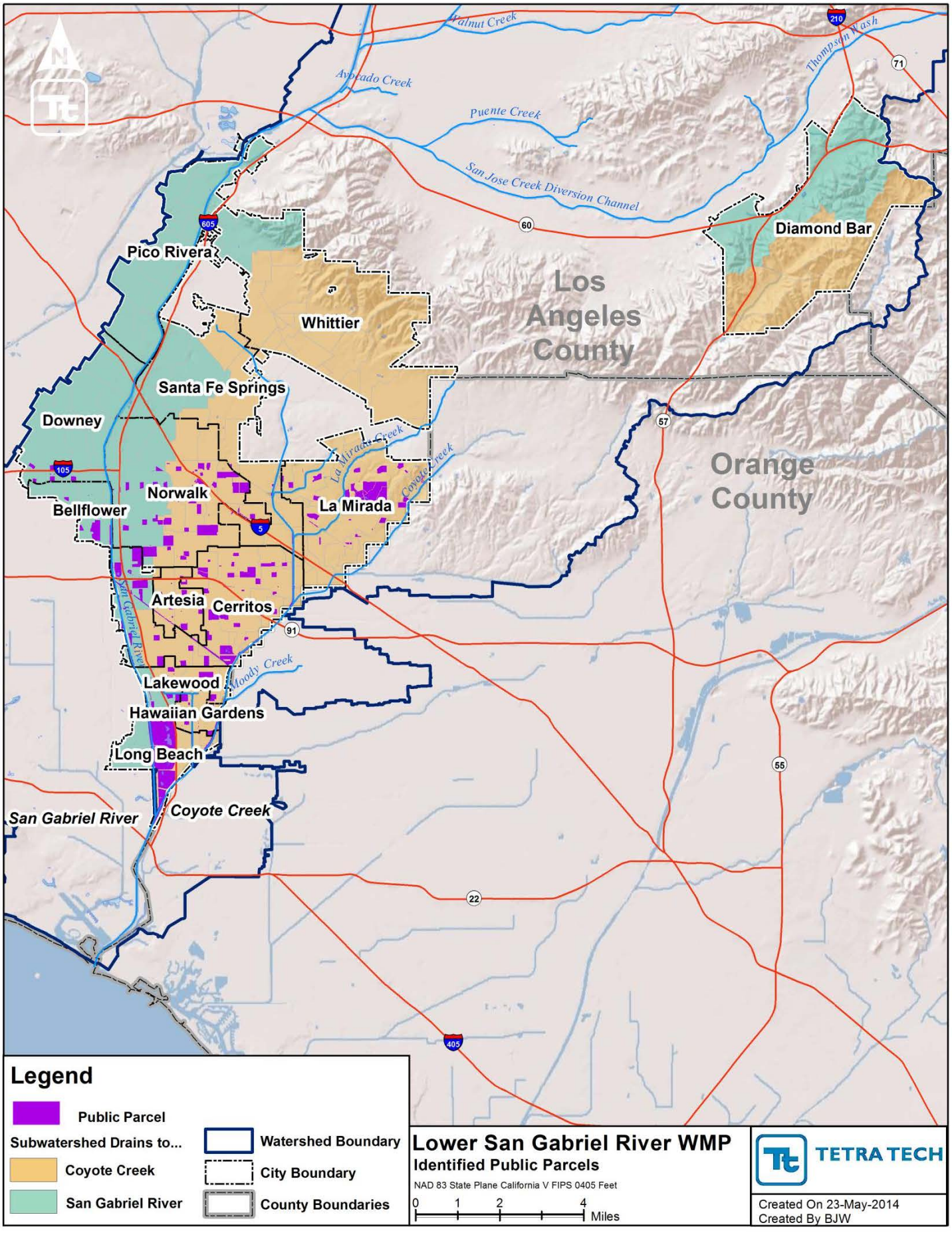

Figure 52. LSGR identified public parcels

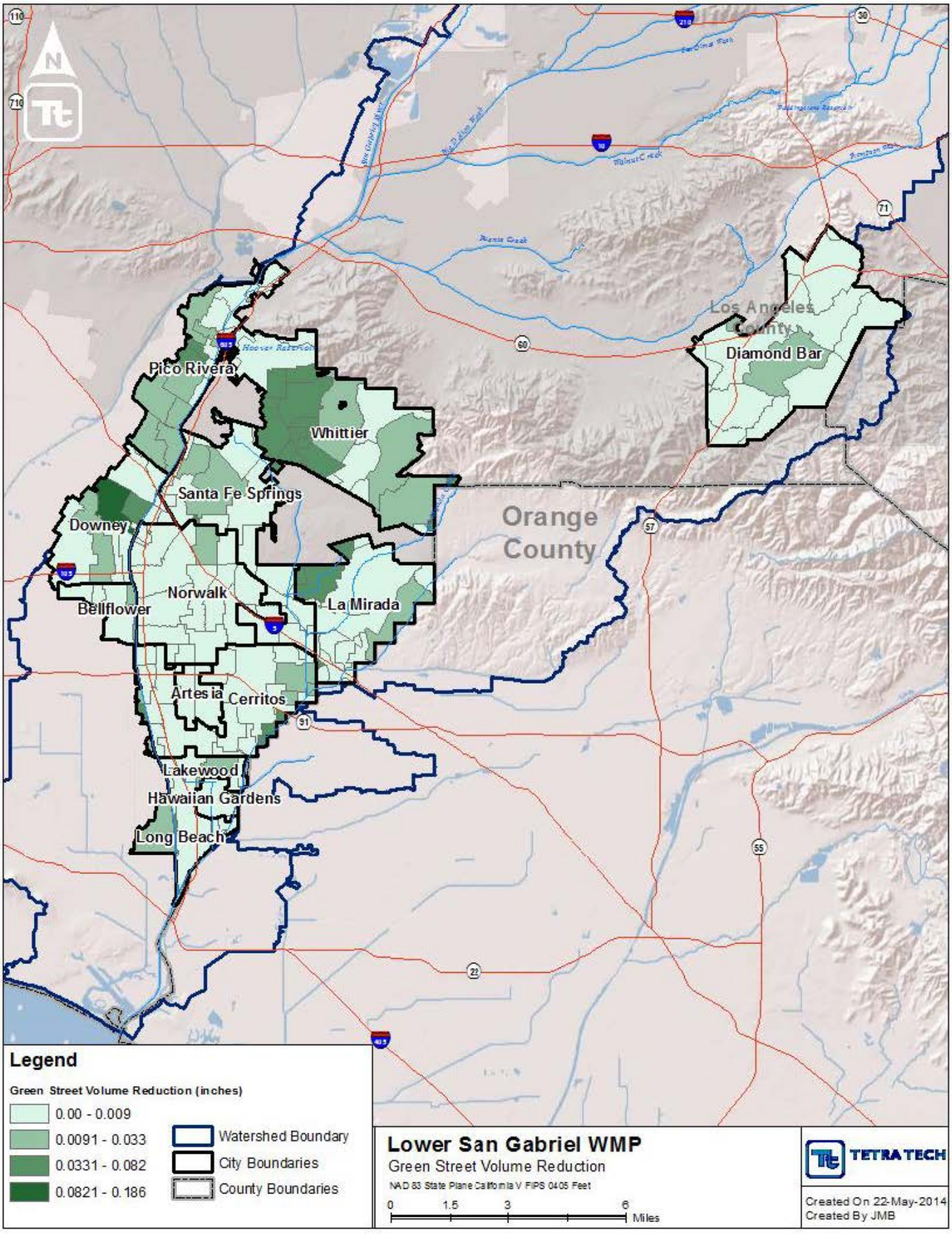

Figure 53. LSGR ROW BMP Volume Reduction

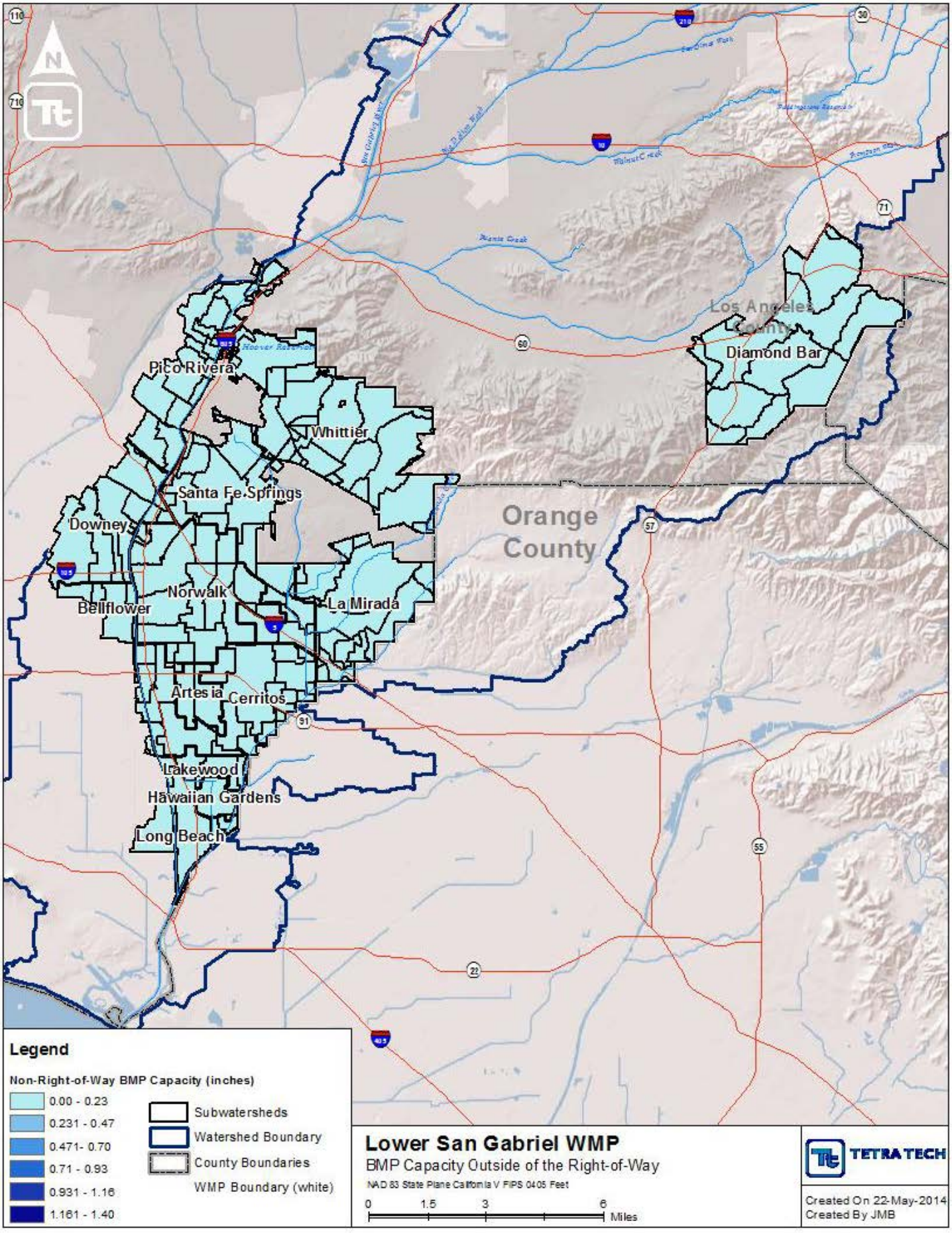

Figure 54. LSGR BMP capacity outside of the right-of-way

Attachment D: Existing and Planned BMPs

Submitted to:

LLAR WMP Group LCC WMP Group LSGR WMP Group

Submitted by:

Tetra Tech
9444 Balboa Ave., Suite 215
San Diego, CA 92123

January 15, 2015

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D1. Existing and Planned BMPs

The following tables summarize existing and planned BMPs in each jurisdiction.

D1.1. City of Bellflower

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Bioretention / Biofiltration	Existing	Riverview Park Infiltration Trenches	2012	10500 Somerset Blvd.	33.896662	-118.11016	105113	16	ac		
Bioretention / Biofiltration	Existing	Riverview Park Infiltration Trenches	2012	10500 Somerset Blvd.	33.896662	-118.11016	105113	16	ac		
Flow-Through Treatment BMP	Existing	Commercial Gas Station and mart	2008	14300 Bellflower Blvd	33.901581	-118.124915	105114	0.42	ac		
Flow-Through Treatment BMP	Existing	Commercial Storage	2005	10526 Rosecrans	33.902009	-118.108102	575118	19.5	ac		
Infiltration BMPs	Existing	St George Church	2012	15725 Cornuta	33.890539	-118.120735	105113	1.36	ac		
Infiltration BMPs	Existing	Autozone	2012	10239 Rosecrans	33.902265	-118.114834	105113	0.78	ac		

D1.2. City of Downey

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Flow Through Treatment BMP	Existing	8314 SECOND ST	2/14/2014		33.9409	-118.13243	245114	1322	sf	0.153	cfs
Flow Through Treatment BMP	Existing	10030 LAKEWOOD	8/17/2007		33.9477	-118.11664	245125	24560	sf	0.17	cfs
Infiltration BMP	Existing	12327 WOODRUFF AV	2/14/2014		33.91989	-118.11706	245113	6894.4	sf	430.9	cf
Infiltration BMP	Existing	12145 WOODRUFF	7/8/2008		33.92338	-118.11805	245113	3200	sf	200	cf
Infiltration BMP	Existing	9500 WASHBURN	2/14/2014		33.92366	-118.1172	245113	342000	sf	9500	cf
Infiltration BMP	Existing	9236 HALL	4/17/2007		33.92972	-118.12155	245113	411840	sf	25740	cf
Infiltration BMP	Existing	9737 IMPERIAL	6/22/2010		33.91761	-118.11961	245114	5600	sf	350	cf
Infiltration BMP	Existing	12254 BELLFLOWER	9/13/2003		33.9214	-118.1239	245114	57600	sf	3600	cf
Infiltration BMP	Existing	11904 BELLFLOWER	2/14/2014		33.92607	-118.12515	245114	5400	sf	300	cf
Infiltration BMP	Existing	11610 LAKEWOOD	9/28/2007		33.93101	-118.12594	245114	91520	sf	5720	cf
Infiltration BMP	Existing	8329 DAVIS	6/15/2010		33.9366	-118.13379	245114	12608	sf	788	cf
Infiltration BMP	Existing	8522 FIRESTONE	2/16/2005		33.93678	-118.12978	245114	105456	sf	6591	cf
Infiltration BMP	Existing	8320 FIRESTONE BLVD	1/1/2010		33.9387	-118.13176	245114	90660	sf	525	cf

RB-AR8262

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9060 IMPERIAL	4/15/2005		33.91646	-118.13532	245115	7056	sf	441	cf
Infiltration BMP	Existing	8141 DE PALMAQ	6/30/2003		33.93618	-118.1402	245115	443008	sf	27688	cf
Infiltration BMP	Existing	8317 DAVIS ST	2/14/2014		33.93683	-118.13441	245115	13920	sf	870	cf
Infiltration BMP	Existing	8333 IOWA	10/11/2001		33.93756	-118.13356	245115	9808	sf	613	cf
Infiltration BMP	Existing	8100 PHLOX	5/20/2004		33.93956	-118.13854	245115	14400	sf	900	cf
Infiltration BMP	Existing	11040 BROOKSHIRE	1/1/2014		33.93932	-118.12496	245119	1923616	sf	120226	cf
Infiltration BMP	Existing	11136 DOLLISON	6/22/2010		33.93448	-118.09613	245122	13824	sf	864	cf
Infiltration BMP	Existing	10239 PICO VISTA	4/7/2003		33.939	-118.10316	245126	2176	sf	136	cf
Infiltration BMP	Existing	10233 PICO VISTA	4/7/2003		33.93914	-118.10305	245126	2176	sf	136	cf
Infiltration BMP	Existing	10228 PICO VISTA	4/7/2003		33.93919	-118.10235	245126	5856	sf	366	cf
Infiltration BMP	Existing	10229 PICO VISTA	4/7/2003		33.93928	-118.10295	245126	2176	sf	136	cf
Infiltration BMP	Existing	10223 PICO VISTA	4/7/2003		33.93946	-118.10289	245126	2048	sf	128	cf
Infiltration BMP	Existing	10218 PICO VISTA	4/7/2003		33.93947	-118.10223	245126	5952	sf	372	cf
Infiltration BMP	Existing	10215 PICO VISTA	4/7/2003		33.93962	-118.10237	245126	2112	sf	132	cf
Infiltration BMP	Existing	10211 PICO VISTA	4/7/2003		33.93969	-118.10255	245126	2304	sf	144	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	10219 PICO VISTA	4/7/2003		33.93975	-118.10273	245126	2304	sf	144	cf
Infiltration BMP	Existing	12800 PARAMOUNT	9/16/2008		33.92108	-118.15383	246077	3168	sf	198	cf
Infiltration BMP	Existing	7930 STEWARD & GRAY	11/18/2004		33.93539	-118.14527	246077	1600	sf	100	cf
Infiltration BMP	Existing	12229 JULIUS	1/1/2006		33.93343	-118.1561	246079	944	sf	59	cf
Infiltration BMP	Existing	7845 BENARES ST	6/14/2001		33.93839	-118.14549	246079	3568	sf	223	cf
Infiltration BMP	Existing	7841 BENARES ST	6/14/2001		33.93851	-118.14537	246079	1760	sf	110	cf
Infiltration BMP	Existing	7837 BENARES ST	6/14/2001		33.93863	-118.14528	246079	1760	sf	110	cf
Infiltration BMP	Existing	7848 BENARES ST	6/14/2001		33.93863	-118.14598	246079	10640	sf	665	cf
Infiltration BMP	Existing	7833 BENARES ST	6/14/2001		33.93875	-118.14518	246079	1760	sf	110	cf
Infiltration BMP	Existing	7844 BENARES ST	6/14/2001		33.93876	-118.14591	246079	2000	sf	125	cf
Infiltration BMP	Existing	7840 BENARES ST	6/14/2001		33.93886	-118.14578	246079	2000	sf	125	cf
Infiltration BMP	Existing	11706 RIVES	6/14/2001		33.93888	-118.14506	246079	1760	sf	110	cf
Infiltration BMP	Existing	7816 BENARES ST	6/14/2001		33.93896	-118.14553	246079	9600	sf	600	cf
Infiltration BMP	Existing	7812 BENARES ST	6/14/2001		33.93904	-118.14568	246079	1760	sf	110	cf
Infiltration BMP	Existing	11726 RIVES	6/14/2001		33.93904	-118.14614	246079	1920	sf	120	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7808 BENARES ST	6/14/2001		33.93911	-118.14583	246079	1760	sf	110	cf
Infiltration BMP	Existing	7808 BENARES ST	6/14/2001		33.93919	-118.14598	246079	1760	sf	110	cf
Infiltration BMP	Existing	7821 BENARES ST	6/14/2001		33.93921	-118.14506	246079	1872	sf	117	cf
Infiltration BMP	Existing	7804 BENARES ST	6/14/2001		33.93926	-118.14613	246079	9760	sf	610	cf
Infiltration BMP	Existing	7817 BENARES ST	6/14/2001		33.93931	-118.14525	246079	1760	sf	110	cf
Infiltration BMP	Existing	7813 BENARES ST	6/14/2001		33.93938	-118.14542	246079	1760	sf	110	cf
Infiltration BMP	Existing	7809 BENARES ST	6/14/2001		33.93945	-118.14557	246079	1760	sf	110	cf
Infiltration BMP	Existing	7805 BENARES ST	6/14/2001		33.93953	-118.14572	246079	1760	sf	110	cf
Infiltration BMP	Existing	7801 BENARES ST	6/14/2001		33.93961	-118.14587	246079	9600	sf	600	cf
Infiltration BMP	Existing	7140 FIRESTONE	10/3/2005		33.94707	-118.15469	246079	24048	sf	1503	cf
Infiltration BMP	Existing	8233 FIRESTONE	6/21/2010		33.94076	-118.13358	246102	91648	sf	5728	cf
Infiltration BMP	Existing	7814 FIRESTONE	2/14/2014		33.94418	-118.14232	246102	3000	sf	125	cf
Infiltration BMP	Existing	7676 FIRESTONE	2/26/2004		33.94527	-118.144	246102	213824	sf	13364	cf
Infiltration BMP	Existing	7201 FIRESTONE	4/19/2007		33.94821	-118.15273	246102	34352	sf	2147	cf
Infiltration BMP	Existing	7360 FLORENCE	6/21/2010		33.95872	-118.141	246102	14496	sf	906	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8129 FLORENCE	6/23/2010		33.95231	-118.12677	246103	8880	sf	555	cf
Infiltration BMP	Existing	8605 GALLATIN ROAD	2/14/2014		33.95768	-118.11432	246103	85792	sf	5362	cf
Infiltration BMP	Existing	9276 DOWNEY	1/4/2007		33.95901	-118.11926	246103	6400	sf	400	cf
Infiltration BMP	Existing	8801 LAKEWOOD	7/14/2006		33.96317	-118.11498	246106	18352	sf	1147	cf
Infiltration BMP	Existing	7880 TELEGRAPH	11/14/2004		33.97112	-118.12113	246111	123104	sf	7694	cf
Permeable Pavement	Existing	9449 IMPERIAL	6/22/2010		33.91809	-118.12656	245115	32160	sf	2010	cf
Permeable Pavement	Existing	9565 FIRESTONE	6/3/2008		33.93043	-118.11175	245119	18928	sf	1183	cf
Permeable Pavement	Existing	12628 PARAMOUNT	2/14/2014		33.92329	-118.15283	246077	15000	sf	284	cf
Permeable Pavement	Existing	11555 PARAMOUNT	2/14/2014		33.94116	-118.14067	246077	8125	sf	400	cf
Permeable Pavement	Existing	8043 SECOND ST	1/1/2009		33.94254	-118.13737	246102	105023	sf	6787	cf
Permeable Pavement	Existing	9250 LAKEWOOD	2/14/2014		33.95768	-118.1153	246103	24662	sf	939	cf
Regional Detention Facility	Existing	9341 IMPERIAL	5/6/2004		33.91918	-118.12898	245115	664624	sf	41539	cf
Regional Infiltration Facility	Existing	12074 LAKEWOOD	5/22/2005		33.9257	-118.13203	245115	960800	sf	60050	cf
Regional Infiltration Facility	Existing	12002 LAKEWOOD	5/22/2005		33.9261	-118.13169	245115	605264	sf	37829	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8764 FIRESTONE	8/14/2008	6523923.595890	6523923.595890	1798908.496460	245119	20064	sf	1254	cf
Infiltration BMP	Existing	9915 DOWNEY	9/27/2005	6523909.682530	6523909.682530	1805554.600030	246103	2265	sf	142	cf
Infiltration BMP	Existing	7602 RUNDELL	1/27/2006	6514863.657960	6514863.657960	1798182.489930	246079	2265	sf	142	cf
Infiltration BMP	Existing	10403 SAMOLINE	10/3/2005	6521224.982130	6521224.982130	1804890.047210	246102	2265	sf	142	cf
Infiltration BMP	Existing	12516 DOLAN	11/18/2005	6518146.741440	6518146.741440	1794105.551200	245115	1698	sf	106	cf
Infiltration BMP	Existing	7845 QUILL	3/28/2006	6515351.811960	6515351.811960	1796427.555720	246079	1698	sf	106	cf
Infiltration BMP	Existing	10435 BIRCHDALE	5/19/2005	6524444.362750	6524444.362750	1802478.415410	245119	1132	sf	71	cf
Infiltration BMP	Existing	8538 ALBIA	9/23/2005	6520089.101510	6520089.101510	1795567.094110	245115	566	sf	35	cf
Infiltration BMP	Existing	12159 CORNUTA	9/16/2005	6525392.928460	6525392.928460	1794233.560240	245114	566	sf	35	cf
Infiltration BMP	Existing	8064 DACOSTA	7/7/2005	6523365.354910	6523365.354910	1805913.806160	246103	566	sf	35	cf
Infiltration BMP	Existing	8551 DALEN	10/6/2005	6518205.327280	6518205.327280	1792517.271110	245115	566	sf	35	cf
Infiltration BMP	Existing	8318 DINSDALE	6/15/2006	6523907.628300	6523907.628300	1804895.972630	246103	566	sf	35	cf
Infiltration BMP	Existing	12641 DOLAN	9/2/2005	6517370.498610	6517370.498610	1793094.154440	245115	566	sf	35	cf
Infiltration BMP	Existing	12837 DOWNEY	6/13/2008	6516221.544620	6516221.544620	1792552.216840	246077	566	sf	35	cf
Infiltration BMP	Existing	12608 DUNROBIN	1/1/2007	6525044.715110	6525044.715110	1792041.222140	245114	566	sf	35	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7715 GAINFORD	5/9/2006	6521302.031220	6521302.031220	1807578.393730	246106	566	sf	35	cf
Infiltration BMP	Existing	12337 HORLEY	6/20/2007	6514828.837130	6514828.837130	1797233.894880	246079	566	sf	35	cf
Infiltration BMP	Existing	12619 IBBETSON	4/7/2008	6525826.717640	6525826.717640	1791950.694670	245114	566	sf	35	cf
Infiltration BMP	Existing	12142 MARBEL	5/5/2008	6521265.537710	6521265.537710	1794924.230550	245115	566	sf	35	cf
Infiltration BMP	Existing	12228 NORLAIN	6/24/2005	6513924.473210	6513924.473210	1798288.206130	246079	566	sf	35	cf
Infiltration BMP	Existing	11733 PATTON	12/9/2005	6521629.388810	6521629.388810	1797656.681610	245114	566	sf	35	cf
Infiltration BMP	Existing	11712 PRUESS	3/29/2006	6518005.349510	6518005.349510	1799785.098800	246077	566	sf	35	cf
Infiltration BMP	Existing	8605 SAMOLINE	10/23/2006	6525562.919850	6525562.919850	1810382.622670	246106	566	sf	35	cf
Infiltration BMP	Existing	7814 SPRINGER	7/20/2005	6515325.745000	6515325.745000	1796943.250000	246079	566	sf	35	cf
Infiltration BMP	Existing	7406 THIRD	9/23/2005	6517102.209740	6517102.209740	1803992.224080	246102	566	sf	35	cf
Infiltration BMP	Existing	8836 TWEEDY	8/21/2006	6524333.205540	6524333.205540	1809897.996880	246106	566	sf	35	cf
Infiltration BMP	Existing	9702 TWEEDY	8/30/2005	6522704.033740	6522704.033740	1807211.824630	246103	566	sf	35	cf
Infiltration BMP	Existing	11414 PARAMOUNT	11/17/2006	6519592.558830	6519592.558830	1800943.348310	245115	37135	sf	2321	cf
Infiltration BMP	Existing	8077 FLORENCE AV	1/1/2009	6523000.000000	6523000.000000	1805200.000000	246103	31872	sf	1992	cf
Infiltration BMP	Existing	8351 FLORENCE	11/29/2005	6524092.726100	6524092.726100	1804613.455750	246103	8252	sf	516	cf

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Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	11003 LAKEWOOD	1/1/2006	6524400.000000	6524400.000000	1799800.000000	245119	8252	sf	516	cf
Infiltration BMP	Existing	9288 LUBEC	6/21/2010	6528705.843900	6528705.843900	1803218.787040	245125	8252	sf	516	cf
Infiltration BMP	Existing	13240 BARLIN	6/24/2005	6517118.017720	6517118.017720	1789361.126310	245524	6189	sf	387	cf
Infiltration BMP	Existing	9802 BROOKSHIRE	4/24/2007	6525737.765210	6525737.765210	1805415.750650	246103	6189	sf	387	cf
Infiltration BMP	Existing	9026 SUVA	10/5/2006	6527186.692380	6527186.692380	1804858.393970	245125	6189	sf	387	cf
Infiltration BMP	Existing	7325 IRWINGROVE	4/27/2005	6518419.969630	6518419.969630	1807291.337240	246102	5158	sf	322	cf
Infiltration BMP	Existing	10064 PANGBORN	8/16/2005	6529846.676910	6529846.676910	1801177.429270	245125	5158	sf	322	cf
Infiltration BMP	Existing	8102 THIRD	3/4/2009	6520617.238210	6520617.238210	1801805.039980	246103	7616	sf	476	cf
Infiltration BMP	Existing	12200 BELLFLOWER	11/4/2008	6524061.916580	6524061.916580	1794195.827920	245114	4126	sf	258	cf
Infiltration BMP	Existing	9818 BIRCHDALE	12/28/2005	6526194.448530	6526194.448530	1804634.814020	245125	4126	sf	258	cf
Infiltration BMP	Existing	10419 BROOKSHIRE	7/30/2007	6523842.460000	6523842.460000	1803179.994160	245119	4126	sf	258	cf
Infiltration BMP	Existing	10432 BROOKSHIRE	2/14/2007	6523911.001360	6523911.001360	1803018.354450	245119	4126	sf	258	cf
Infiltration BMP	Existing	10329 CASANES	1/1/2006	6528565.218740	6528565.218740	1800358.453120	245126	4126	sf	258	cf
Infiltration BMP	Existing	13221 CORRIGAN	3/9/2006	6523120.117490	6523120.117490	1789965.324450	245114	4126	sf	258	cf
Infiltration BMP	Existing	8816 ELSTON	12/28/2005	6526840.850650	6526840.850650	1808666.263650	246103	4126	sf	258	cf

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Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9278 GAINFORD	6/15/2005	6528421.969980	6528421.969980	1803000.469050	245125	4126	sf	258	cf
Infiltration BMP	Existing	7340 IRWINGROVE	12/6/2005	6518415.507880	6518415.507880	1806990.616650	246102	4126	sf	258	cf
Infiltration BMP	Existing	9055 IRWINGROVE	10/17/2006	6526414.238800	6526414.238800	1802422.724820	245119	4126	sf	258	cf
Infiltration BMP	Existing	9005 KRISTIN	1/1/2006	6524171.005660	6524171.005660	1809376.398810	246106	4126	sf	258	cf
Infiltration BMP	Existing	9015 KRISTIN	1/1/2006	6524137.396040	6524137.396040	1809320.713720	246106	4126	sf	258	cf
Infiltration BMP	Existing	10014 LA REINA	11/3/2005	6523603.973220	6523603.973220	1805275.605180	246103	4126	sf	258	cf
Infiltration BMP	Existing	8334 LEXINGTON	3/20/2006	6523900.000000	6523900.000000	1804200.000000	246103	4126	sf	258	cf
Infiltration BMP	Existing	7114 LUXOR	7/27/2005	6513446.571340	6513446.571340	1802395.175860	246100	4126	sf	258	cf
Infiltration BMP	Existing	10348 PANGBORN	10/12/2006	6529020.867850	6529020.867850	1800144.106260	245126	4126	sf	258	cf
Infiltration BMP	Existing	7268 PELLET	12/8/2005	6516203.991240	6516203.991240	1804244.566160	246104	4126	sf	258	cf
Infiltration BMP	Existing	9821 RIVES	9/12/2005	6521261.613640	6521261.613640	1807221.725140	246106	4126	sf	258	cf
Infiltration BMP	Existing	10427 STAMPS	2/27/2006	6523141.588150	6523141.588150	1803526.008280	246103	4126	sf	258	cf
Infiltration BMP	Existing	8325 TEXAS	8/30/2007	6520789.744350	6520789.744350	1799109.948610	245114	4126	sf	258	cf
Infiltration BMP	Existing	9211 ARRINGTON	6/21/2010	6527822.609270	6527822.609270	1805896.813180	245125	3095	sf	193	cf
Infiltration BMP	Existing	10372 BIRCHDALE	1/17/2006	6524786.108330	6524786.108330	1802711.833690	245119	2660	sf	166	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9509 BROCK	10/6/2005	6524084.133490	6524084.133490	1807438.122200	246103	3095	sf	193	cf
Infiltration BMP	Existing	9600 CORD	5/12/2008	6529842.639410	6529842.639410	1803668.379590	245125	3095	sf	193	cf
Infiltration BMP	Existing	10943 CORD	3/13/2007	6526539.555830	6526539.555830	1798046.595190	245119	3095	sf	193	cf
Infiltration BMP	Existing	12569 DOLAN	9/27/2006	6517675.526540	6517675.526540	1793796.546690	245115	3095	sf	193	cf
Infiltration BMP	Existing	9252A ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	3095	sf	193	cf
Infiltration BMP	Existing	9252B ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	3095	sf	193	cf
Infiltration BMP	Existing	9258A ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	3095	sf	193	cf
Infiltration BMP	Existing	9258B ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	3095	sf	193	cf
Infiltration BMP	Existing	9258C ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	3095	sf	193	cf
Infiltration BMP	Existing	9622 HALEDON	3/16/2006	6528283.868130	6528283.868130	1804260.791520	245125	3095	sf	193	cf
Infiltration BMP	Existing	11442 JULIUS	7/26/2007	6517126.240320	6517126.240320	1802109.297720	246079	3095	sf	193	cf
Infiltration BMP	Existing	10026 MATTOCK	1/1/2006	6530326.462180	6530326.462180	1801330.602850	245125	3095	sf	193	cf
Infiltration BMP	Existing	9303 PARAMOUNT	3/14/2006	6523934.101920	6523934.101920	1808355.150660	246106	3095	sf	193	cf
Infiltration BMP	Existing	8739 PARKCLIFF	1/23/2006	6516653.896010	6516653.896010	1788072.265990	245524	2063	sf	129	cf
Infiltration BMP	Existing	9303 PARROT	1/4/2007	6524270.384450	6524270.384450	1808221.036420	246106	3095	sf	193	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7313 PELLET	6/22/2010	6516478.702600	6516478.702600	1804386.841100	246104	3095	sf	193	cf
Infiltration BMP	Existing	10473 PICO VISTA	1/21/2009	6529579.260180	6529579.260180	1798825.132300	245126	3095	sf	193	cf
Infiltration BMP	Existing	7840 THIRD	8/29/2007	6519254.945150	6519254.945150	1802616.251380	246102	3095	sf	193	cf
Infiltration BMP	Existing	8347 VISTA DEL ROSA	7/26/2007	6527061.884710	6527061.884710	1808864.927170	246106	3095	sf	193	cf
Infiltration BMP	Existing	11632 ADENMOOR	6/15/2005	6524141.212380	6524141.212380	1797138.142940	245114	2063	sf	129	cf
Infiltration BMP	Existing	7124 ADWEN	12/20/2007	6513937.816490	6513937.816490	1803059.644840	246100	2063	sf	129	cf
Infiltration BMP	Existing	7258 ADWEN	1/3/2008	6515068.905460	6515068.905460	1802384.347520	246079	2063	sf	129	cf
Infiltration BMP	Existing	7646 ADWEN	10/6/2005	6517037.957040	6517037.957040	1801170.785850	246079	2063	sf	129	cf
Infiltration BMP	Existing	7702 ADWEN	5/11/2006	6517121.727310	6517121.727310	1801116.179360	246079	2063	sf	129	cf
Infiltration BMP	Existing	13032 AIRPOINT	5/14/2007	6517972.459000	6517972.459000	1790335.341940	245115	2063	sf	129	cf
Infiltration BMP	Existing	8455 ALAMEDA	8/7/2008	6519558.018350	6519558.018350	1795721.453060	245115	2063	sf	129	cf
Infiltration BMP	Existing	8632 ALAMEDA	11/2/2006	6520500.318510	6520500.318510	1795019.322380	245115	2063	sf	129	cf
Infiltration BMP	Existing	7945 ALBIA	10/11/2005	6516993.544600	6516993.544600	1797608.073070	246079	2063	sf	129	cf
Infiltration BMP	Existing	8704 ALBIA	5/28/2008	6520928.243910	6520928.243910	1795073.644330	245115	2063	sf	129	cf
Infiltration BMP	Existing	7845 ARNETT	6/18/2010	6518353.322440	6518353.322440	1801165.354440	246079	2063	sf	129	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9217 ARRINGTON	3/27/2006	6527795.727670	6527795.727670	1805838.303240	245125	2063	sf	129	cf
Infiltration BMP	Existing	7870 BAYSINGER	2/8/2008	6521311.922790	6521311.922790	1805484.679070	246102	2063	sf	129	cf
Infiltration BMP	Existing	9964 BELCHER	5/16/2007	6525622.979960	6525622.979960	1789815.793090	245113	2063	sf	129	cf
Infiltration BMP	Existing	12556 BELLDER	8/17/2007	6518567.857140	6518567.857140	1793310.793680	245115	2063	sf	129	cf
Infiltration BMP	Existing	11614 BELLFLOWER	11/7/2008	6523771.271210	6523771.271210	1797348.312220	245114	2063	sf	129	cf
Infiltration BMP	Existing	11802 BELLMAN	3/9/2007	6521898.080850	6521898.080850	1797268.375540	245114	2063	sf	129	cf
Infiltration BMP	Existing	7502 BENARES	1/30/2009	6515952.395710	6515952.395710	1801162.932420	246079	2063	sf	129	cf
Infiltration BMP	Existing	7824 BORSON	5/24/2007	6514090.231790	6514090.231790	1794571.039330	246077	2063	sf	129	cf
Infiltration BMP	Existing	7442 BROOKMILL	2/6/2006	6515991.568850	6515991.568850	1801492.813950	246079	2063	sf	129	cf
Infiltration BMP	Existing	9202 BUELL	7/21/2008	6526325.599230	6526325.599230	1799668.061170	245119	2063	sf	129	cf
Infiltration BMP	Existing	9340 BUELL	8/9/2006	6527287.659290	6527287.659290	1799162.594770	245126	2063	sf	129	cf
Infiltration BMP	Existing	8707 BYERS	3/15/2006	6521183.641890	6521183.641890	1796053.567730	245115	2063	sf	129	cf
Infiltration BMP	Existing	10446 CASANES	10/26/2006	6528470.793910	6528470.793910	1799828.787480	245126	2063	sf	129	cf
Infiltration BMP	Existing	10932 CASANES	11/17/2005	6527225.467210	6527225.467210	1797760.272650	245119	2063	sf	129	cf
Infiltration BMP	Existing	13341 CASTANA	10/28/2005	6517576.502130	6517576.502130	1788949.477410	245524	2063	sf	129	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7408 CECILIA	10/27/2005	6517829.130300	6517829.130300	1804625.827460	246102	2063	sf	129	cf
Infiltration BMP	Existing	7604 CECILIA	5/14/2007	6518455.494160	6518455.494160	1804215.794590	246102	2063	sf	129	cf
Infiltration BMP	Existing	9116 CHANEY	12/19/2005	6529189.877980	6529189.877980	1805493.817150	245125	2063	sf	129	cf
Infiltration BMP	Existing	8210 CHEYENNE	3/18/2008	6515440.785260	6515440.785260	1792057.306890	246077	2063	sf	129	cf
Infiltration BMP	Existing	9663 CLANCEY	8/17/2005	6527712.819630	6527712.819630	1804149.908320	245125	2063	sf	129	cf
Infiltration BMP	Existing	10708 CLANCEY	12/9/2005	6525546.299290	6525546.299290	1800088.746900	245119	2063	sf	129	cf
Infiltration BMP	Existing	8336 CLETA	5/8/2006	6520552.025180	6520552.025180	1798452.238760	245114	2063	sf	129	cf
Infiltration BMP	Existing	8557 CLETA	7/24/2006	6521804.225790	6521804.225790	1798033.515210	245114	2063	sf	129	cf
Infiltration BMP	Existing	8532 COLE	11/7/2005	6521000.000000	6521000.000000	1796400.000000	245115	2063	sf	129	cf
Infiltration BMP	Existing	9003 CORD	6/23/2010	6530731.156250	6530731.156250	1805583.409840	245127	2063	sf	129	cf
Infiltration BMP	Existing	9203 CORD	11/14/2008	6530209.591170	6530209.591170	1804419.169900	245125	2063	sf	129	cf
Infiltration BMP	Existing	13029 CORNUTA	5/17/2007	6525511.407030	6525511.407030	1790564.440990	245113	2063	sf	129	cf
Infiltration BMP	Existing	13102 CORNUTA	8/2/2007	6525701.503660	6525701.503660	1790504.914950	245113	2063	sf	129	cf
Infiltration BMP	Existing	13130 CORNUTA	6/25/2007	6525701.486250	6525701.486250	1790230.251310	245113	2063	sf	129	cf
Infiltration BMP	Existing	9245 DALEWOOD	9/23/2005	6532196.615620	6532196.615620	1804345.945760	245127	2063	sf	129	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	13440 DEMPSTER	10/26/2006	6516234.168650	6516234.168650	1789111.153470	245524	2063	sf	129	cf
Infiltration BMP	Existing	13448 DEMPSTER	5/10/2007	6516184.596670	6516184.596670	1789023.378330	245524	2063	sf	129	cf
Infiltration BMP	Existing	8125 DINSDALE	12/20/2005	6523223.693140	6523223.693140	1805447.514320	246103	2063	sf	129	cf
Infiltration BMP	Existing	10343 DOLAN	3/7/2007	6523688.489440	6523688.489440	1803733.392340	246103	2063	sf	129	cf
Infiltration BMP	Existing	10616 DOLAN	12/8/2005	6523091.688370	6523091.688370	1802186.196180	246103	2063	sf	129	cf
Infiltration BMP	Existing	8451 DONOVAN	10/20/2006	6518824.326830	6518824.326830	1794831.678890	245115	2063	sf	129	cf
Infiltration BMP	Existing	11915 DOWNEY	9/26/2007	6519404.158310	6519404.158310	1797577.606330	245115	2063	sf	129	cf
Infiltration BMP	Existing	12269 DOWNEY	3/16/2006	6518129.427940	6518129.427940	1795616.200900	246077	2063	sf	129	cf
Infiltration BMP	Existing	12631 DUNROBIN	1/14/2009	6524865.692630	6524865.692630	1791809.740080	245114	2063	sf	129	cf
Infiltration BMP	Existing	12644 DUNROBIN	12/27/2006	6525045.107610	6525045.107610	1791670.201830	245114	2063	sf	129	cf
Infiltration BMP	Existing	13212 DUNROBIN	3/6/2008	6525046.199690	6525046.199690	1790094.955960	245114	2063	sf	129	cf
Infiltration BMP	Existing	9018 EGLISE	6/18/2010	6530595.364130	6530595.364130	1805560.296250	245127	2063	sf	129	cf
Infiltration BMP	Existing	9252C ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9252D ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9252E ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9254A ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9254B ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9254C ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9254D ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9254E ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9258D ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9258E ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9260E ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9260A ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9260B ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9260C ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9260D ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	8902 ELSTON	6/22/2010	6526760.905110	6526760.905110	1808606.155990	246103	2063	sf	129	cf
Infiltration BMP	Existing	8420 EUCALYPTUS	11/1/2007	6518268.185230	6518268.185230	1794519.531140	245115	2063	sf	129	cf
Infiltration BMP	Existing	8543 FARM	7/14/2008	6524366.648200	6524366.648200	1802748.102990	245119	2063	sf	129	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7963 FIFTH	4/13/2007	6520492.297340	6520492.297340	1803181.748460	246103	2063	sf	129	cf
Infiltration BMP	Existing	7606 FINEVALE	7/23/2007	6522317.087820	6522317.087820	1809781.757910	246111	2063	sf	129	cf
Infiltration BMP	Existing	8740 FIRESTONE	2/5/2008	6523707.154590	6523707.154590	1799037.579000	245119	2063	sf	129	cf
Infiltration BMP	Existing	8663 FONTANA	8/11/2005	6522041.808010	6522041.808010	1796935.622550	245114	2063	sf	129	cf
Infiltration BMP	Existing	7435 FOSTORIA	8/30/2005	6517713.795360	6517713.795360	1804555.032870	246102	2063	sf	129	cf
Infiltration BMP	Existing	7611 FOSTORIA	7/5/2007	6518456.715640	6518456.715640	1804071.041810	246102	2063	sf	129	cf
Infiltration BMP	Existing	8029 FOURTH	6/15/2006	6520786.200710	6520786.200710	1802533.409070	246103	2063	sf	129	cf
Infiltration BMP	Existing	8524 GAINFORD	6/27/2008	6525485.453790	6525485.453790	1804820.431910	245125	2063	sf	129	cf
Infiltration BMP	Existing	9332 GAINFORD	7/20/2006	6528750.550820	6528750.550820	1802746.272930	245125	2063	sf	129	cf
Infiltration BMP	Existing	9330 GALLATIN	8/2/2007	6529116.628720	6529116.628720	1804180.197000	245125	2063	sf	129	cf
Infiltration BMP	Existing	12271 GLYNN	10/18/2005	6518435.603700	6518435.603700	1795389.616520	245115	2063	sf	129	cf
Infiltration BMP	Existing	9123 HALEDON	1/23/2006	6528738.408770	6528738.408770	1805747.051990	245125	2063	sf	129	cf
Infiltration BMP	Existing	7915 HARPER	2/7/2006	6520609.146350	6520609.146350	1804298.454990	246102	2063	sf	129	cf
Infiltration BMP	Existing	9108 HASTY	8/23/2006	6531133.870830	6531133.870830	1805211.202040	245127	2063	sf	129	cf
Infiltration BMP	Existing	10840 HASTY	1/16/2008	6527245.272860	6527245.272860	1798387.513250	245119	2063	sf	129	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7468 HONDO	12/31/2008	6513888.485770	6513888.485770	1797503.008930	246079	2063	sf	129	cf
Infiltration BMP	Existing	7838 HONDO	2/26/2008	6515366.533450	6515366.533450	1796561.911100	246079	2063	sf	129	cf
Infiltration BMP	Existing	7926 HONDO	7/25/2006	6515828.269550	6515828.269550	1796282.236280	246079	2063	sf	129	cf
Infiltration BMP	Existing	12023 HORTON	10/5/2005	6515547.066470	6515547.066470	1799512.855270	246079	1032	sf	64	cf
Infiltration BMP	Existing	10234 JULIUS	11/5/2009	6519723.348540	6519723.348540	1806551.787860	246102	2063	sf	129	cf
Infiltration BMP	Existing	11828 JULIUS	1/3/2008	6515976.382140	6515976.382140	1800524.752810	246079	2063	sf	129	cf
Infiltration BMP	Existing	9256 KLINEDALE	12/4/2007	6531745.367500	6531745.367500	1804500.031620	245127	2063	sf	129	cf
Infiltration BMP	Existing	9452 KLINEDALE	4/24/2008	6531257.497660	6531257.497660	1803653.019950	245127	2063	sf	129	cf
Infiltration BMP	Existing	9031 LEMORAN	1/30/2009	6529792.995960	6529792.995960	1806045.812140	245125	2063	sf	129	cf
Infiltration BMP	Existing	9910 LESTERFORD	8/3/2005	6531140.582200	6531140.582200	1801442.142180	245125	2063	sf	129	cf
Infiltration BMP	Existing	8533 LOWMAN	1/3/2008	6525796.079270	6525796.079270	1810845.309540	246106	2063	sf	129	cf
Infiltration BMP	Existing	8349 LUBEC	12/27/2006	6524776.248350	6524776.248350	1805794.753990	246103	2063	sf	129	cf
Infiltration BMP	Existing	7630 LUXOR	6/27/2005	6516552.896900	6516552.896900	1800452.817120	246079	2063	sf	129	cf
Infiltration BMP	Existing	12342 MARBEL	3/23/2006	6520586.635090	6520586.635090	1793799.804370	245115	2063	sf	129	cf
Infiltration BMP	Existing	9045 MARGARET ST	1/1/2006	6524143.176440	6524143.176440	1798109.987740	245114	2063	sf	129	cf

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Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	10410 MATTOCK	10/2/2007	6529164.649420	6529164.649420	1799820.803610	245126	2063	sf	129	cf
Infiltration BMP	Existing	10615 MATTOCK	2/22/2006	6528479.681880	6528479.681880	1798952.207590	245126	2063	sf	129	cf
Infiltration BMP	Existing	9136 MELDAR	3/1/2007	6526738.891530	6526738.891530	1807241.651780	246103	2063	sf	129	cf
Infiltration BMP	Existing	7437 MULLER	10/3/2005	6518230.115820	6518230.115820	1805283.479580	246102	1032	sf	64	cf
Infiltration BMP	Existing	7452 MULLER	10/3/2005	6518271.461030	6518271.461030	1805049.518080	246102	2063	sf	129	cf
Infiltration BMP	Existing	10715 NEW	8/9/2007	6521988.945450	6521988.945450	1802370.638520	246103	2063	sf	129	cf
Infiltration BMP	Existing	10715 NEW	7/14/2008	6521988.945450	6521988.945450	1802370.638520	246103	2063	sf	129	cf
Infiltration BMP	Existing	10261 NEWVILLE	10/30/2007	6529641.666020	6529641.666020	1800383.942770	245126	2063	sf	129	cf
Infiltration BMP	Existing	10311 NEWVILLE	1/29/2009	6529538.574620	6529538.574620	1800214.882210	245126	2063	sf	129	cf
Infiltration BMP	Existing	10420 NEWVILLE	4/11/2008	6529346.061190	6529346.061190	1799529.176420	245126	2063	sf	129	cf
Infiltration BMP	Existing	10524 NEWVILLE	6/11/2007	6529062.272820	6529062.272820	1798916.257500	245126	2063	sf	129	cf
Infiltration BMP	Existing	9842 NORLAIN	3/9/2007	6519878.070320	6519878.070320	1807987.575840	246111	2063	sf	129	cf
Infiltration BMP	Existing	10403 PANGBORN	9/16/2005	6528806.561730	6528806.561730	1800136.574080	245126	2063	sf	129	cf
Infiltration BMP	Existing	10421 PANGBORN	6/5/2006	6528710.057740	6528710.057740	1799977.600600	245126	2063	sf	129	cf
Infiltration BMP	Existing	10903 PANGBORN	5/12/2008	6527497.056040	6527497.056040	1797964.159830	245119	2063	sf	129	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9508 PARAMOUNT	7/23/2007	6523724.334180	6523724.334180	1807653.518330	246106	2063	sf	129	cf
Infiltration BMP	Existing	9709 PARROT	6/20/2008	6523336.123150	6523336.123150	1806770.831150	246103	2063	sf	129	cf
Infiltration BMP	Existing	7107 PELLET	10/26/2005	6515228.221140	6515228.221140	1805197.090730	246104	2063	sf	129	cf
Infiltration BMP	Existing	10316 PICO VISTA	6/22/2010	6530326.941520	6530326.941520	1799752.739480	245126	2063	sf	129	cf
Infiltration BMP	Existing	10459 PICO VISTA	8/20/2008	6529643.308750	6529643.308750	1798930.291180	245126	2063	sf	129	cf
Infiltration BMP	Existing	11809 POMERING	1/25/2008	6515588.727520	6515588.727520	1800891.851040	246079	2063	sf	129	cf
Infiltration BMP	Existing	11821 POMERING	11/20/2008	6515535.205010	6515535.205010	1800794.072400	246079	2063	sf	129	cf
Infiltration BMP	Existing	9050 PRISCILLA	2/21/2007	6519218.937330	6519218.937330	1790014.532510	245115	2063	sf	129	cf
Infiltration BMP	Existing	8230 PURITAN	7/12/2007	6515756.650110	6515756.650110	1792196.388750	246077	2063	sf	129	cf
Infiltration BMP	Existing	8107 RAVILLER	6/22/2010	6524405.759790	6524405.759790	1808219.110840	246106	2063	sf	129	cf
Infiltration BMP	Existing	9940 RICHEON	12/26/2007	6520640.158150	6520640.158150	1807053.597690	246106	2063	sf	129	cf
Infiltration BMP	Existing	12015 RICHEON	6/21/2010	6515852.443580	6515852.443580	1799404.256870	246079	2063	sf	129	cf
Infiltration BMP	Existing	7336 RIO HONDO PL	12/26/2007	6516915.991390	6516915.991390	1804928.334260	246104	2063	sf	129	cf
Infiltration BMP	Existing	8418 RIVES	9/30/2005	6525367.917230	6525367.917230	1811575.863460	246106	1032	sf	64	cf
Infiltration BMP	Existing	11638 RIVES	11/2/2006	6517541.202300	6517541.202300	1800577.741160	246079	2063	sf	129	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	11706 RIVES	10/16/2006	6517702.333530	6517702.333530	1800238.435400	246079	2063	sf	129	cf
Infiltration BMP	Existing	12436 ROSE	11/6/2006	6520776.455000	6520776.455000	1793075.765000	245115	2063	sf	129	cf
Infiltration BMP	Existing	12033 SAMOLINE	2/22/2008	6517025.771360	6517025.771360	1798249.691900	246079	2063	sf	129	cf
Infiltration BMP	Existing	12051 SAMOLINE	9/3/2008	6516919.542440	6516919.542440	1798077.846870	246079	2063	sf	129	cf
Infiltration BMP	Existing	12302 SAMOLINE	6/22/2010	6516399.204110	6516399.204110	1796321.463670	246077	2063	sf	129	cf
Infiltration BMP	Existing	7921 SECOND	2/15/2006	6519427.915180	6519427.915180	1802349.970040	246102	2063	sf	129	cf
Infiltration BMP	Existing	9700 SHELLEYFIELD	7/17/2008	6527622.312900	6527622.312900	1804250.399390	245125	2063	sf	129	cf
Infiltration BMP	Existing	10553 SHELLEYFIELD	6/11/2008	6525493.222190	6525493.222190	1800845.190450	245119	2063	sf	129	cf
Infiltration BMP	Existing	8732 SMALLWOOD	2/16/2006	6524307.398160	6524307.398160	1810444.440300	246106	2063	sf	129	cf
Infiltration BMP	Existing	8816 SMALLWOOD	10/11/2005	6524123.348010	6524123.348010	1810138.117570	246106	2063	sf	129	cf
Infiltration BMP	Existing	9127 SONGFEST	12/1/2005	6531508.595900	6531508.595900	1805094.820630	245127	2063	sf	129	cf
Infiltration BMP	Existing	9143 STEWART & GRAY	11/30/2005	6523803.019500	6523803.019500	1796254.085000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9211 STEWART & GRAY	11/27/2006	6524190.537790	6524190.537790	1796254.765000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9112 STOAKES	8/23/2006	6526782.391540	6526782.391540	1807626.036510	246103	2063	sf	129	cf
Infiltration BMP	Existing	9533 SUVA	6/27/2006	6530409.847860	6530409.847860	1802701.771860	245125	2063	sf	129	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9729 TRISTAN	10/18/2005	6526617.474570	6526617.474570	1804798.283870	245125	2063	sf	129	cf
Infiltration BMP	Existing	9216 TWEEDY	12/9/2005	6523630.155980	6523630.155980	1808715.397490	246106	2063	sf	129	cf
Infiltration BMP	Existing	13602 VERDURA	6/28/2007	6516296.473820	6516296.473820	1788728.235150	245524	2063	sf	129	cf
Infiltration BMP	Existing	10305 VULTEE	10/9/2006	6525949.622700	6525949.622700	1802510.250780	245119	2063	sf	129	cf
Infiltration BMP	Existing	10017 WILEY BURKE	6/22/2010	6520091.056520	6520091.056520	1807145.868160	246106	2063	sf	129	cf
Infiltration BMP	Existing	8538 ADOREE	9/26/2007	6517768.216360	6517768.216360	1792006.503470	245115	1032	sf	64	cf
Infiltration BMP	Existing	9407 ADOREE	1/1/2006	6522413.313750	6522413.313750	1791106.017430	245115	1032	sf	64	cf
Infiltration BMP	Existing	7134 ADWEN	1/1/2005	6514021.670500	6514021.670500	1803005.164870	246100	1032	sf	64	cf
Infiltration BMP	Existing	7343 ADWEN	9/4/2007	6515521.914470	6515521.914470	1802266.858280	246079	1032	sf	64	cf
Infiltration BMP	Existing	7743 ADWEN	12/5/2006	6517543.195590	6517543.195590	1801041.561520	246079	1032	sf	64	cf
Infiltration BMP	Existing	7802 ADWEN	10/18/2005	6517699.212930	6517699.212930	1800872.280990	246079	1032	sf	64	cf
Infiltration BMP	Existing	7828 ADWEN	8/4/2005	6517918.117250	6517918.117250	1800738.511970	246079	1032	sf	64	cf
Infiltration BMP	Existing	7852 ADWEN	1/9/2009	6518131.432520	6518131.432520	1800607.974520	246079	1032	sf	64	cf
Infiltration BMP	Existing	7855 ADWEN	11/23/2005	6518235.708380	6518235.708380	1800774.963010	246079	1032	sf	64	cf
Infiltration BMP	Existing	12823 AIRPOINT	6/29/2007	6518348.749200	6518348.749200	1791281.430170	245115	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8441 ALAMEDA	10/31/2005	6519442.769190	6519442.769190	1795780.926380	245115	1032	sf	64	cf
Infiltration BMP	Existing	8549 ALAMEDA	6/23/2010	6520129.148230	6520129.148230	1795426.542360	245115	1032	sf	64	cf
Infiltration BMP	Existing	8448 ALBIA	1/1/2007	6519556.734390	6519556.734390	1795840.452920	245115	1032	sf	64	cf
Infiltration BMP	Existing	8528 ALBIA	2/27/2007	6520000.245000	6520000.245000	1795612.955000	245115	1032	sf	64	cf
Infiltration BMP	Existing	9718 ALIWIN	8/2/2005	6532030.038780	6532030.038780	1804115.104340	245127	1032	sf	64	cf
Infiltration BMP	Existing	7936 ALLENGROVE	1/22/2007	6524421.678930	6524421.678930	1809567.173140	246106	1032	sf	64	cf
Infiltration BMP	Existing	8116 ALLENGROVE	12/5/2005	6525137.825210	6525137.825210	1808747.451430	246106	1032	sf	64	cf
Infiltration BMP	Existing	9166 ANGELL	9/2/2008	6520625.089300	6520625.089300	1790394.866750	245115	1032	sf	64	cf
Infiltration BMP	Existing	9351 APPLEBY	1/3/2008	6529580.566170	6529580.566170	1804445.997380	245125	1032	sf	64	cf
Infiltration BMP	Existing	9520 ARDINE	10/6/2005	6527613.323800	6527613.323800	1797533.903060	245119	1032	sf	64	cf
Infiltration BMP	Existing	7814 ARNETT	6/22/2010	6517981.553910	6517981.553910	1801095.347060	246079	1032	sf	64	cf
Infiltration BMP	Existing	7815 ARNETT	6/22/2010	6518066.490340	6518066.490340	1801237.713920	246079	1032	sf	64	cf
Infiltration BMP	Existing	7832 ARNETT	1/11/2007	6518132.684800	6518132.684800	1801021.243050	246079	1032	sf	64	cf
Infiltration BMP	Existing	8241 ARNETT	11/29/2006	6520442.071210	6520442.071210	1799867.842140	245115	1032	sf	64	cf
Infiltration BMP	Existing	7743 BAIRNSDALE	5/16/2006	6523474.546480	6523474.546480	1810551.323320	246106	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	12904 BARLIN	1/15/2009	6518150.890370	6518150.890370	1791163.941140	245115	1032	sf	64	cf
Infiltration BMP	Existing	13247 BARLIN	5/5/2005	6516868.829160	6516868.829160	1789428.146200	245524	1032	sf	64	cf
Infiltration BMP	Existing	7871 BAYSINGER	1/10/2007	6521422.493960	6521422.493960	1805635.813480	246102	1032	sf	64	cf
Infiltration BMP	Existing	8607 BAYSINGER	1/1/2005	6525304.240800	6525304.240800	1803291.716200	245119	1032	sf	64	cf
Infiltration BMP	Existing	9131 BAYSINGER	9/10/2008	6526918.982970	6526918.982970	1802474.767100	245119	1032	sf	64	cf
Infiltration BMP	Existing	9411 BAYSINGER	9/24/2007	6528736.042510	6528736.042510	1801262.782730	245126	1032	sf	64	cf
Infiltration BMP	Existing	9320 BELCHER	4/10/2007	6520600.361450	6520600.361450	1789754.109890	245115	1032	sf	64	cf
Infiltration BMP	Existing	9969 BELCHER	7/29/2009	6525669.288070	6525669.288070	1789992.480470	245113	1032	sf	64	cf
Infiltration BMP	Existing	10375 BELDER	6/22/2010	6522812.240000	6522812.240000	1803043.757460	246103	1032	sf	64	cf
Infiltration BMP	Existing	7441 BENARES	10/25/2005	6515921.019300	6515921.019300	1801396.174500	246079	1032	sf	64	cf
Infiltration BMP	Existing	7503 BENARES	1/16/2008	6516046.045620	6516046.045620	1801313.189720	246079	1032	sf	64	cf
Infiltration BMP	Existing	11014 BENFIELD	12/19/2005	6531918.630750	6531918.630750	1797937.959120	245122	1032	sf	64	cf
Infiltration BMP	Existing	8555 BIGBY	8/22/2005	6524606.668030	6524606.668030	1802914.545010	245119	1032	sf	64	cf
Infiltration BMP	Existing	9308 BIGBY	12/18/2008	6527591.908660	6527591.908660	1800839.109380	245126	1032	sf	64	cf
Infiltration BMP	Existing	9345 BIGBY	5/16/2006	6527999.312020	6527999.312020	1800803.102000	245126	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9389 BIGBY	9/20/2007	6528361.925530	6528361.925530	1800582.426270	245126	1032	sf	64	cf
Infiltration BMP	Existing	8246 BIRCHCREST	11/28/2005	6526713.325530	6526713.325530	1809350.628180	246106	1032	sf	64	cf
Infiltration BMP	Existing	10434 BIRCHDALE	12/2/2008	6524586.579650	6524586.579650	1802390.820140	245119	1032	sf	64	cf
Infiltration BMP	Existing	8812 BIRCHLEAF	5/3/2007	6527457.897210	6527457.897210	1808468.377860	246103	1032	sf	64	cf
Infiltration BMP	Existing	8912 BIRCHLEAF	10/9/2007	6527209.329660	6527209.329660	1808281.543500	246103	1032	sf	64	cf
Infiltration BMP	Existing	13330 BIXLER	3/21/2007	6516259.886220	6516259.886220	1789972.109000	245524	1032	sf	64	cf
Infiltration BMP	Existing	13411 BIXLER	9/30/2008	6515914.285010	6515914.285010	1789635.314360	245524	1032	sf	64	cf
Infiltration BMP	Existing	13425 BIXLER	8/17/2005	6515841.147610	6515841.147610	1789505.869380	245524	1032	sf	64	cf
Infiltration BMP	Existing	13454 BIXLER	5/10/2007	6515808.905200	6515808.905200	1789174.120800	245524	1032	sf	64	cf
Infiltration BMP	Existing	8220 BLANDWOOD	6/22/2010	6526086.691350	6526086.691350	1808873.058080	246103	1032	sf	64	cf
Infiltration BMP	Existing	12809 BLODGETT	1/1/2006	6518629.647540	6518629.647540	1791208.759970	245115	1032	sf	64	cf
Infiltration BMP	Existing	13026 BLODGETT	1/1/2005	6518225.401930	6518225.401930	1790248.943990	245115	1032	sf	64	cf
Infiltration BMP	Existing	13045 BLODGETT	10/6/2005	6517990.284020	6517990.284020	1790176.483690	245115	1032	sf	64	cf
Infiltration BMP	Existing	13114 BLODGETT	10/6/2005	6517888.613290	6517888.613290	1789931.616790	245115	1032	sf	64	cf
Infiltration BMP	Existing	7931 BORSON	9/6/2006	6514752.824370	6514752.824370	1794266.718830	246077	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8202 BORSON	6/5/2006	6516202.097710	6516202.097710	1793267.543860	246077	1032	sf	64	cf
Infiltration BMP	Existing	8428 BORSON	11/21/2008	6517449.915190	6517449.915190	1792528.167220	245115	1032	sf	64	cf
Infiltration BMP	Existing	8515 BORSON	3/14/2005	6517771.929480	6517771.929480	1792500.505870	245115	1032	sf	64	cf
Infiltration BMP	Existing	8345 BOYNE	6/18/2010	6519344.143470	6519344.143470	1796446.421390	245115	1032	sf	64	cf
Infiltration BMP	Existing	8402 BOYNE	1/1/2005	6519302.113240	6519302.113240	1796279.573520	245115	1032	sf	64	cf
Infiltration BMP	Existing	8525 BOYNE	7/20/2006	6520189.715440	6520189.715440	1796009.699660	245115	1032	sf	64	cf
Infiltration BMP	Existing	8528 BOYNE	2/22/2007	6520138.661540	6520138.661540	1795848.718800	245115	1032	sf	64	cf
Infiltration BMP	Existing	8613 BOYSON	1/1/2006	6520167.899980	6520167.899980	1794794.451220	245115	1032	sf	64	cf
Infiltration BMP	Existing	8647 BOYSON	7/29/2008	6520447.155570	6520447.155570	1794619.557270	245115	1032	sf	64	cf
Infiltration BMP	Existing	10216 BRANSCOMB	2/21/2007	6526794.108720	6526794.108720	1790310.156040	245113	1032	sf	64	cf
Infiltration BMP	Existing	10291 BRANSCOMB	7/25/2006	6527529.378260	6527529.378260	1790458.207730	245118	1032	sf	64	cf
Infiltration BMP	Existing	9624 BROCK	4/22/2005	6523849.153810	6523849.153810	1806723.688440	246103	1032	sf	64	cf
Infiltration BMP	Existing	12351 BROCK	9/3/2008	6516676.858850	6516676.858850	1795612.256100	246077	1032	sf	64	cf
Infiltration BMP	Existing	12608 BROCK	2/11/2005	6516008.590090	6516008.590090	1794308.259250	246077	1032	sf	64	cf
Infiltration BMP	Existing	8269 BROOKGREEN	1/1/2006	6526709.836510	6526709.836510	1808858.860970	246103	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7847 BROOKMILL	6/21/2010	6518005.266020	6518005.266020	1800484.266850	246079	1032	sf	64	cf
Infiltration BMP	Existing	8025 BROOKPARK	1/1/2005	6525207.617130	6525207.617130	1809814.105880	246106	1032	sf	64	cf
Infiltration BMP	Existing	9707 BROOKSHIRE	3/14/2005	6525762.512240	6525762.512240	1805795.982660	246103	1032	sf	64	cf
Infiltration BMP	Existing	10429 BROOKSHIRE	1/19/2005	6523911.001360	6523911.001360	1803018.354450	245119	1032	sf	64	cf
Infiltration BMP	Existing	12404 BROOKSHIRE	6/25/2007	6518808.785660	6518808.785660	1794169.944640	245115	1032	sf	64	cf
Infiltration BMP	Existing	7622 BRUNACHE	10/31/2007	6515665.309920	6515665.309920	1799097.073030	246079	1032	sf	64	cf
Infiltration BMP	Existing	8216 BRUNACHE	11/6/2007	6518414.904440	6518414.904440	1797242.748270	245115	1032	sf	64	cf
Infiltration BMP	Existing	9033 BUCKLES	6/21/2010	6523179.898540	6523179.898540	1796909.863810	245114	1032	sf	64	cf
Infiltration BMP	Existing	7540 BUELL	1/1/2004	6518499.698980	6518499.698980	1804545.470300	246102	1032	sf	64	cf
Infiltration BMP	Existing	9330 BUELL	2/15/2006	6527195.126160	6527195.126160	1799219.087810	245126	1032	sf	64	cf
Infiltration BMP	Existing	9351 BUELL	6/21/2010	6527484.251630	6527484.251630	1799288.621620	245126	1032	sf	64	cf
Infiltration BMP	Existing	9634 BUELL	3/16/2006	6528774.281270	6528774.281270	1798139.573770	245126	1032	sf	64	cf
Infiltration BMP	Existing	9067 BUHMAN	11/20/2007	6530056.595350	6530056.595350	1805336.923900	245125	1032	sf	64	cf
Infiltration BMP	Existing	9208 BUHMAN	6/16/2008	6529799.831660	6529799.831660	1804544.819190	245125	1032	sf	64	cf
Infiltration BMP	Existing	10237 CASANES	3/23/2006	6528975.248660	6528975.248660	1801017.460740	245126	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	10321 CASANES	1/1/2007	6528597.524650	6528597.524650	1800411.412530	245126	1032	sf	64	cf
Infiltration BMP	Existing	10403 CASANES	12/21/2005	6528532.829940	6528532.829940	1800305.536240	245126	1032	sf	64	cf
Infiltration BMP	Existing	10408 CASANES	1/1/2005	6528665.671960	6528665.671960	1800149.799930	245126	1032	sf	64	cf
Infiltration BMP	Existing	10812 CASANES	3/14/2005	6527610.698650	6527610.698650	1798391.295520	245119	1032	sf	64	cf
Infiltration BMP	Existing	10835 CASANES	4/1/2008	6527345.484730	6527345.484730	1798305.683780	245119	1032	sf	64	cf
Infiltration BMP	Existing	10944 CASANES	1/1/2006	6527151.352860	6527151.352860	1797710.972890	245119	1032	sf	64	cf
Infiltration BMP	Existing	8457 CAVEL	9/24/2007	6519984.576530	6519984.576530	1796420.555450	245115	1032	sf	64	cf
Infiltration BMP	Existing	9502 CECILIA	10/11/2007	6527927.079440	6527927.079440	1798327.652080	245126	1032	sf	64	cf
Infiltration BMP	Existing	9531 CECILIA	8/23/2006	6528208.236430	6528208.236430	1798317.933420	245126	1032	sf	64	cf
Infiltration BMP	Existing	9435 CEDARTREE	6/22/2010	6530636.457520	6530636.457520	1805866.234670	245127	1032	sf	64	cf
Infiltration BMP	Existing	9010 CHANEY	11/30/2005	6529789.693370	6529789.693370	1806340.793150	245125	1032	sf	64	cf
Infiltration BMP	Existing	9011 CHANEY	1/31/2006	6529640.900410	6529640.900410	1806424.653160	245125	1032	sf	64	cf
Infiltration BMP	Existing	9134 CHANEY	1/1/2005	6529119.825860	6529119.825860	1805332.958450	245125	1032	sf	64	cf
Infiltration BMP	Existing	10252 CHANEY	1/1/2006	6527373.631100	6527373.631100	1801932.130180	245119	1032	sf	64	cf
Infiltration BMP	Existing	10530 CHANEY	6/3/2008	6526461.472620	6526461.472620	1800532.795270	245119	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8355 CHARLOMA	9/16/2005	6524931.861530	6524931.861530	1806017.636180	246103	1032	sf	64	cf
Infiltration BMP	Existing	9037 CHARLOMA	9/25/2007	6527230.271760	6527230.271760	1804669.291940	245125	1032	sf	64	cf
Infiltration BMP	Existing	8565 CHEROKEE	2/14/2008	6524386.530150	6524386.530150	1802386.701010	245119	1032	sf	64	cf
Infiltration BMP	Existing	8030 CHEYENNE	1/1/2005	6514573.751210	6514573.751210	1792580.925090	246077	1032	sf	64	cf
Infiltration BMP	Existing	8117 CHEYENNE	4/10/2006	6515045.470000	6515045.470000	1792480.065000	246077	1032	sf	64	cf
Infiltration BMP	Existing	8418 CHEYENNE	1/1/2006	6516589.334020	6516589.334020	1791278.419980	245524	1032	sf	64	cf
Infiltration BMP	Existing	9303 CLANCEY	4/3/2006	6528228.489510	6528228.489510	1805319.961840	245125	1032	sf	64	cf
Infiltration BMP	Existing	10518 CLANCEY	3/9/2007	6526045.670270	6526045.670270	1800904.969960	245119	1032	sf	64	cf
Infiltration BMP	Existing	8316 CLETA	4/3/2007	6520383.826830	6520383.826830	1798544.940710	245114	1032	sf	64	cf
Infiltration BMP	Existing	8529 CLETA	1/1/2004	6521562.602410	6521562.602410	1798134.090240	245114	1032	sf	64	cf
Infiltration BMP	Existing	13113 COLDBROOK	6/13/2007	6524340.025750	6524340.025750	1790440.866070	245114	3095	sf	193	cf
Infiltration BMP	Existing	13227 COLDBROOK	2/22/2008	6524428.823880	6524428.823880	1789883.562480	245114	1032	sf	64	cf
Infiltration BMP	Existing	8554 COMOLETTE	6/21/2010	6517765.395020	6517765.395020	1791693.915800	245115	1032	sf	64	cf
Infiltration BMP	Existing	8417 CONKLIN	1/1/2006	6516931.143420	6516931.143420	1791819.671020	245524	1032	sf	64	cf
Infiltration BMP	Existing	7219 COOLGROVE	4/25/2006	6521787.460350	6521787.460350	1811479.001950	246111	1032	sf	64	cf

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Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7605 COOLGROVE	6/22/2010	6522636.872680	6522636.872680	1810413.845850	246111	1032	sf	64	cf
Infiltration BMP	Existing	10210 CORD	2/12/2009	6528662.670970	6528662.670970	1801499.064930	245126	1032	sf	64	cf
Infiltration BMP	Existing	7706 COREY	6/22/2010	6515304.522120	6515304.522120	1798247.325380	246079	1032	sf	64	cf
Infiltration BMP	Existing	11708 CORRIGAN	5/30/2006	6523410.919990	6523410.919990	1796690.721900	245114	1032	sf	64	cf
Infiltration BMP	Existing	13227 CORRIGAN	4/11/2006	6523118.258510	6523118.258510	1789898.574120	245114	1032	sf	64	cf
Infiltration BMP	Existing	10809 CROSSDALE	1/30/2006	6532012.269030	6532012.269030	1798722.436870	245122	1032	sf	64	cf
Infiltration BMP	Existing	7803 DACOSTA	1/1/2006	6521705.534400	6521705.534400	1807011.928190	246106	1032	sf	64	cf
Infiltration BMP	Existing	7808 DACOSTA	3/29/2007	6521675.640660	6521675.640660	1806840.332210	246106	1032	sf	64	cf
Infiltration BMP	Existing	7826 DACOSTA	3/23/2007	6521825.889640	6521825.889640	1806744.301550	246106	1032	sf	64	cf
Infiltration BMP	Existing	8064 DACOSTA	1/6/2009	6523365.354910	6523365.354910	1805913.806160	246103	1032	sf	64	cf
Infiltration BMP	Existing	9242 DALEWOOD	5/17/2007	6532339.520890	6532339.520890	1804239.830010	245127	1032	sf	64	cf
Infiltration BMP	Existing	7044 DE PALMA	1/30/2006	6513058.006240	6513058.006240	1802286.102090	246100	1032	sf	64	cf
Infiltration BMP	Existing	7956 DE PALMA	7/28/2005	6517915.235930	6517915.235930	1799223.139650	246077	1032	sf	64	cf
Infiltration BMP	Existing	8232 DE PALMA	12/10/2008	6519342.730110	6519342.730110	1798392.424410	245115	1032	sf	64	cf
Infiltration BMP	Existing	13134 DEMING	2/6/2007	6518053.947000	6518053.947000	1789691.993030	245115	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	13240 DEMING	8/12/2005	6518068.820530	6518068.820530	1789032.682680	245115	1032	sf	64	cf
Infiltration BMP	Existing	13415 DEMPSTER	1/1/2007	6516194.546390	6516194.546390	1789419.790430	245524	1032	sf	64	cf
Infiltration BMP	Existing	13434 DEMPSTER	1/12/2006	6516258.965410	6516258.965410	1789155.039770	245524	1032	sf	64	cf
Infiltration BMP	Existing	13452 DEMPSTER	9/20/2005	6516159.819690	6516159.819690	1788979.483200	245524	1032	sf	64	cf
Infiltration BMP	Existing	7324 DINSDALE	6/21/2010	6518936.024560	6518936.024560	1807958.155410	246106	1032	sf	64	cf
Infiltration BMP	Existing	8352 DINSDALE	12/19/2005	6524191.795240	6524191.795240	1804722.231880	246103	1032	sf	64	cf
Infiltration BMP	Existing	9325 DINSDALE	7/3/2007	6528635.640220	6528635.640220	1802187.000380	245125	1032	sf	64	cf
Infiltration BMP	Existing	9812 DOLAN	1/10/2007	6524918.033470	6524918.033470	1805427.859430	246103	1032	sf	64	cf
Infiltration BMP	Existing	10410 DOLAN	9/19/2007	6523686.660150	6523686.660150	1803351.652190	245119	1032	sf	64	cf
Infiltration BMP	Existing	12522 DOLAN	12/9/2005	6518109.498100	6518109.498100	1794046.260040	245115	1032	sf	64	cf
Infiltration BMP	Existing	12634 DOLAN	4/11/2006	6517527.198260	6517527.198260	1793053.966010	245115	1032	sf	64	cf
Infiltration BMP	Existing	12712 DOLAN	4/27/2005	6517393.756980	6517393.756980	1792842.640770	245115	1032	sf	64	cf
Infiltration BMP	Existing	8740 DONOVAN	11/2/2006	6520467.711390	6520467.711390	1793463.175520	245115	1032	sf	64	cf
Infiltration BMP	Existing	6408 DOS RIOS	3/7/2007	6523246.583700	6523246.583700	1811462.058000	246111	1032	sf	64	cf
Infiltration BMP	Existing	6420 DOS RIOS	7/14/2008	6523082.430580	6523082.430580	1811381.024700	246111	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	6449 DOS RIOS	8/23/2005	6522675.424950	6522675.424950	1811505.638050	246111	1032	sf	64	cf
Infiltration BMP	Existing	6481 DOS RIOS	8/8/2007	6522296.417970	6522296.417970	1811546.494500	246111	1032	sf	64	cf
Infiltration BMP	Existing	9532 DOWNEY	9/21/2007	6524828.225510	6524828.225510	1806555.186060	246103	1032	sf	64	cf
Infiltration BMP	Existing	12115 DOWNEY	8/12/2005	6518801.058860	6518801.058860	1796628.276370	245115	1032	sf	64	cf
Infiltration BMP	Existing	12116 DOWNEY	7/24/2008	6518985.048760	6518985.048760	1796501.621880	245115	1032	sf	64	cf
Infiltration BMP	Existing	12545 DOWNEY	7/7/2005	6517126.997680	6517126.997680	1794204.833310	246077	1032	sf	64	cf
Infiltration BMP	Existing	13620 DOWNEY	10/24/2007	6515777.167020	6515777.167020	1788934.803130	245524	1032	sf	64	cf
Infiltration BMP	Existing	9756 DOWNEY SANFORD BRIDGE	11/6/2008	6530232.905320	6530232.905320	1802732.275270	245125	1032	sf	64	cf
Infiltration BMP	Existing	12109 DUNROBIN	5/27/2008	6524849.554990	6524849.554990	1794742.565720	245114	1032	sf	64	cf
Infiltration BMP	Existing	12602 DUNROBIN	4/21/2008	6525045.021790	6525045.021790	1792096.938130	245114	1032	sf	64	cf
Infiltration BMP	Existing	13118 DUNROBIN	8/1/2008	6525045.611060	6525045.611060	1790357.500340	245114	1032	sf	64	cf
Infiltration BMP	Existing	13447 EARNSHAW	3/4/2005	6516486.580000	6516486.580000	1788881.960000	245524	1032	sf	64	cf
Infiltration BMP	Existing	12246 EASTBROOK	7/3/2007	6525290.855020	6525290.855020	1793729.113600	245114	1032	sf	64	cf
Infiltration BMP	Existing	13102 EASTBROOK	5/30/2006	6525376.065000	6525376.065000	1790509.718450	245114	1032	sf	64	cf
Infiltration BMP	Existing	13207 EASTBROOK	1/1/2006	6525181.215010	6525181.215010	1790147.343800	245114	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9010 EGLISE	6/22/2010	6530616.481070	6530616.481070	1805612.930940	245127	1032	sf	64	cf
Infiltration BMP	Existing	9124 EGLISE	1/1/2006	6530099.347460	6530099.347460	1804464.036140	245125	1032	sf	64	cf
Infiltration BMP	Existing	10228 EGLISE	6/16/2008	6528317.527320	6528317.527320	1801552.496190	245126	1032	sf	64	cf
Infiltration BMP	Existing	8432 EUCALYPTUS	6/21/2010	6518375.883890	6518375.883890	1794450.252220	245115	1032	sf	64	cf
Infiltration BMP	Existing	8451 EUCALYPTUS	11/5/2008	6518648.903650	6518648.903650	1794509.449160	245115	1032	sf	64	cf
Infiltration BMP	Existing	8449 EVEREST	9/20/2006	6518402.636450	6518402.636450	1794253.840980	245115	1032	sf	64	cf
Infiltration BMP	Existing	9036 FARM	1/1/2005	6525791.032450	6525791.032450	1801568.335890	245119	1032	sf	64	cf
Infiltration BMP	Existing	9068 FARM	1/1/2005	6526062.157630	6526062.157630	1801402.977290	245119	1032	sf	64	cf
Infiltration BMP	Existing	8334 FIFTH	6/24/2005	6522409.331110	6522409.331110	1801742.536430	245114	1032	sf	64	cf
Infiltration BMP	Existing	8540 FIFTH	1/1/2005	6523591.182480	6523591.182480	1801021.450470	245114	1032	sf	64	cf
Infiltration BMP	Existing	7238 FLORENCE	11/14/2005	6518231.298960	6518231.298960	1807648.949310	246104	1032	sf	64	cf
Infiltration BMP	Existing	8324 FONTANA	1/1/2006	6519936.868340	6519936.868340	1797701.691440	245115	1032	sf	64	cf
Infiltration BMP	Existing	7322 FOSTER BRIDGE	6/18/2010	6520302.817760	6520302.817760	1810322.849060	246111	1032	sf	64	cf
Infiltration BMP	Existing	7441 FOSTORIA	10/25/2005	6517764.674110	6517764.674110	1804520.953030	246102	1032	sf	64	cf
Infiltration BMP	Existing	7520 FOSTORIA	1/20/2006	6517974.460950	6517974.460950	1804167.759820	246102	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7639 FOSTORIA	7/27/2007	6518691.469740	6518691.469740	1803918.676960	246102	1032	sf	64	cf
Infiltration BMP	Existing	7915 FOURTH	5/29/2007	6519890.537430	6519890.537430	1803170.158590	246102	1032	sf	64	cf
Infiltration BMP	Existing	7922 FOURTH	1/1/2005	6519878.319950	6519878.319950	1802959.531390	246102	1032	sf	64	cf
Infiltration BMP	Existing	7411 FOURTH PL	9/10/2007	6517375.746060	6517375.746060	1804408.156270	246102	1032	sf	64	cf
Infiltration BMP	Existing	7519 FOURTH PL	6/23/2005	6517868.488420	6517868.488420	1804088.501010	246102	1032	sf	64	cf
Infiltration BMP	Existing	7329 GAINFORD	9/20/2007	6519599.973200	6519599.973200	1808409.397520	246111	1032	sf	64	cf
Infiltration BMP	Existing	7725 GAINFORD	6/21/2010	6521357.607460	6521357.607460	1807543.814610	246106	1032	sf	64	cf
Infiltration BMP	Existing	7735 GAINFORD	12/15/2006	6521461.236080	6521461.236080	1807480.220630	246106	1032	sf	64	cf
Infiltration BMP	Existing	7771 GAINFORD	12/3/2007	6521758.954890	6521758.954890	1807297.289390	246106	1032	sf	64	cf
Infiltration BMP	Existing	8353 GAINFORD	1/4/2007	6524689.963810	6524689.963810	1805534.024270	246103	1032	sf	64	cf
Infiltration BMP	Existing	8553 GAINFORD	4/7/2008	6525875.670020	6525875.670020	1804802.065800	245125	1032	sf	64	cf
Infiltration BMP	Existing	9114 GAINFORD	6/23/2010	6527375.967240	6527375.967240	1803418.253090	245125	1032	sf	64	cf
Infiltration BMP	Existing	8319 GALLATIN	6/23/2010	6525634.222480	6525634.222480	1807445.394810	246103	1032	sf	64	cf
Infiltration BMP	Existing	9069 GALLATIN	3/1/2005	6527846.830170	6527846.830170	1805432.059660	245125	1032	sf	64	cf
Infiltration BMP	Existing	9243 GALLATIN	6/19/2006	6528915.102070	6528915.102070	1804595.777040	245125	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8408 GALT	6/18/2010	6520848.594160	6520848.594160	1798562.646220	245114	1032	sf	64	cf
Infiltration BMP	Existing	8435 GALT	12/27/2005	6521154.530230	6521154.530230	1798569.782020	245114	1032	sf	64	cf
Infiltration BMP	Existing	9119 GARNISH	6/22/2010	6529517.516530	6529517.516530	1805110.082900	245125	1032	sf	64	cf
Infiltration BMP	Existing	9136 GARNISH	2/5/2007	6529607.954040	6529607.954040	1804869.027300	245125	1032	sf	64	cf
Infiltration BMP	Existing	9024 GAYMONT	8/28/2007	6523451.624790	6523451.624790	1809501.434890	246111	1032	sf	64	cf
Infiltration BMP	Existing	12636 GLYNN	10/25/2005	6517337.921050	6517337.921050	1793251.757000	245524	1032	sf	64	cf
Infiltration BMP	Existing	12751 GLYNN	1/1/2005	6516780.406550	6516780.406550	1792749.927780	245524	1032	sf	64	cf
Infiltration BMP	Existing	12755 GLYNN	6/18/2010	6516753.778610	6516753.778610	1792707.557200	245524	1032	sf	64	cf
Infiltration BMP	Existing	12912 GLYNN	1/1/2005	6516567.905690	6516567.905690	1791996.175300	245524	1032	sf	64	cf
Infiltration BMP	Existing	8731 GUATEMALA	10/30/2008	6523507.693960	6523507.693960	1811098.218950	246106	1032	sf	64	cf
Infiltration BMP	Existing	9203 GUATEMALA	3/23/2006	6521893.308510	6521893.308510	1810154.570390	246111	1032	sf	64	cf
Infiltration BMP	Existing	9959 GUATEMALA	6/23/2010	6518699.649950	6518699.649950	1808234.818150	246111	1032	sf	64	cf
Infiltration BMP	Existing	13537 GUNDERSON	3/3/2008	6517350.406160	6517350.406160	1787757.556610	245524	1032	sf	64	cf
Infiltration BMP	Existing	13547 GUNDERSON	6/19/2006	6517298.502270	6517298.502270	1787667.099660	245524	1032	sf	64	cf
Infiltration BMP	Existing	11538 GURLEY	5/3/2005	6520211.328840	6520211.328840	1799382.602480	245115	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	11935 GURLEY	6/18/2010	6519051.777570	6519051.777570	1797582.114550	245115	1032	sf	64	cf
Infiltration BMP	Existing	12019 GURLEY	6/18/2010	6518869.145640	6518869.145640	1797295.091770	245115	1032	sf	64	cf
Infiltration BMP	Existing	12052 GURLEY	1/10/2006	6518841.793230	6518841.793230	1796925.916150	245115	1032	sf	64	cf
Infiltration BMP	Existing	12117 GURLEY	1/1/2007	6518497.250390	6518497.250390	1796711.283370	245115	1032	sf	64	cf
Infiltration BMP	Existing	9117 HALEDON	7/31/2006	6528761.573350	6528761.573350	1805801.190120	245125	1032	sf	64	cf
Infiltration BMP	Existing	10341 HALEDON	5/1/2006	6526657.457480	6526657.457480	1801653.926760	245119	1032	sf	64	cf
Infiltration BMP	Existing	10349 HALEDON	2/8/2005	6526618.690140	6526618.690140	1801591.635520	245119	1032	sf	64	cf
Infiltration BMP	Existing	10425 HALEDON	4/14/2005	6526424.760130	6526424.760130	1801280.406410	245119	1032	sf	64	cf
Infiltration BMP	Existing	10439 HALEDON	9/30/2005	6526346.747570	6526346.747570	1801155.573630	245119	1032	sf	64	cf
Infiltration BMP	Existing	10525 HALEDON	1/28/2005	6526113.410380	6526113.410380	1800804.505840	245119	1032	sf	64	cf
Infiltration BMP	Existing	10550 HALEDON	12/19/2005	6526112.578950	6526112.578950	1800485.376650	245119	1032	sf	64	cf
Infiltration BMP	Existing	9049 HALL ROAD	4/30/2008	6523684.587500	6523684.587500	1797586.831540	245114	1032	sf	64	cf
Infiltration BMP	Existing	7215 HANNON	12/19/2008	6521498.261440	6521498.261440	1811442.204100	246111	1032	sf	64	cf
Infiltration BMP	Existing	13005 HANWELL	2/11/2009	6519590.457150	6519590.457150	1789492.134120	245115	1032	sf	64	cf
Infiltration BMP	Existing	9022 HASTY	10/13/2005	6531232.650260	6531232.650260	1805433.916070	245127	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9205 HASTY	6/22/2010	6530848.690890	6530848.690890	1804978.371330	245127	1032	sf	64	cf
Infiltration BMP	Existing	9206 HASTY	1/1/2005	6531000.691980	6531000.691980	1804885.411940	245127	1032	sf	64	cf
Infiltration BMP	Existing	9241 HASTY	1/1/2006	6530719.487200	6530719.487200	1804649.180550	245127	1032	sf	64	cf
Infiltration BMP	Existing	7736 HONDO	2/8/2005	6514830.078530	6514830.078530	1796886.774430	246079	1032	sf	64	cf
Infiltration BMP	Existing	7753 HONDO	1/24/2007	6515005.269000	6515005.269000	1796951.957630	246079	1032	sf	64	cf
Infiltration BMP	Existing	7803 HONDO	10/11/2005	6515156.509020	6515156.509020	1796903.351830	246079	1032	sf	64	cf
Infiltration BMP	Existing	7808 HONDO	6/22/2010	6515109.805390	6515109.805390	1796717.393590	246079	1032	sf	64	cf
Infiltration BMP	Existing	7814 HONDO	7/25/2008	6515161.093050	6515161.093050	1796686.379320	246079	1032	sf	64	cf
Infiltration BMP	Existing	7920 HONDO	8/21/2006	6515777.018460	6515777.018460	1796313.217950	246079	1032	sf	64	cf
Infiltration BMP	Existing	7932 HONDO	1/1/2006	6515879.568480	6515879.568480	1796251.099580	246079	1032	sf	64	cf
Infiltration BMP	Existing	9008 HORLEY	7/19/2007	6523080.991430	6523080.991430	1809910.740800	246111	1032	sf	64	cf
Infiltration BMP	Existing	9838 HORLEY	7/3/2008	6521155.061500	6521155.061500	1807271.870840	246106	1032	sf	64	cf
Infiltration BMP	Existing	12307 HORLEY	1/1/2005	6514989.782150	6514989.782150	1797487.116040	246079	1032	sf	64	cf
Infiltration BMP	Existing	11427 HORTON	11/23/2005	6517266.456490	6517266.456490	1802136.009270	246079	1032	sf	64	cf
Infiltration BMP	Existing	11553 HORTON	4/21/2005	6516872.120940	6516872.120940	1801498.085040	246079	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	11708 HORTON	10/25/2005	6516455.941870	6516455.941870	1800783.417100	246079	1032	sf	64	cf
Infiltration BMP	Existing	12646 IBBETSON	5/6/2005	6526008.756240	6526008.756240	1791650.535870	245114	1032	sf	64	cf
Infiltration BMP	Existing	8217 IMPERIAL	1/5/2009	6516889.628840	6516889.628840	1794092.786860	246077	1032	sf	64	cf
Infiltration BMP	Existing	7320 IRWINGROVE	1/1/2006	6518255.802480	6518255.802480	1807084.876440	246102	1032	sf	64	cf
Infiltration BMP	Existing	7710 IRWINGROVE	12/11/2007	6520151.425540	6520151.425540	1805902.138310	246102	1032	sf	64	cf
Infiltration BMP	Existing	12208 IZETTA	1/1/2006	6524718.745010	6524718.745010	1794118.344290	245114	1032	sf	64	cf
Infiltration BMP	Existing	12252 IZETTA	7/10/2008	6524718.900100	6524718.900100	1793666.382200	245114	1032	sf	64	cf
Infiltration BMP	Existing	12631 IZETTA	8/28/2007	6524602.625920	6524602.625920	1791809.267080	245114	1032	sf	64	cf
Infiltration BMP	Existing	10228 JULIUS	5/20/2008	6519748.327880	6519748.327880	1806603.074440	246102	1032	sf	64	cf
Infiltration BMP	Existing	10234 JULIUS	6/22/2010	6519723.348540	6519723.348540	1806551.787860	246102	1032	sf	64	cf
Infiltration BMP	Existing	11848 JULIUS	6/23/2010	6515875.825190	6515875.825190	1800351.825190	246079	1032	sf	64	cf
Infiltration BMP	Existing	11859 JULIUS	8/23/2005	6515676.490910	6515676.490910	1800355.137490	246079	1032	sf	64	cf
Infiltration BMP	Existing	11865 JULIUS	11/13/2006	6515650.173870	6515650.173870	1800309.916770	246079	1032	sf	64	cf
Infiltration BMP	Existing	12129 JULIUS	9/29/2005	6514728.334670	6514728.334670	1798846.683770	246079	1032	sf	64	cf
Infiltration BMP	Existing	9263 KLINEDALE	6/21/2010	6531573.525950	6531573.525950	1804517.918460	245127	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9205 LA REINA	11/27/2006	6525690.537020	6525690.537020	1808255.600740	246103	1032	sf	64	cf
Infiltration BMP	Existing	9251 LA REINA	8/10/2007	6525325.121400	6525325.121400	1807968.316200	246103	1032	sf	64	cf
Infiltration BMP	Existing	9260 LA REINA	6/14/2007	6525343.506110	6525343.506110	1807785.350080	246103	1032	sf	64	cf
Infiltration BMP	Existing	9633 LA REINA	9/24/2007	6524180.010720	6524180.010720	1806496.849820	246103	1032	sf	64	cf
Infiltration BMP	Existing	10026 LA REINA	1/1/2005	6523542.730590	6523542.730590	1805175.247470	246103	1032	sf	64	cf
Infiltration BMP	Existing	10219 LA REINA	5/25/2006	6522978.941790	6522978.941790	1804778.433210	246103	1032	sf	64	cf
Infiltration BMP	Existing	8346 LA VILLA	8/29/2005	6522426.709000	6522426.709000	1801414.465390	245114	1032	sf	64	cf
Infiltration BMP	Existing	9524 LA VILLA	9/27/2005	6527942.492070	6527942.492070	1797972.664540	245119	1032	sf	64	cf
Infiltration BMP	Existing	14305 LAKEWOOD	1/1/2006	6518183.322800	6518183.322800	1787270.059950	245524	1032	sf	64	cf
Infiltration BMP	Existing	8218 LANKIN	3/28/2006	6516908.705740	6516908.705740	1794755.893760	246077	1032	sf	64	cf
Infiltration BMP	Existing	13407 LAURELDALE	10/25/2005	6516128.982330	6516128.982330	1789557.891060	245524	1032	sf	64	cf
Infiltration BMP	Existing	11034 LE FLOSS	3/21/2008	6531318.633350	6531318.633350	1797718.334360	245124	1032	sf	64	cf
Infiltration BMP	Existing	9013 LEMORAN	3/16/2006	6529860.990680	6529860.990680	1806212.694780	245125	1032	sf	64	cf
Infiltration BMP	Existing	10036 LESTERFORD	1/11/2006	6530911.516090	6530911.516090	1801094.347740	245125	1032	sf	64	cf
Infiltration BMP	Existing	8355 LEXINGTON	6/15/2005	6523932.891700	6523932.891700	1804236.927600	246103	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7432 LUBEC	7/8/2005	6519806.105180	6519806.105180	1808430.037290	246111	1032	sf	64	cf
Infiltration BMP	Existing	9318 LUBEC	1/1/2006	6528946.832250	6528946.832250	1803071.454980	245125	1032	sf	64	cf
Infiltration BMP	Existing	7341 LUXOR	9/30/2005	6515165.173860	6515165.173860	1801559.243950	246079	1032	sf	64	cf
Infiltration BMP	Existing	7743 LUXOR	8/18/2006	6517197.964320	6517197.964320	1800308.569440	246079	1032	sf	64	cf
Infiltration BMP	Existing	7809 LUXOR	1/1/2006	6517239.593210	6517239.593210	1799986.863830	246079	1032	sf	64	cf
Infiltration BMP	Existing	7982 LUXOR	7/3/2007	6518306.219270	6518306.219270	1799333.376300	246077	1032	sf	64	cf
Infiltration BMP	Existing	8509 LUXOR	12/31/2008	6521183.510000	6521183.510000	1797885.775000	245114	1032	sf	64	cf
Infiltration BMP	Existing	11505 MAC GOVERN	5/1/2006	6519990.708800	6519990.708800	1799977.759420	245115	1032	sf	64	cf
Infiltration BMP	Existing	11527 MAC GOVERN	11/19/2007	6519889.562820	6519889.562820	1799806.361750	245115	1032	sf	64	cf
Infiltration BMP	Existing	8518 MANATEE	4/27/2005	6521541.591450	6521541.591450	1798287.495050	245114	1032	sf	64	cf
Infiltration BMP	Existing	12306 MARBEL	12/29/2005	6520780.434840	6520780.434840	1794110.003960	245115	1032	sf	64	cf
Infiltration BMP	Existing	12322 MARBEL	8/24/2005	6520697.258530	6520697.258530	1793976.926170	245115	1032	sf	64	cf
Infiltration BMP	Existing	10423 MATTOCK	11/21/2008	6528946.576280	6528946.576280	1799798.739650	245126	1032	sf	64	cf
Infiltration BMP	Existing	10527 MATTOCK	1/11/2007	6528618.163260	6528618.163260	1799183.483330	245126	1032	sf	64	cf
Infiltration BMP	Existing	8602 MEADOW	2/28/2008	6519007.155950	6519007.155950	1793158.643900	245115	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8606 MEADOW	10/26/2006	6519050.372960	6519050.372960	1793129.529230	245115	1032	sf	64	cf
Infiltration BMP	Existing	8739 MEADOW	12/17/2007	6520051.313480	6520051.313480	1792689.390880	245115	1032	sf	64	cf
Infiltration BMP	Existing	9106 MELDAR	4/23/2007	6526980.004600	6526980.004600	1807421.893550	246103	1032	sf	64	cf
Infiltration BMP	Existing	7819 MELVA	1/1/2005	6515811.952890	6515811.952890	1797638.263460	246079	1032	sf	64	cf
Infiltration BMP	Existing	8609 MELVA	4/6/2007	6520260.479750	6520260.479750	1795043.474460	245115	1032	sf	64	cf
Infiltration BMP	Existing	9558 METRO	4/3/2008	6531485.802060	6531485.802060	1804114.777900	245127	1032	sf	64	cf
Infiltration BMP	Existing	11711 MITLA	7/13/2005	6513453.724060	6513453.724060	1802912.278240	246100	1032	sf	64	cf
Infiltration BMP	Existing	11819 MORNING	6/21/2010	6517496.555960	6517496.555960	1799723.226450	246077	1032	sf	64	cf
Infiltration BMP	Existing	12070 MORNING	9/13/2006	6516788.931410	6516788.931410	1797957.975300	246079	1032	sf	64	cf
Infiltration BMP	Existing	8637 MORY	1/1/2005	6520217.929830	6520217.929830	1794453.857040	245115	1032	sf	64	cf
Infiltration BMP	Existing	10903 MYRTLE	10/25/2005	6520809.999180	6520809.999180	1802308.735020	246103	1032	sf	64	cf
Infiltration BMP	Existing	8208 NADA	6/29/2005	6518679.653960	6518679.653960	1797804.552950	245115	1032	sf	64	cf
Infiltration BMP	Existing	8249 NADA	2/12/2008	6519111.183860	6519111.183860	1797730.010570	245115	1032	sf	64	cf
Infiltration BMP	Existing	9458 NANCE	6/20/2005	6526752.832360	6526752.832360	1796717.105850	245119	1032	sf	64	cf
Infiltration BMP	Existing	10609 NEDRA	6/3/2005	6522752.614640	6522752.614640	1802538.434710	246103	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	10850 NEWVILLE	7/3/2007	6528159.933410	6528159.933410	1797635.549950	245119	1032	sf	64	cf
Infiltration BMP	Existing	7510 NOREN	5/23/2006	6520838.348300	6520838.348300	1809064.222230	246111	1032	sf	64	cf
Infiltration BMP	Existing	11720 NORLAIN	9/22/2006	6515696.110230	6515696.110230	1801264.632180	246079	1032	sf	64	cf
Infiltration BMP	Existing	12336 NORLAIN	8/1/2007	6513658.838460	6513658.838460	1797875.767390	246079	1032	sf	64	cf
Infiltration BMP	Existing	11628 OLD RIVER SCHOOL	1/1/2006	6515797.838400	6515797.838400	1801876.521840	246079	1032	sf	64	cf
Infiltration BMP	Existing	8521 ORANGE	3/9/2007	6519427.831130	6519427.831130	1794911.101980	245115	1032	sf	64	cf
Infiltration BMP	Existing	9255 ORIZABA	2/15/2006	6525108.451310	6525108.451310	1808168.208600	246103	1032	sf	64	cf
Infiltration BMP	Existing	9719 ORIZABA	8/8/2007	6523780.810110	6523780.810110	1806377.528150	246103	1032	sf	64	cf
Infiltration BMP	Existing	12615 ORIZABA	1/27/2006	6516062.877730	6516062.877730	1794206.618320	246077	1032	sf	64	cf
Infiltration BMP	Existing	8511 OTTO	4/12/2005	6525130.700850	6525130.700850	1804530.864040	245125	1032	sf	64	cf
Infiltration BMP	Existing	9933 PANGBORN	6/29/2006	6530067.434760	6530067.434760	1801915.181390	245125	1032	sf	64	cf
Infiltration BMP	Existing	10202 PANGBORN	1/1/2006	6529571.236640	6529571.236640	1801045.668670	245125	1032	sf	64	cf
Infiltration BMP	Existing	11009 PANGBORN	1/31/2007	6527339.080190	6527339.080190	1797691.116980	245119	1032	sf	64	cf
Infiltration BMP	Existing	9530 PARAMOUNT	7/14/2005	6523601.663290	6523601.663290	1807461.311510	246103	1032	sf	64	cf
Infiltration BMP	Existing	9624 PARAMOUNT	5/9/2005	6523328.526550	6523328.526550	1807031.980170	246103	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8603 PARROT	3/14/2006	6526080.240790	6526080.240790	1809719.746830	246106	1032	sf	64	cf
Infiltration BMP	Existing	9625 PARROT	1/1/2005	6523451.735380	6523451.735380	1806960.011690	246103	1032	sf	64	cf
Infiltration BMP	Existing	9708 PARROT	6/29/2006	6523491.321500	6523491.321500	1806678.668660	246103	1032	sf	64	cf
Infiltration BMP	Existing	12045 PARROT	6/22/2010	6517861.439330	6517861.439330	1797868.798060	246077	1032	sf	64	cf
Infiltration BMP	Existing	12751 PARROT	12/14/2006	6515222.728500	6515222.728500	1793830.999240	246077	1032	sf	64	cf
Infiltration BMP	Existing	7130 PELLET	1/27/2005	6515276.387650	6515276.387650	1804845.311440	246104	1032	sf	64	cf
Infiltration BMP	Existing	7323 PELLET	1/1/2005	6516571.171210	6516571.171210	1804327.110650	246104	1032	sf	64	cf
Infiltration BMP	Existing	7354 PELLET	1/1/2006	6516665.448760	6516665.448760	1803945.359790	246102	1032	sf	64	cf
Infiltration BMP	Existing	7861 PHLOX	9/17/2007	6518688.116640	6518688.116640	1801430.417420	246079	1032	sf	64	cf
Infiltration BMP	Existing	10620 PICO VISTA	3/7/2007	6529428.403390	6529428.403390	1798283.402620	245126	1032	sf	64	cf
Infiltration BMP	Existing	10635 PICO VISTA	8/28/2007	6529197.816790	6529197.816790	1798270.093070	245126	1032	sf	64	cf
Infiltration BMP	Existing	7530 PIVOT	11/23/2005	6516899.016370	6516899.016370	1802660.318910	246079	1032	sf	64	cf
Infiltration BMP	Existing	7709 PIVOT	10/11/2005	6517859.569570	6517859.569570	1802212.124870	246079	1032	sf	64	cf
Infiltration BMP	Existing	7753 PIVOT	6/14/2005	6518241.212950	6518241.212950	1801966.921690	246079	1032	sf	64	cf
Infiltration BMP	Existing	11974 POMERING	6/18/2010	6515116.938670	6515116.938670	1799645.797070	246079	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8732 PRICHARD ST	1/12/2009	6516786.371080	6516786.371080	1788406.289900	245524	1032	sf	64	cf
Infiltration BMP	Existing	8734 PRICHARD ST	1/12/2009	6516831.574810	6516831.574810	1788380.860770	245524	1032	sf	64	cf
Infiltration BMP	Existing	8738 PRICHARD ST	1/12/2009	6516876.454020	6516876.454020	1788355.597890	245524	1032	sf	64	cf
Infiltration BMP	Existing	8740 PRICHARD ST	1/12/2009	6516921.333860	6516921.333860	1788330.343610	245524	1032	sf	64	cf
Infiltration BMP	Existing	8240 PRISCILLA	9/13/2007	6515555.844810	6515555.844810	1791697.292180	246077	1032	sf	64	cf
Infiltration BMP	Existing	9044 PRISCILLA	8/18/2005	6519169.042140	6519169.042140	1790017.667840	245115	1032	sf	64	cf
Infiltration BMP	Existing	9060 PRISCILLA	6/21/2010	6519318.719160	6519318.719160	1790008.270400	245115	1032	sf	64	cf
Infiltration BMP	Existing	11448 PRUESS	1/1/2006	6518742.114860	6518742.114860	1801046.878700	246077	1032	sf	64	cf
Infiltration BMP	Existing	11609 PRUESS	11/16/2006	6518299.675980	6518299.675980	1800455.121300	246077	1032	sf	64	cf
Infiltration BMP	Existing	11619 PRUESS	6/10/2005	6518270.484730	6518270.484730	1800355.677990	246077	1032	sf	64	cf
Infiltration BMP	Existing	11708 PRUESS	1/18/2005	6518033.994760	6518033.994760	1799832.073440	246077	1032	sf	64	cf
Infiltration BMP	Existing	8121 PURITAN	6/5/2006	6515245.448070	6515245.448070	1792698.037730	246077	1032	sf	64	cf
Infiltration BMP	Existing	7707 QUILL	6/1/2007	6514508.683200	6514508.683200	1796937.770200	246079	1032	sf	64	cf
Infiltration BMP	Existing	8108 QUOIT	6/5/2008	6516594.034560	6516594.034560	1795288.918170	246077	1032	sf	64	cf
Infiltration BMP	Existing	9109 RAVILLER	2/6/2007	6527953.464140	6527953.464140	1804924.402110	245125	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9367 RAVILLER	1/1/2006	6529435.914270	6529435.914270	1803746.913820	245125	1032	sf	64	cf
Infiltration BMP	Existing	9728 RICHEON	6/18/2010	6521201.804800	6521201.804800	1807962.626360	246106	1032	sf	64	cf
Infiltration BMP	Existing	12217 RICHEON	1/1/2005	6514937.033870	6514937.033870	1797986.477150	246079	1032	sf	64	cf
Infiltration BMP	Existing	12336 RICHEON	1/10/2007	6514721.816510	6514721.816510	1797298.695230	246079	1032	sf	64	cf
Infiltration BMP	Existing	12342 RICHEON	1/1/2005	6514694.932100	6514694.932100	1797256.523880	246079	1032	sf	64	cf
Infiltration BMP	Existing	12352 RICHEON	10/30/2008	6514641.834370	6514641.834370	1797172.034360	246079	1032	sf	64	cf
Infiltration BMP	Existing	11010 RIO HONDO	2/6/2006	6514511.989690	6514511.989690	1805412.886430	246104	1032	sf	64	cf
Infiltration BMP	Existing	8515 RIVES	2/6/2006	6524958.575190	6524958.575190	1811619.081610	246111	1032	sf	64	cf
Infiltration BMP	Existing	8546 RIVES	6/14/2010	6524726.063490	6524726.063490	1811337.492550	246106	1032	sf	64	cf
Infiltration BMP	Existing	11828 RIVES	1/1/2006	6517020.372820	6517020.372820	1799741.223590	246079	1032	sf	64	cf
Infiltration BMP	Existing	12056 RIVES	10/7/2005	6516252.097820	6516252.097820	1798479.870770	246079	1032	sf	64	cf
Infiltration BMP	Existing	12213 RIVES	6/7/2007	6515544.034920	6515544.034920	1797794.303030	246079	1032	sf	64	cf
Infiltration BMP	Existing	12301 RIVES	1/27/2006	6515274.134590	6515274.134590	1797373.251430	246079	1032	sf	64	cf
Infiltration BMP	Existing	12542 ROSE	6/18/2010	6520775.320830	6520775.320830	1792425.734550	245115	1032	sf	64	cf
Infiltration BMP	Existing	7444 RUNDELL	9/28/2006	6514195.392880	6514195.392880	1798477.819400	246079	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7458 RUNDELL	1/1/2006	6514328.036950	6514328.036950	1798395.544300	246079	1032	sf	64	cf
Infiltration BMP	Existing	8734 RUPP	5/24/2007	6518769.625610	6518769.625610	1791861.464390	245115	1032	sf	64	cf
Infiltration BMP	Existing	9206 SAMOLINE	9/20/2006	6524105.922670	6524105.922670	1808777.784250	246106	1032	sf	64	cf
Infiltration BMP	Existing	9363 SAMOLINE	2/12/2009	6523342.697990	6523342.697990	1808041.206940	246106	1032	sf	64	cf
Infiltration BMP	Existing	9630 SAMOLINE	1/1/2006	6523000.405210	6523000.405210	1807164.143360	246103	1032	sf	64	cf
Infiltration BMP	Existing	12041 SAMOLINE	6/23/2010	6516971.702030	6516971.702030	1798170.274910	246079	1032	sf	64	cf
Infiltration BMP	Existing	10629 SHELLEYFIELD	6/21/2010	6525284.582980	6525284.582980	1800508.363190	245119	1032	sf	64	cf
Infiltration BMP	Existing	9118 SHERIDELL	6/22/2010	6528683.896100	6528683.896100	1805941.227670	245125	1032	sf	64	cf
Infiltration BMP	Existing	10042 SIDEVIEW	6/21/2010	6529464.806690	6529464.806690	1801729.923910	245125	1032	sf	64	cf
Infiltration BMP	Existing	8349 SIXTH	6/21/2010	6522706.066860	6522706.066860	1802231.249170	245114	1032	sf	64	cf
Infiltration BMP	Existing	8363 SIXTH	6/18/2010	6522832.335670	6522832.335670	1802150.209500	245114	1032	sf	64	cf
Infiltration BMP	Existing	8532 SIXTH	6/23/2010	6523697.106090	6523697.106090	1801388.440460	245119	1032	sf	64	cf
Infiltration BMP	Existing	8514 SMALLWOOD	8/24/2006	6525167.581560	6525167.581560	1811228.866910	246106	1032	sf	64	cf
Infiltration BMP	Existing	12007 SMALLWOOD	1/1/2005	6516682.861570	6516682.861570	1798786.226940	246079	1032	sf	64	cf
Infiltration BMP	Existing	12936 SMALLWOOD	7/31/2006	6513688.714060	6513688.714060	1793540.982580	246077	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9235 SONGFEST	6/14/2006	6531351.855720	6531351.855720	1804709.858310	245127	1032	sf	64	cf
Infiltration BMP	Existing	7939 SPRINGER	10/6/2006	6516193.792450	6516193.792450	1796630.732180	246079	1032	sf	64	cf
Infiltration BMP	Existing	9306 STAMPS	6/21/2010	6525546.826990	6525546.826990	1807197.501010	246103	1032	sf	64	cf
Infiltration BMP	Existing	10446 STAMPS	1/1/2005	6523214.650320	6523214.650320	1803242.228000	246103	1032	sf	64	cf
Infiltration BMP	Existing	10536 STAMPS	6/1/2006	6522871.528480	6522871.528480	1802783.838380	246103	1032	sf	64	cf
Infiltration BMP	Existing	13219 STANBRIDGE	9/17/2007	6522806.618420	6522806.618420	1790045.381220	245114	1032	sf	64	cf
Infiltration BMP	Existing	8723 STEWART & GRAY	2/11/2009	6522100.372490	6522100.372490	1796545.507760	245114	1032	sf	64	cf
Infiltration BMP	Existing	9028 STOAKES	8/17/2007	6527221.634250	6527221.634250	1807951.198320	246103	1032	sf	64	cf
Infiltration BMP	Existing	7809 SUVA	1/13/2009	6522703.875430	6522703.875430	1808490.998990	246106	1032	sf	64	cf
Infiltration BMP	Existing	7827 SUVA	1/1/2006	6522849.829890	6522849.829890	1808368.560310	246106	1032	sf	64	cf
Infiltration BMP	Existing	8564 SUVA	1/1/2006	6526403.328390	6526403.328390	1805373.281490	245125	1032	sf	64	cf
Infiltration BMP	Existing	9943 TECUM	4/11/2008	6519363.349470	6519363.349470	1808047.658450	246111	1032	sf	64	cf
Infiltration BMP	Existing	9636 TELEGRAPH	5/8/2006	6531995.042290	6531995.042290	1804929.677680	245128	1032	sf	64	cf
Infiltration BMP	Existing	7968 THIRD	6/21/2005	6519929.169700	6519929.169700	1802199.016820	246102	1032	sf	64	cf
Infiltration BMP	Existing	9819 TRISTAN	10/7/2005	6526302.584780	6526302.584780	1804524.383680	245125	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9253 TRUE	1/1/2005	6531891.994890	6531891.994890	1804462.821310	245127	1032	sf	64	cf
Infiltration BMP	Existing	8843 TWEEDY	9/12/2006	6524140.679400	6524140.679400	1809940.135780	246106	1032	sf	64	cf
Infiltration BMP	Existing	9012 TWEEDY	1/1/2005	6523977.735950	6523977.735950	1809300.273240	246106	1032	sf	64	cf
Infiltration BMP	Existing	9029 TWEEDY	1/1/2006	6523763.012330	6523763.012330	1809288.681880	246106	1032	sf	64	cf
Infiltration BMP	Existing	9612 TWEEDY	6/22/2010	6522847.016620	6522847.016620	1807449.028980	246106	1032	sf	64	cf
Infiltration BMP	Existing	9636 TWEEDY	10/11/2005	6522732.626430	6522732.626430	1807259.266340	246103	1032	sf	64	cf
Infiltration BMP	Existing	9714 TWEEDY	7/24/2006	6522647.237500	6522647.237500	1807116.822930	246103	1032	sf	64	cf
Infiltration BMP	Existing	9718 TWEEDY	9/22/2008	6522619.325230	6522619.325230	1807068.990310	246103	1032	sf	64	cf
Infiltration BMP	Existing	9730 TWEEDY	6/18/2010	6522565.360970	6522565.360970	1806976.155270	246103	1032	sf	64	cf
Infiltration BMP	Existing	13409 VERDURA	1/1/2006	6516484.588360	6516484.588360	1789346.159960	245524	1032	sf	64	cf
Infiltration BMP	Existing	8607 VIA AMORITA	1/19/2006	6524994.226680	6524994.226680	1803003.226520	245119	1032	sf	64	cf
Infiltration BMP	Existing	9356 VIA AMORITA	4/27/2005	6528170.664540	6528170.664540	1800850.979140	245126	1032	sf	64	cf
Infiltration BMP	Existing	7402 VIA RIO NIDO	2/10/2005	6518371.376580	6518371.376580	1806186.704160	246102	1032	sf	64	cf
Infiltration BMP	Existing	8303 VISTA DEL RIO	5/1/2007	6526003.249760	6526003.249760	1808077.011440	246103	1032	sf	64	cf
Infiltration BMP	Existing	8303 VISTA DEL ROSA	4/26/2007	6526763.242710	6526763.242710	1809159.607970	246106	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8351 VISTA DEL ROSA	12/19/2005	6527091.635630	6527091.635630	1808824.632820	246106	2063	sf	129	cf
Infiltration BMP	Existing	10265 VULTEE	4/24/2006	6525980.530560	6525980.530560	1802568.772980	245119	1032	sf	64	cf
Infiltration BMP	Existing	10339 VULTEE	6/18/2010	6525804.209560	6525804.209560	1802209.879860	245119	1032	sf	64	cf
Infiltration BMP	Existing	12709 VULTEE	3/9/2007	6519587.948000	6519587.948000	1791264.714830	245115	1032	sf	64	cf
Infiltration BMP	Existing	12725 WHITEWOOD	7/26/2005	6520341.668580	6520341.668580	1791179.460770	245115	1032	sf	64	cf
Infiltration BMP	Existing	9702 WILEY BURKE	6/21/2010	6521126.099980	6521126.099980	1808337.656530	246106	1032	sf	64	cf
Infiltration BMP	Existing	9750 WILEY BURKE	12/11/2006	6520822.729060	6520822.729060	1807995.132410	246106	1032	sf	64	cf
Infiltration BMP	Existing	9925 WILEY BURKE	1/10/2007	6520271.299840	6520271.299840	1807447.007570	246106	1032	sf	64	cf
Infiltration BMP	Existing	10540 WILEY BURKE	6/21/2007	6519089.326110	6519089.326110	1805048.306870	246102	1032	sf	64	cf
Infiltration BMP	Existing	10643 WOODRUFF	1/1/2006	6526887.322420	6526887.322420	1799535.375650	245119	1032	sf	64	cf
Infiltration BMP	Existing	7515 YANKEY	10/24/2006	6515115.108440	6515115.108440	1798924.389740	246079	1032	sf	64	cf
Infiltration BMP	Existing	10047 CASANES	1/1/2006	6529512.635540	6529512.635540	1801587.658100	245125	1032	sf	64	cf
Infiltration BMP	Existing	9220 CORD	1/1/2004	6530296.778820	6530296.778820	1804178.901350	245125	1032	sf	64	cf
Infiltration BMP	Existing	10040 MATTOCK	1/1/2006	6530247.042350	6530247.042350	1801200.601240	245125	1032	sf	64	cf
Infiltration BMP	Existing	10018 PANGBORN	1/1/2006	6530084.251260	6530084.251260	1801567.525640	245125	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	12053 PATTON	10/19/2004	6520642.037410	6520642.037410	1796050.004800	245115	1032	sf	64	cf
Infiltration BMP	Existing	12048 SAMOLINE	3/20/2007	6517021.712450	6517021.712450	1798014.455830	246079	2063	sf	129	cf
Infiltration BMP	Existing	7879 FLORENCE	2/14/2014	6521700.000000	6521700.000000	1806100.000000	246103	16504	sf	1032	cf
Infiltration BMP	Existing	9020 FIRESTONE	9/12/2008	6524113.023390	6524113.023390	1798572.164290	245119	70288	sf	4393	cf
Infiltration BMP	Existing	7910 FIRESTONE	6/28/2005	6519165.968790	6519165.968790	1801736.513180	246102	55686	sf	3480	cf
Infiltration BMP	Existing	7252 FIRESTONE	5/19/2004	6515489.000650	6515489.000650	1803082.633110	246079	36224	sf	2264	cf
Infiltration BMP	Existing	12256 PARAMOUNT	3/13/2006	6516813.225030	6516813.225030	1796497.685630	246077	34112	sf	2132	cf
Infiltration BMP	Existing	9462 FIRESTONE BL	2/14/2014	6526885.862260	6526885.862260	1797100.585140	245119	35437	sf	2215	cf
Infiltration BMP	Existing	8250 FIRESTONE BLVD	2/14/2014	6521000.000000	6521000.000000	1800300.000000	245115	59085	sf	3693	cf
Infiltration BMP	Existing	8018 TELEGRAPH	8/20/2004	6526800.000000	6526800.000000	1809400.000000	246106	35437	sf	2215	cf
Infiltration BMP	Existing	7447 FIRESTONE BLVD	7/9/2009	6516971.590923	6516971.590923	1803474.089243	246102	43124	sf	2192	cf
Infiltration BMP	Existing	9126 FLORENCE	4/25/2008	6526980.883730	6526980.883730	1802613.015890	245119	29248	sf	1828	cf
Infiltration BMP	Existing	11111 OLD RIVER SCHOOL	6/15/2004	6515500.000000	6515500.000000	1803800.000000	246102	27843	sf	1740	cf
Infiltration BMP	Existing	9634 WASHBURN	5/25/2004	6526574.558590	6526574.558590	1794738.334020	245118	35712	sf	2232	cf
Infiltration BMP	Existing	9475 FIRESTONE	9/20/2004	6527102.470060	6527102.470060	1797292.175990	245119	25078	sf	1567	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9125 IMPERIAL	9/17/2007	6520700.000000	6520700.000000	1792100.000000	245115	53104	sf	3319	cf
Infiltration BMP	Existing	11231 RIVES	4/25/2006	6518392.506170	6518392.506170	1802335.247680	246102	20250	sf	1266	cf
Infiltration BMP	Existing	7936 QUILL	8/23/2006	6515830.400000	6515830.400000	1795880.196930	246079	18984	sf	1187	cf
Infiltration BMP	Existing	8337 FONTANA	8/11/2005	6520206.194620	6520206.194620	1797870.434810	245114	36672	sf	2292	cf
Infiltration BMP	Existing	10225 LESTERFORD	6/22/2010	6530244.844140	6530244.844140	1800567.187010	245126	17718	sf	1107	cf
Infiltration BMP	Existing	7915 FLORENCE	8/11/2009	6522019.025220	6522019.025220	1805973.779210	246103	20192	sf	1262	cf
Infiltration BMP	Existing	11229 PARAMOUNT	3/16/2004	6519482.925030	6519482.925030	1801457.806750	246102	16453	sf	1028	cf
Infiltration BMP	Existing	8103 COLE	5/1/2007	6518213.448370	6518213.448370	1798049.118910	246077	0	sf	0	cf
Infiltration BMP	Existing	8722 BOYNE	7/1/2008	6521213.643060	6521213.643060	1795216.473800	245115	11390	sf	712	cf
Infiltration BMP	Existing	10612 LESTERFORD	6/14/2006	6529218.389270	6529218.389270	1798513.115960	245126	11390	sf	712	cf
Infiltration BMP	Existing	8444 LEXINGTON	4/24/2006	6524361.433930	6524361.433930	1803767.599820	246103	11390	sf	712	cf
Infiltration BMP	Existing	13221 BARLIN	10/10/2006	6516992.431610	6516992.431610	1789646.610200	245524	10125	sf	633	cf
Infiltration BMP	Existing	9611 GARNISH	6/7/2007	6529217.309540	6529217.309540	1803965.758960	245125	10125	sf	633	cf
Infiltration BMP	Existing	7118 PELLET	12/3/2008	6515184.074160	6515184.074160	1804905.113850	246104	10125	sf	633	cf
Infiltration BMP	Existing	9325 RIVES AM	2/14/2014	6522517.375370	6522517.375370	1808878.723180	246111	10125	sf	633	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9371 SUVA	3/13/2007	6529247.009310	6529247.009310	1803484.685240	245125	10125	sf	633	cf
Infiltration BMP	Existing	8556 FLORENCE	1/1/2006	6525137.675720	6525137.675720	1803770.147850	245125	8859	sf	554	cf
Infiltration BMP	Existing	9755 IMPERIAL	3/29/2006	6525700.000000	6525700.000000	1792200.000000	245114	8859	sf	554	cf
Infiltration BMP	Existing	10000 IMPERIAL	3/29/2006	6527246.839530	6527246.839530	1791706.604350	245118	8859	sf	554	cf
Infiltration BMP	Existing	10030 LESTERFORD	6/21/2010	6530953.991420	6530953.991420	1801165.004470	245125	8859	sf	554	cf
Infiltration BMP	Existing	7235 LUXOR	12/12/2005	6514593.326010	6514593.326010	1801941.887350	246079	8859	sf	554	cf
Infiltration BMP	Existing	8115 STEWART & GRAY	3/25/2009	6518648.406750	6518648.406750	1798495.150040	246077	11760	sf	735	cf
Infiltration BMP	Existing	9804 BROOKSHIRE	5/2/2007	6525737.765210	6525737.765210	1805415.750650	246103	7594	sf	475	cf
Infiltration BMP	Existing	7830 DANVERS	12/18/2008	6523967.248740	6523967.248740	1810379.348050	246106	7594	sf	475	cf
Infiltration BMP	Existing	8357 FLORENCE	11/29/2005	6524137.162990	6524137.162990	1804589.285090	246103	7594	sf	475	cf
Infiltration BMP	Existing	8562 FLORENCE	1/1/2006	6525210.620820	6525210.620820	1803736.004200	245125	7594	sf	475	cf
Infiltration BMP	Existing	10735 LAKEWOOD	1/19/2007	6524698.379320	6524698.379320	1800460.893140	245119	8640	sf	540	cf
Infiltration BMP	Existing	9732 ORIZABA	6/5/2008	6523842.356050	6523842.356050	1806158.297200	246103	7594	sf	475	cf
Infiltration BMP	Existing	12066 SAMOLINE	6/18/2010	6517119.562750	6517119.562750	1797806.070750	246079	7594	sf	475	cf
Infiltration BMP	Existing	7711 SECOND	6/21/2010	6518493.103400	6518493.103400	1802942.740750	246102	7594	sf	475	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9517 STOAKES	6/21/2010	6525287.319840	6525287.319840	1806612.266920	246103	7594	sf	475	cf
Infiltration BMP	Existing	12133 ANDERBERG	6/26/2009	6518010.879310	6518010.879310	1796818.463370	245115	6328	sf	396	cf
Infiltration BMP	Existing	9115 BROCK	6/21/2010	6524898.717190	6524898.717190	1808433.166330	246106	6328	sf	396	cf
Infiltration BMP	Existing	9541 CECILIA	6/23/2010	6528302.087900	6528302.087900	1798262.111790	245126	6328	sf	396	cf
Infiltration BMP	Existing	10243 CORD	11/4/2008	6528334.164460	6528334.164460	1801344.678940	245126	6328	sf	396	cf
Infiltration BMP	Existing	13108 CORNUTA	6/21/2010	6525701.475550	6525701.475550	1790449.882450	245113	6328	sf	396	cf
Infiltration BMP	Existing	8129 DACOSTA	8/5/2008	6523736.839560	6523736.839560	1805716.362640	246103	6328	sf	396	cf
Infiltration BMP	Existing	7247 DINWIDDIE	6/22/2010	6515896.418780	6515896.418780	1804170.223670	246104	6328	sf	396	cf
Infiltration BMP	Existing	12002A DOWNEY	8/24/2005	6519100.000000	6519100.000000	1797100.000000	245115	6328	sf	396	cf
Infiltration BMP	Existing	12002C DOWNEY	8/24/2005	6519100.000000	6519100.000000	1797100.000000	245115	6328	sf	396	cf
Infiltration BMP	Existing	8529 EUCALYPTUS	6/18/2010	6519136.171020	6519136.171020	1794210.333930	245115	6328	sf	396	cf
Infiltration BMP	Existing	9204 LA REINA	6/22/2010	6525799.255250	6525799.255250	1808110.827020	246103	6328	sf	396	cf
Infiltration BMP	Existing	9241 LUBEC	6/21/2010	6528410.398740	6528410.398740	1803633.947240	245125	6328	sf	396	cf
Infiltration BMP	Existing	10051 MATTOCK	9/25/2008	6530040.953970	6530040.953970	1801237.222590	245125	6328	sf	396	cf
Infiltration BMP	Existing	12273 PLANETT	6/21/2010	6518942.439290	6518942.439290	1795136.426680	245115	6328	sf	396	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9075 RAVILLER	4/9/2007	6527819.498980	6527819.498980	1805031.907810	245125	6328	sf	396	cf
Infiltration BMP	Existing	7149 ADWEN	5/31/2006	6514275.907390	6514275.907390	1803122.312290	246079	5062	sf	316	cf
Infiltration BMP	Existing	8703 ALAMEDA	9/14/2005	6520830.700880	6520830.700880	1795016.469260	245115	4594	sf	287	cf
Infiltration BMP	Existing	9242 APPLEBY	11/21/2008	6528866.478730	6528866.478730	1804798.824690	245125	5062	sf	316	cf
Infiltration BMP	Existing	9926 BELLDER	3/19/2007	6525715.329050	6525715.329050	1804487.716960	245125	5062	sf	316	cf
Infiltration BMP	Existing	11715 BELLFLOWER	6/15/2009	6523530.688010	6523530.688010	1796655.823230	245114	5062	sf	316	cf
Infiltration BMP	Existing	8019 BERGMAN	10/22/2008	6517711.829130	6517711.829130	1797726.503570	246077	5062	sf	316	cf
Infiltration BMP	Existing	8417 BIGBY	7/23/2007	6523908.146010	6523908.146010	1803525.055670	245119	5062	sf	316	cf
Infiltration BMP	Existing	10004 BIRCHDALE	1/23/2006	6525798.638290	6525798.638290	1803985.957400	245125	5062	sf	316	cf
Infiltration BMP	Existing	9951 BROOKSHIRE	6/18/2010	6525004.036100	6525004.036100	1804835.952720	246103	5062	sf	316	cf
Infiltration BMP	Existing	10927 BROOKSHIRE AV	2/14/2014	6522640.981090	6522640.981090	1800949.695110	245114	5062	sf	316	cf
Infiltration BMP	Existing	10304 CLANCEY	9/19/2008	6526762.243870	6526762.243870	1802017.295250	245119	5062	sf	316	cf
Infiltration BMP	Existing	7213 DINWIDDIE	6/21/2010	6515644.523280	6515644.523280	1804333.457340	246104	5062	sf	316	cf
Infiltration BMP	Existing	9245 DOWNEY	9/19/2007	6525582.317560	6525582.317560	1807792.114420	246103	5062	sf	316	cf
Infiltration BMP	Existing	12002B DOWNEY	8/24/2005	6519100.000000	6519100.000000	1797100.000000	245115	5062	sf	316	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	12002D DOWNEY	8/24/2005	6519100.000000	6519100.000000	1797100.000000	245115	5062	sf	316	cf
Infiltration BMP	Existing	10250 EGLISE AV	2/14/2014	6528202.138900	6528202.138900	1801366.096440	245126	5062	sf	316	cf
Infiltration BMP	Existing	8719 ELMONT	6/18/2010	6526144.563940	6526144.563940	1809393.110180	246106	5062	sf	316	cf
Infiltration BMP	Existing	9355 FLORENCE	7/30/2007	6528769.559400	6528769.559400	1801814.385750	245125	5062	sf	316	cf
Infiltration BMP	Existing	9252 GALLATIN	3/29/2006	6528859.757520	6528859.757520	1804394.594600	245125	5062	sf	316	cf
Infiltration BMP	Existing	9553 GALLATIN	7/28/2004	6530910.776140	6530910.776140	1803037.898220	245125	5062	sf	316	cf
Infiltration BMP	Existing	9724 GARNISH	1/14/2008	6529062.109120	6529062.109120	1803453.035240	245125	5062	sf	316	cf
Infiltration BMP	Existing	8610 GUATEMALA	10/24/2006	6524386.905480	6524386.905480	1811339.167280	246106	5062	sf	316	cf
Infiltration BMP	Existing	10214 HORLEY	8/14/2007	6520372.544870	6520372.544870	1806355.591210	246102	5062	sf	316	cf
Infiltration BMP	Existing	10513 JULIUS	1/22/2009	6518877.932890	6518877.932890	1805532.376750	246102	5062	sf	316	cf
Infiltration BMP	Existing	9204 LA REINA	4/18/2007	6525799.255250	6525799.255250	1808110.827020	246103	5062	sf	316	cf
Infiltration BMP	Existing	9528 LEMORAN	8/29/2008	6529000.799820	6529000.799820	1804066.473220	245125	5062	sf	316	cf
Infiltration BMP	Existing	7334 LUXOR	4/25/2007	6514999.892740	6514999.892740	1801407.207050	246079	5062	sf	316	cf
Infiltration BMP	Existing	9226 MANZANAR	7/8/2005	6526470.419470	6526470.419470	1806685.422630	246103	5062	sf	316	cf
Infiltration BMP	Existing	10524 MATTOCK	2/5/2009	6528788.349750	6528788.349750	1799096.345380	245126	5062	sf	316	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	12123 ORIZABA	12/28/2005	6517943.193960	6517943.193960	1797041.752750	245115	5062	sf	316	cf
Infiltration BMP	Existing	7130 PELLET	6/4/2008	6515276.387650	6515276.387650	1804845.311440	246104	5062	sf	316	cf
Infiltration BMP	Existing	8322 PURITAN	6/14/2007	6516164.281440	6516164.281440	1791774.558840	245524	5062	sf	316	cf
Infiltration BMP	Existing	7312 RIO FLORA	6/18/2010	6516577.089870	6516577.089870	1804589.040390	246104	5062	sf	316	cf
Infiltration BMP	Existing	9331 SAMOLINE	2/17/2006	6523511.819100	6523511.819100	1808307.819060	246106	5062	sf	316	cf
Infiltration BMP	Existing	8015 SEVENTH	8/16/2005	6521322.893520	6521322.893520	1803640.949260	246103	5062	sf	316	cf
Infiltration BMP	Existing	7821 SIXTH	12/6/2005	6519846.881130	6519846.881130	1804004.436800	246102	5062	sf	316	cf
Infiltration BMP	Existing	8409 SIXTH	12/10/2008	6523050.669740	6523050.669740	1802016.668700	245114	5062	sf	316	cf
Infiltration BMP	Existing	9317 STAMPS	1/30/2007	6525356.702810	6525356.702810	1807182.805460	246103	5062	sf	316	cf
Infiltration BMP	Existing	9322 STAMPS	3/16/2006	6525453.602600	6525453.602600	1807062.934260	246103	5062	sf	316	cf
Infiltration BMP	Existing	10443 STAMPS	5/21/2008	6523061.022110	6523061.022110	1803394.248860	246103	5062	sf	316	cf
Infiltration BMP	Existing	10517 STAMPS	6/18/2010	6522812.240000	6522812.240000	1803043.757460	246103	5062	sf	316	cf
Infiltration BMP	Existing	9444 STOAKES	5/22/2007	6525587.983230	6525587.983230	1806625.551490	246103	5062	sf	316	cf
Infiltration BMP	Existing	8329 VISTA DEL RIO	6/18/2010	6526300.133280	6526300.133280	1808123.116520	246103	5062	sf	316	cf
Infiltration BMP	Existing	8368 VISTA DEL RIO	6/1/2007	6526427.553640	6526427.553640	1807729.596630	246103	5062	sf	316	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8543 ALBIA	1/1/2006	6520215.566510	6520215.566510	1795689.212970	245115	3797	sf	237	cf
Infiltration BMP	Existing	7162 BENARES	1/1/2008	6514067.610360	6514067.610360	1802493.217160	246079	3797	sf	237	cf
Infiltration BMP	Existing	12812 BLODGETT	6/8/2009	6518629.647540	6518629.647540	1791208.759970	245115	3797	sf	237	cf
Infiltration BMP	Existing	9503 BROCK AV	2/14/2014	6524115.247920	6524115.247920	1807488.010330	246106	3797	sf	237	cf
Infiltration BMP	Existing	9045 BUCKLES	12/11/2008	6523278.581350	6523278.581350	1796905.300470	245114	3797	sf	237	cf
Infiltration BMP	Existing	10045 CHANEY	7/5/2007	6527656.534860	6527656.534860	1802672.871800	245125	3797	sf	237	cf
Infiltration BMP	Existing	8714 CHEROKEE	5/1/2007	6525056.428300	6525056.428300	1801833.489170	245119	3797	sf	237	cf
Infiltration BMP	Existing	10729 CLANCEY	7/5/2007	6525292.127080	6525292.127080	1799996.460370	245119	3797	sf	237	cf
Infiltration BMP	Existing	8215 COMOLETTE	5/18/2006	6516024.585540	6516024.585540	1792904.896040	246077	3563	sf	223	cf
Infiltration BMP	Existing	7809 DACOSTA	10/5/2007	6521756.096640	6521756.096640	1806979.884160	246106	3797	sf	237	cf
Infiltration BMP	Existing	10424 DOLAN AV	2/14/2014	6523609.999510	6523609.999510	1803226.099470	245119	3797	sf	237	cf
Infiltration BMP	Existing	12337 DUNROBIN	6/21/2010	6524854.924990	6524854.924990	1793158.910710	245114	3797	sf	237	cf
Infiltration BMP	Existing	13234 DUNROBIN	9/30/2005	6525046.618370	6525046.618370	1789885.630870	245114	3797	sf	237	cf
Infiltration BMP	Existing	12612 EASTBROOK	5/30/2006	6525374.680490	6525374.680490	1791988.629320	245114	3797	sf	237	cf
Infiltration BMP	Existing	9400 FLORENCE	7/8/2005	6528900.299250	6528900.299250	1801380.002980	245126	3797	sf	237	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7823 FOURTH PL	9/16/2005	6519381.530610	6519381.530610	1803107.418050	246102	3797	sf	237	cf
Infiltration BMP	Existing	7826 GAINFORD	10/13/2005	6521963.408230	6521963.408230	1806968.662960	246106	3797	sf	237	cf
Infiltration BMP	Existing	7909 GALLATIN	4/27/2006	6523955.572760	6523955.572760	1809190.106160	246106	3797	sf	237	cf
Infiltration BMP	Existing	9118 GARNISH	6/21/2010	6529677.777690	6529677.777690	1805040.238300	245125	3797	sf	237	cf
Infiltration BMP	Existing	12752 GLYNN	6/18/2010	6516929.257070	6516929.257070	1792615.717350	245524	3797	sf	237	cf
Infiltration BMP	Existing	9116 HALEDON	3/2/2006	6528925.738880	6528925.738880	1805732.953010	245125	3797	sf	237	cf
Infiltration BMP	Existing	12819 IBBETSON	11/23/2005	6525827.025010	6525827.025010	1791350.711010	245114	3797	sf	237	cf
Infiltration BMP	Existing	9528 LEMORAN	8/26/2008	6528914.390000	6528914.390000	1804053.870620	245125	3797	sf	237	cf
Infiltration BMP	Existing	10514 LESTERFORD	2/14/2006	6529382.491640	6529382.491640	1798787.162960	245126	3797	sf	237	cf
Infiltration BMP	Existing	9030 LUBEC	2/9/2006	6526996.357320	6526996.357320	1804242.372880	245125	3797	sf	237	cf
Infiltration BMP	Existing	9264 LUBEC	4/19/2006	6528519.099740	6528519.099740	1803331.221940	245125	3797	sf	237	cf
Infiltration BMP	Existing	8545 LUBEC ST	2/14/2014	6525866.355120	6525866.355120	1805123.134500	246103	3797	sf	237	cf
Infiltration BMP	Existing	9247 MANZANAR	10/30/2006	6526227.935330	6526227.935330	1806695.994430	246103	3797	sf	237	cf
Infiltration BMP	Existing	7866 MELVA	6/20/2006	6516126.027390	6516126.027390	1797191.628010	246079	3797	sf	237	cf
Infiltration BMP	Existing	12109 MORNING	5/16/2006	6516408.716280	6516408.716280	1797765.727430	246079	3797	sf	237	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7332 NADA	6/18/2007	6514319.703850	6514319.703850	1800394.247560	246079	3797	sf	237	cf
Infiltration BMP	Existing	7334 NADA	6/18/2007	6514319.703850	6514319.703850	1800394.247560	246079	3797	sf	237	cf
Infiltration BMP	Existing	9821 NEWVILLE	7/30/2007	6530987.438110	6530987.438110	1802116.080780	245125	3797	sf	237	cf
Infiltration BMP	Existing	10268 NEWVILLE	4/24/2007	6529747.604150	6529747.604150	1800228.046080	245126	3797	sf	237	cf
Infiltration BMP	Existing	12280 ORIZABA	6/18/2010	6517505.248620	6517505.248620	1795784.740290	246077	3797	sf	237	cf
Infiltration BMP	Existing	10404 PANGBORN	6/18/2010	6528952.556500	6528952.556500	1800031.154520	245126	3797	sf	237	cf
Infiltration BMP	Existing	12531 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	3797	sf	237	cf
Infiltration BMP	Existing	12537 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	3797	sf	237	cf
Infiltration BMP	Existing	11994 POMERING	2/23/2005	6514993.390330	6514993.390330	1799517.781680	246079	3797	sf	237	cf
Infiltration BMP	Existing	9525 QUINN	2/8/2007	6528803.711540	6528803.711540	1799421.544220	245126	3797	sf	237	cf
Infiltration BMP	Existing	8048 QUOIT	1/21/2009	6516443.407630	6516443.407630	1795348.218010	246077	3797	sf	237	cf
Infiltration BMP	Existing	12326 SAMOLINE	8/29/2008	6516269.535370	6516269.535370	1796118.615320	246077	3797	sf	237	cf
Infiltration BMP	Existing	12504 SMALLWOOD	9/30/2008	6515227.996100	6515227.996100	1795705.820110	246079	3797	sf	237	cf
Infiltration BMP	Existing	9520 STEWART & GRAY	4/10/2008	6526628.650930	6526628.650930	1796061.800920	245118	3797	sf	237	cf
Infiltration BMP	Existing	7411 THIRD	6/2/2006	6517216.302090	6517216.302090	1804140.837740	246102	3797	sf	237	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	12706 WHITEWOOD	9/20/2007	6520505.791550	6520505.791550	1791390.733010	245115	3797	sf	237	cf
Infiltration BMP	Existing	9049 HALL ROAD	2/9/2007	6523684.587500	6523684.587500	1797586.831540	245114	2531	sf	158	cf
Infiltration BMP	Existing	7118 ADWEN	1/27/2006	6513895.884030	6513895.884030	1803086.756410	246100	2531	sf	158	cf
Infiltration BMP	Existing	13202 BARLIN	2/14/2007	6517303.317510	6517303.317510	1789688.349400	245524	2531	sf	158	cf
Infiltration BMP	Existing	10216 BELLMAN	1/5/2009	6525703.110200	6525703.110200	1803293.056930	245119	2531	sf	158	cf
Infiltration BMP	Existing	11809 BELLMAN	2/8/2006	6521732.804620	6521732.804620	1797303.369450	245114	2531	sf	158	cf
Infiltration BMP	Existing	7117 BENARES	8/10/2006	6513814.981610	6513814.981610	1802936.506930	246079	2531	sf	158	cf
Infiltration BMP	Existing	9108 BIGBY	11/23/2005	6526215.785230	6526215.785230	1801649.270450	245119	2531	sf	158	cf
Infiltration BMP	Existing	10213 BIRCHDALE	4/19/2006	6525304.414970	6525304.414970	1803562.084330	245119	2531	sf	158	cf
Infiltration BMP	Existing	9004 BIRCHLEAF	3/7/2007	6527047.235450	6527047.235450	1808159.837050	246103	2531	sf	158	cf
Infiltration BMP	Existing	13126 BLODGETT	8/18/2005	6517829.686700	6517829.686700	1789824.186060	245115	2531	sf	158	cf
Infiltration BMP	Existing	9508 BROCK	2/27/2006	6524228.012180	6524228.012180	1807355.118100	246103	2531	sf	158	cf
Infiltration BMP	Existing	7418 BROOKMILL	7/25/2008	6515791.043440	6515791.043440	1801624.672750	246079	2531	sf	158	cf
Infiltration BMP	Existing	12201 BROOKSHIRE	6/22/2010	6519506.452440	6519506.452440	1795585.950880	245115	2531	sf	158	cf
Infiltration BMP	Existing	7942 BRUNACHE	11/28/2005	6517219.149000	6517219.149000	1798061.073260	246079	2531	sf	158	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9349 CECILIA	9/25/2008	6527282.306940	6527282.306940	1798988.874460	245126	2531	sf	158	cf
Infiltration BMP	Existing	9365 CECILIA	6/18/2010	6527411.791310	6527411.791310	1798910.665650	245126	2531	sf	158	cf
Infiltration BMP	Existing	9608 CECILIA	1/1/2007	6528406.351870	6528406.351870	1798010.127160	245126	2531	sf	158	cf
Infiltration BMP	Existing	9624 CEDARTREE	8/8/2005	6531911.946630	6531911.946630	1804673.812930	245127	2531	sf	158	cf
Infiltration BMP	Existing	8519 CLETA	9/10/2007	6521470.081710	6521470.081710	1798172.541560	245114	2531	sf	158	cf
Infiltration BMP	Existing	7803 CONKLIN	9/2/2005	6513317.560580	6513317.560580	1793980.901190	246077	2297	sf	144	cf
Infiltration BMP	Existing	12816 CORNUTA	10/9/2006	6525701.592160	6525701.592160	1791350.505200	245114	2531	sf	158	cf
Infiltration BMP	Existing	8018 DANVERS	1/26/2009	6524882.345060	6524882.345060	1809453.159850	246106	2531	sf	158	cf
Infiltration BMP	Existing	8517 DEVENIR	10/11/2005	6517399.640210	6517399.640210	1791811.493450	245115	2531	sf	158	cf
Infiltration BMP	Existing	8049 DINSDALE	6/15/2006	6522974.989820	6522974.989820	1805624.556380	246103	2531	sf	158	cf
Infiltration BMP	Existing	9317 DINSDALE	11/5/2008	6528560.545810	6528560.545810	1802232.852640	245125	2531	sf	158	cf
Infiltration BMP	Existing	8510 DONOVAN	7/5/2005	6519046.837890	6519046.837890	1794446.597550	245115	2531	sf	158	cf
Infiltration BMP	Existing	8415 DONOVAN ST	2/14/2014	6518508.946270	6518508.946270	1795018.898890	245115	2531	sf	158	cf
Infiltration BMP	Existing	9635 DOWNEY	7/15/2004	6524420.085960	6524420.085960	1806308.452290	246103	2531	sf	158	cf
Infiltration BMP	Existing	9830 DOWNEY	1/1/2006	6524176.121770	6524176.121770	1805651.929490	246103	2531	sf	158	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	12718 DOWNEY	8/30/2007	6516814.229160	6516814.229160	1793075.140590	245524	2531	sf	158	cf
Infiltration BMP	Existing	12650 DUNROBIN	7/27/2007	6525045.587920	6525045.587920	1791614.482510	245114	2531	sf	158	cf
Infiltration BMP	Existing	9067 EGLISE	9/30/2005	6530265.716940	6530265.716940	1805184.414240	245127	2531	sf	158	cf
Infiltration BMP	Existing	9131 EGLISE	1/16/2009	6529904.336320	6529904.336320	1804464.041860	245125	2531	sf	158	cf
Infiltration BMP	Existing	8573 ELEVENTH	4/24/2006	6525253.900610	6525253.900610	1803595.328980	245119	2531	sf	158	cf
Infiltration BMP	Existing	9061 FARM ST	2/14/2014	6526099.027600	6526099.027600	1801582.141470	245119	2531	sf	158	cf
Infiltration BMP	Existing	7936 FOURTH	1/26/2006	6520005.666040	6520005.666040	1802880.634680	246103	2531	sf	158	cf
Infiltration BMP	Existing	7829 FOURTH PL	2/14/2014	6519381.530610	6519381.530610	1803107.418050	246102	2531	sf	158	cf
Infiltration BMP	Existing	7528 GAINFORD	6/18/2010	6520331.076350	6520331.076350	1807734.704270	246106	1266	sf	79	cf
Infiltration BMP	Existing	8150 GALLATIN	1/14/2008	6524851.065410	6524851.065410	1807922.731550	246103	2531	sf	158	cf
Infiltration BMP	Existing	9068 GALLATIN	7/18/2005	6527754.167230	6527754.167230	1805244.499940	245125	2531	sf	158	cf
Infiltration BMP	Existing	12703 GLENSHIRE	8/18/2006	6520090.968440	6520090.968440	1791341.816710	245115	2531	sf	158	cf
Infiltration BMP	Existing	8703 GUATEMALA	6/18/2010	6523747.929510	6523747.929510	1811239.685330	246111	2531	sf	158	cf
Infiltration BMP	Existing	9903 GUATEMALA	6/21/2010	6519189.043810	6519189.043810	1808530.913060	246111	2531	sf	158	cf
Infiltration BMP	Existing	9208 HALEDON	3/29/2007	6528788.981770	6528788.981770	1805412.621690	245125	2531	sf	158	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9083 HALL	12/8/2005	6524025.781090	6524025.781090	1797583.104370	245114	2531	sf	158	cf
Infiltration BMP	Existing	10348 HASTY	9/14/2006	6528480.545700	6528480.545700	1800482.839460	245126	2531	sf	158	cf
Infiltration BMP	Existing	7844 HONDO	7/8/2005	6515417.898670	6515417.898670	1796530.778030	246079	2531	sf	158	cf
Infiltration BMP	Existing	9244 HORLEY	6/22/2006	6522498.248530	6522498.248530	1809199.750130	246111	2531	sf	158	cf
Infiltration BMP	Existing	12612 IBBETSON	2/9/2007	6526008.655610	6526008.655610	1792000.536540	245114	2531	sf	158	cf
Infiltration BMP	Existing	7214 IRWINGROVE	8/17/2007	6517736.835580	6517736.835580	1807424.228480	246104	2531	sf	158	cf
Infiltration BMP	Existing	10209 JULIUS	6/21/2010	6519702.452650	6519702.452650	1806880.883230	246102	2531	sf	158	cf
Infiltration BMP	Existing	10341 JULIUS	6/4/2008	6519700.000000	6519700.000000	1806100.000000	246102	2531	sf	158	cf
Infiltration BMP	Existing	12313 JULIUS	6/21/2010	6514155.209020	6514155.209020	1797936.932020	246079	2531	sf	158	cf
Infiltration BMP	Existing	7944 KINGBEE	5/31/2007	6516311.045420	6516311.045420	1796702.710410	246079	2531	sf	158	cf
Infiltration BMP	Existing	9605 LA REINA	6/18/2010	6524325.141120	6524325.141120	1806744.664340	246103	2531	sf	158	cf
Infiltration BMP	Existing	10074 LESTERFORD	4/12/2006	6530716.286370	6530716.286370	1800772.683680	245125	2531	sf	158	cf
Infiltration BMP	Existing	9626 LUBEC	6/21/2005	6530889.535260	6530889.535260	1801910.718740	245125	2531	sf	158	cf
Infiltration BMP	Existing	7156 LUXOR	10/28/2005	6513800.826420	6513800.826420	1802169.595300	246100	2531	sf	158	cf
Infiltration BMP	Existing	9202 MANZANAR	4/13/2004	6526663.177850	6526663.177850	1806830.315690	246103	2531	sf	158	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9020 MARGARET	10/2/2006	6523822.925930	6523822.925930	1798066.530690	245114	2531	sf	158	cf
Infiltration BMP	Existing	9127 MELDAR	4/29/2004	6526710.714590	6526710.714590	1807437.827920	246103	2531	sf	158	cf
Infiltration BMP	Existing	11814 MORNING	9/2/2005	6517648.916460	6517648.916460	1799680.107480	246077	2531	sf	158	cf
Infiltration BMP	Existing	7440 MULLER	11/7/2006	6518162.654940	6518162.654940	1805120.460880	246102	2531	sf	158	cf
Infiltration BMP	Existing	12334 ORIZABA	5/5/2005	6517231.678930	6517231.678930	1795384.927500	246077	2531	sf	158	cf
Infiltration BMP	Existing	9311 OTTO	2/2/2008	6528809.245500	6528809.245500	1802513.951810	245125	2531	sf	158	cf
Infiltration BMP	Existing	10436 PANGBORN	7/6/2006	6528781.443840	6528781.443840	1799746.387720	245126	2531	sf	158	cf
Infiltration BMP	Existing	12533 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	12531 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	12531 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	12533 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	12533 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	12533 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	12535 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	12535 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	12535 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	12535 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	12537 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	12537 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	9008 PARROT	6/22/2010	6524997.125330	6524997.125330	1808680.720210	246106	2531	sf	158	cf
Infiltration BMP	Existing	9530 PARROT	10/11/2006	6523866.950960	6523866.950960	1807305.627380	246103	2531	sf	158	cf
Infiltration BMP	Existing	7125 PELLET	11/21/2005	6515366.521160	6515366.521160	1805107.133170	246104	2531	sf	158	cf
Infiltration BMP	Existing	7335 PELLET	2/15/2007	6516661.302200	6516661.302200	1804268.401510	246104	2531	sf	158	cf
Infiltration BMP	Existing	7348 PELLET	6/22/2010	6516619.400060	6516619.400060	1803975.379460	246102	2531	sf	158	cf
Infiltration BMP	Existing	10433 PICO VISTA	6/21/2010	6529704.381130	6529704.381130	1799155.408730	245126	2531	sf	158	cf
Infiltration BMP	Existing	7629 PIVOT	6/4/2008	6517523.064870	6517523.064870	1802428.507060	246079	2531	sf	158	cf
Infiltration BMP	Existing	11962 POMERING	2/24/2006	6515175.131420	6515175.131420	1799743.806870	246079	2531	sf	158	cf
Infiltration BMP	Existing	8133 PRISCILLA	6/22/2010	6515078.400000	6515078.400000	1792153.440000	246077	2531	sf	158	cf
Infiltration BMP	Existing	7603 QUILL	2/28/2007	6514155.935840	6514155.935840	1797151.984960	246079	2531	sf	158	cf
Infiltration BMP	Existing	11539 RICHEON	7/8/2005	6517174.382020	6517174.382020	1801464.078770	246079	2531	sf	158	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	6545 RIVERGROVE	10/11/2005	6520696.757140	6520696.757140	1811248.378990	246111	2531	sf	158	cf
Infiltration BMP	Existing	9320 SAMOLINE	11/3/2006	6523716.410960	6523716.410960	1808296.703240	246106	2531	sf	158	cf
Infiltration BMP	Existing	9602 SAMOLINE	11/23/2005	6523146.135200	6523146.135200	1807399.732010	246103	2531	sf	158	cf
Infiltration BMP	Existing	12015 SAMOLINE	9/29/2008	6517129.601540	6517129.601540	1798409.043860	246079	2531	sf	158	cf
Infiltration BMP	Existing	12048 SAMOLINE	6/22/2010	6517021.712450	6517021.712450	1798014.455830	246079	2531	sf	158	cf
Infiltration BMP	Existing	7962 SECOND	10/3/2007	6519694.108620	6519694.108620	1801968.426700	246102	2531	sf	158	cf
Infiltration BMP	Existing	7712 SEVERY ST	1/1/2008	6524575.222650	6524575.222650	1807124.160130	246103	2531	sf	158	cf
Infiltration BMP	Existing	7331 SHADYOAK	1/16/2009	6521597.847660	6521597.847660	1810725.646550	246111	2531	sf	158	cf
Infiltration BMP	Existing	9103 SHERIDELL	10/29/2007	6528594.889520	6528594.889520	1806159.584670	245125	2531	sf	158	cf
Infiltration BMP	Existing	8345 SIXTH	4/23/2008	6522663.428460	6522663.428460	1802257.170290	245114	2531	sf	158	cf
Infiltration BMP	Existing	9124 STOAKES	4/29/2004	6526659.033140	6526659.033140	1807538.875170	246103	2531	sf	158	cf
Infiltration BMP	Existing	9906 TECUM	8/26/2008	6519710.324270	6519710.324270	1808196.223590	246111	2531	sf	158	cf
Infiltration BMP	Existing	9520 TELEGRAPH	12/4/2008	6531301.476840	6531301.476840	1805512.099740	245127	2531	sf	158	cf
Infiltration BMP	Existing	8302 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	1840	sf	115	cf
Infiltration BMP	Existing	8304 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8306 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8308 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8310 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8312 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8314 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8316 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8318 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8320 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8322 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8324 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8326 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8328 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8330 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8332 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8334 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8336 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8338 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8340 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8342 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8344 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8346 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8348 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8350 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8352 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	7438 THIRD	11/10/2005	6517353.808450	6517353.808450	1803828.489190	246102	2531	sf	158	cf
Infiltration BMP	Existing	7955 THIRD	1/30/2006	6519871.299810	6519871.299810	1802440.525110	246103	2531	sf	158	cf
Infiltration BMP	Existing	9819 TRISTAN	11/19/2007	6526302.584780	6526302.584780	1804524.383680	245125	2531	sf	158	cf
Infiltration BMP	Existing	8555 VIA AMORITA	10/27/2008	6524751.467620	6524751.467620	1803150.610950	245119	2531	sf	158	cf
Infiltration BMP	Existing	9631 WILEY BURKE	3/27/2006	6521095.475640	6521095.475640	1808618.175130	246106	2531	sf	158	cf
Infiltration BMP	Existing	10419 WILEY BURKE	3/7/2008	6519382.492080	6519382.492080	1805731.311650	246102	2531	sf	158	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7319 ADWEN	2/22/2006	6515346.754980	6515346.754980	1802425.342900	246079	1266	sf	79	cf
Infiltration BMP	Existing	13033 AIRPOINT	6/14/2010	6517837.198260	6517837.198260	1790420.981040	245115	1266	sf	79	cf
Infiltration BMP	Existing	8446 ALAMEDA	6/24/2005	6519341.878190	6519341.878190	1795502.737620	245115	1266	sf	79	cf
Infiltration BMP	Existing	9336 APPLEBY	3/9/2006	6529377.514420	6529377.514420	1804389.744220	245125	1266	sf	79	cf
Infiltration BMP	Existing	9540 ARDINE	1/1/2006	6527800.346060	6527800.346060	1797420.079620	245119	1266	sf	79	cf
Infiltration BMP	Existing	7849 ARNETT	7/8/2005	6518395.700160	6518395.700160	1801138.921810	246079	1266	sf	79	cf
Infiltration BMP	Existing	8645 BAYSINGER	11/10/2005	6525612.031290	6525612.031290	1803108.706240	245119	1266	sf	79	cf
Infiltration BMP	Existing	9210 BELCHER	10/12/2006	6519891.840050	6519891.840050	1789806.904790	245115	1266	sf	79	cf
Infiltration BMP	Existing	9245 BELCHER	9/4/2007	6520247.532430	6520247.532430	1789967.036150	245115	1266	sf	79	cf
Infiltration BMP	Existing	10234 BELCHER	6/18/2010	6527119.239350	6527119.239350	1789810.183210	245113	1266	sf	79	cf
Infiltration BMP	Existing	10285 BELCHER	6/21/2010	6527612.081010	6527612.081010	1789959.646450	245118	1266	sf	79	cf
Infiltration BMP	Existing	10028 BELLDER	1/1/2006	6525360.965940	6525360.965940	1803913.208580	245125	1266	sf	79	cf
Infiltration BMP	Existing	10304 BELLMAN	6/1/2005	6525418.498520	6525418.498520	1803041.069680	245119	1266	sf	79	cf
Infiltration BMP	Existing	11014 BENFIELD	6/24/2008	6531918.630750	6531918.630750	1797937.959120	245122	1266	sf	79	cf
Infiltration BMP	Existing	9324 BIRCHBARK	10/7/2005	6524879.129350	6524879.129350	1807661.831210	246103	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7847 BLANDWOOD	6/29/2006	6525016.522210	6525016.522210	1811074.341940	246106	1266	sf	79	cf
Infiltration BMP	Existing	8415 BORSON	10/9/2006	6517421.536650	6517421.536650	1792735.849280	245115	1266	sf	79	cf
Infiltration BMP	Existing	8710 BOYNE	6/29/2006	6521119.595500	6521119.595500	1795272.757840	245115	1266	sf	79	cf
Infiltration BMP	Existing	8910 BROCK	2/3/2009	6525582.226600	6525582.226600	1808734.892600	246106	1266	sf	79	cf
Infiltration BMP	Existing	9702 BROCK	9/25/2006	6523765.203820	6523765.203820	1806580.253440	246103	1266	sf	79	cf
Infiltration BMP	Existing	9730 BROCK	10/16/2009	6523625.354460	6523625.354460	1806340.478590	246103	1266	sf	79	cf
Infiltration BMP	Existing	7550 BROOKMILL	9/25/2006	6516432.435790	6516432.435790	1801137.496710	246079	1266	sf	79	cf
Infiltration BMP	Existing	10360 BROOKSHIRE	8/2/2005	6524254.056510	6524254.056510	1803200.425100	245119	1266	sf	79	cf
Infiltration BMP	Existing	9336 BUELL	5/4/2007	6527241.052050	6527241.052050	1799190.479610	245126	1266	sf	79	cf
Infiltration BMP	Existing	9408 BUELL	1/1/2007	6527563.840160	6527563.840160	1798993.546660	245126	1266	sf	79	cf
Infiltration BMP	Existing	10210 CASANES	7/20/2005	6529273.829610	6529273.829610	1801143.143100	245125	1266	sf	79	cf
Infiltration BMP	Existing	10308 CASANES	6/9/2005	6528827.020030	6528827.020030	1800415.364480	245126	1266	sf	79	cf
Infiltration BMP	Existing	10845 CASANES	12/4/2007	6527288.943480	6527288.943480	1798213.890680	245119	1266	sf	79	cf
Infiltration BMP	Existing	10922 CASANES	8/3/2005	6527279.490710	6527279.490710	1797849.792160	245119	1266	sf	79	cf
Infiltration BMP	Existing	8715 CAVEL	6/22/2010	6521261.550160	6521261.550160	1795688.489420	245115	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9707 CEDARTREE	5/25/2006	6532283.863380	6532283.863380	1804587.051690	245127	1266	sf	79	cf
Infiltration BMP	Existing	10260 CHANEY	6/21/2010	6527337.911630	6527337.911630	1801874.691650	245119	1266	sf	79	cf
Infiltration BMP	Existing	10362 CHANEY	9/4/2007	6526983.558290	6526983.558290	1801306.071650	245119	1266	sf	79	cf
Infiltration BMP	Existing	9246 CLANCEY	5/1/2007	6528479.118010	6528479.118010	1805448.947460	245125	1266	sf	79	cf
Infiltration BMP	Existing	10546 CLANCEY	5/26/2005	6525904.831900	6525904.831900	1800674.595520	245119	1266	sf	79	cf
Infiltration BMP	Existing	12658 COLDBROOK	6/25/2009	6524501.637760	6524501.637760	1791525.543010	245114	1266	sf	79	cf
Infiltration BMP	Existing	8111 COMOLETTE	12/18/2006	6515465.796840	6515465.796840	1793242.397990	246077	1266	sf	79	cf
Infiltration BMP	Existing	8140 COMOLETTE	12/2/2008	6515640.775000	6515640.775000	1792943.865000	246077	1266	sf	79	cf
Infiltration BMP	Existing	8316 COMOLETTE	5/23/2005	6516475.681440	6516475.681440	1792370.081790	245524	1266	sf	79	cf
Infiltration BMP	Existing	9325 CORD	3/21/2008	6529940.912480	6529940.912480	1803762.584020	245125	1266	sf	79	cf
Infiltration BMP	Existing	7732 COREY	1/8/2009	6515481.796500	6515481.796500	1798137.416600	246079	1266	sf	79	cf
Infiltration BMP	Existing	11810 CORRIGAN	3/4/2009	6523411.287590	6523411.287590	1796210.739300	245114	1266	sf	79	cf
Infiltration BMP	Existing	10925 CROSSDALE	6/9/2005	6532012.125130	6532012.125130	1798163.740010	245122	1266	sf	79	cf
Infiltration BMP	Existing	7757 DACOSTA	6/7/2005	6521506.383470	6521506.383470	1807138.583520	246106	1266	sf	79	cf
Infiltration BMP	Existing	8324 DAVIS	6/15/2005	6520852.481770	6520852.481770	1799213.987880	245114	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8517 DEVENIR	2/19/2008	6517399.640210	6517399.640210	1791811.493450	245115	1266	sf	79	cf
Infiltration BMP	Existing	7345 DINSDALE	9/29/2005	6519203.299320	6519203.299320	1808002.090250	246111	1266	sf	79	cf
Infiltration BMP	Existing	8330 DINSDALE	6/21/2010	6524002.238290	6524002.238290	1804838.107610	246103	1266	sf	79	cf
Infiltration BMP	Existing	10340 DOLAN	8/15/2007	6523856.967630	6523856.967630	1803630.622810	245119	1266	sf	79	cf
Infiltration BMP	Existing	12260 DOLAN	4/5/2006	6518910.565000	6518910.565000	1795264.305000	245115	1266	sf	79	cf
Infiltration BMP	Existing	12521 DOLAN	7/19/2007	6517914.404040	6517914.404040	1794175.419610	245115	1266	sf	79	cf
Infiltration BMP	Existing	12621 DOLAN	8/17/2007	6517501.190610	6517501.190610	1793293.644730	245115	1266	sf	79	cf
Infiltration BMP	Existing	12308 DOWNEY	4/19/2007	6518251.608680	6518251.608680	1795363.261670	245115	1266	sf	79	cf
Infiltration BMP	Existing	12532 DOWNEY	10/11/2005	6517442.718730	6517442.718730	1794104.887260	245115	1266	sf	79	cf
Infiltration BMP	Existing	12820 DOWNEY	5/17/2007	6516486.923440	6516486.923440	1792584.707230	245524	1266	sf	79	cf
Infiltration BMP	Existing	12603 DUNROBIN	6/22/2010	6524864.880980	6524864.880980	1792095.613000	245114	1266	sf	79	cf
Infiltration BMP	Existing	12643 DUNROBIN	11/21/2006	6524865.889210	6524865.889210	1791696.268120	245114	1266	sf	79	cf
Infiltration BMP	Existing	12818 DUNROBIN	12/15/2006	6525044.191110	6525044.191110	1791331.787300	245114	1266	sf	79	cf
Infiltration BMP	Existing	12823 DUNROBIN	2/12/2008	6524866.593650	6524866.593650	1791299.463030	245114	1266	sf	79	cf
Infiltration BMP	Existing	13024 DUNROBIN	5/24/2005	6525048.058670	6525048.058670	1790633.750860	245114	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	13240 DUNROBIN	10/1/2008	6525046.731200	6525046.731200	1789833.348360	245114	1266	sf	79	cf
Infiltration BMP	Existing	13638 EARNSHAW	9/16/2005	6516330.576340	6516330.576340	1788317.037630	245524	1266	sf	79	cf
Infiltration BMP	Existing	12155 EASTBROOK	9/16/2005	6525128.882510	6525128.882510	1794289.182720	245114	2297	sf	144	cf
Infiltration BMP	Existing	9125 EGLISE	1/24/2007	6529928.564580	6529928.564580	1804520.963270	245125	1266	sf	79	cf
Infiltration BMP	Existing	10213 EGLISE	10/14/2008	6528271.447820	6528271.447820	1801803.093100	245126	1266	sf	79	cf
Infiltration BMP	Existing	8331 EVEREST	2/21/2007	6517984.856770	6517984.856770	1794526.994330	245115	1266	sf	79	cf
Infiltration BMP	Existing	9037 FARM	6/18/2010	6525882.141210	6525882.141210	1801714.480720	245119	1266	sf	79	cf
Infiltration BMP	Existing	9542 FARM	11/15/2005	6529019.221950	6529019.221950	1799423.700160	245126	1266	sf	79	cf
Infiltration BMP	Existing	8445 FIFTH	6/24/2005	6523180.907390	6523180.907390	1801530.163340	245114	1266	sf	79	cf
Infiltration BMP	Existing	8529 FIFTH	9/23/2005	6523578.003250	6523578.003250	1801288.543780	245114	1266	sf	79	cf
Infiltration BMP	Existing	9221 FOSTER	2/16/2008	6519835.324440	6519835.324440	1789377.664880	245115	1266	sf	79	cf
Infiltration BMP	Existing	9303 FOSTER	8/9/2006	6520280.515660	6520280.515660	1789513.941670	245115	1266	sf	79	cf
Infiltration BMP	Existing	9536 FOSTORIA	10/13/2005	6527900.524680	6527900.524680	1797686.001250	245119	1266	sf	79	cf
Infiltration BMP	Existing	7339 GAINFORD	11/5/2007	6519739.997490	6519739.997490	1808338.936030	246111	1266	sf	79	cf
Infiltration BMP	Existing	8426 GAINFORD	1/7/2008	6524961.213810	6524961.213810	1805124.602410	246103	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9315 GAINFORD	7/5/2005	6528715.710300	6528715.710300	1803034.881460	245125	1266	sf	79	cf
Infiltration BMP	Existing	9641 GAINFORD	10/16/2006	6530976.949360	6530976.949360	1801752.372100	245125	1266	sf	79	cf
Infiltration BMP	Existing	9357 GALLATIN	4/17/2006	6529509.957360	6529509.957360	1804133.004270	245125	1266	sf	79	cf
Infiltration BMP	Existing	8411 GALT	7/18/2007	6520931.662600	6520931.662600	1798681.676310	245114	1266	sf	79	cf
Infiltration BMP	Existing	8125 GARDENDALE	10/3/2007	6514840.842010	6514840.842010	1791988.219650	246077	1266	sf	79	cf
Infiltration BMP	Existing	7553 GLENCLIFF	11/5/2008	6521939.189570	6521939.189570	1809565.009220	246111	1266	sf	79	cf
Infiltration BMP	Existing	12615 GURLEY	9/8/2008	6516705.632650	6516705.632650	1793818.816440	246077	1266	sf	79	cf
Infiltration BMP	Existing	10557 HALEDON	3/22/2006	6525946.687500	6525946.687500	1800529.637640	245119	1266	sf	79	cf
Infiltration BMP	Existing	10714 HALEDON	7/11/2008	6525734.412480	6525734.412480	1799854.605530	245119	1266	sf	79	cf
Infiltration BMP	Existing	9101 HALL	7/19/2007	6524088.768660	6524088.768660	1797585.986810	245114	1266	sf	79	cf
Infiltration BMP	Existing	7416 HONDO	11/21/2007	6513414.170490	6513414.170490	1797767.919490	246079	1266	sf	79	cf
Infiltration BMP	Existing	7927 HONDO	1/8/2007	6515926.722240	6515926.722240	1796435.751150	246079	1266	sf	79	cf
Infiltration BMP	Existing	9228 HORLEY	7/20/2005	6522584.029360	6522584.029360	1809343.702000	246111	1266	sf	79	cf
Infiltration BMP	Existing	9929 HORLEY	6/23/2005	6520827.895940	6520827.895940	1807104.698370	246106	1266	sf	79	cf
Infiltration BMP	Existing	12316 HORLEY	1/1/2007	6515085.680000	6515085.680000	1797312.060000	246079	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	11544 HORTON	5/1/2006	6517050.314050	6517050.314050	1801482.158860	246079	1266	sf	79	cf
Infiltration BMP	Existing	12619 IBBETSON	12/26/2007	6525826.717640	6525826.717640	1791950.694670	245114	1266	sf	79	cf
Infiltration BMP	Existing	12816 IBBETSON	11/23/2005	6526008.922590	6526008.922590	1791350.504040	245114	1266	sf	79	cf
Infiltration BMP	Existing	9030 IOWA	8/29/2007	6523719.000250	6523719.000250	1797706.215730	245114	1266	sf	79	cf
Infiltration BMP	Existing	9036 IOWA	1/23/2006	6523761.535660	6523761.535660	1797679.990250	245114	1266	sf	79	cf
Infiltration BMP	Existing	7214 IRWINGROVE	2/7/2008	6517736.835580	6517736.835580	1807424.228480	246104	1266	sf	79	cf
Infiltration BMP	Existing	7425 IRWINGROVE	11/22/2005	6519037.305040	6519037.305040	1806826.286520	246102	1266	sf	79	cf
Infiltration BMP	Existing	7431 IVO	5/23/2005	6520452.019960	6520452.019960	1808862.657860	246106	1266	sf	79	cf
Infiltration BMP	Existing	12258 IZETTA	11/19/2008	6524718.529730	6524718.529730	1793607.751080	245114	1266	sf	79	cf
Infiltration BMP	Existing	11427 JULIUS	10/6/2005	6517068.729490	6517068.729490	1802337.821610	246079	1266	sf	79	cf
Infiltration BMP	Existing	7863 KINGBEE	6/2/2005	6515998.395150	6515998.395150	1797104.463380	246079	1266	sf	79	cf
Infiltration BMP	Existing	10633 LA REINA	6/7/2005	6521844.406030	6521844.406030	1802801.159980	246103	1266	sf	79	cf
Infiltration BMP	Existing	10726 LA REINA	9/20/2005	6521763.725850	6521763.725850	1802369.001800	246103	1266	sf	79	cf
Infiltration BMP	Existing	10717 LAKEWOOD	1/1/2005	6524762.764130	6524762.764130	1800632.321080	245119	1266	sf	79	cf
Infiltration BMP	Existing	13229 LAKEWOOD	8/30/2005	6518145.854860	6518145.854860	1789091.323220	245115	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8248 LANKIN	5/16/2007	6517152.534650	6517152.534650	1794608.293130	246077	1266	sf	79	cf
Infiltration BMP	Existing	13413 LAURELDALE	9/4/2007	6516097.983610	6516097.983610	1789503.029570	245524	1266	sf	79	cf
Infiltration BMP	Existing	9040 LEMORAN	9/16/2005	6529896.207920	6529896.207920	1805874.052840	245125	1266	sf	79	cf
Infiltration BMP	Existing	10225 LESTERFORD	12/22/2005	6530244.844140	6530244.844140	1800567.187010	245126	1266	sf	79	cf
Infiltration BMP	Existing	10415 LESTERFORD	6/22/2010	6529502.521580	6529502.521580	1799500.525910	245126	1266	sf	79	cf
Infiltration BMP	Existing	10730 LESTERFORD	6/8/2005	6528927.837490	6528927.837490	1798058.051080	245126	1266	sf	79	cf
Infiltration BMP	Existing	8020 LUBEC	3/8/2007	6523117.786070	6523117.786070	1806398.918760	246103	1266	sf	79	cf
Infiltration BMP	Existing	9230 LUBEC	9/30/2005	6528205.943320	6528205.943320	1803519.420650	245125	1266	sf	79	cf
Infiltration BMP	Existing	7259 LUXOR	1/1/2007	6514801.884280	6514801.884280	1801808.218080	246079	1266	sf	79	cf
Infiltration BMP	Existing	7315 LUXOR	3/16/2006	6514953.117040	6514953.117040	1801695.155730	246079	1266	sf	79	cf
Infiltration BMP	Existing	8444 LUXOR	11/10/2005	6520775.356850	6520775.356850	1797851.842110	245114	1266	sf	79	cf
Infiltration BMP	Existing	9102 MANZANAR	7/20/2005	6527192.246670	6527192.246670	1807219.965690	246103	1266	sf	79	cf
Infiltration BMP	Existing	10434 MANZANAR	6/7/2005	6523771.930100	6523771.930100	1803007.033470	245119	1266	sf	79	cf
Infiltration BMP	Existing	11109 MARBEL	7/20/2006	6523692.717760	6523692.717760	1799490.635090	245119	1266	sf	79	cf
Infiltration BMP	Existing	12108 MARBEL	1/31/2006	6521445.538760	6521445.538760	1795214.942010	245115	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7830 MELVA	1/1/2006	6515802.415360	6515802.415360	1797387.108860	246079	1266	sf	79	cf
Infiltration BMP	Existing	7844 MELVA	1/5/2006	6515910.196660	6515910.196660	1797321.983490	246079	1266	sf	79	cf
Infiltration BMP	Existing	12120 MORNING	8/14/2008	6516533.621320	6516533.621320	1797558.681060	246079	1266	sf	79	cf
Infiltration BMP	Existing	7339 NADA	7/8/2005	6514489.286480	6514489.286480	1800567.411080	246079	1266	sf	79	cf
Infiltration BMP	Existing	7351 NADA	6/23/2008	6514590.536380	6514590.536380	1800503.774190	246079	1266	sf	79	cf
Infiltration BMP	Existing	8202 NADA	1/9/2006	6518631.371590	6518631.371590	1797835.542430	245115	1266	sf	79	cf
Infiltration BMP	Existing	7415 NOREN	7/26/2005	6520794.671000	6520794.671000	1809286.272790	246111	1266	sf	79	cf
Infiltration BMP	Existing	9921 NORLAIN	11/3/2008	6519614.140210	6519614.140210	1807835.435830	246111	1266	sf	79	cf
Infiltration BMP	Existing	8127 ORANGE	6/23/2010	6517401.744430	6517401.744430	1796403.841780	246077	1266	sf	79	cf
Infiltration BMP	Existing	9554 ORIZABA	8/19/2005	6524235.753500	6524235.753500	1806817.618650	246103	1266	sf	79	cf
Infiltration BMP	Existing	12333 ORIZABA	1/23/2006	6517077.475660	6517077.475660	1795538.435260	246077	1266	sf	79	cf
Infiltration BMP	Existing	10834 PANGBORN	9/17/2007	6527760.431910	6527760.431910	1798051.772160	245119	1266	sf	79	cf
Infiltration BMP	Existing	7156 PELLET	6/22/2010	6515507.126970	6515507.126970	1804695.751890	246104	1266	sf	79	cf
Infiltration BMP	Existing	9466 PELLET	5/26/2005	6527082.799410	6527082.799410	1797550.782940	245119	1266	sf	79	cf
Infiltration BMP	Existing	10238 PICO VISTA	7/22/2008	6530559.495000	6530559.495000	1800212.246520	245126	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7706 PIVOT	6/18/2010	6517776.543940	6517776.543940	1802077.153370	246079	1266	sf	79	cf
Infiltration BMP	Existing	11951 POMERING	6/18/2010	6515072.562230	6515072.562230	1799936.867790	246079	1266	sf	79	cf
Infiltration BMP	Existing	12010 POMERING	9/20/2005	6514897.027930	6514897.027930	1799318.472210	246079	1266	sf	79	cf
Infiltration BMP	Existing	7803 PURITAN	6/22/2010	6513186.710850	6513186.710850	1793767.422040	246077	1266	sf	79	cf
Infiltration BMP	Existing	8249 QUOIT	5/17/2007	6517406.484080	6517406.484080	1795006.472870	246077	1266	sf	79	cf
Infiltration BMP	Existing	8506 RAVILLER	6/22/2010	6526200.032280	6526200.032280	1805944.598850	246103	1266	sf	79	cf
Infiltration BMP	Existing	9441 RAVILLER	10/7/2005	6529831.524430	6529831.524430	1803323.207760	245125	1266	sf	79	cf
Infiltration BMP	Existing	7110 RIO FLORA	6/1/2010	6515643.202310	6515643.202310	1805187.382260	246104	1266	sf	79	cf
Infiltration BMP	Existing	7371 RIO HONDO PL	7/11/2005	6517283.740950	6517283.740950	1804924.767440	246104	1266	sf	79	cf
Infiltration BMP	Existing	10802 RIVES	3/23/2007	6519422.470020	6519422.470020	1803623.413330	246102	1266	sf	79	cf
Infiltration BMP	Existing	11916 RIVES	2/6/2007	6516737.168290	6516737.168290	1799258.165990	246079	1266	sf	79	cf
Infiltration BMP	Existing	10912 RYERSON	7/14/2005	6515882.754330	6515882.754330	1804962.955590	246104	1266	sf	79	cf
Infiltration BMP	Existing	9505 SAMOLINE	6/21/2010	6523279.038200	6523279.038200	1807936.970620	246106	1266	sf	79	cf
Infiltration BMP	Existing	9631 SAMOLINE	9/4/2007	6522855.010000	6522855.010000	1807250.890000	246103	1266	sf	79	cf
Infiltration BMP	Existing	12030 SAMOLINE	9/23/2005	6517133.868790	6517133.868790	1798177.361600	246079	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	12238 SAMOLINE	9/8/2006	6516738.176240	6516738.176240	1796883.684630	246079	1266	sf	79	cf
Infiltration BMP	Existing	7915 SECOND	3/23/2006	6519374.854020	6519374.854020	1802382.905560	246102	1266	sf	79	cf
Infiltration BMP	Existing	7816 SEVENTH	3/27/2007	6519884.790380	6519884.790380	1804163.292550	246102	1266	sf	79	cf
Infiltration BMP	Existing	8646 SEVENTH	1/3/2006	6524439.566780	6524439.566780	1801605.289810	245119	1266	sf	79	cf
Infiltration BMP	Existing	9225 SIDEVIEW	4/24/2006	6531114.889310	6531114.889310	1804872.365930	245127	1266	sf	79	cf
Infiltration BMP	Existing	8810 SMALLWOOD	6/20/2005	6524153.815510	6524153.815510	1810188.858090	246106	1266	sf	79	cf
Infiltration BMP	Existing	9264 SONGFEST	6/10/2008	6531394.983570	6531394.983570	1804360.661210	245127	1266	sf	79	cf
Infiltration BMP	Existing	7838 SPRINGER	11/21/2006	6515530.871940	6515530.871940	1796818.950680	246079	1266	sf	79	cf
Infiltration BMP	Existing	7844 SPRINGER	3/18/2008	6515582.250000	6515582.250000	1796787.835000	246079	1266	sf	79	cf
Infiltration BMP	Existing	10517 STAMPS	8/18/2005	6522812.240000	6522812.240000	1803043.757460	246103	1266	sf	79	cf
Infiltration BMP	Existing	9520 STEWART & GRAY	2/27/2009	6526628.650930	6526628.650930	1796061.800920	245118	1266	sf	79	cf
Infiltration BMP	Existing	8840 STOAKES	7/15/2005	6527643.045070	6527643.045070	1808263.273840	245125	1266	sf	79	cf
Infiltration BMP	Existing	11831 SUSAN	5/25/2006	6514568.915250	6514568.915250	1801466.560490	246079	1266	sf	79	cf
Infiltration BMP	Existing	8354 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	1266	sf	79	cf
Infiltration BMP	Existing	8356 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8358 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	1266	sf	79	cf
Infiltration BMP	Existing	8360 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	1266	sf	79	cf
Infiltration BMP	Existing	8362 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	1266	sf	79	cf
Infiltration BMP	Existing	8364 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	1266	sf	79	cf
Infiltration BMP	Existing	8366 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	1266	sf	79	cf
Infiltration BMP	Existing	8368 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	1266	sf	79	cf
Infiltration BMP	Existing	7420 THIRD	9/20/2007	6517202.761340	6517202.761340	1803926.714420	246102	1266	sf	79	cf
Infiltration BMP	Existing	7964 THIRD	2/21/2006	6519886.681280	6519886.681280	1802225.378910	246102	1266	sf	79	cf
Infiltration BMP	Existing	9532 TWEEDY	4/20/2007	6523025.939870	6523025.939870	1807743.953100	246106	1266	sf	79	cf
Infiltration BMP	Existing	7347 VIA RIO NIDO	8/1/2007	6518199.953350	6518199.953350	1806523.073370	246104	1266	sf	79	cf
Infiltration BMP	Existing	10419 WILEY BURKE	1/2/2008	6519382.492080	6519382.492080	1805731.311650	246102	1266	sf	79	cf
Infiltration BMP	Existing	10442 WILEY BURKE	1/1/2007	6519428.439440	6519428.439440	1805422.866650	246102	1266	sf	79	cf
Infiltration BMP	Existing	12639 WOODRUFF	12/22/2006	6526127.737740	6526127.737740	1791800.878460	245113	1266	sf	79	cf
Infiltration BMP	Existing	12356 DOWNEY	4/29/2004	6518006.757310	6518006.757310	1794978.083160	245115	5062	sf	316	cf
Infiltration BMP	Existing	10613 NEWVILLE	4/21/2004	6528761.027810	6528761.027810	1798786.621380	245126	2531	sf	158	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	10627 OLD RIVER SCHOOL	7/24/2003	6515233.048270	6515233.048270	1805631.128330	246104	174752	sf	10922	cf
Infiltration BMP	Existing	9215 HALL	12/9/2002	6524758.793890	6524758.793890	1797647.866960	245113	74592	sf	4662	cf
Infiltration BMP	Existing	10933 LAKEWOOD BLVD	10/5/2005	6524600.000000	6524600.000000	1800100.000000	245119	6400	sf	400	cf
Infiltration BMP	Existing	12322 SAMOLINE	7/8/2005	6516301.814120	6516301.814120	1796169.128220	246077	4256	sf	266	cf
Infiltration BMP	Existing	12731 LAKEWOOD	9/17/2003	6519215.285000	6519215.285000	1791371.090000	245115	2128	sf	133	cf
Infiltration BMP	Existing	12739 LAKEWOOD	9/17/2003	6519200.000000	6519200.000000	1791100.000000	245115	2128	sf	133	cf
Infiltration BMP	Existing	8927 BIRCHLEAF	7/11/2006	6527008.160170	6527008.160170	1808327.449830	246103	1056	sf	66	cf
Infiltration BMP	Existing	11929 POMERING	5/1/2006	6515108.241040	6515108.241040	1800149.473170	246079	1056	sf	66	cf
Infiltration BMP	Existing	12240 WOODRUFF	3/19/2010	6526758.991120	6526758.991120	1793878.747920	245118	300224	sf	18764	cf
Infiltration BMP	Existing	12222 WOODRUFF	9/14/2009	6526625.121210	6526625.121210	1794009.479990	245118	70200	sf	4388	cf
Infiltration BMP	Existing	7624 FIRESTONE	1/1/2008	6517500.000000	6517500.000000	1802600.000000	246079	41632	sf	2602	cf
Infiltration BMP	Existing	7714 STEWART & GRAY	4/9/2007	6516397.756580	6516397.756580	1799563.749470	246079	30016	sf	1876	cf
Infiltration BMP	Existing	9637 LAKEWOOD	10/2/2008	6526780.802630	6526780.802630	1805111.536210	245125	15136	sf	946	cf
Infiltration BMP	Existing	12428 BENEDICT	6/14/2007	6525687.022380	6525687.022380	1792528.538110	245114	8080	sf	505	cf
Infiltration BMP	Existing	7774 DINSDALE	2/14/2014	6521332.495780	6521332.495780	1806385.183840	246103	4680	sf	293	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8030 IMPERIAL HWY	2/14/2014	6515729.368090	6515729.368090	1794471.493939	246077	41789	sf	2000	cf
Infiltration BMP	Existing	9623 IMPERIAL HWY	2/14/2014	6524482.209740	6524482.209740	1792569.983950	245114	35408	sf	2213	cf
Infiltration BMP	Existing	10531 LAKEWOOD BL	2/14/2014	6525178.634060	6525178.634060	1801497.338680	245119	5840	sf	365	cf
Infiltration BMP	Existing	8121 FOURTH ST	2/14/2014	6521147.926450	6521147.926450	1802216.858440	246103	4680	sf	293	cf
Infiltration BMP	Existing	8123 FOURTH ST	2/14/2014	6521147.926450	6521147.926450	1802216.858440	246103	4680	sf	293	cf
Infiltration BMP	Existing	8555 TENTH ST	2/14/2014	6524962.328390	6524962.328390	1803501.510410	245119	4680	sf	293	cf
Infiltration BMP	Existing	9356 BUELL ST	2/14/2014	6527425.774610	6527425.774610	1799078.145910	245126	3120	sf	195	cf
Infiltration BMP	Existing	8449 COLE ST	2/14/2014	6520362.597670	6520362.597670	1796910.373080	245115	1560	sf	98	cf

D1.3. City of Lakewood

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Flow-Through Treatment BMP	Existing	Filterra Tree Wells (2)		Paramount & Arbor	33.843398	-118.159673	445521				
Infiltration BMP	Existing	Retention Basin at Cherry Cove Park			33.850296	-118.165478	446014				

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D1.4. City of Paramount

Type of BMP	Existing or Planned ?	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Bioswales	Existing	Landscape Swale	2012	Texaco/Alondra	33.889066	-118.171849	606071	37,500	sf	2109	cf
Bioswales	Existing	Landscape Swale	2012	Orange/Windmill	33.891602	-118.177436	606072	0.6	ac	1470	cf

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D1.5. City of Pico Rivera

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Site-Scale Detention Basin	Existing	French drains at Smith Park	2013	6016 Rosemead Blvd				16	ac		
Site-Scale Detention Basin	Existing	French drains at Rio Vista	2013	Coffman Pico Road				7	ac		
Bioswales	Existing	Beverly Boulevard medians	2012	Beverly Blvd				5280	sf		
Permeable Pavement	Existing	Pico Park permeable pavement	2012	9528 Beverly Blvd				12	ac		
Bioswales	Existing	Telegraph Road medians	2013	Telegraph Rd from Rosemead Blvd to Eastside limit				5280	sf		
Bioswales	Planned	Paramount Blvd medians	2016	Paramount Blvd from Whittier Blvd to Mines Ave				5280	sf		
Infiltration BMPs	Planned	Two (2) Filterra Systems	2016	various				1	ac		
Infiltration BMPs	Existing	City of Pico Rivera City Hall	2011	8615 Passons Blvd				2.75	ac		
Infiltration BMPs	Existing	Rivera Park	2012	9530 Shade Lane				16	ac		

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D1.6. City of Signal Hill

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Bioretention / Biofiltration		Palm Drive Business Center	2/19/2008	2445 N Palm Drive	33.801973	-118.157962	775510	1	ac		
Bioretention / Biofiltration		Aragon Townhomes & Duplexes (City View)	3/9/2007	1902 (1890) Oribaza Ave	33.790924	-118.156725	776003	93,780	sf		
Bioretention / Biofiltration		EDCO Recycling & Transfer		2755 California Avenue	33.807881	-118.181769	776011	9,583	sf		
Bioretention / Biofiltration		EDCO Recycling & Transfer		2756 California Avenue	33.807881	-118.181769	776011	17,424	sf		
Bioretention / Biofiltration		EDCO Recycling & Transfer		2757 California Avenue	33.807881	-118.181769	776011	33,106	sf		
Bioretention / Biofiltration		EDCO Recycling & Transfer		2758 California Avenue	33.807881	-118.181769	776011	10,454	sf		
Bioretention / Biofiltration		EDCO Recycling & Transfer		2759 California Avenue	33.807881	-118.181769	776011	78,486	sf		
Bioretention / Biofiltration		2-Story Building and Parking Lot	12/28/2010	2653 Walnut Avenue	33.805754	-118.171978	776012	0.51	ac		
Bioretention / Biofiltration		EDCO Administrative Terminal	8/1/2011	950 27th Street	33.806179	-118.1812	776012	9583	sf	0.06	cfs
Bioretention / Biofiltration		EDCO Administrative Terminal	8/2/2011	951 27th Street	33.806179	-118.1812	776012	17424	sf	0.08	cfs
Bioretention / Biofiltration		EDCO Administrative Terminal	8/3/2011	952 27th Street	33.806179	-118.1812	776012	33106	sf	0.14	cfs
Bioretention / Biofiltration		EDCO Administrative Terminal	8/4/2011	953 27th Street	33.806179	-118.1812	776012	10454	sf	0.08	cfs
Bioretention / Biofiltration		Fantasy Castle	6/30/2009	2801 Walnut Ave	33.808289	118.171777		1,584	sf		
Bioswales	Existing	Fresh and Easy Neighborhood Market	11/16/2010	3300 Atlantic Avenue	33.817504	-118.184643	485510	18,000	sf	931	cf

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Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Bioswales	Existing	Fresh and Easy Neighborhood Market	11/17/2010	3301 Atlantic Avenue	33.817504	-118.184643	485510	120	sf	7	cf
Bioswales	Existing	Fresh and Easy Neighborhood Market	11/18/2010	3302 Atlantic Avenue	33.817504	-118.184643	485510	10,904	sf	542	cf
Bioswales	Existing	Signal Hill Police Station and Emergency Operation	5/26/2011	2745 Walnut Avenue	33.807067	-118.171984	775510	115,870	sf		
Bioswales	Existing	Jack in the Box	10/21/2008	802 Spring Street	33.812049	-118.182595	775510	12,000	sf		
Bioswales		Boiler Tech Warehouse	10/2/2009	2503 Cerritos Avenue	33.802564	-118.177391	776002	6,754	sf		
Bioswales		Aragon Townhomes & Duplexes (City View)	3/11/2007	1904 (1890) Oribaza Ave	33.790924	-118.156725	776003	31,100	sf		
Bioswales		Fantasy Castle	6/29/2009	2800 Walnut Ave	33.808289	118.171777		32,883	sf		
Flow-Through Treatment BMP	Existing	Petco, Party City	3/3/2009	3100 Atlantic Ave	33.813946	-118.184789	485510				
Flow-Through Treatment BMP	Existing	Petco, Party City	3/4/2009	3101 Atlantic Ave	33.813946	-118.184789	485510				
Flow-Through Treatment BMP	Existing	The Home Depot		3100 Atlantic Avenue	33.813946	-118.184789	485510	3.65	ac		
Flow-Through Treatment BMP	Existing	The Home Depot		3101 Atlantic Avenue	33.813946	-118.184789	485510	7.99	ac		
Flow-Through Treatment BMP	Existing	The Home Depot		3102 Atlantic Avenue	33.813946	-118.184789	485510	3.28	ac		

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Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Flow-Through Treatment BMP	Existing	The Home Depot		3103 Atlantic Avenue	33.813946	-118.184789	485510	4.79	ac		
Flow-Through Treatment BMP		Palm Drive Business Center	2/20/2008	2446 N Palm Drive	33.801973	-118.157962	775510	7,000	sf		
Flow-Through Treatment BMP	Existing	Fresh & Easy	11/17/2009	2475 Cherry Avenue	33.802363	-118.168152	775510	0.68	ac		
Flow-Through Treatment BMP	Existing	Fresh & Easy	11/18/2009	2476 Cherry Avenue	33.802363	-118.168152	775510	0.58	ac		
Flow-Through Treatment BMP	Existing	US Bank	9/17/2008	2615 Cherry Ave	33.804856	-118.167999	775510	18732	sf		
Flow-Through Treatment BMP	Existing	Signal Hill Industrial Center		2665-2745 Temple Ave	33.80648	-118.159782	775510	143,312	sf		
Flow-Through Treatment BMP	Existing	Tanker Interior Washing Facility		1710 E 29th Street	33.80935	-118.170824	775510	10,000	sf		
Flow-Through Treatment BMP	Existing	Delius Restaurant	7/14/2006	2951 Cherry Ave	33.81111	-118.168077	775510	32,000	sf		
Flow-Through Treatment BMP	Existing	Jack in the Box	10/20/2008	801 Spring Street	33.812049	-118.182595	775510	12,000	sf		

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Flow-Through Treatment BMP	Existing	Target (T-2319)	2/13/2007	950 E 33rd Street	33.816767	-118.181488	775510	178,600	sf		
Flow-Through Treatment BMP	Existing	Hawk Industries	5/8/2007	1245 E. 23rd Street	33.799126	-118.17577	776002	27,322	sf		
Flow-Through Treatment BMP	Existing	Hawk Industries	5/9/2007	1246 E. 23rd Street	33.799126	-118.17577	776002	1575	sf		
Flow-Through Treatment BMP		Boiler Tech Warehouse	9/30/2009	2501 Cerritos Avenue	33.802564	-118.177391	776002	6,754	sf		
Flow-Through Treatment BMP	Existing	Las Brisas II Community Housing	1/11/2006	2400-2418 California Ave	33.803504	-118.180639	776002	16,247	sf		
Flow-Through Treatment BMP	Existing	Las Brisas II Community Housing	1/12/2006	2400-2418 California Ave	33.803504	-118.180639	776002	25,047	sf		
Flow-Through Treatment BMP	Existing	Villagio	12/5/2005	2550 Gundry Ave	33.803577	-118.173289	776002	61,000	sf		
Flow-Through Treatment BMP	Existing	Villagio	12/6/2005	2551 Gundry Ave	33.803577	-118.173289	776002	30,492	sf		
Flow-Through Treatment BMP	Existing	Villagio	12/7/2005	2552 Gundry Ave	33.803577	-118.173289	776002	4,356	sf		

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Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Flow-Through Treatment BMP		Aragon Townhomes & Duplexes (City View)	3/6/2007	1899 (1890) Oribaza Ave	33.790924	-118.156725	776003	31,350	sf		
Flow-Through Treatment BMP		Aragon Townhomes & Duplexes (City View)	3/7/2007	1900 (1890) Oribaza Ave	33.790924	-118.156725	776003	63,400	sf		
Flow-Through Treatment BMP		In-N-Out Burger	5/27/2011	799 E. Spring Street	33.812066	-118.183197	776011	65,220	sf		
Flow-Through Treatment BMP		Shoreline Fabricators	8/1/2007	2652 Gundry Ave	33.805493	-118.173804	776012	16,300	sf		
Flow-Through Treatment BMP		Shoreline Fabricators	8/2/2007	2653 Gundry Ave	33.805493	-118.173804	776012	1,395	sf		
Flow-Through Treatment BMP		2-Story Building and Parking Lot	12/29/2010	2654 Walnut Avenue	33.805754	-118.171978	776012				
Flow-Through Treatment BMP		Islamic Center	5/29/2009	996 27th St	33.806216	-118.180729	776012	5000	sf		
Flow-Through Treatment BMP		Crescent Square Development	8/10/2007	1600-1799 Green House Place				136,955	sf		
Infiltration BMPs	Existing	Fresh & Easy	11/19/2009	2477 Cherry Avenue	33.802363	-118.168152	775510	76,143	sf		
Infiltration BMPs	Existing	US Bank	9/19/2008	2617 Cherry Ave	33.804856	-118.167999	775510	18732	sf		

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMPs	Planned	Applebee's	3/12/2013	899 E. Spring Street	33.812089	-118.181855	775510	23,580	sf		
Infiltration BMPs	Existing	Hawk Industries	5/10/2007	1247 E. 23rd Street	33.799126	-118.17577	776002	27,322	sf		
Infiltration BMPs		Boiler Tech Warehouse	10/1/2009	2502 Cerritos Avenue	33.802564	-118.177391	776002	6,754	sf		
Infiltration BMPs		Pacific Walk	1/4/2011	PCH and Orizaba Avenue	33.789847	-118.156748	776003	100,200	sf		
Infiltration BMPs		Pacific Walk	1/5/2011	PCH and Orizaba Avenue	33.789847	-118.156748	776003	149,015	sf		
Infiltration BMPs		Pacific Walk	1/6/2011	PCH and Orizaba Avenue	33.789847	-118.156748	776003	1,300	sf		
Infiltration BMPs		Aragon Townhomes & Duplexes (City View)	3/8/2007	1901 (1890) Oribaza Ave	33.790924	-118.156725	776003	94,750	sf		
Infiltration BMPs		Aragon Townhomes & Duplexes (City View)	3/10/2007	1903 (1890) Oribaza Ave	33.790924	-118.156725	776003	93,780	sf		
Infiltration BMPs	Planned	Willow Street Medical Office Building	12/9/2013	845 E. Willow Street	33.804664	-118.182279	776009	22,651	sf	1095	cf
Infiltration BMPs	Planned	Willow Street Medical Office Building	12/10/2013	846 E. Willow Street	33.804664	-118.182279	776009	37,304	sf	1890	cf
Infiltration BMPs		In-N-Out Burger	5/28/2011	800 E. Spring Street	33.812066	-118.183197	776011	65,220	sf	3425	cf
Infiltration BMPs		Shoreline Fabricators	8/3/2007	2654 Gundry Ave	33.805493	-118.173804	776012	16,300	sf		
Infiltration BMPs		Islamic Center	5/28/2009	995 27th St	33.806216	-118.180729	776012	5000	sf		
Infiltration BMPs	Existing	A & A Ready Mix Concrete	8/1/2007	900 E. Patterson	33.806664	-118.182206	776012	2	ac		
Permeable Pavement	Existing	US Bank	9/18/2008	2616 Cherry Ave	33.804856	-118.167999	775510	60	sf		

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Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Permeable Pavement	Existing	Hawk Industries	5/11/2007	1248 E. 23rd Street	33.799126	-118.17577	776002	5,628	sf		

D1.7. City of South Gate

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Bioretention / Biofiltration		Self Storage	9/15/2008	2405 Southern Ave	33.953436	-118.229363	796034	0.25	ac		
Bioretention / Biofiltration		Hollydale Plaza	3/30/2010	12222 Garfield Avenue	33.915655	-118.168383	796076	15,278	sf		
Bioretention / Biofiltration		Atlantic Avenue Improvements	4/21/2010	Atlantice from Abbott to Firestone	33.943066	-118.181112	796084	7.44	ac		
Bioretention / Biofiltration	Planned	azalea	11/25/2012	4641 Firestone Blvd.	33.952413	-118.187909	796084	7,328	sf	0.22	cfs
Bioswales		South Gate McDonald's	9/30/2013	3313 Tweedy Boulevard	33.945113	-118.211464	796034	5,119	sf		
Bioswales		South Gate McDonald's	10/1/2013	3314 Tweedy Boulevard	33.945113	-118.211464	796034	5,545	sf		
Bioswales		Commercial Center	10/4/2010	9200 Califlornia Avenue	33.950805	-118.206221	796034	12,367	sf		
Bioswales		Commercial Center	10/5/2010	9201 Califlornia Avenue	33.950805	-118.206221	796034	4,263	sf		
Bioswales		Hot Mix Asphalt Plant	5/11/2001	5626 Southern Avenue	33.944913	-118.168148	796083	2.7	ac		
Bioswales		Goals Soccer Centers - South Gate	2/9/2010	9599 Pinehurst Avenue	33.945107	-118.182378	796084	53,142	sf		
Flow-Through Treatment BMP	Existing	South Gate McDonald's	9/26/2013	3309 Tweedy Boulevard	33.945113	-118.211464	796034	2,394	sf		
Flow-Through Treatment BMP		South Gate McDonald's	9/28/2013	3311 Tweedy Boulevard	33.945113	-118.211464	796034	2,436	sf		

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Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Flow-Through Treatment BMP	Existing	Walgreens	7/24/2006	9830 Long Beach	33.946082	-118.215937	796034	48,725	sf		
Flow-Through Treatment BMP	Existing	King's Car Wash	11/29/2006	9801-9807 Long Beach Blvd	33.946452	-118.216775	796034	10,461	sf		
Flow-Through Treatment BMP		King's Car Wash	12/1/2006	9801-9807 Long Beach Blvd	33.946452	-118.216775	796034				
Flow-Through Treatment BMP	Existing	Sarina Townhomes	2/12/2007	9321 State Street	33.950368	-118.21325	796034	14,375	sf		
Flow-Through Treatment BMP		Commercial Center	10/6/2010	9202 Califlornia Avenue	33.950805	-118.206221	796034	16,630	sf		
Flow-Through Treatment BMP		Office Bldg	12/20/2007	3830 Firestone Blvd	33.953324	-118.201934	796034	1,000	sf		
Flow-Through Treatment BMP		Office Bldg	12/21/2007	3831 Firestone Blvd	33.953324	-118.201934	796034	112,000	sf		
Flow-Through Treatment BMP		Office Bldg	12/20/2007	3800 Firestone Blvd	33.95348	-118.202386	796034	1,000	sf		
Flow-Through Treatment BMP		Office Bldg	12/21/2007	3801 Firestone Blvd	33.95348	-118.202386	796034	112,000	sf		

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Flow-Through Treatment BMP	Planned	Calden Court Appartments	9/27/2013	8901 Calden Avenue	33.95515	-118.228736	796034	219,543	sf		
Flow-Through Treatment BMP		Hollydale Plaza	3/31/2010	12223 Garfield Avenue	33.915655	-118.168383	796076	27,381	sf		
Flow-Through Treatment BMP	Existing	Sherwin Inc	4/10/2007	5530 Borwick Ave	33.925749	-118.172611	796082	7,892	sf		
Flow-Through Treatment BMP		Hot Mix Asphalt Plant	5/10/2001	5625 Southern Avenue	33.944913	-118.168148	796083	9.5	ac		
Flow-Through Treatment BMP		Atlantic Avenue Improvements	4/22/2010	Atlantice from Abbott to Firestone	33.943066	-118.181112	796084	13.32	ac		
Flow-Through Treatment BMP		Goals Soccer Centers - South Gate	2/11/2010	9601 Pinehurst Avenue	33.945107	-118.182378	796084	70,036	sf		
Flow-Through Treatment BMP		Goals Soccer Centers - South Gate	2/12/2010	9602 Pinehurst Avenue	33.945107	-118.182378	796084	37,897	sf		
Flow-Through Treatment BMP		Goals Soccer Centers - South Gate	2/13/2010	9603 Pinehurst Avenue	33.945107	-118.182378	796084	63,400	sf		
Flow-Through Treatment BMP	Planned	azalea	11/24/2012	4640 Firestone Blvd.	33.952413	-118.187909	796084	1,583,819	sf		

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Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Flow-Through Treatment BMP	Existing	Interior Removal Specialist Demolition	5/21/2007	9309 Rayo Ave	33.949331	-118.17896	796089				
Flow-Through Treatment BMP		Interior Removal Specialist Demolition	5/22/2007	9310 Rayo Ave	33.949331	-118.17896	796089				
Flow-Through Treatment BMP		Interior Removal Specialist Demolition	5/23/2007	9311 Rayo Ave	33.949331	-118.17896	796089				
Flow-Through Treatment BMP		Interior Removal Specialist Demolition	5/24/2007	9312 Rayo Ave	33.949331	-118.17896	796089				
Flow-Through Treatment BMP		Petrochem Manufacturing	12/18/2006	8401 Quartz	33.957949	-118.191835	796090	162,305	sf		
Flow-Through Treatment BMP		Petrochem Manufacturing	12/19/2006	8402 Quartz	33.957949	-118.191835	796090	51,401	sf		
Infiltration BMPs		South Gate McDonald's	9/27/2013	3310 Tweedy Boulevard	33.945113	-118.211464	796034	2,394	sf		
Infiltration BMPs		South Gate McDonald's	9/29/2013	3312 Tweedy Boulevard	33.945113	-118.211464	796034	2,436	sf		
Infiltration BMPs		South Gate McDonald's	10/4/2013	3317 Tweedy Boulevard	33.945113	-118.211464	796034	3,743	sf		
Infiltration BMPs		King's Car Wash	11/30/2006	9801-9807 Long Beach Blvd	33.946452	-118.216775	796034	3,047	sf		
Infiltration BMPs		Sarina Townhomes	2/13/2007	9322 State Street	33.950368	-118.21325	796034	17,519	sf		

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMPs		Office Bldg	12/22/2007	3832 Firestone Blvd	33.953324	-118.201934	796034	112,000	sf		
Infiltration BMPs		Office Bldg	12/22/2007	3802 Firestone Blvd	33.95348	-118.202386	796034	112,000	sf		
Infiltration BMPs	Existing	Family Dollar	10/8/2012	3610 Firestone	33.95374	-118.204546	796034		sf		
Infiltration BMPs	Planned	Calden Court Appartments	9/28/2013	8902 Calden Avenue	33.95515	-118.228736	796034	219,543	sf		
Infiltration BMPs		South Gate Ward Building New Parking Lot	10/15/2010	2771 Liberty Boulevard	33.961969	-118.220918	796034	14,811	sf		
Infiltration BMPs		Sherwin Inc	4/11/2007	5531 Borwick Ave	33.925749	-118.172611	796082	7,892	sf		
Infiltration BMPs		Atlantic Avenue Improvements	4/23/2010	Atlantice from Abbott to Firestone	33.943066	-118.181112	796084	22,400	sf		
Infiltration BMPs		Batting Cages	11/4/2010	9599 Pinehurst Avenue	33.945107	-118.182378	796084	7,953	sf		
Infiltration BMPs		Goals Soccer Centers - South Gate	2/10/2010	9600 Pinehurst Avenue	33.945107	-118.182378	796084	113	sf		
Infiltration BMPs		Goals Soccer Centers - South Gate	2/14/2010	9604 Pinehurst Avenue	33.945107	-118.182378	796084	171,333	sf		
Infiltration BMPs	Planned	azalea	11/19/2012	4635 Firestone Blvd.	33.952413	-118.187909	796084	444,636	sf	31,365	cf
Infiltration BMPs	Planned	azalea	11/20/2012	4636 Firestone Blvd.	33.952413	-118.187909	796084	110,869	sf	12,946	cf
Infiltration BMPs	Planned	azalea	11/21/2012	4637 Firestone Blvd.	33.952413	-118.187909	796084	582,860	sf	72,234	cf
Infiltration BMPs	Planned	azalea	11/22/2012	4638 Firestone Blvd.	33.952413	-118.187909	796084	222,727	sf	25,348	cf
Infiltration BMPs	Planned	azalea	11/23/2012	4639 Firestone Blvd.	33.952413	-118.187909	796084	222,727	sf	64,314	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMPs	Existing	New South Central Properties, LLC	5/28/2009	8600 Rheem Ave	33.955566	-118.192042	796084	20,960	sf		
Infiltration BMPs		LA Water	8/4/2010	9415 Burtis	33.947369	-118.176109	796350	154,538	sf		
Permeable Pavement		South Gate McDonald's	10/2/2013	3315 Tweedy Boulevard	33.945113	-118.211464	796034	8,697	sf		
Permeable Pavement		South Gate McDonald's	10/3/2013	3316 Tweedy Boulevard	33.945113	-118.211464	796034	3,550	sf		

D1.8. City of Whittier

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Bioretention / Biofiltration	Planned	GWT Biolswale	2014	Greenway Trail from to	33.972121	-118.044253	895098				
Bioretention / Biofiltration	Planned	Whittier Blvd Widening and Bioswale	2017	Whittier Blvd from to							
Green Streets (Describe)	Planned	Lower Uptown reverse drains	2014	Milton, Newlin, Comstock from La Cuarta to Walnut	33.970199	-118.039721	895098		TBD		TBD
Site-Scale Detention Basin	Existing	Police Building and City Hall Storm Drainage	2010	13230 Penn St	33.974748	-118.03371	895098				

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Attachment E: SUPPORTING CALIBRATION DATA

Submitted to:

LLAR WMP Group LCC WMP Group LSGR WMP Group

Submitted by:

Tetra Tech
9444 Balboa Ave., Suite 215
San Diego, CA 92123

January 15, 2015

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Figure 47. Simulated vs. observed load duration plots for Total Sediment (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10. 33

Figure 48. Simulated vs. observed time series plots for Total Sediment (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10. 33

Figure 49. Simulated vs. observed time series plots for Total Nitrogen (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station. 35

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Figure 52. Simulated vs. observed time series plots for Total Phosphorous (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station. 36

Figure 53. Simulated vs. observed load duration plots for Total Copper (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station. 37

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Figure 56. Simulated vs. observed timeseries plots for Total Lead (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station. 38

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Figure 58. Simulated vs. observed timeseries plots for Total Zinc (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station. 39

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Figure 60. Simulated vs. observed timeseries plots for Fecal Coliform (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station. 40

Figure 61. Simulated vs. observed load duration plots for Total Sediment (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station. 41

Figure 62. Simulated vs. observed time series plots for Total Sediment (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station. 41

1. Lower San Gabriel River

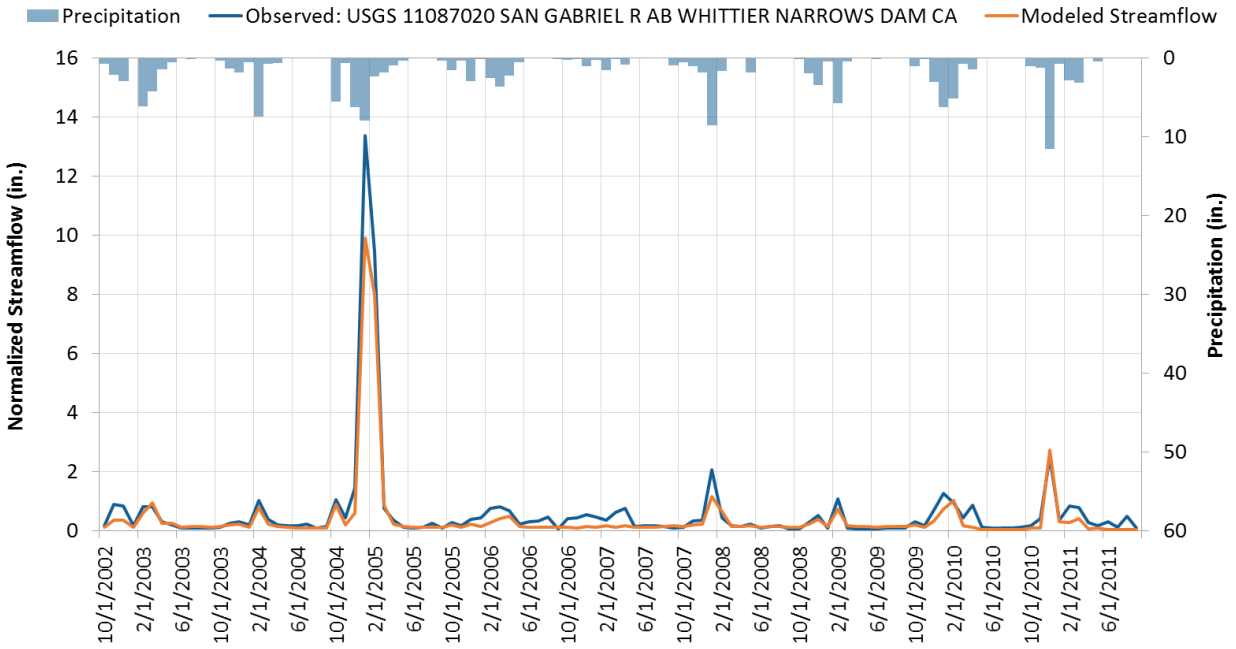

Figure 1. Monthly hydrograph for USGS 11087020 SAN GABRIEL R AB WHITTIER NARROWS DAM CA (10/1/2002 – 9/30/2011).

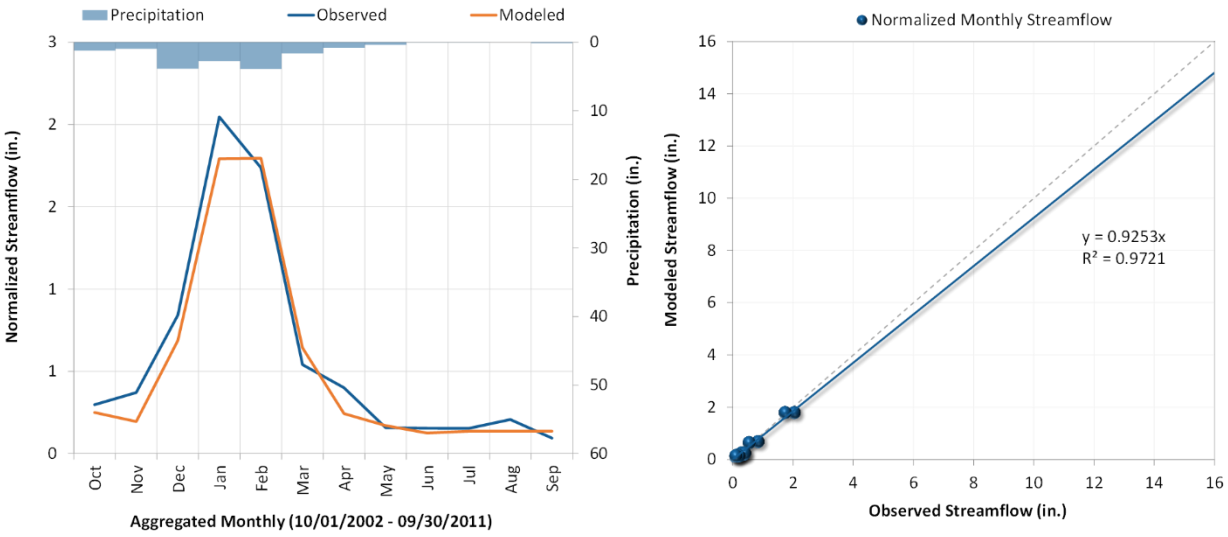

Figure 2. Aggregated monthly hydrograph for USGS 11087020 SAN GABRIEL R AB WHITTIER NARROWS DAM CA (10/1/2002 – 9/30/2011).

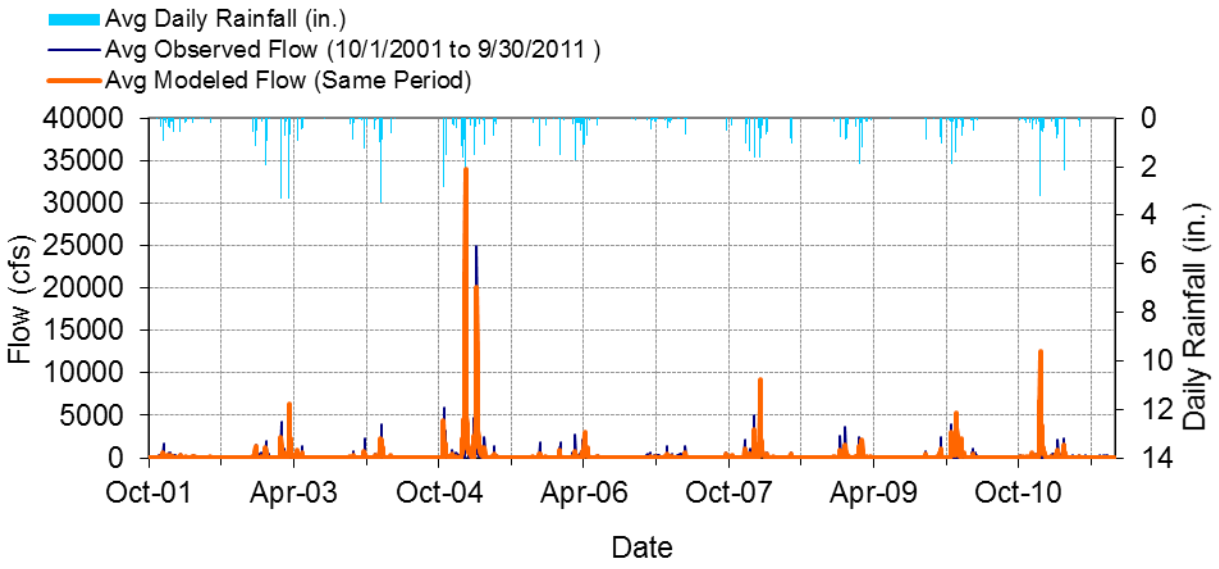

Figure 3. Mean daily flow for USGS 11087020 SAN GABRIEL R AB WHITTIER NARROWS DAM CA (10/1/2002 – 9/30/2011).

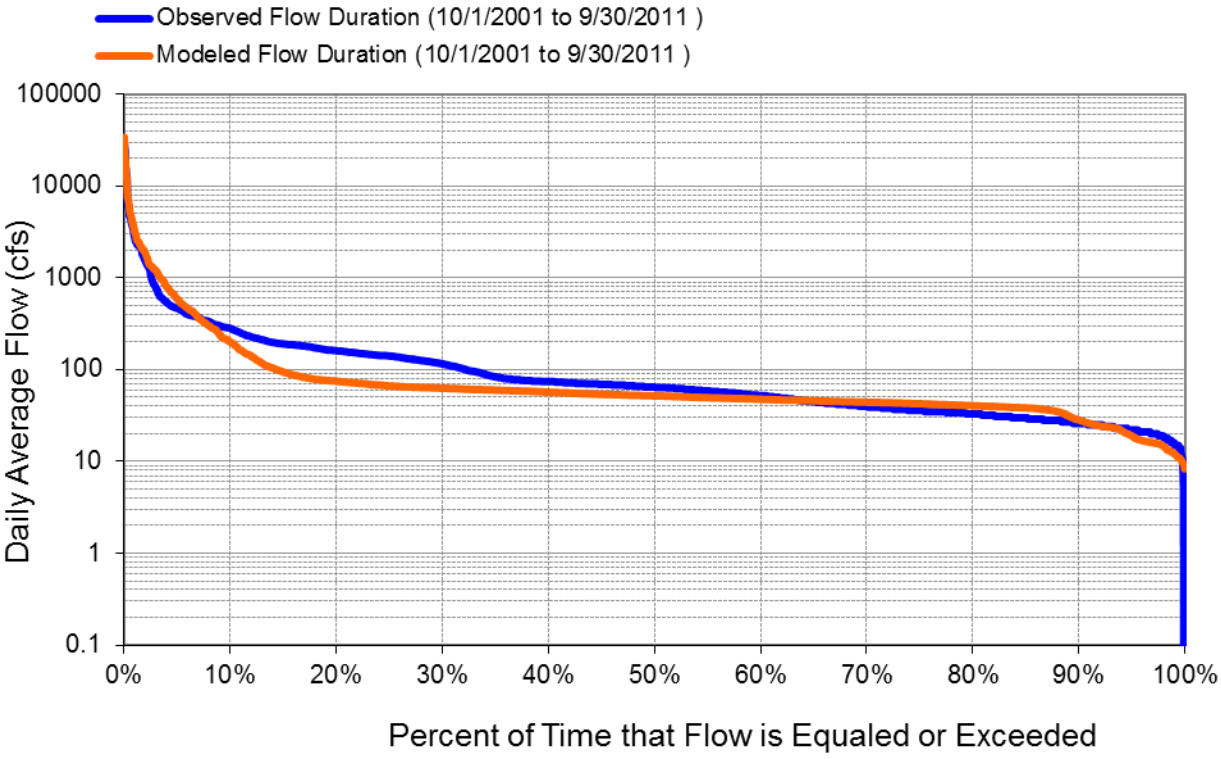

Figure 4. Daily flow exceedance for USGS 11087020 SAN GABRIEL R AB WHITTIER NARROWS DAM CA (10/1/2002 – 9/30/2011).

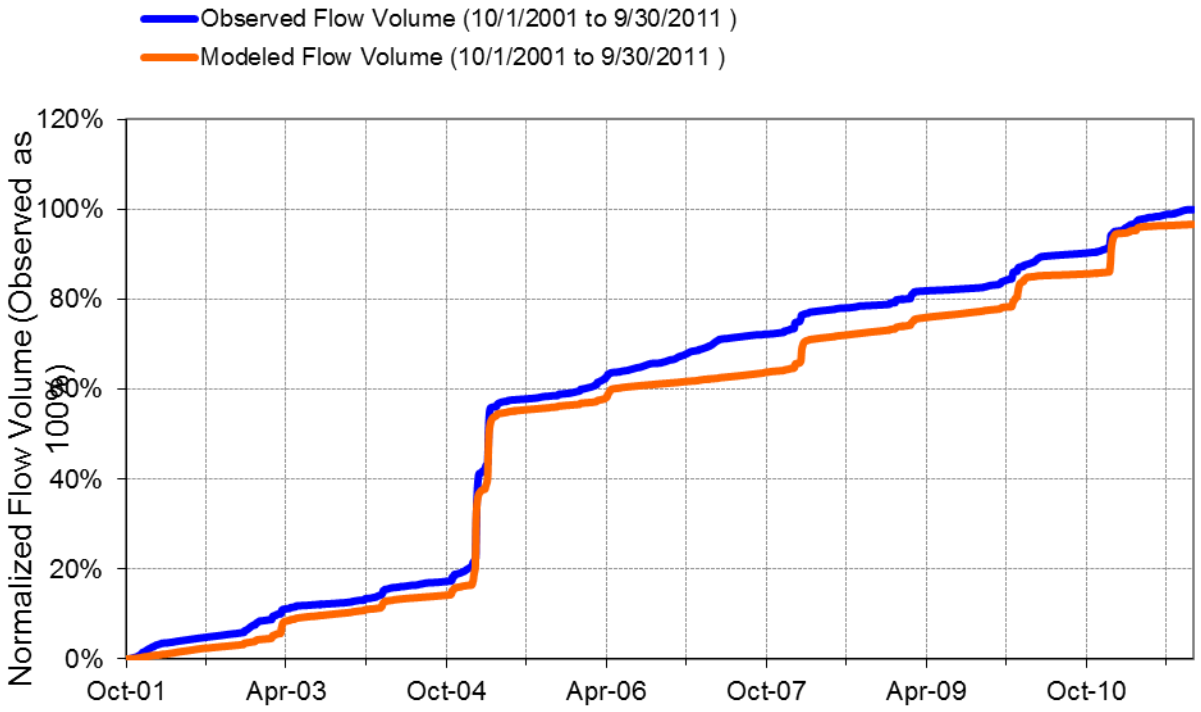

Figure 5. Flow accumulation for USGS 11087020 SAN GABRIEL R AB WHITTIER NARROWS DAM CA (10/1/2002 – 9/30/2011).

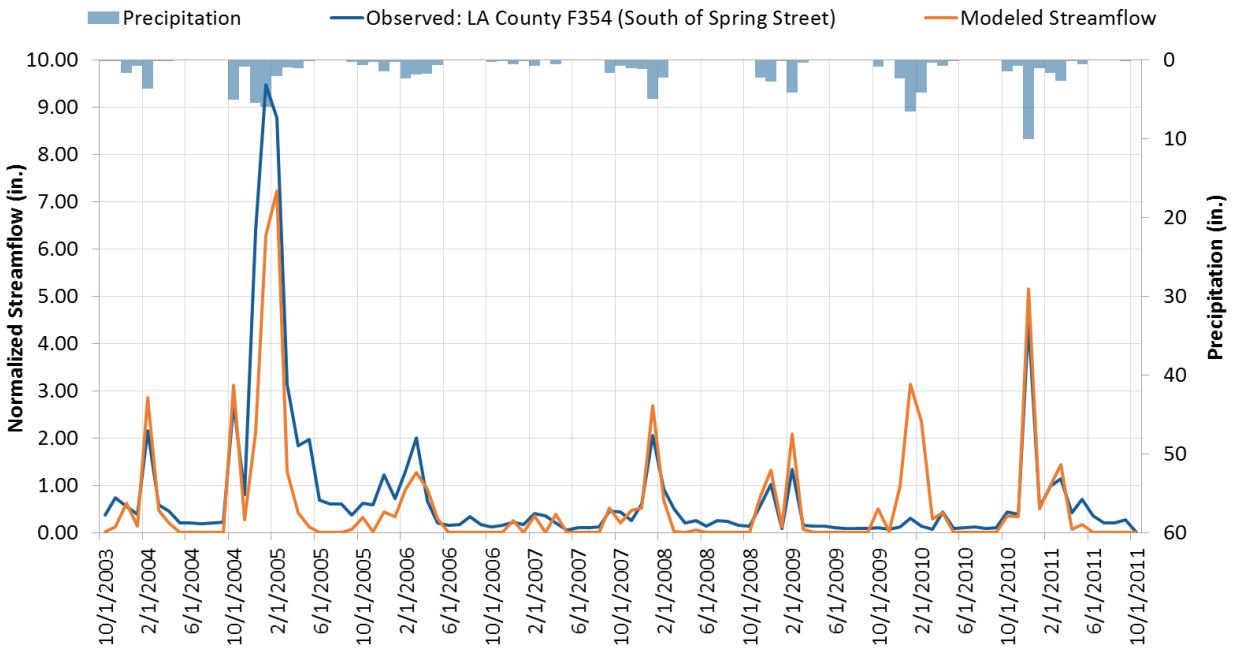

Figure 6. Monthly hydrograph for USGS 11089200 COYOTE C NR BUENA PARK CA (10/1/2003 – 9/30/2011.

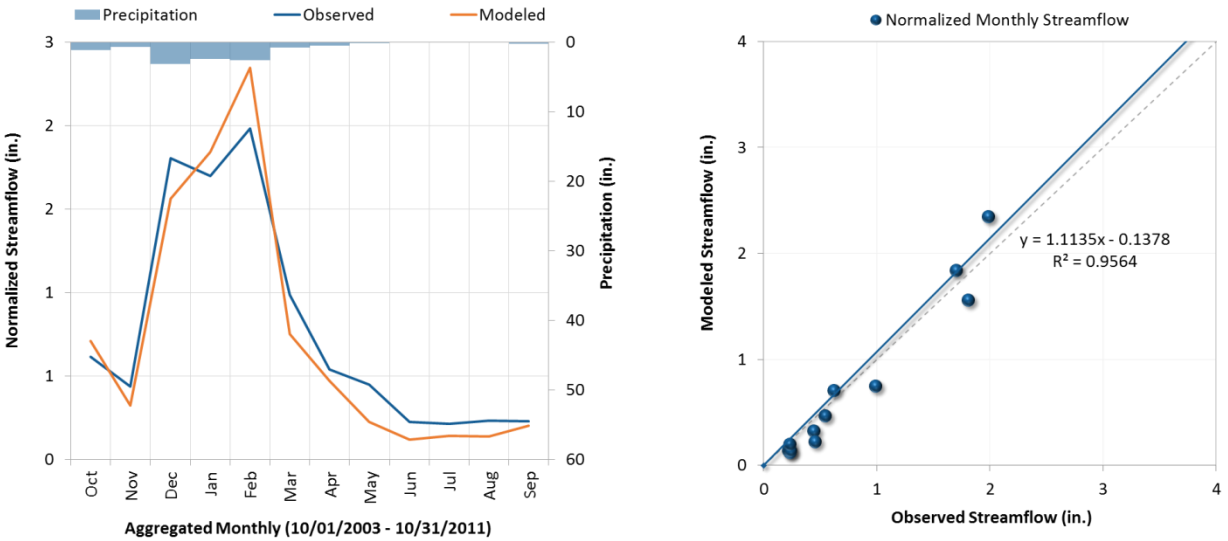

Figure 7. Aggregated monthly hydrograph for USGS 11089200 COYOTE C NR BUENA PARK CA (10/1/2003 – 9/30/2011.

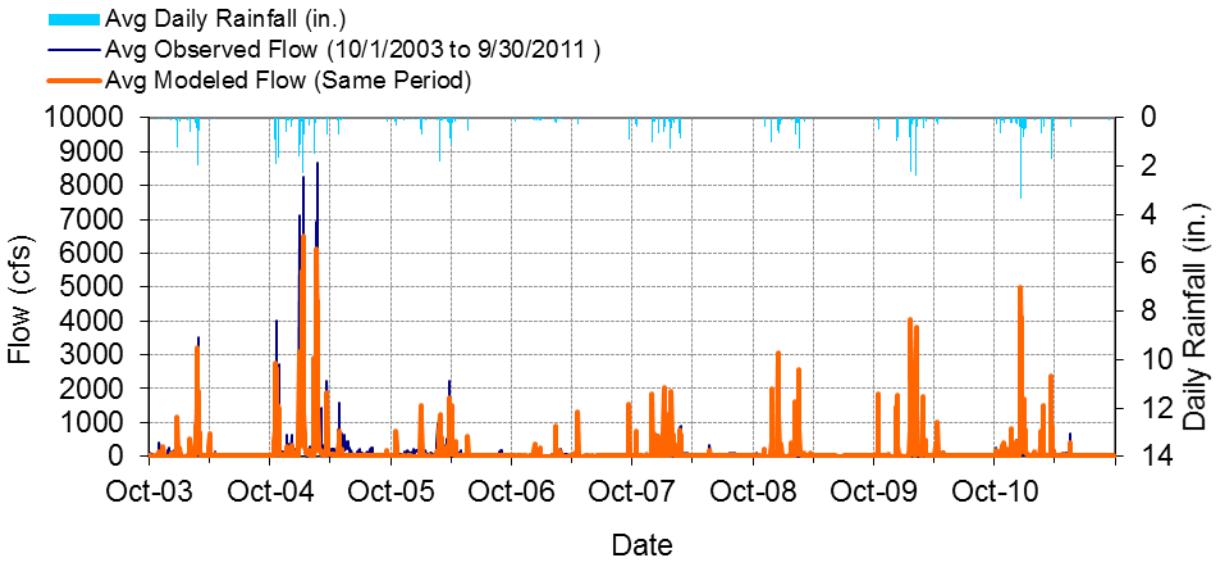

Figure 8. Mean daily flow for USGS 11089200 COYOTE C NR BUENA PARK CA (10/1/2003 – 9/30/2011.

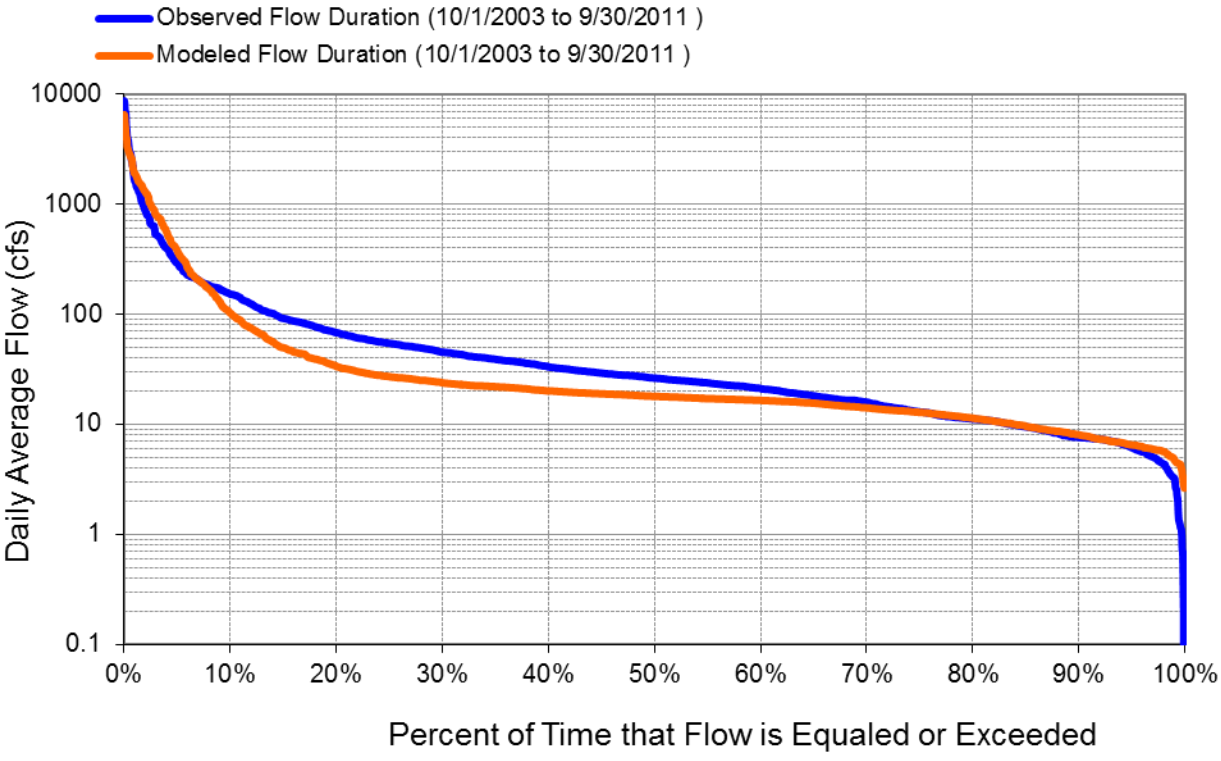

Figure 9. Daily flow exceedance for USGS 11089200 COYOTE C NR BUENA PARK CA (10/1/2003 – 9/30/2011.

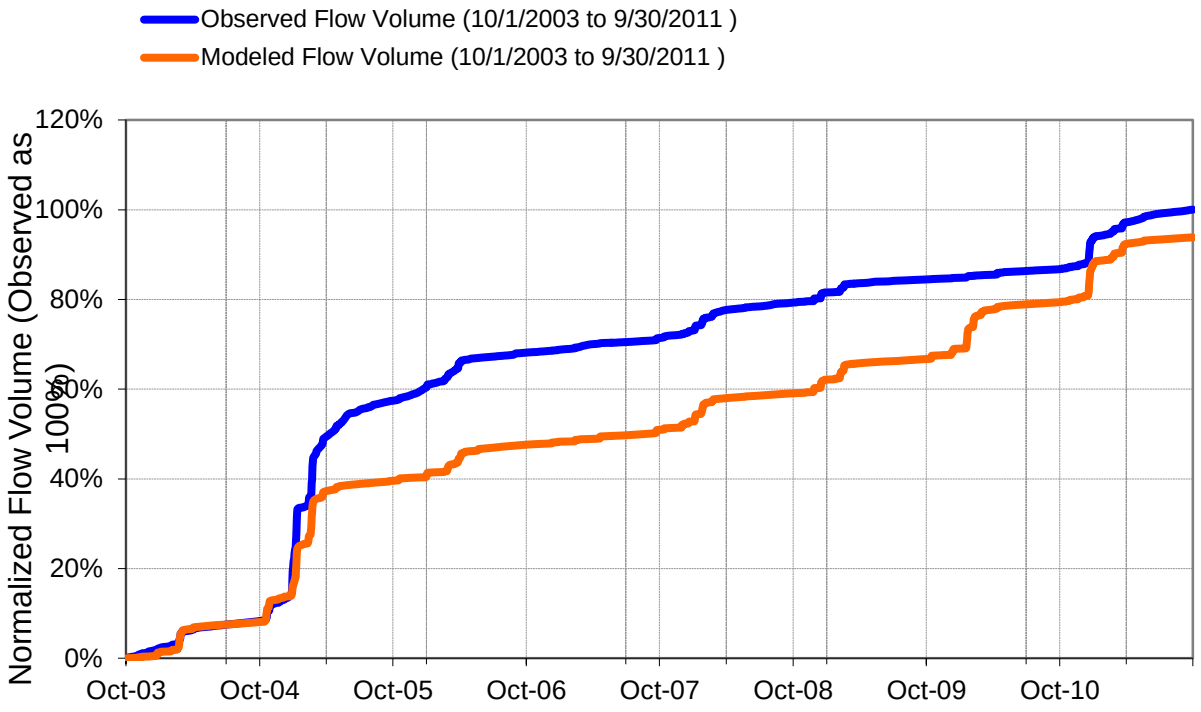

Figure 10. Flow accumulation for USGS 11089200 COYOTE C NR BUENA PARK CA (10/1/2003 – 9/30/2011.

Table 1. Summary of water quality data evaluated for the Lower San Gabriel River

Gage	Constituent	Minimum	Q1	Median	Q3	Maximum
S14	Total Copper (ug/l)	5.0	10.5	13.1	23.9	81.4
S13	Total Copper (ug/l)	0.5	11.8	28.1	48.3	351.0
S14	Total Lead (ug/l)	0.7	1.4	2.9	8.2	56.0
S13	Total Lead (ug/l)	0.2	1.1	10.2	19.2	147.0
S14	TSS (mg/L)	5.0	16.8	38.0	169.8	1258.0
S13	TSS (mg/L)	1.0	48.0	97.0	230.5	1556.0
S14	Total Zinc (ug/l)	19.8	36.6	61.0	86.9	440.0
S13	Total Zinc (ug/l)	1.0	62.0	135.0	241.5	2010.0
S14	Fecal Coliform (MPN/100mL)	20	300	1,300	50,000	16,000,000
S13	FC (MPN/100mL)	20	1,300	16,000	90,000	2,200,000
S14	Total Nitrogen (mg/l)	-	-	-	-	-
S13	Total Nitrogen (mg/l)	-	-	-	-	-
S14	Total Phosphorous (mg/l)	0.05	0.11	0.18	0.41	0.86
S13	Total Phosphorous (mg/l)	-	-	-	-	-

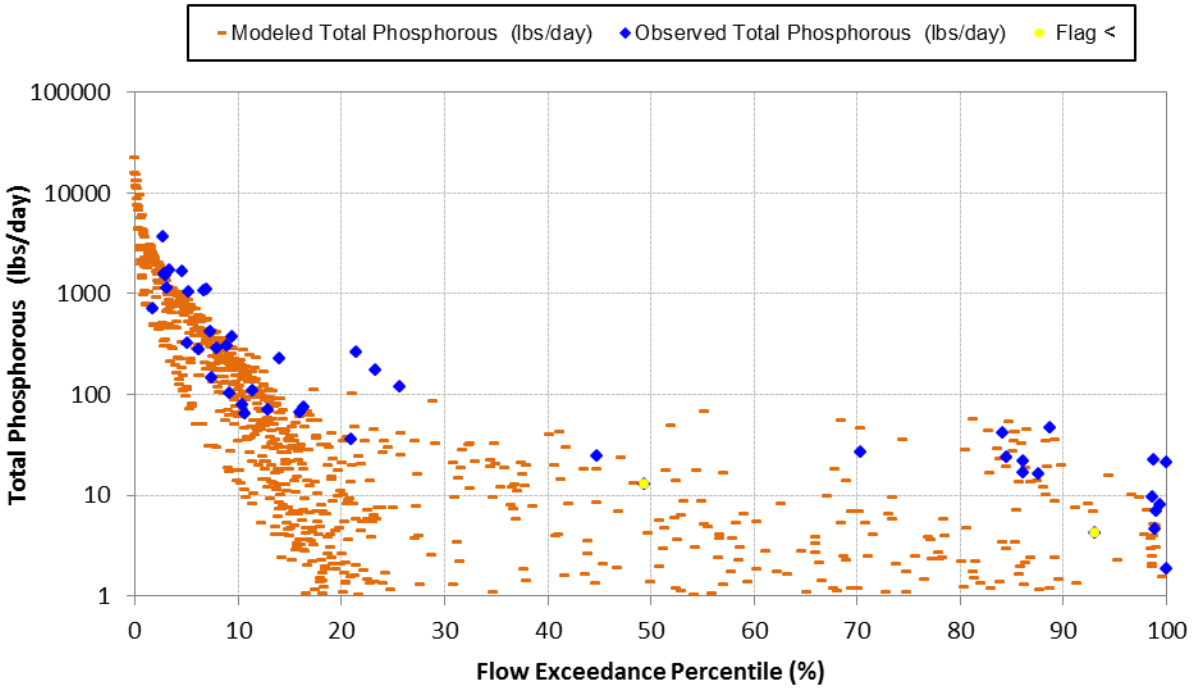

Figure 11. Simulated vs. observed load duration plots for Total Phosphorous (10/1/2002 through 9/30/2011) at San Gabriel River mass emission station S14.

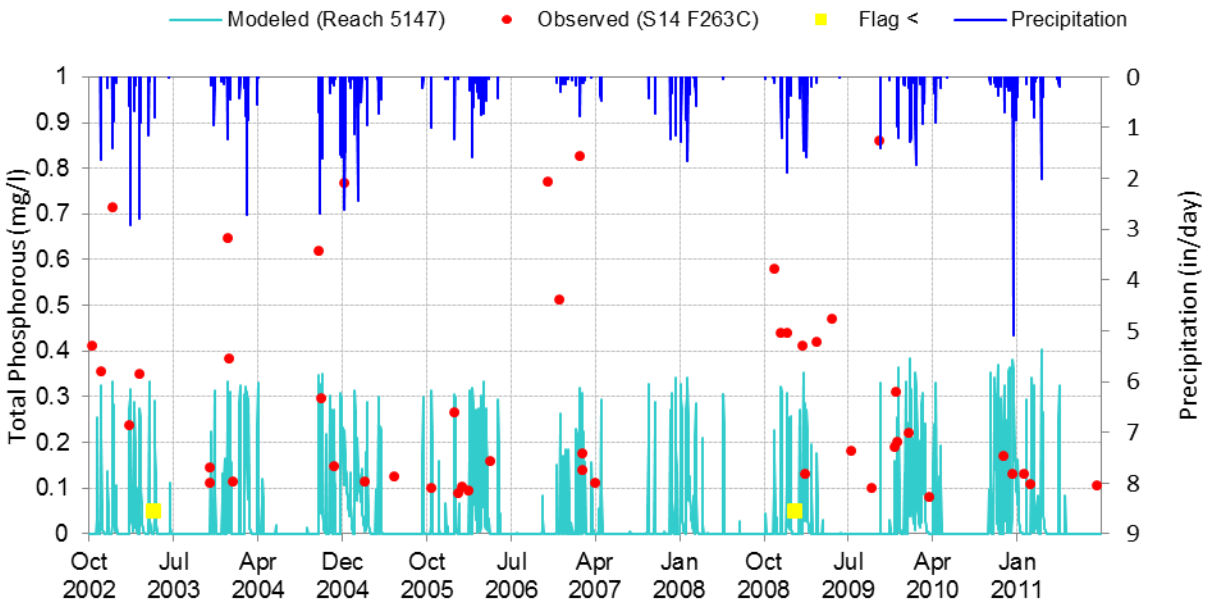

Figure 12. Simulated vs. observed time series plots for Total Phosphorous (10/1/2002 through 9/30/2011) at San Gabriel River mass emission station S14.

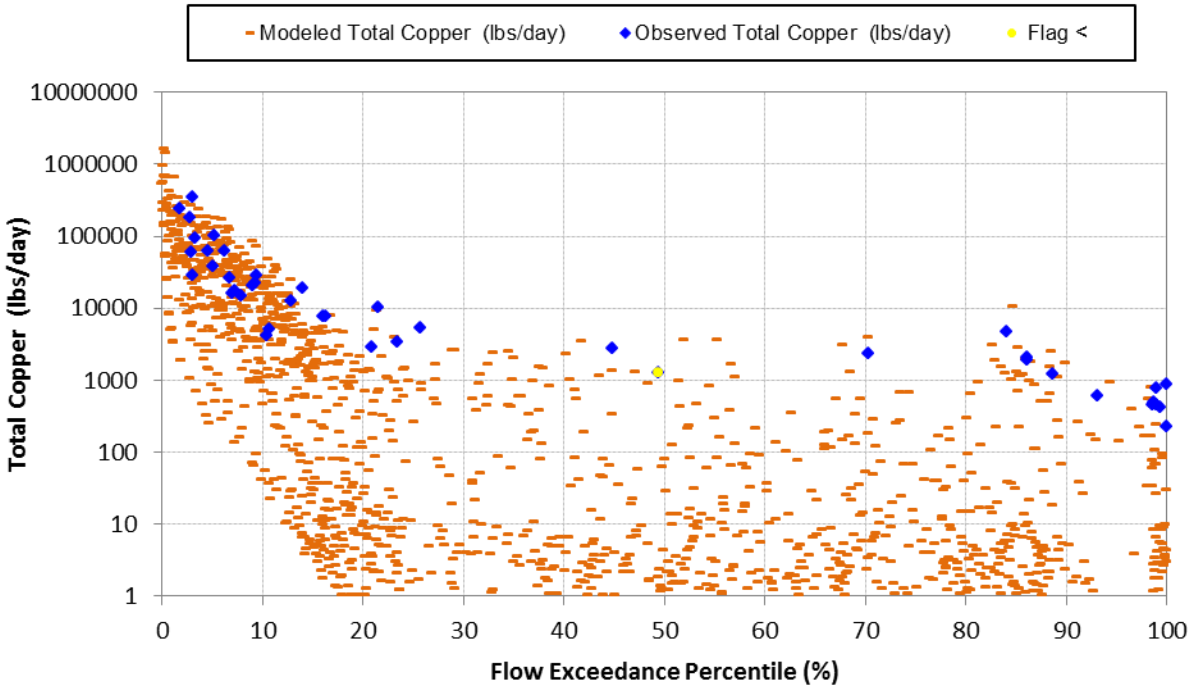

Figure 13. Simulated vs. observed load duration plots for Total Copper (10/1/2002 through 9/30/2011) at San Gabriel River mass emission station S14.

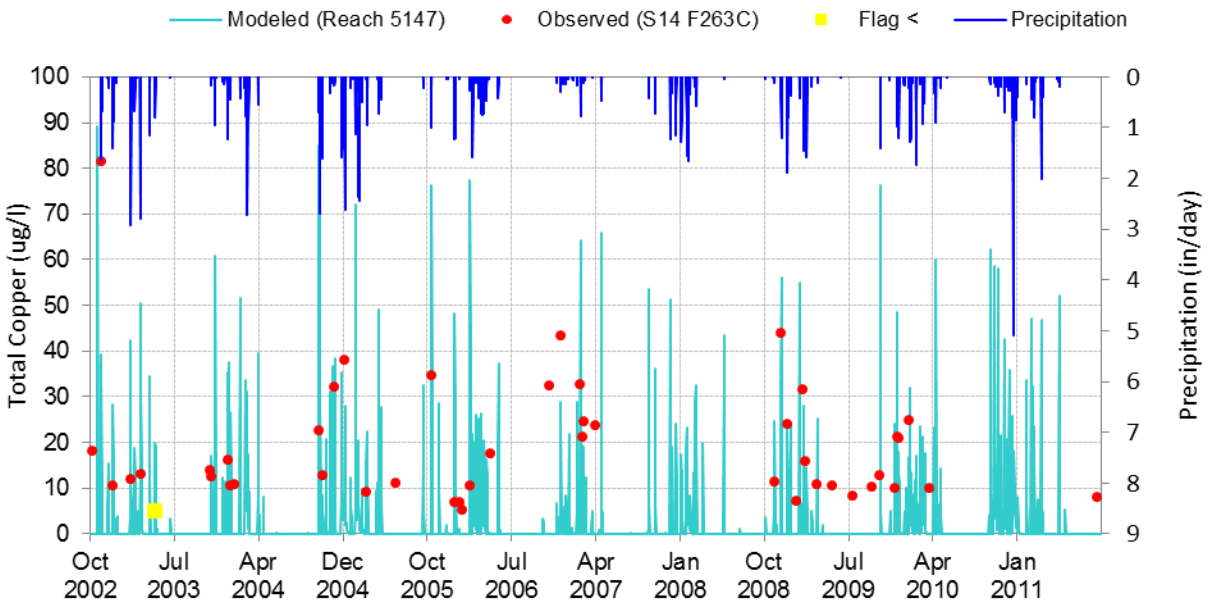

Figure 14. Simulated vs. observed timeseries plots for Total Copper (10/1/2002 through 9/30/2011) at San Gabriel River mass emission station S14.

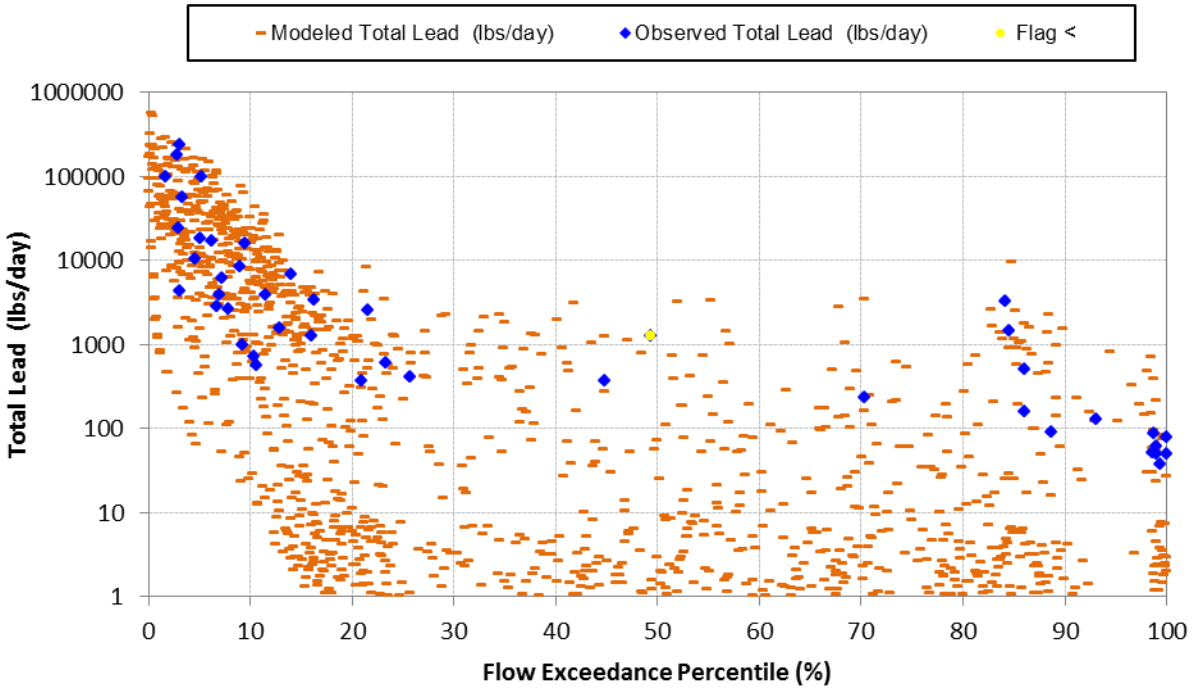

Figure 15. Simulated vs. observed load duration plots for Total Lead (10/1/2002 through 9/30/2011) at San Gabriel River mass emission station S14.

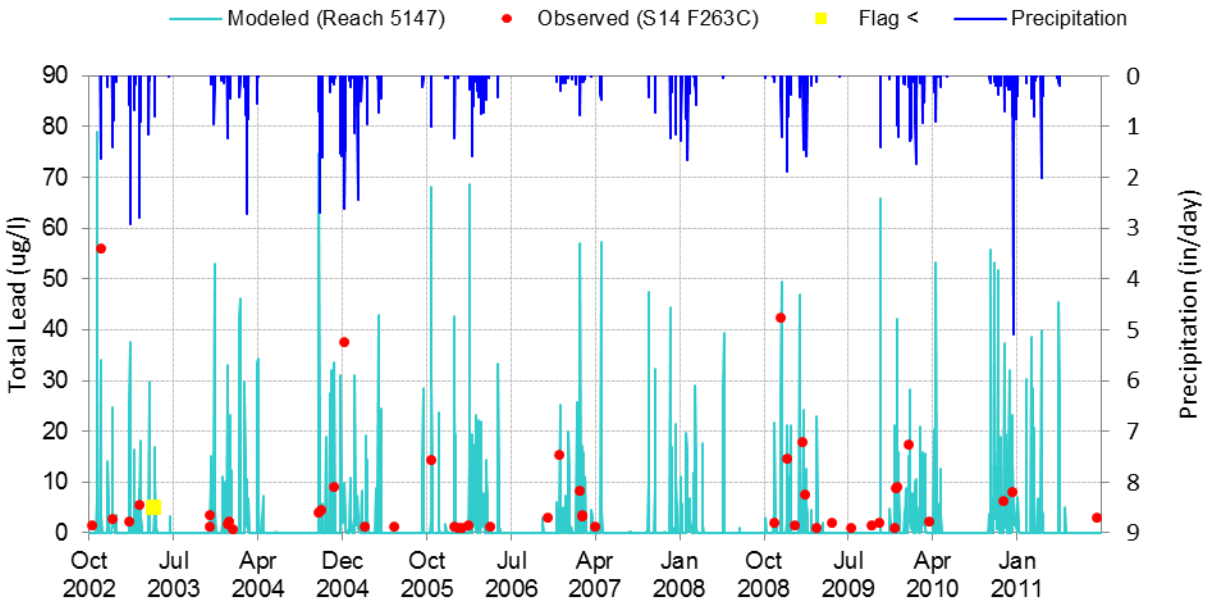

Figure 16. Simulated vs. observed timeseries plots for Total Lead (10/1/2002 through 9/30/2011) at San Gabriel River mass emission station S14.

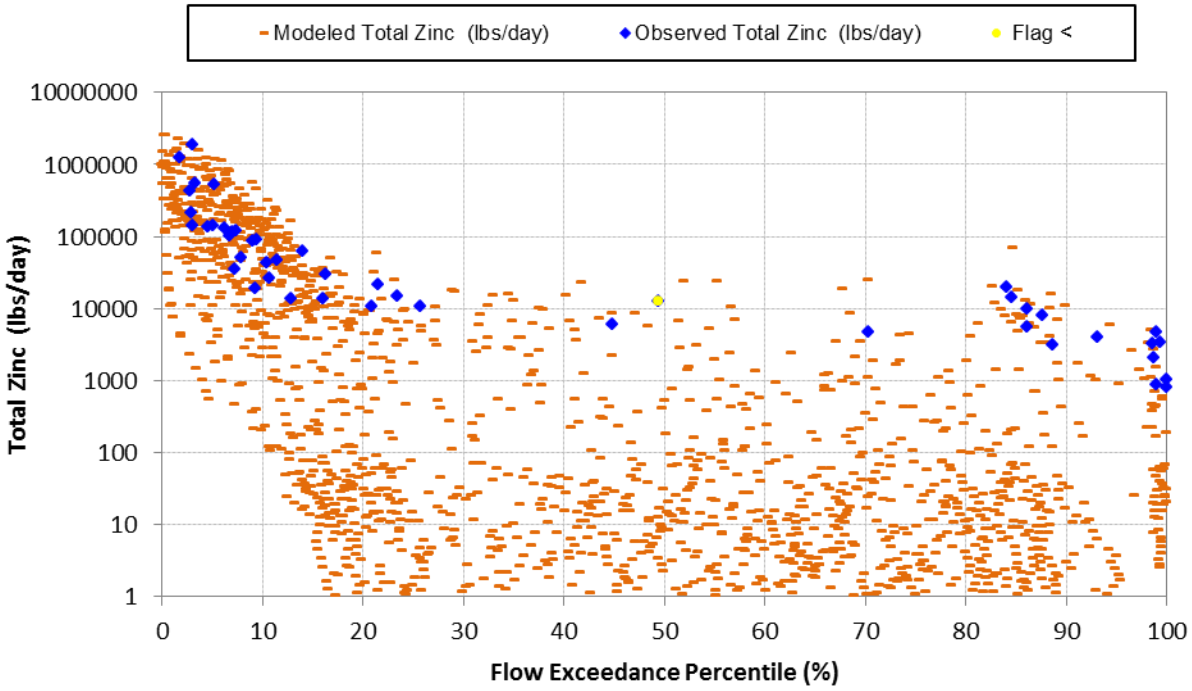

Figure 17. Simulated vs. observed load duration plots for Total Zinc (10/1/2002 through 9/30/2011) at San Gabriel River mass emission station S14.

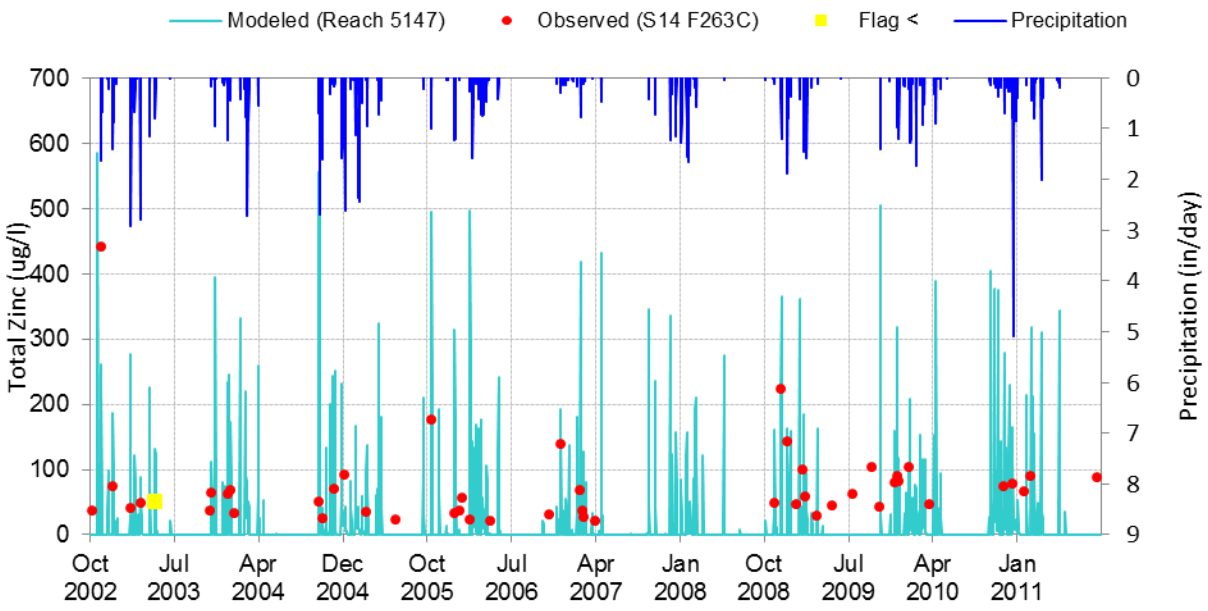

Figure 18. Simulated vs. observed timeseries plots for Total Zinc (10/1/2002 through 9/30/2011) at San Gabriel River mass emission station S14.

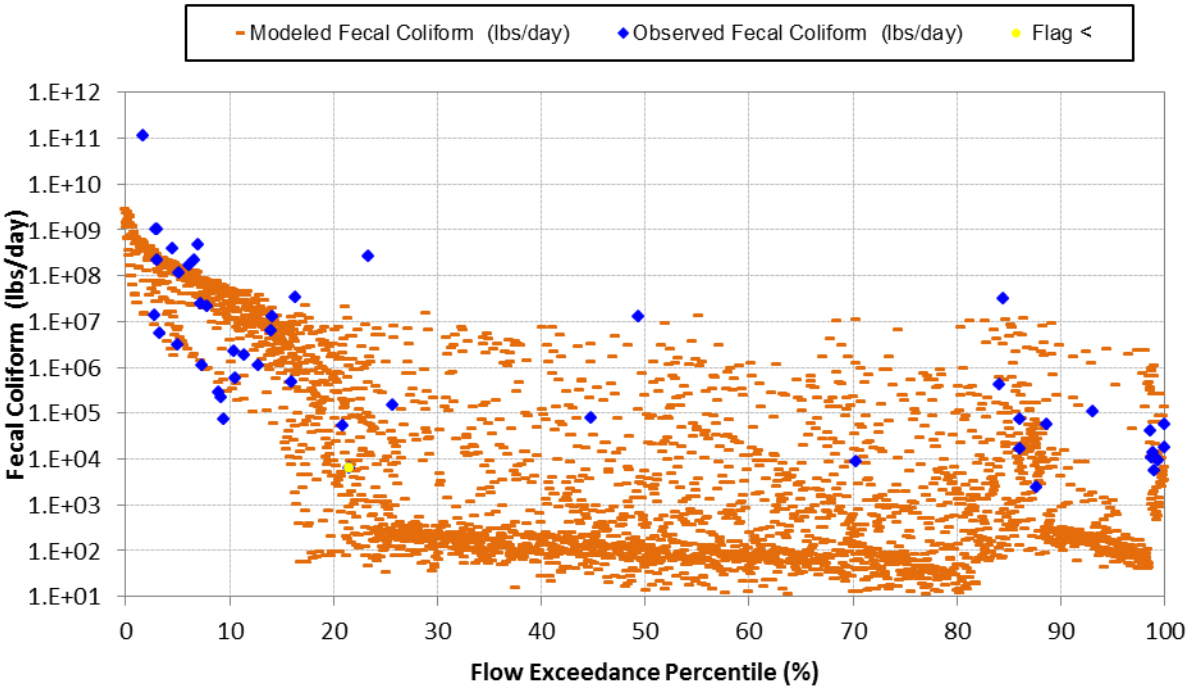

Figure 19. Simulated vs. observed load duration plots for Fecal Coliform (10/1/2002 through 9/30/2011).

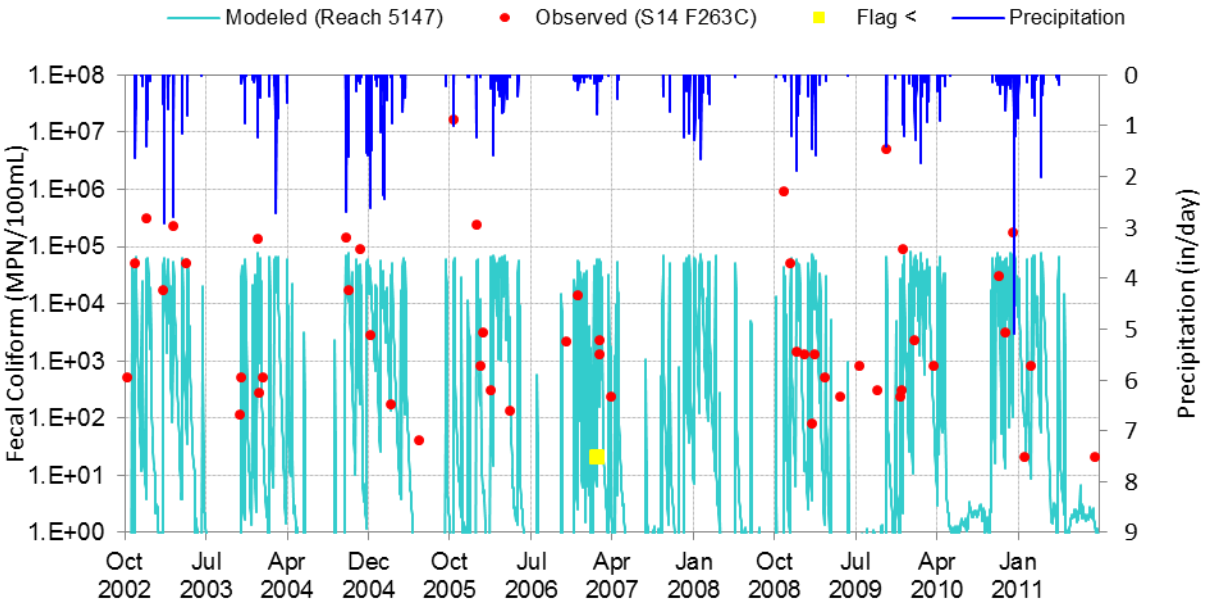

Figure 20. Simulated vs. observed timeseries plots for Fecal Coliform (10/1/2002 through 9/30/2011).

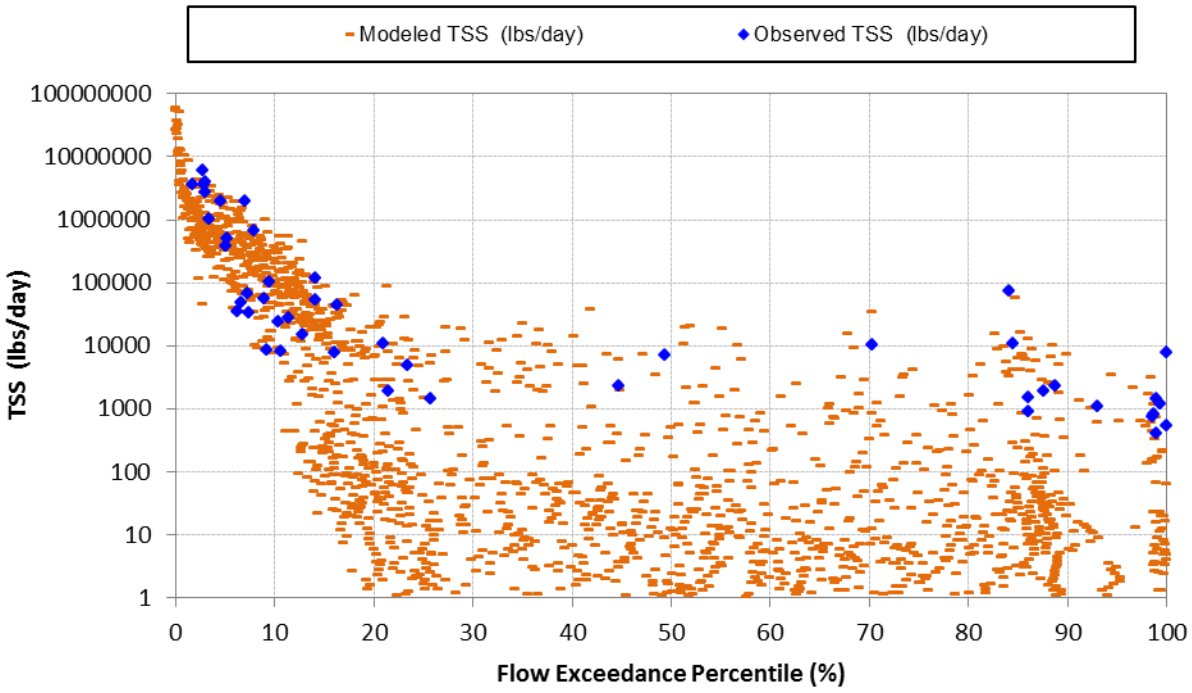

Figure 21. Simulated vs. observed load duration plots for Total Sediment (10/1/2002 through 9/30/2011).

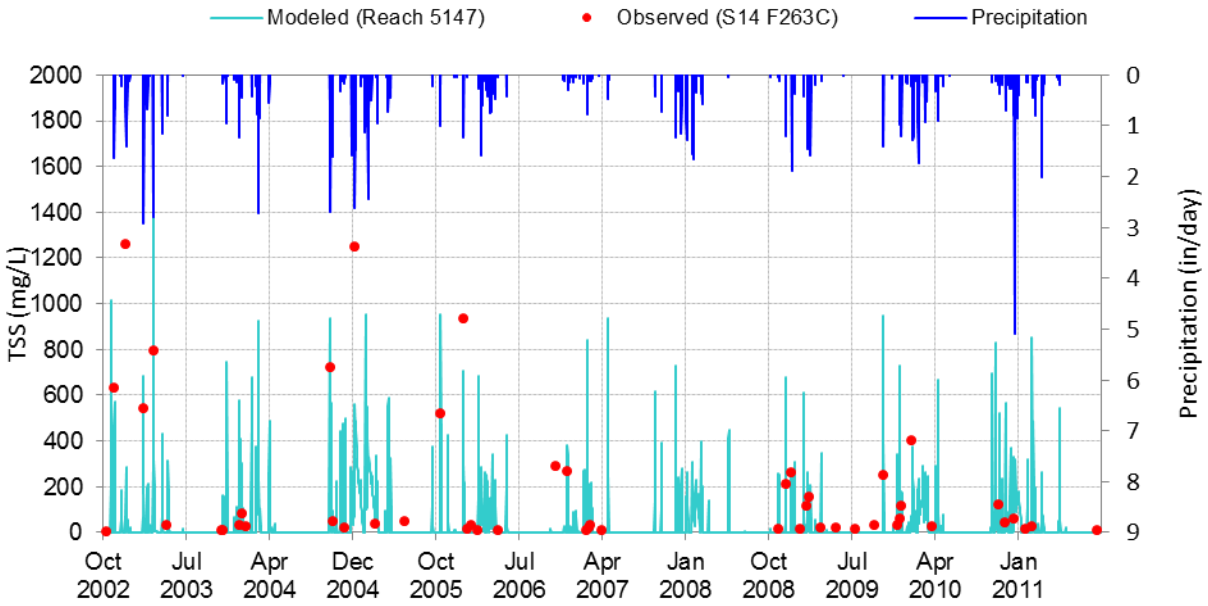

Figure 22. Simulated vs. observed time series plots for Total Sediment (10/1/2002 through 9/30/2011).

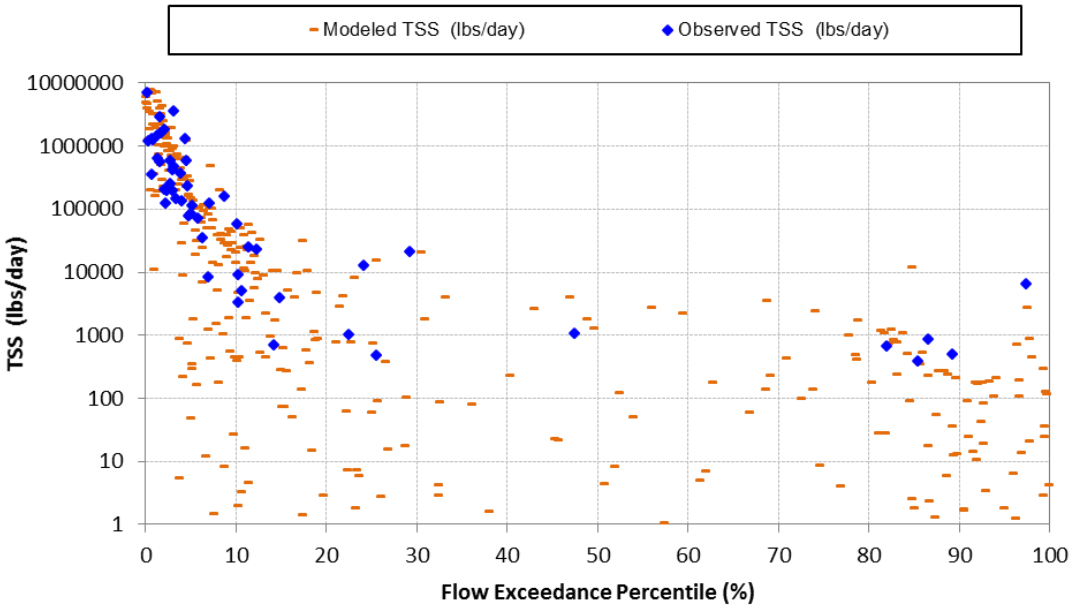

Figure 23. Simulated vs. observed load duration plots for Total Sediment (10/1/2002 through 9/30/2011) at Coyote Creek mass emission station S13.

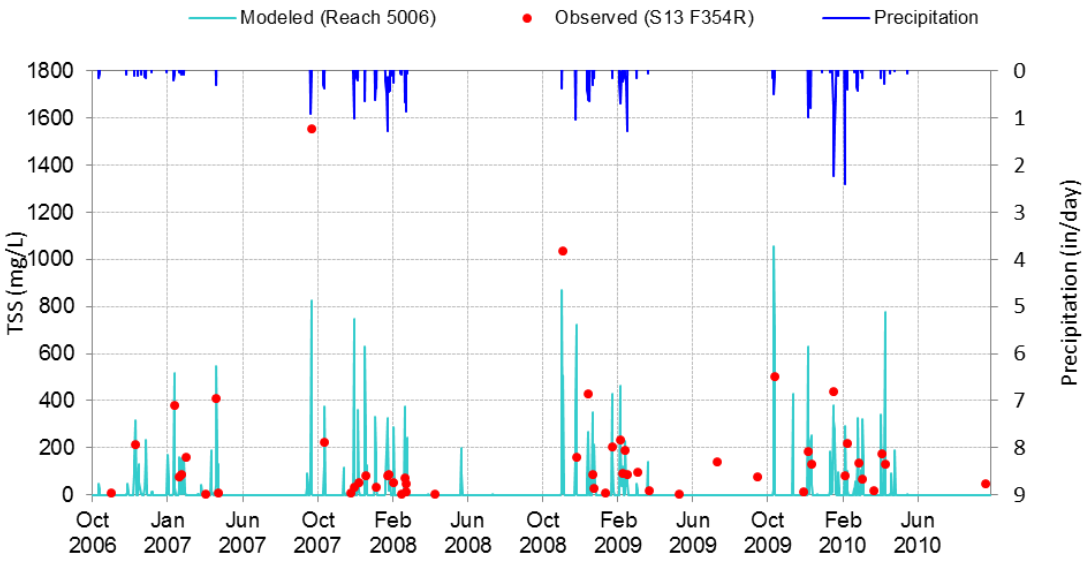

Figure 24. Simulated vs. observed timeseries plots for Total Sediment (10/1/2006 through 9/30/2010) at Coyote Creek mass emission station S13.

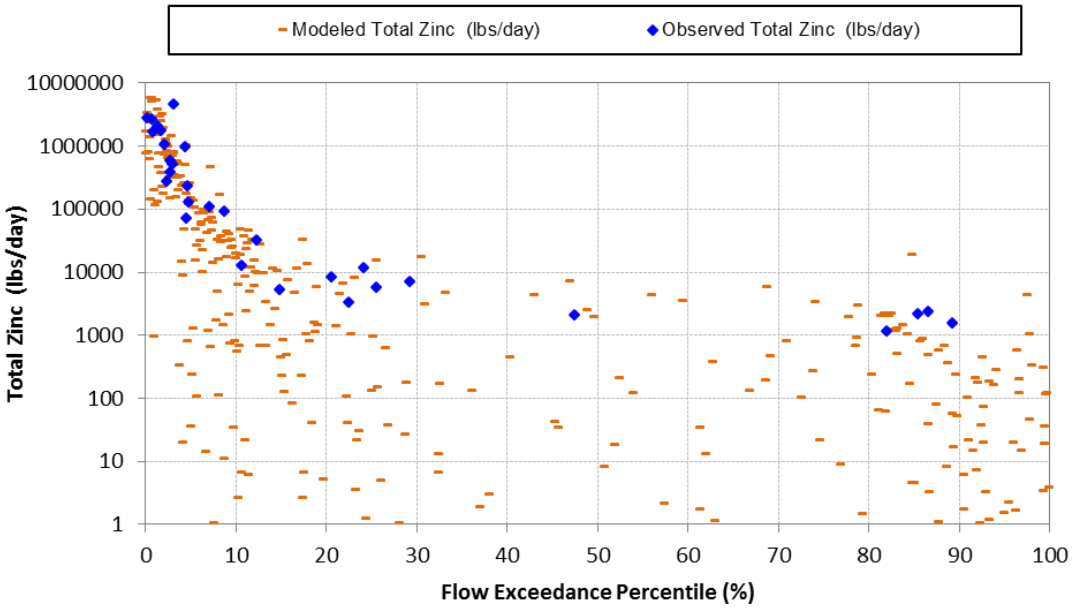

Figure 25. Simulated vs. observed load duration plots for Total Zinc (10/1/2006 through 9/30/2010) at Coyote Creek mass emission station S13.

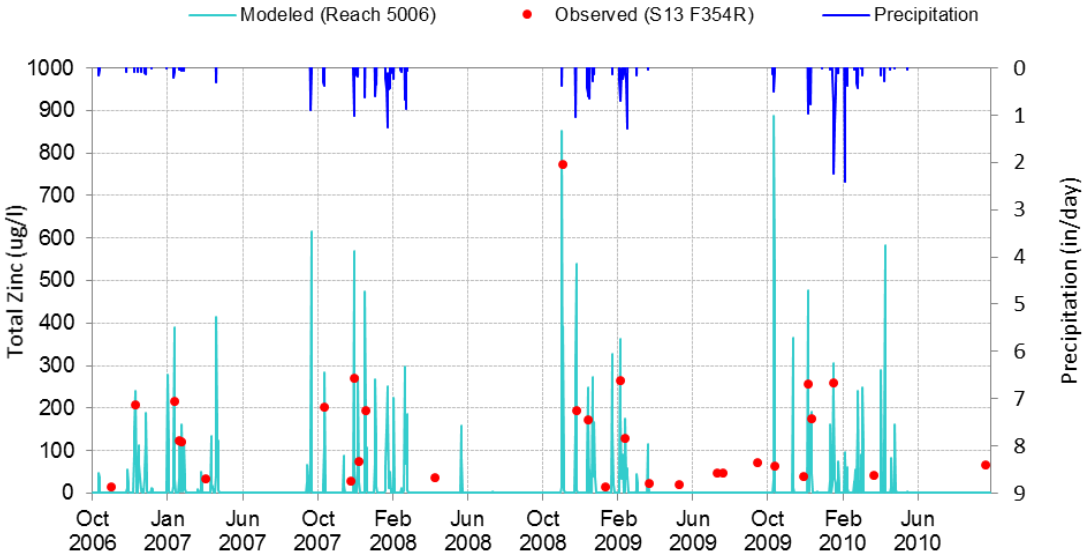

Figure 26. Simulated vs. observed timeseries plots for Total Zinc (10/1/2006 through 9/30/2010) at Coyote Creek mass emission station S13.

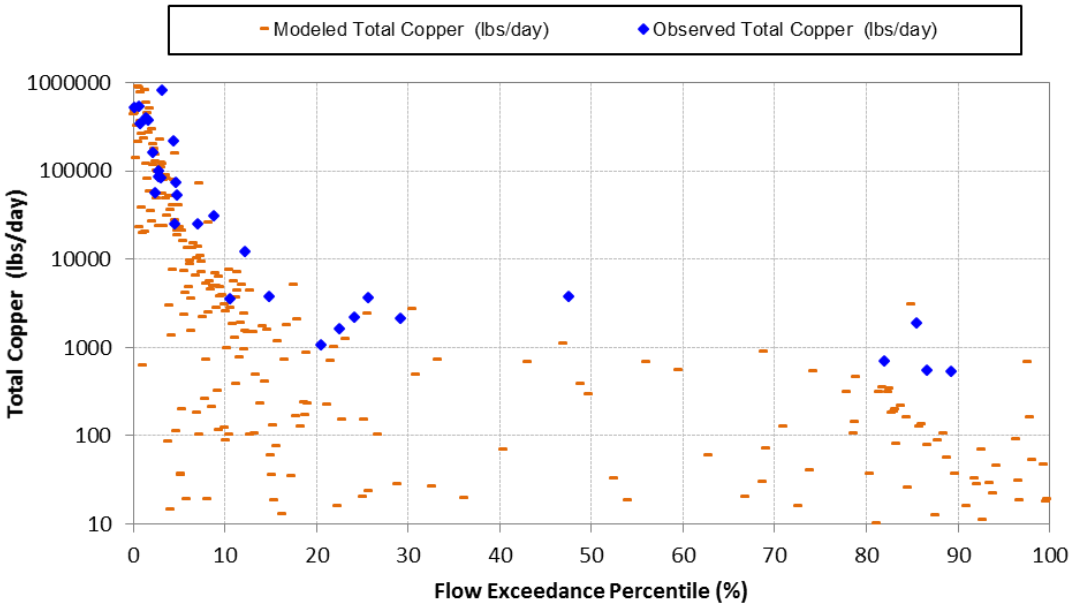

Figure 27. Simulated vs. observed load duration plots for Total Copper (10/1/2006 through 9/30/2010) at Coyote Creek mass emission station S13.

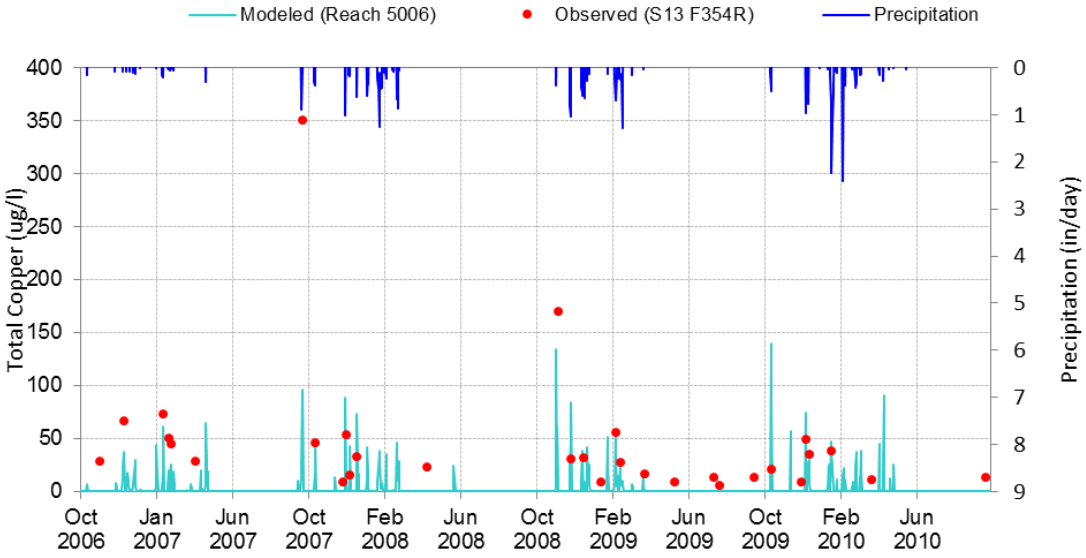

Figure 28. Simulated vs. observed timeseries plots for Total Copper (10/1/2006 through 9/30/2010) at Coyote Creek mass emission station S13.

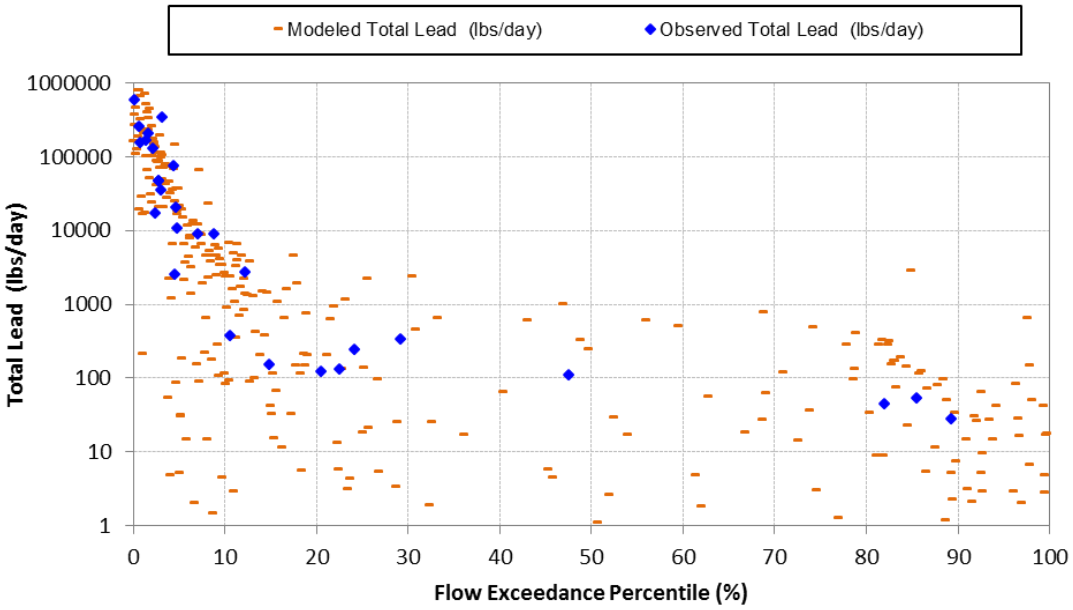

Figure 29 Simulated vs. observed load duration plots for Total Lead (10/1/2006 through 9/30/2010) at Coyote Creek mass emission station S13.

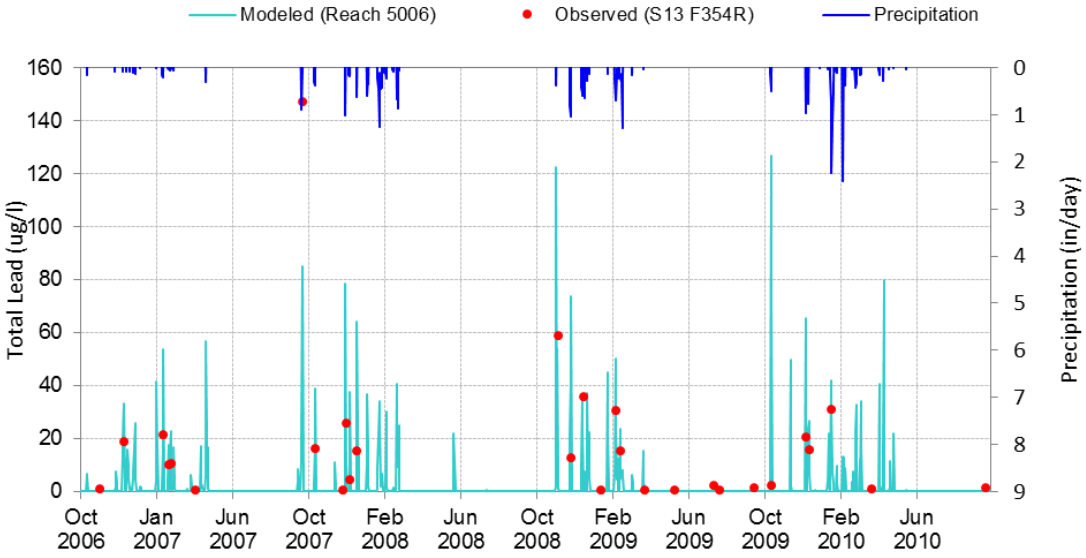

Figure 30. Simulated vs. observed timeseries plots for Total Lead (10/1/2006 through 9/30/2010) at Coyote Creek mass emission station S13.

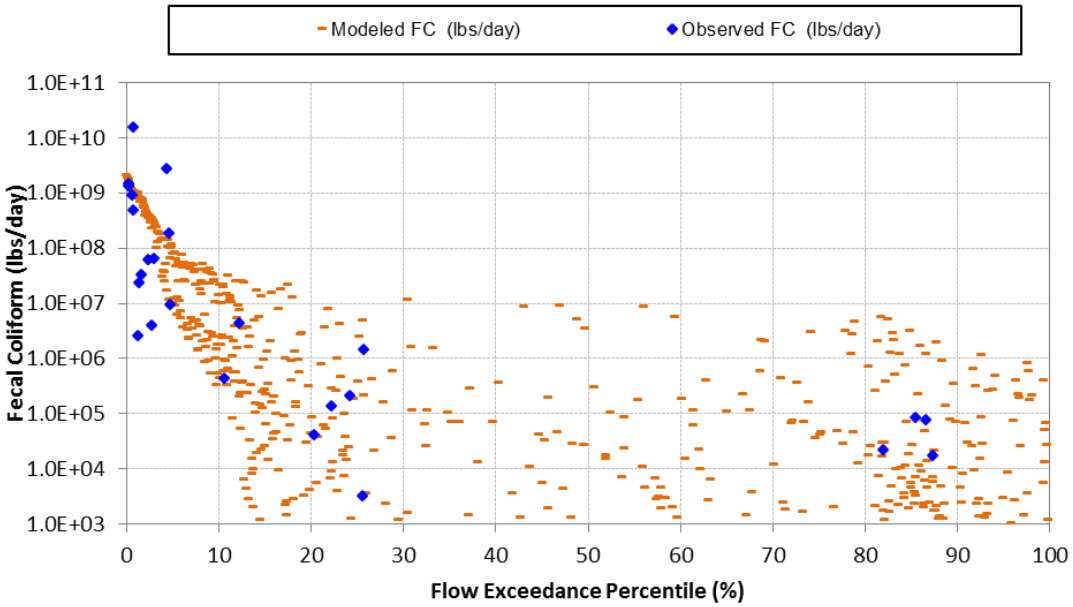

Figure 31. Simulated vs. observed load duration plots for Fecal Coliform (10/1/2006 through 9/30/2010) at Coyote Creek mass emission station S13.

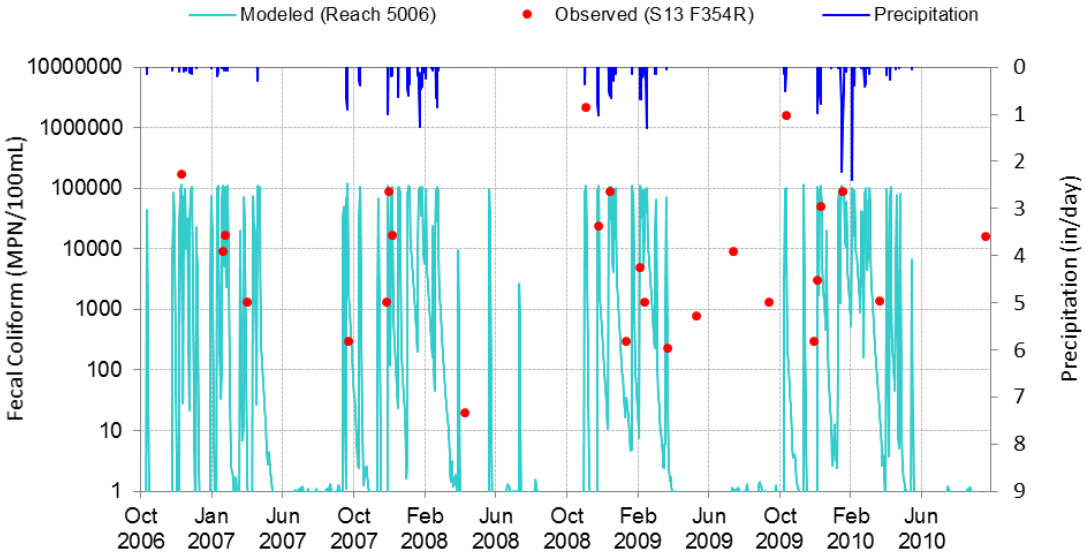

Figure 32. Simulated vs. observed timeseries plots for Fecal Coliform (10/1/2006 through 9/30/2010) at Coyote Creek mass emission station S13.

2. Lower Los Angeles River

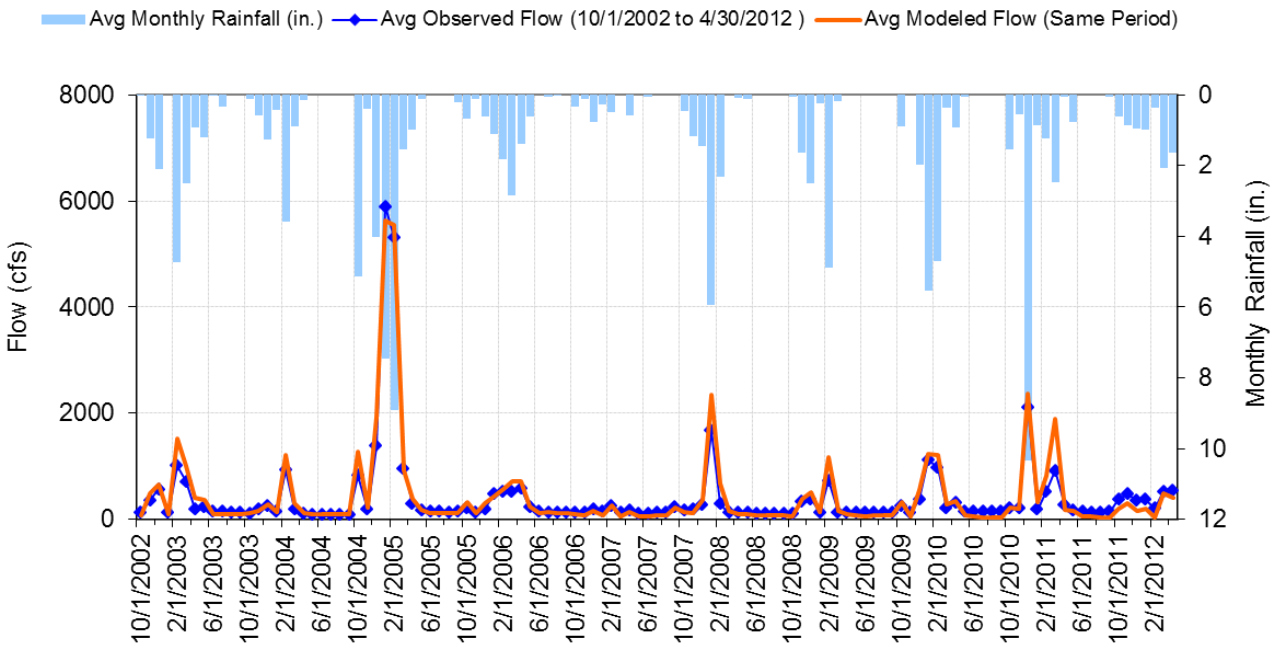

Figure 33. Monthly hydrograph for LA DPW Los Angeles River below Wardlow Road (10/1/2002 – 9/30/2011).

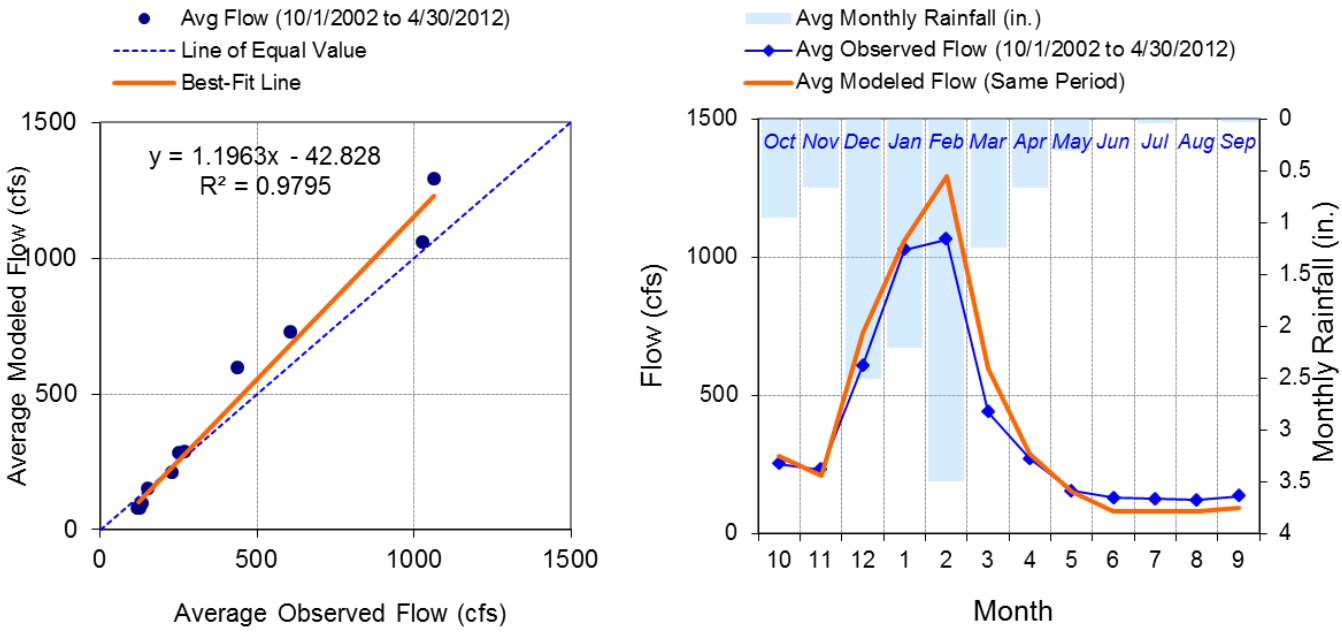

Figure 34. Aggregated monthly hydrograph for LA DPW Los Angeles River below Wardlow Road (10/1/2002 – 9/30/2011).

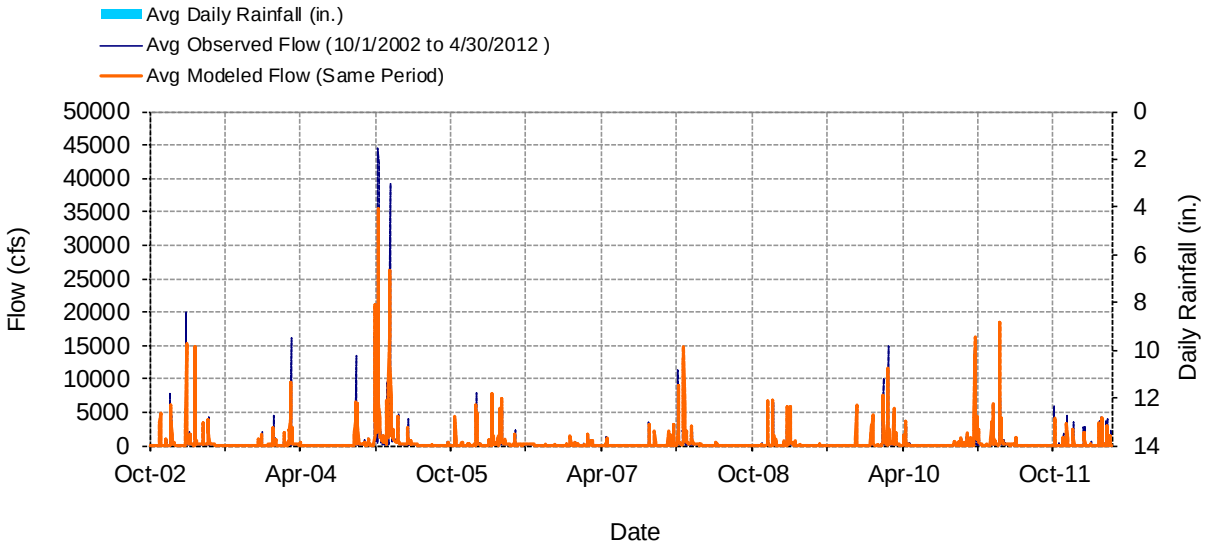

Figure 35. Mean daily flow for LA DPW Los Angeles River below Wardlow Road (10/1/2002 – 9/30/2011).

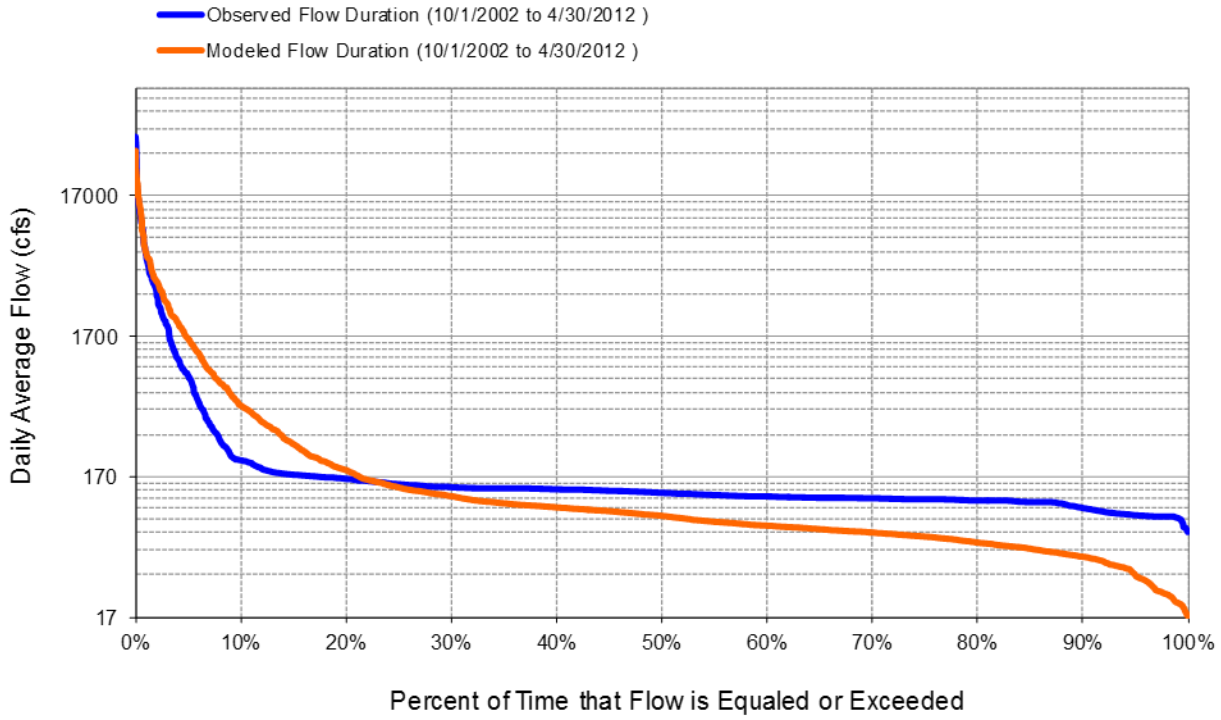

Figure 36. Daily flow exceedance for LA DPW Los Angeles River below Wardlow Road (10/1/2002 – 9/30/2011).

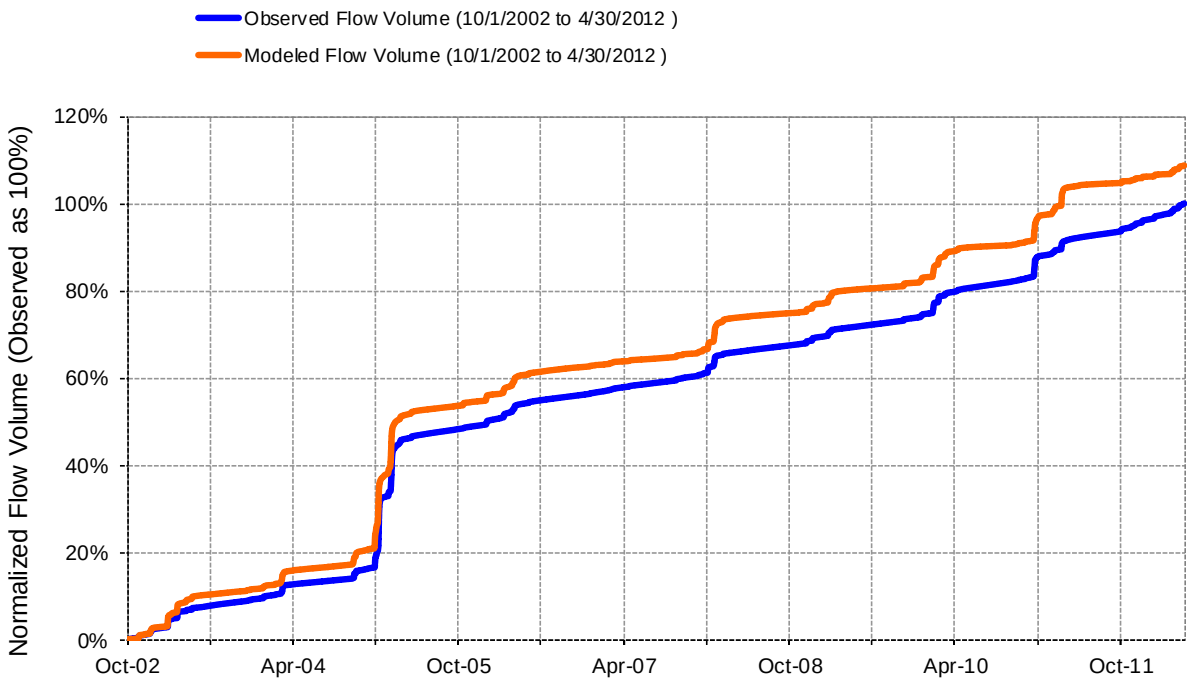

Figure 37. Flow accumulation for LA DPW Los Angeles River below Wardlow Road (10/1/2002 – 9/30/2011).

Table 2. Summary of water quality data evaluated for the Lower Los Angeles River

Gage	Constituent	Minimum	Q1	Median	Q3	Maximum
S10	Total Copper (ug/l)	0.5	12.975	25.8	49.55	424
S10	Total Lead (ug/l)	0.2	2.45	15.6	35.775	1070
S10	TSS (mg/L)	1	63	142.5	295	2280
S10	Total Zinc (ug/l)	22.3	63.85	124	261.75	2590
S10	Fecal Coliform (MPN/100mL)	20	500	24000	240000	24000000
S10	Total Nitrogen (mg/l)	0.03	0.60245	1.064	1.725	6.75
S10	Total Phosphorous (mg/l)	0.05	0.24	0.3785	0.538	8.24

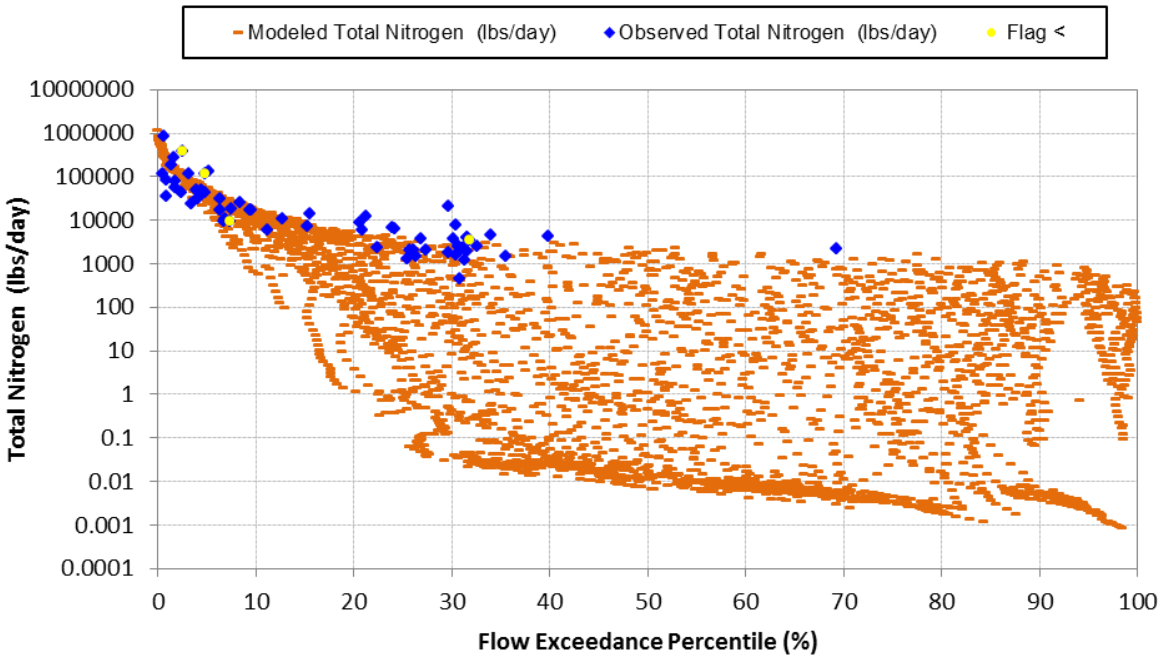

Figure 38. Simulated vs. observed time series plots for Total Nitrogen (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

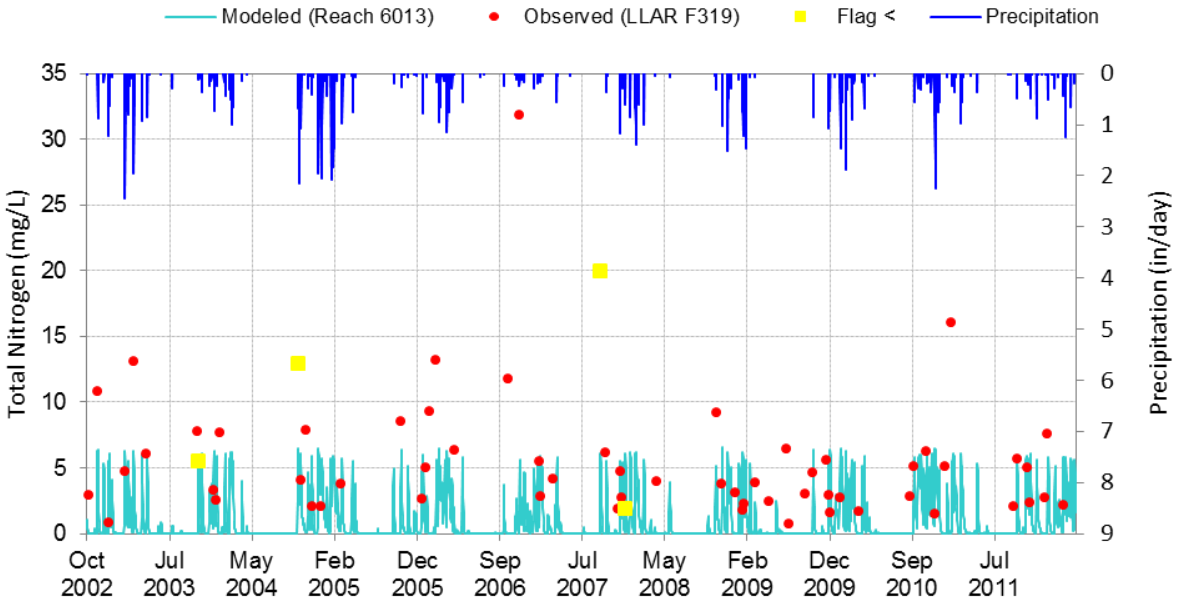

Figure 39. Simulated vs. observed time series plots for Total Nitrogen (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

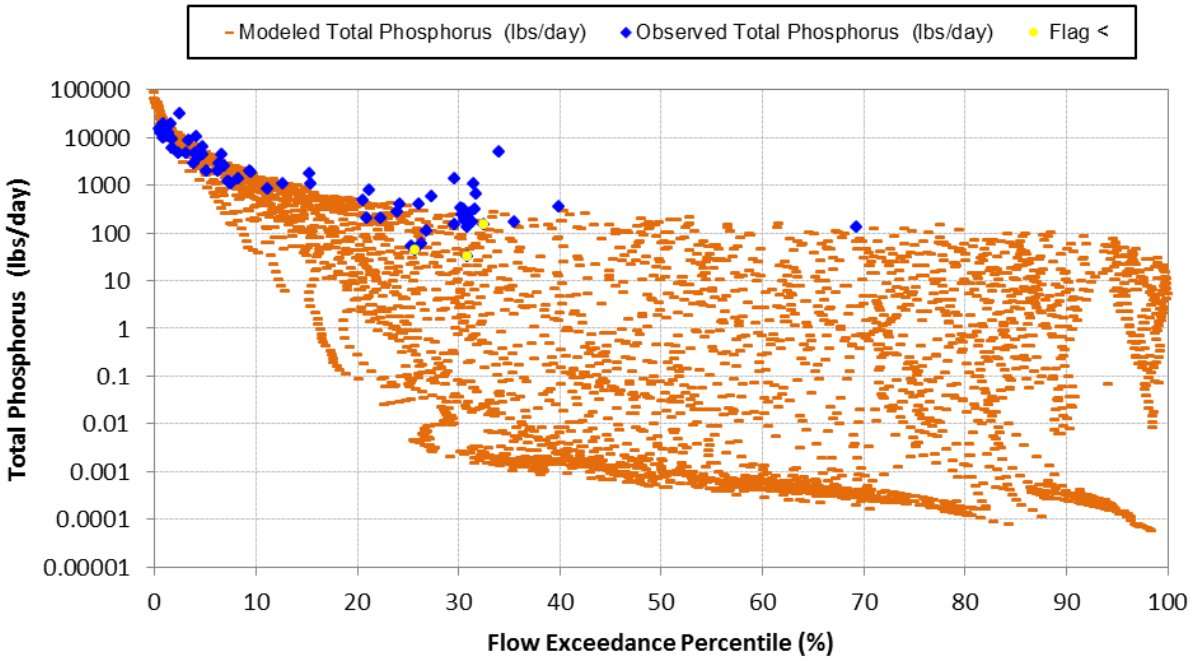

Figure 40. Simulated vs. observed load duration plots for Total Phosphorous (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

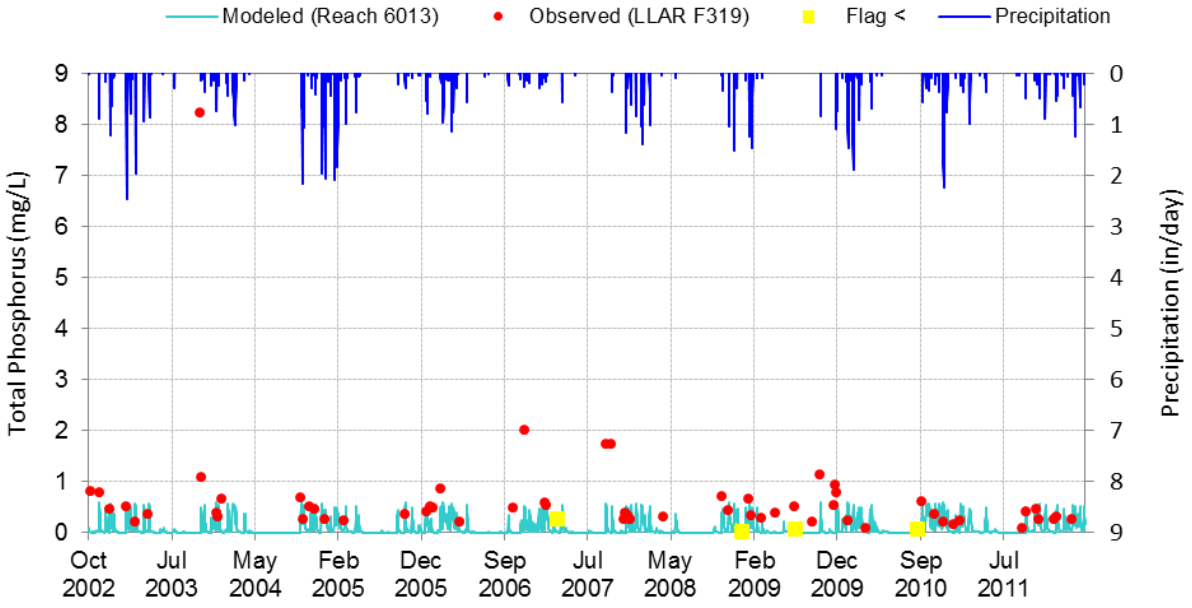

Figure 41. Simulated vs. observed time series plots for Total Phosphorous (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

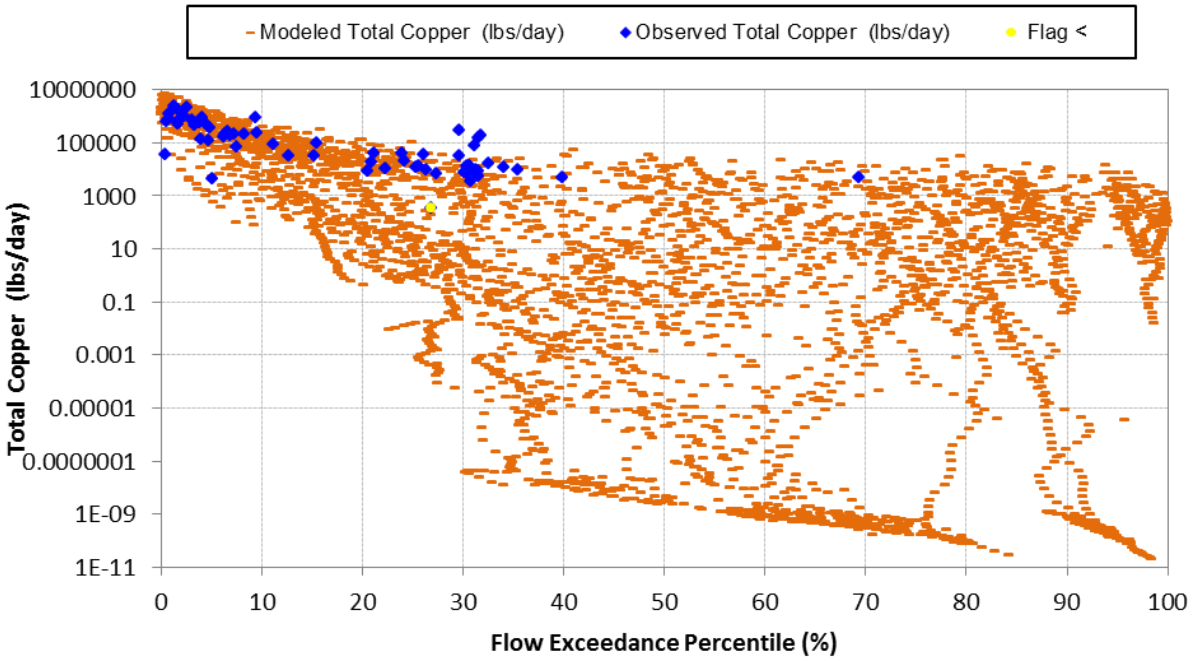

Figure 42. Simulated vs. observed load duration plots for Total Copper (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

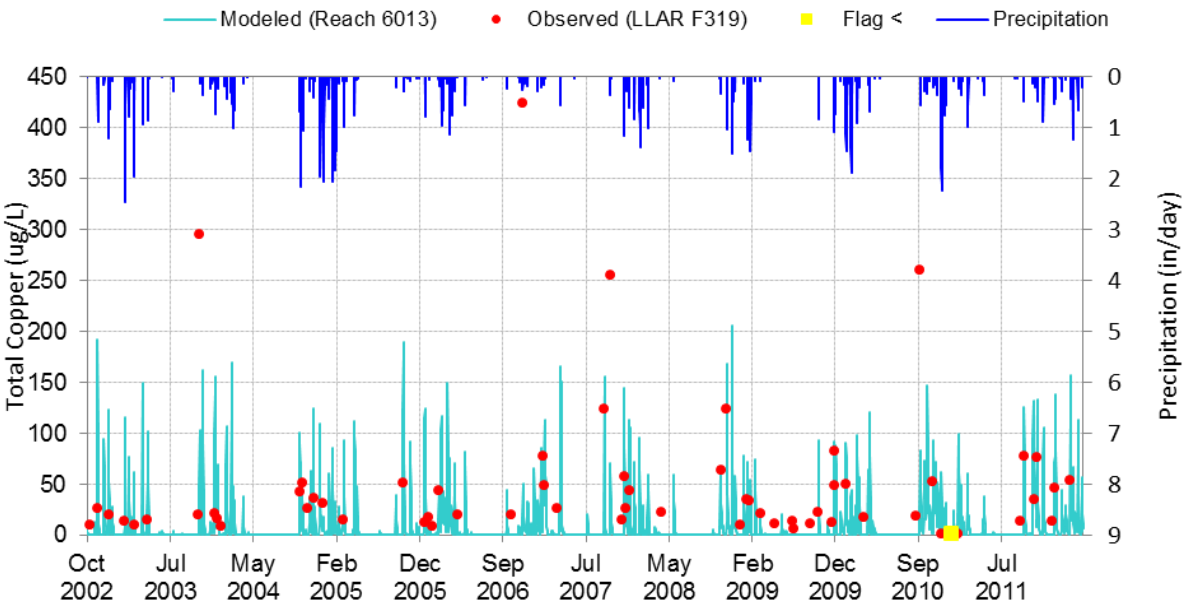

Figure 43. Simulated vs. observed timeseries plots for Total Copper (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

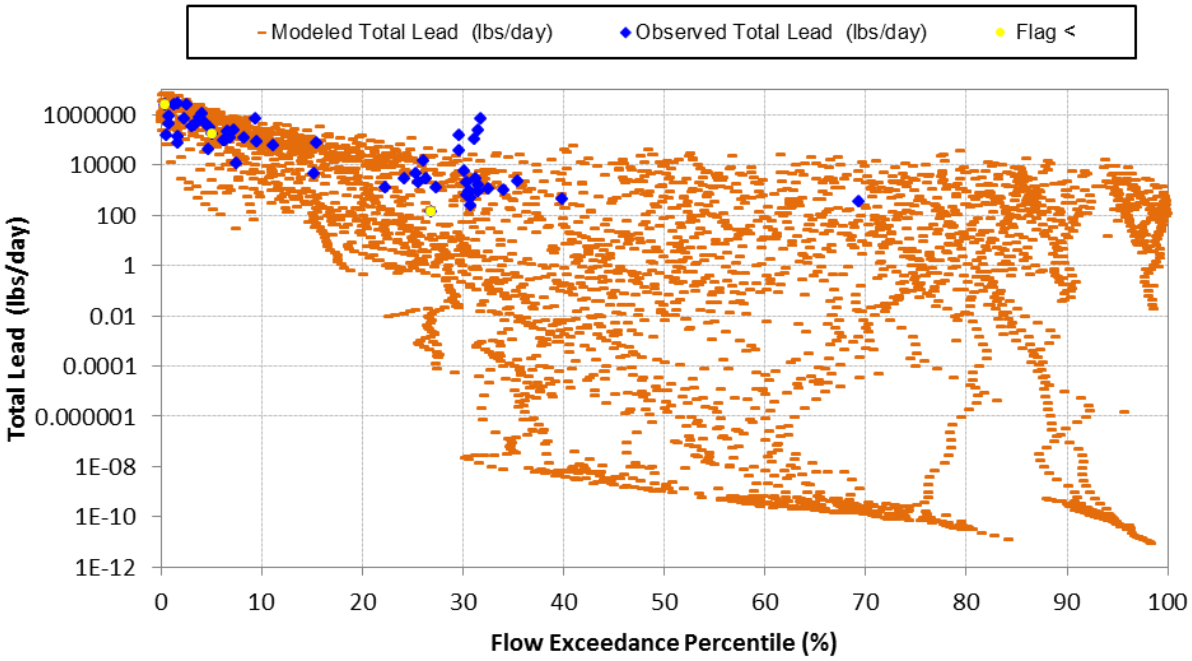

Figure 44. Simulated vs. observed load duration plots for Total Lead (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

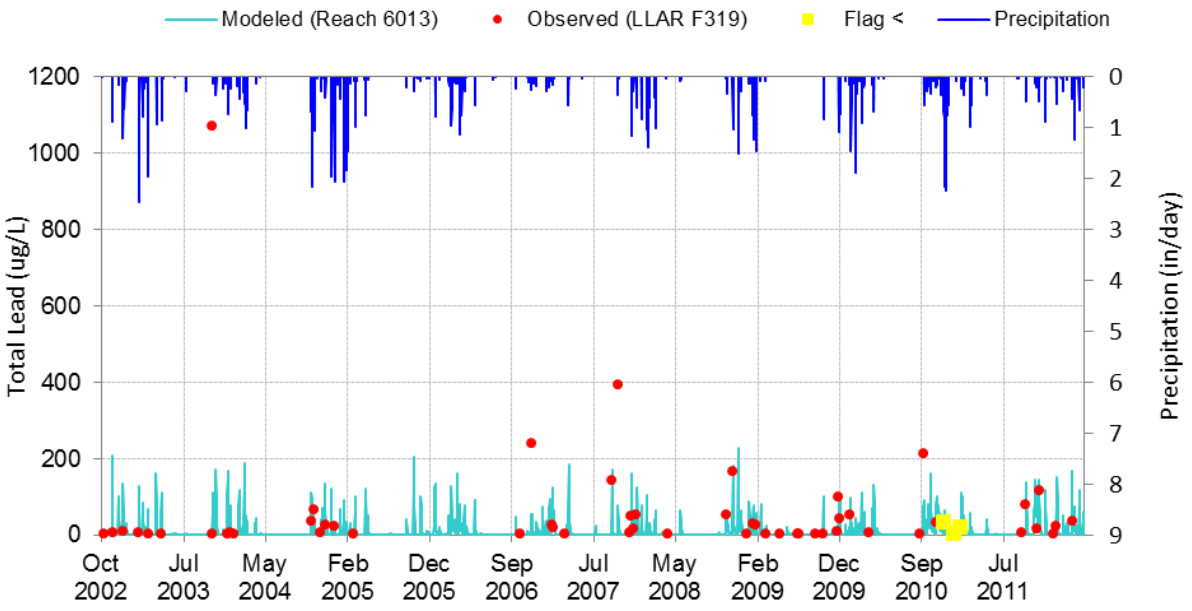

Figure 45. Simulated vs. observed timeseries plots for Total Lead (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

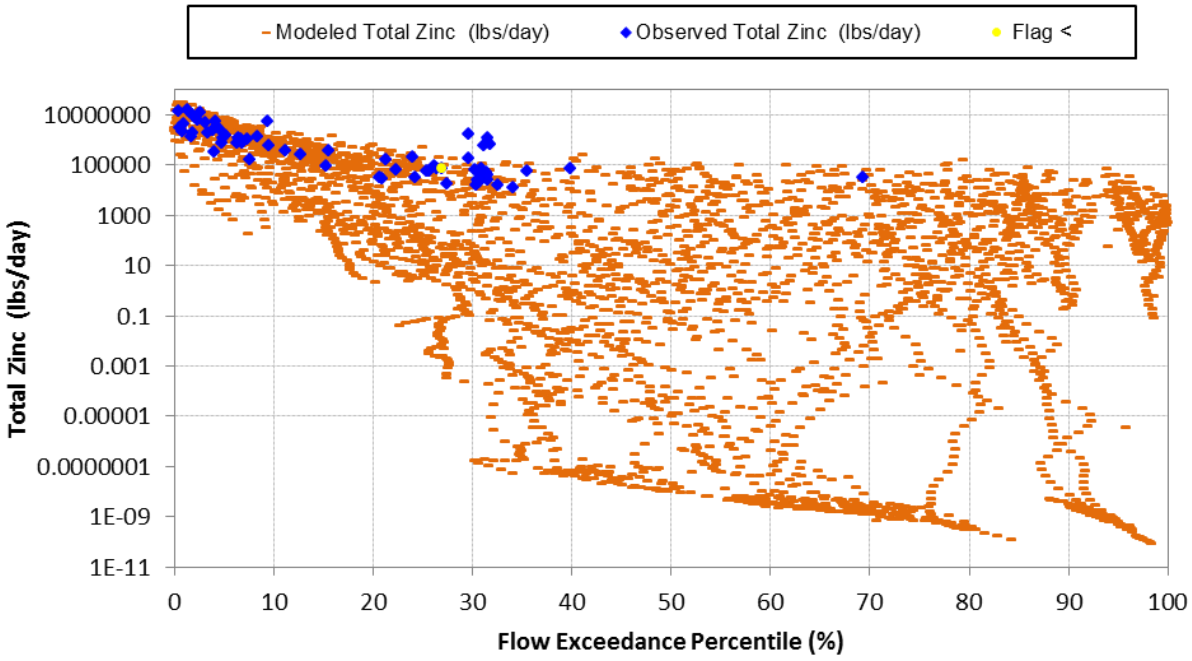

Figure 46. Simulated vs. observed load duration plots for Total Zinc (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

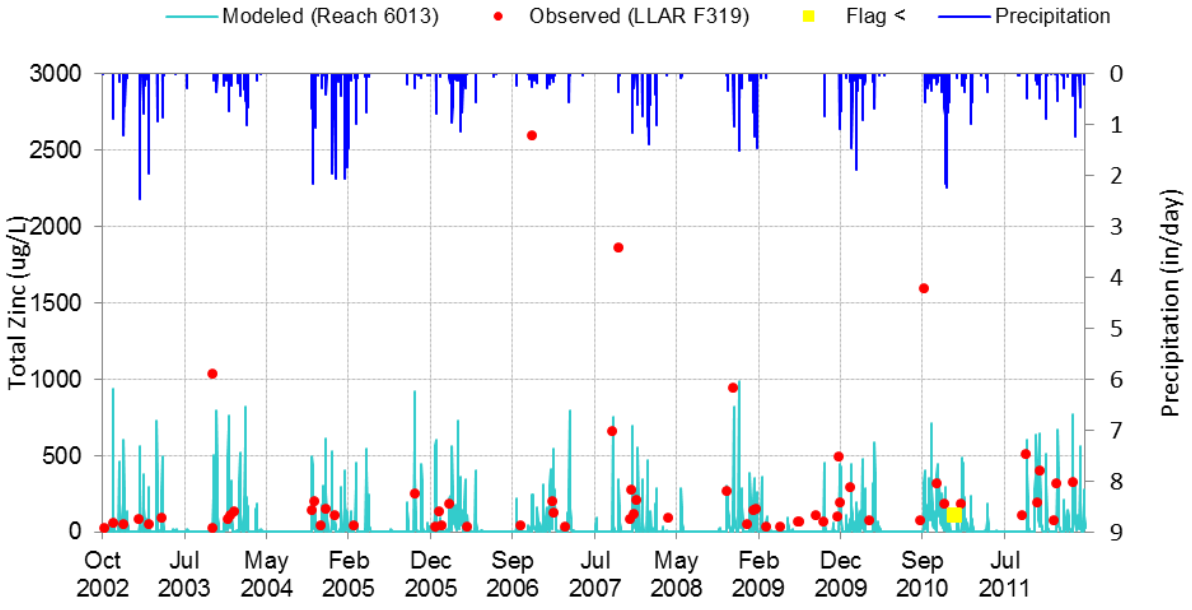

Figure 47. Simulated vs. observed timeseries plots for Total Zinc (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

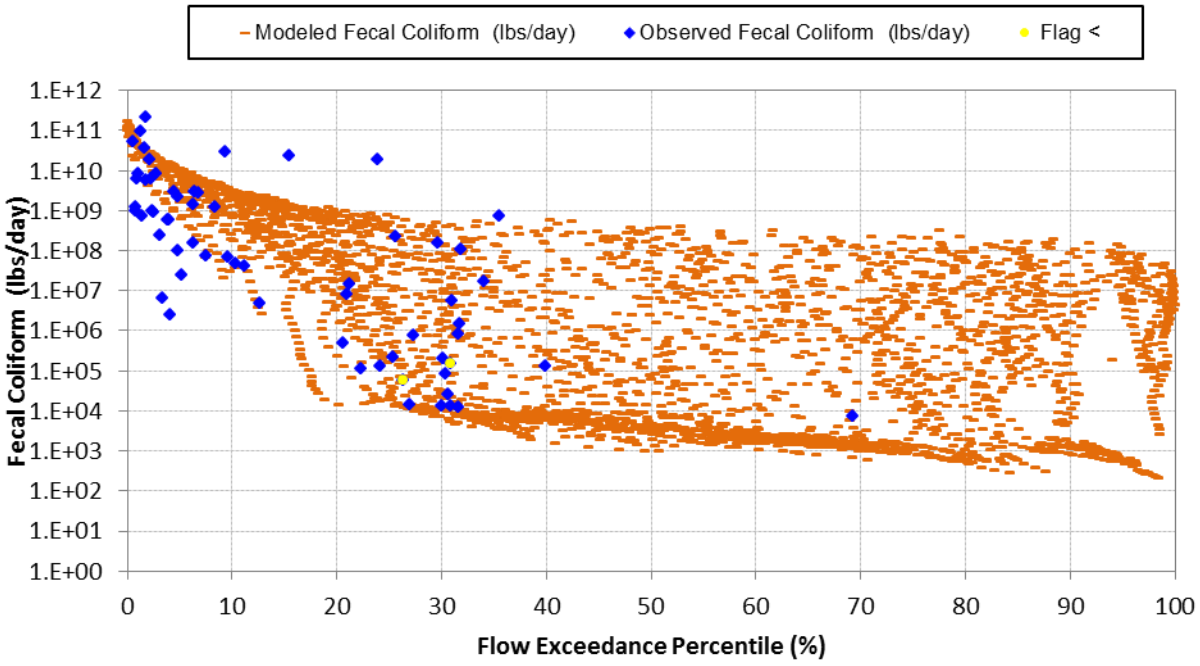

Figure 48. Simulated vs. observed load duration plots for Fecal Coliform (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

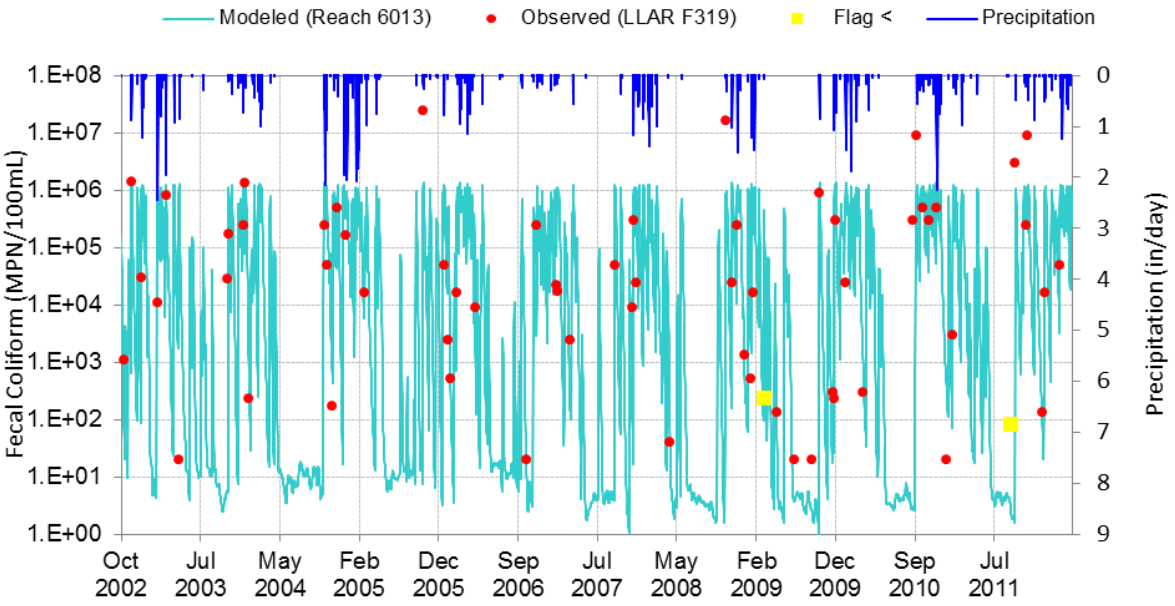

Figure 49. Simulated vs. observed timeseries plots for Fecal Coliform (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

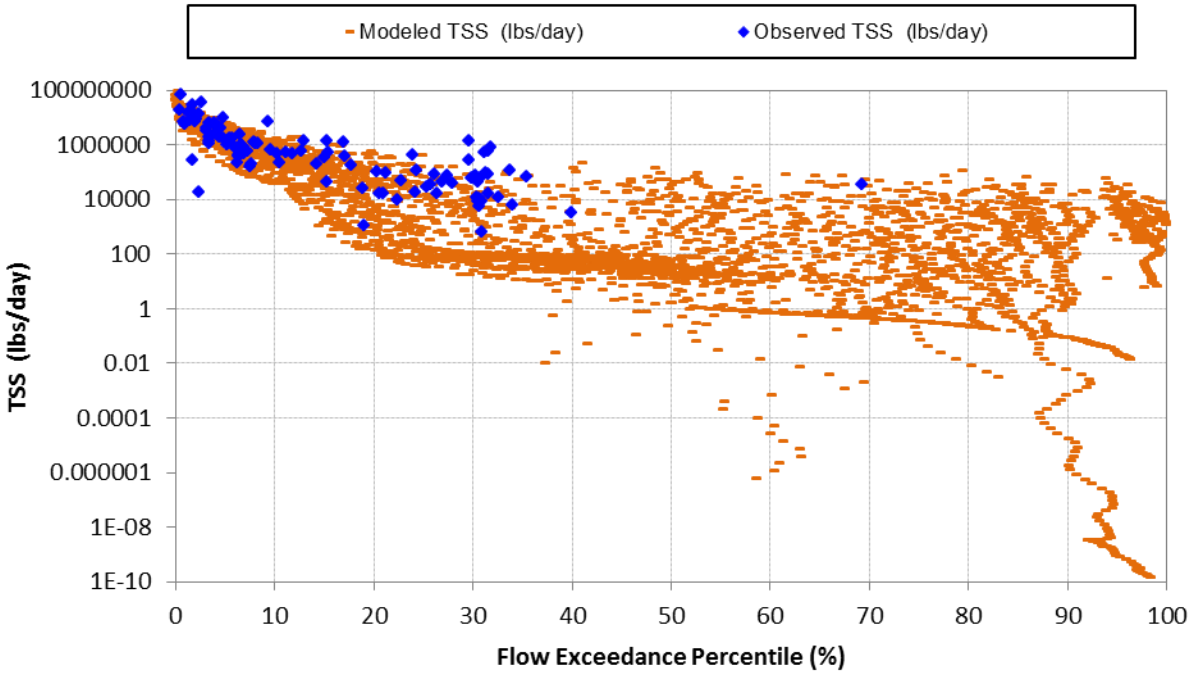

Figure 50. Simulated vs. observed load duration plots for Total Sediment (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

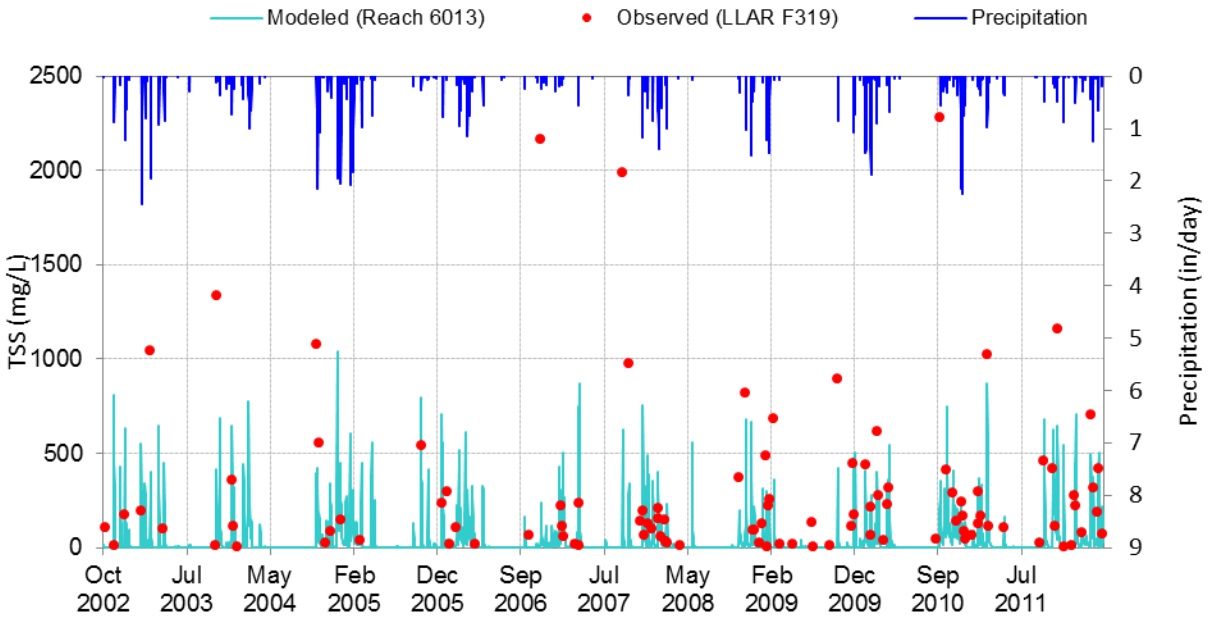

Figure 51. Simulated vs. observed time series plots for Total Sediment (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

3. Los Cerritos Channel

Table 3. Summary of water quality data evaluated for Los Cerritos Channel

Gage	Constituent	Minimum	Q1	Median	Q3	Maximum
Stearns St.	Total Copper (ug/l)	8.4	17.25	25	43.5	240
Stearns St.	Total Lead (ug/l)	0.78	3.025	17	41.75	370
Stearns St.	TSS (mg/L)	2	52.5	110	210	1700
Stearns St.	Total Zinc (ug/l)	9.5	33	180	390	2600
Stearns St.	Fecal Coliform (MPN/100mL)	18	2275	8000	28500	1600000
Stearns St.	Total Nitrogen (mg/l)	0.9	2.147	3.292	4.532	23.7
Stearns St.	Total Phosphorous (mg/l)	0.083	0.22	0.53	0.91	6.2

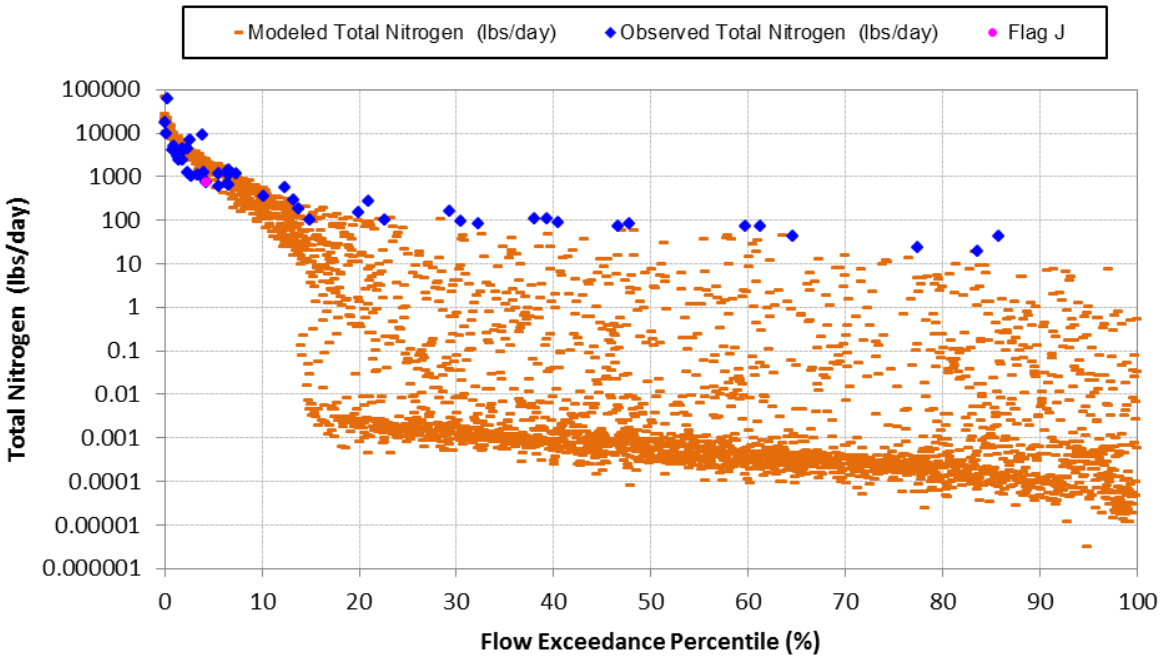

Figure 52. Simulated vs. observed time series plots for Total Nitrogen (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

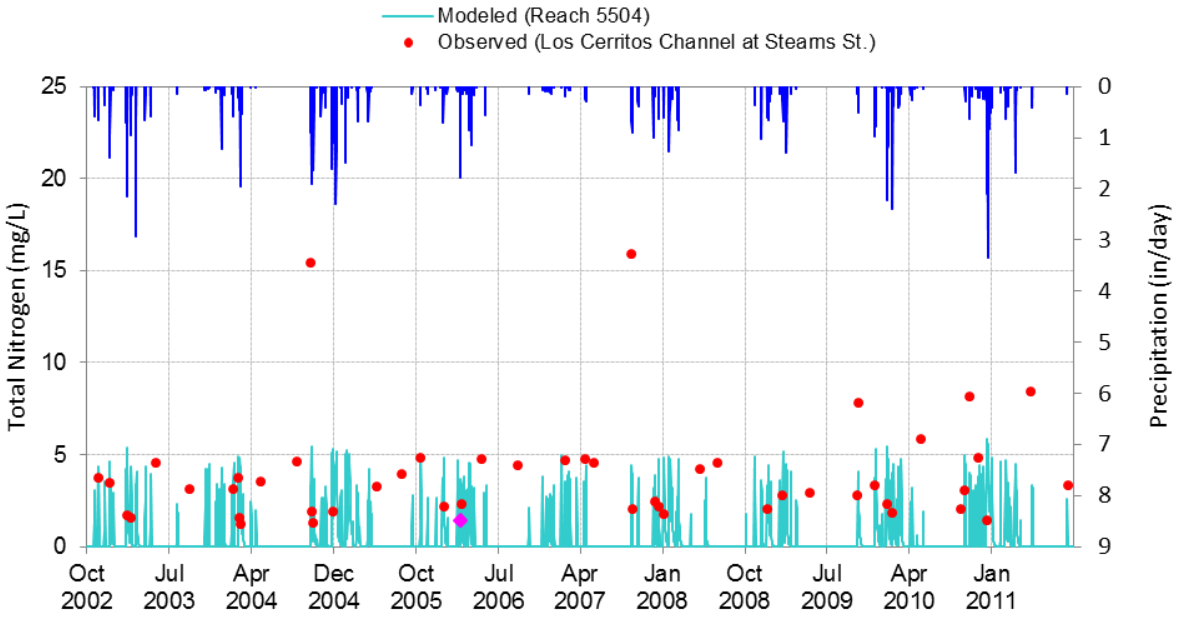

Figure 53. Simulated vs. observed time series plots for Total Nitrogen (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

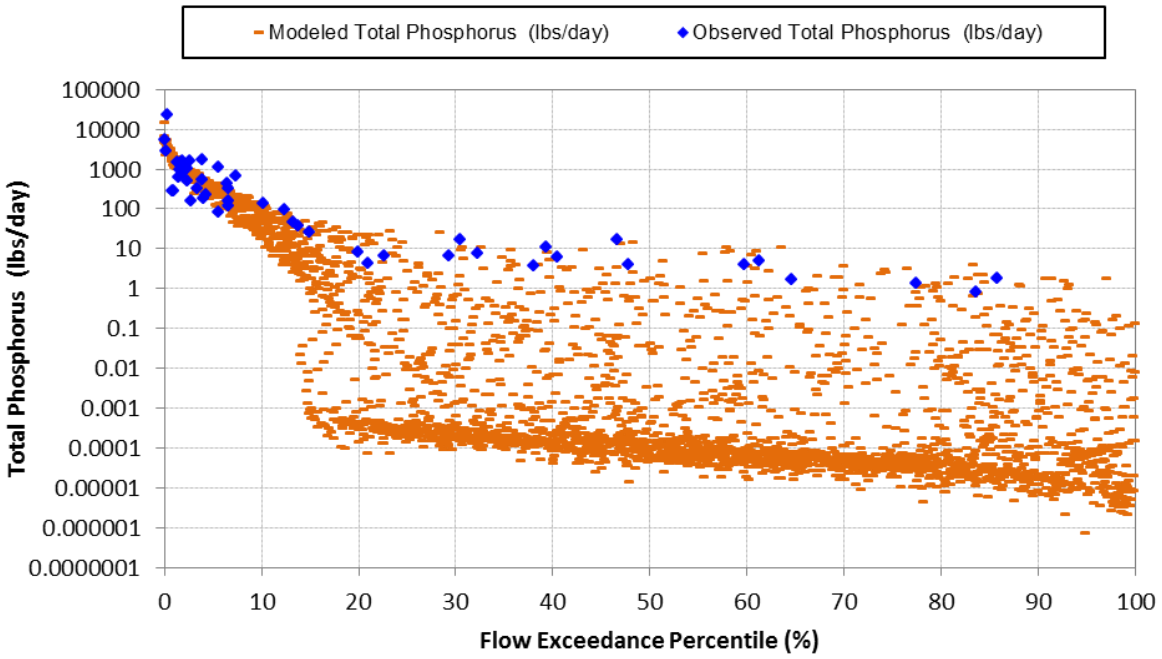

Figure 54. Simulated vs. observed load duration plots for Total Phosphorous (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

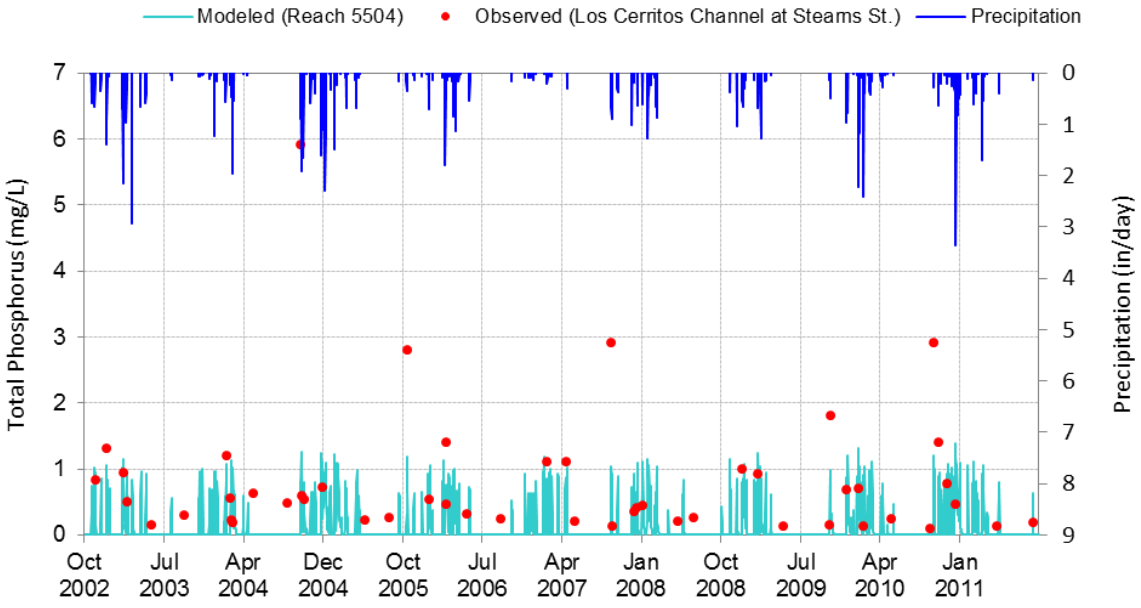

Figure 55. Simulated vs. observed time series plots for Total Phosphorous (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

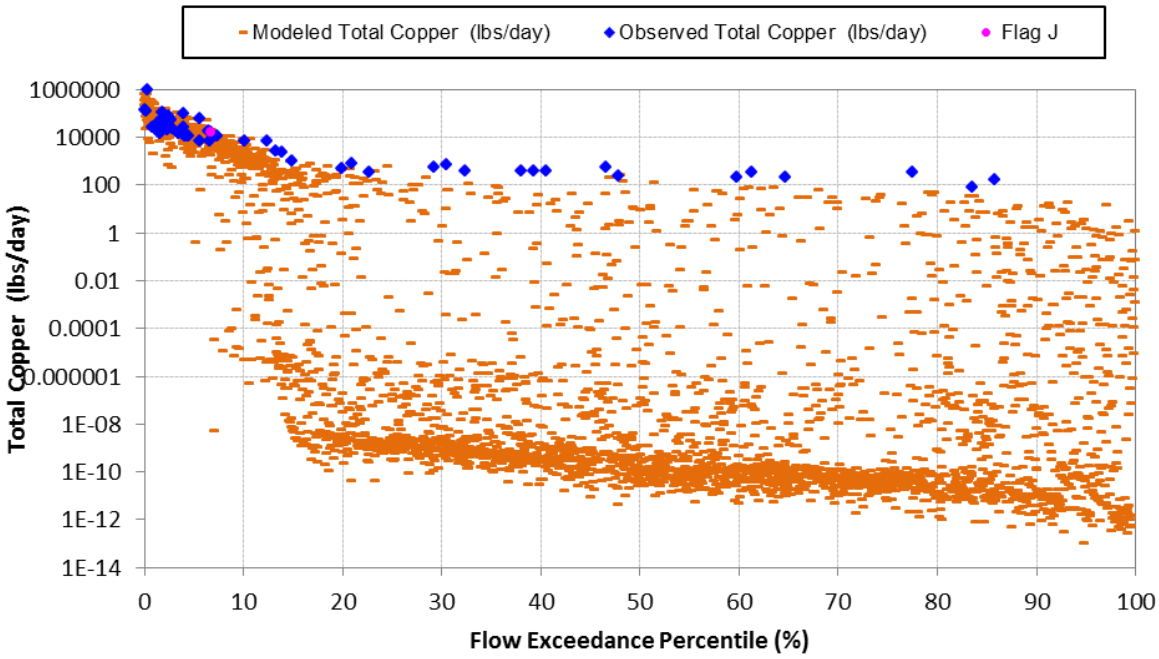

Figure 56. Simulated vs. observed load duration plots for Total Copper (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

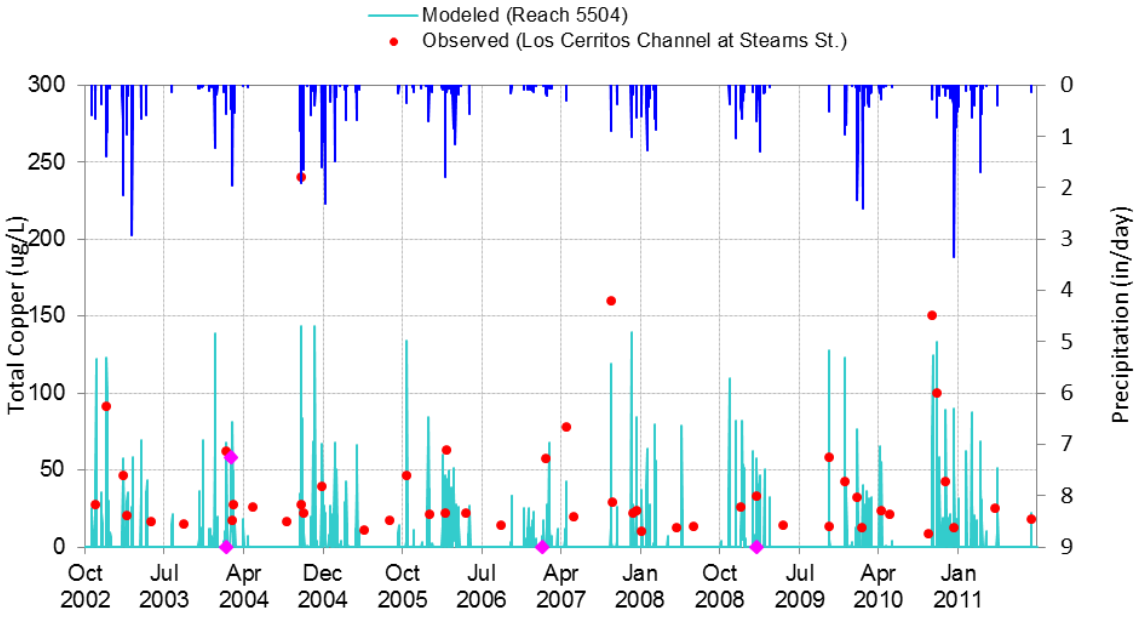

Figure 57. Simulated vs. observed timeseries plots for Total Copper (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

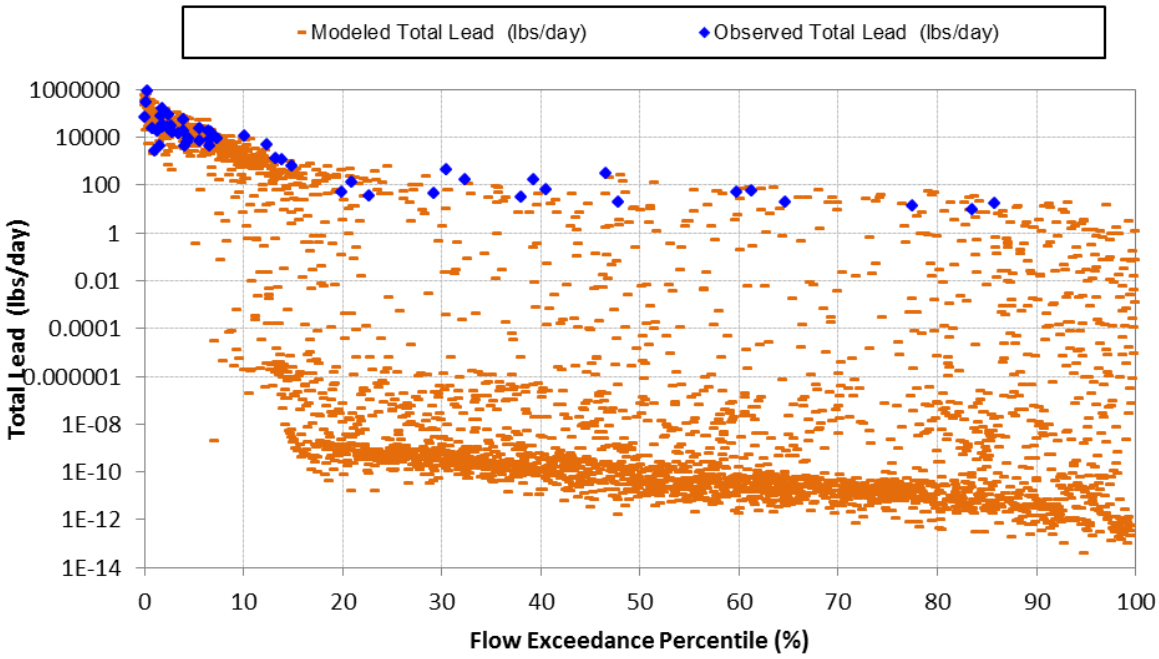

Figure 58. Simulated vs. observed load duration plots for Total Lead (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

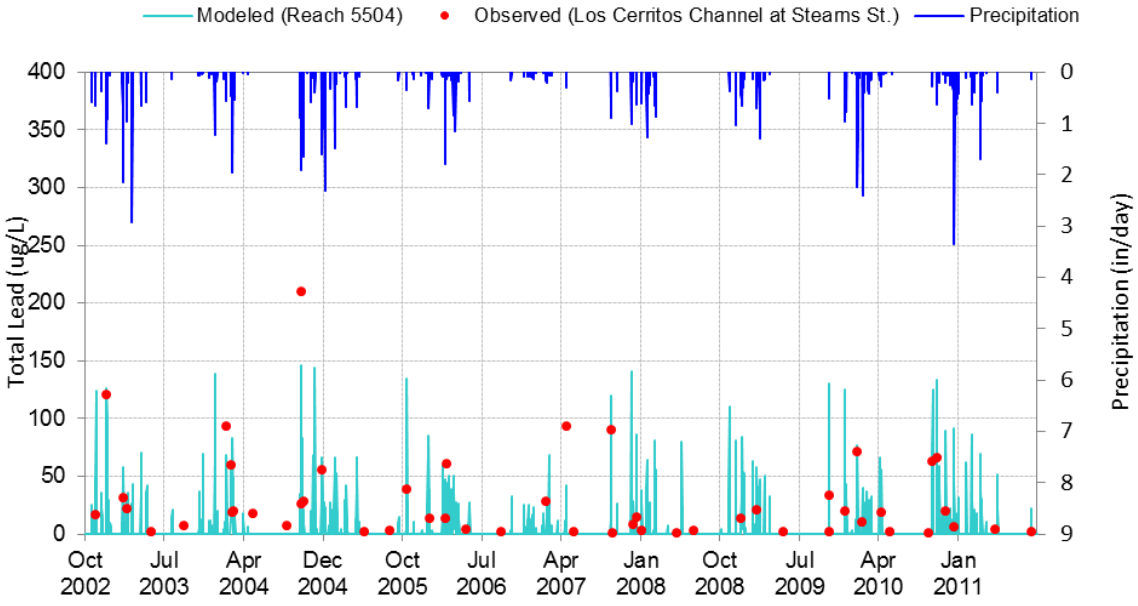

Figure 59. Simulated vs. observed timeseries plots for Total Lead (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

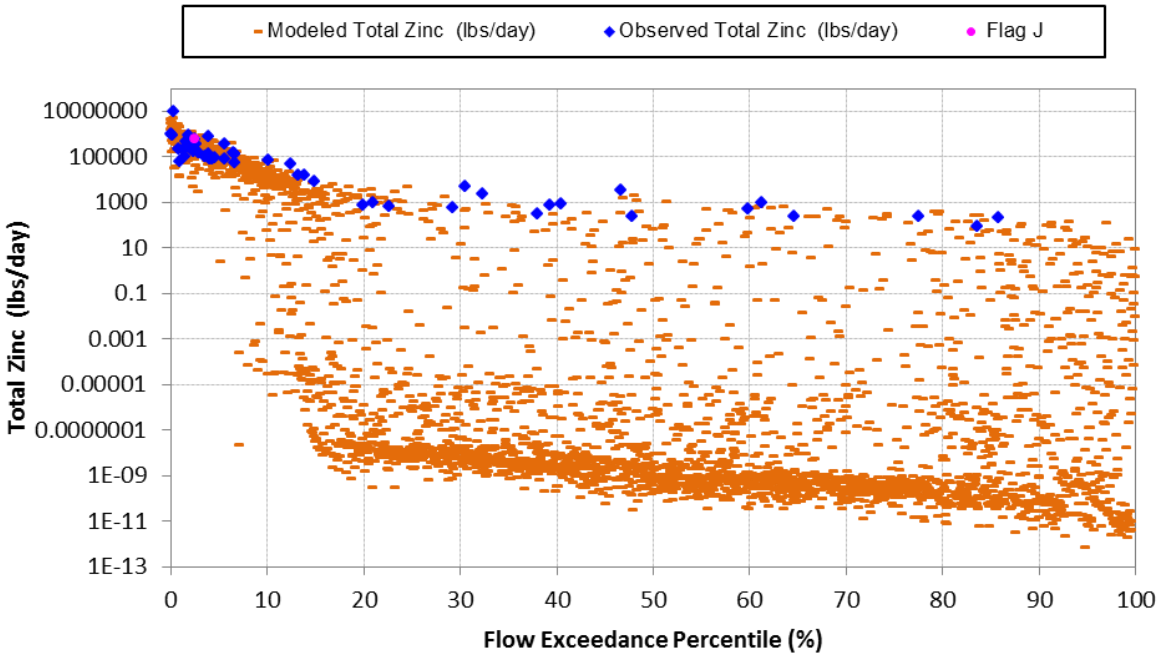

Figure 60. Simulated vs. observed load duration plots for Total Zinc (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

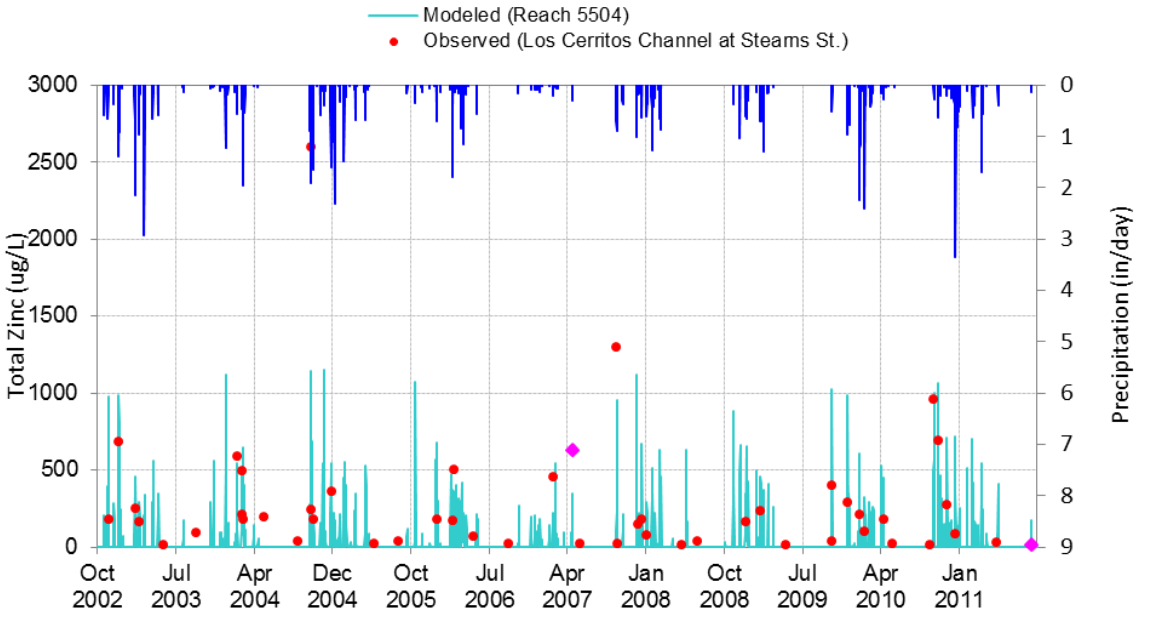

Figure 61. Simulated vs. observed timeseries plots for Total Zinc (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

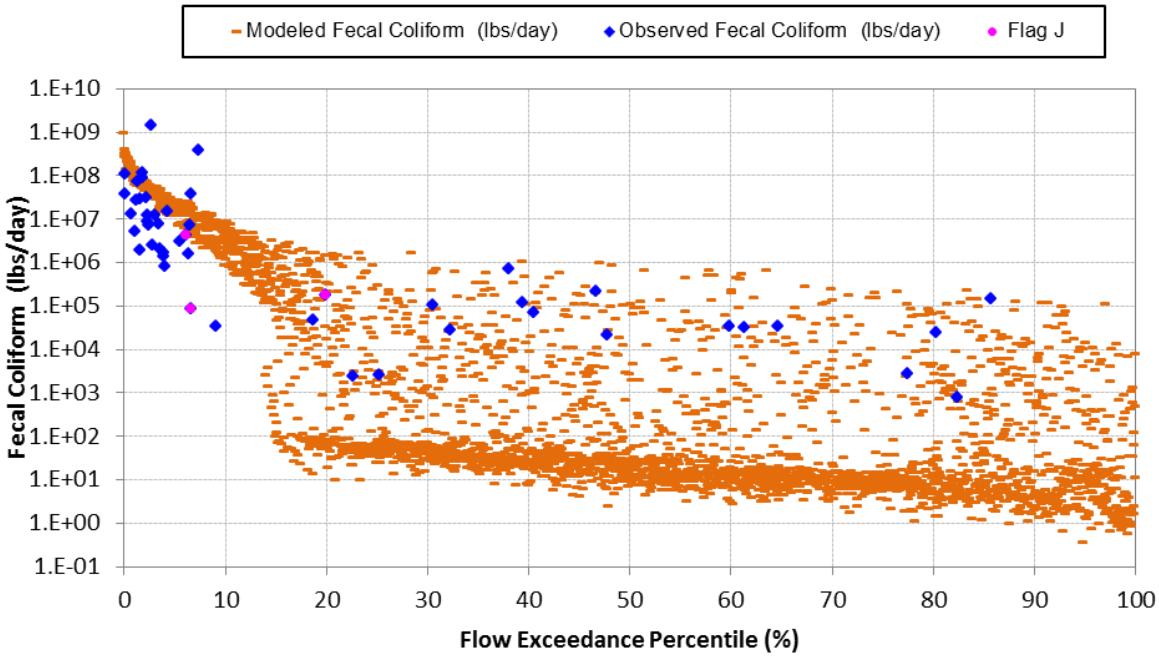

Figure 62. Simulated vs. observed load duration plots for Fecal Coliform (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

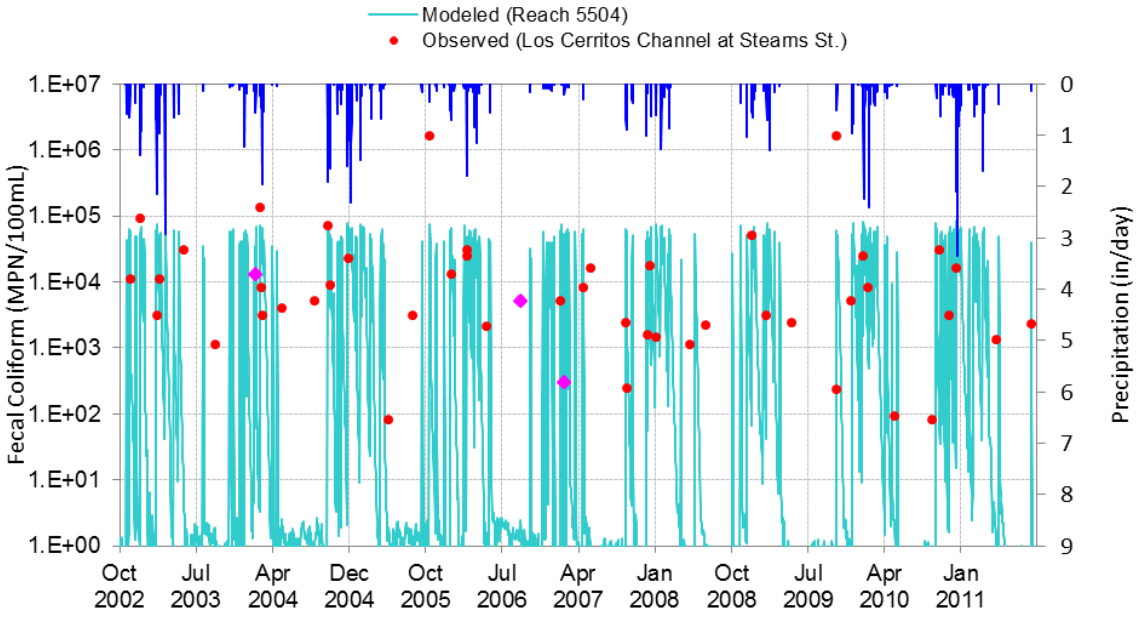

Figure 63. Simulated vs. observed timeseries plots for Fecal Coliform (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

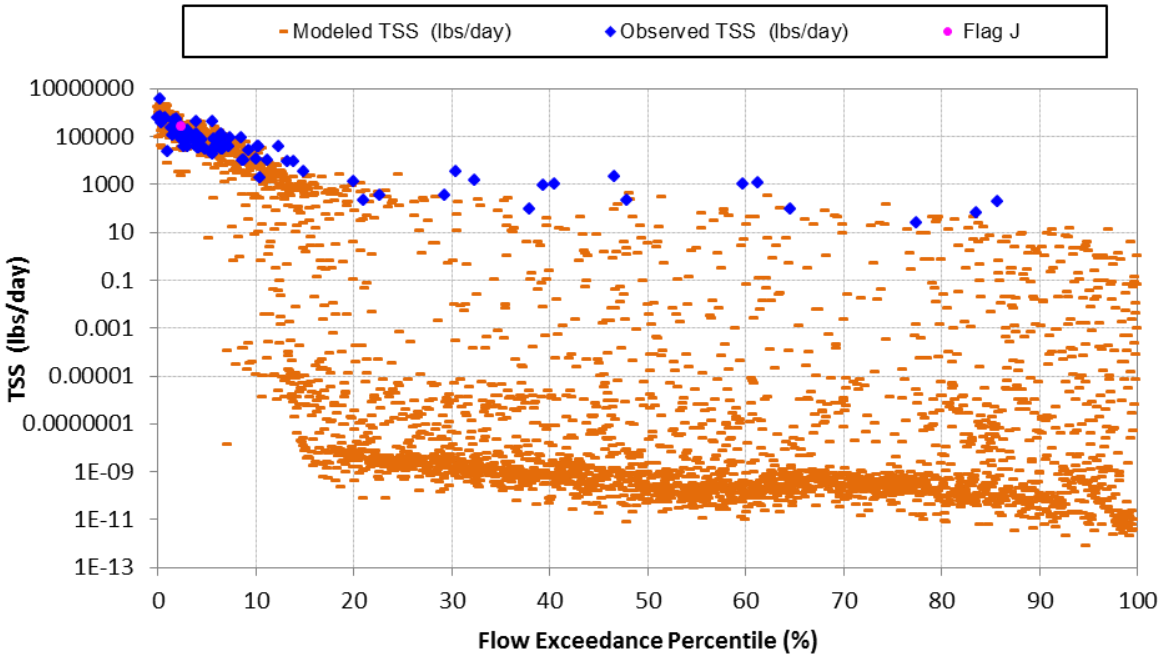

Figure 64. Simulated vs. observed load duration plots for Total Sediment (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

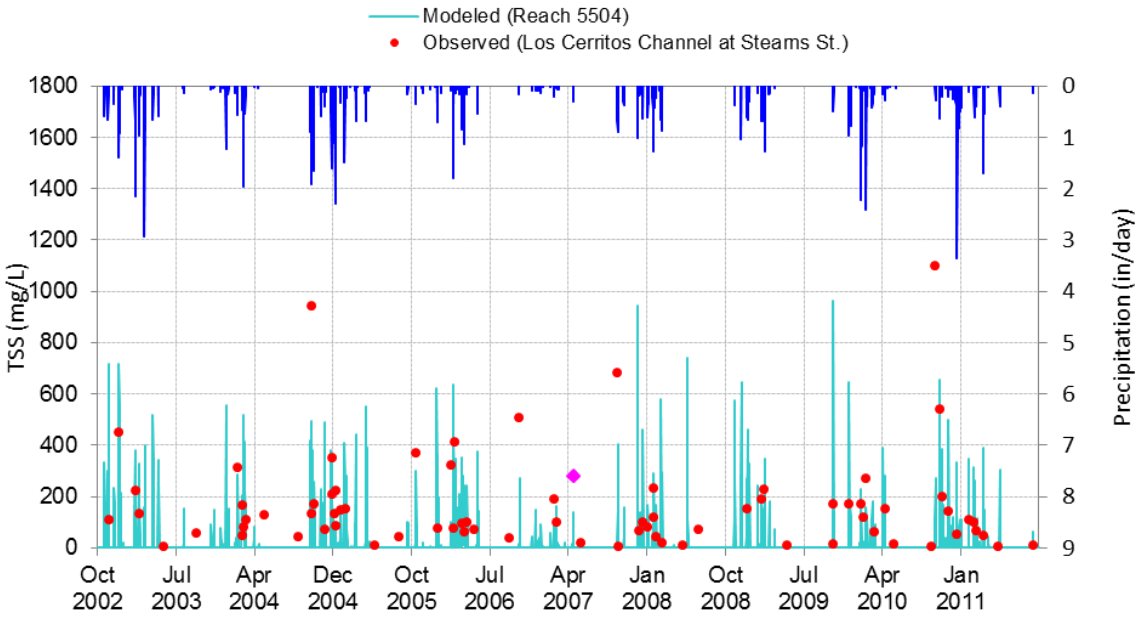

Figure 65. Simulated vs. observed time series plots for Total Sediment (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

Attachment F: Modeled Existing Versus Allowable Pollutant Loadings Plots

Submitted to:

LLAR WMP Group LCC WMP Group LSGR WMP Group

Submitted by:

Tetra Tech
9444 Balboa Ave., Suite 215
San Diego, CA 92123

January 15, 2015

RB-AR8400

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1. Lower San Gabriel River

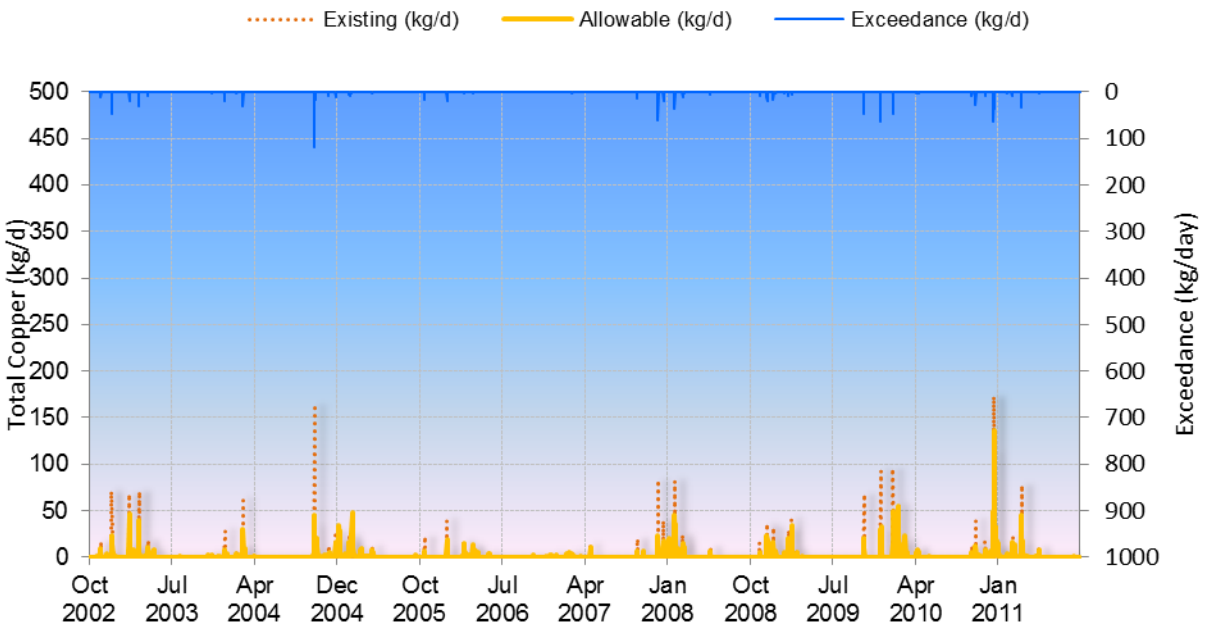


Figure 1. Modeled existing vs. allowable observed timeseries plots for Total Copper (10/1/2002 through 9/30/2011) at San Gabriel River mass emission station S14.

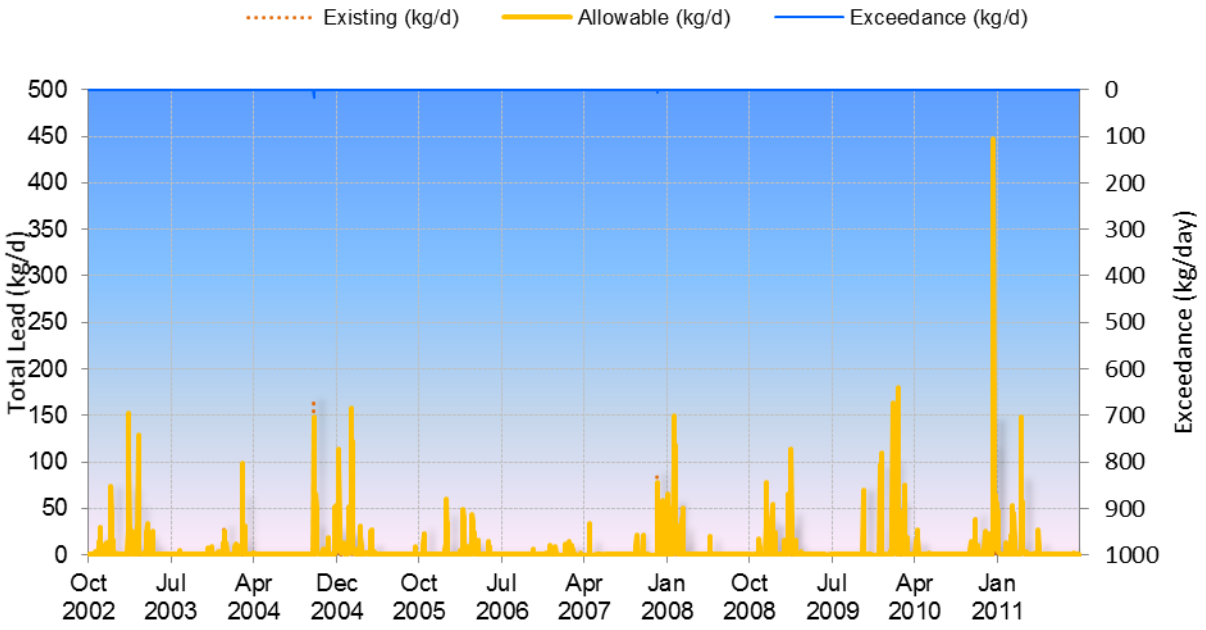
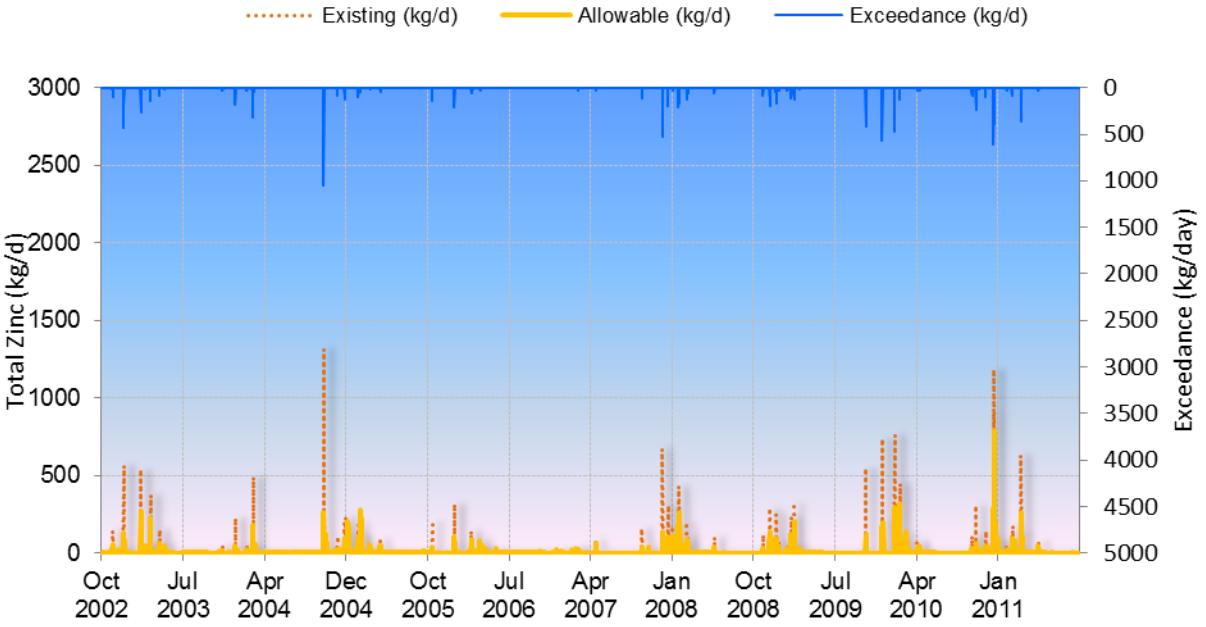


Figure 2. Modeled existing vs. allowable observed timeseries plots for Total Lead (10/1/2002 through 9/30/2011) at San Gabriel River mass emission station S14.



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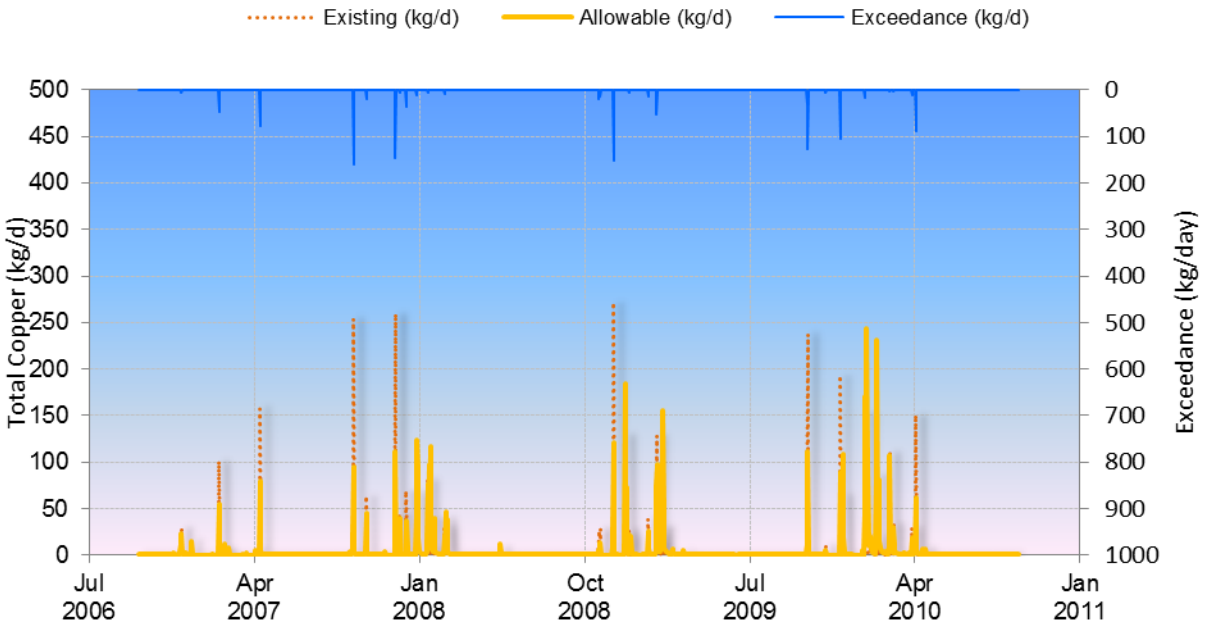


Figure 4. Modeled existing vs. allowable observed timeseries plots for Total Copper (10/1/2006 through 9/30/2011) at Coyote Creek mass emission station S13.

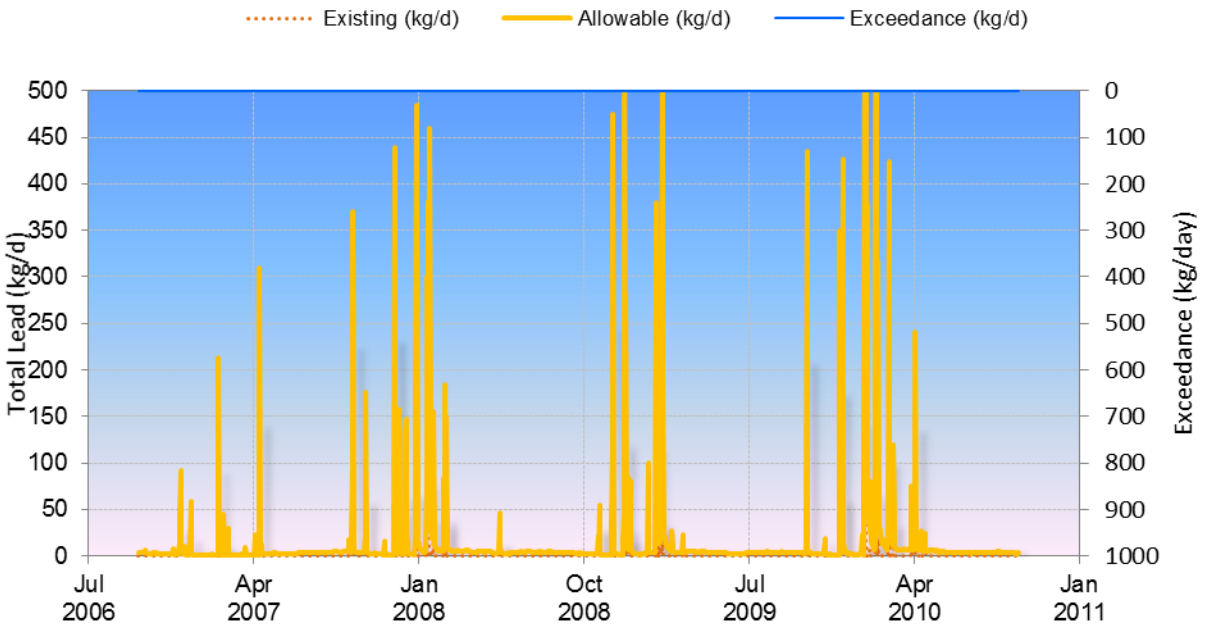


Figure 5. Modeled existing vs. allowable observed timeseries plots for Total Lead (10/1/2006 through 9/30/2011) at Coyote Creek mass emission station S13.

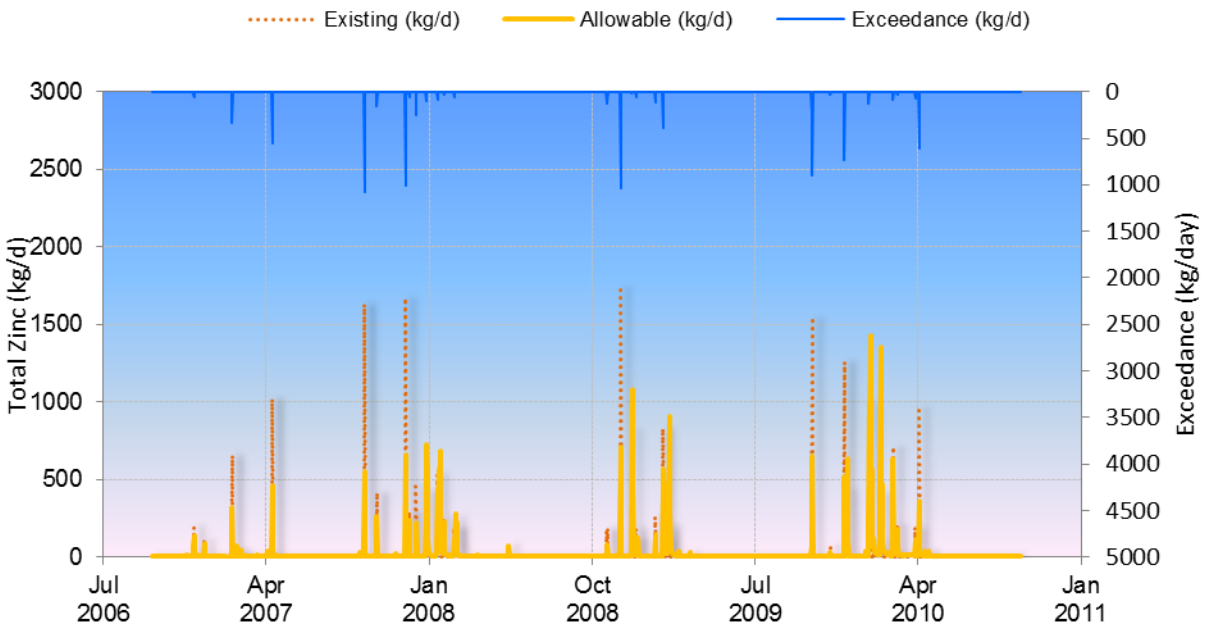


Figure 6. Modeled existing vs. allowable observed timeseries plots for Total Zinc (10/1/2006 through 9/30/2011) at Coyote Creek mass emission station S13.

2. Lower Los Angeles River

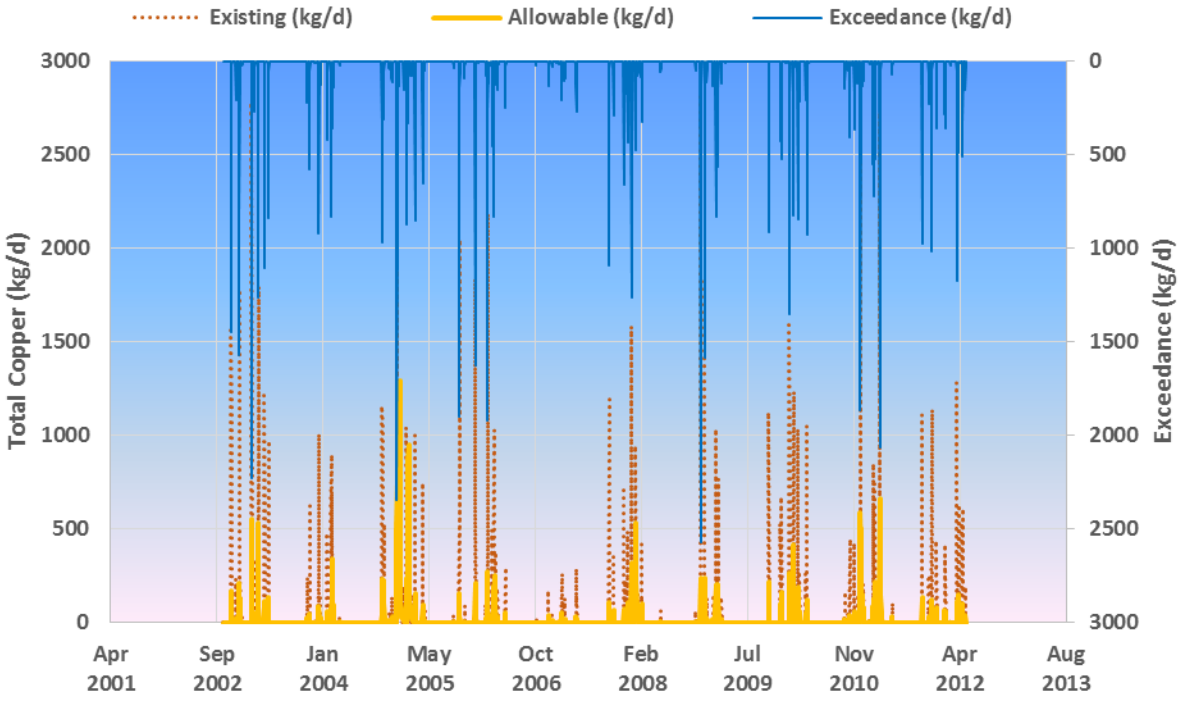


Figure 7. Modeled existing vs. allowable observed timeseries plots for Total Copper (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

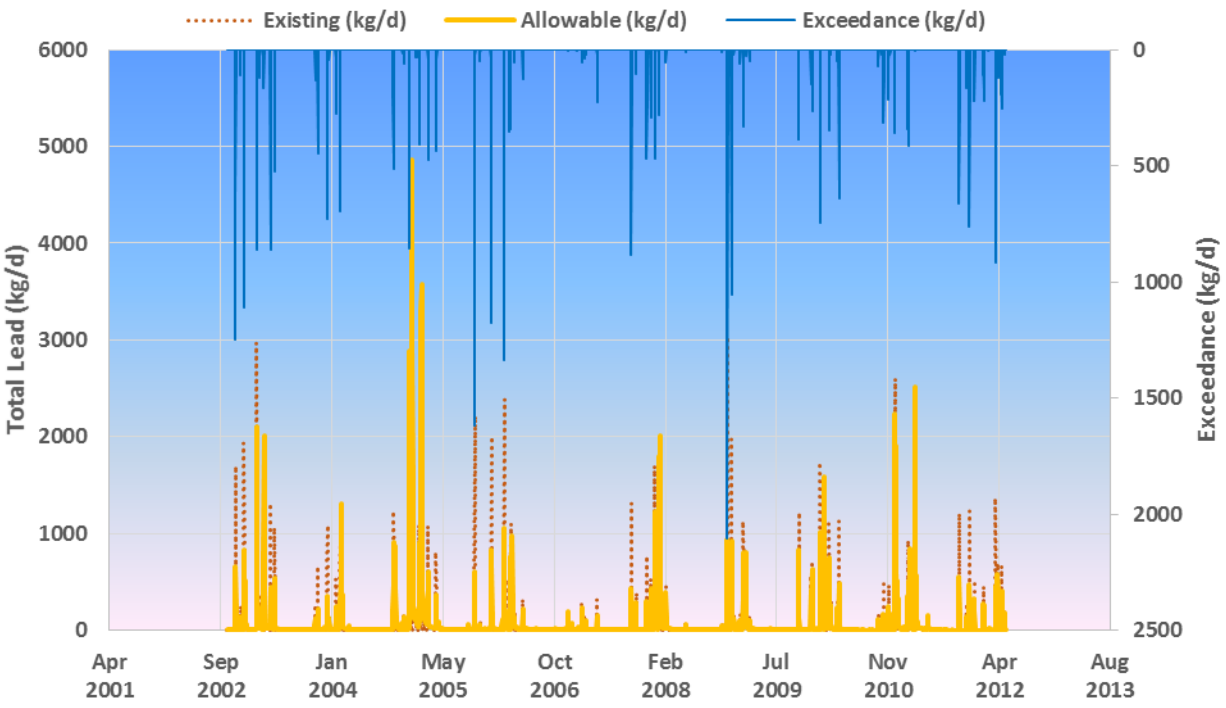


Figure 8. Modeled existing vs. allowable observed timeseries plots for Total Lead (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

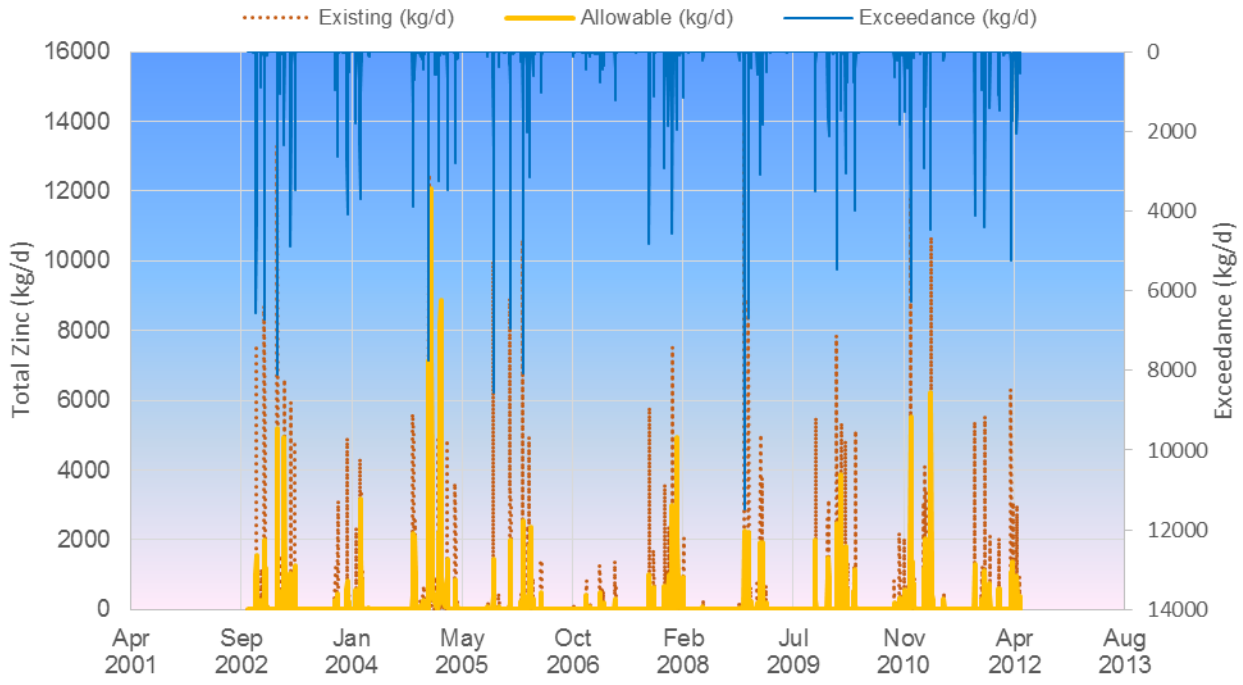


Figure 9. Modeled existing vs. allowable observed timeseries plots for Total Zinc (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

3. Los Cerritos Channel

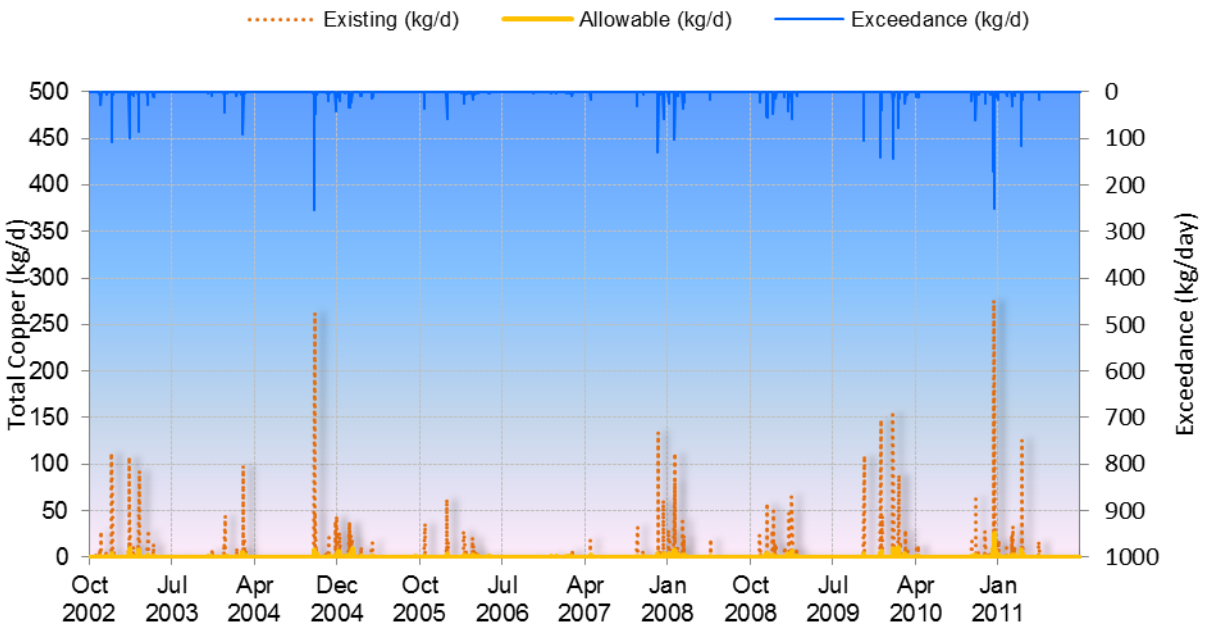


Figure 10. Modeled existing vs. allowable observed timeseries plots for Total Copper (10/1/2002 through 9/30/2011) at Los Cerritos Channel City of Long Beach Stearns Street monitoring station.

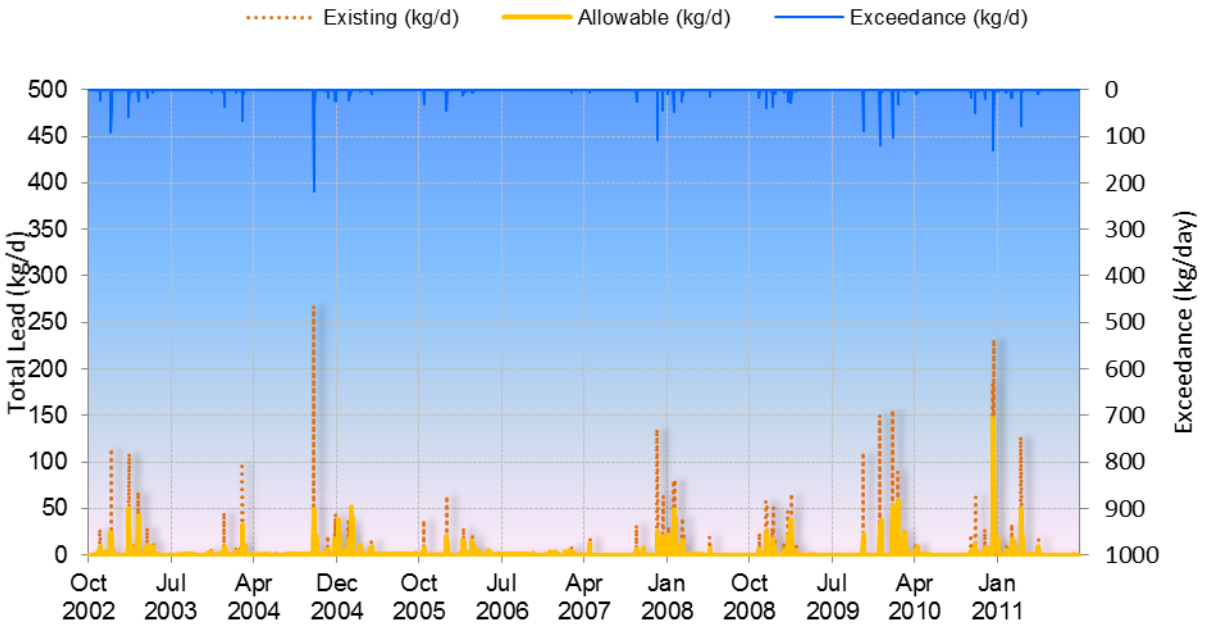


Figure 11. Modeled existing vs. allowable observed timeseries plots for Total Lead (10/1/2002 through 9/30/2011) at Los Cerritos Channel City of Long Beach Stearns Street monitoring station.

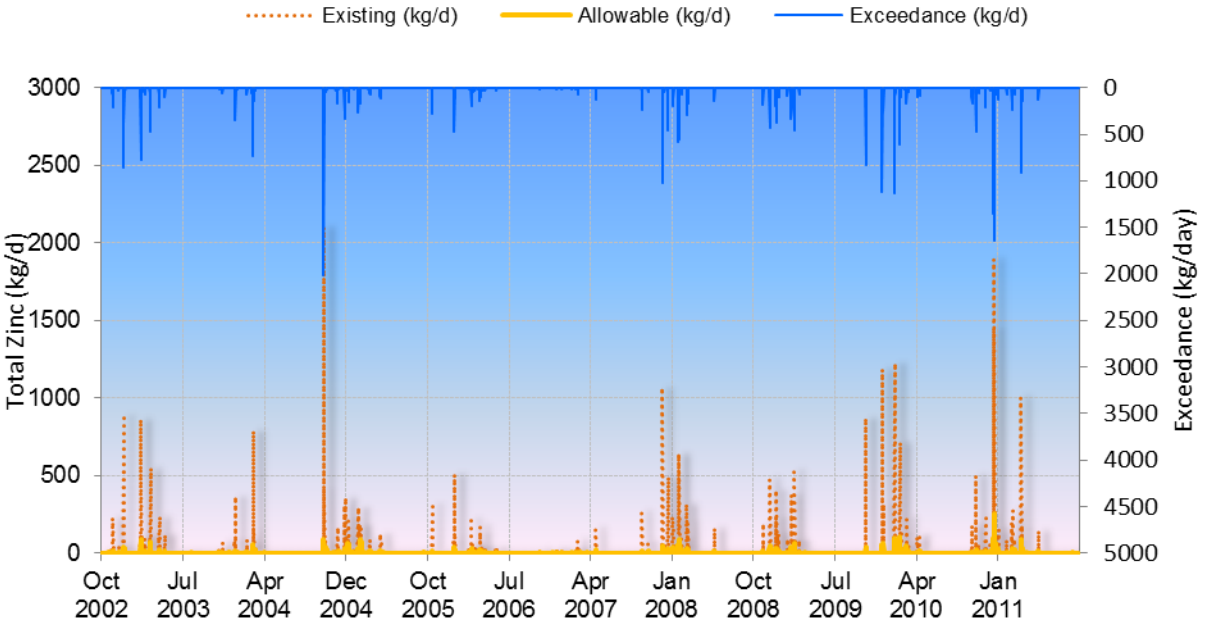
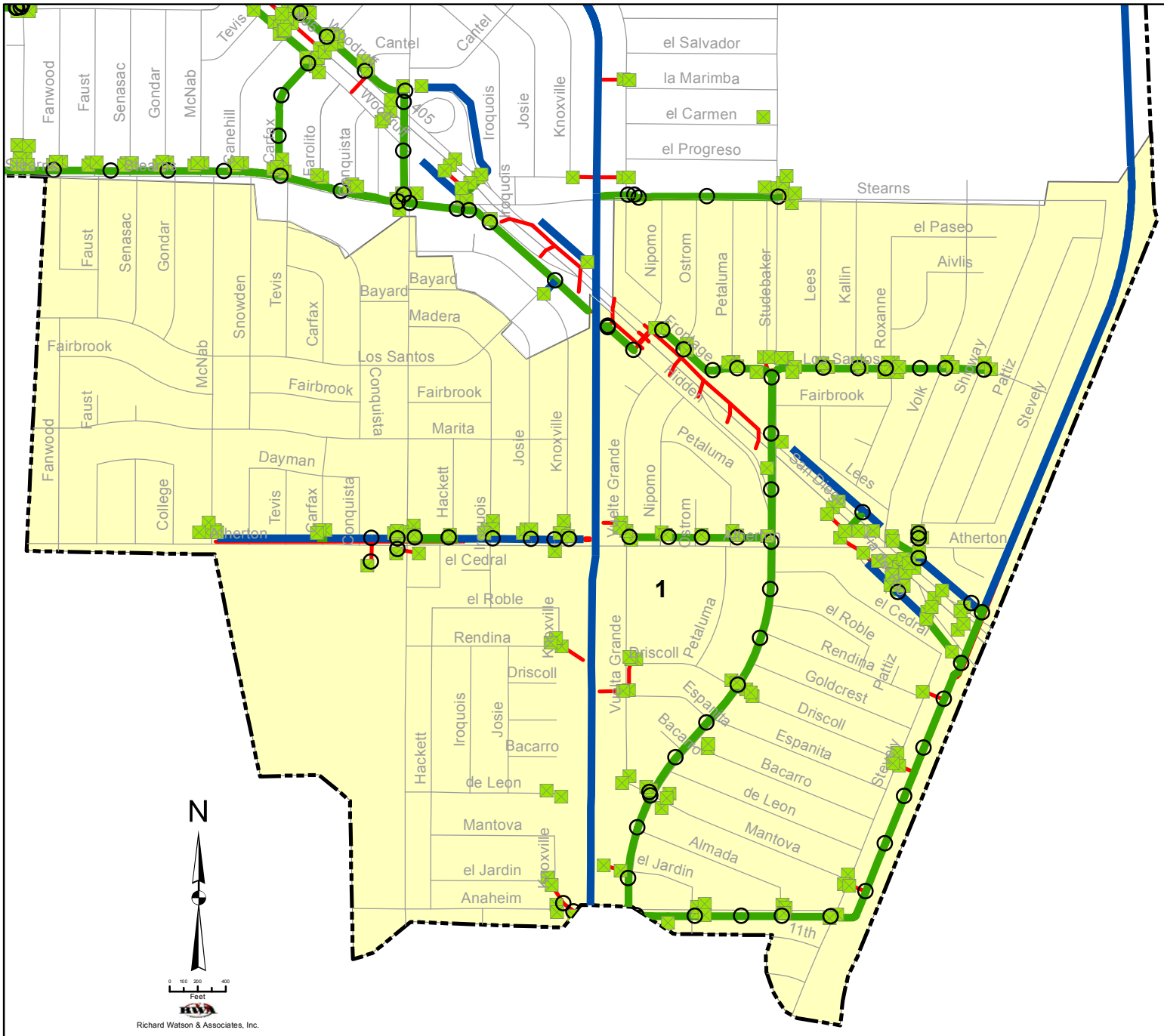


Figure 12. Modeled existing vs. allowable observed timeseries plots for Total Zinc (10/1/2002 through 9/30/2011) at Los Cerritos Channel City of Long Beach Stearns Street monitoring station.

ATTACHMENT B:

LOS CERRITOS CHANNEL SUB-BASIN EXHIBITS

Los Cerritos Channel TMDL Sub-Basin 1



Legend

- LACFCD MH
- LACFCD Catch Basin
- LACFCD Open Channel
- LACFCD Gravity Main
- City Storm Line
- Street Centerlines

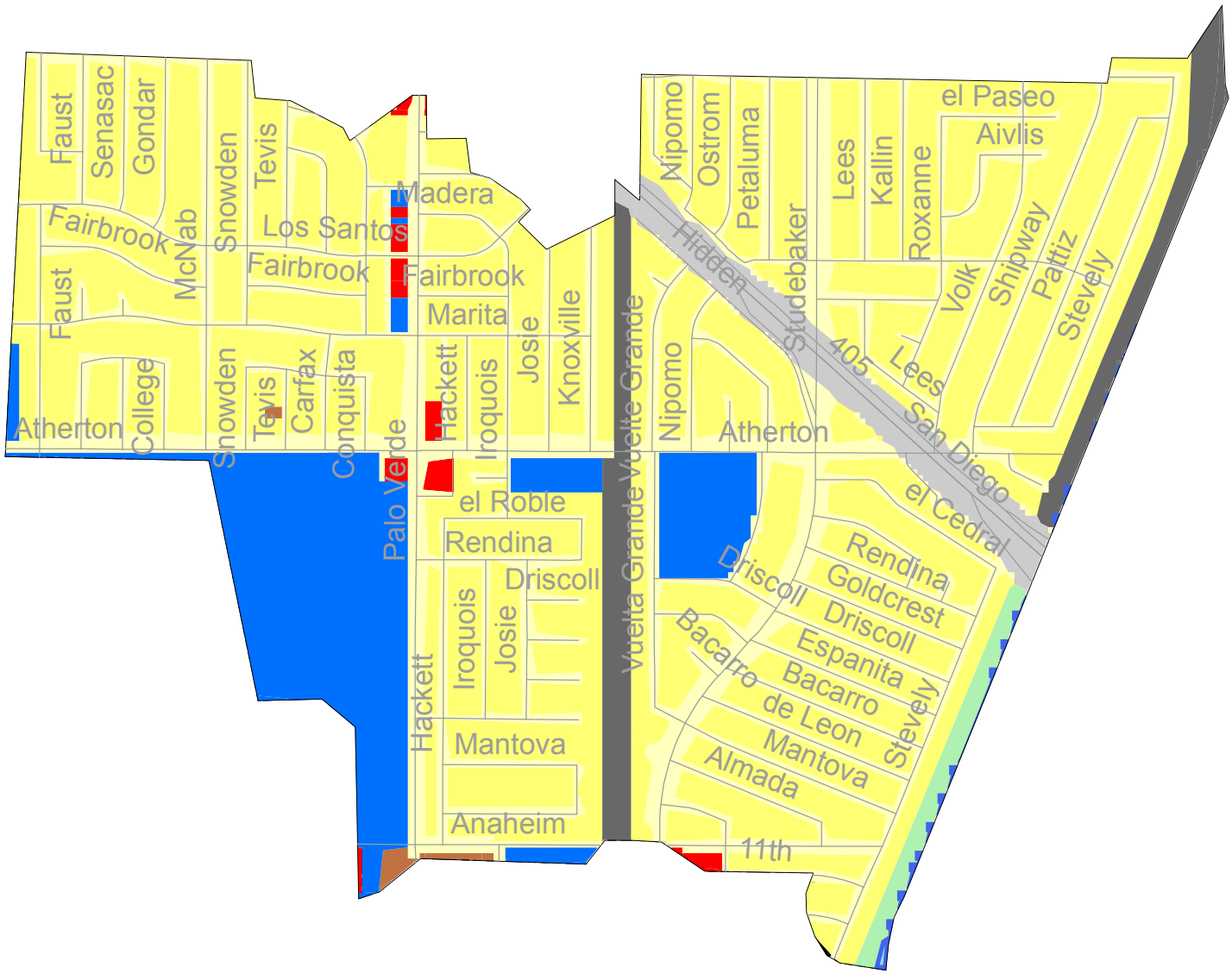
Sub-Basin	Acreage
1	720.3

RB-AR8412

Prepared by: ECKERSALL, LLC

Date: 1/13/2014

Los Cerritos Channel TMDL Sub Basin 1
Hydrologic Response Units



Legend

Hydrologic Response Units

HD SFR	Commercial	Secondary Roads	Water Bodies
LD SFRM	Institutional	Agriculture Moderate Slope D	
LD SFR Steep S	Industrial	Vacant Moderate Slope D	
MF	Transportation	Vacant Steep Slope D	

Sub Basin	Acreage	
1	720	Street Centerlines

N

0 3,250 6,500 13,000
Inches

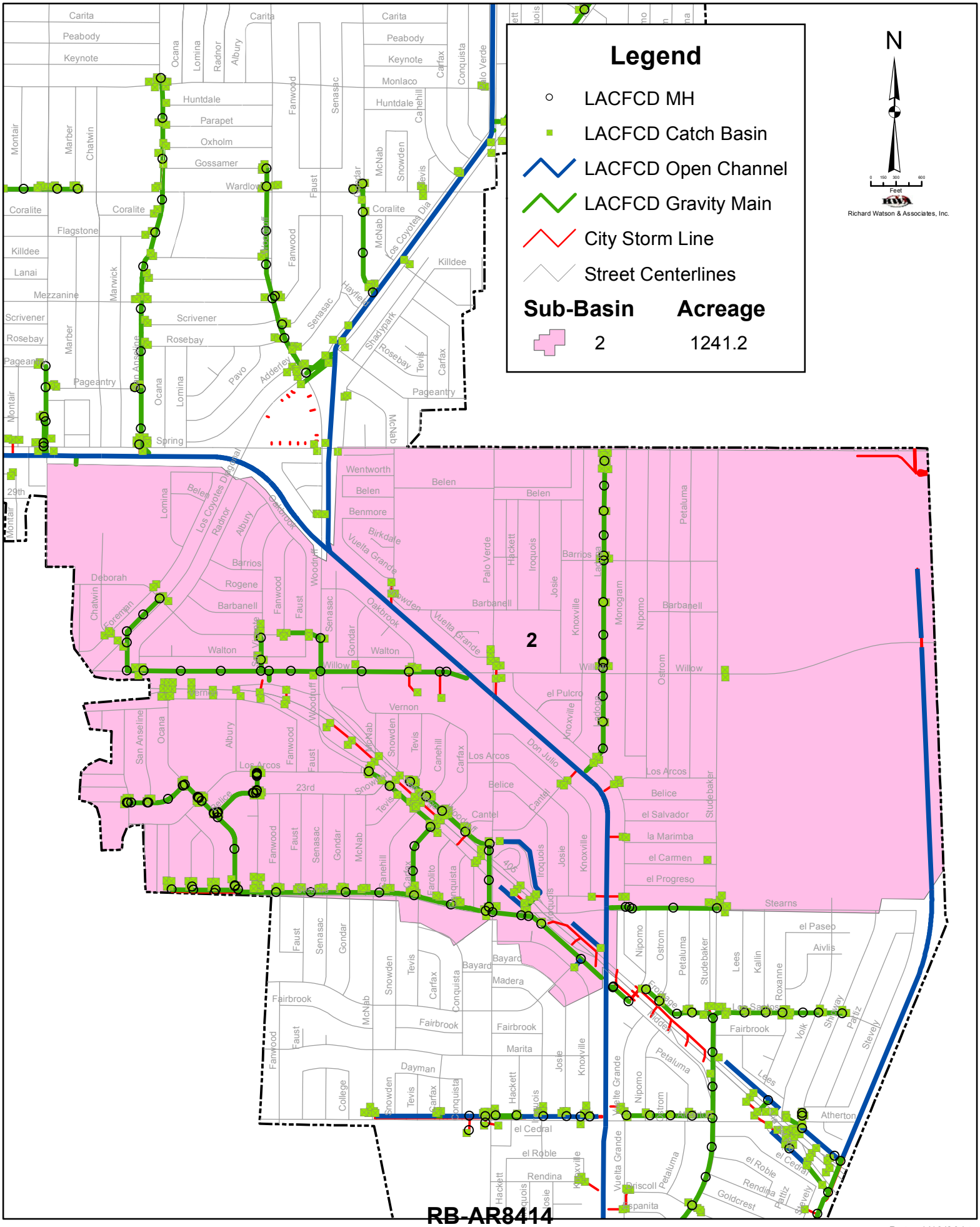
Richard Watson & Associates, Inc.

RB-AR8413

Prepared by: ECKERSALL, LLC

Date: 3/4/2014

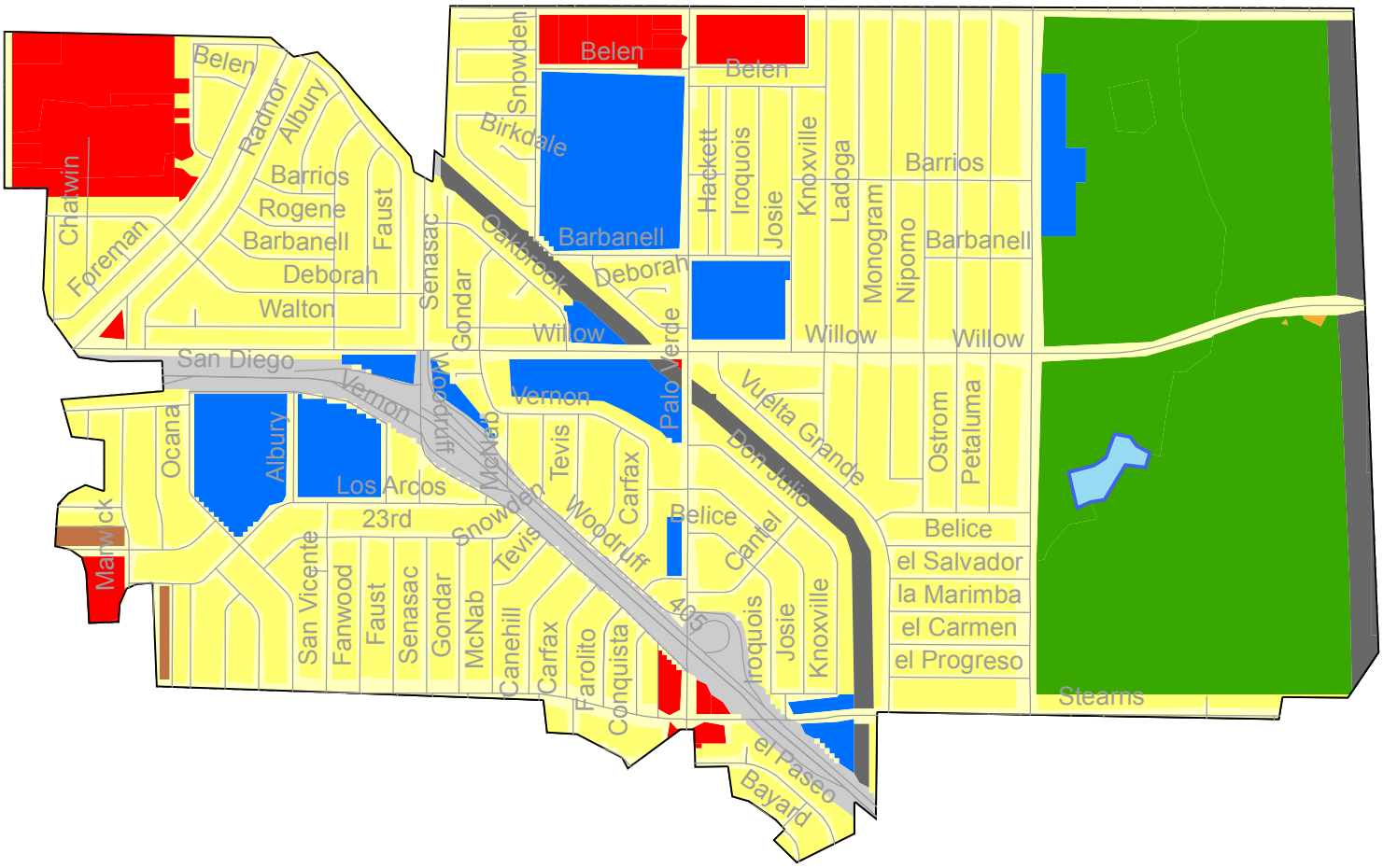
Los Cerritos Channel TMDL Sub-Basin 2



Prepared by: ECKERSALL, LLC

Date: 1/13/2014

Los Cerritos Channel TMDL Sub Basin 2
Hydrologic Response Units



Legend

Hydrologic Response Units

- HD SFR
- LD SFRM
- LD SFR Steep S
- MF
- Commercial
- Institutional
- Industrial
- Transportation
- Secondary Roads
- Agriculture Moderate Slope D
- Vacant Moderate Slope D
- Vacant Steep Slope D
- Water Bodies

Sub Basin 2

Acreage 1241

Street Centerlines

N

0 4,125 8,250 16,500
Inches

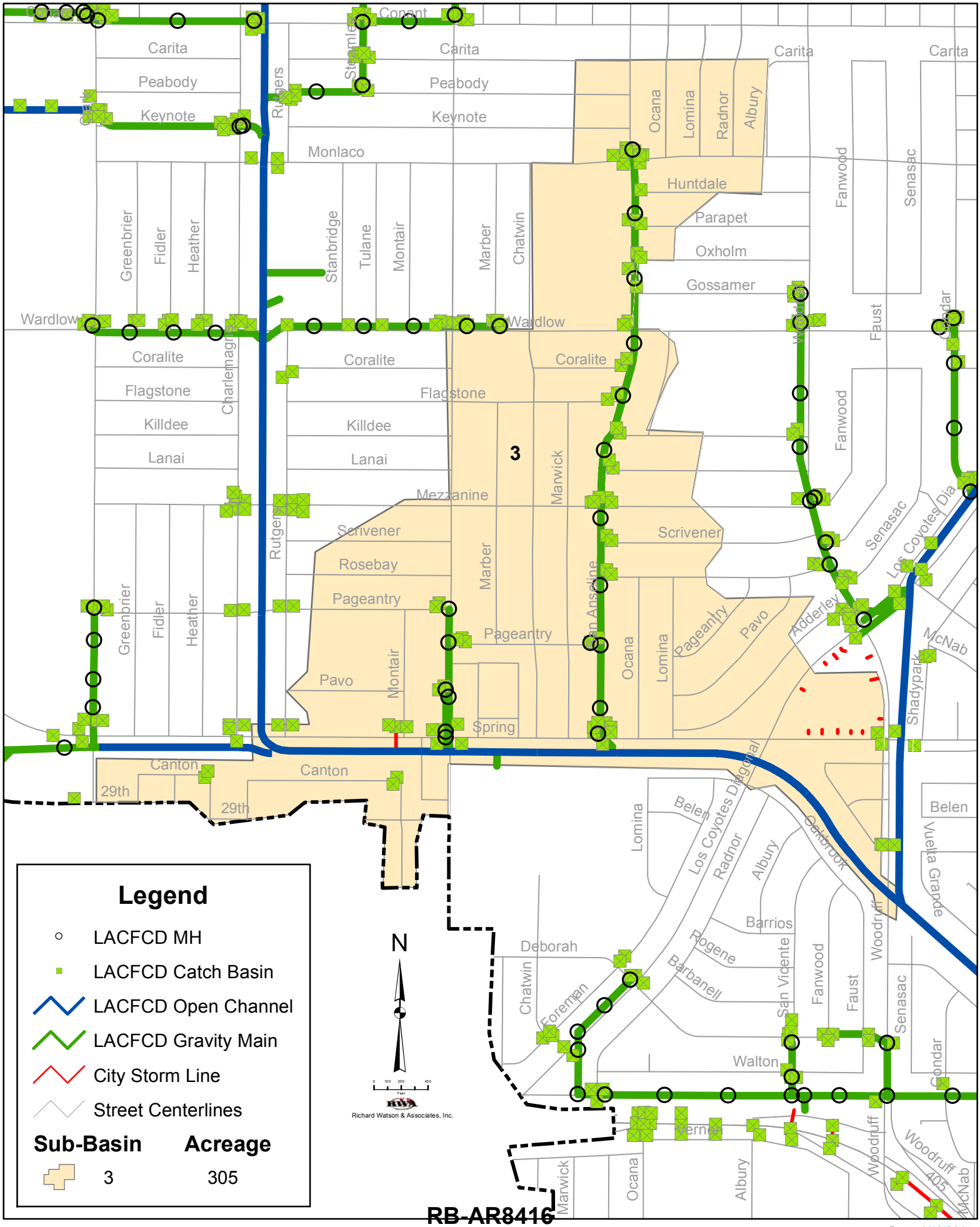
Richard Watson & Associates, Inc.

RB-AR8415

Prepared by: ECKERSALL, LLC

Date: 3/4/2014

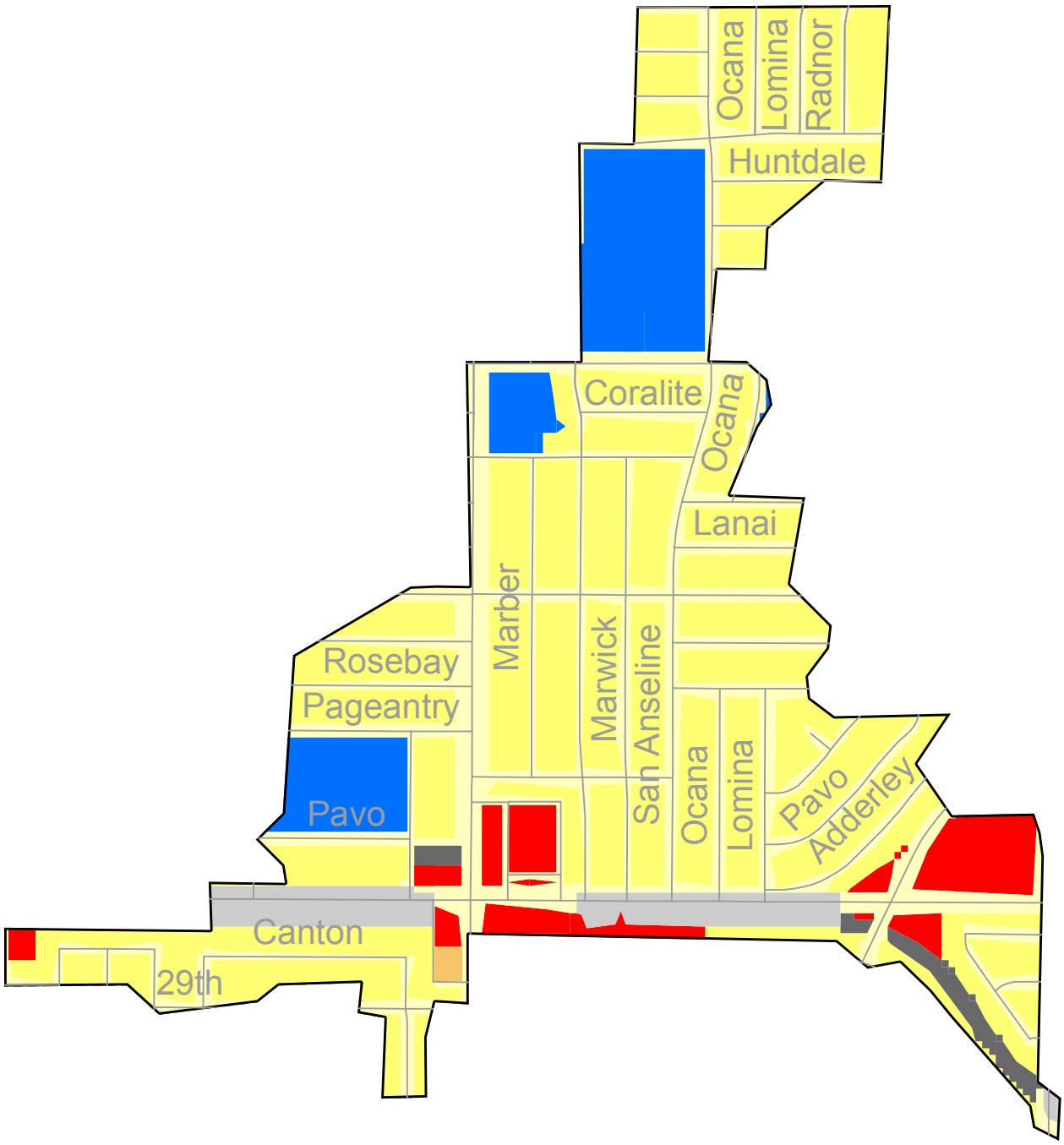
Los Cerritos Channel TMDL Sub-Basin 3



Prepared by: ECKERSALL, LLC

Date: 1/13/2014

Los Cerritos Channel TMDL Sub Basin 3
Hydrologic Response Units



Legend

Hydrologic Response Units

- HD SFR
- LD SFRM
- LD SFR Steep S
- MF
- Commercial
- Institutional
- Industrial
- Transportation
- Secondary Roads
- Agriculture Moderate Slope D
- Vacant Moderate Slope D
- Vacant Steep Slope D
- Water Bodies

Sub Basin
3

Acreage
305

Street Centerlines

N

0 2,750 5,500 11,000
Inches

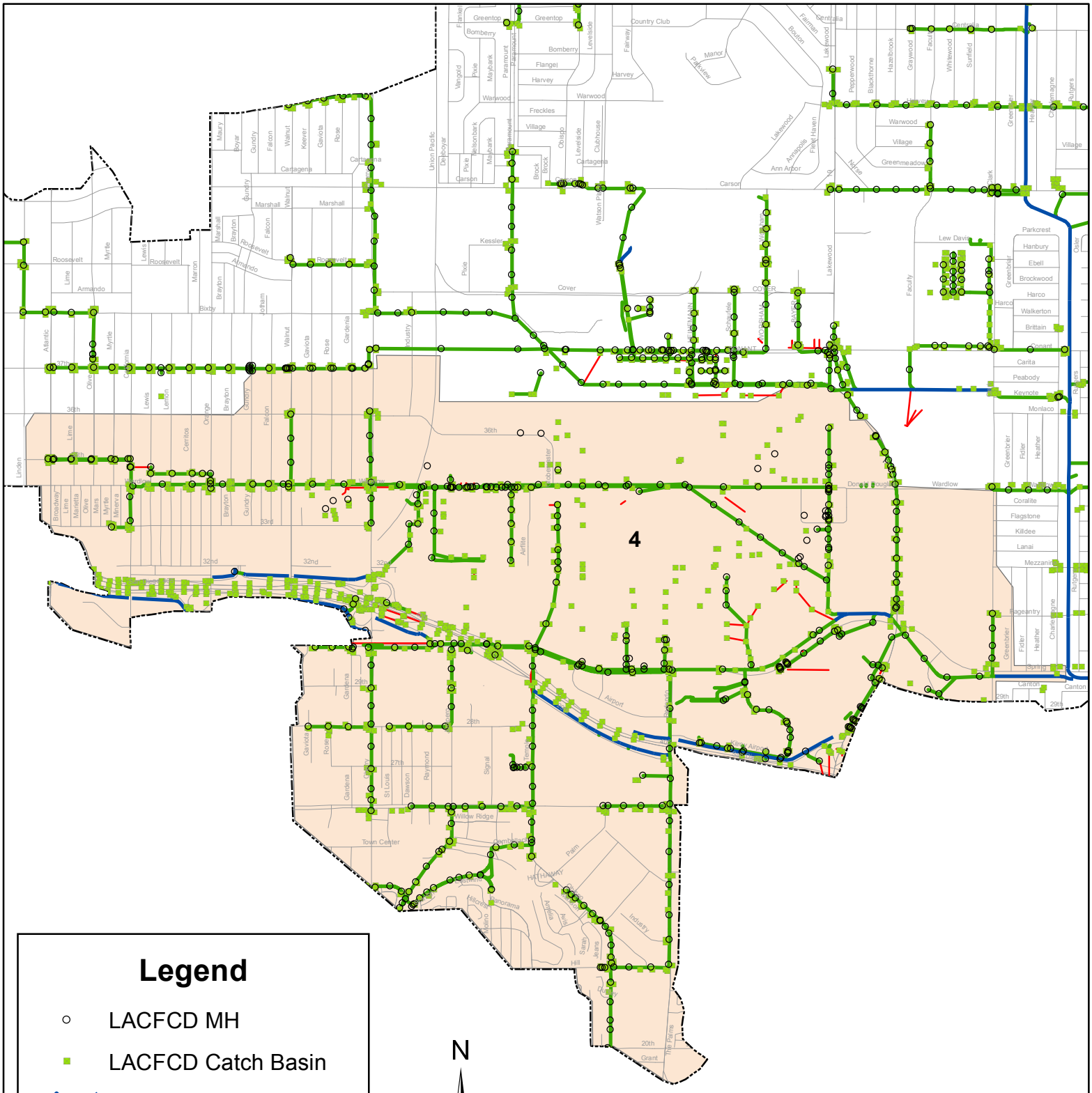
Richard Watson & Associates, Inc.

RB-AR8417

Prepared by: ECKERSALL, LLC

Date: 3/4/2014

Los Cerritos Channel TMDL Sub-Basin 4



Legend

- LACFCD MH
- LACFCD Catch Basin
- LACFCD Open Channel
- LACFCD Gravity Main
- City Storm Line
- Street Centerlines

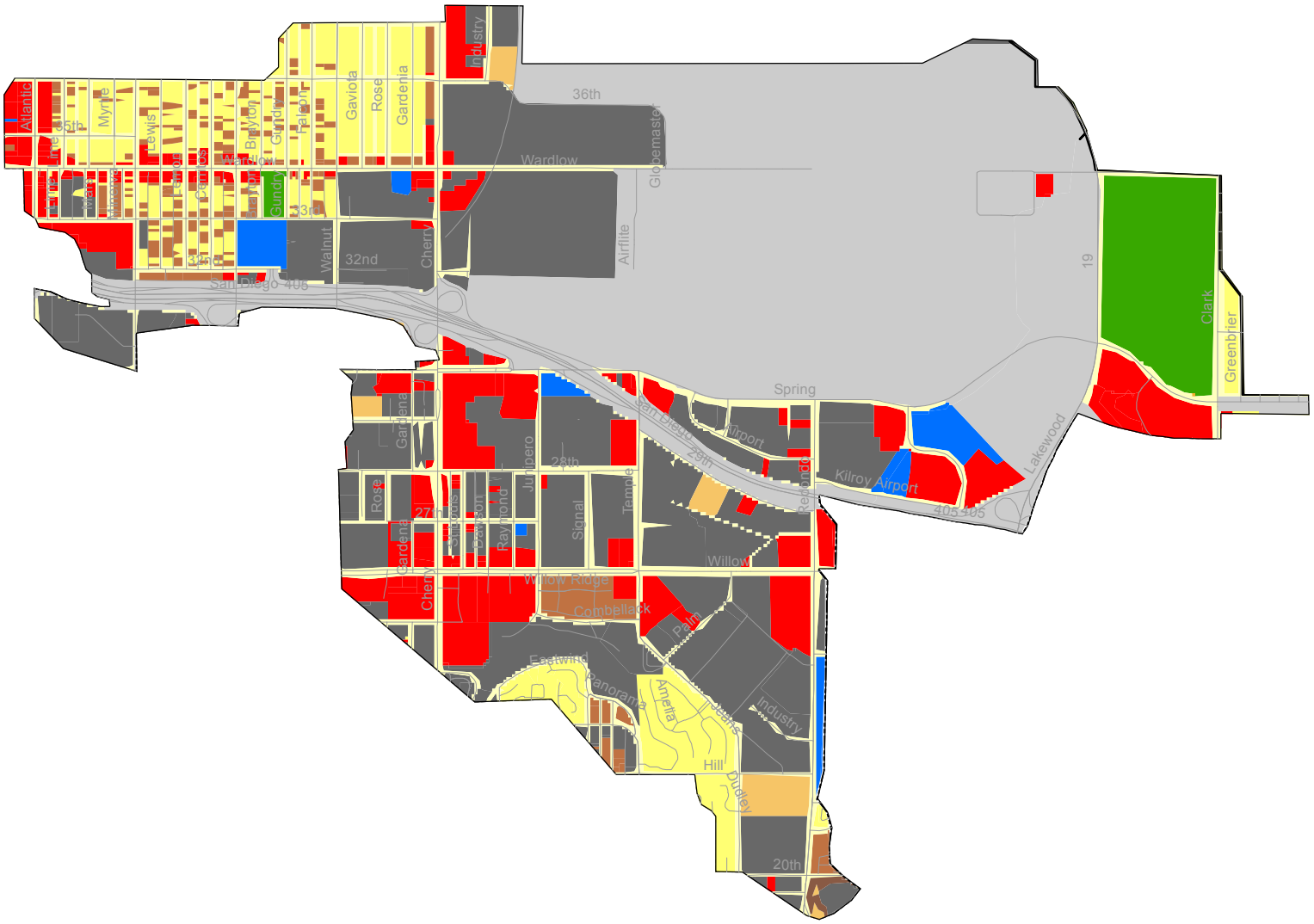
Sub-Basin	Acreage
4	2270

RB-AR8418

Prepared by: ECKERSALL, LLC

Date: 1/13/2014

Los Cerritos Channel TMDL Sub Basin 4
Hydrologic Response Units



Legend

Hydrologic Response Units

- HD SFR
- LD SFRM
- LD SFR Steep S
- MF
- Commercial
- Institutional
- Industrial
- Transportation
- Secondary Roads
- Agriculture Moderate Slope D
- Vacant Moderate Slope D
- Vacant Steep Slope D
- Water Bodies

Sub Basin
4

Acreage
2270

Street Centerlines

N

0 6,500 13,000 26,000
Inches

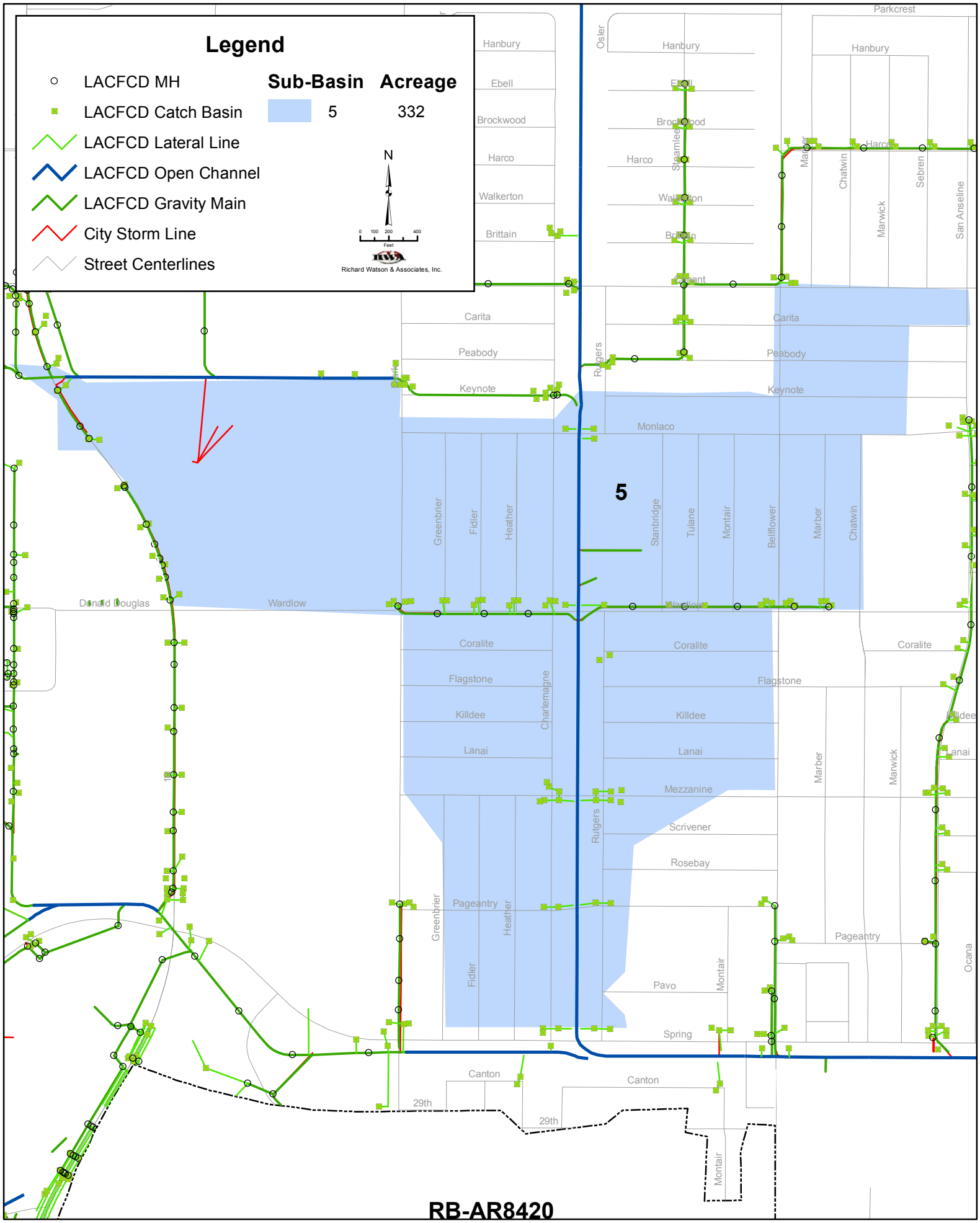
Richard Watson & Associates, Inc.

RB-AR8419

Prepared by: ECKERSALL, LLC

Date: 3/4/2014

Los Cerritos Channel TMDL Sub-Basin 5

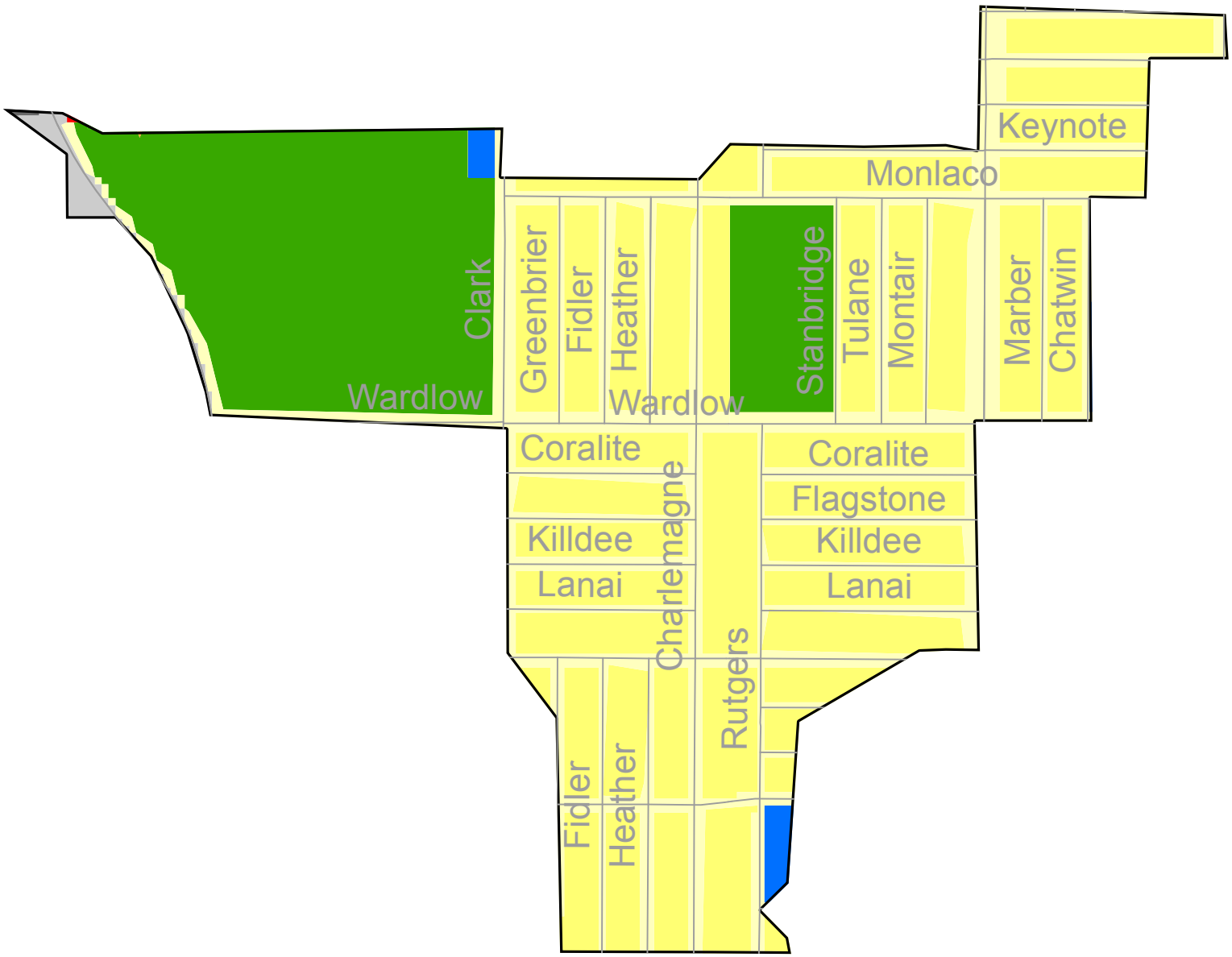


RB-AR8420

Prepared by: ECKERSALL, LLC

Date: 1/9/2014

Los Cerritos Channel TMDL Sub Basin 5
Hydrologic Response Units



Legend

Hydrologic Response Units

- HD SFR
- LD SFRM
- LD SFR Steep S
- MF
- Commercial
- Institutional
- Industrial
- Transportation
- Secondary Roads
- Agriculture Moderate Slope D
- Vacant Moderate Slope D
- Vacant Steep Slope D
- Water Bodies

Sub Basin
5

Acreage
332

Street Centerlines

N

0 2,600 5,200 10,400
Inches

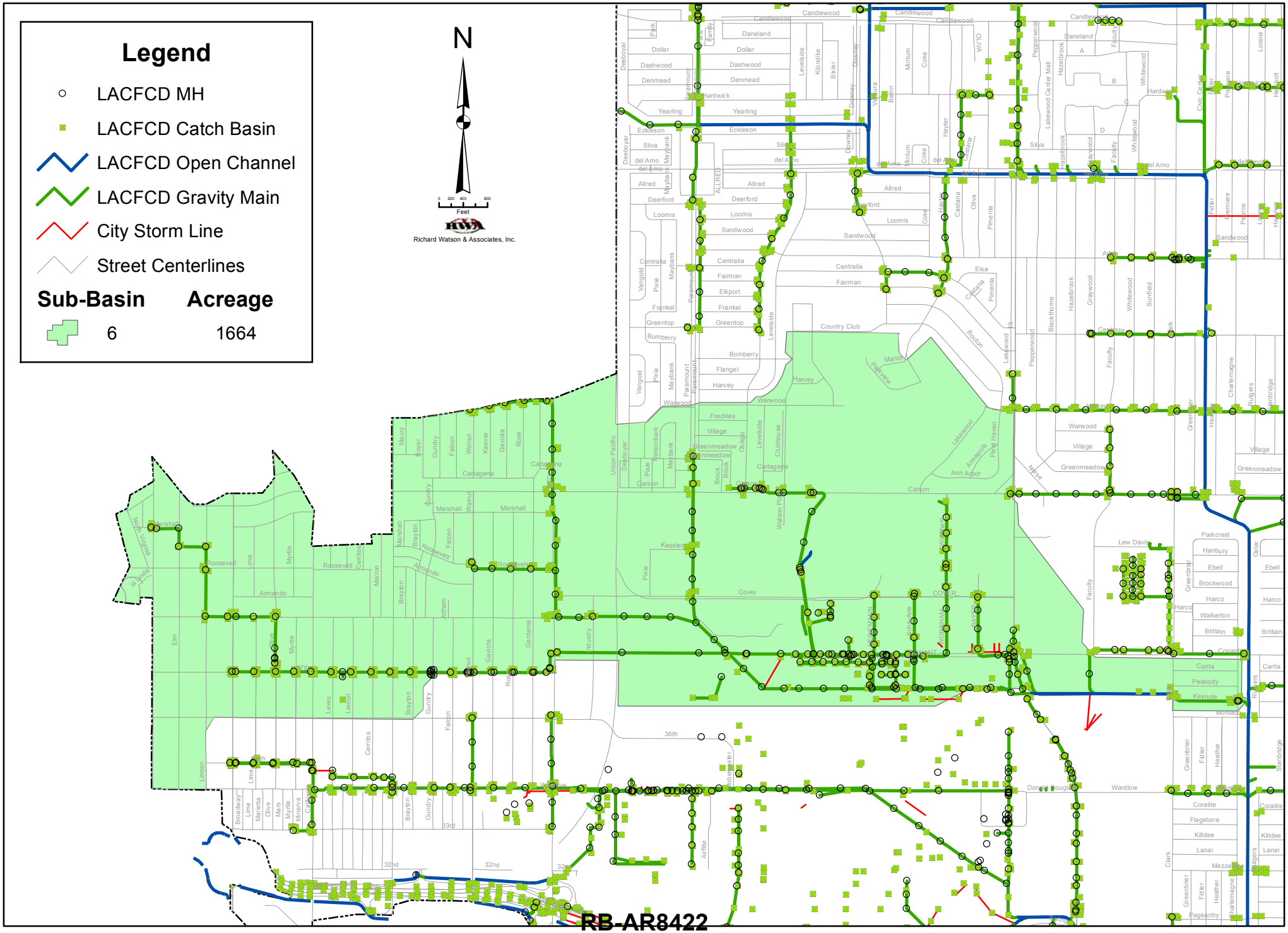
Richard Watson & Associates, Inc.

RB-AR8421

Prepared by: ECKERSALL, LLC

Date: 3/4/2014

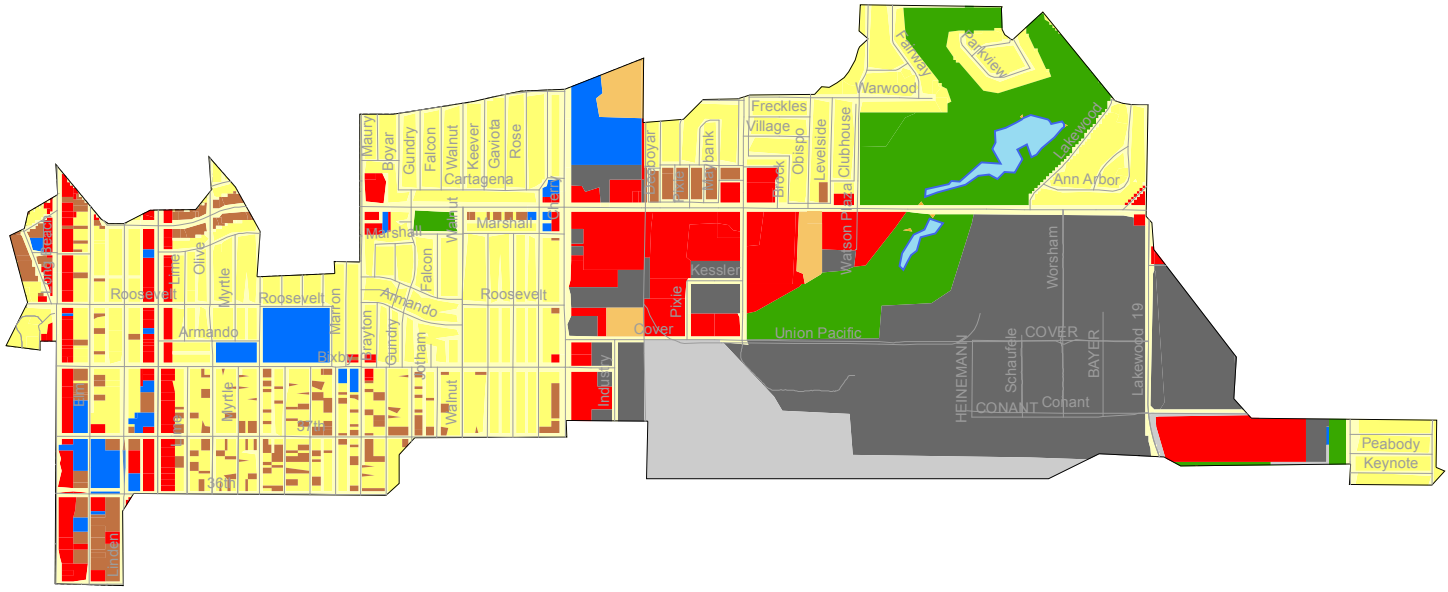
Los Cerritos Channel TMDL Sub-Basin 6



Prepared by: ECKERSALL, LLC

Date: 1/13/2014

Los Cerritos Channel TMDL Sub Basin 6
Hydrologic Response Units



Legend

Hydrologic Response Units

- HD SFR
- LD SFRM
- LD SFR Steep S
- MF
- Commercial
- Institutional
- Industrial
- Transportation
- Secondary Roads
- Agriculture Moderate Slope D
- Vacant Moderate Slope D
- Vacant Steep Slope D
- Water Bodies

Sub Basin
6

Acreage
1664

Street Centerlines

N

0 7,500 15,000 30,000
Inches

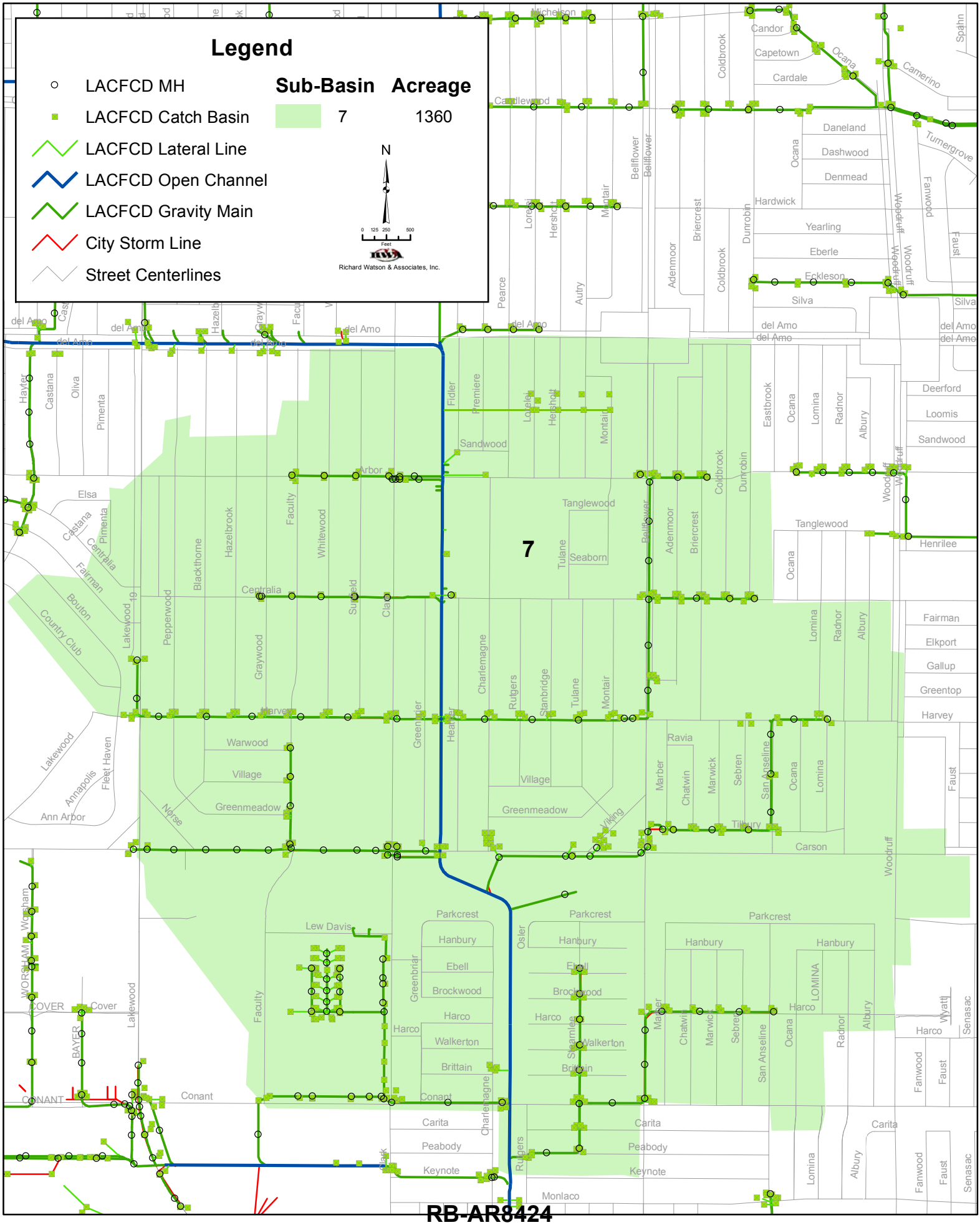
Richard Watson & Associates, Inc.

RB-AR8423

Prepared by: ECKERSALL, LLC

Date: 3/4/2014

Los Cerritos Channel TMDL Sub-Basin 7

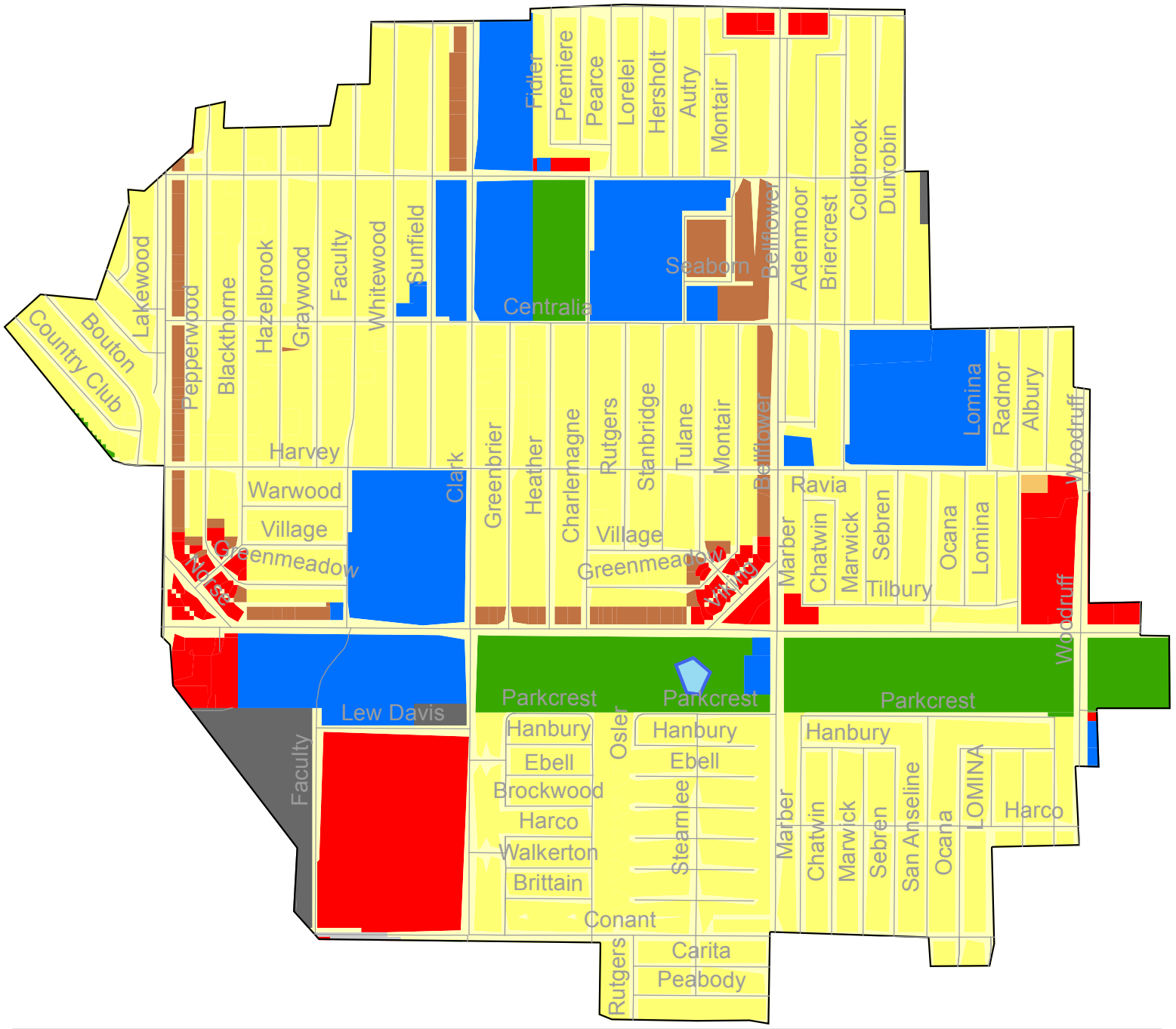


RB-AR8424

Prepared by: ECKERSALL, LLC

Date: 1/9/2014

Los Cerritos Channel TMDL Sub Basin 7
Hydrologic Response Units



Legend

Hydrologic Response Units

- HD SFR
- LD SFRM
- LD SFR Steep S
- MF
- Commercial
- Institutional
- Industrial
- Transportation
- Secondary Roads
- Agriculture Moderate Slope D
- Vacant Moderate Slope D
- Vacant Steep Slope D
- Water Bodies

Sub Basin
7

Acreage
1360

Street Centerlines

N

0 3,750 7,500 15,000
Inches

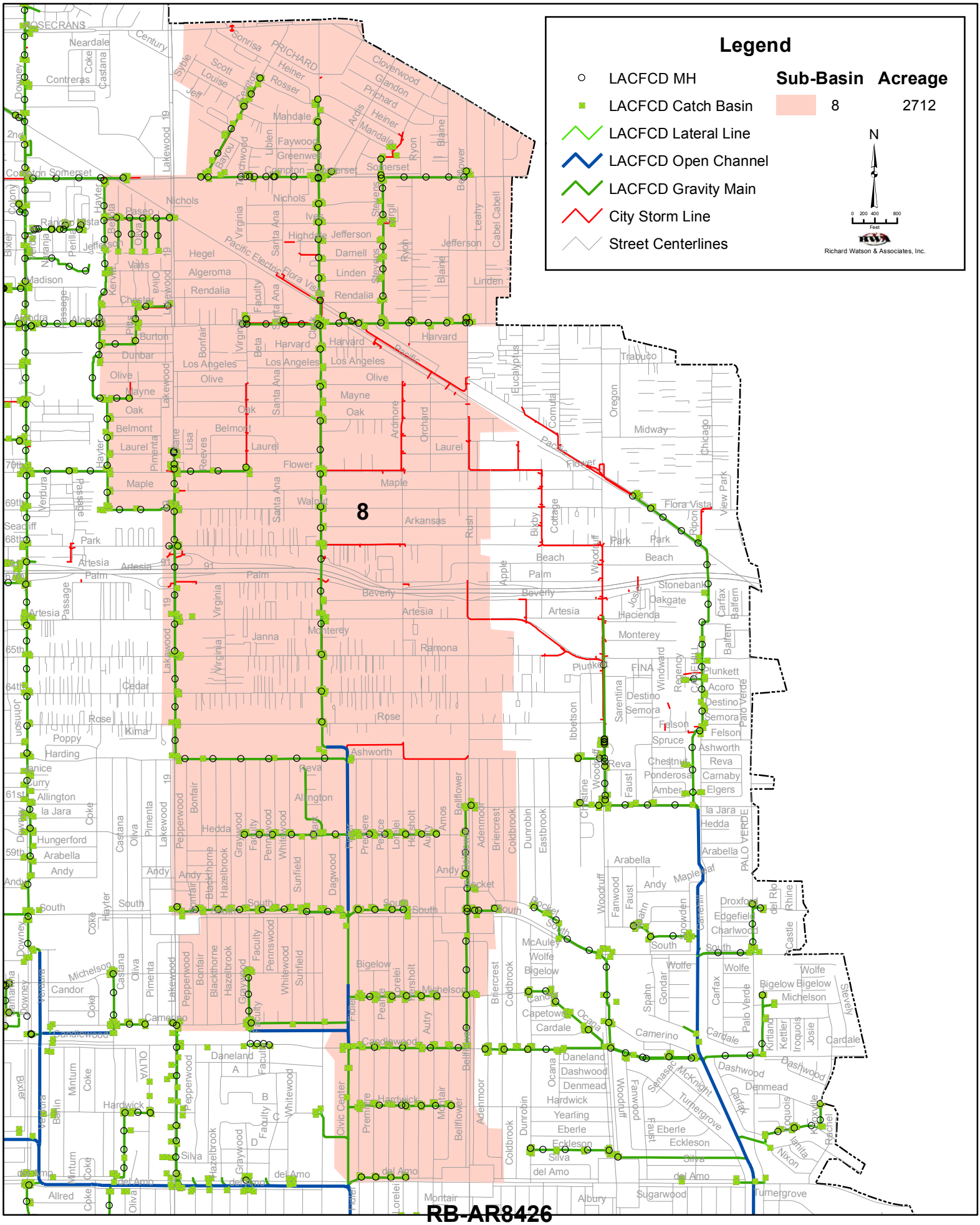
Richard Watson & Associates, Inc.

RB-AR8425

Prepared by: ECKERSALL, LLC

Date: 3/4/2014

Los Cerritos Channel TMDL Sub-Basin 8



RB-AR8426

Prepared by: ECKERSALL, LLC

Date: 1/9/2014

Los Cerritos Channel TMDL Sub Basin 8
Hydrologic Response Units

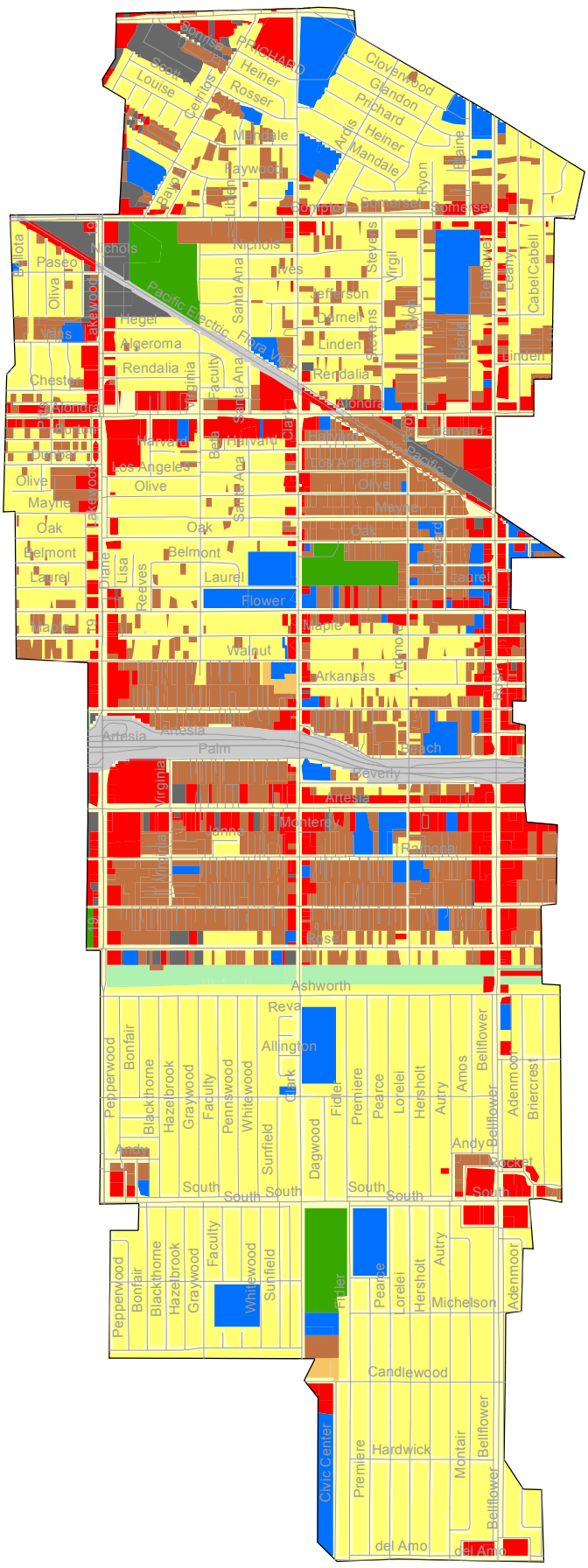
Legend

Hydrologic Response Units

- HD SFR
- LD SFRM
- LD SFR Steep S
- MF
- Commercial
- Institutional
- Industrial
- Transportation
- Secondary Roads
- Agriculture Moderate Slope D
- Vacant Moderate Slope D
- Vacant Steep Slope D
- Water Bodies

Sub Basin	Acreage
8	2712

- Street Centerlines



N

0 7,000 14,000 28,000
Inches

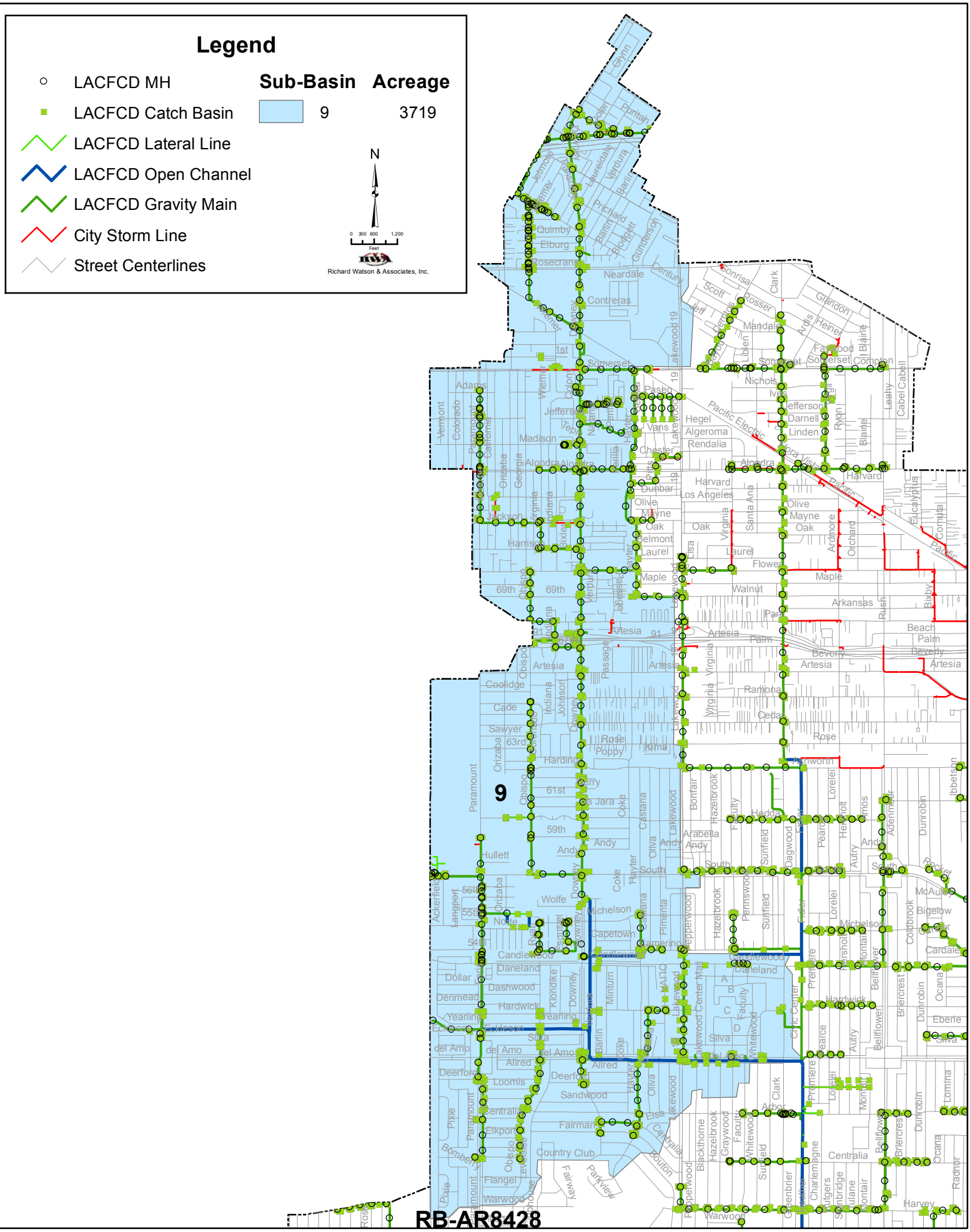
Richard Watson & Associates, Inc.

RB-AR8427

Prepared by: ECKERSALL, LLC

Date: 3/4/2014

Los Cerritos Channel TMDL Sub-Basin 9



Prepared by: ECKERSALL, LLC

Date: 1/9/2014

Los Cerritos Channel TMDL Sub Basin 9
Hydrologic Response Units

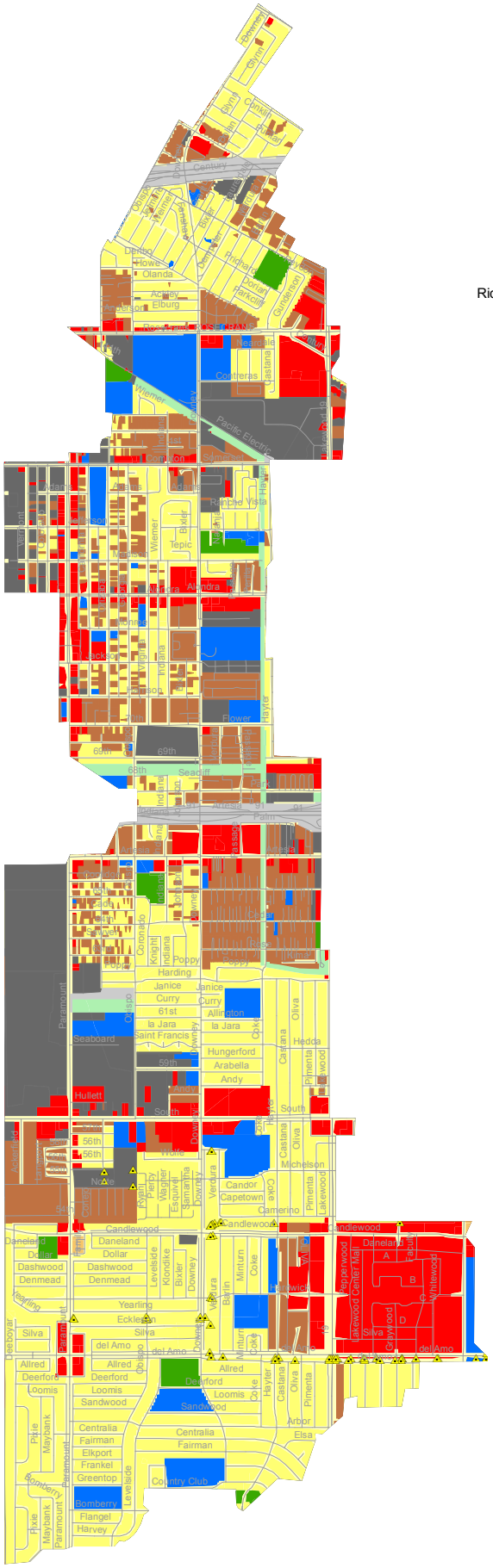
Legend

Hydrologic Response Units

- HD SFR
- LD SFRM
- LD SFR Steep S
- MF
- Commercial
- Institutional
- Industrial
- Transportation
- Secondary Roads
- Agriculture Moderate Slope D
- Vacant Moderate Slope D
- Vacant Steep Slope D
- Water Bodies

Sub Basin	Acreage
9	3718

- Street Centerlines



N

0 10,000 20,000 40,000
Inches

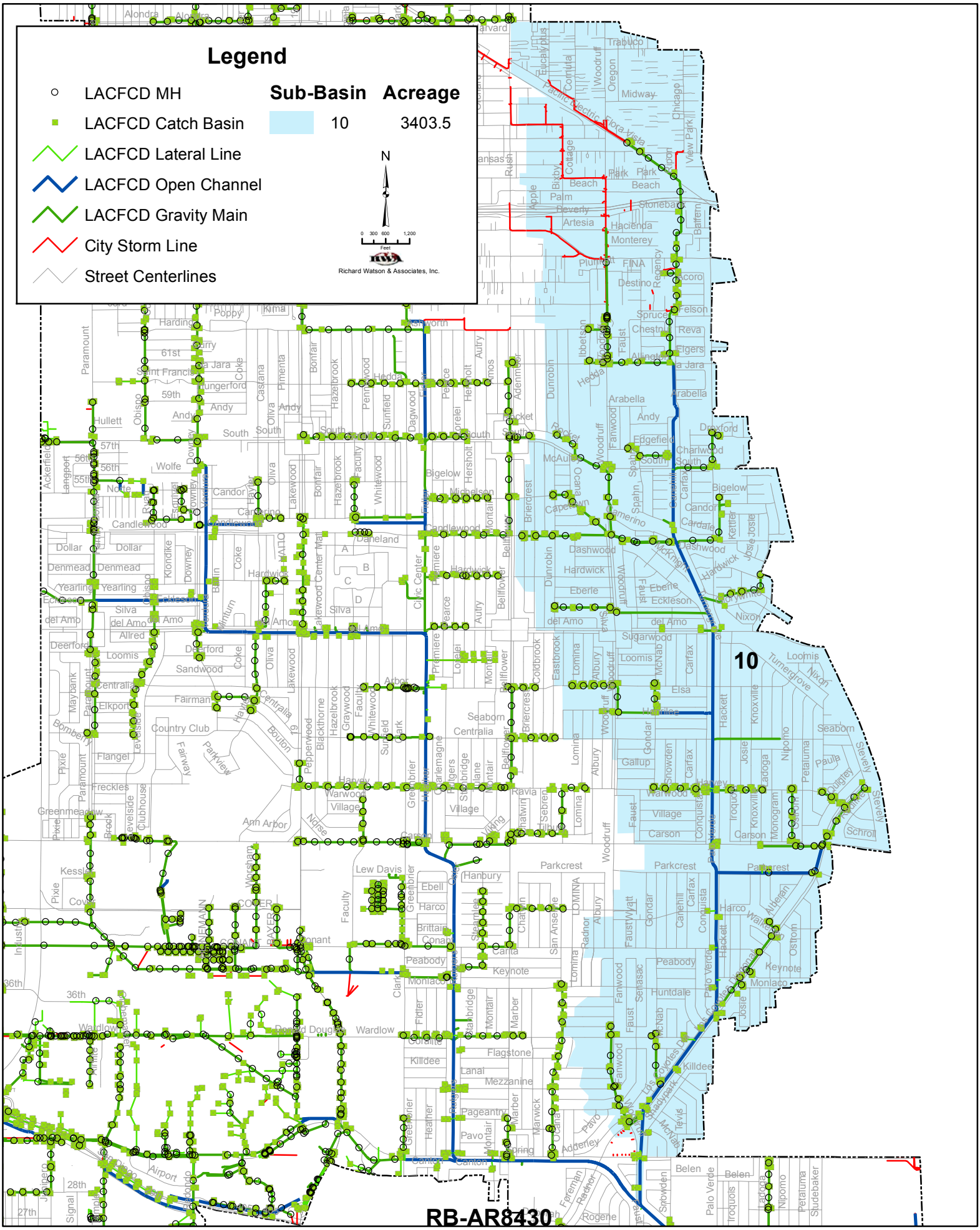
Richard Watson & Associates, Inc.

RB-AR8429

Prepared by: ECKERSALL, LLC

Date: 3/3/2014

Los Cerritos Channel TMDL Sub-Basin 10



Prepared by: ECKERSALL, LLC

Date: 1/9/2014

Los Cerritos Channel TMDL Sub Basin 10
Hydrologic Response Units

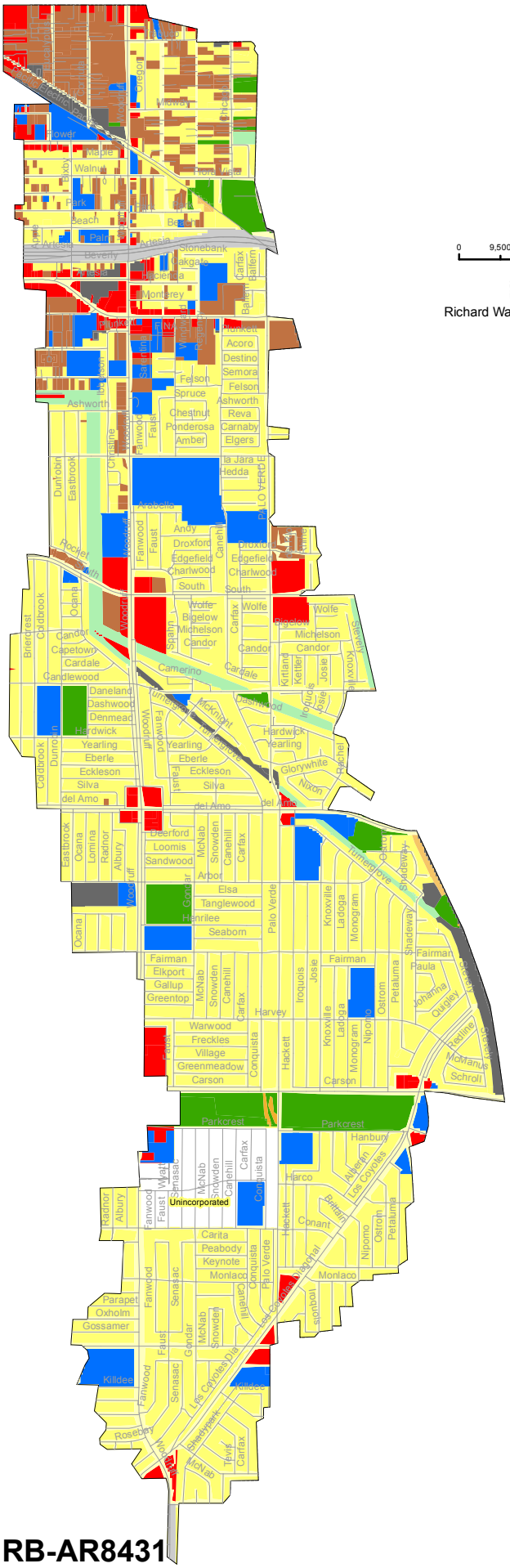
Legend

Hydrologic Response Units

- HD SFR
- LD SFRM
- LD SFR Steep S
- MF
- Commercial
- Institutional
- Industrial
- Transportation
- Secondary Roads
- Agriculture Moderate Slope D
- Vacant Moderate Slope D
- Vacant Steep Slope D
- Water Bodies

Sub Basin	Acreage
10	3403

Street Centerlines



N

0 9,500 19,000 38,000
Inches

Richard Watson & Associates, Inc.

RB-AR8431

Prepared by: ECKERSALL, LLC

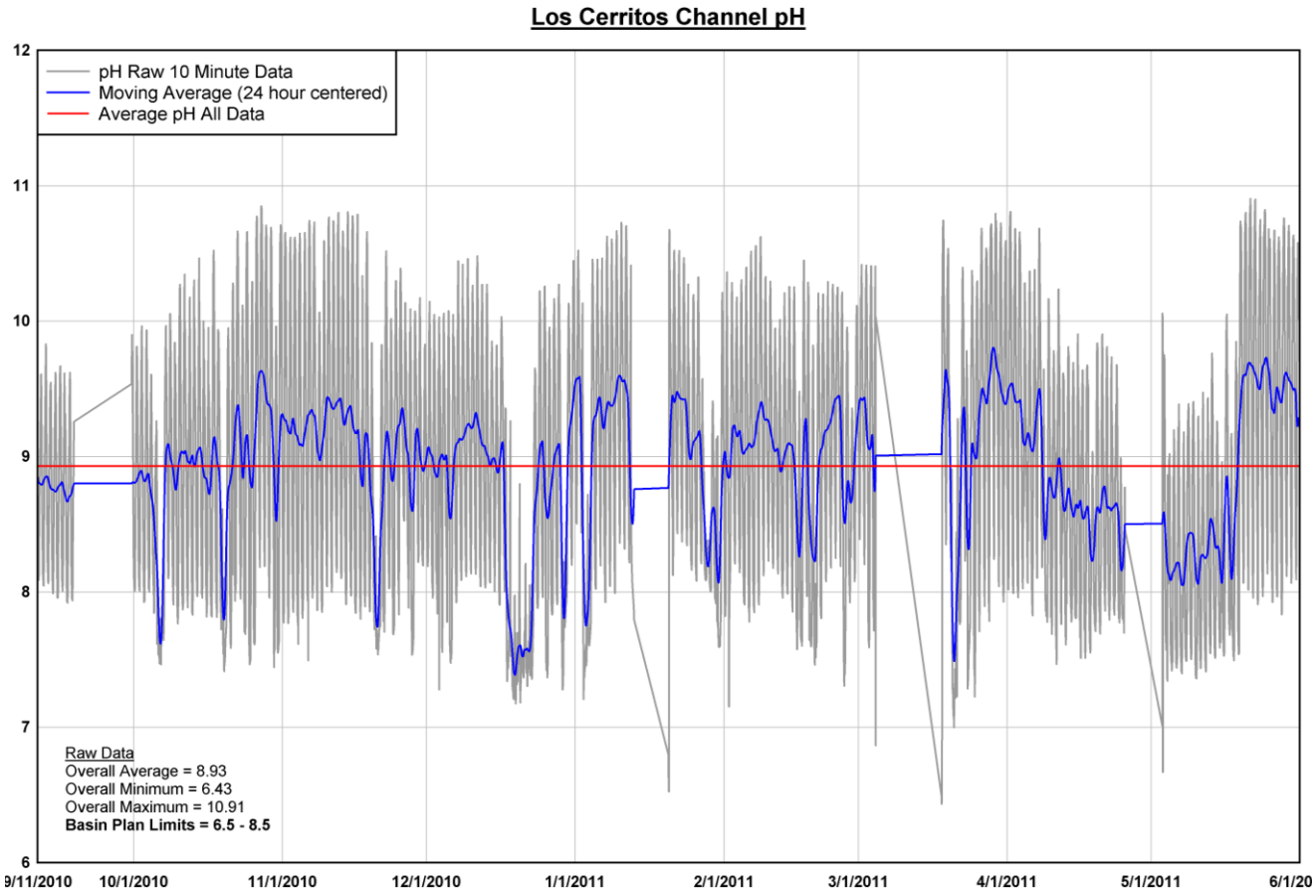
Date: 3/4/2014

ATTACHMENT C:

REVIEW OF LOS CERRITOS CHANNEL WATERSHED AMMONIA AND pH DATA

REVIEW OF LOS CERRITOS CHANNEL WATERSHED AMMONIA AND pH DATA

IMPLICATIONS FOR 303d DELISTING



Prepared For:
Los Cerritos Channel Watershed Group

Cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill and the Los Angeles County Flood Control District

KINNETIC LABORATORIES INCORPORATED

RWA

January, 2015

RB-AR8433

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ATTACHMENTS

Attachment 1. Summary of pH and Ammonia Data from City of Long Beach MS4 NPDES Storm Water Monitoring Site on the Los Cerritos Channel at Stearns Street along with Potential Toxicity Calculations (Excel Spreadsheet File).

Attachment 2. Kinnetic Laboratories, Inc. 2005. City of Long Beach Annual Stormwater Monitoring Report (2004/2005. Appendix B. Los Cerritos Channel Dry Weather Upstream Investigation

Attachment 3 Kinnetic Laboratories, Inc. 2009. City of Long Beach Annual Stormwater Monitoring Report (2008/2009). Appendix B. Los Cerritos Channel Dry Weather Copper and Bacteria Source Investigation.

Attachment 4. Kinnetic Laboratories, Inc. 2011. City of Long Beach Stormwater Monitoring Report. Appendix D. Continuous Measurement of pH and Temperature in the Los Cerritos Channel.

REVIEW OF LOS CERRITOS CHANNEL WATERSHED AMMONIA AND pH DATA

IMPLICATIONS FOR 303d DELISTING

Prepared for the Los Cerritos Channel Watershed Group
Cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill and the Los Angeles County Flood Control District

Prepared by Kinnetic Laboratories, Inc. and Richard Watson & Associates
January, 2015

1.0 INTRODUCTION AND PURPOSE

The freshwater portion of the Los Cerritos Channel was 303d listed by the Los Angeles Regional Water Quality Control Board for ammonia nitrogen (NH_3-N) in 2002 and pH in 2010. The purpose of this document is to summarize and analyze all available ammonia and pH data for the Los Cerritos Channel in order to consider delisting ammonia and pH.

This document summarizes ammonia and pH data from the Los Cerritos Channel developed as part of the City of Long Beach storm water monitoring program. The data set includes all storm water and dry weather monitoring conducted in the Los Cerritos Channel at the Stearns Street monitoring site since 2001. This site is the TMDL compliance site for the Los Cerritos Channel Metals TMDLs. In addition, several special studies conducted in the Los Cerritos Channel by the City of Long Beach's monitoring program have provided supplemental data on pH in the both the open channel and pipes with flows discharging to the open channel. Analysis of these data is carried out with respect to acute and chronic toxicity criteria as prescribed the Basin Plan amended that uses USEPA, 1999 criteria. In addition, the special studies carried out in the Los Cerritos Channel by the City of Long Beach's monitoring program have provided supplemental data on pH cycling in the concrete channels.

2.0 AVAILABLE DATA

Ammonia and pH values are from composited samples from the wet weather storm events that have been monitored since the year 2001. For dry weather, ammonia values are from 24-hour composite samples taken in the fall and spring of each monitoring year. For dry weather, field measurements of pH and temperature were used to assist in evaluating the criteria. All data has been reported in the City of Long Beach's annual NPDES storm water monitoring reports. These data are attached as Appendices to this document.

Several dry weather surveys taken early in the City of Long Beach's identified occasional high pH values in the open concrete channel at the Stearns Street monitoring site. In 2002 the Regional Board added a requirement to conduct an upstream investigation if pH values of 9.0 or greater were encountered during these dry weather surveys at the Stearns Street monitoring site. Subsequently, elevated pH values measured at Stearns Street prompted an upstream survey initially in the concrete channel just above the monitoring site, and subsequently extending up into the Los Cerritos Channel Watershed tributaries (Kinnetic Laboratories, 2005), (Attachment 1). High pH values (9.45 to 10.9 during the day) were found in all the upstream channels, and furthermore, pH was found to rise during the day and drop at night. The results of this investigation supported the hypothesis that the elevated pH values in the shallow flow in the open concrete channels are caused by photosynthetic activity. Attached algae on the channel bottom in the channel consume carbon dioxide (CO_2) while undergoing photosynthesis. Algal growths typical of open channels during dry weather conditions cause high concentrations of dissolved oxygen in the water. The removal of CO_2 from the water causes bicarbonate and carbonate ions to react with hydrogen ions

RB-AR8435

(H^+) to form more CO_2. The loss of H^+ from the water causes the pH to increase. During the night, respiration of the algae and bacteria in the channel cause the CO_2 to be released and oxygen to be consumed. This allows the pH drop during the night. The diurnal cycling of pH is a common occurrence in open waterways. Alkalinity provides buffering capacity such that high alkalinity water should be expected to have less extreme diurnal changes in pH.

A Los Cerritos Channel dry weather copper and bacteria upstream source investigation again documented the occurrence of elevated pH values (Kinnetic Laboratories, 2009, Attachment 2). Importantly it also documented that the elevated pH values occurred only in the open channels, but not in the outfalls draining into the channel as these pipes were not subject to sunshine necessary to support algae growth.

Finally, another special study was conducted (Kinnetic Laboratories, 2011, Attachment 3) to provide better documentation of the daily fluctuations in pH that occur over the course of a year. This study also showed excessively high pH values within the open portions of the channel, not the outfalls. A precision and stable pH logger was calibrated and installed on a bridge abutment under the Stearns Street Bridge to provide a better understanding of pH cycling. The meter was briefly removed and checked with pH standards and a laboratory thermometer during each maintenance visit. Time series records of pH, temperature, solar radiation and rainfall in the Los Cerritos Channel at Stearns Street resulted from this study that extended from September 10, 2010 to June 1, 2011. Results were as follows:

- Both pH and temperature records showed repetitive, pronounced 24-hour sinusoidal oscillations that supported the earlier conclusion that they are controlled by natural biological and physical processes common to all sites with similar conditions within the concrete channels (Figure 1).
- These 24-hour signals are muted and depressed by major storm flows in the Channel, but also immediately continue during the intervening winter dry periods, even in the absence of major filamentous algal mats (Figures 1 and 2).
- Hourly averaged pH values in the channel were pH 7.98 for rain days, pH 9 for dry days, and pH 8.93 as an overall average of all data, but with maximum values during the days of pH 10.49 to 10.91. Minimum values were from pH 6.43 to 7.04 for the various wet/dry categories (Figure 3).
- With the pH average or median just below 9.0 for all days other than during storm events, the upper limits of the Basin Plan water quality objective of pH 8.5 is routinely exceeded most of the year during dry weather (inclusive of summer dry and winter dry periods).

Recent inspections of outfalls within the Los Cerritos Channel Watershed (Kinnetic Laboratories, 2015) have provided further evidence that pH (using narrow range pH paper as an indicator) is not elevated in any outfalls with flowing or seeping discharges into the open channel.

3.0 ANALYSIS OF pH and AMMONIA DATA

Toxicity Analysis. Ammonia and pH data have been summarized in spreadsheets together with calculations with respect to toxicity criteria and are provided as Attachment 4. Aquatic life water quality criteria from the USEPA document (USEPA, 1999) were used to calculate acute and chronic toxicity as a function of temperature and pH in order to be consistent with the current Basin Plan. Calculations made with the latest USEPA guidance document (USEPA, 2013) yielded similar results for acute toxicity and only showed a few more chronic violations at a temperature of 15 ^{0}C. These latter calculations are also included in the attached Excel Spreadsheet (Attachment 4).

For wet weather, results of the toxicity calculations show only one exceedance of acute and chronic ammonia criteria occurred out of 45 records obtained at the Stearns Street monitoring site during the last 13 years. These results are summarized in Table 1 below and are fully documented in the Excel spreadsheet provided in Attachment 4.

For dry weather, ammonia concentrations in 24-hour composite samples were paired with field measurements of pH data available from the Stearns Street monitoring station at the lower end of the

freshwater portion of the Los Cerritos Channel watershed monitoring. The dry weather results for this site are summarized in Table 2 below as well as in the spreadsheet of Attachment 4.

For dry weather, the data available from this site show that no acute toxicity has been encountered. Ammonia chronic aquatic life criteria were not historically exceeded frequently for dry weather discharges from the Los Cerritos Channel as measured at the Stearns Street monitoring site. However, for the past few years, dry weather chronic exceedances have been observed more frequently with four chronic exceedances having been recorded since 2009 at the higher temperature of 20 ^{0}C. These have been due to slowly rising ammonia concentrations in combination with high pH values in the channel. This increase has been associated with dry weather base flows which have decreased to approximately 10 to 20% of the flows measured in 2009 and decreased by 80% to 90% compared to dry weather flow measurements taken in 2003. One recent winter dry weather survey (January, 2015) resulted in higher flows and lower pH values. These factors resulted in no exceedances of chronic ammonia criteria.

Ammonia Concentrations. Ammonia concentrations of NH_3-N measured in the channel have been low, generally in the range of 0.2 to 0.7 mg/l with higher values generally not exceeding about 1.0 mg/l. In contrast, the Los Angeles River TMDL established WLAs for NH_3-N for a 1-hour average of 8.7mg/l and a 30 day average of 2.4 mg/l.

However, natural pH excursions in the Los Cerritos Channel low-flow summer season can cause dry weather exceedances with respect to chronic toxicity as high pH results in most of the ammonia being converted to unionized ammonia which is the most toxic form.

Flows to the Channel from outfalls during the dry season are well within the limits of the Basin Plan for pH (Kinnetic Laboratories 2009, 2011, 2015). Special upstream studies for copper sources done as part of the Long Beach storm water monitoring program, and recent upstream outfall inspections carried out for the new permit requirements showed that these discharges are almost uniformly close to pH 7.0 to 7.5 (Kinnetic Laboratories, 2015).

The dry weather channel has low flows during the summer which consist of a couple of inches of water running over a bottom attached algae mat. During the dry season, temperature and pH have strong diurnal patterns driven by primary production of the algal mats in the shallow water. During the day the algae causes dissolved oxygen levels to become supersaturated. The removal of CO_2 associated with the algal production causes pH to elevate reaching a peak in the mid-afternoon. Similarly, temperatures also peak around this time. At night, both temperature and pH drop significantly due to microbial consumption and respiration. We expect that our point measurements of pH and temperature are more likely to be biased high relative to 24-hour averages or the 30-day averages that the chronic criteria are expected to use.

These natural diurnal cycles in pH have been documented in the Los Cerritos Channel by use of a precision recording pH meter that was deployed at the Stearns Street monitoring site in early September 2010 and recorded continually until late May 2011, thus covering both dry summer season conditions and winter wet seasons for both storm events and wet weather dry seasons. These data were reported in the 2010-2011 Long Beach annual monitoring report and Appendix D of this annual report is attached to this present document. The results of this study showed that pH varied diurnally in Los Cerritos channel from about 6.5 to 10.8 with an average of about 9.0 unless interrupted by rain events. The amplitude of these pH variations was large because of the low volume of flowing water flowing above a healthy mat of attached algae.

4.0 CONCLUSIONS

From analyses of available data, the following conclusions can be drawn:

- Large excursions of pH occur in the Los Cerritos Channel with the pH average or median just below 9.0 for all days other than during storm events. The upper limits of the Basin Plan water quality objective of pH 8.5 is routinely exceeded most of the year during dry weather (inclusive of summer dry and winter dry periods).
- High excursions of pH cause exceedances of the chronic ammonia criteria within the Channel even though ammonia concentrations are generally low.

The Basin Plan states that the pH of inland surface waters shall not be depressed below 6.5 or raised above 8.5 as a result of waste discharges. Ambient pH levels shall not be changed more than 0.5 units from natural conditions as a result of waste discharges. Data reviewed above show that the high pH excursions are not caused by inputs of high pH wastewaters. Rather, the large pH excursions observed during dry weather flow conditions are the result of natural diurnal pH cycling caused by photosynthesis and respiration processes.

Data from the Long Beach stormwater monitoring program plus that of special studies have shown that exceedances of ammonia chronic aquatic life criteria are not caused by either excessive NH_3-N concentrations nor by waste inputs. The exceedance of chronic ammonia criteria are caused by the natural high excursions of pH due to photosynthesis/respiration cycles in these channels.

5.0 TABLES AND FIGURES

Table 1. WET WEATHER – Ammonia Criteria Exceedances at Stearns Street Compliance Site

Evaluation of Basin Plan Criteria

Wet Season	Measured Values		Acute Criteria		Chronic Criteria based upon Two Selected Temperatures			
					T=15 degrees C		T=20 degrees C	
Storm Year	NH3-N	pH	1-hour avg	Exceed (Y/N)	30-day avg	Exceed (Y/N)	30-day avg	Exceed (Y/N)
LB-01	1.20	6.90	39.16	N	5.93	N	4.30	N
LB-01	0.87	7.20	29.54	N	5.22	N	3.78	N
LB-01	0.73	7.00	36.09	N	5.73	N	4.15	N
LB-01	0.54	7.30	26.21	N	4.92	N	3.57	N
LB-01	0.48	7.20	29.54	N	5.22	N	3.78	N
LB-02	1.50	7.40	22.97	N	4.59	N	3.32	N
LB-02	0.69	7.40	22.97	N	4.59	N	3.32	N
LB-03	0.90	6.80	42.00	N	6.10	N	4.42	N
LB-03	0.51	6.70	44.57	N	6.25	N	4.52	N
LB-03	0.29	6.20	53.17	N	6.66	N	4.82	N
LB-03	0.29	6.30	51.97	N	6.61	N	4.79	N
LB-04	0.72	7.08	33.52	N	5.54	N	4.02	N
LB-04	0.39	8.03	7.94	N	2.26	N	1.64	N
LB-04	0.23	6.71	44.32	N	6.23	N	4.52	N
LB-05	2.50	7.07	33.84	N	5.57	N	4.03	N
LB-05	0.19	6.80	42.00	N	6.10	N	4.42	N
LB-05	0.12	7.02	35.46	N	5.68	N	4.12	N
LB-05	0.26	7.02	35.46	N	5.68	N	4.12	N
LB-06	0.73	7.50	19.89	N	4.23	N	3.06	N
LB-06	0.39	8.27	5.00	N	1.55	N	1.12	N
LB-06	0.24	6.80	42.00	N	6.10	N	4.42	N
LB-06	0.31	7.40	22.97	N	4.59	N	3.32	N
LB-07	0.62	8.04	7.79	N	2.23	N	1.61	N
LB-07	0.93	8.87	1.64	N	0.57	Y	0.42	Y
LB-08	1.40	7.07	33.84	N	5.57	N	4.03	N
LB-08	0.48	7.54	18.72	N	4.08	N	2.96	N
LB-08	0.37	6.56	47.67	N	6.41	N	4.64	N
LB-08	0.29	7.82	11.71	N	3.01	N	2.18	N
LB-09	0.29	6.84	40.89	N	6.04	N	4.37	N
LB-09	0.33	7.62	16.49	N	3.78	N	2.74	N
LB-10	0.64	7.39	23.29	N	4.62	N	3.35	N
LB-10	0.51	8.07	7.36	N	2.13	N	1.54	N
LB-10	0.19	7.51	19.59	N	4.19	N	3.04	N
LB-10	0.24	7.48	20.49	N	4.30	N	3.12	N
LB-11	0.80	7.60	17.03	N	3.85	N	2.79	N
LB-11	1.00	7.50	19.89	N	4.23	N	3.06	N
LB-11	0.38	7.80	12.14	N	3.09	N	2.23	N
LB-11	0.16	7.50	19.89	N	4.23	N	3.06	N
LB-12	0.77	7.14	31.54	N	5.39	N	3.90	N
LB-12	0.47	7.50	19.89	N	4.23	N	3.06	N
LB-12	0.66	7.61	16.76	N	3.82	N	2.76	N
LB-12	0.53	7.40	22.97	N	4.59	N	3.32	N
LB-13	0.30	6.92	38.56	N	5.89	N	4.27	N
LB-14	0.50	7.26	27.54	N	5.05	N	3.66	N
LB-14	0.58	7.42	22.34	N	4.52	N	3.27	N
AVG-	**0.59**	**7.30**						

Table 2. **DRY WEATHER – Ammonia Criteria Exceedances at Stearns Street Compliance Site**

Evaluation of Basin Plan Criteria

Dry Season	Measured Values		Acute Criteria		Chronic Criteria based upon Two Selected Temperatures			
					T=15 degrees C		T=20 degrees C	
Storm Year	NH3-N	pH	1-hour avg	Exceed (Y/N)	30-day avg	Exceed (Y/N)	30-day avg	Exceed (Y/N)
LB-01	0.74	8.88	1.61	N	0.56	Y	0.41	Y
LB-02	0.58	8.17	6.07	N	1.82	N	1.32	N
LB-02	0.15	8.72	2.13	N	0.73	N	0.53	N
LB-03	0.17	8.40	3.88	N	1.25	N	0.91	N
LB-03	0.16	8.29	4.81	N	1.50	N	1.09	N
LB-04	0.10	8.45	3.53	N	1.15	N	0.83	N
LB-04	0.10	8.82	1.78	N	0.62	N	0.45	N
LB-05	0.14	8.98	1.37	N	0.49	N	0.35	N
LB-05	0.12	8.21	5.62	N	1.71	N	1.24	N
LB-06	0.10	8.31	4.62	N	1.45	N	1.05	N
LB-06	0.10	8.80	1.84	N	0.64	N	0.46	N
LB-07	0.16	8.75	2.01	N	0.69	N	0.50	N
LB-07	0.11	8.52	3.08	N	1.02	N	0.74	N
LB-08	0.13	8.14	6.43	N	1.91	N	1.38	N
LB-08	0.15	8.74	2.05	N	0.71	N	0.51	N
LB-09	0.25	8.69	2.24	N	0.77	N	0.56	N
LB-09	0.10	8.25	5.20	N	1.60	N	1.16	N
LB-10	0.24	9.38	0.80	N	0.29	N	0.21	Y
LB-10	0.22	9.63	0.63	N	0.24	N	0.17	Y
LB-11	0.32	8.15	6.31	N	1.88	N	1.36	N
LB-11	0.11	8.77	1.94	N	0.67	N	0.49	N
LB-12	0.30	9.15	1.06	N	0.38	N	0.28	Y
LB-12	0.24	8.69	2.24	N	0.77	N	0.56	N
LB-13	0.29	8.01	8.25	N	2.33	N	1.68	N
LB-13	0.41	7.52	19.30	N	4.16	N	3.01	N
LB-14	0.44	8.16	6.19	N	1.85	N	1.34	N
LB-14	0.66	8.7	2.20	N	0.75	N	0.55	Y
LB-15	0.10	8.08	7.22	N	2.10	N	1.52	N
AVG-	**0.24**	**8.55**						

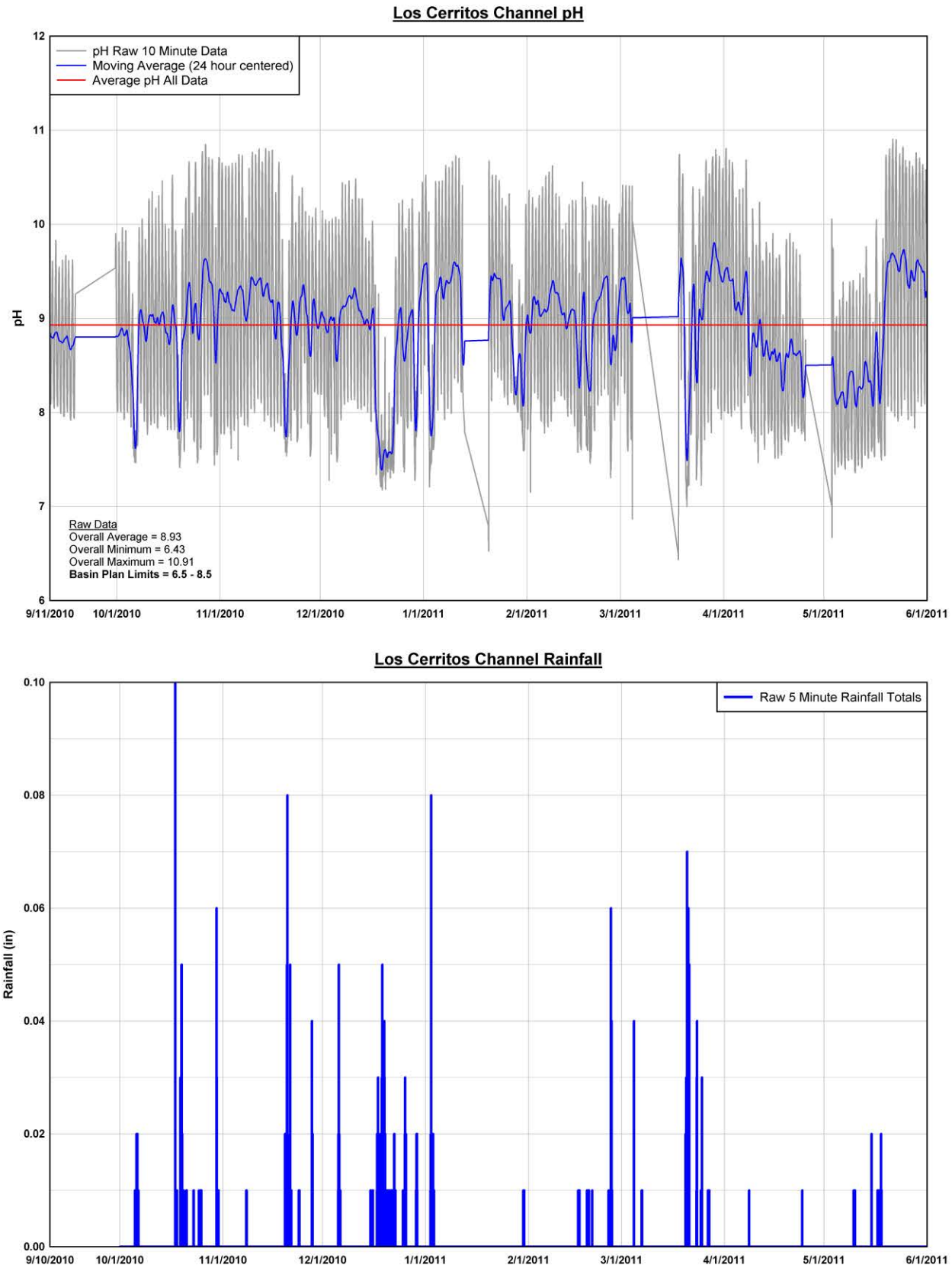

Figure 1. Continuous pH Record at Cerritos Channel Stearns Street Monitoring Site (Above) along with Rainfall (Below), September 10, 2010 to June 1, 2011

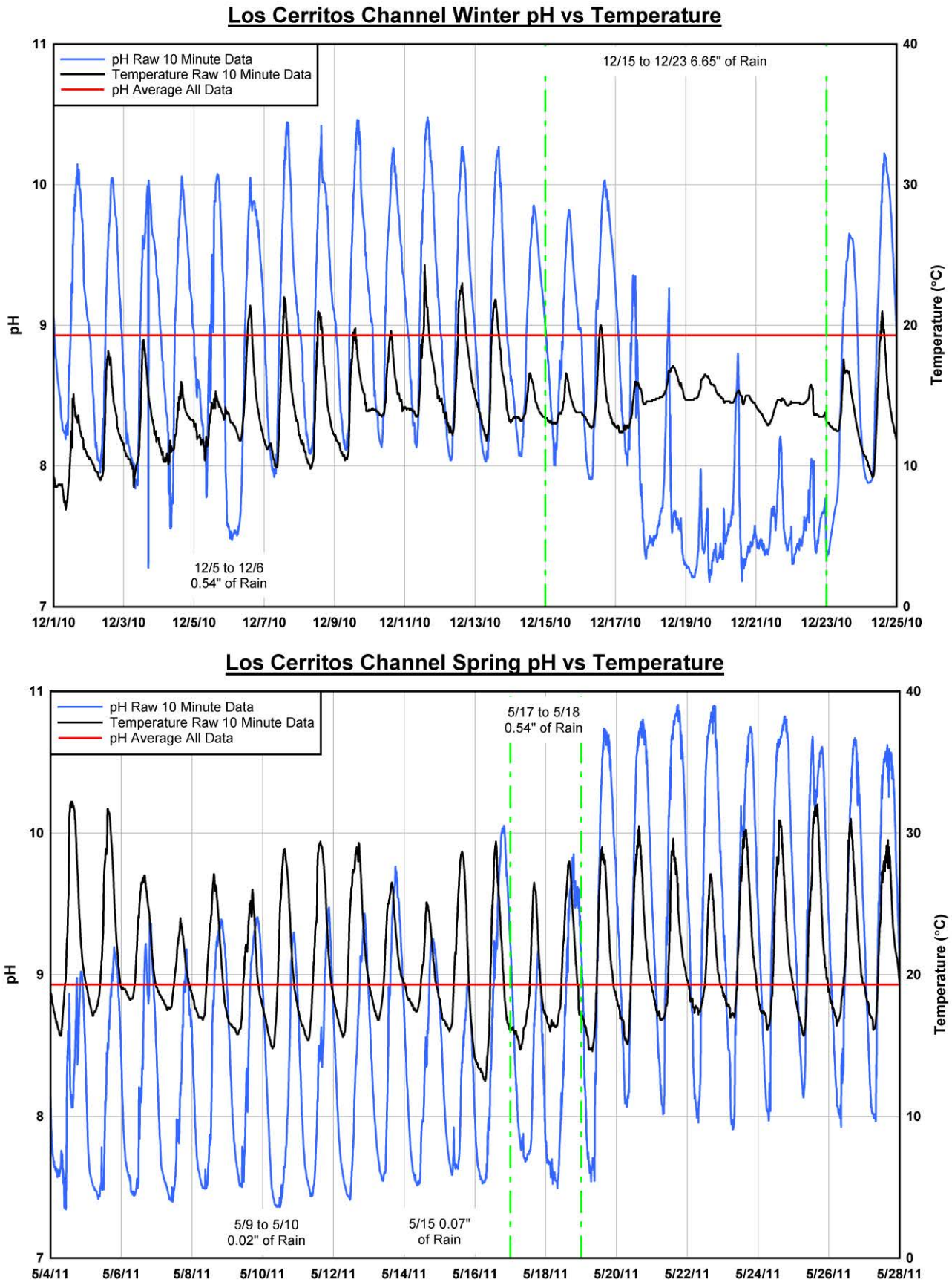

Figure 2. Cycling of pH and Temperature in Winter and Summer

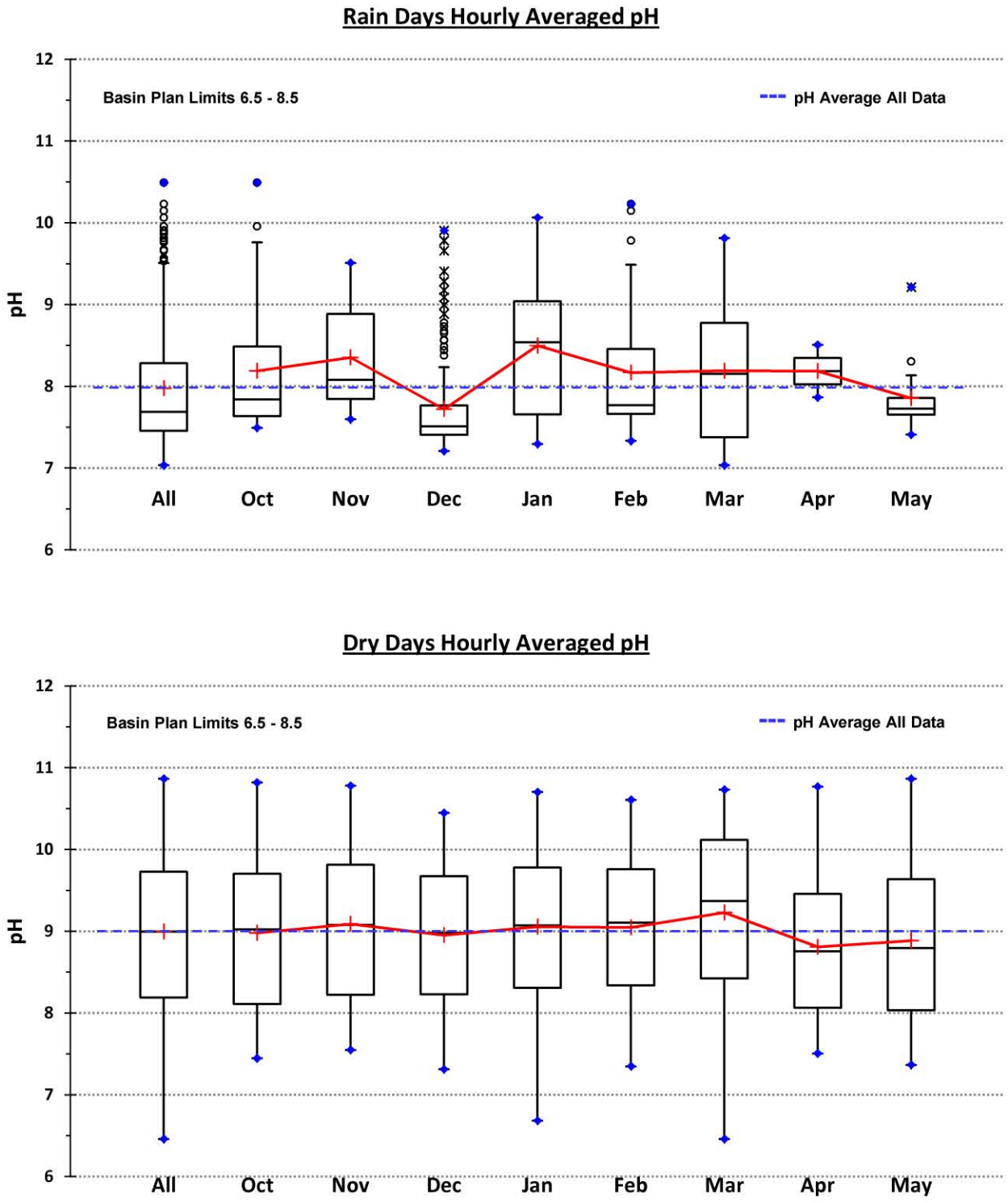

Figure 3. Box Plots of Averaged pH for Rain Days (Above) and for Dry Days (Below)

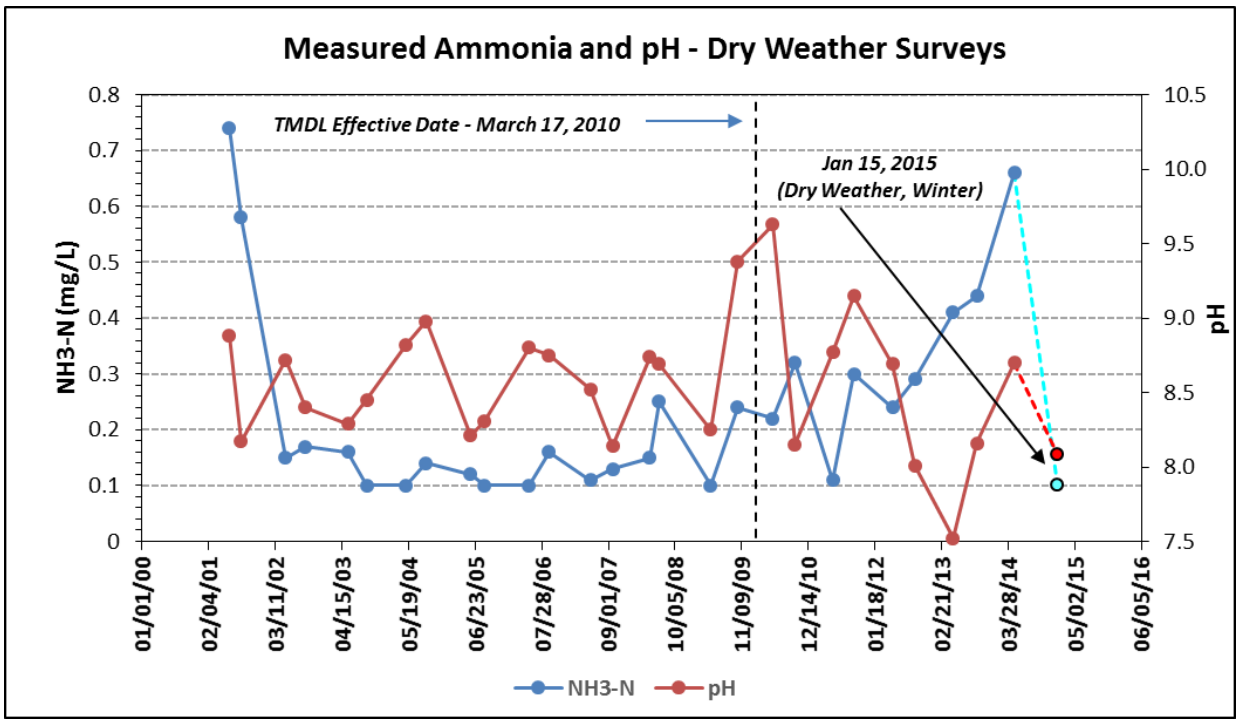

Figure 4. **Los Cerritos Channel Ammonia Nitrogen and pH at Stearns Street**

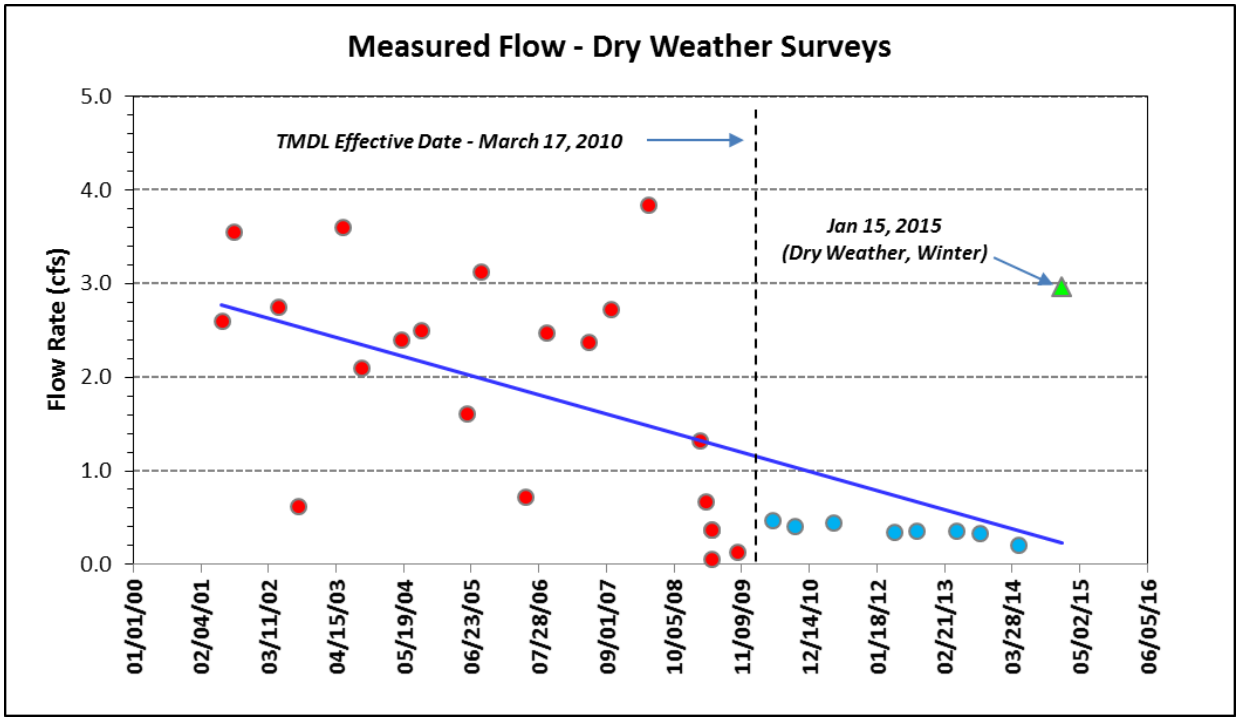

Figure 5. **Measured Dry Weather Flow at Stearns Street in the Los Cerritos Channel.**

6.0 REFERENCES CITED

Kinnetic Laboratories, Inc. 2005. City of Long Beach Stormwater Monitoring Report 2004/2005. NPDES Permit No. CAS004003. Appendix B. Los Cerritos Channel Dry Weather Upstream Investigation.

Kinnetic Laboratories, Inc. 2009. City of Long Beach Stormwater Monitoring Report 2008/2009. NPDES Permit No. CAS004003. Appendix B. Los Cerritos Channel Dry Weather Copper and Bacteria Source Investigation.

Kinnetic Laboratories, Inc. 2011. City of Long Beach Stormwater Monitoring Report 2010/2011. NPDES Permit No. CAS004003. Appendix D. Continuous Measurement of pH and Temperature in the Los Cerritos Channel.

Kinnetic Laboratories, Inc., 2015. Storm Water Outfall Inspections Los Cerritos Channel Watershed. Prepared for the Gateway Water Authority, Cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill and the Los Angeles County Flood Control District.

United States Environmental Protection Agency. 1999. 1999 Update of Ambient Water Quality Criteria for Ammonia. EPA-822-R-99-014. National Technical Information Service, Springfield, VA.

USEPA, 2013. Aquatic Life Ambient Water Quality Criteria for Ammonia – Freshwater, 2013. United States Office of Water 4304T. EPA 822-R-13-001, April 2013. Environmental Protection Agency.

RB-AR8445

ATTACHMENTS

Attachment 1. **Kinnetic Laboratories, Inc. 2005. City of Long Beach Annual Storm Water Monitoring Report (2004/2005. Appendix B. Los Cerritos Channel Dry Weather Upstream Investigation**

Reference: Kinnetic Laboratories, Inc. 2005. City of Long Beach Stromwater Monitoring Report 2004/2005. NPDES Permit No. CAS004003. Appendix B. Los Cerritos Channel Dry Weather Upstream Investigation.

RB-AR8446

Appendix B

Los Cerritos Channel Dry Weather Upstream Investigation

APPENDIX B
LOS CERRITOS CHANNEL DRY WEATHER UPSTREAM INVESTIGATION

1.0 DRY WEATHER UPSTREAM INVESTIGATIONS

Several dry weather surveys conducted early in the program found occasional high pH values at monitoring sites located in open concrete channels. In 2002, the Regional Board added a requirement to conduct upstream investigations if pH values of 9.0 or greater were encountered during the surveys. Elevated pH values were measured in the composite dry weather sample taken at the Los Cerritos Channel station during the August 31, 2004. Upon measurement of the composite bottle pH, an immediate upstream investigation was initiated.

The field crew initially walked approximately 1000 feet upstream in the Los Cerritos Channel to look for possible sources. Measurements of pH tended to increase from 10.02 at the monitoring site to 10.42 to 10.52 at all upstream sites. No sources of water with elevated pH were identified. The crew then went upstream to Spring Street near the junction of the Los Cerritos and Palo Verde Channels. Similar, high pH measurements (10.14 to 10.43) were found in waters above the confluence of these channels, at the mouth of the Palo Verde Channel, and downstream of the confluence. Further investigations were conducted upstream of this site in the vicinity of the Clark Channel. The pH measurements in this region of the Los Cerritos Channel were lower (9.30 to 9.82) but still elevated. Further investigation was halted due to the late hour and approaching darkness.

Since the source could not be quickly located, a follow-up watershed investigation was conducted on September 3, 2004. Eleven sites (Figure 1, Table 1) were visited throughout the watershed including the two major tributaries to the Los Cerritos Channel starting from the Los Cerritos Channel monitoring site (Figure 2). Field estimates of flow were taken using conventional dry weather flow procedures. The average width and depth of the flow were measured for a 10 foot section of the channel. Velocity over the 10-foot section was measured based upon measuring the time required for particles to drift through the segment. Dissolved oxygen was measured with a YSI Model 58 meter. Temperature, salinity and pH were measured with a YSI Model 63 meter. Water samples for measurement of alkalinity were taken for measurement in the laboratory.

Partial measurements were taken at two additional sites. A pH measurement was taken from a trickle flow entering the Clark Channel beneath the Conant Street Bridge (Clark – Outfall; Figure 3). The measured value of 8.17 from this small pipe was the lowest value recorded during the survey. Although pH of water from this outfall was within normal ranges, this site had an unusual mineral formation. In another case only flow was measured at the mouth of the Palo Verde Channel for comparison with flow in the Los Cerritos Channel downstream of the junction of the two conveyances.

The results of this survey are shown in Table 2 and Figures 4 through 8. The survey showed evidence of high pH water throughout the open conveyances of the Los Cerritos Channel and both major tributaries, the Palo Verde and Clark Channels. Measured pH values typically ranged from 9.45 to 10.90. An initial pH check conducted in the morning (0845) at site CC1-A resulted in a pH of 8.93, just under the trigger of 9.0 that was set to initiate upstream investigations. Three hours later (1146), pH had risen to 9.50 and the upstream investigation was started. Flows generally decreased at upstream sites with the exception of flows measured at CC2-A located in the Los Cerritos Channel just downstream of the mouth of the Palo Verde Channel. Total alkalinity ranged from 90 to 173 mg/L. Alkalinity provides an indication of the buffering capacity of the water. Alkalinity values of 100 to 200 would be expected to have a stabilizing effect.

Water temperature and dissolved oxygen were extremely high at all sites. Temperatures ranged from 23.8 to 31.5 °C. Temperatures also tended to increase over the course of the day reaching the higher portion of the range around 1500. Dissolved oxygen levels ranged from just over 11 mg/L to greater than 20 mg/L at several sites.

The results of this investigation support the initial hypothesis that the elevated pH values in these shallow open concrete channels are caused by photosynthetic activity. Evidence suggests that pH increases during the day. Algae in the channels consume carbon dioxide (CO_2) while undergoing photosynthesis. Algal growths typical of open channels during summer, dry weather conditions are shown in a photograph of flows observed during the upstream investigation in the Del Amo Channel (Figure 9) at the upper end of the watershed. Evidence of high photosynthetic activity is typically evident in the form of the high concentrations of dissolved oxygen in the water as well as visual evidence of bubbles being generated as the water becomes oversaturated from oxygen. The removal of CO_2 from the water causes bicarbonate and carbonate ions to react with hydrogen ions (H^+) to form more CO_2. The loss of H^+ from the water causes the pH to increase. During the night, respiration of the algae and bacteria in the channel would cause CO_2 to be released and oxygen to be consumed. This allows the pH drop during the night. The diurnal cycling of pH is a common occurrence in open waterways. Alkalinity provides buffering capacity such that high alkalinity water should be expected to have less extreme diurnal changes in pH.

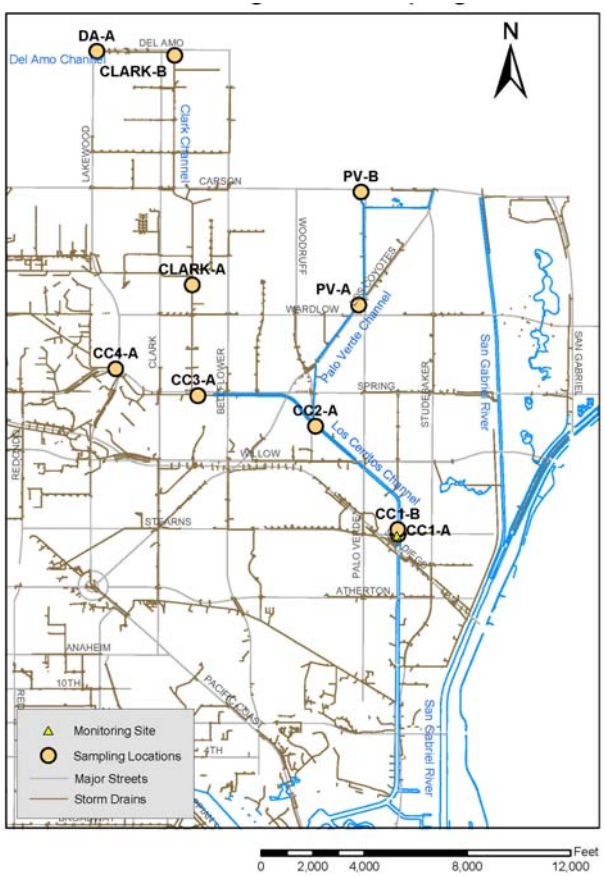

Figure 2. Los Cerritos Channel Watershed Investigation Sites

Figure 1. Dry Weather Flow at the Los Cerritos Monitoring Station, 9/3/04.

Figure 3. Concretions from Outfall into the Clark Channel under the Conant St. Bridge.

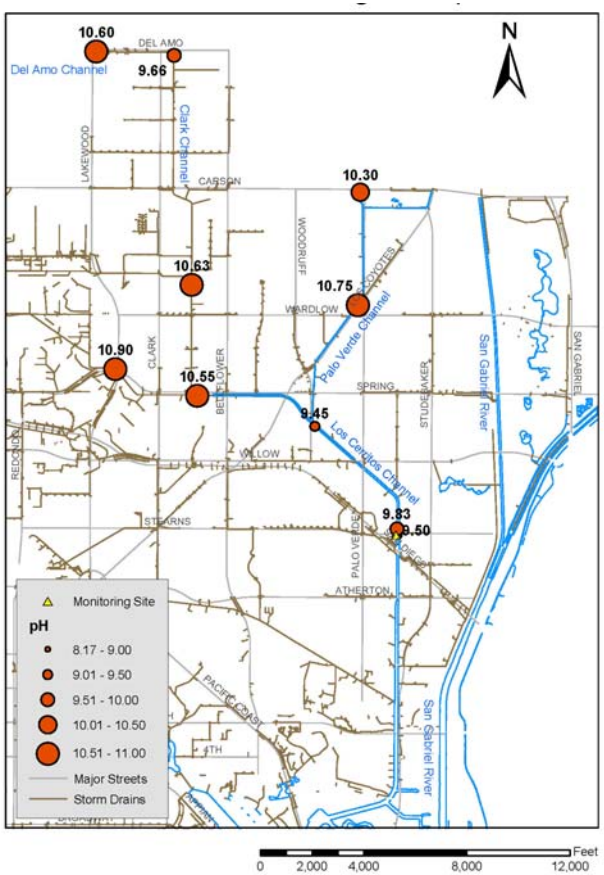

Figure 4. Measured pH at each Los Cerritos Channel Watershed Site.

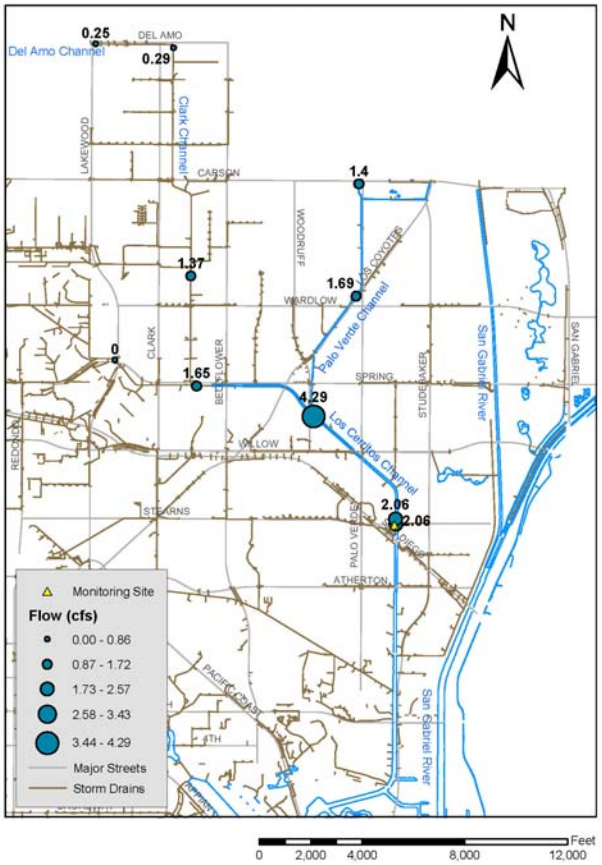

Figure 5. Flow measured at each Los Cerritos Channel Watershed Site.

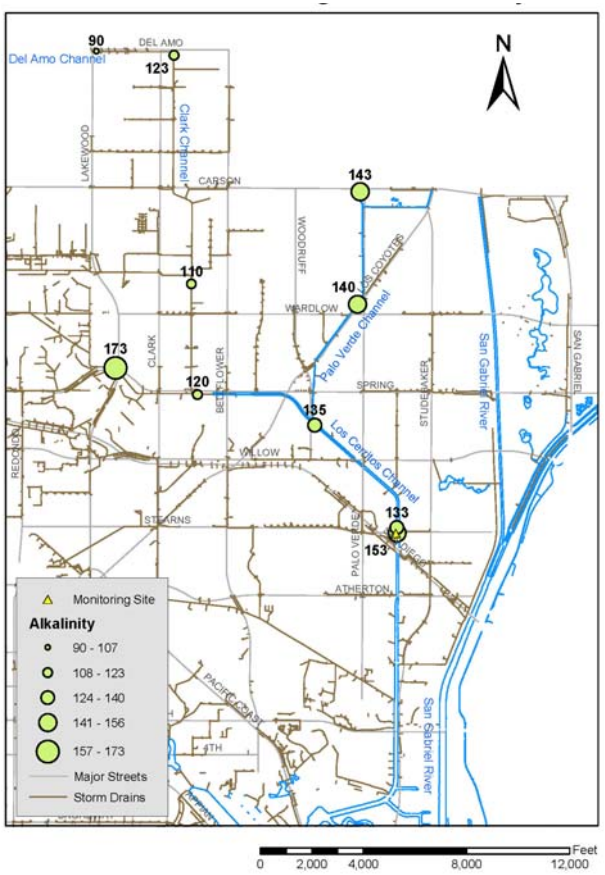

Figure 7. Total Alkalinity measured at each Los Cerritos Channel Watershed Site.

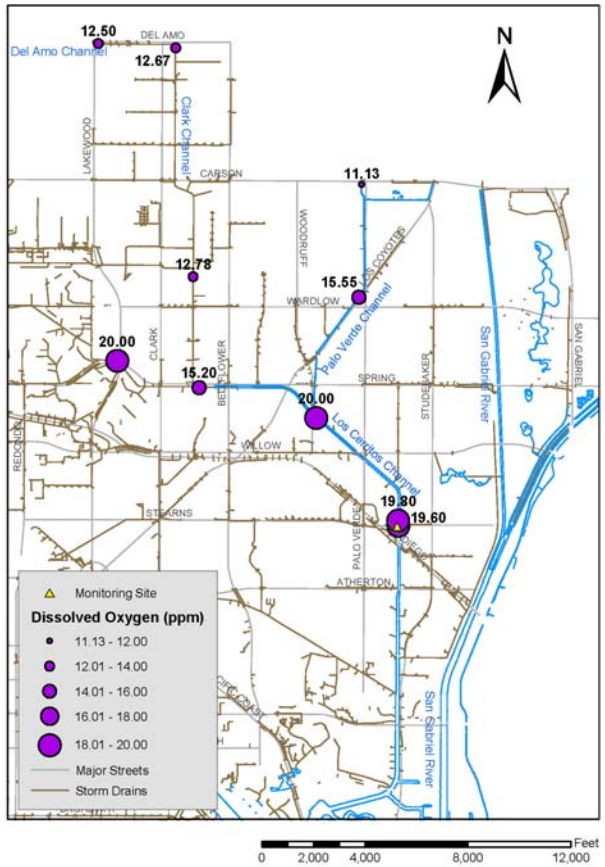

Figure 6. Dissolved Oxygen measured at each Los Cerritos Channel Watershed Site.

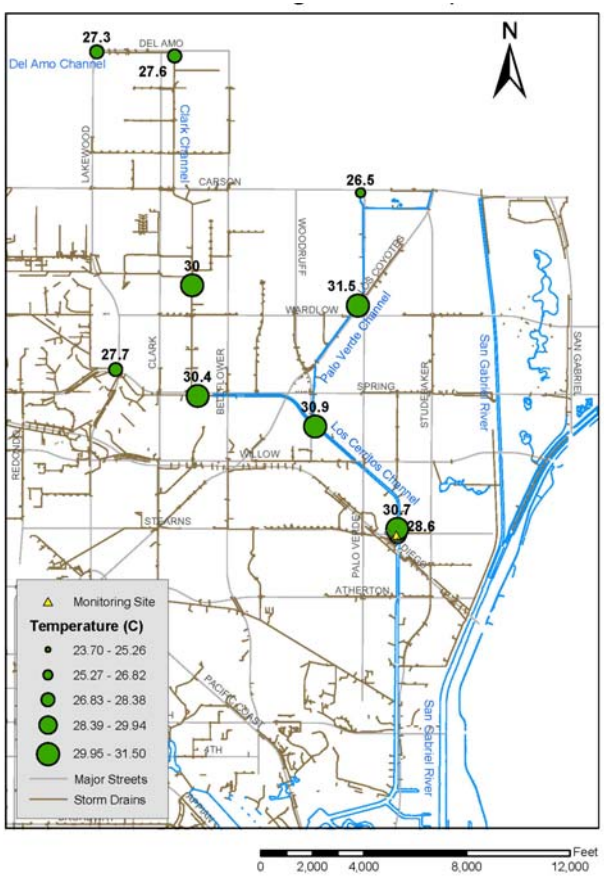

Figure 9. Water Temperature measured at each Los Cerritos Watershed Site.

Figure 8. Dry Weather Flow in the Del Amo Channel showing Typical Dry Season Algal Growth found in Open Channels with Consistent Low Flows.

Table 1. Sampling Locations in the Los Cerritos Channel Watershed

Site Name	Site Description	Latitude[1]	Longitude
CC1-A	Los Cerritos Channel Below Stearns St. bridge	33.79544	118.10352
CC1-B	Los Cerritos Channel at first outfall upstream of Stearns	33.79601	118.10356
CC2-A	Los Cerritos Channel below confluence with Palo Verde Channel	33.80695	118.11408
PV-MOUTH	Palo Verde Channel above confluence with Los Cerritos Channel	33.81070	118.11408
PV-A	Palo Verde Channel west of Palo Verde Ave. and Los Coyotes Diagonal	33.81987	118.10862
PV-B	Palo Verde Channel south of Carson St.	33.83192	118.10832
CC3-A	Los Cerritos Channel below confluence w/ Clark Channel	33.81020	118.12907
CLARK-A	Clark Channel below Monlaco Rd.	33.82201	118.12982
CLARK-OUTFALL	39-inch outfall (106+25) into Clark Channel under the Conant St. bridge	33.82509	118.12982
CLARK-B	Clark Channel south of Del Amo Blvd. Below the confluence of the Clark and Del Amo Channels	33.84647	118.13210
DA-A	Del Amo Channel east of Lakewood Ave.	33.84690	118.14201
CC4-A	Los Cerritos Channel west of Lakewood Ave., north of Spring St.	33.81301	118.13953

1. All positions based upon NAD 1983 datum

Table 2. Summary of the Results of the Upstream Investigation in the Los Cerritos Channel Watershed.

Site Name	Arrival Time	Temp °C	pH	DO mg/L	Salinity (ppt)	Flow (cfs)	Alkalinity (mg/L)			
							Bicarbonate	Carbonate	Hydroxide	Total Alkalinity
CC1-A	8:45	23.8	8.93	15.25	0.5	2.06				
CC1-A	11:46	28.6	9.50	19.60	0.4	2.06	95.0	45.0	< 5.0	153
CC1-B	12:16	30.7	9.83	19.80	0.4	2.06	52.0	54.0	< 5.0	133
CC2-A	12:46	30.9	9.45	>20	0.4	4.29	49.0	57.0	< 5.0	135
PV-MOUTH	12:50					1.63				
PV-A	13:21	31.5	10.75	15.55	0.5	1.69	< 5.0	60.0	14.0	140
PV-B	14:00	26.5	10.30	11.13	0.4	1.40	< 5.0	84.0	< 5.0	143
CC3-A	15:35	30.4	10.55	15.20	0.4	1.65	< 5.0	69.0	< 5.0	120
CLARK-A	15:54	30.0	10.63	12.78	0.8	1.37	< 5.0	57.0	5.1	110
CLARK-OUTFALL	16:21	23.7	8.17							
CLARK-B	16:40	27.6	9.66	12.67	0.4	0.29	34.0	51.0	< 5.0	123
DA-A	17:00	27.3	10.60	12.50	0.4	0.25	< 5.0	51.0	< 5.0	90
CC4-A	17:45	27.7	10.90	>20	0.4	0.00	< 5.0	87.0	9.0	173

RB-AR8456

Attachment 2 **Kinnetic Laboratories, Inc. 2009. City of Long Beach Annual Storm Water Monitoring Report (2008/2009). Appendix B. Los Cerritos Channel Dry Weather Copper and Bacteria Source Investigation.**

Reference: Kinnetic Laboratories, Inc. 2009. City of Long Beach Stromwater Monitoring Report 2008/2009. NPDES Permit No. CAS004003. Appendix B. Los Cerritos Channel Dry Weather Copper and Bacteria Source Investigation.

Los Cerritos Channel Dry Weather Copper and Bacteria Source Investigation

Prepared for:

City of Long Beach
Stormwater Management Program

Prepared by:

Kinnetic Laboratories, Inc.
5225 Avenida Encinas, Suite H
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July 2009

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INTRODUCTION

The Los Cerritos Channel was included on the 2006 California 303(d) list as an impaired waterbody for metals (copper, zinc, and lead), ammonia, trash, chlordane (sediment), bis(2ethylhexyl)phthalate/DEHP and coliform bacteria (California State Water Resources Control Boardand 2006.) Although the 303(d) list does not differentiate between the freshwater and estuarine portions of the Los Cerritos Channel, the recent draft metals TMDL (EPA, Region 9, 2008) recognized both differences between the freshwater portion of the Los Cerritos Channel and seasonal differences. Among the listed metals, only copper was considered a concern during periods of dry weather. Although not addressed in the current TMDL coliform bacteria are also often elevated during both wet and dry periods.

This investigation was designed as a special study to investigate sources of copper and fecal indicator bacteria that contribute to the elevated copper and bacteria concentrations and loads in the Los Cerritos Channel during dry weather conditions. The investigation was conducted to better address several of the long term objectives of the City's stormwater monitoring program listed below.

- Estimate annual mass emissions of pollutants discharged to surface waters through the MS4;
- Evaluate water column and sediment toxicity in receiving waters;
- Evaluate impact of stormwater/urban runoff on marine life in receiving waters;
- Determine and prioritize pollutants of concern in stormwater;
- Identify pollutant sources on the basis of flow sampling, facility inspections, and ICID investigations; and
- Evaluate BMP effectiveness.

The Draft Los Cerritos Channel Total Maximum Daily Loads for Metals (TMDL) document dated November, 2008 proposed dry weather numeric targets for copper in the Los Cerritos Channel based upon the long term average hardness (176 mg/L) of dry weather discharges as measured at the mass emission monitoring station for the Los Cerritos Channel (Table 1). The default CTR conversion factor of 0.96 was used to calculate a target for copper measured as total recoverable copper.

Table 1. Dry Weather Numeric Targets in Terms of Dissolved and Total Recoverable Fraction as Proposed in EPA's Draft Metals TMDL.

Metal	Target* (µg/L) Dissolved	Conversion Factor	Target (µg/L) Total Recoverable
Copper	14.3	0.96	14.9

The copper dry-weather loading capacity (TMDL) for Los Cerritos Channel was then calculated as 14.9 µg/L X 2.98 cfs X 0.00539 (conversion factor) = **0.239 lbs/day**, which is **108.4 grams/day**, expressed as total recoverable metals. A small portion of this (0.14 grams/day) was allocated to direct atmospheric deposition leaving an allocation of **108.26 grams/day** of total recoverable copper for stormwater permittees.

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The historical flow-weighted mean concentrations of copper in dry weather discharges from the Los Cerritos Channel were 12.66 µg/L (dissolved) and 18.06 (total) at the time the Draft TMDL was developed. These were used to estimate historical dry weather loads of 0.203 lbs/day (dissolved) and 0.290 lbs/day (total). Based upon these estimates of average loads and the proposed TMDL load limit, the historical loads will need to be reduced by more than 21% for the average loading to be able to meet the TMDL limits.

METHODS

FIELD SAMPLING AND CHEMICAL ANALYSIS

Five major channels comprise the Los Cerritos Channel watershed within the City limits (Figure 1). The main stem of the Los Cerritos Channel runs N-S in the vicinity of the Stearns St. mass emission monitoring site. Going upstream, the open channel turns to the west until becoming fully enclosed at the edge of the Long Beach Daugherty Airport. The Palo Verde Channel runs N-S roughly parallel to the San Gabriel River and is the first channel to join the Los Cerritos Channel as one moves upstream from the monitoring site. The Clark Channel also runs N-S and is the next upstream channel that feeds into the main stem of the Los Cerritos Channel. The open portion of the Wardlow Channel is relatively short. A portion of the Wardlow Channel runs E-W along the edge of the Skylinks Municipal Golf Course starting from the northern edge of the Long Beach Airport property and discharging into the Clark Channel after briefly becoming enclosed under a residential area. The Del Amo Channel also runs E-W along the northern edge of the boundary between the City of Long Beach and Lakewood before entering the Clark Channel.

Storm drain inputs and in-channel water were sampled in the open channel portion of the Los Cerritos Channel watershed during each of three synoptic surveys. These were conducted on March 3, April 9 and May 11, 2009. The last rain prior to the March 3 survey occurred 14 days earlier and was measured at 0.48 inches. The April 9 survey was preceded by 18 days of dry weather and the prior rainfall was only 0.06 inches. No rain fell between the April 9 and May 11, 2009 surveys.

Surveys were conducted at intervals of approximately one month. By spacing the surveys roughly one month apart, data from each previous survey could be reviewed and sampling strategies adjusted if necessary. Each of the surveys started in the Los Cerritos Channel downstream of the Stearns Avenue Bridge. The survey proceeded upstream in order to avoid upstream disturbances that might impact sampling. Sampling of the channels was originally planned to be conducted primarily near locations where major segments of the drainage system merged. After the first survey, sampling was increased along each channel to improve spatial resolution. Whenever two major segments of the channel merged, samples were taken in the main channel below the tributary, just upstream of the tributary and within the tributary. A total of 70 in-channel sites and 48 outfalls were sampled during the three surveys. All outfalls with flow were sampled during each survey.

Typical Dry Weather Flow Showing Algal Growth

Differential GPS measurements were used to identify the locations of all sampling sites with the exception of a few sites located beneath bridges where accurate GPS readings

could not be attained. At each site flow was measured using the area/velocity method or by the timed volumetric method, depending upon the type of flow and specific conditions at each site. The irregular channel bottom combined with heavy algal growth contributed to low accuracy of flow measurement. Therefore flow measurements in the channel should be considered best estimates.

General water parameters were measured using a Hydrolab Quanta Water Quality Monitoring System. The sonde was equipped with sensors for temperature, specific conductivity, pH, dissolved oxygen, and turbidity. Due to the low flows and shallow depths, the instrument was rarely able to be used for *in situ* measurements. A secondary container was required to collect sufficient volume to obtain measurements. This undoubtedly adds uncertainty to the dissolved oxygen measurements but was considered to still provide valuable information in assessing whether loads from storm drains had caused substantial depressions in oxygen content.

Grab samples were collected for total and dissolved copper, total hardness, total and fecal coliform and enterococcus. Samples were immediately placed on ice and delivered to state certified laboratories within required holding time. Copper and total hardness were analyzed by Soil Control Lab and fecal indicator bacteria were analyzed by CRG Marine Laboratories. Analysis of fecal indicator bacteria was performed using Idexx Quantitray methods with added dilutions to assure that quantitative measurements would be reported in all cases.

Table 2. Analytical Methods and Reporting Limits

Constituent	Method Detection Limit	Reporting Limit	Units	Method
Total Hardness	1.0	10	mg/L	EPA 130.2
Total/Dissolved Copper	0.5	0.098	µg/L	EPA 200.8
Total Coliform	10	24×10^9	MPN/100 ml	Idexx QuantiTray
E. coli	10	24×10^9	MPN/100 ml	Idexx QuantiTray
Enterococcus	10	24×10^9	MPN/100 ml	Idexx QuantiTray

DATA ANALYSIS

Results of the flow and water quality sampling were analyzed for spatial and temporal patterns. All data were plotted using ArcGIS to assist in assessment of spatial and temporal patterns. Loads were calculated for each location to assist in assessing the importance of each outfall or tributary and for comparison with the proposed dry weather TMDL at the Los Cerritos Channel mass emission monitoring site at Stearns St. Means and ranges of flow and concentration for storm drains and in-channel sites were analyzed by survey date and by combining the results of all three sampling dates. Regressions were performed on measured concentrations of total and dissolved copper for each survey in order to evaluate suitability of using the default CTR translator for estimation of daily load limits for total recoverable copper.

RESULTS AND DISCUSSION

The following sections summarize the results of the three dry weather surveys in the open channel portion of the Los Cerritos Channel watershed in Long Beach. Field and laboratory results are summarized for each survey in Table 3 through Table 8. Descriptive statistics of data from the main channels and outfalls are provided in Table 9, Table 10, and Table 11. Instanteous Loads were calculated for each oufall and sampling location within the main channel. These results are summarized in Table 13 through Table 18.

The results are graphically summarized in a series GIS maps in Appendix A. The results of flow measurements; concentrations of total and dissolved copper, concentrations of three fecal indicator bacteria are mapped separately for data from the main channels and outfalls that were discharging to the channels during each survey. These spatial representations of the flow and concentration data are followed by the GIS maps of loading data for copper and fecal indicator bacteria.

FLOW

Low flows were experienced during all three surveys (Table 3, Table 5, and Table 7; Appendix A Figures A-1 through A-3). Flows measured at the Los Cerritos Channel Stearns Street monitoring station were 1.32 cfs during the first survey, 0.67 cfs during the second and 0.37 cfs during the final survey. Flows exceeding those measured at Stearns Street were encountered at upstream locations during both the second and third surveys. During the second survey, the highest flow (1.48 cfs) was measured in the Del Amo Channel along the northern edge of the City limits. Similarly, during the third survey, highest flows occurred in the upper portion of the Clark Channel (0.86 cfs) and in the Del Amo Channel (0.67 cfs).

Each survey took over eight hours to complete such that flow differences could be related to temporal differences. The ability to accurately resolve flows with water depths typically less than an inch, irregular bottoms and heavy algal growth also are major factors impacting the flow measurements. Periods of heavy wind in the channels would occasionally be observed to cause brief flow reversals. The flow measurements within the channels should therefore be considered as reasonable approximations.

Measurements of flow from outfalls were very accurate since most could be determined by the time necessary to fill a 1-liter container. Total flows from outfall comprised just 4% of the flow measured at Stearns Street during the first survey but, during subsequent surveys, flow contributions from outfalls to the open channels became more important. Flow rates from outfalls increased from a total of 0.05 cfs during the first survey to 0.11 cfs during the second. With the lower flow rates in the main channel, contributions from monitored outfalls increased to 16% of flow at the Stearns St. site. By the third survey total flow from outfalls increased to 0.20 cfs accounting for roughly half of the flow measured in the channel. One outfall (WC-07) in the Wardlow Channel was the source of 60% of the total flow from outfalls in the first two surveys and 85% of the flow in the third survey.

WATER QUALITY

The relationship between dissolved and total copper was examined during each survey (Figure 2) by regression. The low concentrations of suspended sediment allowed for direct comparisons without consideration of suspended solids (Figure 2). Within each survey, the proportions of copper in the dissolved form were relatively constant showed variation among surveys. The percentage of copper in the dissolved form ranged from 62% in the second survey to 88% in the first survey. Stein and

Tiefenthaler's (2005) dry weather studies in Ballona Creek indicated that the proportion of dissolved copper in dry weather runoff from both outfalls and open channels was similar and roughly was in the dissolved form. In all cases, the dissolved to total recoverable ratios are notably lower than the default CTR translator value of 0.96.

Dry weather discharges sampled in from the main channels and the outfalls had very different water quality characteristics (Figure 3 and Figure 4; Table 9 through Table 11). .

The differences in water quality characteristics were anticipated and are attributable to exposure to sunlight in the open channels. The exposure to sunlight warms the water and induces the heavy algal growth that is typical of the open channels. The photosynthetic activity removes carbon dioxide from the water and releases oxygen. The uptake of carbon dioxide causes the increase in pH. The extent of the shift is largely dependent on the alkalinity or buffering capacity. The exposure of the water to ultraviolet light also reduces the concentrations of bacteria. At night, respiration of the algae typically reverses the process causing oxygen levels and pH to drop.

Exceedances of the CTR chronic criterion for dissolved copper occurred commonly during all three dry weather surveys (Table 12). Overall 23 of the 70 samples taken in the main channels exceeded the chronic CTR criterion. Six of these exceeded the acute CTR criterion. A similar fraction of the 48 outfall samples also exceeded the CTR chronic criterion. Six of the outfall samples also exceeded the acute criterion. No one particular segment of the watershed had obviously higher levels of exceedences but the Wardlow Channel was unique in not having any samples with exceedences. Part of the reason for this condition was likely the result of relatively high volumes of very clean water that are pumped into the channel from a groundwater treatment facility near Lakewood Blvd. As noted earlier, water from this site can, at times, represent a large proportion of the measured flows from outfalls.

A few cases of exceptionally high concentrations of total recoverable and dissolved copper were encountered during the study but no systematic pattern was evident through all surveys. During the first survey, copper was measured at 1500 ug/L (total) and 750 ug/L (dissolved) in water coming from the enclosed portion of the Clark Channel at the northern boundary of the City of Long Beach. The water also had other unique water quality characteristics. The water was high in conductivity (4.92 mS/cm) and hardness (1800 mg/L). The water also had the lowest pH (7.7) of any channel site. The water temperature was among the lowest measured in the open channels but comparable to other channel sites where water was exiting a closed conveyance. Flow measurements could not be taken at this site due to darkness combined with shallow, braided flow through dense algae. Based upon the general water quality characteristics, this discharge was suspected to have been from a swimming pool but this hypothesis could not be verified.

Total recoverable copper concentrations measured at the Stearns Street monitoring site were below the TMDL concentration-based limit of 14.9 ug/L during the first and third surveys but exceeded the concentration limit during the second survey. Some unusually high concentrations of total recoverable copper (as high as 540 ug/L at CC-12) were measured at several outfalls into in the Los Cerritos Channel during the third survey (Table 8). Upon analysis of the data from this survey, four outfall sites in the Los Cerritos Channel had substantially different ratios of dissolved to total recoverable copper. A review of the field notes indicated that flap gates at these sites would have prevented any measurement of flow or collection of water because of dispersed leakage around the flap gate. The field crew propped open the flap gates at these sites and allowed what they perceived to be adequate time for flows to restabilize before sampling. It is clear that the brief increase in flow caused by this procedure caused resuspension of fine particulate copper at these sites. The time required for flows to stabilize was not nearly sufficient to allow equilibrium conditions to be achieved in terms of water quality. The total recoverable copper values for each site sampled in this manner were identified and excluded from the

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previous analysis of the ratios of dissolved to total recoverable copper. The dissolved copper concentrations at these sites are believed to be relatively unimpacted based upon their similarity with concentrations measured at other outfall locations. The ease with which the reservoir of particulate copper was disturbed in the pipes suggests that similar increases would occur with episodic increases in flow or first flush storm events. Since the mass of the reservoir of particulate copper in any one of these pipes is unknown, it is difficult to assess the significance of brief flow increases/disturbances on total recoverable copper loads.

As expected, concentrations of fecal indicator bacteria were highly variable. Concentrations of all fecal indicator bacteria were lowest during the first survey (Table 3 and Table 4). Total coliform and *E. coli* measured at the Stearns Street monitoring location during the first survey were below Rec-1 water quality standards. During the second survey (Table 5 and Table 6), bacterial levels were broadly elevated throughout most of the watershed but were exceptionally high at the Stearns Street sampling location and several open channel sites located just upstream. Several sites in the upper reaches of the Wardlow and Del Amo channels also had notably high levels of bacteria. Both *E. coli* and enterococcus concentrations exceeded 2000 MPN/100 ml at these sites and total coliform was in excess of 12,000,000 MPN/100 ml at the Del Amo channel site.

LOADS

Calculations of loads for total and dissolved copper as well as fecal indicator bacteria are presented in Table 13 through Table 18. Loads from outfalls are summed for comparisons to those measured at the Stearns Street mass emission monitoring station. This station was the first site sampled in the Los Cerritos Channel during each survey and the first channel station listed on all tables. Load data are also graphically displayed on GIS maps in Appendix A (Figures A-34 to A-63).

Total copper loads measured at the Stearns Street monitoring site were 38.6 g/day during the first survey, 31.3 g/day during the second survey and just 6.8 g/day during the third survey. Slightly higher loading rates were measured at upstream locations in the watershed during the second survey. Loading rates in the Del Amo Channel reached 43.3 g/day. Loading rates for total copper in the lower Clark Channel and the intersection of the Los Cerritos Channel and Palo Verde Channel were 36.7 g/day and 42.9 g/day. The exceptionally low loading rates measured during the third survey were also low at most locations throughout the watershed except for one site in the Clark Channel just below the junction with the Del Amo Channel. The loading rate at this site was measured at 22.4 g/day.

In all cases, loading rates for total copper were far below the proposed TMDL Waste Load Allocation of 108.26 g/day. Thus the highest loading rate measured anywhere in the watershed during all three surveys was still just 40% of the proposed dry weather WLA for the stormwater permittees.

Although the total copper loads measured in the main channels decreased substantially from the first to the third surveys, the total loads from outfalls generally increased. During the first survey, only 0.181 g/day of copper was attributable to outfalls. Outfall loading rates increased to 1.079 g/day during the second survey. Increases in loading rates during the third survey (7.5 g/day) were impacted by elevated concentrations of total recoverable copper measured at sites where flap gates were opened. Eliminating those sites from the calculations still results in roughly 3 g/day which represents a substantial proportion of the 6.8 g/day of total copper measured at the Stearns Street monitoring site.

Loads of fecal indicator bacteria coming from monitored outfalls during the first survey accounted for roughly 20% of the total load at the downstream Stearns Street monitoring site. During the second survey, loads from outfalls represented 10 to 20 percent of the *E. coli* and total coliform loads and 5

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percent of the enterococcus loads. The relative importance of inputs from local outfalls increased during the third survey. In the final survey loads from outfalls represented roughly half of the *E. coli* and total coliform loads at the channel compliance site (Stearns Street) but loads of total coliform from outfalls were three times the load in the channel.

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SUMMARY AND CONCLUSIONS

Three dry weather surveys were conducted in open channel portion of the Los Cerritos Channel Watershed located within the City of Long Beach.

- Flows measured at the Los Cerritos Channel Stearns Street monitoring station were 1.32 cfs during the first survey, 0.67 cfs during the second and 0.37 cfs during the final survey. These reflect a general decrease in dry weather runoff at this location.
- The percentage of copper in the dissolved form ranged from 62% in the second survey to 88% in the first survey. This compares to the roughly 80% dissolved copper in Ballona Creek dry weather investigations but is far less than the CTR default value of 96% used for developing the draft TMDL limits in terms of total recoverable copper.
- Dry weather discharges sampled in from the main channels and the outfalls had very different water quality characteristics. Water in the main channels was typically warmer by 2-3°C, had pH levels in excess of 1 full unit higher, had twice the oxygen content and twice the turbidity. There was no consistent pattern of differences between dry weather flows sampled in the main channel and water from outfalls. Concentrations of fecal indicator bacteria were consistently higher in water sampled from the outfalls but this was most evident in the case of total coliform where the geometric mean of water from outfalls was an order of magnitude greater than in water from the main channels.
- Copper was measured at 1500 ug/L (total) and 750 ug/L (dissolved) in water coming from the enclosed portion of the Clark Channel at the northern boundary of the City of Long Beach. The water was high in conductivity (4.92 mS/cm) and hardness (1800 mg/L). The water also had the lowest pH (7.7) of any channel site. The water temperature was among the lowest measured in the open channels but comparable to other channel sites where water was exiting a closed conveyance.
- Exceedances of the CTR chronic criterion for dissolved copper occurred commonly during all three dry weather surveys (Table 12). Overall 23 of the 70 samples taken in the main channels exceeded the chronic CTR criterion. Six of these exceeded the acute CTR criterion. A similar fraction of the 48 outfall samples also exceeded the CTR chronic criterion. Six of the outfall samples also exceeded the acute criterion.
- A few cases of exceptionally high concentrations of total recoverable and dissolved copper were encountered during the study but no systematic pattern was evident through all surveys. During the first survey, copper was measured at 1500 ug/L (total) and 750 ug/L (dissolved) in water coming from the enclosed portion of the Clark Channel at the northern boundary of the City of Long Beach.
- Total copper loads measured at the Stearns Street monitoring site were 38.6 g/day during the first survey, 31.3 g/day during the second survey and just 6.8 g/day during the third survey**. In all cases, loading rates for total copper were far below the proposed TMDL Waste Load Allocation of 108.26 g/day**. Thus the highest loading rate measured anywhere in the watershed during all three surveys was still just 40% of the proposed dry weather WLA for the stormwater permittees.

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EPA, Region 9. 2008. Los Cerritos Channel Total Maximum Daily Loads, November 2008

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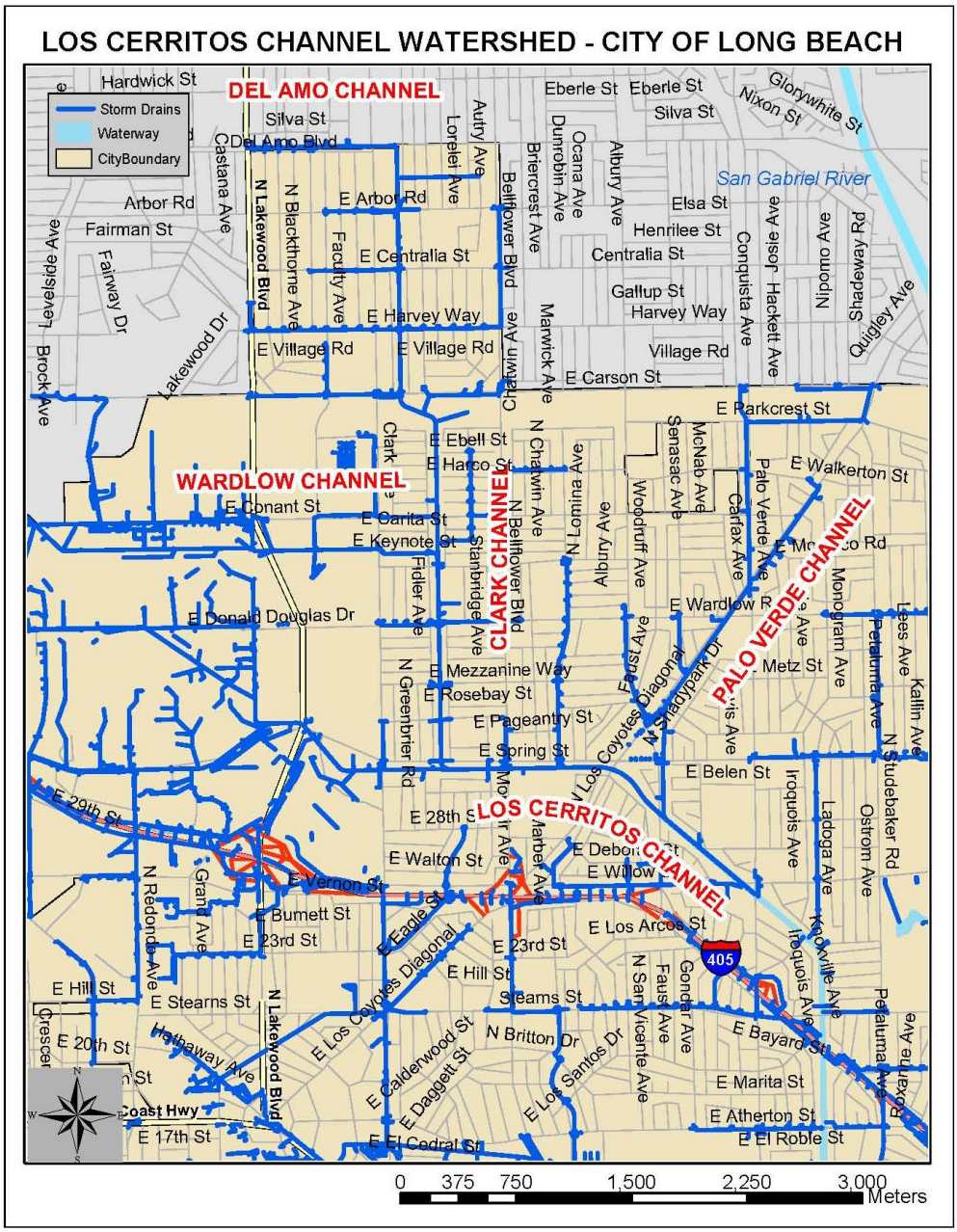
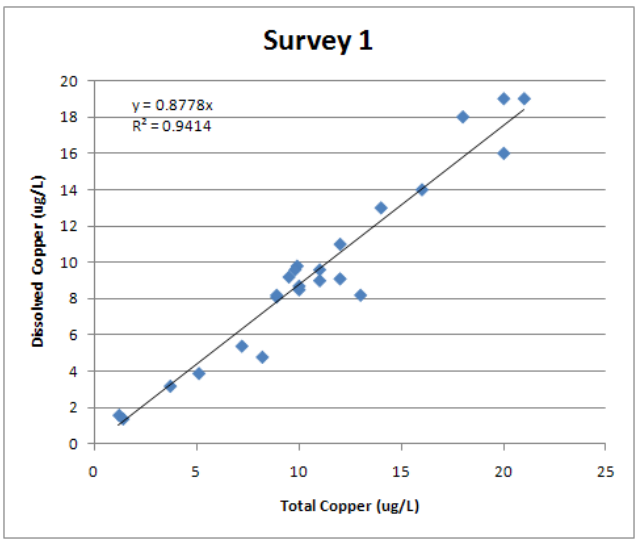
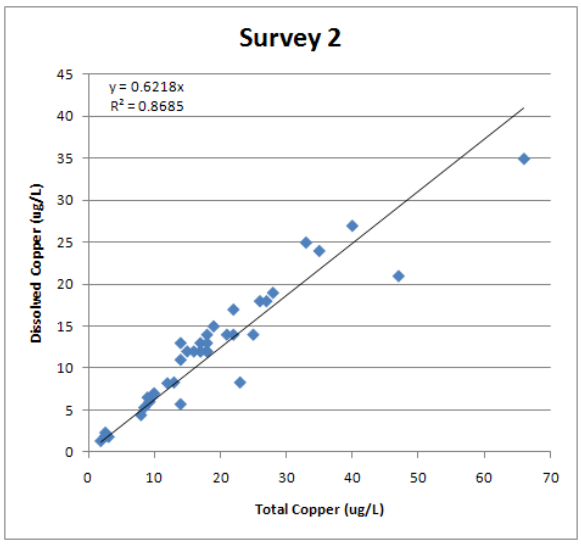


Figure 1. **City of Long Beach, Los Cerritos Channel Watershed.**





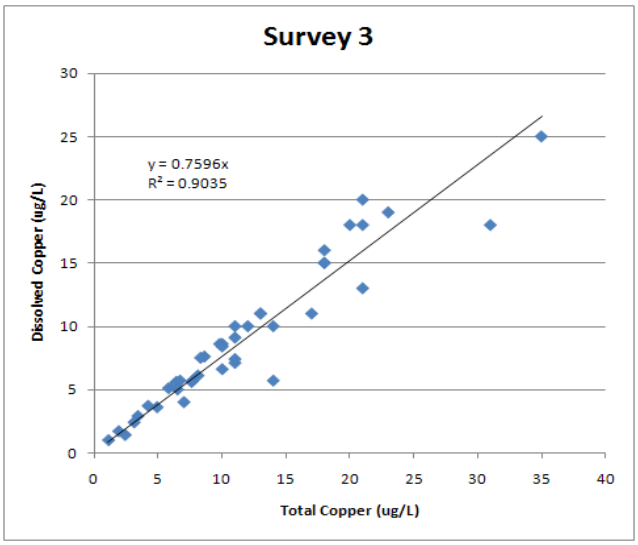


Figure 2. Regressions of All Total and Dissolved Copper Measurements taken during the Three Surveys.

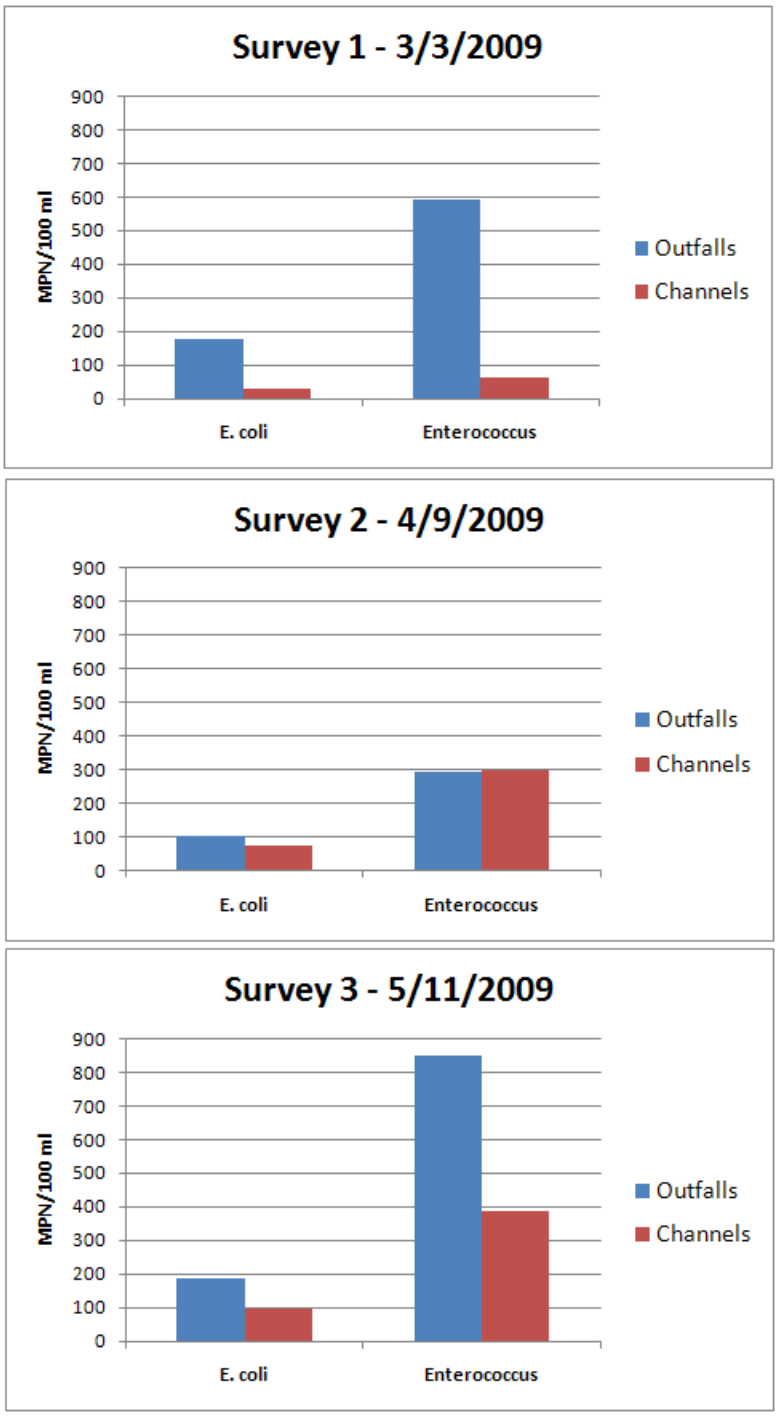


Figure 3. Comparison of Geometric Mean Concentrations of *E. coli* and Enterococcus in Water from Outfalls and the Main Channels during Each Survey.

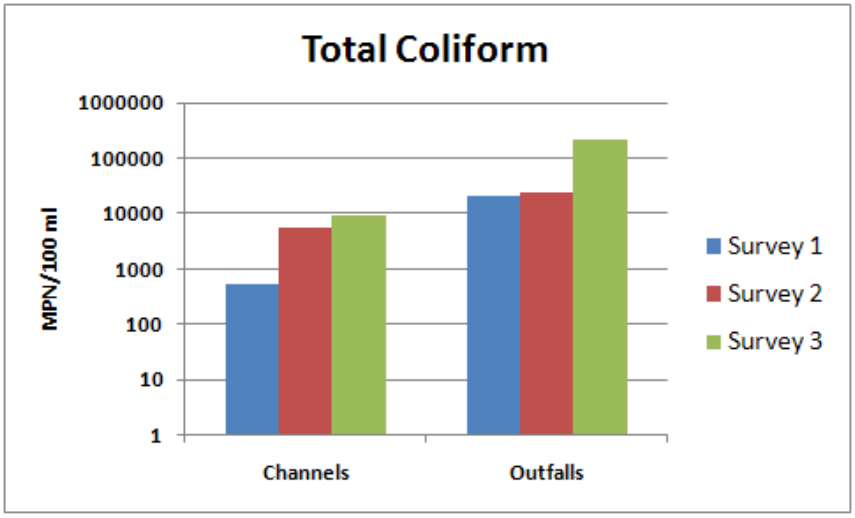


Figure 4. Comparison of Geometric Mean Concentrations of Total Coliform Measured in the Channels and Outfalls during Each Survey.

Table 3. Results of Measurements Taken in the Main Channels during Survey 1 - 3/03/2009.

Site Number	Latitude	Longitude	Depth (ft.)	Flow (cfs)	Temp. (°C)	pH	Cond. (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Enterococcus (MPN/100ml)	Total Coli (MPN/100ml)
LOS CERRITOS															
CC-01-A	33.79529	-118.10359	0.14	1.31503	20.0	9.3	0.730	14.8	8.5	120	12	11	134	109	4106
CC-02-A	33.80701	-118.11418	0.1	1.07143	23.0	9.2	0.964	14.9	5.4	180	10	9.0	122	63	2613
CC-02-B	33.08757	-118.11485	0.1	0.80662	24.2	9.3	0.974	15.5	15.0	180	11	9.0	120	20	4611
CC-02-D	33.08757	-118.11485	0.1	0.80662	24.2	9.3	0.974	15.5	15.0	180	12	9.0	73	5	3282
CC-03-A	33.81073	-118.12917	0.07	0.34955	26.0	10.4	1.065	10.2	60.0	140	9.0	8.0	5	20	52
CC-03-B	33.81017	-118.12967	0.06	0.11324	27.1	10.8	0.648	15.9	20.5	94	18	18	5	5	31
CC-04	33.81302	-118.13950		DND	14.5	10.1	0.523	9.3	273	120	25	12	759	754	17850
PALO VERDE															
PVMOUTH-01	33.80762	-118.11437	0.04	0.05063	28.2	10.5	0.531	16.1	3.3	110	10	10	5	85	5
PVMOUTH-01	33.80762	-118.11437	0.04	0.05063	28.2	10.5	0.531	16.1	3.3	110	10	9.0	5	108	5
PV-02	33.83182	-118.10837	0.02	0.02350	18.6	10.7	1.034	9.8	8.0	110	10	9.0	5	108	776
CLARK															
CLK-01-A	33.81031	-118.12958	0.015	0.09449	26.1	10.5	1.115	12.5	20.0	140	10	9.0	5	31	131
CLK-02-A	33.82259	-118.12985	0.06	0.06443	17.9	9.5	1.450	13.2	2.0	250	9.0	8.0	5	31	1333
CLK-02-B	33.82279	-118.12980	0.055	0.15696	17.1	9.4	1.452	12.6	3.9	250	10	10	5	62	1236
CLK-04-B	33.84691	-118.13225		DND	15.0	7.7	4.92	7.2	87.1	1800	1500	750	404	359	2382
WARDLOW															
WC-01-B	33.82277	-118.12989	0.65	DND	14.5	9.7	0.569	9.6	21.1	64	7.0	5.0	908	97	4106
DEL AMO															
DA-01-A	33.84682	-118.13137		DND	17.6	10.1	0.542	6.6	38.1	150	11	10	10	96	1850

Table 4. Results of Measurements Taken in the Flowing Outfalls during Survey 1 - 3/03/2009

Site Number	Latitude	Longitude	Depth (ft.)	Flow (cfs)	Temp. (°C)	pH	Cond. (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Enterococcus (MPN/100ml)	Total Coli (MPN/100ml)
LOS CERRITOS															
CCO-02-A	3/3/2009	33.79329		0.00109	16.4	8.1	1.406	7.75	1.2	200	8.0	5.0	5	839	46110
CCO-09-A	3/3/2009	33.79944		0.00020	17.3	8.2	0.742	7.12	11.0	130	14	13	111990	127400	204600
CCO-14-A	3/3/2009	33.80306		0.00060	19.2	8.2	0.711	9.06	0.0	130	20	16	5	110	5200
CCO-24-A	3/3/2009	33.81033		0.00014	17.4	8.1	0.569	6.92	41.2	110	13	8.0	173	197	4611000
CLARK															
CKO-09-A	33.81862	-118.12987		0.00051	17.9	8.2	0.641	7.52	4.8	110	5.0	4.0	4106	1317	54750
CKO-17-A	33.82349	-118.12981		0.00017	15.2	7.9	0.945	8.42	10.1	140	20	19	54750	16580	512000
CKO-20-A	33.82499	-118.12981		0.01201	17.4	8.1	2.00	8.25	11.0	570	1.2	1.6	5	63	3873
CKO-22-A	33.83118	-118.13060		0.00145	14.8	8.5	0.703	9.58	2.7	160	16	14	86	1616	43520
PALO VERDE															
PV-08	33.81327	-118.11408		0.00127	19.2	8.1	0.970	7.91	1.7	240	4.0	3.0	135	209	3076
WARDLOW															
WC-26	33.82333	-118.14131		0.03310	17.6	8.5	0.560	8.99	0.0	94	1.4	1.4	5	5	5

Table 5. Results of Measurements Taken in the Main Channel during Survey 2 - 4/09/2009.

Site Number	Latitude	Longitude	Depth (ft.)	Flow (cfs)	Temp. (°C)	pH	Cond. (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Enterococcus (MPN/100ml)	Total Coli (MPN/100ml)
LOS CERRITOS															
CC-A	33.79503	-118.10355	0.14	0.67299	13.9	7.85	1.122	6.71	7.1	110	19	15	7409	26460	478973
CC-B	33.80697	-118.11405	0.1	1.03079	14.79	8.67	1.215	7.8	5.7	130	17	12	25572	86955	448898
CC-C	33.80803	-118.11543	0.1	0.38622	15.02	8.68	1.266	9.44	10.1	150	15	12	595	1635	212323
CC-D	33.81025	-118.12920	0.1	0.61074	18.38	9.3	1.09	16.29	26.0	180	14	11	1644	6037	129460
CC-E	33.81020	-118.12967	0.07	0.07232	20.38	9.58	0.779	18.41	35.1	140	21	14	172	172	57593
CC-F	33.81038	-118.13350	0.06	0.19097	21.7	9.36	0.81	19.17	30.1	160	18	12	1126	1593	161098
CC-H	33.81038	-118.13350		0.19097	21.7	9.36	0.81	19.17	30.1	160	18	12	561	939	152081
CC-G	33.81305	-118.13958		0.06002	26.25	10.75	0.701	21.42	19.5	120	17	13	7	7	76
PALO VERDE															
PV-A	33.80768	-118.11436	0.04	0.00576	17.24	9.31	0.48	16.01	8.6	130	18	14	860	1170	27550
PV-B	33.83168	-118.10841	0.04	0.02571	24.1	9.57	0.647	12.6	11.2	190	33	25	233	934	112600
PV-D	33.83168	-118.10841	0.02	0.02571	24.1	9.57	0.647	12.6	11.2	190	35	24	253	1081	48700
PV-C	33.82005	-118.10852		0.00666	22.57	9.61	0.655	14.28	35.1	140	28	19	20	108	29090
CLARK															
CK-A	33.81089	-118.12985	0.015	1.07180	28.18	10.14	0.994	16.78	9.4	130	14	13	131	524	3120
CK-B	33.81900	-118.12983	0.06	0.21309	26.42	10.59	1.043	17.86	235.0	130	17	12	26	386	52
CK-C	33.82259	-118.12986	0.055	0.39932	21.75	10.02	0.859	15.44	9.8	150	16	12	49	830	98
CK-D	33.82296	-118.12981		0.11219	25.74	10.76	1.152	16.42	5.7	150	18	13	14	173	14
CK-E	33.83268	-118.13227		0.08571	19.35	10.95	1.048	13.17	13.4	140	22	14	63	5777	277
CK-F	33.84665	-118.13214		0.56018	19.54	10.04	0.948	15.24	51.4	180	22	17	562	3303	4215703
CK-G	33.84695	-118.13225		0.01313	15.66	8.49	1.171	8.5	396	250	26	18	72	393	63811
CK-H	33.84695	-118.13225		0.01313	15.66	8.49	1.171	8.5	396	260	27	18	97	270	45412
WARDLOW															
WC-A	33.82279	-118.12987	0.65	DND	15.24	9.31	0.826	12.45	12.8	140	13	8.3	0	0	0
WC-B	33.82275	-118.12984		0.07576	15.03	9.77	0.793	9.09	10.8	120	9	6.0	222	949	8547
WC-C	33.82330	-118.13420		0.09155	25.3	10.98	0.883	15.35	32.9	100	10	7.0	11	92	11
WC-D	33.82332	-118.13682		0.03371	24.28	10.97	0.866	15.79	109	110	10	6.6	4	8	4
WC-E	33.82331	-118.14165		0.20652	17.42	8.4	0.6	9.04	40	150	8	4.4	2092	2062	64372
DEL AMO															
DA-A	33.84685	-118.13236		0.41963	19.58	10.62	0.799	12.37	67.4	98	25	14	51	883	796681
DA-B	33.84687	-118.14217		1.47578	18.66	10.28	0.516	8.8	9.7	76	12	8.2	2239	14009	12449388

Table 6. Results of Measurements Taken in the Flowing Outfalls during Survey 2 - 4/09/2009.

Site Number	Latitude	Longitude	Depth (ft.)	Flow (cfs)	Temp. (°C)	pH	Cond. (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Enterococcus (MPN/100ml)	Total Coli (MPN/100ml)
LOS CERRITOS															
CC-02	33.79333	-118.10361		DND	14.59	7.54	1.113	4.61	80.7	230	16	4.3	85	389	79800
CC-04	33.79568	-118.10326		0.00019	15.75	8.15	0.786	7.27	7.5	140	9.7	6.7	121	1616	2755000
CC-06	33.79597	-118.10371		0.00177	16.96	7.92	0.582	7.21	4.7	100	8.5	5.3	5	5	4106
CC-07	33.79791	-118.10330		0.00012	16.15	7.66	0.711	5.02	8.8	110	14	5.7	5794	9804	275500
CC-14	33.80306	-118.10894		0.00012	18.02	8.03	0.905	7.25	8.6	190	120	81	10	97	198630
CC-14.5	33.80468	-118.11061		0.00045	18.22	8.42	1.001	9.73	3.5	160	2.6	2.3	5	10	63
CC-19	33.81036	-118.12134		0.00353	16.27	7.91	0.919	6.08	8.4	180	23	8	11870	14136	435200
CC-24	33.81037	-118.12524		0.00106	18.08	8.15	0.71	7.5	2.3	130	9	7	8164	3255	173290
CLARK															
CK-06	33.81520	-118.12981		0.00006	19.29	8.02	8.4	7.03	32.0	1000	47	21	256	980	2143000
CK-17	33.82354	-118.12981		0.00039	16.49	7.8	0.981	6.49	7.1	190	66	35	1789	2909	32550
CK-20	33.82501	-118.12986		0.00706	19.07	8.12	1.96	6.73	0.8	670	1.9	1.3	5	450	2046
PALO VERDE															
PV-08	33.81334	-118.11408		0.00090	16.56	8.02	1.093	8.57	3.7	320	3.1	1.8	10	31	19350
PV-22	33.82111	-118.10794		0.00044	17.47	7.91	1.318	7.8	6	160	40	27	75	134	6488
WARDLOW															
WC-07	33.82331	-118.14136		0.09775	21.02	8.49	0.522	9.36	2.2	99	2.6	1.9	5	5	5

Table 7. Results of Measurements Taken in the Main Channel during Survey - 5/11/2009.

Site Number	Latitude	Longitude	Depth (ft.)	Flow (cfs)	Temp. (°C)	pH	Cond. (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Enterococcus (MPN/100ml)	Total Coli (MPN/100ml)
LOS CERRITOS															
CC-A	33.79530	-118.10352	0.14	0.371399	17.63	7.37	1.540	4.04	4.00	300	7.7	5.7	350	1607	54600
CC-B	33.80688	-118.11394	0.1	0.216654	17.56	7.57	1.58	4.60	6.90	310	6.4	5.4	474	171	28800
CC-C	33.80758	-118.11484	0.1	0.404367	17.52	7.9	1.55	5.48	5.60	300	5.8	5.1	63	63	34500
CC-D	33.81025	-118.12936	0.1	0.659095	18.34	8.59	1.313	10.09	24.90	290	6.4	5.6	171	228	68670
CC-E	33.81017	-118.12966	0.07	0.097693	18.78	8.85	0.866	11.63	18.80	200	6.2	5.3	4611	789	52900
CC-F	33.81036	-118.13358	0.06	0.181429	18.63	8.59	0.783	10.19	21.20	190	11	7.1	3873	1723	70600
CC-G	33.81306	-118.13958		0.164550	20.17	9.42	0.665	17.35	37.90	150	7.6	5.6	933	98	72700
CC-H	33.79530	-118.10352		0.371399	17.63	7.37	1.540	4.04	4.00	300	10	6.6	355	1515	75400
PALO VERDE															
PV-A	33.80309	-118.10883	0.04	0.063158	21.5	9.04	1.171	15.91	45.50	250	18	16	3448	1850	54750
PV-B	33.83165	-118.10835	0.04	0.052419	28.11	10.26	1.029	13.74	40.00	190	20	18	158	6131	1918
PV-C	33.82011	-118.10851		0.057874	28.87	10.28	1.243	12.90	17.80	180	21	20	5	134	71
PV-D	33.83165	-118.10835	0.02	0.052419	28.11	10.26	1.029	13.74	40.00	190	21	18	341	5475	4611
CLARK															
CK-A	33.81032	-118.12962	0.015	0.175781	18.22	8.66	1.357	10.37	6.00	310	6.5	5.0	480	368	22470
CK-B	33.81913	-118.12984	0.06	0.330999	22.9	9.13	1.473	14.39	9.90	320	8.6	7.6	573	299	81640
CK-C	33.82257	-118.12984	0.055	0.253102	23.43	9.13	0.817	11.15	4.90	170	4.2	3.7	121	272	27000
CK-D	33.82280	-118.12978		0.207334	31.36	10.23	1.38	14.15	8.10	230	9.8	8.6	5	5	31
CK-E	33.83251	-118.13232		0.160506	31.63	10.65	1.281	12.44	11.40	190	10	8.6	5	41	5
CK-F	33.84658	-118.13220		0.855652	32.22	10.02	0.86	13.55	8.50	140	12	10	10	243	20140
CK-H	33.84658	-118.13220		0.855652	32.22	10.02	0.86	13.55	8.50	140	11	10	10	435	9208
CK-G	33.84695	-118.13225		0.043824	19.38	8.08	1.66	5.89	6.20	440	14	10	4352	2014	228200
WARDLOW															
WC-A	33.84685	-118.13236	0.65	DND	18.63	8.57	0.778	7.38	14.70	170	7.0	4.0	10	288	12960
WC-B	33.82275	-118.12984		0.059761	18.45	8.86	0.716	7.56	3.40	160	3.4	2.9	226	364	24890
WC-C	33.82329	-118.13418		0.096330	27.65	10.62	0.791	12.08	18.40	93	10	8.4	5	1187	2909
WC-D	33.82335	-118.14137		0.155102	24.34	9.42	0.8	15.40	61.80	180	11	9.1	5	5	5
DEL AMO															
DA-A	33.84679	-118.13234		0.436813	32.4	10.11	0.955	12.25	11.30	140	13	11	5	771	18500
DA-C	33.84679	-118.13234		0.436813	32.4	10.11	0.955	12.25	11.30	150	13	11	10	1119	10170
DA-B	33.84686	-118.14210		0.673923	28.52	9.94	0.706	13.19	3.90	120	8.3	7.5	52	1616	81640

Shaded lines are field duplicates of preceding site.

Table 8. Results of Measurements Taken in the Flowing Outfalls during Survey 3 - 5/11/2009

Site Number	Latitude	Longitude	Depth (ft.)	Flow (cfs)	Temp. (°C)	pH	Cond. (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Enterococcus (MPN/100ml)	Total Coli (MPN/100ml)
LOS CERRITOS															
CC-02	33.79333	-118.10369		0.008977	17.08	7.49	1.082	2.16	9.60	190	**7.0**[1]	5.7	414	288	32550
CC-04	33.79564	-118.10331		0.000233	19.05	7.96	0.867	4.09	10.40	180	4.8[1]	3.7	63	12033	410600
CC-05	33.79591	-118.10333		0.000007	DND	DND	DND	DND	DND				149	331	30100
CC-06	33.79594	-118.10365		DND	DND	DND	DND	DND	DND	200	8.1	6.1	201	583	275500
CC-09	33.79942	-118.10358		0.000306	18.6	7.64	0.9	3.40	38.20	180	**35**[1]	12	1246	8664	6015000
CC-11	33.80006	-118.10430		0.000088	DND	DND	DND	DND	DND	170	**37**[1]	15	145	211	46110
CC-12	33.80004	-118.10472		0.001914	19.61	8.02	1.436	5.73	22.60	270	**540**[1]	15	8664	3076	2987000
CC-14	33.80307	-118.10885		0.004032	20.67	8.08	0.824	7.20	27.80	160	**210**[1]	24	836	7330	275000
CC-19	33.81035	-118.12130		0.007063	19.32	7.79	0.808	6.31	21.10	150	6.7	5.7	201	31	86640
CC-22	33.81016	-118.12230		0.000706	19.6	7.79	0.652	5.82	5.50	140	4.9	3.6	5	63	100600
CC-24	33.81036	-118.12532		0.005297	21.4	7.95	0.79	6.37	112.00	160	14	5.7	86	5172	435200
CC-29	33.81015	-118.12663		0.000118	18.93	8.06	1.223	6.78	5.50	180	23	19	1421	4080	1046200
CLARK															
CK-01	33.81076	-118.12995		0.000118	18.76	8.12	0.986	7.80	16.60	180	11	7.4	10	331	197000
CK-06	33.81517	-118.12980		0.000942	19.13	7.9	1.58	5.57	67.20	270	180	73	6867	34100	4611000
CK-08	33.81866	-118.12980		0.000824	19.11	7.92	1.1	6.30	5.00	200	17	11	2359	10500	457000
CK-15	33.82228	-118.12990		0.003531	23.9	7.87	0.616	6.34	2.40	120	3.1	2.4	2987	631	613100
CK-17	33.82354	-118.12981		0.000471	18.72	8.42	1.186	5.69	23.10	200	21	13	624	836	104620
CK-20	33.82501	-118.12968		0.010594	21.01	7.98	1.94	7.73	0.00	650	1.1	1.0	10	5	2481
CK-22	33.83117	-118.13067		0.000589	18.17	8.4	0.752	8.15	1.90	180	18	15	153	2359	4611000
CK-34	33.83607	-118.13214		0.014832	19.15	8.43	0.725	7.87	3.10	200	18	15	393	1000	22820
CK-48	33.84486	-118.13212		0.000153	21.84	8.6	0.965	9.17	7.30	170	35	25	10	1210	34480
PALO VERDE															
PV-08	33.81333	-118.11406		0.001695	19.3	7.92	1.038	6.99	7.20	300	2.4	1.4	328	1243	1872000
PV-10	33.81342	-118.11406		0.010373	21.7	7.52	0.972	7.34	85.00	180	31	18	10	8664	3448000
WARDLOW															
WC-07	33.82332	-118.14133		0.125000	23.67	8.35	0.616	8.28	5.50	140	1.9	1.7	185	317	10710
DEL AMO															
DA-14	33.84687	-118.14127		0.000216	18.73	8.83	1.039	8.67	2.60	370	110	88	5	5	18600

1. Sites were disturbed prior to sampling by propping open the tide gate. Gates were opened since leaking flows around the tide gate could not otherwise be collected or quantified. Water was allowed to reach an equilibrium flow prior to sampling but analysis of the data from these sites indicates that the opening of the tide gate disturbed particulate copper that did not settle. Most of these sites had elevated total recoverable copper with normal levels of dissolved copper.

Table 9. Descriptive Statistics of Flow and Water Quality at Channel and Outfall Sites – Survey 1

CHANNELS

Statistic	Flow (cfs)	Temp. (°C)	pH	Cond (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Entero. (MPN/100ml)	Total Coliform (MPN/100ml)
No. of observations	14	14	14	14	14	14	14	14	14	14	14	14
Minimum	0.023	14.5	7.7	0.523	6.6	2	64	7	5	5	5	5
Maximum	1.315	28.2	10.8	4.92	16.1	273	1800	1500	750	908	754	17850
1st Quartile	0.072	17.2	9.3	0.589	9.6	6.1	113	10	9	5	31	72
Median	**0.135**	**19.3**	**9.9**	**0.969**	**12.6**	**17.5**	**140**	**10**	**10**	8	74	1592
3rd Quartile	0.692	25.5	10.5	1.103	14.9	33.9	180	12	11	131	105	3733
Mean	0.405	20.7	9.8	1.18	12	40.4	265	118	63	178	131	2879
Geometric mean	0.187	20.1	9.8	0.949	11.6	15.9	165	16	13	**30**	**64**	**530**

OUTFALLS

Statistic	Flow (cfs)	Temp. (°C)	pH	Cond (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Entero. (MPN/100ml)	Total Coliform (MPN/100ml)
No. of observations	10	10	10	10	10	10	10	10	10	10	10	10
Minimum	0.00014	14.8	7.9	0.56	6.9	0	94	1.2	1.4	5	5	5
Maximum	0.0331	19.2	8.5	2	9.6	41.2	570	20	19	111990	127400	4611000
1st Quartile	0.00028	16.6	8.1	0.657	7.6	1.3	115	4.3	3.3	5	132	4205
Median	**0.00084**	**17.4**	**8.2**	**0.727**	**8.1**	**3.8**	**135**	**10.5**	**6.5**	111	524	44815
3rd Quartile	0.00141	17.8	8.2	0.964	8.8	10.8	190	15.5	13.8	3123	1541	167138
Mean	0.00505	17.2	8.2	0.925	8.2	8.4	188	10.3	8.5	17126	14834	548413
Geometric mean	0.00102	17.2	8.2	0.849	8.1		161	7.1	6	**178**	**593**	**20969**

Table 10. Descriptive Statistics of Flow and Water Quality at Channel and Outfall Sites – Survey 2

CHANNELS

Statistic	Flow (cfs)	Temp. (°C)	pH	Cond (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Entero. (MPN/100ml)	Total Coliform (MPN/100ml)
No. of observations	26	27	27	27	27	27	27	27	27	27	27	27
Minimum	0.006	13.9	7.7	0.48	6.7	5.7	76	8	4	5	5	5
Maximum	1.476	28.2	11.0	1.266	21.4	396	260	35	25	2239	14009	12449388
1st Quartile	0.040	16.5	9.3	0.740	9.3	10.3	125	14	11.5	13	91	125
Median	**0.152**	**19.6**	**9.6**	**0.859**	**14.3**	**19.5**	**140**	**18**	**13**	110	404	27550
3rd Quartile	0.415	24.1	10.4	1.069	16.4	88.2	160	22	14.5	278	1007	80650
Mean	0.309	20.3	9.7	0.885	13.7	60.3	148	18.6	13	1633	5806	722442
Geometric mean	0.122	19.9	9.6	0.856	13.0	24.8	142	17.4	12	**73**	**297**	**5564**

OUTFALLS

Statistic	Flow (cfs)	Temp. (°C)	pH	Cond (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Entero. (MPN/100ml)	Total Coliform (MPN/100ml)
No. of observations	14	14	14	14	14	14	14	14	14	14	14	14
Minimum	0.00014	14.6	7.5	0.522	4.6	0.8	99	1.9	1.3	5	5	5
Maximum	0.0331	21.0	8.5	8.400	9.7	80.7	1000	120	81	11870	14136	2755000
1st Quartile	0.00019	16.3	7.9	0.730	6.6	3.6	132.5	4.5	2.8	6	48	4702
Median	**0.00045**	**17.2**	**8.0**	**0.950**	**7.2**	**6.6**	**170**	**11.9**	**6.1**	80	420	56175
3rd Quartile	0.00177	18.2	8.1	1.108	7.7	8.6	220	37.8	17.8	1406	2586	256283
Mean	0.00505	17.4	8.0	1.500	7.2	12.6	263	26.0	14.9	2014	2416	437502
Geometric mean	0.00079	17.4	8.0	1.070	7.1	6.2	200	12.5	7.1	**102**	**294**	**23999**

Table 11. Descriptive Statistics of Flow and Water Quality at Channel and Outfall Sites – Survey 3

CHANNELS

Statistic	Flow (cfs)	Temp. (°C)	pH	Cond (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Entero. (MPN/100ml)	Total Coliform (MPN/100ml)
No. of observations	26	27	27	27	27	27	27	27	27	27	27	27
Minimum	0.044	17.3	7.4	0.665	4.0	3.4	93	3.4	2.9	5	5	5
Maximum	0.856	32.4	10.7	1.66	17.4	61.8	440	21	20	4611	6131	228200
1st Quartile	0.097	18.5	8.6	0.809	8.8	6.1	155	6.8	5.5	13	91	126
Median	**0.194**	**22.9**	**9.1**	**1.029**	**12.3**	**11.3**	**190**	**10**	**7.6**	110	404	27550
3rd Quartile	0.396	28.7	10.1	1.369	13.6	20.0	295	12.5	10	278	1008	80650
Mean	0.286	24.0	9.2	1.100	11.1	16.9	215	10.5	8.7	765	1067	39233
Geometric mean	0.196	23.3	9.2	1.055	10.3	11.9	201	9.5	7.8	**98**	**387**	**9018**

OUTFALLS

Statistic	Flow (cfs)	Temp. (°C)	pH	Cond (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Enterococcus (MPN/100ml)	Total Coliform (MPN/100ml)
No. of observations	24	22	22	22	22	22	24	24	24	25	25	25
Minimum	0.000007	17.1	17.5	0.616	2.2	0.0	120	1.1	1.0	5	5	2481
Maximum	0.12500	23.9	8.8	1.94	9.2	112	650	540	88	8664	34100	6015000
1st Quartile	0.00023	18.8	7.9	0.795	5.8	5.1	167	6.3	5.2	63	317	34480
Median	**0.00088**	**19.2**	**8.0**	**0.969**	**6.6**	**8.5**	**180**	**17.5**	**11.5**	201	1000	275000
3rd Quartile	0.00574	20.9	8.3	1.096	7.8	23.0	200	35	15.8	836	5172	1046200
Mean	0.00825	19.9	8.1	1.000	6.5	21.8	214	55.8	16.1	1095	4122	1109732
Geometric mean	0.00110	19.8	8.0	0.961	6.3		199	16.6	9.0	**188**	**850**	**218568**

Table 12. Summary of Sample Counts from the Open Channels and Outfalls Compared with Frequency of Exceedances of Dissolved Copper Water Quality Criteria.

SURVEY NUMBER	LOCATION	# OF SAMPLES	# >CTR CHRONIC	# >CTR ACUTE
Survey 1 3/3/2009	**Channels**	**16**	**5**	**2**
	Los Cerritos	7	3	1
	Palo Verde	3	1	0
	Clark	4	1	1
	Wardlow	1	0	0
	Del Amo	1	0	0
	Outfalls	**10**	**4**	**1**
	Los Cerritos	4	2	0
	Palo Verde	1	0	0
	Clark	4	2	1
	Wardlow	1	0	0
	Del Amo	0	0	0
Survey 2 4/9/2009	**Channels**	**27**	**15**	**4**
	Los Cerritos	8	4	1
	Palo Verde	4	4	2
	Clark	8	5	0
	Wardlow	5	0	0
	Del Amo	2	2	1
	Outfalls	**14**	**3**	**2**
	Los Cerritos	8	1	1
	Palo Verde	2	1	0
	Clark	3	1	1
	Wardlow	1	0	0
	Del Amo	0	0	0
Survey 3 5/11/2009	**Channels**	**27**	**3**	**0**
	Los Cerritos	8	0	0
	Palo Verde	4	3	0
	Clark	8	0	0
	Wardlow	4	0	0
	Del Amo	3	0	0
	Outfalls	**24**	**8**	**3**
	Los Cerritos	11	3	1
	Palo Verde	2	1	0
	Clark	9	3	1
	Wardlow	1	0	0
	Del Amo	1	1	1
ALL SURVEYS COMBINED	**Channels**	**70**	**23**	**6**
	Los Cerritos	23	7	2
	Palo Verde	11	8	2
	Clark	20	6	1
	Wardlow	10	0	0
	Del Amo	6	2	1
	Outfalls	**48**	**15**	**6**
	Los Cerritos	23	6	2
	Palo Verde	5	2	0
	Clark	16	6	3
	Wardlow	3	0	0
	Del Amo	1	1	1

Table 13. Loads of Fecal Indicator Bacteria and Copper from all Main Channels – Survey 1

	E_coli (10^6mpn/day)	Enterococcus (10^6 mpn/day)	Total_Coliform (10^6 mpn /day)	Diss_Copper (g/day)	Total_Copper (g/day)
LOS CERRITOS[2]					
CC-01-A[3]	4311	3507	132103	35.4	38.6
CC-02-A	3198	1651	68495	22.3	26.2
CC-02-B	2368	395	90996	17.8	21.7
CC-02-D[1]	1441		64769	18.0	23.7
CC-03-A		171	445	6.9	7.6
CC-03-B			86	5.0	5.0
CC-04					
PALO VERDE					
PVMOUTH-01		105		1.2	1.2
PVMOUTH-01		134		1.1	1.2
PV-02		168	446	1.1	1.2
CLARK					
CLK-01-A		72	303	2.0	2.3
CLK-02-A		49	2101	1.3	1.4
CLK-02-B		238	4746	3.7	3.8
CLK-04-B					
WARDLOW					
WC-01-B[4]					
DEL AMO					
DA-01-A[4]					

1. Shaded lines indicate field replicates of previous sample.
2. Sites are ordered starting from the lower portion of each channel and moving upstream.
3. Los Cerritos CC-01-A located at the Stearns St. mass emission monitoring site.
4. Flow rates could not be determined at these sites which prohibited load calculations

Table 14. Loads of Fecal Indicator Bacteria and Copper from all Monitored Outfalls – Survey 1

	E_coli (10^6mpn/day)	Enterococcus (10^6 mpn/day)	Total_Coliform (10^6 mpn /day)	Diss_Copper (g/day)	Total_Copper (g/day)
LOS CERRITOS					
CCO-02-A		22	1229	0.013	0.022
CCO-09-A	558	635	1020	0.006	0.007
CCO-14-A		1.6	76	0.023	0.029
CCO-24-A	0.6	0.7	15493	0.003	0.004
subtotal	**559**	**660**	**17818**	**0.045**	**0.062**
CLARK					
CKO-09-A	51	16	683	0.005	0.006
CKO-17-A	233	70	2175	0.008	0.008
CLK-20-A		19	1138	0.047	0.035
CLK-22-A	3.1	57	1546	0.050	0.057
subtotal	**287**	**163**	**5542**	**0.110**	**0.107**
PALO VERDE					
PV-08	4.2	6.5	95.6	0.010	0.011
subtotal	**4.2**	**6.5**	**95.6**	**0.010**	**0.011**
WARDLOW					
WC-26				0.113	0.113
subtotal				**0.113**	**0.113**
TOTAL OUTFALLS	**850**	**829**	**23455**	**0.165**	**0.181**

Table 15. Loads of Fecal Indicator Bacteria and Copper from all Main Channels – Survey 2

	E_coli (10^6mpn/day)	Enterococcus (10^6 mpn/day)	Total_Coliform (10^6 mpn /day)	Diss_Copper (g/day)	Total_Copper (g/day)
LOS CERRITOS[2]					
CC-A[3]	7409	26460	478973	24.7	31.3
CC-B	25572	86955	448898	30.3	42.9
CC-C	595	1635	212323	11.3	14.2
CC-D	1644	6037	129460	16.4	20.9
CC-E	172	172	57593	2.5	3.7
CC-F	1126	1593	161098	5.6	8.4
CC-H[1]	561	939	152081	5.6	8.4
CC-G			76.4	1.9	2.5
PALO VERDE					
PV-A	121	165	3881	0.2	0.3
PV-B	147	588	70839	1.6	2.1
PV-D	159	680	30638	1.5	2.2
PV-C	3.3	18	4740	0.3	0.5
CLARK					
CK-A		524	3120	34.1	36.7
CK-B		386	52	6.3	8.9
CK-C		830	98	11.7	15.6
CK-D		173		3.6	4.9
CK-E	63	5777	277	2.9	4.6
CK-F	562	3303	4215703	23.3	30.2
CK-G	72	393	63811	0.6	0.8
CK-H	97	270	45412	0.6	0.9
WARDLOW					
WC-A					
WC-B	222	949	8547	1.1	1.7
WC-C		92		1.6	2.2
WC-D		8.2		0.5	0.8
WC-E	2092	2062	64372	2.2	4.0
DEL AMO					
DA-A		883	796681	14	26
DA-B	2239	14009	12449388	30	43

1. Shaded lines indicate field replicates of previous sample.
2. Sites are ordered starting from the lower portion of each channel and moving upstream.
3. Los Cerritos CC-A located at the Stearns St. mass emission monitoring site.

Table 16. Loads of Fecal Indicator Bacteria and Copper from all Monitored Outfalls – Survey 2

	E_coli (10^6mpn/day)	Enterococcus (10^6 mpn/day)	Total_Coliform (10^6 mpn /day)	Diss_Copper (g/day)	Total_Copper (g/day)
LOS CERRITOS					
CC-02					
CC-04	0.6	7.4	12695	0.003	0.004
CC-06	0.0	0.0	177	0.023	0.037
CC-07	17.4	29.4	825	0.002	0.004
CC-14	0.0	0.3	572	0.023	0.035
CC-14.5	0.0	0.1	0.7	0.003	0.003
CC-19	1026	1221	37601	0.072	0.199
CC-24	212	84.4	4492	0.017	0.023
subtotal	**1255**	**1343**	**56362**	**0.142**	**0.305**
CLARK					
CK-06	0.4	1.4	3086	0.003	0.007
CK-17	17.2	27.9	312	0.034	0.063
CK-20	0.0	77.8	354	0.022	0.033
subtotal	**17.5**	**107.1**	**3752**	**0.059**	**0.103**
PALO VERDE					
PV-08	0.2	0.7	428	0.004	0.007
PV-22	0.8	1.4	69	0.029	0.043
subtotal	**1.0**	**2.1**	**496.9**	**0.033**	**0.050**
WARDLOW					
WC-07				0.454	0.622
subtotal				**0.454**	**0.622**
TOTAL OUTFALL	**1274**	**1452**	**60611**	**0.688**	**1.079**

Table 17. Loads of Fecal Indicator Bacteria and Copper from all Main Channels - Survey 3

	E_coli (10^6mpn/day)	Enterococcus (10^6 mpn/day)	Total_Coliform (10^6 mpn /day)	Diss_Copper (g/day)	Total_Copper (g/day)
LOS CERRITOS[2]					
CC-A[3]	3092	14602	496126	5.0	6.8
CC-H[1]	3136	13766	685126	5.8	8.8
CC-B	2443	906	152658	2.8	3.3
CC-C	606	623	341313	4.9	5.6
CC-D	2681	3677	1107322	8.8	10.0
CC-E	10715	1886	126439	1.2	1.4
CC-F	16714	7648	313378	3.1	4.7
CC-G	3652	395	292678	2.2	3.0
PALO VERDE					
PV-A	5180	2859	84600	2.4	2.7
PV-B	197	7863	2460	2.2	2.5
PV-D	425	7022	5914	2.2	2.6
PV-C	7	190	101	2.8	2.9
CLARK					
CK-A	2007	1583	96635	2.1	2.7
CK-B	4511	2421	661132	6.0	6.8
CK-C	728	1684	167193	2.2	2.5
CK-D	25	25	157	4.2	4.8
CK-E	19	161	20	3.3	3.8
CK-F	204	5087	421614	20.4	24.4
CK-H	204	9106	192762	20.4	22.4
CK-G	4537	2159	244676	1.0	1.5
WARDLOW					
WC-A					
WC-B	321	532	36392	0.4	0.5
WC-C	11	2798	6856	1.9	2.3
WC-D	18	19	19	3.4	4.1
DEL AMO					
DA-A	52	8240	197709	11.4	13.5
DA-C	104	11959	108686	11.4	13.5
DA-B	834	26645	1346084	12.0	13.3

1. Shaded lines indicate field replicates of previous sample.
2. Sites are ordered starting from the lower portion of each channel and moving upstream.
3. Los Cerritos CC-A located at the Stearns St. mass emission monitoring site.

Table 18. Loads of Fecal Indicator Bacteria and Copper from all Monitored Outfalls – Survey 3

Site Number	E_coli (10^6mpn/day)	Enterococcus (10^6 mpn/day)	Total_Coliform (10^6 mpn /day)	Diss_Copper (g/day)	Total_Copper (g/day)
CERRITOS					
CC-02	88.4	63.2	7149	0.122	0.149
CC-04	0.35	68.5	2338	0.002	0.003
CC-05	0.03	0.06	5		
CC-06					
CC-09	9.1	64.9	45039	0.009	0.025
CC-11	0.30	0.46	100	0.003	0.008
CC-12	394	144	139858	0.068	2.458
CC-14	80	723	27125	0.230	2.014
CC-19	34	5.4	14971	0.096	0.113
CC-22	0.08	1.1	1738	0.006	0.008
CC-24	10.8	670	56401	0.072	0.176
CC-29	4.0	11.7	3013	0.005	0.006
subtotal	**621**	**1753**	**297739**	**0.6**	**5.0**
CLARK					
CK-01	0.03	0.95	567	0.002	0.003
CK-06	154	786	106235	0.164	0.403
CK-08	46	212	9213	0.022	0.033
CK-15	251	55	52971	0.020	0.026
CK-17	7.0	9.6	1205	0.015	0.024
CK-20	2.5	1.3	643	0.025	0.028
CK-22	2.1	34.0	66397	0.021	0.025
CK-34	139	363	8281	0.529	0.635
CK-48	0.04	4.5	129	0.009	0.013
subtotal	**601**	**1465**	**245642**	**0.8**	**1.2**
PALO VERDE					
PV-08	13.2	51.5	77634	0.006	0.010
PV-10	2.47	2199	875086	0.444	0.765
subtotal	**16**	**2250**	**952720**	**0.4**	**0.8**
WARDLOW					
WC-07	550	969	32754	0.505	0.565
subtotal	**550**	**969**	**32754**	**0.5**	**0.6**
DEL AMO					
DA-14	0.03	0.03	98	0.045	0.056
subtotal	**0.03**	**0.03**	**98**	**0.05**	**0.06**
TOTAL OUTFALLS	**1788**	**6438**	**1,528,952**	**2.4**	**7.5**

APPENDIX A

GIS Plots of Flow, Concentration and Calculated Loads Measured in The Main Channel and Flowing Outfalls

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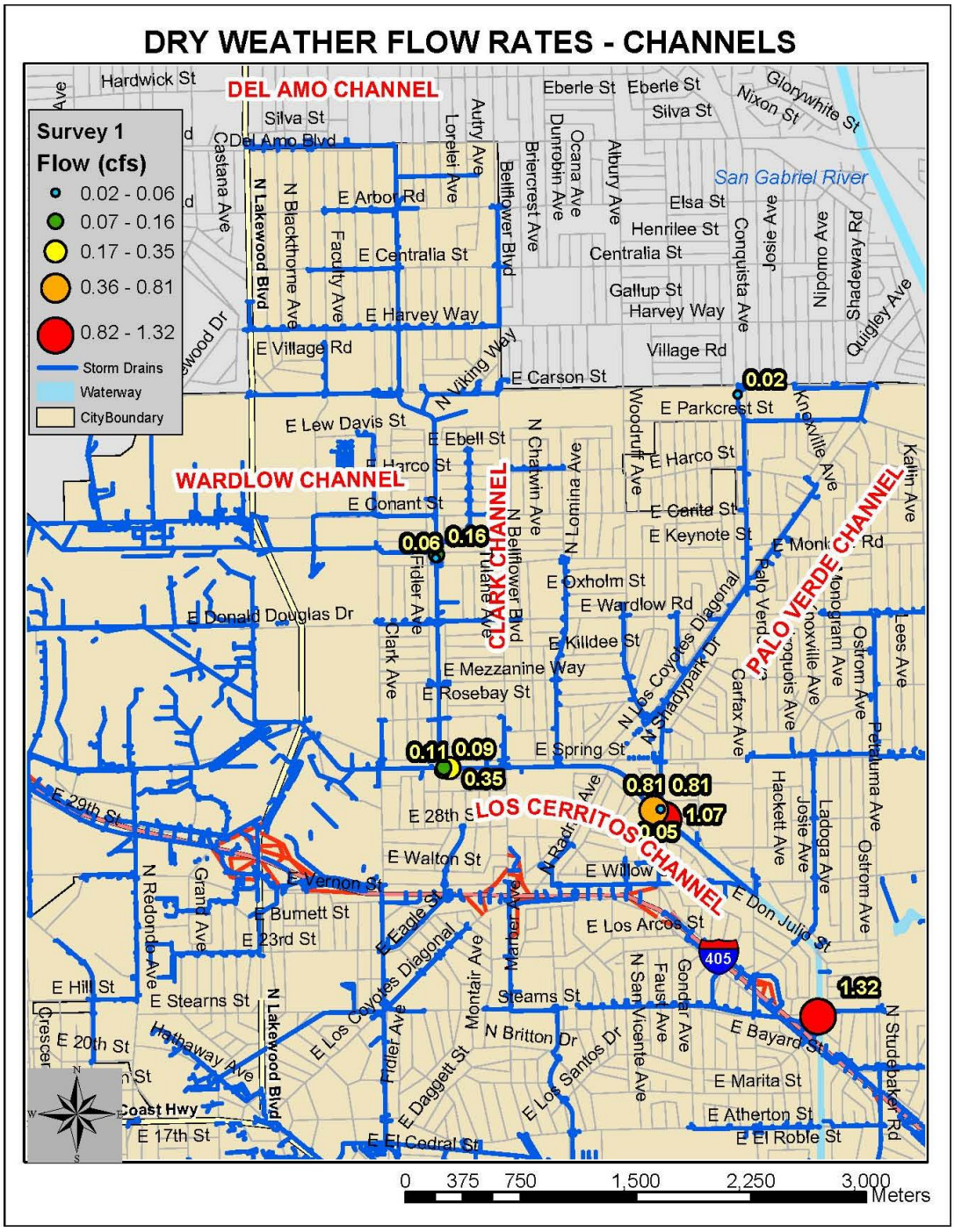

Figure A 1. **Flow (cfs) Measured in the Main Channel during Survey 1.**

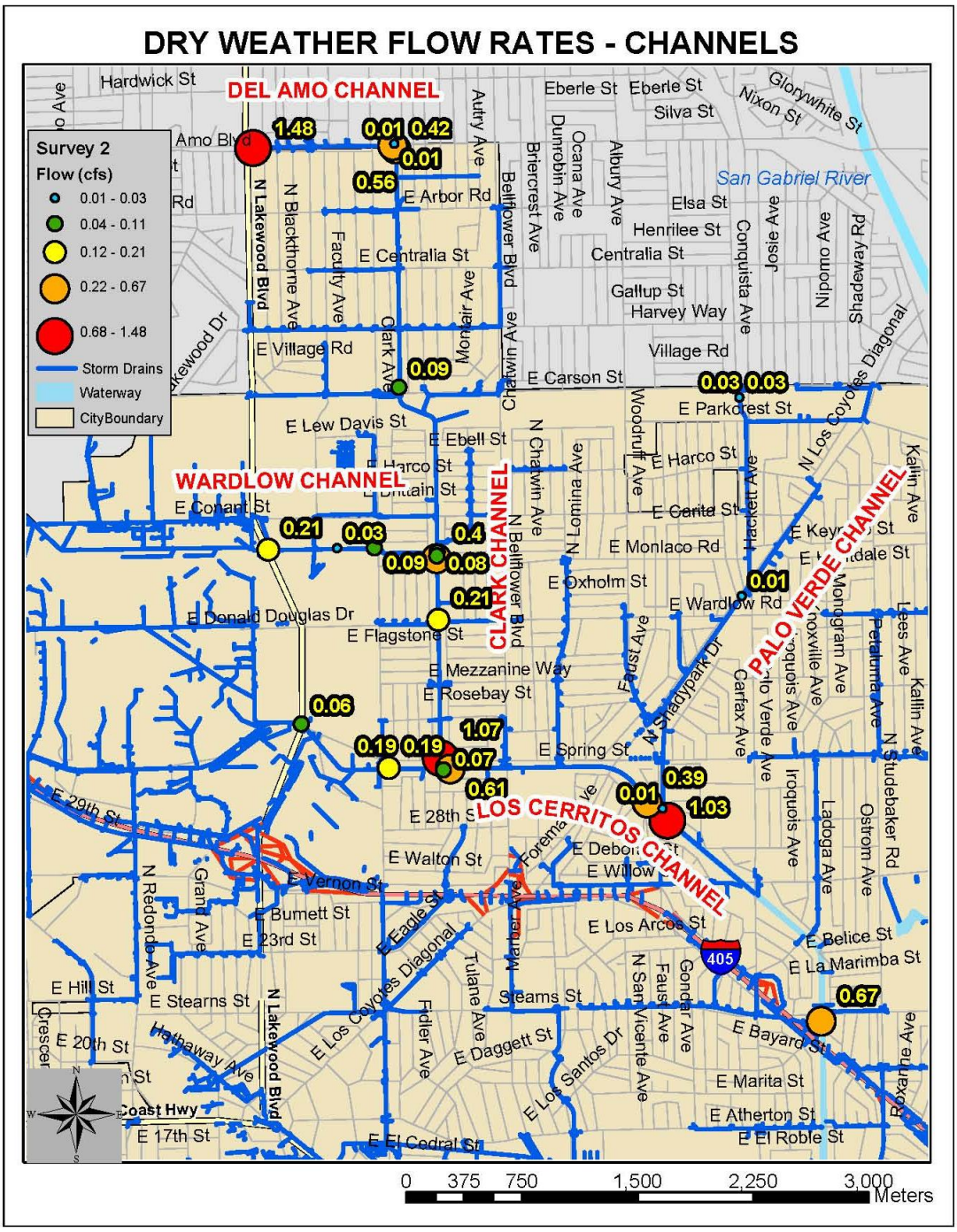

Figure A-2. **Flow (cfs) Measured in the Main Channel during Survey 2.**

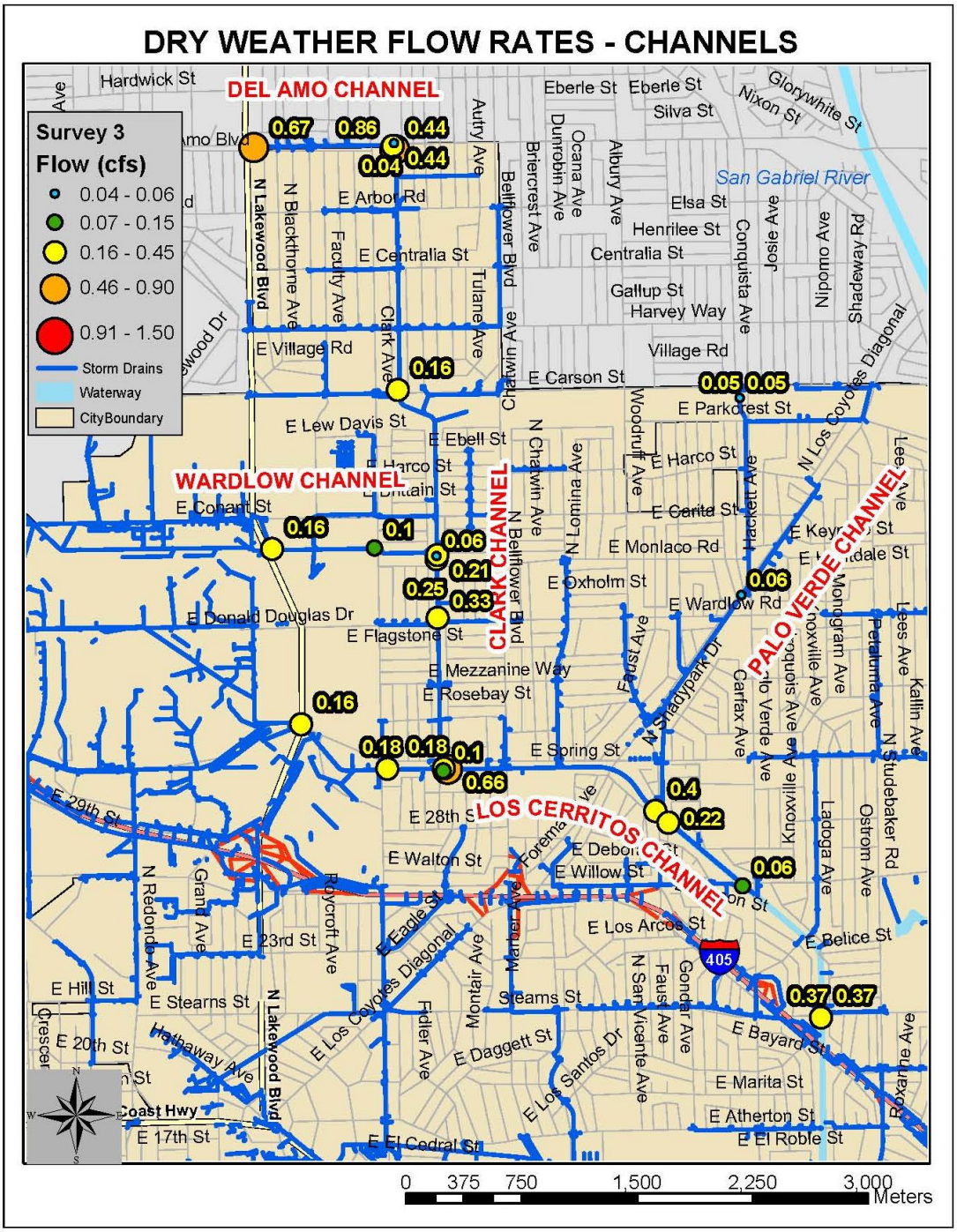

Figure A-3. **Flow (cfs) Measured in the Main Channel during Survey 3.**

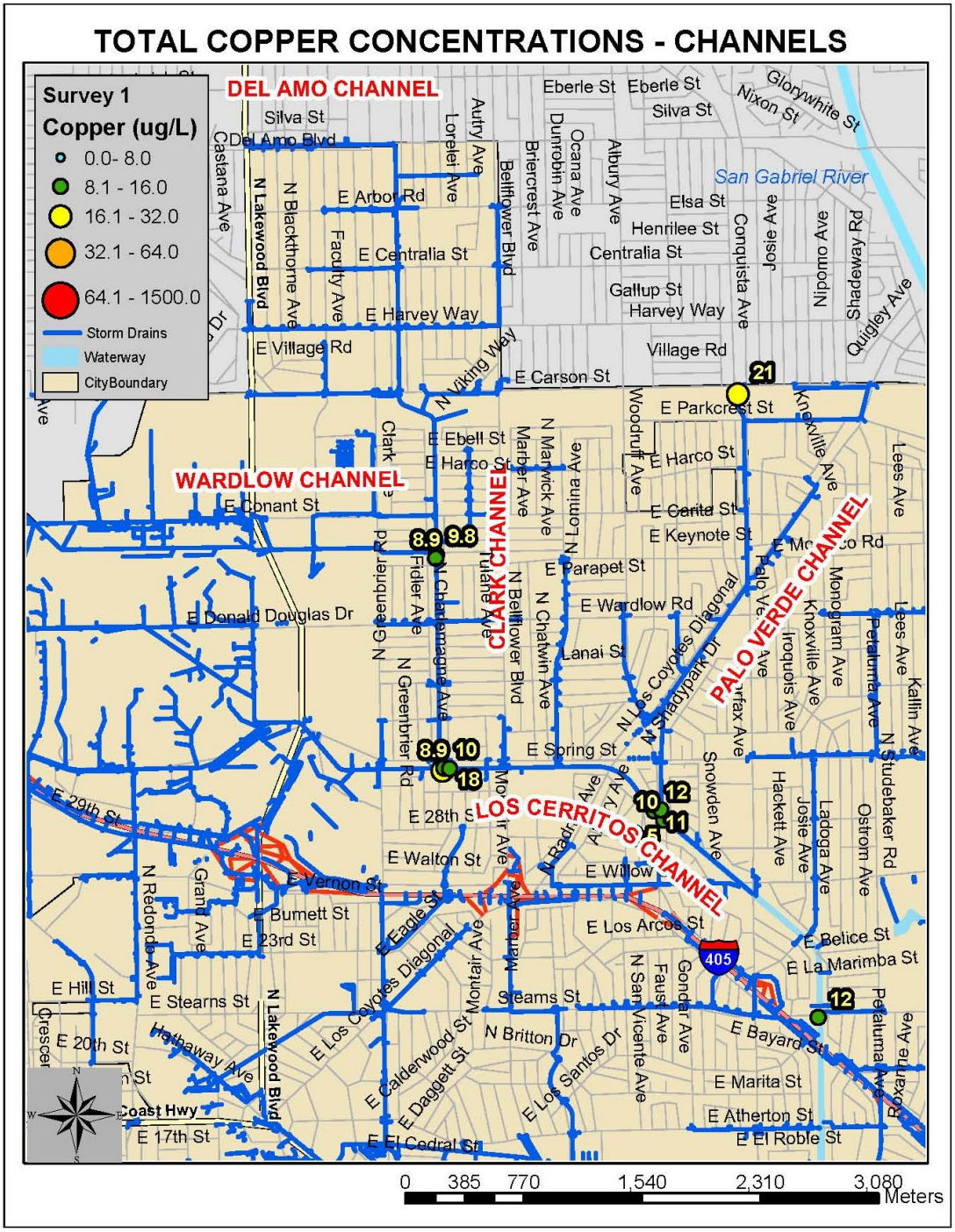

Figure A-4. **Concentrations of Total Copper Measured in the Main Channel during Survey 1.**

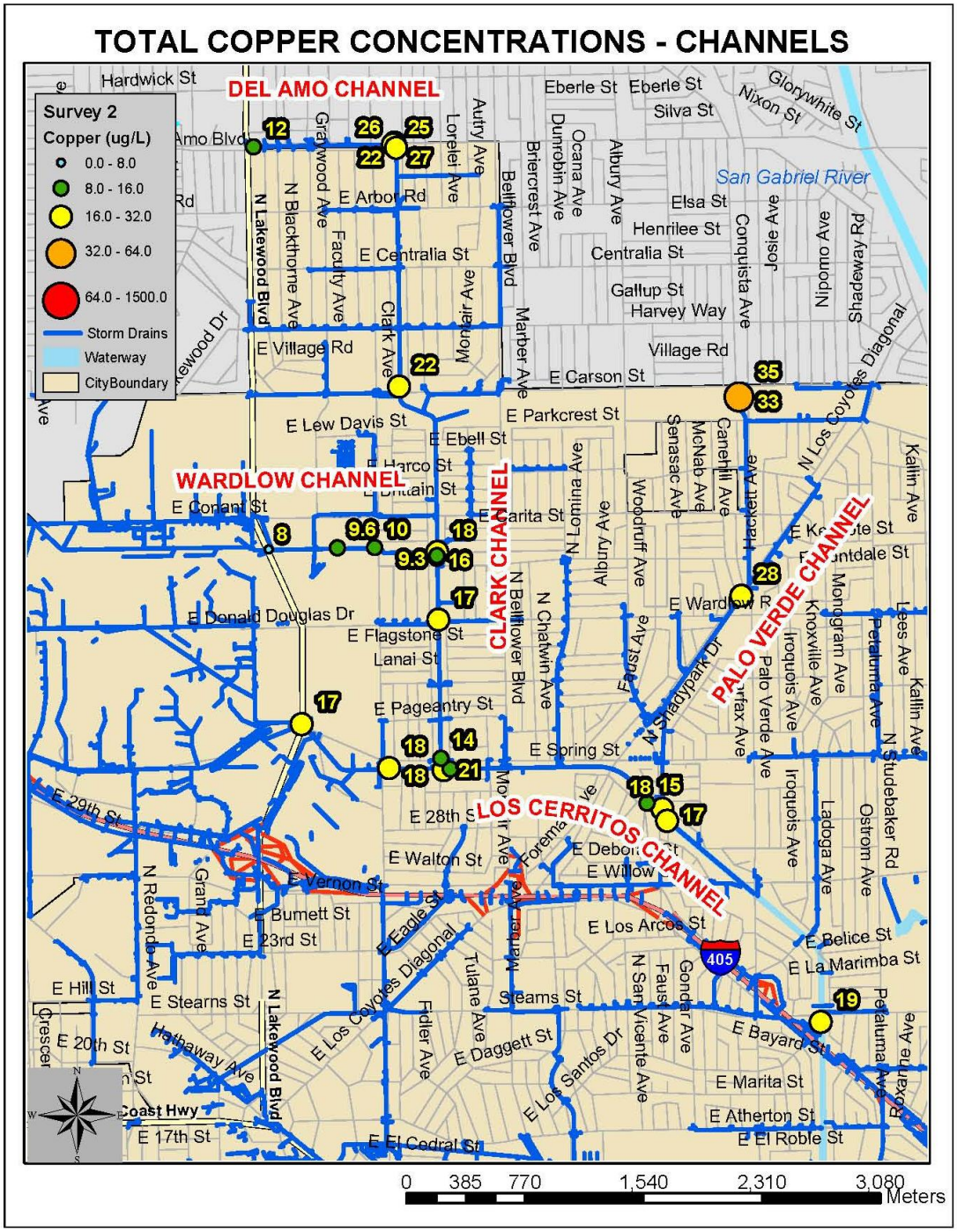

Figure A-5. **Concentrations of Total Copper Measured in the Main Channel during Survey 2.**

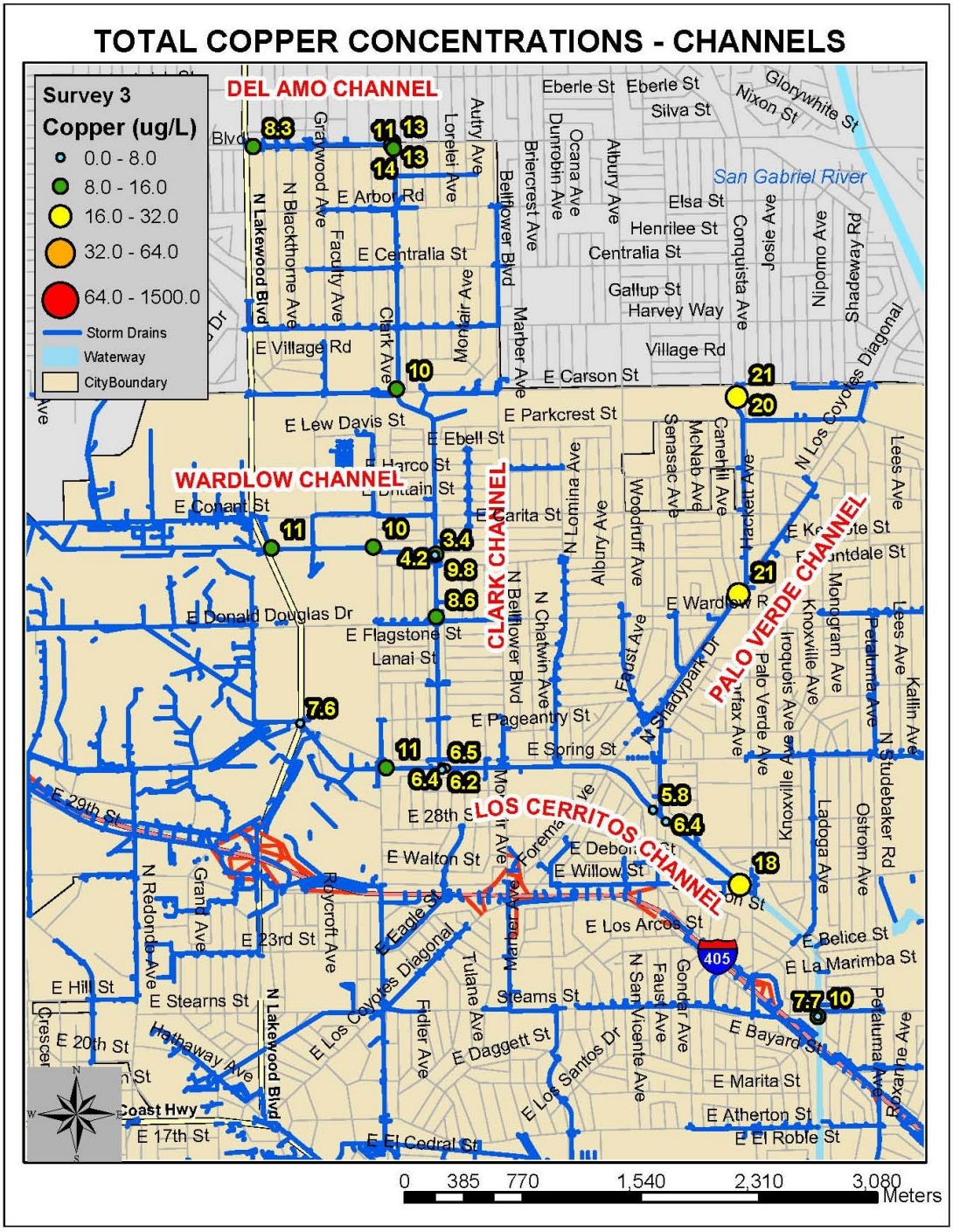

Figure A-6. **Concentrations of Total Copper Measured in the Main Channel during Survey 3.**

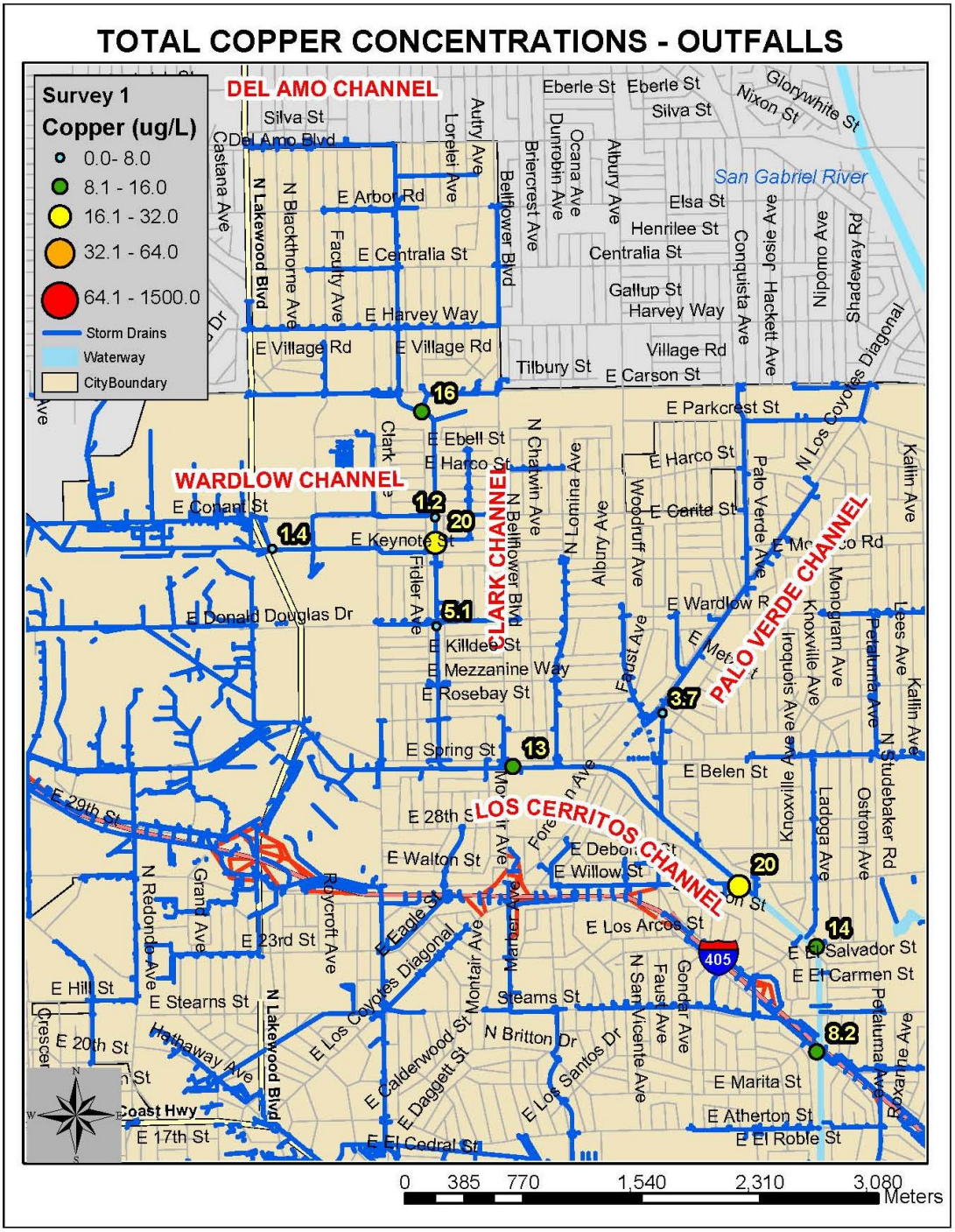

Figure A-7. **Concentrations of Total Copper Measured at Flowing Outfalls during Survey 1.**

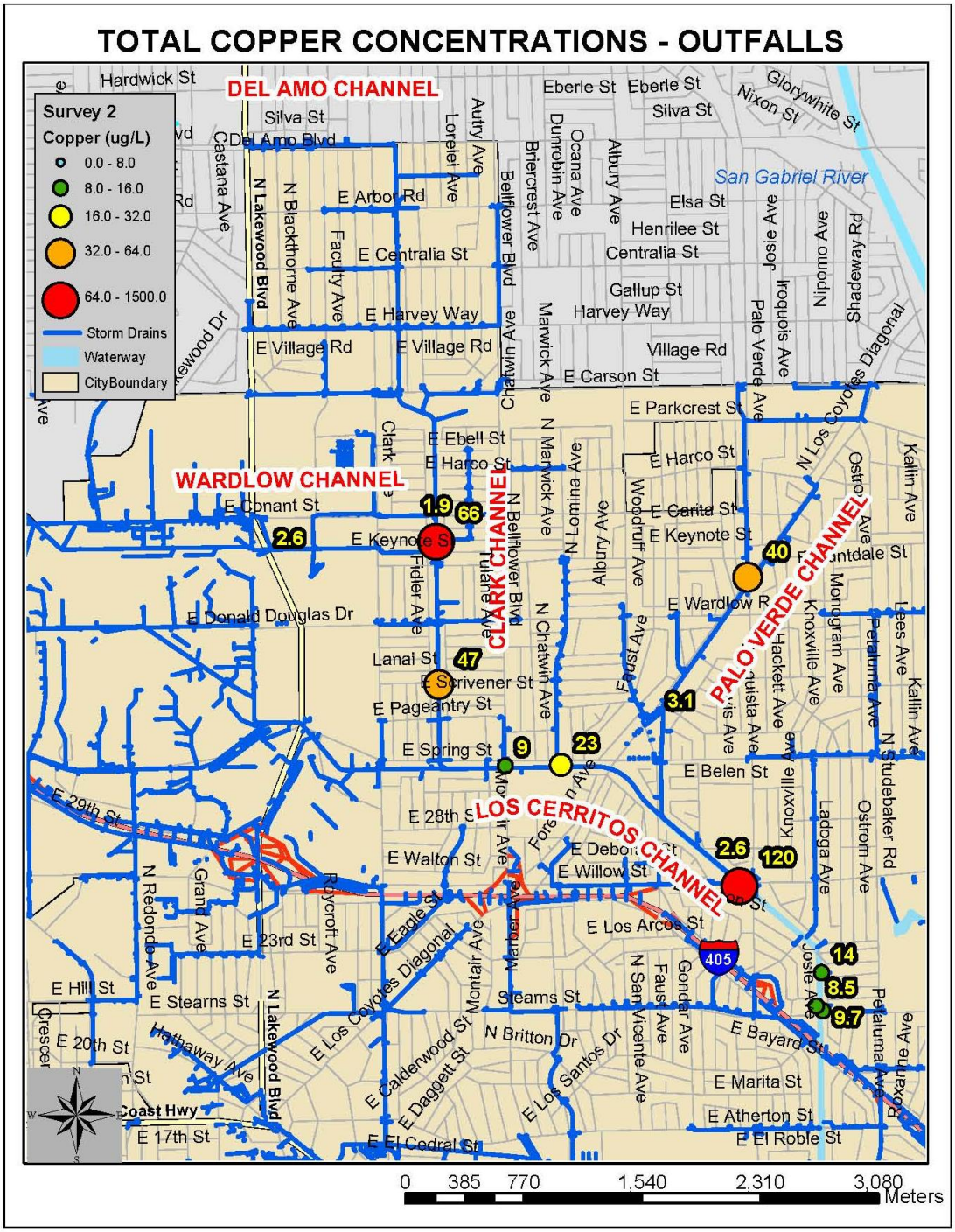

Figure A-8. **Concentrations of Total Copper Measured at Flowing Outfalls during Survey 2.**

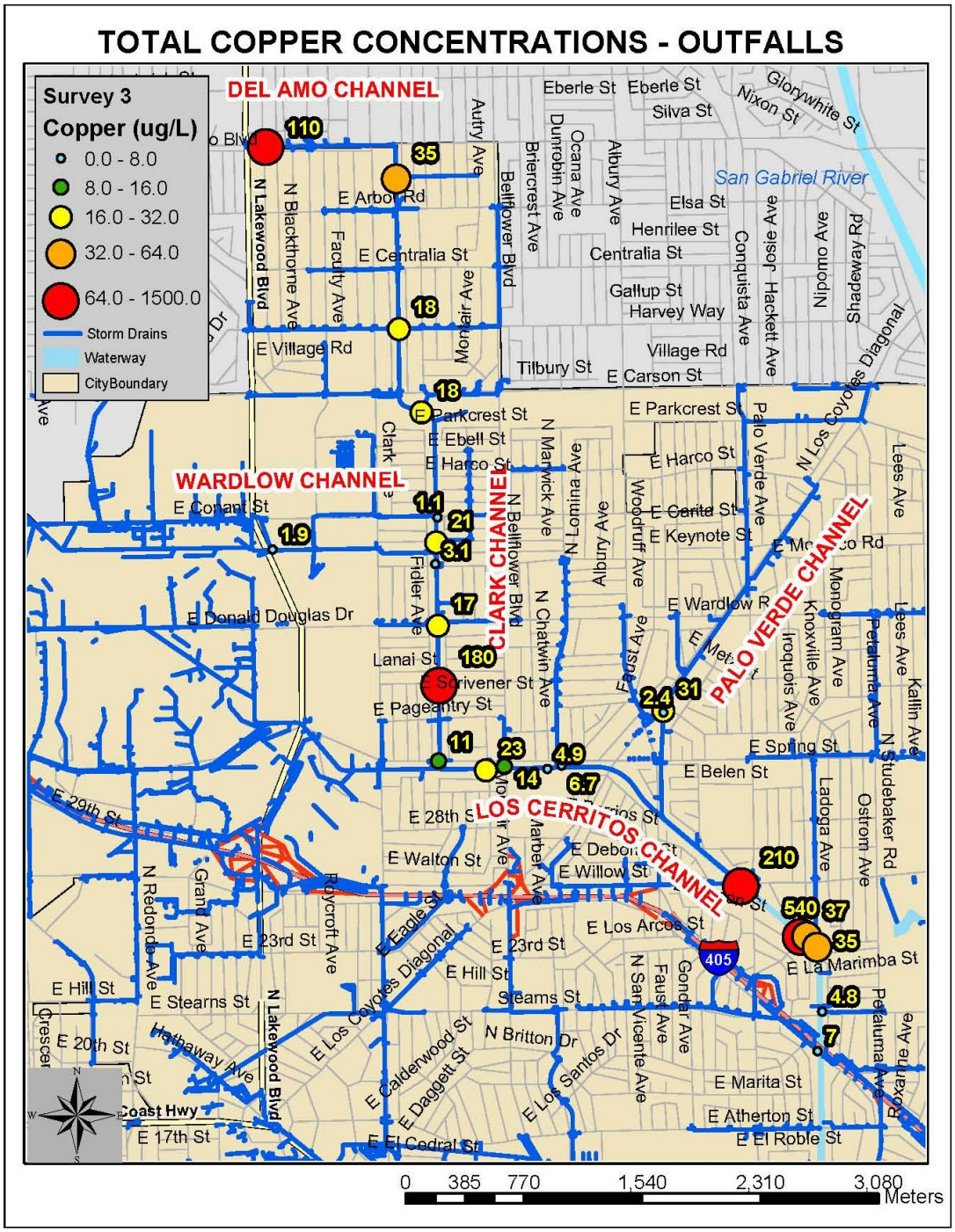

Figure A-9. **Concentrations of Total Copper Measured at Flowing Outfalls during Survey 3.**

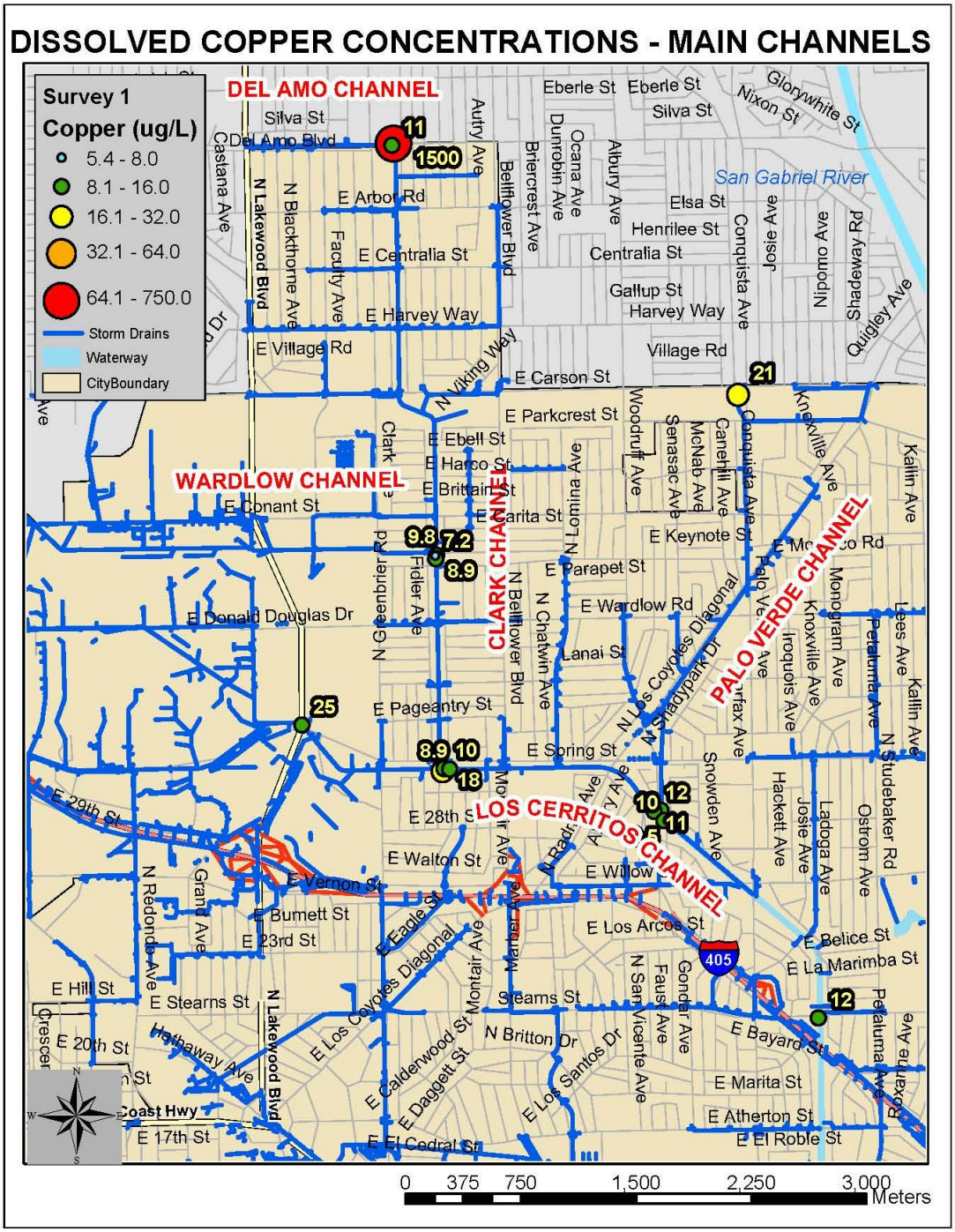

Figure A-10. Concentrations of Dissolved Copper Measured in the Main Channel during Survey 1.

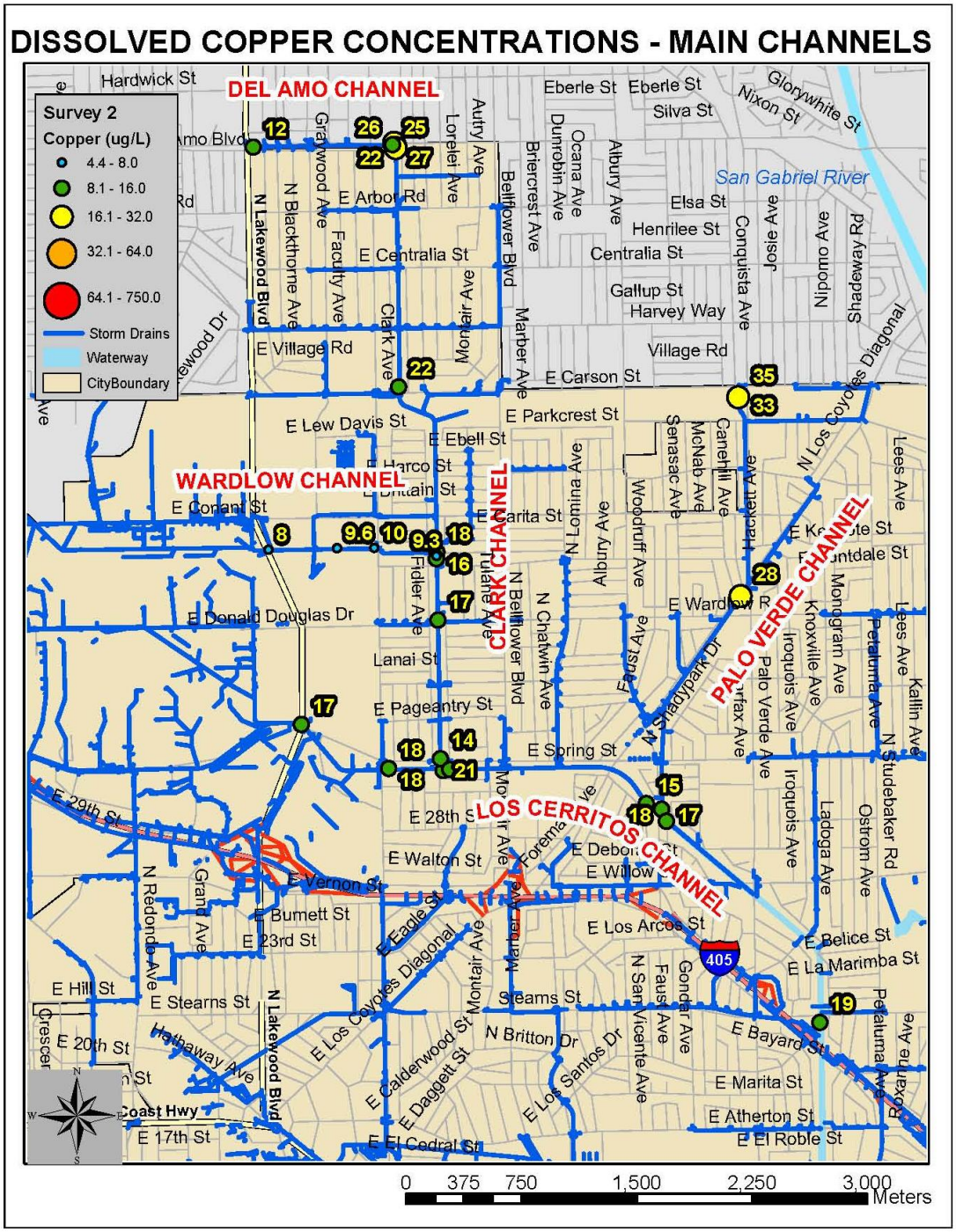

Figure A-11. Concentrations of Dissolved Copper Measured in the Main Channel during Survey 2.

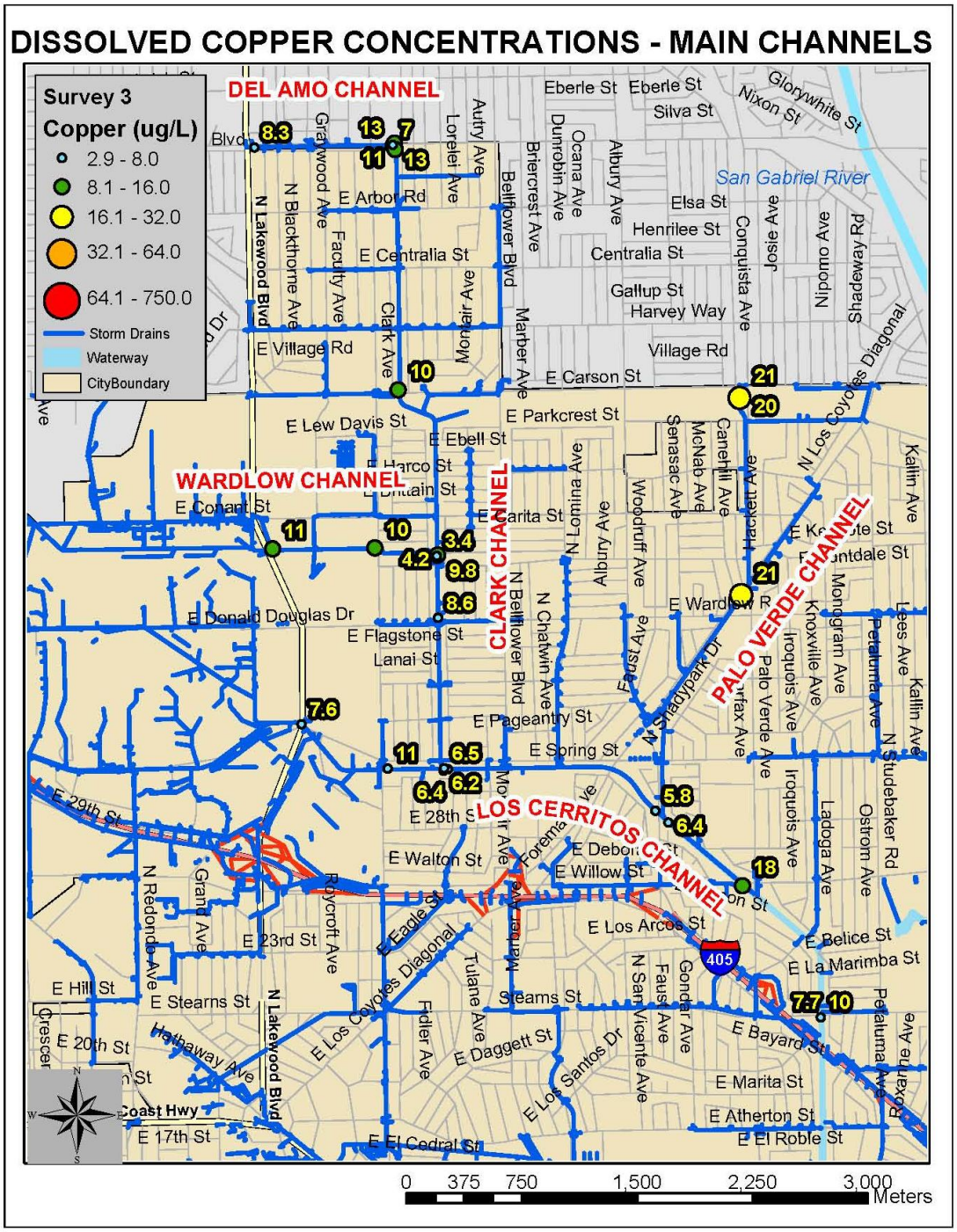

Figure A-12. Concentrations of Dissolved Copper Measured in the Main Channel during Survey 3.

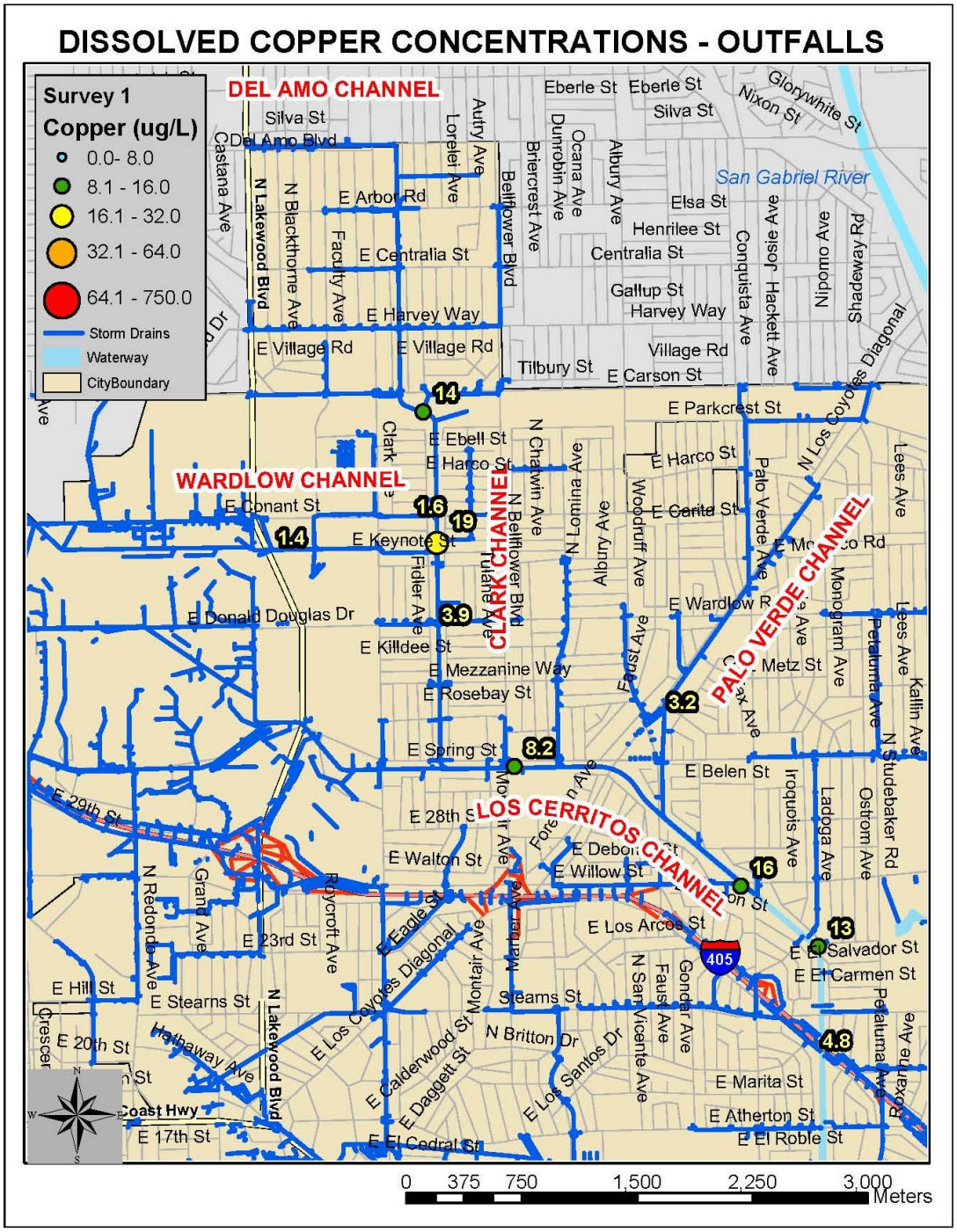

Figure A-13. Concentrations of Dissolved Copper Measured in Flowing Outfalls during Survey 1.

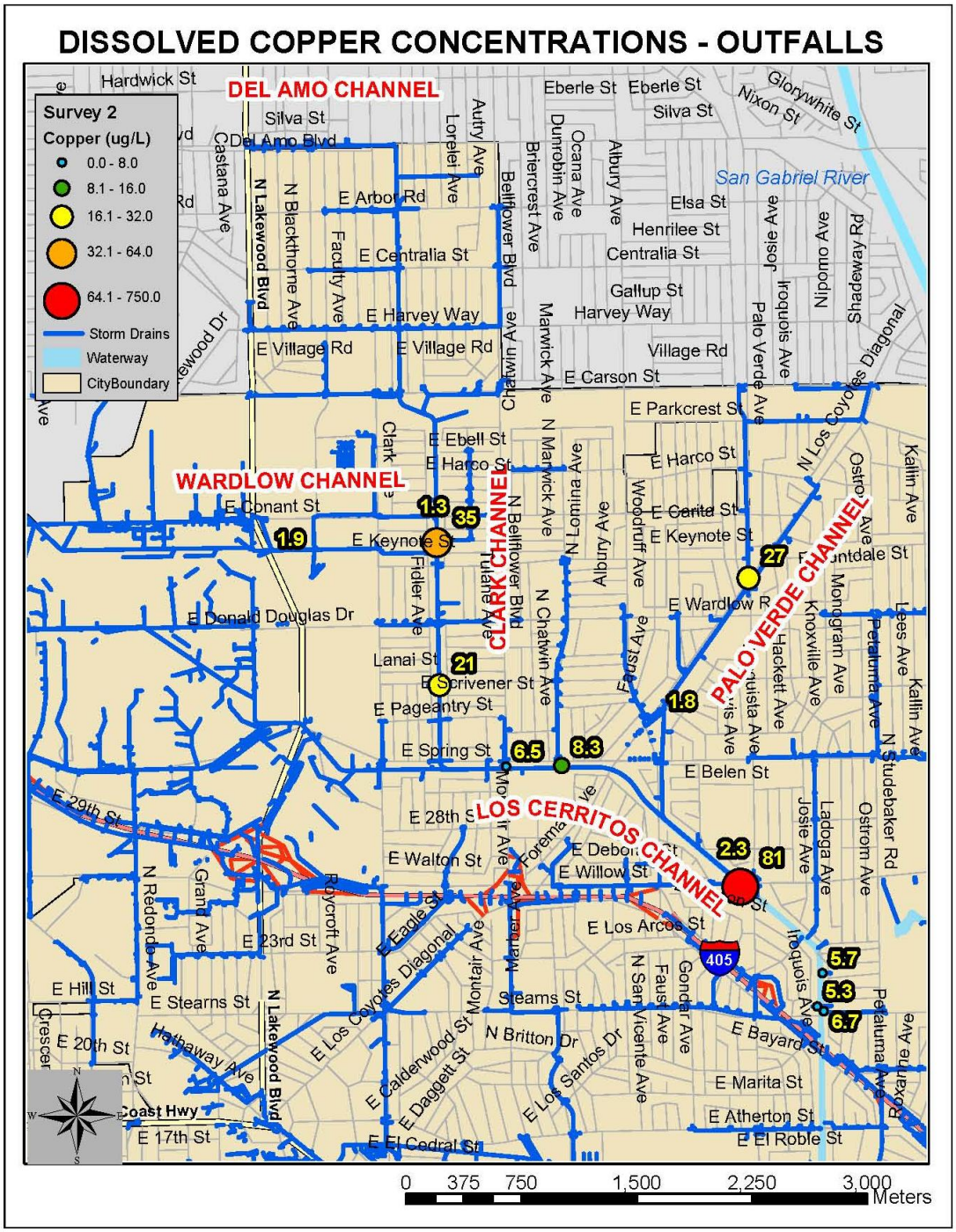

Figure A-14. Concentrations of Dissolved Copper Measured in Flowing Outfalls during Survey 2.

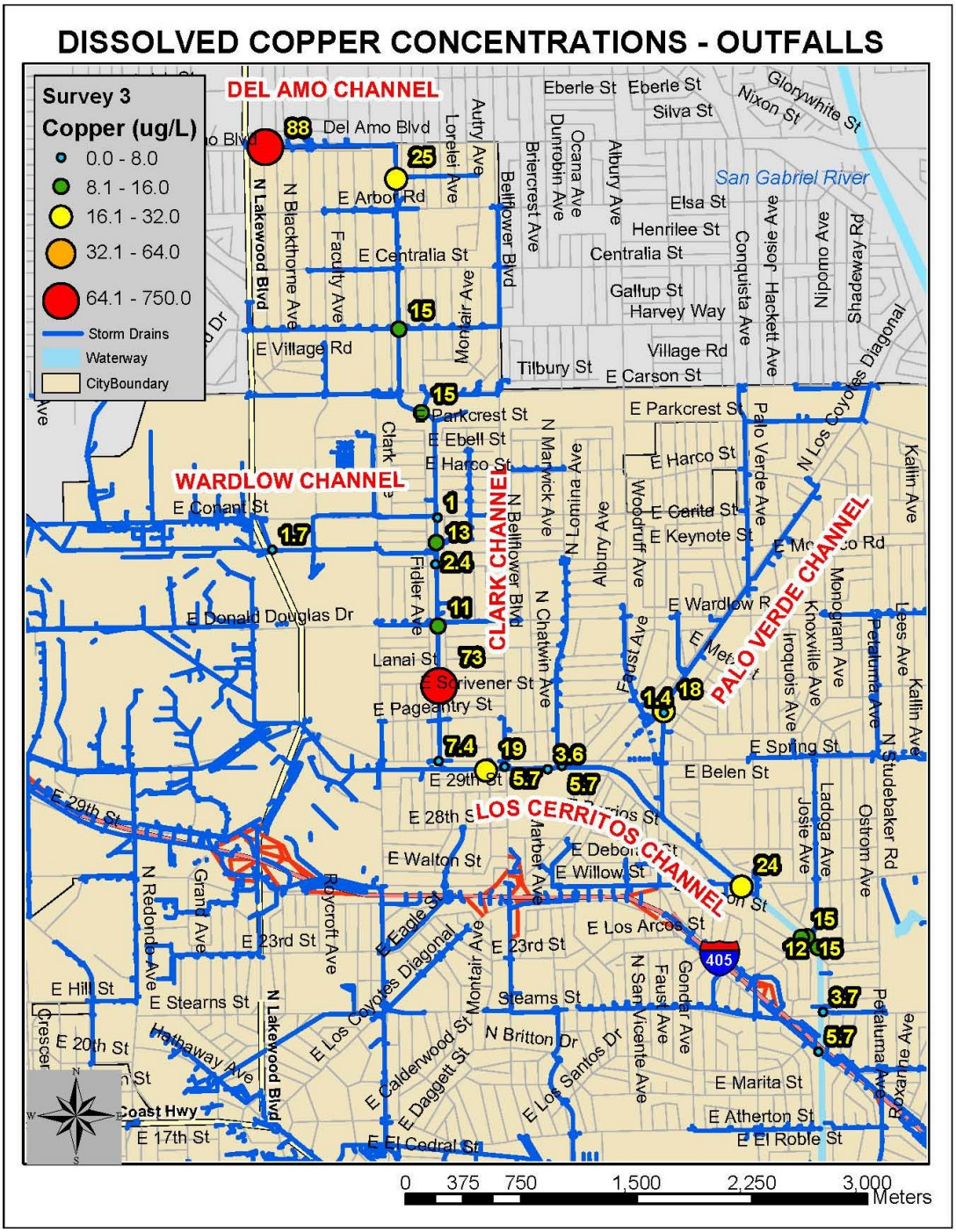

Figure A-15. Concentrations of Dissolved Copper Measured in Flowing Outfalls during Survey 3.

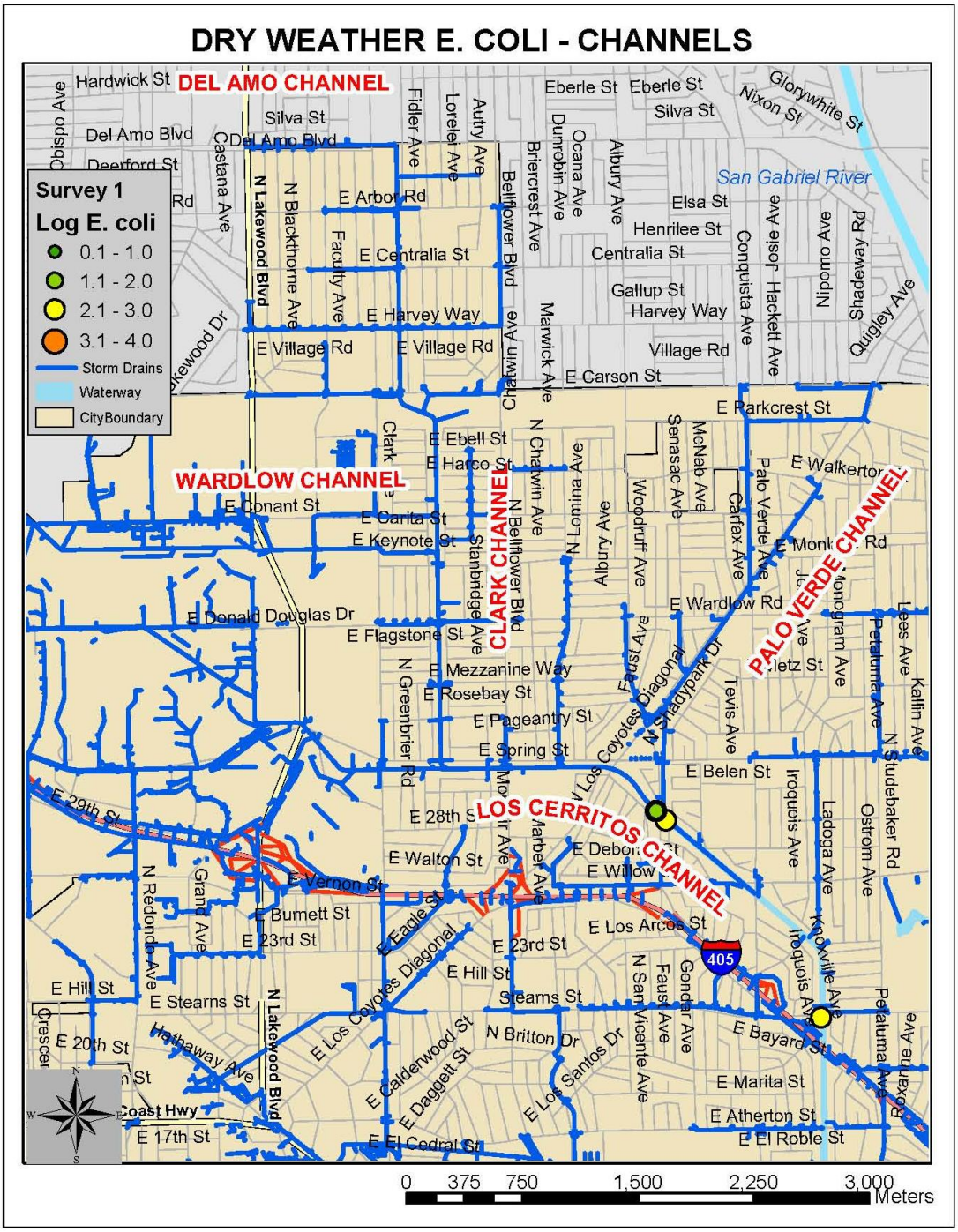

Figure A-16. Concentrations of *E. coli* (Log MPN/100 ml) Measured in Main Channels during Survey 1.

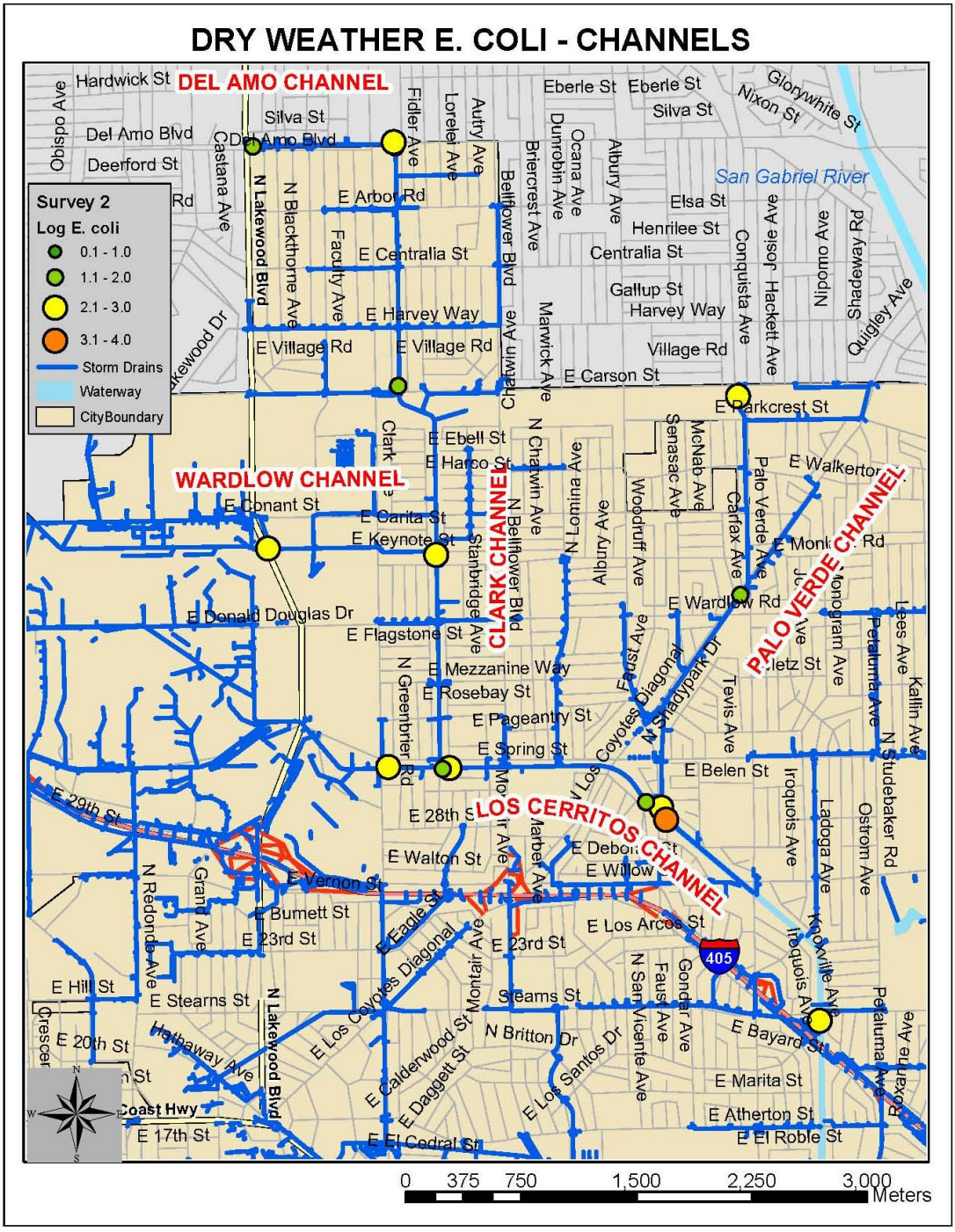

Figure A-17. Concentrations of *E. coli* (Log MPN/100 ml) Measured in Main Channels during Survey 2.

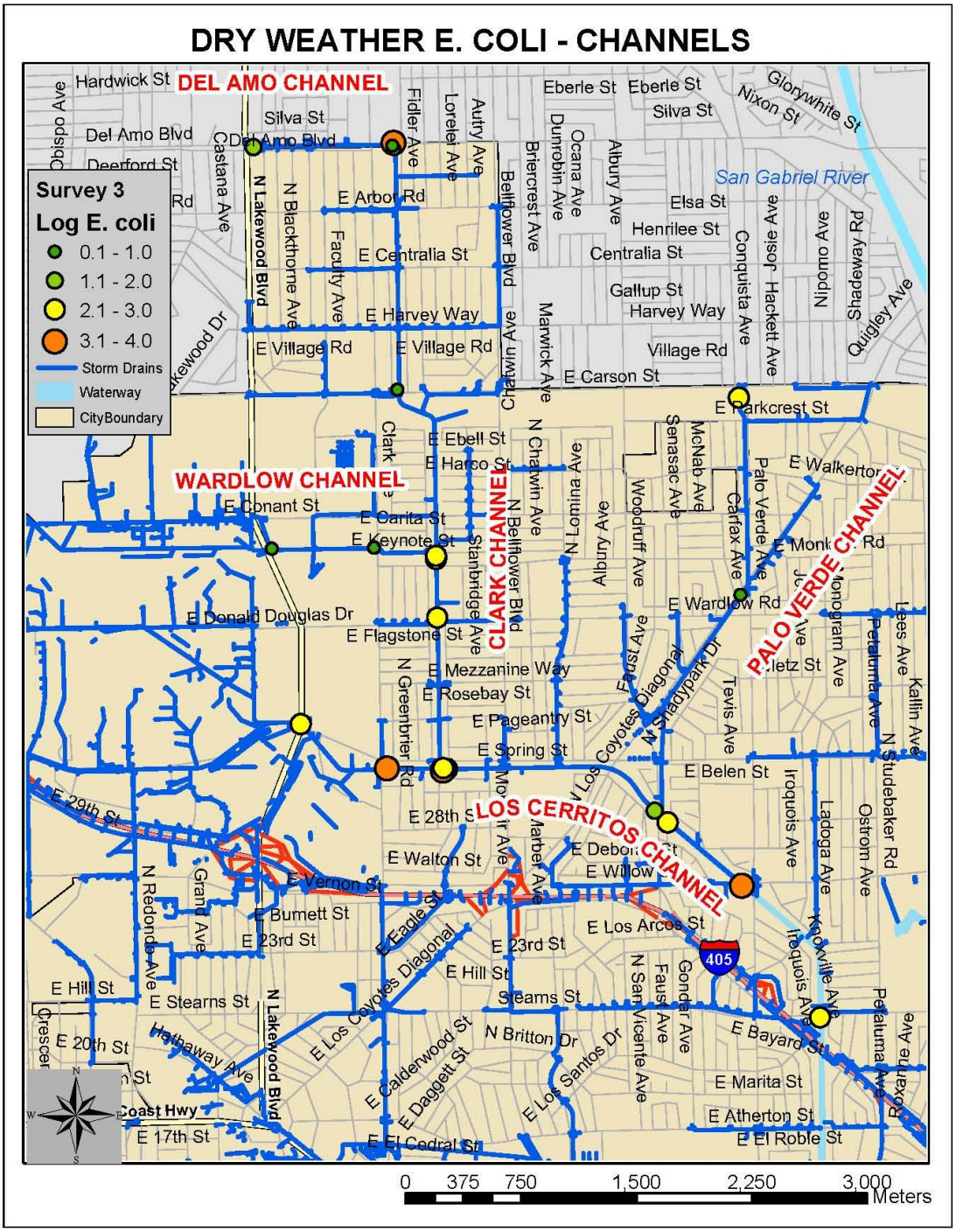

Figure A-18. Concentrations of *E. coli* (Log MPN/100 ml) Measured in Main Channels during Survey 3.

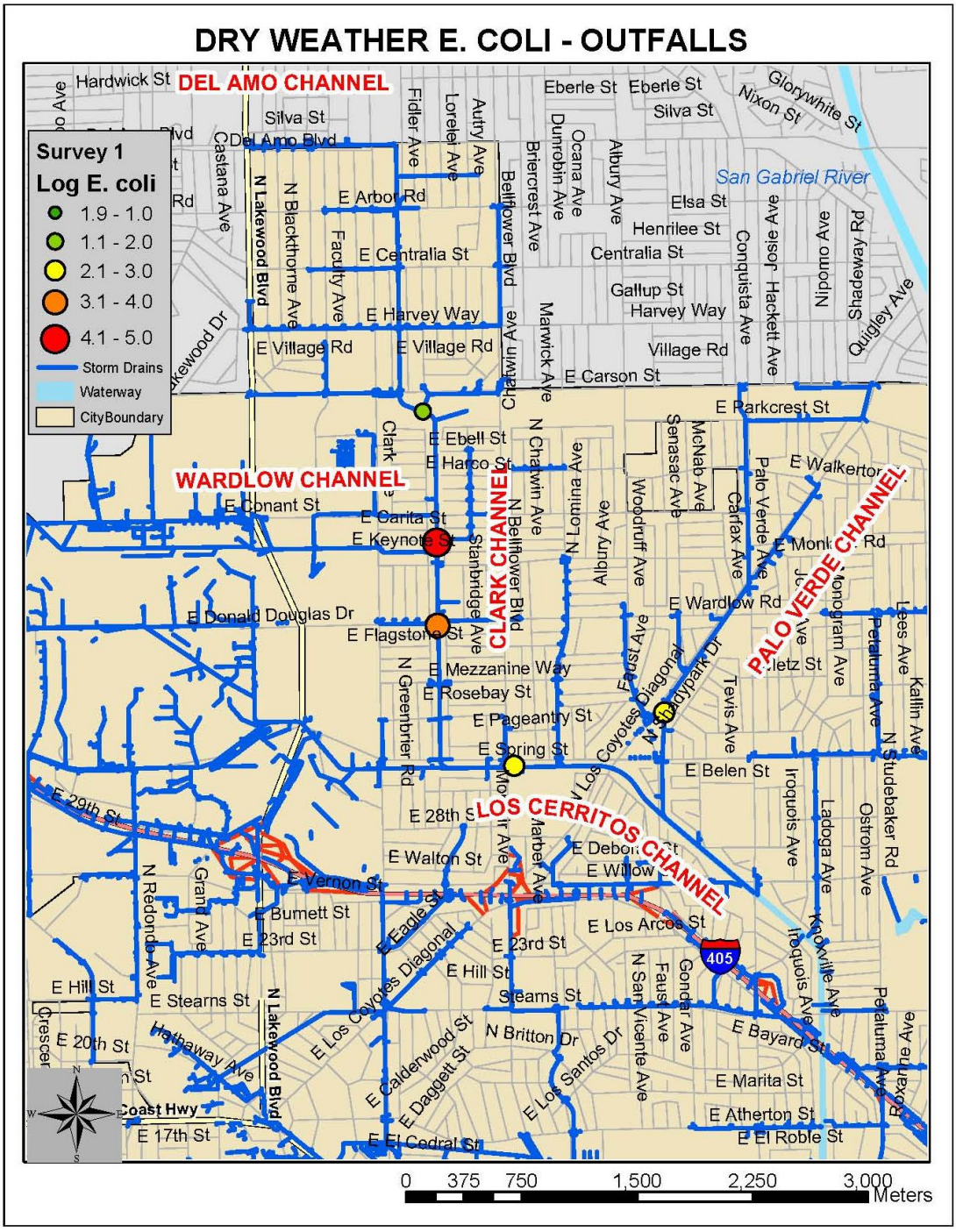

Figure A-19. Concentrations of *E. coli* (Log MPN/100 ml) Measured in Flowing Outfalls during Survey 1.

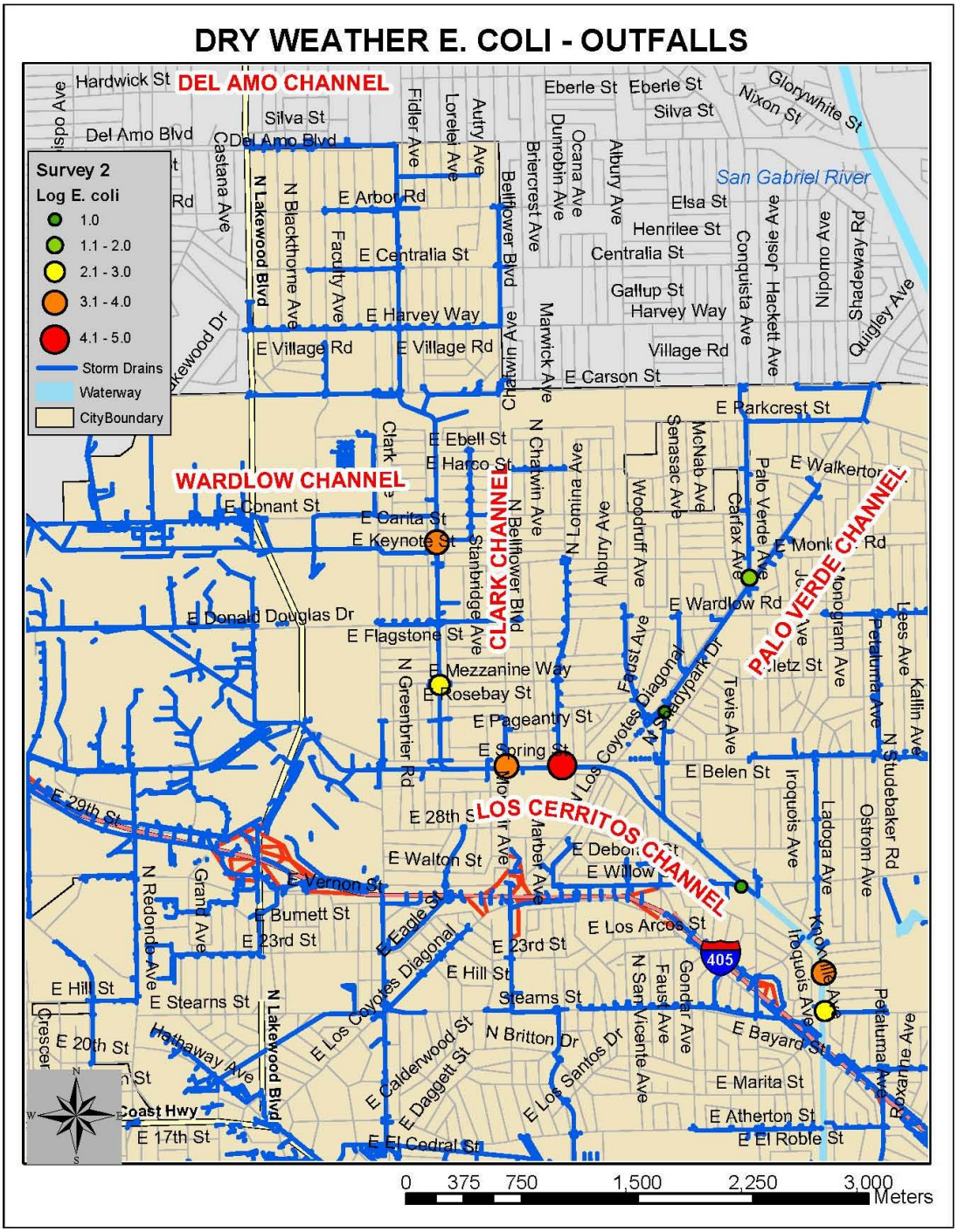

Figure A-20. **Concentrations of *E. coli* (Log MPN/100 ml) Measured in Flowing Outfalls during Survey 2.**

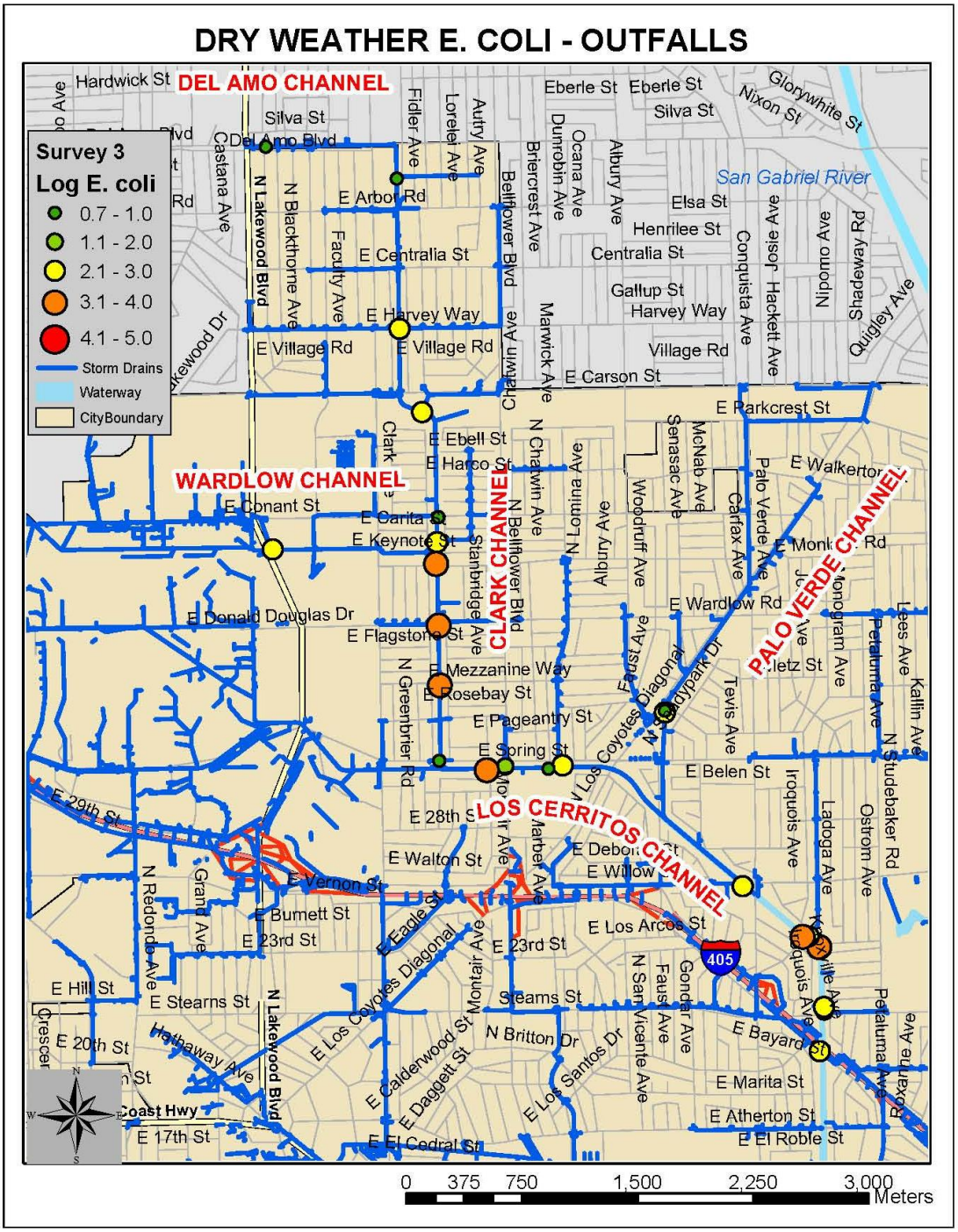

Figure A-21. **Concentrations of *E. coli* (Log MPN/100 ml) Measured in Flowing Outfalls during Survey 3.**

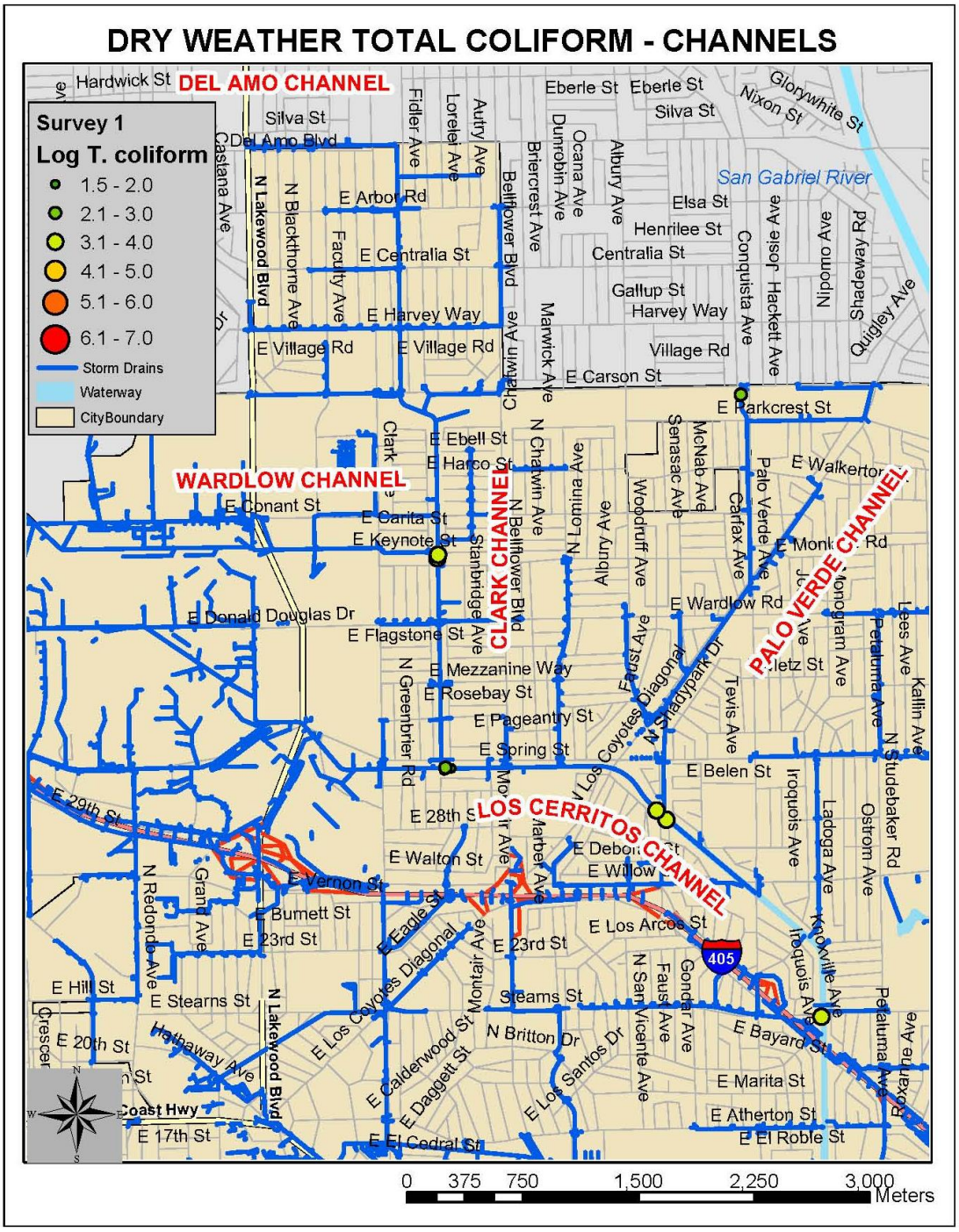

Figure A-22. **Concentrations of Total Coliform (Log MPN/100 ml) Measured in Main Channels during Survey 1.**

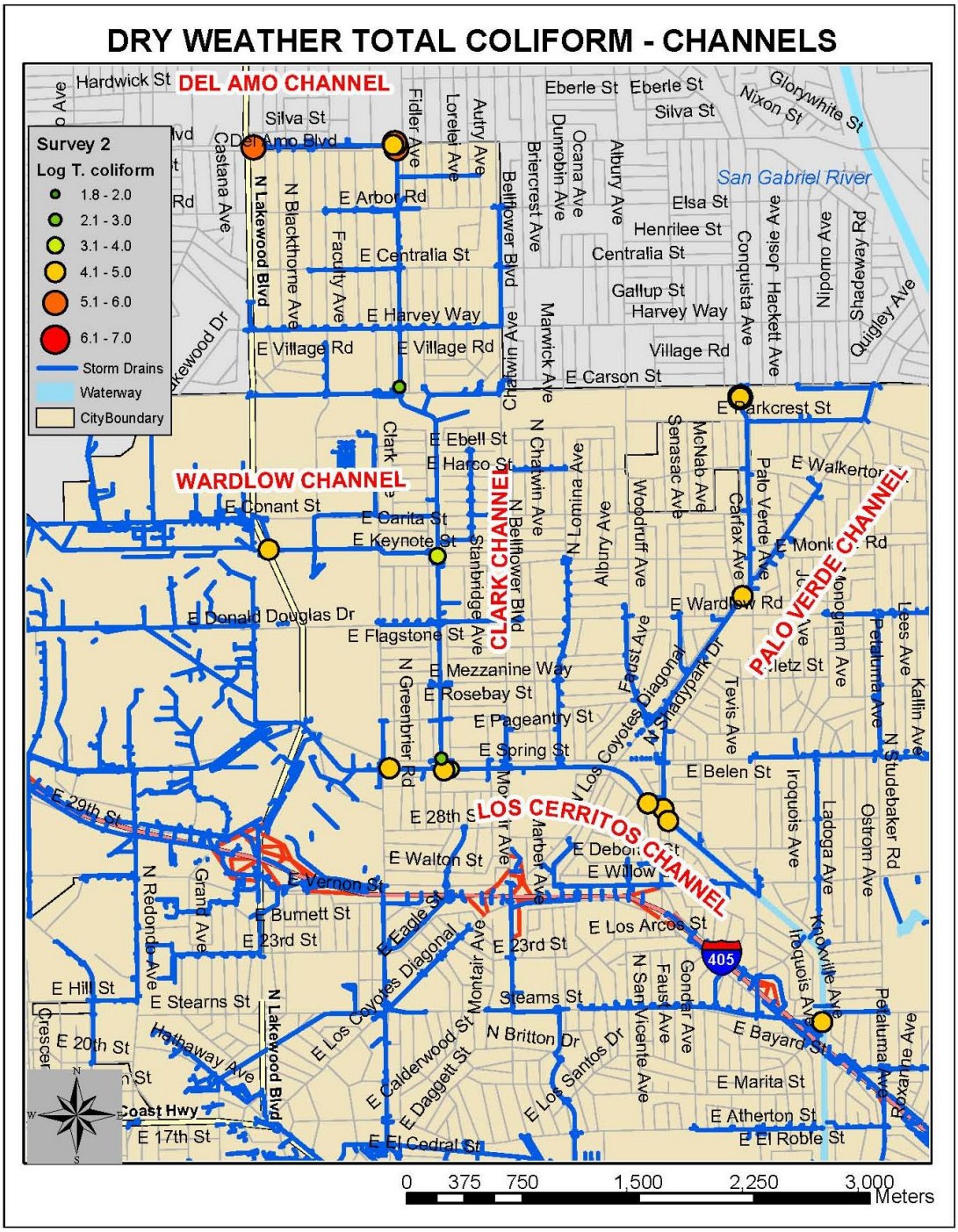

Figure A-23. **Concentrations of Total Coliform (Log MPN/100 ml) Measured in Main Channels during Survey 2.**

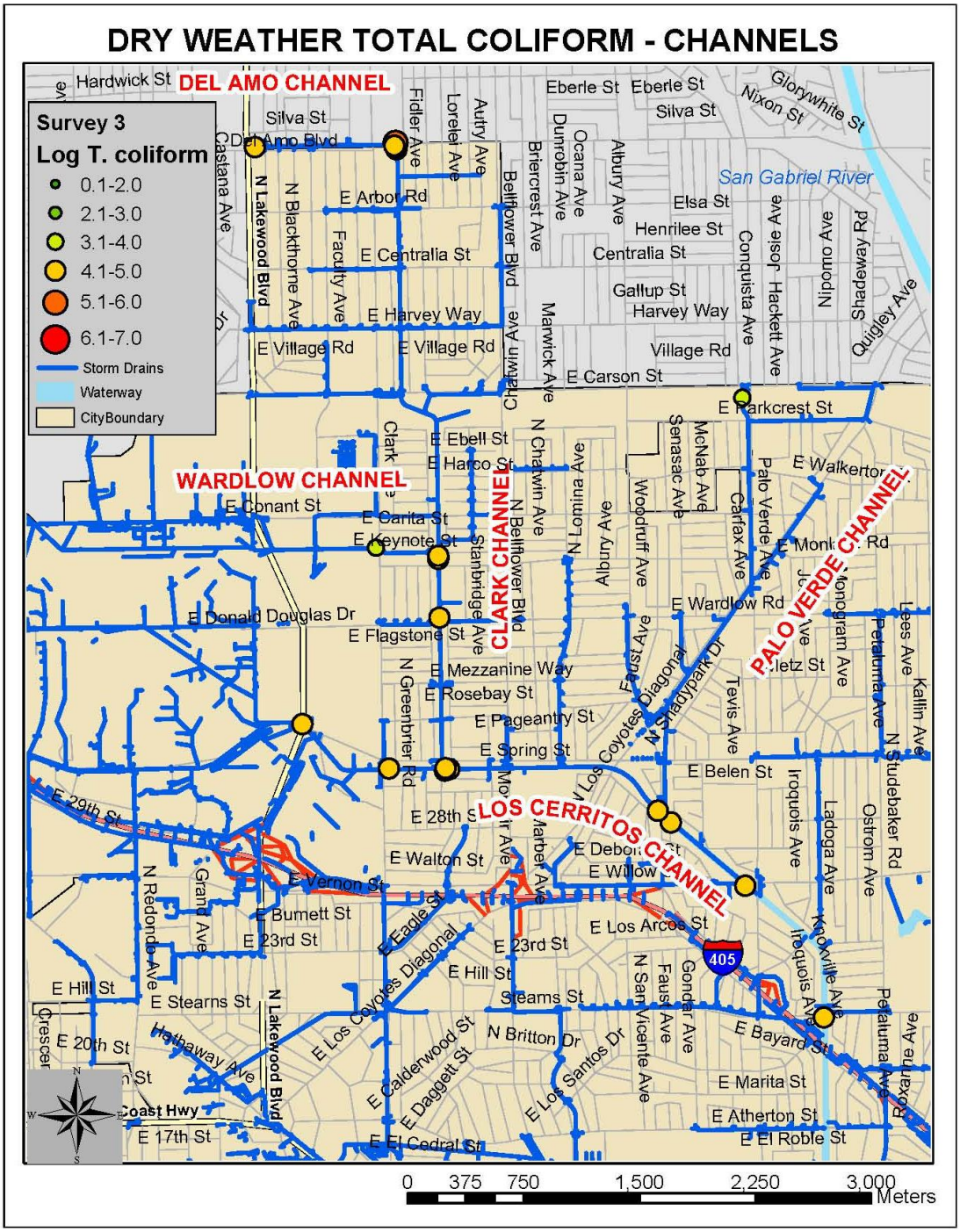

Figure A-24. **Concentrations of Total Coliform (Log MPN/100 ml) Measured in Main Channels during Survey 3.**

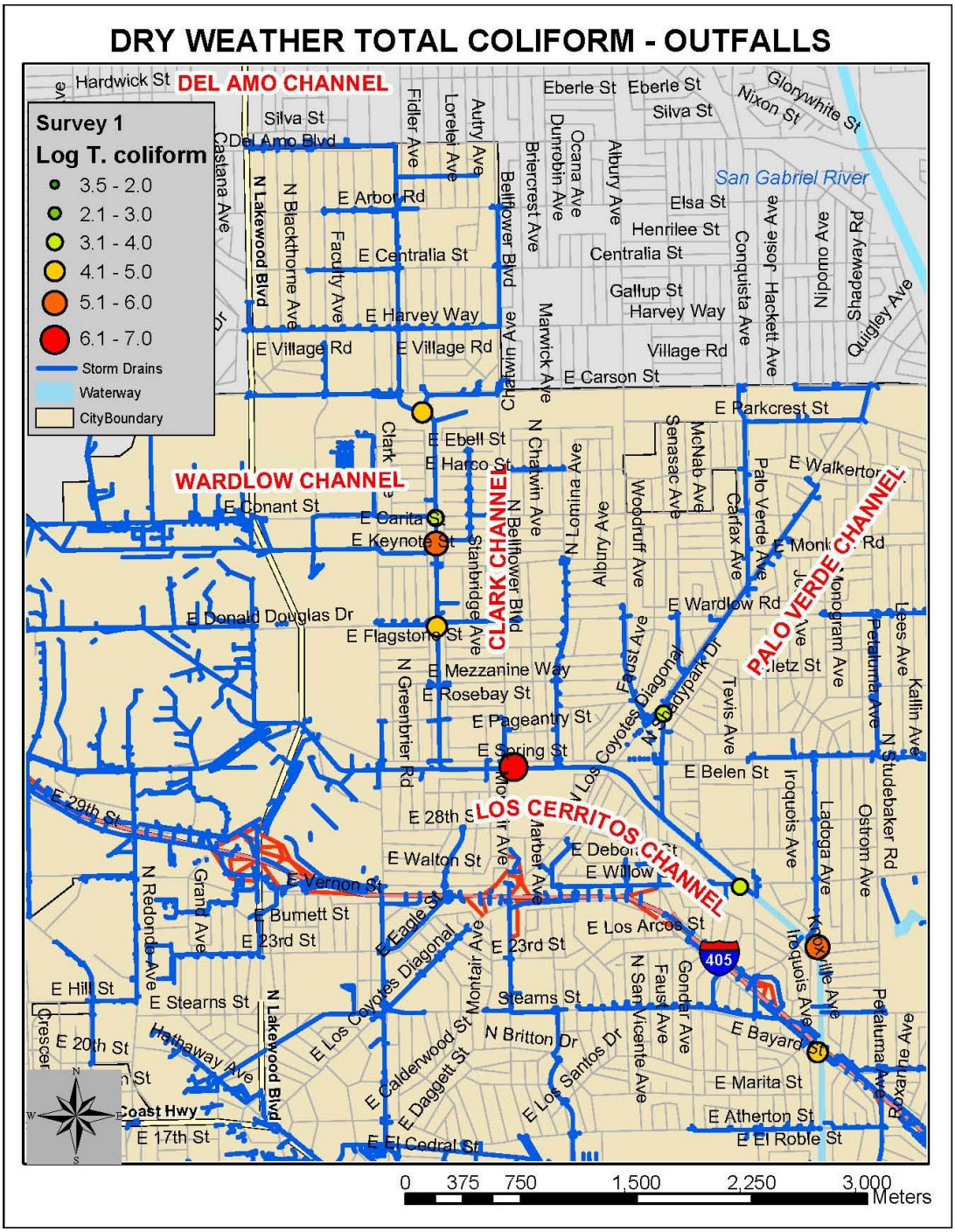

Figure A-25. **Concentrations of Total Coliform (Log MPN/100 ml) Measured in Flowing Outfalls during Survey 1.**

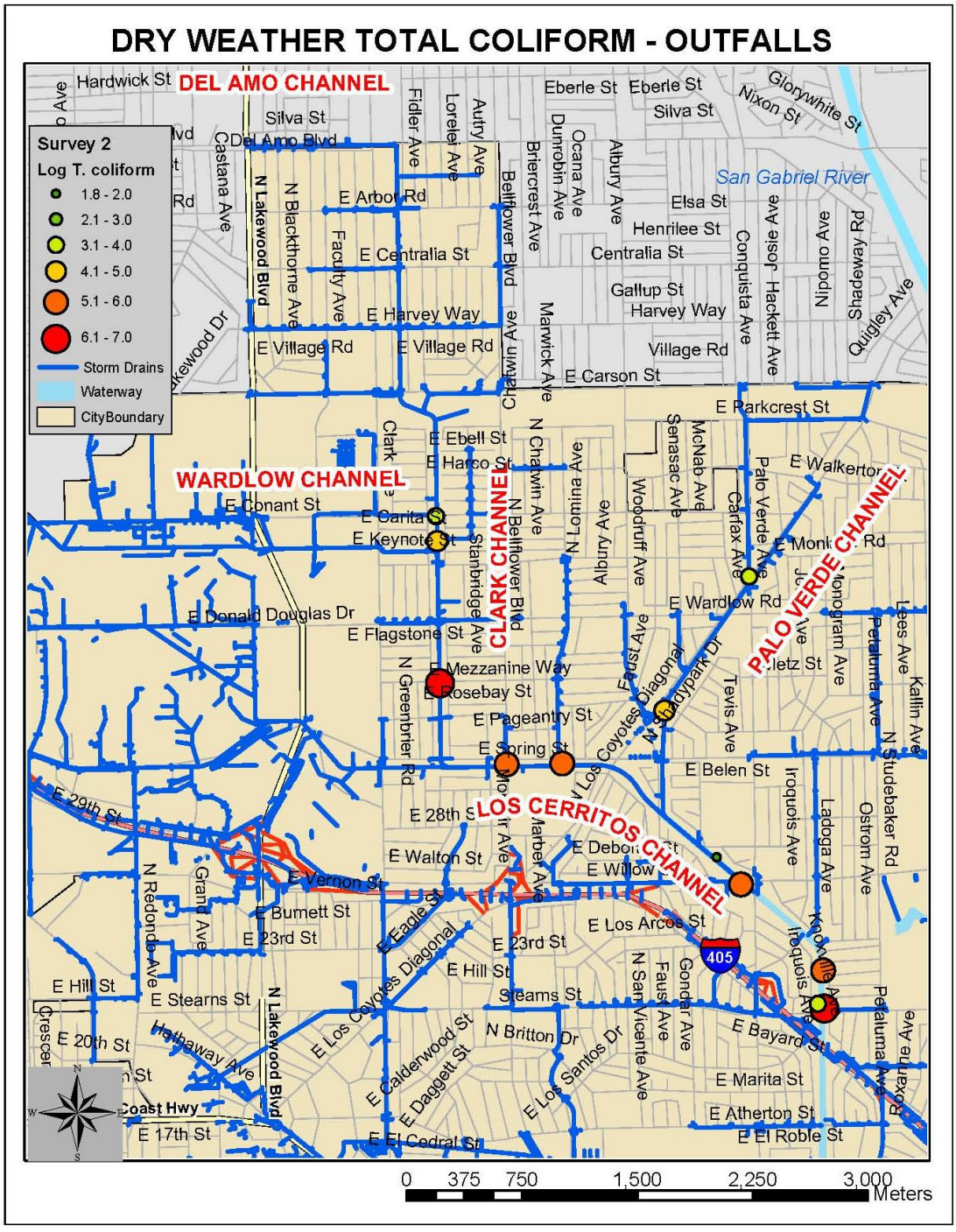

Figure A-26. **Concentrations of Total Coliform (Log MPN/100 ml) Measured in Flowing Outfalls during Survey 2.**

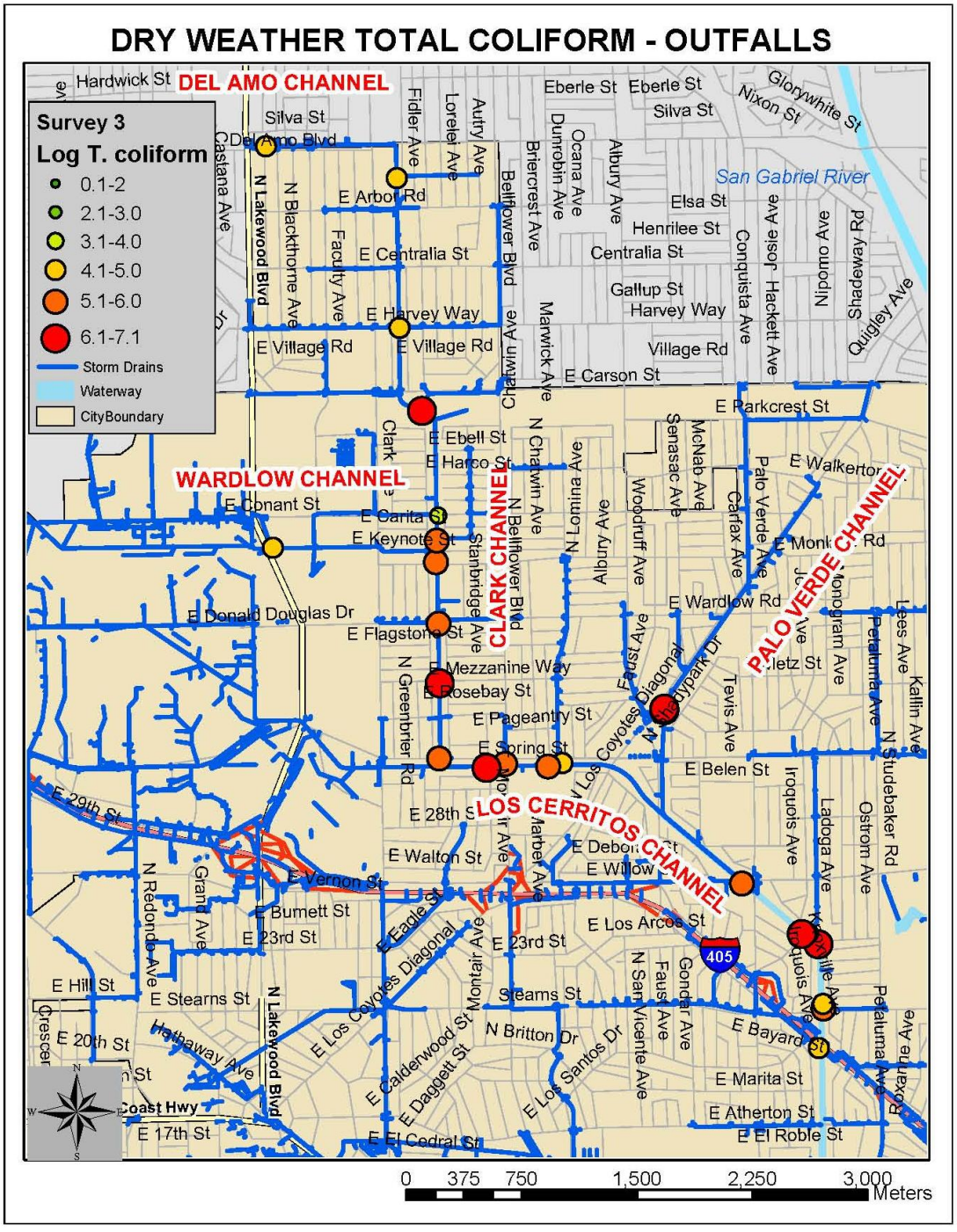

Figure A-27. **Concentrations of Total Coliform (Log MPN/100 ml) Measured in Flowing Outfalls during Survey 3.**

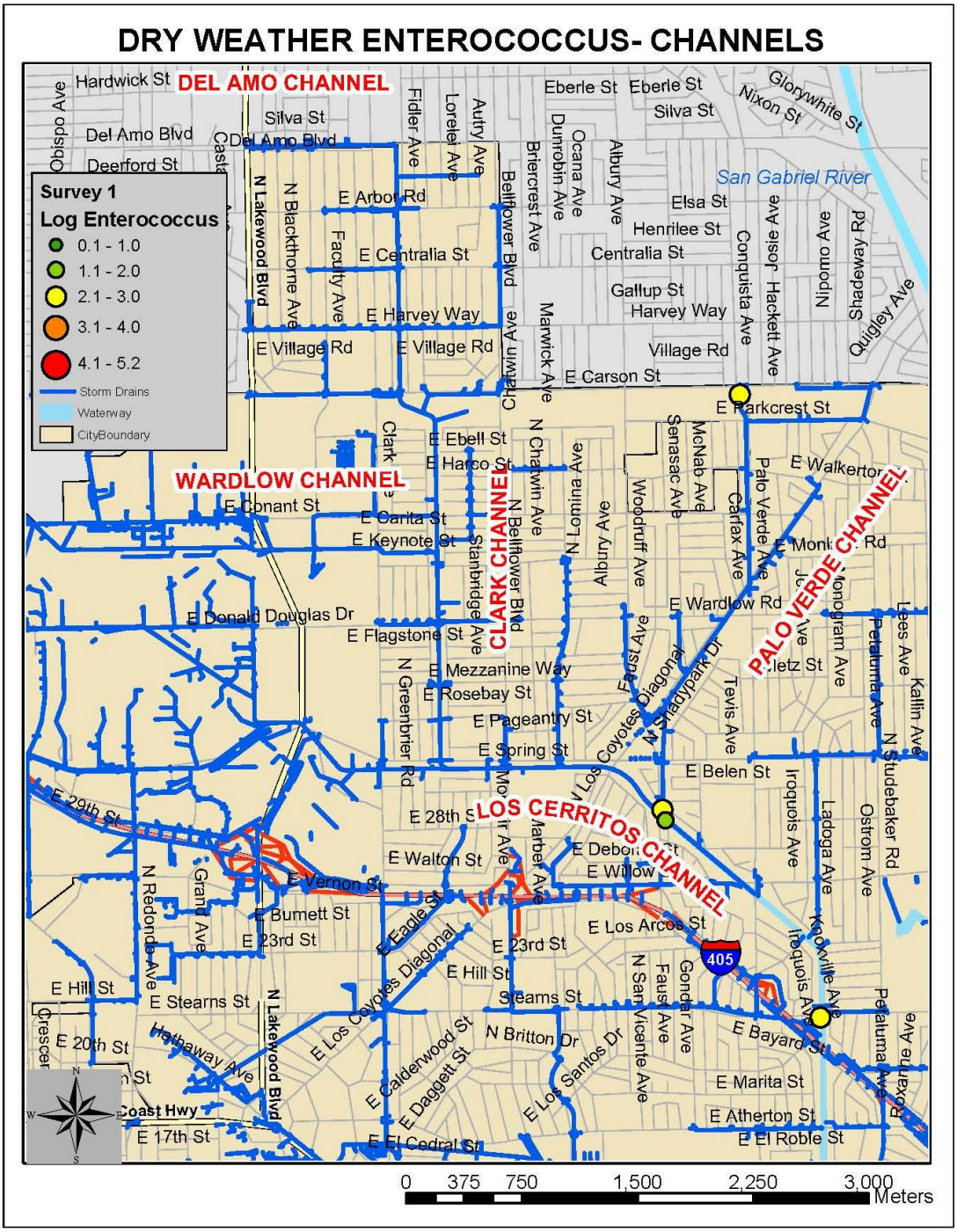

Figure A-28. Concentrations of Enterococcus (Log MPN/100 ml) Measured in Main Channels during Survey 1.

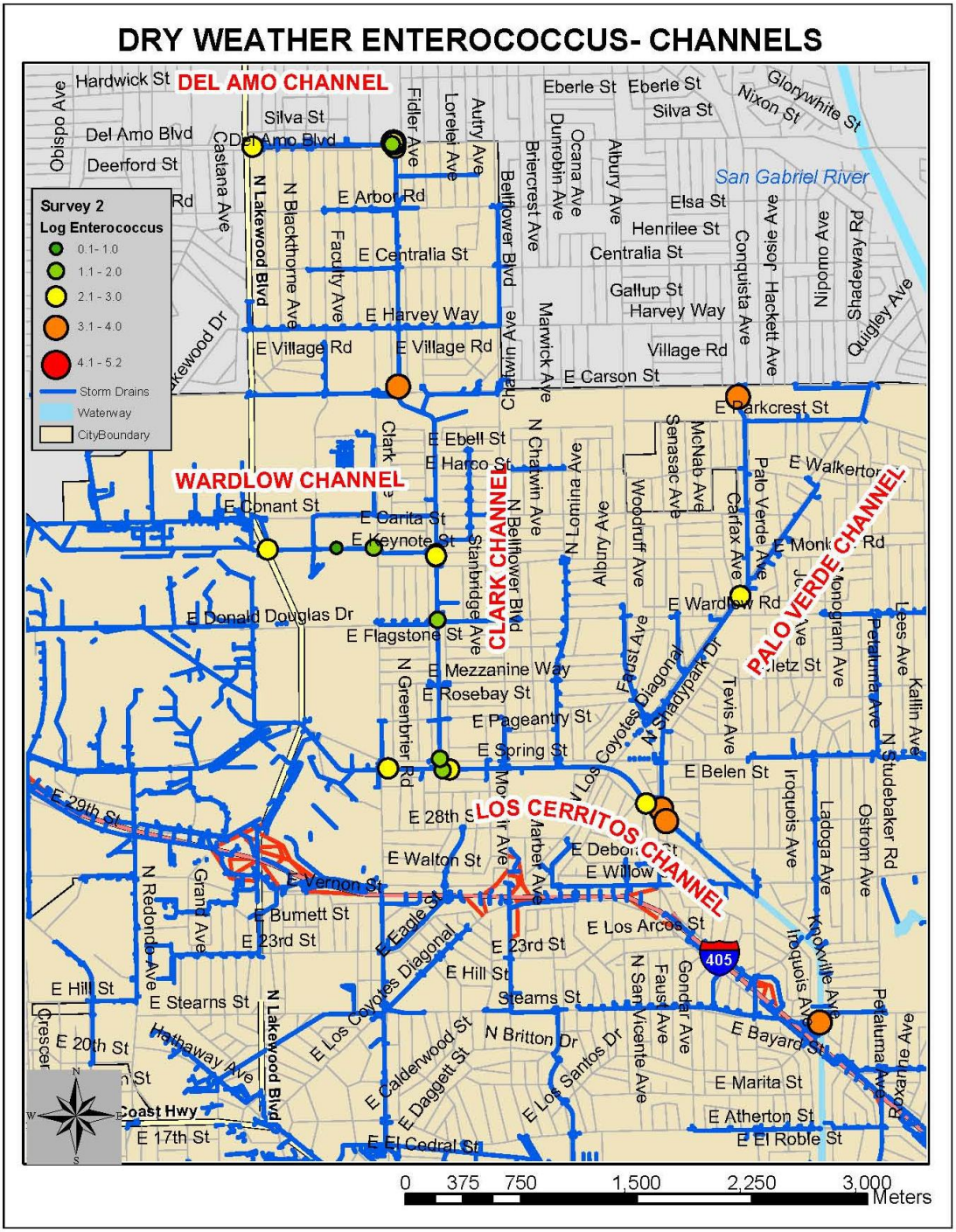

Figure A-29. Concentrations of Enterococcus (Log MPN/100 ml) Measured in Main Channels during Survey 2.

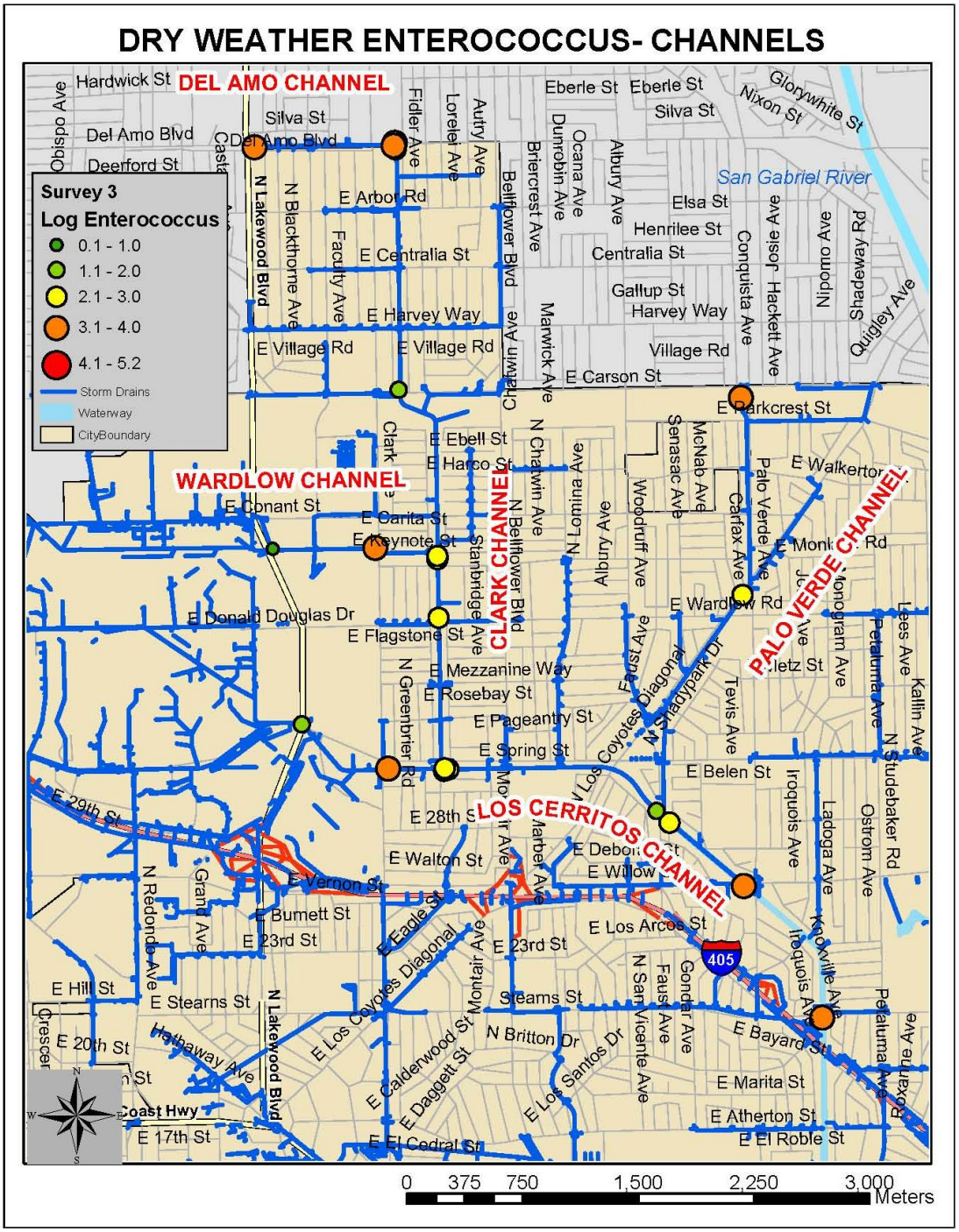

Figure A-30. Concentrations of Enterococcus (Log MPN/100 ml) Measured in Main Channels during Survey 3.

Figure A-31. **Concentrations of Enterococcus (Log MPN/100 ml) Measured in Flowing Outfalls during Survey 1.**

Figure A-32. **Concentrations of Enterococcus (Log MPN/100 ml) Measured in Flowing Outfalls during Survey 2.**

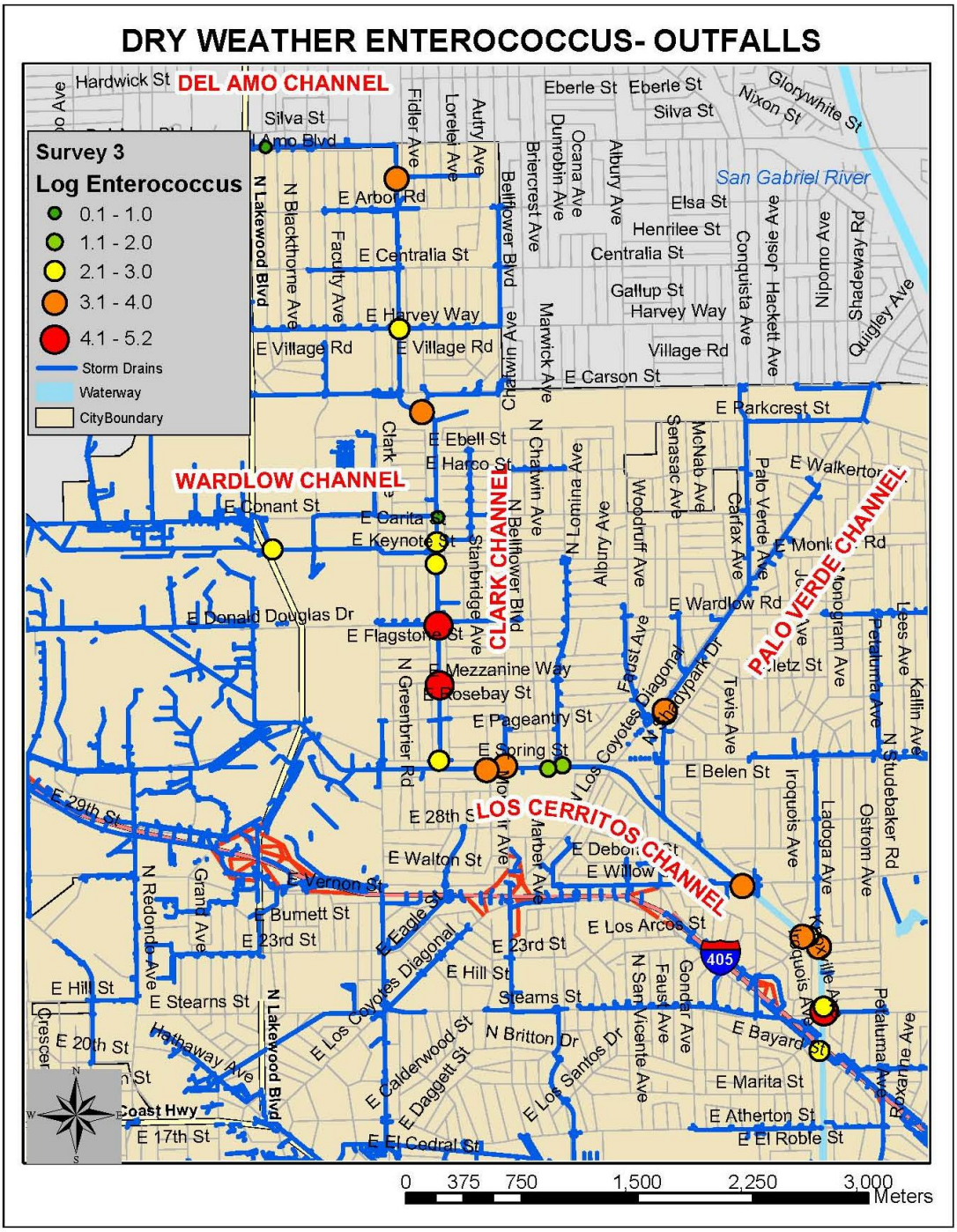

Figure A-33. **Concentrations of Enterococcus (Log MPN/100 ml) Measured in Flowing Outfalls during Survey 3.**

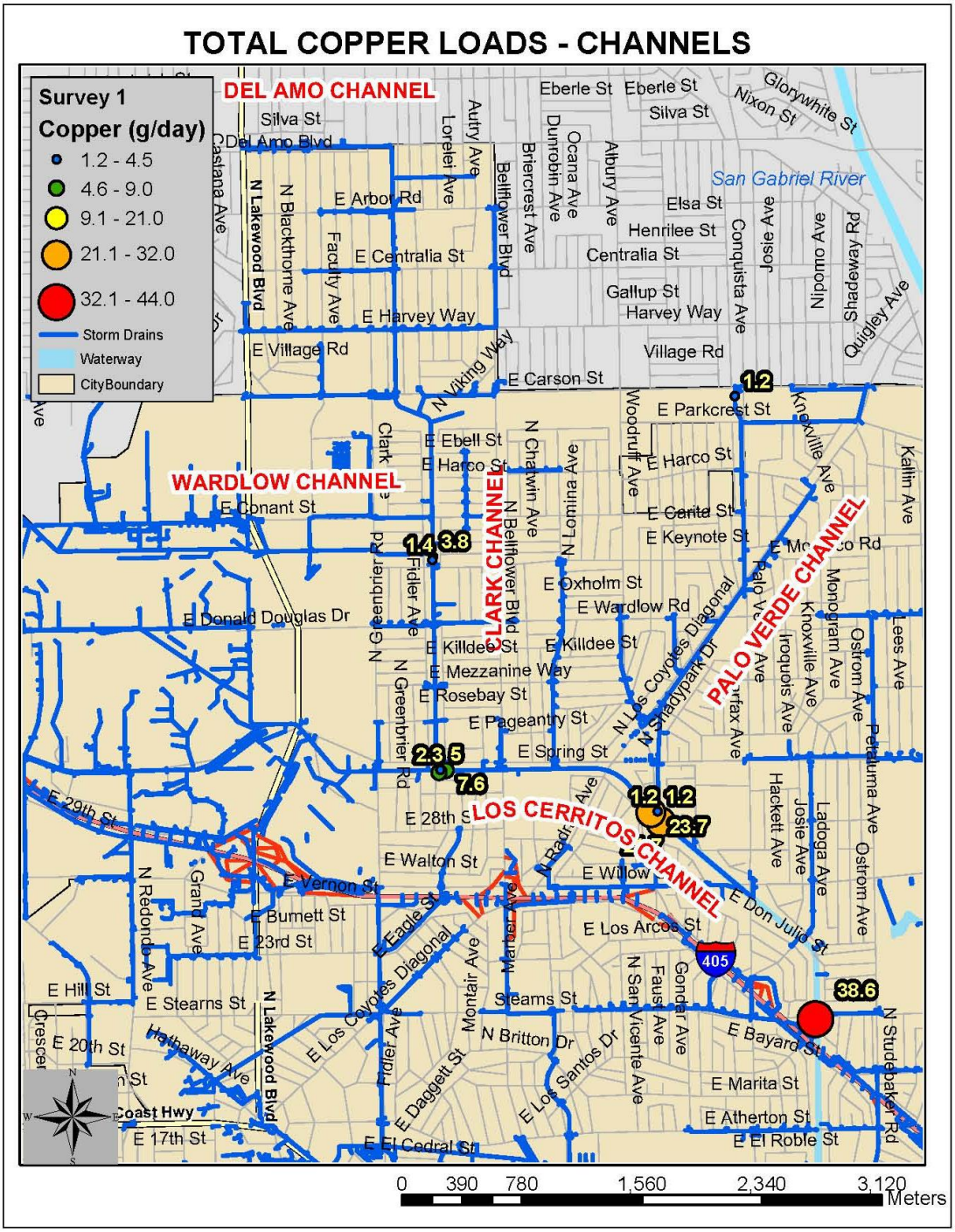

Figure A-34. Total Copper Loads Measured in Main Channels during Survey 1.

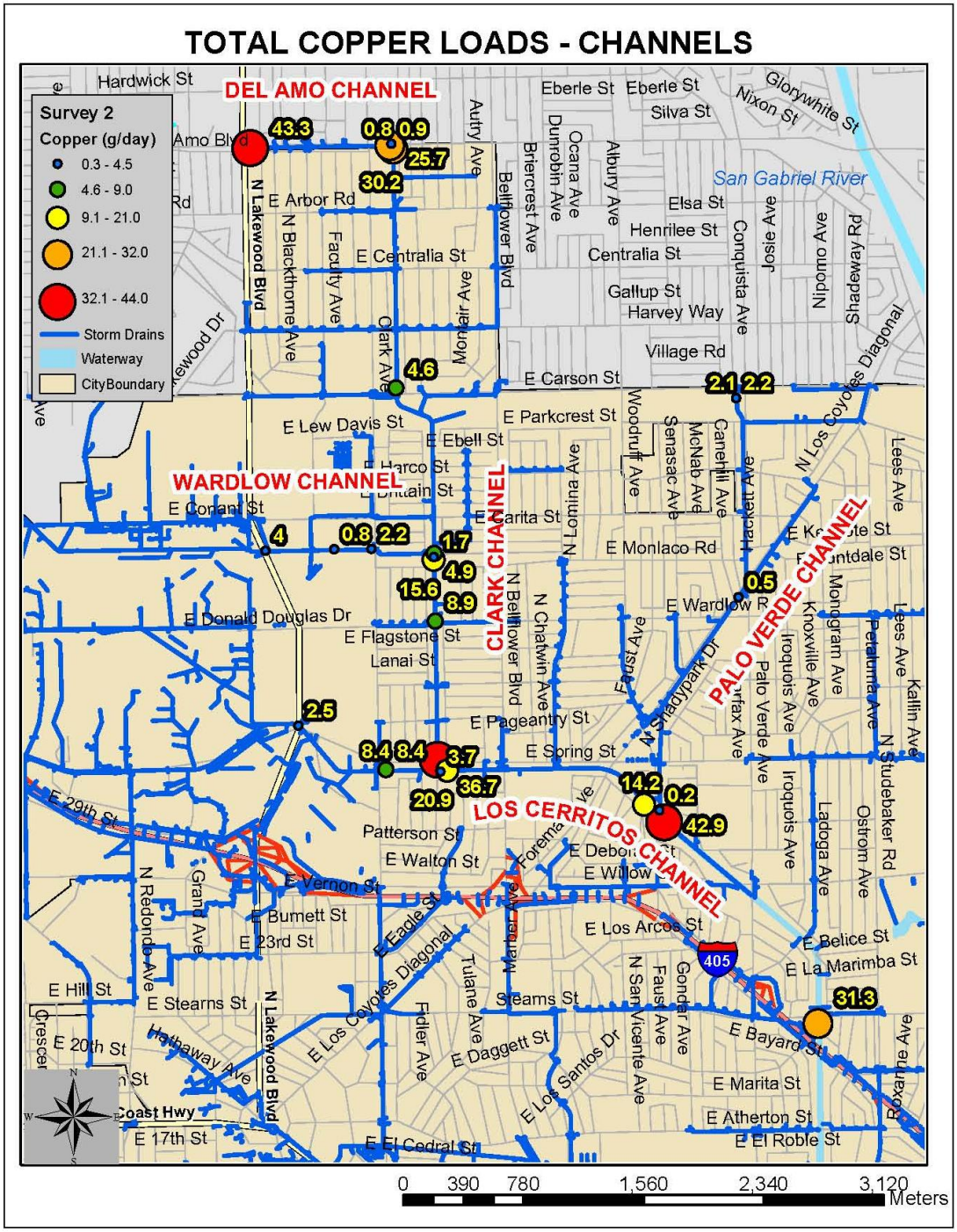

Figure A-35. **Total Copper Loads Measured in Main Channels during Survey2.**

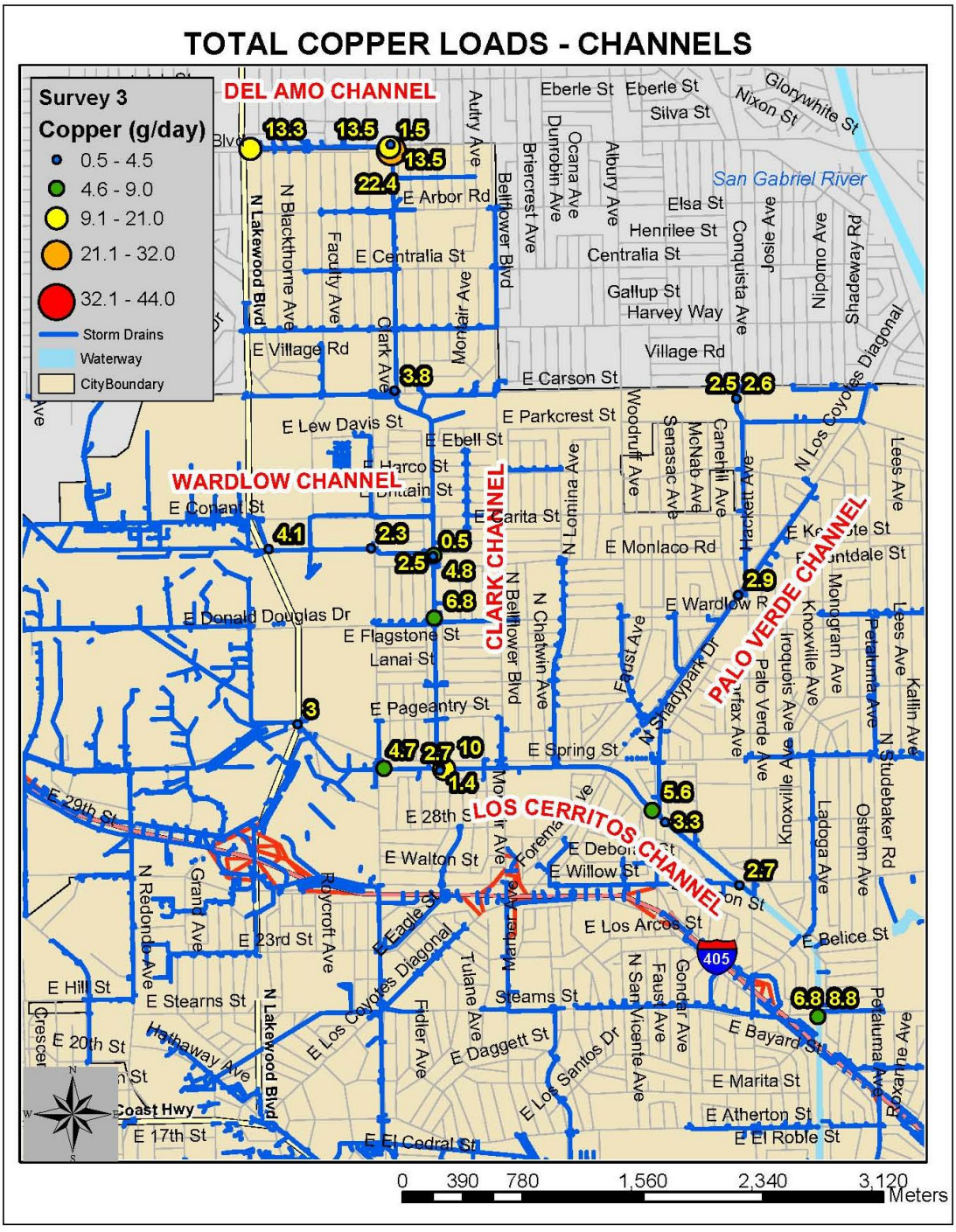

Figure A-36. Total Copper Loads Measured in Main Channels during Survey3.

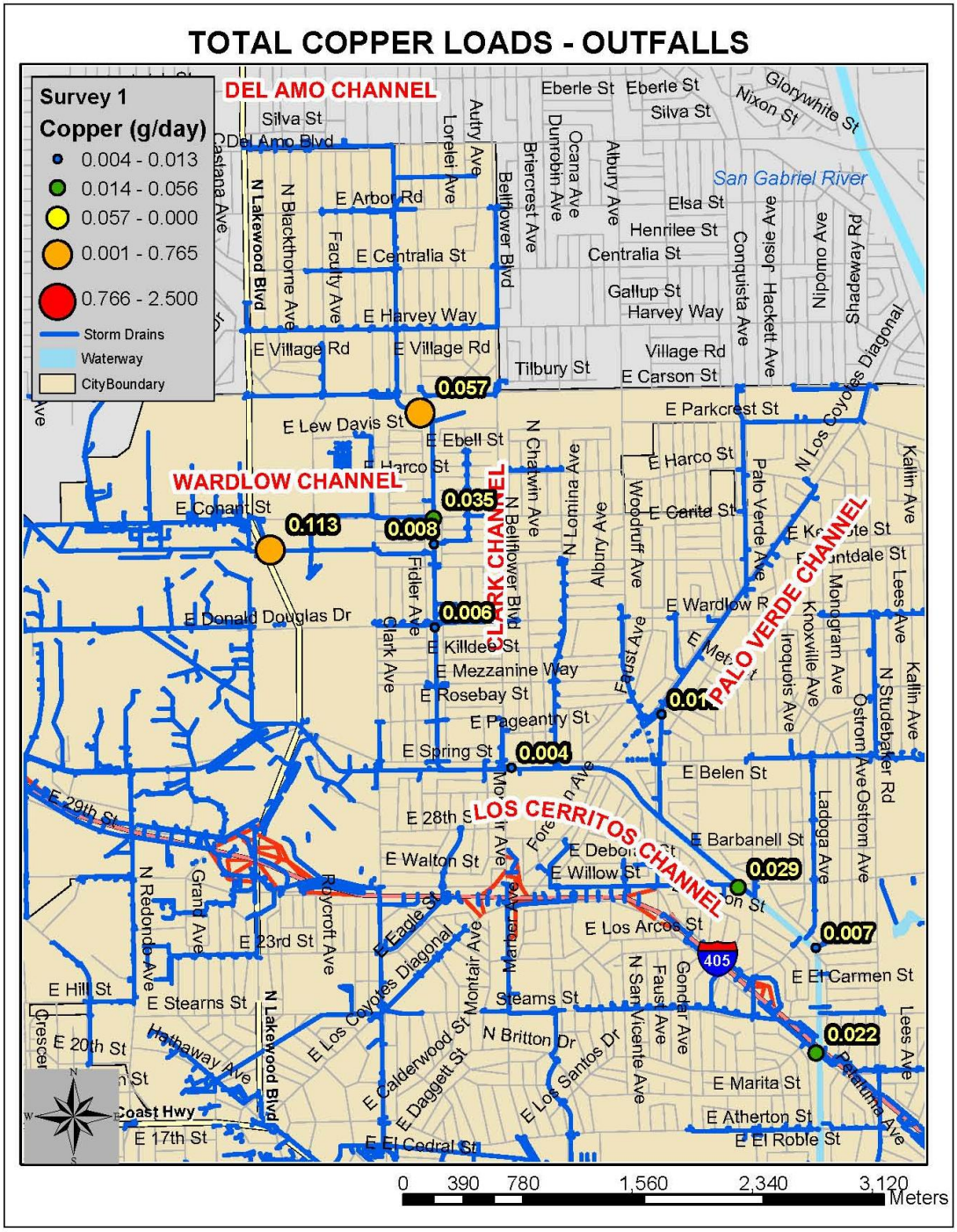

Figure A-37. **Total Copper Loads Measured in Flowing Outfalls during Survey 1.**

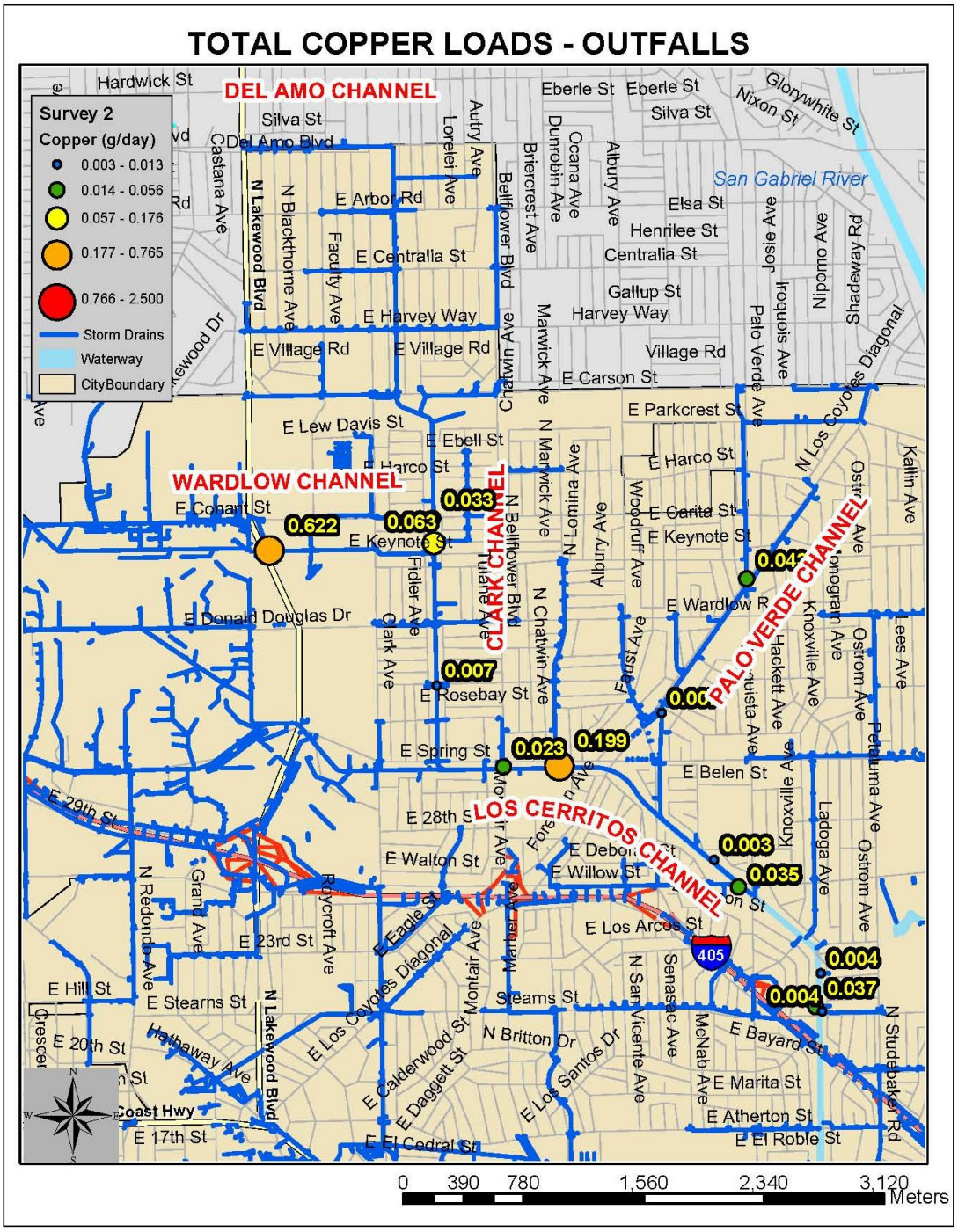

Figure A-38. Total Copper Loads Measured in Flowing Outfalls during Survey 2.

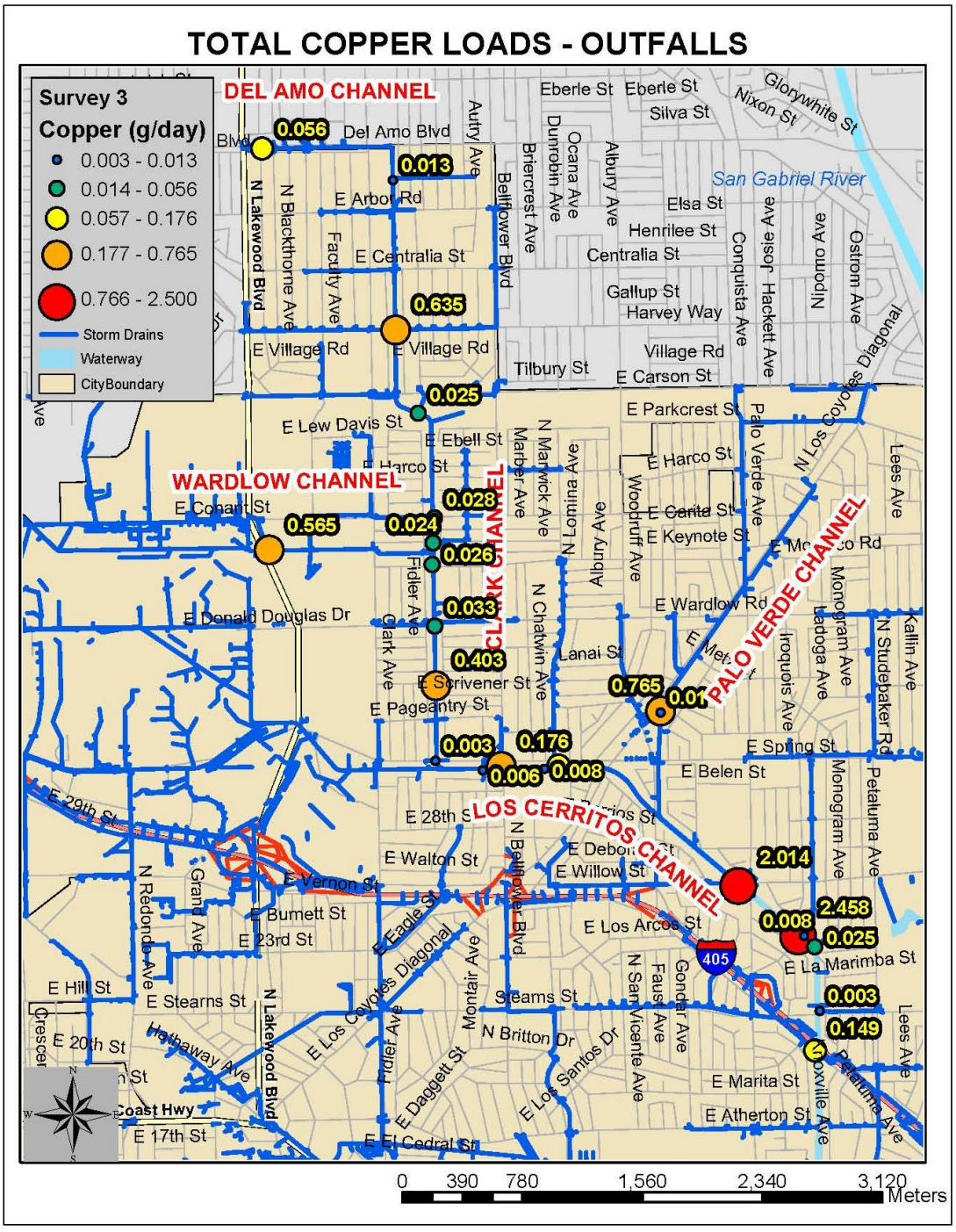

Figure A-39. Total Copper Loads Measured in Flowing Outfalls during Survey 3.

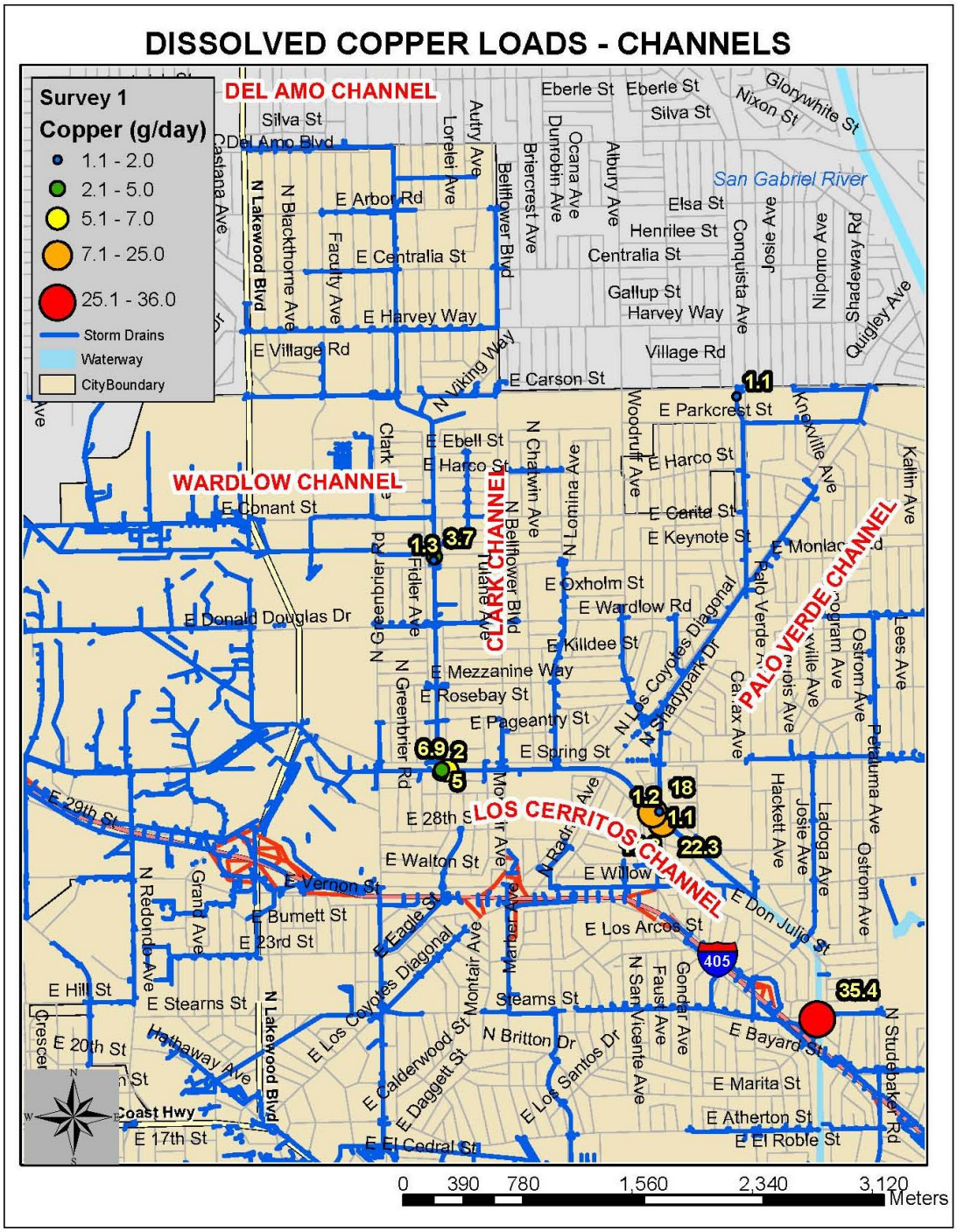

Figure A-40. **Dissolved Copper Loads Measured in Main Channels during Survey 1.**

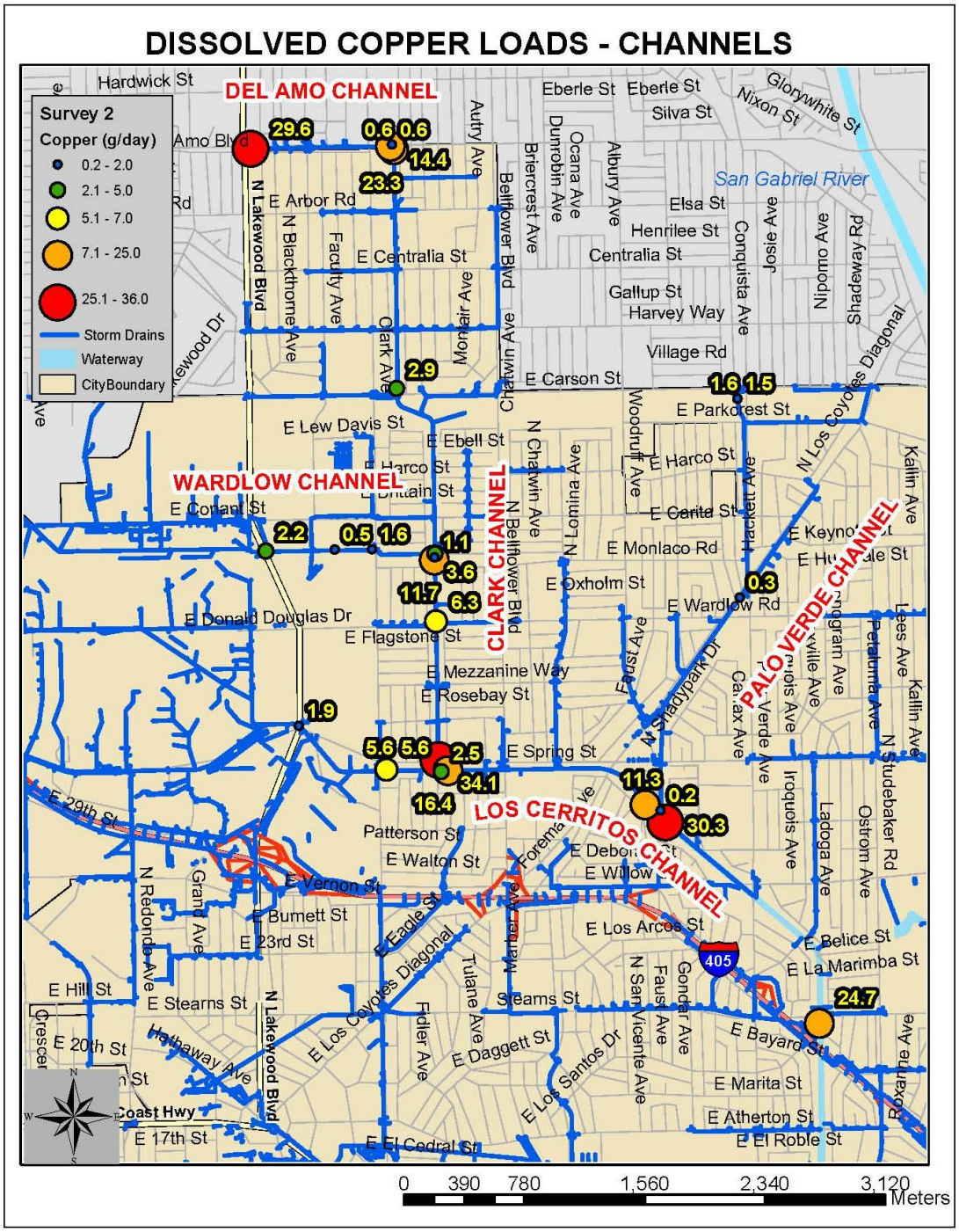

Figure A-41. Dissolved Copper Loads Measured in Main Channels during Survey 2.

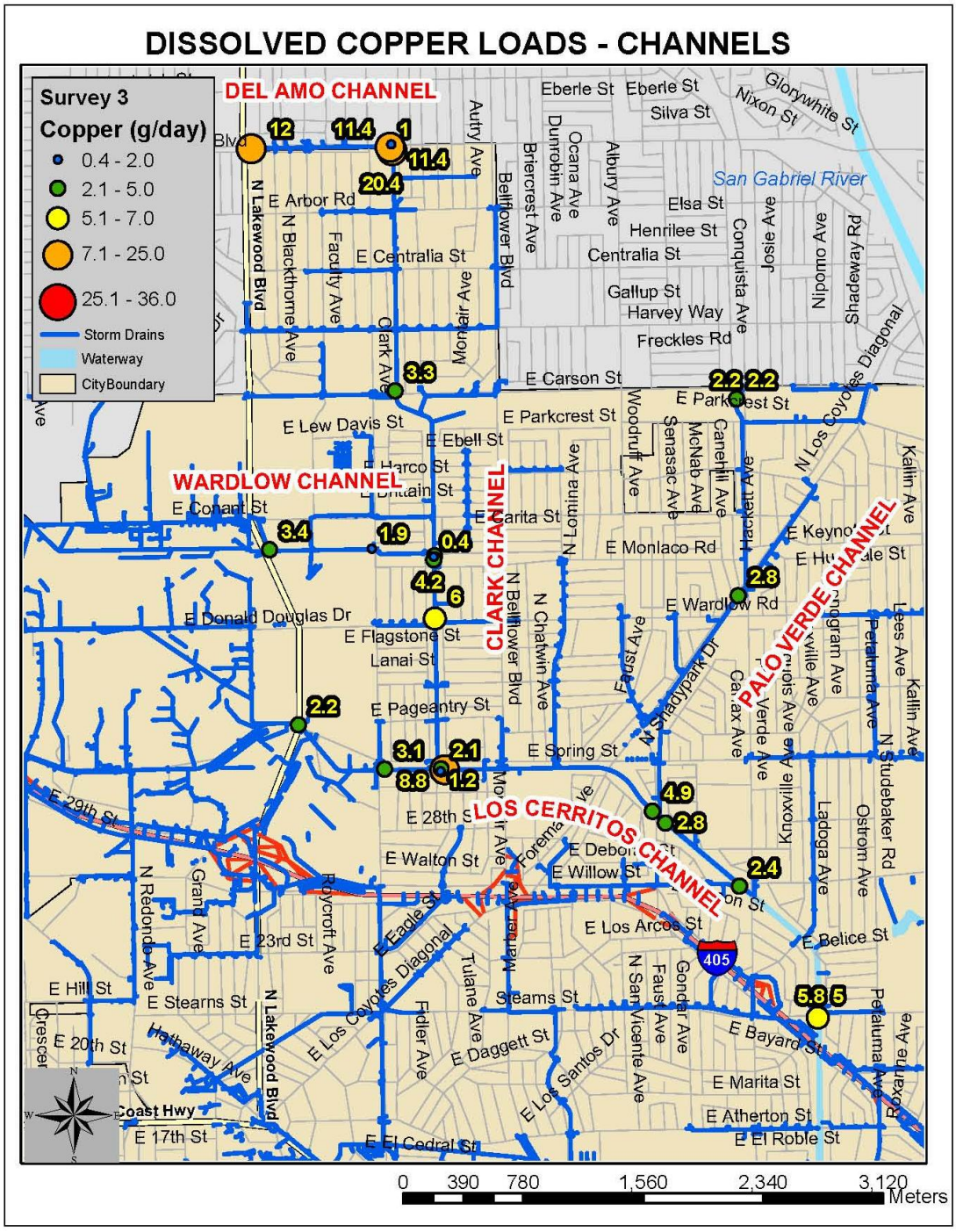

Figure A-42. Dissolved Copper Loads Measured in Main Channels during Survey 3.

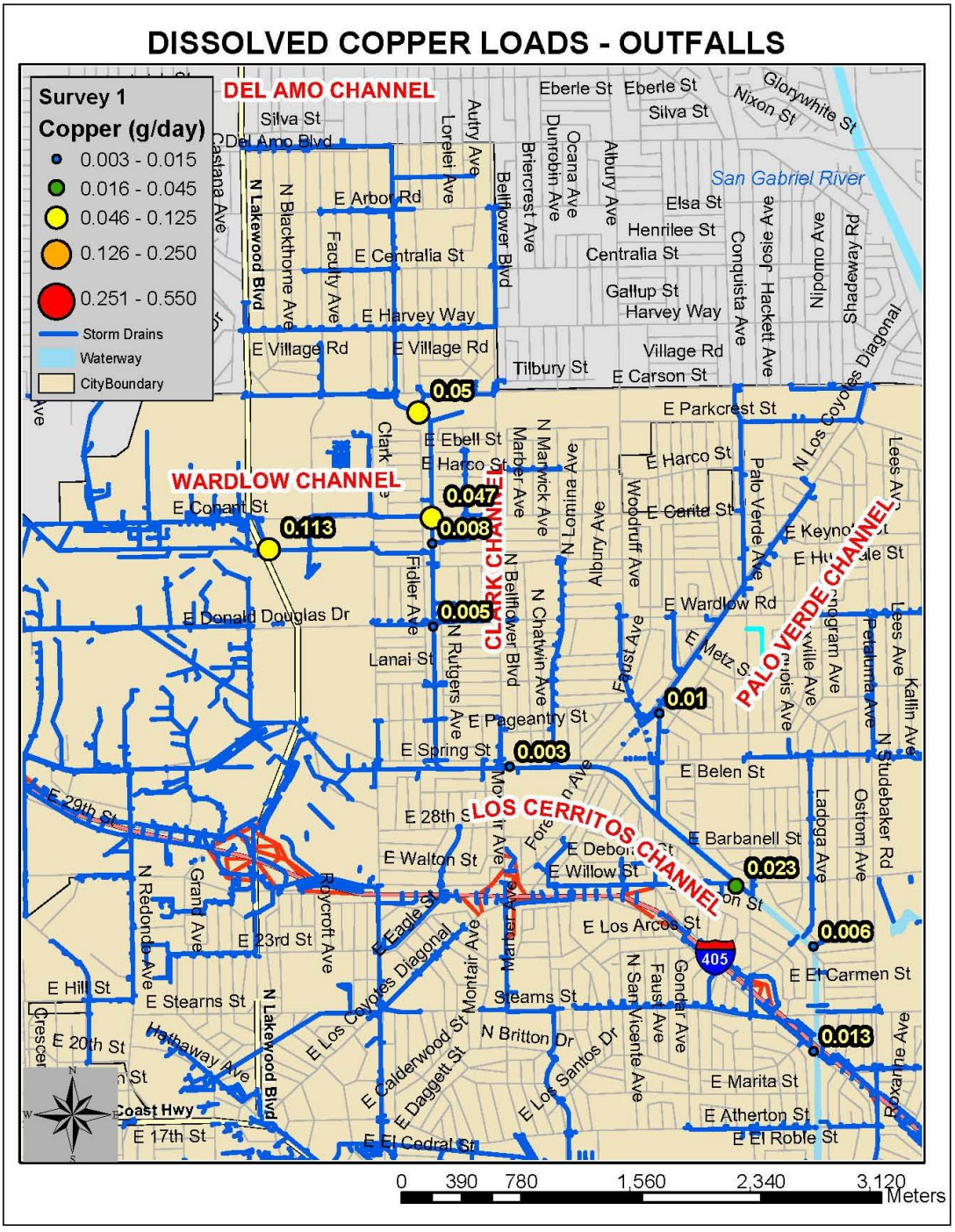

Figure A-43. **Dissolved Copper Loads Measured in Flowing Outfalls during Survey 1.**

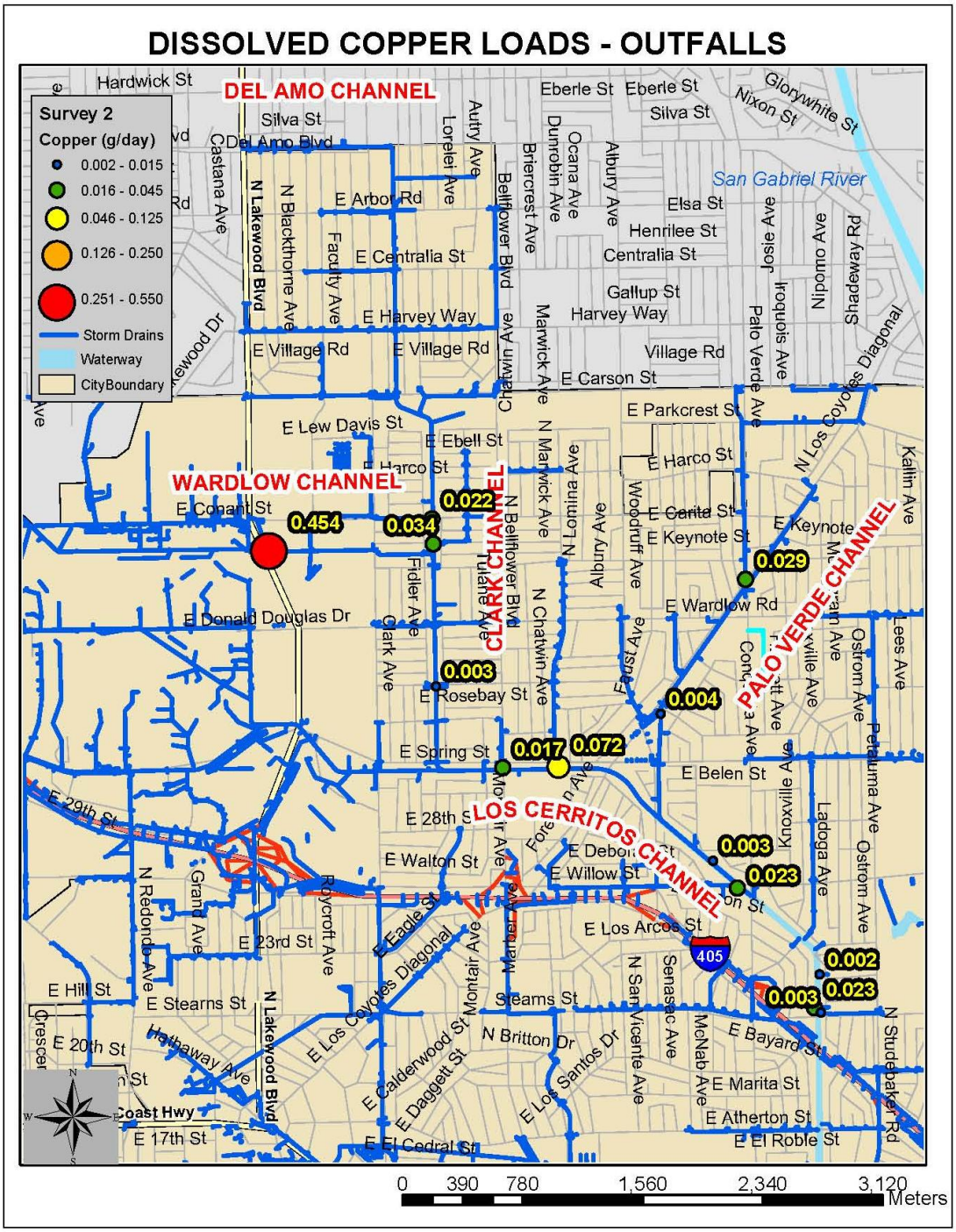

Figure A-44. Dissolved Copper Loads Measured in Flowing Outfalls during Survey 2.

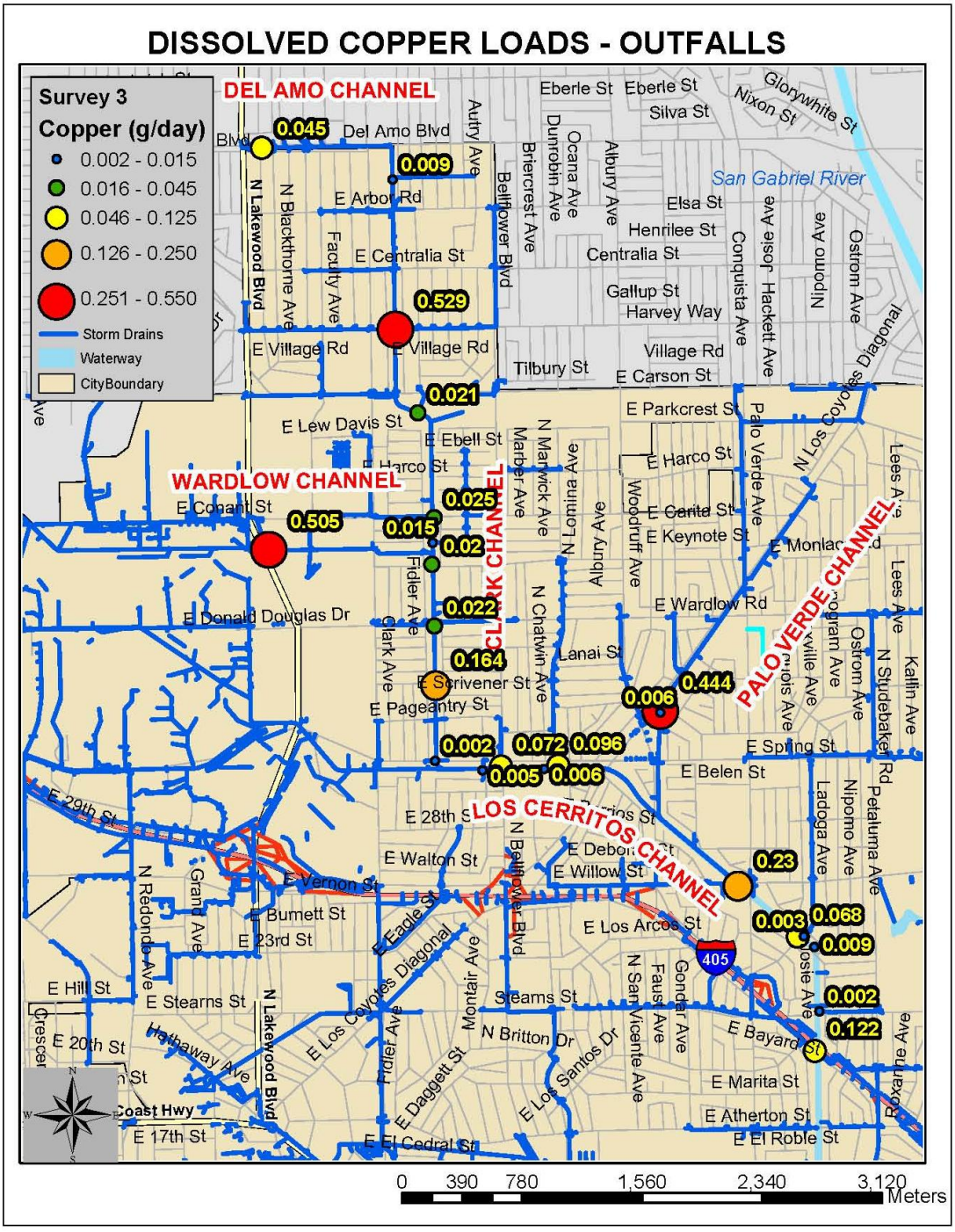

Figure A-45. **Dissolved Copper Loads Measured in Flowing Outfalls during Survey 3.**

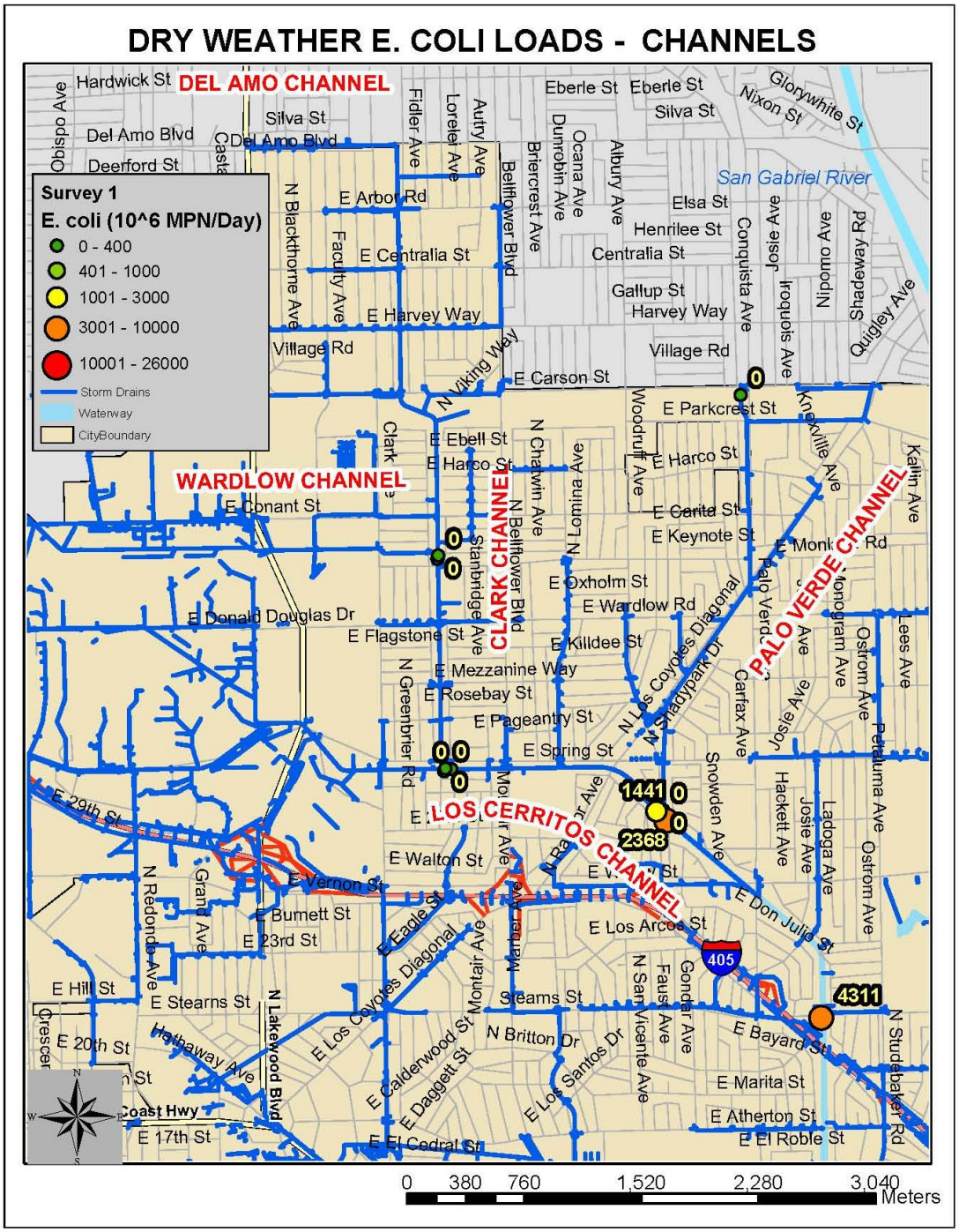

Figure A-46. ***E. coli*** **Loads Measured in Main Channels during Survey 1.**

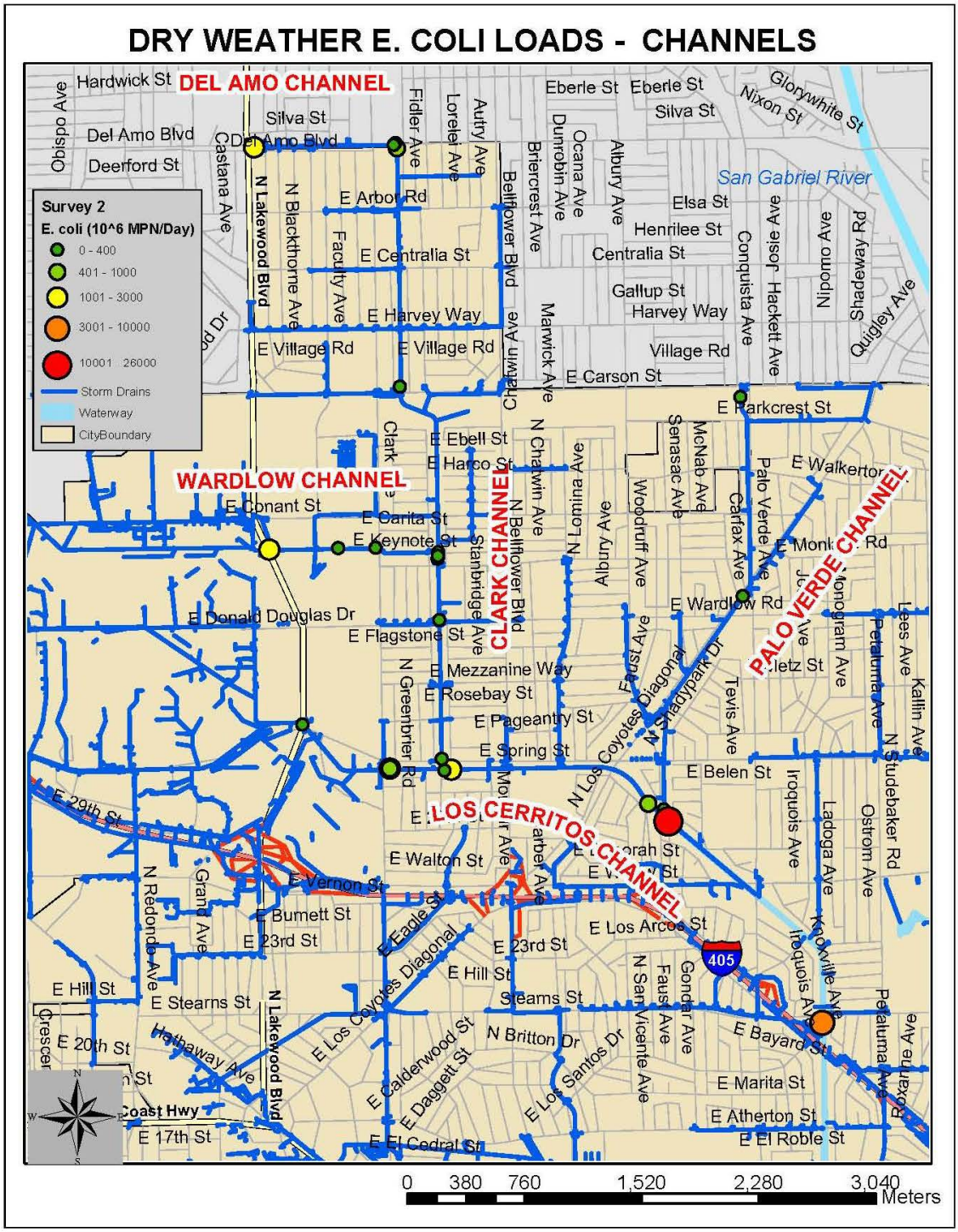

Figure A-47. ***E. coli*** **Loads Measured in Main Channels during Survey 2.**

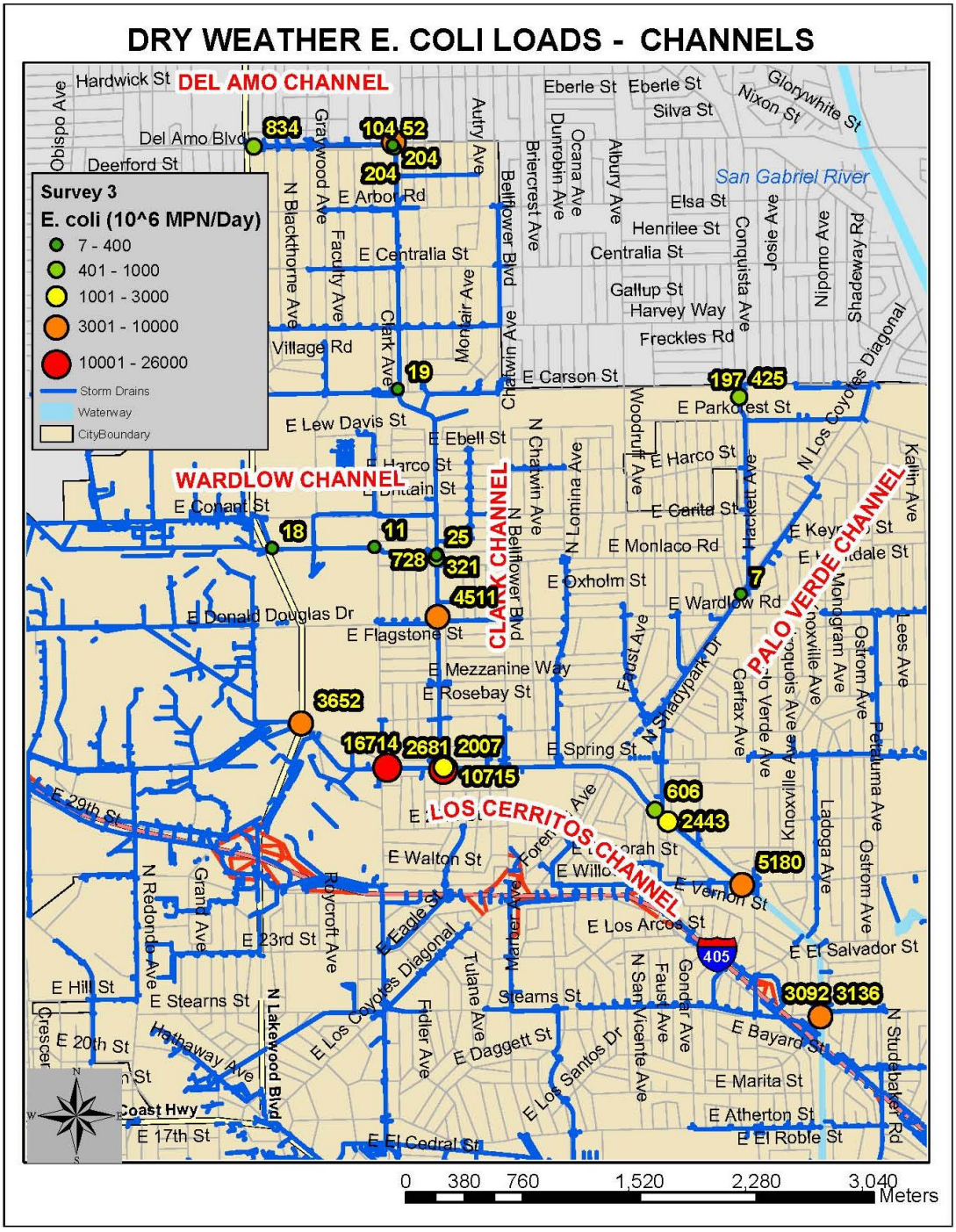

Figure A-48. ***E. coli*** **Loads Measured in Main Channels during Survey 3.**

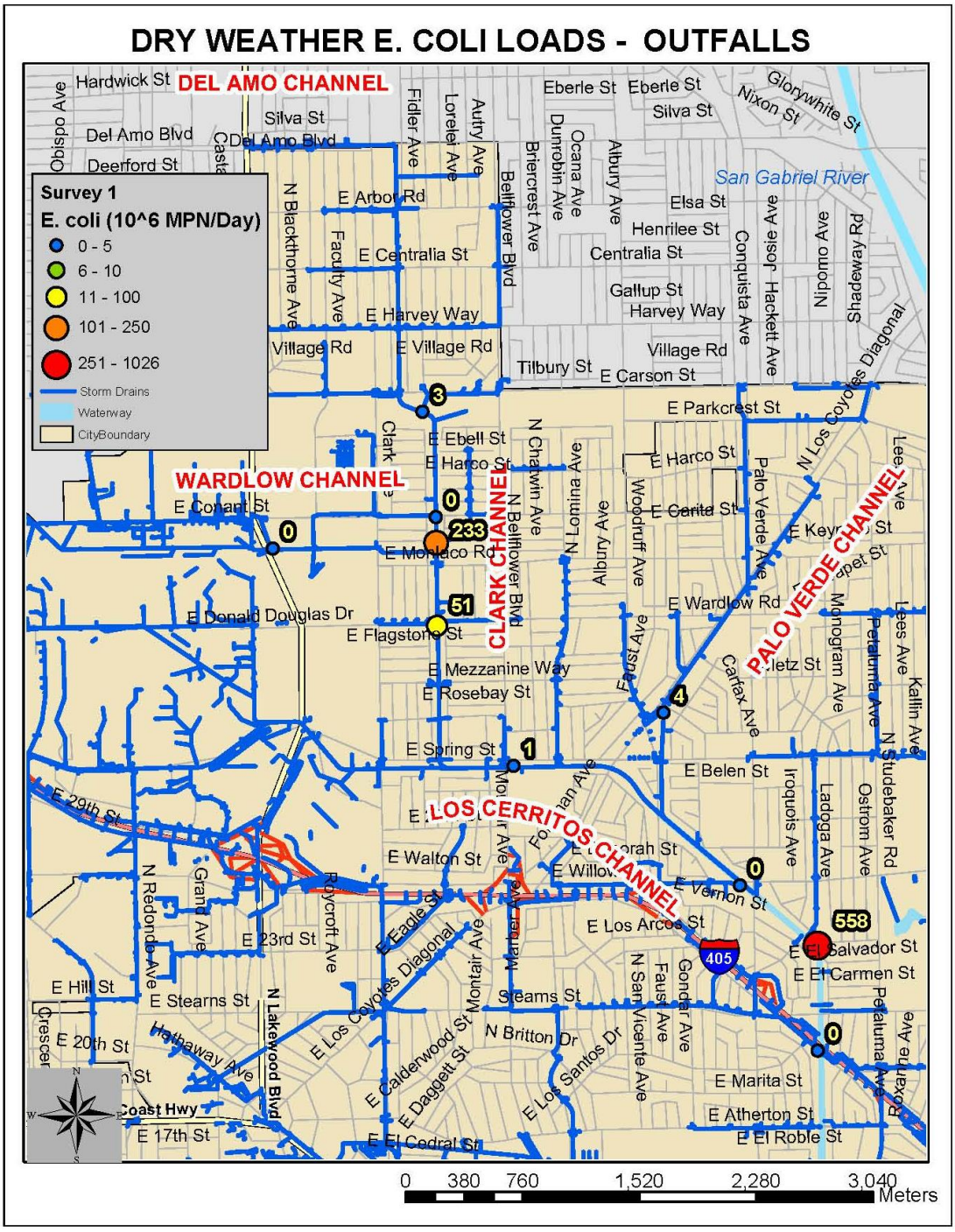

Figure A-49. ***E. coli*** **Loads Measured in Flowing Outfalls during Survey 1.**

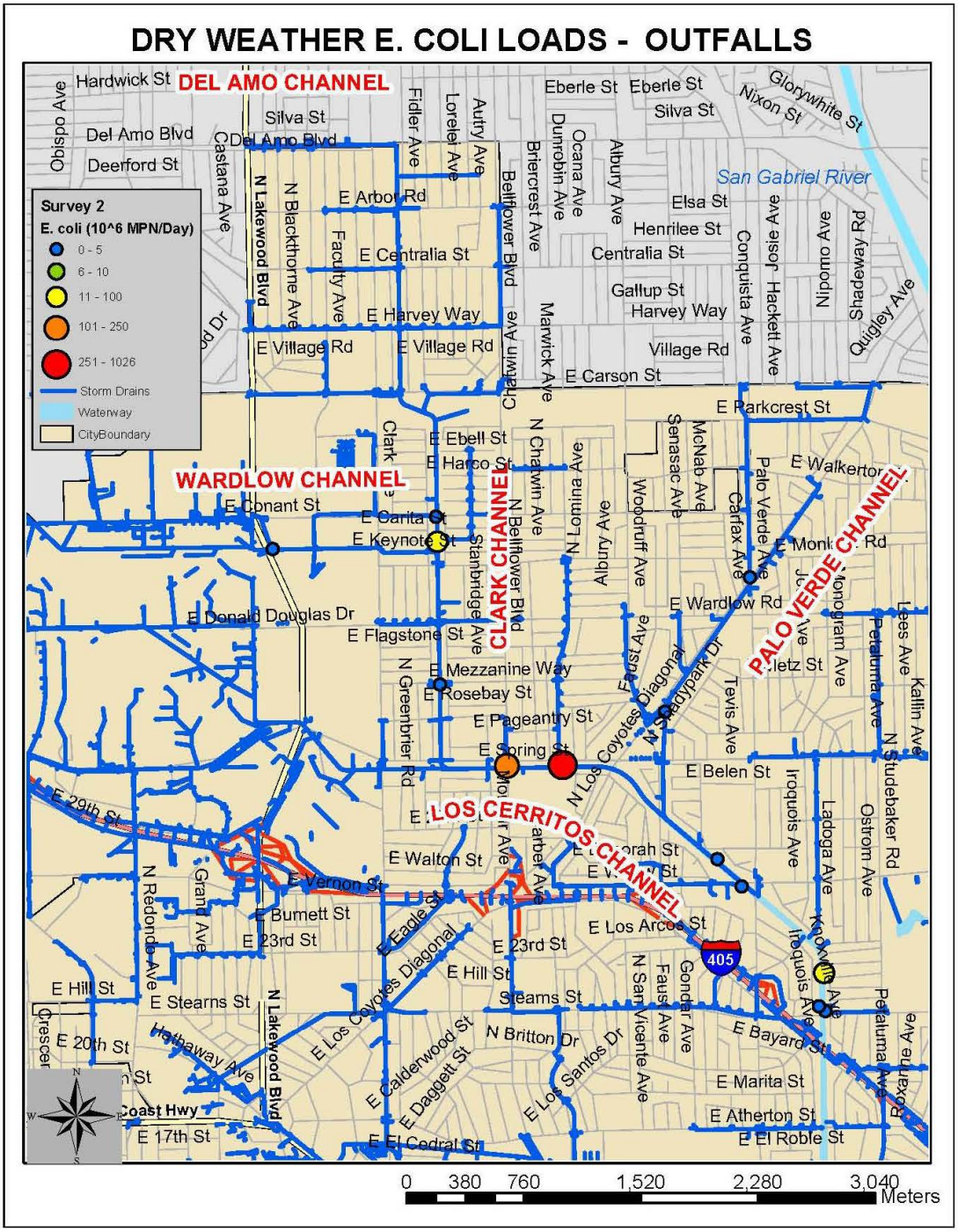

Figure A-50. ***E. coli*** **Loads Measured in Flowing Outfalls during Survey 2.**

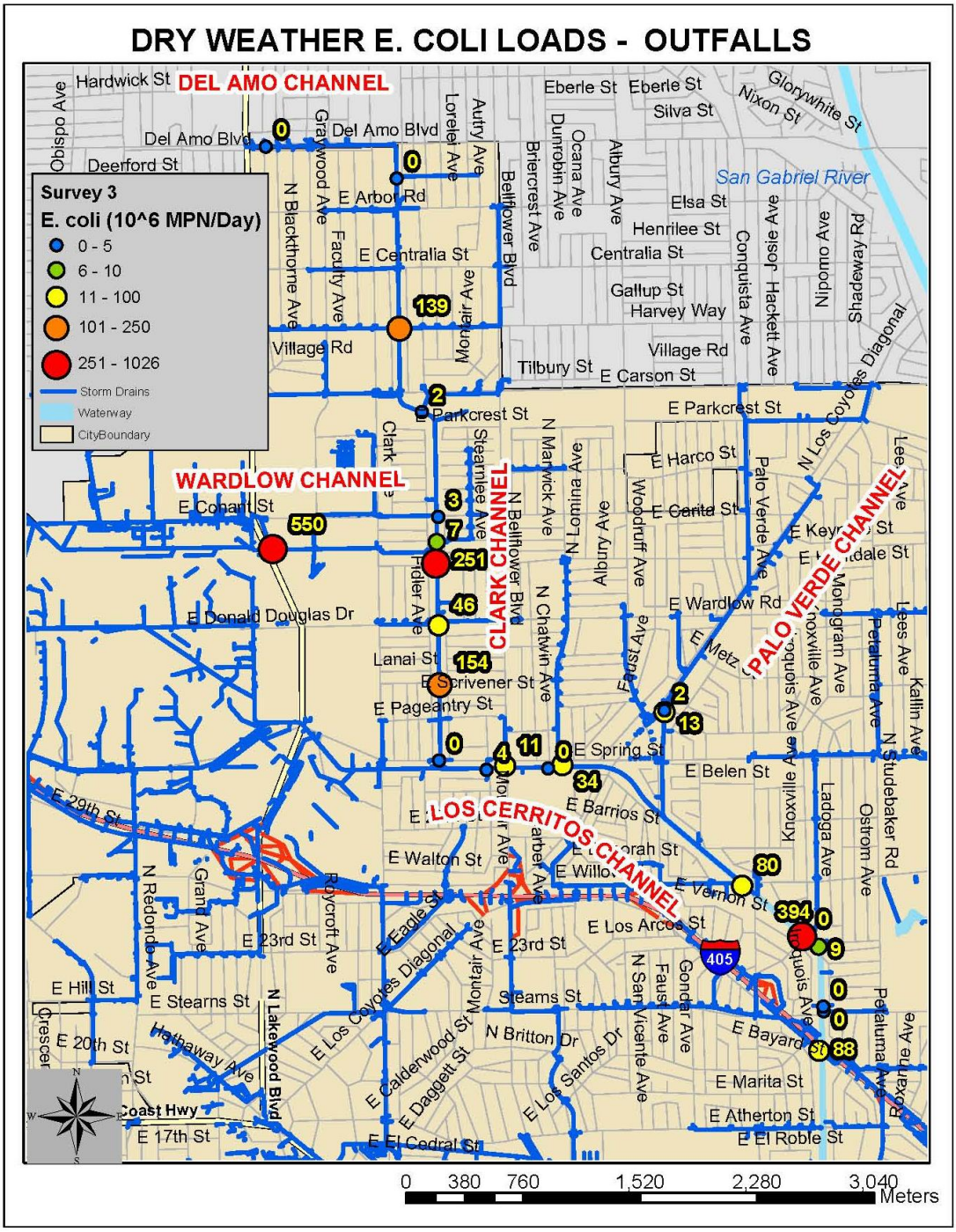

Figure A-51. ***E. coli*** **Loads Measured in Flowing Outfalls during Survey 3.**

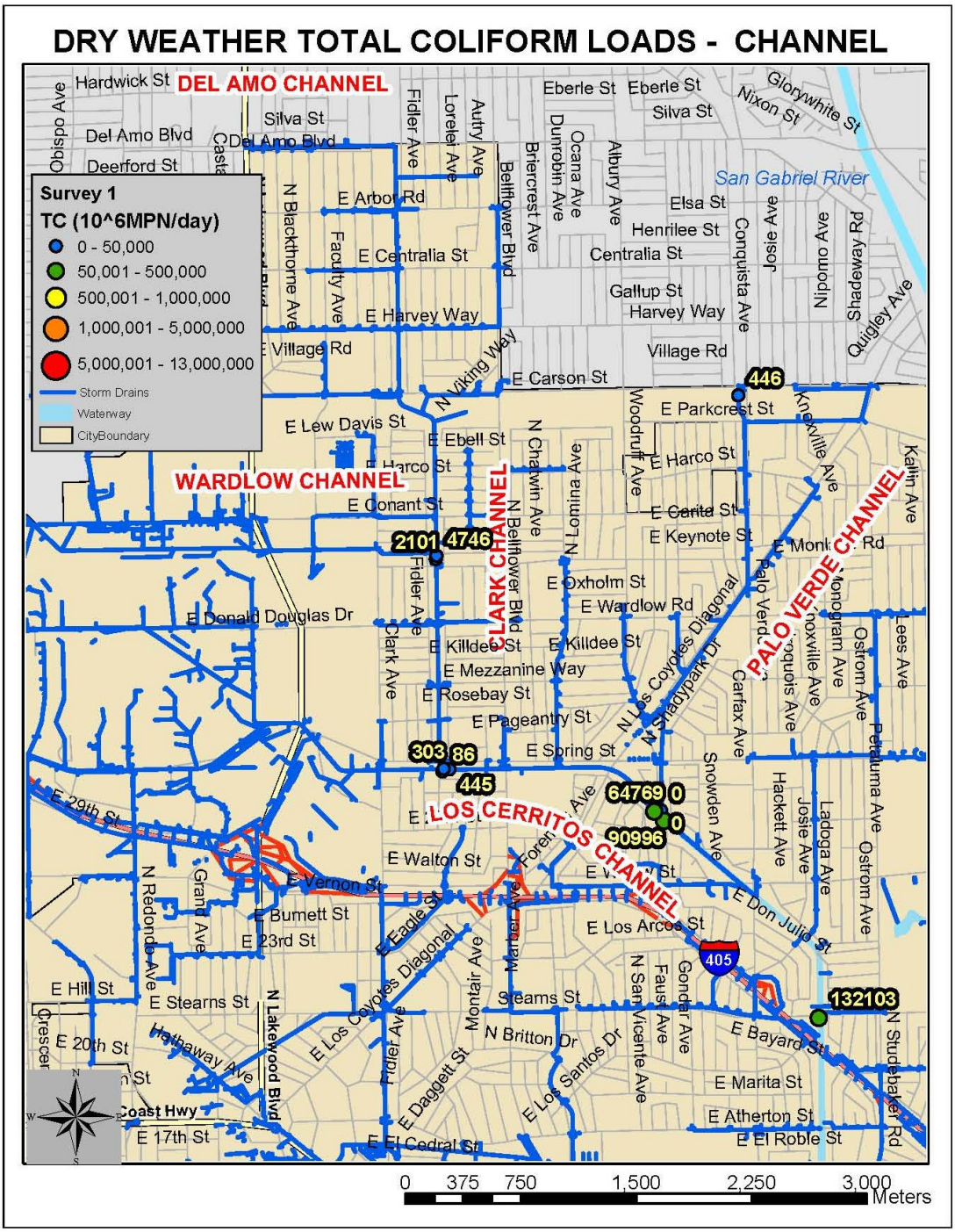

Figure A-52. **Total Coliform Loads Measured in Main Channels during Survey 1.**

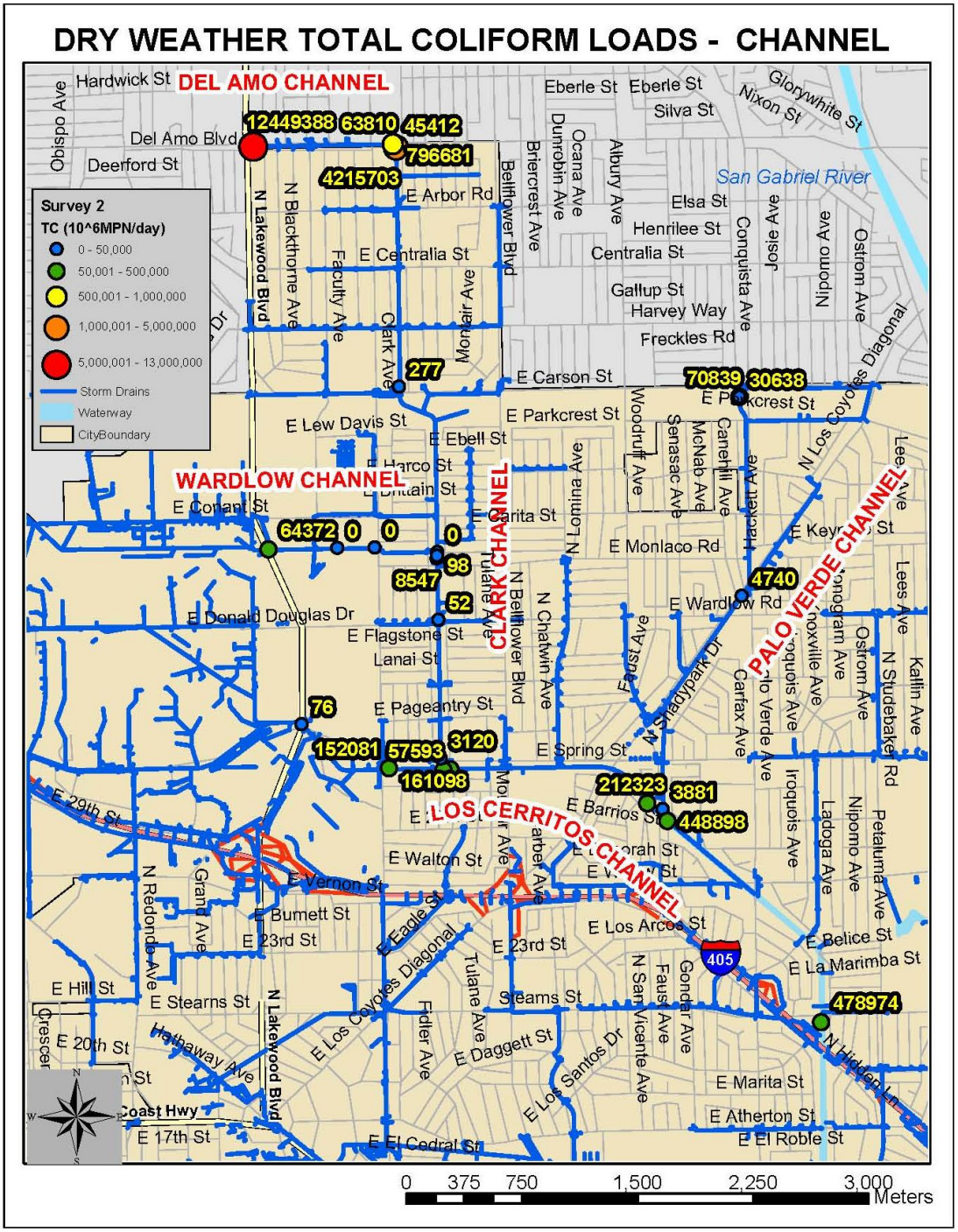

Figure A-53. Total Coliform Loads Measured in Main Channels during Survey 2.

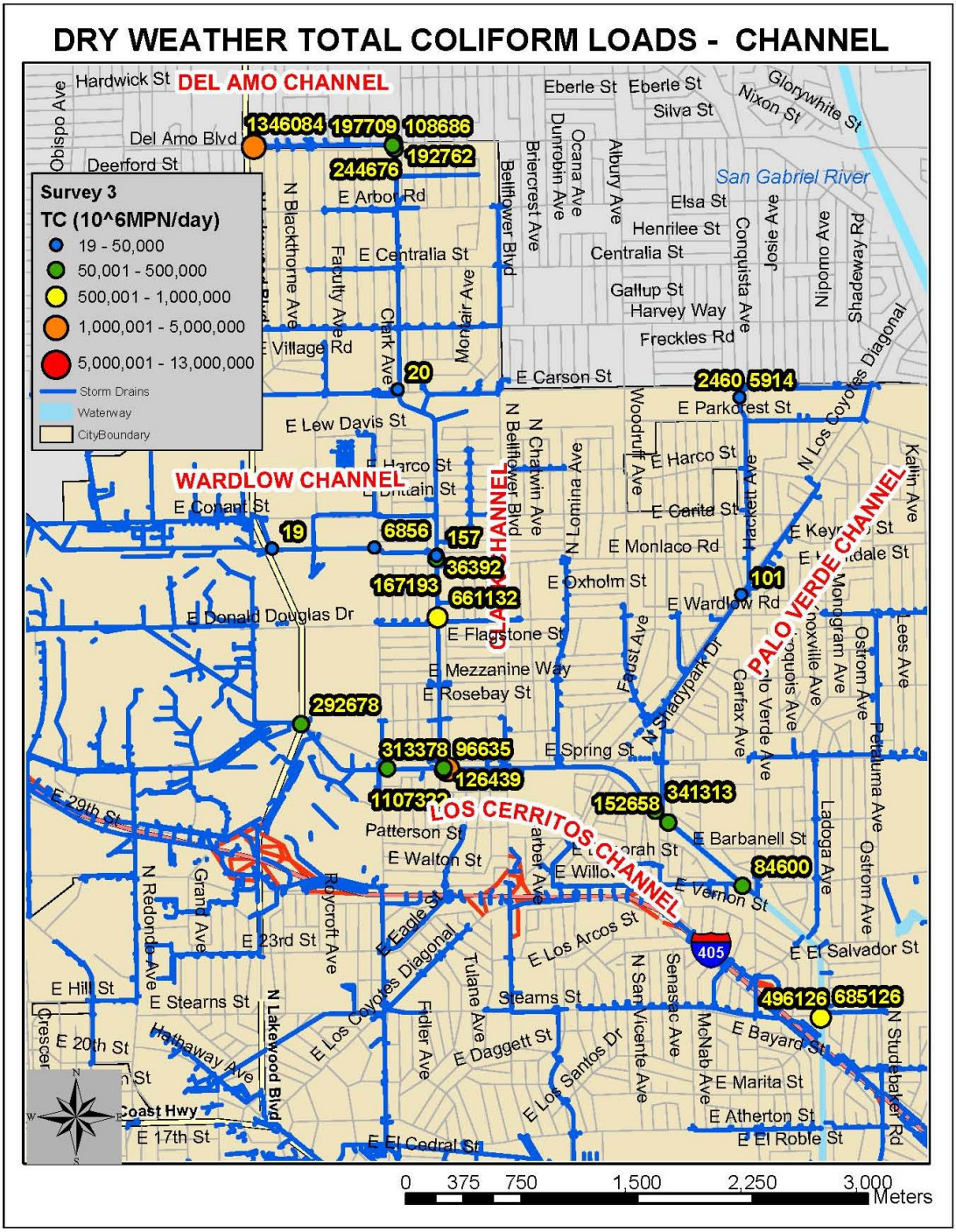

Figure A-54. **Total Coliform Loads Measured in Main Channels during Survey 3.**

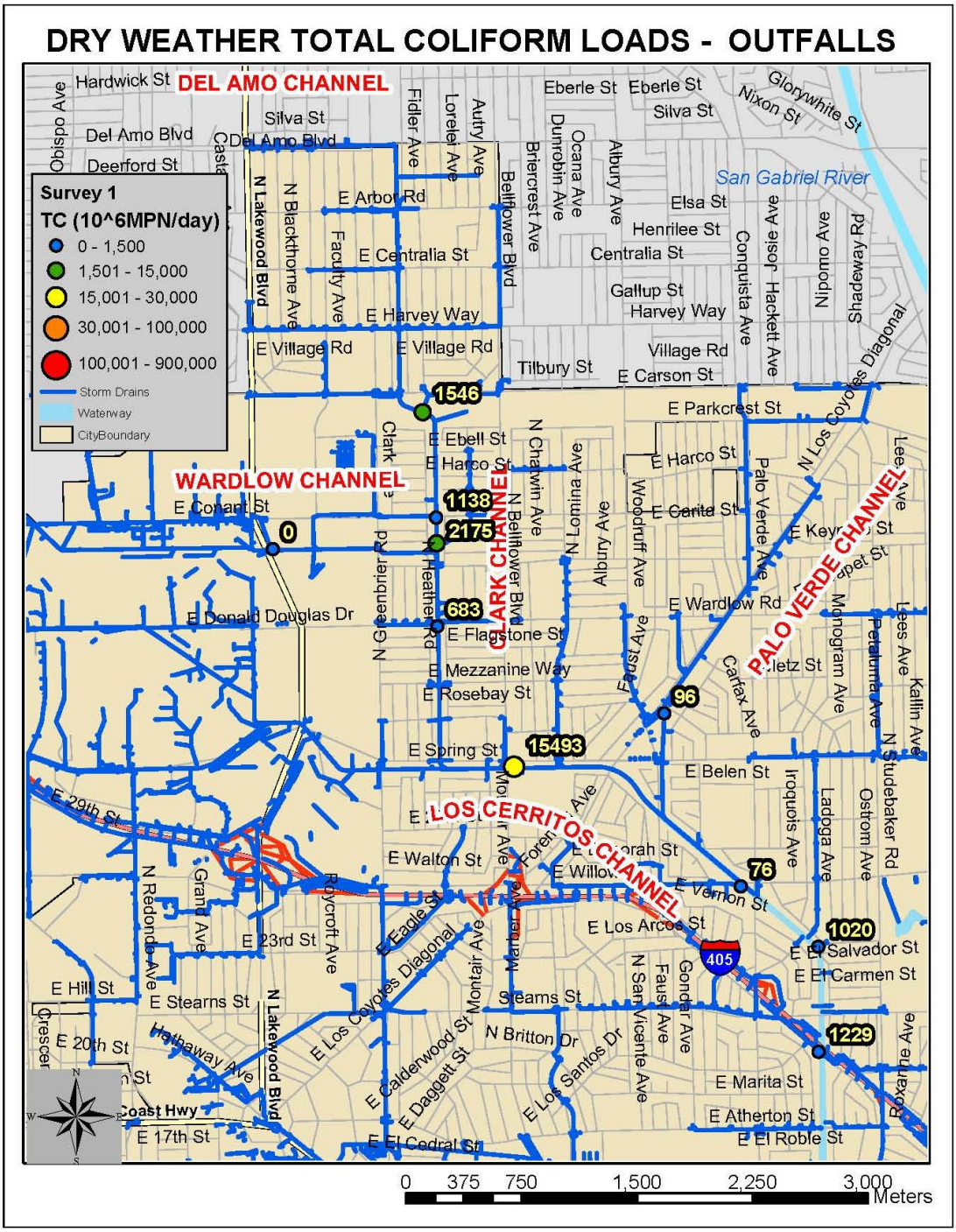

Figure A-55. Total Coliform Loads Measured in Flowing Outfalls during Survey 1.

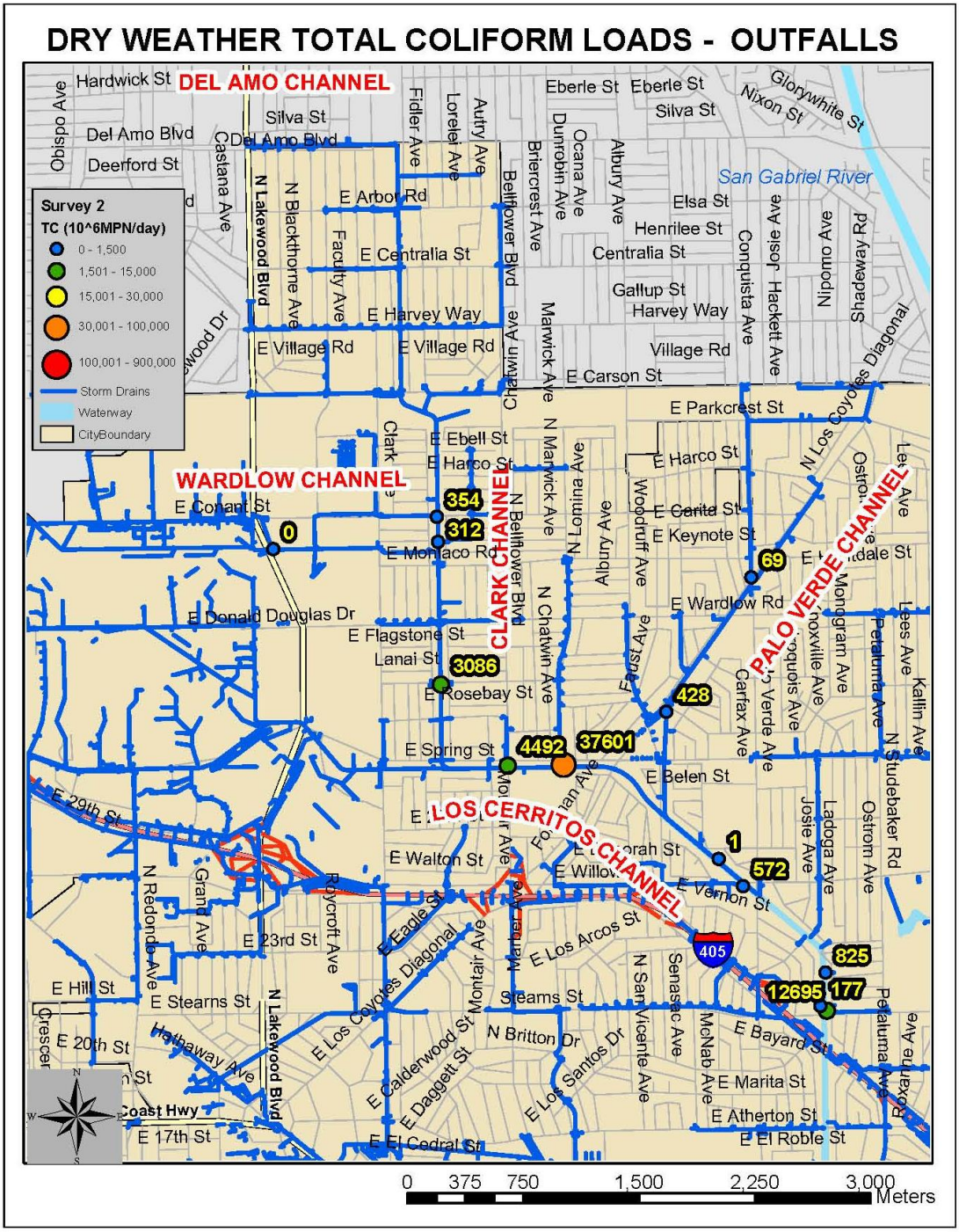

Figure A-56. Total Coliform Loads Measured in Flowing Outfalls during Survey 2.

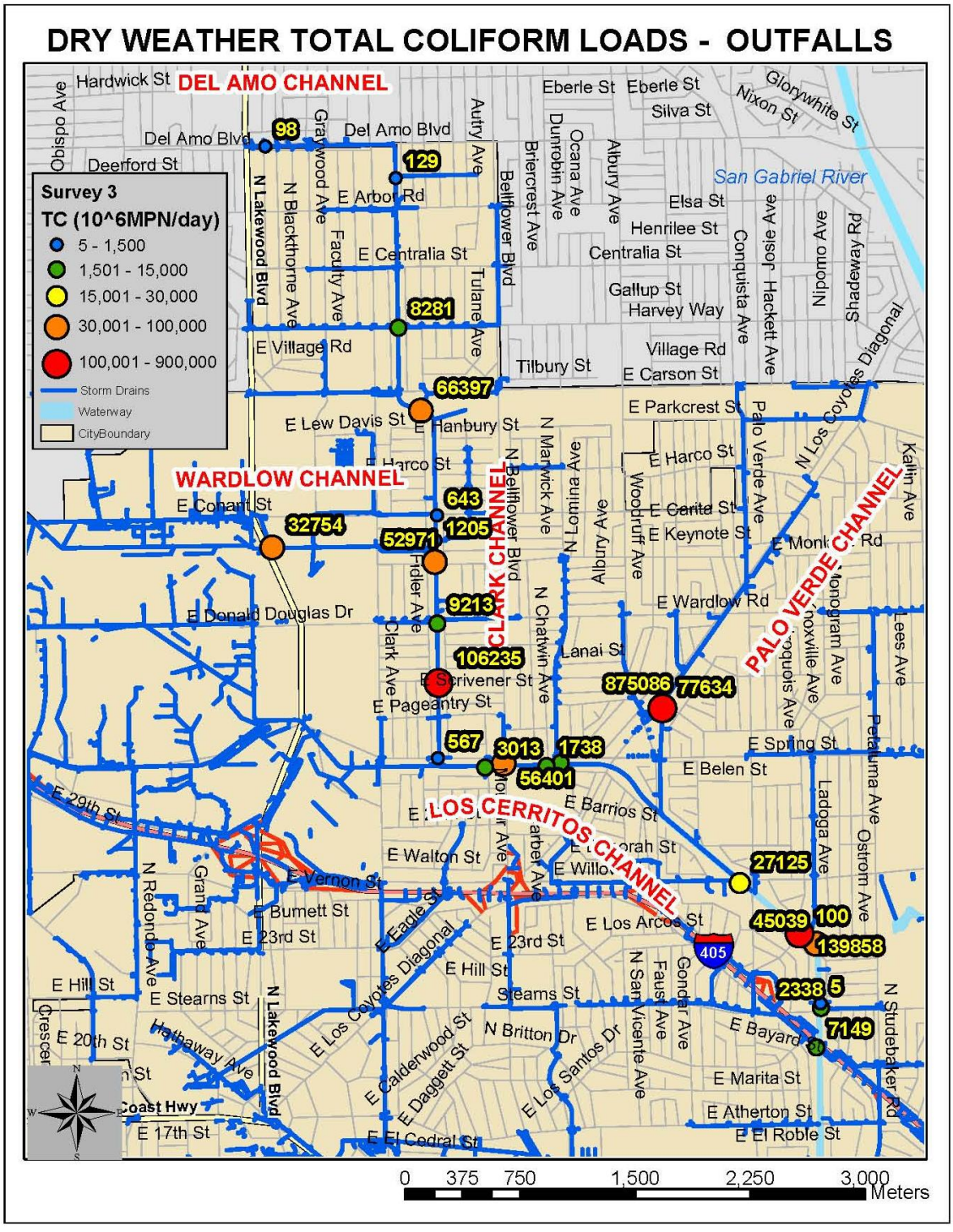

Figure A-57. Total Coliform Loads Measured in Flowing Outfalls during Survey 3.

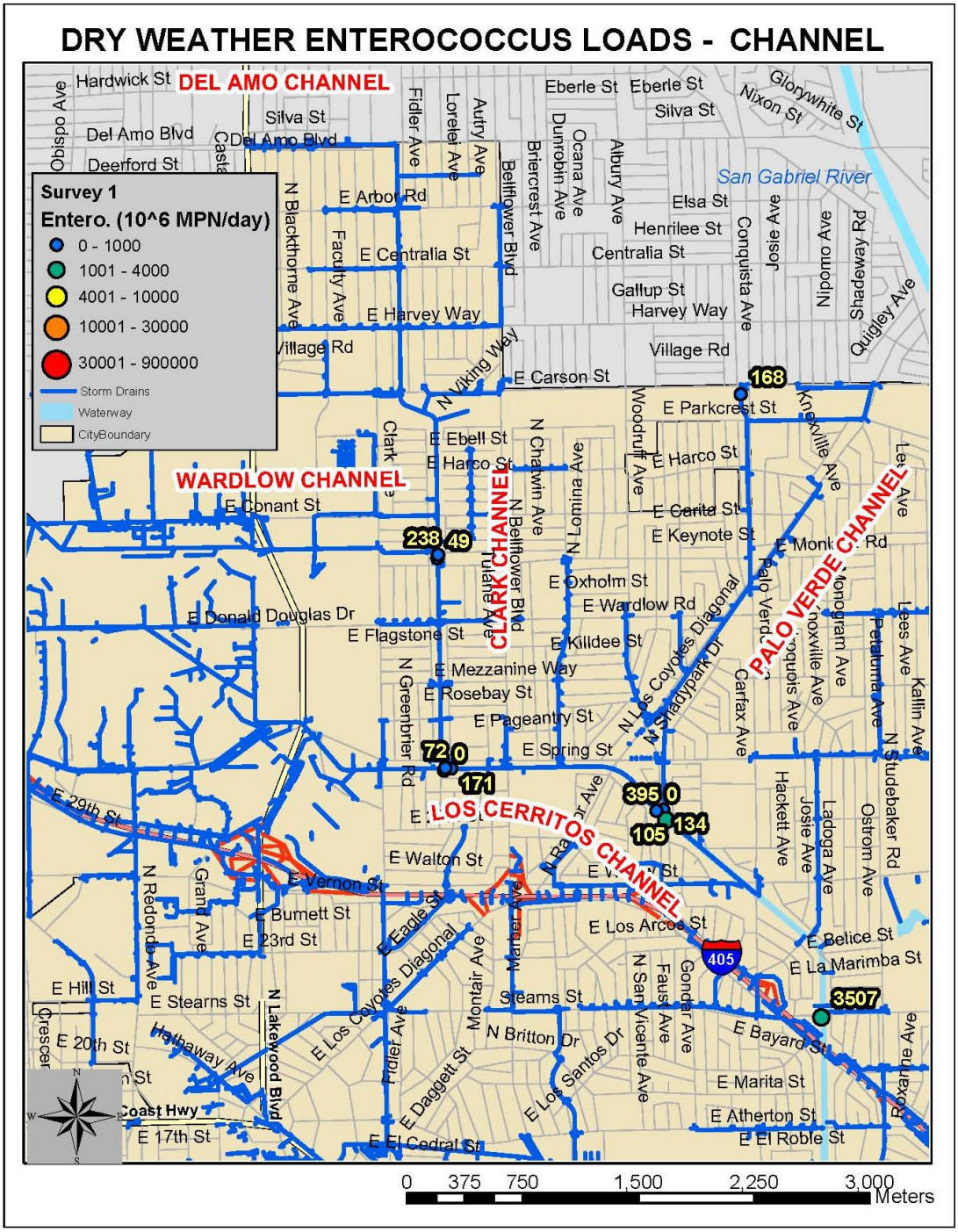

Figure A-58. Enterococcus Loads Measured in Main Channels during Survey 1.

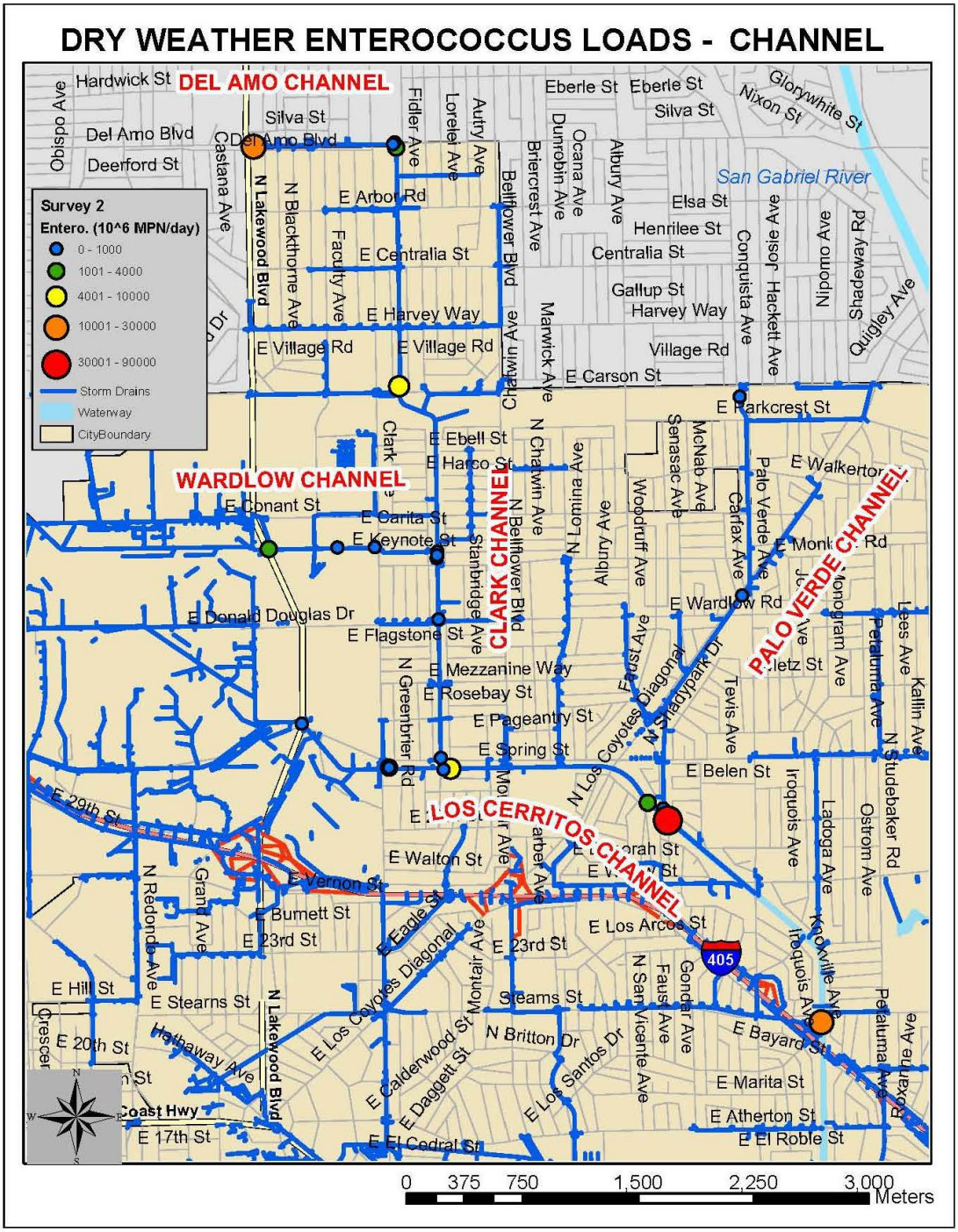

Figure A-59. Enterococcus Loads Measured in Main Channels during Survey 2.

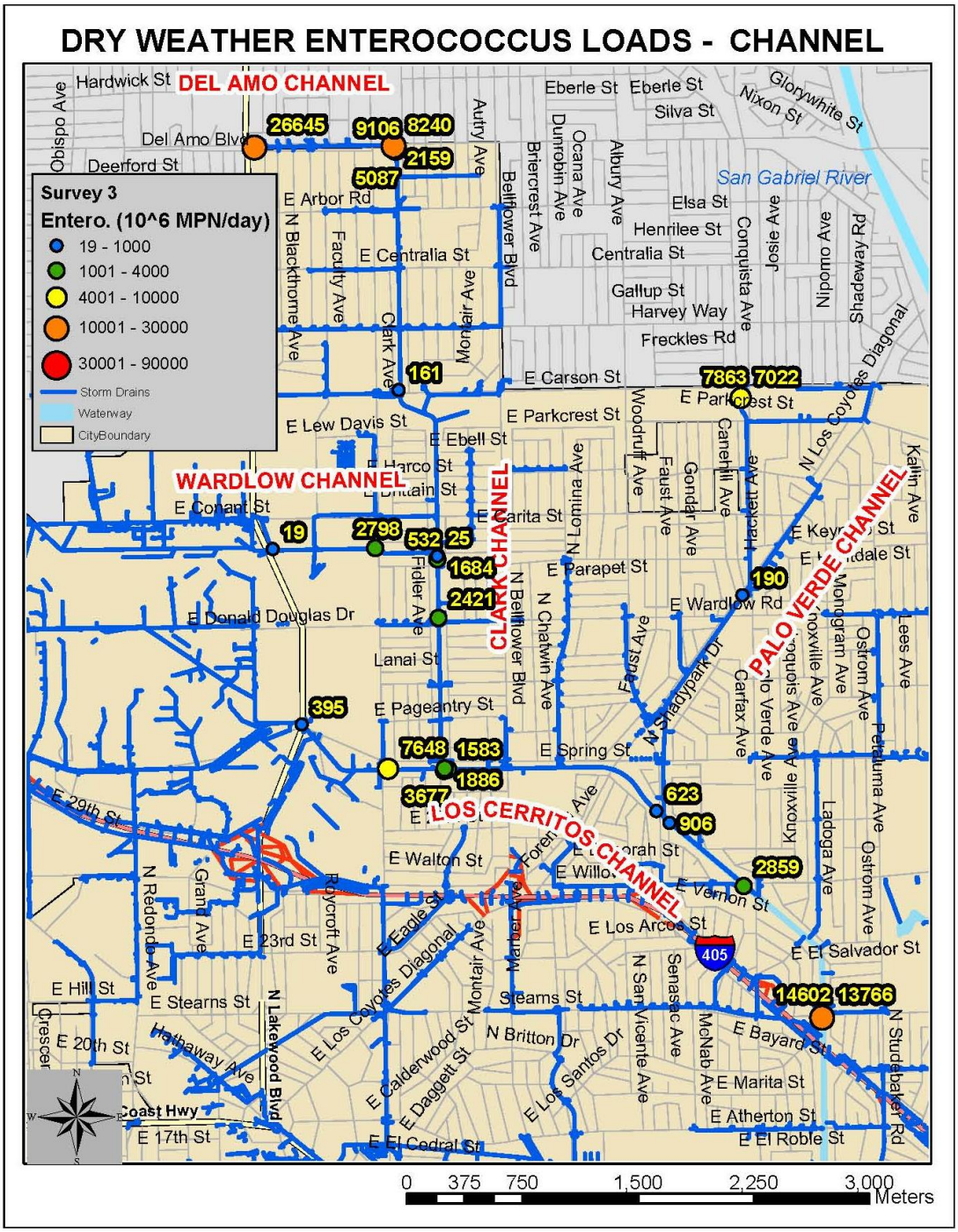

Figure A-60. Enterococcus Loads Measured in Main Channels during Survey 3.

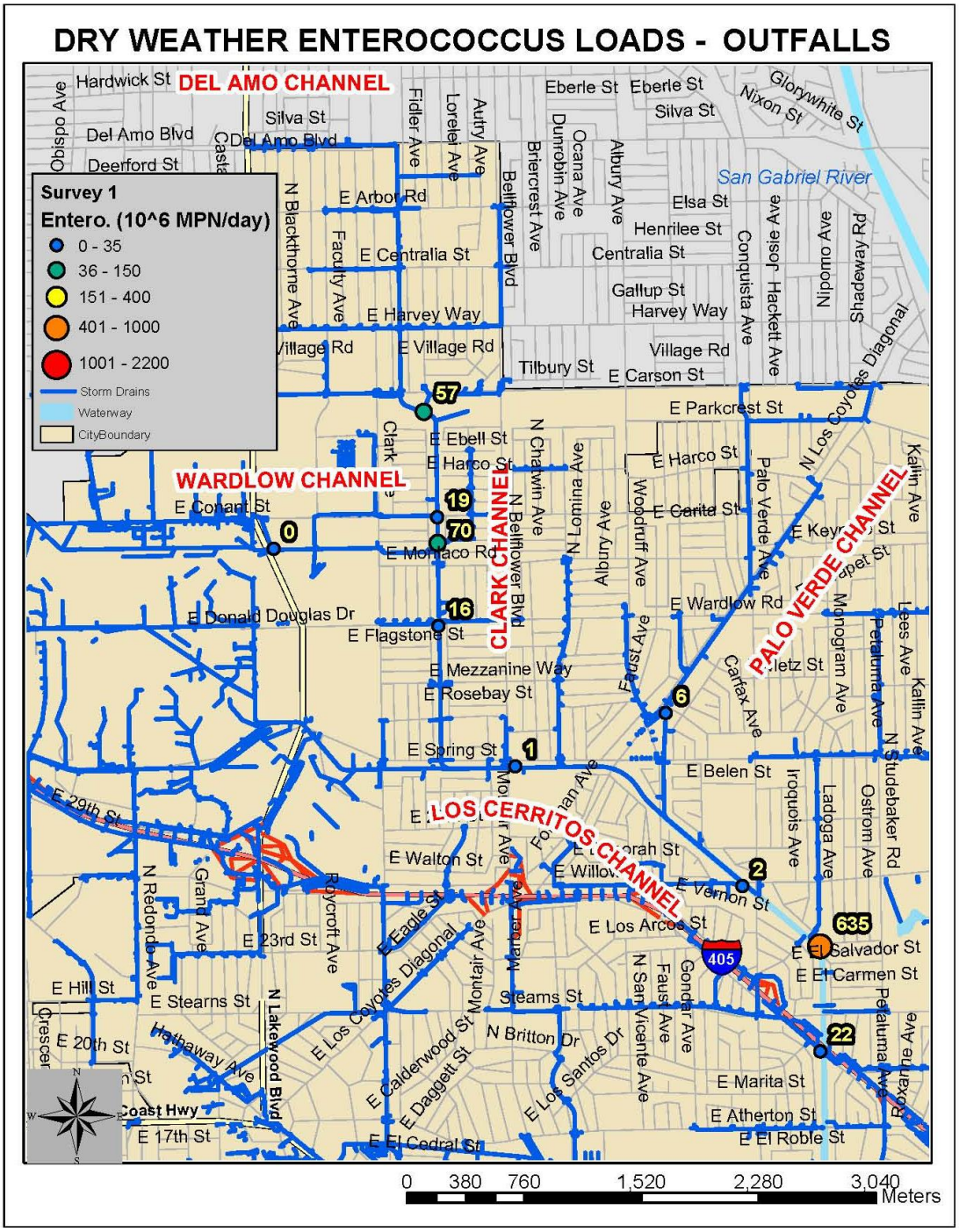

Figure A-61. Enterococcus Loads Measured in Flowing Outfalls during Survey 1.

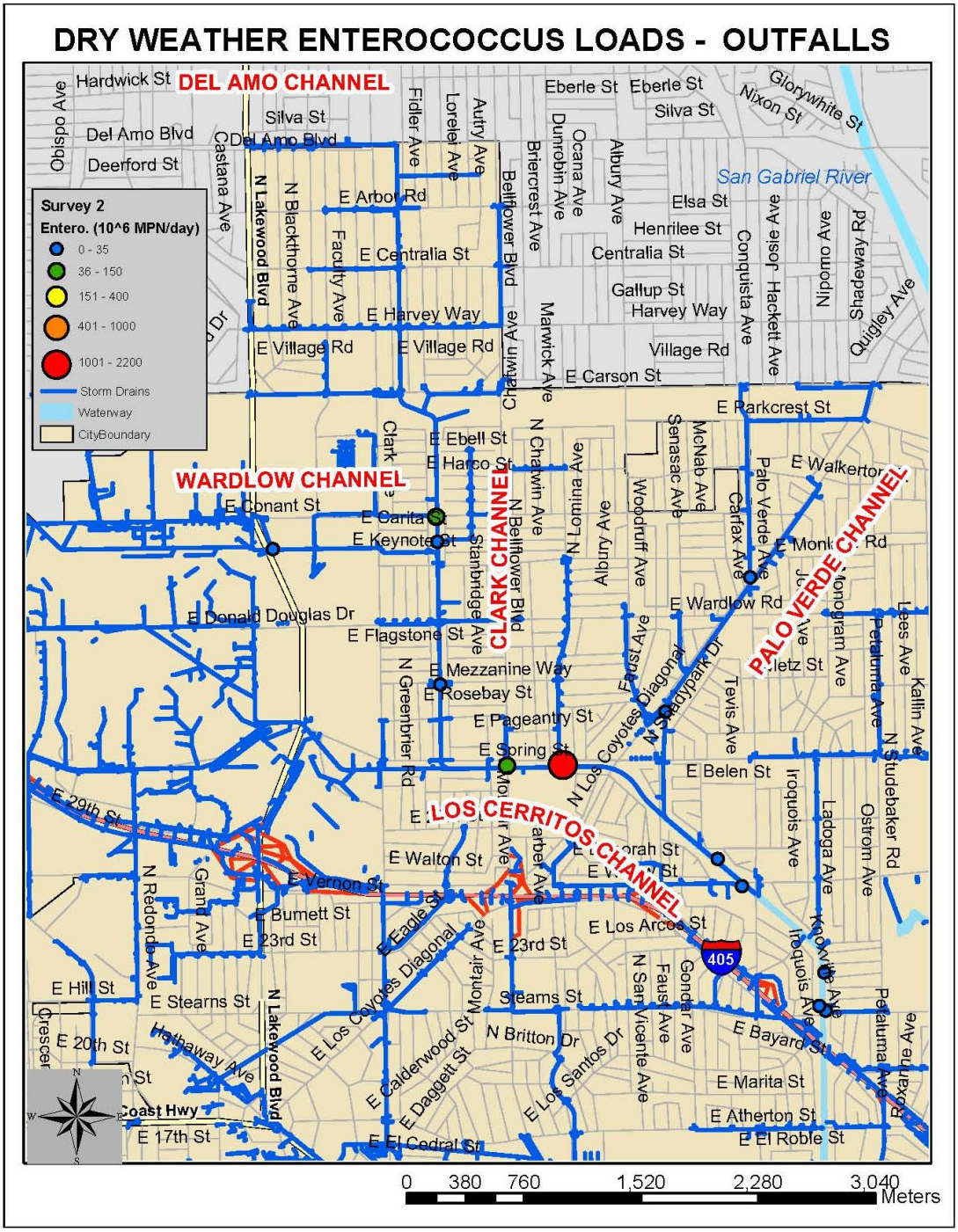

Figure A-62. Enterococcus Loads Measured in Flowing Outfalls during Survey 2.

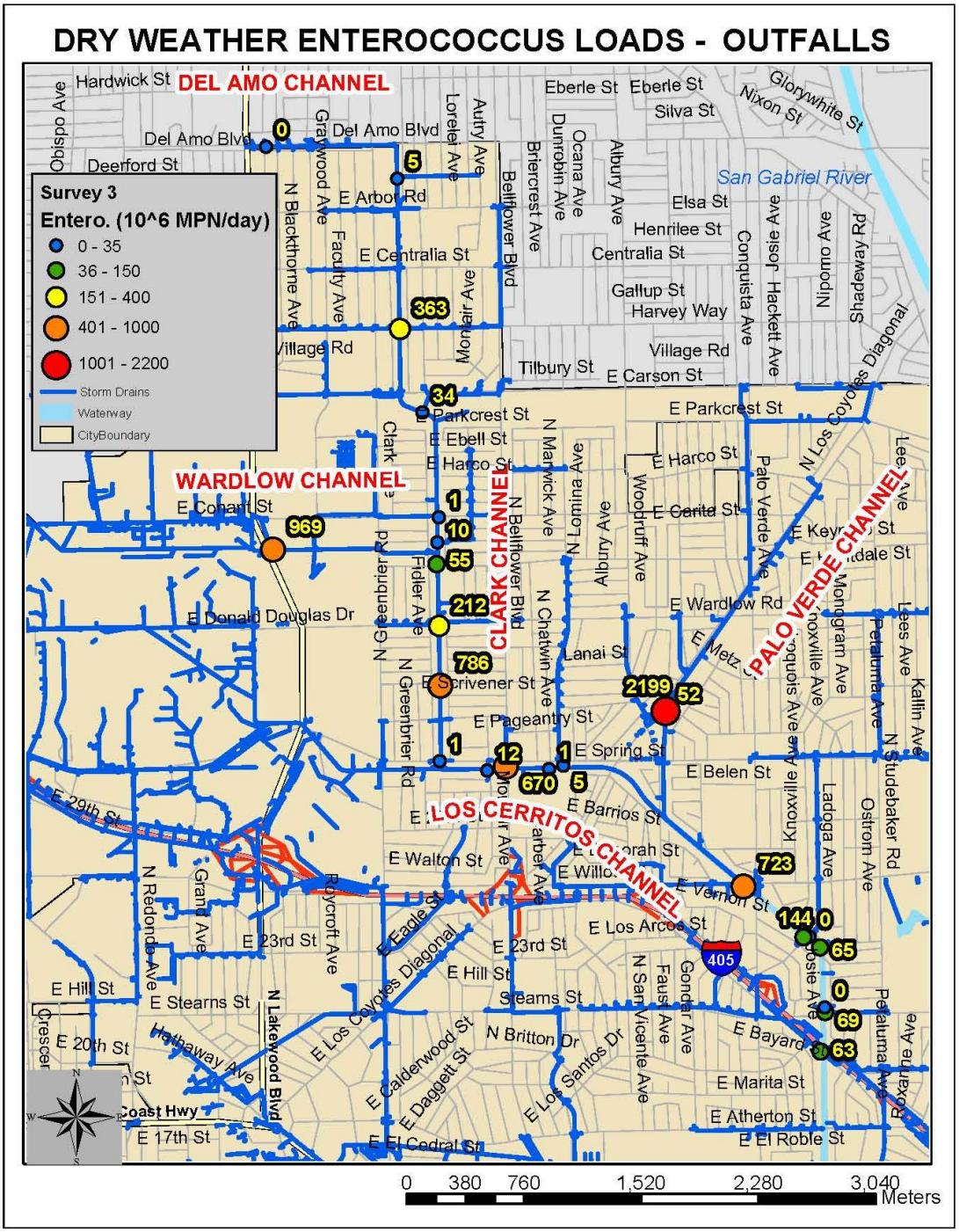

Figure A-63. Enterococcus Loads Measured in Flowing Outfalls during Survey 3.

Attachment 3. **Kinnetic Laboratories, Inc. 2011. City of Long Beach Storm Water Monitoring Report. Appendix D. Continuous Measurement of pH and Temperature in the Los Cerritos Channel.**

Reference: Kinnetic Laboratories, Inc. 2011. City of Long Beach Stromwater Monitoring Report 2010/2011. NPDES Permit No. CAS004003. Appendix D. Continuous Measurement of pH and Temperature in the Los Cerritos Channel.

APPENDIX D
CYCLING OF pH VALUES IN LOS CERRITOS CHANNEL
CITY OF LONG BEACH, CA

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EXECUTIVE SUMMARY

The Basin Plan (CRWQCB, 1994) specifies water quality objectives for pH of 6.5 to 8.5 for inland water, and bays and estuaries. Measurements of pH in Los Cerritos Channel have been routinely taken as part of the City's dry weather water quality monitoring studies required under its NPDES stormwater permit. These values have frequently been measured at levels greater than pH 9.0 (Kinnetic Laboratories 2005, 2009). Initially, pH was measured only at the NPDES mass emission monitoring site in the Los Cerritos Channel. The sampling site is located just below Stearns Street near the end of the freshwater portion of the drainage. The elevation of the channel bottom at this site is such that tidal effects are limited to periods of spring tides. In accordance with permit requirements, subsequent upstream source surveys were conducted in order to determine the source of elevated pH levels in the watershed. The following is a summary of the results of those initial surveys:

- Dry weather exceedances of the pH 8.5 objective was common in the upper Los Cerritos Channel and the upper branches, the Palo Verde Channel, the Clark Channel, Del Amo Channel, and the Wardlow Channel with pH values up to 10.5 or more.
- Dry weather discharges from outfalls entering the open channel from enclosed pipes and box culverts were characterized by uniformly lower pH values of approximately 8.0 and always below pH 9.0.
- These initial upstream investigations showed that pH tended to increase later in the survey day suggesting that they were likely influenced by photosynthetic activity and temperature increases in these shallow Channel flows.

From early data, the initial hypothesis was that the elevated pH values in these shallow open concrete channels are caused by photosynthetic activity during the day. Respiration of algae and bacteria in the biofilm was suggested to be the cause for the decreases in pH overnight. This present report details results of the deployment of a continuous recording instrument that was emplaced in the Los Cerritos Channel at the Stearns Street monitoring station in order to provide documentation of the expected daily and seasonal excursions of both pH and temperature. Except for brief periods when the instrument was pulled for data retrieval and calibration checks, this instrument recorded pH and temperature of the flowing water at intervals of 10 minutes between September 10, 2010 and May 1, 2011.

Results of these continuous recordings are reported below and can be summarized as follows:

- Both pH and temperature records show repetitive, pronounced 24-hour sinusoidal oscillations that support the earlier conclusion that they are controlled by biological and physical processes common to all sites with similar conditions.
- These 24-hour signals are muted and depressed by major storm flows in the Channel, but also immediately

Figure D-1. Typical Dry Weather Flow Showing Algal Growth.

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continue during the intervening winter dry periods even in the absence of major filamentous algal mats.

- Hourly averaged pH values in the Channel were pH 7.98 for rain days, pH 9.00 for dry days, and pH 8.93 as an average of all data, but with maximum values during the days of pH 10.49 to 10.91. Minimum values were from pH 6.43 to 7.04 for the various wet/dry categories.
- With the pH average or median just below 9.0 for all days other than during storm events, the upper limits of the Basin Plan water quality objective of pH 8.5 is routinely exceeded most of the year (inclusive of summer dry and winter dry periods).

BACKGROUND

Over the past ten to eleven years, a substantial number of pH and other conventional water quality measurements have been recorded from the main channels and enclosed outfalls that discharge to the open portion of the Los Cerritos Channel watershed. The following sections provide a summary of these studies and provide a brief history of work completed in this watershed.

Early Dry Weather Measurements in the Los Cerritos Channel

Several dry weather surveys in the Los Cerritos Channel conducted early in the program found high pH values at monitoring sites located in the open concrete channels. In 2002, the Regional Board added a requirement to conduct upstream investigations if pH values of 8.5 or greater were encountered during the surveys.

August, 2004. On August 31, 2004 (Kinnetic Laboratories, 2005) elevated pH values were measured in a time-composite dry weather sample taken at the Los Cerritos Channel station which is located below Stearns Street near the end of the Channel but above tide elevation. Upon measurement of the composite bottle pH, an immediate upstream investigation was initiated.

The field crew initially walked approximately 1000 feet upstream in the Los Cerritos Channel to look for possible sources. Measurements of pH tended to increase from 10.02 at the monitoring site to 10.42 to 10.52 at all upstream sites. No sources of water with elevated pH were identified. The crew then went upstream to Spring Street near the junction of the Los Cerritos and Palo Verde Channels. Similar, high pH measurements (10.14 to 10.43) were found in waters above the confluence of these channels, at the mouth of the Palo Verde Channel, and downstream of the confluence. Further investigations were conducted upstream of this site in the vicinity of the Clark Channel. The pH measurements in this region of the Los Cerritos Channel were lower (9.30 to 9.82) but still elevated. Further investigation was halted due to the late hour and approaching darkness.

September, 2004. Since the source of high pH water was not found to be the result of a nearby source discharge, a follow-up watershed investigation was conducted on September 3, 2004 (Kinnetic Laboratories, 2005). Twelve sites (Table D-1) were visited throughout the watershed starting from the Los Cerritos Channel monitoring site and incorporating the two major tributaries to the Los Cerritos Channel (Figure D-2). Field estimates of flow were taken using conventional dry weather flow procedures. The average width and depth of the flow were measured for a 10 foot section of the channel. Velocity over the 10-foot section was measured based upon measuring the time required for particles to drift through the segment. Dissolved oxygen was measured with a YSI Model 58 meter. Temperature, salinity and pH were measured with a YSI Model 63 meter. Water samples for measurement of alkalinity were taken for measurement in the laboratory.

The results of this survey are shown in Table D-2. The survey showed evidence of high pH water throughout the open conveyances of the Los Cerritos Channel and both major tributaries, the Palo Verde and Clark Channels. Measured pH values typically ranged from 9.45 to 10.90. An initial pH check conducted in the morning (0845) at site CC1-A resulted in a pH of 8.93, just under the trigger of 9.0 that was set to initiate upstream investigations. Three hours later (1146), pH had risen to 9.50 and the upstream investigation was started. Flows generally decreased at upstream sites with the exception of flows measured at CC2-A located in the Los Cerritos Channel just downstream of the mouth of the Palo Verde Channel. Total alkalinity ranged from 90 to 173 mg/L. Alkalinity provides an indication of the

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buffering capacity of the water. Alkalinity values of 100 to 200 would be expected to have a stabilizing effect.

Water temperature and dissolved oxygen were extremely high at all sites. Temperatures ranged from 23.8 to 31.5 °C. Temperatures also tended to increase over the course of the day reaching the higher portion of the range around 1500. Dissolved oxygen levels ranged from just over 11 mg/L to greater than 20 mg/L at several sites indicating that dissolved oxygen was well into supersaturated conditions. Based upon these results the initial hypothesis was that the elevated pH values in these shallow open concrete channels are caused by photosynthetic activity.

Los Cerritos Watershed Surveys, 2009. Extensive surveys were made in the Los Cerritos Channel Watershed (Figure D-4) on March 3, April 9, and May 11, 2009 as part of a copper source study (Kinnetic Laboratories, 2009). Multiple sites were sampled within the Los Cerritos, Palo Verde, Clark, Wardlow, and Del Amo Channels as well as 10 to 24 outfalls that were observed to have measurable discharges into these Channels. Detailed tables of results were included in the original annual report (Kinnetic Laboratories, 2009) but descriptive statistics of the accompanying results are also given in Tables D-3, D-4, and D-5 below.

Results of these three surveys (Tables D-3 through D-5) show the following:

- Median pH of Channel waters ranged from pH 9.1 to 9.9 with maximum values of pH 10.7 to 11.0 and minimum values of pH 7.4 to 7.7.
- Median pH of outfall discharges was pH 8.0 to 8.2 with maximum values of pH 8.5 to 8.8 and minimum values of pH 7.4 to 7.9.
- The results of these more extensive watershed surveys provided further verification that the pH of the Channel waters routinely range above the pH 8.5 Basin Plan objective, but do not fall below the pH 6.5 lower limit.

Interestingly, the results also show that the elevated pH values in the open channels were not due to discharges of water from the enclosed outfalls along the channel since the measured pH of these discharge waters were almost all within the range of acceptable values established in the Basin Plan.

Thus these results provided further evidence of elevated and oscillating pH values within the Channels that correspond with expected effects of daily photosynthetic activity, respiration, temperature, and buffering capacity provided by alkalinity.

Purpose and Scope of Present pH Studies in Cerritos Channel

The purpose of this present study was to provide better documentation of the daily fluctuations in pH over the range of conditions that occur over the course of a year. These data were also intended to provide improved information for calculation of chronic ammonia-N criteria that require use of 30-average pH values.

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Table D-1. Sampling Locations in the Los Cerritos Channel Watershed.

Site Name	Site Description	Latitude[1]	Longitude
CC1-A	Los Cerritos Channel Below Stearns St. bridge	33.79544	118.10352
CC1-B	Los Cerritos Channel at first outfall upstream of Stearns	33.79601	118.10356
CC2-A	Los Cerritos Channel below confluence with Palo Verde Channel	33.80695	118.11408
PV-MOUTH	Palo Verde Channel above confluence with Los Cerritos Channel	33.81070	118.11408
PV-A	Palo Verde Channel west of Palo Verde Ave. and Los Coyotes Diagonal	33.81987	118.10862
PV-B	Palo Verde Channel south of Carson St.	33.83192	118.10832
CC3-A	Los Cerritos Channel below confluence w/ Clark Channel	33.81020	118.12907
CLARK-A	Clark Channel below Monlaco Rd.	33.82201	118.12982
CLARK-OUTFALL	39-inch outfall (106+25) into Clark Channel under the Conant St. bridge	33.82509	118.12982
CLARK-B	Clark Channel south of Del Amo Blvd. Below the confluence of the Clark and Del Amo Channels	33.84647	118.13210
DA-A	Del Amo Channel east of Lakewood Ave.	33.84690	118.14201
CC4-A	Los Cerritos Channel west of Lakewood Ave., north of Spring St.	33.81301	118.13953

1. All positions based upon NAD 1983 datum

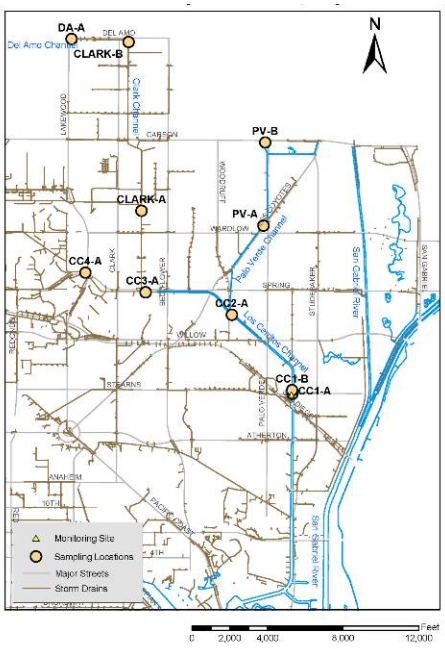

Figure D- 2. Watershed Investigation Sites 2004.

Figure D-3. Typical Dry Season Growth, Del Amo Channel.

Table D-2. Summary of the Results of the 2004 Upstream Investigation in the Los Cerritos Channel Watershed.

Site Name	Arrival Time	Temp °C	pH	DO mg/L	Salinity (ppt)	Flow (cfs)	Alkalinity (mg/L)			
							Bicarbonate	Carbonate	Hydroxide	Total Alkalinity
CC1-A	8:45	23.8	8.93	15.25	0.5	2.06				
CC1-A	11:46	28.6	9.50	19.60	0.4	2.06	95.0	45.0	< 5.0	153
CC1-B	12:16	30.7	9.83	19.80	0.4	2.06	52.0	54.0	< 5.0	133
CC2-A	12:46	30.9	9.45	>20	0.4	4.29	49.0	57.0	< 5.0	135
PV-MOUTH	12:50					1.63				
PV-A	13:21	31.5	10.75	15.55	0.5	1.69	< 5.0	60.0	14.0	140
PV-B	14:00	26.5	10.30	11.13	0.4	1.40	< 5.0	84.0	< 5.0	143
CC3-A	15:35	30.4	10.55	15.20	0.4	1.65	< 5.0	69.0	< 5.0	120
CLARK-A	15:54	30.0	10.63	12.78	0.8	1.37	< 5.0	57.0	5.1	110
CLARK-OUTFALL	16:21	23.7	8.17							
CLARK-B	16:40	27.6	9.66	12.67	0.4	0.29	34.0	51.0	< 5.0	123
DA-A	17:00	27.3	10.60	12.50	0.4	0.25	< 5.0	51.0	< 5.0	90
CC4-A	17:45	27.7	10.90	>20	0.4	0.00	< 5.0	87.0	9.0	173

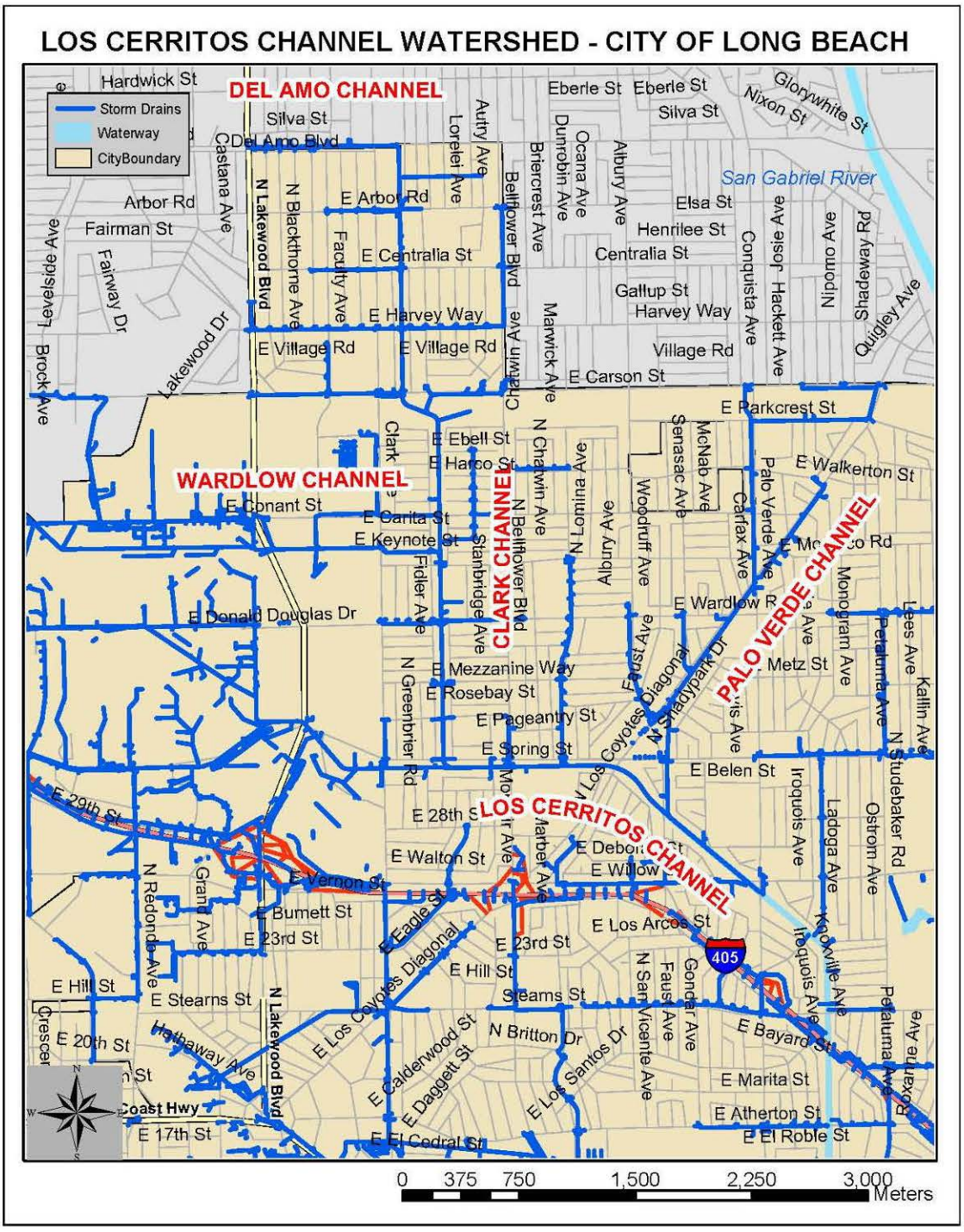

Figure D-4. City of Long Beach Los Cerritos Channel Watershed.

Table D-3. Descriptive Statistics of Flow and Water Quality at Channel and Outfall Sites – Survey 1 (March 3, 2009).

CHANNELS

Statistic	Flow (cfs)	Temp. (°C)	pH	Cond (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Entero. (MPN/100ml)	Total Coliform (MPN/100ml)
No. of observations	14	14	14	14	14	14	14	14	14	14	14	14
Minimum	0.023	14.5	7.7	0.523	6.6	2	64	7	5	5	5	5
Maximum	1.315	28.2	10.8	4.92	16.1	273	1800	1500	750	908	754	17850
1st Quartile	0.072	17.2	9.3	0.589	9.6	6.1	113	10	9	5	31	72
Median	**0.135**	**19.3**	**9.9**	**0.969**	**12.6**	**17.5**	**140**	**10**	**10**	8	74	1592
3rd Quartile	0.692	25.5	10.5	1.103	14.9	33.9	180	12	11	131	105	3733
Mean	0.405	20.7	9.8	1.18	12	40.4	265	118	63	178	131	2879
Geometric mean	0.187	20.1	9.8	0.949	11.6	15.9	165	16	13	**30**	**64**	**530**

OUTFALLS

Statistic	Flow (cfs)	Temp. (°C)	pH	Cond (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Entero. (MPN/100ml)	Total Coliform (MPN/100ml)
No. of observations	10	10	10	10	10	10	10	10	10	10	10	10
Minimum	0.00014	14.8	7.9	0.56	6.9	0	94	1.2	1.4	5	5	5
Maximum	0.0331	19.2	8.5	2	9.6	41.2	570	20	19	111990	127400	4611000
1st Quartile	0.00028	16.6	8.1	0.657	7.6	1.3	115	4.3	3.3	5	132	4205
Median	**0.00084**	**17.4**	**8.2**	**0.727**	**8.1**	**3.8**	**135**	**10.5**	**6.5**	111	524	44815
3rd Quartile	0.00141	17.8	8.2	0.964	8.8	10.8	190	15.5	13.8	3123	1541	167138
Mean	0.00505	17.2	8.2	0.925	8.2	8.4	188	10.3	8.5	17126	14834	548413
Geometric mean	0.00102	17.2	8.2	0.849	8.1		161	7.1	6	**178**	**593**	**20969**

Table D- 4. Descriptive Statistics of Flow and Water Quality at Channel and Outfall Sites – Survey 2 (April 9, 2009).

CHANNELS

Statistic	Flow (cfs)	Temp. (°C)	pH	Cond (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Entero. (MPN/100ml)	Total Coliform (MPN/100ml)
No. of observations	26	27	27	27	27	27	27	27	27	27	27	27
Minimum	0.006	13.9	7.7	0.48	6.7	5.7	76	8	4	5	5	5
Maximum	1.476	28.2	11.0	1.266	21.4	396	260	35	25	2239	14009	12449388
1st Quartile	0.040	16.5	9.3	0.740	9.3	10.3	125	14	11.5	13	91	125
Median	**0.152**	**19.6**	**9.6**	**0.859**	**14.3**	**19.5**	**140**	**18**	**13**	110	404	27550
3rd Quartile	0.415	24.1	10.4	1.069	16.4	88.2	160	22	14.5	278	1007	80650
Mean	0.309	20.3	9.7	0.885	13.7	60.3	148	18.6	13	1633	5806	722442
Geometric mean	0.122	19.9	9.6	0.856	13.0	24.8	142	17.4	12	**73**	**297**	**5564**

OUTFALLS

Statistic	Flow (cfs)	Temp. (°C)	pH	Cond (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Entero. (MPN/100ml)	Total Coliform (MPN/100ml)
No. of observations	14	14	14	14	14	14	14	14	14	14	14	14
Minimum	0.00014	14.6	7.5	0.522	4.6	0.8	99	1.9	1.3	5	5	5
Maximum	0.0331	21.0	8.5	8.400	9.7	80.7	1000	120	81	11870	14136	2755000
1st Quartile	0.00019	16.3	7.9	0.730	6.6	3.6	132.5	4.5	2.8	6	48	4702
Median	**0.00045**	**17.2**	**8.0**	**0.950**	**7.2**	**6.6**	**170**	**11.9**	**6.1**	80	420	56175
3rd Quartile	0.00177	18.2	8.1	1.108	7.7	8.6	220	37.8	17.8	1406	2586	256283
Mean	0.00505	17.4	8.0	1.500	7.2	12.6	263	26.0	14.9	2014	2416	437502
Geometric mean	0.00079	17.4	8.0	1.070	7.1	6.2	200	12.5	7.1	**102**	**294**	**23999**

Table D-5. Descriptive Statistics of Flow and Water Quality at Channel and Outfall Sites – Survey 3 (May 11, 2009).

CHANNELS												
Statistic	**Flow (cfs)**	**Temp. (°C)**	**pH**	**Cond (mS/cm)**	**DO (mg/L)**	**Turb. (NTU)**	**Hardness (mg/L)**	**Tot. Cu (ug/L)**	**Diss. Cu (ug/L)**	**E. coli (MPN/100ml)**	**Entero. (MPN/100ml)**	**Total Coliform (MPN/100ml)**
No. of observations	26	27	27	27	27	27	27	27	27	27	27	27
Minimum	0.044	17.3	7.4	0.665	4.0	3.4	93	3.4	2.9	5	5	5
Maximum	0.856	32.4	10.7	1.66	17.4	61.8	440	21	20	4611	6131	228200
1st Quartile	0.097	18.5	8.6	0.809	8.8	6.1	155	6.8	5.5	13	91	126
Median	**0.194**	**22.9**	**9.1**	**1.029**	**12.3**	**11.3**	**190**	**10**	**7.6**	110	404	27550
3rd Quartile	0.396	28.7	10.1	1.369	13.6	20.0	295	12.5	10	278	1008	80650
Mean	0.286	24.0	9.2	1.100	11.1	16.9	215	10.5	8.7	765	1067	39233
Geometric mean	0.196	23.3	9.2	1.055	10.3	11.9	201	9.5	7.8	**98**	**387**	**9018**

OUTFALLS												
Statistic	**Flow (cfs)**	**Temp. (°C)**	**pH**	**Cond (mS/cm)**	**DO (mg/L)**	**Turb. (NTU)**	**Hardness (mg/L)**	**Tot. Cu (ug/L)**	**Diss. Cu (ug/L)**	**E. coli (MPN/100ml)**	**Enterococcus (MPN/100ml)**	**Total Coliform (MPN/100ml)**
No. of observations	24	22	22	22	22	22	24	24	24	25	25	25
Minimum	0.000007	17.1	7.5	0.616	2.2	0.0	120	1.1	1.0	5	5	2481
Maximum	0.12500	23.9	8.8	1.94	9.2	112	650	540	88	8664	34100	6015000
1st Quartile	0.00023	18.8	7.9	0.795	5.8	5.1	167	6.3	5.2	63	317	34480
Median	**0.00088**	**19.2**	**8.0**	**0.969**	**6.6**	**8.5**	**180**	**17.5**	**11.5**	201	1000	275000
3rd Quartile	0.00574	20.9	8.3	1.096	7.8	23.0	200	35	15.8	836	5172	1046200
Mean	0.00825	19.9	8.1	1.000	6.5	21.8	214	55.8	16.1	1095	4122	1109732
Geometric mean	0.00110	19.8	8.0	0.961	6.3		199	16.6	9.0	**188**	**850**	**218568**

METHODS

In order to obtain continuous records of pH and temperature of water in the Los Cerritos Channel, a WTW pH logger (WQL-pH) fitted with a SensoLyt® WQL pH electrode was installed on a bridge abutment under the Stearns Street Bridge. The logger was set to record temperature and pH at intervals of 10 minutes throughout the deployment. The meter was installed in the middle of the channel below the bridge at a location that ensured the sensors would remain immersed throughout dry weather periods.

Figure D-5. Dry Weather Flow at the Los Cerritos Monitoring Station

The SensoLyt® WQL pH electode records pH in the range of 2 to 12 pH units with an accuracy of ≤ 0.005± 1 digit, and temperature in the range of -5.0°C to 105°C with an accuracy of ≤ 0.1K ± 1 digit. The meter was calibrated before emplacement and checked subsequently each 4 to 6 weeks during maintenance visits with pH standards and a laboratory thermometer and was found to be a stable and reliable instrument.

RESULTS

The continuous series of pH and temperature measurements were taken during the period of September 10, 2010 to May 1, 2011 to obtain both dry and wet season data to document daily, seasonal and event-driven variations in the cycling of pH and temperature. Data were plotted for the full record of deployment in Figure D-6 (upper two plots).

Two features of these data are immediately apparent. First, the strong 24-hour cycle in water temperature and pH is clear and persistent throughout the dry weather season and during dry weather periods throughout the winter. These 24-hour signals are muted in response to significant rain events but reestablish almost immediately after the runoff subsided from these rain events. Secondly, the overall average pH measured in Los Cerritos Channel at the Stearns Street monitoring station is just under pH 9.0 with a daily maximum of up to pH 10.9 thus exceeding Basin Plan objectives of pH 8.5 maximum. Though average solar radiation and average water temperatures drop during the winter, the pH values remain high, and the 24-hour cycle continues along with pH exceedances above pH 8.5.

A closer examination of the 24-hour cycle in temperature and pH is shown in expanded plots of two selected shorter time plots given in Figure D-7, the upper plot for a section of winter record, and the lower plot for a section of record in the spring. Both records show that there is a daily lag between the rise in water temperature and the pH response. A major storm event over a protracted number of days is obvious in the winter record by reduced cycling and pH values depressed to levels less than pH 8.0, but the cycling and pH exceedances resume within a few days. A significant but only one day duration rain occurring in the spring record had much less impact, but pH values actually increased in the following days.

In order to examine the daily cycling more closely, all days of record were averaged versus time of day with the results displayed in Figure D-8. The upper plot shows the results for all rain days, while the lower plot shows the results for all dry days. Both of these plots show temperature and pH hourly averages being lower during the night and increasing during the day. For the rain days, hourly averaged pH was 8.0 overall with maximum pH averaging 8.5. For most of the record comprising all dry days, the same pattern occurred of rising temperature and pH values during the daytime hours. For the dry days (lower plot) the overall average pH was 9.0, with the average maximums of pH 10 occurring late in the afternoon, and the average minimums of about pH 8.0 occurring about at sunrise.

Descriptive statistics for the pH time series data are given in Figure D-9 and numerically in Table D-6. Figure D-9 shows an overall rain day average pH of about 8.0 with a median of pH 7.7, though individual month statistical results are more scattered due to heavier influences of more rain days occurring in December. Nevertheless, maximum pH values for some of the rain days are up to pH 10.5. For the dry days, both the average and median values are about pH 9 with maximum values just below pH 11 and minimum values barely below pH 6.5.

DISCUSSION

The results of this investigation support the initial hypothesis that the elevated pH values in these shallow open concrete channels are caused by photosynthetic activity. Early evidence from discrete sampling in the upper channels suggested that pH increases during the day. These survey results also show that the elevated pH in the Los Cerritos Channel Watershed is not coming from high pH discharges in outfalls that drain into the upper Channels. The present results of the time series measurements of temperature and pH taken at the Stearns Street monitoring site in Los Cerritos Channel above tidal influence show the strong persistent 24-hour signal of temperature and pH values and confirm this hypothesis that the high pH values in the Channel are due to this natural process of algal growth. In addition, these latter time series data show that pH cycling and pH exceedances of the Basin Plan objectives also occur during winter dry weather conditions, starting immediately after muting effects of runoff from significant rain events.

Algae in the channels consume carbon dioxide (CO_2) while undergoing photosynthesis. Algal growths of filimentaeous algae are observed in the open channels typically during summer, dry weather conditions. Evidence of high photosynthetic activity is typically evident in the form of the high concentrations of dissolved oxygen in the water as well as visual evidence of bubbles being generated as the water becomes oversaturated from oxygen. The removal of CO_2 from the water causes bicarbonate and carbonate ions to react with hydrogen ions (H^+) to form more CO_2. The loss of H^+ from the water causes the pH to increase. During the night, respiration of the algae and bacteria in the channel would cause CO_2 to be released and oxygen to be consumed. This allows the pH drop during the night. The diurnal cycling of pH is a common occurrence in open waterways and in shallow lakes. Alkalinity provides buffering capacity such that high alkalinity water has less extreme diurnal changes in pH.

Daily cycling of pH and temperature and high peaks of pH values is a well documented phenomena in streams, ponds, or shallow lakes where shallow water and lack of sufficient vegetation for shading from sunlight allows sufficient photosynthetic activity to produce swings of 1.5 pH units or greater. Examples of high pH resulting from this natural photosynthetic activity can be found in streams and lakes as diverse as those in Hawaii (Tomlinson and DeCarlo, 2001), Oregon (DEQ, 2002), and Montana (Gammons et. al, 2007, Parker et.al. 2007). Phytoplankton diversity and cyanobacterial dominance have been studied in the shallow Santa Olalla Lake in southwestern Spain which is in an area dominated by a Mediterranean-type climate with dry hot summers and low-rainfall winters similar to Southern California (Lopez-Archilla et al., 2003). This lake has an average pH 9.52 with maxima > 10.5 and contained several species of green algae, diatoms, and euglenoids and several cyanobacteria.

Studies carried out in freshwater ponds in the southern United States with respect to management strategies to control pH have been carried out by Tucker and D'Abramo, 2008. They state that chemical interactions among carbon dioxide, hydrogen ions, and the anions that produce alkalinity buffer the pH of most natural waters in a range of about 6 to 8.5. In the absence of processes that add or remove carbon dioxide, the initial pH of water in contact with air depends on its alkalinity. Waters with low alkalinities have an initial pH at the low end of that range, while water of higher alkalinities have higher pH. Adding or removing carbon dioxide causes pH to rise or fall from that initial value. Adding carbon dioxide pushes the previously defined chemical reaction toward the side of forming carbonic acid and hydrogen ions and causing pH to decrease. Removing carbon dioxide pulls the reaction to the other side thereby removing hydrogen ions and causing pH to increase. The amount of variation from the initial pH depends on the amount of carbon dioxide added or removed and the alkalinity, which tends to buffer or reduce the effect of changes in carbon dioxide concentrations.

They state that difficulties in managing pH arise because the term high pH describes not only a chemical property, but also the outcome of many interacting chemical and biological processes. A solution to high pH problems must be to alter pond biology so that the net daily carbon dioxide uptake in near zero by reducing photosynthesis or increasing respiration both of which pose practical difficulties. For pond management, establishing a balance between the hardness and alkalinity helps, addition of alum or an organic substance that will decompose over time to release carbon dioxide into the water, or control of plant growth through shading or use of aquatic herbicides, the latter use in ponds usually to change one type of plant community to a more desirable type. All of these management methods appear to be very difficult if applied to shallow, slow moving water in miles of concrete channels.

CONCLUSIONS

Exceedances of pH above the Basin Plan objective of 8.5 occur in the upper channels of the Los Cerritos Watershed in both summer dry and winter dry periods. Early evidence from discrete sampling in the upper channels of the Los Cerritos Watershed suggested that pH increases during the day. These survey results also showed that the elevated pH in the Los Cerritos Channel Watershed is not coming from high pH discharges in outfalls that drain into the upper Channels. The present results of the time series measurements of temperature and pH taken at the Stearns Street monitoring site in Los Cerritos Channel above tidal influence show the strong persistent 24-hour signal of temperature and pH values and confirm the hypothesis that the high pH values in the Channel are due to this natural process of algal growth.

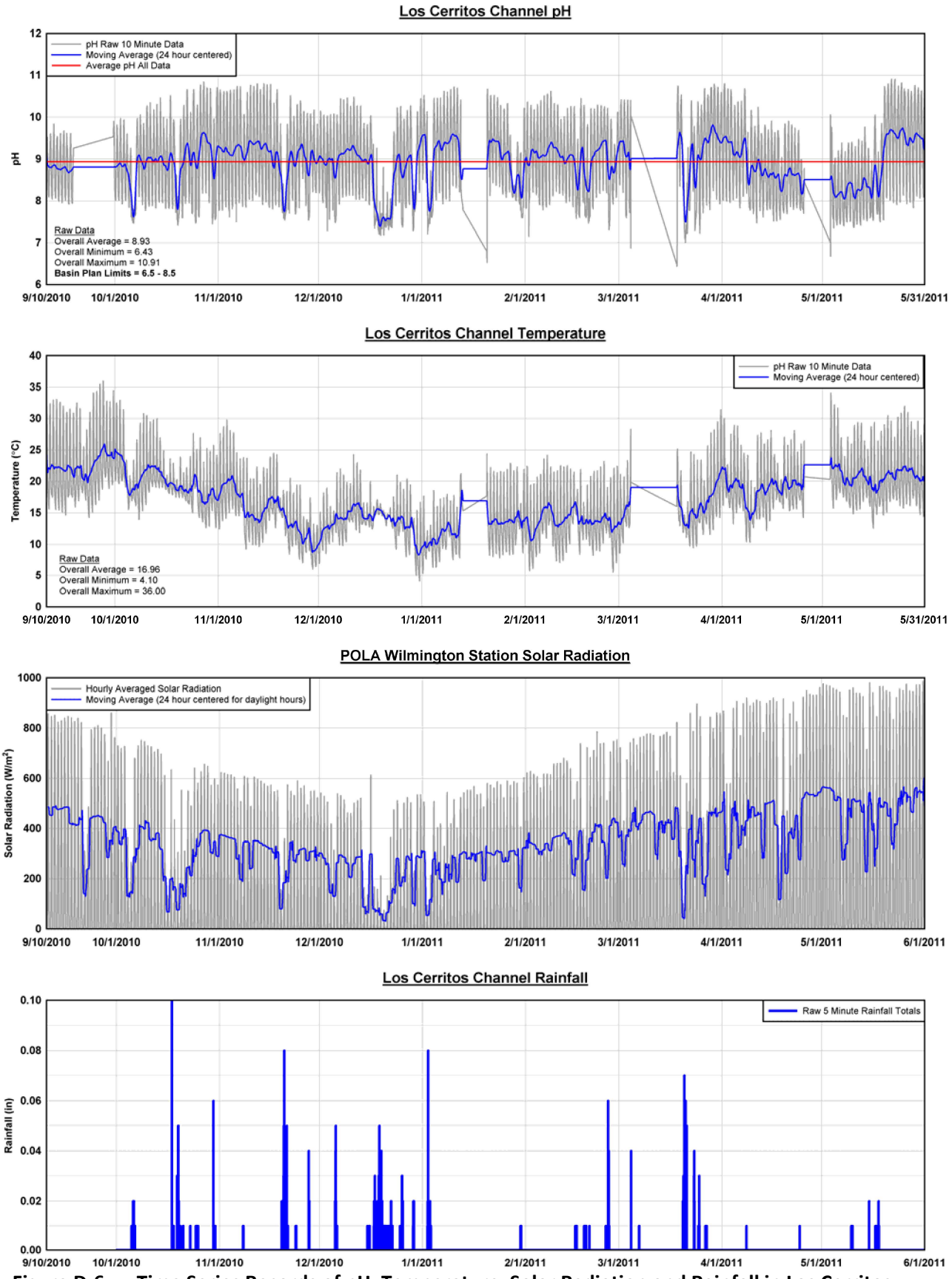

Figure D-6. Time Series Records of pH, Temperature, Solar Radiation and Rainfall in Los Cerritos Channel at Stearns Street. September 10, 2010 to June 1, 2011.

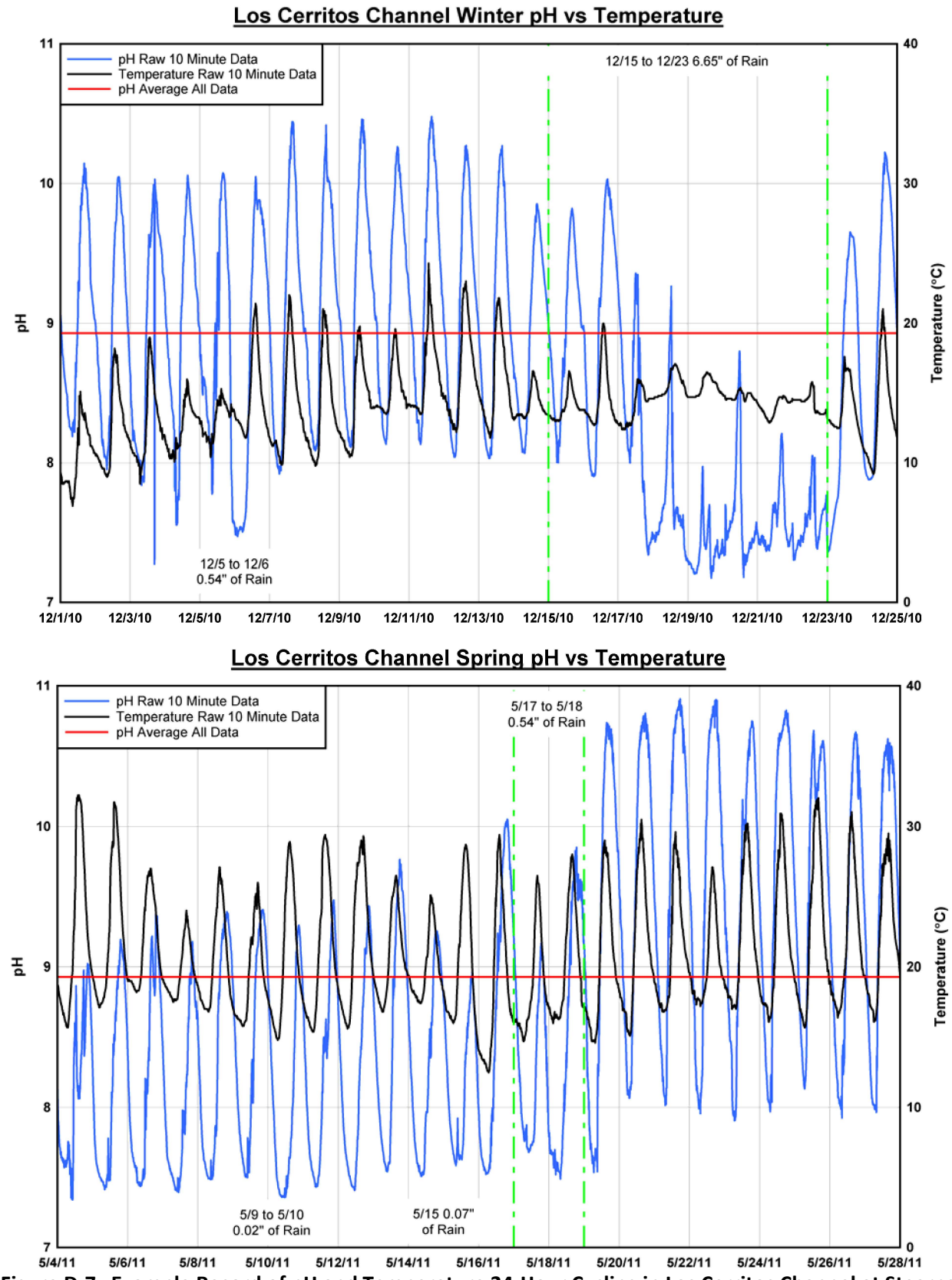

Figure D-7. Example Record of pH and Temperature 24-Hour Cycling in Los Cerritos Channel at Stearns Street. Winter (Above) and Spring (Below) Seasons.

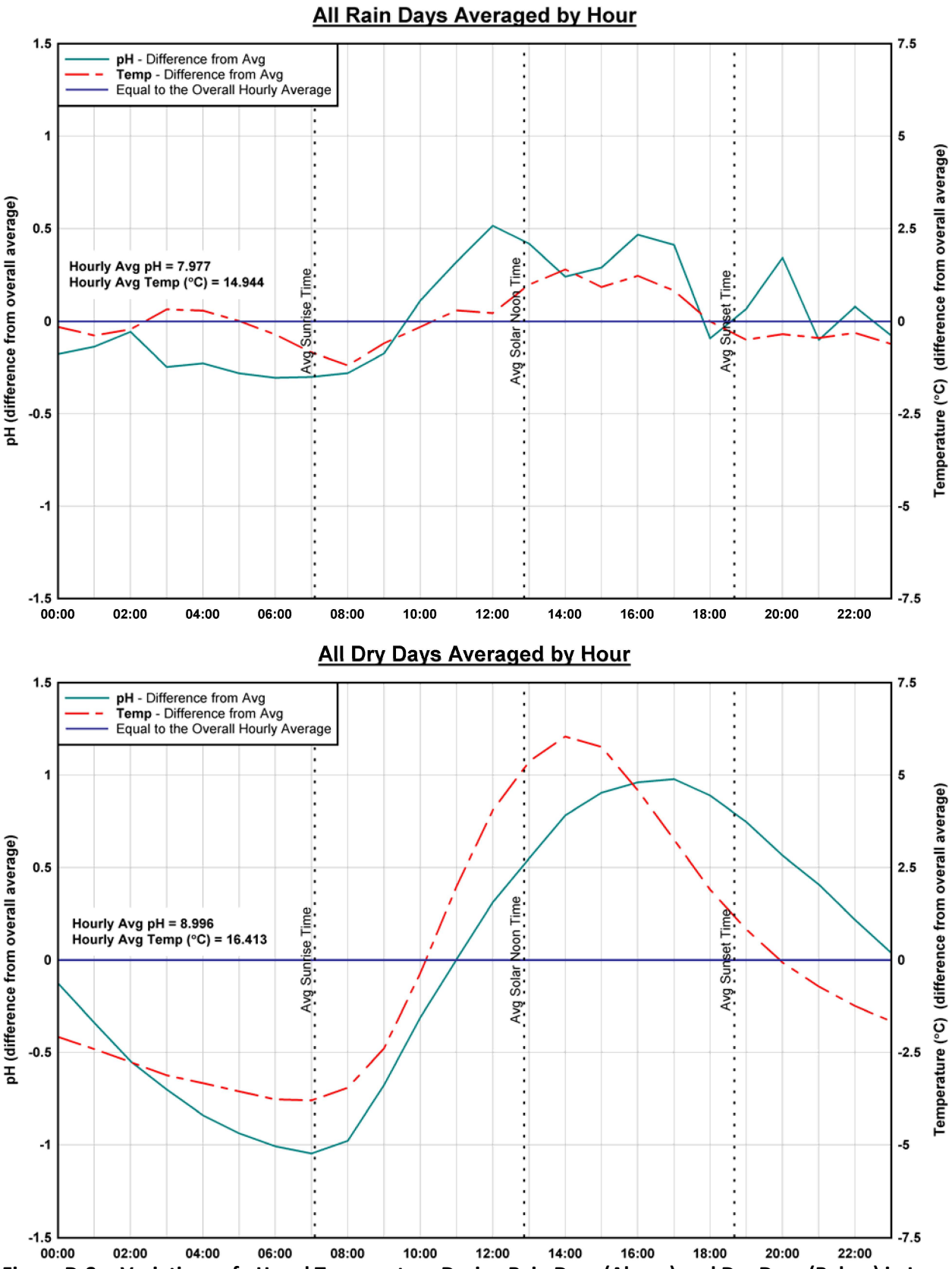

Figure D-8. Variations of pH and Temperature During Rain Days (Above) and Dry Days (Below) in Los Cerritos Channel at Stearns Street.

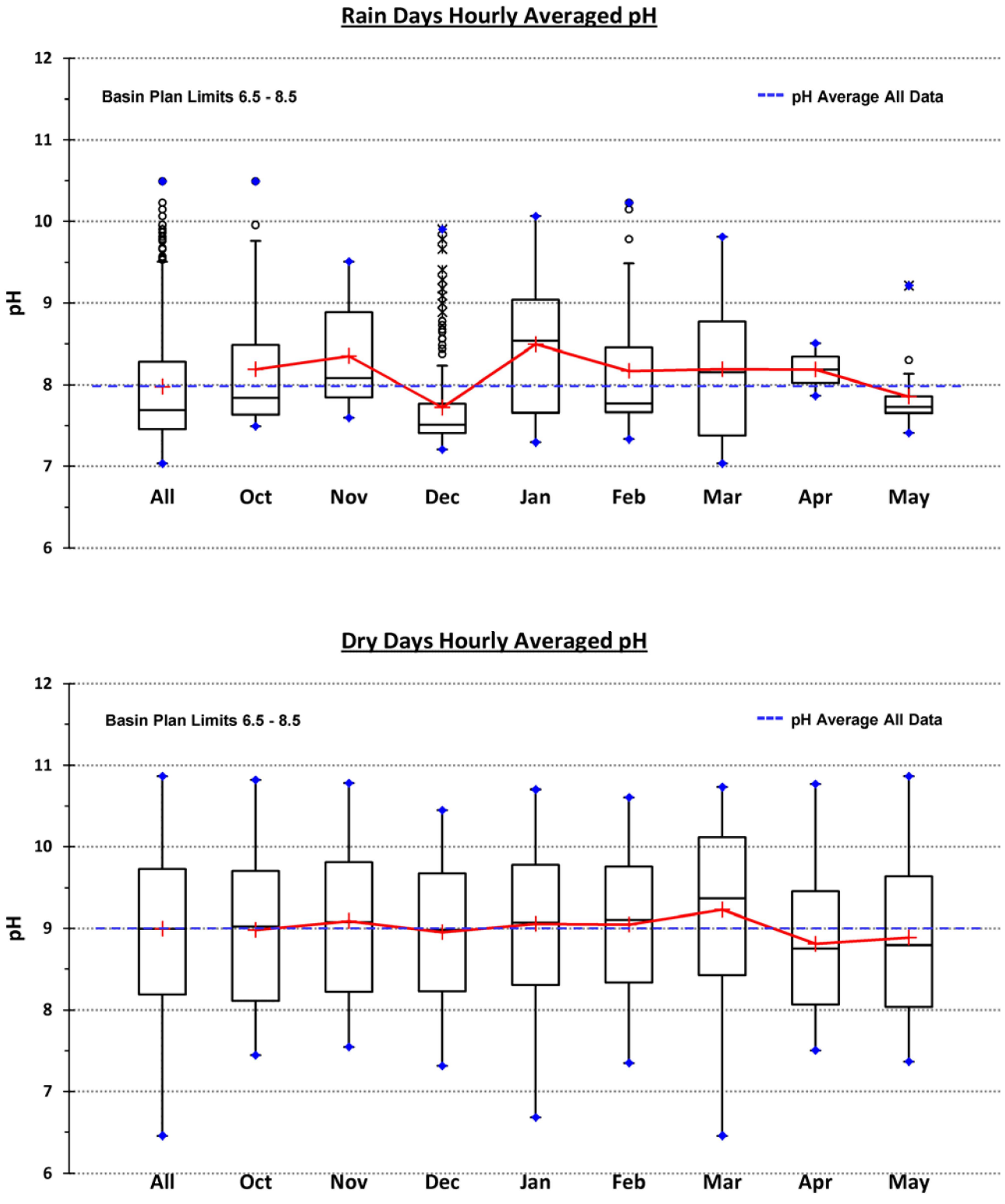

Figure D-9. Variability of pH in Los Cerritos Channel at Stearns Street for Rain Days (Above) and for Dry Days (Below).

Table D-6. Descriptive Statistics for pH at Los Cerritos Channel Monitoring Station.

pH on Rain Days (hourly averaged, Sept. not included)

Yr/Month	Min	Avg	Max	StdDev	CV(%)	Rainfall (in)
2010						
Oct	7.49	8.19	10.49	0.75	9.21	1.74
Nov	7.60	8.35	9.51	0.67	7.99	0.73
Dec	7.21	7.72	9.90	0.54	7.01	8.6
2011						
Jan	7.30	8.50	10.06	0.88	10.35	0.97
Feb	7.33	8.17	10.23	0.84	10.24	0.93
Mar	7.04	8.19	9.81	0.91	11.12	2.65
Apr	7.87	8.19	8.51	0.45	5.55	0.03
May	7.41	7.86	9.21	0.42	5.38	0.63
All	**7.04**	**7.98**	**10.49**	**0.73**	**9.09**	**16.28**

pH on Dry Days (hourly Averaged, Sept. not included)

Yr/Month	Min	Avg	Max	StdDev	CV(%)	Rainfall (in)
2010						
Oct	7.45	8.98	10.82	0.92	10.19	0
Nov	7.55	9.09	10.78	0.92	10.16	0
Dec	7.31	8.95	10.45	0.82	9.11	0
2011						
Jan	6.69	9.06	10.70	0.87	9.66	0
Feb	7.35	9.05	10.61	0.81	8.90	0
Mar	6.46	9.23	10.73	1.02	11.01	0
Apr	7.51	8.81	10.77	0.82	9.27	0
May	7.37	8.89	10.87	1.02	11.47	0
All	**6.46**	**9.00**	**10.87**	**0.90**	**10.05**	**0**

All Raw pH Data

Yr/Month	Min	Avg	Max	StdDev	CV(%)	Rainfall (in)
2010						
Sep	7.92	8.80	9.90	0.57	6.45	-
Oct	7.41	8.90	10.85	0.90	10.15	1.74
Nov	7.49	9.07	10.81	0.93	10.23	0.73
Dec	7.18	8.71	10.48	0.92	10.52	8.6
2011						
Jan	6.52	9.04	10.73	0.88	9.77	0.97
Feb	7.15	9.01	10.62	0.83	9.21	0.93
Mar	6.43	9.14	10.80	1.05	11.53	2.65
Apr	7.47	8.81	10.81	0.82	9.31	0.03
May	6.67	8.86	10.91	1.03	11.58	0.63
All	**6.43**	**8.93**	**10.91**	**0.92**	**10.28**	**16.28**

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RB-AR8583

Attachment 4. **Summary of pH and Ammonia Data from City of Long Beach MS4 NPDES Storm Water Monitoring Site on the Los Cerritos Channel at Stearns Street along with Potential Toxicity Calculations**

(Excel Spreadsheet, Electronic File Only)

RB-AR8584

ATTACHMENT D:

SUPPORT FOR ASSUMPTION OF SB 346 IMPLEMENTATION EFFECTIVENESS

1. Memo: Estimate of Urban Runoff Copper Reduction in Los Angeles County for the Brake Pad Reductions Mandated by SB 346

2. Brake Pad Copper Reduction Calculations Spreadsheet

3. Memo: Brake Pad Copper Reduction – Metrics for Tracking Progress

tdc environmental

MEMO

TO: Richard Watson, Richard Watson & Associates, Inc. **DATE:** Feb. 14, 2013
FROM: Kelly D. Moran, Ph.D. **PROJECT:** 86
SUBJECT: Estimate of Urban Runoff Copper Reduction in Los Angeles County from the Brake Pad Copper Reductions Mandated by SB 346

Summary

This memorandum provides an estimate of urban runoff copper reductions from the brake pad copper reductions mandated by SB 346. The estimate is designed for urban runoff management planning purposes in Los Angeles County.

The estimate relies on available information, which was largely developed through the lengthy collaboration among brake pad manufacturers, government agencies, and environmental groups in the Brake Pad Partnership (BPP). Since certain elements of the brake pad copper reduction schedule are unknown at this time due to the proprietary nature of product formulation and sales data, the estimates rely on a series of reasonable assumptions that were developed on the basis of available data. Three scenarios (see Table 1) were developed to span the reasonable range of industry product modification schedules.

Table 1. Copper Reduction Scenario Summary

Year*	Scenario 1 - One Step Reduction	Scenario 2 - Two Step Reduction	Scenario 3 - Aftermarket Exemption from 0.5% Copper
2014	<0.5% copper brake pads start appearing on new vehicles	<5% copper brake pads start appearing on new vehicles	<5% copper brake pads start appearing on new vehicles
2015			
2016			
2017			
2018		<0.5% copper brake pads start appearing on new vehicles	<0.5% copper brake pads start appearing on new vehicles
2019			
2020			
2021	All new vehicle brake pads <0.5% copper	All new vehicle brake pads <5% copper	All new vehicle brake pads <5% copper
2022			
2023	All replacement pads <0.5% copper	All replacement pads <5% copper	All replacement pads <5% copper
2024			
2025		All new vehicle brake pads <0.5% copper	All new vehicle brake pads <0.5% copper
2026			
2027		All replacement pads <0.5% copper	
2028			

*Key Los Angeles River Metals TMDL compliance dates are highlighted.

For each scenario, quantitative estimates of urban runoff copper reductions were generated through spreadsheet calculations. The resulting estimates summarized in Table 2 are in the form of a percentage reduction in copper in urban runoff in years of interest for TMDL compliance in Los Angeles County (2020, 2024, and 2028) and in 2032.

Table 2. Estimated Urban Runoff Copper Reduction from Brake Pads Alone

Year	Scenario 1 - One Step Reduction	Scenario 2 - Two Step Reduction	Scenario 3 - Aftermarket Exemption from 0.5% Copper
2020	29%	17%	17%
2024	60%	45%	39%
2028	61%	60%	49%
2032	61%	61%	55%

The most significant uncertainties in these estimates are in brake pad copper reduction schedules, brake pad copper contents, and watershed response times (which are affected by watershed-specific characteristics and variation in annual rainfall volumes).

Background

A simple action—vehicle drivers hitting the brakes—released about 600,000 kilograms (1.3 million pounds) of copper into California's environment in 2010. Each time vehicle brakes engage, a tiny amount of fine dust wears off of the vehicle's brake pads. When it rains, some of this dust washes into urban runoff. Scientific studies indicate that dust generated by vehicle brakes is by far the most significant source of copper in urban watersheds. In California's most urbanized watersheds, brake pad copper is estimated to comprise more than 60% of all copper in urban runoff (Donigian 2009[1]).

A California law enacted in 2010, SB 346 (Kehoe) set in place a program that will nearly eliminate copper use in brake pads. SB 346 requires that brake pads sold in California contain no more than 5% copper by weight by 2021, and no more than 0.5% by 2025. According to a representative industry analysis, as of 2006 brake pads contained an average of about 8% copper by weight (BPP 2008). The law also limits dangerous—but fortunately less common—brake pad pollutants, by prohibiting sale of brake pads containing more than trace amounts of lead, mercury, asbestos, cadmium, and hexavalent chromium in 2014. To avoid replacing one environmental problem with another, SB 346 requires manufacturers to examine new formulations carefully and to select alternatives that pose less potential hazard to public health and the environment. Consumer safety will be ensured through a limited deadline extension process for the 2025 0.5% copper requirement (available starting only when a manufacturer demonstrates that no alternative brake friction materials will be safe and available) and by provisions allowing continued sales of replacement brake pads for older vehicles. Starting in 2014, a brake pad copper content certification and labeling system established by SB 346 will provide for ready identification of brake pads with the lowest copper content.

Following California's model, the State of Washington also enacted restrictions on brake pad copper content in 2010 (Washington State 2010). Washington's law provides slightly different exemptions than California's law—notably a much narrower exemption for

[1] See references list at the end of the memorandum.

"aftermarket" brake pads that replace the "original equipment" brake pads sold with new vehicles. Washington law also has another important difference from California law—it requires manufacturers to provide Washington State Department of Ecology with periodic reports of brake pad copper, antimony, nickel, and zinc content, starting in 2013.

Due to the importance of California's vehicle market and the interconnection of vehicle parts distribution systems throughout North America, brake pad manufacturers expect that it is unlikely that any manufacturer will produce California-specific or Washington-specific products (MEMA 2012a). Instead, copper reduction will be integrated throughout the entire North American brake pad market (MEMA 2012a).

In the two years since SB 346 was enacted, the vehicle industry has actively engaged in implementing the law (Moran 2011). Compliance certification markings, box markings, and certified chemical analysis methods have been adopted (SAE 2011; SAE 2012; MEMA 2012b). Washington State has adopted regulations specifying testing, marking, and reporting requirements (Washington Department of Ecology 2012). Although quantitative information about brake pad copper reductions is not yet available, strong industry attention to low-copper and copper-free brake pads and promotion of these pads by companies already offering them (Honeywell undated; FDP Brake 2010-2012; Williams undated; Fastmagna.com 2010; Bendix 2012; Phoenix 2010; ALCO 2012; Wilson 2012; Crowe 2012; Aftermarket News 2012; Murphy 2012) provides evidence that implementation is underway and is proceeding in accordance with the process and time frames anticipated by the Brake Pad Partnership (BPP 1996-2012).

Summary of Available Information

This section summarizes the available information that forms the basis for the brake copper reduction estimates.

Brake Pad Copper Reduction Schedule. In 1999, the Brake Manufacturer's Council committed to offer new low-copper brake pad materials to customers within 5 years of any BPP decision that brake pads are a major copper source (Lawrence 1999). This commitment was triggered by the BPP in late 2008. As discussed above, many manufacturers are currently offering low copper and copper-free brake pads to customers. The timelines in SB 346 and Washington state law provided eight years after the 2013 reformulation commitment for vehicle manufacturers to re-engineer all vehicle platforms to incorporate the new brake pad formulations (BPP 1996-2012). This timeframe was specifically selected to allow vehicle manufacturers to complete the required brake system re-engineering in conjunction with their regular re-engineering of vehicle platforms. Both laws provide for a second overlapping vehicle re-engineering cycle to reach the 2025 0.5% copper standard, which required technology that was not in sight when the laws were adopted in 2010 (but that is now commercially available as documented above).

Brake Pad Copper Content. Through the BPP, brake pad manufacturers reported brake pad copper content annually from 1998-2006 for the highest sales volume new vehicles (BPP 2008). In 2006, original equipment brake pads contained an overall average of 8.2% copper by weight. This average represents a mixture of high-copper brake pads (10-20% copper) and brake pads with no intentionally added copper. In 2008, manufacturers collected formulation type data to estimate the fraction of the market

comprised of no-copper brake pads (Phipps 2008). Because the BPP reporting covered only original equipment brake pads (those sold on new vehicles), the BPP developed a separate estimate of the copper content in aftermarket (replacement) brake pads (Rosselot 2009). Until Washington State's reporting begins, BPP data are the best available information about brake pad copper content.

Brake Pad Replacement Frequency. Brake pad material wears off gradually over the course of the lifetime of the pad. To support the work of the BPP, manufacturers shared propriety market survey data characterizing the replacement frequencies of original equipment and aftermarket brake pads (BPP 1996-2012; AAIA 2008). These data showed that on average, original equipment brake pads are replaced when a vehicle is 3-4 years old. Because older vehicles are driven fewer miles per year (FHWA 2009; Santos 2011), their aftermarket brake pads are only replaced at a rate of about 21% per year (AAIA 2008).

Vehicle Fleet Characterization. The California Department of Finance periodically publishes summaries of vehicle registration data (DOF 2009). These summaries provide vehicle age distributions and the fraction of vehicle registrations by type (light-duty, heavy-duty, motorcycle, trailer). In addition to these data, information from the Southern California Association of Governments' transportation monitoring and information system (SCAG 2012) and the BPP (BPP 1996-2012 and Rosselot 2010) provide the basis for assuming that neglecting contributions from vehicles other than light-duty vehicles will not introduce significant error in the copper reduction estimate.

Copper in Urban Runoff. The Brake Pad Partnership (BPP) completed peer-reviewed scientific studies to characterize brake pad emissions (BMC PEC 2006; Haselden 2004; Schlautman 2006), examine all environmental copper sources (Rosselot 2006a; Rosselot 2006b), and develop quantitative estimates of the brake pad copper contribution to total stormwater copper loads using linked air and watershed models (Pun 2006a; Pun 2006b; Donigian 2007; Donigian 2009).

The BPP's "Upper Colma" modeling watershed is most similar to watersheds in Los Angeles region because of its combination of high urbanization, high traffic levels, and location surrounded by other urban areas. In this watershed, brake pad copper was estimated to comprise 58-66% of total anthropogenic copper.

BPP modeling estimated watershed response time to brake pad copper reductions (Donigian 2009). For the Los Angeles region, watershed response time is assumed to be similar to the BPP's estimates for highly urbanized watersheds with concrete lined channels. In the most highly impervious watersheds, watershed response time is relatively quick, with >70% copper reductions estimated the first year after a change in brake pad reformulation and nearly 90% reduction in 5 years. Concrete channels were found to further reduce these watershed response time.

Computational Assumptions

The copper reduction estimates rely on a series of reasonable assumptions that were developed on the basis of available data. These assumptions are detailed in Table 3.

Table 3. Assumptions Used in Development of Copper Reduction Estimates

Assumption	Basis	References
Brake Pad Copper Reduction Schedule Assumptions – Original Equipment Brake Pads		
By January 1, 2021, all original equipment brake pads will contain less than 5% copper. By January 1, 2025, all original equipment brake pads will contain less than 0.5% copper	Requirements of SB 346	SB 346
Extension requests for 0.5% copper requirement will be relatively limited.	Difficulty of extension process and short time frame for each extension, long time frame for development of alternatives, industry press and informal communications indicating that alternatives are becoming available.	SB 346; BPP 1996-2012; Honeywell undated; FDP Brake 2010-2012; Williams undated; Fastmagna.com 2010; Bendix 2012; Phoenix 2010; ALCO 2012; Wilson 2012; Crowe 2012; Aftermarket News 2012
Lower copper brake pads will be phased in on new vehicles at a constant rate over an 8-year period prior to each compliance deadline.	Estimates from brake pad and vehicle manufacturers, who have consistently explained that they plan to introduce new brake pads when completing the cyclical re-engineering of vehicle platforms. Recent industry press and brake pad manufacturer announcements have been consistent with the statements made during development of legislation.	MEMA 2010; BPP 1996-2012; Honeywell undated; FDP Brake 2010-2012; Williams undated; Fastmagna.com 2010; Bendix 2012; Phoenix 2010; ALCO 2012; Wilson 2012; Crowe 2012; Aftermarket News 2012; Murphy 2012
Washington State will require new vehicle brake pads to contain less than 0.5% copper by January 1, 2025 (same schedule as California).	Washington State law establishes the same compliance date as California law for brake pads less than 5% copper, but does not establish a firm date for requiring brake pads less than 0.5% copper. Washington must conduct a review to set the compliance date. Washington's review will start in 2015. When the review is complete, manufacturers will have 8 years to comply. Washington's review process and decision will take 1-2 years, setting up timing for implementation on 1/1/25. To establish the compliance date, Washington must find that <0.5% copper pads are available. Market information indicates this may already be true. Formulation data that must be reported to Washington in 2013 is likely to provide a scientific basis for Washington's decision. The industry and the two states have worked to harmonize the implementation of the California and Washington laws.	Washington State 2010; Moran 2011; ; Honeywell undated; FDP Brake 2010-2012; Williams undated; Fastmagna.com 2010; Bendix 2012; Phoenix 2010; ALCO 2012; Wilson 2012; Crowe 2012; Aftermarket News 2012; Murphy 2012

Table 3. Assumptions Used in Development of Copper Reduction Estimates (Continued)

Assumption	Basis	References
Brake Pad Copper Reduction Schedule Assumptions – Aftermarket (Replacement) Brake Pads		
Non-compliant replacement brake pads for pre-2021 and pre-2025 vehicles may be sold indefinitely.	Provision of SB 346	SB 346
Under Washington state law, starting on January 1, 2021, all newly manufactured replacement brake pads must contain less than 5% copper. Non-compliant replacement brake pads manufactured prior to January 1, 2021 may be sold until December 31, 2030. Non-compliant replacement brake pads may be sold indefinitely, but only if they are identical to original equipment brake pads.	Washington State law	Washington State 2010; Washington Department of Ecology 2012
Washington State's exemption for original equipment brake pads that are identical to the ones sold with the new vehicle will have only a small effect.	Original equipment services pads that are identical to the ones sold with the vehicle comprise a very small fraction of the market because for cost reasons, even vehicle dealers switch from these pads to lower cost vehicle manufacturer approved service pads a few years later. Vehicle manufacturers protested the narrow nature of this exemption during development of Washington's legislation and its regulations.	BPP 1996-2012
Recognizing that brake pad sales lag behind shipments of new products due to the inventory "turn time" in the brake pad supply chain, only 45% of brake pads sold in a given year are shipped in that year. The remaining sales are comprised of brake pads shipped in the previous year (30%) and brake pads shipped two years prior (25%).	A typical replacement brake pad inventory "turn time" is <2 years. Some low volume pads may be held in inventories for as long as ten years. Inventory carrying costs hold down inventory volumes. Brake pad inventory turn time is longer than other retail inventory turn times because of the plethora of vehicle models and some manufacturers' historic lack of standardization of parts across vehicle models.	BPP 1996-2012
Replacement brake pads for vehicles manufactured with low copper brake pads will also be low in copper, even if the vehicle is manufactured prior to compliance deadlines.	Braking performance will be most easily matched with lower copper formulations. Lower copper formulations will almost certainly be lower cost, which is an important factor in the largely price-driven aftermarket.	BPP 1996-2012

Table 3. Assumptions Used in Development of Copper Reduction Estimates (Continued)

Assumption	Basis	References
Replacement brake pads containing lower levels copper that are designed for vehicles manufactured with high copper brake pads will phase in at a constant rate starting in 2014. The end of the phase in period will be determined by Washington's compliance deadlines.	Since safety standard apply to new vehicles—and not to brake pads—there is no specific regulatory constraint on aftermarket brake pad formulations. Drivers for the aftermarket include cost, safety, and customer acceptance. Since copper is an expensive ingredient, cost considerations point toward early reformulation. Aftermarket manufacturers have a history of making products available to fit new vehicles within a few months of the vehicle's initial manufacture, suggesting that they will make products available on a schedule that phases in over the same general time period as the phase in for original equipment brake pads. Press releases and industry websites indicate that brake pads containing <5% copper and brake pads containing less than 0.5% are both already available. Manufacturers may be less motivated to introduce new products for old vehicles, which present the need to design pads with characteristics similar to those provided by high copper brake pads.	BPP 1996-2012; Honeywell undated; FDP Brake 2010-2012; Williams undated; Fastmagna.com 2010; Bendix 2012; Phoenix 2010; ALCO 2012; Wilson 2012; Crowe 2012; Aftermarket News 2012; Murphy 2012
Brake Pad Copper Content Assumptions		
82% of Original Equipment brake pads contain copper; these pads contain 10-20% copper by weight. 18% of Original Equipment brake pads are semi-metallic, containing <0.5% copper. These pads contain a low level of copper (0.1%) due to the presence of traces of copper in other ingredients.	Analysis of brake pad formulation data collected in Brake Manufacturers' Council annual surveys and BPP Steering Committee discussions of brake pad copper content by formulation type.	MEMA 2010; Phipps 2008; BPP 1996-2012
Original equipment brake pads currently contain an overall average of 8.2% copper by weight	Brake pad copper content data collected in Brake Manufacturers' Council annual surveys for the BPP. Although this is the best available data set, the survey was not designed for use in loading estimates. The most recent survey was in 2006. Newer data are currently unavailable.	BPP 2008
Brake pads meeting the <5% copper requirement will contain an average of 4% copper by weight. Brake pads meeting the <0.5% copper requirement will contain an average of 0.1% copper by weight.	Due to variation in materials input and manufacturing processes for brake pads (which are heterogeneous materials), to ensure compliance, products will need to be designed with copper content well below compliance levels. Since copper does not serve a useful design purpose below 1% concentrations, brake pads containing less than 0.5% copper will only contain trace copper introduced via impurities in other ingredients (e.g., recycled metals).	BPP 1996-2012
Aftermarket brake pads currently contain an overall average of 5% copper by weight.	Estimate made for the Brake Pad Partnership based on the very limited available data on aftermarket brake pads. Copper content is lower due to the high cost of copper as an ingredient and the cost sensitivity of the aftermarket.	Rosselot 2009

Table 3. Assumptions Used in Development of Copper Reduction Estimates (Continued)

Assumption	Basis	References
About 34% of aftermarket brake pads currently contain less than 0.5% copper. The current rate of replacing high copper original equipment brake with <0.5% copper brake pads will not decline and will grow only as aftermarket brake pads are re-engineered.	As compared to original equipment brake pads, a greater fraction of replacement pads are likely to contain less than 0.5% copper. Informal estimates of the copper free fraction of replacement pads have been as high as 50%. In the absence of other information, 34% of replacement brake pads as assumed to be copper free; this value is the midpoint between 18% and 50%. Similarly, in the absence of other information, the fraction of vehicles that started with high copper brake pads but that receive copper free replacement brake pads is assumed to remain constant until re-engineering starts.	BPP 1996-2012; Antenora 2012; MEMA 2012
Brake Pad Replacement Assumptions		
Original equipment brake pads are replaced when vehicle is 3.5 years old.	Brake pads are typically replaced after 3-4 years of service, after about 35,000-40,000 miles of driving.	BPP 1996-2012
Vehicles more than 3.5 years old have their brake pads replaced once every 5 years.	Automotive Aftermarket Industry Association survey data of the aftermarket indicate that 20-22% of vehicles more than 3 years old have their brake pads replaced each year. Older vehicles likely have a lower brake pad replacement rate than new vehicles because vehicle miles traveled falls with vehicle age.	AAIA 2008; BPP 1996-2012; FHWA 2009; Santos 2011
Vehicle Fleet Assumptions		
The age distribution of California's vehicle fleet will remain essentially the same as the distribution in 2007	No available information suggests that future distributions will change dramatically. The gyrations in vehicle sales volumes during the economic downturn appear to have ended.	DOF 2009. Table J3: "Distribution Of Fee-Paid Registrations By Type And Year First Registered California, 2007."
Heavy-duty (truck) brake copper contributions are small.	SCAG vehicle miles traveled (VMT) data show trucks comprise less than 3.5% of total vehicle miles traveled in Los Angeles County. Trucks have larger brake pads, but since consumer acceptance issues (noise, braking comfort) that have driven copper in use in vehicles are not present in this market, copper use is believed to be low.	SCAG 2012; Gilroy 2011; BPP 1996-2012
Motorcycle contributions are small	Motorcycles are estimated to be <1% of statewide brake pad copper emissions.	Rosselot 2010
Trailer contributions are small	Trailers comprise less than 10% of total California vehicle registrations. Trailers probably comprise a relatively small portion of the vehicle miles traveled in the Los Angeles region because they are primarily used on heavy-duty trucks (see above) and for recreational purposes.	DOF 2009. Table J5: "Registration of Motor Vehicles and Trailers which Paid Fees by Type of Vehicle California, 1971 to 2007."; SCAG 2012
Other vehicle types exempted from SB 346 release negligible quantities of copper	Brake Pad Partnership informal analysis	BPP 1996-2012

Table 3. Assumptions Used in Development of Copper Reduction Estimates (Continued)

Assumption	Basis	References
Vehicle Miles Traveled (VMT) Assumptions		
Brake pad wear is proportional to VMT	Information provided by brake pad manufacturers to the Brake Pad Partnership.	Phipps 2006
VMT will not change significantly in coming years.	SCAG data showing VMT was basically flat from 2002 through 2009. Increasing gasoline prices and legislation, regulation, and planning activities to reduce VMT because of climate change should stabilize—and may actually reduce—future VMT.	SCAG 2012
The relative fraction of vehicle miles traveled on highways (as compared to city streets) will not change significantly in coming years.	Brake Pad manufacturer data show that brake pad wear rates on city streets are 5-10 times greater than emissions on highways, due to lower use of brake pads per mile traveled on highways. As long as the relative proportion of vehicle miles traveled on theses two types of road does not change, this does not affect load estimates.	Phipps 2006
Urban Runoff Assumptions		
Urban Runoff Copper Fraction = 62%	In the most highly urbanized watersheds, brake pad copper comprises 58-66% of total anthropogenic copper.	Donigian 2009
Watershed response time in Los Angeles County = 1 year	In the most highly impervious San Francisco Bay area watersheds without concrete channels, watershed response time is relatively quick, with >70% copper reductions estimated the first year after brake pad reformulation and nearly 90% reduction in 5 years. Modeling suggests that channelized watersheds experience a slightly quicker wash out period than the natural channels modeled in the San Francisco Bay area. Weather introduces uncertainty into predicted copper reduction schedules. Wet weather and large storms mobilize copper in watersheds, increasing the speed of copper reductions. Dry years reduce the washout, increasing the length of time that it takes for brake pad copper reductions to be fully reflected in waterways. Modelers found that dry water year scenarios slightly increased washout time, by at most a few years.	Donigian 2009

Brake Pad Copper Reduction Scenarios

The following three scenarios were developed on the basis of available information to bracket the range of potential rates of brake pad copper reduction. Each scenario is based on a different potential pathway for the market transition to the brake pads containing less than 0.5% copper.

Scenario 1 (One-Step Reduction) – Virtually all original equipment (new vehicle) and aftermarket (replacement) brake pads are reformulated to <0.5% copper by January 1, 2021 (first SB 346 copper compliance deadline). Virtually all aftermarket brake pads containing higher copper levels that remain in distributor and retailer inventories are sold within two years of this date.

Brake pad, brake systems, and new vehicle manufacturers would greatly reduce their engineering costs for the transition to low copper brake pads if they can move directly to brake pads with less than 0.5% copper. This scenario describes the copper reductions that would occur if brake pad manufacturers complete product reformulation in a single cycle, thus avoiding two rounds of re-engineering of their products and their manufacturing processes. The primary basis for this scenario is the assumption that all manufacturers can quickly develop products containing less than 0.5% copper that meet all manufacturing, cost, and customer requirements.

Although available information about product formulation changes is currently limited, there is some evidence suggesting that this scenario may occur. The original equipment brake pad industry appears to be attempting to move directly to the lowest copper brake pads (Moran 2011). At least three major vehicle manufacturers have requested that suppliers provide brake pads with less than 0.5% copper for their new vehicle models (Murphy 2012). Press releases and communications with industry members indicate that companies are currently bringing to market brake pads with less than 0.5% copper that are designed to replicate the braking performance properties of higher copper formulations. These new brake pads will be appearing in some 2014 vehicle models (BPP 1996-2012; Murphy 2012).

For aftermarket brake pads, this scenario assumes that Washington State requirements will drive the market transition. Unlike California law, Washington law has very narrow exemptions for aftermarket brake pads (Washington State 2010). Due to the complexity of brake pad distribution chains, if higher copper brake pads enter national distribution systems after Washington's compliance deadlines, manufacturers and retailers will have trouble avoiding non-compliance with Washington requirements (BPP 2008-2010). Consequently, brake manufacturers have stated their intent to implement brake pad copper reductions nationally (MEMA 2012a).

The primary exemption for aftermarket brake pads under Washington law is an allowance for "inventory runoff" of brake pads manufactured prior to the compliance deadline (Washington State 2010). To ensure compliance, brake pad manufacture date must be marked on pads; this date marking is part of the nationwide brake pad compliance marking system (SAE 2012). Typical replacement brake pad inventory turnover time is less than two years (Brake Pad Partnership 1996-2012). Thus, after two years, most brake pads more than two years old have been sold.

Another consideration for the aftermarket is that copper is far more expensive than other brake pad ingredients (BPP 1996-2012). Since price is the primary customer interest in the aftermarket, manufacturers have a financial incentive to eliminate copper in aftermarket brake pads.

This scenario also may avoid the need for purchase of special chemical analysis equipment for manufacturers to monitor products for compliance with the 5% copper standard. In brake pad materials (friction materials), copper concentration measurements around 5% copper pose unique chemical analysis challenges that do not occur at the 0.5% level (Brake Pad Partnership 1996-2012). Developing manufacturing process controls for this copper concentration would cause manufacturers to incur one-time costs that have only short-term benefits.

The primary shortcomings of this scenario are:

(1) Some manufacturers may not successfully develop brake pads containing less than 0.5% copper that meet all manufacturing, cost, and customer requirements soon enough to transition all of their products by the above dates.

(2) Some manufacturers may delay transitions until legal deadlines.

(3) Washington State may provide broader exemptions when it implements its requirement for brake pads to contain less than 0.5% copper, delaying the aftermarket transition to the lowest copper brake pads.

This scenario is optimistic. It is included to show the earliest reasonable dates for achievement of brake copper reductions.

Scenario 2 (Two-Step Reduction) – Virtually all original equipment (new vehicle) brake pads are reformulated to <5% copper by January 1, 2021 and <0.5% copper by 2025 (SB 346 compliance deadlines), with minimal use of exemptions and extensions. Virtually all higher copper aftermarket (replacement) brake pads remaining in inventories are sold within two years of each compliance date.

This scenario assumes that brake pad manufacturers will implement a two-step transition to the lowest copper brake pads, based on legal deadlines. Under this scenario, in the first step manufacturers would replace current high copper products with products containing less than 5% copper. Manufacturers would delay introduction of products with less than 0.5% copper for several years, which would provide additional time for development of formulations containing less than 0.5% copper.

The 5% standard is included in California and Washington laws because when the laws were adopted, brake pad manufacturers indicated that most companies were capable of producing brake pads meeting the 5% standard (BPP 2008-2010). The long transition time provided in the laws before all new vehicles are required to meet the 5% standard was to provide adequate time for re-engineering of the braking systems of every new vehicle that currently uses higher copper brake pads (MEMA 2010).

When the laws were passed, manufacturers indicated that companies would need to develop new formulation approaches to formulate brake pads with less than 0.5% copper while meeting all manufacturing, cost, and customer requirements. SB 346 provided an

additional four years after the 5% standard takes effect to provide extra time for manufacturers to develop the new formulation approaches.

SB 346 was designed to allow vehicle manufacturers to re-engineer vehicle brake systems concurrent with their other periodic vehicle platform re-engineering, which occurs about once every 8 years for most vehicles (Brake Pad Partnership 2008; MEMA 2010). Before a newly re-engineered brake system reaches the market, the brakes go through several years of engineering design, product validations, and performance and safety testing by brake pad manufacturers and vehicle manufacturers (Brake Pad Partnership 2008; MEMA 2010). The timelines in SB 346 provided about 4 years for these activities to be conducted in parallel with formulation development (2010-2013), which occur prior to the sales of the first re-engineered less than 5% copper brake pad new vehicles in 2014. Because the compliance deadline for brake pads with less then 0.5% copper is only four years after the 5% deadline, within 4 years of the introduction of the less than 5% copper brake pad vehicles (2018), manufacturers will begin introducing vehicles with less than 0.5% copper brake pads so as to completely re-engineer all vehicles to meet the 0.5% standard by 2025.

Although the original equipment brake pad industry appears to be attempting to move directly to the lowest copper brake pads, it appears that a few companies are currently bringing brake pads less than 5% copper but more than 0.5% copper to the market in order to provide customers with immediate access to lower copper brake pads (Crowe 2012; Honeywell undated; BPP 1996-2012). The fraction of the overall brake pad market that makes a two-step transition will largely be determined by the success of each company's product formulators in developing less than 0.5% products that meet their company's and customer's manufacturing, cost, and performance requirements.

For aftermarket brake pads, this scenario is based on the assumption that Washington State requirements will drive the aftermarket transition.

The primary shortcomings of this scenario are:

(1) This scenario is not consistent with early evidence suggesting that the original equipment brake pad industry appears to be attempting to move directly to the lowest copper brake pads (see above).

(2) Washington State may provide broader exemptions when it implements its requirement for brake pads to contain less than 0.5% copper, delaying the aftermarket transition to the lowest copper brake pads.

Scenario 3 (Aftermarket Exemption from 0.5% Copper Standard) – Virtually all original equipment (new vehicle) brake pads are reformulated to <5% copper by January 1, 2021 and <0.5% copper by 2025 (SB 346 compliance deadlines), with minimal use of exemptions and extensions. Higher copper aftermarket (replacement) brake pads for vehicles manufactured prior to compliance dates continue to be sold indefinitely.

Like Scenario 2, this scenario assumes that original equipment brake pad manufacturers will implement a two-step transition to the lowest copper brake pads in accordance with the compliance dates in SB 346. Where it differs from Scenario 2 is in the aftermarket. This scenario assumes that Washington State deviates from the policy in its current law and provides a broad aftermarket brake pad exemption similar to the exemption in SB

346 when it implements its requirement for brake pads to contain less than 0.5% copper. The exemption in SB 346 is a permanent exemption for all aftermarket brake pads designed to fit vehicles manufactured prior to California's compliance deadlines in 2021 and 2025. Such an exemption would delay the aftermarket transition to the lowest copper brake pads by allowing high copper replacement brake pads to be sold for vehicles manufactured prior to compliance deadlines.

Under this scenario, aftermarket brake pad manufacturers would maintain the current copper content in their brake pads that are made for use in vehicles manufactured prior to 2021 and 2025. This would avoid the need for manufacturers to develop lower copper brake pads that meet the same performance characteristics as the higher copper brake pads.

Since this exemption is based on the premise that aftermarket brake pads should be designed to be similar to the original equipment brake pads, this scenario assumes that aftermarket brake pads for vehicles that originally have low copper or copper free brake pads will have the same copper content as the originals.

The primary shortcomings of this scenario are:

(1) This scenario is not consistent with early evidence suggesting that the original equipment brake pad industry appears to be attempting to move directly to the lowest copper brake pads (see above).

(2) When establishing regulatory requirements, states ordinarily rely on the precedents established in their state's own authorizing legislation.

Results

Using the assumptions in Table 3, copper reductions were estimated for three scenarios. An attached Excel spreadsheet contains the calculations. The results are presented in Tables 4, 5, and 6. The tables present the estimated average on-road brake pad copper content, the estimated reduction as compared to current (baseline) levels, and the estimated subsequent reduction in copper levels in urban runoff. To account for the watershed lag time, the urban runoff copper reductions are estimated to occur one year after the brake pad copper reductions.

Although every effort was made to develop scenarios that bracket the range of possible copper reduction schedules and to base reduction estimates on reasonable assumptions, these estimates may not account for all possibilities. For example, if high copper brake pads continue to be used in the small populations of exempted vehicles (e.g., motorcycles), the ultimate reduction levels could be slightly less than the anticipated maximum reduction of 61%. In the relatively unlikely event that DTSC allows substantial extensions, the pace of reductions could be slower than estimated in any of the scenarios.

Although these estimates are based on the best available information, they are uncertain. The most significant uncertainties are in brake pad copper reduction schedules, brake pad copper contents, and watershed response times (which are affected by watershed-specific characteristics and variation in annual rainfall volumes). As the brake pad reformulation process unfolds, data will become available from Washington State and brake pad certification organizations that can reduce most of these uncertainties.

Table 4. Scenario 1 - Estimated Urban Runoff Copper Reduction from Brake Pads

Year*	Scenario 1 - One Step Reduction		
	On-Road Average Brake Pad Copper	Estimated Brake Pad Copper Reduction	Estimated Urban Runoff Copper Reduction from Brake Pads Alone
Baseline (2013 and prior years)	6.1%	--	
2019	3.2%	47%	
2020			**29%**
2023	0.2%	97%	
2024			**59%**
2027	0.1%	98%	
2028			**61%**
2031	0.1%	98%	
2032			61%

*Key Los Angeles River Metals TMDL compliance dates are highlighted.

Table 5. Scenario 2 - Estimated Urban Runoff Copper Reduction from Brake Pads

Year*	Scenario 2 - Two Step Reduction		
	On-Road Average Brake Pad Copper	Estimated Brake Pad Copper Reduction	Estimated Urban Runoff Copper Reduction from Brake Pads Alone
Baseline (2013 and prior years)	6.1%	--	
2019	4.4%	28%	
2020			**17%**
2023	1.6%	73%	
2024			**45%**
2027	0.2%	96%	
2028			**60%**
2031	0.1%	98%	
2032			61%

*Key Los Angeles River Metals TMDL compliance dates are highlighted.

Table 6. Scenario 3 - Estimated Urban Runoff Copper Reduction from Brake Pads

Year*	Scenario 3 - Aftermarket Exemption from 0.5% Copper		
	On-Road Average Brake Pad Copper	Estimated Brake Pad Copper Reduction	Estimated Urban Runoff Copper Reduction from Brake Pads Alone
Baseline (2013 and prior years)	6.1%	--	
2019	4.4%	28%	
2020			**17%**
2023	2.3%	63%	
2024			**39%**
2027	1.2%	80%	
2028			**49%**
2031	0.7%	88%	
2032			55%

*Key Los Angeles River Metals TMDL compliance dates are highlighted.

Recommendations

1. When data from implementation of SB 346 and Washington State law become available, consider updating these copper reduction estimates. Washington State's collection of brake pad formulation data every 3 years starting in 2013 and certification agency records, which will be available by 2014, will provide the first data on brake pad copper content since 2006. Starting in 2014, certification agencies will make available lists of brake pads certifications. These lists can be used to determine the fraction of brake pads that are on the market that meet the 5% and 0.5% copper standards. This information can be used not only to update the estimates, but also to refine the assumptions to reduce some of the most important uncertainties in the copper reduction estimates.

2. To reduce peak copper levels, examine the potential for controlling localized high-copper discharges. Copper levels in urban runoff are a combination of baseline copper sources (largely brake pads), localized high-copper sources (e.g., copper roofs, copper-emitting industry), and irregular discharges of copper-containing wastewaters.

   While copper roofs are relatively uncommon, they have relatively high copper runoff concentrations (which may exceed 1,000 micrograms per liter) (TDC Environmental 2004). Event-based discharges may also contain high copper, particularly in dry weather. Examples of dry weather event-based discharges are: water from emptying pools, spas, and fountains (copper from copper pipe corrosion and algaecides) and improper discharge of solutions used to create a green patina on a copper roof (TDC Environmental 2004; LWA 2006).

   San Francisco Bay Area municipalities created resources for development of possible management strategies for other major copper sources (LWA 2006). These resources identify a specific set of potential control measures for each major copper source, define activity and effectiveness metrics for control measure implementation, and lay out a recommended sequence for implementation of

control measures for each source category. The strategies for architectural copper (Section 2) and pool, spa, and fountain algaecides (Section 3, strategies CP-1 through CP-3) are of greatest potential interest for Los Angeles River Copper TMDL compliance. To facilitate effective implementation, each strategy involves a phased implementation process, starting with collecting information and conducting targeted education programs. Subsequently, strategies move from voluntary programs to focused regulatory. Strategy designs, which focus on controlling discharges at the source, aim to minimize both disruption to affected private entities and government implementation costs. To monitor effectiveness, the strategies include tracking and reporting of strategy-specific indicators.

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Scenario Summary

Year	Scenario 1 - One Step Reduction	Scenario 2 - Two Step Reduction	Scenario 3 - Aftermarket Exemption from 0.5% Copper
Baseline (2013 and prior years)			
2014	0.5% copper brake pads begin to phase in to new vehicles	5% copper brake pads begin to phase into new vehicles	5% copper brake pads begin to phase into new vehicles
2015			
2016			
2017			
2018		0.5% copper brake pads begin to phase into new vehicles	0.5% copper brake pads begin to phase into new vehicles
2019			
2020			
2021	All OE Pads <0.5% copper	All OE Pads <5% copper	All OE Pads <5% copper
2022			
2023	All replacement Pads <0.5% copper	All replacement pads <5% copper	All replacement pads <5% copper
2024			
2025		All OE Pads <0.5% copper	All OE Pads <0.5% copper
2026			
2027		All replacement pads <0.5% copper	
2028			
2029			
2030			
2031			
2032			

Key TMDL compliance dates for the LA River are shown in **bold**

Results Summary

Year	Scenario 1 - One Step Reduction			Scer
	On-Road Average Brake Pad Copper	Estimated Brake Pad Copper Reduction	Estimated Urban Runoff Copper Reduction from Brake Pads Alone	On-Road Average Brake Pad Copper
Baseline (2013 and prior years)	6.1%	--		6.1%
2014				
2015				
2016				
2017				
2018				
2019	3.2%	47%		4.4%
2020			**29.4%**	
2021				
2022				
2023	0.2%	97%		1.6%
2024			**59.9%**	
2025				
2026				
2027	0.1%	98%		0.2%
2028			**61.0%**	
2029				
2030				
2031	0.1%	98%		0.1%
2032			**61.0%**	

Key TMDL compliance dates for the LA River are shown in **bold**

nario 2 - Two Step Reduction		Scenario 3 - Aftermarket Exemption from 0.5% Copper		
Estimated Brake Pad Copper Reduction	Estimated Urban Runoff Copper Reduction from Brake Pads Alone	On-Road Average Brake Pad Copper	Estimated Brake Pad Copper Reduction	Estimated Urban Runoff Copper Reduction from Brake Pads Alone
--		6.1%	--	
28%		4.4%	28%	
	17.5%			**17.3%**
73%		2.3%	63%	
	45.4%			**38.9%**
96%		1.2%	80%	
	59.6%			**49.4%**
98%		0.7%	88%	
	61.0%			**54.6%**

Scenario 1 Estimated Brake Pad Copper Content

Original Equipment (OE)

Year Vehicle Manufactured	OE Pad Notes	OE Pad Copper Content (Year average)	Fraction of Model Year Vehicles with <0.5% Copper OE Pads	Fraction of Model Year Vehicles with High Copper OE Pads (average 10% Cu)
2013 and prior years	Overall average of 8.2%, comprised of 18% at 0.1% Cu and 82% at 10% Cu	8.2%	18%	82%
2014	First year of 8 year process of re-engineering new vehicles to have brake pads meeting 0.5% copper standard	7.2%	28%	72%
2015		6.2%	39%	62%
2016		5.2%	49%	51%
2017		4.2%	59%	41%
2018		3.1%	69%	31%
2019		2.1%	80%	21%
2020		1.1%	90%	10%
2021 and thereafter	All new vehicles have brake pads with <0.5% copper	0.1%	100%	0%

Aftermarket Replacement Brake Pads for Fraction of Vehicles with High Copper OE Brake Pads

Year Replacement Pad Manufactured	Replacement Pad Notes	High-Cu Replacement Pad Copper Content (Average Shipped)	High-Cu Replacement Pad Copper Content (Average Sold)*
2013 and prior years	Aftermarket brake pads start with an overall average of 5% copper, comprised of 34% at 0.1% Cu and 66% at 7.5% Cu. Replacements for the 18% of vehicles that always had <0.5% copper (see table above) are excluded in this calculation.	6.1%	6.1%
2014	New low copper pads start phasing in	5.3%	5.7%
2015		4.6%	5.2%
2016		3.8%	4.4%
2017		3.1%	3.7%
2018		2.3%	2.9%
2019		1.6%	2.2%
2020		0.8%	1.4%
2021	All new replacement brake pads contain <0.5% copper, but older brake pads in distribution system still are being sold	0.1%	0.7%
2022		0.1%	0.3%
2023 and thereafter	All replacement brake pads contain <0.5% copper	0.1%	0.1%

*Sales assumption: 45% of product manufactured and sold in the same year; 30% of products sold are manufacturered in previous year; the remaining 25% of products sold were manufactured 2 years prior to sale. Sales of older products are assumed to involve small volumes.

Aftermarket Replacement Brake Pads for Fraction of Vehicles with Low Copper OE Brake Pads
Assumed to be the same copper content as OE brake pad (i.e., 0.1%)

Scenario 2 Estimated Brake Pad Copper Content

Original Equipment (OE)

Year Vehicle Manufactured	OE Pad Notes	OE Pad Copper Content (Year average)	Fraction of Model Year Vehicles with <5% but >0.5% Copper OE Pads	Fraction of Model Year Vehicles with <0.5% Copper OE Pads	Fraction of Model Year Vehicles with High Copper OE Pads (average 10% Cu)
2013 and prior years	Overall average of 8.2%, comprised of 18% at 0.1% Cu and 82% at 10% Cu	8.2%	0%	18%	82%
2014	First year of 8 year process of re-engineering new vehicles to have brake pads meeting 5% copper standard	7.6%	10%	18%	72%
2015		7.0%	21%	18%	62%
2016		6.4%	31%	18%	51%
2017		5.8%	41%	18%	41%
2018	Fifth year of 8 year process of re-engineering new vehicles to have brake pads meeting 5% copper standard, but now vehicles are engineered to meet 0.5% standard because this also is the first year of 8 year process of re-engineering new vehicles to have brake pads meeting 0.5% copper standard	4.7%	41%	28%	31%
2019		3.7%	41%	39%	21%
2020		2.7%	41%	49%	10%
2021	First year of 4 year process of re-engineering new vehicles previously re-engineered with <5% copper brake pads to have brake pads meeting 0.5% copper standard	1.7%	41%	59%	0%
2022		1.3%	31%	69%	0%
2023		0.9%	21%	80%	0%
2024		0.5%	10%	90%	0%
2025 and thereafter	All new vehicles have brake pads with <0.5% copper	0.1%	0%	100%	0%

Aftermarket Replacement Brake Pads for Vehicles with High Copper OE Brake Pads (and, starting in 2021, for vehicles with OE brake pads between 5% and 0.5%)

Year Replacement Pad Manufactured	Replacement Pad Notes	Replacement Pad Copper Content (Average Shipped)	Replacement Pad Copper Content (Average Sold)*
2013 and prior years	Aftermarket brake pads start with an overall average of 5% copper, comprised of 34% at 0.1% Cu and 66% at 7.5% Cu. Replacements for the 18% of vehicles that always had <0.5% copper (see table above) are excluded in this calculation.	6.1%	6.1%
2014	Brake pads with <5% copper pads start phasing in for cars that were originally engineered with high copper OE brake pads	5.7%	5.9%
2015		5.4%	5.6%
2016		5.0%	5.3%
2017		4.6%	4.9%
2018	Brake pads with <0.5% copper pads start phasing in for cars that were originally engineered with high copper OE brake pads	3.9%	4.4%
2019		3.2%	3.8%
2020		2.4%	3.0%
2021	All new replacement brake pads contain <5% copper, but older brake pads in distribution system still are being sold	1.7%	2.3%
2022		1.3%	1.7%
2023		0.9%	1.2%
2024		0.5%	0.8%
2025	All new replacement brake pads contain <0.5% copper, but older brake pads in distribution system still are being sold	0.1%	0.4%
2026		0.1%	0.2%
2027 and thereafter	All replacement brake pads contain <0.5% copper	0.1%	0.1%

*Sales assumption: 45% of product manufactured and sold in the same year; 30% of products sold are manufacturered in previous year; the remaining 25% of products sold were manufactured 2 years prior to sale. Sales of older products are assumed to involve small volumes.

Aftermarket Replacement Brake Pads for Vehicles with <0.5% Copper OE Brake Pads
Assumed to be the same copper content as OE brake pad for all vehicles with <0.5% copper OE pads.

Aftermarket Replacement Brake Pads for Vehicles with 5% Copper OE Brake Pads through 2020
Assumed to be the same copper content as OE brake pads for all vehicles with <5% copper OE pads through 2020; however, when the value in the table above is less, then the value in the table above is assumed. Starting in 2021, see above table for replacement pads for high-copper OE pads

Scenario 3 Estimated Brake Pad Copper Content

Original Equipment (OE)

Year Vehicle Manufactured	OE Pad Notes	OE Pad Copper Content (Year average)	Fraction of Model Year Vehicles with <5% but >0.5% Copper OE Pads	Fraction of Model Year Vehicles with <0.5% Copper OE Pads	Fraction of Model Year Vehicles with High Copper OE Pads (average 10% Cu)
2013 and prior years	Overall average of 8.2%, comprised of 18% at 0.1% Cu and 82% at 10% Cu	8.2%	0%	18%	82%
2014	First year of 8 year process of re-engineering new vehicles to have brake pads meeting 5% copper standard	7.6%	10%	18%	72%
2015		7.0%	21%	18%	62%
2016		6.4%	31%	18%	51%
2017		5.8%	41%	18%	41%
2018	Fifth year of 8 year process of re-engineering new vehicles to have brake pads meeting 5% copper standard, but now vehicles are engineered to meet 0.5% standard because this also is the first year of 8 year process of re-engineering new vehicles to have brake pads meeting 0.5% copper standard	4.7%	41%	28%	31%
2019		3.7%	41%	39%	21%
2020		2.7%	41%	49%	10%
2021	First year of 4 year process of re-engineering new vehicles previously re-engineered with <5% copper brake pads to have brake pads meeting 0.5% copper standard	1.7%	41%	59%	0%
2022		1.3%	31%	69%	0%
2023		0.9%	21%	80%	0%
2024		0.5%	10%	90%	0%
2025 and thereafter	All new vehicles have brake pads with <0.5% copper	0.1%	0%	100%	0%

Aftermarket Replacement Brake Pads for Vehicles with High Copper OE Brake Pads

Year Replacement Pad Manufactured	Replacement Pad Notes	Replacement Pad Copper Content (Average Shipped)	Replacement Pad Copper Content (Average Sold)*
2013 and prior years	Aftermarket brake pads start with an overall average of 5% copper, comprised of 34% at 0.1% Cu and 66% at 7.5% Cu. Replacements for the 18% of vehicles that always had <0.5% copper (see table above) are excluded in this calculation.	6.1%	6.1%
2014	Brake pads with <5% copper pads start phasing in for cars that were originally engineered with high copper OE brake pads	5.7%	5.9%
2015		5.4%	5.6%
2016		5.0%	5.3%
2017		4.6%	4.9%
2018		4.3%	4.6%
2019		3.9%	4.2%
2020		3.6%	3.9%
2021	All new replacement brake pads contain <5% copper, but older brake pads in distribution system still are being sold	3.2%	3.5%
2022		3.2%	3.3%
2023 and thereafter	All replacement brake pads for high and mid-copper OE pads contain <5% copper and 16% (same percentage as in 2013) contain 0.1% Cu	3.2%	3.2%

*Sales assumption: 45% of product manufactured and sold in the same year; 30% of products sold are manufacturered in previous year; the remaining 25% of products sold were manufactured 2 years prior to sale. Sales of older products are assumed to involve small volumes.

Aftermarket Replacement Brake Pads for Vehicles with <5% Copper or <0.5% Copper OE Brake Pads

Assumed to be the same copper content as OE brake pad until the value in the table above is less, then the value in the table above is assumed.

Estimated Vehicle Manufacturing Year Distributions by Year

Year Vehicle Manufactured	2013 and Prior	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
2013 and prior	100.0%	88.6%	78.3%	68.9%	60.5%	53.0%	46.2%	39.8%	33.9%	28.8%	24.6%
2014	0.0%	11.4%	10.3%	9.4%	8.4%	7.5%	6.8%	6.4%	5.9%	5.1%	4.2%
2015	0.0%	0.0%	11.4%	10.3%	9.4%	8.4%	7.5%	6.8%	6.4%	5.9%	5.1%
2016	0.0%	0.0%	0.0%	11.4%	10.3%	9.4%	8.4%	7.5%	6.8%	6.4%	5.9%
2017	0.0%	0.0%	0.0%	0.0%	11.4%	10.3%	9.4%	8.4%	7.5%	6.8%	6.4%
2018	0.0%	0.0%	0.0%	0.0%	0.0%	11.4%	10.3%	9.4%	8.4%	7.5%	6.8%
2019	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	11.4%	10.3%	9.4%	8.4%	7.5%
2020	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	11.4%	10.3%	9.4%	8.4%
2021	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	11.4%	10.3%	9.4%
2022	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	11.4%	10.3%
2023	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	11.4%
2024	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2025	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2026	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2027	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2028	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2029	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2030	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2031	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2032	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Source: Assumed that vehicle age distributions will remain the same as those in 2007
California Department of Finance (2009). California Statistical Abstract Table J3. Distribution Of Fee-F

2024	2025	2026	2027	2028	2029	2030	2031	2032
21.1%	18.1%	15.5%	13.2%	11.3%	9.7%	8.2%	6.8%	5.6%
3.5%	3.0%	2.6%	2.3%	1.9%	1.6%	1.5%	1.4%	1.2%
4.2%	3.5%	3.0%	2.6%	2.3%	1.9%	1.6%	1.5%	1.4%
5.1%	4.2%	3.5%	3.0%	2.6%	2.3%	1.9%	1.6%	1.5%
5.9%	5.1%	4.2%	3.5%	3.0%	2.6%	2.3%	1.9%	1.6%
6.4%	5.9%	5.1%	4.2%	3.5%	3.0%	2.6%	2.3%	1.9%
6.8%	6.4%	5.9%	5.1%	4.2%	3.5%	3.0%	2.6%	2.3%
7.5%	6.8%	6.4%	5.9%	5.1%	4.2%	3.5%	3.0%	2.6%
8.4%	7.5%	6.8%	6.4%	5.9%	5.1%	4.2%	3.5%	3.0%
9.4%	8.4%	7.5%	6.8%	6.4%	5.9%	5.1%	4.2%	3.5%
10.3%	9.4%	8.4%	7.5%	6.8%	6.4%	5.9%	5.1%	4.2%
11.4%	10.3%	9.4%	8.4%	7.5%	6.8%	6.4%	5.9%	5.1%
0.0%	11.4%	10.3%	9.4%	8.4%	7.5%	6.8%	6.4%	5.9%
0.0%	0.0%	11.4%	10.3%	9.4%	8.4%	7.5%	6.8%	6.4%
0.0%	0.0%	0.0%	11.4%	10.3%	9.4%	8.4%	7.5%	6.8%
0.0%	0.0%	0.0%	0.0%	11.4%	10.3%	9.4%	8.4%	7.5%
0.0%	0.0%	0.0%	0.0%	0.0%	11.4%	10.3%	9.4%	8.4%
0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	11.4%	10.3%	9.4%
0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	11.4%	10.3%
0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	11.4%

Paid Registrations By Type And Year First Registered California, 2007.

Baseline Years

Baseline for All Scenarios

Year Vehicle Manufactured	OE Pad Fraction	Aftermarket Pad Fraction	OE Pad Cu Concentration (Avg.)	Aftermarket Pad Cu Concentration (Avg.)	Average on-Road Brake Pad Copper Content
2013 and prior	0.35	0.65	8.2%	5.0%	6.1%

Baseline On-Road Average Brake Pad Copper Content	**6.1%**

2019 On-Road Brake Pad Copper Content Estimates

Year Vehicle Manufactured	% Vehicles on Road in 2019	OE Pad Fraction	Aftermarket Pad Fraction	Year aftermarket pad installed*	OE Pad Cu Concentration (Avg.)
2013 and prior	46.2%	0	1	2016	8.2%
2014	6.8%	0	1	2017	7.2%
2015	7.5%	0	1	2018	6.2%
2016	8.4%	0.5	0.5	2019	5.2%
2017	9.4%	1	0		4.2%
2018	10.3%	1	0		3.1%
2019	11.4%	1	0		2.1%

Year Vehicle Manufactured	% Vehicles on Road in 2019	OE Pad Fraction	Aftermarket Pad Fraction	Year aftermarket pad installed	OE Pad Cu Concentration (Avg.)
2013 and prior	46.2%	0	1	2016	8.2%
2014	6.8%	0	1	2017	7.6%
2015	7.5%	0	1	2018	7.0%
2016	8.4%	0.5	0.5	2019	6.4%
2017	9.4%	1	0		5.8%
2018	10.3%	1	0		4.7%
2019	11.4%	1	0		3.7%

Year Vehicle Manufactured	% Vehicles on Road in 2019	OE Pad Fraction	Aftermarket Pad Fraction	Year aftermarket pad installed	OE Pad Cu Concentration (Avg.)
2013 and prior	46.2%	0	1	2016	8.2%
2014	6.8%	0	1	2017	7.6%
2015	7.5%	0	1	2018	7.0%
2016	8.4%	0.5	0.5	2019	6.4%
2017	9.4%	1	0		5.8%
2018	10.3%	1	0		4.7%
2019	11.4%	1	0		3.7%

*For computational simplicity, replacement pad installations are grouped by calenda
**Throught the calculations, these values reflect the copper concentration in afterm

Scenario 1

Aftermarket Brake Pads Used for High Cu OE Replacement Concentration (Avg.)**	Aftermarket Brake Pads Used for <0.5% Cu OE Replacement Concentration (Avg.)	Fraction of Model Year Vehicles with <0.5% Copper OE Pads	Fraction of Model Year Vehicles with High Copper OE Pads	Average on-Road Brake Pad Copper Content
4.4%	0.1%	18.0%	82.0%	3.6%
3.7%	0.1%	28.3%	71.8%	2.7%
2.9%	0.1%	38.5%	61.5%	1.8%
2.2%	0.1%	48.8%	51.3%	3.2%
				4.2%
				3.1%
				2.1%

On-Road Average Brake Pad Copper Content	Scenario 1

Scenario 2

Aftermarket Brake Pads Used for High Cu OE Replacement Concentration (Avg.)	Aftermarket Brake Pads Used for <5% Cu and >0.5% OE Replacement Concentration (Avg.)	Aftermarket Brake Pads Used for <0.5% Cu OE Replacement Concentration (Avg.)	Fraction of Model Year Vehicles with High Copper OE Pads	Fraction of Model Year Vehicles with <5% but >0.5% Copper OE Pads
5.3%	4.0%	0.1%	82.0%	0.0%
4.9%	4.0%	0.1%	71.8%	10.3%
4.4%	4.0%	0.1%	61.5%	20.5%
3.8%	3.8%	0.1%	51.3%	30.8%

On-Road Average Brake Pad Copper Content

Scenario 3

Aftermarket Brake Pads Used for High Cu OE Replacement Concentration (Avg.)	Aftermarket Brake Pads Used for <5% Cu and >0.5% OE Replacement Concentration (Avg.)	Aftermarket Brake Pads Used for <0.5% Cu OE Replacement Concentration (Avg.)	Fraction of Model Year Vehicles with High Copper OE Pads	Fraction of Model Year Vehicles with <5% but >0.5% Copper OE Pads
5.3%	4.0%	0.1%	82.0%	0.0%
4.9%	4.0%	0.1%	71.8%	10.3%
4.6%	4.0%	0.1%	61.5%	20.5%
4.2%	4.0%	0.1%	51.3%	30.8%

On-Road Average Brake Pad Copper Content

ar year over a five-year cycle. This effectively slightly reduces the average lifetime of the first se
arket pads that were sold the year that the aftermarket brake pad was installed.

Avg. On-Road Cu Content x % of All Vehicles on Road in 2019
0.01680
0.00182
0.00138
0.00267
0.00391
0.00324
0.00243
3.23%

Fraction of Model Year Vehicles with <0.5% Copper OE Pads	Average on-Road Brake Pad Copper Content	Avg. On-Road Cu Content x % of All Vehicles on Road in 2019
18.0%	4.3%	0.02007
18.0%	4.0%	0.00270
18.0%	3.5%	0.00265
18.0%	4.7%	0.00399
	5.8%	0.00542
	4.7%	0.00489
	3.7%	0.00425
Scenario 2		**4.40%**

Fraction of Model Year Vehicles with <0.5% Copper OE Pads	Average on-Road Brake Pad Copper Content	Avg. On-Road Cu Content x % of All Vehicles on Road in 2019
18.0%	4.3%	0.02007
18.0%	4.0%	0.00270
18.0%	3.7%	0.00274
18.0%	4.9%	0.00412
	5.8%	0.00542
	4.7%	0.00489
	3.7%	0.00425
Scenario 3		**4.42%**

t of aftermarket brake pads.

2023 On-Road Brake Pad Copper Content Estimates

Year Vehicle Manufactured	% Vehicles on Road in 2023	OE Pad Fraction	Aftermarket Pad Fraction	Year aftermarket pad installed*	OE Pad Cu Concentration (Avg.)
2013 and prior	24.6%	0	1	2021	8.2%
2014	4.2%	0	1	2022	7.2%
2015	5.1%	0	1	2023	6.2%
2016	5.9%	0	1	2019	5.2%
2017	6.4%	0	1	2020	4.2%
2018	6.8%	0	1	2021	3.1%
2019	7.5%	0	1	2022	2.1%
2020	8.4%	0.5	0.5	2023	1.1%
2021	9.4%	1	0		0.1%
2022	10.3%	1	0		0.1%
2023	11.4%	1	0		0.1%

Year Vehicle Manufactured	% Vehicles on Road in 2023	OE Pad Fraction	Aftermarket Pad Fraction	Year aftermarket pad installed	OE Pad Cu Concentration (Avg.)
2013 and prior	24.6%	0	1	2021	8.2%
2014	4.2%	0	1	2022	7.6%
2015	5.1%	0	1	2023	7.0%
2016	5.9%	0	1	2019	6.4%
2017	6.4%	0	1	2020	5.8%
2018	6.8%	0	1	2021	4.7%
2019	7.5%	0	1	2022	3.7%
2020	8.4%	0.5	0.5	2023	2.7%

2021	9.4%	1	0		1.7%
2022	10.3%	1	0		1.3%
2023	11.4%	1	0		0.9%

Year Vehicle Manufactured	% Vehicles on Road in 2023	OE Pad Fraction	Aftermarket Pad Fraction	Year aftermarket pad installed	OE Pad Cu Concentration (Avg.)
2013 and prior	24.6%	0	1	2021	8.2%
2014	4.2%	0	1	2022	7.6%
2015	5.1%	0	1	2023	7.0%
2016	5.9%	0	1	2019	6.4%
2017	6.4%	0	1	2020	5.8%
2018	6.8%	0	1	2021	4.7%
2019	7.5%	0	1	2022	3.7%
2020	8.4%	0.5	0.5	2023	2.7%
2021	9.4%	1	0		1.7%
2022	10.3%	1	0		1.3%
2023	11.4%	1	0		0.9%

*For computational simplicity, replacement pad installations are grouped by calenda

**Throught the calculations, these values reflect the copper concentration in afterm

Scenario 1

Aftermarket Brake Pads Used for High Cu OE Replacement Concentration (Avg.)**	Aftermarket Brake Pads Used for <0.5% Cu OE Replacement Concentration (Avg.)	Fraction of Model Year Vehicles with <0.5% Copper OE Pads	Fraction of Model Year Vehicles with High Copper OE Pads	Average on-Road Brake Pad Copper Content
0.1%	0.1%	18.0%	82.0%	0.1%
0.1%	0.1%	28.3%	71.8%	0.1%
0.1%	0.1%	38.5%	61.5%	0.1%
1.6%	0.1%	48.8%	51.3%	0.9%
0.8%	0.1%	59.0%	41.0%	0.4%
0.1%	0.1%	69.3%	30.8%	0.1%
0.1%	0.1%	79.5%	20.5%	0.1%
0.1%	0.1%	89.8%	10.3%	0.6%
				0.1%
				0.1%
				0.1%

On-Road Average Brake Pad Copper Content	Scenario 1

Scenario 2

Aftermarket Brake Pads Used for High Cu OE Replacement Concentration (Avg.)	Aftermarket Brake Pads Used for <5% Cu and >0.5% OE Replacement Concentration (Avg.)	Aftermarket Brake Pads Used for <0.5% Cu OE Replacement Concentration (Avg.)	Fraction of Model Year Vehicles with High Copper OE Pads	Fraction of Model Year Vehicles with <5% but >0.5% Copper OE Pads
2.3%	2.3%	0.1%	82.0%	0.0%
1.7%	1.7%	0.1%	71.8%	10.3%
1.2%	1.2%	0.1%	61.5%	20.5%
3.8%	3.8%	0.1%	51.3%	30.8%
3.0%	3.0%	0.1%	41.0%	41.0%
2.3%	2.3%	0.1%	30.8%	41.0%
1.7%	1.7%	0.1%	20.5%	41.0%
1.2%	1.2%	0.1%	10.3%	41.0%

On-Road Average Brake Pad Copper Content

			Scenario 3	
Aftermarket Brake Pads Used for High Cu OE Replacement Concentration (Avg.)	**Aftermarket Brake Pads Used for <5% Cu and >0.5% OE Replacement Concentration (Avg.)**	**Aftermarket Brake Pads Used for <0.5% Cu OE Replacement Concentration (Avg.)**	**Fraction of Model Year Vehicles with High Copper OE Pads**	**Fraction of Model Year Vehicles with <5% but >0.5% Copper OE Pads**
3.5%	3.5%	0.1%	82.0%	0.0%
3.3%	3.3%	0.1%	71.8%	10.3%
3.2%	3.2%	0.1%	61.5%	20.5%
4.2%	4.0%	0.1%	51.3%	30.8%
3.9%	3.9%	0.1%	41.0%	41.0%
3.5%	3.5%	0.1%	30.8%	41.0%
3.3%	3.3%	0.1%	20.5%	41.0%
3.2%	3.2%	0.1%	10.3%	41.0%

On-Road Average Brake Pad Copper Content

ar year over a five-year cycle. This effectively slightly reduces the average lifetime of the first se
arket pads that were sold the year that the aftermarket brake pad was installed.

Avg. On-Road Cu Content x % of All Vehicles on Road in 2023
0.00025
0.00004
0.00005
0.00051
0.00026
0.00007
0.00007
0.00051
0.00009
0.00010
0.00011
0.21%

Fraction of Model Year Vehicles with <0.5% Copper OE Pads	Average on-Road Brake Pad Copper Content	Avg. On-Road Cu Content x % of All Vehicles on Road in 2023
18.0%	1.9%	0.00461
18.0%	1.4%	0.00058
18.0%	1.0%	0.00051
18.0%	3.1%	0.00184
18.0%	2.5%	0.00158
28.3%	1.7%	0.00113
38.5%	1.1%	0.00080
48.8%	1.7%	0.00142

	1.7%	0.00160
	1.3%	0.00134
	0.9%	0.00103
Scenario 2		**1.64%**

Fraction of Model Year Vehicles with <0.5% Copper OE Pads	Average on-Road Brake Pad Copper Content	Avg. On-Road Cu Content x % of All Vehicles on Road in 2023
18.0%	2.9%	0.00715
18.0%	2.7%	0.00114
18.0%	2.7%	0.00136
18.0%	3.4%	0.00202
18.0%	3.2%	0.00203
28.3%	2.6%	0.00174
38.5%	2.1%	0.00156
48.8%	2.2%	0.00186
	1.7%	0.00160
	1.3%	0.00134
	0.9%	0.00103
Scenario 3		**2.28%**

t of aftermarket brake pads.

2027 On-Road Brake Pad Copper Content Estimates

Year Vehicle Manufactured	% Vehicles on Road in 2027	OE Pad Fraction	Aftermarket Pad Fraction	Year aftermarket pad installed*	OE Pad Cu Concentration (Avg.)
2013 and prior	13.2%	0	1	2026	8.2%
2014	2.3%	0	1	2027	7.2%
2015	2.6%	0	1	2023	6.2%
2016	3.0%	0	1	2024	5.2%
2017	3.5%	0	1	2025	4.2%
2018	4.2%	0	1	2026	3.1%
2019	5.1%	0	1	2027	2.1%
2020	5.9%	0	1	2023	1.1%
2021	6.4%	0	1	2024	0.1%
2022	6.8%	0	1	2025	0.1%
2023	7.5%	0	1	2026	0.1%
2024	8.4%	0.5	0.5	2027	0.1%
2025	9.4%	1	0		0.1%
2026	10.3%	1	0		0.1%
2027	11.4%	1	0		0.1%

Year Vehicle Manufactured	% Vehicles on Road in 2027	OE Pad Fraction	Aftermarket Pad Fraction	Year aftermarket pad installed	OE Pad Cu Concentration (Avg.)
2013 and prior	13.2%	0	1	2026	8.2%
2014	2.3%	0	1	2027	7.6%
2015	2.6%	0	1	2023	7.0%
2016	3.0%	0	1	2024	6.4%

2017	3.5%	0	1	2025	5.8%
2018	4.2%	0	1	2026	4.7%
2019	5.1%	0	1	2027	3.7%
2020	5.9%	0	1	2023	2.7%
2021	6.4%	0	1	2024	1.7%
2022	6.8%	0	1	2025	1.3%
2023	7.5%	0	1	2026	0.9%
2024	8.4%	0.5	0.5	2027	0.5%
2025	9.4%	1	0		0.1%
2026	10.3%	1	0		0.1%
2027	11.4%	1	0		0.1%

Year Vehicle Manufactured	% Vehicles on Road in 2027	OE Pad Fraction	Aftermarket Pad Fraction	Year aftermarket pad installed	OE Pad Cu Concentration (Avg.)
2013 and prior	13.2%	0	1	2026	8.2%
2014	2.3%	0	1	2027	7.6%
2015	2.6%	0	1	2023	7.0%
2016	3.0%	0	1	2024	6.4%
2017	3.5%	0	1	2025	5.8%
2018	4.2%	0	1	2026	4.7%
2019	5.1%	0	1	2027	3.7%
2020	5.9%	0	1	2023	2.7%
2021	6.4%	0	1	2024	1.7%
2022	6.8%	0	1	2025	1.3%
2023	7.5%	0	1	2026	0.9%
2024	8.4%	0.5	0.5	2027	0.5%
2025	9.4%	1	0		0.1%
2026	10.3%	1	0		0.1%
2027	11.4%	1	0		0.1%

*For computational simplicity, replacement pad installations are grouped by calenda
**Throught the calculations, these values reflect the copper concentration in afterm

Scenario 1

Aftermarket Brake Pads Used for High Cu OE Replacement Concentration (Avg.)**	Aftermarket Brake Pads Used for <0.5% Cu OE Replacement Concentration (Avg.)	Fraction of Model Year Vehicles with <0.5% Copper OE Pads	Fraction of Model Year Vehicles with High Copper OE Pads	Average on-Road Brake Pad Copper Content
0.1%	0.1%	18.0%	82.0%	0.1%
0.1%	0.1%	28.3%	71.8%	0.1%
0.1%	0.1%	38.5%	61.5%	0.1%
0.1%	0.1%	48.8%	51.3%	0.1%
0.1%	0.1%	59.0%	41.0%	0.1%
0.1%	0.1%	69.3%	30.8%	0.1%
0.1%	0.1%	79.5%	20.5%	0.1%
0.1%	0.1%	89.8%	10.3%	0.1%
0.1%	0.1%	100.0%	0.0%	0.1%
0.1%	0.1%	100.0%	0.0%	0.1%
0.1%	0.1%	100.0%	0.0%	0.1%
0.1%	0.1%	100.0%	0.0%	0.1%
				0.1%
				0.1%
				0.1%

On-Road Average Brake Pad Copper Content	Scenario 1

Scenario 2

Aftermarket Brake Pads Used for High Cu OE Replacement Concentration (Avg.)	Aftermarket Brake Pads Used for <5% Cu and >0.5% OE Replacement Concentration (Avg.)	Aftermarket Brake Pads Used for <0.5% Cu OE Replacement Concentration (Avg.)	Fraction of Model Year Vehicles with High Copper OE Pads	Fraction of Model Year Vehicles with <5% but >0.5% Copper OE Pads
0.2%	0.2%	0.1%	82.0%	0.0%
0.1%	0.1%	0.1%	71.8%	10.3%
1.2%	1.2%	0.1%	61.5%	20.5%
0.8%	0.8%	0.1%	51.3%	30.8%

0.4%	0.4%	0.1%	41.0%	41.0%
0.2%	0.2%	0.1%	30.8%	41.0%
0.1%	0.1%	0.1%	20.5%	41.0%
1.2%	1.2%	0.1%	10.3%	41.0%
0.8%	0.8%	0.1%	0.0%	41.0%
0.4%	0.4%	0.1%	0.0%	30.8%
0.2%	0.2%	0.1%	0.0%	20.5%
0.1%	0.1%	0.1%	0.0%	10.3%

On-Road Average Brake Pad Copper Content

Scenario 3

Aftermarket Brake Pads Used for High Cu OE Replacement Concentration (Avg.)	Aftermarket Brake Pads Used for <5% Cu and >0.5% OE Replacement Concentration (Avg.)	Aftermarket Brake Pads Used for <0.5% Cu OE Replacement Concentration (Avg.)	Fraction of Model Year Vehicles with High Copper OE Pads	Fraction of Model Year Vehicles with <5% but >0.5% Copper OE Pads
3.2%	3.2%	0.1%	82.0%	0.0%
3.2%	3.2%	0.1%	71.8%	10.3%
3.2%	3.2%	0.1%	61.5%	20.5%
3.2%	3.2%	0.1%	51.3%	30.8%
3.2%	3.2%	0.1%	41.0%	41.0%
3.2%	3.2%	0.1%	30.8%	41.0%
3.2%	3.2%	0.1%	20.5%	41.0%
3.2%	3.2%	0.1%	10.3%	41.0%
3.2%	3.2%	0.1%	0.0%	41.0%
3.2%	3.2%	0.1%	0.0%	30.8%
3.2%	3.2%	0.1%	0.0%	20.5%
3.2%	3.2%	0.1%	0.0%	10.3%

On-Road Average Brake Pad Copper Content

ar year over a five-year cycle. This effectively slightly reduces the average lifetime of the first se
arket pads that were sold the year that the aftermarket brake pad was installed.

Avg. On-Road Cu Content x % of All Vehicles on Road in 2027
0.00013
0.00002
0.00003
0.00003
0.00004
0.00004
0.00005
0.00006
0.00006
0.00007
0.00007
0.00008
0.00009
0.00010
0.00011
0.10%

Fraction of Model Year Vehicles with <0.5% Copper OE Pads	Average on-Road Brake Pad Copper Content	Avg. On-Road Cu Content x % of All Vehicles on Road in 2027
18.0%	0.2%	0.00024
18.0%	0.1%	0.00002
18.0%	1.0%	0.00026
18.0%	0.7%	0.00020

18.0%	0.4%	0.00013
28.3%	0.2%	0.00007
38.5%	0.1%	0.00005
48.8%	0.7%	0.00039
59.0%	0.4%	0.00025
69.3%	0.2%	0.00013
79.5%	0.1%	0.00009
89.8%	0.3%	0.00025
	0.1%	0.00009
	0.1%	0.00010
	0.1%	0.00011

Scenario 2	**0.24%**

Fraction of Model Year Vehicles with <0.5% Copper OE Pads	Average on-Road Brake Pad Copper Content	Avg. On-Road Cu Content x % of All Vehicles on Road in 2027
18.0%	2.7%	0.00353
18.0%	2.7%	0.00062
18.0%	2.7%	0.00070
18.0%	2.7%	0.00080
18.0%	2.7%	0.00094
28.3%	2.4%	0.00098
38.5%	2.0%	0.00103
48.8%	1.7%	0.00101
59.0%	1.4%	0.00088
69.3%	1.1%	0.00073
79.5%	0.7%	0.00056
89.8%	0.5%	0.00039
	0.1%	0.00009
	0.1%	0.00010
	0.1%	0.00011

Scenario 3	**1.25%**

et of aftermarket brake pads.

2031 On-Road Brake Pad Copper Content Estimates

Year Vehicle Manufactured	% Vehicles on Road in 2031	OE Pad Fraction	Aftermarket Pad Fraction	Year aftermarket pad installed*	OE Pad Cu Concentration (Avg.)
2013 and prior	6.8%	0	1	2031	8.2%
2014	1.4%	0	1	2027	7.2%
2015	1.5%	0	1	2028	6.2%
2016	1.6%	0	1	2029	5.2%
2017	1.9%	0	1	2030	4.2%
2018	2.3%	0	1	2031	3.1%
2019	2.6%	0	1	2027	2.1%
2020	3.0%	0	1	2028	1.1%
2021	3.5%	0	1	2029	0.1%
2022	4.2%	0	1	2030	0.1%
2023	5.1%	0	1	2031	0.1%
2024	5.9%	0	1	2027	0.1%
2025	6.4%	0	1	2028	0.1%
2026	6.8%	0	1	2029	0.1%
2027	7.5%	0	1	2030	0.1%
2028	8.4%	0.5	0.5	2031	0.1%
2029	9.4%	1	0		0.1%
2030	10.3%	1	0		0.1%
2031	11.4%	1	0		0.1%

Year Vehicle Manufactured	% Vehicles on Road in 2031	OE Pad Fraction	Aftermarket Pad Fraction	Year aftermarket pad installed	OE Pad Cu Concentration (Avg.)

2013 and prior	6.8%	0	1	2031	8.2%
2014	1.4%	0	1	2027	7.6%
2015	1.5%	0	1	2028	7.0%
2016	1.6%	0	1	2029	6.4%
2017	1.9%	0	1	2030	5.8%
2018	2.3%	0	1	2031	4.7%
2019	2.6%	0	1	2027	3.7%
2020	3.0%	0	1	2028	2.7%
2021	3.5%	0	1	2029	1.7%
2022	4.2%	0	1	2030	1.3%
2023	5.1%	0	1	2031	0.9%
2024	5.9%	0	1	2027	0.5%
2025	6.4%	0	1	2028	0.1%
2026	6.8%	0	1	2029	0.1%
2027	7.5%	0	1	2030	0.1%
2028	8.4%	0.5	0.5	2031	0.1%
2029	9.4%	1	0		0.1%
2030	10.3%	1	0		0.1%
2031	11.4%	1	0		0.1%

Year Vehicle Manufactured	% Vehicles on Road in 2031	OE Pad Fraction	Aftermarket Pad Fraction	Year aftermarket pad installed	OE Pad Cu Concentration (Avg.)
2013 and prior	6.8%	0	1	2031	8.2%
2014	1.4%	0	1	2027	7.6%
2015	1.5%	0	1	2028	7.0%
2016	1.6%	0	1	2029	6.4%
2017	1.9%	0	1	2030	5.8%
2018	2.3%	0	1	2031	4.7%
2019	2.6%	0	1	2027	3.7%
2020	3.0%	0	1	2028	2.7%
2021	3.5%	0	1	2029	1.7%
2022	4.2%	0	1	2030	1.3%
2023	5.1%	0	1	2031	0.9%
2024	5.9%	0.5	0.5	2027	0.5%

2025	6.4%	1	0	2028	0.1%
2026	6.8%	1	0	2029	0.1%
2027	7.5%	1	0	2030	0.1%
2028	8.4%	0.5	0.5	2031	0.1%
2029	9.4%	1	0		0.1%
2030	10.3%	1	0		0.1%
2031	11.4%	1	0		0.1%

*For computational simplicity, replacement pad installations are grouped by calenda
**Throught the calculations, these values reflect the copper concentration in afterm

Scenario 1

Aftermarket Brake Pads Used for High Cu OE Replacement Concentration (Avg.)**	Aftermarket Brake Pads Used for <0.5% Cu OE Replacement Concentration (Avg.)	Fraction of Model Year Vehicles with <0.5% Copper OE Pads	Fraction of Model Year Vehicles with High Copper OE Pads	Average on-Road Brake Pad Copper Content
0.1%	0.1%	18.0%	82.0%	0.1%
0.1%	0.1%	28.3%	71.8%	0.1%
0.1%	0.1%	38.5%	61.5%	0.1%
0.1%	0.1%	48.8%	51.3%	0.1%
0.1%	0.1%	59.0%	41.0%	0.1%
0.1%	0.1%	69.3%	30.8%	0.1%
0.1%	0.1%	79.5%	20.5%	0.1%
0.1%	0.1%	89.8%	10.3%	0.1%
0.1%	0.1%	100.0%	0.0%	0.1%
0.1%	0.1%	100.0%	0.0%	0.1%
0.1%	0.1%	100.0%	0.0%	0.1%
0.1%	0.1%	100.0%	0.0%	0.1%
0.1%	0.1%	100.0%	0.0%	0.1%
0.1%	0.1%	100.0%	0.0%	0.1%
0.1%	0.1%	100.0%	0.0%	0.1%
0.1%	0.1%	100.0%	0.0%	0.1%
				0.1%
				0.1%
				0.1%

On-Road Average Brake Pad Copper Content	Scenario 1

Scenario 2

Aftermarket Brake Pads Used for High Cu OE Replacement Concentration (Avg.)	Aftermarket Brake Pads Used for <5% Cu and >0.5% OE Replacement Concentration (Avg.)	Aftermarket Brake Pads Used for <0.5% Cu OE Replacement Concentration (Avg.)	Fraction of Model Year Vehicles with High Copper OE Pads	Fraction of Model Year Vehicles with <5% but >0.5% Copper OE Pads

0.1%	0.1%	0.1%	82.0%	0.0%
0.1%	0.1%	0.1%	71.8%	10.3%
0.1%	0.1%	0.1%	61.5%	20.5%
0.1%	0.1%	0.1%	51.3%	30.8%
0.1%	0.1%	0.1%	41.0%	41.0%
0.1%	0.1%	0.1%	30.8%	41.0%
0.1%	0.1%	0.1%	20.5%	41.0%
0.1%	0.1%	0.1%	10.3%	41.0%
0.1%	0.1%	0.1%	0.0%	41.0%
0.1%	0.1%	0.1%	0.0%	30.8%
0.1%	0.1%	0.1%	0.0%	20.5%
0.1%	0.1%	0.1%	0.0%	10.3%
0.1%	0.1%	0.1%	0.0%	0.0%
0.1%	0.1%	0.1%	0.0%	0.0%
0.1%	0.1%	0.1%	0.0%	0.0%
0.1%	0.1%	0.1%	0.0%	0.0%

On-Road Average Brake Pad Copper Content

Scenario 3

Aftermarket Brake Pads Used for High Cu OE Replacement Concentration (Avg.)	Aftermarket Brake Pads Used for <5% Cu and >0.5% OE Replacement Concentration (Avg.)	Aftermarket Brake Pads Used for <0.5% Cu OE Replacement Concentration (Avg.)	Fraction of Model Year Vehicles with High Copper OE Pads	Fraction of Model Year Vehicles with <5% but >0.5% Copper OE Pads
3.2%	3.2%	0.1%	82.0%	0.0%
3.2%	3.2%	0.1%	71.8%	10.3%
3.2%	3.2%	0.1%	61.5%	20.5%
3.2%	3.2%	0.1%	51.3%	30.8%
3.2%	3.2%	0.1%	41.0%	41.0%
3.2%	3.2%	0.1%	30.8%	41.0%
3.2%	3.2%	0.1%	20.5%	41.0%
3.2%	3.2%	0.1%	10.3%	41.0%
3.2%	3.2%	0.1%	0.0%	41.0%
3.2%	3.2%	0.1%	0.0%	30.8%
3.2%	3.2%	0.1%	0.0%	20.5%
3.2%	3.2%	0.1%	0.0%	10.3%

3.2%	3.2%	0.1%	0.0%	0.0%
3.2%	3.2%	0.1%	0.0%	0.0%
3.2%	3.2%	0.1%	0.0%	0.0%
3.2%	3.2%	0.1%	0.0%	0.0%

On-Road Average Brake Pad Copper Content

ar year over a five-year cycle. This effectively slightly reduces the average lifetime of the first set of
arket pads that were sold the year that the aftermarket brake pad was installed.

Avg. On-Road Cu Content x % of All Vehicles on Road in 2031
0.00007
0.00001
0.00001
0.00002
0.00002
0.00002
0.00003
0.00003
0.00004
0.00004
0.00005
0.00006
0.00006
0.00007
0.00007
0.00008
0.00009
0.00010
0.00011
0.10%

Fraction of Model Year Vehicles with <0.5% Copper OE Pads	Average on-Road Brake Pad Copper Content	Avg. On-Road Cu Content x % of All Vehicles on Road in 2031

18.0%	0.1%	0.00007
18.0%	0.1%	0.00001
18.0%	0.1%	0.00001
18.0%	0.1%	0.00002
18.0%	0.1%	0.00002
28.3%	0.1%	0.00002
38.5%	0.1%	0.00003
48.8%	0.1%	0.00003
59.0%	0.1%	0.00004
69.3%	0.1%	0.00004
79.5%	0.1%	0.00005
89.8%	0.1%	0.00006
100.0%	0.1%	0.00006
100.0%	0.1%	0.00007
100.0%	0.1%	0.00007
100.0%	0.1%	0.00008
	0.1%	0.00009
	0.1%	0.00010
	0.1%	0.00011

Scenario 2	**0.10%**

Fraction of Model Year Vehicles with <0.5% Copper OE Pads	**Average on-Road Brake Pad Copper Content**	**Avg. On-Road Cu Content x % of All Vehicles on Road in 2031**
18.0%	2.7%	0.00181
18.0%	2.7%	0.00038
18.0%	2.7%	0.00039
18.0%	2.7%	0.00043
18.0%	2.7%	0.00051
28.3%	2.4%	0.00055
38.5%	2.0%	0.00053
48.8%	1.7%	0.00051
59.0%	1.4%	0.00049
69.3%	1.1%	0.00044
79.5%	0.7%	0.00038
89.8%	0.5%	0.00027

100.0%	0.1%	0.00006
100.0%	0.1%	0.00007
100.0%	0.1%	0.00007
100.0%	0.1%	0.00008
	0.1%	0.00009
	0.1%	0.00010
	0.1%	0.00011

Scenario 3	**0.73%**

aftermarket brake pads.

Brake Pad Copper Reduction - Metrics for Tracking Progress

Technical Memo

California Stormwater Quality Association

December 1, 2014

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

RB-AR8641

tdc environmental

MEMO

TO:	CASQA	**DATE:**	December 1, 2014
FROM:	Kelly D. Moran, Ph.D.	**PROJECT:**	79
SUBJECT:	Brake Pad Copper Reduction – Metrics for Tracking Progress		

To protect water quality, California law requires near elimination of copper in vehicle brake pads by 2025. Many California municipal urban runoff programs are relying on brake pad copper reduction as a piece of their plans to comply with requirements to reduce copper in urban runoff. This memorandum identifies quantitative metrics that can be used to track the pace of brake pad copper reduction and provides current and baseline values for each metric.

Based on data detailed below, it is apparent that brake pad copper reductions are underway—and are well ahead of regulatory deadlines. Average brake pad formulation copper content—currently 5.6%—has dropped about 30% since 2006. "Copper-free" (<0.5% copper) brake pad formulations have become widely available, comprising 41.2% of all available formulations. Most of the vehicle industry appears to be planning to transition to <0.5% copper brake pads prior to the first copper reduction compliance deadline in 2021.

Background

Scientific studies indicate that dust generated by vehicle brakes is by far the most significant source of copper in urban watersheds. In California's most urbanized watersheds, brake pad copper is estimated to comprise more than 60% of all copper in urban runoff.[1] A California law enacted in 2010, SB 346 (Kehoe) set in place a program that will nearly eliminate copper use in brake pads. SB 346 requires that brake pads sold in California contain no more than 5% copper by weight by 2021, and no more than 0.5% by 2025. The long implementation schedule in SB 346 was designed to provide time to develop new brake pad formulations and to effect a smooth transition by the vehicle industry to the lowest copper brake pads.

Following California's model, the State of Washington also enacted restrictions on brake pad copper content in 2010 (Washington State 2010).[2] Washington's law is similar to California's, but provides a much narrower exemption for "aftermarket" brake pads that replace the "original equipment" brake pads sold with new vehicles. The narrow exemption effectively requires essentially all brake pads to meet SB 346 deadlines.

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[1] Donigian, A.S., B. R. Bicknell and E. Wolfram (2009). *Modeling the Contribution of Copper from Brake Wear Debris to the San Francisco Bay. Phase 2*. Prepared by AQUA TERRA Consultants for the Brake Pad Partnership.

[2] Washington State (2010). Washington Senate Bill 6557 (Senate Environment, Water & Energy Committee). Brake Friction Material. Statutes of 2010, Chapter 70.285 RCW.

Due to the importance of California's vehicle market and the interconnection of vehicle parts distribution systems throughout North America, brake pad manufacturers expect that it is unlikely that any manufacturer will produce California-specific or Washington-specific products. Instead, copper reduction will be integrated throughout the entire North American brake pad market.[3] U.S. EPA and the vehicle industry will likely soon be signing a "Copper-free Brake Initiative" Memorandum of Understanding to cement an industry commitment to nationwide brake pad copper reductions.

SB 346 compliance certification markings (brake pad and box markings) and chemical testing methods have been established by the automobile industry.[4] Washington State has adopted regulations specifying testing, marking, and reporting requirements.[5] California regulations specifying certification, testing, and marking requirements are in development.[6]

The brake pad testing and certification system is up and running, with NSF International serving as the sole certification organization. More than 4,500 brake friction materials have been certified, many of them with at lowest copper (<0.5%) level.

Brake pad copper reduction is already well underway, as demonstrated by the data below. The success and speed of the transition was plainly apparent at the October 2014 Society of Automotive Engineers Brake Colloquium, where many brake pad manufacturers touted their <0.5% copper products and several vehicle manufacturers shared their positive evaluation of the new products and detailed plans for an orderly transition of their entire North American vehicle lines—and most global production—to <0.5% copper by 2021.

Society of Automotive Engineers conference presentations, industry marketing materials, and informal communications with industry members indicate that most of the automotive industry is moving directly to <0.5% copper for the 2021 compliance deadline, thus avoiding a second cycle of reformulations.

Brake Pad Copper Reduction Tracking Metrics

Publicly available data sources were reviewed to identify the best available quantitative metrics for tracking brake pad copper reductions. Because manufacturer sales data are proprietary, no public data set is available to calculate actual on-road brake copper content; however, two excellent quantitative metrics are available to track the pace of brake pad copper content reduction.

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[3] Motor and Equipment Manufacturers Association (MEMA) (2014). "Copper in Brake Friction" http://www.aftermarketsuppliers.org/Councils/Brake-Manufacturers-Council-BMC/Copper-in-Brake-Friction Accessed Nov. 7.

[4] Society of Automotive Engineers (SAE) (2011). *Measurement of Copper and Other Elements in Brake Friction Materials*. SAE Technical Standard J2975; Society of Automotive Engineers (SAE) (2012). *Friction Coefficient Identification and Environmental Marking System for Brake Linings*. SAE Technical Standard J866; Motor and Equipment Manufacturers Association (MEMA) (2012). 3-Stage Certification Logo.

[5] Washington Department of Ecology (2012). *Better Brakes Rule*. Chapter 173-901 Washington Administrative Code. Publication 12-04-027.

[6] California Department of Toxic Substances Control (2014). "Limiting Copper in Brake Pads" http://www.dtsc.ca.gov/PollutionPrevention/BrakePads.cfm Accessed Nov. 7.

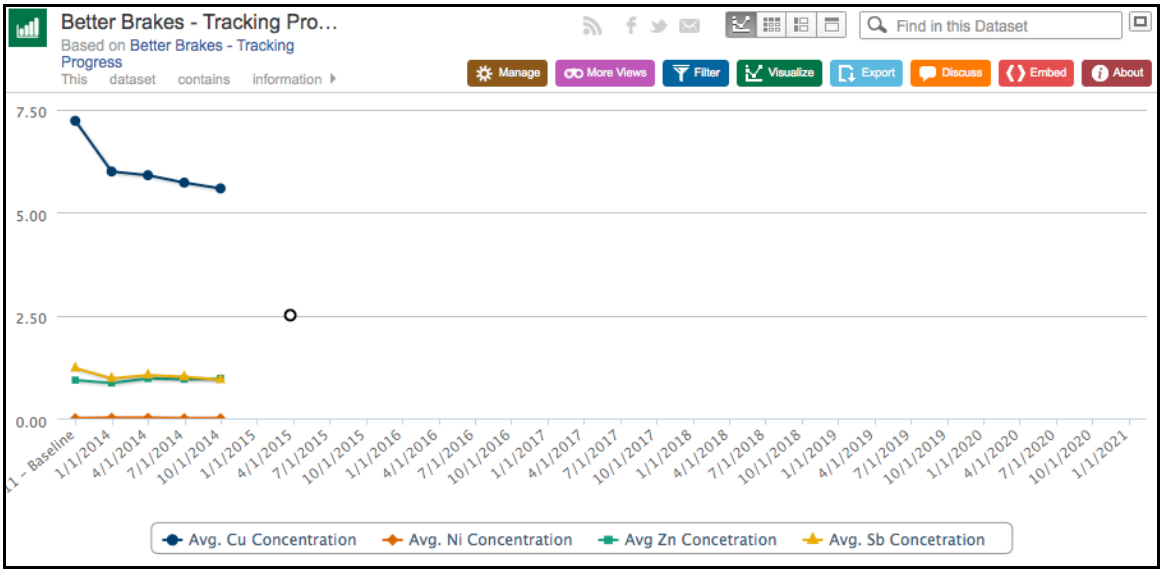
Metric #1 - Washington Ecology Report of Industry-Wide Average Brake Pad Formulation Copper Content

Unlike California's SB 346, Washington law requires manufacturers to provide Washington State Department of Ecology ("Ecology") with periodic reports of brake pad copper, antimony, nickel, and zinc content.[7] This reporting is accomplished in conjunction with the brake pad formulation certification process. After certification, the brake pad certification organization (NSF International) provides Ecology with quarterly reports containing a summary of the chemical testing report for each certified brake pad formulation. The chemical testing report includes the formulation's copper, antimony, nickel, and zinc content. The Washington process included a one-time "baseline" report of the copper, antimony, nickel, and zinc content in 2011 brake pad formulations.

Ecology uses the data it receives on each individual formulation to compute the industry-wide average copper, antimony, nickel, and zinc content for all certified brake pad formulations. Because manufacturers are not required to report sales data for each brake pad formulation, Ecology cannot calculate the true average on-road brake pad copper content. Consequently, the Ecology industry-wide average may not necessarily be the same as the true average on-road brake pad copper content.

Ecology has created a graph tracking the average certified brake pad formulation copper, antimony, nickel, and zinc (Figure 1). The graph shows the 2011 baseline values and data from quarterly reports, which started in January 2014. This graph is available on the Internet at http://www.ecy.wa.gov/programs/hwtr/laws_rules/BBtracking.html

Figure 1. Washington Ecology Tracking Graphic for Average Copper, Antimony, Nickel, and Zinc Content of Certified Brake Pad Formulations



Ecology intends to update the graph quarterly. Resources permitting, updates should be posted in each year in early February, May, August, and November.

[7] This provision, which was originally drafted by CASQA to support anticipated compliance reporting needs of its members, was omitted from the final version of SB 346 to avoid duplication with the Washington law (which had already been adopted) and to minimize costs for the state of California.

According to a representative industry analysis provided to the Brake Pad Partnership, in 2006 brake pads contained an estimated average of about 8% copper by weight.[8] Ecology data indicate that brake pad copper content dropped to about 7.2% in 2011, and has subsequently fallen to 5.6% (October 2014), a 30% reduction from the 2006 Brake Pad Partnership estimate.

Metric #2 – Fraction of Brake Pad Formulations with the "N" (<0.5% copper) Certification

The sole current brake pad certification organization, NSF International, maintains a public list of all brake pad formulations that have been certified as to their copper content (and other metals and asbestos). The list, which provides the specific certification level for each certified formulation, is available in the Internet at http://info.nsf.org/Certified/autorp/listings.asp?standard=SAEJ2975. This report is updated daily with new certifications. Brake pad formulations with <0.5% copper have the "N" certification.

As of November 7, 2014, NSF had certified 4,679 formulations, 1,931 (41.2%) of which have the "N" certification (the remainder have higher copper content). This is a substantial increase since 2006, when about 18% of original equipment and about one-third of replacement ("aftermarket") brake pads were estimated to contain <0.5% copper.[9] Just in the short period since July 24, 2014, the number of "N" certified brake formulations has increased nearly 20%, and the fraction of "N" certified brake pads has increased from 39.2% to 41.2%.[10] Although the NSF website does not provide lists other than the current list, the trend can be tracked through periodic downloading of the NSF certification list.

At this time, no brake pad certification organization other than NSF International exists. Although additional certification organizations are not currently contemplated, there is a potential that the industry may use more than one certification organization. When this metric is updated, data from all certification organizations should be included.

Summary

Two quantitative metrics are available to track the pace of brake pad copper content reduction: (1) the Washington Ecology report of industry-wide average brake pad formulation copper content and (2) the fraction of brake pad formulations with the "N" (<0.5% copper) certification.

Currently, copper brake pad formulations meeting the lowest copper content standard (<0.5% copper) are widely available. Average brake pad formulation copper content (5.6%) has dropped about 30% since 2006. Most of the vehicle industry appears to be planning to transition to <0.5% copper brake pads prior to the first SB 346 copper reduction compliance deadline in 2021.

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[8] Brake Pad Partnership (BPP) (2008). *Copper Use Monitoring Program Results for Model Years 1998-2006*. Prepared by Sustainable Conservation for the Brake Pad Partnership Steering Committee.

[9] Phipps, M. (2008). "An Analysis of the 2006 Copper Monitoring Results." Prepared for the Brake Pad Partnership; and Brake Pad Partnership (BPP) (1996-2012), and information shared with author at Brake Pad Partnership Steering Committee meetings.

[10] On July 24, 2014, 1,612 of 4,108 total formulations had the "N" certification.

ATTACHMENT E:

MINIMUM CONTROL MEASURE GUIDANCE

Watershed Management Program

MCM Guidance

RB-AR8647

Public Information and Participation Program

Introduction

Permit §VI.D.5.a (LA)/ §VII.F.1 (LB)

Each participating city is required to develop and implement a Public Information and Participation Program (PIPP) that includes the requirements listed in Permit §VI.D.5.a (LB §VII.F). This document provides guidance that the participating cities can follow to implement a PIPP in compliance with the Permit.

The objectives of the PIPP are to:

- Measurably increase the knowledge of the target audiences about the MS4, the adverse impacts of stormwater pollution on receiving waters and potential solutions to mitigate the impacts.
- Measurably change the waste disposal and stormwater pollution generation behavior of target audiences by developing and encouraging the implementation of appropriate alternatives.
- Involve and engage a diversity of socio-economic groups and ethnic communities in Los Angeles County to participate in mitigating the impacts of stormwater pollution.

PIPP Implementation

Permit §VI.D.5.b (LA)/§VII.F.2 (LB)

The PIPP is implemented using the following approaches:

- By participating in a County-wide PIPP,
- By participating in one or more Watershed Group sponsored PIPPs, and
- individually within its jurisdiction.

Cities participating in a County-wide or Watershed Group PIPP provide contact info for their staff responsible for stormwater public education activities to the designated PIPP coordinator. Changes in contact information are provided within 30 days of the date that the change occurred.

Public Participation

Permit §VI.D.5.c (LA)/§VII.F.3 (LB)

Public Reporting

The means for public reporting of clogged catch basin inlets and illicit discharges/dumping, faded or missing catch basin labels, and general stormwater and non-stormwater pollution prevention information is provided through the use of the countywide 888-CLEAN-LA hotline. In addition, each participating city:

- Includes the reporting information – updated when necessary – in public information and the government pages of the telephone book as they are developed or published.
- Identifies staff or departments who will serve as the contact person(s) and will make this information available on its website.
- Provides current, updated hotline contact information to the general public within its jurisdiction.

RB-AR8648

Events

Events are organized to target residents and population subgroups. The purpose of the events is to educate and involve the community in stormwater and non-stormwater pollution prevention activities, such as education seminars, clean-ups, and community catch basin stenciling.

Residential Outreach Program

Permit §VI.D.5.d (LA)/§VII.F.4 (LB)

With the exception of item 5, which is no longer an element of the countywide PIP Program, each city implements the following activities for the Residential Outreach Program as part of a countywide program:

1. Conduct stormwater pollution prevention public service announcements and advertising campaigns
2. Prepare public education materials that include information on the proper handling (i.e., disposal, storage and/or use) of:
    a. Vehicle waste fluids
    b. Household waste materials (i.e., trash and household hazardous waste, including personal care products and pharmaceuticals)
    c. Construction waste materials
    d. Pesticides and fertilizers (including integrated pest management (IPM) practices to promote reduced use of pesticides)
    e. Green waste (including lawn clippings and leaves)
    f. Animal wastes
3. Distribute activity specific stormwater pollution prevention public education materials at the following points of purchase:
    a. Automotive parts stores
    b. Home improvement centers / lumber yards / hardware stores/paint stores
    c. Landscaping / gardening centers
    d. Pet shops / feed stores
4. Maintain stormwater websites or provide links to stormwater websites via each participating city's website. This includes educational material and opportunities for the public to participate in stormwater pollution prevention and clean-up activities listed in Part VI.D.4 of the Permit.
5. Provide independent, parochial, and public schools within each participating city's jurisdiction with materials to educate school children (K-12) on stormwater pollution. Material may include videos, live presentations and other information. A useful source of materials to work with, or leverage, is other statewide agencies and associations. These associations include the State Water Board's "Erase the Waste" educational program and the California Environmental Education Interagency Network (CEEIN) to implement this requirement.
6. When implementing the above activities, use effective strategies to educate and involve ethnic communities in stormwater pollution prevention through culturally effective methods.

Industrial/Commercial Facilities Program

Each participating city is required to implement an industrial/commercial facilities program that includes the provisions listed in Permit § VI.D.6 (LB §VII.G). This document provides guidance that the participating cities can follow to implement an industrial/commercial facilities program in compliance with the Permit.

Introduction

Permit § VI.D.6.a (LA)/ §VII.G.1 (LB)

The Industrial/Commercial Facilities Program is designed to prevent illicit discharges into the MS4 and receiving waters, reduce industrial/commercial discharges of stormwater to the maximum extent practicable, and prevent industrial/commercial discharges from the MS4 from causing or contributing to a violation of receiving water limitations. The program consists of the following components:

- Track,
- Educate,
- Inspect and
- Ensure compliance with municipal ordinances at industrial/commercial facilities determined to be critical sources of pollutants in stormwater.

Track Critical Industrial/Commercial Sources

Permit § VI.D.6.b (LA)/ §VII.G.2 (LB)

The critical sources to be tracked are listed in Table ICF-1.

Table ICF-1: Critical Sources

Facility Category	Facility	
Commercial Facilities	Restaurants	
	Automotive service facilities (including those located at automotive dealerships)	
	Retail Gasoline Outlets	
	Nurseries and Nursery Centers (Merchant Wholesalers, Nondurable Goods, and Retail Trade)	
Industrial Facilities	USEPA "Phase I" Facilities[1]	
	Other federally-mandated facilities[2]	Municipal landfills
		Hazardous waste treatment, disposal, and recovery facilities
		Industrial facilities subject to § 313 "Toxic Release Inventory" reporting requirements of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA)[3]
General Facilities	All other commercial or industrial facilities determined to potentially contribute a substantial pollutant load to the MS4.	

[1] as specified in 40 CFR §122.26(b)(14)(i)-(xi)
[2] as specified in 40 CFR §122.26(d)(2)(iv)(C)
[3] 42 U.S.C. § 11023

Critical source facilities are tracked in an electronic database management system. The information stored for each critical source in the inventory is listed in Table ICF-2.

Table ICF-2: Inventory Information for Critical Sources

Information Category		Information
General	Name	Facility Name
	Location	Facility address
		Facility latitude and longitude coordinates
		Receiving water
	Contact	Owner/operator name
		Mailing address
		Phone number
		Email (if available)
Business Type		Standard Industrial Classification (SIC) code and/or North American Industry Classification System (NAICS) code
		Narrative description of the activities performed and/or principal products produced
Water quality		Status of exposure of materials to stormwater
		Pollutants generated by facility activities (A-ICF-1)
		Identification of whether the facility is tributary to a waterbody segment with impairments[4] for pollutants that are also generated by the facility.
Prioritization		High, medium or low. The default priority is medium.
NPDES Permit		For applicable facilities, identify coverage under the State Water Board's General NPDES Permit for the Discharge of Stormwater Associated with Industrial Activities (Industrial General Permit) or other individual or general NPDES permits or any waiver issued by the Regional or State Water Board pertaining to stormwater discharges.
		For Industrial General Permit facilities, identify whether the facility has filed a No Exposure Certification with the State Water Board.

Update Inventory

The critical sources inventory is updated at least annually. The update is accomplished through the collection of new information from sources such as field activities and readily available inter/intra-agency records (e.g. business licenses, pretreatment permits, sanitary sewer connection permits and the State Water Resources Control Board's Storm Water Multiple Application and Report Tracking System (SMARTS)).

[4] CWA § 303(d) listed or subject to a TMDL

Prioritization

Prioritizing facilities by their potential water quality impact provides an excellent opportunity to optimize the effectiveness of the Industrial/Commercial Facilities Program. The three inventory fields under the "Water Quality" category of Table ICF-2 provide information that allows for such a facility prioritization. Based on these fields, the following tables establish a method to prioritize all industrial/commercial facilities into three graded tiers – High, Medium and Low. The City may follow an alternative prioritization method provided it results in a similar three-tiered scheme. In order to maintain a minimum inspection frequency equivalent to the mandates of the MS4 Permit, a condition must be applied to the prioritization process. This condition is explained on the following page.

Prioritization factors

Factor	Description
A	Status of exposure of materials and industrial/commercial activities to stormwater
B	Identification of whether the facility is tributary to a waterbody segment with impairments[5] for pollutants that are also generated by the facility
C	Other factors determined by the City, such as size of facility, presence of exposed soil or history of stormwater violations

Utilizing these factors, follow steps 1, 2 and 3 below:

1. Collect necessary information to evaluate factors

Factor	Initial method	Subsequent method
A	Satellite imagery	Results of stormwater inspection
B	Cross reference Table ICF-4 or 5 with tributary TMDL/ 303(d) pollutants*	Cross reference inspection results with tributary TMDL/ 303(d) pollutants
C	Varies	

* See Pages ICF-9 and 10.

2. Evaluate factors

Factor	Result	Score
A	Low or no exposure	0
	Moderate exposure	½
	Significant exposure	1
B	No**	0
	Yes***	1
C	Low	0
	Medium	½
	High	1

** No pollutant generation/impairment matches
*** ≥ 1 pollutant generation/impairment matches

3. Prioritize facilities

A×B Score		C Score: 0	C Score: ½	C Score: 1
	0	Low	Medium	High
	½	Medium	High	High
	1	High	High	High

This method serves only as a guide to prioritization. The City may also prioritize facilities based on a qualitative assessment of factors A, B and C.

Figure ICF-1: Industrial/Commercial Facility Prioritization Scheme

[5] CWA § 303(d) listed or subject to a TMDL

Step 3 may also be expressed by the relationships $A \cdot B + C \geq 1 \rightarrow$ High, $1 > A \cdot B + C > 0 \rightarrow$ Medium and $A \cdot B + C = 0 \rightarrow$ Low. The purpose of multiplying A and B is to scale the impact of the presence of the pollutants at a facility (B) by the likelihood that they will be discharged to the MS4 (A). Factor C quantifies water quality concerns that are independent of A or B and as such is incorporated through addition. The purpose of this numerical approach is to provide consistency to the prioritization process. It is intended solely as a guide. The City may also prioritize facilities based on a qualitative assessment of factors A, B and C as listed in Figure ICF-1.

Prioritization Condition

The facility prioritization impacts the inspection frequency. In fact the main objective of prioritizing the facilities is to adjust the inspection schedule to focus efforts on water quality priorities. The intent is not to reduce the total number of inspections. In order to maintain a total number of inspections in line with the expectations of the MS4 Permit (i.e. result in the same number of average inspections per year as a semi-quinquennial frequency), one additional condition must be imposed:

> ***The total number of low priority facilities is less than or equal to 3 times the number of high priority facilities.***
>
> *Prioritization condition*

Prioritization Frequency

The default priority for a facility is Medium. Prioritization and reprioritization may be conducted at any time based on the discretion of the City. Figure ICF-2 is a flowchart of the prioritization process.

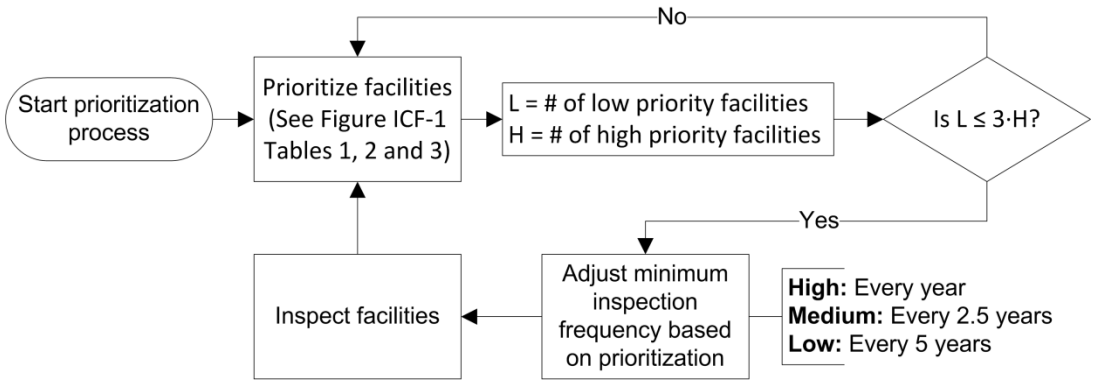

Figure ICF-2: Prioritization Process

Educate Industrial/Commercial Sources

Permit § VI.D.6.c (LA)/ §VII.G.3 (LB)

At least once during the five-year period of the MS4 Permit, the owner/operator of each of the inventoried critical sources is notified of the BMP requirements applicable to the facility/source.

Business Assistance Program

The Business Assistance Program provides technical information to businesses to facilitate their efforts to reduce the discharge of pollutants in stormwater. Assistance is targeted to select business sectors or small businesses upon a determination that their activities may be contributing substantial pollutant loads to the MS4 or receiving water. Assistance may include technical guidance and provision of educational materials. The Program includes at least one of the following components:

- **Technical Guidance** – Provide on-site technical assistance, telephone, or e-mail consultation regarding the responsibilities of businesses to reduce the discharge of pollutants, procedural requirements, and available guidance documents. Guidance methods include but are not limited to:
    - Technical guidance through the critical source inspection program. During an inspection the inspector provides to the business owner/operator 1) on-site technical assistance and 2) contact information for continued consultation. The inspector may also refer staff to relevant fact sheets from the *CASQA Industrial and Commercial BMP Handbook*.
    - Technical guidance initiated with businesses through an informational letter, email, webpage or social media. The notice provides contact information of relevant stormwater staff for business assistance as well as hyperlinks to available guidance documents such as the *CASQA Industrial and Commercial BMP Handbook*.
- **Educational Materials** – Distribute stormwater pollution prevention educational materials to operators of 1) auto repair shops, car wash facilities, restaurants and 2) mobile sources including automobile/equipment repair, washing, or detailing, power washing services, mobile carpet, drape, or upholstery cleaning services, swimming pool, water softener, and spa services, portable sanitary services and commercial applicators and distributors of pesticides, herbicides and fertilizers, if present. Material sources and distribution methods include but are not limited to:
    - Distribution method – The presence of these businesses within an agency's jurisdiction may be determined through business licenses or other readily available inter/intra-agency records.
    - Material sources – Educational materials are available at USEPA's Nonpoint Source (NPS) Outreach Toolbox at http://cfpub.epa.gov/npstbx/index.html. The toolbox is a database of nationwide public education materials that is intended for use by state and local campaigns. The toolbox contains a variety of resources to help develop an effective and targeted outreach campaign.

Inspect Critical Industrial/Commercial Sources

Modified from Permit §VI.D.6.d-e (LA)/ §VII.G.4-5(LB)

Frequency of Inspections

Following the facility prioritization method described in this guidance document, the City will inspect high priority facilities annually, medium priority facilities semi-quinquennially (once every 2.5 years) and low priority facilities quinquennially (once every five years). The frequencies may be altered by the exclusions defined in the following section. The prioritization condition on Page ICF-4 ensures at least the same average number of inspections conducted per year as the semi-quinquennial frequency defined in the MS4 Permit.

The City will conduct the first compliance inspection of industrial/commercial facilities within one year of the approval of the Watershed Management Program by the Executive Officer. There will be a minimum interval of six months between the first and the second mandatory compliance inspections.

Exclusions to the Frequency of Industrial Inspections

Exclusion of Facilities Previously Inspected by the Regional Water Board

The State Water Board's Stormwater Multiple Application and Report Tracking System (SMARTS) database[6] is reviewed at defined intervals to determine if an industrial facility has recently been inspected by the Regional Water Board. The first interval is two years after the effective date of the MS4 Permit (LA: December 28, 2014, LB: March 28,, 2016) and the second interval is four years after the effective date (LA: December 28, 2016, LB: March 28, 2018). If it is determined through the review that the Regional Water Board conducted an inspection of a facility within the prior 24 month period, then the facility does not require an inspection.

No Exposure Verification

The initial inspection identifies those facilities that have filed a No Exposure Certification with the State Water Board. Three to four years after the effective date of the MS4 Permit, a second inspection is performed for at least 25% of the facilities identified to have filed a No Exposure Certification. The purpose of this inspection is to verify the continuity of the no exposure status.

Scope of Inspections

A template inspection form is included as Attachment ICF-A.

Scope of Commercial Inspections

Commercial critical source facilities are inspected to confirm that stormwater and non-stormwater BMPs are effectively implemented in compliance with municipal ordinances. At each facility, inspectors verify that the operator is implementing effective source control BMPs for each corresponding activity. The implementation of additional BMPs is required where stormwater from the MS4 discharges to a significant ecological area (SEA), a water body subject to TMDL provisions[7], or a CWA §303(d) listed impaired water body. For those BMPs that are not adequately protective of water quality standards, additional site-specific controls may be required.

Scope of Mandatory Industrial Facility Inspections

At each industrial critical source the inspector confirms that the facility

- Has a current Waste Discharge Identification (WDID) number for coverage under the Industrial General Permit, and that a Storm Water Pollution Prevention Plan (SWPPP) is available on-site; or
- Has applied for, and has received a current No Exposure Certification for facilities subject to this requirement;
- Is effectively implementing BMPs in compliance with municipal ordinances. Facilities must implement the source control BMPs identified in Table ICF-3, unless the pollutant generating activity does not occur. Additional BMPs must be implemented where stormwater from the MS4 discharges to a water body subject to TMDL Provisions in Part VI.E of the MS4 Permit, or a CWA § 303(d) listed impaired water body. If the specified BMPs are not adequately protective of water quality standards, additional site-specific controls may be required. For critical sources that discharge to MS4s that discharge to SEAs, operators must implement additional pollutant-specific controls to reduce pollutants in stormwater runoff that are causing or contributing to

[6] SMARTS is accessible at https://smarts.waterboards.ca.gov/smarts/faces/SwSmartsLogin.jsp
[7] As described in Part VI.E of the MS4 Permit

exceedances of water quality standards.

- Applicable industrial facilities identified as not having either a current WDID or No Exposure Certification are notified that they must obtain coverage under the Industrial General Permit and will be referred to the Regional Water Board per the Progressive Enforcement Policy procedures identified in Part VI.D.2 of the MS4 Permit.

Source Control BMPs

Permit § VI.D.6.f (LA)/ §VII.G.6 (LB)

Effective source control BMPs for the activities listed in Table ICF-3 are implemented at commercial and industrial facilities, unless the pollutant generating activity does not occur:

Significant Ecological Areas (SEAs)

Permit § VI.D.6.g (LA)/ §VII.H (LB)

For critical sources that discharge to MS4s that discharge to SEAs, each Permittee will require operators to implement additional pollutant-specific controls to reduce pollutants in stormwater runoff that are causing or contributing to exceedances of water quality standards.

Progressive Enforcement

Permit § VI.D.6.h (LA)/ §VII.I (LB)

Each Permittee will implement its Progressive Enforcement Policy to ensure that Industrial / Commercial facilities are brought into compliance with all stormwater requirements within a reasonable time period. See Part VI.D.2 of the MS4 Permit for requirements for the development and implementation of a Progressive Enforcement Policy.

RB-AR8656

Table ICF-3: Source Control BMPs at Commercial and Industrial Facilities

Pollutant-Generating Activity	BMP Description	BMP Fact Sheet*
Unauthorized Non-Storm water Discharges	Effective elimination of non-stormwater discharges	SC-10
Accidental Spills/ Leaks	Implementation of effective spills/ leaks prevention and response procedures	SC-11
Vehicle/ Equipment Fueling	Implementation of effective fueling source control devices and practices	SC-20
Vehicle/ Equipment Cleaning	Implementation of effective equipment/vehicle cleaning practices and appropriate wash water management practices	SC-21
Vehicle/ Equipment Repair	Implementation of effective vehicle/ equipment repair practices and source control devices	SC-22
Outdoor Liquid Storage	Implementation of effective outdoor liquid storage source controls and practices	SC-31
Outdoor Equipment Operations	Implementation of effective outdoor equipment source control devices and practices	SC-32
Outdoor Storage of Raw Materials	Implementation of effective source control practices and structural devices	SC-33
Storage and Handling of Solid Waste	Implementation of effective solid waste storage/ handling practices and appropriate control measures	SC-34
Building and Grounds Maintenance	Implementation of effective facility maintenance practices	SC-41
Parking/ Storage Area Maintenance	Implementation of effective parking/ storage area designs and housekeeping/ maintenance practices	SC-43
Stormwater Conveyance System Maintenance	Implementation of proper conveyance system operation and maintenance protocols	SC-44
Pollutant-Generating Activity	**BMP Description from Regional Water Board Resolution No. 98-08**	
Sidewalk Washing	1. Remove trash, debris, and free standing oil/grease spills/leaks (use absorbent material, if necessary) from the area before washing; and 2. Use high pressure, low volume spray washing using only potable water with no cleaning agents at an average usage of 0.006 gallons per square feet of sidewalk area.	
Street Washing	Collect and divert wash water to the sanitary sewer – publically owned treatment works (POTW). Note: POTW approval may be needed.	

* Source: CASQA Industrial and Commercial Stormwater BMP Handbook, 2003

Table ICF-4: Potential Pollutants from Industrial Activities*

Activity or Facility Type	Potential Pollutants								
	Sediments	Nutrients	Metals	Organics and Toxicants**	Floatable Materials	Oxygen-Demanding Substances	Oil and Grease	Bacteria	Pesticides
Vehicle & Equipment Fueling			X	X					
Vehicle & Equipment Washing and Steam Cleaning	X	X	X	X		X	X		
Vehicle & Equipment Maintenance and Repair			X	X			X		
Outdoor Loading & Unloading of Materials	X	X	X	X	X	X	X		
Outdoor Container Storage of Liquids		X	X	X		X	X		X
Outdoor Process Equipment Operations and Maintenance	X		X	X			X		
Outdoor Storage of Raw Materials, Products, and Byproducts	X	X	X	X	X	X	X		
Waste Handling & Disposal			X	X	X	X	X	X	
Contaminated or Erodible Surface Areas	X	X	X	X	X	X	X	X	
Building and Grounds Maintenance	X	X	X		X	X		X	X
Building Repair, Remodeling, and Construction	X		X		X	X			
Parking/Storage Area Maintenance			X	X	X		X		

* Source: CASQA Industrial and Commercial Stormwater BMP Handbook, 2003

** This includes all toxic pollutants other than pesticides

Table ICF-5: Potential Pollutants by Industrial/Commercial Facility Type*

Activity or Facility Type	Potential Pollutants								
	Sediments	Nutrients	Metals	Organics and Toxicants**	Floatable Materials	Oxygen-Demanding Substances	Oil and Grease	Bacteria	Pesticides
Vehicle mechanical repair, maintenance, fueling, or cleaning	X	X	X	X		X	X		
Airplane mechanical repair, maintenance, fueling, or cleaning	X	X	X	X		X	X		
Boat mechanical repair, maintenance, fueling, or cleaning	X	X	X	X		X	X		
Equipment repair, maintenance, fueling, or cleaning	X	X	X	X		X	X		
Automobile and other vehicle body repair or painting			X	X			X		
Mobile automobile or other vehicle washing	X	X	X			X	X		
Automobile (or other vehicle) parking lots and storage			X		X		X		
Retail or wholesale fueling			X	X	X		X		
Pest control services									X
Eating or drinking establishments		X		X	X	X	X	X	X
Mobile carpet, drape or furniture cleaning	X			X					
Cement mixing or cutting	X								
Masonry	X								
Painting and coating			X	X			X		
Botanical or zoological gardens and exhibits	X	X			X	X		X	X
Landscaping	X	X			X	X		X	X
Nurseries and greenhouses	X	X			X	X		X	X
Golf courses, parks and other recreational areas/facilities	X	X			X	X		X	X
Cemeteries	X	X			X	X		X	X
Pool and fountain cleaning		X	X	X	X	X		X	
Marinas			X	X	X	X	X	X	
Port-a-Potty servicing		X			X	X		X	

* Source: Orange County Drainage Area Management Plan, 2003

** This includes all toxic pollutants other than pesticides

RB-AR8659

Planning and Land Development Program

The Cities are required to implement a Planning and Land Development program that includes the provisions listed in the MS4 Permit (LA MS4 Permit §VI.D.7, LB MS4 Permit §VII.J). This document provides guidance that the participating cities can follow to implement a Planning and Land Development program in compliance with the MS4 Permit.

Introduction

Permit §VI.D.7.a (LA)/§VII.J.1 (LB)

The Planning and Land Development Program for all New Development and Redevelopment projects subject to the MS4 Permit includes measures to:

- Lessen the water quality impacts of development by using smart growth practices such as compact development, directing development towards existing communities via infill or redevelopment, and safeguarding of environmentally sensitive areas.
- Minimize the adverse impacts from stormwater runoff on the biological integrity of Natural Drainage Systems and the beneficial uses of water bodies in accordance with requirements under CEQA (Cal. Pub. Resources Code §21000 et seq.).
- Minimize the percentage of impervious surfaces on land developments by minimizing soil compaction during construction, designing projects to minimize the impervious area footprint, and employing Low Impact Development (LID) design principles to mimic pre-development hydrology through infiltration, evapotranspiration and rainfall harvest and use.
- Maintain existing riparian buffers and enhance riparian buffers when possible.
- Minimize pollutant loadings from impervious surfaces such as roof tops, parking lots, and roadways through the use of properly designed, technically appropriate BMPs (including Source Control BMPs such as good housekeeping practices), LID Strategies, and Treatment Control BMPs.
- Properly select, design and maintain LID and Hydromodification Control BMPs to address pollutants that are likely to be generated, reduce changes to pre-development hydrology, assure long-term function, and avoid the breeding of vectors.[1]
- Prioritize the selection of BMPs to remove stormwater pollutants, reduce stormwater runoff volume, and beneficially use stormwater to support an integrated approach to protecting water quality and managing water resources in the following order of preference:
    - On-site infiltration, bioretention and/or rainfall harvest and use.
    - On-site biofiltration, off-site groundwater replenishment, and/or off-site retrofit.

[1] Treatment BMPs when designed to drain within 96 hours of the end of rainfall minimize the potential for the breeding of vectors. See California Department of Public Health *Best Management Practices for Mosquito Control in California* (2012) at http://www.westnile.ca.gov/resources.php

RB-AR8660

Applicability *Permit §VI.D.7.b (LA)/§VII.J.2-3 (LB)*

New Development Projects

The New Development and Redevelopment categories below will require a Standard Urban Stormwater Mitigation Plan (SUSMP), also known as a Low Impact Development (LID) Plan, containing stormwater mitigation measures in compliance with MS4 Permit requirements. Development projects subject to conditioning and approval for the design and implementation of post-construction controls to mitigate stormwater pollution, prior to completion of the project(s), are listed below:

1. All development projects (including single family hillside homes) equal to 1 acre or greater of disturbed area and adding more than 10,000 square feet of impervious surface area
2. Industrial parks with 10,000 square feet or more of surface area
3. Commercial malls with 10,000 square feet or more surface area
4. Retail gasoline outlets with 5,000 square feet or more of surface area
5. Restaurants (SIC 5812) with 5,000 square feet or more of surface area
6. Parking lots with 5,000 square feet or more of impervious surface area, or with 25 or more parking spaces
7. Automotive service facilities (SIC 5013, 5014, 5511, 5541, 7532-7534 and 7536-7539) with 5,000 square feet or more of surface area
8. Projects located in or directly adjacent to, or discharging directly to a Significant Ecological Area (SEA), where the development will:
    a. Discharge stormwater runoff that is likely to impact a sensitive biological species or habitat; and
    b. Create 2,500 square feet or more of impervious surface area
9. Redevelopment projects in subject categories that meet Redevelopment thresholds identified below

Redevelopment Projects

Redevelopment projects subject to agency conditioning and approval for the design and implementation of post-construction controls to mitigate stormwater pollution, prior to completion of the project(s), are:

1. Land-disturbing activity that results in the creation or addition or replacement of 5,000 square feet or more of impervious surface area on an already developed site on development categories identified above.
2. Where Redevelopment results in an alteration to more than fifty percent of impervious surfaces of a previously existing development, and the existing development was not subject to post-construction stormwater quality control requirements, the entire project must be mitigated.
3. Where Redevelopment results in an alteration of less than fifty percent of impervious surfaces of a previously existing development, and the existing development was not subject to post-construction stormwater quality control requirements, only the alteration must be mitigated, and not the entire

development.

4. Redevelopment does not include routine maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, original purpose of facility or emergency Redevelopment activity required to protect public health and safety. Impervious surface replacement, such as the reconstruction of parking lots and roadways which does not disturb additional area and maintains the original grade and alignment, is considered a routine maintenance activity. Redevelopment does not include the repaving of existing roads to maintain original line and grade.
5. Existing single-family dwelling and accessory structures are exempt from the Redevelopment requirements unless such projects create, add, or replace 10,000 square feet of impervious surface area.

Special Provisions

1. Street and road construction of 10,000 square feet or more of impervious surface area
    a. These projects will follow an approved green streets manual to the maximum extent practicable. Street and road construction applies to standalone streets, roads, highways, and freeway projects, and also applies to streets within larger projects. The Cities will require a Standard Urban Mitigation Plan (SUSMP), also known as a Low Impact Development (LID) Plan, containing stormwater mitigation measures in compliance with the approved green streets manual requirements.
2. Single family hillside homes will require a less extensive plan. To the extent that an agency may lawfully impose conditions, mitigation measures or other requirements on the development or construction of a single-family home in a hillside area as defined in the applicable agency's Code and Ordinances, the Cities will require that during the construction of a single-family hillside home, the following measures are implemented:
    a. Conserve natural areas
    b. Protect slopes and channels
    c. Provide storm drain system stenciling and signage
    d. Divert roof runoff to vegetated areas before discharge unless the diversion would result in slope instability
    e. Direct surface flow to vegetated areas before discharge unless the diversion would result in slope instability.

New Development/ Redevelopment Project Performance Criteria *Permit §VI.D.7.c (LA)/§VII.J.4 (LB)*

Integrated Water Quality/Flow Reduction/Resources Management Criteria

All New Development and Redevelopment projects identified above will control pollutants, pollutant loads, and runoff volume emanating from the project site by: (1) minimizing the impervious surface area and (2) controlling runoff from impervious surfaces through infiltration, bioretention and/or rainfall harvest and use.

Projects will retain on-site the Stormwater Quality Design Volume (SWQDv) defined as the runoff from the 0.75-inch, 24-hour rain event or the 85th percentile, 24-hour rain event, as determined from the Los Angeles County 85th percentile precipitation isohyetal map[2], *whichever is greater*. Exceptions include technical infeasibility, opportunity for regional groundwater replenishment, local ordinance equivalence, or hydromodification, as described in the sections below.

When evaluating the potential for on-site retention, the Cities will consider the maximum potential for evapotranspiration from green roofs and rainfall harvest and use.

Alternative Compliance for Technical Infeasibility or Opportunity for Regional Groundwater Replenishment

In instances of technical infeasibility or where a project has been determined to provide an opportunity to replenish regional groundwater supplies at an offsite location, the Cities may allow projects to comply with the MS4 Permit through the alternative compliance measures as described below:

1. To demonstrate technical infeasibility, the project applicant must demonstrate that the project cannot reliably retain 100 percent of the SWQDv on-site, even with the maximum application of green roofs and rainwater harvest and use, and that compliance with the applicable post-construction requirements would be technically infeasible by submitting a site-specific hydrologic and/or design analysis conducted and endorsed by a registered professional engineer, geologist, architect, and/or landscape architect. Conditions where technical infeasibility may result including those indicated in

[2] Found at <http://ladpw.org/wrd/publication/engineering/Final_Report-Probability_Analysis_of_85th_Percentile_24-hr_Rainfall1.pdf>

2. Table PLD- **1** below. To utilize alternative compliance measures to replenish groundwater at an offsite location, the project applicant will demonstrate *(i)* why it is not advantageous to replenish groundwater at the project site, *(ii)* that groundwater can be used for beneficial purposes at the offsite location, and *(iii)* that the alternative measures will also provide equal or greater water quality benefits to the receiving surface water than the Water Quality/Flow Reduction/Resource Management Criteria.

Table PLD- 1: Technical Infeasibility Criteria

1.	The infiltration rate of saturated in-situ soils is less than 0.3 inch per hour and it is not technically feasible to amend the in-situ soils to attain an infiltration rate necessary to achieve reliable performance of infiltration or bioretention BMPs in retaining the SWQDv on-site.
2.	Locations where seasonal high groundwater is within 5 to 10 feet of the surface,
3.	Locations within 100 feet of a groundwater well used for drinking water,
4.	Brownfield development sites where infiltration poses a risk of causing pollutant mobilization,
5.	Other locations where pollutant mobilization is a documented concern. Pollutant mobilization is considered a documented concern at or near properties that are contaminated or store hazardous substances underground.
6.	Locations with potential geotechnical hazards
7.	Smart growth and infill or Redevelopment locations where the density and/ or nature of the project would create significant difficulty for compliance with the on-site volume retention requirement.

Alternative Compliance Measures

When a project applicant has demonstrated that it is technically infeasible to retain 100 percent of the SWQDv on-site, or is proposing an alternative offsite project to replenish regional groundwater supplies, the agency will require one of the following mitigation options:

1. On-site Biofiltration

   If using biofiltration due to demonstrated technical infeasibility, then the project must biofiltrate 1.5 times the portion of the SWQDv that is not reliably retained on-site, as calculated by Equation 1 below.

   $$B_v = 1.5 * [SWQD_v - R_V]$$ *Equation 1*

   Where:

   Bv = biofiltration volume

   SWQDv = the stormwater runoff from a 0.75 inch, 24-hour storm or the 85th percentile storm[3], *whichever is greater*.

   Rv = volume reliably retained on-site

   The MS4 Permit does not mention flowrate based biotreatment BMPs; however, proprietary biotreatment systems are often sized using flowrate rather than volume. Additionally, in cases where a pump is needed prior to entering the biotreatment BMP, the system requires sizing based on the controlled flow from the pump. Therefore, if it is infeasible to size a biotreatment BMP with volume-based calculations, the flowrate may be substituted in lieu of volume. Similarly, the flow rate must be determined using the design storm of 0.75 inch, 24-hour storm event or the 85th percentile storm[1], whichever is greater.

   Conditions for On-site Biofiltration include the following:

   a. Biofiltration systems will meet the design specifications provided in Attachment H to the MS4 Permit unless otherwise approved by the Regional Water Board Executive Officer.

[3] Found at <http://ladpw.org/wrd/publication/engineering/Final_Report-Probability_Analysis_of_85th_Percentile_24-hr_Rainfall1.pdf>

b. Biofiltration systems discharging to a receiving water that is included on the Clean Water Act section 303(d) list of impaired water quality-limited water bodies due to nitrogen compounds or related effects will be designed and maintained to achieve enhanced nitrogen removal capability. See Attachment H of the MS4 Permit for design criteria for underdrain placement to achieve enhanced nitrogen removal.

2. Offsite Infiltration

Offsite infiltration when implemented will use infiltration or bioretention BMPs to intercept a volume of stormwater runoff equal to the SWQDv, less the volume of stormwater runoff reliably retained on-site, at an approved offsite project and provide pollutant reduction (treatment) of the stormwater runoff discharged from the project site in accordance with the Water Quality Mitigation Criteria. The required offsite mitigation volume will be calculated by Equation 2 below.

$$M_v = 1.0 * [SWQD_v - R_v] \qquad \textit{Equation 2}$$

Where:

M_v = mitigation volume

$SWQD_v$ = runoff from the 0.75 inch, 24-hour storm event or the 85th percentile storm[4], *whichever is greater*

R_v = the volume of stormwater runoff reliably retained on-site.

3. Groundwater Replenishment Projects

Regional projects to replenish regional groundwater supplies at offsite locations may be proposed, provided the groundwater supply has a designated beneficial use in the Basin Plan. Regional groundwater replenishment projects must use infiltration, groundwater replenishment, or bioretention BMPs to intercept a volume of stormwater runoff equal to the SWQDv for New Development and Redevelopment projects, subject to conditioning and approval for the design and implementation of post-construction controls, within the approved project area. The projects must provide pollutant reduction (treatment) of the stormwater runoff discharged from development projects, within the project area, subject to conditioning and approval for the design and implementation of post-construction controls to mitigate stormwater pollution in accordance with the Water Quality Mitigation Criteria.

Regional groundwater replenishment projects being implemented in lieu of onsite controls will mitigate the volume as calculated using Equation 2 above.

Regional groundwater replenishment projects will be located in the same sub-watershed (defined as draining to the same HUC-12 hydrologic area in the Basin Plan) as the New Development or Redevelopment projects which did not implement on-site retention BMPs. Locations outside of the HUC-12 but within the HUC-10 subwatershed area may be considered if there are no opportunities within the HUC-12 subwatershed or if greater pollutant reductions and/or groundwater

[4] Found at <http://ladpw.org/wrd/publication/engineering/Final_Report-Probability_Analysis_of_85th_Percentile_24-hr_Rainfall1.pdf>

replenishment can be achieved at a location within the expanded HUC-10 subwatershed. *The use of a mitigation, groundwater replenishment, or retrofit project outside of the HUC-12 subwatershed is subject to the approval of the Executive Officer of the Regional Water Board*.

4. Offsite Project -Retrofit Existing Development

   Use infiltration, bioretention, rainfall harvest and use and/or biofiltration BMPs to retrofit an existing development, with similar land uses as the New Development or land uses associated with comparable or higher stormwater runoff event mean concentrations (EMCs) than the new development. Comparison of EMCs for different land uses will be based on published data from studies performed in southern California. The retrofit plan will be designed and constructed to:

   a. Intercept a volume of stormwater runoff equal to the mitigation volume (Mv) as described above in Equation 2, except biofiltration BMPs will be designed to meet the biofiltration volume or flowrate as described in Equation 1, and

   b. Provide pollutant reduction (treatment) of the stormwater runoff from the project site as described in the Water Quality Mitigation Criteria.

5. Conditions for Offsite Projects

   Project applicants seeking to utilize these alternative compliance provisions may propose other offsite projects, which the agency in which the project is located may approve if they meet the requirements of this subpart.

   a. Location of offsite projects. Offsite projects will be located in the same sub-watershed (defined as draining to the same HUC-12 hydrologic area in the Basin Plan) as the New Development or Redevelopment project. Locations outside of the HUC-12 but within the HUC-10 subwatershed area may be considered if there are no opportunities within the HUC-12 subwatershed or if greater pollutant reductions and/or groundwater replenishment can be achieved at a location within the expanded HUC-10 subwatershed. *The use of a mitigation, groundwater replenishment, or retrofit project outside of the HUC-12 subwatershed is subject to the approval of the Executive Officer of the Regional Water Board.*

   b. Project applicant must demonstrate that equal benefits to groundwater recharge can be met on the project site.

   c. A prioritized list of potential offsite mitigation, groundwater replenishment and/or retrofit projects will be developed within each agency, and when feasible, the mitigation will be directed to the highest priority project within the same HUC-12 or if approved by the Regional Water Board Executive Officer, the HUC-10 drainage area, as the New Development project.

   d. Infiltration/bioretention will be the preferred LID BMP for offsite mitigation or groundwater replenishment projects. Offsite retrofit projects may include green streets, parking lot retrofits, green roofs, and rainfall harvest and use. Biofiltration BMPs may be considered for retrofit projects when infiltration, bioretention or rainfall harvest and use is technically infeasible.

   e. The agency in which the project is located will develop a schedule for the completion of offsite projects, including milestone dates to identify, fund, design, and construct the projects. Offsite

projects will be completed as soon as possible, and at the latest, within 4 years of the certificate of occupancy for the first project that contributed funds toward the construction of the offsite project, unless a longer period is otherwise authorized by the Executive Officer of the Regional Water Board. For public offsite projects, the agency in which the project is located must provide in their annual reports a summary of total offsite project funds raised to date and a description (including location, general design concept, volume of water expected to be retained, and total estimated budget) of all pending public offsite projects. Funding sufficient to address the offsite volume must be transferred to the agency (for public offsite mitigation projects) or to an escrow account (for private offsite mitigation projects) within one year of the initiation of construction.

f. Offsite projects must be approved by the agency in which the project is located and may be subject to approval by the Regional Water Board Executive Officer, if a third-party petitions the Executive Officer to review the project. Offsite projects will be publicly noticed on the Regional Water Board's website for 30 days prior to approval.

g. The project applicant must perform the offsite projects as approved by either the agency or the Regional Water Board Executive Officer or provide sufficient funding for public or private offsite projects to achieve the equivalent mitigation stormwater volume.

6. Regional Stormwater Mitigation Program

An agency or agency group may apply to the Regional Water Board for approval of a regional or sub-regional stormwater mitigation program to substitute in part or wholly for New and Redevelopment requirements for the area covered by the regional or sub-regional stormwater mitigation program. Upon review and a determination by the Regional Water Board Executive Officer that the proposal is technically valid and appropriate, the Regional Water Board may consider for approval such a program if its implementation meets all of the following requirements:

a. Retains the runoff from the 85th percentile, 24-hour rain event or the 0.75 inch, 24-hour rain event, whichever is greater;

b. Results in improved stormwater quality;

c. Protects stream habitat;

d. Promotes cooperative problem solving by diverse interests;

e. Is fiscally sustainable and has secure funding; and

f. Is completed in five years including the construction and start-up of treatment facilities.

7. Water Quality Mitigation Criteria

All New Development and Redevelopment projects that have been approved for offsite mitigation or groundwater replenishment projects will also provide treatment of stormwater runoff from the project site. These projects will design and implement post-construction stormwater BMPs and control measures to reduce pollutant loading as necessary to:

a. Meet the pollutant specific benchmarks listed in Table PLD2 at the treatment systems outlet or prior to the discharge to the MS4, and

b. Ensure that the discharge does not cause or contribute to an exceedance of water quality standards at the agency's downstream MS4 outfall.

The project proponent may be allowed to install flow-through modular treatment systems including sand filters, or other proprietary BMP treatment systems with a demonstrated efficiency at least equivalent to a sand filter. The sizing of the flow through treatment device will be based on a rainfall intensity of 0.2 inches per hour, or the one year, one-hour rainfall intensity as determined from the most recent Los Angeles County isohyetal map, *whichever is greater*.

Table PLD- 2: Benchmarks Applicable to New Development Treatment BMPs.

Conventional Pollutants					
Pollutant	Suspended Solids mg/L	Total P mg/L	Total N mg/L	TKN mg/L	
Effluent Concentration	14	0.13	1.28	1.09	
Metals					
Pollutant	Total Cd µg/L	Total Cu µg/L	Total Cr µg/L	Total Pb µg/L	Total Zn µg/L
Effluent Concentration	0.3	6	2.8	2.5	23

New developments and redevelopments will not cause or contribute to an exceedance of applicable water quality-based effluent limitations established in the MS4 Permit pursuant to Total Maximum Daily Loads (TMDLs).

8. Hydromodification (Flow/ Volume/ Duration) Control Criteria

All New Development and Redevelopment projects located within natural drainage systems will implement hydrologic control measures, to prevent accelerated downstream erosion and to protect stream habitat in natural drainage systems. The purpose of the hydrologic controls is to minimize changes in post-development hydrologic stormwater runoff discharge rates, velocities, and duration. This will be achieved by maintaining the project's pre-project stormwater runoff flow rates and durations.

Description

Hydromodification control in natural drainage systems will be achieved by maintaining the Erosion Potential (Ep) in streams at a value of 1, unless an alternative value can be shown to be protective of the natural drainage systems from erosion, incision, and sedimentation that can occur as a result of flow increases from impervious surfaces and prevent damage to stream habitat in natural drainage system tributaries[5]. Hydromodification mitigation approaches should meet the criteria below:

a. Hydromodification control may include one, or a combination of on-site, regional or sub-regional hydromodification control BMPs, LID strategies, or stream and riparian buffer restoration measures. Any in-stream restoration measure shall not adversely affect the beneficial uses of the natural drainage systems.

b. Natural drainage systems that are subject to the hydromodification assessments and controls,

[5] See Attachment J of the MS4 Permit, "*Determination of Erosion Potential*"

as described in this section, include all drainages that have not been improved (e.g., channelized or armored with concrete, shotcrete, or rip-rap) or drainage systems that are tributary to a natural drainage system, except as provided in Exemptions to Hydromodification Controls, see below. The clearing or dredging of a natural drainage system does not constitute an "improvement."

c. Until the State Water Board or the Regional Water Board adopts a final Hydromodification Policy or criteria, the Hydromodification Control Criteria described in this section will be implemented to control the potential adverse impacts of changes in hydrology that may result from New Development and Redevelopment projects located within natural drainage systems.

Exemptions to Hydromodification Controls

New Development and Redevelopment projects may be exempt from implementation of hydromodification controls where assessments of downstream channel conditions and proposed discharge hydrology indicate that adverse hydromodification effects to beneficial uses of Natural Drainage Systems are unlikely. Conditions for exemptions include the following:

a. Projects involving replacement, maintenance or repair of an agency's existing flood control facility, storm drain, or transportation network.

b. Redevelopment Projects in the center of urban areas that do not increase the effective impervious area or decrease the infiltration capacity of pervious areas compared to the pre-project conditions.

c. Projects that have any increased discharge directly or via a storm drain to a sump, lake, area under tidal influence, into a waterway that has a 100-year peak flow (Q100) of 25,000 cfs or more, or other receiving water that is not susceptible to hydromodification impacts.

d. Projects that discharge directly or via a storm drain into concrete or otherwise engineered (not natural) channels (e.g., channelized or armored with rip rap, shotcrete, etc.), which, in turn, discharge into receiving water that is not susceptible to hydromodification impacts.

e. LID BMPs implemented on single family homes are sufficient to comply with hydromodification criteria.

Hydromodification Control Criteria

The Hydromodification Control Criteria to protect natural drainage systems are as follows:

a. Except for exemptions described above, projects disturbing an area greater than 1 acre but less than 50 acres within natural drainage systems will be presumed to meet pre-development hydrology if one of the following demonstrations is made:

    i. The project is designed to retain on-site, through infiltration, evapotranspiration, and/or harvest and use, the stormwater volume from the runoff of the 95th percentile, 24-hour storm, or

ii. The runoff flow rate, volume, and velocity for the post-development condition do not exceed the pre-development condition for the 2-year, 24-hour rainfall event and the duration for the post-development condition is not less than the pre-development condition for the 2-year, 24-hour rainfall event. This condition may be substantiated by simple screening models, including those described in Hydromodification Effects on Flow Peaks and Durations in Southern California Urbanizing Watersheds (Hawley et al., 2011) or other models acceptable to the Executive Officer of the Regional Water Board, or

The MS4 Permit states projects will meet Hydromodification Control Criteria if "*The...duration for the post-development condition **do[es] not exceed** the pre-development condition for the 2-year, 24-hour rainfall event*." The runoff duration (Tc) is generally associated with longer values resulting in lower concern for hydromodification impacts. Implementation of LID BMPs generally results in runoff not immediately (or not at all) discharging from the site, increasing the time of concentration. Thus, the interpretation presented herein is that Hydromodification Control Criteria would be met if the runoff duration for the post-development condition is **not less than** the pre-development condition for the 2-year, 24-hour rainfall event.

iii. The Erosion Potential (Ep) in the receiving water channel will approximate 1, as determined by a Hydromodification Analysis Study and the equation presented in Attachment J of the MS4 Permit. Alternatively, agencies can opt to use other work equations to calculate Erosion Potential with Executive Officer approval.

b. Projects disturbing 50 acres or more within natural drainage systems will be presumed to meet pre-development hydrology based on the successful demonstration of one of the following conditions:

i. The site infiltrates on-site at least the runoff from a 2-year, 24hour storm event, or

ii. The runoff flow rate, volume, and velocity for the post-development condition does not exceed the pre-development condition for the 2-year, 24-hour rainfall event and the duration for the post-development condition is not less than the pre-development condition for the 2-year, 24-hour rainfall event. These conditions must be substantiated by hydrologic modeling acceptable to the Regional Water Board Executive Officer, or

iii. The Erosion Potential (Ep) in the receiving water channel will approximate 1, as determined by a Hydromodification Analysis Study and the equation presented in Attachment J of the MS4 Permit.

Alternative Hydromodification Criteria

The requirement for Hydromodification Controls will be satisfied by implementing the hydromodification requirements in the County of Los Angeles Low Impact Development Manual (2009) for all projects disturbing an area greater than 1 acre within natural drainage systems.

3. Watershed Equivalence

Regardless of the methods through which applicants implement alternative compliance measures,

the subwatershed-wide (defined as draining to the same HUC-12 hydrologic area in the Basin Plan) result of all development must be at least the same level of water quality protection as would have been achieved if all projects utilizing these alternative compliance provisions had complied with the Integrated Water Quality/Flow Reduction/Resource Management Criteria, described herein.

4. Annual Report

   Annual Reports will be provided to the Regional Water Board to include a list of mitigation project descriptions and estimated pollutant and flow reduction analyses (compiled from design specifications submitted by project applicants, as approved. Within 4 years of the MS4 Permit adoption, the Annual Reports will include a comparison of the expected aggregate results of alternative compliance projects to the results that would otherwise have been achieved by retaining on site the SWQDv.

Implementation *Permit §VI.D.7.d (LA)/§VII.J.5 (LB)*

Local Ordinance Equivalence

Alternative requirements in the local ordinances for the agencies of this WMP will provide equal or greater reduction in stormwater discharge pollutant loading and volume as would have been obtained through strict conformance with the Integrated Water Quality/Flow Reduction Resources Management Criteria, Alternative Compliance Measures for Technical Infeasibility, or Opportunity for Regional Groundwater Replenishment sections herein and, if applicable, the Hydromodification (Flow/Volume Duration) Control Criteria section herein.

Project Coordination

A process for effective approval of post-construction stormwater control measures will be developed to include:

a. Detailed LID site design and BMP review including review of BMP sizing calculations, BMP pollutant removal performance, and municipal approval; and

b. An established structure for communication and delineated authority between and among municipal departments that have jurisdiction over project review, plan approval, and project construction through memoranda of understanding or an equivalent agreement.

Maintenance Agreement and Transfer

Prior to issuing approval for final occupancy, the Cities will require that all New Development and Redevelopment projects subject to post-construction BMP requirements, with the exception of simple LID BMPs implemented on single family residences, provide an operation and maintenance plan, monitoring plan, where required, and verification of ongoing maintenance provisions for LID practices, Treatment Control BMPs, and Hydromodification Control BMPs including but not limited to: final map conditions, legal agreements, covenants, conditions or restrictions, CEQA mitigation requirements, conditional use permits, and/ or other legally binding maintenance agreements (see Attachments PLD-A and PLD-B for MCA and MCA Termination sample templates, respectively). Agencies will require maintenance records be kept on site.

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Verification at a minimum will include the developer's signed statement accepting responsibility for maintenance until the responsibility is legally transferred; and either:

a. A signed statement from the public entity assuming responsibility for BMP maintenance; or

b. Written conditions in the sales or lease agreement, which require the property owner or tenant to assume responsibility for BMP maintenance and conduct a maintenance inspection at least once a year; or

c. Written text in project covenants, conditions, and restrictions (CCRs) for residential properties assigning BMP maintenance responsibilities to the Home Owners Association; or

d. Any other legally enforceable agreement or mechanism that assigns responsibility for the maintenance of BMPs.

All development projects subject to post-construction BMP requirements will provide a plan for the operation and maintenance of all structural and treatment controls. The plan will be submitted for examination of relevance to keeping the BMPs in proper working order. Where BMPs are transferred to agency for ownership and maintenance, the plan will also include all relevant costs for upkeep of BMPs in the transfer. Operation and Maintenance plans for private BMPs will be kept on-site for periodic review by agency inspectors.

A tracking system and an inspection and enforcement program will be maintained for New Development and Redevelopment post-construction stormwater as shown in Table PLC-3. Enforcement action will be taken per the established Progressive Enforcement Policy as appropriate based on the results of the inspection. See Section for requirements for the development and implementation of a Progressive Enforcement Policy (Appendix A-3-1_PEP).

Table PLD-3: Tracking, Inspection, and Enforcement Program Components

Program	Description	Components	
GIS or other Electronic System	A GIS or other electronic system will be implemented for tracking projects that have been conditioned for post-construction BMPs.	– Municipal Project ID – State WDID No. – Project Acreage – BMP Type and Description – BMP Location (coordinates) – Date of Maintenance Agreement – Date of Acceptance	– Maintenance Records – Inspection Date and Summary – Corrective Action – Date Certificate of Occupancy Issued – Replacement or Repair Date
Inspections[6]	Inspect all development sites upon completion of construction and prior to the issuance of occupancy	Proper installation of: – LID measures, – Structural BMPs,	

[6] The inspection may be combined with other inspections provided it is conducted by trained personnel.

	certificates.	– Treatment control BMPs, and – Hydromodification control BMPs.
Operation and Maintenance[7]	Verify proper operation and maintenance of post-construction BMPs. Inspection at least once every 2 years after project completion.	– Follow a Post-construction BMP Maintenance Inspection checklist (See Attachment PLD-C) – Assess operation and maintenance conditions relating to post-construction BMPs, including BMP repair, replacement, or re-vegetation.

Plan Certification

Each SUSMP/LID Plan should contain proper certifications. The following approach is suggested for SUSMP/LID Plan submittals:

- Form signed by the property owner/applicant stating the category in which the project falls under to easily define the NPDES requirements (see Attachment PLD-D for Form PC sample template).
- Form signed by the property owner/applicant certifying that the BMPs will be implemented, monitored, and maintained per SUSMP/LID Plan requirements (see Attachment PLD-E for Form P1 sample template).
- Form signed and stamped by a California registered civil engineer stating the proposed structural BMPs and certifying the methods and requirements are in compliance with the MS4 Permit requirements (see Attachment PLD-F for Form P2 sample template).

[7] For post-construction BMPs operated and maintained by parties other than the agency in which the BMP(s) is located, the agency will require the other parties to document proper maintenance and operations.

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Development Construction Program

The Cities are required to develop, implement and enforce a construction program that includes the provisions listed in MS4 Permit §VI.D.8 (LB §VII.K). This document provides guidance to assist the Cities in implementing a construction program in compliance with the MS4 Permit.

Objectives

Permit §VI.D.8.a (LA)/§VII.K.1 (LB)

The objectives of the construction program are to:

- Prevent illicit construction-related discharges of pollutants into the MS4 and receiving waters.
- Implement and maintain structural and non-structural BMPs to reduce pollutants in stormwater runoff from construction sites.
- Reduce construction site discharges of pollutants to the MS4 to the MEP.
- Prevent construction site discharges to the MS4 from causing or contributing to a violation of water quality standards.

Erosion and Sediment Control Ordinance

Permit §VI.D.8.b (LA)/ §VII.K.1 (LB)

The construction program requires an established, enforceable erosion and sediment control ordinance for all construction sites that disturb soil.

Applicability

Permit §VI.D.8.c (LA)/ §VII.K.1.v (LB)

The construction program addresses construction activity as defined in Table DC-1.

Table DC-1: Definitions

Construction Activity	
Definition	Any construction or demolition activity, clearing, grading, grubbing, or excavation or any other activity that results in land disturbance.
Examples	Grading, vegetation clearing, soil compaction, paving, repaving and linear underground/overhead projects (LUPs) that result in land disturbance.
Exclusions	Emergency construction required to immediately protect public health and safety, *routine maintenance* as defined below and agricultural activities.
Routine Maintenance (construction program exclusion)	
Definition	Projects required to maintain the integrity of structures, including but not limited to the following:
Examples	Maintaining the original line and grade, hydraulic capacity, or original purpose of the facility.
	Performing restoration work to preserve the original design grade, integrity and hydraulic capacity of flood control facilities.
	Performing road shoulder work, regrading dirt/gravel roadways/shoulders and cleaning out ditches.
	Update existing lines (includes replacing with new materials or pipe) and facilities to comply with applicable codes, standards, and regulations regardless if such projects result in increased capacity.
	Repair leaks
Exclusion	New lines (i.e. not associated with existing facilities and not part of a project to update or replace existing lines) or facilities constructed to comply with applicable codes, standards and regulations.

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The greater part of the construction program is dedicated to construction sites that disturb one acre or more of soil (with the exception of agricultural activities). This coincides with the size threshold for coverage under the State Water Resources Control Board's NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities. The program provisions exclusive to sites less than one acre are addressed first.

Construction Sites Less than One Acre

Permit §VI.D.8.d (LA)/§VII.K.1.vi (LB)

BMPs (< 1 acre)

Through the use of the erosion and sediment control ordinance and/or building permit, construction sites are required have in place an effective combination of erosion and sediment control BMPs from Table DC-2 to prevent erosion and sediment loss and the discharge of construction wastes.

Table DC-2: Applicable Set of BMPs for All Construction Sites

BMP Type	BMP
Erosion Controls	Scheduling
	Preservation of Existing Vegetation
Sediment Controls	Silt Fence
	Sand Bag Barrier
	Stabilized Construction Site Entrance/Exit
Nonstormwater Management	Water Conservation Practices
	Dewatering Operations
Waste Management	Material Delivery and Storage
	Stockpile Management
	Spill Prevention and Control
	Solid Waste Management
	Concrete Waste Management
	Sanitary/Septic Waste Management

Inventory (< 1 acre)

All construction sites with soil disturbing activities that require a permit, regardless of size, are identified and stored in an inventory. Existing permit databases or other tracking systems may be used to file this information. The list of permitted sites is provided to the Regional Water Board upon request.

Inspections (< 1 acre)

Construction sites are inspected on as needed based on the evaluation of the factors that are a threat to water quality. In evaluating the threat to water quality, the following factors are considered: soil erosion potential, site slope, project size and type, sensitivity of receiving water bodies, proximity to receiving water bodies, nonstormwater discharges, past record of noncompliance by the operators of the construction site and any water quality issues relevant to the particular MS4.

Enforcement (< 1 acre)

The Progressive Enforcement Policy (MS4 Permit §VI.D.2) is implemented to ensure that construction sites are brought into compliance with the erosion and sediment control ordinance within a reasonable time period.

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Construction Sites One Acre or Greater

Operators of public and private construction sites within a city's jurisdiction are required to select, install, implement, and maintain BMPs that comply with the erosion and sediment control ordinance.

Construction Site Inventory / Electronic Tracking System *Permit §VI.D.8.g (LA)/§VII.K.1.ix (LB)*

An electronic system is used to inventory all issued grading permits, encroachment permits, demolition permits, building permits, or construction permits (and any other municipal authorization to move soil and/ or construct or destruct that involves land disturbance). A database management system or GIS system is recommended. This inventory is continuously updated as new sites are permitted and sites are completed. The inventory / tracking system contains at a minimum the items listed in Table DC-3.

Table DC-3: Inventory Information for Constructions Sites

Information Type		Information
General	Name	Project Name
	Location	Site address and/or latitude and longitude coordinates
		Receiving water
	Contact	Names of owner and contractor
		Mailing addresses of owner and contractor
		Phone numbers of owner and contractor
		Emails (if available) of owner and contractor
Status		Start and end dates
		Permit approval date and anticipated completion date
		Erosion and Sediment Control Plan (ESCP) approval date
		Status of NOI submittal and CGP coverage
		Current construction phase (where feasible)
Size		Size of project and area of disturbance
Water quality		Proximity to waterbodies listed as impaired[1] by sediment related pollutants
		Proximity to waterbodies for which a sediment-related TMDL has been adopted and approved by USEPA
		Status as a significant threat to water quality (based on a consideration of factors listed in Appendix 1 to the CGP)
Inspection		Inspection frequency
Post construction		List of post-construction structural BMPs subject to O&M requirements

Construction Plan Review and Approval Procedures *Permit §VI.D.8.h (LA)/§VII.K.1.x (LB)*

Plan review procedures are developed and implemented such that the following minimum requirements are met:

- Prior to issuing a grading or building permit, each operator of a construction activity within the city's jurisdiction of which the project is located is required to prepare and submit an ESCP prior to the disturbance of land for review and written approval. The construction site operator is prohibited from commencing construction activity prior to receipt of written approval by the city of which the project is located. An ESCP is not approved unless it contains appropriate site-

[1] CWA §303(d) listed or subject to a TMDL

specific construction site BMPs that meet the minimum requirements of the erosion and sediment control ordinance.

- ESCPs must include the elements of a Storm Water Pollution Prevention Plan (SWPPP). SWPPPs prepared in accordance with the requirements of the Construction General Permit can be accepted as ESCPs.
- At a minimum, the ESCP must address the following elements:
    - Methods to minimize the footprint of the disturbed area and to prevent soil compaction outside of the disturbed area.
    - Methods used to protect native vegetation and trees.
    - Sediment/Erosion Control.
    - Controls to prevent tracking on and off the site.
    - Nonstormwater controls (e.g., vehicle washing, dewatering, etc.).
    - Materials Management (delivery and storage).
    - Spill Prevention and Control.
    - Waste Management (e.g., concrete washout/waste management; sanitary waste management).
    - Identification of site Risk Level as identified per the requirements in Appendix 1 of the Construction General Permit.
- The ESCP must include the rationale for the selection and design of the proposed BMPs, including quantifying the expected soil loss from different BMPs.
- The ESCP must be developed and certified by a Qualified SWPPP Developer (QSD).
- All structural BMPs must be designed by a licensed California Engineer.
- The landowner or the landowner's agent must sign a statement on the ESCP as follows (see Attachment DC-A for sample OC-1 template):

  "I certify that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that submitting false and/ or inaccurate information, failing to update the ESCP to reflect current conditions, or failing to properly and/ or adequately implement the ESCP may result in revocation of grading and/ or other permits or other sanctions provided by law."

- Prior to issuing a grading or building permit, the city of which the project is located verifies that the construction site operators have existing coverage under applicable permits, including, but not limited to the State Water Board's Construction General Permit, and State Water Board 401 Water Quality Certification.
- A checklist is used to conduct and document review of each ESCP (see Attachment DC-B for the ESCP Checklist sample template).

BMP Implementation Level *Permit §VI.D.8.i (LA)/§VII.K.1.xi (LB)*

The Cities will implement technical standards for the selection, installation and maintenance of construction BMPs for all construction sites within its jurisdiction.

The BMP technical standards require:

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- The use of BMPs that are tailored to the risks posed by the project. Sites are ranked from Low Risk (Risk 1) to High Risk (Risk 3). Project risks are calculated based on the potential for erosion from the site and the sensitivity of the receiving water body. Receiving water bodies that are listed on the Clean Water Act (CWA) Section 303(d) list for sediment or siltation are considered High Risk. Likewise, water bodies with designated beneficial uses of SPWN, COLD, and MIGR are also considered High Risk. The combined (sediment/receiving water) site risk is calculated using the methods provided in Appendix 1 of the Construction General Permit. At a minimum, the BMP technical standards include requirements for High Risk sites as defined in Table DC-7.
- The use of BMPs for all construction sites, sites equal or greater to 1 acre, and for paving projects per Table DC-6 and Table DC-8.
- Detailed installation designs and cut sheets for use within ESCPs.
- Maintenance expectations for each BMP, or category of BMPs, as appropriate.

Permittees are encouraged to adopt respective BMPs from latest versions of the California BMP Handbook, Construction or Caltrans Stormwater Quality Handbooks, Construction Site Best Management Practices (BMPs) Manual and addenda. Alternatively, Permittees are authorized to develop or adopt equivalent BMP standards consistent for Southern California and for the range of activities presented in Tables DC-5 through DC-8.

The local BMP technical standards are readily available to the development community and are clearly referenced within the Cities' stormwater or development services websites, ordinances, permit approval processes and/or ESCP review forms. The local BMP technical standards are also readily available to the Regional Water Board upon request.

Local BMP technical standards are available for the BMPs listed in Tables DC-5 through DC-8.

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Table DC-4: Minimum Set of BMPs for All Construction Sites

BMP Type	BMP
Erosion Controls	Scheduling
	Preservation of Existing Vegetation
Sediment Controls	Silt Fence
	Sand Bag Barrier
	Stabilized Construction Site Entrance/Exit
Nonstormwater Management	Water Conservation Practices
	Dewatering Operations
Waste Management	Material Delivery and Storage
	Stockpile Management
	Spill Prevention and Control
	Solid Waste Management
	Concrete Waste Management
	Sanitary/Septic Waste Management

Table DC-5: Additional BMPs Applicable to Construction Sites Disturbing 1 Acre or More

BMP Type	BMP
Erosion Controls	Hydraulic Mulch
	Hydroseeding
	Soil Binders
	Straw Mulch
	Geotextiles and Mats
	Wood Mulching
Sediment Controls	Fiber Rolls
	Gravel Bag Berm
	Street Sweeping and/ or Vacuum
	Storm Drain Inlet Protection
	Scheduling
	Check Dam
Additional Controls	Wind Erosion Controls
	Stabilized Construction Entrance/ Exit
	Stabilized Construction Roadway
	Entrance/ Exit Tire Wash
Non-Storm Management	Vehicle and Equipment Washing
	Vehicle and Equipment Fueling
	Vehicle and Equipment Maintenance
Waste Management	Material Delivery and Storage
	Spill Prevention and Control

Table DC-6: Additional Enhanced BMPs for High Risk Sites

BMP Type	BMP
Erosion Controls	Hydraulic Mulch
	Hydroseeding
	Soil Binders
	Straw Mulch
	Geotextiles and Mats
	Wood Mulching
	Slope Drains
Sediment Controls	Silt Fence
	Fiber Rolls
	Sediment Basin
	Check Dam
	Gravel Bag Berm
	Street Sweeping and/or Vacuum
	Sand Bag Barrier
	Storm Drain Inlet Protection
Additional Controls	Wind Erosion Controls
	Stabilized Construction Entrance/Exit
	Stabilized Construction Roadway
	Entrance/Exit Tire Wash
	Advanced Treatment Systems*
Nonstormwater Management	Water Conservation Practices
	Dewatering Operations (Ground water dewatering only under NPDES Permit No. CAG994004)
	Vehicle and Equipment Washing
	Vehicle and Equipment Fueling
	Vehicle and Equipment Maintenance
Waste Management	Material Delivery and Storage
	Stockpile Management
	Spill Prevention and Control
	Solid Waste Management

*Applies to public roadway projects.

Table DC-7: Minimum Required BMPs for Roadway Paving or Repair Operation (For Private or Public Projects)

#	BMP
1.	Restrict paving and repaving activity to exclude periods of rainfall or predicted rainfall unless required by emergency conditions.
2.	Install gravel bags and filter fabric or other equivalent inlet protection at all susceptible storm drain inlets and at manholes to prevent spills of paving products and tack coat.
3.	Prevent the discharge of release agents including soybean oil, other oils, or diesel to the stormwater drainage system or receiving waters.
4.	Minimize non stormwater runoff from water use for the roller and for evaporative cooling of the asphalt.
5.	Clean equipment over absorbent pads, drip pans, plastic sheeting or other material to capture all spillage and dispose of properly.
6.	Collect liquid waste in a container, with a secure lid, for transport to a maintenance facility to be reused, recycled or disposed of properly.
7.	Collect solid waste by vacuuming or sweeping and securing in an appropriate container for transport to a maintenance facility to be reused, recycled or disposed of properly.
8.	Cover the "cold-mix" asphalt (i.e., pre-mixed aggregate and asphalt binder) with protective sheeting during a rainstorm.
9.	Cover loads with tarp before haul-off to a storage site, and do not overload trucks.
10.	Minimize airborne dust by using water spray or other approved dust suppressant during grinding.
11.	Avoid stockpiling soil, sand, sediment, asphalt material and asphalt grindings materials or rubble in or near stormwater drainage system or receiving waters.
12.	Protect stockpiles with a cover or sediment barriers during a rain.

Construction Site Inspection *Permit §VI.D.8.j (LA)/§VII.K.1.xii (LB)*

The Cities' legal authority is used to implement procedures for inspecting public and private construction sites. The inspection procedures are implemented as follows:

Inspection Frequency

- Inspect the public and private construction sites as specified in Table DC-8.
- All phases of construction are inspected as follows:
    - Prior to Land Disturbance – Prior to allowing an operator to commence land disturbance, each Permittee shall perform an inspection to ensure all necessary erosion and sediment structural and non-structural BMP materials and procedures are available per the erosion and sediment control plan.
    - During Active Construction, including Land Development[2] and Vertical Construction[3] – In accordance with the frequencies specified in Table DC-8, inspections are performed to ensure all necessary erosion and sediment structural and non-structural BMP materials and procedures are available per the erosion and sediment control plan throughout the construction process.
    - Final Landscaping / Site Stabilization[4] – At the conclusion of the project and as a condition of approving and/or issuing a Certificate of Occupancy, the constructed site is inspected to ensure that all graded areas have reached final stabilization and that all

[2] Activities include cuts and fills, rough and finished grading; alluvium removals; canyon cleanouts; rock undercuts; keyway excavations; stockpiling of select material for capping operations; and excavation and street paving, lot grading, curbs, gutters and sidewalks, public utilities, public water facilities including fire hydrants, public sanitary sewer systems, storm sewer system and/or other drainage improvement.
[3] The build out of structures from foundations to roofing, including rough landscaping.
[4] All soil disturbing activities at each individual parcel within the site have been completed.

trash, debris, and construction materials, and temporary erosion and sediment BMPs are removed.

- Based on the required frequencies above, each construction project is inspected a minimum of three times.

Table DC-8: Inspection Frequencies for Sites One Acre or Greater

Site	Inspection Frequency Shall Occur
All sites 1 acre or larger that discharge to a tributary listed by the state as an impaired water for sediment or turbidity under the CWA §303(d)	(1) when two or more consecutive days with greater than 50% chance of rainfall are predicted by NOAA[5], (2) within 48 hours of a ½-inch rain event and at (3) least once every two weeks
Other sites 1 acre or more determined to be a significant threat to water quality[6]	
All other construction sites with 1 acre or more of soil disturbance not meeting the criteria above	At least monthly

Inspection Standard Operating Procedures

Standard operating procedures are implemented, and revised as necessary, that identify the inspection procedures followed by the Cities' inspectors (see Attachment DC-C for suggested standard operating procedures). Inspections of construction sites – and the standard operating procedures – include, but are not limited to:

1. Verification of active coverage under the Construction General Permit for sites disturbing 1 acre or more, or that are part of a planned development that will disturb 1 acre or more and a process for referring non-filers to the Regional Water Board.
2. Review of the applicable ESCP and inspection of the construction site to determine whether all BMPs have been selected, installed, implemented, and maintained according to the approved plan and subsequent approved revisions (see Attachment DC-B for the ESCP Checklist sample template).
3. Assessment of the appropriateness of the planned and installed BMPs and their effectiveness.
4. Visual observation and record keeping of nonstormwater discharges, potential illicit discharges and connections, and potential discharge of pollutants in stormwater runoff.
5. Development of a written or electronic inspection report generated from an inspection checklist used in the field (see Attachment DC-D and DC-E for the Large Site and Small Site[7] Inspection Forms, respectively).
6. Tracking of the number of inspections for the inventoried construction sites throughout the reporting period to verify that the sites are inspected at the minimum frequencies listed in Table DC-8.

Enforcement *Permit §VI.D.8.k (LA)/§VII.K.1.xiii (LB)*

The Progressive Enforcement Policy is implemented to ensure that construction sites are brought into compliance with all stormwater requirements within a reasonable time period.

[5] www.srh.noaa.gov/forecast

[6] In evaluating the threat to water quality, the following factors shall be considered: soil erosion potential; site slope; project size and type; sensitivity of receiving water bodies; proximity to receiving water bodies; nonstormwater discharges; past record of non-compliance by the operators of the construction site; and any water quality issues relevant to the particular MS4.

[7] A "large site" refers to a site greater than or equal to 1 acre while a "small site" refers to a site less than one acre.

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Permittee Staff Training *Permit §VI.D.8.l(LA)/§VII.K.1.xiv(LB)*

Staff whose primary job duties are related to implementing the construction stormwater program are adequately trained.

The Cities may conduct in-house training or contract with consultants. Training is provided to the following staff positions of the MS4:

- Plan Reviewers and Permitting Staff – Staff and consultants are trained as qualified individuals, knowledgeable in the technical review of local erosion and sediment control ordinance, local BMP technical standards, ESCP requirements, and the key objectives of the State Water Board QSD program. The training is provided either internally to staff or staff is required to obtain QSD certification.
- Erosion Sediment Control/Stormwater Inspectors – Inspectors are either 1) knowledgeable in inspection procedures consistent with the State Water Board sponsored program QSD, 2) a Qualified SWPPP Practitioner (QSP) or 3) a designated person on staff trained in the key objectives of the QSD/QSP programs supervises inspection operations. The training is provided either provided internally to staff or staff is required to obtain QSD/QSP certification. Each inspector is knowledgeable of the local BMP technical standards and ESCP requirements.
- Third-Party Plan Reviewers, Permitting Staff, and Inspectors – If outside parties are utilized to conduct inspections and/or review plans, these staff are trained per the requirements listed above. Outside contractors can self-certify, providing they certify they have received all applicable training required in MS4 Permit §VI.D.8 and have documentation to that effect.

Public Agency Activities Program

Each participating city is required to develop and implement a program for public agency facilities and activities that includes the requirements listed in MS4 Permit §VI.D.9 (LB §VII.L). This document provides guidance to assist the Cities in implementing a public agency activities program in compliance with the MS4 Permit.

Objectives

Permit §VI.D.9.a (LA)/§VII.L.1 (LB)

The objectives of the Public Agency Activities program are to:

- Minimize stormwater pollution impacts from Permittee-owned or operated facilities.
- Minimize stormwater pollution impacts from public agency activities.
- Identify opportunities to reduce stormwater pollution impacts from areas of existing development.

MS4 Permit requirements for Public Agency Facilities and Activities consist of the following components which will be discussed in more detail in the sections below:

- Public Construction Activities Management
- Public Facility Inventory
- Inventory of Existing Development for Retrofitting Opportunities
- Public Facility and Activity Management
- Vehicle and Equipment Wash Areas
- Landscape, Park, and Recreational Facilities Management
- Storm Drain Operation and Maintenance
- Streets, Roads, and Parking Facilities Maintenance
- Emergency Procedures
- Municipal Employee and Contractor Training

1. Public Construction Activities Management

Permit §VI.D.9.b (LA)/§VII.L.2 (LB)

Each participating city is required to develop and implement a Development Construction Program that meets the requirements the Development Construction Section of this WMP, and Part VI.D.8 of the LA MS4 Permit at municipally owned or operated (i.e., public or Permittee sponsored) construction projects. In addition, each participating city is required to develop and implement a Planning and Land Development Program that meets the requirements in the Planning and Land Development Section of this WMP, and the MS4 Permit at municipally owned or operated (i.e., public or Permittee sponsored) construction projects.

2. Public Facility Inventory

Permit §VI.D.9.c (LA)/§VII.L.3 (LB)

The Public Agency Activities Program requires the maintenance of an inventory of all Permittee-owned or operated (i.e., public) facilities that are potential sources of stormwater pollution. The incorporation of facility information into a GIS is recommended. Sources that are tracked include but are not limited to the following:

- Animal control facilities
- Chemical storage facilities
- Composting facilities

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- Equipment storage and maintenance facilities (including landscape maintenance-related operations)
- Fueling or fuel storage facilities (including municipal airports)
- Hazardous waste disposal facilities
- Hazardous waste handling and transfer facilities
- Incinerators
- Landfills
- Materials storage yards
- Pesticide storage facilities
- Fire stations
- Public restrooms
- Public parking lots
- Public golf courses
- Public swimming pools
- Public parks
- Public works yards
- Public marinas
- Recycling facilities
- Solid waste handling and transfer facilities
- Vehicle storage and maintenance yards
- Stormwater management facilities (e.g., detention basins)
- All other Permittee-owned or operated facilities or activities that are determined to contribute a substantial pollutant load to the MS4.

The following minimum fields of information are included in the inventory for each Permittee-owned or operated facility:

- Name of facility
- Name of facility manager and contact information
- Address of facility (physical and mailing)
- A narrative description of activities performed and potential pollution sources.
- Coverage under the Industrial General Permit or other individual or general NPDES permits or any applicable waiver issued by the Regional or State Water Board pertaining to stormwater discharges.

The inventory is updated at least once during the 5-year MS4 Permit term. The update are accomplished through collection of new information obtained through field activities or through other readily available inter and intra-agency informational databases (e.g., property management, land-use approvals, accounting and depreciation ledger account, and similar information).

3. Inventory of Existing Development for Retrofit Opportunities

Permit §VI.D.9.d (LA)/§VII.L.4 (LB)

The Public Agency Activities Program requires the development of an inventory of retrofitting opportunities. Retrofit opportunities are identified within the public right-of-way or in coordination with a TMDL implementation plan(s). The goals of the existing development retrofitting inventory are to address the impacts of existing development through regional or sub-regional retrofit projects that

reduce the discharges of stormwater pollutants into the MS4 and prevent discharges from the MS4 from causing or contributing to a violation of water quality standards as defined in the MS4 Permit.

Existing areas of development are screened to identify candidate areas for retrofitting using watershed models or other screening level tools. The areas of existing development identified during the screening process are then evaluated and ranked to prioritize retrofitting candidates. Criteria for this evaluation may include, but is not limited to the following:

- Feasibility, including general private and public land availability;
- Cost effectiveness;
- Pollutant removal effectiveness;
- Tributary area potentially treated;
- Maintenance requirements;
- Landowner cooperation;
- Neighborhood acceptance;
- Aesthetic qualities;
- Efficacy at addressing concern; and
- Potential improvements to public health and safety.

The results of this evaluation are considered in the following programs:

- Highly feasible projects expected to benefit water quality are given a high priority to implement source control and treatment control BMPs in the WMP.
- High priority retrofit projects are considered as candidates for off-site mitigation projects per LA MS4 Permit §VI.D.7.c.iii(4)(d) (LB §VII.J.4.iii(4)).
- Where feasible, the existing development retrofit program is coordinated with flood control projects and other infrastructure improvement programs per LA MS4 Permit §VI.D.9.e.ii(2) (LB §VII.L.5.ii(2)).

Site specific retrofit projects are encouraged through cooperation with private landowners. The following practices are considered in cooperating with private landowners to retrofit existing development:

- Demonstration retrofit projects;
- Retrofits on public land and easements that treat runoff from private
- developments;
- Education and outreach;
- Subsidies for retrofit projects;
- Requiring retrofit projects as enforcement, mitigation or ordinance compliance;
- Public and private partnerships;
- Fees for existing discharges to the MS4 and reduction of fees for retrofit implementation.

4. Public Facility and Activity Management

Permit §VI.D.9.e (LA)/§VII.L.5 (LB)

4.1. Industrial General Permitted Facilities

Permit §VI.D.9.e.i & §VI.D.9.e.v (LA)/§VII.L.5.i (LB)

All Permittee owned or operated facilities where industrial activities are conducted that require coverage are required to obtain coverage under the Industrial General Permit by submitting a Notice of Intent (NOI) to the State Water Resources Control Board (State Board) and preparing a Stormwater

Pollution Prevention Plan (SWPPP). Facilities that may require coverage are listed by category in 40 Code of Federal Regulations (CFR) Section 122.26(b)(14), and include:

- Facilities subject to stormwater effluent limitations guidelines, new source performance standards, or toxic pollutant effluent standards (40 CFR Subchapter N)
- Manufacturing facilities
- Mining and oil and gas facilities
- Hazardous waste treatment, storage, or disposal facilities
- Landfills, land application sites, and open dumps that receive industrial waste
- Recycling facilities
- Steam electric generating facilities
- Transportation facilities
- Sewage treatment plants
- Certain facilities if materials are exposed to stormwater

Municipally owned or operated facilities that have obtained coverage under the IGP implement and maintain BMPs consistent with the associated SWPPP, and are therefore not required to implement and maintain the activity specific BMPs as described in the sections below.

4.2. Flood Management Projects *Permit §VI.D.9.e.ii (LA)/§VII.L.5.ii (LB)*

The following measures are implemented for municipally owned or operated flood management projects:

- Procedures are developed to assess the impacts of flood management projects on the water quality of receiving water bodies;
- Existing structural flood control facilities area evaluated to determine if retrofitting the facility to provide additional pollutant removal from stormwater is feasible.

4.3. Contracted Public Agency Activities *Permit §VI.D.9.e.iv (LA)/§VII.L.5.iv (LB)*

Any contractors hired to conduct Public Agency Activities, including, but not limited to the following must be contractually obligated to implement and maintain the activity specific BMPs outlined in the sections below:

- Storm and/or sanitary sewer system inspection and repair,
- Street sweeping,
- Trash pick-up and disposal, and
- Street and right-of-way construction and repair

It is the responsibility of each Permittee to ensure that these BMPs are being properly implemented and maintained through oversight of contracted activities. Example contractor/lessor contract language is provided in attachment PA-A.

4.4. BMPS for Municipal Activities

Permit §VI.D.9.e.iii & Permit §VI.D.9.e.vi (LA)/§VII.L.5.iii & VII.L.5.vi (LB)

Municipal maintenance and field staff are the ones responsible for implementing effective source control BMPs[1], such as those described in Table PA-1 (or an equivalent set of BMPs) when such activities occur at municipally owned or operated facilities and field operations (i.e. project sites). These sites include, but are not limited to the facility types identified in the Public Facility Inventory, and at any area that includes the activities described in Table PA-1, or that have the potential to discharge pollutants in stormwater. The Caltrans Stormwater Quality Handbook Maintenance Staff Guide (Caltrans Handbook)[2] is an additional resource that describes BMPs to prevent the stormwater-related pollutants most likely to come from common maintenance facility operations and field activities. It provides a straightforward working-level approach to implementing BMPs for common maintenance activities by categorizing these activities into Families, and associating each Family with certain types of BMPs in Activity Cut Sheets. The activities described in Sections 5-10 below are representative of typical municipal operations, and correspond to the activities and BMPs listed in Table PA-1. Where appropriate, each section will identify the appropriate Maintenance Activity Family and corresponding Caltrans Activity Cut Sheets from this table for ease of reference.

Although Table PA-1 and the CalTrans Handbook are excellent references for selecting BMPs for some of the most common municipal activities, they may not represent a comprehensive inventory of activities encountered by maintenance staff and field personnel. Likewise, for those BMPs that are not adequately protective of water quality standards, additional site-specific BMPS may be needed. For example, the implementation of additional BMPs is required where stormwater from the storm drain system discharges to a water body subject to a TMDL, a Clean Water Act §303(d) listed water body, or a significant ecological area (SEA). Attachment PA-B contains a map of SEAs in LA County and Attachment K of the LA MS4 Permit contains a matrix of Permittees and TMDLs.

[1] BMP is defined by the California Stormwater Quality Association as "*any program, technology, process, siting criteria, operating method, measure, or device which controls, prevents, removes, or reduces pollution*". Source Control BMPs are operational practices that prevent pollution by reducing potential pollutants at the source. They typically do not require maintenance or construction, and may consist of programmatic controls such as street sweeping. Treatment Control BMPs are methods of treatment to remove pollutants from stormwater, and can include constructed treatment devices such as an infiltration basin.

[2] The handbook is available at http://www.dot.ca.gov/hq/env/stormwater/special/newsetup/_pdfs/management_ar_rwp/CTSW-RT-02-057.pdf and may also be found by entering the words "Caltrans Stormwater Quality Handbook Maintenance Staff Guide" in a web search engine.

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Table PA-1: General and Activity Specific BMPs and Their Associated Caltrans Handbook Activity Cut Sheet

Maintenance Activity Family	BMP	Caltrans Activity Cut Sheet Number
General BMPs	Scheduling and Planning	B-4
	Spill Prevention and Control	
	Sanitary/Septic Waste Management	
	Material Use	
	Safer Alternative Products	
	Vehicle/Equipment Cleaning, Fueling and Maintenance	
	Illicit Connection Detection, Reporting and Removal	
	Illegal Spill Discharge Control	
	Maintenance Facility Housekeeping Practices	
Flexible Pavement	Asphalt Cement Crack and Joint Grinding/ Sealing	B-9
	Asphalt Paving	B-10
	Structural Pavement Failure (Digouts) Grinding and Paving	B-11
	Emergency Pothole Repairs	B-13
	Sealing Operations	B-14
Rigid Pavement	Portland Cement Crack and Joint Sealing	B-15
	Mudjacking and Drilling	B-16
	Concrete Slab and Spall Repair	B-17
Slope/ Drains/ Vegetation	Shoulder Grading	B-19
	Nonlandscaped Chemical Vegetation Control	B-21
	Nonlandscaped Mechanical Vegetation Control/Mowing	B-23
	Nonlandscaped Tree and Shrub Pruning, Removal	B-24
	Fence Repair	B-25
	Drainage Ditch and Channel Maintenance	B-26
	Drain and Culvert Maintenance	B-28
	Curb and Sidewalk Repair	B-30
Litter/ Debris/ Graffiti	Sweeping Operations	B-32
	Litter and Debris Removal	B-33
	Emergency Response and Cleanup Practices	B-34
	Graffiti Removal	B-36
Landscaping	Chemical Vegetation Control	B-37
	Manual Vegetation Control	B-39
	Landscaped Mechanical Vegetation Control/ Mowing	B-40
	Landscaped Tree and Shrub Pruning, Removal	B-41
	Irrigation Line Repairs	B-42
	Irrigation (Watering), Potable and Nonpotable	B-43
Environmental	Storm Drain Stenciling	B-44
	Roadside Slope Inspection	B-45
	Roadside Stabilization	B-46
	Stormwater Treatment Devices	B-48
	Traction Sand Trap Devices	B-49
Public Facilities	Public Facilities	B-50
Bridges	Welding and Grinding	B-52
	Sandblasting, Wet Blast with Sand Injection, Hydroblasting	B-54
	Painting	B-56
	Bridge Repairs	B-57
Other Structures	Pump Station Cleaning	B-59
	Tube and Tunnel Maintenance and Repair	B-61
	Tow Truck Operations	B-63
	Toll Booth Lane Scrubbing Operations	B-64
Electrical &	Sawcutting for Loop Installation	B-65
Traffic Guidance	Thermoplastic Striping and Marking	B-67
	Paint Striping and Marking	B-68
	Raised/ Recessed Pavement Marker Application/Removal	B-70

	Sign Repair and Maintenance	B-71
	Median Barrier and Guard Rail Repair	B-73
	Emergency Vehicle Energy Attenuation Repair	B-75
Storm Maintenance	Minor Slides and Slipouts Cleanup/ Repair	B-78
Management and Support	Building and Grounds Maintenance	B-80
	Storage of Hazardous Materials (Working Stock)	B-82
	Material Storage Control (Hazardous Waste)	B-84
	Outdoor Storage of Raw Materials	B-85
	Vehicle and Equipment Fueling	B-86
	Vehicle and Equipment Cleaning	B-87
	Vehicle and Equipment Maintenance and Repair	B-88
	Aboveground and Underground Tank Leak and Spill Control	B-90

5. Vehicle and Equipment Wash Areas

Permit §VI.D.9.f (LA)/§VII.L.6 (LB)

This section corresponds to Maintenance Activity Family Management and Support and corresponding Caltrans Activity Cut Sheet B-87.

Vehicle and equipment cleaning at a municipal facility may introduce a number of potential pollutants into the storm drain system. Municipal maintenance and field staff are responsible for implementing and maintaining the activity specific BMPs listed in Table PA-1 for all fixed vehicle and equipment washing; including fire fighting and emergency response vehicles. In addition, maintenance and field staff are responsible for preventing discharges of wash water from entering the storm drain system. Table PA-2 shows the potential pollutants associated with vehicle and equipment cleaning.

Table PA-2: Potential Pollutants Generated from Cleaning Activities

Activity	**Potential Pollutants**					
Vehicle and Equipment Cleaning	Sediment	Nutrients	Trash	Metals	Oil & Grease	Organics

Discharges of wash waters to the storm drain system are prevented by implementing the following measures at existing facilities with vehicle or equipment wash areas:

- Wash water is self-contained and hauled away for proper disposal offsite.
- Wash areas are equipped with a clarifier, or an alternative pre-treatment device, and water is plumbed to the sanitary sewer in accordance with applicable waste water provider regulations.
- Wastewater from all new vehicle and equipment wash facilities, or redeveloped or replaced existing facilities is prevented from discharging to the MS4 by equipping the facility with a clarifier, or an alternative pre-treatment device, and plumbing water to the sanitary sewer in accordance with applicable waste water provider regulations, or by self-containing all water water/wash water and hauling to a point of legal disposal.

6. Landscape, Park, and Recreational Facilities Management

Permit §VI.D.9.g (LA)/ §VII.L.7 (LB)

This section corresponds to multiple Activity Cut Sheets within the Slope/Drains/Vegetation, Landscape, Environmental, and Management and Support Families.

Maintenance practices at parks and recreational facilities generally include fertilizer and pesticide applications, vegetation maintenance and disposal, irrigation, swimming pool chemical maintenance and draining, and trash and debris management. All of these maintenance practices have the potential to contribute pollutants to the storm drain system. Municipal maintenance and field staff are responsible for implementing and maintaining the activity specific BMPs listed in Table PA-1for all public right-of-

ways, flood control facilities and open channels, lakes and reservoirs, and landscape, park, and recreational facilities and activites. Table PA-3 shows the potential pollutants associated with recreational facilities..

Table PA-3: Potential Pollutants Generated from Recreational Facilities

Activity	Potential Pollutants				
Vehicle and Equipment Cleaning	Sediment	Nutrients	Trash	Bacteria	Pesticides

6.1 Model Integrated Pest Management Program

Permit §VI.D.9.g.ii & VI.D.9.g.iii (LA)/§VII.L.7.ii & VII.L.7.iii (LB)

An IPM policy is in place to minimize pesticide and fertilizer use, and encourage the use of IPM techniques for Public Agency facilities and activities. The attached IPM Program template (Attachment PA-C), adapted from the Orange County Drainage Area Management Plan (DAMP) IPM Policy developed by the University of California, Division of Agriculture and Natural Resources, provides an example of an effective IPM program. This IPM Program template is based on regulations, management guidelines, and research-based recommendations established by federal, state and local agencies and universities with particular expertise in pest management.

As part of the IPM policy, a commitment and schedule to reduce the use of pesticides that cause impairment t of surface waters is implemented through the following procedures:

- An inventory of all pesticides used by municipal departments, divisions, and operational units is prepared and updated annually.
- Pesticides used by staff and hired contractors are quantified.
- The use of IPM alternatives is demonstrated, where feasible, to reduce pesticide use.

Municipal maintenance and field staff applying pesticides are certified in the appropriate category by the California Department of Pesticide Regulation, or are under the direct supervision of a pesticide applicator certified in the appropriate category.

7. Storm Drain Operation and Maintenance

Permit §VI.D.9.h (LA)/ §VII.L.8 (LB)

This section corresponds to the Litter/Debris/Graffiti Family: Litter and Debris Removal Cut Sheet, pg. B-33, and the Environmental Family: Storm Drain Stenciling Cut Sheet, pg. B-44

The storm drain system functions primarily to collect and convey surface runoff to receiving waters during storms in order to prevent flooding. It is a common municipal activity to maintain the storm drain system so that it functions hydraulically as intended during storms. Municipal maintenance and field staff are responsible for implementing and maintaining the activity specific BMPs listed in Table PA-1 for storm drain operation and maintenance, and ensuring that all material removed from the MS4 does not reenter the system by dewatering solid material in a contained area and disposing of liquid material in accordance with any of the following measures:

- Self-containing and hauling off for legal disposal; or
- Applying to the land without runoff; or
- Equipping with a clarifier or alternative pre-treatment device and plumbing to the sanitary sewer in accordance with applicable waste water provider regulations.

Table PA-4 shows potential pollutants generated during storm drain operation and maintenance.

Table PA-4: Potential Pollutants Generated from Storm Drain Operation and Maintenance

Activity	Potential Pollutants								
	Sediment	Nutrients	Trash	Metals	Bacteria	Oil & Grease	Organics	Pesticides	Oxygen Demanding Substances
Inspection and Cleaning of Conveyance Structures	×	×	×		×		×		×
Controlling Illicit Connections and Discharges	×	×	×	×	×	×	×	×	×
Controlling Illegal Dumping	×	×	×	×	×	×	×	×	×
Maintenance of Inlet and Outlet Structures	×		×		×	×			

7.1 Catch Basin Cleaning

Permit §VI.D.9.h.iii (LA)/ §VII.L.8.iii (LB)

There is no preferred method for cleaning catch basins as long as the method used is successful in removing accumulated sediment and debris. The methods used are determined in the field with the goal of minimizing the amount of escaped material, and preventing this material from entering the storm drain system. A template catch basin cleaning log is provided in Attachment PA-D.

7.1.1 Catch Basins Cleaning in Areas not Subject to a Trash TMDL

In areas that are not subject to a trash TMDL, catch basin inlets are prioritized based on the amount of trash generated, and inspected according to the schedule in Table PA-5.

Table PA-5: Inspection Frequencies for Catch Basin Inlets

Trash Generating Frequency	Priority	Inspection Frequency
Consistently generates the highest volumes of trash and/or debris	A	A minimum of three times during the wet season (October-April) and once during the dry season every year
Consistently generates moderate volumes of trash and/or debris	B	A minimum of once during the wet season and once during the dry season every year
Generates low volumes of trash and/or debris	C	A minimum of once per year

An inventory of catch basins is maintained and updated regularly. This inventory includes the following components:

- GPS coordinates of each catch basin
- Priorities for inspection
- Rationale or data to support catch basin priority designations
- Inspection and cleaning records

Catch basins are cleaned as necessary based on the inspections conducted. At a minimum, catch basins determined to be at least 25% full of trash are cleaned out.

7.1.2 Catch Basin Cleaning in Areas Subject to a Trash TMDL

In areas subject to a Trash TMDL, all applicable provisions of LA MS4 Permit Section VI.E (LB Part Part VIII) in conformance with the appropriate TMDL implementation schedule, are implemented. This includes an effective combination of full capture, partial capture, institutional controls, or minimum frequency of assessment and collection as described in LA MS4 Permit Section VI.E (LB Part Part VIII).

7.2 Catch Basin Labels and Open Channel Signage

Permit §VI.D.9.h.vi (LA)/ §VII.L.8.vi (LB)

All municipally owned storm drain inlets are labeled with a "No Dumping, Drains to Ocean" message, and inspected for legibility prior to the wet season (October-April) every year. Catch basins with illegible labels are recorded and re-stenciled or re-labeled within 180 days of inspection. In addition, signs referencing local code(s) that prohibit littering and illegal dumping are posted at designated public access points to open channels, creeks, urban lakes, and other relevant water bodies.

7.3 Trash Management

Permit §VI.D.9.h.iv-v & Permit §VI.D.9.h.vii (LA)/§VII.L.8.iv-v (LB)

The following Trash Management BMPs described below are employed to mitigate the impacts of anthropogenic trash on receiving waters.

7.3.1 Trash Management at Public Events

The following measures are implemented for any event in the public right of way or wherever it is foreseeable that substantial quantities of trash and litter may be generated, including events located in areas that are subject to a trash TMDL:

- Proper management of trash and litter generated; and
- Arrangement for temporary screens to be placed on catch basins; or
- Provide clean out of catch basins, trash receptacles, and grounds in the event area within one business day subsequent to the event.

7.3.2 Trash Receptacles

Covered trash receptacles are located in areas identified as high trash generation areas and maintained and cleaned out as necessary to prevent trash overflow. Examples of areas that may be considered high trash generating areas include:

- High vehicle or pedestrian traffic areas
- Commercial areas
- Industrial areas
- Construction areas
- High density residential areas
- Areas adjacent to vacant lots

7.3.3 Additional Trash Management Practices

In areas that are not subject to a trash TMDL, additional trash management practices will be employed no later than five years after the effective date of the LA MS4 Permit (4 years after the effective date of the LB MS4 Permit). Trash excluders or equivalent devices must be installed on or in catch basins or outfalls to prevent the discharge of trash to the MS4 or receiving waters, unless the installation of such BMP(s) alone will cause flooding (not due to lack of maintenance). Alternatively, additional trash BMPs

that provide substantially equivalent removal of trash may be implemented. Additional BMPs may include, but are not limited to:

- Increased street sweeping
- Adding trash cans near trash generation sites
- Prompt enforcement of trash accumulation
- Increased trash collection on public property
- Increased litter prevention messages or trash nets within the MS4

The BMPs chosen will provide equivalent trash removal performance as excluders, and will be demonstrated though the annual report. When outfall trash capture is provided, revision of the schedule for inspection and cleanout of catch basins will also be reported in the annual report.

The State Water Resources Control Board (State Water Board) is considering the adoption of amendments to the Water Quality Control Plans for Ocean Waters of California and for the Inland Surface Water, Enclosed Bays, and Estuaries of California for Trash (Trash Amendments) citing a strong need for statewide consistency in trash management. The proposed Trash Amendments will include five elements: (1) Water Quality Objective, (2) Prohibition of Discharge, (3) Implementation, (4) Compliance Schedule, and (5) Monitoring, which will outline NPDES Permittee requirements for trash management. The development of the Trash Amendments will continue to be monitored, and any additional required trash management practices in areas not subject to a trash TMDL will be implemented per the guidance provided by these amendments.

7.4 Storm Drain Maintenance

Permit §VI.D.9.h.viii (LA)/ §VII.L.8.viii (LB)

The following BMPs constitute the Storm Drain Maintenance Program:

- Municipally-owned open channels and drainage structures are visually inspected for debris at least annually.
- Trash and debris from is removed from open channel storm drains a minimum of once per year, before the storm season.
- The discharge of contaminants is minimized during MS4 maintenance and clean outs;
- Material removed is properly disposed of by containing and hauling away for legal disposal

7.5 Infiltration from Sanitary Sewer to MS4/Preventive Maintenance

Permit §VI.D.9.h.ix (LA)/§VII.L.8.ix (LB)

Thorough, routine, preventive surveys and maintenance of both municipally owned and operated Storm Drain Systems as well as Sanitary Sewer Systems infiltration and seepage of contaminants from the sanitary sewer system into the storm drain system is prevented. Sanitary Sewer System routine preventative maintenance is described in the Sewer System Management Plan (SSMP), which is a component of the Statewide General Waste Discharge Requirements (WDR) for Sanitary Sewer Systems.

Where necessary, controls implemented to limit infiltration of seepage from sanitary sewers to the MS4 include:

- Adequate plan checking for construction and new development;
- Incident response training for its municipal employees that identify sanitary sewer spills;
- Code enforcement inspections;
- MS4 maintenance and inspections;
- Interagency coordination with sewer agencies; and

- Proper education of its municipal staff and contractors conducting field operations on the MS4 or its municipal sanitary sewer (if applicable).

7.6 Permittee Owned Treatment Control BMPs *Permit §VI.D.9.h.x (LA)/§VII.L.8.x (LB)*

All municipally owned treatment control BMPs, including post-construction BMPs, are regularly inspected and maintained to ensure their proper operation.
Any residual water generated during BMP maintenance is disposed of using one of the following procedures:

- Hauled away and legally disposed of; or
- Applied to the land without runoff; or
- Discharged to the sanitary sewer system; or
- Treated or filtered to remove bacteria, sediments, nutrients, and meet the limitations set in Table PA-6 below prior to discharge to the storm drain system.

Table PA-6: Discharge Limitations for Dewatering Treatment BMPs

Parameter	Units	Limitation
Total Suspended Solids	Mg/L	100
Turbidity	NTU	50
Oil and Grease	Mg/L	10

8. Streets, Roads, and Parking Facilities Maintenance

Permit §VI.D.9.i(LA)/§VII.L.9 (LB)

This section corresponds to multiple Activity Cut Sheets within the Flexible Pavement, Rigid Pavement, Litter/Debris/Graffiti, Traffic Guidance, and Management and Support Families.

Streets and roads may collect litter and debris from nearby activities, as well as from vehicular traffic. They also require routine maintenance that may generate waste materials. Table PA-7 shows potential pollutants generated from street, road, and parking facilities maintenance.

Table PA-7: Potential Pollutants Generated from Street, Road, and Parking Facility Maintenance

Activity	Potential Pollutants						
	Sediment	Trash	Metals	Bacteria	Oil & Grease	Organics	Oxygen Demanding Substances
Street and Road Maintenance	×	×	×		×	×	
Parking Facility Maintenance	×	×	×	×	×	×	×

8.1 Street Sweeping *Permit §VI.D.9.i.i-ii(LA)/§VII.L.9.i-ii (LB)*

Streets and/or street segments are swept according to the following designations:

- Priority A: Streets and/or street segments that are designated as consistently generating the highest volumes of trash and/or debris should be swept at least two times per month.
- Priority B: Streets and/or street segments that are designated as consistently generating moderate volumes of trash and/or debris should be swept at least once per month.
- Priority C: Streets and/or street segments that are designated as generating low volumes of trash and/or debris shall be swept as necessary but in no case less than once per year.

8.2 Road Reconstruction *Permit §VI.D.9.iii (LA)/§VII.L.9.iii (LB)*

Projects that include roadbed or street paving, repaving, patching, digouts, or resurfacing roadbed surfaces implement the following BMPS:

- Restricting paving and repaving activities to exclude periods of rainfall or predicted rainfall unless required by emergency conditions.
- Installing sand bags or gravel bags and filter fabric at all susceptible storm drain inlets and at manholes to prevent spills of paving products and tack coat;
- Preventing the discharge of release agents including soybean oil, other oils, or diesel into the MS4 or receiving waters.
- Preventing non-stormwater runoff from water use for the roller and for evaporative cooling of the asphalt.
- Cleaning equipment over absorbent pads, drip pans, plastic sheeting or other material to capture all spillage and dispose of properly.
- Collecting liquid waste in a container, with a secure lid, for transport to a maintenance facility to be reused, recycled or disposed of properly.
- Collecting solid waste by vacuuming or sweeping and securing in an appropriate container for transport to a maintenance facility to be reused, recycled or disposed of properly.
- Covering the “cold-mix” asphalt (i.e., pre-mixed aggregate and asphalt binder) with protective sheeting during a rainstorm.
- Covering loads with tarp before haul-off to a storage site, and not overloading trucks.
- Minimizing airborne dust by using water spray during grinding.
- Avoiding the stockpiling of soil, sand, sediment, asphalt material and asphalt grindings materials or rubble in or near MS4 or receiving waters.
- Protecting stockpiles with a cover or sediment barriers during a rain.

8.3 Parking Facilities Maintenance *Permit §VI.D.9.iv (LA)/ §VII.L.9.iv (LB)*

Municipally owned parking lots that are uncovered and exposed to stormwater are kept clear of debris and excessive oil buildup by inspecting lots at least 2 times per month and cleaning at least once per month.

9. Emergency Procedures *Permit §VI.D.9.j (LA)/ §VII.L.10 (LB)*

Participating Agencies may conduct repairs of essential public service systems and infrastructure in emergency situations with a self-waiver of the provisions of the MS4 Permit as follows:

- Cities will abide by all other regulatory requirements, including notification to other agencies as appropriate.
- Where the self-waiver has been invoked, Cities will submit to the Regional Water Board Executive Officer a statement of the occurrence of the emergency, an explanation of the

circumstances, and the measures that were implemented to reduce the threat to water quality, no later than 30 business days after the situation of emergency has passed.

Minor repairs of essential public service systems and infrastructure in emergency situations (that can be completed in less than one week) are not subject to the notification provisions. Appropriate BMPs to reduce the threat to water quality will be implemented.

10. Municipal Employee and Contractor Training *Permit §VI.D.9.k (LA)/Permit §VII.L.11 (LB)*

An annual training program on the requirements of the overall stormwater management program is implemented for all municipal field staff whose interactions, jobs, and activities affect stormwater quality prior to June 30 every year. The Cities also ensure that contractors performing privatized/contracted municipal services have appropriate training in the stormwater management program. The goals of the annual training are to:

- Promote a clear understanding of the potential for municipal activities to pollute stormwater
- Identify opportunities to require, implement, and maintain appropriate BMPs in their line of work

In addition to the annual stormwater program training, the Cities implement an annual training program to train all of their employees and contractors who use or have the potential to use pesticides or fertilizers (whether or not they normally apply these as part of their work). Training programs address:

- The potential for pesticide-related surface water toxicity
- Proper use, handling, and disposal of pesticides
- Least toxic methods of pest prevention and control, including IPM
- Reduction of pesticide use

Outside contractors can self-certify, providing they certify they have received all applicable training required in the MS4 Permit and have documentation to that effect.

Illicit Connections & Illicit Discharges Elimination Program

Each participating city is required to develop and implement an Illicit Connections & Illicit Discharge Elimination (IC/ID) Program that includes the requirements listed in Permit §VI.D.10.a (LB §VII.M). This document provides guidance to assist the Cities in implementing an IC/ID program in compliance with the Permit.

Introduction *Permit §VI.D.10.a (LA)/§VII.M.1 (LB)*

Illicit connections and illicit discharges (IC/IDs) as defined in Table ICID-1 are potential significant sources of pollutants into and from the MS4. The Illicit Connection and Illicit Discharge (IC/ID) Program provides a comprehensive process for detecting, investigating and eliminating IC/IDs in an efficient and timely manner. The program consists of the following components:

- Procedures for conducting source investigations for IC/IDs
- Procedures for eliminating the source of IC/IDs
- Procedures for public reporting of illicit discharges
- Spill response plan and
- IC/ID education and training for City staff.

The purpose of this program is to effectively prohibit illicit discharges into the MS4.

Table ICID-1: IC/IDs Defined

Prohibition	Definition	Examples
Illicit Connections	Any man-made conveyance that is connected to the MS4 without a permit, excluding roof drains and other similar type connections.	Unpermitted channels, pipelines, conduits, inlets or outlets that are connected directly to the MS4.
Illicit Discharges	Any discharge into the MS4 or from the MS4 into a receiving water that is prohibited under local, state, or federal statutes, ordinances, codes or regulations. This includes any non-stormwater discharge, except those authorized in MS4 Permit §III.A.10.2.	Sanitary wastewater, Vehicle wash water, wash-down from grease traps, motor oil, antifreeze and fuel spills into or from the MS4.

Legal Authority

Adequate Legal Authority is required to prohibit IC/IDs to the MS4 and enable enforcement capabilities to eliminate the sources of IC/IDs.

Illicit Discharge Source Investigation and Elimination *Permit §VI.D.10.b (LA)/ §VII.M.2 (LB)*

The purpose of the IC/ID Program is accomplished in part by developing clear, step-by-step written procedures for conducting investigations of illicit discharges.

Investigation

Standardized procedures for conducting investigations to identify the source of all suspected illicit discharges are included in as an attachment (Illicit Discharge Investigation and Elimination Guidance). Procedures include the following:

- **Initiation** – Investigate the source of all observed discharges. After becoming aware of an illicit discharge, conduct an investigation to identify and locate the source within 72 hours.
- **Prioritization** – Investigate illicit discharges suspected of being sanitary sewage and/or significantly contaminated first.
- **Tracking** – Track all investigations and document the information listed in Table ICID-2.

Table ICID-2: Recorded Information for Illicit Discharge Investigations

Item	Information
1	Date(s) the illicit discharge was observed
2	Results of the investigation
3	Follow-up of the investigation
4	Date the investigation was closed

Elimination

Standardized procedures to eliminate illicit discharges once the sources are located are included as an attachment. Procedures include the following:

- **Notification** – Immediately notify the responsible party (RP)/parties of the problem and require the responsible party to initiate all necessary corrective actions to eliminate the illicit discharge.
    - If it is determined that an illicit discharge originates within an upstream jurisdiction, notify the upstream jurisdiction and the Regional Board. The Notification is conducted within 30 days of determination and information is collected regarding combined efforts to identify the source.
- **Spill response** – The Spill Response Plan is implemented when the source for illicit discharges cannot be traced to a suspected RP. Permanent solutions to such discharges are described in the following section (Flow Diversion).
- **Follow-up** – Conduct and document follow-up investigations upon notification that an illicit discharge has been eliminated to verify that it has been satisfactorily eliminated and cleaned-up.
- **Enforcement** – Enforcement procedures are included in the Progressive Enforcement Policy. The Progressive Enforcement Policy includes a list of enforcement actions.

Progressive Enforcement Policy

The Progressive Enforcement Policy is implemented to ensure that illicit discharges/ illicit connections are eliminated within a reasonable time period. The procedures are followed when the source of the nature of the discharges is known. Procedures typically include:

- Written warnings for minor violations
- Formal notice of violation with specific actions and time frames for compliance
- Compensation from the RP for any costs related to remediation, inspection, investigation, clean-up and oversight activities
- Cease and desist orders

- Civil penalties (infractions), or referral for criminal penalties or further legal action.

Flow Diversion

In the event that an ongoing illicit discharge cannot be eliminated (following the full execution of legal authority and in accordance with the Progressive Enforcement Policy) or the RPs cannot be identified, the discharge is either treated or diverted to the sanitary sewer. In either instance, the Regional Board is notified within 30 days of such determination. Notification includes the following information:

- Written plan that describes the efforts that have been undertaken to eliminate the discharge.
- Description of actions to be undertaken.
- Anticipated cost and
- Schedule for completion.

Identification and Response to Illicit Connections *Permit §VI.D.10.c (LA)/§VII.M.3 (LB)*

Illicit connections can be concentrated sources of pollutants either through direct discharge or infiltration of sewage or other prohibited discharges into the MS4. To reduce this source of pollutants, the following program is implemented for the identification of illicit connections. Key components of this program include investigating and responding in order to actively prevent and eliminate illicit connections.

Investigation

Standardized procedures for identifying illicit connections are included as an attachment (Illicit Connection Investigation Guidance). Procedures include the following:

- **Initiation** – Investigate within 21 days from the discovery or upon receiving a report of a suspected illicit connection. The elements of the investigation are listed in Table ICID-3.
- **Tracking** – Track all investigations and document the information listed in Table ICID-3.

Response

If the source investigation concludes that a connection to the MS4 is both 1) permitted or documented and 2) discharging only stormwater or nonstormwater allowed under WMP NSWD SECTION or other individual or general NPDES Permits/WDRs, then the investigation is closed and no further action is taken. Upon confirmation of a connection to the MS4 is illicit, one of two options is taken:

1. **Permit or document the connection.** The permitted or documented connection may only discharge stormwater and nonstormwater allowed under WMP NSWD SECTION or other individual or general NPDES Permits/WDRs. Retaining a record of the connection and its investigation qualifies as documentation.
2. **Eliminate the connection.** The connection is eliminated within 180 days of completion of the investigation, using formal enforcement authority if necessary.

Table ICID-3: Recorded Information for Illicit Connection Investigations

Item	Information
1	Any relevant illicit discharge information from Table ICID-2
2	Source of the connection
3	Nature and volume of the discharge through the connection
4	RP for the connection (if identified)
5	Response including any formal enforcement taken

Public Reporting of Non-Stormwater Discharges and Spills *Permit §VI.D.10.d (LA)/§VII.M.4 (LB)*

Central Point of Contact

Public reporting of illicit discharges or water quality impacts associated with discharges into or from MS4s through a central contact point are promoted, publicized, and facilitated. This includes phone numbers and an internet site for complaints and spill reporting. The reporting hotline is provided to staff to leverage the field staff that has direct contact with the MS4 in detecting and eliminating illicit discharges.

The LACFCD, in collaboration with the County, provides the central point of contact and through the 888-CLEAN-LA reporting hotline and internet site.

Open Channels

Signage is posted adjacent to open channels (see MS4 Permit IV.D.9.h.vi.(4)). The signage includes information regarding dumping prohibitions and public reporting of illicit discharges.

Complaints

Written procedures are maintained that document how complaint calls are received, and tracked to ensure that all complaints are adequately addressed in the attached form (Record Keeping & Documentation). Following the adaptive management process outlined in the MS4 Permit, the procedures are periodically evaluated to determine whether changes or updates are needed to ensure that the procedures accurately document the employed methods. After the evaluation, any identified changes will be made to the procedures.

Documentation is maintained for all complaint calls. This includes recording the location of the reported spill or IC/ ID and the actions undertaken in response the complaint, including referrals to other agencies.

Spill Response Plan *Permit §VI.D.10.e (LA)/§VII.M.5 (LB)*

A spill response plan (Attachment ICID-E) is implemented for all sewage and other spills that may discharge into its MS4. The spill response plan identifies agencies responsible for spill response and cleanup, telephone numbers and e-mail address for contacts, and contains the following:

- **Agency Coordination** – Coordinate with spill response teams throughout all appropriate departments, programs and agencies so that maximum water quality protection is provided.
- **Spill Response** – Respond to spills for containment within 4 hours of becoming aware of the

spill, except where such spills occur on private property, in which case respond within 2 hours of gaining legal access to the property. Initiate investigation of all public and employee spill complaints within one business day of receiving the complaint to assess validity.

- **Reporting** – Spills that may endanger health or the environment are reported to appropriate public health agencies and the California Emergency Management Agency (Cal EMA).

Illicit Connection and Illicit Discharge Education and Training *Permit §VI.D.10.f (LA)/§VII.M.6 (LB)*

A training program regarding the identification of IC/IDs is implemented for all municipal field staff, who, as part of their normal job responsibilities (e.g., street sweeping, storm drain maintenance, collection system maintenance, road maintenance), may come into contact with or otherwise observe an illicit discharge or illicit connection to the MS4. Contact information, including the procedure for reporting an illicit discharge, is readily available to field staff.

Applicable Staff

Table ICID-4 is a list of field programs where program staff may come into contact with or otherwise observe an illicit discharge or illicit connection to the MS4. Appropriate field staff, supervising staff and contractors involved in these programs require training in IC/ID identification and reporting following the schedule provided in Table ICID-5.

Contracted Staff

Contractors that provide these municipal services may attend city training or certify to the participating city and retain documentation that staff has received applicable training. Otherwise this provision is accomplished through a contractual requirement for contracted staff to receive the training.

Table ICID-4: Municipal Field Programs

Main Field Program Types	Sub-Category Types/Activities
Lake Management	Fertilizer & Pesticide Management
	Mowing, Trimming/Weeding, Planting
	Managing Landscape Waste
	Controlling Litter
	Erosion Control
	Controlling Illegal Dumping
	Bacteria Control
	Monitoring
Landscape Maintenance	Mowing, Trimming/Weeding, Planting
	Irrigation
	Fertilizer & Pesticide
	Managing Landscape Waste
	Erosion Control
Roads, Streets, and Highways Operations and Maintenance	Sweeping & Cleaning
	Street Repair & Maintenance
	Bridge & Structure Maintenance
Fountains, Plazas, and Sidewalk Maintenance and Cleaning	Surface Cleaning
	Graffiti Cleaning
	Sidewalk Repair
	Controlling Litter
	Fountain Maintenance
Solid Waste Handling	Solid Waste Collection
	Waste Reduction & Recycling
	Hazardous Waste Collection
	Litter Control
Water and Sewer Utility O&M	Water Line Maintenance
	Sanitary Sewer Maintenance
	Spill/Leak/Overflow Control
Fire Department Activities	Emergency/Post-Emergency Fire Fighting Activities
	Fire Fighting Training
	Fire Station Activities

Training Schedule

The training schedule for all applicable staff is listed in Table ICID-5.

Table ICID-5: IC/ID Program Training Schedule

Category	Schedule
Current Staff	Twice during the term of the MS4 Permit
New Staff	Within 180 days of starting employment

Training Elements

The IC/ID elements addressed by the training program are listed in Table ICID-6.

Table ICID-6: Minimum IC/ID Training Program Elements

Item	Information
1	IC/ID identification, including definitions and examples
2	Investigation
3	Elimination
4	Clean-up
5	Reporting
6	Documentation

Documentation

Documentation of training program activities and training modules are retained and made available for review by the Regional Board.

PROGRESSIVE ENFORCEMENT POLICY

2014

Stormwater Enforcement Guide

Insert City Seal

RB-AR8706

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PROGRESSIVE ENFORCEMENT POLICY

STORMWATER ENFORCEMENT GUIDE

INTRODUCTION

This Stormwater Progressive Enforcement Policy (PEP) provides procedures to enforce provisions of the Waste Discharge Requirements for Municipal Separate Storm Sewer System (MS4) Discharges within the Coastal Watersheds of Los Angeles County, except those Discharges Originating from the City of Long Beach MS4 Order No. R4-2012-0175. Pursuant to Section VI.D.2.a of the Order, Permittees are required to develop and implement a PEP to ensure that (1) regulated Industrial/ Commercial facilities, (2) construction sites, (3) development and redevelopment sites with post-construction controls, and (4) illicit discharges are each brought into compliance with all storm water and non-storm water requirements. The PEP provides the City with a guidance for enforcing the MS4 Permit Provisions and identifies enforcement procedures designed to encourage a timely response.

PROGRESSIVE ENFORCEMENT

Progressive enforcement is an escalating series of actions that allows for the efficient and effective use of enforcement. In some situations, an informal response (written warning/inspection report) is sufficient to inform the responsible party that there is a deficiency and to require the responsible party to return to compliance. If violations continue, the enforcement response should be quickly escalated to increasingly more formal and serious actions until compliance is achieved. Progressive enforcement is not appropriate in all circumstances. For example, where there is a situation needing immediate response, immediate issuance of a cleanup and abatement order may be appropriate.

COMPLIANCE CRITERIA

The City conducts on-site compliance inspections and conducts investigations, in response to complaints, under their authority provided in their municipal code and ordinances to verify compliance. Typical noncompliance issues related to stormwater may include:

- Prohibited discharges to the storm drain system.
- Site's existing condition is likely to result in exposure of pollutants to stormwater contact and possible pollutant discharge to the storm drain system such as:
    - Poor housekeeping activities that results in pollutant exposure.
    - Unattended spills and leaks.
    - Uncovered or improperly stored wastes, materials, or other items of concern.
    - Open waste receptacles such as tallow bins, compactors, and trash bins.
    - Leaky or contaminated equipment stored or used outdoors.
    - Track-out of dirt and sediment or other materials to street or outdoor areas.
- Illicit connections to the storm drain system.
- Best Management Practices (BMPs) are not in place to address pollutant generating activities, which may include erosion and sediment controls and post construction controls.

Complaint Response

The City may receive complaints regarding stormwater ordinance from their staff members, public, local agencies, or the Regional Water Board. The City initiates, within one business day,[1] investigation of complaints from facilities within its jurisdiction. The initial investigation includes, at minimum, a limited inspection of the facility to confirm validity of the complaint and to determine if the facility is in compliance with municipal storm water ordinance and, if necessary, to oversee corrective action. Emergency complaints are investigated immediately.

PROGRESSIVE ENFORCEMENT GUIDELINES

Informal Enforcement

The City implements professional judgment regarding the circumstances surrounding an enforcement action and chooses to resolve routine noncompliance quickly and efficiently through informal means that are not accompanied by sanctions (e.g., civil charges or penalties). When deemed appropriate, the City employs the procedures described below to correct noncompliance informally.

Written Warning/ Inspection Report

Under circumstances where an inspection reveals routine noncompliance that can be corrected within a reasonably short time, staff may choose to issue a written warning/inspection report that describes the minor deficiencies/violations and includes a schedule for correcting the noncompliance[2]. The purpose of the written warning is to give the responsible party an opportunity to comply voluntarily and thus avoid sanctions that might be imposed by an escalated enforcement response.

For residential zones, the City employs an informal enforcement process and escalates to formal enforcement actions for those residents that do not comply with stormwater regulations.

Formal Enforcement / Administrative Enforcement

In the event that the City determines, based on an inspection or illicit discharge investigation conducted, that a responsible party has failed to adequately comply with the informal enforcement process within the required timeframe, the City may initiate administrative enforcement actions or will implement enforcement actions as established through authority in its municipal code. The City's goal is to achieve compliance through an extensive inspection program, educational outreach efforts and, if necessary, the initiation of appropriate enforcement action(s). The goal of any enforcement action is to: (1) return the facility to compliance in a timely manner; (2) eliminate economic benefit realized by the noncompliant facility; and (3) punish violators and prevent future noncompliance.

Notice of Violations

Under circumstances where the responsible party has failed to comply with the informal enforcement process or where the violations are significant, the City may choose to issue a Notice of Violation (NOV). The purpose of an NOV is to inform the responsible party of the observed violations, the applicable stormwater municipal codes that the responsible party has failed to comply with and the

[1] The City may comply with the Permit by taking initial steps (such as logging, prioritizing, and tasking) to "initiate" the ingestigation within that one business day. However, the Regional Water Board would expect that the initial investigation, including a site visit, to occur within four business days (per MS4 Order No.R4-2012-0175 Section VI.D.2.b)
[2] The City may choose to issue/write inspection report on site or provide to the responsible party at a later time.

potential consequences of failing to correct the violations. The NOV also gives the responsible party an opportunity to correct the violations described in the NOV within a specified time. Under circumstances where the responsible party fails to adequately respond to the NOV by failing to address or correct the violations noted in the NOV, the severity of the enforcement response will continue to escalate as described below.

Failure to Return to Compliance/ Second Notice of Violation

The City's municipal code stormwater ordinance authorizes assessment of administrative penalties which can be carried out by issuing a Failure to Return to Compliance Notice or second NOV . The second NOV is a stronger enforcement option which may be used in circumstances where the responsible party has failed to comply with the requirements as indicated on the first NOV.

Cease and Desist Order

In the event the City's municipal code stormwater ordinance authorizes a Cease and Desist Order (CDO), the City may issue a CDO, as an alternative to the second NOV, when immediate action by the responsible party is necessary to eliminate a continuing or threatened serious violation of the stormwater ordinance.

Misdemeanors

The City's may escalate enforcement when evidence of noncompliance indicates that the violator of the stormwater ordinance has acted intentionally with intent to cause, allow to continue or conceal a discharge in violation of the ordinance.

Issuance of Citation/Infractions

At the discretion of the City's, and as established through authority in its municipal code, the City may issue citations and/or infractions.

Cost Recovery

In the event that a complaint response or violation requires clean-up and or extensive investigation, the City has the authority, as established in the municipal code, to require the responsible party to reimburse the city or County for all costs incurred by the related violation. Cost recovery fees that may be collected include, but are not limited to, investigation, enforcement, compliance assistance, damage, control, and clean-up.

Abatement

When a responsible party fails to cease or control a nuisance condition that results in or is likely to result in further or continuing violations, the City's may request abatement of conditions on private property if necessary, or in the event of imminent danger to public safely or the environment, the City itself may abate the nuisance condition.

Permit Revocation

Sites violating the stormwater permit may be subject to permit revocation procedures as authorized in the City's municipal code.

City's/District Attorney

Severe or continuing violations should be referred to the City's or District Attorney for consideration of criminal charges.

TIMEFRAMES FOR CORRECTING DEFICIENCIES/VIOLATIONS

Depending upon the nature of the deficiencies/violations observed, City's may specify compliance deadlines for the responsible party in the inspection report or NOV.

- Prohibited discharges: discharges are to be stopped immediately and up to two weeks. The City may require the responsible party to provide a written description of correction, long-term compliance plan.
- Illicit connection: discharge via the illicit connection are to be stopped immediately and up to two weeks. The City may require the responsible party to provide proof that connection was permanently terminated. Re-inspection typically is required.
- Pollutant exposure/prohibited conditions violations: Up to two weeks to correct violations. The City may require the responsible party to provide proof of compliance for the observed violations.

EXTENSIONS OF COMPLIANCE DEADLINES

There are instances when a responsible party is not able to comply with requirements within the time frame specified. The City may grant a reasonable extension to the responsible party if the City determines that an extension is warranted, as follows:

- A request for extension must be received in writing (mail, e-mail, fax, hand delivered, etc.) by the City no later than the last day of the initial specified compliance deadline date.
- The extension request must explain why the extension is needed and warranted, as well as include a summary of actions taken to date by the responsible party to comply with requirements of the NOV.
- No more time is provided than should reasonably be needed for the responsible party to competently correct the noted deficiencies/violations. The City grants shorter extensions during the wet season.

Appropriate reasons to grant an extension may include, but are not limited to:

- Confirmed delays due to contractor or other service provider outside of responsible party's control.
- Extensive corrections involving work that would conceivably take longer than the time frame provided.
- In general, extensions should not be granted to allow the continuation of unauthorized non-storwater discharges.

The City may require an action plan or statement to be submitted by the responsible party within the initial compliance time frame, as a condition of granting an extension. The action plan or statement should specify the corrections that are to be made and specify an anticipated time frame for completion. The action plan or statement should be signed and dated by the responsible party.

REFERRALS TO THE REGIONAL BOARD

The City may refer violations of its municipal storm water ordinance and/or California Water Code section 13260 by industrial and commercial facilities and construction site operators to the Regional Water Board provided that the City has made a good faith effort of applying enforcement procedures to achieve compliance with its own ordinance. At a minimum, the City's good faith effort must be documented with:

- Two follow-up inspections, and
- Two warning letters or notices of violation.

Referral of Violations of the General Industrial/Construction Permits

For those facilities or site operators in violation of municipal stormwater ordinances and subject to the Industrial and/or Construction General Permits (IGP/CGP), the City may escalate referral of such violations to the Regional Water Board (promptly via telephone or electronically) after one inspection and one written notice of violation (copied to the Regional Water Board) to the facility or site operator regarding the violation. In making such referrals, the City shall include, at a minimum, the following documentation:[3]

- Name of the facility or site,
- Operator of the facility or site,
- Owner of the facility or site,
- WDID Number (if applicable),
- Records of communication with the facility/site operator regarding the violation, which shall include at least one inspection report,
- The written notice of violation (copied to the Regional Water Board),
- For industrial sites, the industrial activity being conducted at the facility that is subject to the Industrial General Permit, and
- For construction sites, site acreage and Risk Factor rating.

RECORDS RETENTION

City shall maintain records, per their existing record retention policies, and make them available on request to the Regional Water Board, including inspection reports, warning letters, notices of violations, and other enforcement records, demonstrating a good faith effort to bring facilities into compliance.[4]

[3] Pursuant to Order No. R4-2012-0175 Section VI.D.2.a.v
[4] Pursuant to Order No. R4-2012-0175 Section VI.D.2.a.iii

Sources

Los Angeles County Stormwater Quality Management Program (2001)

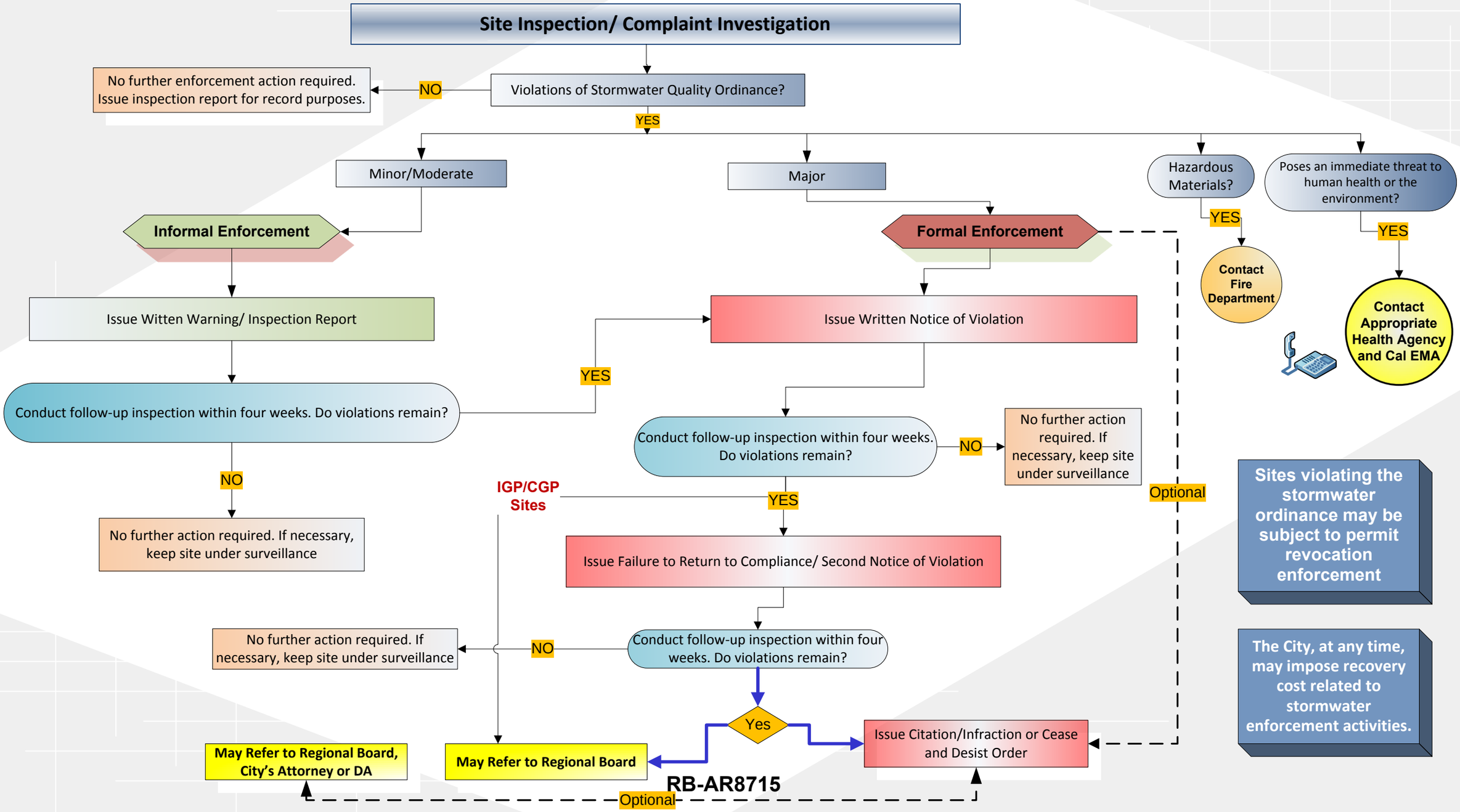
Orange County Municipal Storm Water Drainage Area Management Plan (2003)

Sacramento County Environmental Management Department. Inspection & Enforcement Policy - Commercial/Industrial Stormwater Compliance Program (2012).

Deficiencies/ Violation Degrees

Minor	Moderate	Major
Typically involves conditions that threaten to result in pollutant discharge to the storm system and/or waterways, if not corrected. The immediate threat to human health or the environment is low. **Examples:** **1.** Unattended automotive fluid drips and spills likely to result in moderate discharges to the storm drain system. **2.** Discharge of a moderate amount of car body wet sanding effluent from a single vehicle to outdoor pavement that has not yet impacted the storm drain system. **3.** Unattended spilled restaurant grease on outdoor pavement. Spill appears to be recent, is less than a quart, has not yet impacted the storm drain system and poor housekeeping do not appear to be habitual. **4.** Oily, uncovered engines, or other oily, possibly leaky items stored outside. **5.** Open and missing dumpster and tallow bin lids.	Typically involves less significant pollutant discharges to the storm system and/or receiving waters or conditions that threaten to result in minor to moderate pollutant discharges to the storm system and/or receiving waters. May include small or incidental discharges of hazardous or toxic substances. The violation does not present a major threat to human health and safety, but is likely to result in degradation of receiving water quality. **Examples:** **1.** Discharge of moderate amounts of automotive fluids to storm drain system results from neglected spills and poor housekeeping. **2.** Discharge of moderate amount (less than 20 gallons of diluted effluent) of auto body wet sanding effluent to storm drain system. **3.** More than a quart of spilled restaurant grease on outdoor pavement is neglected, possibly getting tracked out of trash enclosure. Neglect appears to be habitual but so far, impact to storm drain is moderate. **4.** Moderate amount of Oil/fluids leaking from improperly stored engines and parts discharge to storm drain system. **5.** Repeat minor violations may be considered moderate.	Includes significant pollutant discharges to the storm system and/or receiving waters as well as creation of conditions that threaten imminent discharge of significant pollutants to the storm system and/or receiving waters. This also includes, but is not limited to, significant discharges of hazardous or toxic substances. Major violations have the potential to present a major threat to human health or safety and/or the environment. The intent of the violator should be considered: Patterns of willful disregard for safety and the environment, recalcitrance, and repeat violations should contribute to designation of a violation as major, but are not necessary. **Examples:** **1.** Intentional discharge of waste oil to the storm drain. **2.** Discharge of significant volumes of auto body wet sanding effluent to storm drain from work on multiple vehicles, as practice. Especially where repeat violations or evidence of habitual discharge is evident. **3.** Significant amount of spilled restaurant grease is intentionally washed into storm drain, especially if hazardous degreasing agent is used. **4.** Significant amount of Oil/fluids leaking from improperly stored engines and parts discharge to storm drain system, especially if repeat violation. **5.** Repeat moderate violations may be considered major.

PROGRESSIVE ENFORCEMENT FLOW CHART



Watershed Management Program

Attachments to MCM Guidance

Insert City Seal

CITY STORMWATER PROGRAM INDUSTRIAL/COMMERCIAL FACILITY INSPECTION REPORT

Facility:	Address:
Contact:	Title:
Email:	Phone:
Inspector:	Date:
Inspection Type: ☐ Routine ☐ Follow-up ☐ Response to Complaint	BMP materials provided and explained: ☐ Yes ☐ No
SIC/NAICS code and/or business type:	

Industrial Facilities Only

(1) Covered under IGP (WDID is current) or other NPDES Permit: ☐ Yes ☐ No	(2) NEC filed: ☐ Yes ☐ No	SWPPP on-site: ☐ Yes ☐ No
If (1) and (2) above are "No", notified contact of need for IGP coverage and will refer facility to Regional Board: ☐ Yes ☐ No		

CHECKLIST FOR STORMWATER BMP (BEST MANAGEMENT PRACTICE) COMPLIANCE

	BMP	Yes	No	N/A
Vehicle & Equipment Maintenance	**Fueling** - Effective fueling source control devices & practices	☐	☐	☐
	Cleaning – Effective cleaning practices & wash water management practices	☐	☐	☐
	Repair – Effective repair practices & source control devices	☐	☐	☐
Equipment Operations	**Outdoor equipment operations** – Effective source control devices & practices	☐	☐	☐
Storage & Handling	**Outdoor liquids** – Effective source controls & practices	☐	☐	☐
	Outdoor raw materials – Effective source control practices & structural devices	☐	☐	☐
	Solid waste – Effective storage & handling practices & appropriate control measures	☐	☐	☐
Facility Maintenance	**Building & grounds maintenance** – Effective maintenance practices	☐	☐	☐
	Parking & storage area maintenance – Effective designs & housekeeping/maintenance practices	☐	☐	☐
	Stormwater conveyance system maintenance – Proper operation & maintenance protocols	☐	☐	☐
	Sidewalk washing – Remove debris & free standing oil/grease. Use high pressure/low volume spray washing with potable water, no cleaning agents & average rate of 0.006 gal/ft^2.	☐	☐	☐
Spills, Leaks & Discharges	**Accidental spills/leaks** – Effective spill/leak prevention & response procedures	☐	☐	☐
	Unauthorized nonstormwater discharges – Effective elimination	☐	☐	☐

COMMENTS AND CORRECTIVE ACTIONS (IF REQUIRED)
Include description of activities performed and/or principal products produced

ENFORCEMENT: ☐ **None required** ☐ **Corrective Action Notice (complete section below)** ☐ **Other (see comments)**

CORRECTIVE ACTION NOTICE (IF REQUIRED)

If corrective actions have been noted above, then the responsible party (facility owner, occupant or person responsible) is in noncompliance with the City's Stormwater Quality Ordinance. The responsible party may be subject to enforcement actions under this ordinance if the corrective actions are not implemented by:

_____
Corrective Action Due Date

ACKNOWLEDGEMENT OF RECEIPT OF CORRECTIVE ACTION NOTICE

_____	_____	_____
Site Representative Signature	Printed Name	Date

Recording requested by and mail to:

Name: City of [Insert City]
Department of Public Works
ATTN: Director of Public Works

Address: [Insert City Address Line1]
[Insert City Address Line2]

Insert City Seal

********** Space Above This Line For Recorder's Use **********

MASTER COVENANT AND AGREEMENT

REGARDING ON-SITE BMP MAINTENANCE

The undersigned hereby certifies I am (we are) the owner(s) of the hereinafter legally described real property located in the City of [Insert City], County of Los Angeles, State of California (please give legal description: assessor's ID, tract no., lot no., etc.):

_____

Site Address _____

Owner(s) do hereby covenant and agree to and with the City of [Insert City]to maintain all on-site structural Best Management Practices (BMPs) in accordance with the Site Map and the Operations & Maintenance (O&M) Plan set forth in Attachment 1 hereto and incorporated herein by this reference. The specific structural BMPs are listed as follows:

_____

_____

Owner(s) shall maintain the listed drainage devices above on the property indicated and as shown on plans permitted by the City of [Insert City]in a good and functional condition to safeguard the property owners and adjoining properties from damage and pollution.

Owner(s) hereby consent to inspection of the Property by an inspector authorized by the City Manager, or his or her designee, for the purpose for verifying compliance with the provisions of this Agreement.

Owner(s) shall provide printed educational materials with any sale of the property which provide information on what stormwater management facilities are present, the type(s) and location(s) of maintenance signs that are required, and how the necessary maintenance can be performed.

Owner(s) shall provide actual notice of this Agreement and its terms to any respective successor(s) in interest to the Property prior to transfer of said interest to such successor(s) in interest. This covenant and agreement shall run with the land and shall be binding upon any future owners, encumbrances, their successors, heirs or assigns and shall continue in effect until the City of [Insert City] approves its termination.

_____ _____
(Print Name of Property Owner) (Print Name of Property Owner)

_____ _____
(Signature of Property Owner) (Signature of Property Owner)

Dated this _____ day of _____ 20 _____.

********** Space Below This Line For Notary's Use **********

ALL PURPOSE ACKNOWLEDGEMENT

State of _____ }
}
County of _____ }

On _____ before me, _____ personally appeared
(Insert Name of Notary Public and Title)
_____, who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf on which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature _____ (Seal)

Recording requested by and mail to:

Name: City of [Insert City]
Public Works Department
ATTN: Director of Public Works

Address: [Insert City Address Line1]
[Insert City Address Line2]

Insert City Seal

********** Space Above This Line For Recorder's Use **********

MASTER TERMINATION OF COVENANT AND AGREEMENT

REGARDING ON-SITE BMP MAINTENANCE

The undersigned hereby certifies I am (we are) the owner(s) of the hereinafter legally described real property located in the City of [Insert City], County of Los Angeles, State of California (please give legal description: assessor's ID, tract no, lot not, etc.):

_____

Site Address _____

We do hereby, with approval of the City of [Insert City], Engineering Division, terminate the covenant and agreement entered into with the City of [Insert City]as recorded on the _____ day of _____20_____, as Document No.

_____

_____

This covenant and agreement is terminated for the reason that:

_____

_____

_____ _____
(Print Name of Property Owner) (Print Name of Property Owner)

_____ _____
(Signature of Property Owner) (Signature of Property Owner)

Dated this _____ day of _____ 20 _____.

Termination approved by: _____ Date: _____
(Authorized City Representative)

********** Space Below This Line For Notary's Use **********

ALL PURPOSE ACKNOWLEDGEMENT

State of _____ }
}
County of _____ }

On _____ before me, _____ personally appeared
(Insert Name of Notary Public and Title)
_____, who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf on which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature _____ (Seal)

Insert City Seal

City of [Insert City]NPDES Program

POST-CONSTRUCTION BMP VERIFICATION & INSPECTION FORM

PROJECT INFORMATION	
Facility/Project Name:	Inspection Date:
Address:	Inspector:
Contact Name:	Contact Phone:

Project Category

☐ Priority Project ☐ Small Site LID Project ☐ Single Family Residence ☐ Green Street
☐ Public Project ☐ Private Project

Project Type:

☐ Commercial ☐ Industrial ☐ Residential ☐ Multi-Use
☐ Road/Street ☐ Parking Lot ☐ Automotive repair ☐ Restaurant ☐ Other:

Operation/Maintenance:

☐ Reviewed ☐ Not Reviewed ☐ Not Available
Preparer's Name: Preparer's Title:
Address: City: Zip: Phone:

Inspection Type

☐ Prior to Certificate of Occupancy ☐ Special Investigation ☐ Response to Complaint
☐ Routine Inspection (Annual) ☐ Follow-up Inspection

CHECKLIST FOR ROUTINE SOURCE CONTROL BMPs

Requirement	No. of BMPs (if Applicable)	BMP in place per approved LID Plan/SUSMP?	Corrective Action Required
Storm Drain System Stenciling/Signage		☐ Yes ☐ No	☐ Yes ☐ No
Outdoor Material Storage Areas		☐ Yes ☐ No	☐ Yes ☐ No
Trash Storage Areas		☐ Yes ☐ No	☐ Yes ☐ No
Efficient Irrigation Systems & Landscape Design		☐ Yes ☐ No	☐ Yes ☐ No
Protect Slopes & Channels		☐ Yes ☐ No	☐ Yes ☐ No
Loading Dock Areas		☐ Yes ☐ No	☐ Yes ☐ No
Maintenance Bays		☐ Yes ☐ No	☐ Yes ☐ No
Vehicle Wash Areas		☐ Yes ☐ No	☐ Yes ☐ No
Outdoor Process Areas		☐ Yes ☐ No	☐ Yes ☐ No
Equipment Wash Areas		☐ Yes ☐ No	☐ Yes ☐ No
Fueling Areas		☐ Yes ☐ No	☐ Yes ☐ No
Hillside Landscaping		☐ Yes ☐ No	☐ Yes ☐ No
Wash-water Controls for Food Prep Areas		☐ Yes ☐ No	☐ Yes ☐ No
Community Car Wash Racks		☐ Yes ☐ No	☐ Yes ☐ No

CHECKLIST FOR STRUCTURAL BMPs

Requirement	No. of BMPs (if Applicable)	BMP in place per approved LID Plan/SUSMP?	Corrective Action Required
Infiltration Trench/Basin		☐ Yes ☐ No	☐ Yes ☐ No
Infiltration Well/Dry Well		☐ Yes ☐ No	☐ Yes ☐ No
Detention Basin		☐ Yes ☐ No	☐ Yes ☐ No
Porous Pavement		☐ Yes ☐ No	☐ Yes ☐ No
Bio-infiltration		☐ Yes ☐ No	☐ Yes ☐ No
Vegetated Swale		☐ Yes ☐ No	☐ Yes ☐ No
Bio-filtration		☐ Yes ☐ No	☐ Yes ☐ No
Proprietary Control Measure (describe):		☐ Yes ☐ No	☐ Yes ☐ No
Media Filtration		☐ Yes ☐ No	☐ Yes ☐ No
Filter Insert		☐ Yes ☐ No	☐ Yes ☐ No
Regional or Watershed BMPs		☐ Yes ☐ No	☐ Yes ☐ No
Other (describe):		☐ Yes ☐ No	☐ Yes ☐ No

INSPECTION RESULTS:

- ☐ Visible / No Apparent Problems
- ☐ BMP Failure
- ☐ Significant Engineering / Design Flaws
- ☐ Unauthorized Modifications
- ☐ BMP Missing / Removed / Not Located
- ☐ Trash / Debris Exceeding Cap. (bypass)
- ☐ Evidence of Pollution / Dumping
- ☐ Vector Control Issues (Mosquitoes)
- ☐ Inadequate Maintenance

DESCRIPTION OF CORRECTIVE ACTION(S) REQUIRED:

CORRECTIVE ACTION NOTICE (IF REQUIRED)

If any corrective actions have been noted above, then based on this verification inspection, you are in noncompliance with Municipal Code Chapter [-]. You must implement the required corrective action(s) by:

_____
Corrective Action Due Date

After this date, your facility will be re-inspected to verify that all necessary corrective measures have been taken. FAILURE TO IMPLEMENT THE CORRECTIVE ACTION(S) WILL SUBJECT YOU TO ELEVATED ENCORCEMENT, WHICH CAN INCLUDE INFRACTION OR MISDEMEANOR PENALTIES.

ACKNOWLEDGEMENT OF RECEIPT OF CORRECTIVE ACTION NOTICE

_____	_____	_____
Contact Signature	Printed Name	Date

Insert City Seal

STORMWATER PLANNING PROGRAM PRIORITY PROJECT CHECKLIST

FORM PC

Project Name	Owner Name	Developer Name
Project Address	Owner Address	Developer Address
Plan Check #	Owner Phone	Developer Phone

TYPE OF PROJECT

Does the proposed project fall into one of the following categories? Please check Yes/No	YES	NO
PRIORITY PROJECTS		
1. A new project equal to 1 acre or greater of disturbed area and adding more than 10,000 square feet of impervious* surface area		
2. A new industrial park with 10,000 square feet or more of surface area		
3. A new commercial mall with 10,000 square feet or more surface area		
4. A new retail gasoline outlet with 5,000 square feet or more of surface area		
5. A new restaurant (SIC 5812) with 5,000 square feet or more of surface area		
6. A new parking lot with either 5,000 ft^2 or more of impervious* surface or with 25 or more parking spaces		
7. A new automotive service facility (SIC 5013, 5014, 5511, 5541, 7532-7534 and 7536-7539) with 5,000 square feet or more of surface area		
8. Projects located in or directly adjacent to, or discharging directly to a Significant Ecological Area (SEA)*, where the development will: a. Discharge stormwater runoff that is likely to impact a sensitive biological species or habitat; and b. Create 2,500 square feet or more of impervious surface area		
9. Redevelopment*		
SPECIAL PROVISION PROJECTS		
10. Green street* project		
11. Single family hillside* home		

If checked YES, numerical criteria will apply to items 1,2,6-9 and items 3-5 (for project areas of 5,000 ft^2 or more of surface area.) If any of the boxes are checked YES, this project will require the preparation of a Low Impact Development (LID) Plan and a Maintenance Agreement Transfer*

* Defined on back.

Applicant Name

Applicant Signature

Applicant Title

Date

DEFINITIONS:

Impervious are those surfaces that do not allow stormwater runoff to percolate into the ground. Typical impervious surfaces include: concrete, asphalt, roofing materials, etc. However, some specially designed concrete/asphalt do allow water to percolate (pervious).

Hillside means property where the slope is 25% or greater and where grading contemplates cut or fill slopes. Single family hillside homes will require a less extensive plan. During the construction of a single-family hillside home, the following measures are implemented:

a. Conserve natural areas

b. Protect slopes and channels

c. Provide storm drain system stenciling and signage

d. Divert roof runoff to vegetated areas before discharge unless the diversion would result in slope instability

e. Direct surface flow to vegetated areas before discharge unless the diversion would result in slope instability.

Green Streets means any street and road construction of 10,000 square feet or more of impervious surface area

a. These projects will follow an approved green streets manual to the maximum extent practicable. Street and road construction applies to standalone streets, roads, highways, and freeway projects, and also applies to streets within larger projects. Stormwater mitigation measures must be in compliance with the approved green streets manual requirements.

Redevelopment means land-disturbing activities that result in the creation, addition, or replacement of 5,000 ft^2 or more of impervious surface area on an already developed site.

Redevelopment does not include routine maintenance activities that are conducted to maintain the original line and grade, hydraulic capacity, or original purpose of facility, nor does it include modifications to existing single family structures, or emergency construction activities required to immediately protect public health and safety.

Significant Ecological Area means an area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and would be disturbed or degraded by human activities and developments. Also, an area designated by the City as approved by the Regional Water Quality Control Board.

Maintenance Agreement and Transfer: All developments subject to LID and site specific plan requirements provide verification of maintenance provisions for Structural and Treatment Control BMPs, including but not limited to legal agreements, covenants, CEQA mitigation requirements, and/or conditional use permits. Verification at a minimum shall include:

- The developer's and/or owner's signed statement accepting responsibility for maintenance until the responsibility is legally transferred; and
- A signed statement from the public entity assuming responsibility for Structural or Treatment Control BMP maintenance and conduct a maintenance inspection at least once a year; or
- Written conditions in the sales or lease agreement, which requires the recipient to assume responsibility for maintenance and conduct a maintenance inspection at least once a year; or
- Written text in project conditions, covenants and restrictions (CCRs) for residential properties assigning maintenance responsibilities to the Home Owners Association for maintenance of the Structural and Treatment Control BMPs; or
- Any other legally enforceable agreement that assigns responsibility for the maintenance of post-construction Structural or Treatment Control BMPs.

Insert City Seal

STORMWATER PLANNING PROGRAM
PRIORITY DEVELOPMENT & REDEVELOPMENT PROJECTS
PLAN CHECK # _____

FORM P1

Project Name _____ Project Location _____	**GENERAL PROJECT CERTIFICATION**
Company Name _____ Address _____ Contact Name / Title _____ Phone / FAX / Email _____	*A completed original of this form must accompany all LID Plan submittals.*

Best Management Practices (BMPs) have been incorporated into the design/maintenance/construction of this project to accomplish the following:

1. Minimize impacts from stormwater runoff on the biological integrity of Natural Drainage Systems and water bodies in accordance with requirements under CEQA (Cal. Pub. Resources Code § 21100), CWC § 13369, CWA § 319, CWA § 402(p), CWA § 404, CZARA § 6217(g), ESA § 7, and local government ordinances.
2. Maximize the percentage of pervious surfaces to allow more percolation of stormwater into the ground.
3. Minimize the amount of stormwater directed to impermeable surfaces and to the MS4.
4. Minimize pollution emanating from parking lots through the use of appropriate Treatment Control BMPs and good housekeeping practices.
5. Minimize breeding of Vectors
6. Reduce pollutant loads in stormwater from the development site.

I certify that this Low Impact Development Plan and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gathered/evaluated the information submitted.

Post Construction / Maintenance Certification

As the responsible party, I certify that the proposed BMPs will be implemented, monitored and maintained to ensure their continued effectiveness. In the event of a property transfer, the new owner/lessee will be notified of the BMPs in use at this site and I will include written conditions in the sales or lease agreement, which requires the new owner (or lessee) to assume responsibility for maintenance and conduct a maintenance inspection at least once a year. The information contained herein is, to the best of my knowledge and belief, true, accurate, and complete.

In consideration of the execution of City of [Insert City] approval of the proposed Low Impact Development (LID) Plan including any proposed treatment system, the applicant hereby agrees to indemnify, save and keep the City of [Insert City], its officers, agents and employees free and harmless from and against any and all claims for injury, damage, loss, liability, cost and expense of any nature whatsoever, which the City of [Insert City], its officers, agents, or employees may suffer, sustain, incur, pay out as a result of any and all actions, suits, proceedings, claims and demands which may be brought, made, or filed against the City of [Insert City], its officers, agents or employees by reason of or arising out of, or in any manner connected with any and all operations permitted by this approval. This indemnification extends to further agree that the City of [Insert City]is not responsible for any additional requirements or restrictions due to changes in regulations, policies or enforcement practices of the California Regional Water Quality Control Board, or any other applicable regulatory agencies.

Property Owner Name	Property Owner Signature
Applicant Title	Date

PLANNING BEST MANAGEMENT PRACTICES

BMP Name	BMP Identification Number and Name	✓ if to be used
Car Wash Facility	SC-21: Vehicle and Equipment Cleaning	
Constructed Wetlands	MP-20: Wetlands	
Control of Impervious Runoff	-N/A-	
Efficient Irrigation	-N/A-	
Energy Dissipaters	EC-10: Velocity Dissipation Devices	
Extended Detention Basins	TC-22: Extended Detention Basin	
Infiltration Basins	TC-11: Infiltration Basins	
Infiltration Trenches	TC-10: Infiltration Trenches	
Inlet Trash Racks	-N/A-	
Landscape Design	EC-2: Preservation of Existing Vegetation EC-4: Hydro seeding EC-6 & EC-8: Straw & Wood Mulching	
Linings for Urban Runoff Conveyance Channels	-N/A-	
Materials Management	SC-30: Outdoor Loading/Unloading	
Media Filtration	TC-40: Media Filter	
Motor Fuel Concrete Dispensing Areas	SC-20: Vehicle and Equipment Fueling	
Motor Fuel Dispensing Area Canopy	SC-20: Vehicle and Equipment Fueling	
Water Quality Inlets	TC-50: Water Quality Inlet	
Outdoor Storage	SC-31: Outdoor Liquid Container Storage SC-33: Outdoor Storage of Raw Materials	
Porous Pavement and/or Alternative Surfaces	-N/A-	
Protect Slopes and Channels	EC-11: Slope Drains EC-12: Streambank Stabilization	
Self-Contained Areas for Vehicle or Equipment Washing, Steam Cleaning, Maintenance, Repair, or Material Processing	SC-21: Vehicle and Equipment Cleaning SC-22: Vehicle and Equipment Repair SC-32: Outdoor Equipment Operations	
Storm Drain System Stenciling and Signage	SC-34: Waste Handling and Disposal (Signage Section)	
Trash Container Areas	SC-34: Waste Handling and Disposal	
Vegetated Swales and Strips	TC-32: Bioretention	
Wet Ponds	TC-20: Wet Ponds	
Other:	• • • • •	

Please refer to the California Storm Water Best Management Practice Handbooks for more information.

Insert City Seal

STORMWATER TREATMENT CERTIFICATION

FORM P2

SITE NAME and ADDRESS

_____

_____

_____

_____

_____

Plan Check #_____

Planning #_____

APPROXIMATE PROJECT CHARACTERISTICS

Roofed Area	_____	ft^2
Roadway/Parking Area (exposed)	_____	ft^2
Landscaped/Vegetation	_____	ft^2
Other Ground Level Impervious Areas (Ex: Outdoor work or storage areas)	_____	ft^2
Other: _____	_____	ft^2
TOTAL	_____	ft^2

STRUCTURAL/TREATMENT BMPs

(attach additional sheets as necessary) or see back

Area Designation (must correspond with plans)	**Tributary Area** (ft^2)	**Average Impervious Factor**	**Estimated Flow Rate or Volume***	**Anticipated Potential Pollutants**	**Type of BMP** (include size, make, and model, if any)	**BMP Location** (briefly describe)	**Design Treatment Flow Rate or Volume Capacity**

By stamping this form, I acknowledge that each treatment BMP is provided with adequate bypass or overflow so as not to contribute to localized flooding or soil instability.

*Flow rates and volumes based on the 0.75 inch, 24-hour rain event or the 85th percentile, 24-hour rain event, whichever is greater.

I certify that I am a Professional Civil Engineer registered in the State of California, and that the treatment methods and capacities herein comply with the requirements established by the California Regional Water Quality Control Board, Los Angeles Region, and the State Water Resources Control Board for Low Impact Development (LID) Plans.

Affix Registered Engineer Wet Ink Stamp Here:

Print Name _____ **Signature** _____ **Date** _____

STRUCTURAL/TREATMENT BMPs

(attach additional sheets as necessary)

Area Designation (must correspond with plans)	**Tributary Area** (ft^2)	**Average Impervious Factor**	**Estimated Flow Rate or Volume***	**Anticipated Potential Pollutants**	**Type of BMP** (include size, make, and model, if any)	**BMP Location** (briefly describe)	**Design Treatment Flow Rate or Volume Capacity**

Insert City Seal

OWNER'S CERTIFICATION
MINIMUM BMPS FOR ALL CONSTRUCTION SITES

FORM OC1

PLAN CHECK #_____

Project Name	_____	BUILDING/GRADING PERMIT NUMBER	
Project Location	_____		
Owner Name	_____	Contractor Name	_____
Address	_____	Address	_____
Phone	_____	Phone	_____
FAX/Email	_____	FAX/Email	_____

The National Pollutant Discharge Elimination System (NPDES) is the portion of the Clean Water Act that applies to the protection of receiving waters. Under permits from the Los Angeles Regional Water Quality Control Board (RWQCB), certain activities are subject to RWQCB enforcement. To meet the requirements of the Los Angeles County Municipal Stormwater Permit (CAS004001), minimum requirements for sediment control, erosion control and construction activities must be implemented on each project site. Minimum requirements include:

- **EROSION CONTROL:** Erosion from slopes and channels shall be controlled by implementing an effective combination of BMPs, such as the limiting of grading activities during the wet season; inspecting graded areas during rain events; planting and maintenance of vegetation on slopes; and covering erosion susceptible slopes.
- **SEDIMENT CONTROL:** Eroded sediments from areas disturbed by construction and from stockpiles of soil shall be retained on site to minimize sediment transport from the site to streets, drainage facilities and/or adjacent properties via runoff, vehicle tracking or wind.
- **NON-STORMWATER MANAGEMENT:** Non-stormwater runoff from equipment and vehicle washing and any other activity shall be contained at the project site.
- **WASTE MANAGEMENT:** Construction related materials, wastes, spills or residues shall be retained on site to minimize transport from the site to streets, drainage facilities or adjoining properties by wind or runoff. Runoff from equipment and vehicle washing shall be contained at construction sites unless treated to remove sediment and pollutants.

Examples of Minimum BMPs include: (1) Soil piles must be covered with tarps or plastic, (2) leaking equipment must be repaired immediately, (3) refueling must be conducted away from catch basins, (4) catch basins must be protected when working nearby, (5) vacuum all concrete saw cutting, (6) never wash concrete waste into the street, (7) keep the site clean, sweep the gutters at the end of each working day and keep a trash receptacle on site.

As the architect/engineer of record, I have selected appropriate BMPs to effectively minimize the negative impacts of this project's construction activities on stormwater quality. The project owner and contractor are aware that the selected BMPs shall be installed, monitored, and maintained to ensure their effectiveness. The BMPs not selected for implementation are redundant or deemed not applicable to the proposed construction activity.

Architect/Engineer of Record Name	Architect/Engineer of Record Signature
Title	Date

I certify that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that submitting false and/ or inaccurate information, failing to update the ESCP to reflect current conditions, or failing to properly and/ or adequately implement the ESCP may result in revocation of grading and/ or other permits or other sanctions provided by law.

Landowner or Landowner's Agent Name	Landowner or Landowner's Agent Signature
Title	Date

Insert City Seal

EROSION AND SEDIMENT CONTROL PLAN (ESCP) REVIEW CHECKLIST

These requirements apply to all activities involving soil disturbance with the exception of agricultural activities. Applicable activities include but are not limited to grading, vegetation clearing, soil compaction, paving, re-paving and linear underground/overhead projects (LUPs).

Prior to issuing a grading or building permit, each operator of a construction activity within its jurisdiction must prepare and submit an ESCP prior to the disturbance of land.

Contact Name:	Tracking #:
Contact Title:	Site Name:
Company Name:	Site Address:
Mailing Address:	Type of Facility:
City, State, Zip:	Submittal Date:
Phone Number:	Plan Return Date:
Fax Number:	Disturbed Area:

First Review
ESCP Received on:

Review Completed on:

Second Review
ESCP Received on:

Review Completed on:

Third Review
ESCP Received on:

Review Completed on:

Fourth Review
ESCP Received on:

Review Completed on:

Fifth Review
ESCP Received on:

Review Completed on:

Sixth Review
ESCP Received on:

Review Completed on:

ESCP REQUIREMENT	SATISFACTION			COMMENTS
	YES	NO	N/A	
General Information				
Contact information (e.g., name, address, phone, email, etc.) provided for the owner and contractor.	☐	☐	☐	
Basic site information including location, status, size of the project and area of disturbance is provided.	☐	☐	☐	
Proof of existing coverage under applicable permits, including, but not limited to the State Water Board's Construction General Permit, and State Water Board 401 Water Quality Certification.	☐	☐	☐	
Meets the minimum requirements of the jurisdictional erosion and sediment control ordinance.	☐	☐	☐	
Includes the elements of a Storm Water Pollution Prevention Plan (SWPPP) prepared in accordance with the requirements of the Construction General Permit.	☐	☐	☐	
Developed and certified by a Qualified SWPPP Developer (QSD).	☐	☐	☐	
Identifies the proximity all water bodies, water bodies listed as impaired by sediment-related pollutants, and water bodies for which a sediment-related TMDL has been adopted and approved by the USEPA.	☐	☐	☐	
Identifies any significant threat to water quality status, based on consideration of factors listed in Appendix 1 to the Construction General Permit.	☐	☐	☐	
The project start date and anticipated completion date is provided.	☐	☐	☐	
Includes Identification of site Risk Level as identified per the requirements in Appendix 1 of the Construction General Permit.	☐	☐	☐	
Contains a language signed by the landowner or the landowner's agent stating as follows: *"I certify that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that submitting false and/ or inaccurate information, failing to update the ESCP to reflect current conditions, or failing to properly and/ or adequately implement the ESCP may result in revocation of grading and/ or other permits or other sanctions provided by law."*	☐	☐	☐	

ESCP REQUIREMENT	SATISFACTION			COMMENTS
	YES	NO	N/A	
Best Management Practices				
All structural BMPs are designed by a licensed California Engineer.	☐	☐	☐	
Includes Sediment/Erosion Control.	☐	☐	☐	
Includes controls to prevent tracking on and off the site.	☐	☐	☐	
Includes non-stormwater controls (e.g., vehicle washing, dewatering, etc.).	☐	☐	☐	
Includes Materials Management (delivery and storage).	☐	☐	☐	
Includes Spill Prevention and Control.	☐	☐	☐	
Includes Waste Management (e.g., concrete washout/waste management; sanitary waste management).	☐	☐	☐	
Includes methods to minimize the footprint of the disturbed area and to prevent soil compaction outside of the disturbed area.	☐	☐	☐	
Includes methods used to protect native vegetation and trees.	☐	☐	☐	
Includes the rationale for the selection and design of the proposed BMPs, including quantifying the expected soil loss from different BMPs.	☐	☐	☐	
Post-Construction Structural BMPs subject to Operation and Maintenance Requirements are identified.	☐	☐	☐	
Site Plan				
Full sized plans showing the site with all proposed BMPs and water quality notes have been signed and stamped with wet ink application by the appropriate individual.	☐	☐	☐	
Plan includes a title block containing at least the project name, address, and owner.	☐	☐	☐	
All figures, maps, plot plans, etc. have a legend, including a North arrow and scale.	☐	☐	☐	
All facilities are labeled for the intended function.	☐	☐	☐	
All areas of outdoor activity are labeled.	☐	☐	☐	
All structural BMPs are indicated.	☐	☐	☐	
Drainage flow information depicted.	☐	☐	☐	
Project location shown.	☐	☐	☐	
Site boundary indicated.	☐	☐	☐	

Agency Standard Operating Procedures

Each agency will use the suggested language below to develop, implement, and revise as necessary agency-specific Standard Operating Procedures (SOPs) that identify the procedures each agency will follow.

CGP Coverage Verification

- Verification of active coverage under the Construction General Permit for sites disturbing 1 acre or more, or that are part of a planned development that will disturb 1 acre or more and a process for referring non-filers to the Regional Water Board.

Prior to releasing any permits relating to and/or allowing for construction activities on a site resulting in one (1) acre or more of soil disturbance, a Notice of Intent (NOI), a Storm Water Pollution Prevention Plan (SWPPP), and all other Permit Registration Documents (PRDs) must be filed with the Regional Water Resources Control Board (Regional Board) through the State Water Board's Storm water Multi-Application and Report Tracking System (SMARTS) website and a Waste Discharge ID (WDID) number must be obtained from the Regional Board. This requirement will be included as a condition of approval. In cases where construction activities have commenced on a qualifying site and the project has not yet filed all PRDs (along with an explanation for filing late) with the Regional Board, a Notice of Violation (NOV) will be sent to the responsible person. Any work orders released will be stopped and fines may be enforced. The Regional Board will be notified of the discharger's non-compliance. Work will not be allowed to commence until the NOI has been accepted by the Regional Board and WDID number issued.

ESCP Review

- Review of the applicable ESCP and inspection of the construction site to determine whether all BMPs have been selected, installed, implemented, and maintained according to the approved plan and subsequent approved revisions.

Prior to issuing a grading or building permit, each operator of a construction activity within its jurisdiction must prepare and submit an Erosion and Sediment Control Plan (ESCP) prior to the disturbance of land. The ESCP Requirement Checklist will be used to ensure required information is submitted by the responsible person. These requirements apply to all activities involving soil disturbance with the exception of agricultural activities. Applicable activities include but are not limited to grading, vegetation clearing, soil compaction, paving, re-paving and linear underground/overhead projects (LUPs).

BMP Assessment

- Assessment of the appropriateness of the planned and installed BMPs and their effectiveness.

Prior to releasing any permits relating to and/or allowing for construction activities on a site resulting in one (1) acre or more of soil disturbance a Qualified SWPPP Practitioner (QSP) must be identified by the developer. Prior to beginning any construction activities, the QSP must review the ESCP and determine if the following requirements are being met:

1. Erosion and sediment controls are incorporated to provide effective reduction or elimination of sediment related pollutants in stormwater discharges and authorized non-stormwater discharges from the site.

2. Sediment controls are designed to intercept and settle out soil particles that have been detached and transported by the force of water.
3. Non-stormwater control BMPs are selected to control sediment on the construction site.
4. Materials and waste management pollution control BMPs are incorporated to minimize stormwater contact with construction materials, wastes and service areas; and to prevent materials and wastes from being discharged off-site.

If the QSP identifies potential problematic areas of the ESCP, a revision to the ESCP must be submitted for review and approval.

Once the BMPs are installed, inspections must be conducted at the frequency identified in the Watershed Management Program (WMP). All BMPs not functioning as intended must be repaired, replaced, or changed to a more effective BMP. Inspection and maintenance procedures must be in accordance with the CASQA handbook.

Discharge Reporting

- Visual observation and record keeping of non-stormwater discharges, potential illicit discharges and connections, and potential discharge of pollutants in stormwater runoff.

Any non-stormwater discharges, potential illicit discharges and connections, and potential discharge of pollutants in stormwater runoff will be tracked and kept on record.

Public reporting of illicit discharges or water quality impacts associated with discharges into or from MS4s within this jurisdiction will be conducted. Multiple modes of communication are in place to allow for complaints and spill reporting. When a complaint is received it will be documented and tracked to ensure that all complaints are adequately addressed.

A Spill Response Plan will be implemented for all sewage and other spills that may discharge into the MS4 within this jurisdiction. Coordination with spill response teams will be observed throughout all appropriate departments, programs, and agencies so that maximum water quality protection is provided. All spill complaints will be investigated within one business day of receiving the complaint and a response to spills for containment will be conducted within 4 hours of becoming aware of the spill, except where such spills occur on private property, in which case the response should be within 2 hours of gaining legal access to the property. Spills that may endanger health or the environment will be reported to appropriate public health agencies and the Office of Emergency Services (OES).

A training program regarding the identification of illicit connections/illicit discharges (IC/IDs) for all municipal field staff, who, as part of their normal job responsibilities (e.g., street sweeping, storm drain maintenance, collection system maintenance, road maintenance), may come into contact with or otherwise observe an illicit discharge or illicit connection to the MS4 will be provided.

Construction Inspection Reporting and Tracking

- Development of a written or electronic inspection report generated from an inspection checklist used in the field.
- Tracking of the number of inspections for the inventoried construction sites throughout the reporting period to verify that the sites are inspected at the minimum frequencies required.

Inspections will be conducted at a frequency listed in the Watershed Management Program (WMP). Inspection checklists and/or reports will be utilized to determine and keep record of whether or not all

BMPs have been selected, installed, implemented, and maintained according to the approved plan and subsequent approved revisions. These checklists/reports will be retained for at least three (3) years following NOT approval.

Insert City Seal

(CITY NAME) STORMWATER INSPECTION REPORT FOR CONSTRUCTION SITES

SITES ONE ACRE OR GREATER

Project Name:		Address:	
Area disturbed:		WDID:	SWPPP on-site: ☐ Yes ☐ No
Risk level: ☐ Low (Risk 1) ☐ Medium (Risk 2) ☐ High (Risk 3)		Erosion & Sediment Control Plan (ESCP) on-site: ☐ Yes ☐ No	
Phase: ☐ Prior to Land Disturbance ☐ Active construction ☐ Site stabilization			
Developer/Contractor:		Phone number:	
Contact:		Title:	
Inspector:		Date:	
Inspection: ☐ Routine (monthly and for each phase of construction) ☐ Follow-up ☐ Response to complaint		*For sites discharging to a waterbody impaired for sediment/turbidity*[i] ☐ *Routine biweekly* ☐ *Predicted rainfall* ☐ *Recent rainfall*	

CHECKLIST FOR STORMWATER BMP (BEST MANAGEMENT PRACTICE) COMPLIANCE

PHASE 1 AND 2: PRIOR TO LAND DISTURBANCE AND DURING ACTIVE CONSTRUCTION

	Comment	Yes	No	N/A
Erosion Control	1. Erosion controls are implemented in accordance with the ESCP	☐	☐	☐
	2. Erosion observed	☐	☐	☐
Sediment Control	3. Sediment controls are implemented in accordance with the ESCP	☐	☐	☐
	4. Sediment discharge observed	☐	☐	☐
Additional Controls	5. Tracking controls (tire washout, stabilized entrances, exits and roadways) are implemented in accordance with the ESCP	☐	☐	☐
	6. Sediment in roads observed	☐	☐	☐
	7. Wind erosion controls are implemented in accordance with the ESCP	☐	☐	☐
	8. Wind erosion observed	☐	☐	☐
Waste Management	9. Effective material delivery and storage practices are implemented	☐	☐	☐
	10. Spill prevention and control practices are implemented	☐	☐	☐
	11. Stockpile controls are implemented in accordance with the ESCP	☐	☐	☐
	12. Solid waste controls are implemented in accordance with the ESCP	☐	☐	☐
Nonstormwater Management	13. Vehicle and equipment washing, fueling and maintenance controls are implemented in accordance with the ESCP	☐	☐	☐
	14. Nonstormwater discharges observed	☐	☐	☐
	15. Dewatering operations covered under NPDES Permit CAG994004	☐	☐	☐
	16. Water conservation practices are implemented	☐	☐	☐

PHASE 3: FINAL LANDSCAPING/SITE STABILIZATION

Comment	Yes	No	N/A	Comment	Yes	No	N/A
1. Graded areas have reached final stabilization	☐	☐	☐	3. Temporary erosion and sediment BMPs are removed	☐	☐	☐
2. Trash, debris and construction materials are removed	☐	☐	☐	4. Post-construction BMPs are installed	☐	☐	☐

COMMENTS AND CORRECTIVE ACTIONS (IF REQUIRED):

ENFORCEMENT: ☐ **None required** ☐ **Corrective Action Notice (complete section below)** ☐ **Other (see comments)**

CORRECTIVE ACTION NOTICE (IF REQUIRED)

If corrective actions have been noted above, then the responsible party (facility owner, occupant or person responsible) is in noncompliance with the City's Stormwater Quality Ordinance. The responsible party may be subject to enforcement actions under this program if the corrective actions are not implemented by:

_____
Corrective Action Due Date

ACKNOWLEDGEMENT OF RECEIPT OF CORRECTIVE ACTION NOTICE

_____ Site Representative Signature

_____ Printed Name

_____ Date

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[i] For sites discharging to a tributary listed by the state as an impaired waterbody for sediment or turbidity under CWA § 303(d), or determined to be a threat to water quality, inspections must be conducted (1) when two or more consecutive days with greater than 50% chance of rainfall are predicted by NOAA and (2) within 48 hours of a ½-inch rain event and (3) at least once every two weeks.

Insert City Seal

CITY STORMWATER QUALITY PROGRAM
CONSTRUCTION SITE INSPECTION REPORT

FOR SITES LESS THAN ONE ACRE

Project:	Address:
Contact:	Title:
Contractor:	Phone:
Inspector:	Date:

CHECKLIST FOR STORMWATER BMP (BEST MANAGEMENT PRACTICE) COMPLIANCE

	Question	Yes	No	N/A
Erosion Control	1. Effective erosion controls implemented.	☐	☐	☐
	2. Erosion observed.	☐	☐	☐
Sediment Control	3. Effective sediment controls implemented.	☐	☐	☐
	4. Sediment discharge observed.	☐	☐	☐
Non-Stormwater Management	5. Water conservation practices are implemented.	☐	☐	☐
	6. Dewatering operations covered under NPDES Permit CAG994004	☐	☐	☐
Waste Management	7. Effective material delivery/storage practices and spill prevention/control practices are implemented.	☐	☐	☐
	8. Effective waste management controls are implemented.	☐	☐	☐

COMMENTS AND CORRECTIVE ACTIONS (IF REQUIRED):

ENFORCEMENT: ☐ **None required** ☐ **Corrective Action Notice (complete section below)** ☐ **Other (see comments)**

CORRECTIVE ACTION NOTICE (IF REQUIRED)

If corrective actions have been noted above, then the responsible party (facility owner, occupant or person responsible) is in noncompliance with the City's Stormwater Quality Ordinance. The responsible party may be subject to enforcement actions under this program if the corrective actions are not implemented by:

_____
Corrective Action Due Date

ACKNOWLEDGEMENT OF RECEIPT OF CORRECTIVE ACTION NOTICE

_____ Site Representative Signature

_____ Printed Name

_____ Date

Example Lease Language for Fixed Facilities

The following is example language that can be inserted into municipal leases:

The Los Angeles Regional Water Quality Control Board (RWQCB) has issued permits which govern stormwater and non-stormwater discharges resulting from municipal activities performed by or for the Coastal Watersheds of Los Angeles County, including the Los Angeles County Flood Control District, the County of Los Angeles, and 84 incorporated cities within the coastal watersheds of Los Angeles County with the exception of Long Beach (collectively referred to as Permittees). The RWQCB Permit is a National Pollutant Discharge Elimination System (NPDES) Permit No. R4-2023-0175. A Copy of the RWQCB Permit is available for review.

In order to comply with the Permit requirements, the Permittees have developed a Watershed Management Program (WMP) which contains Public Agency Facilities and Activities Maintenance Procedures (Maintenance Procedures) with Best Management Practices (BMPs) adopted from the Caltrans Storm Water Quality Handbook Maintenance Staff Guide (Caltrans Handbook) that parties leasing municipally owned properties must adhere to. These Maintenance Procedures contain pollution prevention and source control techniques to minimize the impact of those activities upon dry-weather urban runoff, stormwater runoff, and receiving water quality.

Activities performed at the facility leased under this agreement shall conform to the RWQCB NPDES Permit, the WMP, and the CalTrans Handbook, and must be performed as described within all applicable Maintenance Procedures. The holder of this agreement shall fully understand the Maintenance Procedures applicable to activities conducted at the facility leased under this agreement prior to conducting them and maintain copies of the Maintenance Procedures at the leased facility throughout the agreement duration. The applicable Maintenance Procedures are included as Exhibit ___ of this agreement.

Evaluation of activities subject to WMP requirements performed at the facility leased under this agreement will be conducted by the city to verify compliance with Maintenance Procedures, and may be required through lessor self-evaluation as determined by the city.

Example Contract Language for Field Programs

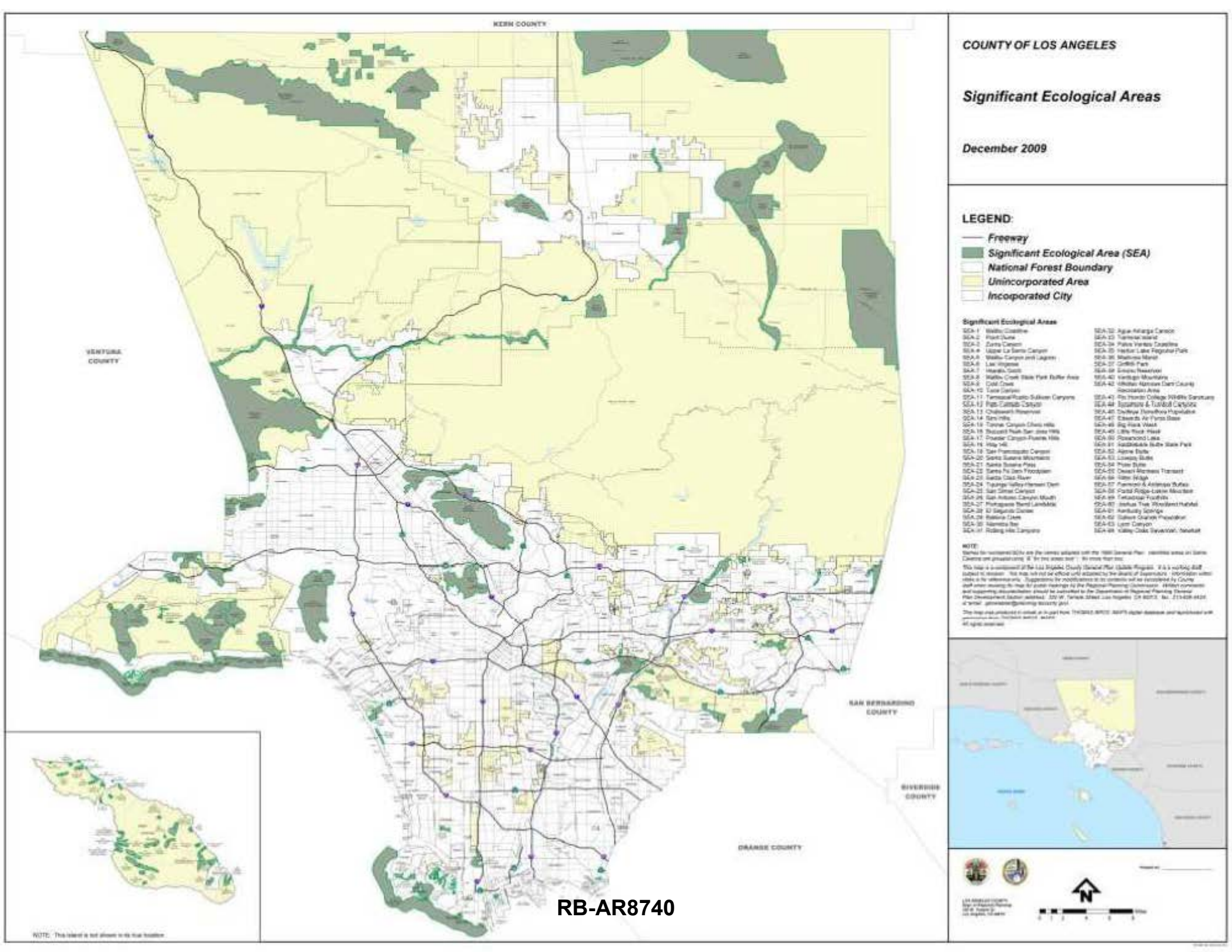
The following is example language that can be inserted into municipal field program contracts:

The Los Angeles Regional Water Quality Control Board (RWQCB) has issued permits which govern stormwater and non-stormwater discharges resulting from municipal activities performed by or for the Coastal Watersheds of Los Angeles County, including the Los Angeles County Flood Control District, the County of Los Angeles, and 84 incorporated cities within the coastal watersheds of Los Angeles County with the exception of Long Beach (collectively referred to as Permittees). The RWQCB Permit is a National Pollutant Discharge Elimination System (NPDES) Permit No. R4-2023-0175. A Copy of the RWQCB Permit is available for review.

In order to comply with the Permit requirements, the Permittees have developed a Watershed Management Program (WMP) which contains Public Agency Facilities and Activities Maintenance Procedures (Maintenance Procedures) with Best Management Practices (BMPs) adopted from the Caltrans Storm Water Quality Handbook Maintenance Staff Guide (Caltrans Handbook) that parties leasing municipally owned properties must adhere to. These Maintenance Procedures contain pollution prevention and source control techniques to minimize the impact of those activities upon dry-weather urban runoff, stormwater runoff, and receiving water quality.

Work performed under this CONTRACT shall conform to the RWQCB NPDES Permit, the WMP, and the CalTrans Handbook, and must be performed as described within all applicable Maintenance Procedures. The CONTRACTOR shall fully understand the Maintenance Procedures applicable to activities that are being conducted under this CONTRACT prior to conducting them and maintain copies of the Maintenance Procedures throughout the CONTRACT duration. The applicable Model Maintenance Procedures are included as Exhibit ___ of this CONTRACT.

Evaluation of activities subject to WMP requirements performed under this CONTRACT will be conducted to verify compliance with the Maintenance Procedures, and may be required through CONTRACTOR self-evaluation as determined by the city.


KERN COUNTY
VENTURA COUNTY
SAN BERNARDINO COUNTY
RIVERSIDE COUNTY
ORANGE COUNTY
COUNTY OF LOS ANGELES
Significant Ecological Areas
December 2009
LEGEND:
Freeway
Significant Ecological Area (SEA)
National Forest Boundary
Unincorporated Area
Incoporated City
Significant Ecological Areas
NOTE: This island is not shown in its true location

RB-AR8740

2014

Integrated Pest Management Program

Developed for the City of

_____

RB AR8741

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INTEGRATED PEST MANAGEMENT (IPM) PROGRAM IMPLEMENTATION GUIDELINES[1] FOR THE CITY OF _____

General IPM Policy

For the past few decades, the trend in pest management has been to increasingly rely on synthetic chemical pesticides. This management strategy results in the increased use of dangerous chemicals, an increase in the number of pests that can become resistant to the pesticides, as well as lead to new organisms becoming pests. Additionally, some pesticides used for terrestrial pest management have been found in waterways causing problems in the aquatic environment.

Pest control managers are now moving away from their reliance on pesticides and toward an integrated approach that combines limited pesticide use with more environmentally friendly pest control techniques. This system is known as integrated pest management (IPM), a strategy that focuses on the long-term prevention of pests through a combination of techniques, including preventative, cultural, mechanical, environmental, biological, and chemical control tactics (**Figure 1**). Multiple IPM techniques can be utilized simultaneously to control pest populations in the most effective manner possible.

A comprehensive IPM Program and Approach allows for primary focus on pollution prevention by monitoring and preventing pests as well as minimizing heavy pest infestations, which reduces the need for chemicals and/or multiple applications. The goal of the IPM Program is not to eliminate all pests, but to keep their populations at tolerable levels. In an IPM program, pesticides should be applied only when it is determined that pests are approaching damaging levels. Because this requires early detection of the pests, IPM programs utilize monitoring techniques and economic thresholds to determine when to implement control strategies. If possible, a person should be trained and assigned to scout the sites on a regular basis. Pesticides may be part of an IPM program, but they should preferably be used only after pests exceed established thresholds and applied only to the affected area (in the case of disease prevention, some modifications may be allowed). In general, all pest control strategies should be those that are least disruptive to biological control organisms (natural enemies), least hazardous to humans and the environment (including non-target organisms), and have the best likelihood of long-term effectiveness.

[1]Adapted from the Orange County Drainage Area Management Plan Integrated Pest Management Policy Developed by the University of California, Division of Agriculture and Natural Resources

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IPM practices are encouraged over the sole use of pesticides as the primary means of pest management (**Table 1**). As a part of their Municipal Activities Program, public agencies and their contractors evaluate the ability to use non-chemical IPM techniques before intensive use of pesticides. This IPM Program template outlines baseline IPM procedures that are required by the Los Angeles County Municipal Separate Storm System Permit (MS4 Permit)[2] along with additional optional IPM techniques that can be employed to implement an effective IPM program.

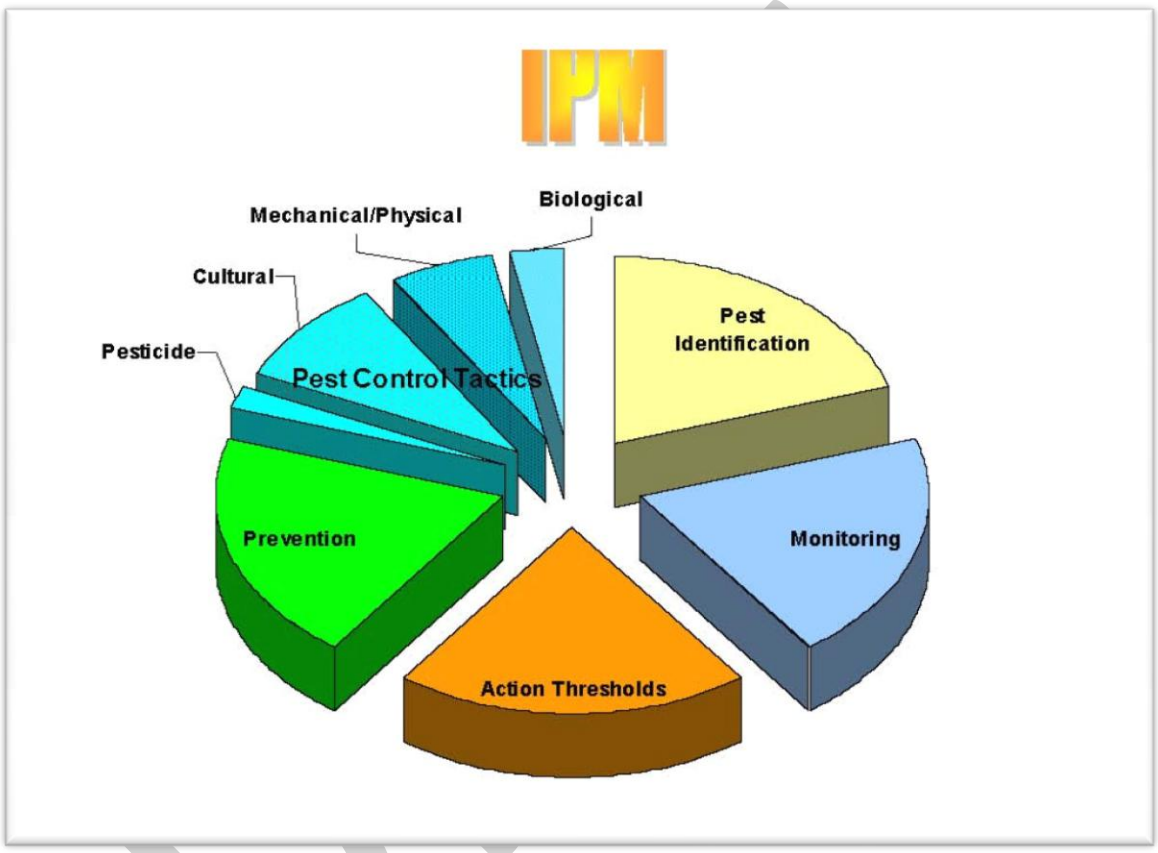

Figure 1 Components of an Integrated Pest Management Program

[2]California Regional Water Quality Control Board Los Angeles Region. 2012. Order No. R4-2012-0175 NPDES Permit No. CAS004001 Waste Discharge Requirements for Municipal Separate Storm Sewer System (MS4) Discharges within the Coastal Watersheds of Los Angeles County, except those Discharges Originating from the City of Long Beach MS4.

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Table 1 Advantages and Disadvantages of a Pesticide-Based Program Versus An IPM-Based Pest Control Program

Pesticide Based Pest Control		IPM Based Pest Control	
Advantages	**Disadvantages**	**Advantages**	**Disadvantages**
Quick suppression of pests	Not long-term	Long-term control	It may take longer to see results
	Pest control is reactive	Can be proactive in pest control actions.	Must establish thresholds
	Loss of natural controls. Often get outbreaks of other pests	Reduces disruption of natural enemies	
		Pesticides can be used (only used as a last resort)	Must have knowledge of pesticides and their effects on other organisms.
Labor is only for spraying	Extra work in cleanup	Staff becomes more knowledgeable of pests and injury symptoms	Labor is required for monitoring and regular scouting Training is required to identify pests and natural enemies
Not much preparation or follow-up needed	Need a PCA recommendation	Pest management is more organized	Must maintain a record-keeping system.
	Pesticide safety issues for applicators, public, animals More pesticides in environment Contamination of water bodies from runoff	Less exposure to pesticides Safer to the environment Reduces contamination from runoff	

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Implementation Guidelines

Enter Designated IPM Coordinator or IPM Contact Information in Box Below:

IPM Coordinator: Contact Info:

Personnel responsible for the care and maintenance of facilities under the City of _____ agree to implement a suite of basic integrated pest management procedures to meet MS4 Permit requirements[3]. The fundamental basis for the IPM program must include the following as outlined in Permit Part VI.D.9.g:

1. **Pesticides are to be used if monitoring indicates they are needed, and pesticides are applied according to applicable permits and established guidelines.**
2. **Treatments are made with the goal of removing only the target organism.**
3. **Pest controls are selected and applied in a manner that minimizes risks to human health, beneficial non-target organisms, and the environment.**
4. **The use of pesticides, including Organophosphates and Pyrethroids, does not threaten water quality.**
5. **Partnerships with other agencies and organizations are established to encourage the use of IPM.**
6. **A standardized protocol is to be used for the routine and non-routine application of pesticides (including pre-emergents), and fertilizers.**
7. **There is to be no application of pesticides or fertilizers (1) when two or more consecutive days with greater than 50% chance of rainfall are predicted by NOAA34, (2) within 48 hours of a ½-inch rain event, or (3) when water is flowing off the area where the application is to occur. This requirement does not apply to the application of aquatic pesticides or pesticides which require water for activation.**
8. **No banned or unregistered pesticides are stored or applied.**
9. **All staff applying pesticides are certified in the appropriate category by the California Department of Pesticide Regulation, or are under the direct supervision of a pesticide applicator certified in the appropriate category.**
10. **Procedures to encourage the retention and planting of native vegetation to**

[3] In addition to MS4 Permit compliance, there are extensive federal and state laws and regulations that all public agencies must be in compliance with at all times, including the California Food and Agricultural Code (FAC) and the California Code of Regulations, Title 3 (3CCR).

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reduce water, pesticide and fertilizer needs are implemented; and

11. **Pesticides and fertilizers are stored indoors or under cover on paved surfaces, or use secondary containment.**
    a. **The use, storage, and handling of hazardous materials are reduced to decrease the potential for spills.**
    b. **Storage areas are regularly inspected.**

In order to implement the above required minimum practices, the following section describes components of an effective IPM Program that can be employed:

- Pest and Symptom Identification
- Prevention
- Monitoring
- Injury Levels and Action Thresholds
- Pest Control Tactics

A number of useful IPM techniques are outlined under each component and further described in Appendix A. These techniques are known to be effective and methods can be selected from each component as necessary to achieve the IPM goals and meet MS4 Permit requirements.

Additional information on the latest IPM techniques including management of new pests in the landscape can be obtained from local UC Cooperative Extension Advisors, UC IPM Regional Advisor, or the Statewide UC IPM Web Site at www.ipm.ucdavis.edu.

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Components of an Effective IPM Program

An IPM program is a long-term, multi-faceted system to manage pests (**Figure 1**). Use of pesticides is a short-term solution to pest problems, and should be used only when the other components fail to maintain the pests or their damage below an acceptable level. Successful IPM practitioners are knowledgeable about the biology of the plants and pests, and successful IPM programs primarily use combinations of cultural practices as well as a combination of physical, mechanical and biological controls.

Pest Identification

It is important to learn to identify all stages of common pests at each site. For example, if you can identify weed seedlings, you can control them before they become larger and more difficult to control and before they flower, disseminating seeds throughout the site. It is also important to be sure that a pest is actually causing the problem. Often damage such as wilting is attributed to root disease but may actually be caused by under watering or wind damage. Appendix A lists specific techniques that can be employed to identify pests.

Prevention

Good pest prevention practices are critical to any IPM program, and can be very effective in reducing pest incidence. Numerous practices can be used to prevent pest incidence and reduce pest population buildup such as the use of resistant varieties, good sanitary practices and proper plant culture. Examples of prevention include choosing an appropriate location for planting, making sure the root system is able to grow adequately and selecting plants that are compatible with the site's environment. Appendix A lists specific techniques that can be employed to achieve pest prevention.

Monitoring

The basis of an effective IPM Program is the development and use of a regular monitoring or scouting program. Monitoring involves examining plants and surrounding areas for pests, examining tools such as sticky traps for insect pests and quantitatively or qualitatively measuring the pest population size or injury. This information can be used to determine if pest populations are increasing, decreasing, or staying the same and to determine when to use a control tactic. Weather and other environmental conditions may also play a factor in whether a pest outbreak may occur so it is important to monitor temperature and soil moisture as well.

It is important to use a systematic approach when monitoring, for example you should examine leaves of a similar age each time you check for pests, rather than looking at the older leaves on some plants and younger ones on others. Randomly looking at a plant and its leaves does not allow you to track changes in pest population or damage over time.

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It is important to establish and maintain a record-keeping system to evaluate and improve your IPM program. Records should include information such as date of examination, pests found, size and extent of the infestation, location of the infestation, control options utilized, effectiveness of the control options, labor and material costs. Appendix A lists specific techniques that can be employed to in the monitoring of pests.

Injury Levels and Action Thresholds

In order to have a way to determine when a control measure should be taken, injury levels and action thresholds must be set for each pest. An injury level is the level of unacceptable damage. For example, the injury level for a leaf-feeding beetle may be set at 30% of the leaves being damaged. Action thresholds are the set of conditions required to trigger a control action. An example of this would be finding an average of 5 or more beetles on 10 shrubs in a location. Action thresholds are set from previous experience or published recommendations and based on expected injury levels. Injury levels are often set by the public's comments. Appendix A lists specific techniques that can be employed to determine injury levels and action thresholds.

Pest Control Tactics

Integrated pest management programs use a variety of pest control tactics in a compatible manner that minimizes adverse effects to the environment. A combination of several control tactics is usually more effective in minimizing pest damage than any single control method. The type of control that an agency selects will likely vary on a case-by-case basis due to the varying site conditions.

The primary pest control tactics to choose from include:

- Cultural
- Mechanical/Physical
- Biological
- Pesticide

Appendix A lists specific pest control techniques that can be employed.

Cultural Controls

Cultural controls are modifications of normal plant care activities that reduce or prevent pests. In addition to those methods used in the pest preventions, other cultural control methods include adjusting the frequency and amount of irrigation, fertilization, and mowing height. For example, spider mite infestations are worse on water-stressed plants, over-fertilization may cause succulent growth which then encourages aphids, too low of a mowing height may thin turf and allow weeds to become established.

Mechanical/Physical Controls

Mechanical control tactics involve the use of manual labor and machinery to reduce or

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eliminate pest problems using methods such as handpicking, physical barriers, or machinery to reduce pest abundance indirectly. Examples include hand-pulling or hoeing and applying mulch to control weeds, using trap boards for snails and slugs, and use of traps for gophers.

The use of physical manipulations that indirectly control or prevent pests by altering temperature, light, and humidity can be effective in controlling pests. Although in outdoor situations these tactics are difficult to use for most pests, they can be effective in controlling birds and mammals if their habitat can be modified such that they do not choose to live or roost in the area. Examples include removing garbage in a timely manner and using netting or wire to prevent bird from roosting.

Biological Controls

Biological control practices use living organisms to reduce pest populations. These organisms are often also referred to as beneficials, natural enemies or biocontrols. They act to keep pest populations low enough to prevent significant economic damage. Biocontrols include pathogens, parasites, predators, competitive species, and antagonistic organisms. Beneficial organisms can occur naturally or can be purchased and released.

The most common organisms used for biological control in landscapes are predators, parasites, pathogens and herbivores.

- Predators are organisms that eat their prey (e.g. Ladybugs).
- Parasites spend part or all of their life cycle associated with their host. Common parasites lay their eggs in or on their host and then the eggs hatch, the larvae feed on the host, killing it (e.g. Tiny stingless wasps for aphids and whiteflies).
- Pathogens are microscopic organisms, such as bacteria, viruses, and fungi that cause diseases in pest insects, mites, nematodes, or weeds (e.g. Bacillus thuringiensis or BT).
- Herbivores are insects or animals that feed on plants. These are effective for weed control. Biocontrols for weeds eat seeds, leaves, or tunnel into plant stems (e.g. goats and some seed and stem borers).

In order to conserve naturally occurring beneficials, broad-spectrum pesticides should be avoided since the use of these types of pesticides may result in secondary pest outbreak due to the mortality of natural enemies that may be keeping other pests under control (Figure 2).

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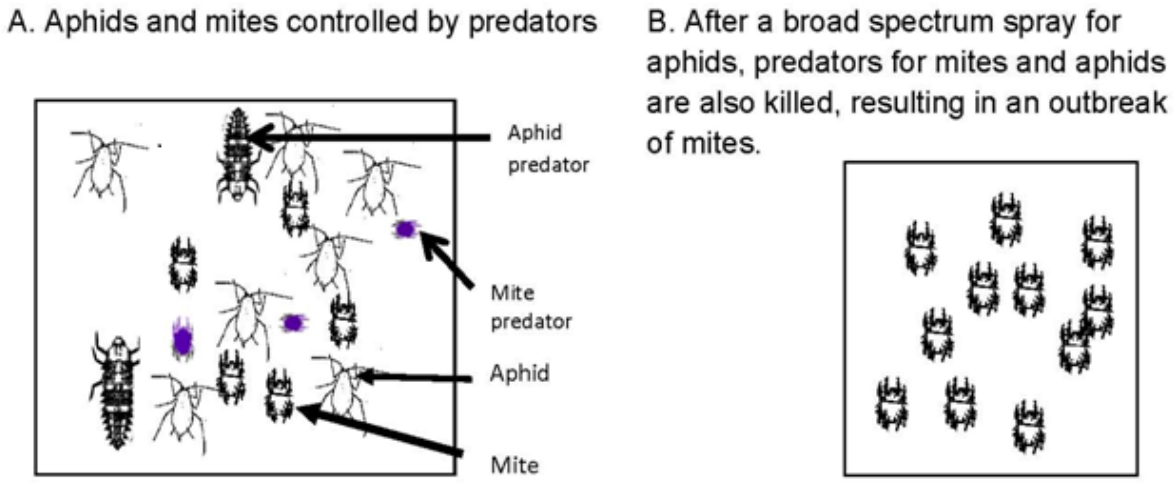

Figure 2 Example of Secondary Pest Outbreak Caused By Use of a Broad Spectrum Insecticide

Pesticide Controls

Any substance used for defoliating plants, regulating plant growth or preventing, destroying, repelling or mitigating any pest, is a pesticide. Insecticides, miticides, herbicides, fungicides, rodenticides and molluscides are all pesticides. Anything with an EPA or DPR registration number on the label is a non-exempt pesticide.

Pesticides should only be used when other methods fail to provide adequate control of pests and just before pest populations cause unacceptable damage. The overuse of pesticides can cause beneficial organisms to be killed and pest resistance to develop. When pesticides must be used, considerations should be made for how to use them most successfully. Avoid pesticides that are broad-spectrum and relatively persistent since these are the ones that can cause the most environmental damage and increase the likelihood of pesticide resistance. Always choose the most specific but least toxic to non-target organisms method.

In addition, considerations should be given to the proximity to water bodies, irrigation schedules, weather (rain or wind), etc. that are secondary factors that may result in the pesticide being moved off-site into the environment. Consideration should be made of the temporary loss of use of an area (application in a park may result in the area being sectioned off).

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Appendix A: Optional IPM Techniques to Integrate into IPM Program

The following practices are generally accepted to be effective IPM techniques. These procedures increase the long-term prevention and suppression of pest problems (insects, weeds, diseases, and vertebrates) with the minimum impact on human health, the environment, and non-target organisms. Emphasis is placed on improving cultural practices to prevent problems and utilize alternative control measures instead of broad spectrum pesticides. The following IPM techniques are divided into the following categories:

- General Pesticide Management Practices
- Pest and Symptom Identification
- Prevention
- Monitoring
- Injury Levels and Action Thresholds
- Pest Control Tactics

GENERAL PESTICIDE MANAGEMENT PRACTICES

- Maintain a complete inventory of all pesticides used and the use sites. This inventory should be updated annually.
- If pesticides are necessary, CAUTION-labeled pesticides should be considered before more toxic alternatives.
- Ensure that no banned or unregulated pesticides are stored or applied.
- Restricted use pesticides should only be used when no other alternatives are practical.
- Only small quantities of pesticides should be purchased eliminating the need for stockpiling.
- MSDSs should be regularly updated to reflect new pesticides or label changes to pesticides in storage.
- Pesticides should be used only according to label instructions.
- Weather conditions that could affect application should be considered. For example, wind conditions affect spray drift; rain may wash pesticide off of leaves.
- Pesticides should not be applied where there is a high chance of movement into water bodies; for example, they should not be applied near wetlands, streams, lakes, ponds or storm drains unless it is for an approved maintenance activity.
- In most cases, empty pesticide containers should be triple-rinsed before disposal. Particular information on the proper disposal of the pesticide and its container can be found on the label.

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- Pesticide equipment and containers should not be cleaned or rinsed in the vicinity of storm drains or other open water areas.
- Pesticides should be stored in covered areas with cement floors and in areas insulated from temperature extremes.
- Chemicals and equipment should be secured during transportation to prevent tipping or excess jarring.
- Pesticides should be transported completely isolated from people, food and clothing, for example, in the bed of the truck rather than in the passenger compartment.
- Pesticide equipment, storage containers and transportation vehicles should be inspected frequently.
- A plan for dealing with pesticide spills and accidents should be developed.
- Unless their safety is compromised, workers should immediately clean up any chemical spills according to label instructions and notify the appropriate supervisors and agencies.
- Pesticide applications on public property, which take place on school grounds, parks, or other public rights-of-way where public exposure is possible, should be posted with warning signs. The specific criteria for the signage can be found in FAC, section 12978. Pesticide applications by the Department of Transportation on public highway rights-of-way are exempt.

PEST AND SYMPTOM IDENTIFICATION

Insects, Mites, and Snails and Slugs

- Field personnel should be trained to recognize basic pests found in the landscape in the following groups: insects, mites, and mollusks.
- A licensed Pest Control Adviser can be on staff or hired to properly identify a pest and the symptoms caused by the pest.
- Field personnel can be trained to utilize disease life cycles to apply treatments when the organism can be controlled most effectively.
- Field personnel can be trained to distinguish between beneficial insects and actual pests found in the landscape (e.g. parasitizing wasps).
- Unknown samples can be submitted to the Orange County Agricultural Commissioner for identification by the county entomologist or plant pathologist.
- Abiotic or nonliving factors (wind, sunburn, air pollution, etc…) should be considered as possible causes of observed symptoms as well as biotic (living) factors.

Weeds

- Field personnel can be trained to identify common weeds in the landscape.
- Field personnel can be trained to utilize weed life cycles to properly control

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weeds such as controlling crabgrass utilizing a pre-emergent herbicide applied in mid-January.
- A licensed Pest Control Adviser can be on staff or contracted to properly identify the pest.

Diseases

- Field personnel can be trained to recognize common diseases or their signs/symptoms in the landscape.
- Field personnel can be trained to utilize disease life cycles to apply treatments when the organism can be controlled most effectively.
- Field personnel can be trained to recognize the difference between biotic and abiotic problems.
- Field personnel can be trained to understand how common diseases are spread throughout the landscape.
- Disease signs and symptoms can be sampled and submitted to the Orange County Agricultural Commissioner for identification by the county plant pathologist.
- A licensed Pest Control Adviser can be on staff or contracted to properly identify the pest.
- Photographs of disease signs and symptoms can be taken and compared to reference guides such as UC IPM's *Pests of Landscape Trees and Shrubs*.

Vertebrates

- Field personnel can be trained to recognize vertebrate pests and the damage they cause in the landscape.
- Field personnel can be trained to utilize vertebrate behavior to properly control the pest most effectively.
- Field personnel can be trained in vertebrate baiting and trapping.
- A licensed Pest Control Adviser can be on staff or contracted to properly identify vertebrate pest.

PREVENTION

Landscape Design Procedures

- Drainage, soil characteristics, water quality and availability should be considered during plant selection.
- Sun exposure, heat, and high temperature conditions should be considered during plant selection.
- Plant material should be selected based on adaptability to local climate conditions, such as those conditions common to a Mediterranean climate.
- Adequate space should be allowed for root growth, especially trees.

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- Nursery stock should be inspected and rejected if not healthy (injuries, diseased, circling roots/potbound, poor staking and/or pruning).
- Pest resistant species and cultivars should be selected.
- Plants with similar growth characteristics and irrigation requirements should be grouped together.
- Landscape design should match available irrigation technology to avoid excess water use and to minimize surface runoff.

Site Preparation and Planting Procedures

- Soil drainage properties can be assessed and compacted soils improved prior to planting.
- A soil analysis can be conducted to determine the chemical and physical properties of the existing soil and then appropriate amendments such as organic matter can be added.
- Irrigation should be installed as designed in order to avoid poor uniformity once plants are in place.
- Proper planting procedures should be followed for particular plant species to avoid planting too deeply or too shallow.
- Nursery tree stakes can be removed at planting and replaced with staking that allows trunk to flex; removing these stakes after 1 to 1.5 years.
- A soil probe or other soil moisture measurement device can be utilized to monitor soil moisture levels in existing root ball and surrounding soil during establishment period.

Water Management

- Plants should be examined weekly for symptoms of water stress and to assist in determining irrigation scheduling.
- Soil moisture can be monitored with a soil probe or soil moisture sensors to assist in scheduling irrigation.
- Evapotranspiration (ET) data or 'smart' clock technology can be utilized to schedule irrigation.
- Cyclic irrigation (short-multiple run times) can be employed to minimize surface runoff.
- Low precipitation sprinklers or low-volume systems can be utilized to reduce surface runoff.
- Systems should be inspected monthly to check for leaks, broken pipes, and clogged or broken sprinkler heads.
- Adjust sprinklers to avoid application of water directly to the trunk of trees (can promote disease) or on to concrete surfaces where it can enter storm drains.
- A hotline, email, or other dedicated method can be established for citizens to

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report leaks and broken sprinkler heads

Fertilizing Procedures

- To avoid nutrient losses below the root zone, fertilize only when plants are actively growing.
- Fertilizer should not be applied within 48 hours of a rain event to avoid losses below the root zone and in surface runoff.
- Soil analyses can be conducted in order to determine existing nutrient levels in the soil prior to fertilizing.
- Turf grass fertilizer maintenance schedules can be based on UC recommendations found online at UC Guide for Healthy Lawns: http://www.ipm.ucdavis.edu/TOOLS/TURF/MAINTAIN/fertilize.html
- Sports turf grass fertilizer maintenance guidelines can be based on UC recommendations found in *Establishing and Maintaining the Natural Turf Athletic Field (UCR ANR Publication Number: 21617)*.
- Overfertilization, especially of trees and shrubs, should be avoided to ensure plant growth is not excessively succulent making it more susceptible to pest infestations.
- Off-target fertilizer applications or spills should be cleaned up immediately by sweeping up and applying to landscape or turf or replacing in spreader or bag to ensure material does not enter storm drains.

Pruning Procedures

- Damaged or diseased wood should be regularly pruned from landscape plants.
- Trees should be pruned according to standards set forth by a professional tree care organization such as the International Society of Arboriculture.
- Plants too large for a space should be replaced instead of pruning them severely.
- Unnecessary pruning should be avoided as wounds are entry sites for decay and disease organisms.
- The age and species of the plant should be taken into account when determining the time of year to prune. For example, eucalyptus should be pruned in December and January when long-horned beetles are not active.
- Tree height reduction should be discouraged. When deemed necessary by a licensed arborist, the crown reduction method approved by a professional tree care organization should be utilized. Topping should not be done to reduce tree size.

MONITORING FOR PESTS AND PROBLEMS

Insect/Mollusk Monitoring Procedures

- Monthly visual inspections of plants for insects, mites, snail and slug damage,

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and recording results is an effective method for tracking changes and easy recall of data.

- Yellow sticky traps can be utilized to assess populations of insects.
- Insects can be dislodged from plants by shaking over a collection surface usually consisting of a clipboard with a white sheet of paper.
- If available for a particular insect, pheromone-baited traps can be utilized.
- Soil-dwelling turf insects can be brought to the surface for monitoring by flushing a specific area of soil (i.e. 2' x 2' grid) with plain water or a soapy water mixture.
- The amount of honeydew (aphids) and frass (caterpillars) present can be utilized as an indicator of population levels.

Weed Monitoring Procedures

- Landscapes can be inspected at least 4 times a year (early winter, early spring, summer and early fall) for weeds in order to determine if and when a weed problem exists.
- Site surveys can be utilized to record the location, date, and severity of weed problem for an effective method of tracking changes and easy recall of data.
    - The number of weeds encountered at periodic intervals (e.g. every 1 to 2 feet) can be counted and recorded along a straight line transecting a landscaped, area or within a selected area, for example 4 sq. ft. samples done in random places in a bed or turf area.

Disease Monitoring Procedures

- Landscapes should be regularly checked for conditions, such as overwatering and injuries, which promote disease.
- Landscapes should checked monthly for disease symptoms and signs. Disease prone plants should be checked more frequently.
- Landscape inspections should note date when disease signs and symptoms were first noticed and the current environmental conditions and soil moisture levels as an effective method of tracking changes and easy recall of data.

Vertebrate Monitoring Procedures

- Landscapes can be regularly inspected for vertebrate presence either by damage caused by animal, actual animal sightings, and/or droppings.
- Records can be kept of the absence or presence of actual vertebrates, the damage caused, and/or the presence or absence of droppings.
- Maps can be created and updated at least twice a year, recording areas of high vertebrate damage or signs (such as gopher mounds).

INJURY LEVELS AND ACTION THRESHOLDS

Insect/Mollusk Thresholds and Guidelines

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- Insect tolerance levels can be established based on the public's acceptance of damage to the landscape or a certain level of nuisance pests (i.e. ants), the actual plant species in the landscape, and long-term monitoring and knowledge of pests causing the damage.
- Thresholds can be based on levels where reasonable control of the pest can be achieved with minimum impact on the environment.
- Insect monitoring records can be utilized to establish threshold levels for the implementation of control strategies. For example, the threshold for the presence of aphids on a rose garden at City Hall is low, while in a native shrub border it might be considerably higher.

Weed Thresholds and Guidelines

- Weed tolerance levels can be established based on public safety or the public's acceptance and the resources available to manage the landscape at that level.
- Weed monitoring records can be utilized to rank the percentage of the landscape area infested (none, light, moderate, heavy, or very heavy) with weeds.
- Public areas can be ranked according to high, medium, or low level of weed control and management conducted according to levels set for each rank (see Appendix B)

Disease Thresholds and Guidelines

- Disease tolerance levels can be established based on the public's acceptance and the resources available to manage the landscape at the level required.
- Disease monitoring records can be utilized to establish threshold levels for the implementation of control strategies. For example, the threshold for the presence of powdery mildew on roses at City Hall is much lower than the threshold for its presence on Euonymus in a parking lot at a city sports park.

Vertebrate Thresholds and Guidelines

- Vertebrate tolerance levels can be established based on public safety, the public's acceptance and the resources available to manage the landscape at the level required.
- Vertebrate monitoring records can be utilized to establish threshold levels for the implementation of control strategies. For example, the threshold for the presence of gopher mounds in a sport field is zero, while in a native shrub border it might be two before a trapping strategy is implemented.

PEST CONTROL TACTICS

Insect/Mollusk Management Methods

Cultural/Mechanical/Physical Control Methods

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- Sticky barriers can be applied to trunks of trees and large shrubs to prevent ants and other wingless invertebrates from plant canopies.
- Small insect infestations can be removed by pruning infested plant parts.
- Copper bands can be installed around base of trees or planting areas where snail and slug infestations are prevalent.
- Plant canopies can be thinned to increase light penetration to expose certain soft-bodied insects (soft-scale) as well as snails and slugs to heat.
- Strong streams of water can be used to dislodge insects such as aphids and whiteflies, from leaves.
- The use of plants that snails and slugs use for shelter should be avoided.
- Avoid irrigating between 5pm and 5am when moisture remains on plant material for several hours.

Biological Control Methods

- Persistent broad-spectrum pesticides should be avoided, especially if biological control of an insect has been established by UC researchers. Examples include parasitoid wasps controlling Eugenia Psyllids, Giant Whitefly, and Ash Whitefly.
- Natural predators (beneficial insects) can be augmented with purchases of additional predators from commercially available resources.

Pesticide Control Methods

- The most selective, rather than broad-spectrum, pesticide should be used.
- If available for controlling a particular insect, biological and botanical pesticides should be selected.
- Insecticidal soaps can be utilized to control infestations of soft-bodied insects such as aphids, thrips, and immature scales.
- Horticultural oils (neem oil and narrow-range refined oils) can be utilized to control infestations of soft-bodied immature and adult insects such as aphids, scales, and whiteflies.
- Pesticides should only utilized when the potential for impacts to the environment, especially water quality, are minimized.
- Equipment should be calibrated prior to the application of the insecticide to avoid excess material being applied to the landscape environment.
- Applicators should be trained to not apply pesticides to hard surfaces and to not allow any pesticide to enter the storm drain system.
- Spot treatments should be utilized rather than broadcast methods.
- Insecticide/fertilizer combinations should only used if it is appropriate timing for BOTH the insecticide application and the fertilizer application.

Weed Management Methods

Cultural, Mechanical, and Physical Control Methods

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- Timers can be set to avoid overwatering as weeds establish in areas where soil moisture is excessive.
- Drainage can be managed to avoid wet areas.
- Weeds can be removed from a site prior to planting.
- Mower height can be adjusted to turf species and time of year.
- Mower should be washed after mowing a weedy site.
- Hand-pulling, mowing, trimmers/brushcutters, flaming, hoeing, and rototilling around landscape plants should be the main methods utilized to control annual weeds and young perennial weeds.
- Soil solarization can be utilized to control some annual and perennial weed species.
- Bare soil areas can be covered with a thick layer of mulch to suppress weeds and conserve soil moisture.
- Soil, mulch, and plant material should be weed-free before it is introduced into the landscape.

Pesticide Control Methods

- Spot treatments can be utilized rather than broadcast methods.
- Herbicide/fertilizer combinations should only used if it is appropriate timing for BOTH the herbicide application and the fertilizer application.
- Herbicides should be utilized according to established thresholds (see Appendix B).
- Organically acceptable herbicides (shown to be effective through science-based research) should be used where appropriate.
- Herbicides can be applied to the stage of weed growth most susceptible to the chemical.
- Equipment should be calibrated prior to the application of the herbicide to avoid excess material being applied to the landscape environment.

Disease Management Methods

Cultural, Mechanical, and Physical Control Methods

- Localized areas of diseased plants should be pruned out and disposed of.
- Pathogen-infested plant parts can be removed from the soil surface area to reduce certain pathogens (e.g. Camellia Petal Blight).
- Pruning tools can be sterilized (e.g. a diluted bleach solution) between plants to prevent the spread of pathogen to other plants.
- Proper irrigation and fertilization can be maintained to prevent plant stress, waterlogging, and subsequent susceptibility to disease.
- Soil solarization can be utilized to control soil pathogens in annual beds where it

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is most effective.

- Mulch can be kept at least 6" from base of plants to avoid excessive moisture around crown possibly resulting in crown rots and is no deeper than 4"
- Disease-prone plants can be replaced with non-susceptible species.

Pesticide Control Methods

- Preventative fungicides and bactericides should only used where diseases can be predicted from environmental conditions and applied prior to infection or the appearance of symptoms.
- Synthetic fungicides should be used sparingly in the landscape and only in high visibility areas in order to minimize development of resistance.
- Organic fungicides and bactericides should be utilized in combination with cultural, mechanical, and physical control methods in order to improve their effectiveness.
- Copper-based fungicides should only be utilized in situations where its entry into surface runoff and storm drains is virtually impossible and after consultation with PCA and IPM coordinator.
- Mycopesticides, commercially available beneficial microorganisms, should be used where appropriate.
- Fungicides classes can be rotated to avoid resistance.

Vertebrate Management Methods

Cultural and Physical Control Methods

- Groundcovers can be maintained such that they do not harbor rats.
    - Shrubs pruned at least 1 foot from the ground (rats).
    - Sources of drinking water removed (leaky faucets, puddles).
    - Trash cans have lids and are emptied daily (rats).
    - Screens or other barriers installed under structures that have a space between soil and floor (rabbits).
- Habitat modification, based on pest biology can be used to reduce shelter. Trapping can be used for gophers when safe and practical.
- Kill traps used for ground squirrels and rabbits, should be checked daily, and put in places not accessible by children or non-target animals.
- Gas cartridges can be used for ground squirrels according to UC recommendations.

Pesticide Control Methods

- Anti-coagulant baits can be used and applied according to label and UC recommendations.
- Bait should be applied in a manner that non-target animals do not have access to

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it.

- Restricted use pesticides should only be applied by or under the direct supervision of an individual with a qualified applicators certificate (QAC). To receive a QAC, a person must take a test administered by Department of Pesticide Regulation (DPR). To obtain test materials, test schedules, and an application, see http://www.cdpr.ca.gov/docs/license/liccert.htm.

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Appendix B

Ranking public areas for weeds (or other pest) management:

Areas ranked as **HIGH** may include areas that the public sees and expects to be well-maintained. Examples are entrances to public buildings such as city hall and libraries.

These areas are allowed to use pesticides based on established thresholds.

Areas ranked as **MEDIUM** may include areas the public sees but does not expect a high level of maintenance. Examples are landscaped areas away from the entrance, recreational and picnic areas. These areas can tolerate a higher lever of weeds.

*These areas are allowed to use pesticides but the threshold is much higher and pesticides are used infrequently and only after consultation with IPM coordinato*r.

Areas ranked as **LOW** may include areas the public rarely sees or does not expect a high level of maintenance. Examples are medians, landscaped areas in parking lots, wildlands. These areas can tolerate a higher lever of weeds.

These areas are not allowed to use pesticides except in extreme cases and only after consultation with IPM coordinator.

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Example Catch Basin Cleaning Log

Catch Basin Cleaning Log			
Date	Location	Number of Catch Basins Cleaned	Total Amount Removed
Notes:			

Example of Completed Catch Basin Cleaning Log

Catch Basin Cleaning Log			
Date	Location	Number of Catch Basins Cleaned	Total Amount Removed
7/1/13	Street #1	20	55 cu. ft.
	Intersection #1	10	
	Street #2	5	
Notes:			

Drainage Inlet/Catch Basin Information		
Location		
Street:	Cross Street:	Side (N,S,E,W)
Distance:	Direction (N,S,E,W):	Inlet #:
Map #:	Grid:	
Condition		
Length of Opening:	Height of Opening:	Stencil Legible (Y/N):
Bicycle Bars (Y/N):	Grate Size:	Inlet Protection Bar (Y/N):
Treatment Control BMP (Y/N):	Type of BMP:	
Repairs Required:		

Illicit Connection Investigations Guidance

Field Screening Techniques

If evidence of an illicit discharge is detected, as described in Section 2, and the source does not appear to be evident or above ground, investigations will be conducted to determine if the discharge is being conveyed through an illicit connection. A good source of information includes *Investigation of Inappropriate Pollutant Entries into Storm Drainage Systems* (EPA/600/R-92/238.1993, Pitt et al). General guidance follows below. These techniques can also be used if a Permittee elects to survey sections of their system for illicit connections.

Document Research

Maps of drainage facilities can be reviewed to locate upstream connections and drainage basins as an initial step to locate potential illicit connections. Other records, such as connection permits and discharge permits, can also be reviewed to determine if legal connections may be the source.

Physical Inspections

Catch basins, manholes and other facilities that can be safely investigated from the surface should be physically checked for evidence of connections. This may be a hard pipe connection, or could be a hose or other conveyance that directs a discharge into the storm drain facility. Identification of connections that exhibit evidence of suspected illicit discharges during routine site inspection (e.g., industrial, commercial or construction). Investigation is conducted to determine if the discharge is being conveyed through an illicit connection when evidence of illicit discharge is detected, and the source does not appear to be evident or above ground.

Facilities that are large enough for personnel to enter can also be physically inspected, however, entry into facilities requires strict adherence to health and safety procedures, including confined space entry procedures. In general, a space is “confined” if it is not intended for human occupancy, has limited openings for entry or exit, and has insufficient natural or mechanical ventilation. Information on safety procedures can be found in many documents, including the *Occupational Safety and Health Guidance Manual*, National Institute for Occupational Safety and Health; *OSHA Safety and Health Standards 29 CFR 1910 (General Industry)*, US Department of Labor, and *Title 8 of the California Code of Regulations, General Industry Safety Order*.

Dye Tests

Dye tests can reveal illicit connections in areas where storm drain flows are unexplained and the Permittee has access to suspect facilities. Typical dye tests consist of the addition of fluorescent dye to a floor drain or waste line from a domestic, commercial or industrial process, followed by monitoring for the dye in downstream storm drains. Permittees should conduct dye testing facility by facility (in each area where unexplained flow exists) until all facilities in the area are tested.

Smoke Tests

Smoke tests can reveal if illicit connections exist, and can reveal their source. Storm drains are sealed via sandbags or other sealing devices (plugs, etc.) and smoking incendiary devices are ignited upstream of the seal. Simultaneous inspections inside area facilities should reveal illicit connections even in the

absence of flow. As illicit discharges are intermittent, smoke tests offer real advantages over other types of illicit discharge source identification methods. However, as many legitimate connections to a storm drain may exist (roof drains, street drains, etc.) smoke may be observed extensively. This may cause some illicit connections to be missed, and create a problem with area businesses and residents as excessive smoke begins to enter private property.

T.V. Inspections

T.V. inspections can reveal if illicit connections exist, but cannot be used to view up the connection to determine the source. Robotized or otherwise mobile television cameras allow visual inspection of storm drains (pipes) too small or dangerous for personnel to enter. Although an excellent method of identifying and documenting illicit connections, T.V. inspections have high costs unless the equipment is already owned or can be borrowed from neighboring agencies.

Guidance Source

Los Angeles County Model Stormwater Quality Management Program, 2003.

Illicit Discharge Investigation and Elimination Guidance

Introduction

Once illicit discharges/disposal are detected and identified, they must be eliminated. Sometimes the source of the spill or discharge/disposal is apparent. The incident can be removed through voluntary cleanup/termination or enforcement procedures, and steps can be taken to prevent its recurrence. These prevention methods can include education and outreach materials for residents and businesses, preventive maintenance practices for infrastructure, vehicles and equipment or additional enforcement.

When the source of the discharge is not apparent, further investigation will be necessary to eliminate it and prevent it from recurring. The following discusses methods that can be used to document the incident, determine the nature of the material, and investigate the source.

Advance Planning

An effective investigation program requires good advance planning. Sufficient staff should be trained to conduct investigations so that qualified staff are available whenever investigations are necessary. Staff should become familiar with illicit discharge investigation and sampling procedures. General guidance follows below to assist with overall planning, but should not be considered complete for proper sampling quality assurance purposes.

Equipment

Appropriate equipment for field investigations may include:

Table 1: Typical Equipment for Investigations

Equipment Type	Equipment
General	Inspection checklist
	Field data log book
	Camera
	Tape measure
	Storm drain system map
	Flashlight
Flow measurement	Ping pong ball or other light floatable
	Stopwatch
Laboratory	Graduated container
	Temperature/pH/conductivity (EC) probe
	Field test kits (e.g., Lamotte test kit)
	12 1-liter amber glass sample bottles
	12 1-liter HDPE sample bottles
	Cooler with ice for sample preservation
	Gloves
	Splash goggles/safety glasses
	Deionized water in wash bottle
First Aid	First aid kit

Data Collection

Before entering the field, the inspection crew should locate information such as the following on a storm drain/street map for areas that will be investigated:

- All known or suspected pollutant generating activities
- Locations of NPDES dischargers
- All locations where storm drains enter open channels
- Catch basins and storm drain manholes

Visual Observation

Visual observation of the storm drain system and/or of activities on the surface can provide information on the source of illicit discharges. It is the simplest method to begin with and the least costly. Evidence of illicit discharges may only consist of visual observations because most illicit discharges are intermittent and will probably not be flowing when inspected. A field inspection crew should investigate the surface drainage system in the vicinity of suspected illicit discharges. This may include accessible areas in the public right-of-way adjacent to residences and businesses, catch basins, open channels near known points of discharge, and upstream manholes.

Photos of visual observations should be taken to aid subsequent data analysis and follow up planning. The following types of visual observations should be recorded on an investigation checklist, such as the one attached:

- Location
- General site description
- Amount, appearance of discharge/disposal
- Stains
- Structural cracking and corrosion
- Vegetative growth
- Nearby facilities with poor outside housekeeping practices
- Pipes/hoses connected to/directed toward drainage system

If the source of the discharge is determined, appropriate methods should be used to eliminate it through voluntary cleanup/termination or enforcement procedures, and steps should be taken to prevent its recurrence.

Sampling and Testing

If flow is observed, and the source of the discharge is not apparent, the crew should collect a sample and measure flow. Several tests should be conducted to determine the nature of the material. This can be compared to records of local facilities and possible pollutant generating activities as an aid in determining the possible sources of the flow.

The sample should be measured for pH, temperature and conductivity (EC). If any of these parameters are abnormal, or strong odors or flow discoloration are detected, the sample should be analyzed. This can be done with a field test kit, which will detect the presence of copper, phenols, detergents, and chlorine. Findings should be recorded on the inspection checklist.

If visual observations are abnormal and/or the field tests detect high concentrations of any constituent, the crew should consider collecting samples for laboratory analysis. The laboratory can usually supply properly cleaned sample bottles and specify either amber glass or plastic (HDPE) bottles depending on the analyses required. If there is enough flow, the field crew should fill several of each type of bottle to obtain enough sample volume for a range of analyses. If there is a limited quantity or sampling is difficult, the field crew should collect as much sample as possible so that the laboratory can run a limited set of analyses. The samples should be placed in a cooler filled with ice and transported to the lab(s) on the same day. Arrangements should be made prior to the field inspection with an analytical laboratory capable of performing the required analyses.

The laboratory analyses run on each sample should be carefully considered. Given the potential high cost for laboratory work, it is prudent to limit the number of analytical parameters (or analytes) tested for each sample. Tests may be selected based on the findings of indicator analyses, visual observations, field tests, and information collected about the types of materials processed, stored and/or spilled within each drainage area.

Guidance Source

Los Angeles County Model Stormwater Quality Management Program, 2003.

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Insert City Seal

ILLICIT CONNECTION/ ILLICIT DISCHARGE INVESTIGATION REPORT

Response Time:
☐ 1-6 hrs. ☐ 13 hrs. ☐ 24 hrs. ☐ 48 hrs.

RESPONSE

Date:	Time:	Inspector:

INVESTIGATION

Location/ Address:

Reason for Investigation: ☐ Complaint ☐ Discharge/Spill Response ☐ Visual Monitoring
☐ Other: _____

Type of Material: ☐ Hazardous ☐ Wastewater ☐ Oil/Grease ☐ Soil/ Sediment ☐ Trash ☐ Sewage
☐ Fuel (Gas/Diesel) ☐ Chemicals ☐ Other _____

Estimated Quantity: ☐ Gallons ☐ Lbs.

Entered Storm Drain System: ☐ Yes ☐ No Storm Drain Location: _____	Entered Receiving Waters: ☐ Yes ☐ No Name of Receiving Water: _____

Observations

Field Testing: ☐ Yes ☐ No Details:	Sample Collected: ☐ Yes ☐ No Details:

Direct/ Constructed Connections Found: ☐ Yes ☐ No
Details:

RESPONSIBLE PARTY

Name:

Address:	Phone/ email:

Repeat Violation? ☐ Yes ☐ No

OUTREACH MATERIAL

Outreach Material Distributed: ☐ None ☐ General Information ☐ BMP Brochure ☐ Other _____

ENFORCEMENT

Enforcement: ☐ None ☐ Written Warning ☐ Notice of Violation ☐ Citation/Infraction ☐ Cease and Desist Order

Other Actions

FOLLOW-UP VISIT

Date:	Time:	Inspector:
Discharge Stopped? ☐ Yes ☐ No		Proper Clean-Up Action Taken: ☐ Yes ☐ No

Further Action Required: ☐ Yes ☐ No
Details:

Insert City Seal

ILLICIT CONNECTION/ ILLICIT DISCHARGE REPORTING & RESPONSE

Received by:	
Date:	Time Received:

REPORTING PARTY	
Name:	Anonymous: ☐ Yes ☐ No
Address:	Phone/email:

INCIDENT	
Date:	Time:
Location/ Address:	
Land Use: ☐ Residential ☐ Commercial ☐ Industrial ☐ Public	
Type of Material: ☐ Hazardous ☐ Wastewater ☐ Oil/Grease ☐ Sediment ☐ Trash ☐ Other _____ ☐ Unknown	
Estimated Quantity: ☐ Gallons ☐ Lbs.	
Entered Storm Drain System/ Receiving Waters? ☐ Yes ☐ No	
Description / Details	
Agencies Contacted: ☐ Office of Emergency Services ☐ HazMat Team ☐ LA County ☐ Regional Board ☐ Other	
Source Investigation Conducted? ☐ Yes ☐ No	Source Identified? ☐ Yes ☐ No
Direct/ Constructed Connections Found? ☐ Yes ☐ No	

ALLEGED RESPONSIBLE PARTY	
Name:	
Address:	Phone/ email:
Vehicle License No:	

ACTION & CLOSURE	
Referred to:	Date:
Department:	Phone/ email:
Actions Taken/ Details	

Date Closed:

Spill Prevention Coordination

Procedures

This attachment discusses spill prevention coordination procedures that identify:

- Divisions or sections responsible for responding to reports of spills
- General and specific spill response procedures including responsible division or section
- Spill response training activities
- Activities conducted to improve spill response procedures and equipment

Divisions or Sections Responsible for Responding to Reports of Spills

Identify the divisions or sections responsible for responding to reports of spills and note divisions or sections that respond to specific types of spills such as hazardous materials spills or sewage spills. Also indicate the specific field staff who respond to spills and the level of support they provide to lead emergency response agencies and source of spill investigations.

General and Specific Spill Response Procedures

Describe or reference general spill response procedures involved in responding to complaints and identifying spills through inspections. Include the spill response process from the spill identification stage through clean up and report preparation. Copies of the forms and reports prepared to document spills should also be included. Specific procedures for hazardous materials spills, floods, and sewage spills should be referenced. Contractor support for spill events, if applicable, should also be noted.

Spill Response Training Activities

Provide an overview of all spill response training that is conducted within the various divisions and sections of the agencies.

Activities to Improve Spill Response Procedures and Equipment

List all activities conducted within the implementing agency to improve spill response procedures and update equipment. Explain how improvements are identified, prioritized, and implemented. Include a schedule of how often spill response procedures and equipment are evaluate.

Spill Investigation, Containment and Cleanup

Investigation

Depending on the location of the spill and the type of material, the appropriate department/ agency should be notified. This may include:

- Storm drain maintenance, if the spill reaches the storm drain system
- Street and road maintenance, if the spill is in the public right-of-ways
- Sewer system maintenance, if the material is from the sewage system
- Industrial waste inspection, if the material is from industrial facilities
- Fire Departments/"first responders," if the material may be hazardous
- Contractors for hazardous materials, if the material is hazardous

These departments/agencies should determine the nature of the material and the extent of the spill. If any agency determines there is a chance that the spill involves hazardous materials, then the local Administering Agency will be notified. An example of spill investigation procedures is depicted in Figure D-1. Reporting procedures for hazardous substances are discussed further in Section 5 of this Illicit Connection/Illicit Discharge Elimination model program.

Containment and Cleanup

Once the nature and extent of the spill is determined, the appropriate departments and field superintendents will be notified to contain and clean up the spill. The three types of cleanup scenarios are (1) hazardous, (2) wastewater, and (3) other non-hazardous materials.

Hazardous

Handling procedures regarding releases of hazardous or potentially hazardous substances into the environment are covered in a number of federal and state regulations, including: Comprehensive Environmental Response, Compensation and Liability Act (CERCLA); Superfund Amendments and Reauthorization Act (SARA); Resource Conservation and Recovery Act (RCRA); and multiple bills codified under Division 20 of the California Health and Safety Code. These procedures are well established and are practiced by local hazardous materials response teams - generally a local Fire Department.

Material determined to be hazardous will be contained by the appropriate hazardous material response team. The team will contact an approved contractor for cleanup. Details are contained in the local *Emergency Response Procedures* manual.

Wastewater

Field crews responding to a sewage spill or overflow should contain the spill to prevent entry of the sewage into the storm drain system or natural watercourse. This will involve a coordinated effort between the sewer, street, and storm drain maintenance crews.

To the maximum extent possible, sewage should be prevented from entering the storm drain system by covering or blocking storm drain inlets and catch basins or by containing or diverting the overflow away from open channels and other storm drain fixtures (using sandbags, inflatable dams, etc.).

In the event that raw sewage enters a storm drain catch basin, where possible the sewage should be vacuumed or pumped out of the catch basin. If a sewage overflow enters a storm drain channel, where possible the downstream channel area should be blocked, flushed with potable water and the captured water pumped to a nearby sewer manhole. Any time a sewage spill enters the storm drain system and has the potential to reach coastal waterways, the local agency and L.A. County Dept. of Health Services, Bureau of Environmental Protection must be notified (323) 881-4147.

Once the spill is contained, it should be removed and the area disinfected. Every effort should be made to ensure that the disinfectant is not discharged to the storm drain system, using methods such as those described above.

Other Non-hazardous Materials

Non-hazardous materials should generally be removed by appropriate crews with knowledge of or jurisdiction over the location of the spill, as indicated in Section D.1. Because the situations and materials will vary widely, procedures will vary as well.

RB-AR8773

All materials should be prevented from entering waterways to the maximum extent possible. Many materials in sufficient quantities can deplete the oxygen level in receiving waters, or smother benthic communities. Typical examples of these materials include landscape waste, milk, flour, and many other organic liquids and solids or fine powders. These materials should generally be removed by first collecting and/or sweeping up all solids and disposing them in a landfill or other approved location. Liquids should be diverted to an area away from waterways where they may be removed with a vacuum truck or can soak into the ground.

Guidance Source

Los Angeles County Model Stormwater Quality Management Program, 2003.

ATTACHMENT F:
LEGAL AUTHORITY CERTIFICATIONS

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December 6, 2013

Sam Unger, Executive Officer
California Regional Water Quality Control Board
Los Angeles Region
320 W. 4th Street, Suite 200
Los Angeles, California 90013-1105

Re: Statement of Legal Authority

Dear Mr. Unger:

This letter is provided to serve as the Statement of Legal Authority for the City of Bellflower (the "City") that must be submitted with its Annual Report pursuant to Part VI.A.2.b. of Order No. R4-2012-0175 for NPDES Permit No. CAS004001. As legal counsel for the City, it is my considered legal opinion the City has all the necessary legal authority to implement and enforce the requirements contained in 40 CFR § 122.26(d)(2)(i)(A-F) and this Order during the reporting period of July 1, 2012 through June 30, 2013, to the extent permitted by State and Federal law, subject to the limitations on municipal action under the California and United States Constitutions.

Per the requirement in Part VI.A.2.b.i., here are citations to the Bellflower Municipal Code ("BMC") for each of the following requirements found in Part VI.A.2.a:

i. *Control the contribution of pollutants to its MS4 from storm water discharges associated with industrial and construction activity and control the quality of storm water discharged from industrial and construction sites. This requirement applies both to industrial and construction sites with coverage under an NPDES permit, as well as to those sites that do not have coverage under an NPDES permit.*

BMC Sections: 13.20.090 Control of Pollutants from Industrial and Commercial Facilities, 13.20.100 Control of Pollutants from Industrial Activities, 13.20.110 Control of Pollutants from Construction Activities Requiring General Construction Activity Stormwater Permit, and 13.20.120 Control of Pollutants from Other Construction Activities

ii. *Prohibit all non-storm water discharges through the MS4 to receiving waters not otherwise authorized or conditionally exempt pursuant to Part III.A.*

BMC Sections: 13.20.050 Illicit Discharges and Nonstormwater Discharges and 13.20.080 Reduction of Pollutants in Runoff

iii. *Prohibit and eliminate illicit discharges and illicit connections to the MS4.*

BMC Sections: 13.20.050 Illicit Discharges and Nonstormwater Discharges and 13.20.070 Illicit Connections

iv. *Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4.*

BMC Section: 13.20.060 Illegal Disposal/Dumping

v. *Require compliance with conditions in Permittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows);*

BMC Section: 13.20.140 Violation, Inspection, Enforcement

vi. *Utilize enforcement mechanisms to require compliance with applicable ordinances, permits, contracts, or orders.*

BMC Section: 13.20.140 Violation, Inspection, Enforcement

vii. *Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Co-permittees;*

BMC Sections: 13.20.050 Illicit Discharges and Nonstormwater Discharges and 13.20.080 Reduction of Pollutants in Runoff

viii. *Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation;*

BMC Sections: 13.20.050 Illicit Discharges and Nonstormwater Discharges and 13.20.080 Reduction of Pollutants in Runoff

ix. *Carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with applicable municipal ordinances, permits, contracts and orders, and with the provisions of this Order, including the prohibition of non-storm water discharges into the MS4 and receiving waters.*

This means the Permittee must have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from entities discharging into its MS4;

BMC Section: 13.20.140 Violation, Inspection, Enforcement

x. *Require the use of control measures to prevent or reduce the discharge of pollutants to achieve water quality standards/receiving water limitations;*

BMC Sections: 13.20.090 Control of Pollutants from Industrial and Commercial Facilities and 13.20.130 Control of Pollutants from New Development/Redevelopment Projects

xi. *Require that structural BMPs are properly operated and maintained;*

BMC Section: 13.20.130 Control of Pollutants from New Development/Redevelopment Projects

xii. *Require documentation on the operation and maintenance of structural BMPs and their effectiveness in reducing the discharge of pollutants to the MS4.*

BMC Section: 13.20.130 Control of Pollutants from New Development/Redevelopment Projects

Per the requirement in Part VI.A.2.b.ii., the City's legal procedures available to mandate compliance with applicable municipal ordinances identified in the above section, and therefore with the conditions of the Order, can be found in BMC Section 13.20.140 Violation, Inspection, Enforcement. Here is the relevant text of that provision:

13.20.140 Violation, Inspection, Enforcement.

A. Violation of any provision of this chapter, any stormwater pollution prevention plan or any permit issued pursuant to this chapter shall be a violation per Chapter 1.08.

B. The Director of Community Development, or the Director's designees, may issue notices of violation and administrative orders to achieve compliance with the provisions of this chapter. Failure to comply with the terms and conditions of such a notice of violation or an administrative order shall constitute a violation of this chapter.

C. The violation of any provision of this chapter is hereby declared to be a nuisance, and may be abated by the City in accordance with its authority to abate nuisances.

D. The remedies listed in this chapter are not exclusive of any other remedies available to the City under any applicable Federal, State or local law and it is within the discretion of the City to seek cumulative remedies.

[...]

F. The Director of Community Development, or the Director's designees, may issue notice of violation and administrative orders to any other person who has failed to comply with either a notice of violation or other administrative order an invoice for costs (invoice of cost) for reimbursement of the City's actual costs incurred in issuing and enforcement of any provision of this chapter.

G. The Director of Community Development, or the Director's designees, may require that any person engaged in any activity and/or owning or operating any facility which may cause or contribute to stormwater pollution or contamination, illicit discharges and/or discharge of nonstormwater to the stormwater system, undertake such monitoring activities and/or analysis and furnish such reports as the officer may specify. The burden, including costs, of these activities, analysis and reports shall bear a reasonable relationship to the need for the monitoring, analysis and the benefits to be obtained.

Thus, enforcement actions can be completed administratively or judicially if necessary.

Please contact the undersigned if you have any questions.

Sincerely,

ALESHIRE & WYNDER, LLP

Joseph W. Pannone
City Attorney for the City of Bellflower

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December 3, 2013

Mr. Sam Unger, Executive Officer
California Regional Water Quality Control Board
Los Angeles Region
320 W. 4th Street, Suite 200
Los Angeles, California 90013-1105

Re: Statement of Legal Authority

Dear Mr. Unger:

This letter is provided to serve as the Statement of Legal Authority for the City of Cerritos (the "City") that must be submitted with its Annual Report pursuant to Part VI.A.2.b. of Order No. R4-2012-0175 for NPDES Permit No. CAS004001. As legal counsel for the City, I have determined that it has all the necessary legal authority to implement and enforce the requirements contained in 40 CFR § 122.26(d)(2)(i)(A-F) and this Order during the reporting period of July 1, 2012 through June 30, 2013, to the extent permitted by State and Federal law, subject to the limitations on municipal action under the California and United States Constitutions.

Per the requirement in Part VI.A.2.b.i., here are citations to the City's Municipal Code for each of the following requirements found in Part VI.A.2.a:

i. *Control the contribution of pollutants to its MS4 from storm water discharges associated with industrial and construction activity and control the quality of storm water discharged from industrial and construction sites. This requirement applies both to industrial and construction sites with coverage under an NPDES permit, as well as to those sites that do not have coverage under an NPDES permit.*

   Municipal Code Sections: 6.32.050 Construction sites requiring building permit and/or grading plan and 6.32.060 Industrial activity sites

ii. *Prohibit all non-storm water discharges through the MS4 to receiving waters not otherwise authorized or conditionally exempt pursuant to Part III.A.*

   Municipal Code Section: 6.32.030 Illicit discharges and connections

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iii. *Prohibit and eliminate illicit discharges and illicit connections to the MS4.*

Municipal Code Section: 6.32.030 Illicit discharges and connections

iv. *Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4.*

Municipal Code Sections: 6.32.030 Illicit discharges and connections and 6.32.040 Illicit disposal

v. *Require compliance with conditions in Permittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows);*

Municipal Code Sections: 6.32.010 Purpose and 6.32.080 Violation—Penalty

vi. *Utilize enforcement mechanisms to require compliance with applicable ordinances, permits, contracts, or orders.*

Municipal Code Section: 6.32.080 Violation—Penalty

vii. *Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Co-permittees;*

Municipal Code Section: 6.32.030 Illicit discharges and connections

viii. *Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation;*

Municipal Code Section: 6.32.030 Illicit discharges and connections

ix. *Carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with applicable municipal ordinances, permits, contracts and orders, and with the provisions of this Order, including the prohibition of non-storm water discharges into the MS4 and receiving waters. This means the Permittee must have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from entities discharging into its MS4;*

Municipal Code Section: 6.32.080 Violation—Penalty, subsection (D)

x. *Require the use of control measures to prevent or reduce the discharge of pollutants to achieve water quality standards/receiving water limitations;*

Municipal Code Section: 6.32.030 Illicit discharges and connections

RB-AR8781

xi. Require that structural BMPs are properly operated and maintained;

Municipal Code Section: 6.32.055 Urban runoff mitigation plan for new development

xii. Require documentation on the operation and maintenance of structural BMPs and their effectiveness in reducing the discharge of pollutants to the MS4.

Municipal Code Section: 6.32.055 Urban runoff mitigation plan for new development

Per the requirement in Part VI.A.2.b.ii., the City's legal procedures available to mandate compliance with applicable municipal ordinances identified in the above section, and therefore with the conditions of the Order, can be found in Municipal Code Section 6.32.080 Violation—Penalty. Here is the relevant text of that provision:

6.32.080 Violation—Penalty.

(A) The violation of any provision of this chapter, or failure to comply with any of the requirements of this chapter, shall constitute a misdemeanor; except that notwithstanding any other provision of this chapter, any such violation constituting a misdemeanor under this chapter may, at the sole discretion of the authorized enforcement officer, by charged and prosecuted as an infraction.

(B) In addition to the penalties provided, any condition caused or permitted to exist in violation of any of the provisions of this chapter is a threat to the public health, safety and welfare, is declared and deemed a nuisance, may be summarily abated and/or restored by the authorized enforcement officer, and/or civil action to abate, enjoin or otherwise compel the cessation of such nuisance.

(1) The cost of such abatement and restoration shall be borne by the owner of the property and the cost thereof shall be invoiced to the owner of the property. If the invoice is not paid with sixty days, a lien shall be placed upon and against the property. If the lien is not satisfied within three months, the property may be sold in satisfaction thereof in a like manner as other real property is sold under execution.

(2) If any violation of this chapter constitutes a seasonal recurrent nuisance, the authorized enforcement officer shall so declare. Thereafter such seasonal and recurrent nuisance shall be abated every year without the necessity of any further hearing.

(3) In any administrative or civil proceeding under this chapter in which the city prevails, the city shall be awarded all costs of investigation, administrative overhead, out-of-pocket expenses, costs of suit and reasonable attorney fees.

(C) Penalties for Failure to Comply with BMPs. The authorized enforcement officer shall enforce this chapter as follows:

(1) For the first failure to comply with any provision of this chapter, the authorized enforcement officer shall issue to the affected person or business a written notice which includes the following information:

(a) A statement specifying the violation committed;

(b) A specified time period within which the affected person or business must correct the failure or file a written notice disputing the notice of failure to comply;

(c) A statement of the penalty for continued noncompliance.

(2) For each subsequent failure to comply with any provision of this chapter, following written notice issued pursuant to subsection (C)(1) of this section, the authorized enforcement officer may levy a penalty of one hundred dollars each day during which a person or business fails to comply with the provisions of this chapter. Each day following written notice shall constitute a separate offense. Said penalty shall be set by the city council resolution.

[…]

Thus, enforcement actions can be completed administratively or judicially if necessary.

Please contact the undersigned if you have any questions.

Sincerely,

ALESHIRE & WYNDER, LLP

Mark W. Steres
City Attorney for the City of Cerritos

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City of Downey

FUTURE UNLIMITED

YVETTE M. ABICH GARCIA
City Attorney

December 12, 2013

Mr. Sam Unger, Executive Officer
California Regional Water Quality Control Board
Los Angeles Region
320 W. 4th Street, Suite 200
Los Angeles, CA 90013-1105

RE: Legal Authority Certification for the City of Downey

Dear Mr. Unger:

As the City Attorney for the City of Downey, I have reviewed the City's existing ordinances, applicable statutes, and/or applicable contracts and have determined that as of the date of this letter, the City can operate pursuant to the legal authority required in 40 CFR 122.26(d)(2)(i)(A)-(F) and Part VI.A.2 of Order No. R4-2012-0175, issued by the Regional Water Quality Control Board – Los Angeles Region ("RWQCB"), adopted on December 28, 2012 and entitled "Waste Discharge Requirements for Municipal Separate Storm Sewer System (MS4) Discharges within the Coastal Watersheds of Los Angeles County, except those Discharges Originating from the City of Long Beach (MS4)" [NPDES No. CAS004001] (the "2012 NPDES Permit"). Enforcement of the City's storm water ordinances can be completed administratively or, if necessary, through the judicial system.

This letter is limited to the matters contained herein, and should not be read as expressing any opinion on any other matter except on the matters expressly set forth herein.

Please call the undersigned if you have any questions.

Sincerely,

CITY OF DOWNEY

Yvette M. Abich Garcia
City Attorney

cc: John L. Hunter & Associates

RB-AR8784

STEVEN N. SKOLNIK

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December 9, 2013

Lisa Rapp, Director of Public Works
City of Lakewood
5050 Clark Avenue
Lakewood, CA 90712

Re: Order No. R4-2012-0175
NPDES No. CAS004001

Dear Ms. Rapp:

In my capacity as City Attorney for the City of Lakewood (the "City"), I hereby confirm that the City has the legal authority within its jurisdiction to implement and enforce each of the requirements contained in 40 CFR @ 122.26(d)(2)(i)(A-F) and the Order referenced above. Such legal authority is derived from Article 11, Section 7 of the California Constitution, Section 13002 of the California Water Code, and Section 5801 of the Lakewood Municipal Code, which incorporates by reference the pertinent provisions of the Los Angeles County Code.

The City is authorized to take enforcement action by administrative proceedings or in the judicial system.

Very truly yours,

Steven N. Skolnik

Long Beach Legal Authority

The legal authority certifications of the cities of the LCC are included in this section. The City of Long Beach's MS4 permit is on a separate timeline (effective date 15 months after the Los Angeles County-Wide MS4 Permit) and a legal authority letter will be submitted separately. A status report will be included in the Long Beach separate area WMP when submitted on or before March 28, 2015.

STATEMENT OF LEGAL AUTHORITY

Pursuant to Part VI.A.2.b. of Order No. R4-2012-0175, the City of Paramount has all the necessary legal authority to implement and enforce the requirements contained in 40 CFR § 122.26(d)(2)(i)(A-F) and this Order during the reporting period of July 1, 2012 through June 30, 2013. This is made evident by municipal code citation to each of the following requirements found in Part VI.A.2.a:

1. Control the contribution of pollutants to its MS4 from storm water discharges associated with industrial or commercial activity and control the quality of storm water discharged from industrial and commercial sites. This requirement applies both to industrial and commercial sites with coverage under an NPDES permit, as well as to those sites that do not have coverage under an NPDES permit.
   Municipal Code Section: Sec. 48-3.5. Prohibited discharges from industrial or commercial activity
2. Prohibit all non-storm water discharges through the MS4 to receiving waters not otherwise authorized or conditionally exempt pursuant to Part III.A.
   Municipal Code Section: Sec. 48-3.3. Littering and other discharge of polluting or damaging substances prohibited
3. Prohibit and eliminate illicit discharges and illicit connections to the MS4.
   Municipal Code Section: Sec. 48-3. Illicit discharges prohibited and Sec. 48-3.1. Installation or use of illicit connections prohibited
4. Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4.
   Municipal Code Section: Sec. 48-3.3. Littering and other discharge of polluting or damaging substances prohibited
5. Require compliance with applicable Permittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows);
   Municipal Code Section: Sec. 48-3.8. Notification of uncontrolled discharges required.
6. Utilize enforcement mechanisms to require compliance with applicable ordinances, permits, contracts, or orders.
   Municipal Code Section: Sec. 48-5. Enforcement - Director's powers and duties
7. Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Co-permittees;
   Municipal Code Section: Sec. 48-3.3. Littering and other discharge of polluting or damaging substances prohibited and Sec. 48-2.1. Purpose and Intent.
8. Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation;
   Municipal Code Section: Sec. 48-3.3. Littering and other discharge of polluting or damaging substances prohibited and Sec. 48-2.1. Purpose and Intent.

RB-AR8787

9. Carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with applicable municipal ordinances, permits, contracts and orders, and with the provisions of this Order, including the prohibition of non-storm water discharges into the MS4 and receiving waters. This means the Permittee must have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from entities discharging into its MS4;
   Municipal Code Section: Sec. 48-5.3. Inspection to ascertain compliance - Access
10. Require the use of control measures to prevent or reduce the discharge of pollutants to achieve water quality standards/receiving water limitations;
    Municipal Code Section: Sec. 48-5.4. Notice to correct violations - Director may take action
11. Require that structural BMPs are properly operated and maintained.
    Municipal Code Section: Sec. 48-4.1. Best management practices for construction activity, 48-42, best managerial practices for industrial and commercial facilities.
12. Require documentation on the operation and maintenance of structural BMPs and their effectiveness in reducing the discharge of pollutants to the MS4.
    Municipal Code Section: Sec. 48-4.3. Installation of structural BMPs

The City of Paramount legal procedures available to mandate compliance with applicable municipal ordinances identified in the above section, and therefore with the conditions of the Order, can be found in Section *Sec. 48-5. Enforcement - Director's powers and duties*. Violations of this section are deemed a "Public Nuisance" in section 48-5.5, where any discharge in violation of this chapter, any illicit connection, and/or any violation of runoff management requirements shall constitute a threat to public health and safety.

Signature: John E Cavanaugh.
John E. Cavanaugh, City Attorney

Date: 12-3-13

RB-AR8788

ALESHIRE & WYNDER LLP
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December 3, 2013

Mr. Sam Unger, Executive Officer
California Regional Water Quality Control Board
Los Angeles Region
320 W. 4th Street, Suite 200
Los Angeles, California 90013-1105

Re: Legal Authority Statement

Dear Mr. Unger:

This letter is provided to serve as the Statement of Legal Authority for the City of Signal Hill (the "City") that must be submitted with its Annual Report pursuant to Part VI.A.2.b. of Order No. R4-2012-0175 for NPDES Permit No. CAS004001. As legal counsel for the City, I have determined that it has all the necessary legal authority to implement and enforce the requirements contained in 40 CFR § 122.26(d)(2)(i)(A-F) and this Order during the reporting period of July 1, 2012 through June 30, 2013, to the extent permitted by State and Federal law, subject to the limitations on municipal action under the California and United States Constitutions.

Per the requirement in Part VI.A.2.b.i., here are citations to the City's Municipal Code for each of the following requirements found in Part VI.A.2.a:

i. *Control the contribution of pollutants to its MS4 from storm water discharges associated with industrial and construction activity and control the quality of storm water discharged from industrial and construction sites. This requirement applies both to industrial and construction sites with coverage under an NPDES permit, as well as to those sites that do not have coverage under an NPDES permit.*

   Municipal Code Sections: 12.16.060 Illicit discharges, 12.16.100 Compliance with state and federal discharge requirements, and 12.16.112 Construction pollutant reduction

ii. *Prohibit all non-storm water discharges through the MS4 to receiving waters not otherwise authorized or conditionally exempt pursuant to Part III.A.*

Municipal Code Section: 12.16.060 Illicit discharges

iii. *Prohibit and eliminate illicit discharges and illicit connections to the MS4.*

Municipal Code Sections: 12.16.050 Illicit connections prohibited and 12.16.060 Illicit discharges

iv. *Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4.*

Municipal Code Sections: 12.16.060 Illicit discharges and 12.16.080 Littering

v. *Require compliance with conditions in Permittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows);*

Municipal Code Section: 12.16.120 Inspection and enforcement

vi. *Utilize enforcement mechanisms to require compliance with applicable ordinances, permits, contracts, or orders.*

Municipal Code Section: 12.16.120 Inspection and enforcement

vii. *Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Co-permittees;*

Municipal Code Sections: 12.16.020 Purpose and intent and 12.16.120 Inspection and enforcement

viii. *Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation;*

Municipal Code Sections: 12.16.020 Purpose and intent and 12.16.120 Inspection and enforcement

ix. *Carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with applicable municipal ordinances, permits, contracts and orders, and with the provisions of this Order, including the prohibition of non-storm water discharges into the MS4 and receiving waters. This means the Permittee must have authority to enter, monitor, inspect, take*

measurements, review and copy records, and require regular reports from entities discharging into its MS4;

Municipal Code Section: 12.16.120 Inspection and enforcement

x. *Require the use of control measures to prevent or reduce the discharge of pollutants to achieve water quality standards/receiving water limitations;*

Municipal Code Sections: 12.16.060 Illicit discharges, 12.16.114 New development/redevelopment pollutant reduction, and 12.16.116 Small site new development/ redevelopment pollutant reduction

xi. *Require that structural BMPs are properly operated and maintained;*

Municipal Code Sections: 12.16.114 New development/redevelopment pollutant reduction and 12.16.116 Small site new development/ redevelopment pollutant reduction

xii. *Require documentation on the operation and maintenance of structural BMPs and their effectiveness in reducing the discharge of pollutants to the MS4.*

Municipal Code Section: 12.16.114 New development/redevelopment pollutant reduction and 12.16.116 Small site new development/ redevelopment pollutant reduction

Per the requirement in Part VI.A.2.b.ii., the City's legal procedures available to mandate compliance with applicable municipal ordinances identified in the above section, and therefore with the conditions of the Order, can be found in Municipal Code Section 12.16.120 Inspection and enforcement. Here is the relevant text of that provision:

"12.16.120 Inspection and enforcement.

[...]

B. Enforcement.

1. Any violation of this chapter is a misdemeanor and shall be punishable by either a fine of up to one thousand dollars or six months in the county jail, or both.

2. Any person who may otherwise be charged with a misdemeanor as a result of a violation of this chapter may be charged, at the discretion of the prosecuting attorney, with an infraction punishable by a fine of not more than one

hundred dollars for the first violation, two hundred dollars for the second violation, and two hundred fifty dollars for each additional violation thereafter.

3. As a part of any sentence or other penalty imposed or the award of any damage, the court may also order that restitution be paid to the City or any injured person, or, in the case of a violator who is a minor, by the minor's parent or lawfully designated guardian or custodian. Restitution may include the amount of any reward.

4. Any person violating the provisions of this chapter shall reimburse the City for any and all costs incurred by the City in responding to, investigating, assessing, monitoring, treating, cleaning, removing, or remediating any Illicit Discharge or Pollutant from the municipal storm drain system; rectifying any Illicit Connection; or remediating any violation of this chapter.

Such costs to be paid to the City include all administrative expenses and all legal expenses, including costs and attorneys' fees, in obtaining compliance, and in litigation including all costs and attorneys' fees on any appeal. The costs to be recovered in this Section 12.16.120 shall be recoverable from any and all persons violating this chapter.

5. In the event any violation of this chapter constitutes an imminent danger to public health, safety, or the environment, the City Manager or Director, or any authorized agent thereof, may enter upon the premises from which the violation emanates, abate the violation and danger created to the public safety or the environment, and restore any premises affected by the alleged violation, without notice to or consent from the owner or occupant of the premises. An imminent danger shall include but is not limited to exigent circumstances created by the Discharge of Pollutants, where such Discharge presents a significant and immediate threat to the public health or safety, or the environment.

6. Violations of this chapter may further be deemed to be a public nuisance which may be abated by administrative or civil or criminal action in accordance with the terms and provisions of this code and state law.

7. All costs and fees incurred by the City as a result of any violation of this chapter which constitute a nuisance, including all administrative fees and expenses and legal fees and expenses, shall become a lien against the subject premises from which the nuisance emanated and a personal obligation against the owner, in accordance with Government Code Sections 38773.1 and 38773.5. The owner of record of the premises subject to any lien shall receive notice of the lien prior to recording, as required by Government Code Section 38773.1. The City Attorney is authorized to collect nuisance abatement costs or enforce a nuisance lien in an action brought for money judgment, or by delivery to the county

assessor of a special assessment against the premises in accordance with the conditions and requirements of Government Code Section 38773.5.

8. Any person acting in violation of this chapter may also be acting in violation of the Clean Water Act or the California Porter-Cologne Act (California Water Code Section 13000 et seq.) and the regulations thereunder, and other laws and regulations, and may be subject to damages, fines and penalties, including civil liability under such other laws. The City Attorney is authorized to file a citizen's suit pursuant to the Clean Water Act, seeking penalties, damages and orders compelling compliance and appropriate relief.

9. The City Attorney is authorized to file in a court of competent jurisdiction a civil action seeking an injunction against any violation or threatened or continuing violation of this chapter. Any temporary, preliminary or permanent injunction issued pursuant hereto may include an order for reimbursement to the City for all costs incurred in enforcing this chapter, including costs of inspection, investigation, monitoring, treatment, abatement, removal or remediation undertaken by or at the expense of the city, and may include all legal expenses and fees and any and all costs incurred relating to the restoration or remediation of the environment.

10. Each separate Discharge in violation of this chapter and each day a violation of this chapter exists, without correction, shall constitute a new and separate violation punishable as a separate infraction, misdemeanor and/or civil violation.

11. Whenever necessary, interagency coordination will be employed to enforce the provisions of this chapter.

12. The City may utilize any and all other remedies as otherwise provided by law."

Thus, enforcement actions can be completed administratively or judicially if necessary.

Please contact the undersigned if you have any questions.

Sincerely,

ALESHIRE & WYNDER, LLP

David J. Aleshire
City Attorney for the City of Signal Hill

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JOHN F. KRATTLI
County Counsel

December 16, 2013

Mr. Samuel Unger, P.E., Executive Officer
California Regional Water Quality Control Board – Los Angeles Region
320 West 4th Street, Suite 200
Los Angeles, CA 90013-2343

Attention: Mr. Ivar Ridgeway

Re: Certification By Legal Counsel For Los Angeles County Flood Control District's Annual Report

Dear Mr. Unger:

Pursuant to the requirements of Part VI(A)(2)(b) of Order No. R4-2012-0175 (the "Order"), the Office of the County Counsel of the County of Los Angeles makes the following certification in support of the Annual Report of the Los Angeles County Flood Control District ("LACFCD"):

Certification Pursuant To Order Part VI(A)(2)(b)

"*Each Permittee must submit a statement certified by its chief legal counsel that the Permittee has the legal authority within its jurisdiction to implement and enforce the requirements contained in 40 CFR §122.26(d)(2)(i)(A-F) and this Order.*"

LACFCD has the legal authority within its jurisdiction to implement and enforce each of the requirements contained in 40 CFR §122.26(d)(2)(i)(A-F) and the Order.

Order Part VI(A)(2)(b)(i)

"*Citation of applicable municipal ordinances or other appropriate legal authorities and their relationship to the requirements of 40 CFR §122.26(d)(2)(i)(A-F) and this Order*"

Citations Of Applicable Ordinances Or Other Legal Authorities

Although many portions of State law, the Charter of the County of Los Angeles, the Los Angeles County Code and LACFCD's Flood Control District Code ("Code") are potentially applicable to the implementation and enforcement of these requirements, the primary applicable laws and ordinances are as follows:

Los Angeles County Code, Title 12, Chapter 12.80 STORMWATER AND RUNOFF POLLUTION CONTROL, including:

§12.80.010 - §12.80.360 Definitions

§12.80.370 Short title.

§12.80.380 Purpose and intent.

§12.80.390 Applicability of this chapter.

§12.80.400 Standards, guidelines and criteria.

§12.80.410 Illicit discharges prohibited.

§12.80.420 Installation or use of illicit connections prohibited.

§12.80.430 Removal of illicit connection from the storm drain system.

§12.80.440 Littering and other discharge of polluting or damaging substances prohibited.

§12.80.450 Stormwater and runoff pollution mitigation for construction activity.

§12.80.460 Prohibited discharges from industrial or commercial activity.

§12.80.470 Industrial/commercial facility sources required to obtain a NPDES permit.

§12.80.480 Public facility sources required to obtain a NPDES permit.

§12.80.490 Notification of uncontrolled discharges required.

§12.80.500 Good housekeeping provisions.

§12.80.510 Best management practices for construction activity.

§12.80.520 Best management practices for industrial and commercial facilities.

§12.80.530 Installation of structural BMPs.

§12.80.540 BMPs to be consistent with environmental goals.

§12.80.550 Enforcement—Director's powers and duties.

§12.80.560 Identification for inspectors and maintenance personnel.

§12.80.570 Obstructing access to facilities prohibited.

§12.80.580 Inspection to ascertain compliance—Access required.

§12.80.590 Interference with inspector prohibited.

§12.80.600 Notice to correct violations—Director may take action.

§12.80.610 Violation a public nuisance.

§12.80.620 Nuisance abatement—Director to perform work when—Costs.

§12.80.630 Violation—Penalty.

§12.80.635 Administrative fines.

§12.80.640 Penalties not exclusive.

§12.80.650 Conflicts with other code sections.

§12.80.660 Severability.

§12.80.700 Purpose.

§12.80.710 Applicability.

§12.80.720 Registration required.

§12.80.730 Exempt facilities.

§12.80.740 Certificate of inspection—Issuance by the director.

§12.80.750 Certificate of inspection—Suspension or revocation.

§12.80.760 Certificate of inspection—Termination.

§12.80.770 Service fees.

§12.80.780 Fee schedule.

§12.80.790 Credit for overlapping inspection programs.

§12.80.800 Annual review of fees.

Los Angeles County Code, Title 12, Chapter 12.84 LOW IMPACT DEVELOPMENT STANDARDS, including:

§12.84.410 Purpose.

§12.84.420 Definitions.

§12.84.430 Applicability.

§12.84.440 Low Impact Development Standards.

§12.84.445 Hydromodification Control.

§12.84.450 LID Plan Review.

§12.84.460 Additional Requirements.

Los Angeles County Code, Title 22 PLANNING AND ZONING, Part 6 ENFORCEMENT PROCEDURES, including:

§22.60.330 General prohibitions.

§22.60.340 Violations.

§22.60.350 Public nuisance.

§22.60.360 Infractions.

§22.60.370 Injunction.

§22.60.380 Enforcement.

§22.60.390 Zoning enforcement order and noncompliance fee.

Los Angeles County Code, Title 26 BUILDING CODE, including:

§26.103 Violations And Penalties

§26.104 Organization And Enforcement

§26.105 Appeals Boards

§26.106 Permits

§26.107 Fees

§26.108 Inspections

LACFCD Code Chapter 21 - STORMWATER AND RUNOFF POLLUTION CONTROL including:

§21.01 Purpose and Intent

§21.03 Definitions

§21.05 Standards, Guidelines, and Criteria

§21.07 Prohibited Discharges

§21.09 Installation or Use of Illicit Connections Prohibited

§21.11 Littering Prohibited

§21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity

§21.15 Notification of Uncontrolled Discharges Required

§21.17 Requirement to Monitor and Analyze

§21.19 Conflicts With Other Code Sections

§21.21 Severability

§21.23 Violation a Public Nuisance

California Government Code §6502

California Government Code §23004

California Water Code §8100 *et. seq.*

Relationship Of Applicable Ordinances Or Other Legal Authorities To The Requirements of 40 CFR §122.26(d)(2)(i)(A-F) And The Order

Although, depending upon the particular issue, there may be multiple ways in which particular sections of the County of Los Angeles' ordinances, LACFCD's ordinances, and statutes relate to the requirements contained in 40 CFR §122.26(d)(2)(i)(A-F) and the Order, the table below indicates the basic relationship with Part VI(A)(2)(a) of the Order:

Order Part VI(A)(2)(a) Items	**Primary Applicable Ordinance/Statute**
i. Control the contribution of pollutants to its MS4 from storm water discharges associated with industrial and construction activity and control the quality of storm water discharged from industrial and construction sites. This requirement applies both to industrial and construction sites with coverage under an NPDES permit, as well as to those sites that do not have coverage under an NPDES permit.	Los Angeles County Code: §12.80.410 [illicit discharge prohibited]; §12.80.450 [construction] §12.80.460 [industrial and commercial] §12.80.470 and .480 [industrial and commercial NPDES requirements] §12.84.440 [LID standards] §12.84.445 [hydromodification control] §12.84.450 [LID Plan Review] §22.60.330 [general prohibitions] §22.60.340 [violations] §22.60.350 [public nuisance] §22.60.360 [infractions] §22.60.370 [injunction] §22.60.380 [enforcement.] §22.60.390 [zoning enforcement order] §26.103 [violations and penalties]

Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
	§26.104 [enforcement] §26.106 [permits] §26.108 [inspections] LACFCD Code: §21.05 Standards, Guidelines, and Criteria §21.07 Prohibited Discharges §21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity §21.15 Notification of Uncontrolled Discharges Required §21.17 Requirement to Monitor and Analyze §21.23 Violation a Public Nuisance
ii. Prohibit all non-storm water discharges through the MS4 to receiving waters not otherwise authorized or conditionally exempt pursuant to Part III.A.	Los Angeles County Code: §12.80.410 [illicit discharge prohibited] LACFCD Code: §21.07 Prohibited Discharges
iii. Prohibit and eliminate illicit discharges and illicit connections to the MS4.	Los Angeles County Code: §12.80.410 [illicit discharge prohibited]; §12.80.420 [illicit connections prohibited] LACFCD Code: §21.05 Standards, Guidelines, and Criteria §21.07 Prohibited Discharges §21.09 Installation or Use of Illicit Connections Prohibited §21.23 Violation a Public Nuisance

Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
iv. Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4.	Los Angeles County Code: §12.80.410 [illicit discharge prohibited]; §12.80.440 [littering and other polluting prohibited] LACFCD Code: §19.07 Interference With or Placing Obstructions, Refuse, Contaminating Substances, or Invasive Species in Facilities Prohibited §21.05 Standards, Guidelines, and Criteria §21.07 Prohibited Discharges §21.09 Installation or Use of Illicit Connections Prohibited §21.11 Littering Prohibited §21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity §21.15 Notification of Uncontrolled Discharges Required §21.17 Requirement to Monitor and Analyze §21.23 Violation a Public Nuisance
v. Require compliance with conditions in Permittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows).	Los Angeles County Code: §12.80.490 [notification of uncontrolled discharge] §12.80.570 [obstructing access to facilities] §12.80.580 [compliance inspection] §12.80.610 [violation a nuisance] §12.620 [nuisance abatement] §12.80.635 [violation penalty]

Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
	§12.80.640 [penalties not exclusive] §12.84.440 [LID standards] §12.84.445 [hydromodification control] §12.84.450 [LID Plan Review] §22.60.330 [general prohibitions] §22.60.340 [violations] §22.60.350 [public nuisance] §22.60.360 [infractions] §22.60.370 [injunction] §22.60.380 [enforcement.] §22.60.390 [zoning enforcement order] §26.103 [violations and penalties] §26.104 [enforcement] §26.106 [permits] §26.108 [inspections] LACFCD Code: §19.11 Violation a Public Nuisance §21.05 Standards, Guidelines, and Criteria §21.07 Prohibited Discharges §21.09 Installation or Use of Illicit Connections Prohibited §21.11 Littering Prohibited §21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity §21.15 Notification of Uncontrolled Discharges Required §21.17 Requirement to Monitor and Analyze

Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
	§21.19 Conflicts With Other Code Sections §21.23 Violation a Public Nuisance
vi. Utilize enforcement mechanisms to require compliance with applicable ordinances, permits, contracts, or orders.	Same as item v., above
vii. Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Copermittees.	California Government Code §6502 California Government Code §23004
viii. Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation.	California Government Code §6502 California Government Code §23004
ix. Carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with applicable municipal ordinances, permits, contracts and orders, and with the provisions of this Order, including the prohibition of non-storm water discharges into the MS4 and receiving waters. This means the Permittee must have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from entities discharging into its MS4.	Los Angeles County Code: §12.80.490 [notification of uncontrolled discharge] §12.80.570 [obstructing access to facilities] §12.80.580 [compliance inspection] §12.80.610 [violation a nuisance] §12.80.620 [nuisance abatement] §12.80.635 [violation penalty] §12.80.640 [penalties not exclusive] §22.60.380 [enforcement.] §26.106 [permits] §26.108 [inspections]

Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
	LACFCD Code: §21.05 Standards, Guidelines, and Criteria §21.07 Prohibited Discharges §21.09 Installation or Use of Illicit Connections Prohibited §21.11 Littering Prohibited §21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity §21.15 Notification of Uncontrolled Discharges Required §21.17 Requirement to Monitor and Analyze §21.23 Violation a Public Nuisance
x. Require the use of control measures to prevent or reduce the discharge of pollutants to achieve water quality standards/receiving water limitations.	Los Angeles County Code: §12.80.450 [construction mitigation] §12.80.500 [good housekeeping practices] §12.80.510 [construction BMPs] §12.80.520 [industrial/commercial BMPs] §12.84.440 [LID standards] §12.84.450 [LID Plan Review] §22.60.330 [general prohibitions] §22.60.380 [enforcement.] §22.60.390 [zoning enforcement order] §26.106 [permits] §26.108 [inspections] LACFCD Code: §21.05 Standards, Guidelines, and Criteria

Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
	§21.07 Prohibited Discharges §21.09 Installation or Use of Illicit Connections Prohibited §21.11 Littering Prohibited §21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity §21.15 Notification of Uncontrolled Discharges Required §21.17 Requirement to Monitor and Analyze §21.23 Violation a Public Nuisance
xi. Require that structural BMPs are properly operated and maintained.	Los Angeles County Code: §12.80.530 [installation of structural BMPs] §22.60.380 [enforcement.] §22.60.390 [zoning enforcement order] §26.106 [permits] §26.108 [inspections] LACFCD Code: §21.05 Standards, Guidelines, and Criteria §21.07 Prohibited Discharges §21.09 Installation or Use of Illicit Connections Prohibited §21.11 Littering Prohibited §21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity §21.15 Notification of Uncontrolled Discharges Required §21.17 Requirement to Monitor and Analyze

Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
	§21.23 Violation a Public Nuisance
xii. Require documentation on the operation and maintenance of structural BMPs and their effectiveness in reducing the discharge of pollutants to the MS4.	Los Angeles County Code: §12.80.530 [installation of structural BMPs] §22.60.380 [enforcement.] §22.60.390 [zoning enforcement order] §26.106 [permits] §26.108 [inspections] LACFCD Code: §21.05 Standards, Guidelines, and Criteria §21.07 Prohibited Discharges §21.09 Installation or Use of Illicit Connections Prohibited §21.11 Littering Prohibited §21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity §21.15 Notification of Uncontrolled Discharges Required §21.17 Requirement to Monitor and Analyze §21.23 Violation a Public Nuisance

Order Part VI(A)(2)(b)(ii)

"*Identification of the local administrative and legal procedures available to mandate compliance with applicable municipal ordinances identified in subsection (i) above and therefore with the conditions of this Order, and a statement as to whether enforcement actions can be completed administratively or whether they must be commenced and completed in the judicial system.*"

The local administrative and legal procedures available to mandate compliance with the above ordinances are specified in those ordinances, particularly in:

Los Angeles County Code:

§12.80.550 Enforcement—Director's powers and duties.

§12.80.600 Notice to correct violations—Director may take action.

§12.80.610 Violation a public nuisance.

§12.80.620 Nuisance abatement—Director to perform work when—Costs.

§12.80.630 Violation—Penalty.

§12.80.635 Administrative fines.

§12.80.640 Penalties not exclusive.

§12.84.450 LID Plan Review.

§12.84.460 Additional Requirements.

Title 26, §103 Violations And Penalties

Title 26, §104 Organization And Enforcement

Title 26, §105 Appeals Boards

Title 26, §106 Permits

§22.60.330 General prohibitions.

§22.60.340 Violations.

§22.60.350 Public nuisance.

§22.60.360 Infractions.

§22.60.370 Injunction.

§22.60.380 Enforcement.

§22.60.390 Zoning enforcement order and noncompliance fee.

LACFCD Code:

§21.05 Standards, Guidelines, and Criteria

§21.07 Prohibited Discharges

§21.09 Installation or Use of Illicit Connections Prohibited

§21.11 Littering Prohibited

§21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity

§21.15 Notification of Uncontrolled Discharges Required

§21.17 Requirement to Monitor and Analyze

§21.23 Violation a Public Nuisance

LACFCD attempts to first resolve each enforcement action administratively. However, the above cited ordinances also provide LACFCD with the authority to pursue such actions in the judicial system as necessary.

Very truly yours,

JOHN F. KRATTLI
County Counsel

By
JUDITH A. FRIES
Principal Deputy County Counsel
Public Works Division

JAF:jyj

Response to Regional Board Comments on the LCC WMP 1-29-2015

LA MS4 Permit Provision (equivalent provisions are also found in the Long Beach MS4 Permit)	**Regional Water Board Staff Comment and Necessary Revision**	**Response/Actions Taken**
1 Part VI.C.5.a.ii(2)-(3) (Category 2 and 3 Pollutants - Receiving Water Limitations)	The Group should clearly identify the applicable receiving water limitations for the Category 2 and 3 pollutants it has identified in Tables 2-11 and 2-12 of the draft WMP by referring back to Table 2-3. Table 2-12 includes a column for "Standard of Exceedance" and identifies the document where the standard is found, but not the standard itself. However, it appears that all of the applicable receiving water limitations are included in Table 2-3, including those for the "Low Priority Pollutants" listed in Table 2-13.	Columns were added to Tables 2-11 and 2-12 showing applicable receiving water limitations.
2 Part VI.C.5.a.iv.(2) (Prioritizations - Ammonia)	The draft WMP notes that ammonia has been proposed for delisting and therefore will not be addressed. To justify this position, the Group should present the data demonstrating that there is no longer an impairment due to ammonia to support delisting.	New material was added to sub-section 2.4 describing the 13 years of data collected by the City of Long Beach at the mouth of the channel, and a new Appendix C was added containing data about ammonia and pH in the Los Cerritos Channel for Regional Board review. Data from several special studies document that the few recent dry-weather exceedances of ammonia standards have been due to natural pH cycling in the greatly reduced dry-weather flows. The data show that flows to the channels from the outfalls during the dry season are well within Basin Plan pH standards and that the diurnal cycles in pH are not the result of waste discharges.

3 Part VI.C.5.b.iv.(1)(a)(ii) (Minimum Control Measures - Industrial/Commercial Facilities Program)	The Group proposes to alter the commercial and industrial facility inspection frequencies in Parts VI.D.6.d and VI.D.6.e of the LA County MS4 Permit. The proposed modification includes a prioritization process in which the member Cities rate applicable facilities as high, medium, or low priority. High priority facilities are inspected more frequently and low priority facilities are inspected less frequently. The prioritization scheme included in Figure ICF-1 prioritizes facilities by their potential water quality impact. However, the draft WMP also notes that Cities "may follow an alternative prioritization method provided it results in a similar three-tiered scheme." The revised WMP should ensure, and explicitly state that any alternative prioritization method used by a City must also be based on water quality impact. Furthermore, the draft WMP also notes that Cities can prioritize and reprioritize facilities at any time based on their discretion. The Group should revise their draft WMP to clearly state when the initial prioritization of facilities will occur. Additionally, the Group should be explicity clear that during any reprioritization, the ratio of low priority to high priority facilities must always remain at 3:1 or lower to maintain inspection frequencies identified in the draft WMP.	The Prioritization Method language in Table 4-4 was modified to clarify that any alternative prioritization method used by a City will be based on water quality. The initial prioritization in most cases will occur after the first round of inspections. However, in situations where the second round of inspections has started before the WMP is approved, the initial prioritization may not occur until the next permit cycle. In all cases, the ratio of low priority to high priority facilities will remain at 3:1 or lower to maintain inspection frequencies.
4 Part VI.C.5.a.iv.(2)(a) (Prioritization)	Where data indicate impairment or exceedances of RWLs and the findings from the source assessment implicate discharges from the MS4, the Permit requires a strategy for controlling pollutants that is sufficient to achieve compliance as soon as possible. Although Section 5.0 describes compliance with RWLs and Section 6.0 includes an implementation schedule, the program needs to more clearly demonstrate that the compliance	New language was added to sub-sections 5.2.2 and 5.2.3 explaining the strategies for bringing Category 2 and Category 3 pollutants into compliance as soon as possible. Trash reduction will follow the new statewide trash amendments requirements. The schedule for elimination of Bis(2-ethylhexyl) phthalate exceedances is tied to the trash schedule because Bis(2) is a plasticizer that enters the receiving waters

	schedule described in Section 5.0 ensures compliance is "as soon as possible."	as a component of plastic trash. The inspection process will be used to educate maintenance organizations and individuals about not letting detergents and other products enter the storm drain, and that we will target elimination of MBAS exceedances by 2022 (end of next permit term). Further reductions in dry weather discharges will reduce dry-weather bacteria exceedances and possibly eliminate them within 10 years. The only way we currently know to reduce wet-weather bacteria exceedances is to obtain a high-flow suspension and to capture stormwater. 20-25 years will be needed to design, fund, and build enough capacity to significantly reduce wet-weather bacteria exceedances. The Permittees do not propose addressing ammonia and pH in the watershed through control measures. Rather, as explained above, they believe there is sufficient documentation to delist them.
5 Part VI.C.5.b.iv.(4)(b)-(c)(Selection of Watershed Control Measures)	This RAA identifies potential areas for green street conversion and assumes a 30% conversion of the road length in the suitable areas; however, the specific locations and projects are not identified. Although it may not be possible to provide detailed information on specific projects at this time, the WMP should at least commit to the construction of the necessary number of projects within specific sub-basins to ensure compliance with permit requirements per applicable compliance schedules.	Language was added to Section 6.0 reiterating that, consistent with the Water Quality Improvement Hierarchy shown in Figure 3-1 and the overall Water Quality Improvement Strategy discussed in Section 3, the Permittees will construct the necessary mix of water capture facilities, green streets, LID projects, and treatment controls in the various sub-basins to supplement the true source control, runoff reduction, and TSS reduction measures to ensure compliance with permit requirements per applicable compliance schedules. The mix of measures will be periodically adjusted through the adaptive management process.

6	Watershed Control Measures - Part VI.C.5.b.iv.(4)(c)	The draft WMP does not include clear information on the nature, scope, and timing of implementation of all its watershed control measures. Regional Water Board staff recognizes the amount of information that the Group has provided on watershed control measures in its draft WMP. However, this information at times lacks specificity or is interspersed within different sections of the draft WMP (e.g., street sweeping is discussed in the draft WMP's chapter on strategy, but not in the chapter on control measures). Regional Water Board staff suggests that the Group construct a concise table or other organized listing of all its discussed control measures that contains the required information. This would clarify the descriptions that the Group includes in Sections 3 and 4 of its draft WMP.	Sub-sections 4.5.1 and 4.5.2 were strengthened by adding more information about the control measures discussed in Section 3.0. Preliminary information on the number, type, and location(s) and/or frequency of implementation of structural control measures and non-structural best management practices, as well as the nature, scope, and timing of implementation of pollution prevention measures is found in the revised implementation tables in Section 6.
7	Part VI.C.5.b.iv.(4)(c) (Watershed Control Measures - Enhanced Street Sweeping)	The description of the enhanced street sweeping program lacks detail. It is discussed in Section 3 as part of the group's strategy, but details regarding implementation do not appear to be included in Section 4. In particular, since the City of Long Beach does not use vacuum or regenerative street sweepers, as indicated in Table 3-3, the WMP should be clear as to what enhancement to street sweeping the City of Long Beach will implement.	The description of the enhanced street sweeping program was expanded and details concerning the program included in sub-section 4.5.1. A general statement about the City of Long Beach street sweeping program was also added.
8	Part VI.C.5.b.iv.(4)(c) (Watershed Control Measures - SB 346 Copper Reductions)	The draft WMP appears to rely mostly on the phase-out of copper in automotive brake pads, via approved legislation SB 346, to achieve the necessary copper load reductions. Given the combination of other Cu sources identified in various LA TMDLs such as building materials, other vehicle wear, air deposition from fuel combustion and industrial facilities, and that SB 346 progressively phases out Cu content in brakes of new cars (5% by	Sub-section 4.5.1 was revised to add a discussion of the implementation of SB 346 and mention the non-brake pad sources of copper shown in Figure 3-2. In addition, two brake pad copper reduction technical memos were added to the WMP in a new Appendix C: 1) The "Estimate of Urban Runoff Copper Reduction in Los Angeles County from Brake Pad Copper Reduction

	weight until 2021, 0.5% by weight until 2025), then other structural and non-structural BMPs may still be needed to reduce Cu loads sufficiently to achieve compliance deadlines for interim and/or final WQBELS.	Mandated by SB 346" study and 2) a "Brake Pad Copper Reduction - Metrics for Tracking Progress."
9 Part VI.C.5.b.iv.(4)(d) (Watershed Control Measures - Milestones)	The MS4 Permit requires that the WMP provide specificity with regard to structural and non-structural BMPs, including the number, type, and locations(s), etc. adequate to assess compliance. In a number of cases, additional specificity on the number, type, and general locations(s) of watershed control measures as well as the timing of implementation for each is needed. Section 6 of the draft WMP includes a four-phase WMP implementation schedule for control measures (MCMs, source control measures, stormwater capture, etc.). Some of these actions are listed as, "encourage the use of..." (e.g., p. 6-6); greater specificity is required as to what actions will be taken by the group to encourage these actions by others. Items in the schedule only reference the year (or years) that a measure of milestone will be implemented. This should be revised to include more specific and/or exact dates where appropriate. Furthermore, some items discussed as control measures do not appear to have milestones within the implementation schedule (e.g., enhanced street sweeping in Table 6-4). Additionally, many items in the implementation schedule are ongoing measures that are not new interim milestones (e.g. MCMs, implementation of SB 346, enhanced street sweeping, etc.). For transparency, Regional Water Board staff recommends that ongoing measures clearly be separated from interim	Section 6.0 was strengthened by adding an explanation of actions to be taken to encourage actions by others. Tables in Section 6.0 were revised to specify quarters by which control measures will be implemented and were restructured to separate ongoing measures from interim milestones for structural controls and non-structural BMPs in the implementation schedule. In addition, where possible and appropriate, more specificity on actions within the current and next permit terms was provided to demonstrate how compliance with interim requirements are to be met.

	milestones for structural controls and non-structural BMPs in the implementation schedule. Regional Water Board staff recognizes uncertainties may complicate establishment of specific implementation dates, however there should at least be more specificity on actions within the current and next permit terms to ensure that the following interim requirements are met: (1) a 10% reduction in metals loads during wet weather and a 30% reduction in dry weather by 2017 and (2) a 35% reduction in metals loads during wet weather and a 70% reduction during dry weather by 2020.	
10 Part VI.C.5.b.iv.(4)(e) (Watershed Control Measures - Permittee Responsibilities)	For MCMs and NSW discharge screening control measures, the draft WMP clearly lists responsibilities in Table 4-3. However, for other control measures, it is harder to identify Permittee responsibilities. The WMP Implementation Schedule groups together all actions that are being implemented. Although City specific items are marked (e.g. Skylinks Golf Course), it is hard to clearly read amongst the other group actions. The WMP could be improved by including a separate schedule for each City. Table 6-8 also breaks down control measure implementation; however, this is broken up into sub-basins rather than by City, making the responsibilities not immediately clear.	A new Section 4.10 was added to the WMP, generally describing individual Permittee responsibilities within a watershed management program that is initially emphasizing true source control/pollution prevention and runoff reduction, without a separate implementation schedule for each city. In addition, information was added to Table 6-8 listing the responsible jurisdictions for each sub-basin.
11 Part VI.C.5.b.iv.(5)(c) (Selection of Watershed Control Measures)	For waterbody-pollutant combinations not addressed by TMDLs, the MS4 Permit requires that the plan demonstrate using the reasonable assurance analysis (RAA) that the activities and control measures to be implemented will achieve applicable receiving water limitations as soon as possible. The RAA demonstrates the control measures would be adequate to	The new language in sub-sections 5.2.2 and 5.2.3, discussed above, and the new sub-section 5.4, discussed below, together respond to this comment.

	comply with the limitations/deadlines for the "limiting pollutants" for TMDLs and concludes that this will ensure compliance for all other pollutants of concern. However, it does not address the question of whether compliance with limitations for pollutants not addressed by TMDLs could be achieved in a shorter time frame.	
12 Part VI.C.b.iv.(5) (Reasonable Assurance Analysis - Limiting Pollutants)	The RAA identifies zinc and *E. coli* as the limiting pollutants for wet weather and dry weather, respectively. They note that these two pollutants will drive reductions of other pollutants. If the Group believes that this approach demonstrates that activities and control measures will achieve applicable receiving water limitations, it should explicitly state and justify this for the category 2 and 3 pollutants. (This appears to have been done for category 1 pollutants and *E. coli* in Tables 5-6 and 5-9 and Figure 5-13, but not for other categories 2 and 3 pollutants.)	A new sub-section 5.4 was added to the WMP entitled "Addressing Limiting Pollutants Drives Other Pollutant Reductions." This new sub-section describes how the control measures to address zinc in wet weather and *E. coli* in dry weather will drive reductions in exceedances of RWLs for ammonia, pH, trash, Bis(2-ethylhexyl) phthalate, and MBAS.
13 Part VI.C.5.b.iv.(5) (Reasonable Assurance Analysis - New Non-Structural Controls)	The draft WMP assumes a 10% pollutant reduction from new non-structural controls. Although 10% is a modest fraction of the overall controls necessary, additional support for this assumption should be provided, particularly since the group appears to be relying almost entirely on these controls for near-term pollutant reductions to achieve early interim milestones/deadlines. Additionally, as part of the adaptive management process, the Permittees need to commit to evaluate this assumption during program implementation and develop alternate controls if it becomes apparent that the assumption is not supported.	A new paragraph was added to sub-section 4.5.1 supporting the assumption of a 10% pollutant reduction for new non-structural measures by explaining the expected impacts of implementing SB 346, implementing the TSS reduction program, implementing plastic bag bans, and implementing the commercial/industrial inspection program. In addition, sub-section 10.3 was amended to include a commitment to evaluate the assumption as part of the adaptive management process and to develop alternative controls if it becomes apparent that the assumption is not supported.

14 Part VI.C.5.b.iv.(5) (Reasonable Assurance Analysis - Irrigation Reductions)	For dry weather, the WMP assumes a 25% reduction in irrigation (RAA, section 7.1.2). Additional support should be provided for this assumption, particularly since the group appears to be relying almost entirely on this non-structural BMP for near-term pollutant reductions to meet early interim milestones/deadlines. Additionally, as part of the adaptive management process, the Permittees need to commit to evaluate this assumption during program implementation and develop alternate controls if it becomes apparent that the assumption is not supported.	A new paragraph was added to sub-section 3.3 explaining the reduction in average 2001-2008 dry-weather runoff from 2.35 CFS to less than 0.5 CFS and comparing this reduced flow to the modeled 2003 and 2008 dry-weather flows in the RAA. This reduction reflects a successful water conservation program based in large part on reduction of landscape irrigation. Also, sub-section 10.3 was amended to include a commitment to evaluate this assumption as part of the adaptive management process and to develop alternative controls if it becomes apparent that the assumption is not supported.
15 Part VI.C.5.b.iv.(5) (Reasonable Assurance Analysis - Regional BMPs)	Section 1.4.2 of Attachment A to the RAA points out that additional potential regional BMPs were identified to provide the remaining BMP volume noted in Table 9-5. It indicates they can be found in Section 3 of the WMP. It is unclear if the RAA is referring to the "First Order Major BMP Sites" listed in Table 4-5 and the "Second Order Major BMP Sites" listed in Table 4-6. The RAA should clarify that sufficient sites were identified. Additionally, the WMP should mention how these sites relate to the RAA.	Language was added to sub-section 4.5.2 explaining the relationship of the first and second order regional BMP sites to the RAA and explaining the need to find and evaluate additional Regional BMP sites through the adaptive management process. This language also explains that the regional capture volume for regional BMPs will be reduced due to implementation of green streets and LID projects as well as effective implementation of source control measures.
16 Part VI.C.5.b.iv.(5) (Reasonable Assurance Analysis - Permitted Industrial Facilities)	The draft WMP, including the RAA, excludes stormwater runoff from non-MS4 facilities within the WMA from the stormwater treatment target. In particular, industrial facilities that are permitted by the Water Boards under the Industrial General Permit or an individual stormwater permit were identified and subtracted from the treatment target. Regional Water Board staff recognizes that this was done with the assumption that these industrial facilities will retain their	Sub-section 4.3.2.2.2 was amended to clarify that the Industrial/Commercial Facilities Program will include tracking critical industrial sources and educating industrial facilities with the intent of ensuring that all industrial facilities are implementing BMPs as required.

	runoff and/or eliminate their cause/contribution to receiving water exceedances, as required by their respective NPDES permit. However, it is important that the Group's actions under its Industrial/Commercial Facilities Program - including tracking critical industrial sources, educating industrial facilities regarding BMP requirements, and inspecting industrial facilities - ensure that all industrial facilities are implementing BMPs as required.	
17 Part VI.C.5.b.iv.(5) (Reasonable Assurance Analysis - Caltrans Facilities)	The draft WMP, including the RAA, takes a similar approach for areas under the jurisdiction of the California Department of Transportation (Caltrans). Caltrans facilities that are permitted under the Caltrans MS4 permit (Order No. 2012-0011-DWQ) were also identified and subtracted from the treatment target. It should be noted that the Amendment to the Caltrans Permit (Order WQ 2014-0077-DWQ) includes provisions to address TMDL requirements throughout the state. Revisions to Attachment IV of the Caltrans Permit require that Caltrans prioritize all TMDLs for implementation of source control measures and BMPs, with prioritization being "consistent with the final TMDL deadlines to the extent feasible." Additionally, the Caltrans Permit also includes provisions for collaborative implementation through Cooperative Implementation Agreements between Caltrans and other responsible entities to conduct work to comply with a TMDL. By contributing funds to Cooperative Implementation Agreements and/or the Cooperative Implementation Grant Program, Caltrans may receive credit for compliance units, which are needed for compliance under the Caltrans Permit. In a similar manner, the LA County MS4 Permit includes provisions for Permittees to control the contribution of	Language was added to sub-section 3.7, explaining the Watershed Group's coordination with Caltrans and the potential for collaborative implementation of projects through Collaborative Implementation Agreements.

	pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other MS4 owners - such as Caltrans - to successfully implement the provisions of the Order (see Parts VI.A.2.a.viii and VI.A.4.a.iii). Therefore, the Group should ensure that it is closely coordinating with appropriate Caltrans District staff regarding the identification and implementation of watershed control measures to achieve water quality requirements (i.e. applicable Receiving Water Limitations and WQBELs). Regional Water Board staff recognizes that the Group has taken the initial steps for such collaboration since Caltrans participates in the Group and the draft WMP notes Caltrans in its strategies for runoff reduction and total suspended solids reduction.	
18 Part VI.C.5.b.iv.(6) (Legal Authority)	Attachment D to the draft WMP includes a copy of legal certifications for all Group members except for Long Beach. The legal certifications for Long Beach should be submitted in the revised WMP.	The following language was added to the new Attachment F explaining the status of Long Beach's legal certifications: The legal authority certifications of the cities of the LCC are included in this section. The City of Long Beach's MS4 permit is on a separate timeline (effective date 15 months after the Los Angeles County-Wide MS4 Permit) and a legal authority letter will be submitted separately. A status report will be included in the Long Beach separate area WMP when submitted on or before March 28, 2015.

19 Part VI.C.5.c.iii(3)(Compliance Schedules - Bacteria)	The draft WMP proposes a final compliance date of September 2040 for *E. coli* and *Enterococcus.* However, the Group does not provide sufficient justification for this date. Additionally, milestones and a schedule of dates for achieving milestones are not defined for these two pollutants. In revising this draft WMP, the Group should evaluate compliance schedules of bacteria TMDLs that have been established within the region and modify the proposed compliance schedule for these pollutants to include interim milestones and dates for their achievement and a final compliance date that is as soon as possible. Justification for the final compliance date as well as interim milestones should also be included.	Sub-section 2.4 was amended to provide greater justification for the final compliance date and interim milestones for *E. coli* and enterococcus. Tables 6-5, 6-6, and 6-7, as subdivided, were amended to include interim milestones for reduction of *E. coli* and enterococcus, including dry-weather compliance by the fourth quarter of 2025.
20 Part VI.C.5.iii(3) (Compliance Schedules - Ammonia and pH)	The draft WMP does not propose milestones or final compliance dates for ammonia and pH, which were both identified as Category 2 pollutants. The WMP should include milestones and compliance date for these pollutants and address them through watershed control measures, or alternatively, provide the data to support delisting (in the case of ammonia) and to support that exceedances of pH outside the acceptable range are due to natural causes.	The WMP does not propose milestones or final compliance dates for ammonia and pH because, as noted above, both are being proposed for delisting. Naturally occurring cycles in pH in the shallow dry-weather flows are causing the exceedances of chronic ammonia standards. In the absence of dry-weather pH cycling, there would be no ammonia exceedances. Language was added to sub-section 2.4 explaining the rationale for delisting ammonia and pH, and a new Appendix C was added containing data about ammonia and pH in the Los Cerritos Channel.
21 Figures and Symbols in Draft WMP	Some figures in the draft WMP are distorted. Examples include: • Figures 1-2 and 1-3 (on pages 1-6 and 1-8, respectively) have legends that are missing information • Table 4-4 (on page 4-13) does not display Figure ICF-1 • Mathematical symbols used on pages 5-4 and 5-5 do not correctly display	The distorted figure in the draft WMP and the display of mathematical symbols in Section 5.3 (pages 5-4 and 5-5) were corrected.

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Comment #	WMP Section	WMP Page #	Permit Page # /Section	RB Comment	Consultant Responsible	Response
4	Modeling comments on RAA			While we understand that there is significant reliance on a volume-based approach, the predicted baseline concentrations and loads for all modeled pollutants of concern, including TSS, should be presented in summary tables for wet weather conditions. This model output should be available, since it is the basis for the percent reductions in pollutant load presented in Table 5-6. (See Table 5. Model Output for Both Process-based BMP Models and Empirically-based BMP models, pages 20-21 of the RAA Guidelines)	Paradigm	Additional table added to report to reflect the baseline loads. Found on page 39 as Table 5-6.
5	Modeling comments on RAA			Further, the differences between baseline concentrations/loads and allowable concentration/loads should be presented in time series for each pollutant under long-term continuous simulation and as a summary of the differences between pollutant concentrations/loads and allowable concentrations/loads for the critical wet weather period. (See Table 5. Model Output for Both Process-based BMP Models and Empirically-based BMP Models, pages 20-21 of the RAA Guidelines)	Tetra Tech	Time series plots were added as a new attachment (Attachment F). Text was added to the report in Section 5.3.1 to refer the reader to the attachment for the plots.
6	Modeling comments on RAA			We note that modeling was not conducted for organics (DDT, PCBs, and PAHs). It is not clear why these pollutants were not modeled or why previous modeling of these pollutants could not be used, such as that conducted during the development of the Dominguez Channel and Greater	Paradigm	It should be noted that the original watershed modeling (based on LSPC) supporting the Dominguez Channel and Greater LA and Long Beach Harbor Waters Toxic Pollutants TMDL did not include simulation of DDT, PCBs, and PAHs. Rather,

Comment #	WMP Section	WMP Page #	Permit Page # /Section	RB Comment	Consultant Responsible	Response
				LA and Long Beach Harbor Waters Toxic Pollutants TMDL. An explanation for the lack of modeling is needed.		modeled sediment was used as a surrogate to estimate watershed loadings. Therefore, 90th percentile of observed concentrations were assigned, meet requirements set forth by RAA guidance provided by the Regional Water Quality Control Board.
7	Modeling comments on RAA			The report presents the existing runoff volumes, required volume reductions, and proposed volume reductions from BMP scenarios to achieve the 85th percentile, 24-hour volume retention standard for each major watershed area. The same information on the runoff volume associated with the 85th percentile, 24-hour event and the proposed runoff volume reduction from each BMP scenario also needs to be presented for each modeled subbasin (e.g. a series of tables similar to 8-1 through 8-4 and 9-4 through 9-7). See Table 5 of the RAA Guidelines. Additionally, more explanation is needed as to what constitutes the "incremental" and "cumulative" critical year storm volumes in tables 9-4 through 9-7 and how these values were derived from previous tables.	Tetra Tech	Attachment B was updated to include the requested tables. Sentence of text was added to provide some clarification in Section 9.2.1 – Third paragraph.
9	Modeling comments on RAA			The ID number for each of the subwatersheds from the model input file should be provided and be shown in the simulation domain to present the geographic relationship of subwatersheds, within each watershed area, that are simulated in the LSPC model.	Tetra Tech	The maps were added to Attachment C with the other supporting figures.

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Los Cerritos Channel

Coordinated Integrated Monitoring Program

LOS CERRITOS CHANNEL **WATERSHED**

Participants

Bellflower
Cerritos
Downey
Lakewood
Long Beach
Paramount
Signal Hill
Los Angeles County Flood Control District

Prepared by:

KINNETIC LABORATORIES INCORPORATED

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February 2015

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ACRONYMS

ALERT	Automatic Local Evaluation in Real Time
AMEL	Average Monthly Effluent Limitation
Basin Plan	*Water Quality Control Plan for the Coastal Watersheds of Los Angeles and Ventura Counties*
BMP	Best Management Practices
BPJ	Best Professional Judgment
BOD	Biochemical Oxygen Demand 5-day @ 20 °C
CASQA	California Stormwater Quality Association
CCR	California Code of Regulations
CD	Compact Disc
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CIMP	Coordinated Integrated Monitoring Program
CL	Control Limit
COD	Chemical Oxygen Demand
CTR	California Toxics Rule
CV	Coefficient of Variation
CWA	Clean Water Act
CWC	California Water Code
CWP	Center for Watershed Protection
Discharger	Los Angeles County MS4 Permittees
DNQ	Detected But Not Quantified
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethylene
DDT	Dichlorodiphenyltrichloroethane
EFA	Effective Filtration Area
EIA	Effective Impervious Area
ELAP	California Department of Public Health Environmental Laboratory Accreditation Program
Facility	Los Angeles County MS4s
FEB	Fluorinated Ethylene Propylene
FIB	Fecal Indicator Bacteria
GIS	Geographical Information System
gpd	gallons per day
HUC	Hydrologic Unit Code
IC50	Concentration at which the organism is 50% inhibited
IC/ID	Illicit Connection and Illicit Discharge Elimination
IWC	In-Stream Waste Concentration
LA	Load Allocations
LACFCD	Los Angeles County Flood Control District
LARWQCB	Regional Water Quality Control Board, Los Angeles
LCC	Los Cerritos Channel
LID	Low Impact Development

LOEC	Lowest Observed Effect Concentration
MAL	Municipal Action Limits
MBAS	Methylene Blue Active Substances
MCM	Minimum Control Measure
mg/L	milligrams per Liter
MDEL	Maximum Daily Effluent Limitation
ME	Mass Emission
µg/L	micrograms per Liter
MDL	Method Detection Limit
MEC	Maximum Effluent Concentration
MGD	Million Gallons Per Day
ML	Minimum Level
MRP	Monitoring and Reporting Program
MS4	Municipal Separate Storm Sewer System
MTBE	Methyl tertiary-butyl ether
ND	Not Detected
NOEC	No Observable Effect Concentration
NPDES	National Pollutant Discharge Elimination System
NSW	Non-Stormwater
NTR	National Toxics Rule
Ocean Plan	Water Quality Control Plan for Ocean Waters of California
ORI	Outfall Reconnaissance Inventory
PCB	Polychlorinated Biphenyls
PWS	Primary Watershed Segment
PES	Polyester-reinforced polysulfone
QA	Quality Assurance
QA/QC	Quality Assurance/Quality Control
QPF	Quantified Precipitation Forecast
RAP	Reasonable Assurance Program
Regional Water Board	California Regional Water Quality Control Board, Los Angeles Region
RL	Reporting Limit
RPA	Reasonable Potential Analysis
RWL	Receiving Water Limitations
SIP	State Implementation Policy (Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California)
SMC	Stormwater Monitoring Coalition
SMR	Self-Monitoring Reports
SQO	Sediment Quality Objective
SSC	Suspended Sediment Concentration
State Water Board	California State Water Resources Control Board
SVOC	Semi-Volatile Organic Compound
SWAMP	State's Water Ambient Monitoring Program
SWS	Secondary Watershed Segment

TAC	Test Acceptability Criteria
TIE	Toxicity Identification Evaluation
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TOC	Total Organic Carbon
TRE	Toxicity Reduction Evaluation
TSD	Technical Support Document
TSS	Total Suspended Solid
TST	Test of Significant Toxicity
TU_c	Chronic Toxicity Unit
USEPA	United States Environmental Protection Agency
USGS	U.S. Geological Survey
WDR	Waste Discharge Requirements
WET	Whole Effluent Toxicity
WLA	Waste Load Allocations
WMA	Watershed Management Area
WMG	Waste Management Group
WMMS	Watershed Management Modeling System
WMP	Watershed Management Program
WQBELs	Water Quality-Based Effluent Limitations
WQS	Water Quality Standards
%	Percent

COORDINATED INTEGRATED MONITORING PROGRAM FOR THE LOS CERRITOS CHANNEL WATERSHED GROUP

1 Introduction

A Coordinated Integrated Monitoring Program (CIMP) is required to be submitted either separately or as part of a Watershed Management Plan (WMP). The CIMP is required to integrate requirements of the current Los Angeles County MS4 Permit, the City of Long Beach MS4 permit and TMDL monitoring requirements. This plan was developed to address five primary objectives which include:

- Assess the chemical, physical, and biological impacts of discharges from the MS4s on receiving waters.
- Assess compliance with receiving water limitations and water quality-based effluent limitations (WQBELs) established to implement TMDL wet and dry weather load allocations
- Characterize pollutant loads in MS4 discharges.
- Identify sources of pollutants in MS4 discharges.
- Measure and improve the effectiveness of pollutant controls implemented under the new MS4 permits.

Figure 1-1 provides a summary of all jurisdictions that are participating in both the WMP and the CIMP. The Los Angeles County Flood Control District includes the entire area addressed by the Los Cerritos Channel WMP and CIMP.

1.1 Monitoring Objectives

The Permit Monitoring and Reporting Program (MRP) for Los Angeles County[1] and the City of Long Beach[2] have equivalent requirements. The Los Cerritos Channel watershed is located in areas covered by both permits but the requirements differ only in terms of schedules. The City of Long Beach opted to participate in the WMP and CIMP being developed under the Los Angeles County Permit schedule but the major elements and primary objectives listed below are identical. The CIMP is required to incorporate the following elements and address the established objectives under each element:

- Receiving Water Monitoring (Wet and Dry Weather) (Part II.E.1 of the MRP)
    - Are receiving water limitations being met?
    - Are there trends in pollutant concentrations over time or during specified conditions?

[1] Order No. R4-2012-0175, NPDES Permit No. CAS004001

[2] Order No. R4-2014-0024, NPDES Permit No. CAS004003

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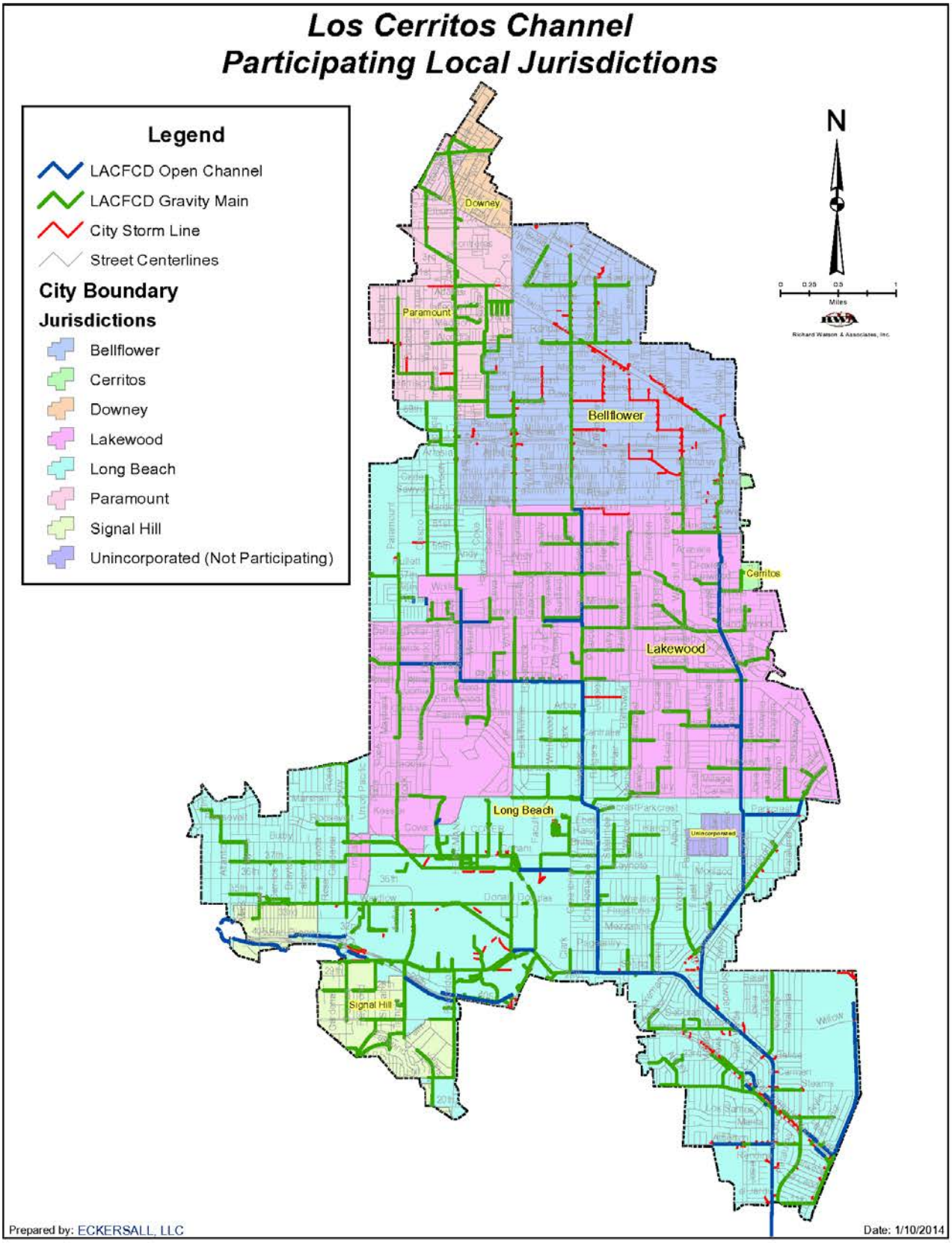

Figure 1-1. Jurisdictions Participating in the WMP and CIMP.

    - Are designated beneficial uses fully supported as determined by water chemistry, aquatic toxicity, and bioassessment monitoring?
- Stormwater Outfall Monitoring (Part II.E. 2 of the MRP)
    - How does the quality of the permittees' discharges compare to Municipal Action Limits (MALs)?
    - Are the permittees' discharges in compliance with applicable stormwater WQBELs derived from TMDL Waste Load Allocations (WLAs)?
    - Do the permittees' discharges cause or contribute to an exceedance of the receiving water limitations?
- Non-Stormwater Outfall Based Monitoring (Part II.E.3 of the MRP)
    - Are the permittees' discharges in compliance with non-stormwater WQBELs derived from TMDL WLAs.
    - How does the quality of the permittees' discharges compare to Non-Stormwater Action Levels?
    - Do the permittees' discharges cause or contribute to an exceedance of the receiving water limitations?
    - Do the permittees comply with the requirements of the Illicit Connection and Illegal Discharge Program?
- New Development/Re-Development Effectiveness Tracking (Part II.E.4 of the MRP)
    - Are the conditions established in building permits issued by the Permittees being met?
    - Are stormwater volumes associated with the design storm effectively retained on-site?
- Regional Studies
    - How do the permittees plan to participate in efforts to characterize the impact of the MS4 on receiving waters? Include participation in regional studies with the Southern California Stormwater Monitoring Coalition (SMC) and any special studies specified in TMDLs.

1.2 Monitoring Sites and Approach

The approach presented in this CIMP incorporates all objectives of the MRP but provides a customized approach to address the objectives identified in the MRP for Stormwater Outfall Monitoring based upon the unique characteristics of the LCC watershed. Unlike other WMGs in Los Angeles County, the LCC watershed does not receive flow from other WMGs. External contributions of contaminants are limited to atmospheric deposition originating predominantly from major transportation corridors and facilities.

1.2.1 Receiving Water

Receiving water quality monitoring will be conducted at the historic Los Cerritos Channel site at Stearns Street (LCC1). Originally, this location was considered a mass emission monitoring site for the City's stormwater program since it captures runoff stormwater originating from a large segment of the City. This site is also the compliance monitoring site for TMDL monitoring. This site is located about 100 feet downstream of a former U.S. Geological Survey (USGS) gaging station (Figure 1-2) and effectively marks the downstream extent of freshwater influences within the Channel. During low tides, freshwater extends down to the end of the concrete-lined channel below Atherton St. LCC1 marks the upper extent of tidal influence for all but the most extreme high tides. The portion of the Los Cerritos Channel listed

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as impaired for metals was identified as the 2.1 mile freshwater portion above the tidal prism. EPA (2010) used data from 10 years of both wet and dry weather monitoring at the LCC1 to establish the freshwater metals TMDL for the Los Cerritos Channel. This site now has a record of stormwater and dry weather water quality measurements that extend back for 13 years using consistent methods and, in most cases, consistent detection limits applicable to current receiving water limitations (RWLs).

1.2.2 Primary Watershed Segmentation (PWS) Monitoring

Stormwater outfall monitoring in the LCC watershed will be addressed by partitioning the watershed into segments that correspond to those used in the Los Cerritos Metals TMDLs to develop a model for estimating flow and pollutant loads. This allows the modeling information to be used to assist in directing sampling efforts to target areas of the watershed believed to contribute greater loads and verify the accuracy of the model. If the monitoring program identifies a segment of the watershed as contributing significantly higher pollutants loads than the segments, then further monitoring will be conducted to further identify and isolate the source. This "forensic" monitoring would further partition the watershed by monitoring of Secondary Watershed Segmentation (SWS) using more portable sampling stations.

PWS sampling is intended to assist in determining whether the permittees' discharges are causing or contributing to exceedance of receiving water limitations, assess whether the permittees' discharges are in compliance with applicable WQBELs derived from TMDL WLAs and with applicable action limits. The Los Cerritos Channel watershed is highly divided with a number of separate channels contributing flow. In practice, no clear distinction exists between the end of the storm drain system and the start of tributaries or receiving waters. Restricting monitoring sites to locations considered to be "outfall" sites would limit sampling to much smaller catchments that are intended to be representative of land use throughout the LCC watershed. This monitoring approach was not considered to be an effective strategy for identification of the major sources of contaminants and would provide limited assistance in directing effective implementation of control measures in this watershed.

Primary Watershed Segment (PWS) sites (Figure 1-2) were selected based upon:

- LSPC modeling results from the LCC Metals TMDL (U.S. EPA 2010);
- land use characteristics within the watershed; and
- the ability to isolate major portions of the watershed.

The LSPC model was used to simulate flows and metals concentrations in Los Cerritos Channel during development of the LCC Metals TMDLs. An updated version of the LSPC serves as the basis for the Los Angeles County Watershed Management Modeling System (WMMS). The model divided the watershed into 10 sub-basins (Figure 1-2) and developed loading estimates (Figure 1-3) for each of the sub-basins. The LSPC model results provided the primary guidance for selection of appropriate watershed monitoring sites. Site selection first considered sub-basins that the model identified as the most significant sources of metals. Potential sites were considered at locations near the downstream edge of each sub-basin and where runoff from each sub-basin could be effectively isolated. Land use information for within each sub-basin was then examined to determine dominant land uses within each segment and assure that all major land uses would be effectively sampled. Lastly, sites were selected to

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effectively represent a large proportion of the watershed and yet avoid large disparities in the sizes of each segment such that pollutant or sediment delivery ratios[3] would not vary substantially among monitoring sites.

Sites selected as PWS sites include SB4, SB10, SB8 and SB9 (Figure 1-2; Table 1-2). Each of these sites isolates significant proportions of their respective sub-basins (4, 10, 8 and 9). Together, these monitoring locations allow 68% of the entire watershed to be monitored. Once implemented, pollutant loading rates for each of the PWS sites can be compared to loads measured at the downstream receiving water site (LCC1) in order to assess potential discrepancy in load contributions and determine if further implementation of control measures is warranted

SB4 is located in the Los Cerritos Channel just west of Lakewood Blvd. and adjacent to the Long Beach Daugherty Airport. This site will effectively sample runoff from sub-basin 4. LSPC modeling indicated that this segment may be a significant source of both copper and zinc (Figure 1-3). Land use in this segment of the watershed (Table 1-1) is dominated equally by the Airport (classified as mixed urban in the model) and industrial land use. This segment represents approximately 13% of the entire LCC watershed.

SB10 is located in the Palo Verde Channel and will collect runoff from the Sub-Basin 10. This segment of the watershed is comprised largely of low-density residential neighborhoods (Table 1-1) and represents 19% of the entire LCC watershed. The LSPC model predicted that this portion of the watershed would produce moderate loads of copper, lead and zinc. This watershed is somewhat unique in its relatively large size (3403 acres) and having more than 77 percent residential land use (71% low density and 6.3% high density residential land use). Monitoring of this sub-basin is considered to be useful in validating the modeling results and providing improved estimates of trace metal loads from residential areas.

Sub-basins 8 and 9 are located in northern portion of the watershed (Figure 1-2) draining portions of Bellflower, Downey, Lakewood, Long Beach, and Paramount. LSPC modeling indicated that these two sub-basins would likely yield some of the highest loads of metals (Figure 1-3). Initial modeling indicated that sub-basin 9 was expected to have higher loads of copper, lead and zinc than most other areas. The model projected that copper and lead loading would be elevated in sub-basin 8 but this region was expected to produce slightly lower levels of zinc. Land uses in both sub-basins are predominantly residential with substantial amounts of commercial activities (Table 1-1). Together, these two sub-basins comprise over a third of the LCC watershed. Monitoring sites are located near the bottom of each of these sub-basins. SB8 is located in the Clark Channel just north of the Lakewood Civic Center and SB9 is located in the Del Amo Channel near Clark Avenue.

Monitoring at these four PWS sites will form the backbone of the program. This program allows for an adaptive process that enables resources to be focused on confirming modeling results and portions of the watershed that are significant sources of contaminants and flow. Wet weather monitoring at the

[3] The delivery ratio of pollutant loads can be defined as the ratio of the discharged pollutant load delivered to the point of interest divided by the mass of pollutants generated at the source.

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LCC1 receiving water monitoring site and the four PWS sites will be used to evaluate if one or more of these segments is contributing excessive loads of key pollutants.

Potential Secondary Watershed Segment (SWS) sites for forensic monitoring have been identified within each of the four sub-basins (Figure 1-2). SWS sites are identified by the name of the sub-basin monitoring site followed by a hyphen and a sequential number for each added site. For example, potential SWS sites in sub-basin 4 are identified as SB4-1 and SB4-2.

Where possible, these sites are positioned at locations that further dissect the sub-basins. In sub-basin 4, tentative SWS sites effectively divide the sub-basin into two areas of comparable size. SWS sites isolate major, but unequal branches of the drainages within both sub-basins 8 and 9. Sub-basin 10 has a more linear configuration that required locating potential SWS sites at two locations along the length of the sub-basin. These are sites where further monitoring would be conducted if one of more of the sub-basins is identified as having high pollutant loading rates. It is not anticipated that all secondary sampling locations will require sampling and it is possible that none will require further sampling.

Any sampling initiated at these SWS sites would be conducted with temporary installations designed to allow for installation within one day. Monitoring at these sites would utilize 24-hour, time-based sampling triggered by flow. Sampling would be conducted concurrently with sampling of the long-term sub-basin watershed sites (PWS sites) and the receiving water monitoring site (LCC1).

SWS sites will utilize time-based monitoring methods to aid in isolating areas that may be contributing excessive concentrations of contaminants. If monitoring data indicate that one of the two SWS sites has elevated concentrations of any contaminant of concern, additional upstream monitoring sites will be selected based upon the configuration of the upstream storm drains and land use. Monitoring equipment used for the paired secondary stations would then be relocated upstream in the targeted segment to better isolate potential sources.

1.2.3 Non-Stormwater Outfall Monitoring

Non-Stormwater Outfall Based Monitoring will be conducted throughout the major open channels of the Los Cerritos Channel Watershed. Initially, all pipes exceeding 12 inches in diameter and discharging either directly into the Los Cerritos Channel receiving water or into any of the open channels will be identified in the first screening survey. By the end of 2014, the database will be refined to determine which of the 12-inch to 36-inch pipes include discharges from areas with industrial land uses. Discharge pipes less than 36 inches and determined not to incorporate runoff from industrial land use areas will be excluded from further surveys. After completing an inventory of the outfalls, two more screening surveys will be conducted by the end of 2014 to document sites with persistent and significant non-stormwater flows. Subsequently, the source ID program will utilize an array of different methods to assist in determining whether flows are the result of illicit connections/illicit discharges (IC/IDs), authorized or conditionally exempt non-stormwater flows, natural flows or unknown. These may include available drainage maps, information on existing dewatering permits or industrial discharges, and a combination of field tests and limited laboratory testing.

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1.2.4 New Development/Re-Development Effectiveness Tracking

Participating agencies have developed mechanisms for tracking information related to new and re-development projects that are subject to post-construction best management practice requirements in Part VI.D.7 of the MS4 Permit.

1.2.5 Regional Studies

On behalf of the participating agencies, the Los Angeles County Flood Control District (LACFCD) will continue to provide financial and/or monitoring resources to the Southern California SMC Regional Watershed Monitoring Program, also known as the Regionally Consistent and Integrated Freshwater Stream Bioassessment Monitoring Program (Bioassessment Program). The Bioassessment Program was initiated in 2009 and is structured to occur in cycles of five years. Sampling under the first cycle concluded in 2013. The next five-year cycle is scheduled to begin in 2015, with additional special study monitoring scheduled to occur in 2014.

Permittee representatives will also participate in the SMC meetings and assist in development and implementation of selected and appropriate regional studies designed to improve stormwater characterization and impact assessment.

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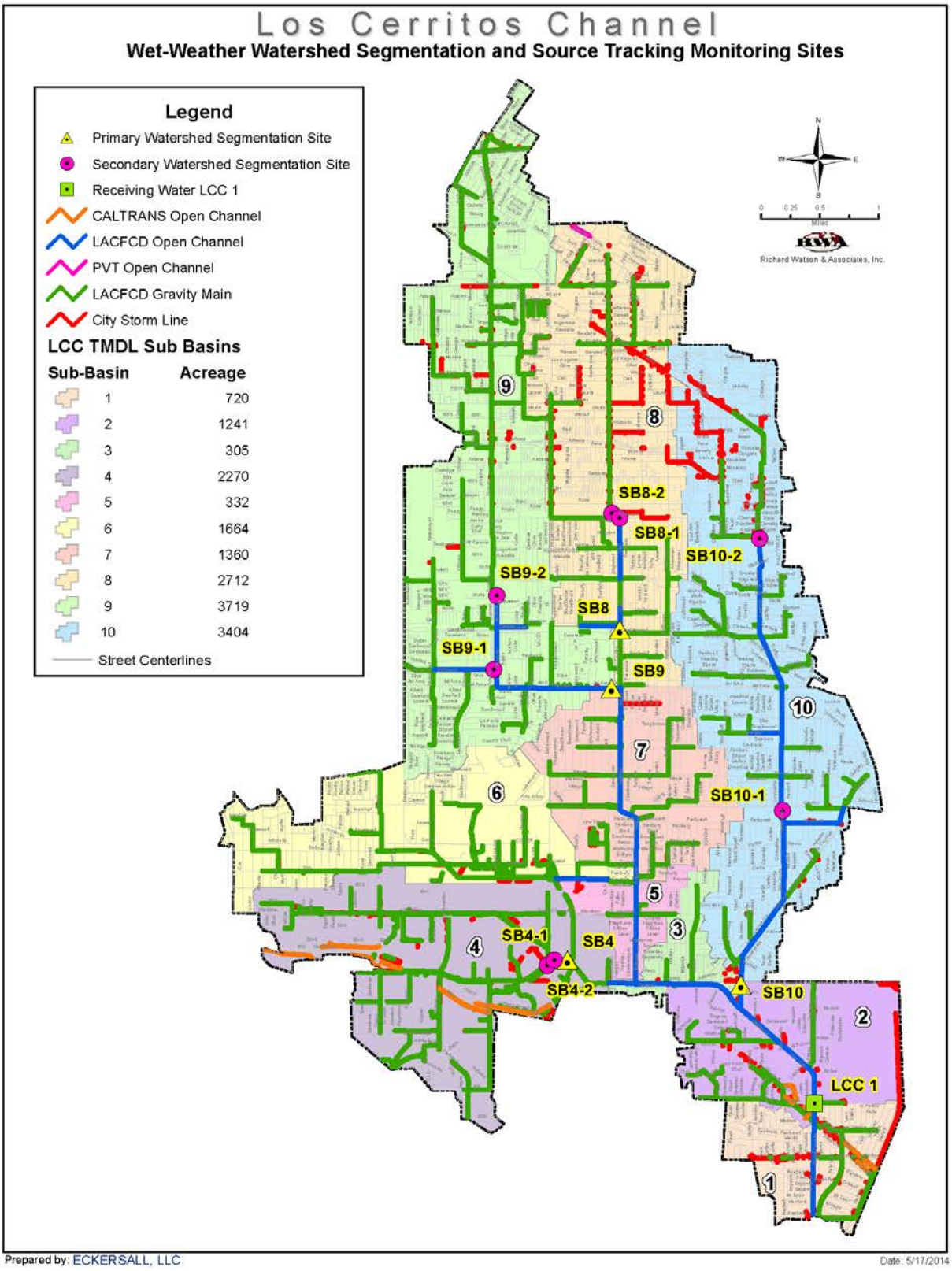
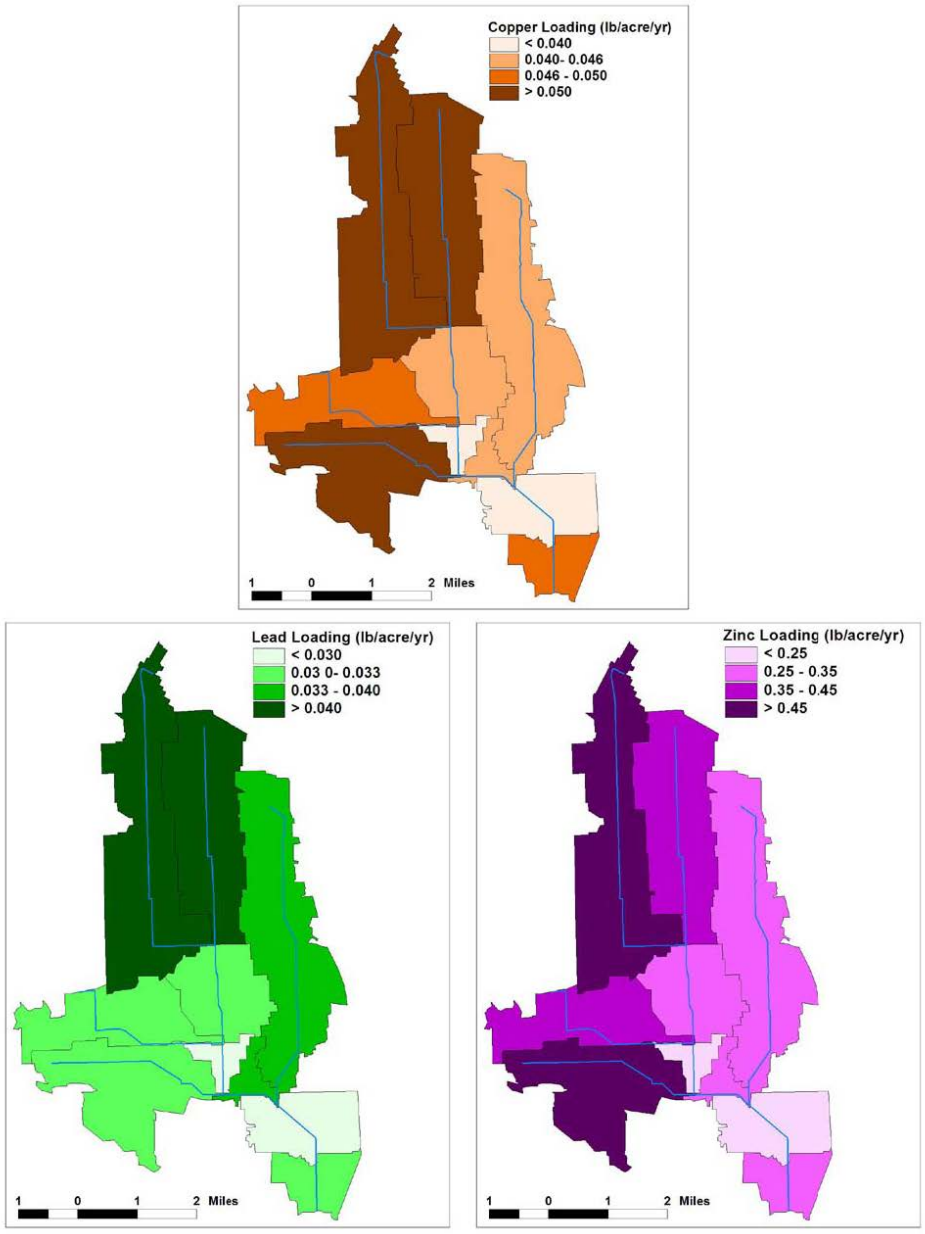


Figure 1-2. Locations of Potential Wet Weather Monitoring Sites in the Los Cerritos Channel Watershed.



Source: EPA 2010. Los Cerritos Channel Metals TMDL.

Figure 1-3. Estimated Concentrations of Metals from each Sub-Basin of the Los Cerritos Channel Watershed.

Table 1-1. Summary of Land Use Associated with Monitored Segments of the Los Cerritos Channel Watershed.

	SUB-BASIN NUMBER/ACREAGE				
Land Use	4	8	9	10	TOTAL[1]
Agriculture	0.0	37.3	42.4	50.0	130
Commercial	353	507	710	372	1941
Industrial	706	125	500	59.0	1390
HD Residential	40.0	371	491	213	1115
LD Residential	276	1,598	1,783	2,416	6072
Mixed Urban	753	13.6	120	142	1029
Open	144	60.4	63.9	152	419
Total Acres	2,271	2,712	3,710	3,403	12,096
		Total Watershed Acres			**17,716**
	SUB-BASIN NUMBER/%				
Land Cover	4	8	9	10	-
Agriculture	0.0	1.4	1.1	1.5	0.7
Commercial	15.5	18.7	19.1	10.9	11.0
Industrial	31.1	4.6	13.5	1.7	7.8
HD Residential	1.8	13.7	13.2	6.3	6.3
LD Residential	12.2	58.9	48.1	71.0	34.3
Mixed Urban	33.2	0.5	3.2	4.2	5.8
Open	6.3	2.2	1.7	4.5	2.4
Total %	13	15	21	19	68

HD= High Density, LD= Low Density

[1]Land use composition for all 10 sub-basins can be accessed in the Los Cerritos Channel Metals TMDLs (EPA 2010)

Table 1-2. Monitoring Site Designation and Monitoring Function.

Site Name	Site Description	Datum NAD83		Type of Site			
				Receiving Water	TMDL	WATERSHED	
		Latitude (N)	Longitude (W)			Primary	Secondary[1]
LCC1	Stearns Street	33.79538	118.10361	**X**	**X**	**X**	
SB4	Sub-basin 4 – Spring St. Drain	33.81306	118.13953		**X**	**X**	
SB8	Sub-basin 8 – Clark Drain	33.85384	118.13226		**X**	**X**	
SB9	Sub-basin 9 – Del Amo/Downey	33.84682	118.13370		**X**	**X**	
SB10	Sub-basin 10 – Palo Verde	33.81044	118.11430		**X**	**X**	
SB4-1	Northern Sub-basin[1]	33.81316	118.14235				**X**
SB4-2	Southern Sub-basin[1]	33.81288	118.14249				**X**
SB8-1	North Clark Channel[1]	33.86848	118.13355				**X**
SB8-2	West Clark Channel[1]	33.86783	118.13225				**X**
SB9-1	West Downey Channel[1]	33.84908	118.15978				**X**
SB9-2	North Downey Channel[1]	33.85844	118.15046				**X**
SB10-1	North Palo Verde Channel[1]	33.86546	118.11160				**X**
SB10-2	Mid Palo Verde Channel	33.83210	118.10836				**X**

[1] These locations are ***tentative*** sites and will be further evaluated as part of the adaptive management of the CIMP. Monitoring at secondary sites will be dependent upon the monitoring results at each of the Primary Watershed Sites.

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2 Overview of the Schedule and Sampling Frequencies for each CIMP Element

The CIMP will be implemented in a phased process (Table 2-1). Existing monitoring at LCC1 continues to be conducted, and the dry weather screening of major outfalls has commenced. Implementation of new monitoring programs and modifications to the existing monitoring program at LCC1 will be implemented beginning July 1, 2015 or 90 days after the approval of the CIMP, whichever is later.

Receiving Water Quality Monitoring

- Monitoring will occur at one Receiving Water Quality Monitoring Site, LCC1, which will also serve as the LCC Metals TMDL compliance site.
- Monitoring will be conducted during two dry weather and four wet weather events per year. This allows alignment of monitoring the Receiving Water and Stormwater Outfall Monitoring requirements of the Permit with TMDL Monitoring. Alignment of these monitoring requirements allows for a more efficient and cost effective program. The Watershed Group will use wet-weather monitoring results from the first year to consider requesting a reduction in frequency to three wet-weather events in the future. The fourth storm event is only for the purpose of fulfilling the TMDL requirements. Only copper, lead, zinc, total suspended solids (TSS), suspended sediment concentration (SSC), and hardness will be analyzed.
- Monitoring of the two dry weather flows will start in July 1, 2015 or 90 days after approval of the CIMP, whichever is later. Wet season monitoring will follow for four storm events during the 2015/16 wet season.
- Water quality testing during the critical dry weather flows (July) and during the first significant storm event of the year will incorporate the entire list of water quality parameters listed in Table E-2 of the MRP. Water quality testing during the remaining two wet weather events and one dry weather event will incorporate all constituents identified in Table 3.2 (See Section 3) for the Los Cerritos Channel receiving waters.
- If Table E-2 constituents are not detected at the specified Method Detection Limit (MDL) for their respective test method or if the results are below the lowest applicable water quality objective, and is not otherwise identified as being 303(d)-listed or part of an ongoing TMDL, the analyte will not be further analyzed. In accordance with the minimum requirements established in the Permit MRP (page E-16) parameters exceeding the lowest applicable water quality objective will continue to be analyzed for the remainder of the Order at the receiving water monitoring station.
- The Aquatic Toxicity Testing program will be initiated during the 2015 dry weather season at LCC1. Aquatic Toxicity Testing will be conducted during one dry weather monitoring event when critical low flow conditions are expected and during two storm events including the first major storm of the year.

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Primary Watershed Segmentation (PWS) Stormwater Monitoring

- Due to water conservation in response to drought and greatly reduced dry-weather discharges, the drainage area is already in compliance with dry-weather copper WLA at Stearns Street. The watershed segment monitoring program is designed to help demonstrate compliance with wet-weather WLAs. A phased-in approach will be employed for monitoring sites.
- Two PWS sites, SB4 and SB10, will be installed and ready for monitoring during the 2015/16 wet season. SB8 and SB9 will be installed and prepared to monitor storm events during the 2016/17 wet season, and will complete the planned array of four PWS sites.
- Two portable monitoring units, SBX-1 and SBX-2, will be installed in 2017-2018 to monitor secondary watershed segments based on results of primary watershed segment monitoring.
- When possible, PWS sampling will be conducted concurrently with stormwater monitoring at LCC1. This will result in three monitored stormwater events for each PWS site as they are installed and ready for collection of flow-rated composite samples.
- Water quality testing at PWS sites will initially incorporate a list of general and conventional pollutants, *E. coli*, nutrients, and metals. A detailed list of analytes to be initially tested at PWS sites is addressed in Section 3.2.
- Additional water quality parameters listed in Table E-2 of the MRP may be incorporated based upon results of stormwater monitoring at the receiving water station, LCC1. These constituents will be added to monitoring requirements at PWS sites once an analyte is detected in stormwater runoff at LCC1 during two consecutive stormwater monitoring events. Similarly, if analytes added the PWS monitoring are not detected at PWS sites during two consecutive stormwater monitoring events, they will be removed from the required analytical list.
- Once a minimum of two seasons of wet weather monitoring data (six events) are available from a PWS site, data will be evaluated to determine if forensic monitoring is necessary to assist in source tracking and identifying upstream sources of key pollutants. Forensic monitoring would be conducted by further dividing the watershed with Secondary Watershed Segmentation (SWS) sites. Potential SWS sites have been identified for each of the four PWS sites but these sites will only be used if water quality constituents measured at the PWS sites are sufficiently elevated to warrant implementation of forensic monitoring.
- Sampling at SWS sites would be performed with temporary, mobile stormwater sampling stations used to take time-based composite samples and would focus on the specific analytes of concern as well as any appropriate ancillary analytes. Source tracking would be triggered if running averages measured at a PWS site exceeds Municipal Action Limits (MALs; Attachment G of the MRP) by more than 20% any analytes that have limits and that are required to be sampled at the PWS sites. Similarly, forensic sampling would also be conducted if the running average pollutant loading rates for Category 1 or 2 pollutants are found to exceed those measured at LCC1 (the Los Cerritos Channel receiving water/TMDL monitoring site) by more than 25%.

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Non-Stormwater Outfall Monitoring Program

- Three initial surveys will be completed. The first will focus upon verification of outfalls as identified based upon available City and County GIS records, providing baseline photographic records, assessing flow, recording observations, and field water quality measurements. An inventory of outfalls above 12 inches in diameter will be created. The second and third screening surveys will expand field water quality testing to assist in the identification and classification of the discharge.
- Information from the three initial surveys will be used to determine which outfalls have significant discharges and classify these outfalls for further investigation. Information from the three surveys such as flow rates of the discharge, flow rates in the channel, the nature of the channel-earthen or concrete, and land uses in the drainage area will be used collectively to determine significance.
- Outfalls with significant flow will be classified for further investigation. Flow measurements, observations, field water quality tests and limited laboratory tests may be used to classify the remaining outfalls as either **Suspect Discharges**, **Potential Discharges** or **Unlikely** discharges of concern. Clean outfalls with no evidence of discharges or odors during the initial surveys will be classified as **Unlikely** sources of non-stormwater discharges and will not require further investigation.
- Outfalls considered having the highest risk for illicit discharges or illegal flows will be classified as **Suspect Discharges.** This will require multiple lines of evidence indicative of potential illicit discharges or persistent high flows that represent significant receiving waters contributions.
- Outfalls considered to be **Suspect Discharges** will be further classified and ranked for further investigations designed to identify the sources of these discharges and to determine whether discharges are illicit, exempt, conditionally exempt, conditionally exempt but non-essential flows or unknown.
- Suspect outfalls determined to have exempt or conditionally exempt discharges will be identified in annual reports along with the measures taken to identify the sources.
- Suspect outfalls identified with conditionally exempt but non-essential flows or flows from unknown sources will be first be subject to review to determine if suitable control measures can be implemented to eliminate the discharges.
- If discharges cannot be eliminated, they will be subjected to a periodic monitoring to document that sufficient measures are taken to control potential discharges of pollutants in the discharge.
- Source investigations for discharges from outfalls classified as suspect will be ongoing in order to meet the requirement that investigations are conducted for no less than 25% of the outfalls in the inventory by December 2015 and 100% of the outfalls in the inventory by December 2017.
- Outfalls classified as **Potential Discharges** will be reassessed during the permit.
- Outfalls with obvious illicit discharges will be immediately classified as such and investigated immediately.

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Table 2-1. Schedule for Implementation of Monitoring Activities in the Los Cerritos Channel Watershed[7].

Task	Dry 2014	Dry 2015	Wet 2015-16	Dry 2016	Wet 2016-17	Dry 2017	Wet 2017-18	Dry 2018
Receiving Water/TMDL								
LCC1 Stearns St.	Note 6							
Chemistry[1]		2	4	2	4	2	4	2
Aquatic Toxicity		1	2	1	2	1	2	1
Primary Watershed Segments								
SB10			3		3		3	
SB4			3		3		3	
SB8					3		3	
SB9					3		3	
Secondary Watershed Segments[2]								
SBX-1							3	
SBX-2							3	
Non-Stormwater Outfall								
Inventory & Screen[3]	3							
Source ID[4]		Ongoing		Ongoing		Ongoing		Ongoing
Monitoring[5]				2		2		2

1. Table E-2 chemical analyses will be performed once during the first wet weather event and once during the first critical dry weather monitoring event. Constituents that exceed MDLs and available water quality objectives will continue to be monitored along with all constituents included as Category 1, 2 or 3 water body/pollutant classifications for the subject water body. Wet and dry weather chemical constituents will be separately assessed for purposes of continued monitoring. All constituents classified as category 1, 2, and 3 water body/pollutant in the water body will continue to be monitored during the permit cycle unless the constituents (primarily category 3 constituents) are shown to not be present at levels of concern on a consistent basis.
2. Initial locations of Secondary Watershed Segmentation (SWS) sites have been selected for each Primary Watershed Segment (PWS). Implementation of monitoring at SWS site will be dependent upon results of monitoring at PWS sites (e.g. exceedance of action limits).
3. Initial Inventory and Screening will be completed in three surveys before the end of 2014. One re-assessment of the Non-Stormwater Outfall Monitoring Program will be conducted prior to December 2017.
4. Investigations designed to track and classify discharges will start during the 2015 dry season. Source tracking and classification work depend upon the number of sites categorized as Suspect outfalls with evidence of significant flow.
5. Monitoring will be implemented if significant dry weather flows are identified at discharge points that are cannot be identified, are non-essential exempt flows, or identified as illicit flows that are not yet controlled. These sites will be initially monitored twice a year in conjunction with dry weather monitoring of the receiving water site.
6. Monitoring at LCC1 will continue to be conducted in accordance with the existing permit until the CIMP is approved.
7. The fourth storm event is only for the purpose of fulfilling the TMDL requirements. Only metals, TSS, SSC, and hardness will be analyzed.

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3 Chemical/Physical Parameters

Section 2 of the WMP provides a detailed analysis of water quality priorities within the Los Cerritos Channel Watershed. Water quality priorities were established in accordance with Section C.5.a.ii of the Permit. The three Permit categories are defined as:

- **Category 1 (Highest Priority):** Water body-pollutant combinations for which water quality-based effluent limitations and/or receiving water limitations are established in Part VI.E and Attachments L through R of the Order.
- **Category 2 (High Priority):** Pollutants for which data indicate water quality impairment in the receiving water according to the State's Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List (State Listing Policy) and for which MS4 discharges may be causing or contributing to the impairment.
- **Category 3 (Medium Priority):** Pollutants for which there are insufficient data to indicate water quality impairment in the receiving water according to the State's Listing Policy, but which exceed applicable receiving water limitations contained in this Order and for which MS4 discharges may be causing or contributing to the exceedance.

These Permit categories were intended to be specific to water bodies within the watershed but, in the case of the Los Cerritos Channel, data are limited to a single point in the watershed. Table 3-1 summarizes pollutants within each category.

Table 3-1. Waterbody-Pollutant Categories for the Los Cerritos Channel Watershed.

Category	Constituents
1	copper, lead, zinc, DDT, chlordane, PCBs, PAHs
2	ammonia, bis(2)ethylhexylphthalate, *E. coli*, pH
3	MBAS, enterococcus

The primary constituents of concern in the watershed are copper, lead and zinc which are part of the Los Cerritos Channel Metals TMDLs. Chlordane, DDTs, PCBs and PAHs are incorporated due to a 303(d) listing for chlordane in sediments downstream in the tidal portion of the channel and the Harbor Toxics TMDL for which the Los Cerritos Channel is considered part of the nearshore watershed[4]. Permittees in

[4] As recognized by the footnote in Attachment K-4 of the Permit, the Cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, Signal Hill, and the LACFCD have entered into an Amended Consent Decree with the United States and the State of California, including the Regional Board, pursuant to which the Regional Board has released the aforementioned entities from responsibility for toxic pollutants in the Dominguez Channel and the Greater Los Angeles and Long Beach Harbors. Accordingly, no inference should be drawn from the submission of this CIMP or from any action or implementation taken pursuant to it that the aforementioned entities are obligated to implement the Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters Toxic Pollutants TMDL, including this CIMP or any of the TMDL's other obligations or plans, or that the aforementioned entities have waived any rights under the Amended Consent Decree.

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the nearshore watershed are separately contributing to monitoring requirements in the Harbor waters and the Los Angeles River Estuary. Therefore DDTs, PCBs and PAHs are not currently incorporated into the sampling requirements for the ME and PWS monitoring sites. Two other constituents, ammonia and pH, are 303(d) listed due to dry weather flows where extremely shallow flows cause a daily cycle of pH and result in calculated ammonia water quality criteria to be exceeded despite extremely low concentrations. Additional listings exist for minor exceedances of methylene blue active substances (MBAS) criteria and exceedance of coliform and enterococcus bacteria. Enterococcus bacteria are limited to LCC1 since this site discharges to an estuarine environment.

Table 3-2 summarizes the constituents that will be monitoring at the ME and PWS sites. These constituents will serve as the core of the monitoring program. In addition, sections VI.C.1.e and VI.D.1.d of the MRP require that a comprehensive list of constituents is screened once during the first major storm event of the year and once during a period of critical low flow. Results of this analytical screening process will determine which constituents need to be analyzed at the mass emission site for the remainder of the five-year cycle of the permit.

If a parameter is not detected above the Method Detection Limit (MDL) for its respective test method *or* the result is below the lowest applicable water quality objective, and is not otherwise identified as a basic monitoring requirement, a TMDL analyte or a 303(d) listing, it need not be further analyzed. If a parameter is detected exceeding the lowest applicable water quality objective during either the wet or dry weather screening then the parameter shall be analyzed for the remainder of the Order (2017) at the receiving water monitoring station where it was detected during the respective conditions (wet or dry).

Analytical tests will be reconsidered at least once during each permit cycle in order to assess the appropriateness of maintaining the analyte or suite of analyses in the testing requirements. Water quality criteria, analytical methods, analytical results consistently near detection limits, updated information with respect to sources or many other additional factors may contribute to factors may warrant reconsideration of the analyte. If an analyte listed in Table E-2 (Attachment E of the Permit) is not detected at levels of concern during two consecutive monitoring events representing the same seasonal conditions, the Watershed Group will submit a request to the Regional Board to remove the analyte from future sampling. This does not include constituents which are basic monitoring requirements. In order to avoid bias due to seasonal build-up/wash off, this evaluation would be limited to the comparisons of the first major storm of the season rather than data consecutive events from the same season.

Constituents requiring screening are listed in Table E-2 of the Monitoring and Reporting Program. These constituents are further broken out by major analytical groups in Table 3-3 through Table 3-9 below.

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Table 3-2. Summary of Constituents to be Monitored on a Regular Basis at the Mass Emission Site (LCC1) and the Primary Watershed Segmentation (PWS) Sites.

CLASS OF MEASUREMENTS	MASS EMISSION SITE (LCC1)		PRIMARY WATERSHED SEGMENTATION (PWS) SITES
	Wet	Dry	Wet
Flow	4	2	3
Field Measurements (dissolved oxygen, pH, temperature, and specific conductivity)	4	2	3
MRP Table E-2 Constituents[1] (other than those specifically listed below)	1	1	
Aquatic Toxicity[5]	2	1	
General and Conventional Pollutants[6] (Table 3-3) (All except total phenols, turbidity, BOD_5, MTBE, and chloride and fluoride)	3	2	3
Microbiological Constituents (Table 3-4) *E.coli,* Total & Fecal Coliform, enterococcus[2]	3	2	
E.coli			3
Nutrients (Table 3-5) - none required			
Organochlorine Pesticides and PCBs (Table 3-7) Chlordane[3]	3	2	
Metals[6] **(Table 3-6**) Cu, Pb, & Zn	4	2	3
Organophosphate Pesticides[4] (Table 3-8) - none required			
Semivolatile Organic Compounds (Table 3-9**)** bis(2)ethylhexylphthalate	3	2	

1. All Table E-2 constituents will be measured during the first major storm event of the season and the critical, low flow dry weather event (July) during the first year of the CIMP. Constituents that are detected above the lowest applicable WQOs during the first year of monitoring, will be analyzed for the remainder of the Order at the receiving water monitoring station where it was detected.
2. Analysis of all Fecal Indicator Bacteria (FIBs) will only be included for LCC1 that discharges directly to the Los Cerritos Channel Estuary. Enterococcus will not be analyzed at PWS sites since they do not discharge to marine or estuarine waters.
3. Chlordane components are based upon sum of chlordane-alpha, chlordane-gamma, nonachlor-alpha, nonachlor-gamma, and oxychlordane consistent with the Harbor Toxics TMDL.
4. No organophosphate pesticides are required as part of the baseline program.
5. Aquatic toxicity may be triggered at PWS sites by results from LCC1.
6. The fourth storm event is only for the purpose of fulfilling the TMDL requirements. Only copper, lead, zinc, TSS, SSC, and hardness will be analyzed.

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Analytical requirements for the program are broken out by analytical test requirements since many are associated with an analytical test suite. This is most evident with the semivolatile organic compounds analyzed by EPA Method 625. Although this section identifies recommended methods for each analyte, many of the target constituents can be addressed by alternative methods. Use of alternative analytical methods may be preferable in cases where a larger suite of target analytes can be tested and still enable meeting minimum levels (MLs) established for each analyte. Selection of analytical methods is intended to be performance-based to allow laboratories flexibility to utilize methods that meet or exceed MLs listed in the MRP. As an example, the following tables (Table 3-7 and Table 3-8) list separate EPA methods for organochlorine pesticides and aroclors, organophosphate pesticides and semivolatile organic compounds. Some laboratories choose to use EPA Method 625 for all of these test requirements. This approach is acceptable as long as the method meets the MLs listed in Table E-2 of the MRP and meet data quality objectives consistent with the State's Surface Water Ambient Monitoring Program (SWAMP), but other laboratories will use separate test protocol for organophosphate pesticides.

The critical dry weather event is defined as the period when historical in-stream flow records are the lowest or during the historically driest month. Point measurements of dry weather flows taken in Los Cerritos Channel between 2000 and 2014 have been relatively uniform between May and September of each year, but base flows have decreased to approximately 0.5 cfs in recent years. Rainfall during the summer dry season is minimal and only briefly impacts flows in the channel. As a result, it is expected that critical dry weather flow testing could be performed anytime between May and September. Nevertheless, regional data suggest that rainfall and flows in major watersheds (Los Angeles River and San Gabriel River watersheds) are least in July. As such, critical low flow monitoring will be conducted in July.

A more accurate assessment of critical dry weather flow conditions will be completed and available by the end of the 2014 dry season. Flumes equipped with stilling wells, pressure sensors and data loggers will be constructed and installed throughout the watershed for a period of 6-8 weeks. The work is part of a State-funded Proposition 84 study[5] intended to provide detailed, continuous records of water level, flow and temperature at each site for the duration of the deployment. Four of the flumes will be located at sites selected as PWS sites for this CIMP. These data will be used to determine if flow diminishes over the course of a few weeks or exhibits diurnal fluctuations as expected. Concurrent water samples will also be collected over three 24-hour time periods to analyze trace metals (especially copper, lead, and zinc) and nutrient loading. If differences are noted, forensic work will be conducted to identify and mitigate the source of the discharges. Although this work is not part of the CIMP, the results of this program will be utilized to refine the "critical dry weather flow period" and to help provide guidance with respect to segments most likely to contribute higher loads of metals during dry weather conditions.

[5] Gateway Water Management Authority Agreement No. 12-423-550. Los Cerritos Channel Watershed Segmentation and Low Impact Development (LID) Project

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3.2 General and Conventional Pollutants

Most of the general and conventional pollutants listed in Table 3-3 will continue to be analyzed as part of the base monitoring requirements for both receiving water and PWS/SWS sampling. These constituents are common contaminants in stormwater from urban environments. Some, such as turbidity, are redundant and best used as surrogates under special studies. Turbidity is often used as a surrogate for suspended solids but requires calibration to the source material. Turbidity measurements are recognized to lack comparability due to differences in equipment as well as the differences between static and dynamic measurements (Anderson 2005 - USGS National Field Manual for Collection of Water Quality Data, Chapter 6.7). Total suspended solids (TSS) and suspended sediment concentrations (SSC) directly examine particles associated with water samples and do not suffer from the problems associated with measuring turbidity. An integral part of the pollutant reduction strategy involves the reduction of discharged solids from the MS4, therefore both TSS and SSC will be monitored. Since SSC sampling protocols are not met by the automatic stormwater samplers designed to measure pollutants, SSC analysis will be done on a subsample of the composite sample. Rigorous subsampling protocols will be utilized in order to assure representative samples that can be related directly to the chemical results. The SSC sample analyses will add information to the current TSS analyses being run.

Other pollutants in this group have been tested in samples from LCC1 since 2000 and have not been detected. As an example, total phenols have never exceeded the ML of 0.1 mg/L in this watershed. MTBE and cyanide were analyzed during the first three years of the City of Long Beach Stormwater Monitoring Program. MTBE has only detected in 1 out of 11 samples and cyanide was never detected. Although perchlorate has not been analyzed in stormwater in the LCC watershed, industrial activities likely to result in perchlorate discharges do not exist in the watershed. Perchlorate will be screened at the receiving water site (LCC1) during the initial surveys but this contaminant is not expected to require continued analysis at any monitoring site.

In summary, sufficient evidence exists to eliminate total recoverable phenolic compounds, cyanide, turbidity and MTBE from further analysis. Perchlorate will be incorporated in the initial screening since it has not been tested but it is not expected that continued testing will be required. Most other constituents included in this list are common contaminants in stormwater runoff and will continue to be analyzed. Analysis of chloride and fluoride may be analyzed as needed to assist in differentiating potable water and groundwater sources during source tracking programs for the non-stormwater outfall monitoring program but will not be included in monitoring conducted for wet/dry weather receiving water monitoring or for monitoring of the PWS/SWS monitoring sites.

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Table 3-3. Conventional Constituents, Analytical Methods and Quantitation Limits.

CONSTITUENTS CONVENTIONAL POLLUTANTS	METHOD	Target Reporting Limits mg/L
Oil and Grease	EPA1664	5
Total Petroleum Hydrocarbon	EPA 418.1	5
Total Suspended Solids	EPA 160.2	1
Suspended Sediment Concentration	ASTM D3977-97 (Method C)	0.5
Total Dissolved Solids	EPA 160.1	1
Volatile Suspended Solids	EPA 160.4	1
Total Organic Carbon	EPA 415.1	1
Biochemical Oxygen Demand	SM 5210B EPA 405.1	3
Chemical Oxygen Demand	EPA 410.1	4
Alkalinity	EPA 310.1	5
Specific Conductance	EPA 120.1	1 umho
Total Hardness	EPA 130.2	1
MBAS	EPA 425.1	0.02
Chloride	EPA300.0	2
Fluoride	EPA300.0	0.1
Perchlorate	EPA314.0	4 ug/L
Field Measurements	**METHOD**	**mg/L**
pH-field instrumentation	EPA 150.1	0 – 14
Temperature-field	In-situ	N/A
Dissolved Oxygen- field [1]	In-situ	Sensitivity to 5 mg/L

[1]Dissolved Oxygen will only be measured during dry weather surveys.

3.3 Microbiological Constituents

All four microbiological constituents used as fecal indicator bacteria (FIB) will continue to be monitored at the LCC1 Receiving Water monitoring site. Bacteria used as fecal indicators in marine waters will continue to be analyzed during wet and dry weather surveys due to being situated just above the Los Cerritos Channel Estuary. Only *E. coli* will be monitored at the four primary watershed segment sites since these are each located in freshwater portion of the watershed. Table 3-4 provides both upper and lower quantification limits for each FIB which was established to assure that quantifiable results are obtained. Upper quantitation limits are provided to assure that FIBs are quantified.

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Table 3-4. Microbiological Constituents, Analytical Methods and Quantitation Limits.

BACTERIA[1]	Method	Lower Limits MPN/100ml	Upper Limits MPN/100ml
Total coliform (marine waters)	SM 9221B	<20	>2,400,000
Fecal coliform (marine waters)	SM 9221E	<20	>2,400,000
Enterococcus (marine waters)	SM 9230B/C	<20	>2,400,000
E. coli (fresh waters)	SM 9221E/ Colilert-QT	<10	>2,400,000

[1]Microbiological constituents will vary based upon sampling point. Total and fecal coliform and enterococcus will be measured only in marine waters or at locations where either the discharge point or receiving water body will impact marine waters. *E. coli* will be analyzed at sites within the freshwater portion of the watershed.

3.4 Nutrients

Nutrients (Table 3-5) are also considered as part of the base requirements for the monitoring program. These will be analyzed as part of the Table E-2 screening requirements during the first major storm event of the year and a critical dry weather sampling event at the receiving water site (LCC1). Nutrients have not been identified as exceeding any applicable RWL to date and are therefore not scheduled to be sampled as part of the ongoing program unless required based upon the initial screening. The current monitoring plan calls for separate analysis of nitrate-N and nitrite-N. Concentrations of nitrite-N have typically been low. If data indicates that concentrations of nitrite-N remain minimal, these analytes will be combined into one analytical procedure that quantifies both nitrate-N and nitrite-N at the same time.

Table 3-5. Nutrients, analytical methods, and quantitation limits

CONSTITUENT	METHOD	REPORTING LIMIT (mg/L)
Total Kjeldahl Nitrogen (TKN)[1]	EPA 351.1	0.50
Nitrate as Nitrogen (NO_3-N)[1,2]	EPA 300.0	0.10
Nitrite as Nitrogen (NO_2-N)[1,2]	EPA 300.0	0.05
Total Nitrogen[1]	calculation	NA
Ammonia as Nitrogen (NH_3-N)	EPA 350.1	0.10
Total Phosphorus	SM 4500-P E or F	0.1
Dissolved Phosphorus	SM 4500-P E or F	0.1

1. Total Nitrogen is the sum of TKN, nitrate, and nitrite.
2. Nitrate –N and Nitrite-N may be analyzed together using EPA 300

3.5 Total and Dissolved Trace Metals

A total of 16 trace metals are listed in Table E-2 of the MRP. Analytical methods and reporting limits for these elements are summarized in Table 3-6. Most metals will be analyzed by EPA Method 200.8 using ICP-MS to provide appropriate detection limits. Hexavalent chromium and mercury both require alternative methods. Neither hexavalent chromium nor mercury is commonly analyzed as part of stormwater programs. Hexavalent chromium has been analyzed at LACFCD's mass emission monitoring sites in both the Los Angeles River (S10) and the San Gabriel River (S14) for the past eight to ten years and has not been detected. Mercury has been detected at some mass emission monitoring sites but detections are not common at any. Analytical methods and detection limits used for the monitoring have been consistent with those required in Table E-2 of the MRP.

Measurement of mercury is generally not considered to be appropriate in flow-weighted composite samples taken with autosamplers due to its volatility. This becomes more of an issue when sampling is conducted near the limits of a peristaltic pump. Automatic stormwater samplers are not suitable for sampling stormwater at low detection limits (0.5 to 5 nanograms/liter). Grab samples will be taken for analysis of mercury in order to augment composite samples, which will be analyzed by EPA method 245.1. These grab samples will be analyzed by Method 1631E since this method is less subject to interferences and will be collected at the same time that monitoring crews pull other grab samples required by the monitoring program. Additional QAQC will be employed to support the extremely low detection limits required by the program.

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Table 3-6. Metals Analytical Methods, and Quantitation Limits.

METALS (Dissolved & Total)	METHOD	Reporting Limit *ug/L*
Aluminum	EPA200.8	100
Antimony	EPA200.8	0.5
Arsenic	EPA200.8	0.5
Beryllium	EPA200.8	0.5
Cadmium	EPA200.8	0.25
Chromium (total)	EPA200.8	0.5
Chromium (Hexavalent)	EPA218.6	5
Copper	EPA200.8	0.5
Iron	EPA200.8	25
Lead	EPA200.8	0.5
Mercury	EPA245.1	0.2
Mercury (Low level)	EPA1631E	0.0005
Nickel	EPA200.8	1
Selenium	EPA200.8	1
Silver	EPA200.8	0.25
Thallium	EPA200.8	0.5
Zinc	EPA200.8	1

3.6 Organochlorine Pesticides and PCBs

Although organochlorine pesticides (OC pesticides) and PCBs are not commonly present in stormwater sampled at LCC1, they have periodically been detected at low concentrations. The analytical methods and detection limits for these compounds are summarized in Table 3-7. These compounds are specified in Table E-2 of the MRP. The MRP suggests that detection of any of these analytes in excess of the ML and/or applicable criteria will require continuation of the analysis through the period of the permit. Since this could be attributable to analytical issues, we have recommended more frequent reevaluation (refer to Section 3).

Since the OC pesticides are part of an analytical suite, detection of one compound would necessitate continuation of the entire suite. However, this would not require continuation of analysis of PCBs analyses if they are not detected in the early storm event and critical dry weather monitoring event. Monitoring for PCBs will be reported as the summation of aroclors and a minimum of 50 congeners, using EPA Method 8270 without the use of High Resolution Mass Spectrometry for routine monitoring.

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Table 3-7. Chlorinated Pesticides and PCB Analytical Methods, and Quantitation Limits

CHLORINATED PESTICIDES	METHOD	Reporting Limit µg/L
Aldrin	EPA 608, 8081A	0.005
alpha-BHC	EPA 608, 8081A	0.01
beta-BHC	EPA 608, 8081A	0.005
delta-BHC	EPA 608, 8081A	0.005
gamma-BHC (lindane)	EPA 608, 8081A	0.02
alpha-chlordane	EPA 608, 8081A	0.1
gamma-chlordane	EPA 608, 8081A	0.1
Nonachlor-alpha	EPA 608, 8081A	0.1
Nonachlor-gamma	EPA 608, 8081A	0.1
Oxychlordane	EPA 608, 8081A	0.1
4,4'-DDD	EPA 608, 8081A	0.05
4,4'-DDE	EPA 608, 8081A	0.05
4,4'-DDT	EPA 608, 8081A	0.01
Dieldrin	EPA 608, 8081A	0.01
alpha-Endosulfan	EPA 608, 8081A	0.02
beta-Endosulfan	EPA 608, 8081A	0.01
Endosulfan sulfate	EPA 608, 8081A	0.05
Endrin	EPA 608, 8081A	0.01
Endrin aldehyde	EPA 608, 8081A	0.01
Heptachlor	EPA 608, 8081A	0.01
Heptachlor Epoxide	EPA 608, 8081A	0.01
Toxaphene	EPA 608, 8081A	0.5
POLYCHLORINATED BIPHENYLS[1]		
PCB 5	EPA Method 8270	0.005
PCB 8	EPA Method 8270	0.005
PCB 15	EPA Method 8270	0.005
PCB 18	EPA Method 8270	0.005
PCB 27	EPA Method 8270	0.005
PCB 28	EPA Method 8270	0.005
PCB 29	EPA Method 8270	0.005
PCB 31	EPA Method 8270	0.005
PCB 33	EPA Method 8270	0.005
PCB 44	EPA Method 8270	0.005
PCB 49	EPA Method 8270	0.005
PCB 52	EPA Method 8270	0.005
PCB 56	EPA Method 8270	0.005
PCB 60	EPA Method 8270	0.005
PCB 66	EPA Method 8270	0.005
PCB 70	EPA Method 8270	0.005
PCB 74	EPA Method 8270	0.005
PCB 87	EPA Method 8270	0.005
PCB 95	EPA Method 8270	0.005

PCB 97	EPA Method 8270	0.005
PCB 99	EPA Method 8270	0.005
PCB 101	EPA Method 8270	0.005
PCB 105	EPA Method 8270	0.005
PCB 110	EPA Method 8270	0.005
PCB 114	EPA Method 8270	0.005
PCB 118	EPA Method 8270	0.005
PCB 128	EPA Method 8270	0.005
PCB 137	EPA Method 8270	0.005
PCB 138	EPA Method 8270	0.005
PCB 141	EPA Method 8270	0.005
PCB 149	EPA Method 8270	0.005
PCB 151	EPA Method 8270	0.005
PCB 153	EPA Method 8270	0.005
PCB 156	EPA Method 8270	0.005
PCB 157	EPA Method 8270	0.005
PCB 158	EPA Method 8270	0.005
PCB 170	EPA Method 8270	0.005
PCB 174	EPA Method 8270	0.005
PCB 177	EPA Method 8270	0.005
PCB 180	EPA Method 8270	0.005
PCB 183	EPA Method 8270	0.005
PCB 187	EPA Method 8270	0.005
PCB 189	EPA Method 8270	0.005
PCB 194	EPA Method 8270	0.005
PCB 195	EPA Method 8270	0.005
PCB 200	EPA Method 8270	0.005
PCB 201	EPA Method 8270	0.005
PCB 203	EPA Method 8270	0.005
PCB 206	EPA Method 8270	0.005
PCB 209	EPA Method 8270	0.005
Aroclor-1248	EPA 608,EPA 8082	0.5
Aroclor-1254	EPA 608,EPA 8082	0.5
Aroclor-1260	EPA 608,EPA 8082	0.5

1. Monitoring for PCBs will be reported as the summation of aroclors and a minimum of at least 50 congeners. List of aroclors and congeners were obtained from Table C8 in the State's Surface Water Ambient Monitoring Program's Quality Assurance Program Plan.

3.7 Organophosphate Pesticides and Herbicides

Organophosphate pesticides, triamine pesticides and herbicides list in Table E-2 of the MRP are summarized in Table 3-8. Due to the fact that diazinon and chlorpyrifos are no longer available for residential use, these constituents are now rarely detected. When detected, concentrations rarely exceed available ambient water quality criteria for protection of aquatic life. Malathion, however,

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remains a common constituent in stormwater runoff but this pesticide is not as toxic as other organophosphate pesticides.

Two compounds in this list, atrazine and simazine, are not organophosphate pesticides but can be analyzed by EPA Method 8141a. Both are triazine herbicides which are used for control of broadleaf weeds. Based upon historical data, herbicides such as these and the three additional separately listed compounds are unlikely to require continued analysis after completion of initial screening of Table E-2 constituents. Alternative analytical methods may be considered and used as long as the established reporting limits can be met.

Table 3-8. Organophosphate Pesticides and Herbicides Analytical Methods, and Quantitation Limits

ORGANOPHOSPHATE PESTICIDES	METHOD	Reporting Limit µg/L
Atrazine	EPA507, 8141A	1
Chlorpyrifos	EPA8141A	0.05
Cyanazine	EPA8141A	1
Diazinon	EPA8141A	0.01
Malathion	EPA8141A	1
Prometryn	EPA8141A	1
Simazine	EPA8141A	1
HERBICIDES		
Glyphosate	EPA547	5
2,4-D	EPA515.3	0.02
2,4,5-TP-SILVEX	EPA515.3	0.2

3.8 Semivolatile Organic Compounds (Acid, Base/Neutral)

Semivolatile organic compounds (SVOCs) from Table E-2 of the MRP are listed in Table 3-9 below. Acids consist mostly of phenolic compounds which are uncommon in stormwater samples. Base/neutrals include polynuclear aromatic hydrocarbons (PAHs) and phthalates. SVOCa were only measured during the first two years of the City of Long Beach Stormwater Monitoring Program. Very few analytes were detected and those that were detected were typically less than 10 times the reporting limit. Phthalates were among the most common SVOCs detected and are 303(d) listed based upon measurements taken over ten years ago. Phthalates have been historically a common laboratory contaminant due to the significant use of plastic in laboratories but they are also a common environmental contaminant for the same reason.

Table 3-9. Semivolatile Organic Compounds, Analytical Methods, and Quantification Limits.,

SEMIVOLATILE ORGANIC COMPOUNDS	METHOD	Reporting Limit
ACIDS		**µg/L**
2-Chlorophenol	EPA625	2
4-Chloro-3-methylphenol	EPA625	1
2,4-Dichlorophenol	EPA625	1
2,4-Dimethylphenol	EPA625	2
2,4-Dinitrophenol	EPA625	5
2-Nitrophenol	EPA625	10
4-Nitrophenol	EPA625	5
Pentachlorophenol	EPA625	2
Phenol	EPA625	1
2,4,6-Trichlorophenol	EPA625	10
BASE/NEUTRAL		µg/L
Acenaphthene	EPA625	1
Acenaphthylene	EPA625	2
Anthracene	EPA625	2
Benzidine	EPA625	5
1,2 Benzanthracene	EPA625	5
Benzo(a)pyrene	EPA625	2
Benzo(g,h,i)perylene	EPA625	5
3,4 Benzofluoranthene	EPA625	10
Benzo(k)fluoranthene	EPA625	2
Bis(2-Chloroethoxy) methane	EPA625	5
Bis(2-Chloroisopropyl) ether	EPA625	2
Bis(2-Chloroethyl) ether	EPA625	1
Bis(2-Ethylhexl) phthalate	EPA625	5
4-Bromophenyl phenyl ether	EPA625	5
Butyl benzyl phthalate	EPA625	10
2-Chloroethyl vinyl ether	EPA625	1
2-Chloronaphthalene	EPA625	10
4-Chlorophenyl phenyl ether	EPA625	5
Chrysene	EPA625	5
Dibenzo(a,h)anthracene	EPA625	0.1
1,3-Dichlorobenzene	EPA625	1
1,4-Dichlorobenzene	EPA625	1
1,2-Dichlorobenzene	EPA625	1
3,3-Dichlorobenzidine	EPA625	5
Diethyl phthalate	EPA625	2
Dimethyl phthalate	EPA625	2
di-n-Butyl phthalate	EPA625	10
2,4-Dinitrotoluene	EPA625	5
2,6-Dinitrotoluene	EPA625	5
4,6 Dinitro-2-methylphenol	EPA625	5

SEMIVOLATILE ORGANIC COMPOUNDS	METHOD	Reporting Limit
1,2-Diphenylhydrazine	EPA625	1
di-n-Octyl phthalate	EPA625	10
Fluoranthene	EPA625	0.05
Fluorene	EPA625	0.1
Hexachlorobenzene	EPA625	1
Hexachlorobutadiene	EPA625	1
Hexachloro-cyclopentadiene	EPA625	5
Hexachloroethane	EPA625	1
Indeno(1,2,3-cd)pyrene	EPA625	0.05
Isophorone	EPA625	1
Naphthalene	EPA625	0.2
Nitrobenzene	EPA625	1
N-Nitroso-dimethyl amine	EPA625	5
N-Nitroso-diphenyl amine	EPA625	1
N-Nitroso-di-n-propyl amine	EPA625	5
Phenanthrene	EPA625	0.05
Pyrene	EPA625	0.05
1,2,4-Trichlorobenzene	EPA625	1

4 Aquatic Toxicity Testing and Toxicity Identification Evaluations

Aquatic toxicity testing supports the identification of best management practices (BMPs) to address sources of toxicity in urban runoff. Monitoring begins in the receiving water and the information gained is used to identify constituents for monitoring at outfalls to support the identification of pollutants that need to be addressed in the WMP. The sub-sections below describe the detailed process for conducting aquatic toxicity monitoring, evaluating results, and the technical and logistical rationale. Control measures and management actions to address confirmed toxicity caused by urban runoff are addressed by the WMP, either via currently identified management actions or those that are identified via adaptive management of the WMP.

4.2 Sensitive Species Selection

The Permit MRP (page E-32) states that sensitivity screening to select the most sensitive test species should be conducted unless "a sensitive test species has already been determined, or if there is prior knowledge of potential toxicant(s) and a test species is sensitive to such toxicant(s), then monitoring shall be conducted using only that test species." Previous relevant studies conducted in the watershed should be considered. Such studies may have been completed via previous MS4 sampling, wastewater NPDES sampling, or special studies conducted within the watershed.

As described in the MRP (page E-31), if samples are collected in receiving waters with salinity less than 1 part per thousand (ppt), or from outfalls discharging to receiving waters with salinity less than 1 ppt, toxicity tests should be conducted on the most sensitive test species in accordance with species and short-term test methods in *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms* (EPA/821/R-02/013, 2002; Table IA, 40 CFR Part 136). Salinities of both dry and wet weather discharges from the Los Cerritos Channel are considered to meet the freshwater criterion. During extreme high tides, salinity at the LCC1 receiving water monitoring site can exceed 1 ppt but dry weather sampling is always scheduled to avoid these extremes. The freshwater test species identified in the MRP are:

- A static renewal toxicity test with the fathead minnow, *Pimephales promelas* (Larval Survival and Growth Test Method 1000.04).
- A static renewal toxicity test with the daphnid, *Ceriodaphnia dubia* (Survival and Reproduction Test Method 1002.05).
- A static renewal toxicity test with the green alga, *Selenastrum capricornutum* (also named *Raphidocelis subcapitata*) (Growth Test Method 1003.0).

The three test species were evaluated to determine if either a sensitive test species had already been determined, or if there is prior knowledge of potential toxicant(s) and a test species is sensitive to such toxicant(s). In reviewing the available data in the Los Angeles River, Los Cerritos Channel, and the San Gabriel River watersheds, organophosphate pesticides and/or metals have been identified as problematic and are generally considered the primary aquatic life toxicants of concern found in urban runoff. Pyrethroid pesticides are known to be present in urban runoff and potentially contribute to toxicity in these waters. Tests specific to pyrethroid pesticides are simply less common. Given the

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knowledge of the presence of these potential toxicants in the watershed, the sensitivities of each of the three species were considered to evaluate which is the most sensitive to the potential toxicants in the watersheds.

Ceriodaphnia dubia has been reported as a sensitive test species for historical and current use pesticides and metals, and studies indicate that it is more sensitive to the toxicants of concern than *P. promelas* or *S. capricornutum*. In its aquatic life copper criteria document, the USEPA reports greater sensitivity of *C. dubia* to copper (species mean acute value of 5.93 µg/L) compared to *Pimephales promelas* (species mean acute value of 69.93 µg/L; EPA, 2007). *C. dubia's* relatively higher sensitive to metals is common across multiple metals. Researchers at the University of California, Davis also reviewed available species sensitivity values in developing pesticide criteria for the Central Valley Regional Water Quality Control Board. The UC Davis researchers reported higher sensitivity of *C. dubia* to diazinon and bifenthrin (species mean acute value of 0.34 µg/l and 0.105 µg/L) compared to *P. promelas* (species mean acute value of 7804 µg/L and 0.405 µg/L; Palumbo et al., 2010a, b). Additionally, a study of the City of Stockton urban stormwater runoff found acute and chronic toxicity to *C. dubia*, with no toxicity to *S. capricornutum* or *P. promelas* (Lee and Lee, 2001). The toxicity was attributed to organophosphate pesticides, indicating a higher sensitivity of *C. dubia* compared to *S. capricornutum* or *P. promelas*. *P. promelas* is generally less sensitive to metals and pesticides but has been found to be more sensitive to ammonia than *C. dubia*. However, as ammonia is not typically a constituent of concern for urban runoff and ammonia is not consistently observed above the toxic thresholds in the watershed, *P. promelas* is not considered a particularly sensitive species for evaluating the impacts of urban runoff in receiving waters in the watershed.

Selenastrum capricornutum is a species that is sensitive to herbicides; however, while sometimes present in urban runoff, measured concentrations are typically very low. Herbicides have not been identified as a potential toxicant in the watershed. *S. capricornutum* is also not considered the most sensitive species as it is not sensitive to either pyrethroids or organophosphate pesticides and is not as sensitive to metals as *C. dubia*. The *S. capricornutum* growth test can also be affected by high concentrations of suspended and dissolved solids, color and pH extremes, which can interfere with the determination of sample toxicity. As a result, it is common to manipulate the sample by centrifugation and filtration to remove solids in order to conduct the test. This process may affect the toxicity of the sample. In a study of urban highway stormwater runoff (Kayhanian et. al, 2008), the green alga response to the stormwater samples was more variable than both the *C. dubia* and the *P. promelas* and in some cases the alga growth was considered to be potentially enhanced due to the presence of stimulatory nutrients.

As *C. dubia* is identified as the most sensitive to known potential toxicant(s) typically found in receiving waters and urban runoff in the freshwater potions of the watershed and has demonstrated toxicity in programs within the watershed (CWH and ABC Laboratories, 2013), *C. dubia* is selected as the most sensitive species. The species also has the advantage of being easily maintained in in-house mass cultures. The simplicity of the test, the ease of interpreting results, and the smaller volume necessary to run the test, make the test a valuable screening tool. The ease of sample collection and higher

sensitivity will support assessing the presence of ambient receiving water toxicity or long term effects of toxic stormwater over time. As such, toxicity testing will be conducted using *C. dubia*.

An alternative species of water fleas, *Daphnia magna*, may be used if the water being tested has elevated hardness. *C. dubia* test organisms are typically cultured in moderately hard waters (80-100 mg/L CaCO3) and can have increased sensitivity to elevated water hardness greater than 400 mg/L CaCO3), which is beyond their typical habitat range. Because of this, *Daphnia magna* may be substituted in instances where hardness in site waters exceeds 400 mg/L ($CaCO_3$). *Daphnia magna* is more tolerant to high hardness levels and is a suitable substitution for *C. dubia* in these instances (Cowgill and Milazzo, 1990).

4.3 Testing Period

The following describes the testing periods to assess toxicity in samples collected in the LCC WMP area during dry and wet weather conditions. Short-term chronic tests will be used to assess both survival and reproductive/growth endpoints for *C. dubia* for both wet and dry weather sampling efforts. Although wet weather conditions in the region generally persist for less than the chronic testing periods (7 days), the *C. dubia* chronic test will be used for wet weather toxicity testing in accordance with *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms* (EPA, 2002a). Utilization of standard chronic tests on wet weather samples are not expected to generate results representative of the typical conditions found in the receiving water intended to be simulated by toxicity testing.

4.4 Toxicity Endpoint Assessment and Toxicity Identification Evaluation Triggers

Per the MRP, toxicity test endpoints will be analyzed, using the Test of Significant Toxicity (TST) t-test approach specified by the USEPA (USEPA, 2010). The Permit specifies that the chronic in-stream waste concentration (IWC) is set at 100% receiving water for receiving water samples and 100% effluent for outfall samples. Using the TST approach, a t-value is calculated for a test result and compared with a critical t-value from USEPA's TST Implementation Document (USEPA, 2010). Follow-up triggers are generally based on the Permit specified statistical assessment as described below.

For chronic *C. dubia* toxicity testing, if a ≥50% reduction in survival or reproduction is observed between the sample and laboratory control that is statistically significant, a toxicity identification evaluation (TIE) will be performed.

TIE procedures will be initiated as soon as possible after the toxicity trigger threshold is observed to reduce the potential for loss of toxicity due to extended sample storage. If the cause of toxicity is readily apparent or is caused by pathogen related mortality or epibiont interference with the test, the result will be rejected, if necessary, a modified testing procedure will be developed for future testing.

In cases where significant endpoint toxicity effects greater than 50% are observed in the original sample, but the follow-up TIE positive control "signal" is found to not be statistically significant, the cause of toxicity will be considered non-persistent. No immediate follow-up testing is required on the sample.

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However, future test results will be evaluated to determine if implementation of concurrent TIE treatments are needed to provide an opportunity to identify the cause of toxicity.

4.5 Toxicity Identification Evaluation Approach

The results of toxicity testing will be used to trigger further investigations to determine the cause of observed laboratory toxicity. The primary purpose of conducting TIEs is to support the identification of management actions that will result in the removal of pollutants causing toxicity in receiving waters. Successful TIEs will direct monitoring at outfall sampling sites to inform management actions. As such, the goal of conducting TIEs is to identify pollutant(s) that should be sampled during outfall monitoring so that management actions can be identified to address the pollutant(s).

The TIE approach as described in USEPA's 1991 Methods for Aquatic Toxicity Identification is divided into three phases although some elements of the first two phases are often combined. Each of the three phases is briefly summarized below:

- Phase I utilizes methods to characterize the physical/chemical nature of the constituents, which cause toxicity. Such characteristics as solubility, volatility and filterability are determined without specifically identifying the toxicants. Phase I results are intended as a first step in specifically identifying the toxicants but the data generated can also be used to develop treatment methods to remove toxicity without specific identification of the toxicants.
- Phase II utilizes methods to specifically identify toxicants.
- Phase III utilizes methods to confirm the suspected toxicants.

A Phase I TIE will be conducted on samples that exceed a TIE trigger described in Section 4.5. Water quality data will be reviewed to future support evaluation of potential toxicants. A range of sample manipulations may be conducted as part of the TIE process. The most common manipulations are described in Table 4-1. Information from previous chemical testing and/or TIE efforts will be used to determine which of these (or other) sample manipulations are most likely to provide useful information for identification of primary toxicants. TIE methods will generally adhere to USEPA procedures documented in conducting TIEs (USEPA, 1991, 1992, 1993a-b).

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Table 4-1. Phase I and II Toxicity Identification Evaluation Sample Manipulations

TIE Sample Manipulation	Expected Response
pH Adjustment (pH 7 and 8.5)	Alters toxicity in pH sensitive compounds (i.e., ammonia and some trace metals)
Filtration or centrifugation*	Removes particulates and associated toxicants
Ethylenediamine-Tetraacetic Acid (EDTA) or Cation Exchange Column*	Chelates trace metals, particularly divalent cationic metals
Sodium thiosulfate (STS) addition	Reduces toxicants attributable to oxidants (i.e., chlorine) and some trace metals
Piperonyl Butoxide (PBO)*	Reduces toxicity from organophosphate pesticides such as diazinon, chlorpyrifos and malathion, and enhances pyrethroid toxicity
Carboxylesterase addition(1)	Hydrolyzes pyrethroids
Temperature adjustments(2)	Pyrethroids become more toxic when test temperatures are decreased
Solid Phase Extraction (SPE) with C18 column*	Removes non-polar organics (including pesticides) and some relatively non-polar metal chelates
Sequential Solvent Extraction of C18 column	Further resolution of SPE-extracted compounds for chemical analyses
No Manipulation*	Baseline test for comparing the relative effectiveness of other manipulations

***** Denotes treatments that will be conducted during the initiation of toxicity monitoring, but may be revised as the program is implemented. These treatments were recommended for initial stormwater testing in Appendix E (Toxicity Testing Tool for Stormwater Discharges) of the State Water Resources Control Board's June 2012 Public Review Draft "Policy for Toxicity Assessment and Control".

1 Carboxylesterase addition has been used in recent studies to help identify pyrethroid-associated toxicity (Wheelock et al., 2004; Weston and Amweg, 2007). However, this treatment is experimental in nature and should be used along with other pyrethroid-targeted TIE treatments (e.g., PBO addition).

2 Temperature adjustments are another recent manipulation used to evaluate pyrethroid-associated toxicity. Lower temperatures increase the lethality of pyrethroid pesticides. (Harwood, You and Lydy, 2009)

The Watershed Group will identify the cause(s) of toxicity using a selection of treatments in Table 4-1 and, if possible, using the results of water column chemistry analyses. After any initial assessments of the cause of toxicity, the information may be used during future events to modify the targeted treatments to more closely target the expected toxicant or class of toxicants. Moreover, if the toxicant or toxicant class is not initially identified, toxicity monitoring during subsequent events will confirm if the toxicant is persistent or a short-term episodic occurrence.

As the primary goals of conducting TIEs is to identify pollutants for incorporation into outfall monitoring, narrowing the list of toxicants following Phase I TIEs via Phase II/III TIEs is not necessary if the toxicant class determined during the Phase I TIE is sufficient for 1) identifying additional pollutants for outfall monitoring and/or 2) identifying control measures. Thus, if the specific pollutant(s) or classes of pollutants (e.g., metals that are analyzed via EPA Method 200.8) are identified then sufficient information is available to incorporate the additional pollutants into outfall monitoring and to start implementation of control measures to target the additional pollutants.

Phase II TIEs may be utilized to identify specific constituents causing toxicity in a given sample if the results of Phase I TIE testing and a review of available chemistry data fails to provide information

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necessary to identify constituents that warrant additional monitoring activities or management actions to identify likely sources of the toxicants and lead to elimination of the sources of these contaminants. Phase III TIEs will be conducted following any Phase II TIEs.

For the purposes of determining whether a TIE is inconclusive, TIEs will be considered inconclusive if:

- The toxicity is persistent (i.e., observed in the baseline), and
- The cause of toxicity cannot be attributed to a class of constituents (e.g., insecticides, metals, etc.) that can be targeted for monitoring.

If (1) a combination of causes that act in a synergistic or additive manner are identified; (2) the toxicity can be removed with a treatment or via a combination of the TIE treatments; or (3) the analysis of water quality data collected during the same event identify the pollutant or analytical class of pollutants, the result of a TIE is considered conclusive.

Note that the MRP (page E-33) allows a TIE Prioritization Metric (as described in Appendix E of the Stormwater Monitoring Coalition's Model Monitoring Program) for use in ranking sites for TIEs. However, as the extent to which TIEs will be conducted is unknown, prioritization cannot be conducted at this time. However, prioritization may be utilized in the future based on the results of toxicity monitoring and an approach to prioritization will be developed through the CIMP adaptive management process and will be described in future versions of the CIMP.

4.6 Follow Up on Toxicity Testing Results

Our suggested approach is that If the results of two TIEs on separate receiving samples collected during the same conditions (i.e., wet or dry weather) are inconclusive, a toxicity test conducted during the same conditions (i.e., wet or dry weather), using the same test species, will be conducted at applicable upstream outfalls as soon as feasible (i.e., the next monitoring event that is at least 45 days following the toxicity laboratory's report transmitting the results of an inconclusive TIE). The same TIE evaluation triggers and TIE approach presented in Section 4.3 and 4.4, respectively will be followed based on the results of the outfall sample.

The MRP (page E-33) indicates the following actions should be taken when a toxicant or class of toxicants is identified through a TIE:

1. Group Members shall analyze for the toxicant(s) during the next scheduled sampling event in the discharge from the outfall(s) upstream of the receiving water location.
2. If the toxicant is present in the discharge from the outfall at levels above the applicable receiving water limitation, a toxicity reduction evaluation (TRE) will be performed for that toxicant.

The list of constituents monitored at outfalls identified in the CIMP will be modified based on the results of the TIEs. Similarly, upon completion of a successful dry weather TIE, additional constituents identified in the TIE will be added to monitoring requirements at outfalls with significant non-stormwater flows. Monitoring for those constituents will occur as soon as feasible following the completion of a successful

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TIE (i.e., the next monitoring event that is at least 45 days following the toxicity laboratory's report transmitting the results of a successful TIE).

The requirements of the TREs will be met as part of the adaptive management process in the WMPs rather than the CIMP. The identification and implementation of control measures to address the causes of toxicity are tied to management of the stormwater program, not the CIMP. It is expected that the requirements of TREs will only be conducted for toxicants that are not already addressed by an existing Permit requirement (i.e., TMDLs) or existing or planned management actions.

The Water Boards' TMDL Roundtable is currently evaluating options to streamline and consistently respond to urban-use pesticide impairment listings throughout the State including a statewide urban-use pesticide TMDL modeled after the San Francisco Bay Area Urban Creeks Pesticides TMDL. In Addition to toxicity testing, statewide efforts will be monitored to study these pesticides being discussed by the California Stormwater Quality Association (CASQA) Pesticides sub-committee and other Regional Water Boards. The toxicity approach is subject to modifications based on discussions with the Regional Board.

4.7 Summary of Aquatic Toxicity Monitoring

The approach to conducting aquatic toxicity monitoring as described in the previous sections is summarized in detail in Figure 4.1. The intent of the approach is to identify the cause of toxicity observed in receiving water to the extent possible with the toxicity testing tools available, thereby directing outfall monitoring for the pollutants causing toxicity with the ultimate goal of supporting the development and implementation of management actions.

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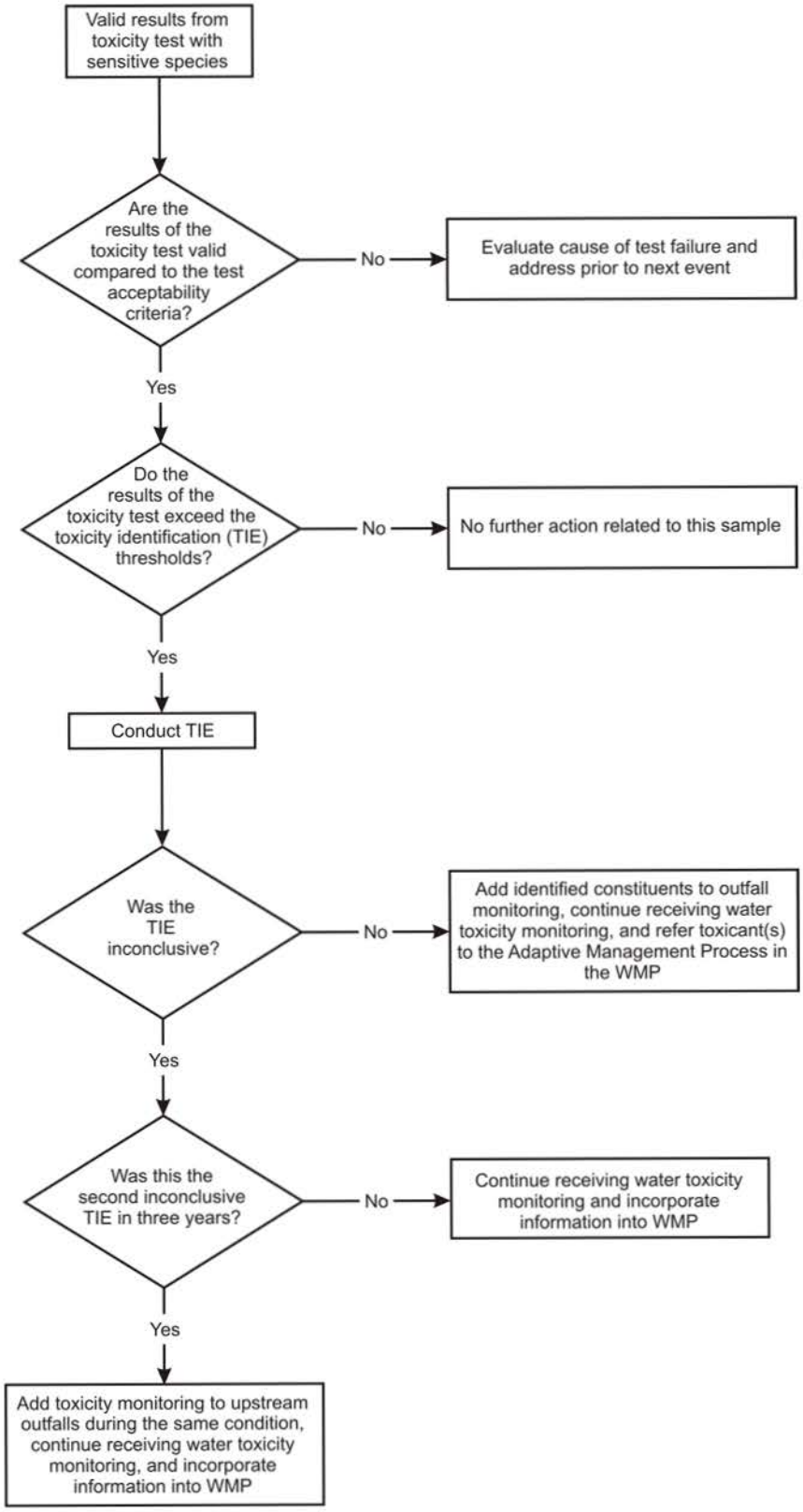

Figure 4.1. Detailed Aquatic Toxicity Assessment Process.

5 Receiving Water Quality Monitoring (Wet and Dry Weather)

Receiving water quality monitoring will primarily be conducted with automated stormwater monitoring equipment detailed in Appendix A. Water samples for bacteria, oil and grease, petroleum hydrocarbons, low level mercury, and volatile organic compounds must be collected separately as grab samples. Appendix A also discussed manual collection of water samples when required. This section addresses both the equipment and protocol used for collection of flow-weighted and time-weighted composite samples. The monitoring site LCC1 as shown in Figure 1-2 will serve as the Receiving Water and TMDL compliance monitoring location for the Los Cerritos Channel. The monitoring equipment provides continuous records of rainfall at this site as well as flow during storm events. This site monitors and records all flows exceeding 18 cfs. Flow estimates are based upon a rating curve established for a former gaging station located approximately 100 feet upstream.

During dry weather monitoring, manual flow measurements are required to obtain instantaneous estimates of flow rates. Measurements are taken at a position where flow is relative uniform over a distance of 10 to 20 feet. Measurements are taken to determine to average width of the flowing water and the depth of water at the center of the flow. Water velocities are recorded by the time required for particles to travel a measured distance along the channel. The velocity of water flow is multiplied by the cross-sectional area of the channel to estimate flow. Since the channel approximates a triangular form, the cross-sectional area of the flowing water is calculated as ½ of the depth at the center of the channel multiplied by the width of flowing water. Dry weather flows have averaged approximately 0.5 cfs during the past five years.

5.1 Sampling Frequency and Mobilization Requirements

Monitoring of receiving water quality will be performed four times a year during the wet season and two times a year during dry weather conditions. Screening for Table E-2 constituents listed in the MRP will be conducted during the first significant storm of the year and during a critically dry weather period. Large sampling volumes are required to incorporate all analytical tests and associated QA/QC needed for Table E-2 constituents, bioassay tests and to provide sufficient volumes should TIEs be required. Due to these requirements, mobilization criteria for the initial wet weather events will differ from subsequent events.

Mobilization of field crews will typically start when there is both a 70% probability of rainfall within 24 hours of the arrival of a predicted storm event and Quantitative Precipitation Forecasts (QPFs) indicate that a minimum of 0.25 inches will occur within a 24-hour time period. Due to the importance of the first storm event of the year, crews will be mobilized to prepare the site (or sites) for monitoring 24 hours in advance of any events with at least a 50% probability of rainfall and QPFs of at least 0.20 inches within a 24-hour time period. If weather forecasts for the first storm of the season indicate development of a condition known as a "cut-off low"[6], partial field teams may initially be deployed to

[6] A closed upper-level low which has become completely displaced (cut off) from basic westerly current, and moves independently of that current. Cutoff lows may remain nearly stationary for days, or on occasion may move westward opposite to the prevailing flow aloft (i.e., retrogression).

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prepare stations since such conditions create highly unpredictable situations that have the potential to suddenly move onshore with higher than expected rainfall. Full mobilization will require an upgrade in the local forecast to a predicted rainfall of at least 0.25 inches with a minimum probability of 70% within 12 hours of the event. For the purposes of this CIMP, weather forecasts and Quantitative Precipitation Forecasts (QPFs) provided by the Los Angeles/Oxnard National Weather Service and the California Nevada River Forecast Center will be used to assess whether mobilization criteria are met.

Once the screening phase has been completed for Table E-2 constituents, storm events will be considered suitable for monitoring given a minimum of 72 hours (3 days) with cumulative rainfall of less than 0.1 inches of rainfall within the watershed. Evaluation of antecedent rainfall conditions will initially be based upon Los Angeles County ALERT (Automatic Local Evaluation in Real Time) stations and rain gauges within or near the Los Cerritos Channel Watershed and rainfall measured at LCC1. The rain gauge located at Signal Hill City Hall (#335) will serve as the primary site for evaluation of antecedent conditions. The rain gauge installed at LCC1 will serve as the secondary site if the primary site is inoperable or unavailable. As the Primary Watershed Segmentation (PWS) sites come on line, these sites will also be used to evaluate antecedent conditions. Assessment of antecedent conditions will be based upon average rainfall measured at sites located within the watershed boundaries and that are known to be fully operable. Due to anticipated reductions in required stormwater volumes, monitoring of subsequent storm events will be based upon weather forecasts predicting rainfall of 0.25 inches at probability of at least 70% within 24 hours of the predicted event. Once crews are mobilized for a storm event, rainfall must exceed a minimum of 0.25 inches and provide sufficient rainfall to project objectives. One of the three storm events to be sampled at the LCC1 Receiving Water Monitoring Site is only intended to address the requirements of the metals TMDL. At this site, a minimum rainfall event of 0.15 to 0.25 inches would be expected fulfill sampling requirements for the TMDL constituents and provide a representative flow-composite sample due to the fact that the watershed is highly impervious.

Two monitoring events are required during dry weather conditions. There has been no indication that seasonal trends exist with respect to dry weather flows in the Los Cerritos Channel Watershed but data from the ongoing Proposition 84 study will provide information to evaluate if seasonality in flow exists in different areas of the watershed. Based upon existing information, dry weather monitoring at the LCC1 Receiving Water Monitoring Site will be conducted once in late spring/early summer (May to June) and again towards the end of the dry season in September/October. This will be consistent with historical dry weather sampling conducted under the City of Long Beach NPDES Permit. During the dry season, the only restriction on sampling will be that total rainfall over the 72 hour time period preceding the sampling event does not exceed 0.1 inches. In practice, rainfall is very rare during the summer months. With the exception of unusual periods when hurricanes developing off of Baja California cause some precipitation to spin north, rainfall events are very infrequent. When practical, dry weather monitoring will be conducted during periods with less than 0.1 inches of rain occur over the previous week.

5.2 Sampling Constituents

With minor exceptions, chemical analyses are scheduled to be conducted for all analytes listed in Table 3-3 through Table 3-9 during the first significant rainfall of the season and again during a period of critical low flow. Chemical constituents not detected in excess of their respective Method Detection

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Limits (MDLs) or that do not exceed available water quality standards will be considered for removal during subsequent surveys. Adjustments to the list of analytical tests will be assessed separately for wet and dry weather sampling requirements. Since the initial screening event may be followed too quickly for the data to be received and fully evaluated, the field team must be prepared to collect water samples for the testing the full set of Table E-2 constituents during the second sampling event.

Most of the general and conventional pollutants listed in Table 3-3 will continue to be analyzed as part of the base monitoring requirements for continued monitoring for both receiving waters and for the metals TMDL. The only pollutants considered for elimination will be cyanide, total phenols, perchlorate, and MTBE. Analysis of chloride and fluoride will continue to be used to assist in the interpretation of potential potable water sources during in association with the non-stormwater screening program. In addition, microbiological constituents (Table 3-4), nutrients (Table 3-5), chlordane compounds listed in Table 3-7 and TMDL metals (Table 3-6) will continue to be part of the ongoing monitoring at LLC1.

As noted in the previous section, it has been determined that adequate data exist to determine which of the three freshwater species are considered to be most sensitive during both storm events and dry weather periods. Available literature and local data indicate that the most sensitive bioassay test species is *Ceriodaphnia dubia*. The prior section on Aquatic Toxicity Testing and TIEs goes into detail as to species selection and the overall approach recommended for measuring toxicity in the receiving waters and strategies to eliminate any sources of toxicity. During wet weather conditions, bioassay tests will be performed based upon exposure to 100 percent test waters over a 48-hour time period since this time exposure is deemed to be more consistent with the duration of typical storm events. Since exposure times during the dry season are much longer, dry weather testing will utilize 7-day chronic toxicity tests that assess both survival and reproductive endpoints for *C. dubia*. Chronic testing will also be conducted on 100 percent undiluted samples. Table 5-1 provides sample volumes necessary for toxicity tests (both wet and dry weather) as well as minimum volumes necessary to fulfill Phase I TIE testing if necessary. As detailed in the previous section, the sublethal endpoints will be assessed using EPA's TST procedure to determine if there is a statistically significant 50% difference between sample controls and the test waters and ultimately determine if further testing should be is necessary.

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Table 5-1. Toxicity Test Volume Requirements for Aquatic Toxicity Testing as part of the Los Cerritos Channel Coordinated Integrated Monitoring Program.

Test Organism	Toxicity Test Type	Test Concentration	Volume Required for Initial Screen (L)	Minimum Volume Required for TIE (L)[1]
Freshwater Tests for Samples with Salinity < 1.0 ppt				
Daphnid Water Flea (*Ceriodaphnia dubia*)	48-Hour Acute Survival 7-day Chronic Survival and Reproduction	100% only	1.5	10
Sample Receipt Water Quality	--	--	1.0	--
Total volume required per event for samples with salinity < 1.0 ppt			2.5	a

[1] Minimum volume for the TIE is for Phase 1 characterization testing only. The additional volume collected for potential TIE testing can be held in refrigeration (4°C in the dark, no head space) and shipped to the laboratory at a later date if needed.

Note: The NPDES permit targets a 36-hr holding time for initiation of testing but allows a maximum holding time of 72-hr if necessary.

6 Primary Watershed Segmentation (PWS) Sites

6.2 Sampling Frequency and Mobilization Requirements

The sampling frequency and mobilization requirements for the PWS sites will be consistent with monitoring conducted at the LCC1. A total of three storm events will be monitored at each PWS site once they are installed. Monitoring will be concurrent with LCC1 monitoring in order to allow for comparison of pollutant loading rates associated with each segment relative to ultimate pollutant loads measured at the LCC1 site.

6.3 PWS Sampling Constituents

Constituents monitored at each PWS site will include all TMDL constituents as well as general and conventional constituents necessary to assist in evaluation of the data (Table 6-1). Constituents included in the MAL list and monitored at the outfall sites will be included in an annual MAL Assessment Report reported as part of the Annual Report. The MAL Assessment Report will summarize the monitoring data in comparison to the applicable MALs, and identify those subwatersheds where the running average concentrations of these constituents exceed the MALs by twenty percent or more.

Table 6-1. Constituents Monitored at Primary Watershed Segment (PWS) Sites.

CONSTITUENTS CONVENTIONAL POLLUTANTS	METHOD	TARGET REPORTING LIMITS mg/L
Total Suspended Solids	EPA 160.2	1
Total Dissolved Solids	EPA 160.1	1
Volatile Suspended Solids	EPA 160.4	1
Total Organic Carbon	EPA 415.1	1
Chemical Oxygen Demand	EPA 410.1	4
Alkalinity	EPA 310.1	5
Specific Conductance	EPA 120.1	1
Total Hardness	EPA 130.2	1
MBAS	EPA 425.1	0.02
Chloride	EPA300.0	2
Fluoride	EPA300.0	0.1
METALS (Dissolved & Total)	**METHOD**	**ug/L**
Copper	EPA200.8	0.5
Lead	EPA200.8	0.5
Zinc	EPA200.8	1

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7 Secondary Watershed Segmentation (SWS) Sites (Wet Weather)

Secondary Watershed Segmentation (SWS) sites will be monitored with portable equipment that will be used to assist in tracking sources of constituents found to be elevated at one of the Primary Watershed Segmentation sites. The portable monitoring stations will consist of a battery powered autosamplers triggered by sensors installed in the channel to detect the start of flow. Once triggered, the samplers will take time-weighted samples for a 24-hour period. The autosamplers will be set to take 200 mL samples every 15 minutes while is present in the channel. All sample composite bottles and materials contacting the water will be identical to those used for each of the "permanent" or fixed monitoring sites.

SWS sites are expected to be deployed upstream of PWS sites where specific contaminants are found to be elevated. Tentative locations (Figure 1-2) have been established at sites in each subwatershed should PWS monitoring data indicate that forensic monitoring is necessary to further isolate areas contributing excessive pollutant loads. The selected sites further segment the subwatersheds into two areas and are designed to be monitored concurrently with the SWS site. Pre-selection of candidate SWS sites was intended to facilitate implementation of forensic monitoring by clearly identifying the next step if conditions are met that trigger further testing.

SWS monitoring will be triggered if the running average of any MAL constituent is exceeded by 20 percent or if the running average of MAL or TMDL constituents at a PWS site exceeds the running average at other PWS sites by more than 20 percent. SWS sites would focus on monitoring the specific constituent of concern and any additional data necessary to help interpret the results. For example, if the constituent of concern is a trace metal, monitoring at SWS sites would include both TSS and hardness.

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8 Non-Stormwater (NSW) Outfall Monitoring

Detailed objectives of the screening and monitoring process (Section IX.A, page E-23 of the MRP) include the following:

1. Develop criteria or other means to ensure that all outfalls with significant non-stormwater discharges are identified and assessed during the term of this Order.

2. For outfalls determined to have significant non-stormwater flow, determine whether flows are the result of illicit connections/illicit discharges (IC/IDs), authorized or conditionally exempt non-stormwater flows, natural flows, or from unknown sources.

3. Refer information related to identified IC/IDs to the IC/ID Elimination Program (Part VI.D.10 of the Order) for appropriate action.

4. Based on existing screening or monitoring data or other institutional knowledge, assess the impact of non-stormwater discharges (other than identified IC/IDs) on the receiving water.

5. Prioritize monitoring of outfalls considering the potential threat to the receiving water and applicable TMDL compliance schedules.

6. Conduct monitoring or assess existing monitoring data to determine the impact of non-stormwater discharges on the receiving water.

7. Conduct monitoring or other investigations to identify the source of pollutants in non-stormwater discharges.

8. Use results of the screening process to evaluate the conditionally exempt non-stormwater discharges identified in Parts III.A.2 and III.A.3 of the Order and take appropriate actions pursuant to Part III.A.4.d of the Order for those discharges that have been found to be a source of pollutants. Any future reclassification will occur per the conditions in Parts III.A.2 or III.A.6 of the Order.

9. Maximize the use of Permittee resources by integrating the screening and monitoring process into existing or planned CIMP efforts.

Ultimately, the NSW program is intended to establish a process for identifying outfalls that serve as potential sources of contaminants. Sites where initial screening indicates the potential for discharges of a magnitude considered to have the potential to cause or contribute to exceedances of receiving water limitations will require further efforts to classify the discharges and determine appropriate actions, if any.

In cases where flow or other factors show evidence of potential discharges of concern, the program will take further action to determine if the flows are illicit, exempt, conditionally exempt, conditionally exempt but non-essential, or if the source(s) of the discharge cannot be identified (unknown). Illicit discharges require immediate action and, if they cannot be eliminated, monitoring will be implemented

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until such time that the illicit discharge can be eliminated. Discharges classified as conditionally exempt but non-essential or unknown also require ongoing monitoring.

The following sections summarize the elements of the program and processes to ultimately eliminate major sources of non-stormwater discharges.

8.1 Non-Stormwater Outfall Screening and Monitoring Program

The NSW Outfall Screening and Monitoring Program will consist of a screening phase designed to initially classify outfalls into one of three categories. Three screening surveys will be conducted starting in the summer of 2014 to identify outfalls or other discharges that are considered to be significant and persistent sources of non-stormwater flow to either the open channels or receiving waters.

The initial survey will focus on completing an inventory of all outfalls (refer to Appendix E) to receiving waters. Outfalls greater than 12-inches in diameter (or equivalent) will be photographed and documented. All minor outfalls[7] (outfalls less than 36-inches in diameter or equivalent) without evidence of the presence of industrial activities will be maintained in the database but will be considered as not requiring any further action.

If while in the process of conducting any of the site inspections, the inspection team encounters a transitory discharge, such as a liquid or oil spill, the problem will be immediately referred to the appropriate local jurisdiction for clean-up or response. If it is not readily apparent which jurisdictional authority has responsibility; the discharge will be reported to the WMG technical committee chair.

Information from all three screening surveys will be consolidated to assist in the identification and ranking of outfalls considered to have significant NSW discharges. Multiple lines of evidence will be considered when assessing the significance of a discharge. Data from the field screening program such as flow measurements, general observations and *in-situ* water quality information will be given primary consideration but land uses within the drainage area will also be considered.

A combination of field observations, flow measurements and field water quality measurements collected during the screening surveys will be used to classify outfalls into one of the following three categories that will determine further actions (Figure 8-1):

1. **Suspect Discharge** – Outfalls with persistent high flows during at least two out of three visits and with high severity on one or more physical indicators (odors, oil deposits, etc.). Outfalls in this category require prioritization and further investigation.

[7] Minor municipal separate storm sewer outfall (or ''minor outfall'') means a municipal separate storm sewer outfall that discharges from a single pipe with an inside diameter of less than 36 inches or its equivalent (discharge from a single conveyance other than circular pipe which is associated with a drainage area of less than 50 acres); or for MS4s that receive stormwater from lands zoned for industrial activity (based on comprehensive zoning plans or the equivalent), an outfall that discharges from a single pipe with an inside diameter of less than 12 inches or from its equivalent (discharge from other than a circular pipe associated with a drainage area of 2 acres or less)

2. **Potential Discharge** - Flowing or non-flowing outfalls with presence of two or more physical indicators. Outfalls in this category are considered to be low priority but will be continue to be monitored periodically to determine if the sites are subject to less frequent, discharges or determine if actions can be taken to reduce or eliminate the factors that lead to the site being considered a potential source of contaminants.

3**. Unlikely Discharge** - Non-flowing outfalls with no physical indicators of an illicit discharge. Outfalls within this classification would be not be subject to any further screening.

Initial screening activities will emphasize use of field water quality instrumentation and/or simple field test kits to assist in classifying discharges. Collection of water samples for limited laboratory testing may be incorporated into the program as requirements for more complex, accurate and scientifically supportable data become necessary to characterize NSW discharges and provide scientifically supportable data to track the source of these discharges. The Center for Watershed Protection (CWP) and Pitt (2004) provide an evaluation of twelve analytes for assistance in determining the source of NSW discharges (Table 8-2). Three of the analytes can be measured with *in-situ* instrumentation. Others can be analyzed relatively inexpensively by use of field test kits or can be analyzed in an ELAP-certified laboratory. In addition, three to five of the listed tests are often considered sufficient to screen for illicit discharges. Ammonia, MBAS, fluoride (assuming tap water is fluorinated), and potassium are considered to confidently differentiate between sewage, wash water, tap water and industrial wastes. Incorporation of *in-situ* measurement of temperature, pH, TDS/salinity, turbidity and dissolved oxygen can further assist in characterizing and tracking the source(s) of an NSW discharge.

8.1.1 Identification of Outfalls with Significant Non-Stormwater Discharges

Existing monitoring data or institutional knowledge (Objective 4) are not available to allow identification of outfalls with significant NSW discharges. The screening program is necessary to collect information necessary to identify outfalls with potentially significant NSW discharges. The outfall screening includes collection of information necessary to provide an accurate inventory of the major outfalls, assess flow from each outfall and in the receiving waters, determine the general characteristics of the receiving waters (e.g. is flow present, does the flow from the outfall represent a large proportion of the flow, is it an earthen or lined channel), and record general observations indicative of possible illicit discharges. The initial screening survey(s) will also be used to refine the inventory information required in Section 8.1.2.

Table 8-1. Outline of the NSW Outfall Screening and Monitoring Program.

Element	Description	Timing of Completion
1. Outfall Screening	Because data required to implement the NSW Outfall Program are not available, the Permittees will implement a screening process to determine which outfalls exhibit significant NSW discharges and those that do not require further investigation. Data will be recorded on Outfall Reconnaissance Investigation (ORI) forms and in the associated database.	The Outfall Screening process is currently being implemented. Identification of obvious illicit discharges will be immediately addressed. Otherwise, the Outfall Screening process will be completed prior to starting source investigations.
2. Identification of outfalls with significant NSW discharge (Part IX.C of the MRP)	Data from the Outfall Screening process will be used to categorize MS4 outfalls on the basis of discharge flow rates, field water quality and physical observations.	Concurrent with Outfall Screening December 28, 2014 with Annual CIMP Report
3. Inventory of Outfalls with NSW discharge (Part IX.D of the MRP)	Develop an inventory of all major MS4 outfalls, identify outfalls with known NSW discharges and identify outfalls with no flow requiring no further assessment.	Concurrent with Outfall Screening December 28, 2014 with Annual CIMP Report
4. Prioritized source investigation (Part IX.E of the MRP)	Use the data collected during the Outfall Screening process to further prioritize outfalls for source investigations.	Prioritization for Source Investigation will be occur after completion of Outfall Screening
5. Identify sources of significant NSW discharges (Part IX.F of the MRP)	For outfalls exhibiting significant NSW discharges, Permittees will perform source investigations per the established prioritization.	Complete source investigations for 25% of the outfalls with significant NSW discharges by December 28, 2015 and 100% by December 28, 2017
6. Monitoring NSW discharges exceeding criteria (Part IX.G of the MRP)	Monitor outfalls determined to convey significant NSW discharges comprised of either unknown or conditionally exempt non-essential discharges, or illicit discharges that cannot be abated.	Monitoring will commence within 90 days of completing the source investigations

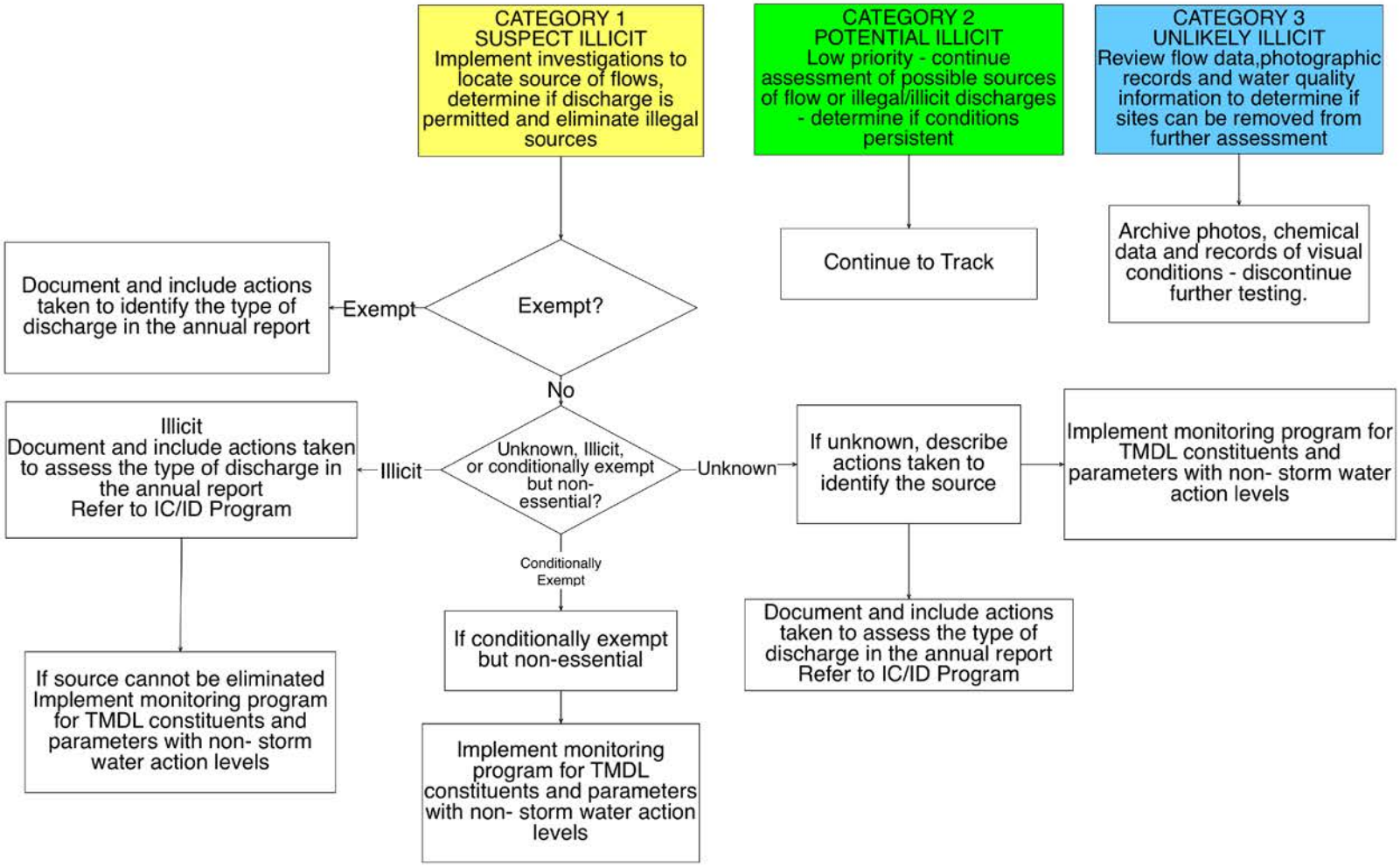

Figure 8-1. Flow Diagram of NSW Outfall Program after Classifying Outfalls during Initial Screening.

Table 8-2. Potential Indicator Parameters for Identification of Sources of NSW Discharges.

Indicator Parameters	
Ammonia	E. coli
Boron	Fluoride
Chlorine	Hardness
Color	pH - Field
Conductivity-Field	Potassium
Detergents – Surfactants (MBAS or fluorescence)	Turbidity

Based upon CWP and Pitt 2004. Illicit Discharge Detection and Elimination A Guidance Manual for Program Development and Technical Assessments

The outfall screening process has already been initiated in order to meet the established schedule for completion of 25% of the source identification work. Once the screening process is completed Permittees are required to identify MS4 outfalls with "significant" NSW discharges. The MRP (Section IX.C.1) indicates that significant NSW discharges may be determined based upon one or more of the following characteristics:

a. Discharges from major outfalls subject to dry weather TMDLs.

b. Discharges for which existing monitoring data exceeds Non-Stormwater Action Levels (NALs) identified in Attachment G of the Order.

c. Non-stormwater discharges that have caused or have the potential to cause overtopping of downstream diversions.

d. Discharges exceeding a proposed threshold discharge rate as determined by the Permittee.

Most of these characteristics are either unlikely to differentiate significant NSW discharges or the information will not be available when the screening process is completed. Multiple lines of evidence derived from flow measurements, observations and *in-situ* water quality information recorded on the Outfall Reconnaissance Investigation (ORI) forms used during the screening process will be used to determine "significant" NSW discharges and appropriately rank sites for source investigations. The relative magnitude of the discharges, persistence of the flow, visual and physical characteristics recorded at each site, and land uses associated with the drainage may also be considered. Characteristics of the receiving waters (flow, channel characteristics –hard or soft-bottom, etc.) at the discharge location will also be considered when determining the relative significance of NSW discharges. The most important consideration is whether the discharge has the potential to cause or contribute to exceedance of receiving water quality limitations. Factors that provide the best insight with respect to these impacts will receive the greatest weight when establishing the list of "significant" NSW discharges.

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8.1.2 Inventory of MS4 Outfalls with Non-Stormwater Discharges

Part VII.A of the MRP requires that the CIMP plan(s) include a map(s) and/or database of the MS4 that includes the elements listed in Table 8-3. Most required elements are complete and included with this CIMP. Elements requiring further development include the Effective Impervious Area, information on the length of open channels and underground pipes equal to or greater than 18 inches, and the drainage areas associated with each outfall. Sub-basins used for the WMMS model are currently associated with each outfall within that sub-basin. If an outfall is identified as a significant source of NSW discharges, drainage areas for each targeted outfall will be refined and updated in the database. Additional information such as documenting presence of significant NSW discharges, links to a database documenting water quality measurements at sites with significant NSW discharges will be updated annually and submitted with the CIMP annual report.

As a component of the inventory and screening process, Permittees are required to document the physical attributes of MS4 outfalls determined to have significant non-stormwater discharges. Table 8-4 summarizes the minimum physical attributes required to be recorded and linked to the outfall database.

These data will be maintained using the Outfall Reconnaissance Inventory (ORI) field form and associated database (Appendix C) developed by CWP and Pitt (2004). Data entry can be accomplished by completing the ORI form while conducting the screening survey. Current forms are shown in the Appendix D but may be modified as the parameters and database are modified to provide different information more relevant to the NSW program.

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Table 8-3. Basic Database and Mapping Information for the Watershed.

Database Element	Status	
	Complete	Schedule
1. Surface water bodies within the Permittee(s) jurisdiction	X	
2. Sub-watershed (HUC 12) boundaries	X	
3. Land use overlay	X	
4. Effective Impervious Area (EIA) overlay (if available)		Will provide if available
5. Jurisdictional boundaries	X	
6. The location and length of all open channel and underground pipes 18 inches in diameter or greater (with the exception of catch basin connector pipes)	X[1]	
7. The location of all dry weather diversions	X	
8. The location of all major MS4 outfalls within the Permittee's jurisdictional boundary. Each major outfall shall be assigned an alphanumeric identifier, which must be noted on the map	X[2]	
9. Notation of outfalls with significant non-stormwater discharges (to be updated annually)	X	ongoing
10. Storm drain outfall catchment areas for each major outfall within the Permittee(s) jurisdiction	X[3]	ongoing
11. Each mapped MS4 outfall shall be linked to a database containing descriptive and monitoring data associated with the outfall. The data shall include:[4]		
a. Ownership	X	
b. Coordinates	X	
c. Physical description	X	
d. Photographs of the outfall, where possible to provide baseline information to track operation and maintenance needs over time	X	
e. Determination of whether the outfall conveys significant non-stormwater discharges		ongoing
f. Stormwater and non-stormwater monitoring data		ongoing

1. Locations are identified but the length of all open channel and underground pipes are not fully documented.
2. Attributes in the shapefile contain a Unique ID for all outfalls greater than 12" in diameter.
3. Catchments for each outfall are included as the area of the sub-basins associated with each outfall. Several outfalls may drain these sub-basins. Data will be developed as needed to resolve the drainage areas specific to each outfall.
4. Efforts are ongoing to define ownership and maintenance responsibility. As data become available, information regarding the conveyance of NSW and associated water quality data will be added to the database. Information will be updated based upon the three screening surveys.

Table 8-4. Minimum Physical Attributes Recorded during the Outfall Screening Process.

Database Element
a. Date and time of last visual observation or inspection
b. Outfall alpha-numeric identifier
c. Description of outfall structure including size (e.g., diameter and shape)
d. Description of receiving water at the point of discharge (e.g., natural, soft-bottom with armored sides, trapezoidal, concrete channel)
e. Latitude/longitude coordinates
f. Nearest street address
g. Parking, access, and safety considerations
h. Photographs of outfall condition
i. Photographs of significant non-stormwater discharge (or indicators of discharge) unless safety considerations preclude obtaining photographs
j. Estimation of discharge rate
k. All diversions either upstream or downstream of the outfall
l. Observations regarding discharge characteristics such as turbidity, odor, color, presence of debris, floatables, or characteristics that could aid in pollutant source identification
m. Observations regarding the receiving water such as flow, channel type, hard/soft bottom (added minimum attribute.)

8.1.3 Prioritized Source Identification

After completion of the initial reconnaissance survey and the two additional screening surveys, sites will be ranked based upon both initial flow observations from the reconnaissance inventory and the classifications assigned during each of the screening surveys. Source investigations will be scheduled to be conducted at sites categorized as Potential Illicit discharges.

The MRP (IX.E.1) states that prioritization of source investigations should be based upon the following items in order of importance.

a. Outfalls discharging directly to receiving waters with WQBELs or receiving water limitations in the TMDL provisions for which final compliance deadlines have passed.

b. All major outfalls and other outfalls that discharge to a receiving water subject to a TMDL shall be prioritized according to TMDL compliance schedules.

c. Outfalls for which monitoring data exist and indicate recurring exceedances of one or more of the Action Levels identified in Attachment G of this Order.

d. All other major outfalls identified to have significant non-stormwater discharges.

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Additional information from the screening process will be used to refine priorities. Sites with evidence of higher, more frequent flow, presence of odors or stains will be assigned higher priorities for source investigations.

8.1.4 Identify Source(s) of Significant Non-Stormwater Discharges

The screening and source identification component of the program is intended to identify the source or sources of contaminants contributing to an NSW discharge. The prioritized list of major outfalls with significant NSW discharges will be used to direct investigations starting with outfalls deemed to present the greatest risk to the receiving water body.

The Order requires the WMG to develop a source identification schedule based on the prioritized list of outfalls exhibiting significant NSW discharges. Source investigations will be conducted for no less than 25% of the outfalls in the inventory by December 2015 and 100% of the outfalls in the inventory by December 2017.

Part IX.A.2 of the MRP requires Permittees to classify the source investigation results into one of four endpoints: illicit connections/illicit discharges (IC/IDs), authorized or conditionally exempt non-stormwater flows, natural flows, or from unknown sources. If source investigations indicate the source is illicit or unknown, the Permittee will document actions to eliminate the discharge and implement monitoring if the discharge cannot be eliminated.

If the source of a discharge is found to be attributable to natural flows or authorized conditionally exempt NSW discharge, the Permittee must identify the basis for the determination (natural flows) and identify the NPDES permitted discharger. If the source is found to be a conditionally exempt but non-essential discharge, monitoring is required to determine whether the discharge should remain conditionally exempt or be prohibited.

Source investigations will be conducted using a variety of different approaches depending upon the initial screening results, land use within the area drained by the discharge point, and the availability of drainage maps. Any additional water quality sampling will emphasize analysis of simple indicators, most of which can be either taken to a laboratory or analyzed in the field using field test kits. Such testing would only be conducted as needed to differentiate major sources of flows or to assist in assessing mixed sources rather than detailed characterization of the discharge. Investigations may include:

- Tracking of dry weather flows from the location where they are first observed in an upstream direction along the conveyance system.
- Collection of additional water samples for analysis of NWS indicators for assistance in differentiating major categories of discharges such as tap water, groundwater, wash waters and industrial wastewaters.
- Compiling and reviewing available resources including past monitoring and investigation data, land use/MS4 maps, aerial photography, existing NPDES discharge permits and property ownership information.

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If source tracking efforts indicate that the discharge originates from a jurisdiction upstream of the boundaries of the LCC WMP, the appropriate jurisdiction and the Regional Board will be notified in writing of the discharge within 30 days of the determination. All existing information regarding documentation and characterization of the data, contribution determination efforts, and efforts taken to identify its source will be included.

Investigations will be concluded if authorized, natural, or essential conditionally exempt flows are found to be the source of the discharge. If the discharge is determined to be due to non-essential conditionally exempt, illicit, or unknown discharges, further investigations will be considered to assess whether the discharge can be eliminated. Alternatively, if the discharges are either non-essential conditionally exempt or of an unknown source, additional investigations may be conducted to demonstrate that it is not causing or contributing to receiving water impairments.

8.1.5 Monitor Non-Stormwater Discharges Exceeding Criteria

As required in the MRP (Part II.3.3), outfalls with significant NSW discharges that remain unaddressed after source identification will be monitored. The objectives of the non-stormwater outfall based monitoring program include the following:

a. Determine whether a Permittee's discharge is in compliance with applicable NSW WQBELs derived from TMDL WLAs;

b. Determine whether a Permittee's discharge exceeds NSW action levels, as described in Attachment G of the Order;

c. Determine whether a Permittee's discharge contributes to or causes an exceedance of receiving water limitations; and

d. Assist a Permittee in identifying illicit discharges as described in Part VI.D.10 of the Order.

After completion of source investigations, outfalls found to convey NSW discharges that could not be abated and were identified as illicit, conditionally exempt but non-essential or unknown will be monitored. Monitoring will be initiated within 90 days of completing the source investigations or as soon as the first scheduled dry weather survey. Conducting NSW monitoring at the same time as receiving water dry weather monitoring will be more cost effective and allow evaluation of whether the NSW discharges are causing or contributing to any observed exceedances of water quality objectives in the receiving water.

Monitoring of NSW discharges is expected to undergo substantial changes from year to year as the result of ongoing actions taken to control or eliminate these discharges. As NSW discharges are addressed, monitoring of the discharges will no longer be required. In addition, if monitoring demonstrates that discharges do not exceed any WQBELs, non-stormwater action levels, or water quality standards for pollutants identified on the 303(d) list after the first year, monitoring of the pollutants meeting all receiving water limitations will be no longer be necessary. Due to potential frequent adjustments in the number and location of outfalls requiring monitoring and pollutants

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requiring monitoring, the annual CIMP report is expected to communicate adjustments in the number and locations of monitored discharges, pollutants being monitored and justifications for any adjustments.

8.1.5.1 Monitoring Parameters and Frequency

The MRP (Section IX.G.1) specifies the minimum parameters for monitoring of NSW discharges. Determination of monitoring parameters at each site requires consideration of a number of factors applicable to each site. Monitoring parameters will include:

a. Flow;

b. Pollutants assigned a WQBEL or receiving water limitation to implement TMDL Provisions for the respective receiving water, as identified in Attachments L - R of the Order;

c. Other pollutants identified on the CWA section 303(d) List for the receiving water or downstream receiving waters;

d. Pollutants identified in a TIE conducted in response to observed aquatic toxicity during dry weather at the nearest downstream receiving water monitoring station (LCC1) during the last sample event or, where the TIE conducted on the receiving water sample was inconclusive, aquatic toxicity (if the discharge exhibits aquatic toxicity, then a TIE shall be conducted); and

e. Other parameters in Table E-2 identified as exceeding the lowest applicable water quality objective at LCC1 (the nearest downstream receiving water station) per Part VI.D.1.d.

The MRP (Part IX.G.2-4) specifies the following monitoring frequency for NSW outfall monitoring:

- For outfalls subject to a dry weather TMDL, the monitoring frequency shall be per the approved TMDL monitoring plan or as otherwise specified in the TMDL or as specified in an approved CIMP.
- For outfalls not subject to dry weather TMDLs, approximately quarterly for first year.
- Monitoring can be eliminated or reduced to twice per year, beginning in the second year of monitoring if pollutant concentrations measured during the first year do not exceed WQBELs, MALs or water quality standards for pollutants identified on the 303(d) List.

While a monitoring frequency of four times per year is specified in the Permit, it is inconsistent with the dry weather receiving water monitoring requirements. The receiving water monitoring requires two dry weather monitoring events per year. Additionally, during the term of the current Permit, outfalls are required to be screened at least once and those with significant NSW discharges will be subject to a source investigation. As a result, the LCC WMG recommends that NSW outfall monitoring events be conducted twice per year. The NSW outfall monitoring events will be coordinated with the dry weather receiving water monitoring events to provide better opportunities to determine if the NSW discharges are causing or contributing to any observed exceedances of water quality objectives in the receiving water.

Any monitoring required will be performed using grab samples (refer to Appendix A for field sampling procedures) rather than automated samplers. Bacteria, which are expected to be the limiting factor at many sites during dry weather, require collection by grab methods and delivery to the laboratory within 6 hours. Based upon the much reduced variability experienced in measurements of dry weather flows associated with ongoing monitoring programs, measured concentrations of other analytes are not expected to vary significantly over a 24-hour period.

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9 New Development/Re-Development Effectiveness Tracking

Each of the cities in the watershed will maintain an electronic database to track qualifying new development and re-development projects that are subject to the Planning and Land Development Programs of Part VI.D.7 of Order No. R4 2012- 0175 and Part VII.J of Order No. R4 2014-0024. The electronic databases contain the information listed in Table 9-1 that includes details about the project and the design of onsite and offsite best management practices, as well as descriptions of the required information.

To promote consistency across the watershed and facilitate future planning and research within the watershed, all of the cities within the watershed are subscribing to MS4Front, a web-based software system designed to streamline record keeping for MS4 permits and assists with annual reporting. The cities concluded that although it is a sophisticated management tool, it is flexible and relatively easy to use. The existing tracking programs will be converted to MS4Front.

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Table 9-1. Information Required in the New Development/Re-Development Tracking Database.

	Required Information	Description
General Site Information	Project Name and Developer Name	Brief name of project and developer information (e.g. name, address, and phone number).
	Project Location and Map	Coordinates and map of the project location. The map should be linked to the GIS storm-drain map required in part VII.A of the Permit.
	Documentation of issuance of requirements to the developer	Date that the project developer was issued the Permit requirements for the project (e.g. conditions of approval).
	Date of Certificate of Occupancy	Date that the Certificate of Occupancy was issued.
On-site BMP Sizing Information	85th percentile storm event (inches per 24 hours)	85th percentile storm depth for the project location calculated using the Analysis of 85th Percentile 24-hour Rainfall Depths Within the County of Los Angeles.
	95th percentile storm event (inches per 24 hours)	95th percentile storm depth for the project location calculated using the *Analysis of 85th Percentile 24-hour Rainfall Depths Within the County of Los Angeles*. Only applies if the project drains directly to a natural drainage system[8] and is subject to hydromodification control measures.
	Project design storm (inches per 24 hours)	The design storm for each BMP as calculated using the Analysis of 85th Percentile 24-hour Rainfall Depths Within the County of Los Angeles.
	Projects design volume (gallons or MGD)	The design storm volume (design storm multiplied by tributary area and runoff coefficient) for each BMP.
	Percent of design storm volume to be retained on site	The percentage of the design volume which on-site BMPs will retain.
	Other design criteria required to meet hydromodification requirements for projects that directly drain to natural water bodies	Information relevant to determine if the project meets hydromodification requirements as described in the Permit e.g., peak flow and velocity in natural water body, peak flow from project area in mitigated and unmitigated condition, etc.). Only applies if the project drains directly to a natural drainage system.
	One -year, one-hour storm intensity as depicted on the most recently issued isohyetal map published by the Los Angeles County Hydrologist for flow-through BMPs	If flow-through BMPs (e.g., sand filters, media filters) for water quality are used at the project, provide the one-year, one-hour storm intensity at the project site from the most recent isohyetal map issued by LA County.
Off-site BMP Information	Location and maps of off-site mitigation, groundwater replenishment, or retrofit sites	If any off-site mitigation is used, provide locations and maps linked to the GIS storm-drain map required in part VII.A of the Permit.
	Design volume for water quality mitigation treatment BMPs	The calculated design volume, If water quality mitigation is required.
	Percent of design storm volume to be infiltrated at an off-site mitigation or groundwater replenishment project site	The percentage of the design volume which off-site mitigation or groundwater replenishment will retain.
	Percent of design storm volume to be retained or treated with biofiltration at an off-site retrofit project	The percentage of the design volume which off-site biofiltration will retain or treat.

[8] A natural drainage system is defined as a drainage system that has not been improved (e.g., channelized or armored). The clearing or dredging of a natural drainage system does not cause the system to be classified as an improved drainage system.

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10 Reporting

Reporting will normally consist of Annual CIMP Reports and semi-annual data reports. Discharge Assessment Plans will only be submitted if TIEs are found to produce inconsistent results during two consecutive tests. These include the following reports:

Annual CIMP Reports

Annual CIMP monitoring reports are required to be submitted to the Regional Water Board Executive Officer by December 15th of each year in the form of three compact disks (CDs). The reporting period will cover July 1 through June 30. The annual reporting process is intended to meet the following objectives.

Summary information allowing the Regional Board to assess:

a. Each Permittee's participation in one or more Watershed Management Programs.
b. The impact of each Permittee(s) stormwater and non-stormwater discharges on the receiving water.
c. Each Permittee's compliance with receiving water limitations, numeric water quality-based effluent limitations, and non-stormwater action levels.
d. The effectiveness of each Permittee(s) control measures in reducing discharges of pollutants from the MS4 to receiving waters.
e. Whether the quality of MS4 discharges and the health of receiving waters is improving, staying the same, or declining as a result watershed management program efforts, and/or TMDL implementation measures, or other Minimum Control Measures.
f. Whether changes in water quality can be attributed to pollutant controls imposed on new development, re-development, or retrofit projects.

Data Submittals

Analytical data reports are required to be submitted to the Regional Board on a semi-annual basis in accordance with the Southern California Municipal Storm Water Monitoring Coalition's Standardized Data Transfer Formats. These reports are required to be subject to verification and validation prior to submittal. They are to cover monitoring periods of July 1 through December 31 for the mid-year report and January 1- June 30 for the end of year report. These data reports should summarize:

- Exceedances of applicable WQBELs, receiving water limitations, or any available interim action levels or other aquatic toxicity thresholds.
- Basic information regarding sampling dates, locations, or other pertinent documentation.

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11 References

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APPENDIX A

AUTOMATED STORMWATER MONITORING EQUIPMENT

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1 Automated Stormwater Monitoring Equipment

Monitoring of stormwater runoff at the receiving water/TMDL site and Watershed Segmentation monitoring sites will require use of automated stormwater sampling equipment. This section addresses equipment and sampling procedures that will be used for LCC1, PWS and SWS sites.

Flow-weighted and time-weighted sampling will generally require similar equipment. Similar equipment will be necessary regardless of the selected sampling approach. Time-weighted composite samples simply allow for more mobile installations that do not require flow meters, rain gauges, solar panels, or communication equipment. In lieu of communications equipment, such sites require added field personnel to monitor and track performance of the equipment along with added sensors to trigger the equipment to initiate the sampling.

For purposes of this CIMP, it is assumed that all sites requiring collection of flow-weighted composite samples will be established as "permanent" or "long-term" sites with appropriate security to protect the equipment and intake structures from debris coming down the stream or vandalism. As noted, collection of time-weighted samples will be utilize the same types of autosamplers and composite containers but will not include flow meters, rain gauges and telecommunication packages. Monitoring stations designed to take time-weighted composite samples will require sensors to detect initial flows and trigger the sampler. This will allow for use of smaller security enclosures that can temporally be secured at a site or, if necessary, equipment can be deployed in a manhole.

Fixed monitoring sites will utilize automated stormwater sampling stations that incorporate an autosampler (American Sigma or Isco), a datalogger/flow module to monitor flow and pace the autosampler, a rain gauge to monitor and record local rainfall, and telecommunications to allow for remote monitoring and control of each site. Sites without access to AC power will be powered by deep-cycle marine batteries. Sites without direct access to AC power will utilize solar panels to provide the energy needed to maintain the charge on two deep cycle batteries used to power the autosampler, flow meter and datalogger. Providing reliable telecommunications for real-time access to data and to provide command and control functionality has greatly improved efficiency and contributed to improved stormwater data.

Both types of automated stormwater monitoring systems considered for this monitoring program use peristaltic pumping systems. When appropriate measures are taken, it has been demonstrated that these types of systems are capable of collecting blanks that are uncontaminated and high quality, reproducible data using detection limits appropriate to water quality criteria. In order to accomplish this, extreme care must be taken to avoid introduction of contaminants.

Requirements include:

- Assuring that all materials coming into contact with the samples are intrinsically low in trace metals and do not adsorb/absorb metals or other target.

- Materials coming into contact with the sample water are subjected to intensive cleaning using standardized protocol and subjected to systematic blanking to demonstrate and document that blanking standards are met.
- All cleaned sampling equipment and bottles are appropriately tracked so that blanking data can be associated with all component deployed in the field.
- Samples are collected, processed and transported taking care to avoid contamination from field personnel or their gear, and
- Laboratory analysis is conducted in a filtered air environment using ultrapure reagents.

Table 2-1 of the USGS National Field Manual (http://pubs.water.usgs.gov/twri9A/) provides a summary of acceptable materials for use sampling organic and inorganic constituents. The stormwater monitoring stations will primarily utilize 20-L borosilicate glass media bottles for the composite samples, FEP tubing for the sample hose and either 316 SS or Teflon-coated intake strainers. Ten (10) liter borosilicate glass media bottles will be considered for sites where required sample volumes are low and lower sample volumes are acceptable. The peristaltic hose is a silicone-base material that is necessary for operation of the autosamplers. The peristaltic hose can be as source of silica which is not a target compound.

Although the technical limitations of autosamplers are often cited, they still provide the most practical method for collecting representative samples of stormwater runoff for characterization of water quality and have been heavily utilized for this purpose for the past 20 years. The alternative, manual sampling, is generally not practical for collection of flow-weighted composite samples from a large number of sites or for sampling events that occur over an extended period of time. Despite the known drawbacks, autosamplers combined with accurate flow metering remain the most common and appropriate tool for monitoring stormwater runoff.

1.1 Sampler Intake Strainer, Intake Tubing and Flexible Pump Tubing

Intake strainers will be used to prevent small rocks and debris from being drawn into the intake tubing and causing blockages or damage to the pump and peristaltic pump tubing. Strainers will be constructed of a combination of Teflon and 316 stainless or simply stainless steel. The low profile version is typically preferred to provide greater ability to sample shallow flows. Although high grade stainless steel intake strainers are not likely to impact trace metal measurements, it is preferable to use strainers coated with a fluoropolymer coating. If the stainless steel intake is not coated, the strainer will not be subjected to cleaning with acids. Cleaning will be limited to warm tap water, laboratory detergents and MilliQ water rinses.

Tubing comprised of 100% FEP (Fluorinated Ethylene Propylene) will be used for the intake tubing. Several alternative fluoropolymer products are available but 3/8" ID solid FEP tubing has the chemical characteristics suitable for sampling metals and organics at low levels and appropriate physical characteristics. The rigidity of FEP tubing provides resistance to collapse at high head differentials but still is manageable for tight configurations.

The peristaltic hose used in autosamplers is a medical-grade silicon product. The specifications for the peristaltic pump hoses used in these samplers are unique to the samplers. It is very important that hose specified and provided by the manufacturers of the autosamplers be used. Minor

differences in the peristaltic hose can cause major deterioration in performance of the samplers. Use of generic peristaltic pump hose from other sources can lead to problems with the ability to calibrate the samplers and maintain intake velocities of greater than 2.5 feet per second with higher lift requirements.

The peristaltic hose is connected to the FEP tubing and fed through the pump head leaving the minimum amount necessary to feed the peristaltic pump hose into the top of the composite bottle. The composite container will always have a lid to prevent dust from settling in the container.

1.2 Composite Containers

The composite containers used for monitoring must be demonstrated to be free of contaminants of interest at the desired levels (USEPA 1996). Containers constructed of fluoropolymers (FEP, PTFE), conventional or linear polyethylene, polycarbonate, polysulfone, polypropylene, or ultrapure quartz are considered optimal for metals but borosilicate glass has been shown to be suitable for both trace metals and organics at limits appropriate to EPA water quality criteria. High capacity borosilicate media bottles (20-liters or ~5-gallons) are preferred for storm monitoring since they can be cleaned and suitably blanked for analysis of both metals and organic compounds. The transparency of the bottles is also a useful feature when subsampling and cleaning the containers for reuse.

Figure 1. Composite Bottle with Label and installed Tubing inside Brute® Container.

These large media bottles are designed for stoppers and thus do not come with lids. Suitable closure mechanisms must be fabricated for use during sampling, transport and storage of clean bottles. The preferred closure mechanism is a Teflon® stopper fitted with a Viton® O-ring (2 3/8" - I.D. x 23/4"-O.D.) that seals the lid against the media bottle. A polypropylene clamp (Figure 2) is used to seal the Teflon® stopper and O-ring to the rim of the composite sample bottle. Two polypropylene bolts with wing-nuts are used to maintain pressure on the seal or to assist in removal of the lid.

Every composite bottle requires one solid lid for use in protecting the bottle during storage and transport. A minimum of one Teflon® stopper should be available for each monitoring site during storm events. Each field sampling crew should have additional stoppers with holes ("sampling stopper") that would be available if a sampling stopper is accidentally contaminated during bottle changes or original installations.

Figure 2. Composite bottle showing bottle bag used for transport and lifting.

The holes in the sampling stoppers should be minimally larger than the external diameter of the peristaltic hose. If a tight fit exists, the pressure created when water is pumped into the bottle will cause the hose to be ejected and the sampling event will to be abandoned.

Transporting composite bottles is best accomplished by use of 10-gallon Brute® containers to both protect them from breakage and simplify handling. They also provide additional capacity for ice while transporting full bottles to the laboratory or subsampling site.

Bottle bags (Figure 2) are also useful in allowing full bottles to be handled easier and reduce the need to contact the bottles near the neck. They are important for both minimizing the need to handle the neck of the bottle and are also an important Health and Safety issue. The empty bottles weigh 15 pounds and they hold another 40 pounds of water when full. These can be very slippery and difficult to handle when removing them from the autosamplers. Bags can be easily fabricated out of square-mesh nylon netting with nylon straps for handles. Use of bottle bags allows two people to lift a full bottle out of the ice in the autosampler and place it in a Brute® container. Whether empty or full, suitable restraints should be provided whenever the 20-L composite bottles and Brute® containers are being transported.

1.3 Flow Monitoring

Retrieval of flow-weighted stormwater samplers requires the ability to accurately measure flow over the full range of conditions that occur at the monitoring site. The ability to accurately measure flow at an outfall site should be carefully considered during the initial site selection process. Hydraulic characteristics necessary to allow for accurate flow measurement include a relatively straight and uniform length of pipe or channel without major confluences or other features that would disrupt establishment of uniform flow conditions. The actual measurement site should be located sufficiently downstream from inflows to the drainage system to achieve well-mixed conditions across the channel. Ideally, the flow sensor and sample collection inlet should be placed a minimum of five pipe diameters upstream and ten pipe diameters downstream of any confluence to minimize turbulence and ensure well-mixed flow. The latest edition of the *Isco Open Channel Flow Measurement Handbook* (Walkowiak 2008) is an invaluable resource to assist in selection of the most appropriate approach for flow measurements and information on the constraints of each method.

The existing mass emission site has an established flow rating curve (Stage-Flow relationships) that only requires measurement of water level to estimate flow. Additional sites requiring flow monitoring are expected to utilize area-velocity sensors that use Doppler-based sensors to measure

the velocity of water in the conveyance, a pressure sensor to measure water depth, and information regarding channel dimensions to allow for real-time flow measurements to pace the autosamplers.

1.4 Rainfall Gauges

Electronic tipping bucket rain gauges will be installed at each fixed monitoring location to provide improved assessment of rainfall in the smaller drainages. Use of a localized rain gauge provides better representation of conditions at the site. A variety of quality instruments are available but all require substantial maintenance to ensure maintenance of high data quality.

Tipping bucket rain gauges with standard 8-inch diameter cones will be used at each site. These provide 1 tip per 0.01" of rain and have an accuracy of ± 2% up to 2"/hr. The accuracy of tipping bucket rain gauges can be impacted by very intense rainfall events but errors are more commonly due to poor installation.

Continuous data records will be maintained throughout the wet season with data being output and recorded for each tip of the bucket. The rainfall data is downloaded at the same rate as the flow and stormwater monitoring events.

1.5 Power

Stormwater monitoring equipment can generally be powered by battery or standard 120VAC. If 120VAC power is unavailable, external, sealed deep-cycle marine batteries will be used to power the monitoring site. Even systems with access to 120VAC will be equipped with batteries that can provide backup power in case of power outages during an event. All batteries will be placed in plastic marine battery cases to isolate the terminals and wiring. A second battery will be provided at each site to support the telecommunication packages. Sites relying on battery power will also be equipped with a solar panel to assure that a full charge is available when needed for a storm event.

1.6 Telecommunication for System Command/Control and Data Access

The ability to remotely communicate with the monitoring equipment has been shown to provide efficient and representative sampling of stormwater runoff. Remote communication facilitates preparation of stations for storm events and making last minute adjustments to sampling criteria based upon the most recent forecasts. Communication with the sites also reduces the number of field visits by monitoring personnel. Remote two-way communication with monitoring sites allows the project manager (storm control) to make informed decisions during the storm as to the best allocations of human resources among sampling sites. By remotely monitoring the status of each monitoring site, the manager can more accurately estimate when composite bottles will fill and direct field crews to the site to avoid disruptions in the sampling. Real time access to flow, sampling and rainfall data also provides important information for determining when sampling should be terminated and crews directed to collect and process the samples. Increases in both efficiency and sample quality make two-way communication with monitoring stations a necessity for most monitoring programs.

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APPENDIX B

CLEANING AND BLANKING PROTOCOL

FOR

EQUIPMENT AND SUPPLIES USED IN COLLECTION OF FLOW OR TIME-WEIGHTED COMPOSITES

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CLEANING PROTOCOL FOR:

20-L Borosilicate Glass Composite Bottles (Media Bottles) and Closures

1.0 SCOPE

This Standard Operating Procedure (SOP) describes the procedures for the cleaning of 20-liter composite sample bottles and the related equipment necessary to complete the task. The purpose of these procedures is to ensure that the sample bottles are contaminant-free and to ensure the safety of the personnel performing this procedure.

2.0 APPLICATION

This SOP applies to all laboratory activities that comprise the cleaning of 20-liter composite sample bottles and stoppers.

3.0 HEALTH AND SAFETY CONSIDERATIONS

The cleaning of 20-liter composite-sample bottles and associated equipment involves hazardous materials. Skin contact with all materials and solutions should be minimized by wearing appropriate personal protective equipment (PPE) including: chemical-resistant gloves, laboratory coats, chemical-resistant aprons, and goggles. To ensure that you are aware of the hazards involved, the material safety data sheets (MSDSs) for nitric acid and laboratory detergents should be reviewed before beginning any of these procedures.

Note: Preparations should be made to contain and neutralize any spillage of acid. Be aware of the location of absorbent, neutralizing, and containment materials in the bottle cleaning area.

4.0 DEFINITIONS

4.1 **Composite sample bottle** - 20 liter borosilicate glass bottle that is used with autosamplers to collect a stormwater composite sample.

4.2 **Stopper** - a Teflon® cap used to seal the composite sample bottle (either solid, or drilled with holes for the silicon inlet tubing).

4.3 **O-Ring** - Viton O-ring 23/8"- I.D. x 23/4"- O.D. that is located around the base of stopper.

4.4 **Clamp** - Polypropylene clamp, 2 bolts, and wing nuts specifically designed to fasten the stopper and the O-ring to the rim of the composite sample bottle.

4.5 **De-ionized (DI) water** - commercial de-ionized water (12-13 Megohm/cm)

4.6 **Laboratory Detergent** - 2% solution of Contrad 70® or Micro-90® detergent

5.0 EQUIPMENT

5.1 Instrumentation:

1) Peristaltic pump with a protocol-cleaned sub-sampling hose setup

5.2 Reagents:

1) ACS Reagent Grade nitric acid in a 2 Normal solution (2N HNO_3)

2) Contrad 70® non-phosphate laboratory detergent

3) Contrad 70® anti-foaming agent

4) Micro-90® non-phosphate laboratory detergent

5) Baking soda or equivalent to neutralize acid

6) pH paper

5.3 Apparatus:

1) Bottle Rolling Rack

2) DI Rinse Rack

3) Yellow Neutralization Drip Bucket

4) Neutralization Tank

5.4 Documentation:

The status of each composite sample bottle must be tracked. Bottles should be washed in batches of 10, 20, or 30 and the status of each batch must be made apparent to all personnel by posting a large status label (including the start date) with each batch. This will ensure that all required soak times have been attained and that each bottle was subjected to the proper cleaning procedures. Information on each batch of bottles cleaned (including bottle number, QA batch, date cleaning started, date finished, date blanked, and cleaning technicians) should be entered in the **Bottle Cleaning Log Sheet**.

6.0 CLEANING PROCEDURES

Care must be taken to ensure that no contaminants are introduced at any point during this procedure. If the wash is not performed with this in mind, the possibility for the introduction of contaminants (i.e., from dust, dirty sub-sampling tubing tips, dirty fingers/gloves, automobile emissions, etc.) is increased significantly.

6.1 Teflon® Bottle Stoppers with Holes and Field Extras:

To be performed whenever required for field use.

1) Wash with laboratory detergent using a clean all-plastic brush.

2) Rinse thoroughly (minimum of three times) with tap water.

3) Rinse thoroughly (minimum of three times) with DI water.

4) Wash three times with 2N nitric acid squirt bottle.

5) Rinse thoroughly (minimum of three times) with DI water.

6) Allow to dry in a dust-free environment.

7) Store in two sealed clean Ziploc® bags.

6.2 NPS 20 liter composite sample bottle Cleaning:

6.2.1 Preliminary Bottle Cleaning:

Bottles should undergo a preliminary rinse with tap water as soon as possible after they are available. This includes dumping any remaining stormwater into a sanitary drain and rinsing the bottles and stoppers. This prevents material from adhering to the interior surface of the bottle.

6.2.2 **48 Hour Soak:** Place the bottle to be cleaned into a secondary containment bucket. Prepare a 2% solution of laboratory detergent with tap water directly in the bottle. Note: Since laboratory detergent is a foaming solution, add 3/4 of the tap water first, add the detergent, then add the rest of the water. Should excessive foam be generated, a few drops of Contrad 70® anti-foaming agent may be added. **Make sure that the bottle is filled to the rim and scrub the rim with an all-plastic scrub brush.** Scrub a Teflon® stopper with 2% solution of laboratory detergent and place stopper over the full bottle so overflowing happens. This will allow both the stopper and the bottle to soak for 48 hours. After the 48 hour soak, this solution may be may be retained for reuse (i.e., siphoned into other dirty bottles) or it can be poured off into a sanitary drain.

6.2.3 Teflon® Bottle Stopper and O-ring Cleaning:

This procedure should be performed prior to the bottle washing process so that the stopper can follow the bottle through the acid wash.

1) Rinse thoroughly (minimum of three times) with tap water.

2) Rinse thoroughly (minimum of three times) with DI water.

3) Store temporarily in a similarly cleaned

6.2.4 **Tap Water Rinse:** Tap water rinses detergent better than DI water. Flush upside down bottle with tap water for 20 sec. Rinse each bottle 3 times with tap water being careful not to contaminate the clean surfaces.

6.2.5 **DI Rinse:** Rinse the top and neck of the bottles with DI water using a squirt bottle and then rinse upside down for three minutes on the DI rinse rack for bottles. Make sure to tip bottles from side to side for a more thorough rinsing. Allow 1-2 minutes for the bottles to

drain as much as possible. Rinse each stopper with DI water squirt bottle 3 times (being careful not to touch the clean surfaces).

6.2.6 **Acid Wash:** Note that it is important to Wash the bottle with 2N nitric acid according to the following procedure:

1) Place the empty bottle near the 2N nitric acid carboy and peristaltic pump. The location should be able to safely contain a spill if the 20L bottle breaks.

2) Pump acid into the bottle using the peristaltic pump fitted with a protocol-cleaned sub-sampling hose setup

3) Fill the bottle slightly more than half full.

4) Place a protocol-cleaned solid Teflon® stopper (with a properly seated O-ring) (Refer to Section 6.2.3 above) on the bottle and clamp it securely.

5) **Carefully** lift and place the bottle on the roller rack and check for leakage from the stopper. Neutralize any spillage. Often small leaks can be corrected by a slight tightening of the clamp. Roll the bottles for twenty minutes.

6) Pump the acid into another bottle for rolling or back into the 2N nitric acid carboy.

6.2.7 **DI Rinse for Sub-sampling Hose**: After use, the sub-sampling hose setup should be rinsed by pumping 1-2 gallons of DI water through the hoses and into a neutralization tank. Carefully rinse the outside of the hose to remove any acid that may be on the exterior of the hose. pH paper should be used to insure that the fluid in and on the hose is 6.8 or higher. Continue rinsing until your reach neutral pH. Store hose in a clean, large plastic bag between uses. Dispose of rinsate in accordance with all federal, state, and local regulations

6.2.8 **DI Rinse for Bottles**: Allow the bottles to drain into a yellow neutralization bucket for at least 1 minute. Place four bottles at a time on the DI rinse rack and rinse for 5 minutes. Move bottles around to ensure complete and thorough rinsing. Rinse the outside of the bottle with tap water. Allow bottles to drain for 2 minutes.

6.2.9 **DI Rinse for Stoppers**: Rinse caps thoroughly 3 times over neutralization tank. Place on a clean surface where the clean side of the stopper will not be contaminated.

6.3 **Storage:** Clamp a stopper (one that went through the entire cleaning procedure) on the bottle. Properly label the bottle as to the date cleaned and by whom and place on the bottle storage rack or in a secondary containment bucket in a safe area. Also, fill out the **Bottle Cleaning Log Sheet**.

7.0 QUALITY ASSURANCE REQUIREMENTS

7.1 The NPS 20 liter sample bottles must be evaluated ("blanked") for contaminants after they have completed the decontamination procedure. The analytical laboratory performing the evaluation should supply Milli-Q® water that is used as a blanking rinsate, and sample

bottles for the appropriate constituents of concern. This evaluation will be accomplished by randomly blanking 10% of the washed bottles, or 1 bottle per batch (whichever is greater) and having the blanking rinsate analyzed by the laboratory for the appropriate constituents.

7.2 If any of the bottles fail the analyses (concentration of any analytes are at or above the limit of detection), all of the bottles from that batch must be decontaminated. Again, 10% of these bottles must be subjected to the blanking process as described-above.

7.3 If results of the evaluation process show that the bottles are not contaminant-free, the cleaning procedure must be re-evaluated. Consult with the Quality Assurance/Quality Control Officer to determine the source of contamination.

CLEANING PROTOCOL FOR:

Miscellaneous Laboratory Equipment used for Cleaning and Blanking

1.0 SCOPE

This Standard Operating Procedure describes the procedures for cleaning the miscellaneous items necessary to complete the tasks of cleaning 20- liter composite sample bottles and hoses. The purpose of these procedures is to ensure that the items are contaminant-free and to ensure the safety of the personnel performing this procedure.

2.0 APPLICATION

This SOP applies to all laboratory activities that comprise the cleaning of ancillary items necessary to complete the tasks of cleaning 20 liter composite sample bottles and NPS hoses.

3.0 HEALTH AND SAFETY CONSIDERATIONS

The cleaning of the following items may involve contact with hazardous materials. Skin contact with all materials and solutions should be minimized by wearing appropriate personal protective equipment (PPE) including: chemically-resistant protective gloves, laboratory coats, chemically-resistant aprons, and goggles. In addition, to ensure that you are aware of the hazards involved and of any new revisions to the procedure, the material safety data sheets (MSDSs) for nitric acid and the laboratory detergent should be reviewed before beginning any of these procedures.

4.0 DEFINITIONS

4.1 Polyethylene Squirt Bottles - ½ and 1 liter squirt bottles for washing and/or rinsing with DI water or nitric acid.

4.2 Polycarbonate and Polyethylene De-ionized Water Jugs - For holding DI water.

4.3 Polyethylene Bucket - For holding tap water, DI water or detergent solutions during hose washing procedures.

4.4 Four-inch Teflon® Connector - For connecting two lengths of silicon peristaltic tubing together.

4.5 Four-inch Silicon Connector - For connecting two lengths of Teflon® hose together.

4.6 Orange Polypropylene Hose Caps - For placing over the ends of clean Teflon® hose to prevent contamination.

4.7 De-ionized (DI) water - Commercial de-ionized water

4.8 Laboratory Detergent - 2% solution of Contrad 70® or Micro-90® detergent.

5.0 EQUIPMENT

5.1 Instrumentation: Not applicable.

5.2 Reagents:

1) ACS Reagent Grade nitric acid as a 2 Normal solution (2N HNO_3)

2) Micro-90® non-phosphate laboratory detergent

3) Contrad 70® non-phosphate laboratory detergent

4) Contrad 70® anti-foaming agent.

5) pH paper or pH meter

6) Baking soda ($NaHCO_3$) or equivalent to neutralize acid

5.3 Apparatus:

1) Clean polyethylene squirt bottles.

2) Clean polyethylene trays or 2000 ml glass beakers.

3) Neutralization Tank

5.4 Documentation:

Label each squirt bottle, DI jug, storage container holding clean items, etc. as to the date each was cleaned and the initials of the cleaning technician.

6.0 CLEANING PROCEDURES

Care must be taken to ensure that no contaminants are introduced at any point during these procedures. If the wash is not performed with this in mind, the possibility for the introduction of contaminants (i.e., from dirty sinks, dirty counter tops, dirty fingers/gloves, dirty hose ends, etc.) is increased significantly.

Rinsing properly is essential to ensure proper cleaning. This is done by squirting the liquid over the item to be cleaned in a top-down fashion, letting the water flow off completely **before** applying the next rinse. Rinse the item in this fashion **a minimum** of three times. **Numerous rinses of relatively small volumes are much better than one or two rinses of higher volume.** Be aware of handling: use clean gloves (it is best if they have gone through the same prior wash as the item to be rinsed) and rinse off the fingers prior to grasping the item to be cleaned. Try to grasp the item in a slightly different place between rinses so ones fingers do not cover a portion of the item throughout the rinses.

6.1 Polyethylene Squirt Bottles:

1) Soak in a 2% solution of laboratory detergent in a protocol-cleaned bucket for 48 hours.

2) Rinse thoroughly (minimum of three times) with tap water.

3) Rinse thoroughly (minimum of three times) with DI water.

4) Wash three times with 2N (10%) nitric acid.

5) Rinse thoroughly (minimum of three times) with DI water. Neutralize and dispose of rinsate in accordance with all federal, state, and local regulations.

6.2 Polycarbonate and Polyethylene DI Water Jugs:

1) Fill to the rim with a 2% solution of laboratory detergent, cap the jug, and let soak for 48 hours. Wash cap with an all-plastic scrub brush after soak.

2) Rinse thoroughly (minimum of three times) with tap water.

3) Rinse thoroughly (minimum of three times) with DI water.

4) Wash three times with 2N (10%) nitric acid.

5) Rinse thoroughly (minimum of three times) with DI water. Neutralize and dispose of rinsate in accordance with all federal, state, and local regulations.

6.3 Polyethylene Bucket:

1) Fill to the rim with a 2% solution of laboratory detergent and let soak for 48 hours.

2) Rinse thoroughly (minimum of three times) with tap water.

3) Rinse thoroughly (minimum of three times) with DI water.

4) Wash three times with 2N (10%) nitric acid squirt bottle.

5) Rinse thoroughly (minimum of three times) with DI water. Neutralize and dispose of rinsate in accordance with all federal, state, and local regulations. **Label as to the date cleaned and initial**.

6.4 Four-inch Teflon® and Silicon Hose Connectors and Orange Polypropylene Hose Caps. The purpose of the four-inch sections of Teflon® and silicon hose is to connect longer lengths of each type of hose together during the hose cleaning procedures. The orange polypropylene hose caps are for the ends of cleaned FEP hoses to prevent contamination prior to use in the field or laboratory.

1) Using a 2% solution of laboratory detergent, soak the four-inch sections of FEP hose, silicon tubing, and orange caps for 48 hours.

2) Rinse thoroughly with tap water (minimum of three rinses).

3) Rinse thoroughly with DI water (minimum of three rinses).

4) Using a squirt bottle filled with 2N (10%) HNO_3, thoroughly rinse the interior and exterior of the connectors and caps thoroughly OR, roll/agitate them in a shallow layer of 2N (10%) HNO_3 in a laboratory detergent cleaned glass beaker or other appropriate, clean container for a more thorough washing.

5) Thoroughly rinse connectors and caps with DI water (minimum of three rinses). Neutralize and dispose of rinsate in accordance with all federal, state, and local regulations. Keep clean connectors and caps in a similarly cleaned (or certified clean) widemouth glass jar or detergent-cleaned resealable bag and **label as clean, date cleaned, and initial**.

NPS 20-Liter Bottle Subsampling Procedure

1.0 Scope

This Standard Operating Procedure (SOP) describes the procedures for the compositing and sub-sampling of non-point source (NPS) 20 liter sample bottles. The purpose of these procedures is to ensure that the sub-samples taken are representative of the entire water sample in the 20-L bottle (or bottles). In order to prevent confusion, it should be noted that in other KLI SOPs relating to 20-L bottles they are referred to as "composite" bottles because they are a composite of many small samples taken over the course of a storm; in this SOP the use of "compositing" generally refers to the calculated combining of more than one of these 20-L "composite" bottles.

2.0 Application

This SOP applies to all laboratory activities that comprise the compositing and sub-sampling of NPS 20 liter sample bottles.

3.0 Health and Safety Considerations

The compositing and sub-sampling of NPS 20 liter sample bottles may involve contact with contaminated water. Skin contact with sampled water should be minimized by wearing appropriate protective gloves, clothing, and safety glasses. Avoid hand-face contact during the compositing and sub-sampling procedures. Wash hands with soap and warm water after work is completed.

4.0 Definitions

4.1 **20 liter sample bottle:** 20 liter borosilicate glass bottle that is used to collect multiple samples over the course of a storm (a composite sample).

4.2 **Large-capacity stirrer**: Electric motorized "plate" that supports a 20 liter bottle and facilitates the mixing of sample water within the bottle by means of spinning a pre-cleaned magnetic stir-bar which is introduced into the bottle.

4.3 **Stir-bar**: Teflon-coated magnetic "bar" approximately 2-3 inches in length which is introduced into a 20 liter bottle and is spun by the stirrer, thereby creating a vortex in the bottle and mixing the sample. Pre-cleaned using cleaning protocols provided in KLI SOP for *Cleaning Procedures for Miscellaneous Items Related to NPS Sampling*.

4.4 **Sub-sampling hose**: Two ~3-foot lengths of Teflon tubing connected by a ~2-foot length of silicon tubing. Pre-cleaned using cleaning protocols provided in SOP for *Teflon Sample Hose and Silicon Peristaltic Tubing Cleaning Procedures*. Used with a peristaltic pump to transfer sample water from the 20-L sample bottle to sample analyte containers.

4.6 **Volume-to-Sample Ratio (VSR):** A number that represents the volume of water that will flow past the flow-meter before a sample is taken (usually in liters but can also be in kilo-cubic feet for river deployments). For example, if the VSR is 1000 it means that every time 1000 liters passes

the flow-meter the sampler collects a sample (1000 liters of flow per 1 sample taken). Note: The VSR indicates when a sample should be taken and is NOT an indication of the sample size.

5.0 EQUIPMENT

5.1 Instrumentation: Not applicable

5.2 Reagents: Not applicable.

5.3 Apparatus

1) Large capacity stirrer.

2) Stir bar.

3) Sub-sampling hose.

4) Peristaltic pump.

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APPENDIX C

QUALITY ASSURANCE/QUALITY CONTROL

1. Quality Assurance/Quality Control

Elements of a Quality Assurance and Quality Control (QA/QC) Plan have been incorporated into the CIMP in order to detail critical activities conducted to assure that both chemical and physical measurements meet the standard of quality needed to evaluate measurements at levels relevant to applicable water quality criteria. With many different monitoring programs being implemented within the region, comparability should remain of the primary goals of the QA/QC monitoring program. The Intergovernmental Task Force on Monitoring Water Quality (ITFM, 1995) defines comparability as the "characteristics that allow information from many sources to be of definable or equivalent quality so that it can be used to address program objectives not necessarily related to those for which the data were collected."

One important aspect of comparability is the use of analytical laboratories that are accredited under a program such as the National Environmental Laboratory Accreditation Program (NELAP), California's Environmental Laboratory Accreditation Program (ELAP) or a well-qualified research laboratory. In addition, the laboratory should be a participant in a laboratory proficiency and intercalibration program. Laboratories have not been selected for this program but participation in the Stormwater Monitoring Coalition's (SMC) intercalibration program will be a primary consideration. Unfortunately, the SMC has not fully completed implementation of a program the full range of analyses included in the MRP Table E-2 list.

Evaluation of data quality will be based upon protocols provided in the *National Functional Guidelines for Inorganic Superfund Data Review (USEPA540-R-10-011)* (USEPA 2010), *National Functional Guidelines for Superfund Organic Methods Data Review (EPA540/R-08-01),* and the *Guidance on the Documentation and Evaluation of Trace Metals Data Collected for Clean Water Act Compliance Monitoring (EPA/821/B/95/002)* (USEPA 1996).

The sections that follow address activities associated with both field sampling and laboratory analyses. Quality assurance activities start with procedures designed to assure that errors introduced in the field sampling and subsampling processes are minimized. Field QA/QC samples are collected and used to evaluate potential contamination and sampling error introduced into a sample prior to its submittal to the analytical laboratory. Laboratory QA/QC activities are used to provide information needed to assess potential laboratory contamination, analytical precision and accuracy, and representativeness.

1.1.1 Sample Handling, Containers and Holding Times.

Table **1** provides a summary of the types of sample volumes, container types, preservation and holding times for each analytical method. Analytical methods requiring the same preservation and container types may be transferred to the laboratory in one container in order to minimize handling prior to transfer to the laboratory.

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Table 1. Constituents, Sample Container, Preservation and Holding Times.

Analyte	EPA Method Number	Holding Time	Container Size	Container Type	Preservation	Minimum Level/ Resolution	Units
Conventionals							
pH	150.1	15 minutes		glass or PE	none	+/- 0.1	std. units
Oil and Grease	1664A	28 days	1 L	Glass	HCl	5	mg/L
TPH	418.1	28 days	1 L	Glass	HCl	5	mg/L
Total Phenols	420.1	28 days	500mL-1 L	Glass	H_sSO_4	5	mg/L
Cyanide	SM4500-CN-E	14 days	500 mL	HDPE	NaOH	0.003	mg/L
Turbidity	SM2130B	48 hours	100-250mL	Glass	4-6°C	1	NTU
TSS	160.2	7 days	1 L	HDPE	4-6°C	4	mg/L
SSC[1]	ASTMD3977B	7 days	1 L	HDPE	4-6°C	4	mg/L
TDS	160.1	7 days	1 L	HDPE	4-6°C	1	mg/L
VSS	160.4	7 days	1 L	HDPE	4-6°C	1	mg/L
TOC; DOC	415.1	28 days	250 mL	glass	4°C and HCl or H_2SO_4 to pH<2	1	mg/L
BOD_5	SM5210B	48 hours	600mL-1L	HDPE	4-6°C	3	mg/L
COD	410.1	28 days	20-250 mL	Glass	H_sSO_4	4	mg/L
Alkalinity	SM 2320B	Filter ASAP, 14 days	100-250 mL	HDPE	4-6°C	1	mg/L
Conductivity	SM 2510	28 days	100-250 mL	HDPE	4°C; filter if hold time >24 hours	1	µmho/cm
Hardness	130.2	6 months	100-250 mL	HDPE	and HNO_3 or H_2SO_4 to pH<2	1	mg/L
MBAS	425.1	48 hours	250-500 mL	HDPE	4-6°C	0.02	mg/L
Chloride	300	28 days	250-500 mL	HDPE	4-6°C	2	mg/L
Fluoride	300	28 days	250-500 mL	HDPE	4-6°C	0.1	mg/L
Perchlorate	314.0	28 days	100-250 mL	HDPE	4-6°C	4	µg/L
Volatile Organics							
MTBE	624	14 days	3 40mL VOA	Glass	HCl	1	µg/L

Analyte	EPA Method Number	Holding Time	Container Size	Container Type	Preservation	Minimum Level/ Resolution	Units
Bacteria							
Total Coliform	SM9221B	6 hr-8 hr	100 mL	Sterile HDPE	4-6°C	20-2,400,000	MPN/100mL
Fecal Coliform	SM9221B	6 hr-8 hr	100 mL	Sterile HDPE	4-6°C	20-2,400,000	MPN/100mL
Enterococcus	SM9230B or C	6 hr-8 hr	100 mL	Sterile HDPE	4-6°C	20-2,400,000	MPN/100mL
E. coli	SM 9223 COLt	6 hr-8 hr	100 mL	Sterile HDPE	4-6°C	20-2,400,000	MPN/100mL
Nutrients							
TKN	351.1	28 days	500mL-1L	Amber glass	H_sSO_4	0.5	mg/L
Nitrate-N	300	48 hours	50-125mL	HDPE	4-6°C	0.1	mg/L
Nitrite-N	300	48 hours	50-125mL	HDPE	4-6°C	0.05	mg/L
Total Nitrogen	Calculation					NA	mg/L
Ammonia-N	350.1	28 days	500mL-1L	Amber glass	H_sSO_4	0.1	mg/L
Total Phosphorus	SM4500-P,EorF	28 days	100-250 mL	glass	H_sSO_4	0.1	mg/L
Dissolved Phosphorus	SM4500-P,EorF	28 days	100-250 mL	glass	4-6°C	0.1	mg/L
Organic Compounds (pesticides and herbicides)							
Organochlorine Pesticides & PCBs[1]	608 & 8270	7days:40days	1L	Amber glass	4-6°C	0.005-0.5	µg/L
Organophosphate Pesticides	507	14days	1L	Amber glass	$Na_sS_2O_3$ 4-6°C	0.01-1	µg/L
Glyphosate	547	14days	250mL	Amber glass	$Na_sS_2O_3$ 4-6°C	5	µg/L
Chlorinated Acids	515.3	14days	250mL	Amber glass	$Na_sS_2O_3$ 4-6°C		
2,4-D						0.02	µg/L
2,4,5-TP-Silvex						0.2	µg/L
Semivolatile Organic Compounds	625;8270D	7days;40days	1L	Amber glass	4-6°C	0.05-10	µg/L

Metals (Total and Dissolved)

Analyte	EPA Method Number	Holding Time	Container Size	Container Type	Preservation	Minimum Level/ Resolution	Units
Aluminum	200.8	If practical, filter immediately after subsampling. Otherwise filter in laboratory for dissolved fraction and preserve not more than 24 hours after subsampling; 6 months to analysis	250 to500 mL	HDPE	4°C and HNO_3 to pH<2	100	µg/L
Antimony	200.8					0.5	µg/L
Arsenic	200.8					0.5	µg/L
Beryllium	200.8					0.5	µg/L
Cadmium	200.8					0.25	µg/L
Chromium (Total)	200.8					0.5	µg/L
Copper	200.8					0.5	µg/L
Iron	200.8					25	µg/L
Lead	200.8					0.5	µg/L
Nickel	200.8					1	µg/L
Selenium	200.8					1	µg/L
Silver	200.8					0.25	µg/L
Thallium	200.8					0.5	µg/L
Zinc	200.8					1	µg/L
Chromium (Hexavalent)	218.6	Filter as above 24 hours	250 ml	HDPE	4°C	5	µg/L
Mercury	245.1	Filter as above 28 days	250 ml	Glass or Teflon	4°C and HNO3 to pH<2	0.2	µg/L
Mercury	1631E	Filter as above 28 days	250 ml	Glass or Teflon	4°C and HNO3 to pH<2	0.0005	µg/L

Abbreviations

TSS=Total Suspended Solids
SSC=Suspended Sediment Concentration
TDS=Total Dissolved Solids
TPH=Total Petroleum Hydrocarbons
VSS=Volatile Suspended Solids
TOC=Total Organic Carbon
BOD_5=Five-day Biochemical Oxygen Demand
COD=Chemical Oxygen Demand
MBAS=Methylene Blue Active Substances
MTBE= Methyl Tertiary Butyl Ether
TKN=Total Kjeldahl Nitrogen
PCBs=Polychlorinated Biphenyls

1. Monitoring for PCBs will be reported as the summation of aroclors and a minimum of 50 congeners. 54 PCB congeners include: 8, 18, 28, 31, 33, 37, 44, 49, 52, 56, 60, 66, 70, 74, 77, 81, 87, 95, 97, 99, 101, 105, 110, 114, 118, 119, 123, 126, 128, 132, 138, 141, 149, 151, 153, 156, 157, 158, 167, 168, 169, 170, 174, 177, 180, 183, 187, 189, 194, 195, 201, 203, 206, and 209. These include all 41 congeners analyzed in the SCCWRP Bight Program and dominant congeners used to identify the aroclor

1.1.2 Precision, Bias, Accuracy, Representativeness, Completeness, and Comparability

The overall quality of analytical measurements is assessed through evaluation of precision, accuracy/bias, representativeness, comparability and completeness. Precision and accuracy/bias are measured quantitatively. Representativeness and comparability are both assessed qualitatively. Completeness is assessed in both quantitative and qualitative terms. The following sections examine how these measures are typically applied.

1.1.2.1 Precision

Precision provides an assessment of mutual agreement between repeated measurements. These measurements apply to field duplicates, laboratory duplicates, matrix spike duplicates, and laboratory control sample duplicates. Monitoring of precision through the process allows for the evaluation of the consistency of field sampling and laboratory analyses.

The Relative Percent Difference (RPD) will be used to evaluate precision based upon duplicate samples. The RPD is calculated for each pair of data is calculated as:

$$RPD=[(x_1-x_2)*100]/[(x_1+x_2)/2)$$

Where:

x_1=concentration or value of sample 1 of the pair

x_2=concentration or value of sample 2 of the pair

In the case of matrix spike/spike duplicate, RPDs are compared with measurement quality objectives (MQOs) established for the program. MQOs will be established to be consistent with the most current SWAMP objectives in the SWAMP Quality Assurance Project Plan (2008) including the most recent updates as well as consultations with the laboratories performing the analyses. In the case of laboratory or field duplicates, values can often be near or below the established reporting limits. The most current SWAMP guidelines rely upon matrix spike/spike duplicate analyses for organic compounds instead of using laboratory duplicates since one or both values are often below detection limits or are near the detection limits. In such cases, RPDs do not provide useful information.

1.1.2.2 Bias

Bias is the systematic inherent in a method or caused by some artifact or idiosyncrasy of the measurement system. Bias may be either positive or negative and can emanate from a number of different points in the process. Although both positive and negative biases may exist concurrently in the same sample, the net bias is all that can be reasonably addressed in this project. Bias is preferably measured through analysis of spiked samples so that matrix effects are incorporated.

1.1.2.3 Accuracy

Accuracy is a measure of the closeness of a measurement or the average of a number of measurements to the true value. Accuracy includes of a combination of random error as measured by precision and systematic error as measured by bias. An assessment of the accuracy of measurements is based on determining the percent difference between measured values and known or "true" values applied to surrogates, Matrix Spikes (MS), Laboratory Control Samples (LCS) and Standard Reference Materials (SRM). Surrogates and matrix spikes evaluate matrix interferences on analytical performance, while laboratory control samples, standard reference materials and blank spikes (BS) evaluate analytical performance in the absence of matrix effects.

Assessment of the accuracy of measurements is based upon determining the difference between measured values and the true value. This is assessed primarily through analysis of spike recoveries or certified value ranges for SRMs. Spike recoveries are calculated as Percent Recovery according to the following formula:

$$\text{Percent Recovery} = [(t-x)/\alpha]*100\%$$

Where:

t=total concentration found in the spiked sample

x=original concentration in sample prior to spiking, and

α=actual spike concentration added to the sample

1.1.2.4 Representativeness, Comparability and Completeness

Representativeness is the degree to which data accurately and precisely represents the natural environment. For stormwater runoff, representativeness is first evaluated based upon the automated flow-composite sample and the associated hydrograph. To be considered as representative, the autosampler must have effectively triggered to capture initial runoff from the pavement and the composite sample should:

- be comprised of a minimum number of aliquots over the course of the storm event,
- effectively represent the period of peak flow,
- contain flow-weighted aliquots from over 80% of the total runoff volume, and
- demonstrate little or no evidence of "stacking".

Stacking occurs when the sampling volume is set too low and commands back up in the memory of an autosampler causing it to continuously cycle until it catches up with the accumulation of total flow measured by the stormwater monitoring station.

Representativeness is also assessed through the process of splitting or subsampling 20 L composite bottles into individual sample containers being sent to the laboratory. The first subsamples removed from the composite bottle should have the same composition as the last. Subsampling should be conducted in accordance with guidance in the subsampling SOP. This SOP is based upon use of large laboratory magnetic stir plate, an autosampler, and precleaned subsampling hoses to minimize

variability. Sample splitting can introduce a substantial amount of error especially if significant quantities of coarse sediments (greater than 250 µm) represent as significant fraction of the suspended sediments. Use of a USGS Teflon churns or Decaport cone splitter may also be used but would require development of a separate SOP.

Comparability is the measure of confidence with which one dataset can be compared to another. The use of standardized methods of chemical analysis and field sampling and processing are ways of insuring comparability. Application of consistent sampling and processing procedures is necessary for assuring comparability among data sets. Thorough documentation of these procedures, quality assurance activities and a written assessment of data validation and quality are necessary to provide others with the basic elements to evaluate comparability.

Completeness is a measure of the percentage of the data judged valid after comparison with specific validation criteria. This includes data lost through accidental breakage of sample containers or other activities that result in irreparable loss of samples. Implementation of standardized Chain-of-Custody procedures which track samples as they are transferred between custodians is one method of maintaining a high level of completeness.

A high level of completeness is essential to all phases of this study due to the limited number of samples. Of course, the overall goal is to obtain completeness of 100%, however, a realistic data quality indicator of 95% insures an adequate level of data return.

1.1.3 Laboratory Quality Assurance/Quality Control

The quality of analytical data is dependent on the ways in which samples are collected, handled and analyzed. Data Quality Objectives provide the standards against which the data are compared to determine if they meet the quality necessary to be used to address program objectives. Data will be subjected to a thorough verification and validation process designed to evaluate project data quality and determine whether data require qualification.

The three major categories of QA/QC checks are accuracy, precision, and contamination were discussed in the previous section. As a minimum, the laboratory will incorporate analysis of method blanks, and matrix spike/spike duplicates with each analytical batch. Laboratory duplicates will be analyzed for analytical tests where matrix spike/spike duplicate are not analyzed. Use of Certified Reference Materials (CRM) or Standard Reference Materials (SRM) is also recommended as these allow assessment of long term performance of the analytical methods so that representativeness can be assessed. Laboratories often use an internal CRM that is analyzed with each batch to evaluate any potential long-term shift in performance of the analytical procedures. Recommended minimum quality control samples will be based upon SWAMP QAPP (2008) and the associated 2013 Quality Control and Sample Handling Tables for water (http://www.swrcb.ca.gov/water_issues/programs/swamp/mqo.shtml).

1.1.4 Field QA/QC

1.1.4.1 Blanks

A thorough system of blanking is an essential element of monitoring. Much of the blanking processes are performed well in advance of the actual monitoring in order to demonstrate that all equipment expected to contact water is free of contaminants at the detection limits established for the program. Equipment components are cleaned in batches. Subsamples from each cleaning batch are rinsed with Type 1 laboratory blank water and submitted to the laboratory for analysis. If hits are encountered in any cleaning batch, the entire batch is put back through the cleaning and blanking process until satisfactory results are obtained. If contaminants are measured in the blanks, it is often prudent to reexamine the cleaning processes and equipment or materials used in the cleaning process. Equipment requiring blanks and the frequency of blanks is summarized below and in Table 2.

Table 2. Summary of Blanking Requirements for Field Equipment.

System Component	Blanking Frequency
Intake Hose	One per batch
Peristaltic Pump Hose	One per batch[1] or 10% for batches greater than 10
Composite Bottles	One per batch or 10% for batches greater than 10
Subsampling Pump Hose	One per batch or 10% for batches greater than 10
Laboratory Sample Containers	2% of the lot[2] or batch, minimum of one
Capsule Filter Blank[3]	One per batch or 10% for batches greater than 10
Churn/Cone Splitter[4]	When field cleaning is performed, process one blank per session

[1] A batch is a group of samples that are cleaned at the same time and in the same manner.

[2] If decontaminated bottles are sent directly from the manufacturer, the batch would be the lot designated by the manufacturer in their testing of the bottles.

[3] If filtration is performed in the laboratory, the capsule filter blanks would be considered part of laboratory QA/QC.

[4] This is applicable to use of a churn or cone splitter to subsample flow-weighted composite samples into individual containers. Splitting may be performed by the sampling team in a protected, clean area or by the laboratory.

1.1.4.2 Field Duplicates

Composite subsampling duplicates associated with flow-weighted composite samples are often referred to as field duplicates but, in fact, they are subsampling replicates. These replicates help assess combined variability associated with subsampling from the composite container and variability associated with the analytical process. They are evaluated against the same criteria as used for laboratory duplicates.

1.1.5 Equipment Cleaning, Blanking and Tracking

Sample collection, handling, and processing materials can contribute and/or sorb trace elements within the time scales typical for collection, processing and analysis of runoff samples. Sampling artifacts are especially important when measured concentrations that are at or near analytical detection limits (Horowitz 1997). Therefore, great care is required to collect and process samples in a manner that will minimize potential contamination and variability in the sampling process (Breault and Granato 2000).

Sampling conducted to measure dissolved metals and other trace contaminants at levels relevant to EPA water quality criteria requires documentation that all sampling equipment is free of contamination and that the processes used to obtain and handle samples do not introduce contamination. This requires documentation that methods used to collect, process and analyze the samples do not introduce contamination. Documentation for the CIMP includes written procedures provided in Appendix B for cleaning all components of the sampling system, blanking processes necessary to verify that system components and sample handling are not introducing contamination, and a system of tracking deployment of protocol-cleaned equipment in the field as described in this section.

All composite containers and equipment used for sample collection in the field and/or sample storage in the laboratory will be decontaminated and cleaned prior to use. These include the FEP tubing, Teflon® lids, strainers and hoses/fittings that are used in the subsampling process (USGS 1993). Personnel assigned to clean and handle the equipment are thoroughly trained and familiar with the cleaning, blanking, and tracking procedures. In addition, all field sampling staff will be trained to be familiar with these processes so that they have a better understanding of the importance of using clean sampling procedures and the effort required to eliminate sources of contamination.

Sample contamination has long been considered one of the most significant problems associated with measurement of dissolved metals and may be accentuated with use of High Resolution Mass Spectroscopy (HRMS) methods for trace levels of organic constituents at levels three orders of magnitude lower than conventional GCMS methods. One of the major elements of QA/QC documentation is establishing that clean sampling procedures are used throughout the process and that all equipment used to collect and process the water samples are free of contamination.

Cleaning protocols are consistent with ASTM (2008) standard D5088 – 02 that covers cleaning of sampling equipment and sample bottles. The generalized cleaning process is based upon a series of washings that typically start with tap water with a phosphate-free detergent, a tap water rinse, soaking in a 10% solution of reagent grade nitric acid, and a final series of rinses with ASTM Type 1 water. Detailed procedures for decontamination of sampling equipment are provided in Appendix A. In addition, Appendix G of the most recent Caltrans Stormwater Monitoring Guidance Manual (Caltrans, 2013) provides alternative cleaning procedure that incorporate use of methylene chloride to remove potential organic contaminants. Experience indicates that this step can be eliminated and still result in blanking data suitable for most target organic contaminants. Addition of this cleaning step or a comparable step to address organic contaminants may be necessary if satisfactory equipment blanks cannot be attained. Significant issues exist with respect to use of methylene

chloride. This chemical is highly toxic, must be handled and disposed as a hazardous waste and is difficult to fully remove from the 20-L media bottles used as composite containers.

In order to account for any contamination introduced by sampling containers, blanks must be collected for composite bottles and laboratory bottles used for sample storage for trace contaminants. A sampling container blank is prepared by filling a clean container with blank water and measuring the concentrations of selected constituents (typically metals and other trace contaminants for composite bottles and metals analysis only for metals storage bottles). Blanking of the 20-L composite bottles will be performed by using the minimum amount of blank water necessary for the selected analytical tests. This is typically requires one to two liters. The bottle is capped and then manipulated to assure that all surfaces up to the neck of the bottle are rinsed. The water is then be allowed to sit for a minimum of one hour before decanting the rinse water into sample containers. In order to provide adequate control, media bottles are labelled and tracked. All media bottles cleaned and blanked in one batch are tracked to allow for recall if laboratory analyses reveal any contamination. Further tracking is required in the field to document where bottles from each cleaning batch are used and to assist in tracking of any contamination that might be detected after bottles have been deployed since laboratory turnaround in the middle of the storm season may require use of decontaminated bottles prior to receiving the results of the blank analyses.

Selected constituents for blanking will be dependent upon the list of contaminants with reasonable potential to be present at levels that could impact sample results. Minimum parameters used for blank analyses will include total recoverable trace metals, TDS, TOC and nutrients. Analysis of total metals will allow for detection of any residual metal contamination which will be of concern for all sampling. Nutrients, particularly nitrogen compounds, will assure that residual nitrogen from acid cleaning has been fully removed. TDS and TOC are useful for accessing presence of any residual contaminants. Additional blanking may be added when sampling other constituents with ultra-low analytical methods. These blanks may be submitted "blind" to the laboratory by field personnel or prepared internally by the laboratory.

Certified pre-cleaned QC-grade laboratory containers can be used. These bottles are cleaned using acceptable protocol for the intended analysis and tracked by lots. They come with standard certification forms that document the concentration to which the bottles are considered "contaminant-free" but these concentrations are not typically suitable for program reporting limits required for measurement of dissolved metals. Manufacturers may provide an option of certification to specific limits required by a project but it is preferable to purchase the QC bottles that are tracked by lot and conduct internal blanking studies. Lots not meeting project requirements should be returned to the manufacturer and exchanged for containers from another lot. At least 2% of the bottles in any "lot" or "batch" should be blanked at the program detection limits with a minimum frequency of one bottle per batch. A batch is considered to be a group of samples that are cleaned at the same time and in the same manner; or, if decontaminated bottles are sent directly from the manufacturer, the batch would be the lot designated by the manufacturer in their testing of the bottles. Cleaned bottles are stored in a clean area with lids properly secured.

Subsampling hoses consist of a length of peristaltic hose with short lengths of FEP tubing attached to each end. These are required to be cleaned inside and out since the FEP tubing is immersed in the

composite bottle during the subsampling process. Once cleaned, the ends of the subsampling hoses are bagged. All hoses associated with the batch are then stored in large zip-lock containers labeled to identify the cleaning batch. Blanking of subsampling hoses is conducted as part of the composite bottle blanking process. A clean subsampling hose is used to decant blank water from the 20-L composite bottles into clean laboratory containers. Detection of any contaminants in the bottle blanks therefore requires that the subsampling hoses also are subjected another decontamination process. After cleaning, the subsampling hoses should only be handled while wearing clean, powder-free nitrile gloves.

APPENDIX D

NON-STORMWATER IC/ID AND OUTFALL TRACKING

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Operation Procedures	
Illicit Discharge Detection & Elimination: Initial Outfall Screening	
Purpose:	This provides a basic checklist for field crews conducting initial survey of storm drainage system outfalls for use in identification of illicit discharges

Reference: Brown et al., *Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments,* Center for Watershed Protection, Ellicott City, 2004.

Planning Considerations:

- ❑ Employees should have reviewed and understand the information presented in Chapter 11 of the reference manual
- ❑ Inspections are to occur during dry weather (no runoff producing precipitation in last 72 hours)
- ❑ Conduct inspections with at least two staff per crew
- ❑ Conduct inspections during low groundwater (if appropriate).
- ❑ Complete ***Site Info section on Outfall Reconnaissance Inventory Form*** before leaving the office. Additional forms should be available for undocumented outfalls

Field Methods:

- ❑ Ensure outfall is accessible.
- ❑ Inspect outfall only if safe to do so.
- ❑ Characterize the outfall by recording information on the ***LCC Outfall Reconnaissance Inventory Form.***
- ❑ Photograph the outfall with a digital camera (use dry erase board to identify outfall).
- ❑ Enter flow information on form if dry weather flow is present and ***easily*** obtained. If not, provide rough estimate of flow.
- ❑ Document clean, dry outfalls for potential elimination during future screening programs.
- ❑ Water samples will not be collected during the initial survey. In-situ measurements of temperature, conductivity, and pH should be taken if significant flow is present.
- ❑ Do not enter private property without permission.
- ❑ Photograph each site with the site identification written on the dry erase board.

Equipment List:

1. System map
2. Outfall Reconnaissance Inventory Forms
3. City identification or business cards
4. Digital camera (spare batteries)
5. Cell phone
6. GPS unit
7. Clip board and pencils
8. Dry erase board and pens
9. Hand Mirror
10. Flashlight (spare batteries)
11. Disposable gloves
12. Folding wood ruler or comparable
13. Temperature, Conductivity probe
14. pH probe/strips
15. ***Ammonia test strips***
16. ***Ten1-liter (polyethylene) sample bottles***
17. Watch with second hand
18. Calculator
19. Hand sanitizer
20. Safety vests
21. First aid kit
22. ***Cooler***
23. Permanent marker

Bolded, italicized items will only be needed for later surveys. No water quality samples will be taken for laboratory analysis during the first survey.

LOS CERRITOS CHANNEL OUTFALL RECONNAISSANCE INVENTORY/ SAMPLE COLLECTION FIELD SHEET

Section 1: Background Data

Subbasin:		Outfall ID:	
Today's date:		Time (Military):	
Investigators:		Form completed by:	
Temperature (°F):	Rainfall (in.): Last 24 hours: Last 48 hours:		
Latitude:	Longitude:	GPS Unit:	GPS LMK #:
Camera:		Photo #s:	

Land Use in Drainage Area (Check all that apply):

☐ Industrial ☐ Open Space

☐ Ultra-Urban Residential ☐ Institutional

☐ Suburban Residential Other: _____

☐ Commercial Known Industries: _____

Notes (e.g.., origin of outfall, if known):

Section 2: Outfall Description

LOCATION	MATERIAL	SHAPE		DIMENSIONS (IN.)	SUBMERGED
☐ **Closed Pipe**	☐ RCP ☐ CMP ☐ PVC ☐ HDPE ☐ Steel ☐ Other: _____	☐ Circular ☐ Elliptical ☐ Box ☐ Other: _____	☐ Single ☐ Double ☐ Triple ☐ Other: _____	Diameter/Dimensions: _____	In Water: ☐ No ☐ Partially ☐ Fully With Sediment: ☐ No ☐ Partially ☐ Fully
☐ **Open drainage**	☐ Concrete ☐ Earthen ☐ rip-rap ☐ Other: _____	☐ Trapezoid ☐ Parabolic ☐ Other: _____		Depth: _____ Top Width: _____ Bottom Width: _____	
☐ **In-Stream**	**(applicable when collecting samples)**				
Flow Present?	☐ Yes ☐ No	***If No, Skip to Section 5***			
Flow Description (If present)	☐ Trickle ☐ Moderate ☐ Substantial				

Section 3: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS				
PARAMETER		**RESULT**	**UNIT**	**EQUIPMENT**
☐Flow #1	Volume		Liter	Bottle
	Time to fill		Sec	
☐Flow #2	Flow depth		In	Tape measure
	Flow width	____' ____"	Ft, In	Tape measure
	Measured length	____' ____"	Ft, In	Tape measure
	Time of travel		S	Stop watch
Temperature			°F	Meter
pH			pH Units	Meter
Ammonia			mg/L	Test strip

Los Cerritos Channel Outfall Reconnaissance Inventory Field Sheet

Section 4: Physical Indicators for Flowing Outfalls Only

Are Any Physical Indicators Present in the flow? ☐ Yes ☐ No *(If No, Skip to Section 5)*

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (1-3)		
Odor	☐	☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas ☐ Sulfide ☐ Other:	☐ 1 – Faint	☐ 2 – Easily detected	☐ 3 – Noticeable from a distance
Color	☐	☐ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other:	☐ 1 – Faint colors in sample bottle	☐ 2 – Clearly visible in sample bottle	☐ 3 – Clearly visible in outfall flow
Turbidity	☐	See severity	☐ 1 – Slight cloudiness	☐ 2 – Cloudy	☐ 3 – Opaque
Floatables -Does Not Include Trash!!	☐	☐ Sewage (Toilet Paper, etc.) ☐ Suds ☐ Petroleum (oil sheen) ☐ Other:	☐ 1 – Few/slight; origin not obvious	☐ 2 – Some; indications of origin (e.g., possible suds or oil sheen)	☐ 3 - Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls

Are physical indicators that are not related to flow present? ☐ Yes ☐ No *(If No, Skip to Section 6)*

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
Outfall Damage	☐	☐ Spalling, Cracking or Chipping ☐ Peeling Paint ☐ Corrosion	
Deposits/Stains	☐	☐ Oily ☐ Flow Line ☐ Paint ☐ Other:	
Abnormal Vegetation	☐	☐ Excessive ☐ Inhibited	
Poor pool quality	☐	☐ Odors ☐ Colors ☐ Floatables ☐ Oil Sheen ☐ Suds ☐ Excessive Algae ☐ Other:	
Pipe benthic growth	☐	☐ Brown ☐ Orange ☐ Green ☐ Other:	

Section 6: Overall Outfall Characterization

☐ Unlikely ☐ Potential (presence of two or more indicators) ☐ Suspect (one or more indicators with a severity of 3) ☐ Obvious

Section 7: Data Collection

1. Sample for the lab?	☐ Yes	☐ No	
2. If yes, collected from:	☐ Flow	☐ Pool	
3. Intermittent flow trap set?	☐ Yes	☐ No	If Yes, type: ☐ OBM ☐ Caulk dam

Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)?

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APPENDIX E

MAJOR AND MINOR OUTFALLS TO THE LOS CERRITOS CHANNEL WATERSHED

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Major Outfalls (=>36 inches) in the Los Cerritos Channel Watershed

LDISCHARGE POINT	DESCRIPTION	DISCHARGE POINT LATITUDE	DISCHARGE POINT LONGITUDE	OWNER	SIDE (R/L)	DISTANCE FROM CHANNEL STARTING POINT (km)	JURISDICTION	MODEL SUB WATERSHED	UNIQUE ID	PHOTO UNIQUE ID	CHANNEL UNIQUE ID
CLARK CHANNEL											
N. Charlemagne Ave/E. Pageantry St	36" Discharge	33.81315	-118.12997	Long Beach	R	1.925	Long Beach	BI9A-5	BI9A-5-001		CC-0.273
N. Rutgers Ave/E. Pageantry St	36" Discharge	33.81317	-118.12970	Long Beach	L	1.927	Long Beach	BI9A-5	BI9A-5-002		CC-0.275
N Charlemagne Ave/E. Mezzanine Way	72" Discharge	33.81519	-118.12998	Long Beach	R	2.141	Long Beach	BI9A-5	BI9A-5-003		CC-0.494
N Rutgers Ave/E. Mezzanine Way	54" Discharge	33.81519	-118.12971	Long Beach	L	2.152	Long Beach	BI9A-5	BI9A-5-004		CC-0.507
3343 Rutgers Ave/E. Wardlow Rd	36" Discharge	33.81791	-118.12970	UNK	L	2.449	Long Beach	BI9A-5	BI9A-5-005		CC-0.793
N. Charlemagne Ave/E. Wardlow Rd	42" Discharge	33.81870	-118.12997	LACFCD	R	2.528	Long Beach	BI9A-5	BI9A-5-006		CC-0.877B
N. Rutgers Ave/E. Wardlow Rd	42" Discharge	33.81869	-118.12971	LACFCD	L	2.528	Long Beach	BI9A-5	BI9A-5-007		CC-0.877A
N. Charlemagne/E. Monlaco Rd	150" Discharge	33.82273	-118.12977	LACFCD	R	2.993	Long Beach	BI9A-5	BI9A-5-015		CC-1.342
N. Rutgers Ave/E. Keynote St	63" Discharge	33.82355	-118.12967	LACFCD	L	3.070	Long Beach	BI9A-4	BI9A-4-001		CC-1.419
E. Conant St/N. Charlemagne Ave	39" Discharge	33.82505	-118.12990	LACFCD	R	3.238	Long Beach	BI9A-4	BI9A-4-002		CC-1.586
Carson St/N. Bellflower Blvd	63" Discharge	33.83124	-118.13056	LACFCD	L	3.960	Long Beach	BI9A-4	BI9A-4-007		CC-2.309

Carson St/N. Greenbrier Rd	48" Discharge	33.83215	-118.13235	LACFCD	R	4.164	Long Beach	BI9A-4	BI9A-4-008		CC-2.512
Carson St/N. Greenbrier Rd	45" Discharge	33.83233	-118.13233	LACFCD	R	4.206	Long Beach	BI9A-4	BI9A-4-011		CC-2.555
Harvey Way/N. Greenbrier Rd	51" Discharge	33.83612	-118.13233	LACFCD	R	4.599	Long Beach	BI9A-4	BI9A-4-016		CC-2.948
Harvey Way/Heather Rd	81" Discharge	33.83613	-118.13205	LACFCD	L	4.602	Long Beach	BI9A-4	BI9A-4-017		CC-2.950
E. Centralia St/N. Greenbrier Rd	42" Discharge	33.83954	-118.13225	LACFCD	R	4.976	Long Beach	BI9A-3	BI9A-3-001		CC-3.324A
E. Centralia St/Heather Rd	42" Discharge	33.83951	-118.13206	LACFCD	L	4.976	Long Beach	BI9A-3	BI9A-3-002		CC-3.324B
E. Arbor Rd/Clark Ave	36" Discharge	33.84300	-118.13226	LACFCD	R	5.348	Long Beach	BI9A-3	BI9A-3-007		CC-3.696
E. Arbor Rd/Clark Ave	39" Discharge	33.84297	-118.13225	LACFCD	R	5.357	Long Beach	BI9A-3	BI9A-3-008		CC-3.705
4763 Fidler Ave/Del Amo Blvd	36" Discharge	33.84500	-118.13203	Long Beach	L	5.586	Long Beach	BI9A-3	BI9A-3-011		CC-3.934
Del Amo Blvd/Fidler Ave	138" Discharge	33.84697	-118.13223	LACFCD	C	5.807	Lakewood	BI9A-3	BI9A-3-014		CC-4.155
Civic Center/Clark Ave	36" Discharge	33.84922	-118.13228	LACFCD	R	6.052	Lakewood	BI9A-2	BI9A-2-002		CC-4.413
Candlewood St/Fidler Ave	57" Discharge	33.85360	-118.13219	LACFCD	L	6.521	Lakewood	BI9A-2	BI9A-2-009		CC-4.882
Candlewood St/Fidler Ave	126" Discharge	33.85379	-118.13221	LACFCD		6.586	Lakewood	BI9A-1	BI9A-1-002		CC-4.916
Candlewood St/Clark Ave	72" Discharge	33.85442	-118.13226	LACFCD	R	6.625	Lakewood	BI9A-1	BI9A-1-003		CC-4.986
5443 Fidler Ave/Michelson St	36" Discharge	33.85618	-118.13213	LACFCD	L	6.818	Lakewood	BI9A-1	BI9A-1-008	BI9A-1-007	CC-5.179
Clark Ave/Michelson St	126" Discharge	33.85684	-118.13225	LACFCD		6.889	Lakewood	BI9A-1	BI9A-1-010		CC-5.250
South St/Fidler Ave	39" Discharge	33.86017	-118.13219	LACFCD	L	7.255	Lakewood	BI9A-1	BI9A-1-013		CC-5.616A

South St/Dagwood Ave	57" Discharge	33.86017	-118.13232	LACFCD	R	7.255	Lakewood	BI9A-1	BI9A-1-014		CC-5.616B
											CC-5.652
South St/Dagwood Ave	132" Discharge	33.86046	-118.13225	LACFCD	C	7.290	Lakewood	BI9A-1	BI9A-1-017		CC-5.651
Hedda St/Fidler Ave	39" Discharge	33.86411	-118.13232	LACFCD	L	7.696	Lakewood	BI9A-1	BI9A-1-018		CC-6.057B
Hedda St/Fidler Ave	39" Discharge	33.86409	-118.13234	LACFCD	R	7.696	Lakewood	BI9A-1	BI9A-1-019		CC-6.057A
Ashworth St/Fidler Ave	75" Discharge	33.86780	-118.13235	LACFCD	R	8.109	Lakewood	BI9A-1	BI9A-1-022		CC-6.469
Ashworth St/Fidler Ave	132" Discharge	33.86836	-118.13233	Lakewood	L	8.162	Lakewood	BI9A-1	BI9A-1-025		CC-6.522
Clark Ave/Ashworth St	87" Discharge	33.86848	-118.13355	LACFCD		8.282	Lakewood	BI9A-1	BI9A-1-026		CC-6.643
DEL AMO CHANNEL											
Del Amo Blvd/Whitewood Ave	36" Discharge	33.84696	-118.13552	UNK	L	0.286	Lakewood	BI9B-2	BI9B-2-003	BI9B-2-003	DAC-0.331
Del Amo Blvd/Faculty Ave	36" Discharge	33.84696	-118.13695	LACFCD	L	0.421	Lakewood	BI9B-2	BI9B-2-004	BI9B-2-004	DAC-0.466
Del Amo Blvd/Graywood Ave	42" Discharge	33.84698	-118.13783	LACFCD	L	0.508	Lakewood	BI9B-2	BI9B-2-005	BI9B-2-005	DAC-0.554
Del Amo Blvd/Graywood Ave	36" Discharge	33.84699	-118.13797	LACFCD	L	0.516	Lakewood	BI9B-2	BI9B-2-006	BI9B-2-005	DAC-0.561
Del Amo Blvd/Hazelbrook Ave	36" Discharge	33.84694	-118.19539	LACFCD	L	0.664	Lakewood	BI9B-2	BI9B-2-010	BI9B-2-010	DAC-0.709
Del Amo Blvd/Blackthorne Ave	36" Discharge	33.84697	-118.14041	LACFCD	R	0.737	Lakewood	BI9B-2	BI9B-2-011	BI9B-2-011	DAC-0.782

Del Amo Blvd/N. Blackthorne Ave	18" Discharge	33.84698	-118.14024	LACFCD	L	0.7388	Lakewood	BI9B-2	BI9B-2-012		DAC-0.784
Del Amo Blvd/N. Pepperwood Ave	36" Discharge	33.84699	-118.14126	LACFCD	L	0.820	Lakewood	BI9B-2	BI9B-2-014	BI9B-2-014	DAC-0.865
Del Amo Blvd/Lakewood Blvd	36" Discharge	33.84701	-118.14200	LACFCD	L	0.902	Lakewood	BI9B-2	BI9B-2-016	BI9B-2-016	DAC-0.947
Del Amo Blvd/Lakewood Blvd	45" Discharge	33.84699	-118.14226	LACFCD	L	0.917	Lakewood	BI9B-2	BI9B-2-018	BI9B-2-018	DAC-0.963
Del Amo Blvd/Lakewood Blvd	36" Discharge	33.84700	-118.14255	UNK	L	1.960	Lakewood	BI9B-2	BI9B-2-020	BI9B-2-020	DAC-1.004
Del Amo Blvd/Hayter Ave	48" Discharge	33.84702	-118.14598	LACFCD	L	1.253	Lakewood	BI9B-2	BI9B-2-024	BI9B-2-024	DAC-1.253
Del Amo Blvd/Hayter Ave	45" Discharge	33.84684	-118.14629	LACFCD	R	1.289	Lakewood	BI9B-2	BI9B-2-027	BI9B-2-027	DAC-1.334B
Del Amo Blvd/Downey Ave	48" Discharge	33.84703	-118.15051	LACFCD	R	1.666	Lakewood	BI9B-2	BI9B-2-029	BI9B-2-029	DAC-1.711
Downey Ave/Eckleson St	114" Discharge	33.84884	-118.15047	LACFCD		1.911	Lakewood	BI9B-2	BI9B-2-032		DAC-1.911
DOWNEY CHANNEL											
Candlewood St/Downey Ave	42" Discharge	33.853717	-118.150524	UNK	R	0.551	Lakewood	BI447A	BI447A-003	BI447A-003	DNC-0.5514
Candlewood St/Downey Ave	42" Discharge	33.854243	-118.150513	UNK	R	0.609	Lakewood	BI447A	BI447A-005	BI447-005	DNC-0.6093
Candlewood St/Downey Ave	42" Discharge	33.854297	-118.150527	Lakewood	R	0.618	Lakewood	BI447A	BI447A-006	BI447A-006	DNC-0.618
Candlewood St/Downey Ave	72" Discharge	33.854368	-118.150421	Lakewood	L	0.624	Lakewood	BI447A	BI447A-007	BI447A-007	DNC-0.624
Saint Pancratius Pl/Verdura Ave	117" Discharge	33.858402	-118.150459	Lakewood	L	1.072	Lakewood	BI447A	BI447A-008		DNC-1.072B

Saint Pancratius Pl/Verdura Ave	117" Discharge	33.858405	-118.15051	Lakewood	R	1.072	Lakewood	BI447A	BI447A-009		DNC-1.072A
Candlewood St/Downey Ave	72" Discharge	33.854382	-118.15029	Lakewood		0.633	Lakewood	BI447A	BI447A-010		DNC-0.796
Obispo Ave/Eckleson St	36" Discharge	33.849078	-118.154687	LACFCD	R	2.332	Lakewood	BI9B-1	BI9B-1-004		DNC-2.332
Obispo Ave/Eckleson St	60" Discharge	33.849074	-118.154747	LACFCD	R	2.336	Lakewood	BI9B-1	BI9B-1-005		DNC-2.336
Obispo Ave/Eckleson St	36" Discharge	33.849083	-118.154825	UNK	R	2.347	Lakewood	BI9B-1	BI9B-1-006		DNC-2.347
Obispo Ave/Eckleson St	48" Discharge	33.849183	-118.154825	UNK	L	2.347	Lakewood	BI9B-1	BI9B-1-007		DNC-2.347
Paramount Blvd/Eckleson St	66" Discharge	33.849146	-118.159614	LACFCD	L	2.804	Lakewood	BI9B-1	BI9B-1-008	BI9B-1-008	DNC-2.804A
Paramount Blvd/Eckleson St	66" Discharge	33.849096	-118.159614	LACFCD	R	2.804	Lakewood	BI9B-1	BI9B-1-009	BI9B-1-008	DNC-2.804B
LOS CERRITOS CHANNEL											
Knoxville Ave/E. Atherton St	36" Discharge (1 of 3)	33.78867	-118.10368	Long Beach	R	7.386	Long Beach	LCERR-5	LCERR-5-003		LCC-0.030
Knoxville Ave/E. Atherton St	36" Discharge (2 of 3)	33.78884	-118.10370	Long Beach	R	7.386	Long Beach	LCERR-5	LCERR-5-004		LCC-0.031
Knoxville Ave/E. Atherton St	36" Discharge (3 of 3)	33.78902	-118.10369	Long Beach	R	7.387	Long Beach	LCERR-5	LCERR-5-005		LCC-0.032
Vuelta Grande Ave/E. Atherton St	42" Discharge	33.78917	-118.10331	Long Beach	L	7.417	Long Beach	LCERR-5	LCERR-5-006		LCC-0.062
2040 Knoxville Ave	48" Discharge (1 of 3)	33.79319	-118.10369	LACFCD	R	7.876	Long Beach	LCERR-5	LCERR-5-007		LCC-0.521
2040 Knoxville Ave	48" Discharge (2 of 3)	33.79336	-118.10368	LACFCD	R	7.877	Long Beach	LCERR-5	LCERR-5-008		LCC-0.522

2040 Knoxville Ave	48" Discharge (3 of 3)	33.79356	-118.10369	LACFCD	R	7.878	Long Beach	LCERR-5	LCERR-5-009		LCC-0.523
Vuelta Grande Ave/N. Hidden Ln	42" Discharge	33.79304	-118.10333	LACFCD	L	7.899	Long Beach	LCERR-5	LCERR-5-010		LCC-0.544
Vuelta Grande Ave/E. Stearns St	48" Discharge	33.79565	-118.10330	LACFCD	L	8.135	Long Beach	LCERR-4	LCERR-4-001		LCC-0.780
Vuelta Grande Ave/E. la Marimba St	36" Discharge	33.79793	-118.10332	Long Beach	L	8.387	Long Beach	LCERR-4	LCERR-4-004		LCC-1.032
2372 Knoxville Ave/E. Cantel St	36" Discharge	33.80000	-118.10472	Long Beach	R	8.682	Long Beach	LCERR-4	LCERR-4-007		LCC-1.327
6400 Willow St/Palo Verde Ave	42" Discharge	33.80262	-118.10779	Long Beach	L	9.071	Long Beach	LCERR-4	LCERR-4-008		LCC-1.716
6220 Willow St/Palo Verde Ave	48" Discharge	33.80304	-118.10890	PVRT	R	9.181	Long Beach	LCERR-4	LCERR-4-009		LCC-1.826
Spring St/San Anseline Ave	66" Discharge	33.81035	-118.12130	LACFCD	L	0.725	Long Beach	LCERR-3	LCERR-3-002		LCC-3.388
Spring St/Bellflower Blvd	36" Discharge	33.81043	-118.12552	LACFCD	L	1.115	Long Beach	LCERR-3	LCERR-3-006		LCC-3.778
Spring St/Montair Ave	45" Discharge	33.81014	-118.12680	Long Beach	R	1.230	Long Beach	LCERR-3	LCERR-3-009		LCC-3.892
Heather Rd/Spring St	45" Discharge	33.81026	-118.13101	UNK	R	0.135	Long Beach	LCERR-2	LCERR-2-002		LCC-4.301A
Clark Ave/Spring St	96" Discharge	33.81034	-118.13376	LACFCD	C	0.392	Long Beach	LCERR-2	LCERR-2-004		LCC-4.558

N. Lakewood Blvd/E. Spring St	96" Discharge	33.81303	-118.13950	LACFCD		1.077	Long Beach	LCERR-2	LCERR-2-007		LCC-5.221
Lakewood Blvd/Spring St	36" Discharge	33.81306	-118.13949	LACFCD	L	1.045	Long Beach	LCERR-2	LCERR-2-005		LCC-5.229
Spring St/Lakewood Blvd	54" Discharge	33.81313	-118.14033	LACFCD	R	1.135	Long Beach	LCERR-2	LCERR-2-006		LCC-5.319
Spring St/Lakewood Blvd	108" Discharge	33.81316	-118.14235	LACFCD	L	1.322	Long Beach	LCERR-1	LCERR-1-001		LCC-5.506
Spring St/Lakewood Blvd	120" Discharge	33.81288	-118.14249	LACFCD	R	1.341	Long Beach	LCERR-1	LCERR-1-002		LCC-5.525
WARDLOW CHANNEL											
Clark Ave/Keynote St	228" Discharge	33.82331	-118.13408	LACFCD		5.885	Long Beach	BI9C	BI9C-001		WC-5.883
Lakewood Blvd	36" Discharge	33.82333	-118.13822	LACFCD	L	6.194	Long Beach	BI9C	BI9C-004		WC-6.264
Lakewood Blvd	42" Discharge	33.82332	-118.14130	LACFCD	L	6.482	Long Beach	BI9C	BI9C-005		WC-6.555
Lakewood Blvd	228" Discharge	33.82332	-118.14165	LACFCD		6.520	Long Beach	BI9A-5	BI9A-5-017		WC-6.586
PALO VERDE CHANNEL											
WOODRUFF AVE / SPRING ST	54" Discharge	33.81090	-118.11427	Long Beach	R	0.430	Long Beach	BI9E-2	BI9E-2-006		PVC-0.430
3055 SHADYPARK DR/McNab Ave	36" Discharge	33.81224	-118.11410	Long Beach	L	0.584	Long Beach	BI9E-2	BI9E-2-007		PVC-0.584

LOS CERRITOS DRAIN LINE E / LOS COYOTES DIA/E.Pagentry St	36" Discharge (1 of 2)	33.81329	-118.11409	LACFCD	R	0.723	Long Beach	BI9E-2	BI9E-2-009		PVC-0.723
LOS CERRITOS DRAIN LINE E / LOS COYOTES DIA/E.Pagentry St	36" Discharge (2 of 2)	33.81359	-118.11407	LACFCD	R	0.727	Long Beach	BI9E-2	BI9E-2-010		PVC-0.727
LOS COYOTES DIA / GONDAR AVE	48" Discharge	33.81550	-118.11258	LACFCD	R	0.987	Long Beach	BI9E-2	BI9E-2-014		PVC-0.987
6228 WARDLOW RD/Los Coyotes Dia W	36" Discharge	33.81864	-118.10980	Long Beach	R	1.426	Long Beach	BI9E-2	BI9E-2-016		PVC-1.426
Los Coyotes Dia/Conquista Ave	42" Discharge	33.82054	-118.10802	Long Beach	L	1.684	Long Beach	BI9E-2	BI9E-2-019		PVC-1.684
PALO VERDE AVE / LOS COYOTES DIA	36" Discharge (1 of 2)	33.82110	-118.10793	LACFCD	L	1.748	Long Beach	BI9E-2	BI9E-2-021		PVC-1.747
PALO VERDE AVE / LOS COYOTES DIA	36" Discharge (2 of 2)	33.82110	-118.10793	LACFCD	L	1.748	Long Beach	BI9E-2	BI9E-2-022		PVC-1.748
3778 PALO VERDE AVE/Harco St	36" Discharge	33.82715	-118.10795	LACFCD	L	2.434	Long Beach	BI9E-2	BI9E-2-026		PVC-2.434
3788 CONQUISTA AVE/Harco St	48" Discharge	33.82758	-118.10811	LACFCD	R	2.470	LA County(LBC-254)	BI9E-2	BI9E-2-027		PVC-2.470
Palo Verde Ave/E. Parkcrest St	72" Discharge	33.83025	-118.10793	LACFCD	L	2.778	Los Angeles County	BI9E-2	BI9E-2-028		PVC-2.778A
	72" Discharge	33.83026	-118.10793	LACFCD	L	2.7779	Los Angeles County	BI9E-2	BI9E-2-029		PVC-2.778B
Carson St/Palo Verde Ave	48" Discharge	33.83232	-118.10832	Long Beach	L	3.008	Long Beach	BI9E-1	BI9E-1-034		PVC-3.008
Harvey Way/Palo Verde Ave	36" Discharge	33.83585	-118.10829	LACFCD	L	3.418	Lakewood	BI9E-1	BI9E-1-006	BI9E-1-006	PVC-3.417
Harvey Way/Palo Verde Ave	36" Discharge	33.83592	-118.10840	LACFCD	R	3.418	Lakewood	BI9E-1	BI9E-1-007	BI9E-1-007	PVC-3.418

Harvey Way/Palo Verde Ave	36" Discharge	33.83613	-118.10839	LACFCD	R	3.438	Lakewood	BI9E-1	BI9E-1-008	BI9E-1-008	PVC-3.437
Centralia St/Palo Verde Ave	48" Discharge	33.83948	-118.10822	LACFCD	L	3.827	Lakewood	BI9E-1	BI9E-1-013	BI9E-1-013	PVC-3.827
Henrilee Lateral/Conquista Ave	6'x7' Trap Channel Discharge	33.84132	-118.10834	LACFCD	R	4.017	Lakewood	BI9E-1	BI9E-1-032	BI9E-1-032	PVC-4.017
Turnergrove Dr/Silva St	48" Discharge (1 of 2)	33.84822	-118.10873	LACFCD	R	4.793	Lakewood	BI9E-1	BI9E-1-025	BI9E-1-025	PVC-4.793
Turnergrove Dr/Silva St	48" Discharge (2 of 2)	33.84824	-118.10873	LACFCD	R	4.795	Lakewood	BI9E-1	BI9E-1-026	BI9E-1-025	PVC-4.795
Palo Verde Ave/Carfax Ave	48" Discharge	33.84925	-118.10918	LACFCD	L	4.905	Lakewood	BI9E-1	BI9E-1-027	BI9E-1-027	PVC-4.905
Candlewood St/Carfax Ave	51" Discharge	33.85309	-118.11127	LACFCD	L	5.368	Lakewood	BI9E-1	BI9E-1-030	BI9E-1-030	PVC-5.368
Candlewood St/Carfax Ave	54" Discharge	33.85313	-118.11142	LACFCD	R	5.374	Lakewood	BI9E-1	BI9E-1-031	BI9E-1-031	PVC-5.374
South St/Canehill Ave	63" Discharge	33.85820	-118.11151	LACFCD	L	5.960	Lakewood	BI446B	BI446B-004	BI446B-004	PVC-5.960
South St/Canehill Ave	42" Discharge	33.85854	-118.11148	LACFCD	L	6.004	Lakewood	BI446B	BI446B-007	BI446B-007	PVC-6.004
Snowden Ave/Charlwood St	36" Discharge	33.85921	-118.11171	LACFCD	R	6.080	Lakewood	BI446B	BI446B-008	BI446B-000	PVC-6.080
Allington St/Canehill Ave	72" Discharge	33.86546	-118.11160	LACFCD	L	6.792	Lakewood	BI446B	BI446B-011	BI446B-011	PVC-6.793B
Allington St/Canehill Ave	75" Discharge	33.86546	-118.11161	LACFCD	R	6.792	Lakewood	BI446B	BI446B-012	BI446B-011	PVC-6.793A

Minor Outfalls (12-36 inches) in the Los Cerritos Channel Watershed

DISCHARGE POINT	EFFLUENT DESCRIPTION	DISCHARGE POINT LATITUDE	DISCHARGE POINT LONGITUDE	OWNER	SIDE (L/R)	DISTANCE FROM CHANNEL STARTING POINT (km)	JURISDICTION	MODEL SUB WATERSHED	UNIQUE ID	PHOTO UNIQUE ID	CHANNEL UNIQUE ID
CLARK CHANNEL											
Charlemagne Ave/Spring St	24" Discharge	33.81081	-118.13000	LACFCD	R	1.662	Long Beach	LCERR-3	LCERR-3-011		CC-0.009A
Rutgers Ave/Spring St	18" Discharge	33.81079	-118.12973	LACFCD	L	1.662	Long Beach	LCERR-3	LCERR-3-012		CC-0.009B
N. Charlemagne Ave/E. Wardlow Rd	18" Discharge	33.81895	-118.12994	Long Beach	R	2.565	Long Beach	BI9A-5	BI9A-5-008		CC-0.914B
E. Wardlow Rd/N. Rutgers Ave	18" Discharge	33.81897	-118.12970	Long Beach	L	2.565	Long Beach	BI9A-5	BI9A-5-009		CC-0.914A
Stanbridge Ave/E. Wardlow Rd	24" Discharge	33.81936	-118.12971	LACFCD	L	2.612	Long Beach	BI9A-5	BI9A-5-010		CC-0.961
E. Monlaco Rd/N. Rutgers Ave	18" Discharge	33.82216	-118.12968	Long Beach	L	2.924	Long Beach	BI9A-5	BI9A-5-012		CC-1.273
E. Monlaco Rd/N. Rutgers Ave	18" Discharge	33.82236	-118.12967	Long Beach	L	2.941	Long Beach	BI9A-5	BI9A-5-013		CC-1.290A
E. Monlaco Rd/N. Charlemagne Ave	18" Discharge	33.82233	-118.12995	Long Beach	R	2.941	Long Beach	BI9A-5	BI9A-5-014		CC-1.290B
E. Conant St/N. Charlemagne Ave	15" Discharge	33.82498	-118.12992	Long Beach	R	3.239	Long Beach	BI9A-4	BI9A-4-003		CC-1.587
E. Conant St/N. Charlemagne Ave	15" Discharge	33.82517	-118.12992	Long Beach	R	3.256	Long Beach	BI9A-4	BI9A-4-004		CC-1.605
N. Charlemagne Ave/E. Brittain St	24" Discharge	33.82604	-118.12991	Long Beach	R	3.354	Long Beach	BI9A-4	BI9A-4-005		CC-1.703
Carson St/N. Bellflower Blvd	12" Discharge	33.83070	-118.12970	LACFCD	L	3.865	Long Beach	BI9A-4	BI9A-4-006		CC-2.214
Carson St/N. Greenbrier Rd	24" Discharge	33.83223	-118.13231	Long Beach	R	4.168	Long Beach	BI9A-4	BI9A-4-009		CC-2.517A
Carson St/Heather Rd	24" Discharge	33.83223	-118.13210	Long Beach	L	4.168	Long Beach	BI9A-4	BI9A-4-010		CC-2.517B
Carson St/N. Greenbrier Rd	24" Discharge	33.83246	-118.13231	Long Beach	R	4.211	Long Beach	BI9A-4	BI9A-4-012		CC-2.560A
Carson St/Heather Rd	24" Discharge	33.83246	-118.13209	Long Beach	L	4.211	Long Beach	BI9A-4	BI9A-4-013		CC-2.560B
Harvey Way/Heather Rd	18" Discharge	33.83606	-118.13204	Long Beach	L	4.598	Long Beach	BI9A-4	BI9A-4-014		CC-2.947A

Harvey Way/Heather Rd	18" Discharge	33.83606	-118.13232	Long Beach	R	4.598	Long Beach	BI9A-4	BI9A-4-015		CC-2.947B
Harvey Way/N. Greenbrier Rd	18" Discharge	33.83620	-118.13231	Long Beach	R	4.610	Long Beach	BI9A-4	BI9A-4-018		CC-2.958A
Harvey Way/Heather Rd	18" Discharge	33.83620	-118.13205	Long Beach	L	4.610	Long Beach	BI9A-4	BI9A-4-019		CC-2.958B
E. Centralia St/N. Greenbrier Rd	18" Discharge	33.83969	-118.13227	Long Beach	R	4.994	Long Beach	BI9A-3	BI9A-3-003		CC-3.342A
E. Centralia St/Heather Rd	18" Discharge	33.83967	-118.13203	Long Beach	L	4.994	Long Beach	BI9A-3	BI9A-3-004		CC-3.342B
E. Centralia St/Pan American Park	15" Discharge	33.84087	-118.13202	Long Beach	L	5.129	Long Beach	BI9A-3	BI9A-3-005		CC-3.477
E. Arbor Rd/Pan American Park	15" Discharge	33.84154	-118.13203	Long Beach	L	5.205	Long Beach	BI9A-3	BI9A-3-006		CC-3.554
E. Arbor Rd/N. Charlemagne	24" Discharge	33.84312	-118.13202	Long Beach	L	5.379	Long Beach	BI9A-3	BI9A-3-009		CC-3.728
E. Arbor Rd./Fidler Ave	30" Discharge	33.84351	-118.13202	Long Beach	L	5.416	Long Beach	BI9A-3	BI9A-3-010		CC-3.764
Del Amo Blvd/Fidler Ave	33" Discharge	33.84693	-118.13217	LACFCD	L	5.801	Lakewood	BI9A-3	BI9A-3-012	BI9A-3-012	CC-4.149
Del Amo Blvd/Fidler Ave	18" Discharge	33.84701	-118.13216	UNK	L	5.802	Lakewood	BI9A-3	BI9A-3-013	BI9A-3-013	CC-4.150
Del Amo Blvd/Civic Center Way	30" Discharge	33.84721	-118.13220	UNK	L	5.834	Lakewood	BI9A-2	BI9A-2-001		CC-4.182
Civic Center/Del Amo Blvd	24" Discharge	33.84984	-118.13231	UNK	R	6.123	Lakewood	BI9A-2	BI9A-2-003		CC-4.484
Civic Center Way/Hardwick St	30" Discharge	33.85077	-118.13222	LACFCD	L	6.215	Lakewood	BI9A-2	BI9A-2-004		CC-4.575
Civic Center Way/Candlewood St	12" Discharge	33.85243	-118.13229	UNK	R	6.401	Lakewood	BI9A-2	BI9A-2-007		CC-4.762
Civic Center Way/Candlewood St	18" Discharge	33.85268	-118.13229	Lakewood	R	6.422	Lakewood	BI9A-2	BI9A-2-008		CC-4.783
Candlewood St/Clark Ave	18" Discharge	33.85382	-118.13222	LACFCD	R	6.545	Lakewood	BI9A-1	BI9A-1-001		CC-4.906
Candlewood St/Clark Ave	12" Discharge	33.85493	-118.13235	UNK	R	6.674	Lakewood	BI9A-1	BI9A-1-004		CC-5.035
Clark Ave/Michelson St	12" Discharge	33.85577	-118.13230	UNK	R	6.774	Lakewood	BI9A-1	BI9A-1-005		CC-5.135
Clark Ave/Michelson St	12" Discharge	33.85594	-118.13231	UNK	R	6.791	Lakewood	BI9A-1	BI9A-1-006		CC-5.151
Clark Ave/Michelson St	12" Discharge	33.85612	-118.13231	UNK	R	6.807	Lakewood	BI9A-1	BI9A-1-007		CC-5.168
Clark Ave/Michelson St	12" Discharge	33.85631	-118.13231	UNK	R	6.834	Lakewood	BI9A-1	BI9A-1-009		CC-5.194
Fidler Ave/Bigelow St	12" Discharge	33.85765	-118.13232	UNK	R	6.981	Lakewood	BI9A-1	BI9A-1-011		CC-5.342
Clark Ave/South St	24" Discharge	33.85968	-118.13228	Lakewood	R	7.192	Lakewood	BI9A-1	BI9A-1-012		CC-5.553
South St/Dagwood Ave	20" Discharge	33.86046	-118.13233	UNK	R	7.289	Lakewood	BI9A-1	BI9A-1-015		CC-5.649
South St/Fidler Ave	30" Discharge	33.86045	-118.13219	UNK	L	7.291	Lakewood	BI9A-1	BI9A-1-016		CC-5.652
Hedda St/Fidler Ave	15" Discharge	33.86417	-118.13221	UNK	L	7.697	Lakewood	BI9A-1	BI9A-1-020		CC-6.058

Hedda St/Fidler Ave	15" Discharge	33.86427	-118.13221	UNK	L	7.708	Lakewood	BI9A-1	BI9A-1-021		CC-6.089
Ashworth St/Fidler Ave	15" Discharge	33.86783	-118.13225	Lakewood	L	8.112	Lakewood	BI9A-1	BI9A-1-023		CC-6.472
Ashworth St/Fidler Ave	15" Discharge	33.86799	-118.13227	Lakewood	L	7.708	Lakewood	BI9A-1	BI9A-1-024		CC-6.485
DEL AMO CHANNEL											
Del Amo Blvd/Fidler Ave	24" Discharge	33.84697	-118.13290	UNK	L	0.079	Lakewood	BI9B-2	BI9B-2-001	BI9B-2-001	DAC-0.079
Del Amo Blvd/Whitewood Ave	24" Discharge	33.84697	-118.13540	Lakewood	L	0.283	Lakewood	BI9B-2	BI9B-2-002	BI9B-2-002	DAC-0.328
Del Amo Blvd/Graywood Ave	18" Discharge	33.84680	-118.13791	Long Beach	R	0.517	Lakewood	BI9B-2	BI9B-2-007	BI9B-2-007	DAC-0.562
Del Amo Blvd/Graywood Ave	15" Discharge	33.84680	-118.13827	Long Beach	R	0.538	Lakewood	BI9B-2	BI9B-2-008	BI9B-2-008	DAC-0.583
Del Amo Blvd/Graywood Ave	15" Discharge	33.84680	-118.13930	Long Beach	R	0.554	Lakewood	BI9B-2	BI9B-2-009	BI9B-2-009	DAC-0.599
Del Amo Blvd/Hazelbrook Ave	36" Discharge	33.84694	-118.13953		L	0.6642	Lakewood	BI9B-2	BI9B-2-010		DAC-0.709
Del Amo Blvd/Blackthorne Ave	18" Discharge	33.84680	-118.14030	Long Beach	R	0.742	Lakewood	BI9B-2	BI9B-2-013	BI9B-2-013	DAC-0.784
Del Amo Blvd/N. Blackthorne Ave	18" Discharge	33.84698	-118.14024	LACFCD	L	0.739	Lakewood	BI9B-2	BI9B-2-012	BI9B-2-012	DAC-0.787
Del Amo Blvd/N. Pepperwood Ave	15" Discharge	33.84681	-118.14139	Long Beach	R	0.836	Lakewood	BI9B-2	BI9B-2-015	BI9B-2-015	DAC-0.881
Del Amo Blvd/Lakewood Blvd	15" Discharge	33.84682	-118.14225	Long Beach	R	0.908	Lakewood	BI9B-2	BI9B-2-017	BI9B-2-017	DAC-0.953
Del Amo Blvd/Lakewood Blvd	18" Discharge	33.84700	-118.14241	Long Beach	L	0.924	Lakewood	BI9B-2	BI9B-2-019	BI9B-2-019	DAC-0.970
Del Amo Blvd/Lakewood Blvd	12" Discharge	33.84689	-118.14267	Lakewood	L	1.005	Lakewood	BI9B-2	BI9B-2-021	BI9B-2-021	DAC-1.005
Del Amo Blvd/Lakewood Blvd	18" Discharge	33.84681	-118.14264	Long Beach	R	1.961	Lakewood	BI9B-2	BI9B-2-022	BI9B-2-021	DAC-1.006
Del Amo Blvd/Oliva Ave	30" Discharge	33.84683	-118.14493	UNK	R	1.207	Lakewood	BI9B-2	BI9B-2-023	BI9B-2-023	DAC-1.252
Del Amo Blvd/Hayter Ave	30" Discharge	33.84686	-118.14618	UNK	R	1.289	Lakewood	BI9B-2	BI9B-2-026	BI9B-2-026	DAC-1.324
Del Amo Blvd/Hayter Ave	30" Discharge	33.84701	-118.14623	UNK	L	1.279	Lakewood	BI9B-2	BI9B-2-025	BI9B-2-025	DAC-1.334A
Del Amo Blvd/Verdura Ave	24" Discharge	33.84705	-118.14970	UNK	L	1.614	Lakewood	BI9B-2	BI9B-2-028	BI9B-2-028	DAC-1.659
Del Amo Blvd/Downey Ave	18" Discharge	33.84723	-118.15061	UNK	R	1.693	Lakewood	BI9B-2	BI9B-2-030	BI9B-2-030	DAC-1.738
DOWNEY CHANNEL											
Hardwick St/Downey Ave	30" Discharge	33.85025	-118.15041	UNK	L	0.165	Lakewood	BI447A	BI447A-001		DNC-0.165
Hardwick St/Downey Ave	30" Discharge	33.85031	-118.15054	UNK	R	0.173	Lakewood	BI447A	BI447A-002	BI447A-002	DNC-0.173
Candlewood St/Downey Ave	24" Discharge	33.85372	-118.15039	UNK	L	0.554	Lakewood	BI447A	BI447A-004	BI447A-004	DNC-0.554

Downey Ave/Eckleson St	18" Discharge	33.84919	-118.15089	Lakewood	L	1.985	Lakewood	BI9B-1	BI9B-1-001		DNC-1.985
Downey Ave/Eckleson St	21" Discharge	33.84920	-118.15121	UNK	L	2.019	Lakewood	BI9B-1	BI9B-1-002		DNC-2.019
Downey Ave/Eckleson St	18" Discharge	33.84908	-118.15121	UNK	R	2.022	Lakewood	BI9B-1	BI9B-1-003		DNC-2.022
LOS CERRITOS CHANNEL											
Knoxville Ave/E. el Progreso St	24" Discharge	33.79599	-118.10369	Long Beach	R	8.172	Long Beach	LCERR-4	LCERR-4-002		LCC-0.817
Vuelta Grande Ave/Stearns St	24" Discharge	33.79599	-118.10328	Long Beach	L	8.173	Long Beach	LCERR-4	LCERR-4-003		LCC-0.818
Vuelta Grande Ave/Los Arcos St	33" Discharge	33.79944	-118.10356	Long Beach	L	8.555	Long Beach	LCERR-4	LCERR-4-005		LCC-1.199
Vuelta Grande Ave/Ladoga Ave	21" Discharge	33.80006	-118.10427	LACFCD	L	8.649	Long Beach	LCERR-4	LCERR-4-006		LCC-1.294
Vuelta Grande Ave/Snowden Ave	24" Discharge	33.80557	-118.11188	Long Beach	L	9.678	Long Beach	LCERR-4	LCERR-4-010		LCC-2.323
Spring St/Lomina Ave	21" Discharge	33.81012	-118.12110	LACFCD	R	0.721	Long Beach	LCERR-3	LCERR-3-001		LCC-3.384
Spring St/San Anseline Ave	18" Discharge	33.81036	-118.12163	LACFCD	L	0.759	Long Beach	LCERR-3	LCERR-3-003		LCC-3.422
Spring St/Bellflower Blvd	21" Discharge	33.81013	-118.12411	LACFCD	R	1.000	Long Beach	LCERR-3	LCERR-3-004		LCC-3.663
Spring St/Bellflower Blvd	15" Discharge	33.81041	-118.12514	LACFCD	L	1.085	Long Beach	LCERR-3	LCERR-3-005		LCC-3.748
Spring St/Montair Ave	15" Discharge	33.81042	-118.12562	LACFCD	L	1.135	Long Beach	LCERR-3	LCERR-3-007		LCC-3.798
Spring St/Montair Ave	18" Discharge	33.81041	-118.12674	Long Beach	L	1.222	Long Beach	LCERR-3	LCERR-3-008		LCC-3.885
Charlemagne Ave/Spring St	15" Discharge	33.81051	-118.13042	Long Beach	L	0.078	Long Beach	LCERR-2	LCERR-2-001		LCC-4.245
Heather Rd/Spring St	24" Discharge	33.81023	-118.13107	Long Beach	R	0.135	Long Beach	LCERR-2	LCERR-2-003		LCC-4.301B
WARDLOW CHANNEL											
Clark Ave/Keynote St	18" Discharge	33.82335	-118.13495	Long Beach	L	5.885	Long Beach	BI9C	BI9C-002		WC-5.964
Clark Ave/Keynote St	18" Discharge	33.82337	-118.13574	Long Beach	L	5.918	Long Beach	BI9C	BI9C-003		WC-6.038
Lakewood Blvd	18" Discharge	33.82331	-118.14151	Long Beach	L	6.519	Lakewood	BI9A-5	BI9A-5-016		WC-6.571
SOUTH OF ATHERTON											
Vuelta Grande Ave/Espanita St	30" Discharge	33.78581	-118.10343	Long Beach	L	7.049	Long Beach	LCERR-5	LCERR-5-001		LCC-7049.1
Vuelta Grande Ave/E. Driscoll St	30" Discharge	33.78644	-118.10384	Long Beach	R	7.116	Long Beach	LCERR-5	LCERR-5-002		LCC-7116.2
PALO VERDE CHANNEL											
WOODRUFF AVE / VUELTA GRANDE AVE	24" Discharge	33.80836	-118.11435	Long Beach	R	0.156	Long Beach	BI9E-2	BI9E-2-001		PVC-0.156

6036 SPRING ST/Woodruff Ave	15" Discharge	33.81039	-118.11423	Long Beach	L	0.377	Long Beach	BI9E-2	BI9E-2-002		PVC-0.377
WOODRUFF AVE / SPRING ST	18" Discharge	33.81039	-118.11432	Long Beach	R	0.378	Long Beach	BI9E-2	BI9E-2-003		PVC-0.378
SPRING ST / WOODRUFF AVE	18" Discharge	33.81064	-118.11431	LACFCD	R	0.408	Long Beach	BI9E-2	BI9E-2-004		PVC-0.408
SPRING ST / WOODRUFF AVE	15" Discharge	33.81065	-118.11431	Long Beach	R	0.408	Long Beach	BI9E-2	BI9E-2-005		PVC-0.408
3128 LOS COYOTES DIA/E. Pageantry St	24" Discharge	33.81311	-118.11411	LACFCD	R	0.705	Long Beach	BI9E-2	BI9E-2-008		PVC-0.705
3143 LOS COYOTES DIA/E. Pagentry St	30" Discharge	33.81394	-118.11397	Long Beach	R	0.775	Long Beach	BI9E-2	BI9E-2-011		PVC-0.775
3142 LOS COYOTES DIA/E. Pagentry St	21" Discharge	33.81406	-118.11376	Long Beach	L	0.792	Long Beach	BI9E-2	BI9E-2-012		PVC-0.792
3169 LOS COYOTES DIA/N. Hayfield Dr	15" Discharge	33.81449	-118.11347	Long Beach	R	0.848	Long Beach	BI9E-2	BI9E-2-013		PVC-0.848
3302 LOS COYOTES DIA/Metz St	21" Discharge	33.81666	-118.11144	Long Beach	L	1.154	Long Beach	BI9E-2	BI9E-2-015		PVC-1.154
3425 LOS COYOTES DIA/Canehill Ave	21" Discharge	33.81940	-118.10913	Long Beach	R	1.527	Long Beach	BI9E-2	BI9E-2-017		PVC-1.527
LOS COYOTES DIA / PALO VERDE AVE	21" Discharge	33.82048	-118.10807	Long Beach	L	1.676	Long Beach	BI9E-2	BI9E-2-018		PVC-1.676
LOS COYOTES DIA / PALO VERDE AVE	18" Discharge	33.82081	-118.10792	LACFCD	L	1.721	Long Beach	BI9E-2	BI9E-2-020		PVC-1.721
PALO VERDE AVE/E. Monlaco Rd	24" Discharge	33.82224	-118.10796	Long Beach	R	1.878	Long Beach	BI9E-2	BI9E-2-023		PVC-1.878
Palo Verde Ave/E. Keynote St	27" Discharge	33.82280	-118.10793	Long Beach	L	1.937	Long Beach	BI9E-2	BI9E-2-024		PVC-1.937
3702 CONQUISTA AVE/Palo Verde Ave	27" Discharge	33.82505	-118.10798	Long Beach	R	2.201	Long Beach	BI9E-2	BI9E-2-025		PVC-2.201
Carson St/Palo Verde Ave	12" Discharge	33.83210	-118.10836	Long Beach		2.985	Long Beach	BI9E-1	BI9E-1-001		PVC-2.985
Carson St/Palo Verde Ave	18" Discharge	33.83235	-118.10832	Long Beach	L	3.009	Long Beach	BI9E-1	BI9E-1-002		PVC-3.009
Carson St/Palo Verde Ave	18" Discharge	33.83241	-118.10833	UNK	L	3.030	Lakewood	BI9E-1	BI9E-1-033	BI9E-1-033	PVC-3.030
Carson St/Palo Verde Ave	30" Discharge	33.83240	-118.10843	UNK	R	3.031	Lakewood	BI9E-1	BI9E-1-003	BI9E-1-003	PVC-3.031
4139 Palo Verde Ave/Harvey Way	18" Discharge	33.83433	-118.10831	UNK	L	3.228	Lakewood	BI9E-1	BI9E-1-004	BI9E-1-004	PVC-3.228
4222 Conquista Ave/Harvey Way	18" Discharge	33.83500	-118.10841	UNK	R	3.300	Lakewood	BI9E-1	BI9E-1-005	BI9E-1-005	PVC-3.300
Harvey Way/Palo Verde Ave	18" Discharge	33.83611	-118.10829	Lakewod	L	3.438	Lakewood	BI9E-1	BI9E-1-009	BI9E-1-009	PVC-3.438
Harvey Way/Palo Verde Ave	18" Discharge	33.83615	-118.10828	UNK	L	3.444	Lakewood	BI9E-1	BI9E-1-010	BI9E-1-010	PVC-3.444
Centralia St/Palo Verde Ave	15" Discharge	33.83775	-118.10824	UNK	L	3.622	Lakewood	BI9E-1	BI9E-1-011	BI9E-1-011	PVC-3.622

Centralia St/Palo Verde Ave	15" Discharge	33.83936	-118.10822	UNK	R	3.804	Lakewood	BI9E-1	BI9E-1-012	BI9E-1-012	PVC-3.804
Centralia St/Palo Verde Ave	24" Discharge	33.83947	-118.10842	UNK	R	3.824	Lakewood	BI9E-1	BI9E-1-014	BI9E-1-014	PVC-3.824
Centralia St/Palo Verde Ave	15" Discharge	33.83958	-118.10822	UNK	L	3.829	Lakewood	BI9E-1	BI9E-1-015	BI9E-1-015	PVC-3.829
Conquista Ave/Arbor Rd	15" Discharge	33.84135	-118.10821	UNK	L	4.020	Lakewood	BI9E-1	BI9E-1-016	BI9E-1-016	PVC-4.020
Arbor Rd/Palo Verde Ave	15" Discharge	33.84306	-118.10820	UNK	L	4.208	Lakewood	BI9E-1	BI9E-1-017	BI9E-1-017	PVC-4.208
Arbor Rd/Palo Verde Ave	24" Discharge	33.84326	-118.10841	UNK	R	4.228	Lakewood	BI9E-1	BI9E-1-018	BI9E-1-018	PVC-4.228
Arbor Rd/Palo Verde Ave	30" Discharge	33.84327	-118.10841	UNK	L	4.229	Lakewood	BI9E-1	BI9E-1-019	BI9E-1-019	PVC-4.229
Arbor Rd/Palo Verde Ave	18" Discharge	33.84332	-118.10820	UNK	L	4.235	Lakewood	BI9E-1	BI9E-1-020	BI9E-1-020	PVC-4.235
Arbor Rd/Palo Verde Ave	15" Discharge	33.84507	-118.10822	UNK	L	4.434	Lakewood	BI9E-1	BI9E-1-021	BI9E-1-021	PVC-4.434
Del Amo Blvd/Palo Verde Ave	15" Discharge	33.84685	-118.10819	UNK	L	4.628	Lakewood	BI9E-1	BI9E-1-022	BI9E-1-022	PVC-4.628
Del Amo Blvd/Palo Verde Ave	18" Discharge	33.84713	-118.10821	LACFCD	L	4.659	Lakewood	BI9E-1	BI9E-1-023	BI9E-1-023	PVC-4.659
Del Amo Blvd/Palo Verde Ave	24" Discharge	33.84714	-118.10836	LACFCD	R	4.659	Lakewood	BI9E-1	BI9E-1-024	BI9E-1-024	PVC-4.660
5023Carfax Ave/E. Hardwick St	18" Discharge	33.85007	-118.10960	UNK	L	4.962	Lakewood	BI9E-1	BI9E-1-028	BI9E-1-028	PVC-4.962
6251 McKnight Dr/Chesteroark Dr	24" Discharge	33.85057	-118.11001	UNK	R	5.075	Lakewood	BI9E-1	BI9E-1-029	BI9E-1-029	PVC-5.075
Candlewood St/Carfax Ave	24" Discharge	33.85321	-118.11132	UNK	L	5.403	Lakewood	BI446B	BI446B-001		PVC-5.403
Candlewood St/Cardale St	30" Discharge	33.85389	-118.11155	Lakewood	L	5.489	Lakewood	BI446B	BI446B-002		PVC-5.489
Candlewood St/Capetown St	27" Discharge	33.85441	-118.11167	Lakewood	R	5.543	Lakewood	BI446B	BI446B-003	BI446B-003	PVC-5.543
South St/Canehill Ave	18" Discharge	33.85822	-118.11172	UNK	R	5.970	Lakewood	BI446B	BI446B-005		PVC-5.970
South St/Canehill Ave	12" Discharge	33.85827	-118.11172	Lakewod	R	5.980	Lakewood	BI446B	BI446B-006		PVC-5.980

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APPENDIX F

GENERAL FIELD SAMPLING PROCEDURES

FOR

COMPOSITE AND GRAB SAMPLES

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GENERAL FIELD SAMPLING PROCEDURE FOR:

Composite Samples

1.0 SCOPE

This Standard Operating Procedure (SOP) describes the procedures for the compositing and sub-sampling of non-point source (NPS) "composite" sample bottles. The purpose of these procedures is to ensure that the sub-samples taken are representative of the entire water sample in the "composite" bottle (or bottles). In order to prevent confusion, it should be noted that the bottles are referred to as "composite" bottles because they are a composite of many small samples taken over the course of a storm; in this SOP the use of "compositing" generally refers to the calculated combining of more than one of these "composite" bottles.

2.0 APPLICATION

This SOP applies to all laboratory activities that comprise the compositing and sub-sampling of NPS composite sample bottles.

3.0 HEALTH AND SAFETY CONSIDERATIONS

The compositing and sub-sampling of composite sample bottles may involve contact with contaminated water. Skin contact with sampled water should be minimized by wearing appropriate protective gloves, clothing, and safety glasses. Avoid hand-face contact during the compositing and sub-sampling procedures. Wash hands with soap and warm water after work is completed.

4.0 DEFINITIONS

4.1 "Composite" sample bottle: A borosilicate glass bottle that is used to collect multiple samples over the course of a storm (a composite sample).

4.2 Large-capacity stirrer: Electric motorized "plate" that supports composite bottle and facilitates the mixing of sample water within the bottle by means of spinning a pre-cleaned magnetic stir-bar which is introduced into the bottle.

4.3 Stir-bar: Pre-cleaned teflon-coated magnetic "bar" approximately 2-3 inches in length which is introduced into a composite bottle and is spun by the stirrer, thereby creating a vortex in the bottle and mixing the sample.

4.4 Sub-sampling hose: Two pre-cleaned ~3-foot lengths of Teflon tubing connected by a ~2-foot length of silicon tubing. Used with a peristaltic pump to transfer sample water from the composite sample bottle to sample analyte containers.

4.5 Volume-to-Sample Ratio (VSR): A number that represents the volume of water that will flow past the flow-meter before a sample is taken (usually in liters but can also be in kilo-cubic feet for river deployments). For example, if the VSR is 1000 it means that every time 1000 liters passes the flow-meter the sampler collects a

sample (1000 liters of flow per 1 sample taken). Note: The VSR indicates when a sample should be taken and is NOT an indication of the sample size.

5.0 EQUIPMENT

5.1 Instrumentation: Not applicable

5.2 Reagents: Not applicable.

5.3 Apparatus:

1) Large capacity stirrer.

2) Stir bar.

3) Sub-sampling hose.

4) Peristaltic pump.

5.4 Documentation: Information from the field logbook should include the volume-to-sample ratio for each composite sample bottle, each bottle's ID number, and the time of the last sample taken at a particular sampling site (for purposes of holding times). Previous documentation should exist for the cleaning batch numbers for the 20-L bottles and the sub-sampling hoses.

6.0 COMPOSITING AND SUB-SAMPLING PROCEDURES

Compositing sample water prior to sub-sampling may be necessary if more than one composite sample bottle was filled (or partially filled) during the course of a storm at a particular sampling site. Care must be taken to ensure that no contaminants are introduced at any point during this procedure. If the compositing is not performed with this in mind, the possibility for the introduction of contaminants (i.e., from dust, dirty sub-sampling hose tips, dirty fingers/gloves, engine emissions, etc.) is increased significantly.

6.1 Determining the Fraction of Each Sample Bottle to be Composited: This is essential to producing a composite that is representative of the entire storm sampled and is not biased/weighted toward the first part of the storm (Bottle 1) or the last part of the storm (last bottle). In general, either the bottles have been sampled using the same volume-to-sample ratio (VSR), OR the VSR has been increased for the Bottle 2 in order to prevent over-filling of another bottle; this happens when the amount of rainfall and resulting runoff volume was underestimated.

6.1.1 Consult the field logbook and confirm that the bottles are from the same sampling station. Inspect the bottles' "ID" tags and confirm that the volume-to-sample ratio (VSR) numbers are the same as in the logbook.

6.1.2 If both bottles have the same VSR then equal parts of each sample should be mixed.

6.1.3 If the VSR of Bottle 2 is double that of Bottle 1 then 2-parts from Bottle 2 should be mixed with 1-part from Bottle 1. This is because Bottle 1 is, in a sense, twice as concentrated as Bottle 2, having sampled half as much flow per sample aliquot.

6.1.4 If there are more than two bottles to composite simply follow the rules above but apply it to all three bottles. For example, if Bottles 1, 2, and 3 had VSRs of 100, 200, and 400, respectively, then the composite would be composed of 4-parts from Bottle 3, 2-parts from Bottle 2, and 1-part from Bottle 1.

6.1.5 Volume-to-Sample Ratios are typically multiples of each other and are rarely fractions of each other. This is simply to make compositing bottles with different VSRs easier.

6.1.6 Rarely does an instance occur in which the VSR of Bottle 1 is HIGHER than that of Bottle 2. The only reason for this would be if the runoff was grossly overestimated and "Sample Control" instructed a field crew to pull Bottle 1 early and lower the VSR for Bottle 2.

6.2 Determining Water Volume Needed and the Fate of Any Excess Water: Compositing multiple composite bottles can often be done using only those bottles, or may require "dirtying" or "sacrificing" a clean composite bottle. The different reasons are described below.

6.2.1 Determine sample volume needed: The minimum volume of sample water needed for filling the numerous sample analyte containers must be known, or calculated on the spot. This is done by simply adding up the volumes of all sample containers to be filled. If there is not enough sample water (after compositing) to fill all the containers then consult with the project manager to determine what the order of priority is for the analyses (i.e., in what order to fill the containers). It is also useful to know the absolute minimum sample volumes needed by the laboratory to perform each analysis; some sample containers may not need to be filled completely.

6.2.2 Determine if excess water is to be saved: If the composite bottles are mostly full then it is likely that much of the sample water will be left over from the sub-sampling process. In this case it is sometimes prudent to save the left over sample water (on ice) for several days in case problems occur with the laboratory and more water is needed. Always check with the project manager on this point because it <u>may</u> require dirtying (sacrificing) a clean composite bottle to make the composite in. If any excess water is not to be saved then compositing can always be done in the existing composite

sample bottles: while being homogenized on a stir plate the excess sample water is simply discarded (pumped out in a calculated fashion), making room for the final composite.

6.2.3 **Plan on making as large a composite as possible:** If, for example, only 8 liters of sample water are needed but there is enough water to make a higher volume composite then it is prudent to do so. This is to account for any accidental spills and, if required, to the save enough excess water for possible re-analysis. There generally will never be a need to make a composite greater than a single 20-L composite bottle.

6.2.4 **If only one composite bottle exists from a station:** Simply follow the procedures for sub-sampling into numerous sample containers described in Section 6.5.

6.3 **Compositing Without Saving Excess Water:** This procedure also applies to instances in which there may not be excess water. For the sake of clarity an example will be used to explain the following steps. In this example three 20-L composite bottles are involved in creating a composite: Bottle 1 has 20 liters of sample water and was filled at a Volume to Sample Ratio (VSR) of 100; Bottle 2 has 20 liters and a VSR of 200; Bottle 3 has 20 liters and a VSR of 400. Sample water will be composited in Bottle 3. Most bottles have 1 liter graduations; if some don't then sample depth must be used to figure the fraction of water to be transferred.

6.3.1 Carefully place Bottle 3 on a large spin plate and gently drop a pre-cleaned stir-bar into the bottle and adjust the speed of the spin plate to optimize the mixing of the sample water throughout the bottle. The speed at which the stir-bar is spun should be adjusted so that even mixing is achieved. Speeds that are too fast will create a large vortex within the composite bottle that can actually concentrate heavier particles and should be avoided. Settling on a particular speed is based on a subjective visual assessment of what speed produces the most even, random mixing throughout the composite bottle.

6.3.2 Install a pre-cleaned sub-sampling hose into a peristaltic pump. Carefully remove the plastic cover which protects the approximately 18 inches of its exterior surface which has been cleaned. Insert this end into Bottle 3. Uncap the other end of the sub-sampling hose and ready it over a waste bucket.

6.3.3 While being mixed on the stir plate pump 10 liters into the waste bucket, leaving 10 liters in Bottle 3. This is best performed by two people. One person is responsible for filling the waste bucket and one person is responsible for moving the intake tubing up and down in the water column of the composite sample and controlling the pump. Based on experimental

evidence, this up and down movement of the intake helps obtain (or, in this case discard) a more representative sample. This is because there can still be some stratification of heavier particles in the sample bottle despite the mixing created by the stirrer. The up and down movement of the intake tubing should be limited to 80-90 percent of the water depth and should never touch the bottom of the sample bottle.

6.3.4 Remove Bottle 3 from the stir plate and replace with Bottle 2 and insert a new stir-bar and mix as described in Section 6.3.1. Keeping the sub-sampling hose clean (avoid setting it down or bumping it into objects), insert the intake end into Bottle 2. Using the methods described in Section 6.3.3 pump only 5 liters from Bottle 2 into Bottle 3, making a total of 15 liters. **NEVER INSERT THE "DIRTY" EFFLUENT END OF THE HOSE INTO ANY BOTTLE.**

6.3.5 Repeat the actions in Section 6.3.4 with Bottle 1, pumping only 2.5 liters of Bottle 1 into Bottle 3, making a total of 17.5 liters of composited water.

6.3.6 Note that this process cannot generate any excess composite water because there is none left from Bottle 3 that has not been contaminated in the waste bucket.

6.4 Compositing While Also Saving Excess Water: This is identical to the procedures described in Section 6.3 with one difference: the first 10 liters of Bottle 3 is pumped into a clean 20-L bottle instead of into a waste bucket. This "dirties" a fourth bottle but ensures that excess sample water can be kept and composited again, if desired.

6.5 Sub-sampling Composited Water into Sample Containers: This is the final stage in successfully filling a suite of sample analyte containers with composited water that is representative of an entire sampling event.

6.5.1 Place the composite bottle containing the composited water on the stir plate and achieve proper mixing.

6.5.2 Uncap and arrange all the sample containers to be filled in such a way that they can be easily filled. Due to the vibration of the peristaltic pump on the sub-sampling hose it takes a very steady hand to efficiently guide the stream of sample water into the containers. **NEVER INSERT THE "DIRTY" EFFLUENT END OF THE HOSE INTO THE SAMPLE CONTAINERS.** It is often necessary to steady the sample containers with a second hand so they do not fall over.

7.0 PERSONNEL

Only personnel that have been trained in the use of the proper safety equipment, as per the are allowed to complete this task. . The Laboratory Supervisor is responsible for training

personnel in the proper procedures in composite sample bottle, teflon sample hose and silicon peristaltic tubing, and stir bar cleaning.

8.0 QUALITY ASSURANCE REQUIREMENTS

The composite sample bottles and sub-sampling hoses must have been evaluated ("blanked") for contaminants after their initial decontamination procedure.

GENERAL FIELD SAMPLING PROCEDURE FOR:

Grab Samples

1.0 SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) describes the procedures involved in the discrete manual sampling (grab sampling) of storm water for a nonpoint source (NPS) monitoring program. The purpose of these procedures is to ensure contaminant free samples, and to ensure the safety of the personnel involved.

2.0 DEFINITIONS

2.1 Sample Containers – any EPA or laboratory specified clean container that is used to collect sample water.

2.2 Grab Pole – used to obtain grabs from locations where it is impossible or too dangerous (fast current, storm drain pipe, etc.) to manually obtain a sample.

3.0 PERSONNEL

Only personnel that have been trained in the use of the proper safety equipment are allowed to complete this task. Training needs to include the proper sampling techniques and station hazards that will be encountered while performing this task. The Project Manager is responsible for training personnel in these procedures.

4.0 EQUIPMENT

4.1 Instrumentation – see section 12.0 Physical Parameters

4.2 Reagents – preservatives will be supplied by the laboratory that supplies the sample bottles. Usually, the preservative is a concentrated acid (HNO_3, H_2SO_4, HCl or other).

4.3 Apparatus – a telescoping grab pole with a bottle holding device secured to one end. The bottle holding device is made of plastic and Velcro. It is designed to hold in place sample bottles of various sizes and types.

4.4 Documentation – time, date, location, number of containers and type of grab (whether for chemical analysis or physical parameters) must be noted in the station log book for that station.

5.0 PROCEDURES

Grab sampling methods will be discussed for the following analytes:

Metals and Total Cyanide

Oil and Grease

Fecal Coliform and Fecal Streptococci

Volatile Organic and Aromatic Compounds (VOA's)

Organic Compounds (Pesticides, PAHs, PCBs, SVOCs, etc.)

Physical Parameters

6.0 GRAB SAMPLING TECHNIQUES

6.1 Grab sampling may be conducted at any time during the storm event, depending upon the specific project requirements. The type of grab study might vary as the storm season progresses and the scope requirements deem necessary. These might include:

6.1.1 **Discrete Grabs** – Taken once during the storm event at a predetermined time, usually at peak flow.

6.1.2 **Persistent Grabs** – A schedule of discrete grabs which continue through the end of the storm to show a rate of change over time.

6.1.3 **First Flush** – A type of discrete grab to be taken within the first thirty minutes of the storm event.

For the majority of grab sample studies, discrete grabs will be required. Grabs will be taken on the rising hydrocurve of the storm event and as close to peak stage as is feasible. The times of these grabs will be decided by the Storm Control and/or Shift Leader and will be relayed to the field crews.

6.2 Depending upon then type of analyte being sampled, the technique may vary but all sampling **MUST** follow these general rules to minimize contamination:

6.2.1 Grab bottles are to be filled as near to the intake as is safely possible.

6.2.2 When unable to obtain a sample near the intake, take one as near to the center of flow as possible or in an area of sufficient velocity to ensure good mixing

6.2.3 The field personnel taking grab samples must be standing downstream from the sample bottle when filling.

6.2.4 The mouth of the bottle must be facing into the current.

6.2.5 Raise and lower the bottle through the water column so the sample is not biased with only one level sampled.

6.2.6 Manhole sites and inaccessible stream sites are best sampled with a grab pole.

7.0 METALS AND TOTAL CYANIDE

Samples to be analyzed for metals and cyanide are grabbed in a plastic or Teflon® container. Metals and total cyanide will require a preservative in the container (see Section 4.2). These grabs require extra care so as to not overfill the container and spill out any of the preservative, or allow the preservative to come into contact with the skin.

Metals sample bottles contain an acid preservative (HNO_3) and total cyanide sample bottles contain a base (NaOH) for a preservative. When the grab container is being filled manually, the level of water can be watched so the container is not overfilled. When the sample cannot be taken by hand and must be taken with a grab pole, the filling becomes a bit more difficult. Lower the container with the grab pole and watch for escaping air bubbles when submerged. Pull the sample bottle out frequently to check the water level accumulated and quit filling when that level has reached the "shoulder" of the bottle. Be sure **NOT TO OVERFILL THE SAMPLE BOTTLE**; this would spill the preservative compromising the sample and possibly endangering the person sampling.

8.0 OIL AND GREASE

Oil and grease samples are very similar to metals in that the bottles contain preservative and **MUST NOT BE OVERFILLED**. Oil and grease analysis requires that the sample be taken in glass containers, usually amber and usually in duplicate (in case of breakage). Fill these containers in the same exact way as mentioned above for metals analysis.

9.0 FECAL COLIFORM AND FECAL STREPTOCOCCI

Fecal coliform and fecal streptococci are usually grabbed in bacteria bottles or urine analysis cups. They contain a residual chlorine removal preservative tablet and should be filled to the sample container fill line when sampling. Wear protective gloves so that there is no skin contact with the interior of the container. The main precaution is not to contaminate the sample when opening the cup. Fill each cup completely and secure the cap.

10.0 VOLATILE ORGANIC AND AROMATIC COMPOUNDS (VOA'S)

Collecting water for Volatile Organic Compounds (VOA) requires extreme care. VOA's volatilize (enter the gaseous phase very quickly), thus, sample vials are designed to prevent this. These vials will leave no headspace (air bubbles) in a properly filled container because they have a septa cap , thereby minimizing loss of analyte to the atmosphere.

To fill a VOA vial, lower it into the water column and allow it to **FILL UP COMPLETELY** (until a water dome is formed over the top of the vial). VOA's must be preserved with HCl so take extra care not to spill any of this preservative. Very carefully place the septa cap onto the vial so no air is introduced, start with the cap tilted to one side and gently lower it until it is seated onto the threads of the vial and secure. Make sure there is no air in the vial by inverting the sample. If air bubbles show, a new sample must be taken using a new vial and the bad container and sample must be returned to the lab for proper disposal. **See Section 13.0 for additional precautions to be taken with VOA vials.**

11.0 ORGANIC COMPOUNDS (PESTICIDES, PAHs, PCBs, SVOCS, etc.)

Organic compound samples are collected in glass containers, usually amber. These samples generally do not require preservatives but should be filled in the same way as those collected for metals, and oil and grease analyses.

12.0 PHYSICAL PARAMETERS

Each time a station is visited during a storm event, certain physical parameters must be measured. Generally, at a minimum, pH and temperature are measured. Follow the instructions that are included with the field instrumentation used for the best results. There are many different brands of meters that require different techniques.

Take the measurements as close to the grab sampling point as possible while keeping safety a priority. A grab sample may be taken and analyzed somewhere more convenient and safe than the stream edge. Remember that the analysis on a grab sample should be performed "as soon as possible" to ensure as accurate measurements (pH, temperature, etc.) as possible. Record all results in the log book for that station and be sure to write in the units of measurement.

13.0 QUALITY CONTROL LIMITS

Grab sample containers must come from a reputable distributor and be certified clean for the analyte to be sampled. They must also be properly preserved and labeled prior to sampling. Transport the bottles in clean coolers accompanied with any required paperwork or instructions.

Immediately upon completion of sampling, return the sample bottles to a clean cooler and ice them down to 4°C. Recheck to be certain that all the information on the label is correct (date, time, location, analysis, preservative, etc.). Fill out the required paperwork and station log book sheets and transfer the samples to a predetermined pick-up location for the Analytical Laboratory.

13.1 For some storm sampling events, different Quality Assurance and Quality Controls (QA/QC) will be implemented. These will include:

13.1.1 Field Duplicates – Additional set of sample bottles grabbed at the same location and time as the actual sample. This sample may be given its own mock station identification and be submitted to the Analytical Laboratory blind.

13.1.2 Field Blanks – This is a full set of sample bottles (usually minus TSS and turbidity) containing reagent grade analyte free water provided by the Analytical Laboratory that will be doing the analysis. These samples are poured by hand from clean bottles containing the blank water into a labeled sample container. These sample bottles may be given a mock station identification and submitted blind as well.

13.1.3 Trip Blanks – Usually required for very sensitive samples (VOA's). The Analytical Laboratory will provide sample bottles already filled with reagent

grade analyte free water that will make the full "trip" from the lab, out into the field and back into the lab. **THESE CONTAINERS ARE NOT TO BE OPENED**.

Trip blanks are only analyzed if contamination is suspected. If analyzed and contamination is found, they usually warrant further investigation and subsequent sampling.

13.1.4 Matrix Spiking and Lab Replicates – These analyses can usually be taken from a sample bottle already sent into the field and do not require extra bottles, however, extra volume may be required at these stations.

13.2 While performing or preparing for grab sampling, be sure that no "outside" contamination will occur:

13.2.1 No engines are running in the general vicinity of sampling.

13.2.2 Sample containers are clean and intact.

13.2.3 Sample containers are properly labeled and meet bottle requirements for that analyte (size, type, preservative, type of cap liners, etc.).

13.2.4 Sample techniques are proper and safe.

13.3 Volatile Organic and Aromatic Compounds (VOA's) – require very special handling.

13.3.1 VOA vials are very fragile. Protect with adequate foam packing material.

13.3.2 VOA bottles should have no headspace (see Section 10.0). This means that they are subject to freezing. **Prevent direct contact of VOA vial with ice by using additional packaging.**

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APPENDIX G

Stormwater Outfall Inspections

Los Cerritos Channel Watershed*

* Due to size, file type and associated additional materials including KMZ files, photos, and log book scans, this appendix will be submitted separately

April 28, 2015

Permittees of the Los Cerritos Channel Watershed Management Group[1]

APPROVAL, WITH CONDITIONS, OF THE LOS CERRITOS CHANNEL WATERSHED MANAGEMENT GROUP'S WATERSHED MANAGEMENT PROGRAM (WMP), PURSUANT TO THE LOS ANGELES COUNTY MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) PERMIT (NPDES PERMIT NO. CAS004001; ORDER NO. R4-2012-0175) AND THE CITY OF LONG BEACH MS4 PERMIT (NPDES PERMIT NO. CAS004003; ORDER NO. R4-2014-0024)

Dear Permittees of the Los Cerritos Channel Watershed Management Group:

On November 8, 2012, the California Regional Water Quality Control Board, Los Angeles Region (Los Angeles Water Board or Board) adopted Order No. R4-2012-0175, *Waste Discharge Requirements for Municipal Separate Storm Sewer System (MS4) Discharges within the Coastal Watersheds of Los Angeles County, except those Discharges Originating from the City of Long Beach* (hereafter, LA County MS4 Permit). On February 6, 2014, the Board adopted Order No. R4-2014-0024, *Waste Discharge Requirements for Municipal Separate Storm Sewer System Discharges from the City of Long Beach* (hereafter, Long Beach MS4 Permit). Part VI.C of the LA County MS4 Permit and Part VII.C of the Long Beach MS4 Permit allow Permittees the option to develop either a Watershed Management Program (WMP) or an Enhanced Watershed Management Program (EWMP) to implement permit requirements on a watershed scale through customized strategies, control measures, and best management practices (BMPs).

Development of a WMP or EWMP is voluntary and allows a Permittee to address the highest watershed priorities, including complying with the requirements of Part V.A (Receiving Water Limitations), Part VI.E and Attachments L through R (Total Maximum Daily Load Provisions), and by customizing the control measures in Parts III.A (Prohibitions – Non-Storm Water Discharges) and VI.D (Minimum Control Measures), except the Planning and Land

[1] Permittees of the Los Cerritos Channel Watershed Management Group include the Los Angeles County Flood Control District; and the cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill. See attached distribution list.

Development Program, of the LA County MS4 Permit.[2] Pursuant to Part VI.C.4.c of the LA County MS4 Permit and Part VII.C.4.c of the Long Beach MS4 Permit,, the Permittees of the Los Cerritos Channel Watershed Management Group (LCC WMG) jointly submitted a draft WMP dated June 28, 2014, to the Los Angeles Water Board for review.

Public Review and Comment

On July 3, 2014, the Board provided public notice and a 46-day period to allow for public review and comment on the LCC WMG's draft WMP. A separate notice of availability regarding the draft WMPs, including the LCC WMG draft WMP, was directed to State Senators and Assembly Members within the Coastal Watersheds of Los Angeles County. The Board received two comment letters that had comments on WMPs generally, which were in part applicable to the LCC WMG draft WMP. One joint letter was from Natural Resources Defense Council (NRDC), Heal the Bay, and Los Angeles Waterkeeper, and the other letter was from the Construction Industry Coalition on Water Quality (CICWQ). On October 9, 2014, the Board held a workshop at its regularly scheduled Board meeting on the draft WMPs. The Board also held a public meeting on April 13, 2015 for permittees and interested persons to discuss the revised draft WMPs with the Executive Officer and staff. During its initial review and its review of the revised draft WMP, the Los Angeles Water Board considered those comments applicable to the LCC WMG's proposed WMP.

Los Angeles Water Board Review

Concurrently with the public review, the Los Angeles Water Board, along with U.S. EPA Region IX staff, reviewed the draft WMPs. On October 29, 2014, the Los Angeles Water Board sent a letter to the LCC WMG detailing the Board's comments on the draft WMP and identifying the revisions that needed to be addressed prior to the Board's approval of the LCC WMG's WMP. The letter directed the LCC WMG to submit a revised draft WMP addressing the Los Angeles Water Board's comments. Prior to the LCC WMG's submittal of the revised draft WMP, Board staff had a meeting on January 23, 2015 with LCC WMG representatives and consultants to discuss the Board's comments and the revisions to the draft WMP, including the supporting reasonable assurance analysis (RAA), which would address the Board's comments. The LCC WMG submitted a revised draft WMP on January 29, 2015 for Los Angeles Water Board review and approval.

[2] Equivalent requirements in the Long Beach MS4 Permit are as follows: Part VI.A (Receiving Water Limitations), Part VIII (Total Maximum Daily Load Provisions), Part IV.B (Prohibitions – Non-Storm Water Discharges), and Part VII.D-VII.M (Minimum Control Measures).

Approval of WMP, with Conditions

The Los Angeles Water Board hereby approves, subject to the following conditions, the LCC WMG's January 29, 2015 revised draft WMP. The Board may rescind this approval if all of the following conditions are not met to the satisfaction of the Board within the timeframe provided below.

1. Revise the discussion of ammonia in Section 5.2.2 of the revised draft WMP to include that the Permittees of the LCC WMG will monitor ammonia and pH as part of their Coordinated Integrated Monitoring Program and will re-evaluate ammonia as part of the adaptive management evaluation.
2. Revise the Phase 1 (2015-2017) milestones on Table 6-5 of the revised draft WMP (pg. 6-8) as follows:
    a. Remove the footnote that conditions "TSS Reduction" and "Runoff Reduction and Stormwater Capture" milestones on trash amendment adoption (i.e., remove reference to the language: "Presuming adoption of trash amendments by State Water Board in spring of 2015").
    b. Revise the table to include the specific days for milestone achievement rather than just the year and the quarter. For example, "Adoption of model TSS reduction ordinances by City of Signal Hill" should have a completion date of *December 31, 2015* instead of *Q4, 2015*.
    c. For the "Construction of initial stormwater capture facility" milestone, replace "if funding available" with "as needed to achieve volume reduction milestones." If the Permittees of the LCC WMG cannot identify a funding source, they may submit a request for extension of the milestone deadline to the Los Angeles Water Board's Executive Officer.
3. Revise the Phase 2 (2018-2020) milestones on Table 6-7 of the revised draft WMP (pg. 6-12) by replacing the language "subject to availability of funding" with "as needed to achieve volume reduction milestones." If the Permittees of the LCC WMG cannot identify a funding source, they may submit a request for extension of the milestone deadline to the Los Angeles Water Board's Executive Officer.
4. The City of Long Beach submitted its Statement of Legal Authority to the Los Angeles Water Board on February 26, 2015. Include this Statement of Legal Authority in the WMP appendix section containing the other Permittees' legal authority statements.

The LCC WMG shall submit a final WMP to the Los Angeles Water Board that satisfies all of the above conditions no later than June 12, 2015.

Determination of Compliance with WMP

Pursuant to Part VI.C.6 of the LA County MS4 Permit and Part VII.C.6 of the Long Beach MS4 Permit, the Permittees of the LCC WMG shall begin implementation of the approved WMP

immediately. To continue to be afforded the opportunity to implement permit provisions within the framework of the WMP, Permittees must fully and timely implement all actions per associated schedules set forth in the approved WMP regardless of any contingencies indicated in the approved WMP (e.g., funding) unless a modification to the approved WMP, including any extension of deadlines where allowed, is approved by the Los Angeles Water Board pursuant to Part VI.C.6.a or Part VI.C.8.a.ii-iii of the LA County MS4 Permit, and/or Part VII.C.6 or Part VII.C.8.b-c of the Long Beach MS4 Permit. The Los Angeles Water Board will determine the LCC Permittees' compliance with the WMP on the basis of the compliance actions and milestones included in the WMP, including, but not limited to, the following:

- Sections 4.3 Minimum Control Measures, 4.4 Non-Stormwater Discharge Control Measures, 4.5 TMDL Control Measures, 4.6 Non-TMDL Impaired Waters Control Measures, 4.7 Control Measures for Non-Impairment Pollutants, 4.8 Control Measures to be Implemented at the Watershed and Sub-watershed Levels, and 4.9 Control Measures to be Implemented at the Jurisdictional Level
- Table 4-3: New Fourth Term MS4 Permit Non-Structural MCMs (Cities only) and NSWDs
- Table 6-1: Final Compliance Dates for Category 1, 2, and 3 Pollutants
- Table 6-2: Interim Milestone Targets between December 28, 2012 and December 28, 2017
- Table 6-3: Summary WMP Implementation and Milestone Schedule
- Table 6-4: WMP Implementation Schedule – Ongoing Measures Phase 1
- Table 6-5: WMP Implementation Schedule – Measures with Interim Milestones Phase 1
- Table 6-6: WMP Implementation Schedule – Ongoing Measures Phase 2
- Table 6-7: WMP Implementation Schedule – Measures with Interim Milestones Phase 2
- Table 6-12: Sub-Basin Implementation Measures
- RAA Attachment B: Detailed Jurisdictional Compliance Tables

Pursuant to Parts VI.C.3 and VI.E.2.d.i.(4)(a) of the LA County MS4 Permit[3], the LCC Permittees' full and timely compliance with all actions and dates for their achievement in their approved WMP shall constitute compliance with permit provisions pertaining to applicable WQBELs/WLAs in Part VI.E and Attachments N and Q of the LA County MS4 Permit.[4] Further, per Part VI.C.2.b of the LA County MS4 Permit and Part VII.C.2.e of the Long Beach MS4 Permit, the LCC Permittees' full compliance with all requirements and dates for their achievement in their approved WMP constitutes compliance with the receiving water limitations provisions of Part V.A of the LA County MS4 Permit and Part VI.A of the Long Beach MS4 Permit for the specific waterbody-pollutant combinations addressed by their approved WMP.

[3] Corresponding provisions in the Long Beach MS4 Permit are Parts VII.C.3 and VIII.E.1.d.

[4] Corresponding provisions in the Long Beach MS4 Permit are Part VIII (general TMDL provisions) and Parts VIII.J and VIII.P (provisions specific to Los Cerritos Channel and Greater Harbor TMDLs).

If the Permittees in the LCC WMG fail to meet any requirement or date for its achievement in the approved WMP, which will be demonstrated through the LCC WMG's Annual Reports and program audits (when conducted), the Permittees in the LCC WMG shall be subject to the baseline requirements of the LA County MS4 Permit and the Long Beach MS4 Permit, including demonstrating compliance with applicable receiving water limitations and TMDL-based WQBELs/WLAs through outfall and receiving water monitoring. See Parts VI.C.2.c and VI.E.2.d.i.(4)(c) of the LA County MS4 Permit, and Parts VII.C.2.f and VIII.E.1.d.iii of the Long Beach MS4 Permit.

Annual Reporting

The LCC WMG shall report on achievement of actions and milestones within the reporting year, as well as progress towards future milestones related to multi-year projects, through their Annual Report per Attachment E, Part XVIII of the LA County MS4 Permit and Attachment E, Parts XV to XIX of the Long Beach MS4 Permit. For multi-year efforts, the LCC WMG shall include the status of the project, which includes the status with regard to standard project implementation steps. These steps include, but are not limited to, adopted or potential future changes to municipal ordinances to implement the project, site selection, environmental review and permitting, project design, acquisition of grant or loan funding and/or municipal approval of project funding, contractor selection, construction schedule, start-up, and effectiveness evaluation (once operational), where applicable. For all stormwater retention/infiltration projects, including LID due to new/redevelopment, green streets, and regional BMPs, the Permittees in the LCC WMG shall report annually on the volume of stormwater retained in the area covered by the LCC WMG WMP. The LCC WMG shall also report annually on runoff reduction, total suspended solids (TSS) reduction, and pollutant reductions from source control in light of its Water Quality Improvement Strategy.

The LCC WMG shall also include in their Annual Report the source(s) of funds used during the reporting year, and those funds proposed for the coming year, to meet necessary expenditures related to implementation of the actions identified in its WMP per Part VI.A.3 of the LA County MS4 Permit and Part VII.A.3 of the Long Beach MS4 Permit. Further, as part of the annual certification concerning a Permittee's legal authority required by Part VI.A.2.b of the LA County MS4 Permit and Part VII.A.2.b of the Long Beach MS4 Permit, each Permittee in the LCC WMG shall also certify in the Annual Report that each has the necessary legal authority to implement each of the actions and milestones in the approved WMP as required by Part VI.C.5.b.iv.(6) of the LA County MS4 Permit and Part VII.C.5.vi of the Long Beach MS4 Permit. If a Permittee does not have legal authority to implement an action or milestone at the time the LCC WMG submits their Annual Report, the Permittee shall propose a schedule to establish and maintain such legal authority.

Adaptive Management

The LCC WMG shall conduct a comprehensive evaluation of its WMP no later than April 28, 2017, and subsequently, every two years thereafter pursuant to the adaptive management process set forth in Part VI.C.8 of the Los Angeles County MS4 Permit and Part VII.C.8 of the Long Beach MS4 Permit. As part of this process, the LCC WMG must evaluate progress toward achieving:

- Applicable WQBELs/WLAs in Attachments N and Q of the LA County MS4 Permit and Parts VIII.J, and VIII.P of the Long Beach MS4 Permit according to the milestones set forth in its WMP;
- Improved water quality in MS4 discharges and receiving waters;
- Stormwater retention milestones; and
- Multi-year efforts that were not completed in the current year and will continue into the subsequent year(s), among other requirements.

The LCC WMG's evaluation of the above shall be based on both progress implementing actions in the WMP and an evaluation of outfall-based monitoring data and receiving water data. Per Attachment E, Part XVIII.6 of the LA County MS4 Permit and Attachment E, Part XVIII.6 of the Long Beach MS4 Permit, the LCC WMG shall implement adaptive management strategies, including but not limited to:

- Refinement and recalibration of the Reasonable Assurance Analysis (RAA) based on data specific to the LCC WMP area that are collected through the LCC WMG's Coordinated Integrated Monitoring Program and other data as appropriate;
- Identifying the most effective control measures, why they are the most effective, and how other control measures can be optimized based on this understanding;
- Identify the least effective control measures, why they are ineffective, and how the control measures can be modified or replaced to be more effective;
- Identify significant changes to control measures during the prior year(s) and the rationale for the changes; and
- Describe all significant changes to control measures anticipated to be made in the next year(s) and the rationale for each change.

As part of the adaptive management process, any modifications to the WMP, including any requests for extension of deadlines not associated with TMDL provisions, must be submitted to the Los Angeles Water Board for review and approval. The Permittees of the LCC WMG must implement any modifications to the WMP upon approval by the Los Angeles Water Board or its Executive Officer, or within 60 days of submittal of modification if the Los Angeles Water Board or its Executive Officer expresses no objections. Note that the LA County MS4 Permittees' Report(s) of Waste Discharge (ROWD) are due no later than July 1, 2017 and the City of Long Beach's ROWD is due no later than September 29, 2018. To align any modifications to the WMP proposed through the adaptive management process with permit reissuance, results of

the first adaptive management cycle should be submitted in conjunction with the Permittees' ROWD.

The Los Angeles Water Board appreciates the participation and cooperation of the LCC WMG in the implementation of the LA County MS4 Permit. If you have any questions, please contact Chris Lopez at Chris.Lopez@waterboards.ca.gov or by phone at (213) 576-6674. Alternatively, you may also contact Ivar Ridgeway, Storm Water Permitting, at Ivar.Ridgeway@waterboards.ca.gov or by phone at (213) 620-2150.

Sincerely,

Samuel Unger

Samuel Unger, P.E.
Executive Officer

Enclosure: Mailing Distribution List

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SECRETARY FOR
ENVIRONMENTAL PROTECTION

Los Angeles Regional Water Quality Control Board

June 18, 2015

Permittees of the Los Cerritos Channel Watershed Management Group[1]
(See Distribution List)

APPROVAL, WITH CONDITIONS, OF THE LOS CERRITOS CHANNEL WATERSHED MANAGEMENT GROUP COORDINATED INTEGRATED MONITORING PROGRAM, PURSUANT TO ATTACHMENT E, PART IV.B OF THE LOS ANGELES COUNTY MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) PERMIT (NPDES PERMIT NO. CAS004001; ORDER NO. R4-2012-0175) AND ATTACHMENT E, PART IV.B OF THE CITY OF LONG BEACH MS4 PERMIT (NPDES PERMIT NO. CAS004003; ORDER NO. R4-2014-0024)

Dear Permittees of the Los Cerritos Channel Watershed Management Group:

The Los Angeles Regional Water Quality Control Board (Los Angeles Water Board or Board) has reviewed the revised monitoring program submitted on February 18, 2015 by the Los Cerritos Channel Watershed Management Group (Group). This monitoring program was submitted pursuant to the provisions of NPDES Permit No. CAS004001 (Order No. R4-2012-0175), which authorizes discharges from the municipal separate storm sewer system (MS4) operated by 86 municipal Permittees within Los Angeles County (hereafter, LA County MS4 Permit), and NPDES Permit No. CAS004003 (Order No. R4-2014-0024), which authorizes MS4 discharges from the City of Long Beach (hereafter, Long Beach MS4 Permit). Both MS4 permits allow Permittees the option to develop and implement a coordinated integrated monitoring program (CIMP) that achieves the five Primary Objectives set forth in Part II.A of Attachment E and includes the elements set forth in Part II.E of Attachment E[2]. These programs must be approved by the Executive Officer of the Los Angeles Water Board.

The Los Angeles Water Board has reviewed the Group's revised CIMP and has determined that the CIMP includes the elements set forth in Part II.E of Attachment E and will achieve the Primary Objectives set forth in Part II.A of Attachment E of the LA County MS4 Permit and the equivalent sections of the Long Beach MS4 Permit.

Public Review and Comment

On July 3, 2014, the Board provided public notice and a 46-day period to allow for public review and comment on the Group's draft CIMP. A separate notice of availability regarding the draft

[1] Permittees of the Los Cerritos Channel Watershed Management Group CIMP include the Los Angeles County Flood Control District; and the cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill.

[2] Equivalent sections in the Long Beach MS4 Permit are Attachment E, Parts II.A and II.D, respectively.

CIMPs, including the Group's CIMP, was directed to State Senators and Assembly Members within the Coastal Watersheds of Los Angeles County. The Board received three comment letters that had comments applicable to the Group's draft CIMP. One joint letter was from the Natural Resources Defense Council (NRDC), Heal the Bay, and Los Angeles Waterkeeper, and the other letters were from the Construction Industry Coalition on Water Quality (CICWQ) and Ventura Countywide Stormwater Quality Management Program. During the review of the draft and revised CIMP, the Los Angeles Water Board considered those comments applicable to the Group's proposed CIMP.

Los Angeles Water Board Review

Concurrent with the public review, the Los Angeles Water Board, along with U.S. EPA Region IX staff, reviewed the draft CIMPs. On November 20, 2014, the Los Angeles Water Board sent a letter to the Group detailing the Board's comments on the draft CIMP and identifying the revisions that needed to be addressed prior to the Board's approval of the Group's CIMP. The letter directed the Group to submit a revised CIMP addressing the Los Angeles Water Board's comments. Prior to the Group's submittal of its revised CIMP, the Los Angeles Water Board staff had a meeting on January 23, 2015 and email exchanges with the Group's representatives and consultants to discuss the Board's remaining comments and necessary revisions to the draft CIMP. The Group submitted its revised CIMP on February 18, 2015 for Los Angeles Water Board review and approval.

CIMP Approval

The Los Angeles Water Board hereby approves, subject to the following conditions, the Group's February 18, 2015 revised CIMP. The Board may rescind this approval if all of the following conditions are not met to the satisfaction of the Board within the timeframe provided below.

1. As noted in the Group's WMP Approval, include ammonia in the list of monitored constituents in Table 3-2 for mass emission station and primary watershed segmentation monitoring, and ensure that ammonia is monitored under the non-stormwater outfall monitoring program.
2. Include a map that shows HUC-12 boundaries.
3. Include a map that shows land uses throughout the Group's area (i.e. land use overlay).

In separate correspondence to all Permittees developing CIMPs and Integrated Monitoring Programs (IMPs), the Los Angeles Water Board will also be providing clarification of requirements for toxicity monitoring – specifically regarding additional toxicity monitoring upstream and at outfalls where toxicity is identified during at sampling event at a receiving water monitoring site.

The Group shall submit a final CIMP to the Los Angeles Water Board that satisfies all of the above conditions no later than **July 3, 2015**. Pursuant to Attachment E, Part IV.C.6 of the LA County MS4 Permit[3], the Group must commence implementing its monitoring program within 90 days after this approval of the final CIMP (i.e. no later than September 16, 2015). Please note that the Group is responsible for complying with all reporting provisions included in Attachment E, Part XIV – XVIII and Section F of Part XIX, "Reporting Requirements for Los Cerritos

[3] Equivalent requirement in the Long Beach MS4 Permit is Attachment E, Part IV.C.5.

Channel WMA TMDLs," and Attachment D, Sections IV, V, and VII.A of the LA County MS4 Permit[4]. The Group is also responsible for complying with applicable reporting provisions included in Section C of Part XIX, "Reporting Requirements for Dominguez Channel and Greater Harbors Waters WMA TMDLs."[5] Finally, the Group is also responsible for complying with the following requirements under Annual Reporting and Adaptive Management.

Annual Reporting

Within the reporting year, through its Annual Report per Attachment E, Part XVIII of the LA County MS4 Permit[6], the Group shall report on the status of the phased initiation of stormwater monitoring established in the revised CIMP and specified below.

- Section 2 "Overview of the Schedule and Sampling Frequencies for each CIMP Element"
- Table 2-1 "Schedule for Implementation of Monitoring Activities in the Los Cerritos Channel Watershed": The CIMP establishes a phased approach to initiate monitoring with SB10 and SB4 to be added the first year; SB8 and SB9 to be added the second year; and SBX-1 and SBX-2 to be added the third year.

In addition, the Annual Report shall provide an Integrated Monitoring Report that summarizes all identified exceedances of:

- outfall-based stormwater monitoring data,
- wet weather receiving water monitoring data,
- dry weather receiving water monitoring data, and
- non-storm water outfall monitoring data

against all applicable receiving water limitations, water quality-based effluent limitations, non-storm water action levels, and aquatic toxicity thresholds as defined in Sections XII.F and G of this MRP. All sample results that exceeded one or more applicable thresholds shall be readily identified.

The Annual Report shall also include a Municipal Action Level (MAL) Assessment Report, which shall present the stormwater outfall monitoring data in comparison to the applicable MALs, and identify those subwatersheds with a running average of twenty percent or greater of exceedances of the MALs in discharges of stormwater from the MS4. Please note that beginning in Year 3 after the effective date of the LA County MS4 Permit, each Permittee or group of Permittees shall submit a MAL Action Plan with the Annual Report (first MAL Action Plan due with December 15, 2015 Annual Report) to the Regional Water Board Executive Officer, for those subwatersheds with a running average of twenty percent or greater of exceedances of the MALs in any discharge of storm water from the MS4. Please note that implementation of an approved Watershed Management Program (WMP) or Enhanced Watershed Management Program (EWMP) per Part VI.C of the LA County MS4 Permit fulfills all requirements related to the development and implementation of the MAL Action Plan, as per

[4] Equivalent requirements in the Long Beach MS4 Permit are: Attachment E, Parts XIV-XVIII; Attachment E, Part XIX.D, "Reporting Requirements for Los Cerritos Channel WMA TMDLs"; and Attachment D, Parts IV, V, and VII.A.

[5] Equivalent requirement in the Long Beach MS4 Permit is Attachment E, Part XIX, Section A.

[6] Equivalent requirement in the Long Beach MS4 Permit is Attachment E, Part XVIII.

Attachment G of the LA County MS4 Permit[7], for those pollutants addressed by the WMP or EWMP.

Adaptive Management

The Regional Water Board or its Executive Officer, consistent with 40 CFR section 122.41, may approve changes to the Monitoring and Reporting Program, after providing the opportunity for public comment, either:

1. By request of the Group or by an interested person after submittal of the Monitoring Report. Such request shall be in writing and filed not later than 60 days after the Monitoring Report submittal date, or
2. As deemed necessary by the Regional Water Board Executive Officer, following notice to the Group.

As part of the adaptive management process, any modifications to the CIMP must be submitted to the Los Angeles Water Board for review and approval. The Group must implement any modifications to the CIMP upon approval by the Los Angeles Water Board or its Executive Officer, or within 60 days of submittal of modifications if the Los Angeles Water Board or its Executive Officer expresses no objections. Note that the Group's Report of Waste Discharge (ROWD) is due no later than July 1, 2017[8]. To align any modifications to the CIMP proposed through the adaptive management process with permit reissuance, results of the first adaptive management cycle should be submitted in conjunction with the Group's ROWD.

If you have any questions, please contact Mr. Chris Lopez of the Storm Water Permitting Unit by electronic mail at Chris.Lopez@waterboards.ca.gov or by phone at (213) 576-6674. Alternatively, you may also contact Mr. Ivar Ridgeway, Chief of the Storm Water Permitting Unit, by electronic mail at Ivar.Ridgeway@waterboards.ca.gov or by phone at (213) 620-2150.

Sincerely,

Samuel Unger

Samuel Unger, P.E.
Executive Officer

Enclosures: Los Cerritos Channel Watershed Management Group Distribution List

[7] Equivalent sections in the Long Beach MS4 Permit are Part VII.C and Attachment G.

[8] The ROWD for the Long Beach MS4 Permit is due September 29, 2018.

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LOS CERRITOS CHANNEL
WATERSHED GROUP

Los Cerritos Channel
Watershed Management Program

Bellflower Cerritos Downey Lakewood Long Beach Paramount Signal Hill Los Angeles County Flood Control District

We Serve to Protect our Coastal Waters

Prepared by: RICHARD WATSON & ASSOCIATES, INC.
Stormwater Quality Planning

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LIST OF ACRONYMS

BMPs – Best Management Practices

CALTRANS – California Department of Transportation

CASQA – California Stormwater Quality Association

CIMP – Coordinated Integrated Monitoring Plan

DEHP - Bis (2-ethylhexyl)phthalate

EWMP – Enhanced Watershed Management Program

Long Beach Permit - Order No. R4-2014-0024 (NPDES Permit No. CAS004003, *Waste Discharge Requirements for Municipal Separate Storm Sewer System Discharges from the City of Long Beach)*

Los Angeles Permit - Order No. R4-2012-0175 (NPDES Permit No. CAS004001, *Waste Discharge Requirements for Municipal Separate Storm Sewer System [MS4] Discharges within the Coastal Watersheds of Los Angeles County, Except those Discharges Originating from the City of Long Beach MS4)*

LCC – Los Cerritos Channel

MCMs – Minimum Control Measures

MEP – Maximum Extent Practicable

NPDES – National Pollutant Discharge Elimination System

RWL – Receiving Water Limitations

Regional Water Board – Los Angeles Regional Water Quality Control Board

TAC – Technical Advisory Committee

TMDL – Total Maximum Daily Load

TSS – Total Suspended Solids

WAGs – Watershed Authority Groups

Watershed Group – Los Cerritos Channel Watershed Group

WMP – Watershed Management Program

WQP – Water Quality Priority

WQBELs – Water Quality Based Effluent Limitations

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Watershed Group – Los Cerritos Channel Watershed Group

WMP – Watershed Management Program

WQP – Water Quality Priority

WQBELs – Water Quality Based Effluent Limitations

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Executive Summary

The Permittees of the Los Cerritos Channel (LCC) Freshwater Watershed (Watershed), a portion of the Los Cerritos Channel and Alamitos Bay Watershed Management Area, have developed this Watershed Management Program (WMP) as specified in Order R4-2012-0175. This WMP sets forth a plan to achieve pollutant reductions in the waterbodies of the LCC Watershed. It serves as the Implementation Plan for the Los Cerritos Channel Metals TMDLs. The associated Coordinated Integrated Monitoring Plan (CIMP) serves as the Coordinated Monitoring Plan for the Metals TMDL. In addition to the CIMP, the WMP is accompanied by a reasonable assurance analysis (RAA) based upon the Watershed Management Modeling System previously developed by the Los Angeles County Flood Control District (LACFCD) in collaboration with USEPA. The WMP is a long-term planning document that takes a comprehensive look at the LCC Watershed, including land uses, the municipal separate storm sewer system (MS4), existing and planned control measures, and historical monitoring data. It lays the groundwork for expanding upon Permittees' existing water quality management programs and provides the flexibility necessary to allow the Permittees to respond to new issues or concerns that might arise in the course of routine monitoring or as the result of emerging topics in stormwater science.

The LCC Permittees began working together to address water quality in late 2008 by forming a Technical Committee in response to a draft of the EPA-established Metals TMDLs for the LCC Watershed. The Group, now known as the Los Cerritos Channel Watershed Group, is comprised of the Cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill, as well as the Los Angeles County Flood Control District and, informally, the California Department of Transportation (Caltrans). The Group originally entered into Memoranda of Agreement (MOAs) in 2010, with the Gateway Water Management Authority (GWMA) acting as fiduciary agent. The Group is covered by the Los Angeles County MS4 Permit (Order No. R4-2012-0175, adopted November 8, 2012), except for the City of Long Beach, which is covered by the City of Long Beach MS4 Permit (NPDES Permit Order No. R4-2014-0024, adopted February 6, 2014). Both Permits are on five-year renewal cycles. Caltrans is regulated by a separate statewide permit, which was adopted September 19, 2012 and became effective on July 1, 2013. It too is on a five-year cycle. Since the adoption of the new Los Angeles MS4 Permit, the Watershed Group has worked to analyze the range of stormwater management alternatives contained in the Permit for addressing targeted stormwater pollutants in the Los Cerritos Channel.

The Los Cerritos Channel Watershed Group has considered how best to develop a WMP to implement the requirements of the Permits on a watershed scale through each Permittee's stormwater management program and through customized strategies, control measures, and best management practices (BMPs). The Watershed Group has revisited strategies, control measures, and BMPs and concludes that addressing water quality impairments within the Watershed should be based on a multi-faceted approach, initially focused on source control, runoff reduction, and total suspended solids (TSS) reduction. Members of the Watershed Group have been particularly focused on true source control (pollution prevention) because major sources of copper, lead, and zinc are released into the atmosphere, which results in widespread deposition on impervious surfaces such as streets, highways, parking lots, and rooftops. In

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addition, these metals are directly deposited onto roadways and other surfaces from motor vehicle components such as brakes, wheel weights, and tires. In addition, the Watershed Group's strategy includes low impact development (LID) and green streets, operational source control methods (including enhanced street sweeping), and capture and infiltration and/or capture and use of stormwater, with treatment controls considered the method of last resort, since they are the least effective and most costly water quality improvement methods.

Each of the Cities in the Watershed Group contributed either directly or indirectly to efforts by the California Stormwater Quality Association (CASQA) and Sustainable Conservation to develop and negotiate SB 346 – the passage of which is a milestone that will significantly reduce the level of copper in metropolitan area waters throughout the state through reduction of copper in vehicle brake pads. Members of the Watershed Group look forward to working with CASQA next to address zinc in vehicle tires. The Department of Toxic Substances Control (DTSC) has newly adopted Safer Consumer Product Regulations that will be a future method by which zinc in tires could potentially be addressed. These two true source control efforts will address two of the Watershed's major pollutants of concern. Although, due to the DTSC's schedule for addressing pollutants, it will be a few years before the Watershed Group would be able to address zinc through the Safer Consumer Product Regulations, Group Members can work in the interim to gain support for including zinc in DTSC's list of pollutants of concern on a future list. Group Members will also work to address local sources of zinc.

The Los Cerritos Channel Metals TMDLs established waste load allocations (WLAs) for copper, lead, and zinc during wet weather and copper during dry weather. Total lead limits were based upon maintenance of historical concentrations, and total lead concentrations and loads remain in compliance with the TMDL limits. Elevated concentrations of total recoverable aluminum, copper, lead, and zinc are commonly associated with elevated sediment concentrations during storm events. Aluminum is expected to be elevated during storm events due to its natural abundance in soils and is not considered to be a major pollutant of concern. Concentrations of dissolved copper and zinc commonly exceed freshwater quality criteria during storm events, and are the two metals of primary concern. The Watershed Group expects to see reductions in copper loading soon, due to implementation of SB 346. Brake pad manufacturers have already begun to significantly reduce the amount of copper in vehicle brake pads.

Los Cerritos Channel Watershed Group Permittees are fortunate to have 13 years of data already collected by the City of Long Beach at its Stearns Street mass emission monitoring site. Major elements incorporated in Long Beach's monitoring and reporting program include, 1) mass emission monitoring during storm events, 2) monitoring of dry-weather discharges at each mass emission site, and 3) special studies. Data from the Long Beach monitoring program is intended to support decisions needed to refine BMPs for the reduction of pollutant loading and the protection and enhancement of beneficial use of the receiving waters.

The Long Beach mass emission monitoring program is intended to characterize stormwater discharges, identify contaminants of concern and develop pollutant load estimates for each major watershed. Flow-rated, whole storm composite samples are obtained and analyzed for major constituents of concern that include conventional constituents, total and dissolved metals, organochlorine pesticides, and organophosphate pesticides. For the past two years, this has also included pyrethroid pesticides, and, for the past year, Fipronil. Trends over the past 10 years

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have been examined for principal contaminants of concern. Concentrations of contaminants measured in both wet- and dry-weather discharges are compared with various receiving water quality criteria. For purposes of analysis, water quality criteria or objectives were used to provide reference points for assessing the relative importance of various stormwater contaminants, although specific receiving water studies are necessary to quantify the presence and magnitude of any actual water quality impacts.

Part VI.C.5.a of the Los Angeles MS4 Permit requires Permittees to identify the water quality priorities within each Watershed Management Area (WMA) that will be addressed by a WMP. It further requires Permittees to designate three categories of priority pollutants that will be addressed: Category 1 (Highest Priority), Category 2 (High Priority), and Category 3 (Medium Priority). Highest Priority pollutants are those for which water quality-based effluent limitations and/or receiving water limitations are established in the Order. High Priority are those pollutants for which water quality data indicate a water quality impairment in the receiving water according to the California's Clean Water Act (CWA) Section 303(d) List for which MS4 discharges may be causing or contributing to the impairment, but which are not being addressed through TMDLs. The third category is not as clear-cut. It is defined to include pollutants for which there are insufficient data to indicate water quality impairment, but which exceed applicable receiving water limitations. This LCC WMP identifies Category 1 and Category 2 pollutants, and proposes a screening process to separate medium priority (Category 3) pollutants from those the Watershed Group considers to be low priority at this time.

In implementing this WMP, the Watershed Group will select control measures that will facilitate cost-effective implementation of the Water Quality Improvement Strategy specified in Section 3 of this Program. Section 4 of the Program includes a summary of the assessment of each minimum control measure (MCM) program, as well as a determination as to whether the Permittees will implement the MCM provisions as explicitly stated or with modifications to focus on specific water quality problems. Information on how compliance with receiving water limitations can be achieved through stormwater capture is in Section 5 of this WMP, with further details in the RAA that was prepared collectively for three watersheds – the LCC, Lower Los Angeles River, and Lower San Gabriel River Watersheds – because several cities are in two or three of these watersheds and the cities wanted consistency within the jurisdictions. The RAA is described in Section 8 and found in Attachment A.

The Watershed Group has begun implementation of the CIMP by conducting three field screenings of non-stormwater outfalls. Full implementation of the CIMP is proposed to commence within 90 days after approval of the CIMP by the Executive Officer of the Regional Board or by July 1, 2015, whichever is later. The schedule provides for commencing monitoring on July 1, 2015 as starting monitoring part way through a complete monitoring year or missing the first storms of the year would not be productive. Formal implementation of the Los Cerritos Channel WMP will begin upon approval of the final Program pursuant to Table 9 of Order No. R4-2012-0175.

The LCC Watershed Group has developed its implementation schedules based on guidance in the Permit that specifies that compliance schedules and interim milestone dates be used to measure progress toward addressing the highest water quality priorities and achieving applicable water quality-based effluent limitations. The schedules in this WMP will allow the

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Watershed Group to measure progress on a watershed scale every two years as part of an adaptive management process. Schedules have been initially developed for the strategies, control measures, and BMPs to be implemented on a watershed scale and on municipal roles in planning and implementing these projects (See Section 6 of this WMP). The Watershed Group is emphasizing a watershed approach to addressing water quality problems within the Watershed.

The overall implementation schedule for the LCC WMP is strongly influenced by TMDL final compliance dates and target dates for Category 2 and 3 pollutants, the Watershed Group's Water Quality Improvement Strategy, and the need to establish a stable and sustainable stormwater funding source in Los Angeles County and California to pay for the expensive stormwater capture and stormwater treatment facilities anticipated to be necessary to meet water quality standards in a timely manner. Final wet-weather compliance target dates for Category 1, 2, and 3 pollutants are shown in Section 2 and Section 6 of this Program (see Tables 2-9 through 2-12 and 6-1). Schedules for jurisdictional projects will be added to the schedules during adaptive management review as cities plan and program implementation of green streets, LID, and other local projects. The initial schedule contained in this WMP covers a 26-year period and is structured into eight three-year phases and a two-year phase. The schedule assumes a 2015 start date and is based on an anticipated 5-year permit renewal cycle (see Tables in Section 6 of this Program).

The Los Cerritos Channel Watershed Group looks forward to continuing to work together, and with the Regional Water Board, to achieve pollutant reductions in the waterbodies of the Watershed. Prior to 2012, MS4 permits required cities and agencies to implement a series of BMPs such as street sweeping and catch basin cleaning to demonstrate compliance. With the adoption of the fourth term MS4 permit by the Regional Water Board on November 8, 2012, the emphasis shifted to a watershed-based effort that includes the goals of achieving specific pollutant targets as runoff leaves the storm drain system and enters the Los Cerritos Channel. This Watershed Management Program, together with its accompanying RAA and CIMP, constitutes the first step in that watershed-based effort.

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1.0 Introduction and Background

1.1 Introduction

The Los Cerritos Channel (LCC) Watershed (Watershed) is a small, urbanized watershed comprising 17,711 acres in the Los Cerritos Channel and Alamitos Bay Watershed Management Area. The Permittees in the Watershed have been working together since late 2008 to address water quality issues in the Watershed. The Watershed includes the Cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill, as well as 94 acres of unincorporated land. After formalizing their partnership in 2010, these Permittees came together as the Los Cerritos Channel Technical Committee, and are now known as the Los Cerritos Channel Watershed Group. Since then, the Los Angeles County of Flood Control District (LACFCD) has joined the Watershed Group, and the California Department of Transportation (Caltrans) participates with the Group on an informal basis.

The Los Cerritos Channel Watershed Group has chosen to develop a Watershed Management Program (WMP) as a collaborative effort pursuant to Part VI.C. of Order No. R4-2012-0175 (National Pollutant Discharge Elimination System [NPDES] Permit No. CAS004001, *Waste Discharge Requirements for Municipal Separate Storm Sewer System [MS4] Discharges within the Coastal Watersheds of Los Angeles County, Except those Discharges Originating from the City of Long Beach MS4*, or "Los Angeles County Permit") and Part VII.C. of Order No. R4-2014-0024 (NPDES Permit No. CAS004003, *Waste Discharge Requirements for Municipal Separate Storm Sewer System Discharges from the City of Long Beach*, or "Long Beach Permit") to implement the requirements of the Order on a watershed scale through customized strategies and control measures and continued implementation of the applicable minimum control measures (MCMs) specified in Part VI.D. of the Order No. R4-2012-0175 and Part VI. C of Order No. R4-2014-0024. This voluntary approach to compliance with the Order will allow the Permittees the flexibility of addressing the highest watershed priorities first and allow the Permittees to develop a Coordinated Integrated Monitoring Program (CIMP) that matches the unique nature of the Watershed through watershed segmentation and forensic monitoring to locate the primary sources of pollutants within the Watershed. The customized strategies and control measures presented in this Program will be implemented both on a watershed and sub-basin basis and, where applicable, through each Permittee's stormwater management program.

Consistent with the Order, the WMP is designed to ensure that, over time, discharges from the Watershed Group's MS4s will achieve applicable water quality based effluent limitations (WQBELs) in Part VI.E. of the Permit, including the Los Cerritos Channel Metals Total Maximum Daily Loads (TMDLs) (Attachment Q of the Permit) and the Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters Toxic Pollutants TMDL (Attachment N of the Permit), not cause or contribute to exceedances of receiving water limitations in Parts V.A and VI.E of the Order or the applicable TMDLs, and not include non-stormwater discharges that are effectively prohibited by Part III.A. of the Order. Control measures will be implemented to reduce the discharge of pollutants to the maximum extent practicable. (MEP).

Consistent with Part VI.C.5-C.8, the WMP:

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1. Prioritizes water quality issues;
2. Identifies and implements strategies, control measures, and best management practices (BMPs) to achieve required water quality outcomes;
3. Executes an integrated monitoring program and assessment program;
4. Modifies strategies, control measures, and BMPs, as necessary, based on analysis of monitoring data collected, to ensure that applicable water quality-based effluent limitations and receiving water limitations and other milestones set forth in the WMP are achieved in the required timeframes; and
5. During the preparation of this WMP, the Los Cerritos Channel Watershed Group held a joint stakeholder meeting with the Lower San Gabriel River Watershed Committee. The Groups held the joint meeting on April 30 to seek stakeholder input, partially because several cities are in both watersheds and partially because the Regional Water Board's June 2013 Basin Plan Amendment addressed the Metals TMDLs for both watersheds and included a common implementation schedule. The joint presentation included descriptions of the watersheds, the overall approach to the WMPs, water quality priorities, monitoring, the Reasonable Assurance Analysis, strategies, control measures, schedules, priority pollutants, regional projects, and next steps. The presentation was followed by a valuable question and answer session.

Even though the Los Cerritos Watershed Group has chosen to propose a WMP – not an Enhanced Watershed Management Program (EWMP) – it will evaluate opportunities through the adaptive management process for collaboration on multi-benefit regional projects that collectively, wherever feasible, retain all non-stormwater runoff and all stormwater runoff from the 85th percentile 24-hour storm event for the drainage area tributary to the projects while achieving other benefits, such as water supply.

The WMP also addresses compliance with receiving water limitations not otherwise addressed by a TMDL. For pollutants with the same fate and transport mechanisms as pollutants addressed by a specified TMDL, the planned control measures will be designed to address both the TMDL pollutants and the other pollutants identified as having the same fate and transport mechanisms. A major example of this is the total suspended solids (TSS) reduction measures discussed in Section 3.4, which will address metals and legacy organics. In this case, both sets of pollutants are subject to a TMDL, but the TMDLs address different areas and have different compliance dates. The control measures designed to address the TMDL with the earlier compliance date will also reduce the loading of pollutants subject to the TMDL with the later compliance date.

The development of this WMP is based on an assumption that the current requirements will withstand the appeals to the State Water Board and possible litigation. However, the Los Cerritos Watershed Group recognizes that there could be some future changes to the requirements in Order No. R4-2012-0175. For instance, in a letter dated July 8, 2013, the State Water Board invited comments on the following two questions:

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1. Is the watershed management program/enhanced watershed management program alternative contained in the Los Angeles MS4 Permit an appropriate approach to revising the receiving water limitations in MS4 permits?
2. If not, what revisions to the watershed management program/enhanced watershed management program alternative of the Los Angeles MS4 Permit would make the approach a viable alternative for receiving water limitations in MS4 permits?

Numerous entities provided comments on WMPs/EWMPs as an alternative approach. Previously, based on comments provided during the public comment period prior to Permit adoption, Los Angeles Regional Water Quality Control Board (Regional Water Board) staff proposed the use of WMPs/EWMPs, and the Regional Water Board members voted unanimously to include them in the Los Angeles MS4 Permit.

Pursuant to 303(d) listings for the Los Cerritos Channel for copper, zinc, and lead, and to a 13-year time schedule imposed by a 1999 Consent Decree between USEPA and local environmental groups (*Heal the Bay, et al v. Browner et al*), USEPA established the Los Cerritos Channel Total Maximum Daily Loads for Metals on March 17, 2010. Since USEPA does not establish implementation plans or implementation schedules for its TMDLs, development of both was necessary for the Los Cerritos Channel. The Regional Water Board agreed to adopt a Basin Plan Amendment including general implementation plans and schedules for the Los Cerritos Channel Metals TMDLs. This WMP will serve as a detailed implementation plan for addressing the Los Cerritos Channel Metals TMDLs. The Basin Plan Amendment was adopted by the Regional Water Board on June 6, 2013. It was approved by the State Water Board on March 4, 2014. It became effective with approval by the Office of Administrative Law on October 13, 2014.

The WMP is a compliance-oriented water quality management tool to be used to facilitate improvement of surface water quality and provide opportunities to increase local water supplies. As stated in the Fact Sheet for the Los Angeles MS4 Permit, "the purpose of Watershed Management Programs is to provide a framework for Watershed Group members to implement the requirements of [permits] in an integrated and collaborative fashion to address water quality priorities on a watershed scale." The program is designed to facilitate watershed-based stormwater management planning using an adaptive management approach that allows for strategic planning and integration of water quality goals with water supply benefits.

Development of a WMP, with its associated monitoring program and Reasonable Assurance Analysis, is expensive, and its implementation will be both costly and rigorous. In acknowledgement of that fact, the Regional Water Board included incentives in the Permit to encourage participation in WMP or EWMP programs. One such incentive is the provision that, through implementation of a WMP, Permittees may comply with receiving water limitations, including water quality based effluent limitations.

1.2 The Watershed

The Los Cerritos Channel Watershed comprises a predominantly urban land area of approximately 17,711 acres (27.7 square miles) (See Figure 1-1).

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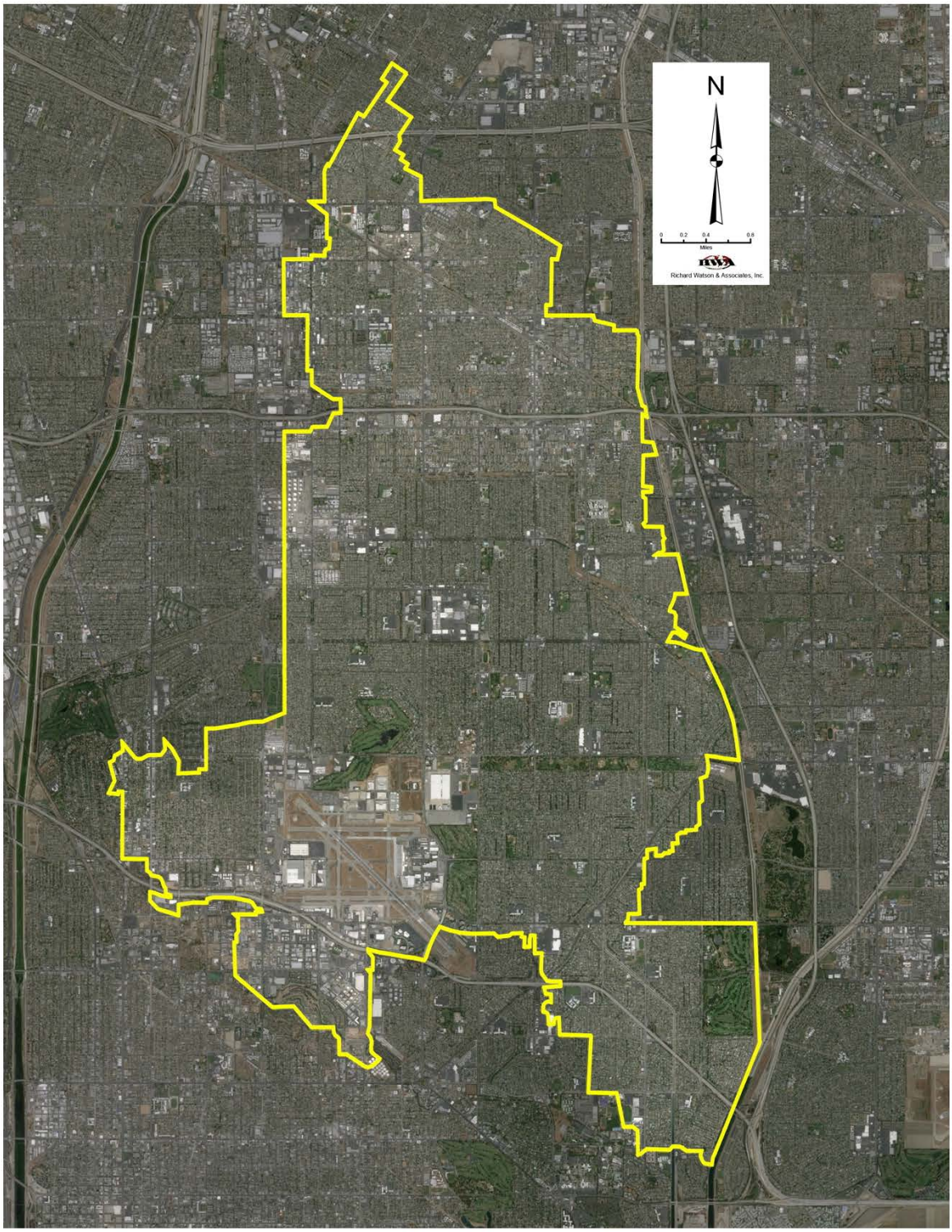
Figure 1-1. Los Cerritos Channel Watershed



The Watershed extends from just north of I-105 in Downey south to Atherton Street in Long Beach, where the Channel discharges into the Los Cerritos Channel Estuary, which, in turn, discharges through Marine Stadium and Alamitos Bay to San Pedro Bay. The Watershed includes ten MS4 Permittees

regulated under three MS4 permits: the Los Angeles MS4 Permit, the Long Beach MS4 Permit, and the Caltrans Permit. Seven Cities and the Los Angeles County Flood Control District (LACFCD) are participating formally together in development of a WMP and a CIMP. (See Figure 1-2.) The entire Watershed is within the LACFCD. Caltrans is participating informally as of January 2015, since a Memorandum of Understanding (MOU) has not yet been signed. Completion of an MOU and formal participation on the part of Caltrans is anticipated in the future. The total area covered by the WMP includes approximately 17,199 acres. Approximately 498 acres of Caltrans property regulated under a statewide MS4 permit and a 94-acre unincorporated area with a separate WMP are excluded from this WMP. The following table provides a breakdown of the land area within the Los Cerritos Channel Watershed by Permittee.

Table 1-1: Los Cerritos Channel Watershed Land Area by Permittee

Permittee	Land Area (Acres)[1,]	Percentage of Total Area
Bellflower	2,818.4	15.91%
Cerritos	57.6	0.33%
Downey	245.0	1.38%
Lakewood	4,802.7	27.12%
Long Beach	7,535.4	42.55%
Paramount	1,128.9	6.37%
Signal Hill	530.7	3.00%
Caltrans	498.0[1]	2.81%
County FCD	NA[2]	NA
Total:	**17,616.7**	**100%**

[1] Caltrans average subtracted from city areas.

[2] County of Los Angeles' 94-acre area within the Los Cerritos Channel and Alamitos Bay Watershed Management Area is not included in this WMP.

The County of Los Angeles and the LACFCD have prepared a separate WMP and CIMP for the 94-acre unincorporated area and other LACFCD service areas within portions of the Los Cerritos Channel and Alamitos Bay Watershed Management Area.

The Los Cerritos Channel itself is an open flood control channel. The Cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill, and a small portion of unincorporated Los Angeles County are located within the area that drains to the Channel. It is a concrete-lined freshwater channel until it reaches approximately Atherton Road, where the Channel's tidal prism begins. A small marina located in the Estuary is used for recreational purposes. Average dry-weather flows in the Channel were 2.35 cubic feet per second (cfs) when the Metals TMDLs were established, with storm event flows recorded as high as a historical maximum of 1,460 cfs. Dry weather flows have subsequently decreased, due in part to the water conservation efforts by cities within the Watershed.

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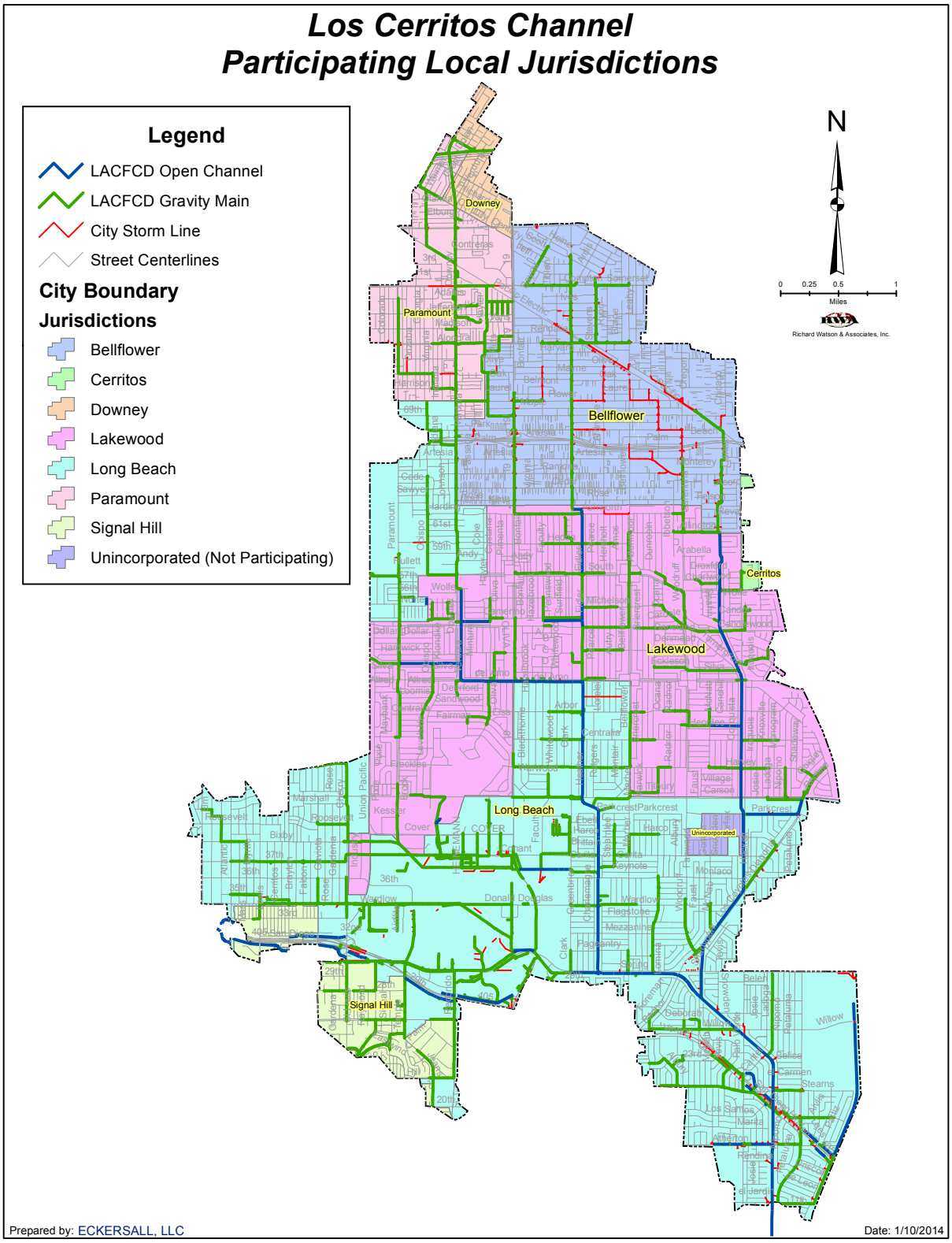
Figure 1-2. Los Cerritos Channel Participating Local Agencies



The portion of the Los Cerritos Channel listed as impaired for metals is the approximately 2.1-mile long freshwater portion above the tidal prism. Approximately 44 percent of the Watershed is located in the eastern part of the City of Long Beach, with the remaining 56 percent located outside the City of Long Beach in the other jurisdictions in the Watershed.

Land use within the Watershed is 93% urban, including approximately 60% residential, 9% mixed urban, 15% commercial, and 9% industrial. Open space accounts for approximately 6% of land use in the Watershed, with agriculture comprising <1% of land use. The following table reproduced from the *Los Cerritos Channel Total Maximum Daily Loads for Metals* illustrates the specific land use percentages in the Watershed:

Table 1-2: Los Cerritos Channel Watershed Land Use Percentages

Land Cover Type	No. of Acres[1]	Percentage of Watershed
Agriculture	137.1	0.8%
Commercial	2,668.6	15.1%
High Density Residential	1,228.5	6.9%
Industrial	1,615.0	9.1%
Low Density Residential	9,278.9	52.4%
Mixed Urban	1,665.8	9.4%
Open Space	1,097.9	6.2%
Water	18.9	0.1%
Total	**17,710.7**	**100%**

[1] Includes 94 acres of unincorporated area and 498 acres of Caltrans properties.

These land uses were converted into hydrological response units as part of development of the Watershed Modeling System (WMMS) for the County of Los Angeles. (See Figure 1-3)

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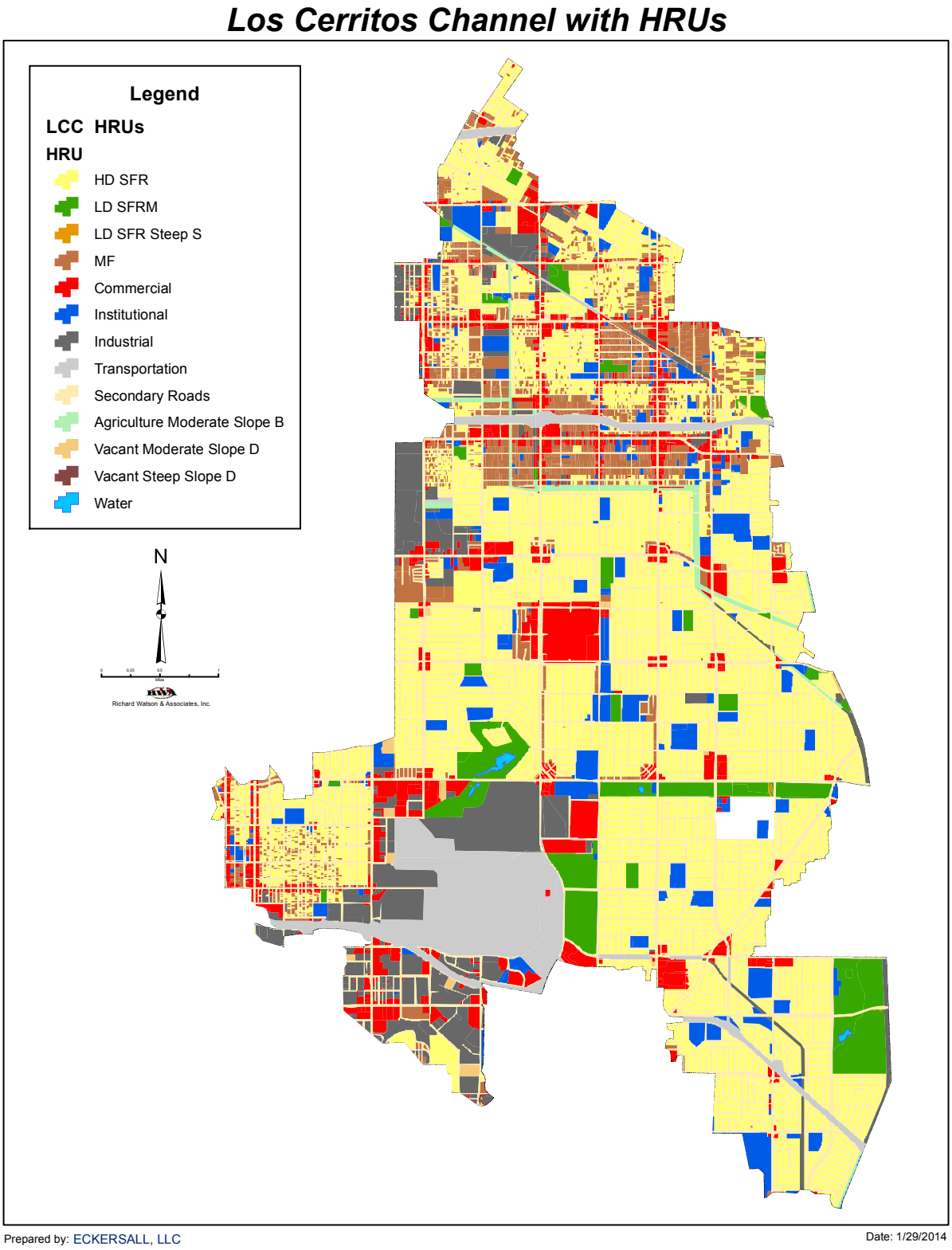
Figure 1-3 LCC Hydrologic Response Units



1.3 Water Quality Issues and the History of Water Quality Regulation

The MS4 Permits require Permittees to identify water quality priorities that will be addressed by a WMP. These priorities are to include water quality-based effluent limitations and/or receiving water limitations, as well as an evaluation of existing water quality conditions, including characterization of stormwater and non-stormwater discharges. The Permits further require Permittees to designate three categories of pollutants: Category 1 (Highest Priority), Category 2 (High Priority), and Category 3 (Medium Priority). The requirements for the first two designations are clear in terms of the level of impairment that relates to each. However, the third category, which includes pollutants for which there are insufficient data to indicate water quality impairment, is quite broad and does not distinguish between medium priority and low priority pollutants. In order to identify Category 3 pollutants, the Los Cerritos Channel Watershed Group has developed a screening process to distinguish between medium priority pollutants and those the Group considers to be low priority. See Section 2.2 of this Program for detailed descriptions of the Category 1, 2, and 3 pollutants for the Los Cerritos Channel WMP.

The State of California has established water quality standards based on three components: 1) beneficial uses, as defined by the Regional Water Board in the Basin Plan; 2) narrative and/or numeric water quality objectives; and 3) an antidegradation policy. For certain pollutants, USEPA has established numeric criteria that serve as water quality standards for California's inland surface waters. (California Toxics Rule, 40 CFR 131.38).

In 1990, USEPA established Phase I of the municipal National Pollutant Discharge Elimination System (NPDES) program, which, in part, required operators of medium and large MS4s (generally serving populations of 100,000 or more) to implement stormwater management programs. These programs require addressing a variety of water quality–related issues, including:

- Structural control maintenance
- Areas of significant development or redevelopment
- Roadway runoff management
- Flood control related to water quality issues
- Municipally owned operations such as landfills and wastewater treatment plants
- Municipally owned hazardous waste treatment, storage, or disposal sites
- Application of pesticides, herbicides, and fertilizers
- Illicit discharge detection and elimination
- Regulation of sites classified as associated with industrial activity
- Construction site and post-construction site runoff control
- Public education and outreach

Section 303(d) of the federal Clean Water Act (CWA) requires each State to "identify those waters within its boundaries for which the effluent limitations are not stringent enough to implement any water quality objective applicable to such waters." The CWA further requires States to establish priority rankings for waterbody-pollutant combinations on the 303(d) Listing of Impaired Waters, and to establish TMDLs for those waters. A TMDL is defined in the CWA as "the sum of the individual waste

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load allocations for point sources and load allocations for nonpoint sources and natural background." The CWA requires TMDLs to be set at levels "necessary to achieve all applicable water quality standards" in the Channel (Source: *Los Cerritos Channel Total Maximum Daily Loads for Metals, March 2010*.) TMDLs also are required to account for seasonal variations and include a margin of safety to account for any lack of knowledge regarding the relationships between effluent limitations and water quality. USEPA included in the Los Cerritos Channel Metals TMDLs an explicit margin of safety equal to 10% of the loading capacity or existing load available for wet-weather allocations.

The State Water Resources Control Board and the nine Regional Water Quality Control Boards are responsible for preparing lists of impaired waterbodies for the 303(d) list and for preparing TMDLs in California. Both processes are subject to USEPA approval. If USEPA does not approve a State-submitted TMDL, it is required to establish a TMDL for that waterbody. The Regional Water Boards are responsible for issuing NPDES permits and state-specified Waste Discharge Requirements.

During the 1996 and 1998 303(d) listing cycles, the Los Angeles Regional Water Board identified over 700 waterbody-pollutant combinations in the region for which TMDLs are required. As a result of a consent decree approved between USEPA, Heal the Bay, and NRDC, a 13-year schedule for development of TMDLs in the Los Angeles region was established on March 22, 1999. The Consent Decree combined the over 700 waterbody-pollutant combinations into 92 TMDL analytical units. Because of the high volume of TMDLs required, which the State was going to be unable to complete and adopt within the 13-year consent decree deadline, USEPA established some of these TMDLs – including those for Analytical Unit 84, which is for metals listings in Los Cerritos Channel.

1.4 History of Water Quality Impairments in Los Cerritos Channel

The Los Cerritos Channel was included on the 1998, 2002, 2006, and 2010 California Clean Water Act Section 303(d) lists as impaired for copper, lead, and zinc. Dry-weather runoff in the Los Cerritos Channel comes largely from groundwater inflow and discharges to the MS4s from illicit connections, excess irrigation, and other residential and commercial practices. Wet-weather metals sources are generally associated with the accumulation and wash-off of metals on the land surface. The volume of wet-weather loading varies with storm size.

In addition to the metals impairments for which TMDLs have been established, the Channel has been listed through the years as impaired for aluminum, bis(2-ethylhexyl)phthalate, coliform bacteria, trash, and pH, although none of these impairments are currently subject to TMDL requirements. Also, the Watershed was included in the nearshore area for the Greater Harbor Toxics TMDLs, which lists impairments for copper, lead, zinc, DDT (fish tissue), PCBs (fish tissue), chlordane (fish tissue), PAHs (fish tissue), and toxicity (sediment). See Section 2.0 for a detailed discussion of water quality issues within the Watershed and the priority pollutants to be addressed through implementation of this WMP.

At the time the Metals TMDLs were adopted in 2010, there were 68 NPDES permittees in the Los Cerritos Channel Watershed, including MS4 permits, the Caltrans permit, general construction and general industrial stormwater permits, those regulated under minor NPDES permits, and general NPDES

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permits. Individual metals sources in the watershed include vehicle brake pads, vehicle tire wear, building materials, pesticides, erosion of paint, and aerial deposition of emissions from industrial facilities.

As part of development of the Los Cerritos Channel Total Maximum Daily Loads for Metals, USEPA defined ten sub-basins within the Watershed (See Figure 1-4). Since Order No. R4-2012-0175 specifies that WMPs should reflect sub-watersheds defined in TMDLs, this program emphasizes implementation by sub-basin rather than the sub-watersheds defined in WMMS. The sub-watersheds aggregate to the sub-basins that will facilitate use of Reasonable Assurance Analysis (RAA) sub-watershed information as the WMP is implemented on a sub-basin basis.

Runoff to the Channel is regulated as a point source discharge in the permits; however, there are both point source and nonpoint source contributions to metals loadings in the Channel. Nonpoint sources are those that discharge via sheet flow or natural discharges, or from unregulated sites such as schools. These loadings from a variety of anthropogenic and natural sources accumulate in the Watershed and are washed into the Channel through rainfall. Sources include urban debris, erosion of susceptible materials, agricultural practices, and atmospheric deposition. The percentage of copper contribution from vehicle brake pads in the Los Cerritos Channel is significant. Copper particles are deposited onto land areas by direct deposition and are released into the air during brake pad use and subsequently deposited onto impervious surfaces and transported into water bodies through stormwater and urban runoff.

The Basin Plan for the Los Angeles Region defines one existing beneficial use (wildlife habitat [WILD]) and two intermittent beneficial uses (noncontact water recreation [REC2] and warm water habitat [WARM]) for Los Cerritos Channel. For development of the Los Cerritos Channel Metals TMDLs, USEPA assessed water quality using data from the City of Long Beach stormwater program and five additional samples provided by Kinnetic Laboratories, Inc. Metals data were collected from the Stearns Street monitoring site in the City of Long Beach, above the tidewater in the Los Cerritos Channel. Flow rates based on flow velocity and channel dimensions were used to calculate total flow following storm events. Dry-weather and wet-weather metals concentrations were compared to California Toxics Rule (CTR) values using hardness measured for each sampling event to assess the frequency of exceedances of the CTR criteria for copper, lead, and zinc in Los Cerritos Channel. Monitoring indicates exceedances for copper in dry weather, but not for lead or zinc. In wet weather, monitoring indicates exceedances for copper and zinc. A dry-weather TMDL was developed for copper, and wet-weather TMDLs were developed for copper, lead, and zinc. However, the wet-weather lead TMDL requires no further reductions.

The latest Los Angeles County MS4 Permit (Order No. R4-2012-0175) was adopted by the Los Angeles Regional Water Quality Control Board on November 8, 2012 and became effective December 28, 2012. This Permit covers 86 co-permittees, including 84 incorporated cities, the County of Los Angeles, and the LACFCD, and is on a five-year renewal cycle. The City of Long Beach MS4 Permit (NPDES Permit Order No. R4-2014-0024) was adopted on February 6, 2014, and is also on a five-year renewal cycle. It covers the City of Long Beach portions of the watershed.

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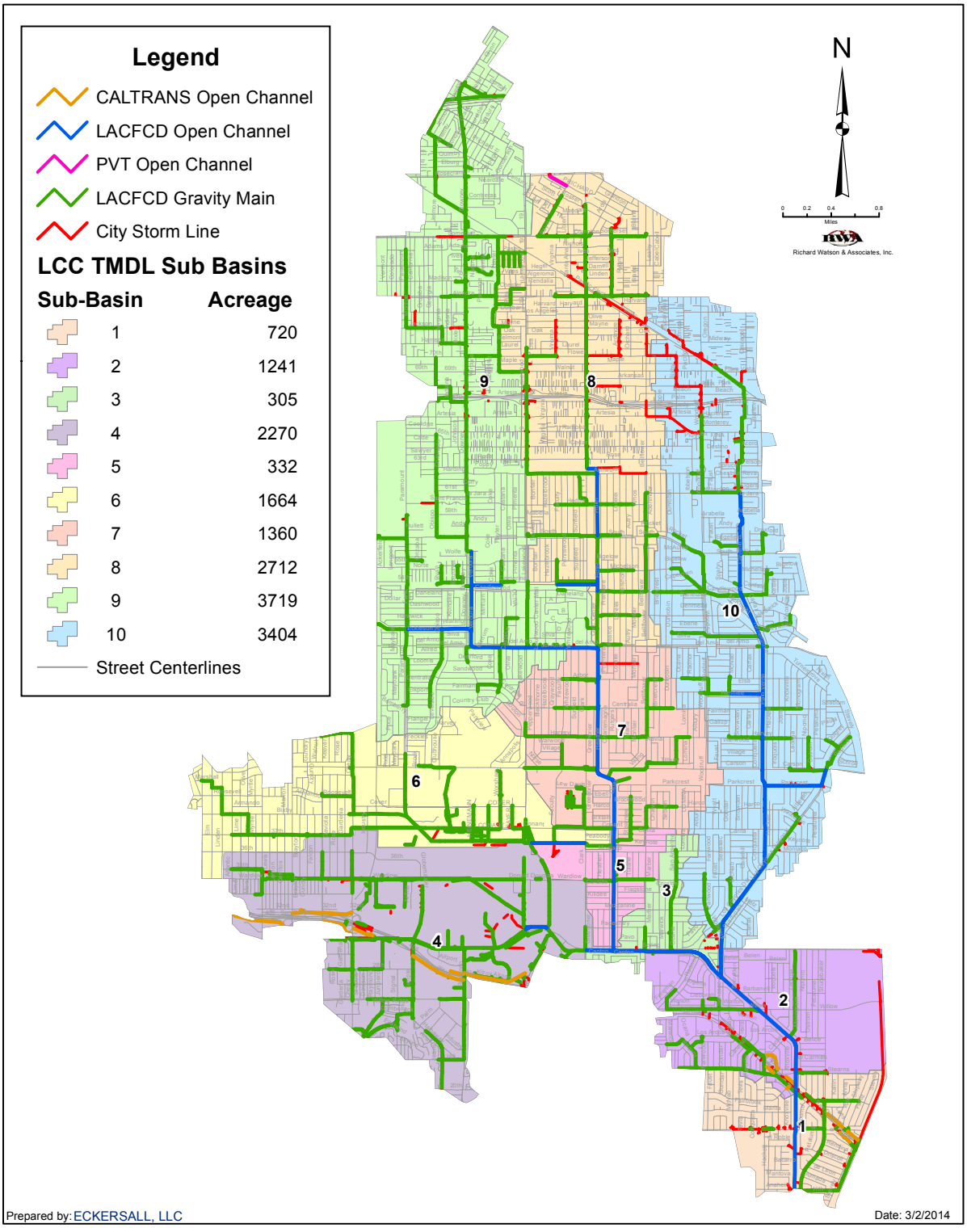
Figure 1-4. Los Cerritos Channel Sub-basins



1.5 Organizing to Address Water Quality

As noted above, the Los Cerritos Channel Watershed Group has been working together since late 2008, when the group organized in response to a draft of the EPA-established Metals TMDLs for the freshwater portion of the Los Cerritos Channel Freshwater Watershed. The participating agencies, together with the Gateway Water Management Authority (GWMA), which acts as the fiduciary agent for the Watershed Group, entered into memoranda of agreement in 2010. Because of this history of working together to address water quality issues in the watershed, and because of its organizational arrangements with GWMA, the Watershed Group has chosen to continue its focus on the Los Cerritos Channel portion of the Los Cerritos Channel and Alamitos Bay Watershed Management Area, while taking into account water quality impairments in the Los Cerritos Channel Estuary and the Greater Los Angeles/Long Beach Harbor to which the Los Cerritos Channel Watershed may be contributing.

Since the adoption of the new MS4 Permit, the Watershed Group has comprehensively analyzed the range of stormwater management alternatives in the new Permit for addressing targeted stormwater pollutants in the Los Cerritos Channel. The Watershed Group elected to continue working together in a multi-agency effort to prepare a WMP and CIMP. The draft program plan was submitted to the Regional Water Board on June 29, 2014.

Cities implementing all aspects of the approved program will, with some exceptions, be deemed in compliance – at least for an interim period – with the receiving water numerical discharge limits. Under the Permit there is also protection from third party litigation risks for agencies participating in a WMP.

1.6 Metals TMDLs

The USEPA-established *Los Cerritos Channel Total Maximum Daily Load for Metals* (March 17, 2010) includes the problem statement, numeric targets, source analysis, loading capacity, load allocations (LAs), waste load allocations (WLAs), and margin of safety, but does not include an implementation plan or schedule. As noted earlier, the Regional Water Board has adopted and the State Water Board has approved a Basin Plan Amendment that includes a general implementation plan and a schedule.

The Cities in the Watershed Group have contributed to the effort by the California Stormwater Quality Association (CASQA) and Sustainable Conservation to develop the legislation that ultimately became SB 346. It requires incremental reduction in the amount of copper in vehicle brake pads. Implementation of SB 346 will, over time, significantly reduce the level of copper in urban waters throughout the state. As noted previously, a significant percentage of the copper loading to the Los Cerritos Channel is due to copper in brake pads. Implementation of SB 346 should assist Watershed Group member cities and agencies to reduce copper loadings in their jurisdictions. This represents an example of “true source control,” which is the most cost-effective way to achieve pollutant reductions.

Table 1-3 lists applicable interim and final water quality based effluent limitations established by the Implementation Schedule for the Los Cerritos Channel Metals TMDLs.

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Table 1-3: Implementation Schedule for LCC Metals TMDL

TMDL Order	WQBEL	Interim/Final	Compliance Date
Metals TMDLs 2010-2026	Dry Weather[1] 30% of drainage area	Interim	9/30/2017
	70% of drainage area	Interim	9/30/2020
	100% of drainage area	Interim	9/30/2023
	Wet Weather[1] 10% of drainage area	Interim	9/30/2017
	35% of drainage area	Interim	9/30/2020
	65% of drainage area	Interim	9/30/2023
	100% of drainage area	Final	9/30/2026

[1] An Implementation Schedule for the Los Cerritos Channel Metals TMDLs was approved by the Regional Water Board on June 6, 2013 in Attachment B to Resolution No. R13-004.

1.7 MS4 Permit Requirements

Section VI.E.3 of the Los Angeles County MS4 Permit provides a framework for developing implementation plans for USEPA-established TMDLs by requiring Permittees subject to waste load allocations (WLAs) to propose and implement best management practices that will be effective in achieving compliance with USEPA-established numeric WLAs. A CIMP is required to be submitted either separately or as part of a WMP. The Watershed Group's CIMP is required to integrate requirements of the current Los Angeles County MS4 Permit, the City of Long Beach MS4 Permit, and TMDL monitoring requirements.

On June 6, 2013, the Los Angeles Regional Water Board adopted Resolution No. R13-004 that amended the Water Quality Control Plan for the Los Angeles Region to incorporate implementation plans for the TMDLs for Metals in the Los Cerritos Channel and for Metals and Selenium in the San Gabriel River and Impaired Tributaries. Attachment B to the Resolution specifies an interim compliance date of September 30, 2017, which is after the anticipated approval date for the WMP, but is approximately three months prior to the expiration date for the Los Angeles County MS4 Permit. Attachment B also specifies two additional interim compliance dates in 2020 and 2023 and a final compliance date of September 30, 2026. Pursuant to Section VI.E.3 of the Order, the WMP will become the Implementation Plan for the EPA-established Los Cerritos Channel TMDLs for Metals.

The new MS4 Permit requires that participating agencies prepare individual Letters of Intent to participate in development of a WMP. The member agencies of the LCC Watershed Group each prepared and submitted such letters.

1.8 Overview of WMP Strategy

The Los Cerritos Channel Watershed Group member agencies continue to engage in a number of required control measures that were initiated prior to commencement of WMP development and that have continued throughout the WMP development process. In addition, the Watershed Group has concluded that the best way to address water quality impairments within the Los Cerritos Channel

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receiving waters is to implement a multi-faceted WMP strategy utilizing each member agency's stormwater management program along with customized strategies, control measures, and BMPs at the watershed and sub-basin levels. The initial focus will be on true source control, runoff reduction, and total suspended solids (TSS) reduction. Once those options have been pursued, Watershed Permittees will pursue LID and green streets, operational source control, capture and infiltration, capture and use, and treatment controls (See Figure 3-1 in Section 3.0). However, planning for additional measures will occur concurrently with implementation of true source control measures.

True source control – reducing or eliminating a pollutant at its source – is a critical component of this strategy. Its effectiveness is simple: if pollutants are not generated or released, they will not be available for transport to the receiving waters. The Watershed Group has focused particularly on true source control because major sources of copper, lead, and zinc are released into the atmosphere, resulting in widespread deposition on impervious surfaces such as streets, highways, parking lots, and rooftops, in addition to the direct deposition that occurs on streets, highways, parking lots, and driveways. Copper is being addressed through the implementation of SB 346.

The Watershed Group is planning to work with CASQA to address a major source of zinc – automotive tires. The Department of Toxic Substances Control (DTSC) adopted new Safer Consumer Product Regulations that establish a process for identifying, prioritizing, and eliminating or reducing Chemicals of Concern in Priority Products. Because the requirements for inclusion on the initial priority product list are restrictive, these regulations cannot be used to reduce zinc in tires until after January 1, 2016. However, the Watershed Group will be able to work with CASQA and others to develop a well-supported petition to support the addition of zinc in tires as a product-chemical combination on the Priority Products List.

The Watershed Group will also emphasize TSS reduction. Reducing total suspended solids in the receiving waters should result in a significant reduction of metals and legacy organics, since both groups of pollutants adhere to sediment. This initial emphasis on TSS reduction should reduce the volume of water that ultimately needs to be captured and infiltrated or used to achieve standards for metals and legacy organics. The Watershed Group also will implement an enhanced street sweeping and parking lot sweeping program within the upper Palo Verde Channel sub-basin and/or the upper Clark Channel sub-basin during the first phase of implementation of this plan.

The runoff reduction strategy will initially focus on reduction of dry-weather runoff to substantially improve water quality during dry-weather days. This will involve a combination of water conservation and improvements in landscape irrigation efficiency to eliminate or greatly reduce overspray and runoff that provides a transport mechanism to carry pollutants to the storm drain system and into the receiving waters of the Los Cerritos Channel. Watershed Group members will use their Public Outreach Programs and Public Agency Activities Programs to promote and monitor operational source control measures that address priority pollutants within the Watershed. Runoff reduction will also involve dry-weather diversions to either the sanitary sewer system or infiltration/evapotranspiration facilities, such as infiltration trenches and rain gardens.

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Reducing runoff during wet weather is challenging and costly. The Watershed is essentially built-out and will be partially dependent on redevelopment to create opportunities for wet-weather runoff reduction. However, member agencies will implement green streets; retrofit low impact development (LID) components at key locations; and reduce directly connected impervious areas. In addition, member agencies will implement capture and use and capture and infiltrate measures to the maximum extent practicable.

Because of the depth to the drinking water aquifer and the widespread presence of clay lenses throughout the Watershed, implementation of a capture and infiltrate strategy will be challenging. The Watershed Group has attempted to locate initial potential water capture facilities in locations where captured stormwater can be treated, if necessary, and used for irrigation if infiltration is not feasible. These locations include local parks and golf courses and, potentially, school sites. To date, thirteen first order water capture sites have been identified. The three initial projects are planned for two park locations and a golf course, locations that will be particularly helpful in bringing the upper portions of sub-basins 4, 8, and 10 into compliance with the Waste Load Allocations in the Metals TMDLs and reduce the loads of other priority pollutants with similar fate and transport mechanisms.

The Watershed Group will also implement operational source control measures. These measures include street sweeping and cover and containment, as well as education and outreach efforts to encourage public and private sector entities to reduce or eliminate the discharge of pollutants or to reduce or prevent the contact of pollutants with rainwater and/or urban runoff.

Except for vegetative treatment associated with LID and green streets, MS4 treatment control is generally viewed by the Watershed Group as a last resort to be used when true source control, runoff reduction, TSS reduction, and operational source control are not sufficient. The Permittees anticipate that much of the treatment control implemented in the Watershed will be associated with implementation of LID ordinances and green streets policies. Further, although enhanced street sweeping should be sufficient to control direct and indirect deposition of zinc on arterials and residential streets, control of zinc from industrial sources may require the installation of targeted treatment controls. The need for installation of treatment control facilities will be continually re-evaluated through the adaptive management process required by Order No. R4-2012-0175 and explained in Section 10 of this Program.

The adaptive management process will be key to successful implementation of the Los Cerritos Channel Watershed Management Program. The Watershed Group will utilize management techniques set forth in this Program, assess and monitor for results, and refine program components, as necessary. For further details on the Watershed Group's multi-pronged strategy, including its Financial Strategy, please see Section 3.0 of this Program.

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2.0 Identification of Water Quality Priorities

2.1 Water Quality Characterization

2.1.1 Introduction

The Permittees within the Los Cerritos Channel Watershed are fortunate to have 13 years of data collected by the City of Long Beach at its Stearns Street mass emission monitoring site. This monitoring site was established pursuant to the City's individual MS4 permit first adopted in 1999

Major elements incorporated in Long Beach's monitoring and reporting program include 1) mass emission monitoring during storm events, 2) monitoring of dry weather discharges at each mass emission site, and 3) special studies. Special studies were included in the original permit to provide the flexibility necessary to allow the program to respond to new issues or concerns that might arise in the course of routine monitoring or as the result of emerging topics in stormwater science. Special studies were generally intended to improve assessment of impacts on receiving water, identify sources and sinks for contaminants, and assess compliance with TMDL targets and water quality objectives. The City has developed a variety of special studies during the past 13 years. In addition, the City has incorporated analysis of additional pollutants of concern based upon changes that have occurred with respect to pesticides that are available for residential use. Data from the monitoring program is intended to support decisions necessary to refine BMPs for the reduction of pollutant loading and the protection and enhancement of beneficial use of the receiving waters.

Mass emission monitoring is specified to be conducted at four sites during four wet weather storm events each year, including the Stearns Street site for the Los Cerritos Channel. The 1999 permit allowed for a phased implementation process with monitoring of the Los Cerritos Channel site starting in the second year of the program. An automated monitoring station was first installed and operable for the 2000/2001 wet season. Dry season monitoring was started in June 2001.

Storm Water Runoff at the Los Cerritos Channel Monitoring Station

The Stearns Street monitoring station serves as both a mass emission monitoring site for the City of Long Beach stormwater monitoring program and as the compliance point for the Los Cerritos Metals

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TMDL. The storm water monitoring station is installed in a steel utility box located on the west side of the channel south of Stearns Street. Water level/flow sensors and Teflon/FEP tubing for water sampling are installed on the bottom of the large concrete lined channel. The sensors and intake tubing pass through conduit to protect against the high flows and debris passing through the channel. Flow rates based upon measured water levels and a stage-flow rating curve used at an adjacent gauging station that is no longer in service.

This sampling site is normally above tidewater on Los Cerritos Channel. During extreme tides that typically occur during the dry weather surveys, this site can be impacted by backwater conditions. This has been remedied in recent years by scheduling dry weather sampling for periods that have less extreme tidal ranges.

The Long Beach mass emission monitoring program was developed to characterize stormwater discharges, identify contaminants of concern and develop pollutant load estimates for each major watershed. Monitoring is required to be conducted during the first significant rainfall event of the season. Flow-rated, whole storm composite samples are obtained and analyzed for major constituents of concern which include conventional constituents, total and dissolved metals. For the past two years, this has also included pyrethroid pesticides, and, for the past year, Fipronil.. A more comprehensive set of constituents was analyzed during the earlier years of the program. These included extensive screening for semivolatile organics (acid, base and neutral compounds), MBTE, and larger suites of both triazine pesticides and trace metals. The analytical set was selectively reduced after these compounds failed to occur at levels exceeding Minimum Levels (MLs) or where concentrations did not exceed any available and appropriate water quality standards. Toxicity testing using sea urchin fertilization tests and water flea survival and reproduction is conducted on composite storm samples. Toxicity tests during the earlier years of the program also included mysids but tests conducted at that time were not as sensitive as either the sea urchin fertilization test or the water flea tests. As with the chemical constituents, toxicity testing using mysids was suspended in lieu of the more sensitive tests. Phase 1 Toxicity Identification Evaluations (TIEs) are required to be performed on all samples that exhibit toxicity in excess of predetermined trigger values. The TIE process is used to determine the likely contaminants contributing to the observed toxicity.

Dry weather monitoring at Stearns Street consists of inspections conducted at the mass emission site and the collection and analysis of dry weather discharges over 24-hour periods. Monitoring is required to be conducted twice during each dry season. Sampling is typically conducted in September just prior to the storm season and in May following several weeks of dry weather. This element of the program is intended to assist in identification of pollutants of concern, assess the impacts that these pollutants might have on biological communities in the receiving waters and identify the sources of these contaminants such that they can be effectively controlled or eliminated. Dry weather discharge samples

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are subjected to the same chemical analysis and toxicity testing procedures as used for storm water monitoring.

2.1.2 Summary of Water Quality Conditions in the Los Cerritos Channel Freshwater Receiving Waters

The following sections discuss the quality of stormwater and dry weather discharges from the mass emission monitoring site. Concentrations of contaminants measured in both wet and dry weather discharges were compared with various receiving water quality criteria. Temporal trends over the past 13 years were examined for principal contaminants of concern. Data from the Stearns Street site were examined in great detail in order to assess progress towards meeting established Waste Load Allocations in the Los Cerritos Channel Metals TMDLs. The toxicity of both storm water and dry weather discharges are summarized for the duration of this time period. Water quality data associated with stormwater runoff (Table 2-1) and dry weather discharges (Table 2-2) are summarized for the most common contaminants of concern. Benchmarks used to evaluate receiving waters are summarized in Table 2-3 and Table 2-4.

For the purpose of this analysis, water quality criteria or objectives were used to provide reference points for assessing the relative importance of various stormwater contaminants, though specific receiving water studies are necessary to quantify the presence and magnitude of any actual water quality impacts. Ultimately, specific beneficial uses of the receiving water body should be considered when selecting the appropriate benchmarks.

Water quality criteria used as benchmarks in freshwater environments are summarized in Table 2-3 Criteria applicable to saline conditions are summarized separately in Table 2-4. These reference water quality criteria are useful for screening Event Mean Concentrations (EMCs) generated for most of the major constituents measured as part of this program. Most importantly, these benchmarks are only intended to serve as a tool to assist with the interpretation of the storm water quality data. Exceedances of these receiving water quality benchmarks do not necessarily indicate impairment. Other factors such as dilution, duration and transformation in the receiving waters must also be considered. Nevertheless they can be extremely useful in screening for analytes that might have greater potential to impact receiving waters and/or warrant more consideration in development of BMPs and implementation of source control strategies.

For comparative purposes, an EMC was considered to be an exceedance if the value was higher than any of the reference or benchmark values. In using these benchmarks, it is important that the source of the specific criterion is considered. For instance, metals concentrations derived from California Toxics Rule (CTR) freshwater criteria for protection of aquatic life are based upon dissolved concentrations and are often a function of hardness. Values listed in Table 2-3 are based upon a default hardness of 100 mg/L

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which is consistent with tabulated values provided in the CTR. Evaluation of any possible exceedance of hardness-dependent criterion is based upon the actual hardness EMC for the site and event therefore the criterion will change. Hardness measured during wet weather events is typically far less than 100 mg/L while hardness associated with dry weather events will be substantially higher. For metals with criteria dependent upon hardness, CTR criteria tend to be much higher for dry weather discharges since elevated hardness encountered during the dry season tends to mitigate potential toxicity of these metals. Saltwater objectives listed for metals under the CTR are also based upon dissolved concentrations while those listed under the California Ocean Plan are based upon total recoverable measurements. Although Ocean Plan numbers are used for comparative purposes, the marine and estuarine receiving waters in the Los Cerritos Channel Estuary would only be subject to the CTR saltwater values since both Alamitos Bay and San Pedro Bay are considered enclosed bays and estuaries. Water quality criteria provided in the Los Angeles Basin Plan are primarily based upon Title 22 drinking water standards. For two of the key organophosphate pesticides, the only available water quality criteria are those proposed by the California Department of Fish and Game (Siepmann and Finlayson, 2002). UC Davis (Faria et al. 2010; Fojut et al. 2012) has recently provided a series of reports that suggest new acute and chronic water quality criteria for a series of pesticides that include various pyrethroids and organophosphate pesticides.

Both acute and chronic water quality criteria are used in this evaluation. Due to the limited period of discharge, the acute criteria are considered most applicable to storm water. Dry weather discharges are most appropriately compared against chronic criteria (CCCs or daily maxima).

2.1.2.1 Wet Season Water Quality

The water quality criteria for pH included in the Los Angeles Basin Plan (CRWQCB, Los Angeles, 1994) indicate that surface waters should be maintained in the range of 6.5 to 8.5. Elevated pH is extremely atypical due to the acidic nature of rainfall. It is unusual to have storm water with measured pH values greater than the upper Basin Plan limit of 8.5 but historically a small percentage of storm water samples have exceeded the upper standard of 8.5.

Although care is taken to get accurate pH measurements, it is well known that accurate measurements in water with low ionic strength are difficult to obtain due to instability and slow response times. It is possible that some historical measurements were impacted by this problem. Sensors and measurement techniques for addressing water with low ionic strength have improved over the past decade.

The total coliform, fecal coliform and enterococcus single sample benchmarks are commonly exceeded during wet weather sampling events. Grab samples taken for bacteria during storm events most often exceed Basin Plan water quality criteria but also have shown a tremendous degree of variability. This can be attributed to both extreme variability that can occur over the course of a storm event and even

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extreme short-term variability that is common when taking field duplicates. Although the variation is substantial, overall concentrations of fecal indicator bacteria (FIBs) in storm water average about 104 mpn/100 ml for both Enterococcus and fecal coliform. *E. coli* have not been directly measured as part of the storm water monitoring program, however, fecal coliform concentrations provide an upper estimate of the *E. coli* in the water samples. The monitoring program will be transitioning to *E.coli.*

Over the past 13 years, four total recoverable metals including aluminum, copper, lead and zinc have frequently exceeded benchmark reference values. Criteria for total recoverable aluminum exist for drinking water (Basin Plan criteria) and aquatic life as a nonpriority pollutant (Table 2-3). Elevated levels of aluminum are normal during storm events due to naturally high levels in soils and the increased loads of sediment.

Concentrations of total recoverable copper, lead, and zinc measured in runoff at the Stearns Street site have frequently exceeded Ocean Plan criteria over the past thirteen years of the stormwater monitoring program.

Chlorinated pesticides continue to be uncommon in storm water runoff from the Stearns Street mass emission site. When detected, concentrations of detected compounds have typically been low (less than 10 times the reporting limit). Although largely banned or restricted throughout industrialized nations, these legacy pesticides persist in the environment.

The banning of residential, nonprofessional use of diazinon and chlorpyrifos resulted in these contaminants no longer being measureable in most storm water samples. Lower detection limits were implemented in the middle of the 2010/2011 monitoring season. The detection limits for chlorpyrifos dropped from 0.05 µg/L to 0.002 µg/L and the detection limits for diazinon dropped from 0.01 µg/L to 0.0015 µg/L. Use of the lower detection limits resulted in chlorpyrifos being detected in runoff from the Los Cerritos Channel. However, concentrations remain below the benchmark concentrations developed by California Department of Fish and Wildlife.

Pyrethroid pesticides have largely replaced diazinon and chlorpyrifos for pest control in the urban environment. Pyrethroids were not added to the analytical suite until mid-season during 2010/2011. Pyrethroid pesticides have been analyzed in wet weather runoff from the Stearns Street site for the past three years. The presence of bifenthrin, cyfluthrin, cypermethrin and permethrin are of primary concern. Although permethrin is consistently measured at the highest concentrations, this compound is the least toxic of these four pyrethroid pesticides.

These pesticides are known to be highly toxic with several compounds causing a toxic response to *Hyalella* at levels as low as 0.002 µg/L (2 ng/L), which is near the detection limit for many of these compounds. Many of the pyrethroids were measured at concentrations that would be expected to

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cause toxicity to *Hyalella* or *Americamysis* but generally low enough that *Ceriodaphnia* would not be expected to show impacts. It is also unlikely that pyrethroid toxicity would be measureable using the standard suite of WET tests being proposed for use in the new Los Angeles County and City of Long Beach MS4 NPDES permits.

Although pyrethroid pesticides are a recognized concern, the short and long-term impacts of these compounds are not well understood. These compounds are extremely difficult to measure since they are highly hydrophobic and tend to adhere to surfaces. In stormwater, pyrethroids tend to partition to suspended solids reducing bioavailability (Yang et al. 2006).

Since these compounds are highly hydrophobic, they are best known for the toxicity that they exert on the benthos. The environmental toxicity of these compounds was first established using amphipod tests that are conducted using sediment. Tests were later modified to use amphipods for water testing. Although these compounds typically have a half-life in water that ranges from days to months, it is expected that they may persist much longer in the sediments. Recently, Lao et al. (2010) identified the presence of pyrethroid pesticides in sediment sampled in the Ballona Creek Estuary. Levels measured in the sediments were considered sufficient to have caused observed toxicity to *Eohaustorius, which* is an amphipod common in marine and estuarine environments.

2.1.2.2 Dry Season Water Quality

With the exception of organophosphate pesticides, water quality of dry weather discharges has not changed substantially since the start of the program in 2000. Dry season water quality has not tended to vary greatly between sites or sampling dates. The most significant changes continue to be decreases in the volume of dry weather discharges.

Exceedance of pH criteria remains one of the most common occurrences during dry weather. These exceedances typically occur only in drainages with open concrete channels. These excursions are not observed in waters that enter the storm drains or receiving waters directly from pipes. Extensive testing conducted in the Los Cerritos Channel during the 2010/2011 season demonstrated natural cycling of pH in any shallow, low flow channel with the presence of algae. Controlling these fluctuations would require enclosing the channel or eliminating flow during the dry seasons. Enclosure of the channels would impact bacterial concentrations by eliminating the sanitizing effects of sunlight that helps to control bacteria.

Exceedances of dissolved metals criteria during dry weather are largely limited to copper in waters from the Los Cerritos Channel. In addition, exceedances of dissolved copper criteria are mostly due to the CTR saltwater criteria. During the dry season, hardness values average 184 mg/L. As a result, water quality criteria for hardness dependent metals are elevated which results in few exceedances of the dissolved copper criterion. At this level of hardness, the CTR freshwater dissolved copper criterion is equal to 15.1 µg/L.

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Low levels of four pyrethroid compounds caused exceedances of draft criteria during dry weather however most were detected at concentrations between the Method Detection Limit and the Reporting Limit. Since the criteria proposed by Fojut et al. (2012) are below the reporting limits, these detections were considered to be exceedances. Bifenthrin was the only pyrethroid pesticide detected above reporting limits during the dry weather surveys. With the exception of these pyrethroid pesticides, organic constituents (aroclors, chlorinated pesticides, and organophosphate pesticides) are typically undetected in dry weather samples.

2.1.3 Toxicity Results

The following sections summarize the results of bioassay tests conducted during both dry and wet weather periods at the Stearns Street monitoring site between the year 2000 and 2013. Figure 2-5 and Figure 2-7 summarize chronic toxicity of stormwater to sea urchin fertilization and water flea reproduction, respectively, throughout the thirteen years of the City's monitoring program. Figure 2-4 and Figure 2-6 provides similar summaries of dry weather chronic toxicity for urchins and water fleas, respectively.

Sea urchins have shown more instances of moderate to high (>8 TUc) wet weather toxicity than have water fleas (Figure 2-5 and Figure 2-7).

Figure 2-7 shows a virtual absence of wet weather water flea toxicity after the 2001/2002 storm season at Stearns Street, except minor to moderate reproductive effects in 2004/2005. In the 2008/2009 program, instances of elevated reproductive toxicity were attributed to statistical artifacts due to very low within-test variability. Data from the 2009/2010 and continuing into the 2012/2013 monitoring programs continues to show that water flea toxicity is almost undetectable in wet weather samples.

There was some suggestion in the toxicity data from early monitoring periods that seasonal flushing may have been a factor affecting the variability in storm water toxicity. Early years of the program suggested that *Ceriodaphnia* toxicity was usually somewhat elevated in early versus late storms, but this pattern was not evident in later years. Toxicity to sea urchins has varied widely over the storm seasons allow generally lower toxicity was encountered since 2006 yet occasional toxicity has been encountered at levels as high as 16 TUc or more (Figure 2-5). Since the 2004/2005 storm season water flea toxicity has dropped to near undetectable levels while the sea urchin toxicity has been more sporadic with toxicity increasing slightly in the 2011/2012 and 2012/2013 storm seasons.

Sources of toxicity were examined by comparing measured toxicity with toxicity predicted based upon the chemical analysis of key toxicants. The predicted acute toxicity of the sample is calculated from the measured concentrations of the chemical constituents and their corresponding EC50 or LC50. Expected water flea toxicity was calculated based upon LC50s for zinc, chlorpyrifos and diazinon. Earlier testing implicated these analytes as the primary toxicants contributing to mortality and reproduction. Expected

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toxicity for the sea urchin fertilization test was calculated based upon EC50 data for zinc and copper. With few exceptions, concentrations of these two metals were found to be sufficient to explain the most of the toxicity observed in the sea urchin fertilization tests.

2.1.3.1 Test of Significant Toxicity (TST)

The Test of Significant Toxicity (TST) is a statistical approach to analyze whole effluent tests (WET) and ambient toxicity data that is being developed by the U.S. Environmental Protection Agency. The State Water Resources Board has proposed a draft policy to implement statewide use of the TST approach. The new policy is intended to provide a consistent approach to monitoring toxicity in discharges to inland surface waters, enclosed bays, and estuaries. The potential impacts of incorporating the TST approach into storm water programs have not been fully evaluated.

The TST is designed to be used as a two-concentration data analysis of the sample contrasting receiving water, also referred to as the critical concentration, with a control concentration. Once WET tests are completed, results are analyzed with the TST calculator to assess if the sample was toxic. The TST approach is intended to determine if a sample at the critical concentration and the control within a WET test differ by an acceptable amount. This method yields a simple yes/no as to whether or not a sample is considered toxic.

Table 2-5 provides a comparison of use of the NOEC and TST methods for initiation of Toxicity Identification Evaluations (TIE) using the results of water flea reproduction tests conducted in waters from the Los Cerritos Channel over the past three years. Application of the TST indicated presence of significant toxicity in four of 15 bioassay tests. Only one of these also exceeded an effect level of 50%, which would require immediate implementation of TIE testing under the new Los Angeles County MS4 permit. This was a dry weather sample taken in May 2013.

For the 2012/2013 Los Cerritos Channel season data from all water flea reproduction tests (storm water and dry weather tests) were subjected to both analytical approaches. All storm water samples for water flea reproduction passed using both the NOEC and TST approach. However, use of the TST approach would have triggered an additional TIE test for the Los Cerritos Channel site for a dry weather test in May 2013. This sample had minor evidence of toxicity with a TUc of 2.0. Under the program guidelines, this was minor toxicity was not sufficient to warrant TIE testing.

2.1.4 TMDLS

The Los Cerritos Channel Metals TMDLs established WLAs for total copper, lead and zinc during wet weather and total copper during dry weather. Total lead limits were based upon maintenance of historical concentrations. Total lead concentrations and loads remain compliant with the TMDL limits. Total copper exceeds existing targets by factors ranging from 1.9 to 8. Total zinc exceeds target levels by

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factors of 1.4 to 5.9. Both total lead and total zinc concentrations show evidence of steady decreases in concentration over the past 13 years. During dry weather periods, both concentrations and loads of total copper are declining. The combination of these factors has resulted in dry weather copper loads within the Los Cerritos Channel declining to levels that are less than 20% of the WLA. The copper dry-weather loading capacity (TMDL) for Los Cerritos Channel was established based upon the following calculation: 19.1 µg/L X 2.35 cfs X 0.00539 (conversion factor) = 0.242 lbs/day or 109.7 grams/day. The TMDL objectives are expressed as total recoverable metals.

Dry weather flows have dramatically declined in recent years (Figure 2-3) presumably due to better water conservation efforts. The average flow measured at the Los Cerritos Channel monitoring site has been consistently under 0.5 cfs since 2009. At the same time, concentrations of total copper have significantly declined. The combination of these factors resulted in dry weather copper loads in the Los Cerritos Channel declining to levels that are less than 20% of the WLA.

The wet weather load capacities for total copper, total lead, and total zinc were calculated based upon storm volumes and the following concentrations:

Total copper = 9.8 ug/L
Total lead = 55.8 ug/L
Total zinc = 95.6 ug/L

Table 2-6 provides a summary of the TMDL load limitations for copper, lead and zinc along with storm volumes, calculated loads, and exceedance factors for storm events from 2011 through 2013. As noted above, measured loads of total copper exceed the TMDL limits by a factor of 1.9 to 8.0. Similarly, measured loads of zinc exceed the TMDL limitation by factors ranging from 1.4 to 5.9. Load limits established for total lead were based upon assuring that historical conditions were not exceeded. Lead loads have not exceeded a factor of 0.8 (or 80%) of the limit established in the TMDL. This suggests that the historical decline in lead concentrations is continuing. A comparison of concentrations of total copper, lead and zinc prior to the TMDLs and after the TMDLs (Figure 2-1) shows little evidence of changes for metals over this short time but the concentrations of total lead do show less variability in recent time. In contrast, the concentrations for total copper and zinc show substantial variability in post TMDL measurements.

Figure 2-2 provides a more detailed examination of trends over time. Graphics on the left side of the page separate conditions before and after implementation of the TMDLs while those on the right side of the page simply illustrate long-term trends. Flows associated with monitored events are relatively consistent although there is some suggestion that flows associated with these events have slightly increased over time.

Concentrations of total copper have been relatively stable but both total lead and total zinc concentrations show evidence of decreases in concentration over the past 13 years. Wet weather loads show similar but more muted trends as a result of increase in storm volumes. Apparent decreases in

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total zinc loads after implementation of the TMDL are of interest but are likely an artifact of the limited post-TMDL data set.

Necessary decreases in concentrations of total copper are best illustrated by examination of the distributional characteristics of total copper concentrations. All measurements of total copper have exceeded the limit established in the TMDL. In order to meet TMDL requirements, total copper concentrations will need to be reduced by more than 70%.

2.1.5 Summary of Monitoring Results

Monitoring of storm water runoff and dry weather flows at the Los Cerritos Channel Stearns Street mass emission site over the past 13 years has resulted in the identification of a relatively small list of constituents of concern. Elevated concentrations of total recoverable aluminum, copper, lead and zinc are commonly associated with storm water discharges due to increased sediment loads. Concentrations of these metals are typically associated with elevated sediment concentrations during storm events. Aluminum is expected to be elevated during storm events simply due to the natural abundance of this metal in soils. Although aluminum temporarily exceeds drinking water quality criteria during storm events, it is not considered to be a major constituent of concern. Concentrations of total recoverable lead are also elevated during storm events but concentrations of dissolved lead consistently meet existing water quality objectives. As a result, the Los Cerritos Channel Metals TMDL established a WLA for total recoverable lead based upon existing loads for both anti-degradation purposes and to assure that downstream waters are protected. Concentrations of dissolved copper and zinc commonly exceed freshwater water quality criteria [California Toxics Rule (CTR) Criteria Maximum Concentrations (CMS)] during storm events and are the two metals of primary concern. Long-term trends suggest that both lead and zinc have been declining slightly during the past decade but concentrations of copper remain relatively steady. Concentrations of copper are expected to decline with reductions in the copper content of brake pads. Recent information from the Washington State Department of Ecology and NSF International indicate that significant reduction of copper in brake pads have already begun (See California Stormwater Quality Association Technical Memo in Attachment D).

Two organophosphate pesticides, diazinon and chlorpyrifos, were commonly detected in storm water runoff before 2002-2003 when they were banned for residential use. By 2006, concentrations of both compounds declined to levels below benchmarks established by California Fish and Wildlife. These compounds are no longer considered to be constituents of concern.

Fecal Indicator Bacteria (FIBs) tend to be elevated in receiving waters during both wet and dry weather, but concentrations increase substantially during storm events. Concentrations of fecal coliform range from 10^4 to 10^5 MPN/100 ml during storm events.

Exceedance of pH criteria is common during periods of dry weather. A year-long study identified a consistent daily cycle of increasing pH during the day and decreasing concentrations at night that was attributed to low flows and intensive algal production. When storm events occur, pH concentrations become relative stable and remain within water quality objectives.

RB-AR9028

Organochlorine pesticides are not common in stormwater discharges from the Los Cerritos Channel but, when detected, concentrations are typically near detection limits. In most cases, measured values range from near at concentrations within 10 times the reporting limits.

In recent years, monitoring was extended to incorporate pyrethroid pesticides. Four of these compounds, bifenthrin, cyfluthrin, cypermethrin and permethrin are of primary concern. Initial studies indicate that concentrations measured during storm events are sufficient to produce a toxic response to more sensitive bioassay species. These compounds are also present in dry weather flows but concentrations are diminished.

A general trend of reduced toxicity has been observed for both stormwater and dry weather flows from the Los Cerritos Channel Freshwater watershed. Thirteen years of bioassay testing during both wet and dry weather indicates that toxicity is decreasing in both frequency and intensity. Decreases in toxicity are most evident during periods of dry weather with tests conducted with water fleas showing the most improvement. Decreases in toxicity were attributed to the elimination of residential uses of diazinon and chlorpyrifos. Bioassays using the sea urchin fertilization test have shown similar improvements. A number of TIEs have been conducted during this time period and in all cases results of the TIEs have shown that toxicity was caused by cationic metals. Cationic metals are simply metals in an ionic form with positive charges. These may include forms of the more common metals present in runoff (cadmium, copper, nickel, lead and zinc).

Comparisons of the actual toxicity versus expected toxicity calculated from the concentrations of key toxicants confirmed that metals were the most likely cause of toxicity in the sea urchin fertilization test. Concentrations of dissolved metals, particularly zinc and copper, measured in stormwater samples were typically sufficient to explain observed toxicity.

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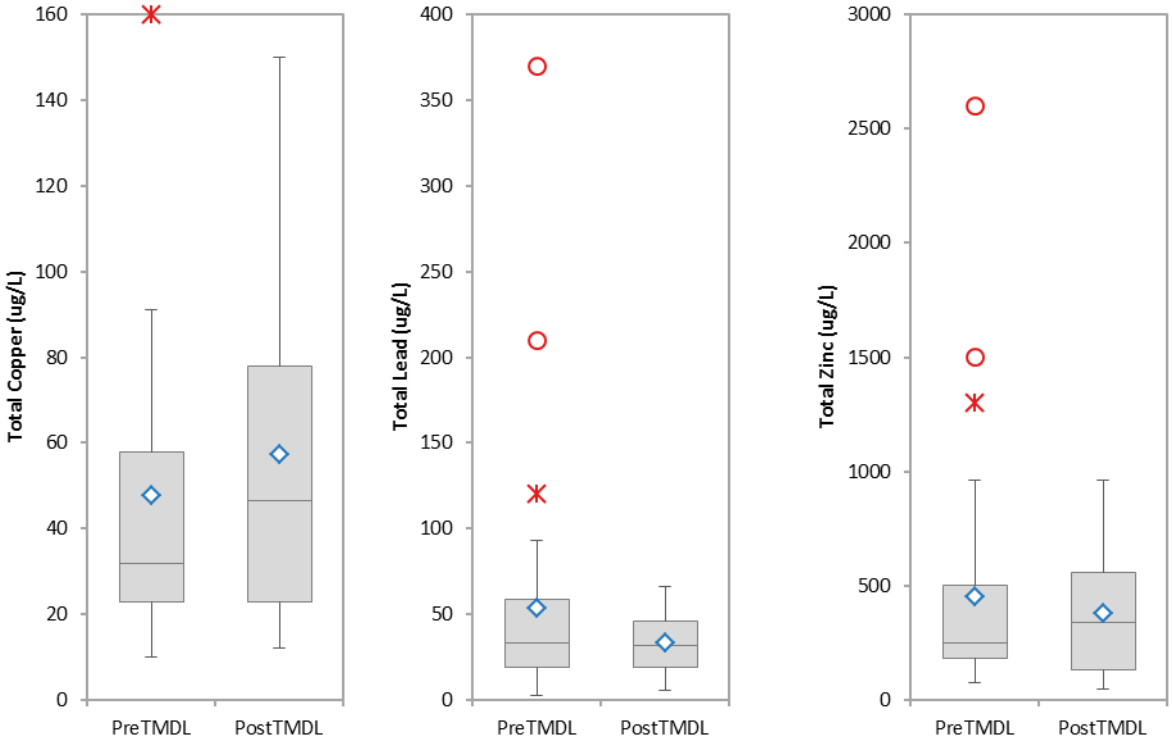


Figure 2-1. Box Plots showing the Distribution of Total Copper, Lead and Zinc before and after TMDL Implementation at the Los Cerritos Channel Monitoring Site (PreTMDL=35 samples, PostTMDL=10 samples)

Box plots display the minimum, 1st quartile, median, mean and 3rd quartile are displayed together with both limits (the ends of the "whiskers") beyond which values are considered anomalous. The mean is displayed with blue ◊ and a black line corresponds to the median. Limits are calculated as follows:

Lower limit: Linf = X(i) such that {X(i) – [Q1 – 1.5 (Q3 – Q1)]} is minimum and X(i) = Q1 – 1.5 (Q3 – Q1).

Upper limit: Lsup = X(i) such that {X(i) - [Q3 + 1.5 (Q3 – Q1)]} is minimum and X(i) = Q3 + 1.5 (Q3 – Q1)

Values that are outside the [Q1 - 3 (Q3 – Q1); Q3 + 3 (Q3 – Q1)] interval are displayed with the * symbol. Values that are in the [Q1 - 3 (Q3 – Q1); Q1 – 1.5 (Q3 – Q1)] or the [Q3 + 1.5 (Q3 – Q1); Q3 + 3 (Q3 – Q1)] intervals are displayed with the "o" symbol.

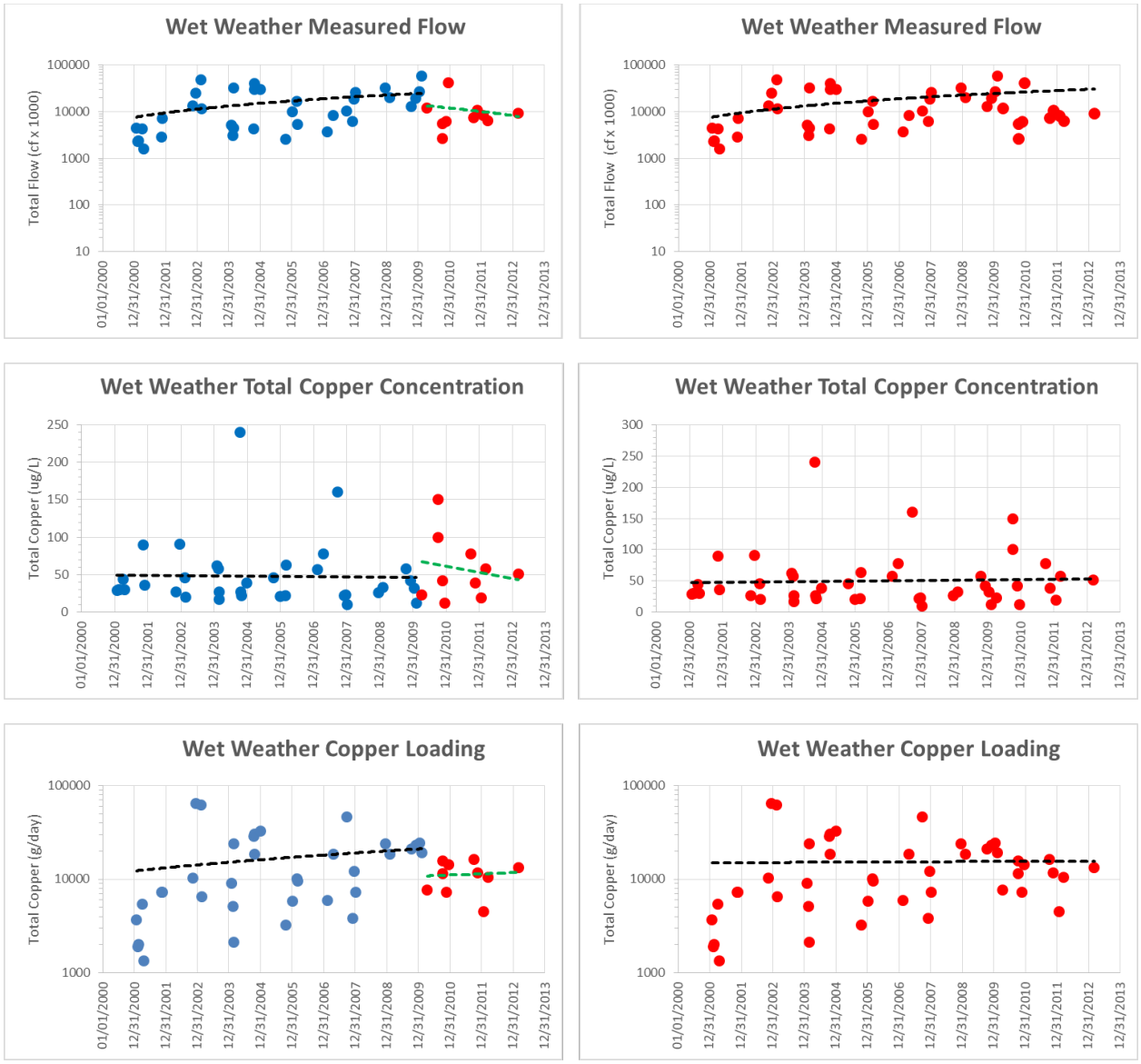
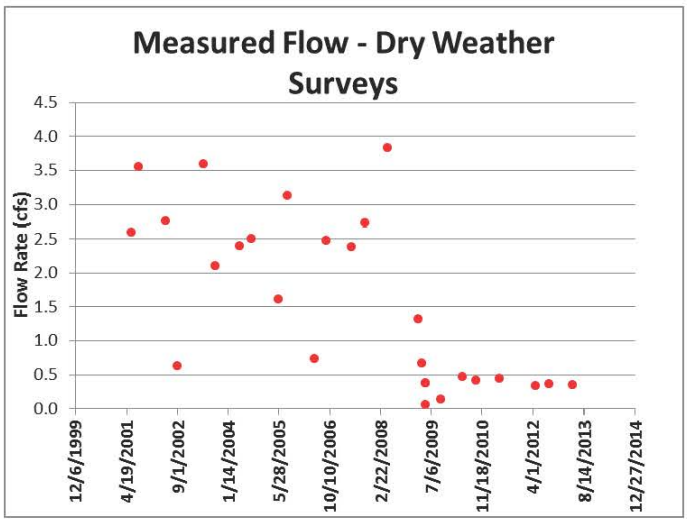
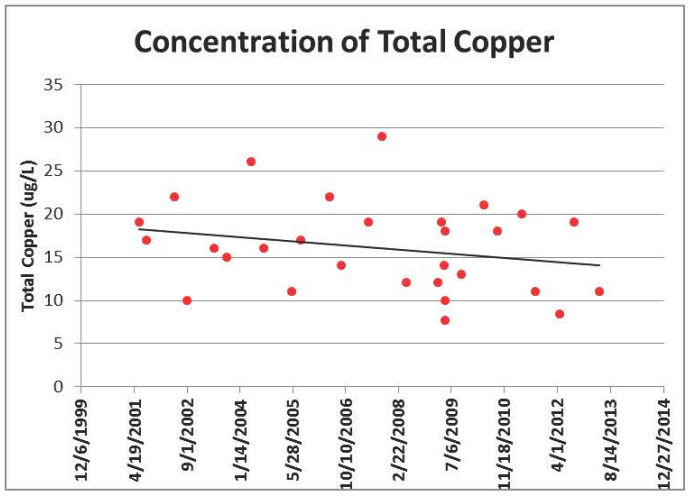


Figure 2-2. Stormwater Flow, Concentration and Loads for Total Copper, Zinc and Lead at the Los Cerritos Channel Station.





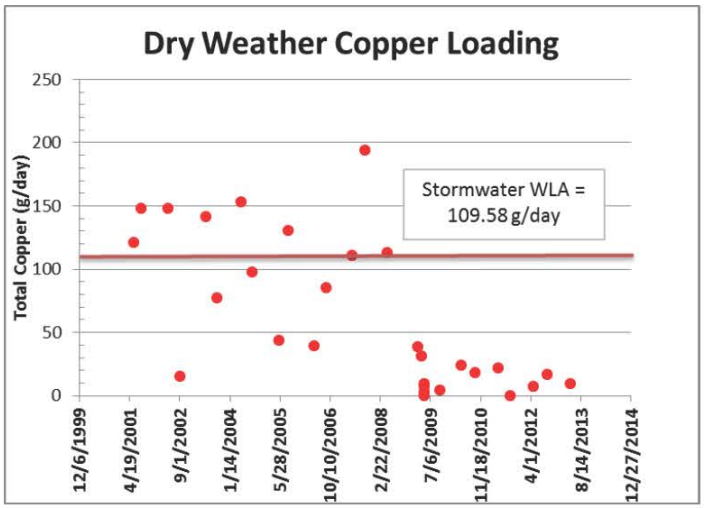


Figure 2-3. Dry Weather Flow, Total Copper Concentrations and Total Copper Loading at the Los Cerritos Channel Monitoring Site

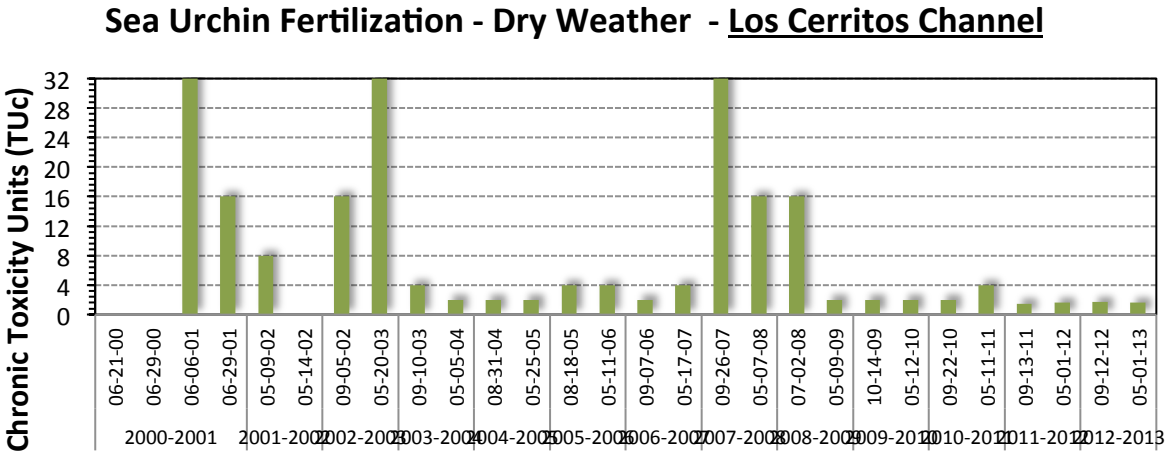


Figure 2-4. Chronic Toxicity of Dry Weather Discharge to Sea Urchin Fertilization 2000 to 2013.

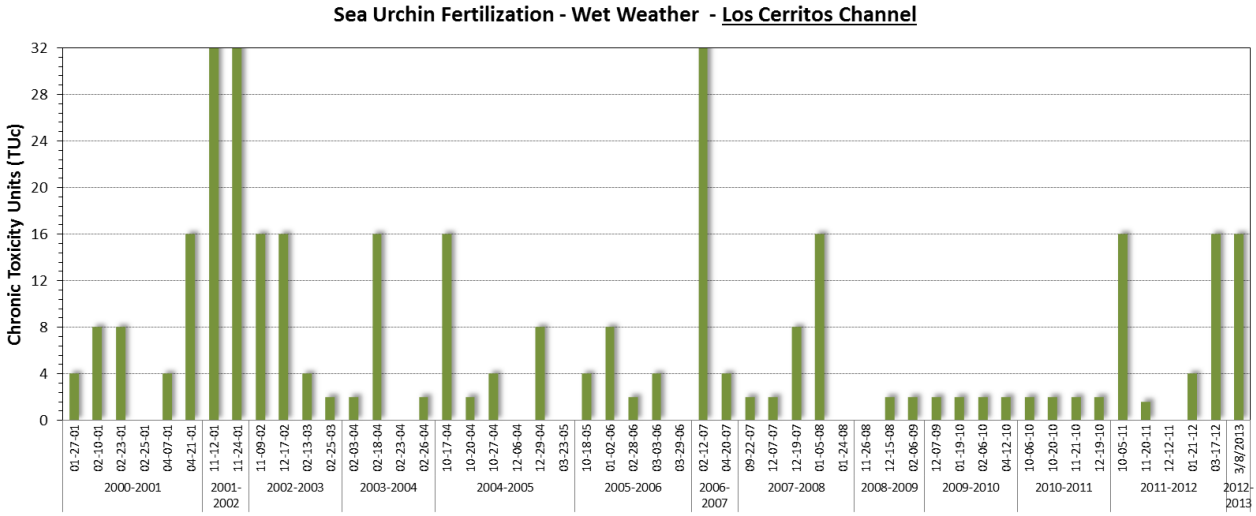


Figure 2-5. Chronic Toxicity of Stormwater Discharge to Sea Urchin Fertilization 2000 to 2013.

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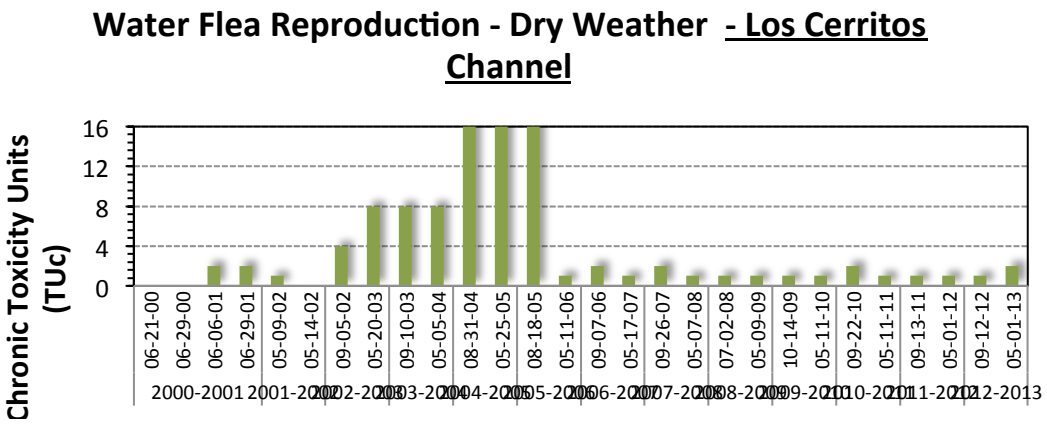

Figure 2-6. Chronic Toxicity of Dry Weather Discharge to Water Flea Reproduction 2000 to 2013.

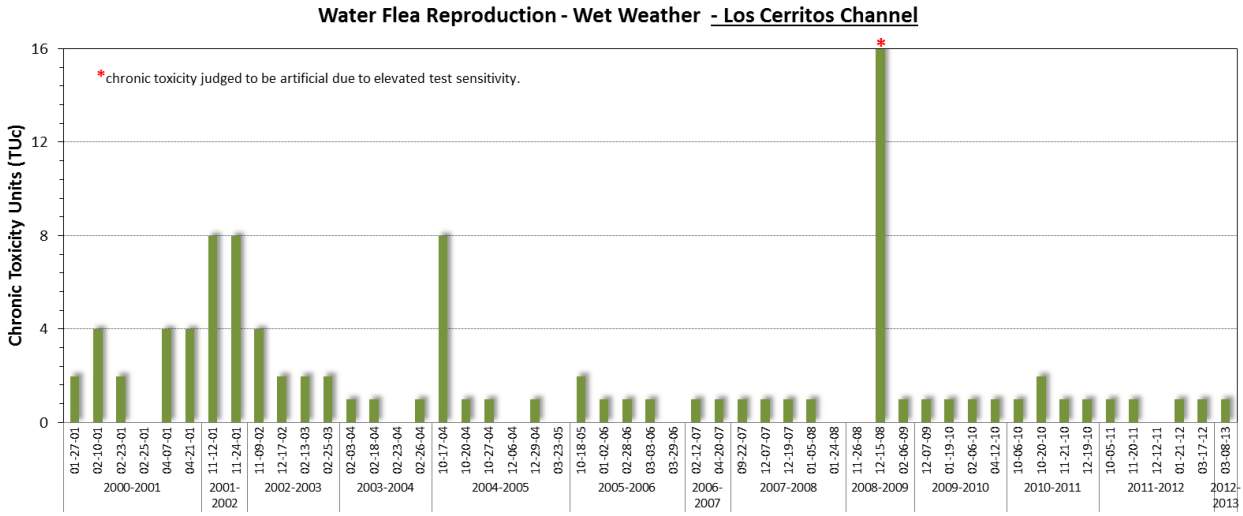

Figure 2-7. Chronic Toxicity of Stormwater Discharge to Water Flea Reproduction 2000 to 2013

Table 2-1. Summary of TSS, metals, bacteria and selected organophosphate pesticides measured in stormwater runoff at the Los Cerritos Channel Mass Emission

Date	TSS (mg/L)	Diss Cd (µg/L)	Total Cd (µg/L)	Diss Cu (µg/L)	Total Cu (µg/L)	Diss Pb (µg/L)	Total Pb (µg/L)	Diss Zn (µg/L)	Total Zn (µg/L)	Enterococcus MPN/100mL	Fecal Coliform MPN/100mL	Total Coliform MPN/100mL	Chlorpyrifos	Diazinon	Malathion
1/27/2001	260	0.25U	1.7	11	29	1.1	59	42	250		5000	110000	0.5U	0.5U	0.5U
2/10/2001	260	0.25U	0.81	11	30	0.5U	34	75	290		8000	50000	0.5U	0.5U	0.5U
2/23/2001	210	0.25U	1.3	12	30	1.1	52	51	290		30000	170000	0.5U	0.5U	0.5U
4/7/2001	350	0.21J	3.3	3.6	44	0.5	44	66	960		28000	90000	0.5U	0.5U	0.5U
4/21/2001	170	0.55	1.8	12	30	1.4	35	150	420		50000	300000	0.025U	0.21	0.27J
11/13/2001	1700	0.125U	5.5	7.4	90	3.1	370	48	1500	13210	50000	160000	0.025U	0.005U	0.5U
11/25/2001	200	0.125U	1.6	7.9	36	1.7	43	78	770	7520	50000	160000	0.28	0.41	0.5U
11/10/2002	110	0.36	0.59	19	27	7.6	16	160	180	1178	11000	80000	0.025U	0.2	0.5U
12/17/2002	450	0.125U	2.9	8.1	91	1.4	120	60	680	6670	90000	160000	0.025U	0.11	0.5U
2/13/2003	220	0.125U	1.0	5.0	46	0.79	31	35	250	144	3000	50000	0.025U	0.12	0.5U
2/25/2003	130	0.125U	0.61	5.6	20	0.97	22	63	160	4400	11000	160000		0.13	
2/3/2004	314	0.16	2.6	7.2	62	0.82	93	55	590	24400	13000	24000	0.025U	0.071	0.5U
2/18/2004	166	0.19	2.0	12	58	1.0	59	71	490	93000	130000	130000	0.025U	0.025U	0.5U
2/23/2004	48	0.12	0.62	5.0	17	0.48	19	52	210	12800	8000	30000	0.025U	0.025U	0.5U
2/26/2004	80	0.099J	0.66	4.4	27	0.61	20	37	180	9650	3000	13000	0.025U	0.025U	0.5U
3/3/2004	110														
10/17/2004	940	0.125U	8.3	12	240	3.3	210	130	2600				0.06	0.66	0.93
10/20/2004	130	0.12J	1.2	5.7	27	0.65	26	32	240	94000	70000	900000	0.55	0.05U	0.18
10/27/2004	170	0.125U	0.8	3.5	22	0.4J	28	11	180	35000	9000	90000	0.025U	0.025U	0.2
12/6/2004	69														
12/30/2004	350	0.057	1.2	3.9	39	0.32J	55	9.8	360	39000	22000	240000	0.025U	0.2	0.084
12/31/2004	210														

U=analyte not detected at the associated detection limit.
J=value is considered an estimate. This is most commonly encountered when the analyte is detected at a concentration exceeding the detection limit but below the reporting limit.

2.5

Date	TSS (mg/L)	Diss Cd (µg/L)	Total Cd (µg/L)	Diss Cu (µg/L)	Total Cu (µg/L)	Diss Pb (µg/L)	Total Pb (µg/L)	Diss Zn (µg/L)	Total Zn (µg/L)	Enterococcus MPN/100mL	Fecal Coliform MPN/100mL	Total Coliform MPN/100mL	Chlorpyrifos	Diazinon	Malathion
1/8/2005	130														
1/10/2005	86														
1/11/2005	220														
1/28/2005	148														
2/12/2005	150														
10/18/2005	370	0.22	1.4	12	46	1.7	38	120		158000	1600000	1600000	0.005U	0.005U	0.299
1/2/2006	73	0.12J	0.6	5.7	21	0.66	13	49	180	9590	13000	90000	0.01U	0.01U	0.19
2/19/2006	320														
2/28/2006	75	0.12J	0.5	6.9	22	0.92	13	53	170	15500	30000	160000	0.005	0.005U	0.0389
3/3/2006	410	0.059J	1.5	4.8	63	0.5U	61	20	500	7900	24000	50000	0.001U	0.002U	0.003
3/29/2006	96														
4/5/2006	63														
4/15/2006	97														
10/14/2006	504														
2/11/2007	190	0.071J	1.1	10	57	0.86	28	78	450	109	300	2800	0.001U	0.002U	0.003
2/19/2007	100														
4/21/2007	280	0.12U	1.7	12	78	1.5	93	91	630	9950	8000	50000	0.001U	0.0232	0.165
9/22/2007	680	0.067	3.4	17	160	3	90	130	1300	1200	2400	11000	0.001U	0.002U	0.5126
12/8/2007	64	0.12U	0.3	11	22	0.92	8.3	74	150	13000	1536	3820	0.001U	0.027	0.1696
12/19/2007	100	0.081	0.47	9.1	23	0.76	14	49	180	21000	17000	160000	0.001U	0.002U	0.086
1/6/2008	80	0.074	0.17	6.8	10	0.44	3.0	42	76	8100	1400	90000	0.001U	0.002U	0.003
1/24/2008	230														
1/27/2008	120														

U=analyte not detected at the associated detection limit.
J=value is considered an estimate. This is most commonly encountered when the analyte is measured at a concentration exceeding the detection limit but below the reporting limit.

Date	TSS (mg/L)	Diss Cd (µg/L)	Total Cd (µg/L)	Diss Cu (µg/L)	Total Cu (µg/L)	Diss Pb (µg/L)	Total Pb (µg/L)	Diss Zn (µg/L)	Total Zn (µg/L)	Enterococcus MPN/100mL	Fecal Coliform MPN/100mL	Total Coliform MPN/100mL	Chlorpyrifos	Diazinon	Malathion
2/4/2008	43														
2/23/2008	17.3														
12/15/2008	150	0.077	0.45	7.4	26	0.34	13	26	160	25000	50000	90000	0.001U	0.002U	0.2866
2/6/2009	190	0.078	0.71	8.1	33	1.1	21	46	230	18000	3000	30000	0.001U	0.002U	0.1617
2/14/2009	226														
10/14/2009	170	0.067	0.89	15	58	1.8	33	85	400	35000	1600000	1600000	0.001U	0.002U	0.1431
12/8/2009	170	0.071	0.69	9.3	42	0.76	20	61	290	4700	5000	22000	0.001U	0.002U	0.1452
1/19/2010	170	0.043	0.54	4.9	32	0.37	71	20	210	18000	24000	160000	0.00U1	0.002U	0.1013
1/27/2010	116.5														
2/6/2010	270	0.083	0.25	3.1	12	0.2J	10	9.3	99	5400	8000	24000	0.001U	0.0216	0.003
3/7/2010	61.3														
4/12/2010	150	0.051	0.54	6.3	23	0.45	19	34	180				0.001U	0.002U	0.1919
10/6/2010	1100	0.048	2.2	13	150	2.0	63	30	960				0.001065	0.00213	0.211
10/20/2010	540	0.062	1.9	12	100	1.6	66	42	690	72000	30000	500000	0.00125	0.0025	0.325
10/30/2010	200														
11/21/2010	140	0.069	0.62	11	42	0.77	20	45	270	6600	3000	24000	0.011	0.0042	0.03
12/19/2010	52	0.049	0.20	4.5	12	0.35	5.5	28	85	6900	16000	50000	0.0016	0.0016	0.05
1/30/2011	108														
2/16/2011	99														
2/26/2011	66														
3/20/2011	46														
10/5/2011	260	0.18	1.4	13	78	1.6	37	64	560	14000	140000	1600000	0.005U	0.01U	0.025U

U=analyte not detected at the associated detection limit.
J=value is considered an estimate. This is most commonly encountered when the analyte is measured at a concentration exceeding the detection limit but below the reporting limit.

Date	TSS (mg/L)	Diss Cd (µg/L)	Total Cd (µg/L)	Diss Cu (µg/L)	Total Cu (µg/L)	Diss Pb (µg/L)	Total Pb (µg/L)	Diss Zn (µg/L)	Total Zn (µg/L)	Enterococcus MPN/100mL	Fecal Coliform MPN/100mL	Total Coliform MPN/100mL	Chlorpyrifos	Diazinon	Malathion
11/12/2011	68														
11/21/2011	160	0.064	0.68	7.1	39	0.57	26	37	290	5500	220000	220000	0.001U	0.0014	0.025U
1/21/2012	53	0.12U	0.35	7.4	19	0.39	9.3	44	130	4100	3300	35000	0.0014	0.00075U	0.03
3/17/2012	370	0.1U	0.78	8.6	58	0.63	43	41	390	9200	160000	160000	0.0051	0.00075U	0.025U
3/26/2012	120														
3/8/2013	410	0.05J	0.87	6.0	51	0.25	46	33	390	7700	54000	54000	0.0047	0.0015U	0.05U

U=analyte not detected at the associated detection limit.
J=value is considered an estimate. This is most commonly encountered when the analyte is measured at a concentration exceeding the detection limit but below the reporting limit.

U=analyte not detected at the associated detection limit.
J=value is considered an estimate. This is most commonly encountered when the analyte is measured at a concentration exceeding the detection limit but below the reporting limit.

Table 2-2. Summary of TSS, metals, bacteria and selected organophosphate pesticides measured in dry weather runoff at the Los Cerritos Channel Mass Emission Site.

Date	TSS (mg/L)	Diss Cd (µg/L)	Total Cd (µg/L)	Diss Cu (µg/L)	Total Cu (µg/L)	Diss Pb (µg/L)	Total Pb (µg/L)	Diss Zn (µg/L)	Total Zn (µg/L)	Enterococcus MPN/100mL	Fecal Coliform MPN/100mL	Total Coliform MPN/100mL	Chlorpyrifos (µg/L)	Diazinon (µg/L)	Malathion (µg/L)
6/5/2001	14	0.2	1.1	14	19	2.4	3.1	13	23		13000	160000	0.05U	0.22	0.1U
8/16/2001	58	0.5	0.57	16	17	3.2	3.5	39	43		2300	30000	0.05U	0.096	0.1U
5/9/2002	2	0.25	0.36	16	22	0.5	0.78	9.3	17	910	1100	3000	0.05U	0.32	1U
9/5/2002	18	0.25	0.25	6.7	10	0.58	1.2	9	12	3300	8000	24000	0.05U	0.01U	1U
5/20/2003	4	0.43	0.44	14	16	1.2	1.3	19	13	20300	30000	160000	0.05U	0.05U	1U
9/10/2003	56	0.25	0.27	3.4	15	0.57	6.5	17	92	600	1100	24000	0.05U	0.064	1U
5/5/2004	128	0.23	0.85	7.7	26	0.6	17	8.8	190	3200	4000	110000	0.05U	0.05U	1U
8/31/2004	41	0.25	0.29	9.8	16	0.71	6.8	8.2	33	3100	5000	16000	0.05U	0.71	1U
5/25/2005	11	0.31	0.42	8.4	11	0.7	1.2	14	22	1440	80	2400	0.05U	0.01U	1U
8/18/2005	44	0.2	0.26	12	17	0.6	2.8	43	40	4200	3000	50000	0.01U	0.01U	0.01U
5/11/2006	72	0.23	0.32	15	22	1.1	3.6	19	68	57600	2100	30000	0.002U	0.004U	0.006U
9/7/2006	38	0.046	0.096	7.5	14	0.74	1.5	6.7	22	2400	5000	26000	0.002U	0.004U	0.006U
5/17/2007	20	0.25	0.29	12	19	0.8	1.8	13	24	9900	16000	24000	0.002U	0.004U	0.006U
9/26/2007	2.2	0.26	0.29	27	29	0.78	1.1	17	21	600	240	2400	0.002U	0.004U	0.006U
5/7/2008	11	0.16	0.18	11	12	0.64	0.94	8.3	12	940	1100	3000	0.002U	0.0085	0.006U
7/2/2008	69	0.083	0.21	5.7	13	0.54	3.1	7.2	33	210	2200	16000	0.002U	0.004U	0.006U
5/7/2009	6.8	0.16	0.2	13	14	1.1	1.4	13	16	910	2400	5000	0.002U	0.004U	0.006U
10/13/2009	13	0.054	0.16	9.2	13	0.51	1.5	15	33	220	230	300	0.002U	0.004U	0.006U
5/12/2010	13	0.2	0.24	17	21	0.94	1.7	11	21	1700	90	1300	0.002U	0.004U	0.006U
9/23/2010	6.6	0.17	0.19	6.6	8.4	0.84	0.99	6.3	9.5	60	80	300	0.002U	0.004U	0.006U
5/11/2011	6.4	0.35	0.46	21	25	2	3.9	21	29	10	1300	79000	0.002U	0.0015U	0.05U
9/14/2011	10	0.34	0.47	13	18	0.34	1.3	5.7	15	280	2300	1700	0.002U	0.0015U	0.05U
5/2/2012	8.4	0.3	0.31	18	20	0.73	1.1	12	16	210	18	18	0.005U	0.0025	0.05U

U=analyte not detected at the associated detection limit.
J=value is considered an estimate. This is most commonly encountered when the analyte is measured at a concentration exceeding the detection limit but below the reporting limit.

RB-AR9039

Date	TSS (mg/L)	Diss Cd (µg/L)	Total Cd (µg/L)	Diss Cu (µg/L)	Total Cu (µg/L)	Diss Pb (µg/L)	Total Pb (µg/L)	Diss Zn (µg/L)	Total Zn (µg/L)	Enterococcus MPN/100mL	Fecal Coliform MPN/100mL	Total Coliform MPN/100mL	Chlorpyrifos (µg/L)	Diazinon (µg/L)	Malathion (µg/L)
9/13/2012	11	0.086	0.12	15	19	0.55	0.94	7.5	14	7700	230	230	0.00036U	0.0015U	0.05U
5/1/2013	7.5	0.18	0.2	9.4	11	0.93	1	13	14	860	170	1700	0.002U	0.0015U	0.05U

U=analyte not detected at the associated detection limit.
J=value is considered an estimate. This is most commonly encountered when the analyte is measured at a concentration exceeding the detection limit but below the reporting limit.

U=analyte not detected at the associated detection limit.
J=value is considered an estimate. This is most commonly encountered when the analyte is measured at a concentration exceeding the detection limit but below the reporting limit.

Table 2-3. Available Freshwater Benchmarks and Guidelines Used to Evaluate Quality of Wet and Dry Season Discharges from the Mass Emission Sites.

	Long Beach	LA Basin Plan	California Toxics Rule		California Fish and Game	
	2013	Acute	Chronic	Acute	Chronic	Acute
Analyte Group	ML[4]	Max. Level	CCC [2]	CMC [2]	CCC	CMC
Bacteria (MPN/100 ml) –Freshwater						
E. coli		235				
Conventionals (mg/L unless noted)						
pH (pH Units)	0.1	[6.5 - 8.5]				
MBAS	0.025	0.5				
Nitrate (as N)	0.1	10				
Nitrite (as N)	0.1	1				
Total Ammonia (as N)	0.1	- [1]				
Dissolved Metals (µg/L)						
Arsenic	0.5		150	340		
Cadmium[3]	0.2		2.2	4.3		
Copper	0.5		5.0	7.0		
Lead[3]	0.2		1.2	30		
Nickel	0.5		29	260		
Silver	0.2			3.4		
Zinc	1		66	65		
Total Metals (µg/L)						
Aluminum	25	1000				
Cadmium	0.25	5				
Chromium	0.5	50				
Nickel	0.5	100				
Selenium	1	50	5	20		

1. The one-hour average ammonia-N criterion applicable to storm events is pH dependent. The 30-day ammonia-N criterion applicable to dry weather is both temperature and pH dependent.

U=analyte not detected at the associated detection limit.
J=value is considered an estimate. This is most commonly encountered when the analyte is measured at a concentration exceeding the detection limit but below the reporting limit.

RB-AR9041

2. CTR freshwater dissolved metals are hardness dependent. The values listed here are computed for a hardness of 50 mg/L which is consistent with typical hardness values associated with stormwater runoff.
3. CTR freshwater dissolved cadmium and lead coefficients for conversion of total recoverable to dissolved criteria are also hardness dependent. Cadmium benchmarks are based on a hardness of 100 mg/L.
4. The detection limits (also MLs) used during the 2012-13 City of Long Beach MS4 Monitoring Program are provided to provide a reference point for the ability to interpret water quality measurements relative to available water quality criteria.

U=analyte not detected at the associated detection limit.
J=value is considered an estimate. This is most commonly encountered when the analyte is measured at a concentration exceeding the detection limit but below the reporting limit.

RB-AR9042

Table 2-3. Available Freshwater Benchmarks and Guidelines Used to Evaluate Quality of Wet and Dry Season Discharges from the Mass Emission Sites (continued).

	Long Beach	LA Basin Plan	California Toxics Rule		California Fish and Game		UC Davis	
	2013	Acute	Chronic	Acute	Chronic	Acute	Chronic	Acute
Analyte Group	ML	Max. Level	CCC *	CMC *	CCC	CMC	CCC	CMC
Aroclors (µg/L)								
Aroclor 1016	0.02	0.5						
Aroclor 1221	0.02	0.5						
Aroclor 1232	0.02	0.5						
Aroclor 1242	0.02	0.5						
Aroclor 1248	0.02	0.5						
Aroclor 1254	0.02	0.5						
Aroclor 1260	0.02	0.5						
Chlorinated Pesticides (µg/L)								
4,4'-DDT	0.005		0.001	1.1				
Aldrin	0.005			3				
Dieldrin	0.005		0.056	0.24				
Endrin	0.005	2	0.036	0.086				
gamma-BHC (Lindane)	0.005			0.95				
Endosulfan I	0.005		0.056	0.22				
Endosulfan II	0.005		0.056	0.22				
Heptachlor	0.005	0.01	0.0038					
Heptachlor epoxide	0.005	0.01	0.0038					
Total Chlordane	0.005	0.1	0.0043	2.4				
Methoxychlor	0.005	40						
Mirex	0.005						0.001	
Toxaphene	0.05	2	0.0002					
Organophosphates (µg/L)								
Chlorpyrifos	0.002				0.014	0.02	0.0056	0.011
Diazinon	0.004				0.05	0.08	0.17	0.82
Malathion	0.006				0.1	0.43	0.028	0.17
Atrazine	0.01	3						
Simazine	0.01	4						
Pyrethroids (ng/L)								

U=analyte not detected at the associated detection limit.
J=value is considered an estimate. This is most commonly encountered when the analyte is measured at a concentration exceeding the detection limit but below the reporting limit.

RB-AR9043

Bifenthrin	1.5	3			0.6	4
Cyfluthrin	1.5	2			0.05	0.3
Cypermethrin	1.5				0.2	1
L-Cyhalothrin	1.5				0.5	1
Permethrin	15				2	10
Total Deltamethrin/Tralomethrin	3					
Total Esfenvalerate/Fenvalerate	1.5					

Table 2-4. Saltwater Benchmarks and Guidelines Used to Evaluate Quality of Wet and Dry Season Discharges from the Mass Emission Sites.

	Long Beach	California Ocean Plan			California Toxics Rule		California Fish and Game		UC Davis	
Analyte Group	2013 ML	Instantaneous Single Sample	Daily Maximum	30-day Average	Chronic CCC	Acute CMC	Chronic CCC	Acute CMC	Chronic CCC	Acute CMC
Bacteria (MPN/100 ml)										
Enterococcus	10	104								
Fecal Coliform	20	400								
Total Coliform	20	10000								
Ratio of Fecal to Total Coliform		FC/TC≥0.1 & TC>1000								
Conventionals (mg/L unless noted)										
pH (pH Units)	0.1		[6.0 - 9.0]							
Total Ammonia (as N)	0.1		2.4							
Dissolved Metals (µg/L)										
Arsenic	0.5				36	69				
Cadmium	0.2				9.3	42				
Copper	0.5				3.1	4.8				
Lead	0.2				8.1	210				
Nickel	0.5				8.2	74				
Selenium	1				71	290				
Silver	0.2				-	1.9				
Zinc	1				81	90				
Total Metals (µg/L)										
Arsenic	0.5	80	32							
Cadmium	0.2	10	4							
Copper	0.5	30	12							
Lead	0.2	20	8							

U=analyte not detected at the associated detection limit.
J=value is considered an estimate. This is most commonly encountered when the analyte is measured at a concentration exceeding the detection limit but below the reporting limit.

Nickel	0.5	50	20			
Selenium	1	150	60			
Silver	0.2	7	2.8			
Zinc	1	200	80			
Aroclors (µg/L)						
Total Aroclors			0.000019			

U=analyte not detected at the associated detection limit.
J=value is considered an estimate. This is most commonly encountered when the analyte is measured at a concentration exceeding the detection limit but below the reporting limit.

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Table 2-4. Saltwater Benchmarks and Guidelines Used to Evaluate Quality of Wet and Dry Season Discharges from the Mass Emission Sites. (continued)

	Long Beach	California Ocean Plan			California Toxics Rule		California Fish and Game		UC Davis	
	2001-2011	Instantaneous	Daily	30-day	Chronic	Acute	Chronic	Acute	Chronic	Acute
Analyte Group	ML	Single Sample	Maximum	Average	CCC	CMC	CCC	CMC	CCC	CMC
Chlorinated Pesticides (µg/L)										
4,4'-DDT	0.005				0.001	0.13				
Aldrin	0.005			0.000022		1.3				
Dieldrin	0.005			0.00004		0.71				
Endrin	0.005		0.004			0.037				
gamma-BHC (Lindane)	0.005					0.16				
Endosulfan I	0.005		0.018			0.034				
Endosulfan II	0.005		0.018			0.034				
Heptachlor	0.005			0.00005		0.053				
Heptachlor epoxide	0.005			0.00002		0.053				
Total Chlordane	0.005				0.004	0.09				
Methoxychlor	0.005									
Mirex	0.005									0.001
Toxaphene	0.05			0.00021		0.21				
Organophosphates (µg/L)										
Chlorpyrifos	0.002						0.009	0.02	0.0056	0.011
Malathion	0.006						0.1	0.34	0.028	0.17
Pyrethroids (ng/L)										
Bifenthrin	1.5								0.6	4
Cyfluthrin	1.5								0.05	0.3
Cypermethrin	1.5								0.2	1
L-Cyhalothrin	1.5								0.5	1
Permethrin	15								2	10
Total Deltamethrin/Tralomethrin	3									
Total Esfenvalerate/Fenvalerate	1.5									

Notes to Table 2-3 and 2-4:

General

Minimum Level (ML) is the concentration at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method specified sample weights, volumes, and processing steps have been followed.

Criteria continuous concentration (CCC) equals the highest concentration of pollutant to which aquatic life can be exposed for an extended period of time without deleterious effects.

Criteria maximum concentration (CMC) equals the highest concentration of pollutant to which aquatic life can be exposed for a short period of time with deleterious effects.

California Toxics Rule

U=analyte not detected at the associated detection limit.
J=value is considered an estimate. This is most commonly encountered when the analyte is measured at a concentration exceeding the detection limit but below the reporting limit.

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CTR freshwater dissolved metals are hardness dependent. The values listed here are computed for a hardness of 50 mg/L.
CTR freshwater dissolved cadmium and lead conversion coefficients for changes from total to dissolved bases are also hardness dependent.
CTR freshwater and saltwater dissolved metal criteria are "CCC" except for silver which are "CMC".
CTR freshwater and saltwater organics are "CCC" except for aldrin and gamma-BHC which are "CMC".

Ocean Plan and LA Basin Plan

Bacteria are instantaneous or single sample criteria.
LA Basin Plan contains Title 22 Drinking Water standards
Ammonia listed is Acute 1-hour average objective for waters not designated COLD and/or MIGR and is pH dependent. The value listed is for a pH of 7.5. Chronic criteria are applied to Dry Weather results and are pH and temperature dependent

California Fish and Game

All values are "CMC" criteria. CMCs are considered acute criteria.

U=analyte not detected at the associated detection limit.
J=value is considered an estimate. This is most commonly encountered when the analyte is measured at a concentration exceeding the detection limit but below the reporting limit.

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Table 2-5. Comparison of the use of Toxicity Units and the TST procedure for triggering Phase 1 TIE tests.

Station	Date	NOEC[a]	Median Response[b]	TU_a[c]	TU_c[d]	TST[e]	% effect at IWC[f]
Los Cerritos	9/23/10	50	>100	<1.0	2.0	Fail	30.7
Los Cerritos	10/6/10	100	>100	<1.0	1.0	Pass	
Los Cerritos	10/20/10	50	>100	<1.0	2.0	Fail	49.4
Los Cerritos	11/21/10	100	>100	<1.0	1.0	Pass	
Los Cerritos	12/19/10	100	>100	<1.0	1.0	Fail	19.1
Los Cerritos	5/11/11	100	>100	<1.0	1.0	Pass	
Los Cerritos	9/14/11	100	>100	<1.0	1.0	Pass	
Los Cerritos	10/6/11	100	>100	<1.0	1.0	Pass	
Los Cerritos	11/20/11	100	>100	<1.0	1.0	Pass	
Los Cerritos	1/21/12	100	>100	<1.0	1.0	Pass	
Los Cerritos	3/17/12	100	>100	<1.0	1.0	Pass	
Los Cerritos	5/2/12	100	>100	<1.0	1.0	Pass	
Los Cerritos	9/13/12	100	>100	<1.0	1.0	Pass	
Los Cerritos	3/8/13	100	>100	<1.0	1.0	Pass	
Los Cerritos	5/1/13	50	86.5	1.2	2.0	Fail	65.7

Test results indicating where a TIE would have been performed using the TST method (TST failure and >50% effect) but was not indicated with the NOEC approach are highlighted in blue. The TST indicated that the test failed and the %effect was greater than 50%. Test results showing failure of the TST that would not have triggered at TIE based upon the NOEC approach are highlighted in red.

[a] No Observed Effect Concentration: the highest concentration with a test response not significantly different from the control.
[b] Concentration causing 50% inhibition in water flea reproduction (IC_{50}).
[c] Acute toxicity units = $100/IC_{50}$.
[d] Chronic toxicity units = 100/NOEC.
[e] Test of Significant Toxicity.
[f] IWC = Instream Waste Concentration (100% receiving water)

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Table 2-6. TMDL Load Limitations and Measured Loads at the Los Cerritos Monitoring Site during Storm Events.

		TMDL Load Limits (ug/L)		
		Total Copper	Total Lead	Total Zinc
		9.8	55.8	95.6

		TMDL Load Limits (kilograms/day)			Total Measured Loads (kilograms/day)			Exceedance Factors (TMDL Load Limit/Measured Load)		
Season	**Total Flow (cf)**	Total Copper	Total Lead	Total Zinc	Total Copper	Total Lead	Total Zinc	Total Copper	Total Lead	Total Zinc
2011-2012	2.07E+08	2.0	11.6	19.8	16.2	7.7	116	8.0	0.7	5.9
	2.99E+08	2.9	16.7	28.6	11.6	7.8	86	4.0	0.5	3.0
	2.36E+08	2.3	13.2	22.6	4.5	2.2	31	1.9	0.2	1.4
	1.8E+08	1.8	10.1	17.2	10.4	7.7	70	5.9	0.8	4.1
2012-2013	2.60E+08	2.6	14.5	24.9	13.3	12.0	102	5.2	0.8	4.1

2.2 Waterbody – Pollutant Classification

Part VI.C.5.a of Order No. R4-2012-0175 requires Permittees to "identify the water quality priorities within each WMA that will be addressed by the Watershed Management Program. At a minimum, these priorities shall include achieving water quality-based effluent limitations and/or receiving water limitations established pursuant to TMDLs, as set forth in Part VI.E and attachments L through R of this Order." The Permit also specifies that each WMP shall include an evaluation of existing water quality conditions, including characterization of stormwater and non-stormwater discharges from the MS4 and receiving water quality.

The permit further requires Permittees to designate three categories of priority pollutants to be addressed by the WMP. Two of these categories are clearly defined. Category 1 (Highest Priority) is to include waterbody-pollutant combinations for which water quality-based effluent limitations and/or receiving water limitations are established in Part VI.E and attachments L through R of the order. Category 1 pollutants are discussed in Section 2.2.1 of this plan. Category 2 (High Priority) pollutants are those for which water quality data indicate a water quality-impairment in the receiving water according to the State's Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List (State Listing Policy) and for which MS4 discharges may be causing or contributing to the impairment. Category 2 pollutants are discussed in Section 2.2.2 of this plan.

The third category is not as clearly defined as the first two categories. Category 3 (Medium Priority) is defined to include pollutants for which there are insufficient data to indicate water quality impairment in the receiving water according to the State's Listing Policy, but which exceed applicable receiving water limitations contained in the Order and for which MS4 discharges may be causing or contributing

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to exceedances. This definition is too broad for a watershed with only a few scattered exceedances for some constituents. This plan proposes a screening process based on three criteria to separate medium priority pollutants from those we consider to be low priority at this time. Category 3 pollutants are discussed in Section 2.2.3 of this plan.

2.2.1 Identification of Category 1 (Highest Priority) Pollutants

Section VI.C.5.a.ii(1) of the Order defines highest priority pollutants as:

> Waterbody-pollutant combinations for which water quality-based effluent limitations and/or receiving water limitations are established in Part VI.E and attachments L through R of this Order.

Category 1 Pollutants from two sets of TMDLs apply directly and indirectly to the Los Cerritos Channel Watershed. The Los Cerritos Channel Metals TMDLs, established by USEPA in March 2010 created waste load allocations for copper, lead, and zinc in the Los Cerritos Channel Freshwater Watershed. The compliance point for these TMDLs is the City of Long Beach monitoring station at Stearns Street upstream of the terminus of the concrete lined flood control channel. The USEPA-established TMDLs do not have implementation plans or schedules. However, the Los Angeles Regional Water Board adopted a Basin Plan Amendment on June 6, 2013. This BPA contains an implementation schedule with both interim and final compliance dates. The final compliance date is September 30, 2026. Interim milestone compliance dates occur on September 30, 2017, September 30, 2020, and September 30, 2023. Only the September 30, 2017 milestone date occurs within the term of Order No R4-2012-0175. (See Table 2-9.)

The set of TMDLs that apply indirectly to the Los Cerritos Channel Watershed are contained in the Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters Toxic Pollutants TMDL. A draft monitoring plan for this TMDL has been prepared and monitoring commenced in September 2014. Three monitoring locations have been established in San Pedro Bay. The results of the monitoring at these sites will guide future monitoring at the mouth of the Los Cerritos Channel, and forensic monitoring within the watershed. Future implementation of control measures within the watershed could also be influenced by the results of the San Pedro Bay monitoring. The monitoring database also includes occasional, isolated exceedances that could have resulted from field or laboratory errors. (See Table 2-10.)

2.2.2 Identification of Category 2 (High Priority) Pollutants

Section VI.C.5.9.ii(2) of the Order defines high priority pollutants as:

> Pollutants for which data indicate water quality impairment in the receiving water according to the State's Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List (State Listing Policy) and for which MS4 discharges may be causing or contributing to the impairment.

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Five pollutants are considered Category 2 (High Priority) pollutants for the Los Cerritos Channel. These are ammonia, bis(2-ethylhexyl)phthalate (DEHP), coliform bacteria, trash, and pH. They were added to the 303(d) list in 2002, 2006, and 2010. Ammonia has been proposed for delisting, but it is not clear when this might happen. (See Table 2-11.)

For one other metal, aluminum, although there have been many exceedances of water quality standards during the past 10 years, these exceedances are based on secondary drinking water standards because State Board Resolution No. 88-63 (Sources of Drinking Water) and Regional Board Resolution No. 89-03 (Incorporation of Sources of Drinking Water Policy into the Water Quality Control Plans (Basin Plans) resulted in all surface and ground waters being considered suitable, or potentially suitable, for municipal water supply. The aluminum in Los Cerritos Channel stormwater is naturally occurring in the suspended sediment and the water used for municipal water supplies would be filtered to remove the sediment. (See Table 2-13) In addition, the Channel is designated in the Basin Plan with a potential MUN beneficial use with an asterisk, meaning that the use may be considered for an exemption at a later date. Therefore, aluminum is considered a low priority pollutant at this time.

2.2.3 Identification of Category 3 (Medium Priority) Pollutants

Section VI.C.5.a.ii(3) of the Order defines medium priority pollutants as:

> "Pollutants for which there are insufficient data to indicate water quality impairment in the receiving water according to the State's Listing Policy, but which exceed applicable receiving water limitations contained in this Order and for which MS4 discharges may be causing or contributing to the exceedance."

This is a very broad definition for a watershed with 13 years of water quality monitoring data, including exceedances in the past for constituents that are no longer sold in metropolitan areas in California (e.g., diazinon and chlorpyrifos), as well as other constituents that have long since been banned for sale in the United States. Some of these constituents left significant, long-lasting residue in the environment (particularly in marine sediments and fish tissue) and are generally referred to as legacy pollutants. Several of these legacy pollutants, including chlordane, DDT, PAHs, and PCBs, are being addressed through the Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters Toxic Pollutants TMDL. (See Table 2-10.)

In order to account for the diversity of data in the database and focus its efforts on priority pollutants, the Watershed Group decided to employ three criteria to define Category 3 Medium Priority Pollutants. First, in order to be consistent with the current/baseline pollutant loading to be used in the Reasonable Assurance Analysis for the Watershed Management Program, only the last 10 years of monitoring data have been used in determining Category 3 priority pollutants. Second, the number of exceedances for both dry weather and wet weather has been compared to Tables 3.1 and 3.2 of the State's Listing Policy to determine the percentage of the minimum number of measured exceedances

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needed to place a water segment on the Section 303(d) List for toxicants and for conventional pollutants. A mid-range of 50% was selected as the cut-off point for considering a pollutant a candidate for designation as a Category 3 Priority Pollutant, and to be conservative, wet and dry weather exceedances are considered separately. Lastly, in order to avoid giving priority to a pollutant based on an exceedance that could have been the result of a field or laboratory error, only pollutants with two exceedances in the last five years have been placed on the initial Category 3 Medium Priority Pollutant List. This process will be revisited as part of the Adaptive Management Process.

The data used to determine which pollutants are included in Category 3 Priority Pollutants is presented in Tables 2-7 and 2-8. One table presents wet-weather monitoring data and the other includes dry-weather monitoring data. Both tables include data for the 2003-2004 rain year through the 2012-2013 rain year. They are both based on regulatory standards for freshwater Non-Regulatory Standards discussed later in this section.

Table 2-7 presents the wet-weather monitoring data analyzed to help determine which pollutants were classified as Category 3 Medium Priority Pollutants. As shown in the table, enterococcus, fecal coliform, total coliform, aluminum, total chlordane, dissolved copper, dissolved zinc, and chlorpyrifos all have 100% or more of the required number of measured exceedances during wet-weather to be candidates for inclusion on the Category 3 list. All but chlorpyrifos have two or more exceedances during the last five years. In addition, MBAS, cadmium, chromium, Simazine, and dissolved silver have 50% of the exceedances required for listing. However, of this group only MBAS has two exceedances in the last five years.

As shown in Table 2-8, enterococcus, fecal coliform, total coliform, pH, and dissolved copper all have 100% or more of the required number of measured exceedances during dry weather to be candidates for inclusion on the Category 3 List. In addition, the single 2003-2004 exceedance for aluminum is 50% of the number of exceedances needed for listing of a toxicant per Table 3.1 of the Listing Policy. However, copper is already a Category 1 pollutant, coliform bacteria and pH are Category 2 pollutants, and the exceedances for enterococcus were based on saltwater standards – not freshwater standards. This was done to monitor enterococcus since the Los Cerritos Channel discharges into a saline estuary.

The resulting Category 3 list is shown in Table 2-12. This table shows the pollutants, the seasons of exceedances, the standards of exceedance, the percentage of required exceedances for listing per the State Listing Policy, proposed final wet-weather target dates, and notes that describe the exceedances. The pollutants on this table are the priority pollutants for which there is insufficient data to indicate water quality impairments.

2.2.4 Identification of Low Priority Pollutants

After review of pollutants for which there is insufficient data to indicate water quality impairment in the receiving water according to the State's Listing Policy in relation to the three criteria used to identify Category 3 Pollutants, the Watershed Group has identified six pollutants as low priority

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pollutants at this time. These pollutants are shown in Table 2-13 that is structured in the same manner as Table 2-12. Three of these pollutants are metals that each showed one wet-weather exceedance in either 2003-04 or 2004-05. The other pollutants are two pesticides that have been banned for sale in urban areas. These are chlorpyrifos and diazinon, which both theoretically quality for 303(d) listing per the State's listing policy, but the last exceedances for both were in 2004-05. In addition, as noted above, aluminum has been included Table 2-13 and not being addressed at this time because it may be considered for an exemption in the Basin Plan at a later date.

2.2.5 Emerging Constituents of Concern

Over 84,000 industrial chemicals are currently being produced and at least 610 of these compounds have been identified as being both persistent and bioaccumulative. Many of these compounds have the potential to be transported into aquatic and marine habitats by way of stormwater discharges. Recent studies in San Francisco Bay and throughout California have identified a number of different compounds or groups of compounds as possible concerns. These include pyrethroid pesticides, Fipronil and its degradates, perfluorooctane sulfonate (PFOs), nonylphenols, and various flame retardants (chlorinated phosphates and PBDEs. Early identification and actions have already been effective at reducing accumulation of some of these compounds in sediments and tissues. The Watershed group is currently investigating potential presence of pyrethroids and Fipronil in stormwater. The Group will continue to review the literature concerning other constituents of concern and potentially modify the monitoring program or recommend further regional work under the Stormwater Monitoring Coalition effort as part of the adaptive management process.

2.3 Source Assessment

Pursuant to Part VI.C.5.iii of Order No. R4-2012-0175, this section includes a summary of known and suspected stormwater and non-stormwater pollutant sources. For Category 1 pollutants, emphasis has been given to the source assessment in the applicable TMDLs. For category 2 and 3 pollutants, emphasis has been given to source assessments in related TMDLs elsewhere in the Region and professional judgment based on interpretation of various sources, including those listed in Part VI.C.5.iii(1) of the Order.

2.3.1 Sources of Metals

The source assessment section of the Los Cerritos Channel Metals TMDLs provides a thorough overview of the potential sources of copper, lead, and zinc within the watershed. The TMDL states, "Individual sources of metals in stormwater include automobile brake pads, vehicle wear, building materials, pesticides, erosion of paint and deposition of air emissions from fuel combustion and industrial facilities." Air deposition is not the true source of many pollutants, but it is the secondary source for many pollutants, including copper, lead, and zinc. The Metals TMDLs estimated that indirect deposition of copper within the watershed is 531 kg/year, while indirect deposition of lead is 398

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kg/year, and indirect deposition of zinc is 2,655 kg/year. The principal true source of copper is brake pads that are estimated to contribute 50-60% or more of the copper in urban runoff. The true sources of lead are many, but USEPA has estimated that half of the lead in urban area atmospheric deposition of lead is from avgas, the fuel used for piston engine aircraft. There are also many sources of zinc. However, two sources appear to be dominant: tires and galvanized metal. Zinc is used in the vulcanization of rubber and deposited directly and indirectly through atmospheric deposition.

A SCCWRP stormwater study conducted between 2001 and 2005 found that industrial land use sites contributed substantially higher fluxes and event mean concentrations (EMCs) of copper and zinc than other land use categories. Industrial sites typically have more than 70% impervious cover as well as on-site sources of metals, which may explain the higher loadings of copper and zinc from this land use. In addition, industrial sites, along with agricultural land uses, were found to contribute substantially higher fluxes of TSS than other land uses.

Industrial sites within the LCC Freshwater Watershed with stormwater permits include sites for trucking and warehousing, transportation equipment, fabricated metal products, petroleum and coal products, rubber and miscellaneous plastics products, oil and gas extraction, and other miscellaneous industries. There is a potential for metals loadings from each of these industries, particularly transportation and manufacturing facilities. Redevelopment of former industrial sites has a higher potential to discharge sediment containing metals.

2.3.2 Sources of Legacy Organics

The source assessment section of the staff report for the *Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters Toxic Pollutants Total Maximum Daily Loads (Harbor Toxics TMDL)* provides an excellent assessment of the potential sources of legacy organics from the area tributary to the harbors and San Pedro Bay, including the Los Cerritos Channel Watershed portion of the Nearshore Area defined in the TMDLs. The source assessment identifies the potential sources of organochlorine pesticides, PCBs, sediment toxicity, PAHs, and metals. However, this WMP relies on the watershed-specific information in the Los Cerritos Channel Metals TMDL for its assessment of the potential sources of metals. The source assessment in the Harbor Toxics TMDL indicates that PAHs that are currently generated or deposited in the watersheds are then washed off and discharged into receiving waters. It generally views PCBs, DDT, dieldrin, toxaphene, and chlordane as legacy pollutants that remain ubiquitous within the environment, bound to fine-grained particles. However, the Watershed Group also considers PAHs to be partially a legacy pollutant because of their long history of release and binding to fine-grained particles. Like zinc from galvanized metal products, PAHs are ubiquitous within the urban environment. Some are naturally occurring, but most are anthropogenic and come from the release of petroleum products and combustion of organic matter. They are distributed across the Watershed by atmospheric deposition.

A major indirect source of these pollutants in the Los Cerritos Channel is the fine-grained sediment that becomes dislodged and transported through the storm drains and contributes significantly to the

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TSS loads within the Channel. Some of this sediment is from construction sites and some is from streets, highways, and other impervious surfaces. However, much of it is from exposed soil in industrial facility sites, transmission line rights-of-way, freeway rights-of-way, hillside slopes, and vacant lots.

2.3.3 Sources of Category 2 Pollutants

Bis(2-ethylhexyl)phthalate (DEHP) and trash share sources, since DEHP is a plasticizer that most likely enters the receiving waters through the presence of plastic bottles and other plastic materials in trash. The State Water Board's December 2014 Proposed Final Draft Staff Report for the Proposed Draft Amendments to the Statewide Water Quality Control Plans notes that trash is related to the direct and indirect activities of Watershed inhabitants. The draft report lists five primary sources or transport mechanisms for trash to reach State waters:

1) Littering by the public on or adjacent to waterways

2) Storm events draining watersheds and carrying trash originating from littering, inadequate waste handling or illegal dumping via storm drain system to receiving waters

3) Wind-blown trash, also originating from littering, inadequate waste handling, or illegal dumping

4) Illegal dumping into or adjacent to waterbodies, and

5) Direct disposal (overboard disposal and/or dumping) of trash into waterbodies from vessels involved in commercial, military, fishing, or recreational activities.

The proposed amendments to the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries recognizes the following land use categories as priority land uses for addressing trash: high density residential, industrial, commercial, mixed urban, and public transportation stations.

Coliform bacteria have many natural and anthropogenic sources. Pet waste, improper cleaning of restaurant floor mats, inclusion of food and food waste in trash, leaking wastewater tanks on motor homes, and homeless encampments are among the anthropogenic sources. Among the natural sources are wildlife and bird excrement and regrowth in enclosed pipes, behind trash nets, and under algal mats during low flow conditions. The sources of pH are associated with natural processes during dry weather with shallow water flowing over concrete surfaces in the presence of sunlight.

Ammonia in surface water can originate from many sources. Within the Los Cerritos Channel Watershed, the principal sources are probably land-applied manure and bio-solids, airborne ammonia, sediment discharges, wildlife feces, decay of aquatic organisms, and organic materials in the water.

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2.3.4 Sources of Category 3 Pollutants

MBAS is a surfactant, and its sources within the Watershed are likely associated with the discharge of detergents and other cleaning products. Outdoor car washing and illicit discharges by cleaning services may be significant sources.

The sources of enterococcus within the Watershed are similar to the sources of coliform bacteria. However, a few species of enterococcus are associated with plants rather than fecal material. Enterococcus is used in the marine environment because it tends to correlate with viruses.

2.4 Priority and Sequencing of Addressing Water Quality Issues

The initial priority and sequencing of addressing water quality issues in the Los Cerritos Channel Watershed are related largely to four factors: 1) Interim TMDL milestone dates, 2) final TMDL compliance dates, 3) wet-weather compliance target dates for Category 2 and 3 pollutants, and 4) availability of money. The first priority is to address Category 1 pollutants with initial sequencing focused on copper, lead, and zinc, which are included in both the Los Cerritos Channel Metals TMDLs and the Harbor Toxics TMDL. By addressing the 2017, 2020, and 2023 interim milestones for copper, lead, and zinc in the metals TMDLs, and the final compliance date of September 30, 2026, the Watershed Group will also be addressing the metals in the Harbor Toxics TMDL. In addition, to the extent that TSS reduction and runoff reduction are employed to address metals, the legacy organics in the Harbor Toxics TMDL will also be addressed.

The second priority is to address methylene blue active substances (MBAS). Even though MBAS is a Category 3 pollutant, the Watershed Group proposes to address it early in order to eliminate the need to add it to the 303(d) List. The exceedances have generally been low, and it may be able to be handled through the inspection and education processes because it is a surfactant found in detergents used in commercial/industrial facility maintenance and in outdoor car washes.

The third priority for addressing water quality issues within the watershed is to address trash and Bis(2-ethylhexyl) phthalate through the installation of full capture systems in catch basins in high priority land use areas. DEHP will be addressed because it is a plasticizer and its presence in the receiving waters appears to be associated with the presence of plastic trash in the waters.

The fourth priority is to address pH and bacteria in dry-weather by reducing dry-weather discharges and reducing the nutrient discharges throughout the watershed. The pH issue is a natural dry-weather condition associated with algal growth in open concrete-lined channels with low flows of water exposed to bright sunlight. If the dry-weather flows can be eliminated through water conservation, infiltration, and capture and use, the cycle will be interrupted and the diurnal spikes in the pH will be eliminated. Furthermore, the elimination of dry-weather flows will reduce the transport of bacteria and possibly eliminate the algal substrate that facilitates bacteria growth within the open channels.

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The fifth priority will be to address wet-weather bacteria. Fully addressing bacteria will be a complicated and expensive process that requires more research and possibly regulatory changes. Stormwater capture and infiltration or use is one method that will be used to address wet-weather bacteria control. Restaurant inspections, public education regarding cleaning up after pets, and biological treatment of runoff will also be employed. However, the Permittees within the Watershed are not confident that available tools will allow them to meet current regulatory standards. Therefore, the Watershed Group will investigate other possible control measures.

The Watershed Group believes that it can come into compliance with dry-weather bacteria standards within 10 years by greatly reducing or eliminating dry-weather discharges in the Los Cerritos Channel. This will eliminate bacteria problems for approximately 90% of the year. Milestones for achieving dry-weather standards are found in Section 6.

The Watershed Group does not currently understand how to meet bacteria standards during wet weather and will be requesting a high flow suspension for the recreational beneficial use for the Los Cerritos Channel during the next triennial review cycle, which we understand will be initiated soon. At the conclusion of that process, the Group should be able to provide interim milestones for meeting wet-weather standards as part of the adaptive management process.

The Watershed Group does not plan to address ammonia at this time because it has been proposed for delisting. The 13 years of data collected by the City of Long Beach at the mouth of Los Cerritos Channel and several special studies demonstrate that there are no measured wet-weather exceedances of wet-weather standards, and the few recent dry-weather chronic exceedances have been due to natural pH cycling in the greatly reduced dry-weather flows. Data in Attachment C, the "Review of Los Cerritos Channel Watershed Ammonia and pH Data – Implications of 303(d) Delisting" show that flows to the channels from outfalls during dry-weather are well within Basin Plan pH standards and that the diurnal cycles in pH are not the result of waste discharges. These data support the delisting of both ammonia and pH for the Los Cerritos Channel.

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Table 2-7. Los Cerritos Channel Wet-Weather Exceedances 2003-4 through 2012-13 Rain Years

Constituent	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	Total Exceed-ances	Data Points	%*
BASIN PLAN CRITERIA													
Microbiology													
Enterococcus	4	3	4	3	4	2	4	3	4	1	32	32	>100
Fecal Coliform	4	3	4	2	4	2	4	3	4	1	31	32	>100
Total Coliform	4	3	4	2	3	2	4	3	4	1	30	32	>100
Conventionals													
MBAS	0	1	0	0	0	0	0	1	1	0	3	34	50
Nitrate (as N)	0	0	0	0	0	0	0	0	0	0	0	33	0
Nitrite (as N)	0	0	0	0	0	0	0	0	0	0	0	33	0
pH	0	0	0	1	0	0	0	0	0	0	1	41	20
Total Metals													
Aluminum	3	4	4	2	2	2	4	4	4	1	30	34	>100
Arsenic	0	0	0	0	0	0	0	0	0	0	0	34	0
Cadmium	0	1	0	0	0	0	0	0	0	0	1	34	50
Chromium	0	1	0	0	0	0	0	0	0	0	1	34	50
Nickel	0	0	0	0	0	0	0	0	0	0	0	34	0
Selenium	0	0	0	0	0	0	0	0	0	0	0	34	0
Aroclors													
Aroclor 1016	0	0	0	0	0	0	0	0	0	0	0	34	0
Aroclor 1221	0	0	0	0	0	0	0	0	0	0	0	34	0
Aroclor 1232	0	0	0	0	0	0	0	0	0	0	0	34	0
Aroclor 1242	0	0	0	0	0	0	0	0	0	0	0	34	0
Aroclor 1248	0	0	0	0	0	0	0	0	0	0	0	34	0
Aroclor 1254			0	0	0	0	0	0	0	0	0	26	0
Aroclor 1260	0	0	0	0	0	0	0	0	0	0	0	34	0
Chlorinated Pesticides													
Endrin	0	0	0	0	0	0	0	0	0	0	0	34	0
gamma-BHC (Lindane)	0	0	0	0	0	0	0	0	0	0	0	34	0
Heptachlor	0	0	0	0	0	0	0	0	0	0	0	34	0
Heptachlor epoxide	0	0	0	0	0	0	0	0	0	0	0	34	0
Methoxychlor	0	0	0	0	0	0	0	0	0	0	0	34	0
Total Chlordane	0	0	0	0	1	0	1	0	0	0	2	34	100
Toxaphene	0	0	0	0	0	0	0	0	0	0	0	34	0
Triazine													
Atrazine	0	0	0	0	0	0	0	0			0	27	0
Simazine	1	0	0	0	0	0	0	0			1	27	50

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Constituent	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	Total Exceed-ances	Data Points	%*
CTR FRESH CMC													
Dissolved Metals													
Arsenic	0	0	0	0	0	0	0	0	0	0	0	34	0
Cadmium	0	0	0	0	0	0	0	0	0	0	0	34	0
Copper	4	2	4	2	3	2	5	4	4	1	31	34	>100
Lead	0	0	0	0	0	0	0	0	0	0	0	34	0
Nickel	0	0	0	0	0	0	0	0	0	0	0	34	0
Silver	0	0	0	0	0	0	1	0	0	0	1	34	50
Zinc	4	2	3	2	2	1	3	2	4	1	24	34	>100
Total Metals													
Selenium	0	0	0	0	0	0	0	0	0	0	0	34	0
Chlorinated Pesticides													
4,4'-DDT	0	0	0	0	0	0	0	0	0	0	0	34	0
Aldrin	0	0	0	0	0	0	0	0	0	0	0	34	0
Dieldrin	0	0	0	0	0	0	0	0	0	0	0	34	0
Endosulfan I	0	0	0	0	0	0	0	0	0	0	0	34	0
Endosulfan II	0	0	0	0	0	0	0	0	0	0	0	34	0
Endrin	0	0	0	0	0	0	0	0	0	0	0	34	0
gamma-BHC (Lindane)	0	0	0	0	0	0	0	0	0	0	0	34	0
Heptachlor	0	0	0	0	0	0	0	0	0	0	0	34	0
Heptachlor epoxide	0	0	0	0	0	0	0	0	0	0	0	34	0
Toxaphene	0	0	0	0	0	0	0	0	0	0	0	34	0
CDFG FRESH CMC													
Organophosphates													
Chlorpyrifos	0	2	0	0	0	0	0	0	0	0	2	34	>100

* Percentage of required exceedances for listing per the State Listing Policy

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Table 2-8. Los Cerritos Channel Dry-Weather Exceedances 2003-04 through 2012-13 Rain Years

Constituent	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	Total Exceed-ances	Data Points	%*
BASIN PLAN													
Microbiology													
Enterococcus	2	2	2	2	2	2	2	0	2	2	18	20	>100
Fecal Coliform	2	1	2	2	1	2	0	1	1	0	12	20	>100
Total Coliform	2	1	2	2	0	1	0	1	0	0	9	20	>100
Conventionals													
MBAS	0	0	1	0	0	0	0	0	0	0	1	20	20
Nitrate (as N)	0	0	0	0	0	0	0	0	0	0	0	20	0
Nitrite (as N)	0	0	0	0	0	0	0	0	0	0	0	20	0
pH	1	2	3	4	3	2	2	1	2	1	21	20	>100
Total Metals													
Aluminum	1	0	0	0	0	0	0	0	0	0	1	20	50
Arsenic	0	0	0	0	0	0	0	0	0	0	0	20	0
Cadmium	0	0	0	0	0	0	0	0	0	0	0	20	0
Chromium	0	0	0	0	0	0	0	0	0	0	0	20	0
Nickel	0	0	0	0	0	0	0	0	0	0	0	20	0
Selenium	0	0	0	0	0	0	0	0	0	0	0	20	0
Aroclors													
Aroclor 1016	0	0	0	0	0	0	0	0	0	0	0	20	0
Aroclor 1221	0	0	0	0	0	0	0	0	0	0	0	20	0
Aroclor 1232	0	0	0	0	0	0	0	0	0	0	0	20	0
Aroclor 1242	0	0	0	0	0	0	0	0	0	0	0	20	0
Aroclor 1248	0	0	0	0	0	0	0	0	0	0	0	20	0
Aroclor 1254			0	0	0	0	0	0	0	0	0	20	0
Aroclor 1260	0	0	0	0	0	0	0	0	0	0	0	20	0
Chlorinated Pesticides													
Endrin	0	0	0	0	0	0	0	0	0	0	0	20	0
gamma-BHC (Lindane)	0	0	0	0	0	0	0	0	0	0	0	20	0
Heptachlor	0	0	0	0	0	0	0	0	0	0	0	20	0
Heptachlor epoxide	0	0	0	0	0	0	0	0	0	0	0	20	0
Methoxychlor	0	0	0	0	0	0	0	0	0	0	0	19	0
Total Chlordane	0	0	0	0	0	0	0	0	0	0	0	20	0
Toxaphene	0	0	0	0	0	0	0	0	0	0	0	20	0
Triazine													
Atrazine	0	0	0	0	0	0	0	0			0	15	0
Simazine	0	0	0	0	0	0	0	0			0	15	0

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Constituent	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	Total Exceed-ances	Data Points	%*
CTR FRESH CCC													
Dissolved Metals													
Arsenic	0	0	0	0	0	0	0	0	0	0	0	20	0
Cadmium	0	0	0	0	0	0	0	0	0	0	0	20	0
Copper	0	0	1	0	1	1	1	1	2	1	8	20	>100
Lead	0	0	0	0	0	0	0	0	0	0	0	20	0
Nickel	0	0	0	0	0	0	0	0	0	0	0	20	0
Zinc	0	0	0	0	0	0	0	0	0	0	0	20	0
Total Metals													
Selenium	0	0	0	0	0	0	0	0	0	0	0	20	0
Chlorinated Pesticides													
4,4'-DDT	0	0	0	0	0	0	0	0	0	0	0	20	0
Aldrin	0	0	0	0	0	0	0	0	0	0	0	20	0
Dieldrin	0	0	0	0	0	0	0	0	0	0	0	20	0
Endosulfan I	0	0	0	0	0	0	0	0	0	0	0	20	0
Endosulfan II	0	0	0	0	0	0	0	0	0	0	0	20	0
Endrin	0	0	0	0	0	0	0	0	0	0	0	20	0
Heptachlor epoxide	0	0	0	0	0	0	0	0	0	0	0	20	0
Toxaphene	0	0	0	0	0	0	0	0	0	0	0	20	0
1.1.1.1.1.1 C FG FRESH CCC													
Organophosphates													
Chlorpyrifos	0	0	0	0	0	0	0	0	0	0	0	20	0
Diazinon	1	1	0	0	0	0	0	0	0	0	2	20	100

*Percentage of required exceedances for listing per the State Policy

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Table 2-9. Los Cerritos Channel Watershed Priority Pollutants – Category 1 (Highest Priority)[1]

Los Cerritos Channel Metals TMDLs

Pollutant	Listing Date	TMDL	Final Wet-Weather Compliance Target Dates	Notes
Copper (Dry weather and wet weather)	2002	EPA-established TMDL March 17, 2010	September 30, 2026	74.7% reduction required by Metals TMDL.
Lead (Wet weather)	2002	EPA-established TMDL March 17, 2010	September 30, 2026	No further reduction required by Metals TMDL.
Zinc (Wet weather)	2002	EPA-established TMDL March 17, 2010	September 30, 2026	69.2% reduction required by Metals TMDL.

[1] Category 1 (Highest Priority): Water body-pollutant combinations for which quality-based effluent limitations and/or receiving water limitations are established in Part VI.E and Attachments L through R of this Order. (Order No. R4-2012-0175, p. 59)

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Table 2-10. Los Cerritos Channel Watershed Priority Pollutants – Category 1 (Highest Priority)[1]

Greater Harbor Toxics TMDLs[2]

Pollutant	Listing Date	TMDL	Final Wet-Weather Compliance Target Dates	Notes[3]
Copper	1998	TMDL effective March 23, 2012	March 23, 2032	Addressed by LCC Metals TMDLs
Lead	1998	TMDL effective March 23, 2012	March 23, 2032	Addressed by LCC Metals TMDLs
Zinc	1998	TMDL effective March 23, 2012	March 23, 2032	Addressed by LCC Metals TMDLs
DDT (Fish tissue)	1996	TMDL effective March 23, 2012	March 23, 2032	Entire nearshore watershed is 0.7% of DDT loading to Greater Harbor waters. LCC Reduction required unknown.
PCBs (Fish tissue)	1996	TMDL effective March 23, 2012	March 23, 2032	Entire nearshore watershed is 0.2% of PCBs loading to Greater Harbor waters. LCC Reduction required unknown.
Chlordane (Fish tissue)	2006	TMDL effective March 23, 2012	March 23, 2032	Chlordane is primarily a legacy pollutant. A bed sediment concentration of 0.5 µg/kg dry sediment has been assigned to Eastern San Pedro Bay. LCC reduction required unknown.
PAHs (Sediment)	1998	TMDL effective March 23, 2012	March 23, 2032	Entire nearshore watershed is 5.8% of total PAHs loading to Greater Harbor waters. LCC Reduction required unknown.
Toxicity (Sediment)	1996	TMDL effective March 23, 2012	March 23, 2032	Entire nearshore watershed is 1.9% of sediment loading to the Greater Harbor Waters in wet conditions and 0.1% in dry conditions. LCC reduction required unknown.

[1]Category 1 (Highest Priority): Water body-pollutant combinations for which quality-based effluent limitations and/or receiving water limitations are established in Part VI.E and Attachments L through R of this Order. (Order No. R4-2012-0175, p. 59)
[2] Based on 303(d) listings for Los Angeles Harbor.
[3] Source of notes (other than those for metals) is table in linkage analysis section of Attachment A to Resolution No. R11-008.

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Table 2-11. Los Cerritos Channel Watershed Priority Pollutants – Category 2 (High Priority)[1]

Pollutant[2]	Listing Date	State-Proposed TMDL Date	Estimated Final Wet-Weather Compliance Target Dates	Applicable Receiving Water Limitations	Notes
Ammonia	2002	2015	NA	0.1 mg/L	Proposed for de-listing
Bis(2) (DEHP)	2006	2019	2025	5.9 mg/L	Related to plastic trash
Coliform Bacteria	2002	2019	2040	235 MPN/100ml	Now only *E. Coli*
Trash	2006	2019	2025	Narrative standard related to nuisance or adversely affecting beneficial uses	Compliance by installation of full-capture devices in priority land use areas
pH	2010	2021	NA	[6.5 – 8.5][3]	Natural dry-weather condition

[1] Category 2 (High Priority): Pollutants for which data indicate water quality impairment in the receiving water according to the State's Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List (State Listing Policy) and for which MS4 discharges may be causing or contributing to the impairment. (Order No. R4-2012-0175, p. 59)

[2] The Channel is also listed as impaired for chlordane in sediment. However, chlordane is considered a Category 1 pollutant since it is included in the Greater Harbor Toxics TMDLs.

[3] In addition, ambient pH levels shall not be changed more than 0.5 units from natural conditions as a result of waste discharge.

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Table 2-12. Los Cerritos Channel Water Body–Pollutant Classification Category 3 (Medium Priority)[1]

Pollutant	Season of Exceedances	Standard of Exceedance	Percentage of Required Exceedance for Listing	Final Wet-Weather Compliance Target Dates	Applicable Receiving Water Limitations	Notes
MBAS	Dry weather and wet weather	Basin Plan	44% (54)[2]	2025	0.5 mg/L	Exceedances: 1 dry-weather in 10 years; none in the last 5 years. 3 wet-weather 10 years; 2 in the last 5 years The limit is 0.5 mg/L and the exceedances were generally low (0.57, 0.58, 0.60, and 0.88 mg/L).
Enter-ococcus[3]	Dry weather and wet weather	Basin Plan	>100% (52)[2]	2040	104 MPN/100 ml	Exceedances: 18 dry-weather in 10 years; 8 in the last 5 years. 32 wet-weather in 10 years; 14 in the last 5 years

[1] Category 3 (Medium Priority): Pollutants for which there are insufficient data to indicate water quality impairment in the receiving water according to the State's Listing Policy, but which exceed applicable receiving water limitations contained in this Order and for which MS4 discharges may be causing or contributing to the exceedance. Priority among pollutants that have exceeded standards during the last 10 years is for those for which exceedances have been greater than 50% of the number required for listing for either wet weather or dry weather and have exceeded standards are least twice in the last five years.

[2] Number of samples.

[3] Exceedances based on saline water standard. Included because channel discharges to saline estuary.

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Table 2-13. Los Cerritos Channel Low Priority Pollutants Not Being Addressed at this Time

Pollutant	Season of Exceedances	Standard of Exceedance	Percentage of Required Exceedance for Listing	Final Wet-Weather Compliance Target Dates	Notes
Aluminum[1]	NA	NA	NA	NA	Exceedances: 1 dry-weather in 10 years; none in the last 5 years. 30 wet-weather in 10 years; 15 in the last 5 years Exceedances based on potential MUN beneficial use and secondary drinking water standard
Cadmium	Wet weather	Basin Plan	50% (54)[2]	NA	One wet weather exceedance in 2004-05
Chlorpyrifos[3]	Wet weather	CFW[4] FRESH CCC	100%(50)[2]	NA	Two wet-weather exceedances in 2004-05. No longer sold in area.
Chromium	Wet weather	Basin Plan	50% (54)[2]	NA	One wet-weather exceedance in 2004-05
Diazinon[3]	Dry weather and Wet weather	CFW[4] FRESH CCC	100%(50)[2]	NA	One wet-weather exceedance in 2003-04 and one dry-weather exceedance in 2004-05. No longer sold in area.
Dissolved Silver	Wet weather	CFW[4] FRESH CMC	50% (34)[2]	NA	One wet-weather exceedance in 2003-04

[1] The Channel is designated in the Basin Plan with a potential MUN beneficial use with an asterisk, meaning that the use may be considered for an exemption at a later date. Therefore, aluminum is considered a low priority pollutant at this time.
[2] Number of samples

June 8, 2015

[3] Theoretically chlorpyrifos and diazinon would qualify for listing under the State's listing policy, but the last exceedances were in 2004-05, and the products are no longer sold for urban use. Therefore, the Watershed Group considers these low priority pollutants.

[4] California Department of Fish and Wildlife, formerly California Department of Fish and Game

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3.0 Water Quality Improvement Strategy

3.1 Overall Multi-Pronged Strategy

The Los Cerritos Channel Watershed Group (Watershed Group) has considered how best to develop a watershed management program to implement the requirements of Part VI.C.1.a of Order No. R4-2012-0175 and Part VI.C.1.a of Order no. R4-2014-0024 on a watershed scale through each Permittee's stormwater management program and through customized strategies, control measures, and best management practices (BMPs).

The Watershed Group has revisited strategies, control measures, and BMPs that it has discussed during the last five years and has concluded that addressing water quality impairments within the Los Cerritos Channel receiving waters should be based on a multi-faceted strategy initially focused on source control, runoff reduction, and total suspended solids (TSS) reduction. If pollutants are not generated or released, they will not be available for transport to the receiving waters. In addition, if soils can be stabilized, sediment controlled, and dry-weather runoff and initial flushes of stormwater runoff eliminated or greatly reduced, the major transportation mechanisms will be eliminated or greatly reduced, and many fewer pollutants will reach the receiving waters.

The Los Cerritos Channel Watershed Group plans to implement a water quality improvement hierarchy based on true source control, runoff reduction, and TSS reduction. Moving up the pyramid, treatment controls will constitute the smallest component of the overall program, as source control, reduction, LID and green streets, operational source control, capture and infiltration, and capture and use are all more effective methods for improving water quality.

3.2 Source Control Strategy

Members of the Watershed Group are interested in both "true source control" (pollution prevention) and "operational source control." The Watershed Group has been particularly focused on true source control because major sources of copper, lead, and zinc are released into the atmosphere, which results in widespread deposition on impervious surfaces such as streets, highways, parking lots, and rooftops. In addition, these metals are discharged directly onto streets, highways, parking lots, and driveways from motor vehicle components such as brakes, wheel weights, and tires.

Each of the cities within the watershed contributed either directly or indirectly to the effort by the California Stormwater Quality Association (CASQA) and Sustainable Conservation to develop

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and negotiate the legislative proposal that ultimately became SB 346, which was adopted by the legislature in 2010 and signed by the Governor on September 25, 2010 as Chapter 307 of the Statutes of 2010. The passage of SB 346 is a milestone that will significantly reduce the level of copper in metropolitan area waters throughout the state since vehicle brake pads constitute the single largest source of copper in metropolitan environments (See Figure 3-2.) SB 346 requires incremental reduction in the amount of copper in vehicle brake pads with key milestone dates of January 1, 2021, when most brake pads sold in California will be required to contain less than 5% copper by weight and January 1, 2025, when most brake pads will be required to contain less than 0.5% copper by weight. (See Figure 3-3.) Indications from the major brake pad friction materials manufacturers are that they are planning, where feasible, to go straight to a "zero" copper pad where no copper is intentionally added to the pad. They will do this in order to reduce the multi-million dollar costs that would result from two friction materials reformulations within a few years.

Figure 3-1. Water Quality Improvement Hierarchy

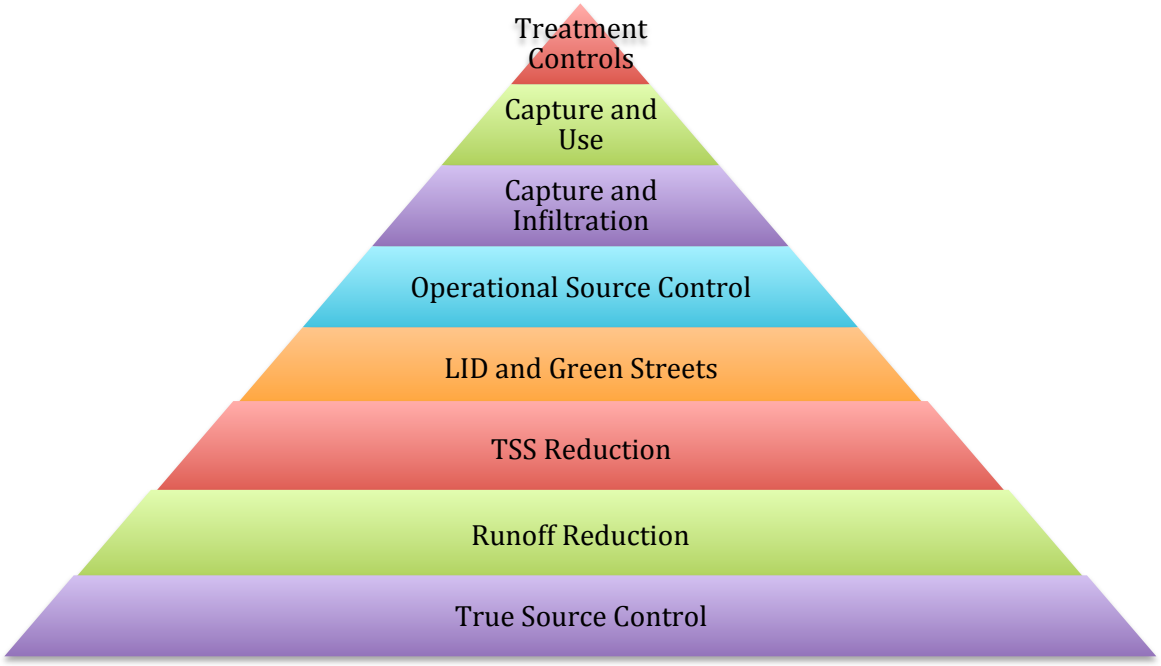

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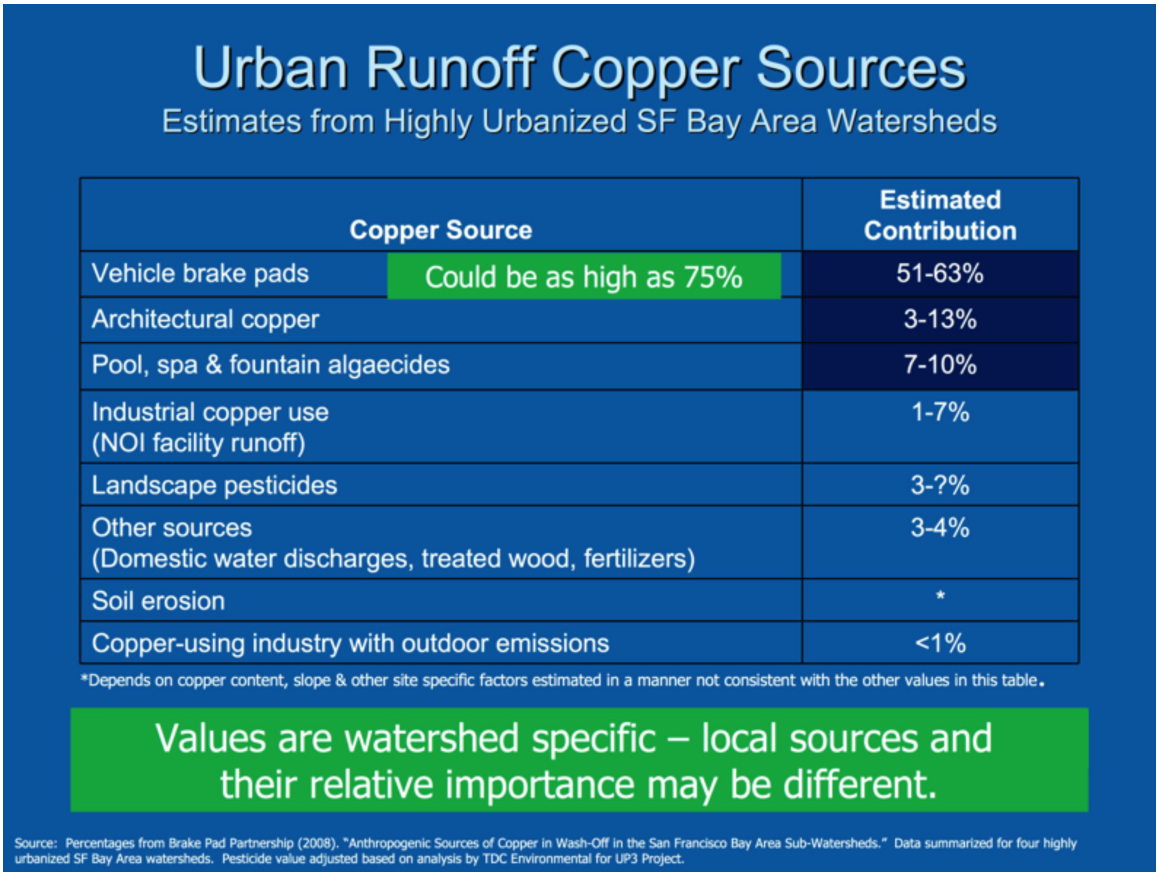
Figure 3-2



Source: Percentages from Brake Pad Partnership (2008). "Anthropogenic Sources of Copper in Wash-off in the San Francisco Bay Area Sub-Watersheds." Data summarized for four highly urbanized SF Bay Area Watersheds. Pesticide value adjusted based on analysis by TDC Environmental for UP3 Project.

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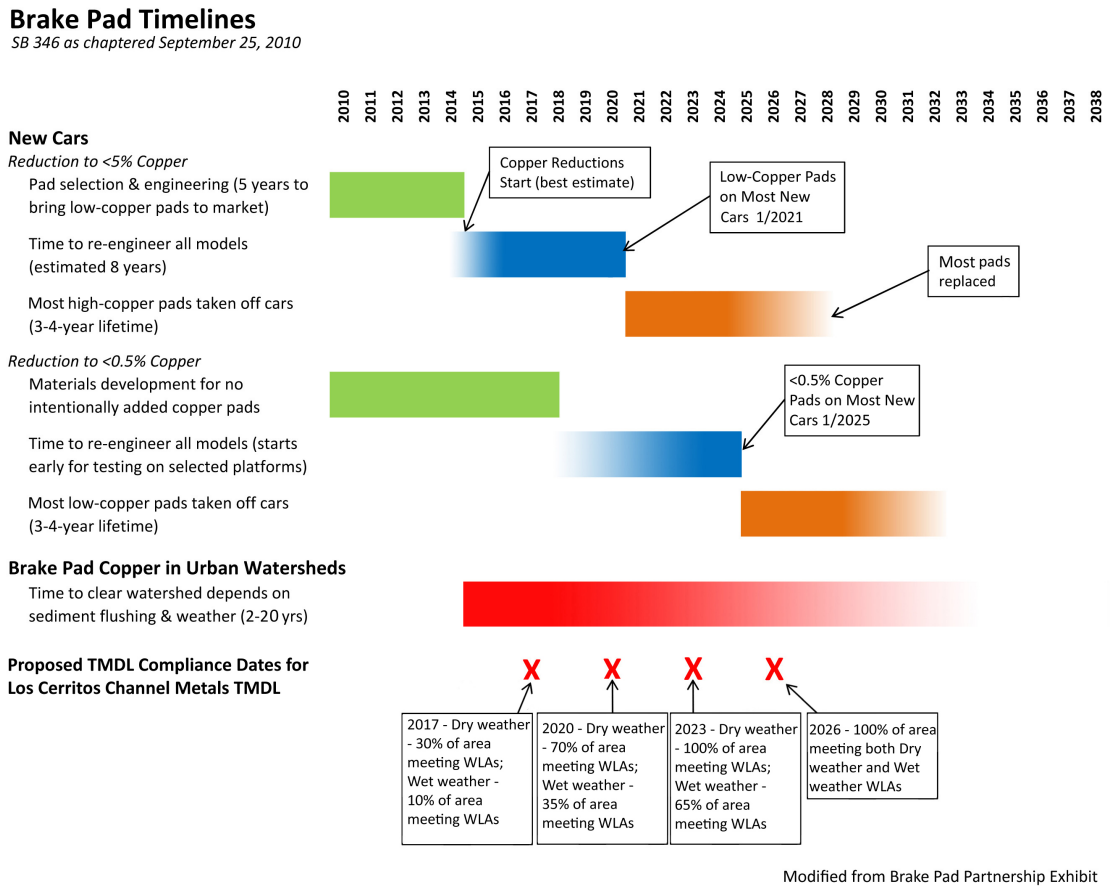
Figure 3-3



Modified from Brake Pad Partnership Exhibit

To improve its understanding of the potential impacts of SB 346, the Watershed Group commissioned a study, "Estimate of Urban Runoff Copper Reduction in Los Angeles County from the Brake Pad Copper Reductions Mandated by SB 346." (See Attachment D.) This estimate relied on available information, which was largely developed through a lengthy collaboration among brake pad manufacturers, government agencies, and environmental groups in the Brake Pad Partnership. The estimate examined three scenarios: a one-step reduction in copper, a two-step reduction in copper, and an aftermarket exemption for 0.5% copper. Scenario one showed a 60% reduction in urban runoff copper reduction from brake pads alone by 2024 and a 61% reduction by 2028. Scenario two showed a 45% reduction by 2024 and a 60% reduction by 2028. Scenario three showed a 39% reduction by 2024 and a 49% reduction by 2028. A CASQA subcommittee is proposing to update these estimates in 2015 by incorporating new baseline copper concentrations data for new vehicles from Washington State, brake pad industry guidance on various assumptions used in the estimate, and the fraction of all brake pad formulations certified as containing less than 0.5% copper. All brake pads sold in California after January 1, 2014 are to be certified and marked with edge codes indicating this compliance level. As of November 7, 2014, 4,679 brake pads have been certified by NSF International, the

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organization that certifies the measurement of copper in brake friction materials. The edge codes will provide information on copper content and the requirement that on and after January 1, 2014 any motor vehicle brake friction materials sold in California must contain no more than 0.1 percent by weight of the following materials: cadmium and its compounds, chromium (VI) salts, lead and its compounds, mercury and its compounds, and asbestiform fibers. There is a limited exception for depletion of inventories, but that exception ends December 31, 2023. The copper reduction study and an accompanying spreadsheet of calculations were reviewed with staff of the Los Angeles Regional Water Board in connection with the development and adoption of an Amendment to the Water Quality Control Plan for the Los Angeles Region to Incorporate Implementation Plans for the Total Maximum Daily Loads for Metals in the Los Cerritos Channel and for Metals and Selenium in the San Gabriel River and Impaired Tributaries.

The results of the study are reflected in the Reasonable Assurance Analysis (RAA) performed to demonstrate that the activities and control measures identified in the Watershed Management Program will ensure that Permittee MS4 discharges will achieve applicable water quality-based effluent limitations for copper.

The Watershed Group has concluded that the most cost-effective and long-lasting way to solve water pollution problems is to develop state-wide or regional control measures that will encourage or require, if necessary, product substitution or material substitution at the manufacturing stage. This can be a complex and time-consuming process, but the payoff in water quality improvement can be tremendous.

The members of the Watershed Group are now looking forward to working with the California Stormwater Quality Association to address a major source of zinc – tires. The Department of Toxic Substances Control (DTSC) adopted new Safer Consumer Product Regulations that became effective October 1, 2013. These regulations contain a process for identifying and prioritizing Chemicals of Concern in Priority Products containing these constituents, as well as a process for eliminating or reducing the adverse impacts of Chemicals of Concern in Priority Products. It will apply to most consumer products placed into the stream of commerce in California. It specifically applies to adverse environmental impacts, including adverse water quality impacts, and it contains a petition process for identification and prioritization of chemicals and projects. CASQA, supported by Los Angeles River Watershed permittees, has started the process of conducting research and building a file of critical information to support the designation of zinc in tires as a future priority product/constituent combination. The initial product of this effort is a zinc literature survey that discusses major and minor sources of zinc as documented in scientific literature from around the world.

The cost and effectiveness relationships between true source control, operational source control, and treatment control are shown in Figure 3-4, prepared for CASQA.

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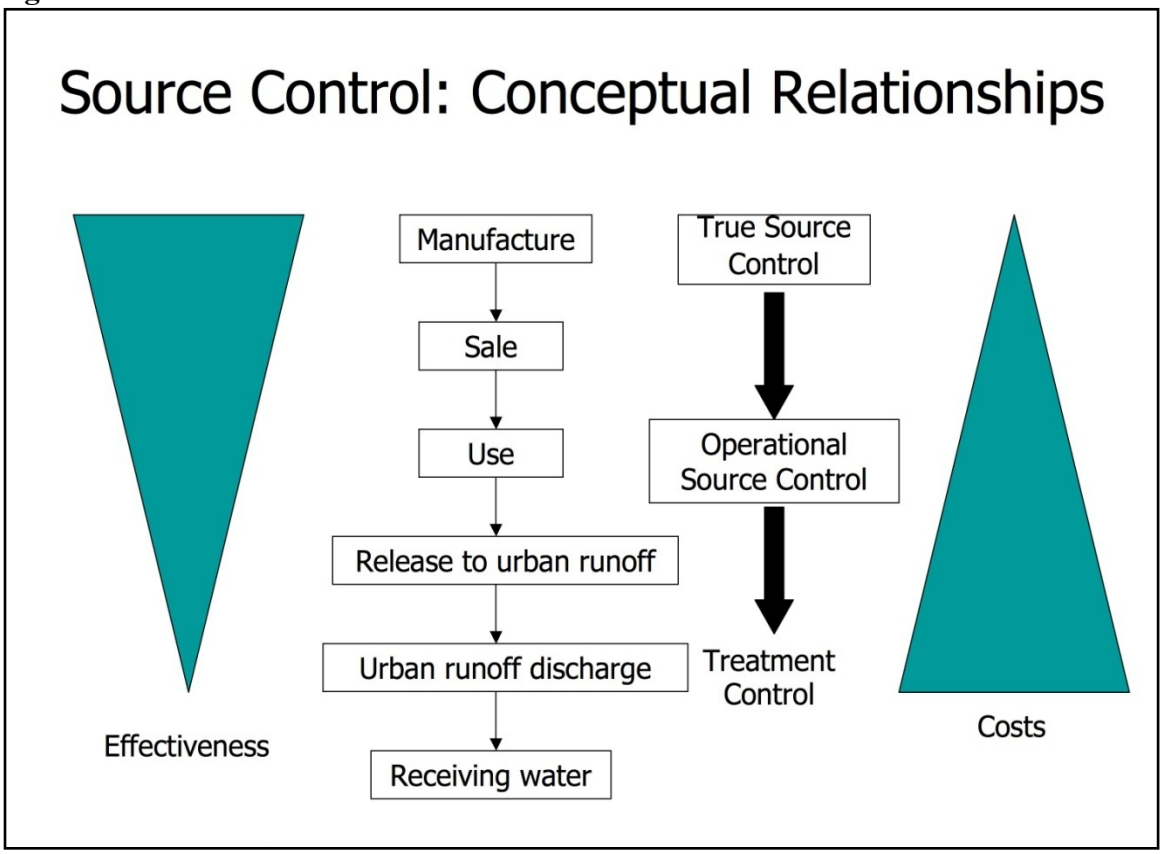
Figure 3-4



Source: California Stormwater Quality Association (CASQA)

Because the requirements for inclusion on the initial priority product list are quite restrictive, the regulations cannot be used to control zinc in tires until after January 1, 2016. However, the Watershed Group and others will be able to utilize the next two years to work with CASQA and others to develop a well-supported petition to support the addition of zinc in tires as a product-chemical combination on the Priority Products List.

Operational source control involves such measures as street sweeping and working with public and private entities to reduce or eliminate the discharge of pollutants. The Permittees within the watershed will use their Public Outreach Programs and Public Agency Activities Programs to promote and monitor operational source control measures addressing priority pollutants within the Watershed.

The Industrial General Permit, readopted on April 1, 2014, will help control zinc associated with industrial processes. However, it does not regulate outdoor sources of zinc such as galvanized chain link fences and roofs that are common at industrial facilities, but not directly associated with industrial processes.

Permittees will also address outdoor sources of zinc and other metals partially through the following runoff reduction strategy. Capturing and infiltrating and/or using runoff will interrupt the transport of these metals to receiving waters.

3.3. Runoff Reduction Strategy

In conjunction with true source control (prevention of pollutants at the source) and operational source control, the Watershed Group will implement a runoff reduction strategy that initially will focus on reduction of dry-weather runoff that will result in substantial water quality improvements during dry-weather days (approximately 330 days per year on average). This will be accomplished through a combination of water conservation and improvements in landscape irrigation efficiency to eliminate or greatly reduce overspray and runoff that provides a transport mechanism to carry pollutants to the storm drain system and hence to the receiving waters of the Los Cerritos Channel. Strategic location of green street elements will also help reduce dry-weather runoff.

The Watershed Group will give both short-term and long-term emphasis to dry-weather runoff reduction in order to reduce or eliminate runoff as a mechanism to transport metals from industrial facilities, roads, parking lots, and driveways to the Los Cerritos Channel receiving waters. Water conservation measures will be emphasized in order to reduce the potential for dry-weather runoff. The Watershed Group has already realized reductions in runoff due to the application of water conservation measures. Water conservation and improved irrigation practices will be supplemented by: a) the diversion of dry-weather discharges to facilities designed to store and infiltrate water, and b) a reduction in directly connected imperious surfaces over time.

Reducing runoff during wet weather is a challenging and costly undertaking. The Watershed is essentially built-out and will be primarily dependent on redevelopment to create opportunities for wet-weather runoff reduction. However, the member agencies will endeavor to incorporate green infrastructure into redevelopment projects, implement green streets, retrofit LID components at key locations, capture and use or infiltrate stormwater, and reduce directly connected impervious areas to the extent reasonably feasible. Wet weather runoff reduction is a long-term measure that will be addressed in later phases of the implementation plan as grant funds become available. After source control and runoff reduction, members of the Watershed Group will look to sediment control, direct infiltration, capture and infiltration, capture and use, and treatment controls. (See Figure 3-1, the Water Quality Improvement Hierarchy that is central to the Water Quality Improvement Strategy of the Los Cerritos Channel Freshwater Watershed.)

Areas tributary to well-maintained BMPs designed to capture and infiltrate or capture and use the runoff from an 85th percentile, 24-hour storm should be deemed to be in compliance with

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the assumptions and requirements of the WLAs for Watershed Management Programs as well as for Enhanced Watershed Programs.

The members of the Watershed Group propose to collaborate with water purveyors and their planning departments to use local water conservation requirements and implementation of AB 1881, the Water Conservation in Landscaping Act, to reduce both dry-weather and wet-weather runoff. AB 1881 was approved in the fall of 2006 with a requirement that the Department of Water Resources (DWR) update the model local water efficient landscape ordinance adopted by the Department in the early 1990s pursuant to Chapter 1145 of the Statutes of 1990. The updated model ordinance was promulgated by the Department on September 10, 2009. The Act required that not later than January 1, 2010, local agencies either adopt the updated model ordinance or another water efficient landscape ordinance at least as effective in conserving water as the updated model ordinance. By January 31, 2010, each local agency was required to notify the DWR whether it had adopted its own water efficient landscape ordinance or the updated model ordinance.

AB 1881 encourages the capture and retention of stormwater onsite to improve water use efficiency and water quality. It includes a requirement for a landscape water budget that establishes the maximum amount of water to be applied through an irrigation system. The model ordinance applies to new construction and rehabilitated landscapes for public agency projects and private development projects with a landscape area equal to or greater than 2,500 square feet, as well as developer-installed new construction and rehabilitated landscapes in single family and multi-family projects requiring a building or landscape permit, plan check, or design review. Since the watershed cities are largely built-out, the requirements will generally be limited to public projects and redevelopment projects, but every reduction in landscape irrigation should assist in reducing metal loads.

The majority of cities in the Watershed Group have already adopted water conservation ordinances that require the immediate conservation of water, usually as a progressive scale based on drought levels. These cities have also adopted landscape irrigation efficiency ordinances.

In addition, the Caltrans Stormwater Management Plan (SWMP) specifies requirements for the implementation of BMPs for State transportation projects (Caltrans 2003). Whenever a Caltrans project results in stormwater runoff to receiving waters or a storm drain system owned by another permittee, Caltrans is required to consider approved treatment systems (referred to as Category III BMPs) and, where feasible, to install them. Approved treatment systems vary, but Caltrans maximizes the use of biofilters or bioswales to reduce runoff and pollutant loads. Other approved treatment systems include infiltration basins, detention basins, traction sand traps, and dry weather flow diversions. Continued implementation of these requirements will provide

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water quality benefits over the long term. It may be possible to further increase the use of structural BMPs to maximize infiltration onsite.

Reductions in dry-weather flows in recent years demonstrate that voluntary and mandatory reductions in irrigation have already had a significant impact. The average dry-weather runoff between 2001 and 2009, as measured at Stearns Street, was 2.35 cfs. It is now less than 0.5 cfs. This means that there has been a 78% reduction from the average flows between 2001 and 2009. The RAA modeled an average 2003 dry-weather flow of 4.65 cfs and an average 2008 dry-weather flow of 2.20 cfs, and the existing measured dry-weather flow is 89% lower than the modeled 2003 dry-weather flows and 77% lower than the modeled 2008 dry-weather flows. This indicates that current dry-weather pollutant loads are significantly less than the modeled 2003 and 2008 daily pollutant loads. Continued restrictions on irrigation, replacement of turf, and installation of more efficient irrigation equipment in response to runoff restrictions will result in further reductions in irrigation and runoff.

3.4 Total Suspended Solids Reduction Strategy

After reviewing the "Wet-Weather Modeling Analysis" subsection of the Linkage Analysis in the Los Cerritos Channel Total Maximum Daily Loads for Metals, the Watershed Group concluded that beyond the Minimum Control Measures, runoff reduction, and implementation of SB 346, initial implementation of its multi-pronged strategy should focus on TSS reduction. This conclusion is based on statements in the TMDLs document. The wet-weather Modeling Analysis discussion in the TMDLs stated that "To assess the link between the sources of sediment, metals, and the impaired waters, a modeling system was utilized that simulates land-use based sources of sediment and associated metals loads and the hydrologic and hydraulic processes that affect delivery." It went on to say that "Loading processes for metals (copper, lead, and zinc) for each land use were represented through their association with sediment." These statements about the modeling process describe the bases for the metals TMDLs and indicate that initial WMP measures implemented in the watershed should focus on TSS reductions. Reducing TSS in the receiving waters should result in a significant reduction of metals and legacy organics in the receiving waters since both groups of pollutants adhere to sediment. The greater the reduction in TSS, the greater the reduction in metals and legacy organics. Initial emphasis on TSS reduction should reduce the volume of water that ultimately needs to be captured and infiltrated or used to achieve standards for the Category 1 pollutants being addressed by the WMP – namely metals and legacy organics. This would make implementation of the WMP more cost-efficient.

Table 3-1 below, and the accompanying box plots on the following page, provide a summary of TSS concentrations at the Stearns Street monitoring site over a 13-year period, based on 74 wet-weather observations and 25 dry-weather observations.

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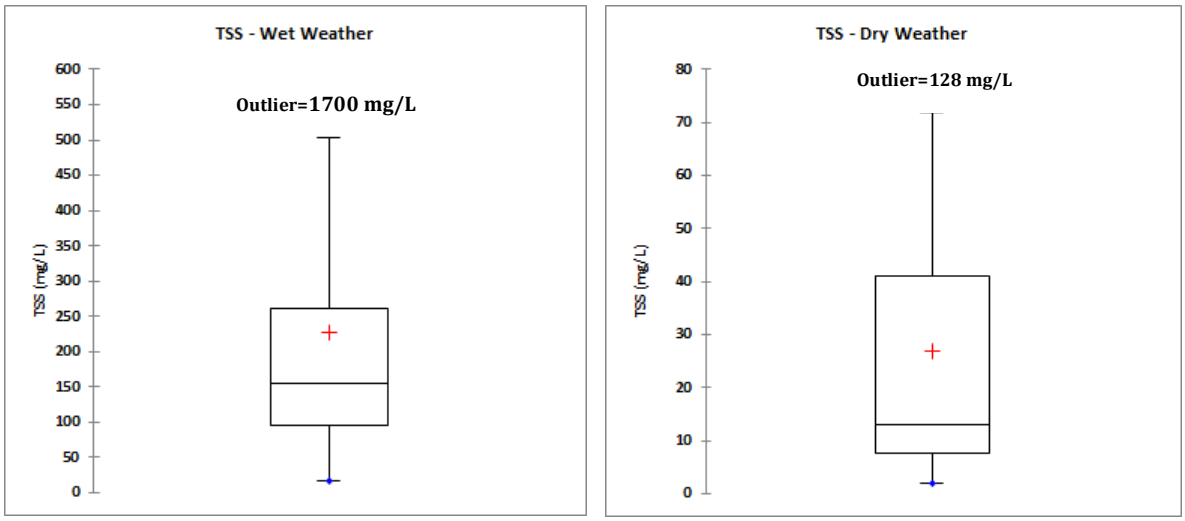
Table 3-1. Summary statistics of TSS (mg/L) measured at the Los Cerritos Channel Stearns Street mass emission and TMDL monitoring site.

Statistic	Wet Weather	Dry Weather
No. of observations	74	25
Minimum	17	2
Maximum	1700	128
1st Quartile	96	7.5
Median	155	13
3rd Quartile	260	41
Mean	227	27
Standard deviation (n-1)	256	30

Although the Reasonable Assurance Analysis is assuming only a 5% reduction in TSS through implementation of the TSS Reduction Strategy, the Watershed Group is actually targeting a reduction in the wet-weather mean concentration of TSS at Stearns Street from 227 mg/l to 150 mg/l. This target seems reasonable in light of TSS concentrations in other developed watersheds. It would be a 34% reduction in the mean concentration of TSS. Since the wet-weather mean sediment load is greatly influenced by the larger loads associated with large storms, to significantly reduce the TSS load in the channel, the Watershed Group will need to adequately address sediment concentrations resulting from larger storms. Implementation of this strategy will be assessed through the adaptive management process.

Table 3-2. Box Plots of Wet and Dry Weather TSS Concentrations at the Los Cerritos Channel Stearns Street Mass Emissions and TMDL Monitoring Site



Dark center line is the median (50th percentile), the red plus sign is the arithmetic average, the upper end of the box is the third quartile or Q3 (75th percentile), the lower end of the box is the first quartile or Q2 (25th percentile), the upper whisker is (Q3 + 1.5*(Q3-Q1)), the lower whisker is (Q1-1.5* (Q3-Q1).

The TSS Load Reduction Strategy is targeted at accelerating reductions of Category 1 pollutants addressed by the Los Cerritos Channel Metals TMDLs and the Greater Harbor Toxics TMDLs. It will also help to address bacteria loading within the watershed. The final compliance date for the Los Cerritos Channel TMDLs is September 30, 2026, and the final compliance date for the Greater Harbor Toxics TMDLs is March 23, 2032. The Watershed Group believes that TSS reduction, combined with true source control (discussed in Section 3.2), low impact development, green streets, and implementation of minimum control measures will constitute a strong and effective initial implementation of the WMP. The combination of these measures will facilitate compliance with interim milestones while providing time for funding measures to be put in place to pay for the design, construction, and operation of stormwater capture and low flow diversion facilities and to develop working relationships with water and wastewater agencies.

The core of this program is the Group's soil stabilization/sediment control strategy, described in Section 3.5 of the WMP. Two key components of this strategy are implementation of enhanced erosion and sediment control at construction sites, in accordance with each city's Development Construction Program (see Section 4.3.2), and stabilization of exposed soil not associated with construction sites. As noted above, the Group recognizes that the total sediment load in the Channel is closely associated with infrequent larger storms. For this reason, the Group's soil stabilization/sediment control program will emphasize soil stabilization and, for the larger sources of exposed sediment in each jurisdiction, supplemental sediment control measures. The

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Group intends to reduce the sediment load from the watershed, as measured at the Stearns Street monitoring station, by at least 20% by 2020. The Watershed Group considers this is a reasonable target given the magnitude of exposed dirt in the watershed. Such a reduction would result in significant reductions in the loads of metals, legacy organics, and bacteria.

In preparation for addressing exposed soil not associated with construction sites, various member cities have conducted initial assessments of exposed soil within these jurisdictions. The assessments indicated that the City of Signal Hill has the highest percentage of exposed dirt in the Watershed due to a number of factors, including slopes and the impacts of current and historic oil production. Therefore, the initial focus for TSS reduction will be on sub-basin 4 (See Figure 1-4 and Attachment B), which includes portions of Signal Hill and Long Beach. An initial analysis of exposed dirt not associated with construction in the portion of Signal Hill in the Los Cerritos Channel Watershed indicates that it totals approximately 3.06 million square feet (70.3 acres), or 13.2% of the city area within the Watershed. This is a much higher proportion of exposed dirt than in any other city in the Watershed. In addition, Signal Hill has greater local relief than the other cities within the Watershed and hence a higher probability of significant erosion and discharge of sediment than other portions of the Watershed. Furthermore, sub-basin 4 was modeled as being the number one source of zinc in the Watershed during development of the Metals TMDLs by USEPA.

The City of Signal Hill has agreed to develop a model vacant lot ordinance designed to reduce the discharge of sediment from the City. Development of the ordinance will consider elements of a vacant lot landscaping ordinance adopted by the City of Whittier and Signal Hill's own ordinances dealing with Storage Yards and Outdoor Storage Areas and with Trucking Yard Performance Standards. The Whittier Ordinance defines different types of vacant lots and specifies landscaping, irrigation, and maintenance requirements for lots. Lots smaller than one-half acre must be fully landscaped with draught tolerant or xeroscape material that requires no or little water after the first three years of growth. For lots one-half acre or larger, a minimum five-foot wide landscaped planter is required adjacent to public rights-of-way, except alleys, using the same landscaping materials used in the smaller lots. Perimeter barrier fences are also required behind the planters. The model ordinance will specifically focus on erosion and sediment control. It will also likely utilize the compliance plan approach used in the Signal Hill ordinances as a tool to build consensus on how best to reduce erosion and the discharge of sediment. The Signal Hill ordinances include a procedure for City review of properties for compliance with provisions of the ordinances. The City then prepares compliance plans for non-compliant properties and allows property owners to prepare alternative compliance plans for City approval.

The initial assessments conducted have indicated that two of the other potential major sources of exposed soil within portions of the watershed are beyond the direct control of the cities. These are Caltrans rights-of-way and transmission line rights-of-way. Caltrans rights-of-way are

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found in Sub-basins 1, 2, 4, 8, 9, and 10. Transmission line rights-of-way are found in sub-basins 1, 2, 8, 9, and 10. Since Caltrans is a participant in the Watershed Group, the cities will work with Caltrans to ensure that its rights-of-way are stabilized in a timely manner. However, since the public and private utilities whose rights-of-way must be stabilized are not members of the Watershed Group, negotiations with the utilities on how best to keep sediment from their rights-of-way out of the storm drain system will be necessary. This process has already begun with meetings held with representatives of Southern California Edison.

3.4.1 Soil Stabilization/Sediment Control

The Watershed Group plans a major, multi-faceted program to control sediment to implement its TSS Reduction Strategy and because metals (Category 1 Priority Pollutants) are ubiquitous within the area due to atmospheric deposition. These metals adhere to sediment and are transported to receiving waters by rainfall and urban runoff. The approaches to sediment control proposed for use in the watershed include enhanced erosion and sediment control at construction sites, stabilization of exposed soil not associated with construction sites, enhanced street sweeping, and enhanced parking lot sweeping.

Since the area is built out, there is limited construction at any given time. However, enhanced erosion and sediment control at all construction sites involving disturbed soil of one-acre or more is mandated by the current State Construction General Permit that became effective on July 1, 2010. In addition, the Permittees will require an effective combination of erosion and sediment controls for construction sites of less than one acre, consistent with Part IV.D.8.d of Order No. R4-2012-0175. They also will employ erosion and sediment control on publicly owned areas with exposed soil, and will encourage and/or require private property owners to stabilize exposed soil on vacant lots and other privately owned sites. These practices will first be employed in the Phase I sub-watersheds (See Section 6).

Cities throughout the Watershed will consider the adoption of vacant lot ordinances that will contain landscaping as well as erosion control and sediment control, based on experience with a pilot ordinance proposed for adoption by the City of Signal Hill, to help with initial implementation of the TSS Reduction Strategy.

Caltrans will stabilize exposed soil within its rights-of-way in order to reduce the transport of metals in runoff from its facilities and to sequester legacy lead that can be transported by wind as well as water.

3.4.2 Enhanced Street Sweeping

Enhanced street sweeping will be especially important until the sources of metals in atmospheric deposition are controlled. Metals are deposited on streets, highways, and parking lots directly from cars and trucks and also across the Watershed by atmospheric deposition.

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Much of the critical sediment for transporting metals to receiving waters is very fine and not picked up by traditional broom sweepers.

Street sweeping is getting renewed attention as an operational best management practice to reduce the discharge of sediment and metals. New vacuum sweepers and regenerative sweepers are quite effective at removing fine particles from streets and parking lots. The U.S. Navy is one of the agencies examining the use of high-efficiency sweepers to remove metals from its facilities. In May 2008, the Navy's Space and Naval Warfare Systems Command (SPAWAR) Systems Center in San Diego made a presentation entitled, "Metals Load Reduction in Storm Water Using High-Efficiency Sweepers" to a Joint Services Environmental Management Conference. The Navy observed that there are numerous widespread sources of metals, some of which are not easily controlled. The Navy is responsible for large areas with many discharge points. The Navy was concerned that stormwater metals concentrations, particularly copper and zinc, commonly exceed storm or process water discharge compliance requirements, since metals accumulate in sediments and receiving water impacts occur at low concentrations.

The Navy focused on street sweeping as a potentially effective BMP for reducing the adverse impact of metals on receiving waters because: 1) it can be applied to large areas, 2) particles on the ground are a source of stormwater copper and zinc, and 3) new sweeper technologies may be capable of removing significant amounts of particles, and, therefore, metals. The Navy's early tests showed that some particles swept off the ground were relatively high in copper and zinc and that these particles were a source of dissolved metals. The SPAWAR Systems Center concluded that high efficiency sweepers could remove significant amounts of metals before they become entrained in stormwater and that sweeping provides a potentially useful wide-area BMP.

The use of high-efficiency sweepers as an area-wide BMP for metals appears to be particularly applicable for the Los Cerritos Channel drainage area because indirect atmospheric deposition and direct deposition from motor vehicles are primary sources of metals in the Watershed.

As a result of the Navy's research and other recent research into the effectiveness of high-efficiency vacuum and regenerative sweepers, the Watershed Group has concluded that the timely use of well-maintained, high-efficiency sweepers could constitute a deemed compliant BMP for metals in the same way that the use of certified full-capture devices does for trash. Therefore, the Watershed Group proposes to implement an enhanced street and parking lot sweeping program within the upper portion of the Palo Verde Channel sub-basin and the upper portion of the Clark Channel sub-basin during the first phase of implementation of this plan.

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In addition, Caltrans conducts roadway and roadside cleanup operations to provide safe highway conditions and to maintain a neat and clean appearance. Sweeping operations are scheduled at the discretion of the Maintenance Supervisor based on the accumulation of trash and debris. Depending on traffic, weather, and available resources, sweeping frequencies are based on collecting a minimum of 1/2 cubic yard and a maximum of 1 cubic yard of material per mile swept. Debris on the roadway that may constitute a traffic hazard is removed immediately upon discovery or notification. Caltrans uses mechanical broom sweepers that meet the specifications needed to sweep in the highly traveled freeway environment and to pick up the variety of materials found on a the freeway shoulder or median. Caltrans, in cooperation with the other Watershed Group members, will reevaluate its sweeping policy with the goal of improving the efficiency of metals removal.

3.5 Runoff Capture and Infiltrate or Use Strategy

The Los Cerritos Channel Watershed Group chose not to pursue an Enhanced Watershed Management Program, largely because of its knowledge of the depth to the drinking water aquifer and the widespread presence of clay lenses throughout the watershed. The combination of these factors will make implementation of a capture and infiltrate strategy challenging. Therefore, the Group has attempted to locate potential water capture facilities in locations where the captured stormwater can be treated, if necessary, and used for irrigation if infiltration is not feasible. These locations include local parks and golf courses where irrigation is needed (See Section 4.5.2 and Figure 4-1). The Group is also looking at utility right-of-way sites where captured water could be used for nursery or garden plot irrigation, as well as at school sites (See Section 4.5.2 and Figure 4-2). To date, thirteen water capture sites have been identified, primarily in upper and middle portions of the watershed (See Section 4.5 for the location of these sites). Implementation of projects at these sites will be phased in over time, as needed and as funding is available. The initial stormwater capture projects are planned for locations in Mayfair Park in the City of Lakewood, Caruthers Park in the City of Bellflower, and Skylinks Golf Course in the City of Long Beach. Projects at these sites will capture non-stormwater runoff and first flush stormwater discharges from the upper portions of sub-basins 4, 8, and 10, as defined in the Los Cerritos Channel TMDL for Metals in the Cities of Bellflower, Lakewood, Long Beach, and Signal Hill. The Mayfair Park project will also capture discharges from the middle portion of sub-basin 8 in the City of Lakewood. These locations will be particularly helpful in bringing the upper portions of these sub-basins into compliance with waste load allocations in the Metals TMDLs and reduce the loads of other priority pollutants with similar fate and transport characteristics. The next three sites will be in Heartwell Park and Skylinks Golf Course in the City of Long Beach. These sites will serve sub-basins 6, 7, and 10. In addition to the use of major stormwater capture facilities, the Permittees will accomplish additional stormwater capture and infiltration through implementation of LID ordinances and Green Streets policies. Implementation of projects through the use of these ordinances and policies will be scattered across the built-out watershed because they will be dependent on the initiation and completion

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of redevelopment projects and road reconstruction projects. However, over a sustained period of time, they should contribute significantly to non-stormwater and stormwater infiltration and interruption of the runoff transport mechanisms.

3.6 Treatment Control Strategy

Except for vegetative treatment associated with LID, MS4 treatment control is generally viewed by the Watershed Group as a last resort to be used when true source control and operational source control, runoff reduction, and sediment control are not sufficient to comply with water quality-based effluent limits based on the assumptions and requirements of TMDLs applicable to the Watershed, or other applicable water quality objectives. This view is based on the conceptual relationships shown in Figure 3-4 in Section 3.2. Treatment control before discharge into receiving waters tends to be less effective and more costly than source control, especially true source control, which was why CASQA and Sustainable Conservation spent so much time and money getting SB 346 adopted and signed into law. Removing the very small particles of copper emitted by brake pads from stormwater discharges would have been very difficult, inconsistent, and extremely expensive. Similar relationships are associated with the treatment of other pollutants such as zinc, pesticides, and bacteria. In addition to the current measures to reduce copper in brake pads, the Watershed Group is acutely aware that the removal of lead from leaded gasoline and the banning of the sale of diazinon and chlorpyrifos in urban California have already had positive effects on water quality and reduced the costs of future treatment control. The Permittees are also keenly aware that some treatment control is likely to be necessary to achieve compliance in a timely manner.

The Cities will be complying with the proposed trash amendments to the Water Quality Control Plan for Inland Surface Water, Enclosed Bays, and Estuaries in California when the amendments are adopted by the State Water Resources Control Board and become effective. The strategy for compliance with the amendments will have to be developed after the draft Watershed Management Program has been submitted to the Regional Water Board because the proposed amendments have just been released for public comment and will not be adopted until later in 2015. The proposed amendments contain compliance options similar to those in the Los Angeles River Trash TMDL, but with the opportunity to focus on high trash generation areas.

The Permittees anticipate that much of the treatment control implemented in the Watershed will be associated with implementation of LID ordinances and Green Streets policies. They also anticipate that some treatment control may be necessary to achieve zinc waste load allocations. Although enhanced street sweeping should be sufficient to control direct and indirect deposition of zinc on arterials and residential streets, control of zinc from industrial sources may require the installation of targeted treatment controls since the capture and infiltration or capture and use of both non-stormwater and stormwater discharges will be a long-term and expensive process. In addition, Permittees are not certain how effective implementation of the

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new Industrial General Permit will be with respect to the reduction of zinc in stormwater discharges. This uncertainty is magnified by the recognition that many zinc sources at industrial facilities are not related to industrial processes and therefore not regulated by the Industrial General Permit.

The need for installation of treatment control facilities will be continually re-evaluated through the adaptive management process required by Order Nos. R4-2012-0175 and R4-2014-0024 and explained in Section 10 of this plan. The Permittees are confident that a continuation of the implementation of SB 346, enhanced street sweeping, dry-weather runoff reduction, and TSS reduction will be sufficient to meet the September 30, 2017 and the September 30, 2020 milestones in the Los Cerritos Channel Total Maximum Daily Loads for Metals. However, compliance with the September 23, 2023 interim milestone and the September 30, 2026 final compliance date may require treatment controls if there is any delay in implementation of SB 346, or if stormwater Permittees are not successful in using the petition process in the Safer Consumer Products Regulations to control zinc in tires. In addition, if new regulations promulgated by the Department of Pesticides Regulation are not successful in reducing pyrethroids in stormwater discharges, effective treatment control measures may have to be developed and implemented.

3.7 Financial Strategy

This financial strategy is provided to meet the development and implementation requirements for this WMP in accordance with Order No. R4-2012-0175 and Order No. R4-2014-0024. The cost estimates provided herein are preliminary and based on the best science available to date. The estimates are also subject to revision as new information becomes available, including as the projects are refined over the implementation period.

Financing the implementation of the Water Quality Improvement Strategy for the Los Cerritos Channel Watershed is the greatest challenge confronting the agencies in the Watershed. In the absence of stormwater utility fees, the agencies have no dedicated revenue streams to pay for the stormwater capture BMPs anticipated if the agencies in the Watershed were to depend on stormwater capture and treatment controls to achieve compliance. Therefore, to be able to sufficiently reduce pollutant loads to meet water quality objectives, the Watershed is going to pursue a multi-pronged financial strategy to match the multi-pronged Water Quality Improvement Strategy. In addition, the Watershed is coordinating the proposed implementation schedule (see Section 6) with the financial strategy.

The Watershed Group has considered the recommendations in the City Managers' Stormwater Funding Options report in developing this financial strategy. The City Managers' report addresses options open to the agencies in Los Angeles County after the County Board of Supervisors chose not to move forward on a proposed stormwater fee that would have generated approximately $295 million annually. A critical component of the report is the

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observation that moving forward with a stormwater fee vote would likely occur after June 2015, which means that the first funds might not be available until property tax payments are received in 2017. Therefore, the Watershed Group will strongly emphasize minimum control measures, source control, runoff reduction, and TSS reduction through the end of the current permit cycle. If a fee structure similar to the proposal presented to the Board of Supervisors in 2013 were adopted, the Los Cerritos Channel Watershed could expect annual revenues of approximately $2.7 million from a pro-rata distribution of the funds allocated to the Cities in the Watershed starting in 2017, plus a possible $3.4 million for the portion of the fee allocated to the Watershed Authority Groups (WAGs) if the Cities and the applicable WAGs allocated money to the watersheds on a proportional basis.

Assuming a total of approximately $6 million per year available from a funding source based on the proposed Clean Water, Clean Beaches funding initiative, the Watershed could expect approximately $60 million to be available over 10 years and $150 million over 25 years. However, these amounts would not be sufficient to pay for expensive stormwater capture and dry-weather low flow diversions to the sanitary sewer if the agencies had to depend on such projects to come into compliance with receiving water limitations and water quality-based effluent limitations specified in Order No. R4-2012-0175. Estimates provided by Tetra Tech and Paradigm Environmental in the Reasonable Assurance Analysis for this WMP indicate that the volume of water capture capacity within the Watershed could be 209 acre-feet (AF) in 2020 and 592 acre-feet in 2026. According to the RAA, the 209 AF capture value is equivalent to achieving a 35% load reduction by September 20, 2020. The 592 AF in water capture volume was modeled as capture/treatment volume required to achieve the final load reduction requirements of the Metals TMDLs in 2026. These estimates assume total dependence on water capture and that implementation of other measures does not significantly reduce pollutant discharges to the receiving waters.

For cost estimation purposes, this WMP initially assumes that the Watershed could ultimately require the capacity to capture and infiltrate or use 592 AF of water. This estimate is based on the Reasonable Assurance Analysis performed to demonstrate that the activities and control measures proposed in this WMP will achieve compliance with applicable compliance deadlines during the permit term. Based on cost estimates for constructing underground compact concrete stormwater capture facilities with a capacity of eight acre-feet, such a requirement could cost $332 million for construction of these facilities between now and September 30, 2026. This represents an average cost of $18,745 per acre, which is approximately $989 more than the estimated compliance cost of $17,756 per acre for the City of San Diego (under a different permit with fewer TMDLs) and $9,212 less than the estimated costs of $27,957 per acre for the City of Los Angeles (under the same permit). This estimate is a planning level cost estimate. No preliminary engineering has been completed. Costs could be reduced significantly by implementation of effective source control measures, TSS reduction measures, the implementation of green streets, and the implementation of low impact development.

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Implementation of these alternative control measures will be continuously monitored, and future costs will be re-estimated during each adaptive management review.

As the City Manager Work Group notes in its Stormwater Funding Options report, "the Los Angeles region faces critical, very costly, and seriously underfunded stormwater and urban runoff water quality challenges." The latest MS4 permits, Order No. R4-2012-0175 and Order No. R4-2014-0024, have greatly magnified the cost challenges. The absence of a stable stormwater funding mechanism not tied to municipal General Funds is becoming even more critical. For that reason, the City Manager Committees of the California Contract Cities Association and the League of California Cities, Los Angeles County Division, formed a Work Group to review stormwater funding options after the County's proposed Clean Water, Clean Beaches funding initiative failed to move forward. The Work Group found that funding stormwater programs is so complex and dynamic, and the water quality improvement measures so costly, that Permittees cannot depend on a single funding option at this time. The City Managers' report includes a variety of recommendations, including: organizational recommendations; education and outreach program recommendations; recommendations for legislation; Clean Water, Clean Beaches recommendations; local funding options; and recommendations for the Regional Water Board.

Watershed Group members have been involved in development of the recommendations, and the Group proposes to consider the recommendations of the City Managers Work Group and to work with its recommendations to do what is necessary to develop long-term solutions to stormwater quality funding. In the meantime, the Watershed Group will focus on the local funding options presented in the report to secure the needed funding for initial implementation of the WMP.

During the early years of implementation, the Permittees anticipate having to depend largely on local fees such as commercial/industrial inspection fees, General Fund expenditures, and, potentially, Clean Water State Revolving Fund program financing agreements to fund implementation of the Water Quality Improvement Strategy. The Watershed Group will seek opportunities to leverage the limited funds available. It will do this by financially supporting efforts of others, such as the California Stormwater Quality Association (CASQA), to seek State approval of true source control measures such as implementation of the Safer Consumer Product Regulations adopted by the Department of Toxic Substances Control in 2013. The Watershed Group will also support programs to increase water conservation, reduce dry-weather discharges to the storm drain system, and reduce TSS during wet weather. Successfully accomplishing these efforts could reduce the money needed in the long term to capture and/or treat stormwater discharges to comply with TMDLs and meet water quality objectives.

In addition, although Caltrans District 7 has only been participating informally in the Watershed Group, the Group's consultants have been in communication with Caltrans Headquarters regarding implementation of Attachment IV of the Caltrans Permit and the future possibility of

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working together on one or more projects through a Cooperative Implementation Agreement. There have also been discussions concerning the possible future Cooperative Implementation Grant Program that could be administered by the State Water Board. The Group will continue to closely coordinate with appropriate Caltrans District and Headquarters staff regarding the identification and implementation of watershed control measures to achieve water quality requirements as well as funding opportunities.

Concurrently, the Watershed Group proposes to work with the California Contract Cities, the Los Angeles County Division of the League of California Cities, and others to educate elected officials and voters about the water quality problems facing the region and the need to develop an equitable financing mechanism to fund the programs and facilities necessary to come into compliance with water quality regulations.

Legislative solutions will be necessary to clarify the application of Proposition 218 to fees for stormwater projects. AB 2403 has provided some assistance. It changed the definition of water in the Proposition 218 Omnibus Implementation Act of 1997 to make it possible to levee a fee to fund the capture and infiltration or capture and use of stormwater without the need for a vote of property owners as the general electorate. The Watershed Group will also support local and statewide efforts to amend Proposition 218 to have all stormwater fees treated in the same manner as water, sewage, and refuse fees. The Watershed Group, and/or its member agencies, will also seek grants to implement rainwater capture and reuse or capture and infiltrate projects on publicly owned property, including grants resulting from the passage of Proposition 1 on November 4, 2014. The Water Bond designated $200 million specifically for multi-benefit stormwater management projects, and funds for several other provisions could provide additional funds for stormwater quality projects.

In the long term, financing the Water Quality Improvement Strategy for the Los Cerritos Channel Watershed will require establishing dependable revenue streams for local water quality programs. Accomplishing this formidable task will require the cooperation of many entities, including business and environmental organizations and the Regional Water Board.

3.8 Uncertainties

There are many uncertainties associated with the implementation of this Watershed Management Program that could impact future program costs, availability of funding, and future risks. These uncertainties will be at least partially addressed through experience and implementation of the adaptive process discussed in Section 10. However, they will continue to exist throughout the life of the Program. The Watershed's communities have already made significant investments in stormwater quality programs. For example, the City of Signal Hill has seen its stormwater compliance budget grow by 260% during the last decade (from $250,000 in 2004 to $650,000 in 2014). By contrast, the City's general fund budget grew by 20% during this same time frame, with general inflation increasing by 31% during this ten-year period.

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Permittees fear greatly increased costs in the future because of new permit requirements, and they are concerned that they do not know exactly what the costs will be or where they will get the money.

The majority of the Watershed's communities have relied on general fund revenues to finance their stormwater programs. These monies face competition from other critical municipal services, including public safety (police, sheriff, fire, paramedics), parks, and street maintenance programs. This is primarily due to the uncertainties created by Proposition 218. The State's Constitution was amended in 1996 to require votes by either property owners or the general electorate on many parcel based taxes and fees. The *Jarvis v. City of Salinas* case, heard in 1999 in the 6th Appellate Court, resulted in the ruling that stormwater fees must follow the election requirements found in Proposition 218. This has made the adoption of stormwater fees very difficult statewide. However, despite the challenges of implementing stormwater fees caused by Proposition 218, some Cities have been able to fund portions of their stormwater programs with new fees. For instance, in 2004, the City of Signal Hill relied upon the Proposition 218 protest hearing process to increase revenues for trash reduction programs in stormwater. This fee annually collects approximately $96,000, which is used to fund trash related implementation costs for the Signal Hill stormwater quality program. AB 2403 made adoption of some stormwater fees easier, but only for fees funding stormwater use projects.

Uncertainties Associated with Long-Term Costs

This Program places great emphasis on source control (pollution prevention), runoff reduction, and erosion and sediment control as cost-efficient means of reducing pollutant loads to come into compliance with TMDLs and other water quality standards. There is a substantial degree of uncertainty associated with these control measures because they are partially dependent on the adoption and implementation of State legislation and local ordinances. Adoption and implementation of these measures, in turn, are dependent upon understanding complex storm water quality issues and upon commitment to implementing measures and enforcing legislation and ordinances. There are also many uncertainties associated with the implementation of structural control measures such as green streets, low impact development, stormwater capture facilities, and treatment control facilities. The success and efficiencies of these projects will be impacted by factors such as the infiltration rates of soils, the presence of clay lenses, the existence of high water tables, and the presence of existing underground utilities. There could also be changes in water quality standards and other regulations that would impact long-term costs.

Uncertainties Associated with Available Funding

As noted in the draft *Stormwater Funding Options* report discussed above in Section 3.7, there are many uncertainties associated with future funding for stormwater quality programs in Los Angeles County and elsewhere in California, since they are functionally orphaned utilities.

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Stormwater programs were not treated like water, sewer, and refuse utilities in Proposition 218 and therefore face much steeper hurdles in developing stable, sustainable revenue streams. The decision in the recent *Griffith v. Pajaro Valley Water Management Agency* case (as codified in AB 2403) provides some relief for projects directly associated with water supply and use, but the decision does nothing to assist funding of the majority of stormwater quality programs and projects. An amendment to Article XIIID of the California Constitution would be needed to fully treat funding of stormwater quality programs on par with water, sewer, and refuse utilities.

The decision by the Los Angeles Board of Supervisors in 2013 not to move forward with the proposed stormwater fee created more uncertainty for stormwater quality programs in Los Angeles County. Two of the reasons that the Board of Supervisors decided not to move forward with the proposed fee were that cities did not strongly support the fee and several groups, such as school districts, the business community, and others - including some cities - had concerns with the structure of the fee and the timing of the process. As noted above, the City Managers Committees of the California Contract Cities Association and the League of California Cities, Los Angeles County Division, responded to the decision by the Board of Supervisors by convening a meeting of stakeholders. The City Managers' group undertook development of the *Stormwater Funding Options* Report in light of the extraordinary costs expected to result from implementing the Watershed Management Programs and Enhanced Watershed Management Programs specified in the new Los Angeles Area Municipal Stormwater Permit. The *Stormwater Funding Options* Report presents a range of recommendations, but the outcome of these recommendations is not known at this time, adding to the uncertainties associated with future funding availability.

Another potential source of funding is grant funding. Over the last few years stormwater programs have received some project funds from grants funded by Proposition 40, 50, and 84. However, most of these grant funds have been spent or committed. The passage of Proposition 1 authorizes another $7.12 billion in general obligation funds for water quality supply, treatment, and storage projects. However, the total amount that will be available for stormwater projects is not known at this time. Neither is the rate at which funds will be made available known at this time. However, we do know that the Governor's proposed 2015-2016 State Budget only directly specifies that the State Water Board will receive $0.6 million for stormwater management, and the Department of Water Resources will receive $32.8 million for the Integrated Regional Water Management Program.

Uncertainties Associated with Future Risks

In addition to current uncertainties associated with costs and funding, there are multiple uncertainties associated with the possibility of missing compliance dates. The first TMDL standards compliance dates for the LCC Watershed will be the interim metals milestones of 2017, 2020, and 2023, and the final compliance date of September 30, 2026. The final non-TMDL water quality standard target compliance date is projected to be sometime in 2040. Thus,

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there will be many deadlines that must be met despite limited resources. Member agencies will need to set priorities and seek funding in order to meet the various compliance deadlines.

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4.0 Selection of Watershed Control Measures

4.1 Control Measure Objectives

As required by Part III.C.5 of Order No. R4-2012-0175, the specific objectives of the control measures in this WMP include:

(1) Prevention or elimination of non-stormwater discharges to the MS4 that are a source of pollutants from the MS4 to receiving waters;

(2) Implementation of pollutant controls necessary to achieve all applicable interim and final water quality-based effluent limitations and/or receiving water limitations pursuant to corresponding compliance schedules; and

(3) Ensuring that discharges from the MS4 do not cause or contribute to exceedances of receiving water limitations.

In addition, a general objective is the selection of control measures that will facilitate cost-effective implementation of the Water Quality Improvement Strategy specified in Section 3 of this WMP.

4.2 Existing and Planned Control Measures

4.2.1 Control Measures in Effect

The control measures currently in effect are primarily the various control measures programs specified in Order No. 01-182, including the following:

- Public Information and Participation Program,
- Industrial/Commercial Facilities Control Program,
- Development Planning Program,
- Development Construction Program,
- Public Agency Activities Program, and
- Illicit Connection and Illicit Discharge Elimination Program

In addition, as shown in Table 4-5, all seven Cities sweep residential, commercial, and industrial areas on at least a weekly basis.

4.2.2 Existing Planning for Control Measures

As noted in Section 3.2, the Cities in the Watershed have contributed to the planning for implementation of SB 346 to largely remove copper in brake pads by January 1, 2025, 21 months before

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the final compliance date for the copper TMDL for the Los Cerritos Channel Freshwater Watershed established by USEPA.

The Watershed Group also worked with Regional Water Board staff on the development of a Basin Plan Amendment to add an implementation plan and an implementation schedule for the Los Cerritos Channel TMDL for Metals into the Water Quality Control Plan for the Los Angeles Region. This amendment was adopted by the Regional Water Board on June 6, 2013, and approved by the State Water Board on February 6, 2014.

In addition, the Watershed Group has been discussing the use of the Safer Consumer Product Regulations adopted by the Department of Toxic Substances Control to reduce the zinc content of automobile and truck tires after 2016. The Group has also been reviewing local sources of zinc in preparation for developing local control measures for zinc as part of the first adaptive management review process.

4.3 Minimum Control Measures

The Minimum Control Measures (MCMs) are baseline WCMs required for all Permittees. The MCMs are defined in the MS4 Permit (excluding modifications set forth in an approved WMP) and are generally implemented individually by each Permittee. The objectives of the MCMs are to 1) result in a significant reduction in pollutants discharged into receiving waters and 2) satisfy the requirements of 40 CFR §122.26(d)(2)(iv). The MCMs are separate from enhanced Targeted Control Measures, which are developed by the Watershed Group and included in the WMP to specifically address water quality priorities (WQPs).

The MS4 Permit allows the modification of several MCMs programs, so long as the modified actions are set forth in the approved WMP and are consistent with 40 CFR §122.26(d)(2)(iv). The modifications are based on an assessment to identify opportunities for focusing resources on WQPs. The term “modifications” refers only to instances where language from the MS4 Permit MCM provisions is removed and/or replaced. Any control measures that are strictly enhancements of the existing programs (i.e. do not conflict with the MS4 Permit MCM provisions) are included in the separate category of Targeted WCMs.

The following sections include a summary of the assessment of each MCM program as well as a determination as to whether each Participating Agency will implement the MCM provisions 1) as explicitly stated in the corresponding section of the MS4 Permit or 2) with modifications to focus resources on WQPs. Independent of the determinations made, the agencies may consider additional MCM modifications through the Adaptive Management Process. Implementation of the MCMs will follow the approval of this WMP by the Regional Board Executive Officer following MS4 Permit §VI.D.1.b.

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4.3.1 Los Angeles County Flood Control District Minimum Control Measures

The LACFCD will implement the MCMs as defined from §VI.D.1 to §VI.D.4 of the MS4 Permit.

4.3.2. Assessment of Minimum Control Measures (Cities Only)

Pursuant to MS4 Permit §VI.C.5.b.iv.(1).(a), the following section is an assessment of the MS4 Permit MCMs, intended to identify opportunities for focusing resources on WQPs.

4.3.2.1. Development Construction Program

4.3.2.1.1. Assessment

Although controlling sediment is not a WQP, the reduction of sediment through an effective Development Construction Program will address WQPs. This is because sediment mobilizes other pollutants, including many of the WQP pollutants. As such the Development Construction Program is an integral component of each City's jurisdictional stormwater management program.

Compared to the prior MS4 Permit, the current Permit expands the provisions for the Development Construction Program. This expansion includes additional or enhanced requirements for plan review, site tracking, inspection frequencies, inspection standards, Best Management Practice (BMP) implementation and employee training. If implemented effectively, these enhancements will aid in the control of sediment within the Watershed, and consequently, will address WQPs. As such, no modifications to the provisions of the Development Construction Program have been identified.

4.3.2.1.2. Determination

The Cities will implement the MCMs as defined in §VI.D.8 of the MS4 Permit. To assist the Cities in the development and implementation of a jurisdictional program, a guidance document is included in Attachment E.

4.3.2.2. Industrial/Commercial Facilities Program

4.3.2.2.1. Assessment

The MS4 Permit provisions for the Industrial/Commercial Facilities Program provide opportunities for customization to address WQPs. Specifically, §VI.D.6.e.i.4 states that industrial inspection frequencies may be modified through the WMP development process. The Cities propose modifying the inspection frequencies of both industrial and commercial facilities based on a facility prioritization scheme that considers WQPs. For example, facilities that are deemed to have a high potential to discharge metals (a WQP pollutant) may be prioritized as "High" and inspected more frequently while facilities that have a small likelihood to adversely impact WQPs may be prioritized as "Low" and inspected less frequently.

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4.3.2.2.2 Determination

Sections VI.D.6.d and VI.D.6.e of the MS4 Permit will be replaced with the language in Table 4l 4, which is located below in subsection 4.3.4 *New Fourth Term Permit Minimum Control Measures (Cities Only)* and is identified as MCMl ICFl 3.

In order to provide clarity to the Cities, one combined guidance document has been prepared for the Program, with the prioritization and revised inspection frequencies included – see Attachment E. The document is also intended to assist the Cities in the development and implementation of a jurisdictional program.

The Permittee Industrial/Commercial Facilities will include tracking of critical sources and educating industrial facility managers with the intent of ensuring that all industrial facilities are implementing BMPs as required.

4.3.2.3. Illicit Connection and Illicit Discharges Elimination Program

4.3.2.3.1. Assessment

The purpose of the Illicit Connection and Illicit Discharges Elimination (ICID) Program is to detect, investigate and eliminate IC/IDs to the MS4. In order to address WQPs, a potential modification to MS4 Permit provisions would be the inclusion of a proactive approach for the detection of illicit discharges. However such an approach will be addressed through non-stormwater outfall based screening monitoring as outlined in the MRP. Also, such activities do not conflict with the MS4 Permit provisions for an IC/ID Program, and as such would be classified as a Targeted Control Measure. As such there is no need to modify the base provisions of the program.

4.3.2.3.1 Determination

The Cities will implement the MCMs as defined in §VI.D.10 of the MS4 Permit. To assist the Cities in the development and implementation of a jurisdictional program, a guidance document is included in Attachment E.

4.3.2.4 Planning and Land Development Program

4.3.2.4.1. Assessment

Following MS4 Permit §VI.C.5.b.iv.1.a, the Planning and Land Development Program was not assessed for potential modifications.

4.3.2.4.2. Determination

The Cities will implement the MCMs as defined in §VI.D.7 of the MS4 Permit. To assist the Cities in the development and implementation of a jurisdictional program, a guidance document is included in Attachment E.

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4.3.2.5 Public Agency Activities Program

4.3.2.5.1 Assessment

The Public Agency Activities Program is divided into several sub-programs. Many of the MS4 Permit provisions within the sub-programs consist of baseline BMPs that do not suggest modification. The sub-programs that do suggest a prioritized approach – such as street sweeping and catch basin cleaning frequencies – already provide this opportunity (frequencies are based on a City's assessment of trash and debris generation). The Public Facility Inventory sub-program also provides a prioritization opportunity, based on the tracking data obtained for each facility. However, since these facilities are not subject to regular "public agency" inspections as in the Industrial/Commercial Facilities Program, there is little utility in incorporating such a prioritization. The provisions of the public construction activities sub-program are considered an integral component of the jurisdictional stormwater program, for the reasons explained in the assessment of the Development Construction Program provisions. In summary there is no need to modify the MS4 Permit provisions of the program.

4.3.2.5.2 Determination

The Cities will implement the MCMs as defined in §VI.D.9 of the MS4 Permit. To assist the Cities in the development and implementation of a jurisdictional program, a guidance document is included in Attachment E.

4.3.2.6 Public Information and Participation Program

4.3.2.6.1 Assessment

The MS4 Permit allows a City to implement the requirements of the Public Information and Participation Program (PIPP) 1) by participating in a Countywide effort, 2) by participating in a Watershed Group effort, 3) individually within its jurisdiction or 4) through a combination of these approaches. The Cities will implement the PIPP following a combination of approaches. Consequently some clarifications of the MS4 Permit provisions are necessary.

In terms of modifications to address WQPs, the MS4 Permit provisions for the PIPP are not particularly prescriptive, thus allowing the Cities the flexibility to focus efforts on WQPs through the development of the program. As such, there is no need to modify the MS4 permit provisions of the program.

4.3.2.6.2 Determination

The table below provides clarification on elements of the MS4 Permit provisions for the PIPP:

Table 4-1: Elements of the PIPP

Permit section	Clarification
§VI.D.5.c.(i) Public Participation	Each City will participate in a Countywide sponsored PIPP to provide a means for public reporting of clogged catch basin inlets and illicit discharges/dumping, faded or missing catch basin labels, and general stormwater and non-stormwater pollution prevention information.
§VI.D.5.d Residential Outreach Program	Each City will work in conjunction with a Countywide sponsored PIPP to implement the Residential Outreach Program. Elements of program that will not be administered or implemented by the County will be addressed

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	individually by each City. Through the adaptive management process, PIPP participation may develop into a watershed group or individual effort, or some combination of these approaches.

In order to provide clarity to the Cities, one combined guidance document has been prepared for the Program, with the approach for each provision (i.e. joint or individual effort) included – see Attachment E. The document is also intended to assist the Cities in the development and implementation of a jurisdictional program.

4.3.2.7 Progressive Enforcement and Interagency Coordination

4.3.2.7.1 Assessment

Following MS4 Permit §VI.C.5.b.iv.1.a, the Progressive Enforcement and Interagency Coordination Program was not assessed for potential modifications.

4.3.2.7.2 Determination

The Cities will implement the MCMs as defined in §VI.D.2 of the MS4 Permit. To assist the Cities in the development and implementation of a jurisdictional program, a guidance document is included in Attachment E.

4.3.3 Third Term Permit Minimum Control Measures

Until the WMP is approved by the Executive Officer of the Regional Board, the MCM provisions of the prior third term MS4 permit continue to be implemented by the participating agencies. Some of the MCMs of the current MS4 Permit are relatively unchanged carry-overs from the prior third term permit. The remaining MCMs are either enhancements of the third term MCMs or entirely new provisions. These new and enhanced fourth term MCMs are described in the following section.

4.3.4 New Fourth Term Permit Minimum Control Measures (Cities Only)

Part VI.D of the MS4 Permit (the MCM provisions) introduces many new provisions and program elements to be developed and incorporated within each participating agency's jurisdictional stormwater program. This section briefly describes the new and enhanced MCMs required for the Cities (City MCMs), excluding those required for the LACFCD in §VI.D.4. An MCM is considered new if it was not required by the prior MS4 Permit and is considered enhanced if it is an enhancement of a related provision of the prior MS4 Permit.

The details of each provision may be found in the relevant sections of the MS4 Permit, which are included. Unless an alternate date is provided in the MS4 Permit or in this section, the adoption date for the City MCMs coincides with the approval of the WMP by the Regional Board's Executive Officer.

4.3.4.1 Structural Controls

The new and enhanced MCMs consist primarily of nonstructural control measures, with the marked exception of the Planning and Land Development provisions, described as follows.

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LID and Hydromodification

MS4 Permit §VI.D.7

The LID and hydromodification provisions of the Planning and Land Development program are a significant enhancement from the prior MS4 Permit. The implementation of structural LID BMPs at new developments throughout the watershed will appreciably decrease the effective impervious area, reducing flow and, consequently, pollutant loads. The program is unique in that it will increase in effectiveness over time as more and more existing developments are redeveloped and bound to the LID/hydromodification requirements.

Trash Excluder Installation

MS4 Permit §VI.D.9.h.vii.(1)

In areas that are not subject to a trash TMDL, the Public Agency Activities Program includes a requirement to install excluders (or equivalent devices) on or in Priority A (see §VI.D.9.h.iii.(1))) area catch basins or outfalls to prevent the discharge of trash to the MS4. For LA MS4 Permittees, the deadline is no later than four years after the effective date of the Permit. This provision may be supplanted by the statewide trash amendments for the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California, which propose the installation of full-capture devices in the high priority land use areas of industrial, commercial, high-density residential and public transportation stations. A proposed final staff report was released on December 31, 2014, but no hearing date has been scheduled.

4.3.4.2 Nonstructural Controls

Table 4-3 lists the new and enhanced nonstructural City MCMs as well as the new and enhanced NSWD measures. The BMP effectiveness from Table 4-3 is based on similar BMPs listed in Tetra Tech's CLRP for Chollas Creek Watershed in San Diego County, 2012. The correlation of BMP effectiveness with WQPs is based on Table 4-2. The pages following Table 4-3 describe each of the listed controls.

Table 4-2 Pollutant Category versus Water Quality Classification

Waterbody-pollutant classification	Type of pollutant								
	Bacteria	Metals	Organics	Sediment	Pesticides	Nutrients	Oil and grease	Dissolved minerals	Trash
Category 1		✗	✗		✗				
Category 2	✗		✗			✗			✗
Category 3	✗		✗						

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Table 4-3: New Fourth Term MS4 Permit Nonstructural MCMs (Cities only) and NSWDs

#	WCM Category/ID	WCM	BMP effectiveness with respect to WQPs					Agency							
			Category I	Category II	Category III	Sediment reduction	Volume or flow reduction	Bellflower	Cerritos	Downey	Flood Control	Lakewood	Long Beach	Paramount	Signal Hill
		Planning and Land Development													
1	MCM-PLD-1	Amend development regulations to facilitate LID implementation	◈	◆	◆	◆	◆	✗	✗	✗	✗	✗	✗	✗	✗
2	MCM-PLD-2	Post-construction BMP tracking, inspections, and enforcement	◈	◈	◈	◈	◈	✗	✗	✗	✗	✗	✗	✗	✗
		Existing Development													
3	MCM-ICF-1	Increase in facility types inspected and number of inspections conducted	◈	◈	◈	◈	◈	✗	✗	✗	✗	✗	✗	✗	✗
4	MCM-ICF-2	Business assistance program and BMP notification	◈	◈	◈	◈	◈	✗	✗	✗	✗	✗	✗	✗	✗
5	MCM-ICF-3 (TCM-ICF-1)	Prioritize facilities/inspections based on water quality priorities	◈	◈	◈	◈	◈	✗	✗	✗	✗	✗	✗	✗	✗
		Construction													
6	MCM-DC-1	Enhanced plan review program	◈	◈	◈	◆	◈	✗	✗	✗	✗	✗	✗	✗	✗
7	MCM-DC-2	Enhanced inspection standards and BMP requirements	◈	◈	◈	◆	◈	✗	✗	✗	✗	✗	✗	✗	✗

#	WCM Category/ID	WCM	BMP effectiveness with respect to WQPs					Agency							
			Category I	Category II	Category III	Sediment reduction	Volume or flow reduction	Bellflower	Cerritos	Downey	Flood Control	Lakewood	Long Beach	Paramount	Signal Hill
8	MCM-DC-3	Increased inspection frequencies	◈	◈	◈	◆	◈	✗	✗	✗	✗	✗	✗	✗	✗
9	MCM-TRA-1	Enhanced staff training program	◈	◈	◈	◆	◈	✗	✗	✗	✗	✗	✗	✗	✗
		Illicit Discharge Detection/Elimination													
10	MCM-ICID-1	Enhanced IC/ID enforcement and written procedures	◈	◈	◈	◈	◈	✗	✗	✗	✗	✗	✗	✗	✗
11	NSWD-1	Outfall screening and source investigations	◈	◈	◈	◈	◆	✗	✗	✗	✗	✗	✗	✗	✗
12	MCM-TRA-1	Enhanced staff/contractor training	◈	◈	◈	◈	◈	✗	✗	✗	✗	✗	✗	✗	✗
		Dry weather runoff reduction													
13	NSWD-1	Outfall screening and source investigations	◈	◈	◈	◈	◆	✗	✗	✗	✗	✗	✗	✗	✗
14	NSWD-2	Enhanced conditions for NSWDs, including irrigation reduction	◆	◆	◆	◆	◆	✗	✗	✗	✗	✗	✗	✗	✗
		Public Information and Participation													
15	MCM-PIP-1	Stormwater resources on City website	◈	◈	◈	◈	◈	✗	✗	✗	✗	✗	✗	✗	✗

#	WCM Category/ID	WCM	BMP effectiveness with respect to WQPs					Agency							
			Category I	Category II	Category III	Sediment reduction	Volume or flow reduction	Bellflower	Cerritos	Downey	Flood Control	Lakewood	Long Beach	Paramount	Signal Hill
		Public Agency Activities													
16	MCM-PAA-1	Enhanced BMP requirements for fixed facility/field activities	◈	◈	◈	◈	◈	✗	✗	✗	✗	✗	✗	✗	✗
17	MCM-PAA-2	Reprioritization of catch basins and clean-out frequencies	◆	◈	◈	◆	◇	✗	✗	✗	✗	✗	✗	✗	✗
18	MCM-PAA-3	Integrated Pest Management Program	◈	◈	◈	◇	◇	✗	✗	✗	✗	✗	✗	✗	✗
19	MCM-PAA-4	Enhanced measures to control infiltration from sanitary sewers	◇	◆	◆	◇	◇	✗	✗	✗	✗	✗	✗	✗	✗
20	MCM-PAA-5	Inspection and maintenance of Permittee owned treatment controls	◈	◈	◈	◈	◈	✗	✗	✗	✗	✗	✗	✗	✗
21	MCM-TRA-1	Enhanced inspector/staff training	◈	◈	◈	◈	◈	✗	✗	✗	✗	✗	✗	✗	✗

✗ – To be implemented by agency within current MS4 Permit term. MCM – Minimum Control Measure. NSWD – Non-stormwater discharge measure.

◆ Primary pollutant reduction ◈ Secondary pollutant reduction ◇ Pollutant not addressed

BMP effectiveness ratings based on similar BMPs listed in Tetra Tech's CLRP for Chollas Creek Watershed in San Diego County, 2012.

Enhanced Staff/Contractor Training Programs

MCM-TRA-1

MS4 Permit §VI.D.7.d.iv.(b), §VI.D.8.l, §VI.D.9.k, §VI.D.10.f

Measures introduced:

- Prescriptive staff training requirements to the Development Construction, Illicit Connections and Illicit Discharges Elimination and Public Agency Activities Programs. For example, relevant staff involved with the Construction Program must be knowledgeable in procedures consistent with the State Water Board sponsored Qualified SWPPP Practitioner/Developer (QSP/QSD) program.
- Inspections of structural BMPs under the Planning and Land Development Program must be conducted by trained personnel.
- Outside contractors are bound to the same training standards as in-house staff

These new and enhanced provisions will increase the overall effectiveness of the Jurisdictional Stormwater Management Programs (JSWMPs).

Amend Development Regulations to Facilitate LID Implementation

MCM-PLD-1

MS4 Permit §VI.C.4.c.i, §VI.D.7.d.i

The participating agencies have developed and adopted LID ordinances and Green Street Policies. These measures will facilitate LID implementation.

Post-Construction BMP Tracking, Inspections, and Enforcement

MCM-PLD-2

MS4 Permit: §VI.D.7.d.iv

The Cities must track post-construction BMPs, conduct BMP verification and maintenance inspections and follow the Progressive Enforcement Policy in cases of non-compliance. This will improve the effectiveness of the Planning and Land Development program.

Increase in Facility Types Inspected and Number of Inspections Conducted

MCM-IFC-1

MS4 Permit: §VI.D.6.d, §VI.D.6.e, also affected by NPDES No. CAS000001, the State Water Resources Control Board's (SWRCB) Industrial General Permit (IGP)

Measures introduced:

- Inspect nurseries and nursery centers
- Perform follow-up *No Exposure Verification* inspections for at least 25% of industries that have filed a *No Exposure Certification (NEC)*
- Inspect light industrial facilities. Under the SWRCB's IGP adopted on April 1, 2014, light industries previously excluded from coverage under the IGP must now obtain coverage. Light industry is defined as SICs 20, 21, 22, 23, 2434, 25, 265, 267, 27, 283, 285, 30, 31 (except 311), 323, 34 (except 3441), 35, 36, 37 (except 373), 38, 39 and 4221-4225. This includes facilities ubiquitous in industrial zones such as warehouses and machine shops. Although many of these

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facilities will likely qualify for the NEC, the type and number of facilities requiring inspection under the MS4 Permit will still increase.

These new and enhanced measures will increase the effectiveness of the Industrial/Commercial Facilities Program.

Business Assistance Program and BMP Notification MCM-IFC-2

MS4 Permit: §VI.D.6.c

Measures introduced:

- Notify industrial/commercial owner/operators of applicable BMP requirements.
- Implement a Business Assistance Program to provide technical information to businesses to facilitate their efforts to reduce the discharge of pollutants in stormwater. The business assistance program described in the prior LA MS4 Permit was an optional provision.

These new and enhanced measures will increase the effectiveness of the Industrial/Commercial Facilities Program.

Prioritize Facilities/Inspections Based on Water Quality Priorities MCM-IFC-3 (TCM-ICF-1)

MS4 Permit: Modified MCM (replaces §VI.D.6.d, §VI.D.6.e)

A program has been developed to prioritize industrial/commercial facilities based on their potential to adversely impact WQPs. The resulting prioritization scheme determines the inspection frequency, replacing the uniform inspection frequency provided in the MS4 Permit. This allows Cities to concentrate efforts on WQPs. Sections VI.D.6.d and VI.D.6.e of the MS4 Permit will be replaced with the language presented in Table 4-4 below.

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Table 4-4

Replaces §VI.D.6.d and §VI.D.6.e of the MS4 Permit

VI.D.6.d Prioritize Critical Industrial/Commercial Sources

VI.D.6.d.i Prioritization Method

Prioritizing facilities by potential water quality impact provides an opportunity to optimize the effectiveness of the Industrial/Commercial Facilities Program and to focus efforts on water quality priorities. The inventory fields in Part VI.D.6.b.ii provide information that allows for such a facility prioritization. Based on these fields, Figure ICF-1 establishes a method for each City to prioritize all industrial/commercial facilities into three tiers – High, Medium and Low. A City may follow an alternative prioritization method provided it is based on water quality impact and results in a similar three-tiered scheme.

Prioritization factors

Factor	Description
A	Status of exposure of materials and industrial/commercial activities to stormwater
B	Identification of whether the facility is tributary to a waterbody segment with impairments[1] for pollutants that are also generated by the facility
C	Other factors determined by the City, such as size of facility, presence of exposed soil or history of stormwater violations

Utilizing these factors, follow steps 1, 2 and 3 below:

1. Collect necessary information to evaluate factors

Factor	Initial method	Subsequent method
A	Satellite imagery	Results of stormwater inspection
B	Cross reference Table A-ICF-1 with tributary TMDL/ 303(d) pollutants	Cross reference inspection results with tributary TMDL/ 303(d) pollutants
C	Varies	

2. Evaluate factors

Factor	Result	Score
	Low or no exposure	0
A	Moderate exposure	½
	Significant exposure	1
B	No*	0
	Yes**	1
	Low	0
C	Medium	½
	High	1

3. Prioritize facilities

		C Score		
		0	**½**	**1**
A×B Score	**0**	Low	Medium	High
	½	Medium	High	High
	1	High	High	High

This method serves only as a guide to prioritization. The City may also prioritize facilities based on a qualitative assessment of factors A, B and C.

* No pollutant generation/impairment matches.

** ≥ 1 pollutant generation/impairment matches.

Figure ICF-1: Industrial/Commercial Facility Prioritization Scheme

Step 3 in Figure ICF-1 may also be expressed by the relationships A·B + C ≥ 1 → High, 1 > A·B + C > 0 → Medium and A·B + C = 0 → Low. The purpose of multiplying A and B is to scale the impact of the presence of the pollutants at a facility (B) by the likelihood that they will be discharged to the MS4 (A). Factor C quantifies water quality concerns

[1] CWA §303(d) listed or subject to a TMDL

Table 4-4

Replaces §VI.D.6.d and §VI.D.6.e of the MS4 Permit

that are independent of A or B and as such is incorporated through addition. The purpose of this numerical approach is to provide consistency to the prioritization process. It is intended solely as a guide. The City may also prioritize facilities based on a qualitative assessment of factors A, B and C as listed in Figure ICF-1.

VI.D.6.d.i.(1) Prioritization Condition

The following condition will be met during the prioritization process: ***The total number of low priority facilities is less than or equal to 3 times the number of high priority facilities***. This condition is applied to maintain a minimum inspection frequency as explained in Section VI.D.6.e.i.

VI.D.6.d.i.(2) Prioritization Frequency

The default priority for a facility is Medium. Facilities will be reprioritized as necessary following the results of routine inspections. The City may also use any readily available information that clarifies potential water quality impacts (e.g., satellite imagery) in order to prioritize a facility before the initial inspection. Reprioritization may also be conducted at any time as new water quality-based information on a facility becomes available. During reprioritization, the ratio of low priority to high priority facilities will remain at 3:1 or lower. Figure ICF-2 is a flowchart of the prioritization process.

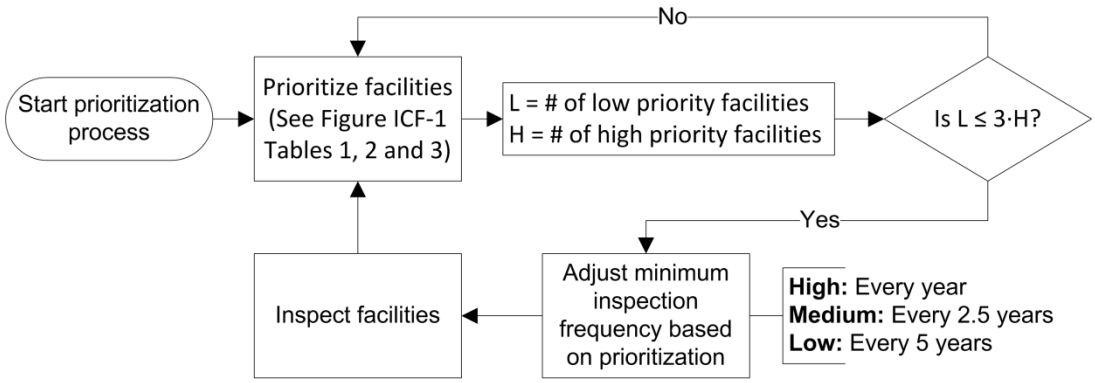

Figure ICF-2

VI.D.6.e Inspect Critical Industrial/Commercial Sources

VI.D.6.e.i Frequency of Industrial/Commercial Inspections

Following the facility prioritization method in Part VI.D.6.d.i, each City will inspect high priority facilities annually, medium priority facilities semi-quinquennially (once every 2.5 years) and low priority facilities quinquennially (once every five years). The frequencies may be altered by the exclusions defined in Part VI.D.6.e.i.(1). The condition in Part VI.D.6.d.i.(1) ensures at least the same average number of inspections conducted per year as the semi-quinquennial frequency defined in the MS4 Permit.

Each City will conduct the first compliance inspection for all industrial/commercial facilities within one year of the approval of the WMP. A minimum interval of 6 months between the first and the second mandatory compliance inspection is required.

VI.D.6.e.i.(1) Exclusions to the Frequency of Industrial Inspections

VI.D.6.e.i.(1).(a) Exclusion of Facilities Previously Inspected by the Regional Water Board

Each City will review the State Water Board's Stormwater Multiple Application and Report Tracking System (SMARTS) database at defined intervals to determine if an industrial facility has recently been inspected by the Regional Water Board. The first interval will occur approximately 2 years after the effective date of the Order. The

Table 4-4

Replaces §VI.D.6.d and §VI.D.6.e of the MS4 Permit
City does not need to inspect the facility if it is determined that the Regional Water Board conducted an inspection of the facility within the prior 24-month period. The second interval will occur approximately 4 years after the effective date of the Order. Likewise, the City does not need to inspect the facility if it is determined that the Regional Water Board conducted an inspection of the facility within the prior 24-month period. **VI.D.6.e.i.(1).(b) No Exposure Verification** As a component of the first mandatory inspection, each City will identify those facilities that have filed a No Exposure Certification with the State Water Board. Approximately 3 to 4 years after the effective date of the Order, each City will evaluate its inventory of industrial facilities and perform a second mandatory compliance inspection at a minimum of 25% of the facilities identified to have filed a No Exposure Certification. The purpose of this inspection is to verify the continuity of the no exposure status. **VI.D.6.e.ii Scope of Industrial/Commercial Inspections** **VI.D.6.e.ii.(1) Scope of Commercial Inspections** Each City will inspect all commercial facilities to confirm that stormwater and non-stormwater BMPs are being effectively implemented in compliance with municipal ordinances. At each facility, inspectors will verify that the operator is implementing effective source control BMPs for each corresponding activity. Each City will require implementation of additional BMPs where stormwater from the MS4 discharges to a significant ecological area (SEA), a waterbody subject to TMDL provisions in Part VI.E, or a CWA §303(d) listed impaired water body. Likewise, for those BMPs that are not adequately protective of water quality standards, a City may require additional site-specific controls. **VI.D.6.e.ii.(2) Scope of Industrial Inspections** Each City will confirm that each industrial facility: a) Has a current Waste Discharge Identification (WDID) number for coverage under the Industrial General Permit, and that a Stormwater Pollution Prevention Plan (SWPPP) is available on-site; or b) Has applied for, and has received a current No Exposure Certification for facilities subject to this requirement; c) Is effectively implementing BMPs in compliance with municipal ordinances. Facilities must implement the source control BMPs identified in Table 10, unless the pollutant generating activity does not occur. The Cities will require implementation of additional BMPs where stormwater from the MS4 discharges to a waterbody subject to TMDL Provisions in Part VI.E, or a CWA §303(d) listed impaired water body. Likewise, if the specified BMPs are not adequately protective of water quality standards, a City may require additional site-specific controls. For critical sources that discharge to MS4s that discharge to SEAs, each City will require operators to implement additional pollutant-specific controls to reduce pollutants in stormwater runoff that are causing or contributing to exceedances of water quality standards. d) Applicable industrial facilities identified as not having either a current WDID or No Exposure Certification will be notified that they must obtain coverage under the Industrial General Permit and will be referred to the Regional Water Board per the Progressive Enforcement Policy procedures identified in Part VI.D.2.

Enhanced Plan Review Program

MCM-DC-1

MS4 Permit: §VI.D.8.h, §VI.D.8.i

In general the MS4 Permit introduces provisions that conform to the SWRCB's Construction General Permit. For construction sites one acre or greater, measures include the following:

- Construction activity operators must submit Erosion and Sediment Control Plans (ESCPs) prior to grading permit issuance, developed and certified by a QSD to SWPPP standards.
- Operators must propose minimum BMPs that meet technical standards. The cities must provide these standards.
- Develop procedures and checklists to review and approve relevant construction plans.

These new and enhanced measures will increase the effectiveness of the Development Construction Program, which in turn is expected to reduce TSS loading into the MS4. TSS reduction is an integral component in addressing WQPs.

Enhanced Inspection Standards/BMP Requirements at Construction Sites MCM-DC-2

MS4 Permit: §VI.D.8.d, §VI.D.8.i, §VI.D.8.j

Measures introduced:

- Ensure BMPs from the ESCPs are properly installed and maintained.
- Ensure the minimum BMPs for sites less than one acre are installed and maintained.
- Develop and implement standard operating procedures for City stormwater inspections of construction sites.
- Require activity-specific BMPs for paving projects.

These new and enhanced measures will increase the effectiveness of the Development Construction Program, which in turn is expected to reduce TSS loading into the MS4. TSS reduction is an integral component in addressing WQPs.

Increased Inspection Frequencies MCM-DC-3

MS4 Permit: §VI.D.8.j

The inspection frequency for construction sites one acre or more has significantly increased. The prior LA MS4 Permit required a minimum of one inspection during the rainy season. The current MS4 Permit requires monthly inspections year-round, as well as mandatory inspections based on the phase of construction. This enhanced measure will increase the effectiveness of the Development Construction Program, which in turn is expected to reduce TSS loading into the MS4. TSS reduction is an integral component in addressing WQPs.

Enhanced IC/ID Enforcement and Written Program Procedures MCM-ICID-1

MS4 Permit: §VI.D.2, §VI.D.10

Measures introduced:

- Develop and implement a Progressive Enforcement Policy that applies to the IC/ID Elimination, Development Construction, Planning and Land Development and Industrial/Commercial Facilities Programs. The Progressive Enforcement Policy is an augmentation of the policy listed

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in the prior LA MS4 Permit, which was restricted to the Industrial/Commercial Facilities Program.

- Maintain written procedures for receiving complaints, conducting investigations and responding to spills.

These new and enhanced measures will increase the effectiveness of the IC/ID Elimination program, as well as the related enforcement components of the Development Construction, Planning and Land Development and Industrial/Commercial Facilities Programs.

Stormwater Resources on City Website MCM-PIP-1

MS4 Permit: §VI.D.5.d.i.(4)

Measures introduced:

- The MS4 Permit introduces a requirement to maintain a stormwater webpage or provide links to stormwater websites via the City's website. The website (in-house or linked) will include:
  - Educational material and
  - Opportunities for the public to participate in stormwater pollution prevention and clean-up activities.

Enhanced BMP Requirements for Fixed Facility/Field Activities MCM-PAA-1

MS4 Permit: §VI.D.9.e

Measures introduced:

- Implement effective source control BMPs for 65 specific pollutant-generating activities such as mudjacking, shoulder grading and spall repair.
- Contractually require hired contractors to implement and maintain the activity specific BMPs. Conduct oversight of contractor activities to ensure the BMPs are implemented and maintained.

These new and enhanced measures will increase the effectiveness of the Public Agency Activities program.

Reprioritization of Catch Basins and Clean-Out Frequencies MCM-PAA-2

MS4 Permit: §VI.D.9.h.iii

In areas not subject to a trash TMDL, measures introduced include the following:

- Determine priority areas and update the map of catch basins with GPS coordinates and priority.
- Include the rationale or data to support the priority designations.

These new and enhanced measures will increase the effectiveness of the Public Agency Activities program.

Integrated Pest Management Program MCM-PAA-3

MS4 Permit: §VI.D.9.g

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The MS4 Permit introduces entirely new, prescriptive requirements to implement an Integrated Pest Management (IPM) Program for public agency activities and at public facilities. These requirements include adopting and verifiably implementing policies, procedures and/or ordinances that support the IPM program. Intertwined with the IPM provisions are additional requirements to control and minimize the use of fertilizers. These new and expansive measures will increase the effectiveness of the Public Agency Activities program and address WQPs.

Enhanced Measures to Control Infiltration from Sanitary Sewers MCM-PAA-4

MS4 Permit: §VI.D.9.ix

The MS4 Permit introduces specific requirements to control infiltration from the sanitary sewer into the MS4. The measures include adequate plan checking, preventative maintenance, spill response, enforcement, interagency coordination and staff/contractor education. The requirements may be fulfilled through implementation of a Sewer System Management Plan in accordance with the Statewide General Waste Discharge Requirements for Sanitary Sewer Systems.

Inspection and Maintenance of Permittee-Owned Treatment Controls MCM-PAA-5

MS4 Permit: §VI.D.9.x

The MS4 Permit introduces requirements to implement an inspection and maintenance program for all Permittee owned treatment control BMPs, including post-construction treatment control BMPs. This measure will increase the effectiveness of the Public Agency Activities program.

4.4 Non-Stormwater Discharge Control Measures

4.4.1 Non-Structural Control Measures

Section 3.3 discusses the Watershed's overall runoff reduction strategy. The principal non-stormwater control measure being implemented in the Watershed is water conservation. Many of the municipal water conservation programs within the Watershed were stimulated by the approval of AB 1881, the Water Conservation in Landscaping Act, in 2006. The current drought has provided additional incentive to conserve water. The results of water conservation programs within the watershed are now seen in dry-weather monitoring at the Stearns Street monitoring site above the discharge point from the freshwater channel into the Estuary at Atherton Street in Long Beach. The average dry-weather flow at Stearns Street was estimated in the Metals TMDLs to be 2.35 cfs based on sampling during the 2001-2009 time frame. Current data indicates that average dry-weather flows are less than 0.5 cfs.

The second non-structural measure implemented within the Watershed is improved irrigation practices to reduce the amount of water used and the discharge of excess water to the storm drain system. Continued improvements by municipalities and education of residents and businesses should further reduce non-stormwater discharges.

In addition, the Industrial/Commercial Facilities Inspection Program and the Construction Site Inspection Program will be used to reduce non-stormwater discharges.

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4.4.2 Structural Control Measures

Physically modifying irrigation systems to substitute sub-surface irrigation for surface irrigation and realigning spray leads to prevent overspray onto sidewalks and streets will be implemented over time at public facilities, as funding becomes available. In addition, residents and businesses will be encouraged to make similar improvements to further reduce non-stormwater discharges.

4.5 TMDL Control Measures

4.5.1 Non-Structural Control Measures

Since the only TMDLs currently applicable to the Los Cerritos Channel are the Metals TMDLs established by USEPA and the Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters Toxic Pollutants TMDL adopted by the Regional Water Board, the TMDL non-structural control measures implemented in and for the Watershed will relate to metals and legacy organics. As noted in Section 3, these measures will emphasize source control and TSS reduction. The two metals requiring reductions according to the Los Cerritos Channel Metals TMDLs are copper and zinc. There is also a TMDL for lead. However, after review and replication of a translator study, EPA concluded that no further lead reductions are required. The majority of copper reduction is anticipated to come from implementation of SB 346, which requires the reduction in most brake pads sold in California to 5% copper in 2021 and 0.5% in 2025.

Another significant source of copper is copper-based algaecides. These are used frequently to treat swimming pools. If the phase-out of copper in brake pads does not bring the Watershed into compliance with copper waste load allocations, Permittees will use outreach programs to encourage residents to stop using copper-based algaecides. Also, additional local non-structural controls such as regulating copper roofs, cooper roof gutters, and downspouts may be needed. However, this may not be necessary because many of the friction material manufacturers are moving directly to no copper added brake pads by 2021. This possibility was analyzed as scenario one in the “Estimate of Urban Runoff Copper Reduction in Los Angeles County from Brake Pad Copper Reduction Mandated by SB 346.” In addition, the California Stormwater Quality Association recently released a Technical Memo entitled, “Brake Pad Copper Reduction – Metrics for Tracking Progress.” This memo describes recent progress in removal of copper from brake pads, and describes metrics that will be used to track future reductions. (See Attachment D.)

Reduction of zinc discharges to the receiving waters is also likely to involve non-structural measures. As discussed in Section 3 and above in Section 4.2.2, the Watershed Group is planning to work with others to use the Department of Toxic Substances Control’s Safer Consumer Product Regulations to reduce the zinc in tires, one of the greatest sources of zinc in the metropolitan area. The Permittees may also find it necessary to adopt ordinances to regulate local sources of zinc, including the widespread outdoor use of galvanized metal, another major source of zinc.

In addition, the Watershed Group is monitoring the research related to the potential of reducing lead in aviation gasoline, or Avgas, that is used in piston engine aircraft, primarily general aviation aircraft.

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USEPA has estimated that approximately 50% of lead in metropolitan atmospheric deposition comes from Avgas. A reduction of lead in Avgas could result in a further reduction of lead in the Los Cerritos Channel Watershed because the City of Long Beach is home to many general aviation aircraft.

Implementation of the TSS reduction strategy discussed in Section 3.0 will involve both non-structural and structural measures. The non-structural measures are likely to be ordinances that require landscaping, erosion control, and sediment control on vacant lots and other significant sources of exposed dirt. There will also likely be agreements developed between Cities and electrical utilities regarding erosion and sediment control in transmission line rights-of-way.

The proposed enhanced sweeping will use a combination of regenerative and vacuum sweepers. Major arterials, major intersections, median curbs, commercial, and industrial areas will be swept more frequently in the month preceding the rainy season. In addition, owners of private parking lots will initially be encouraged to enhance their sweeping programs. Ultimately, parking lot sweeping ordinances may be necessary to ensure that parking lots are swept sufficiently well to remove the fine metal particles resulting from atmospheric deposition and direct deposition from tire wear and braking, as well as other fine sediment particles. The need for future ordinances will be considered during the initial adaptive management process. Several Watershed Group members have already begun using regenerative and vacuum sweepers that are better able to capture fine particles (See Table 4-**5**, Street Sweeping Survey Table below.) The City of Long Beach continues to use broom sweepers, but has begun considering possible modifications to its street sweeping program. However, recent elections resulted in a new mayor and several new members of the City Council, and concluding the street sweeping review has been delayed. Any changes to the Long Beach street sweeping program will be addressed through the adaptive management process.

The RAA has assumed that non-structural control measures will result in a 10% pollutant reduction. The Watershed Group believes this is a conservative assumption. Implementation of SB 346 is projected to reduce copper pollution by over 60%. In addition, the Group has already seen a tremendous reduction in dry-weather runoff due primarily to non-structural control measures such as irrigation reduction requirements. Also, implementation of the TSS reduction strategy is expected to reduce TSS discharges to the Los Cerritos Channel by 20% by 2020. This will greatly reduce the sediment transport mechanism for metals, legacy organics, and bacteria, and thereby reduce pollutant loads. The Group also expects future reductions in zinc through the application of the Safer Consumer Product Regulations for tires and a reduction in zinc discharges through the coating of exposed zinc surfaces over time. Enhancement of street sweeping practices, such as median sweeping, intersection sweeping, and frequency of sweeping certain areas, are expected to further reduce copper, zinc, sediment, and trash. In addition, the plastic bag bans currently being implemented are anticipated to reduce plastics in the receiving waters. Industrial inspections will also reduce a number of pollutants.

As recognized by a footnote to Table K-7 and other tables in Attachment K of the Permit, the Participating Agencies have entered into an Amended Consent Decree with the United States and the State of California, including the Regional Board. The footnote specifically states: “The requirements of this Order to implement the obligations of [the Dominguez Channel and Greater Los Angeles and Long

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Beach Harbor Waters Toxic Pollutants TMDL] do not apply to a Permittee to the extent that it is determined that the Permittee has been released from that obligation pursuant to the Amended Consent Decree entered in *United States v. Montrose Chemical Corp.*, Case No. 90-3122 AAH (JRx)." The submission of this WMP and its associated CIMP and any action or implementation taken pursuant to it shall not constitute a waiver of any such release of obligations established by that Amended Consent Decree.

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Table 4-5: Los Cerritos Channel Street Sweeping Survey

City	Type of Sweeper	Frequency			Ordinance that restricts parking on a sweeping day	Does your city utilize any special procedures for sweeping major intersections? If yes, please describe those procedures.	Does your city have a program for municipal parking lot sweeping? If it does, please list the frequency/schedule	Does your city have requirements for private parking lots?
		Residential	Commercial	Industrial				
Bellflower	Vacuum	Weekly	Weekly	Weekly	Yes	Regular sweeping at intersections	Parking lots are swept once per week	No
Cerritos	Regenerative	Weekly	Weekly	Weekly	Yes	No	Yes. All City lots are swept once per week	No
Downey	Regenerative	Weekly	2x per week	Weekly	Yes	No	Yes – weekly in early morning	No
Lakewood	Regenerative	Weekly	Weekly	Weekly	Yes	Major intersections swept early morning before traffic	Yes-weekly	No
Long Beach	Broom Sweepers	Weekly	Weekly	Weekly	Yes	No	---	---
Paramount	Regenerative	Weekly	Weekly	Weekly	Yes	Major intersections are swept twice weekly	City owned lots of Parks and City facilities are swept once per week	No
Signal Hill	Regenerative	Weekly	Weekly	Weekly	Yes	All major intersections are swept	Upon request	Yes (see Municipal Code 12.16.060)

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4.5.2 Structural Control Measures

The initial structural measures to control TMDL pollutants are anticipated to be low flow diversions and water capture measures, including green streets, LID, and stormwater capture and infiltrate or use facilities that will also capture non-stormwater discharges. As noted in Section 3.5, the implementation of green streets and LID projects will generally be dependent on the initiation and completion of redevelopment projects and road construction projects in the largely built-out Watershed.

Permittees within the Watershed are currently looking for opportunities to construct green streets. One approach has been the incorporation of green street elements into proposed regional corridor projects. One example is the proposed Lakewood Boulevard Corridor Capacity Enhancement Project. The City of Lakewood is proposing a complete streets project on Lakewood Boulevard from Del Amo Boulevard at the southern City limits to the northern City limits just north of Ashworth Street. The City of Lakewood portion of the project is approximately 1.5 miles in length. This is the first phase of a regional corridor that may eventually extend from Long Beach through Bellflower and Downey to Pico Rivera. The primary focus of the project is to increase the capacity of Lakewood Boulevard through multimodal methods including enhancing transit capacity, and adding bike lanes and pedestrian walkways, as well as increasing intersection capacity through additional turn lanes and strengthening pavement to accommodate for the additional transit and automobile traffic. The Lakewood Public Works Department is working with its consultants to develop Lakewood Boulevard into a green complete street.

As part of the complete streets project, Lakewood Boulevard will include, to the "maximum extent practicable," infiltration stormwater treatment Best Management Practices (BMPs) in compliance with the Los Angeles County MS4 Permit and City of Lakewood Low Impact Development (LID) Ordinance and Green Streets Policy.

The project is in the conceptual stage, and it is being planned to provide approximately 200,000 square feet of stormwater treatment. Methods of treatment are anticipated to consist primarily of vegetated bio-swales, bio-infiltration basins, and infiltration trenches, with curb cuts to allow water to flow into the facilities. A meandering median swale to allow bio-infiltration as well as parkway bio-swales will be included throughout much of the project length. Other stormwater treatment BMPs, where feasible, may include rain gardens, porous pavement, and other LID treatment methods.

In addition to providing stormwater treatment BMPs, the project proposes to replace the existing irrigated turf with drought adaptive trees and shrubs to minimize water use. This planting will reduce irrigation, maintenance, and plant waste, which also provides the added benefits of reducing the project area's "carbon footprint." The irrigation system would be modified for low volume use and future recycled water when available.

The Gateway COG TAC, which guides the use of Gateway COG Measure R regional funds, has approved $2.6 million for preliminary design, environmental clearance, and final design. The TAC's approval will go to the METRO Board for final approval in May.

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Completion of major water capture and use projects, with infiltration when feasible, will be dependent on available funding. The Watershed Group has identified 13 first order (Highest Priority) sites for such projects in public parks and golf courses, plus eight second order sites in utility easements. These sites are listed in Tables 4-5 and 4-6 and shown in Figures 4-1 and 4-2. As noted in Section 3.5, the Watershed Group has identified the first six sites to be addressed and will be pursuing funding to complete initial designs for three of these sites in preparation for seeking grant funding. Assuming an average capacity of eight acre-feet (AF), the Watershed Group anticipated that the first 13 water capture and use projects could have a total stormwater capture capacity of 104 AF and the second eight could add another 64 AF of stormwater capture, if they can be constructed underground within the transmission line rights-of-way. The need for additional centralized water capture will be evaluated through the adaptive management process.

These first and second order major BMP sites are proposed to handle 168 acre-feet of the 204.5 acre-feet of potential regional BMP volume shown in Table 9-5 of the RAA. The Watershed Group has identified sufficient potential additional BMP sites at schools in the Watershed. However, these sites have not been included in the WMP at this time because negotiations with school districts have only just begun. The Group has also identified potential sites involving private property, but these sites may not be necessary. Further additional Regional BMP sites will be evaluated through the adaptive management process. In addition, the Group expects the regional capture volume to be reduced through implementation of source control measures.

The need for additional sites will be influenced by the effectiveness of non-structural control measures such as implementation of SB 346, the runoff reduction program, the TSS reduction program, and the implementation of green streets and other LID projects. If additional major underground water capture facilities are needed, they also will be located under parks, golf courses, utility easements, and schools to the extent feasible. Each adaptive management process cycle will provide additional specific information on the number, type, and location of structural and non-structural BMPs. Additional information on the anticipated timing of BMPs is found in Section 6.

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Table 4-6: Potential Los Cerritos Channel Watershed First Order Major BMP Sites

(Public Park and Golf Courses)

No.	Name	Latitude	Longitude	WMMS Sub-watershed	Sub-basin
1	Potential Progress Park BMP Site (Paramount)	33.892402°	-118.150910°	5523	SB 9
2	Potential Bike Trail @ Clark Ave BMP Site (Bellflower)	33.890138°	-118.133766°	5518	SB 8
3	Potential Sims Park BMP Site (Bellflower)	33.883770°	-118.133772°	5517	SB 8
4	Potential Mayfair Park BMP Site (Lakewood)	33.857028°	-118.132101°	5517	SB 10
5	Potential Caruthers Park BMP Site (Bellflower)	33.878452°	-118.111056°	5507	SB 10
6	Potential Heartwell Park Palo Verde Channel BMP Site (Long Beach)	33.830487°	-118.108951°	5505	SB 10
7	Potential Long Beach Junior Golf Course BMP Site (Long Beach)	33.830422°	-118.104780°	5505	SB 10
8	Potential Heartwell Park Clark Channel BMP Site (Long Beach)	33.830761°	-118.129573°	5514	SB 7
9	Potential Pan American Park BMP Site (Long Beach)	33.842283°	-118.131496°	5514	SB 7
10	Potential Skylinks Wardlow Channel BMP Site (Long Beach)	33.822990°	-118.135062°	5515	SB 6
11	Potential Wardlow Park BMP Site (Long Beach)	33.821295°	-118.129327°	5511	SB 5

12	Potential Skylinks LCC BMP Site (Long Beach)	33.812905°	-118.138772°	5509	SB 4
13	Potential Reservoir Park BMP Site (Signal Hill)	33.818430°	-118.174593°	5510	SB 4

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Table 4-7: Potential Los Cerritos Channel Watershed Second Order Major BMP Sites

(Transmission Rights-of-Way)

No.	Name	Latitude	Longitude	WMMS Sub-watershed	Sub-basin
1	Potential Transmission R-O-W BMP Site [East of Downey Avenue in Paramount]	33.899399°	-118.152599°	5524	SB 9
2	Potential Transmission R-O-W BMP Site [Dunbar/Mayne in Bellflower]	33.886455°	-118.147181°	5519	SB 8/9
3	Potential Transmission R-O-W BMP Site [South of Paramount on Downey Ave. in Bellflower]	33.879384°	-118.151030°	5523	SB 9
4	Potential Transmission R-O-W BMP Site [East of Clark Ave. in Lakewood]	33.868742°	-118.133477°	5517	SB 8
5	Potential Transmission R-O-W BMP Site [East of Lakewood Blvd. in Lakewood]	33.868338°	-118.141666°	5517	SB 8
6	Potential Transmission R-O-W BMP Site [West of Community Gardens in Lakewood]	33.854136°	-118.113120°	5507	SB 10
7	Potential Transmission R-O-W BMP Site [Candlewood East of Woodruff in Lakewood]	33.852845°	-118.114556°	5506	SB 10
8	Potential Transmission R-O-W [West of Palo Verde Channel in Lakewood]	33.849443°	-118.109604°	5506	SB 10

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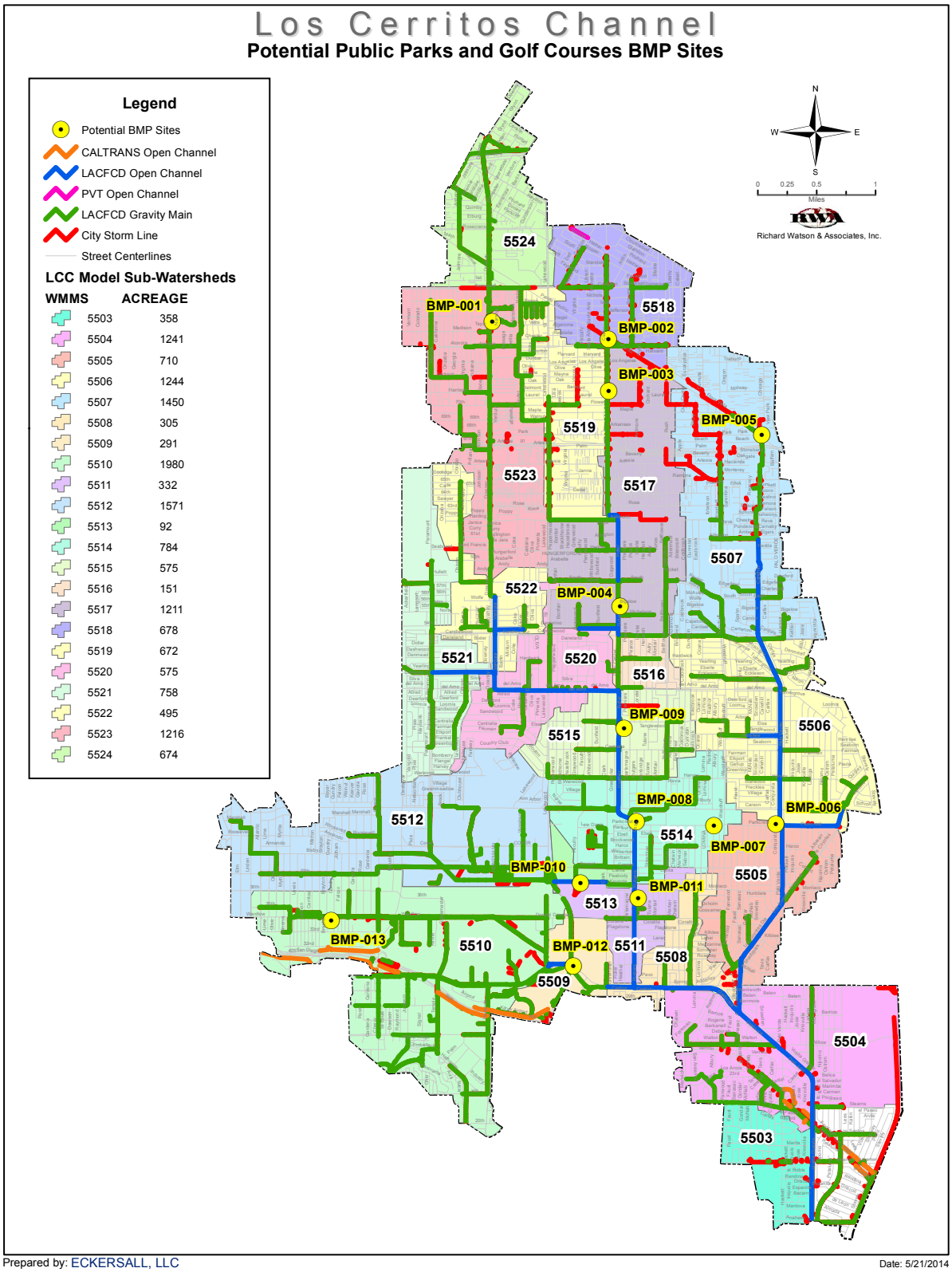

Figure 4-1: LCC Potential Public Parks and Golf Course BMP Sites

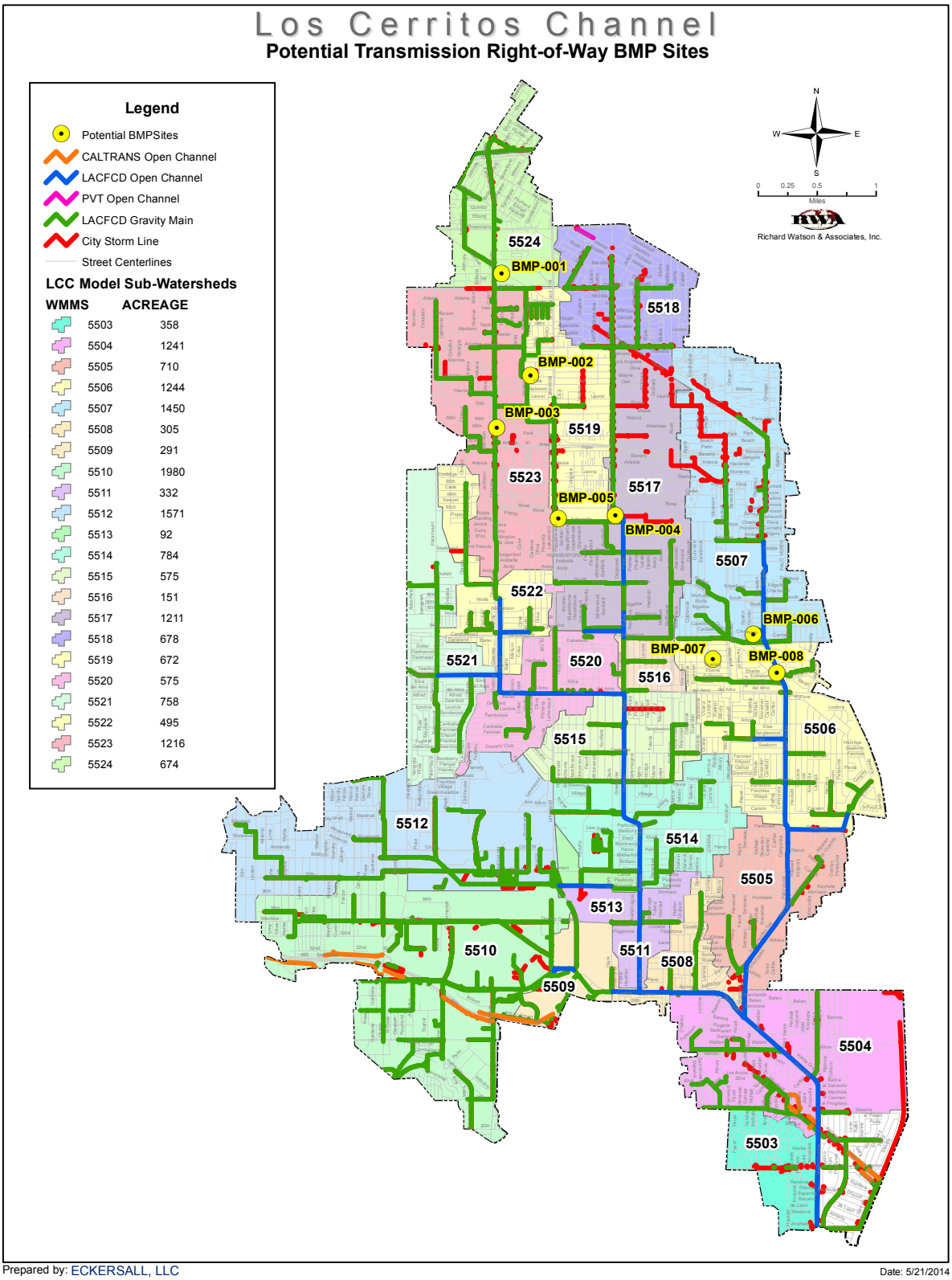

Figure 4-2: LCC Potential Transmission ROW BMP Sites

4.6 Non-TMDL Impaired Waters Control Measures

4.6.1 Non-Structural Control Measures

The non-structural control measures implemented to address non-TMDL impaired waters will focus on implementation of minimum control measures, particularly commercial/industrial inspections, construction inspections, business outreach, and residential outreach. In addition, the Watershed Group will monitor and support, where appropriate, extended producer responsibility and packaging reductions proposed by the California Product Stewardship Council. Future bacteria control measures will be evaluated through the adaptive management process.

4.6.2 Structural Control Measures

The primary structural measures to control trash will be installation of full capture devices in priority land use areas pursuant to the State Water Board trash amendments when they are adopted. The Watershed Group proposes to work with the Regional Water Board regarding the requirements in Order Part VI.D.9.h.vii(1) related to installation of trash excluders in light of the proposed trash amendments. Future bacteria control measures will be enacted through the adaptive management process.

4.7 Control Measures for Non-Impairment Pollutants

4.7.1 Non-Structural Control Measures

The non-structural control measures to be implemented to control non-impairment pollutants consist primarily of TSS reduction and the full range of minimum control measures, especially the inspection and outreach measures. The Watershed Group will also emphasize true source control and operational source control to reduce the release of potential pollutants. The Group will also monitor and support, when appropriate, extended producer responsibility, including take-back measures that will reduce the probability of pollutant releases.

4.7.2 Structural Control Measures

The Watershed Group is not proposing any special structural control measures to address non-impairment pollutants. Rather, it will depend on LID, green streets, stormwater capture, and other structural measures implemented to address TMDL and non-TMDL requirements to also help control non-impairment pollutants indicated by monitoring results.

4.8 Control Measures To Be Implemented at the Watershed and Sub-Watershed Levels

4.8.1 Non-Structural Control Measures

The non-structural control measures being implemented at the Watershed and sub-watershed scales involve the development of model ordinances, support for true source control and operational source

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control measures, coordination of business outreach and residential outreach, and preliminary design of proto-type water-capture facilities.

4.8.2 Structural Control Measures

Structural measures to be implemented at the Watershed and sub-watershed scales will likely include water capture devices. These will likely be sub-watershed projects developed pursuant to specific MOUs between the benefitting agencies. If a regional or sub-regional stormwater fee is established, construction of Watershed and/or subwatershed projects will become much more feasible. However, Memoranda of Understanding would be required to determine the allocation of benefits and agreement on funding.

4.9 Control Measures To Be Implemented at the Jurisdictional Level

4.9.1 Non-Structural Control Measures

Individual jurisdictions within the Watershed will be responsible for implementation of minimum control measures. They will also be responsible for model ordinances and adopting appropriate targeted implementation ordinances, such as ordinances to implement the TSS Reduction Strategy. In addition, they will be asked to support source control measures such as extended producer responsibility, when appropriate, and to comment on proposed legislation and/or regulations.

4.9.2 Structural Control Measures

Individual jurisdictions will be responsible for installation and maintenance of green streets and LID measures. They may also construct water capture and water treatment facilities when grants are available or sustainable stormwater fee measures have been implemented.

4.10 Overview of Implementation Responsibilities

The Watershed Management Program has been designed to emphasize multi-jurisdictional watershed cooperation to the extent feasible. Individual jurisdictions are responsible for implementation of minimum control measures and enhanced street sweeping, as well as the implementation of green street policies and LID ordinances. Jurisdictions discharging to planned major water capture facilities will be responsible for design and construction of the water capture facilities pursuant to agreements to be developed prior to initiating design and construction. Jurisdictional responsibilities for design of the initial major water capture facilities are shown in Tables 6-5, 6-7, 6-9, and 6-11, and jurisdictional responsibilities by sub-basin are shown in Table 6-12.

The LACFCD will work with the Watershed group in its efforts to address source controls; assess, develop, and pursue funding for structural BMPs, and promote the use of water reuse and infiltration. As regional project scopes are further refined, the LACFCD will contribute to the WMP projects on a case-by-case basis, agreed upon with the Watershed Group.

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5.0 Compliance with Receiving Water Limitations

This section explains how the Watershed Group believes it will come into compliance with receiving water limitations. Additional information on how compliance can be achieved through stormwater capture is contained in the Reasonable Assurance Analysis (RAA) prepared for the Lower Los Angeles River, the Los Cerritos Channel, and the Lower San Gabriel River Watersheds. This RAA is described in Section 8 and found in Attachment A.

5.1 Compliance with Receiving Water Limitations Addressed by a TMDL

5.1.1 Copper

The Los Cerritos Channel TMDL for copper contains interim compliance dates of September 30, 2017, September 30, 2020, and September 30, 2023, as well as a final compliance date of September 30, 2026, for both dry weather and wet weather. Current monitoring indicates that the Watershed has already achieved compliance with water quality standards for copper during dry weather, most likely due to the recent large reduction in average dry-weather flows from 2.35 cfs to less than 0.5 cfs at Stearns Street.

The wet-weather compliance date for 2017 requires that 10% of the total drainage area served by the storm drain system effectively meets the wet-weather WLAs. The RAA prepared by Tetra Tech with the assistance of Paradigm Environmental indicates that the Watershed will meet the 2017 interim milestone through implementation of non-structural control measures, including the targeted total suspended solids (TSS) reduction program. The Watershed Group will demonstrate this reduction either by a 10% reduction in loadings as measured at the Stearns Street monitoring site or by monitoring results demonstrating that a sub-basin containing 10% or more of the drainage area served by the storm drain system meets the wet weather WLAs for copper. For September 30, 2020, during the next 5-year permit cycle, the requirement is that 35% of the total drainage area served by the storm drain system effectively meet the wet-weather WLAs. The Watershed Group expects this to be met by the cumulative impacts of implementation of SB 346, implementation of the TSS reduction strategy, implementation of green streets policies and LID ordinances, and implementation of stormwater capture and infiltrate and/or use projects, enhanced street-sweeping, and continued implementation of minimum control measures. These same measures will result in compliance with the 2023 interim milestone and the 2026 final compliance requirements.

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5.2 Compliance with Receiving Water Limitations Not Otherwise Addressed by a TMDL

5.2.1 Impairment Pollutants in the Same Class as Those Addressed in a TMDL

Although coliform bacteria and enterococcus are weakly associated with sediment, the Watershed Group has concluded that none of the Category 2 or Category 3 pollutants are in the same class as those pollutants addressed by a TMDL.

5.2.2 Impairment Pollutants Not in the Same Class as Those Addressed in a TMDL

This WMP addresses five impairment pollutants not in the same class as those addressed in a TMDL. These are the Category 2 pollutants ammonia, bis(2-ethylhexyl)phthalate (DEHP), coliform bacteria, trash, and pH. Ammonia is proposed for delisting, and the Watershed Group does not propose to address it at this time. (See Section 2 for more details.)

Bis(2-ethylhexyl)phthalate is a plasticizer associated with plastic trash so it will be addressed with trash. The Watershed Group proposes to address trash through the process outlined in the State Water Board's proposed trash amendments to the California Ocean Plan and the Inland Surface Waters, Enclosed Bays, and Estuaries Plan. Once the State Water Board adopts these amendments, this WMP will be amended through the adaptive management process to specify in more detail how the Watershed will meet trash and DEHP water quality standards.

The Proposed *Final Staff Report for the Amendments to the Water Quality Control Plan for the Ocean Waters of California to Control Trash* and *Part 1 Trash Provisions of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California* will apply to all surface waters of the State and specify a time schedule of 10 years from the first implementing permit, but no later than 15 years from the effective date of the Trash Amendments. Because trash will be addressed in accordance with the Trash Amendments, the Watershed Group believes that its proposed 10-year schedule to meet trash and DEHP water quality standards is as soon as the standards can realistically be met.

The 303(d) list includes coliform bacteria (now *E. coli*), which will be partially addressed by runoff reduction and stormwater capture. It will also be addressed by ongoing implementation of several of the minimum control measures. In order to address coliform bacteria (*E. coli*) as soon as possible, the Watershed Group plans to first address dry-weather bacteria. The Group plans to do this through further reductions in dry-weather flows through implementation of LID ordinances and green streets policies and through dry-weather diversion to sanitary sewers or to infiltration or bioretention facilities. Further reductions in dry-weather flows (now averaging less than 0.5 cfs at Stearns Street) will reduce dry-weather bacteria exceedances and possibly

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eliminate them in 10 years. This is as soon as realistically possible to eliminate dry weather flows. Eliminating bacteria exceedance during dry weather would bring the channel into compliance with *E.* coli standards for approximately 90% of the year. The Watershed Group proposes to address bacteria more directly during the second and third adaptive management reviews after members have had a chance to review the effectiveness of runoff reduction and ongoing implementation of minimum control measures on *E. coli* counts in the receiving waters. The Group will then evaluate the potential need for alternative measures. The only way the Permittees currently know to reduce wet-weather bacteria exceedances is to obtain a high-flow suspension and to capture stormwater. Twenty to twenty-five years will be needed to design, fund, and build enough capacity to significantly reduce wet-weather bacteria exceedances. Therefore, the Watershed Group believes that 2040 is as soon as wet-weather bacteria standards can be realistically met.

The Permittees do not propose addressing ammonia and pH in the watershed through control measures. Rather, as noted in Section 2, they believe there is sufficient documentation to delist them. The last impairment is a condition – not a pollutant. It is a pH exceedance associated with shallow water flowing over a concrete surface and sunshine. It is a natural dry-weather condition. The Watershed Group proposes to work with Regional Water Board staff on a way to delist pH since it is a natural condition – not a pollutant. The LCC Watershed Group will monitor ammonia and pH as part of its Coordinated Integrated Monitoring Program, and will re-evaluate ammonia as part of the adaptive management evaluation, the first of which will be conducted no later than April 28, 2017, with follow-up evaluations every two years thereafter.

5.2.3 Non-Impairment Pollutants

The only Category 3 pollutants included in this WMP are MBAS and enterococcus. Enterococcus is not a freshwater problem. It is included in the WMP because the principal monitoring site for the Watershed (Stearns Street) is located just upstream of the saline Los Cerritos Channel Estuary. It will be addressed in the same manner as *E. coli* is addressed.

The Watershed Group believes that it may be able to come into compliance with MBAS standards sooner because of the limited number of exceedances and the low level of the exceedances (see Table 2-12). The member cities will use the inspection process to educate maintenance organizations and individuals about not letting detergents and other cleaning products enter the storm drain. The Group is going to target eliminating MBAS exceedances by 2020. The Group believes that it should be possible to change the behavior of the target audience in five years. If the data do not demonstrate success by the time of the second adaptive management review, the Group will implement other measures. Table 2-12 continues to show a final wet weather compliance date of 2025 in case education and inspection measures are not sufficient to achieve compliance with water quality standards.

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5.3 Total Suspended Solids Reduction Quantification

Although expected pollutant reductions resulting from the TSS reduction program are not modeled empirically within WMMS, a rudimentary quantification of the program's potential effectiveness may be calculated through the application of the Revised Universal Soil Loss Equation (RUSLE). The RUSLE is defined as

$$\boldsymbol{A = RKLS}$$

where

$\boldsymbol{A}$ = Spatially and temporally averaged soil loss per unit area per unit time. The result is expressed in the units elected for $\boldsymbol{K}$ and $\boldsymbol{R}$.

$\boldsymbol{R}$= Rainfall-runoff erosivity factor (per unit time, generally one year),

$\boldsymbol{K}$= Soil erodibility factor (mass per unit area – an area density – generally tons per acre),

$\boldsymbol{L}$= Slope length factor and

$\boldsymbol{S}$= Slope steepness factor.

Using local values of $\boldsymbol{R}$, $\boldsymbol{K}$ and $\boldsymbol{LS}$ obtained through maps available on the State Water Resources Control Board's website for the Construction General Permit[1],

$$\boldsymbol{R \approx 40\ year^{-1}}$$
$$\boldsymbol{K \approx 0.32\ \frac{tons}{acre}}$$ and
$$\boldsymbol{LS \approx 0.45}$$

giving

$$\boldsymbol{A = \left(40\ year^{-1}\right)\left(0.32\ \frac{tons}{acre}\right)0.45}$$
$$\boldsymbol{A = 5.76\ \frac{tons}{acre\ year}}.$$

Following the CGP Risk assessment procedures, 5.76 tons per acre year is within the "low sediment risk" designation.

During the cooperative preparation of the Lower San Gabriel River, Lower Los Angeles River and Los Cerritos Channel WMPs, several participating agencies provided estimates of exposed soil within their jurisdiction that were not related to construction activities. The City of Bellflower field-verified these estimates, which totaled approximately 18 acres or about 0.5% of the City. Following the calculated value for $\boldsymbol{A}$, this equates to approximately 100 tons of soil loss per year.The City of Signal Hill determined that 70.3 acres of the 531 acres within the city that drain

[1] http://www.waterboards.ca.gov/water_issues/programs/stormwater/constpermits.shtml

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to the Los Cerritos Channel consists of undeveloped vacant land (13%)—however this is an anomalous circumstance specific to the City. Applying the 70.3 acres to Signal Hill and extrapolating the 0.5% to the remaining area of the Los Cerritos Channel Watershed (17,179 acres), the soil loss tonnage is

$$\boldsymbol{M_{TSS} = fWA = (0.005 \cdot 17,179\ acres + 70.3\ acres)\left(5.76\ \frac{tons}{acre\ year}\right)}$$

$$\boldsymbol{M_{TSS} \approx 156\ \text{acres}\left(5.76\ \frac{tons}{acre\ year}\right)}$$

$$\boldsymbol{M_{TSS} \approx 900\ \frac{tons}{acre\ year}}$$

where

$\boldsymbol{M_{TSS}}$ = Estimated annual soil loss within the watershed in tons,
$\boldsymbol{f}$ = Estimated fraction of exposed soil (non-construction) within a given urbanized area and
$\boldsymbol{W}$ = Watershed area.

Historical monitoring results from the watershed suggest that approximately 1.8 grams of zinc adheres to every kilogram of TSS, so that the zinc discharge $\boldsymbol{M_{Zn}}$ associated with $\boldsymbol{M_{TSS}}$ is

$$\boldsymbol{M_{Zn} \approx \left(\frac{1.8}{1000}\right) M_{TSS}}$$
$$\boldsymbol{M_{Zn} \approx \left(\frac{1.8}{1000}\right)\left(900\ \frac{tons}{year}\right)\left(\frac{2000\ lbs}{1\ ton}\right)}$$
$$\boldsymbol{M_{Zn} \approx 3,200\ \frac{lbs}{year}\ or\ 1,450\ \frac{kg}{year}.}$$

The RAA predicts an annual zinc loading of 2,607 kg for the average storm year. Assuming that within the term of the MS4 Permits the TSS Reduction Strategy approaches an effectiveness goal of 10% (145 kg/year), this would equate to a load reduction of **5.5%**. Equivalently, an effectiveness of 20% corresponds to a load reduction of **11%** and an effectiveness of 30% corresponds to a reduction of **16.5%**. Reductions of this magnitude provide support for the 10% load reduction assumed for non-modeled controls. Further development of the TSS Reduction program is anticipated to meaningfully aid in the achievement of targeted load reductions.

5.4 Addressing Limiting Pollutants Drives Other Pollutant Reduction

The identification of limiting pollutants – *E. coli* in dry weather and zinc in wet weather – in sub-sections 5.3.1 and 5.3.2 of the Reasonable Assurance Analysis (RAA) was intended to identify the most challenging pollutants so that the Permittees could develop control measures to address these pollutants that would also address other pollutants. These control measures will especially

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address the category 2 and 3 pollutants – with the exception of ammonia and pH that are proposed for delisting (see Section 2).

All Category 2 and Category 3 pollutants will be addressed through the program described above to greatly reduce or eliminate dry-weather discharges in the channel system as soon as possible, perhaps within 10 years. Each reduction in dry-weather discharges will reduce the transport mechanism that carries trash, bacteria, and MBAS downstream. Furthermore, as the dry-weather discharges approach zero, the algal mat will be reduced and the diurnal cycling of pH reduced or eliminated. This, in turn, will reduce or eliminate ammonia exceedances.

The LID, green streets, and water capture facilities constructed to address zinc, the wet weather limiting pollutant, will also address other pollutants. LID and green street facilities will reduce the transport mechanism and capture trash and MBAS, as well as bacteria. The regional and sub-regional water capture facilities will involve pre-treatment that will capture trash and other suspended materials. The facilities will also capture dissolved material that will be filtered as the water infiltrates or be removed if the water is treated for surface irrigation.

In addition, trash and Bis(2-ethylhexyl) phthalate (DEHP), a plasticizer associated with and addressed with trash, are partially addressed through street sweeping, which, in addition to keeping sediment out of the storm drain system, also helps keep trash out of the storm drain system. Further, as explained above, DEHP and trash will also be addressed by implementation of the Proposed Trash Amendments that will apply to the Los Cerritos Channel and its tributaries. The Watershed Group believes that through this approach of activities and control measures it will achieve applicable receiving water limitations for Category 2 and Category 3 pollutants.

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6.0 Implementation Schedules

Formal implementation of the Los Cerritos Channel WMP will begin upon approval of the final program plan pursuant to Table 9 of Order No. R4-2012-0175. For planning purposes, the Watershed Group is projecting final plan approval by March or April of 2015. The schedule provides for commencing monitoring on July 1, 2015 as starting monitoring part way through a complete monitoring year or missing the first storms of the year would not be productive. The implementation schedule is strongly influenced by TMDL final wet-weather compliance dates and target dates for Category 2 and Category 3 pollutants, the Watershed Group's Water Quality Improvement Strategy, and the need to establish a stable and sustainable stormwater funding source in Los Angeles County to pay for the expensive stormwater capture and stormwater treatment facilities anticipated to be necessary to meet water quality standards in a timely manner.

At this time it is not possible to identify all projects and schedule their implementation. For instance, although the RAA identifies areas for green street construction and assumes a 30% conversion of road length in suitable areas, it will take time to identify and schedule construction of individual green streets projects. The watershed cities are currently working with the Gateway Council of Governments (Gateway COG) to identify future arterial and intersection projects in the COG's Strategic Transportation Plan with potential for installation of green street measures. Even though not all projects can be specified and scheduled at this time, the Permittees, consistent with the Water Quality Improvement Hierarchy shown in Figure 3-1 and the overall Water Quality Improvement Strategy discussed in Section 3, will construct the necessary mix of water capture facilities, green streets, LID projects, and treatment controls in the various sub-basins to supplement the true source control, runoff reduction, and TSS reduction measures to ensure compliance with permit requirements per applicable compliance schedules. The mix of measures will be periodically adjusted through the adaptive management process.

Furthermore, the LACFCD will work with the Watershed Group in its efforts to address source controls; assess, develop, and pursue funding for structural BMPs, and promote the use of water reuse and infiltration. As regional project scopes are further refined, the LACFCD will contribute to the WMP projects on a case-by-case basis, agreed upon with the Watershed Group.

The overall implementation schedule for the Los Cerritos Channel Watershed Management Program is based, in part, on the implementation schedule in the Los Cerritos Channel Metals TMDLs and the Greater Harbor Toxics TMDLs. For other pollutants, the implementation schedules are based on the schedules for TMDLs in other watersheds. Final wet-weather compliance target dates for Category 1, 2, and 3 pollutants are shown in Table 6-1 as well as tables, 2-9, 2-10, 2-11, and 2-12 in Section 2. Interim milestone targets occurring between July 1, 2014 and December 28, 2022 are shown in Table 6-2.

Table 6-1: Final Compliance Dates for Category 1, 2, and 3 Pollutants

Date	Target
September 2025	Target compliance date for trash and Bis(2-ethylhexyl)phthalate and MBAS

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September 2026	Final compliance date for LCC Metals TMDLs
March 2032	Final compliance date for Harbor Toxics TMDL
September 2040	Target compliance date for bacteria

Table 6-2: Interim Milestone Targets Between December 28, 2012 and December 28, 2017*

Date	Target
September 30, 2016	10% of the Watershed meeting Basin Plan standard of 0.5 mg/L for MBAS
September 30, 2016	Installation of full-capture trash control devices serving 10% of the high priority land uses in the watershed to address trash and Bis(2-ethylhexyl)phthalate**
March 23, 2017	Greater Harbor Responsible Parties complete Phase I of Implementation Plan and Sediment Management Plan
September 30, 2017	For the LCC Metals TMDLs, 30% of the drainage area served by storm drain system effectively meeting dry-weather WLAs and 10% of drainage area served by storm drain system meeting wet-weather WLAs or equivalent redirections in total loads at Stearns Street monitoring site.
September 30, 2017	Installation of full-capture trash control devices serving 20% of the high priority land uses in the watershed to address trash and Bis(2-ethylhexyl)phthalate**
September 30, 2017	20% of the watershed meeting Basin Plan standard of 0.5 mg/l for MBAS

* Additional milestone information in Tables 6-4 through 6-11.

** Assuming adoption of proposed Trash Amendments in Spring 2015.

Part VI.C.5.c provides guidance for inclusion of implementation schedules into the WMP. Compliance schedules for TMDLs are to be incorporated into the program schedule. Compliance schedules and interim milestone dates are to be used to measure progress toward addressing the highest water quality priorities and achieving applicable water quality-based effluent limitations. Schedules must be adequate to measure progress on a watershed scale every two years as part of an adaptive management process. Schedules are to be developed for the strategies, control measures, and BMPs to be implemented by each Permittee within its jurisdiction and for those that will be implemented by multiple Permittees on a watershed scale. The current schedule focuses on regional projects to be implemented on a watershed scale and on municipal roles in planning and implementing these projects. Schedules for jurisdictional projects will be added to the schedules during adaptive management review as cities plan and program implementation of green streets, LID, and other local projects. Several of the measures in the

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Implementation Schedule include encouraging actions by other entities. Depending on the measure, this encouragement will be done through outreach efforts and/or implementation of inspection programs.

The initial schedule contained in this WMP covers a 26-year period and is structured into eight three-year phases and a two-year phase. These schedules assume a 2015 start date and are based on an anticipated 5-year permit renewal cycle. Table 3 is an implementation summary for the period 2015 through 2040. The table summarizes information for Phases 1-4 (2015-2026) and a schedule for planning Phases 5-9 (2027-2040). It shows the interim milestone and final compliance dates for the metals TMDLs as well as anticipated interim milestone and final compliance dates for the State Water Board's trash amendments. At this time it contains only one compliance date for the Greater Harbor Toxics TMDL. The Watershed Group will review data from the Greater Harbor Regional Monitoring Coalition monitoring of East San Pedro Bay during the first two adaptive management reviews to develop a schedule, if needed, for measures to address Greater Harbor Toxics TMDL pollutants not already addressed.

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Table 6-3
Summary WMP Implementation and Milestone Schedule[1]

2015-2017 Phase 1 (See Tables 6-4, 6-5, and 6-12 for schedules, milestones, and sub-basin implementation measures)[2]

Q2, 2015 – Anticipated Adoption of Trash Amendment

Q3, 2015 – Anticipated Effective Date of Trash Amendment

September 30, 2016 –Anticipated Interim Trash Amendment Milestone

September 30, 2016 – Interim MBAS Milestone

March 23, 2017 – Completion of Phase I of Implementation Plan and Sediment Management Plan for Greater Harbor Toxics TMDL

July 1, 2017 – Report of Waste Discharge (ROWD) Due

September 30, 2017 –Anticipated Interim Trash Amendment Milestone

September 30, 2017 – Interim Metals TMDL Milestone

September 30, 2017 – Interim MBAS Milestone

2018-2020 Phase 2 (See Tables 6-6, 6-7, and 6-12 for schedules, milestones, and sub-basin implementation measures)[1, 2]

September 30, 2018 – Anticipated Interim Trash Amendment Milestone

September 30, 2018 – Interim MBAS Milestone

September 30, 2019 – Anticipated Interim Trash Amendment Milestone

September 30, 2019 – Interim MBAS Milestone

September 30, 2020 – Anticipated Interim Trash Amendment Milestone

September 30, 2020 – Interim MBAS Milestone

September 30, 2020 – Interim Metals TMDL Milestone

2021-2023 Phase 3 (See Tables 6-8, 6-9, and 6-12 for schedules, milestones, and implementation measures)[3]

September 30, 2021 – Anticipated Interim Trash Amendment Milestone

September 30, 2021 – Interim MBAS Milestone

[1] Schedule based on 5-year permit renewal schedule
[2] Phases 1 and 2 are detailed as action plans subject to availability of funds for design and construction of green streets and stormwater capture devices.
[3] Phase 3 will be converted to an action plan as part of a 2017 Report of Waste Discharge (ROWD).

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July 2022 – Anticipated ROWD Due Date

September 30, 2022 – Anticipated Interim Trash Amendment Milestone

September 30, 2022 – Interim MBAS Milestone

September 30, 2023 – Anticipated Interim Trash Amendment Milestone

September 30, 2023 – Interim Metals TMDLs Milestone

September 30, 2023 – Interim MBAS Milestone

2024-2026 Phase 4 (See Tables 6-10, 6-11, and 6-12 for schedules, milestones, and implementation measures)[4]

September 30, 2024 – Anticipated Interim Trash Amendment Milestone

September 30, 2024 – Interim MBAS Milestone

September 30, 2025 – Anticipated Interim Trash Amendment Final Compliance Date

September 30, 2025 – Final MBAS Compliance Target Date

July 2026 – Anticipated ROWD Due Date

September 30, 2026 – Final Metals TMDLs Compliance Date

2027-2029 Phase 5 (To Be Planned During Phase 3)[5]

2030–2032 Phase 6 (To Be Planned During Phase 4)[6]

2033-2035 Phase 7 (To Be Planned During Phase 5)[7]

2036-2038 Phase 8 (To Be Planned in Phase 6)[8]

2039-2040 Phase 9 (To Be Planned in Phase 7)[9]

Tables 6-4 through 6-11 provide more information about activities during phases 1-4 (2015-2026). They demonstrate the progressive implementation of the WMP, beginning with planning and ordinance development and moving to design and construction, subject to the availability of funding. The schedule for phases 2-4 will be reviewed and refined during the first adaptive management review.

[4] Phase 4 will be converted to an action plan as part of the expected 2022 ROWD.
[5] Phase 5 will be converted to an action plan as part of the expected 2022 ROWD.
[6] Phase 6 will be converted to an action plan as part of the expected 2027 ROWD.
[7] Phase 7 will be converted to an action plan as part of the expected 2032 ROWD.
[8] Phase 8 will be converted to an action plan as part of the expected 2032 ROWD.
[9] Phase 9 will be converted to an action plan as part of the expected 2037 ROWD.

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Table 6-4
WMP Implementation Schedule – Ongoing Measures
Phase 1 (2015-2017)

Minimum Control Measures

- Public Information and Participation Program
- Industrial/Commercial Facilities Control Program[1]
- Development of Planning Program
- Development of Controls Program
- Public Agencies Activities Program
- Illicit Connection and Illicit Discharge Elimination Program
- Preparation of a targeted industrial inspection component for metals by City of Paramount

True Source Control and Operational Source Control[1]
(Emphasis on Category 1 pollutants)

- Implementation of SB 346
- Implementation of SB 757
- Support development and Implementation of Safer Consumer Products Regulations
- Monitoring of USEPA Proposed Rulemaking to further reduce or remove lead from aviation gasoline
- Monitoring of California Product Stewardship Council Proposals, especially for Extended Producer Responsibility and other true source control measures
- Outreach to industries potentially contributing zinc to Watershed by all municipalities to encourage control of non-industrial process source of zinc.

TSS Reduction (Soil Stabilization/Sediment Control)[1]

- Implementation of model TSS reduction ordinance(s) by City of Signal Hill (2016-2017)
- Enhanced erosion and sediment control at construction sites
- Stabilization of exposed soil not associated with construction sites
- Enhanced street sweeping.

Runoff Reduction and Stormwater Capture[1]

- Jurisdictional planning for green streets Support State legislation to resolve liability issues raised by school administrators in order to facilitate construction of water capture facilities under school athletic fields and playgrounds (2015-2016)
- Encourage Cities and water purveyors to work together to implement stormwater capture and use or infiltration facilities consistent with AB 2403Encourage the use of permeable pavements in parking lots
- Encourage the use of cisterns and rain barrels to reduce the discharge of roof stormwater runoff

[1] Refer to Table 6-12 for implementation by sub-basin.

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Trash Reduction and Control[1]

- Watershed Group coordination with California Product Stewardship Council to reduce trash through reduction of packing materials and implementation of take-back programs
- Research regarding grant opportunities by Watershed Group to pay for installation of full capture systems for high priority land use areas

Stormwater Financing

- Encourage California Contract Cities and League of California Cities, Los Angeles County Division to organize as recommended in the Stormwater Funding Options report to secure sustainable water quality funding in Los Angeles County.
- Improve public education and outreach by Watershed Cities to inform residents, businesses, and others about stormwater program requirements and funding issues.
- Encourage State legislature to adopt a "per tire" zinc control fee with monies made available to local government to construct stormwater capture and/or treatment control facilities to reduce the discharge of zinc to receiving waters
- Encourage inclusion of more money for stormwater quality management in future State water bonds and transportation bond measures
- Encourage Cities to support adoption of a regional stormwater fee

Priority Sub-basin Targets[2]

Targets	Acreage[3]	% LCC Watershed[3]
Sub-basin 4	2,270.6	12.80
Sub-basin 8	2,711.8	15.30
Sub-basin 10	3,403.1	19.20
		47.30

[2] See Figure 1-4 and Attachment B. Special attention given to control measures serving priority sub-basins during this phase.

[3] Based on EPA TMDL acreages that include Caltrans and County acreages

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Table 6-5
WMP Implementation Schedule – Measures with Interim Milestones
Phase 1 (2015-2017)

TSS Reduction (Soil Stabilization/Sediment Control)

- Adoption of model TSS reduction ordinances by City of Signal Hill (December 31, 2015)
- Consideration of possible adoption of TSS reduction ordinances by other Cities within the Watershed (December 31, 2016)
- Consideration and possible adoption of parking lot sweeping ordinances by Cities within Watershed (December 31, 2016)

Runoff Reduction and Stormwater Capture

- Development of prototype design of biofiltration and infiltration chamber for streets with wider parkways by City of Lakewood (September 30, 2015)
- Development of prototype design of biofiltration and infiltration chamber for streets with narrow parkways by City of Paramount (December 31, 2015)
- Development of concept plan for stormwater capture project at Mayfair Park by Cities of Lakewood and Bellflower (June 30, 2016)
- Development of concept plan for stormwater project at Skylinks Golf Course by Cities of Long Beach and Signal Hill (December 31, 2015)
- Development of a process for allocating costs to design and construct regional stormwater capture projects (December 31, 2015)
- Construction of low flow diversion to infiltration/evapotranspiration facility or sanitary sewers for one headwater outfall (September 30, 2016)
- Construction of low flow diversion to infiltration/evapotranspiration facility or sanitary sewer for one headwater outfall (September 30, 2017)
- Construction of initial stormwater capture facility, as needed to achieve volume reduction milestones (September 30, 2017)

Trash Reduction and Control[1]

- Inventory by Cities in Watershed of catch basins in high priority land use areas pursuant to Trash Amendments adopted by State Water Board (March 31, 2016)[1]
- Installation of full capture systems by Cities in 10% of catch basins serving high priority land use areas within the Watershed portions of each City, subject to the availability of funding (September 30, 2016)[1]
- Installation of full capture systems by Cities in 20% of catch basins serving high priority land use areas within the Watershed portions of each City, subject to the availability of funding (September 30, 2017)[1]

[1] Presuming adoption of trash amendments by State Water Board in spring of 2015.

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Treatment Control

- Installation of two tree box filters by the City of Downey, funded partially through a Proposition 84 grant received by the Gateway Water Management Agency (September 30, 2016)
- Installation of two tree box filters by City of Signal Hill, partially funded by a Proposition 84 grant received by the Gateway Water Management Agency (September 30, 2016)

Priority Sub-basin Targets[1]

Targets	Acreage[2]	% LCC Watershed[3]
Sub-basin 4	2,270.6	12.80
Sub-basin 8	2,711.8	15.30
Sub-basin 10	3,403.1	19.20
		47.30

[1] See Figure 1-4 and Attachment B. Special attention given to control measures serving priority sub-basins during this phase.

[2] Based on EPA TMDL acreages that include Caltrans and County acreages

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Table 6-6
WMP Implementation Schedule – Ongoing Measures
Phase 2 (2018-2020)

Minimum Control Measures

- Public Information and Participation Program
- Industrial/Commercial Facilities Control Program[1]
- Development Planning Program
- Development Controls Program
- Public Agencies Activities Program
- Illicit Connection and Illicit Discharge Elimination Program

True Source Control and Operational Source Control[2]
(Emphasis on Category 1 pollutants)

- Implementation of SB 346
- Implementation of SB 757
- Implementation of Safer Consumer Products Regulations to reduce zinc in tires
- Monitoring of USEPA Rulemaking to further reduce or remove lead from aviation gasoline
- Monitoring of California Product Stewardship Council Proposals, especially for Extended Producer Responsibility and other true source control measures
- Outreach to industries potentially contributing zinc to Watershed by all municipalities to encourage control of non-industrial process source of zinc.
- Outreach to restaurants and markets to encourage control of potential sources of bacteria
- Outreach to pet owners to clean up after their pets to reduce sources of bacteria

TSS Reduction (Soil Stabilization/Sediment Control)[2]

- Implementation of adopted TSS reduction ordinance(s) by Cities in Watershed
- Implementation of adopted parking lot sweeping ordinances by Cities in Watershed
- Implementation of agreements with utilities
- Enhanced erosion and sediment control at construction sites
- Stabilization of exposed soil not associated with construction sites
- Enhanced street sweeping
- Enhanced parking lot sweeping

Runoff Reduction and Stormwater Capture[2]

- Jurisdictional planning for green streets
- Implementation of biofiltration and infiltration chambers for streets with wider parkways by Cities, subject to availability of funding
- Implementation of biofiltration and infiltration chambers for streets with narrow parkways by Cities, subject to availability of funding

[1] Initial emphasis on facilities that are probable metals and trash sources.

[2] Refer to Table 6-12 for implementation by sub-basin.

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- Encourage Cities and water purveyors to work together to implement stormwater capture and use or infiltration facilities consistent with AB 2403
- Encourage the use of permeable pavements in parking lots
- Encourage the use of cisterns and rain barrels to reduce the discharge of roof stormwater runoff

Trash Reduction and Control

- Watershed Group coordination with California Product Stewardship Council to reduce trash through reduction of packing materials and implementation of take-back programs
- Research regarding grant opportunities by Watershed Group to pay for full capture devices for catch basins in high priority land use areas

Stormwater Financing

- To Be Determined

Priority Subbasin Targets[3]

Targets	Acreage[4]	% LCC Watershed
Sub-basin 4	2,270.6	12.80
Sub-basin 7	1,359.7	7.68
Sub-basin 8	2,711.8	15.30
Sub-basin 9	3,709.3	20.90
Sub-basin 10	3,403.1	19.20
		65.88

[3] See Figure 1-4 and Attachment B. Special attention given to control measures serving priority sub basins during this phase.
[4] Based on EPA TMDL acreages that include Caltrans and County acreages

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Table 6-7
WMP Implementation Schedule – Measures with Interim Milestones
Phase 2 (2018-2020)

Runoff Reduction and Stormwater Capture[2]

- Implementation of stormwater capture project at Mayfair Park by Cities of Lakewood and Bellflower, as needed to achieve volume reduction milestones (September 30, 2019)
- Implementation of stormwater project at Skylinks Golf Course by Cities of Long Beach and Signal Hill, as needed to achieve volume reduction milestones (September 30, 2019)
- Development of concept plan for stormwater capture device at Caruthers Park by the City of Bellflower (December 31, 2018)
- Development of concept plan for stormwater capture at Heartwell Park (Clark Channel) by Long Beach, Bellflower, Lakewood, and Paramount (September 30, 2020)
- Development of concept plan for stormwater capture at Heartwell Park (Palo Verde Channel) by Cities of Bellflower, Lakewood (June 30, 2018)
- Development of concept plan for stormwater capture at Skylinks Golf Course by Cities of Long Beach and Lakewood (June 30, 2018)

Trash Reduction and Control

- Installation of full capture systems by Cities in 30% of catch basins serving high priority land use areas within the Watershed portions of each City, subject to the availability of funding (September 30, 2018)
- Installation of full capture systems by Cities in 40% of catch basins serving high priority land use areas within the Watershed portions of each City, subject to the availability of funding (September 30, 2019)[1]
- Installation of full capture systems by Cities in 50% of catch basins serving high priority land use areas within the Watershed portions of each City, subject to the availability of funding (September 30, 2020)[2]

	Priority Sub-basin Targets[2]	
Targets	Acreage[3]	% LCC Watershed[3]
Sub-basin 4	2,270.6	12.80
Sub-basin 7	1,359.7	7.68
Sub-basin 8	2,711.8	15.30
Sub-basin 9	3,709.3	20.90
Sub-basin 10	3,403.1	19.20
		65.88

[1] Presuming adoption of trash amendments by State Water Board in Spring 2015
[2] See Figure 1-4 and Attachment B. Special attention given to control measures serving priority sub-basins during this phase.
[3] Based on EPA TMDL acreages that include Caltrans and County acreages

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Table 6-8
WMP Implementation Schedule – Ongoing Measures
Phase 3 (2021-2023) Tentative Plan

Minimum Control Measures

- Public Information and Participation Program
- Industrial/Commercial Facilities Control Program[1]
- Development Planning Program
- Development Controls Program
- Public Agencies Activities Program
- Illicit Connection and Illicit Discharge Elimination Program

True Source Control and Operational Source Control[2]
(Emphasis on Category 1 pollutants)

- Implementation of SB 346
- Implementation of SB 757
- Implementation of Safer Consumer Products Regulations to reduce zinc in tires
- Monitoring of USEPA Rulemaking to further reduce or remove lead from aviation gasoline
- Monitoring of California Product Stewardship Council Proposals, especially for Extended Producer Responsibility and other true source control measures
- Outreach to industries potentially contributing zinc to Watershed by all municipalities to encourage control of non-industrial process source of zinc.
- Outreach to restaurants and markets to encourage control of potential sources of bacteria
- Outreach to pet owners to clean up after their pets to reduce sources of bacteria

TSS Reduction (Soil Stabilization/Sediment Control)[2]

- Implementation of adopted TSS reduction ordinance(s) by Cities in Watershed
- Implementation of adopted parking lot sweeping ordinances by Cities in Watershed
- Implementation of agreements with utilities
- Enhanced erosion and sediment control at construction sites
- Stabilization of exposed soil not associated with construction sites
- Enhanced street sweeping
- Enhanced parking lot sweeping

Runoff Reduction and Stormwater Capture[2]

- Jurisdictional planning for green streets
- Implementation of biofiltration and infiltration chambers for streets with wider parkways by Cities, subject to availability of funding
- Implementation of biofiltration and infiltration chambers for streets with narrow parkways by Cities, subject to availability of funding

[1] Initial emphasis on facilities that are probable metals and trash sources.
[2] Refer to Table 6-12 for implementation by sub-basin.

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- Encourage Cities and water purveyors to work together to implement stormwater capture and use or infiltration facilities consistent with AB 2403
- Encourage the use of permeable pavements in parking lots
- Encourage the use of cisterns and rain barrels to reduce the discharge of roof stormwater runoff

Trash Reduction and Control

- Watershed Group coordination with California Product Stewardship Council to reduce trash through reduction of packing materials and implementation of take-back programs
- Research regarding grant opportunities by Watershed Group to pay for installation of full capture systems for catch basins in high priority land use areas

Stormwater Financing

- To Be Determined

Priority Sub-basin Targets[3]

Targets	Acreage[4]	% LCC Watershed
Sub-basin 5	331.6	1.87
Sub-basin 6	1,663.7	9.39
Sub-basin 7	1,359.7	7.68
Sub-basin 9	3,709.3	20.90
		39.84

[3] See Figure 1-4 and Attachment B. Special attention given to control measures serving priority sub-basins during this phase.

[4] Based on EPA TMDL acreages that include Caltrans and County acreages

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Table 6-9
WMP Implementation Schedule –Measures with Interim Milestones
Phase 3 (2021-2023) Tentative Plan

Runoff Reduction and Stormwater Capture

- Implementation of stormwater capture project at Heartwell Park (Clark Channel) by Cities of Long Beach, Bellflower, Lakewood, and Paramount, subject to availability of funding (Q3, 2021)
- Implementation of stormwater project at Heartwell Park (Palo Verde Channel) by Cities of Bellflower and Lakewood, subject to availability of funding (Q3, 2021)
- Implementation of stormwater capture device at Caruthers Park by City of Bellflower, subject to availability of funding (Q3, 2022)
- Development of concept plan for stormwater capture at Reservoir Park by City of Signal Hill (Q2, 2022)
- Development of concept plan for stormwater capture at Progress Park by City of Paramount (Q2, 2022)
- Development of concept plan for stormwater capture at Wardlow Park by City of Long Beach (Q3, 2023)

Trash Reduction and Control

- Installation of full capture systems by Cities in 60% of catch basins serving high priority land use areas within the Watershed portion of each City, subject to the availability of funding (Q3, 2021)[1]
- Installation of full capture systems by Cities in 70% of catch basins serving high priority land use areas within the Watershed portion of each City, subject to the availability of funding (Q3, 2022)[3]
- Installation of full capture systems by Cities in 80% of catch basins serving high priority land use areas within the Watershed portion of each City, subject to the availability of funding (Q3, 2023)[3]

Stormwater Financing

- To Be Determined

	Priority Sub-basin Targets[2]	
Targets	Acreage[3]	% LCC Watershed
Sub-basin 5	331.6	1.87
Sub-basin 6	1,663.7	9.39
Sub-basin 7	1,359.7	7.68
Sub-basin 9	3,709.3	20.90
		39.84

[1] Presuming adoption of trash amendments by State Water Board in Spring 2015.
[2] See Figure 1-4 and Attachment B. Special attention given to control measures serving priority sub-basins during this phase.
[3] Based on EPA TMDL acreages that include Caltrans and County acreages

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Table 6-10
WMP Implementation Schedule – Ongoing Measures
Phase 4 (2024-2026) Tentative Plan

Minimum Control Measures

- Public Information and Participation Program
- Industrial/Commercial Facilities Control Program[1]
- Development Planning Program
- Development Controls Program
- Public Agencies Activities Program
- Illicit Connection and Illicit Discharge Elimination Program

True Source Control and Operational Source Control[2]
(Emphasis on Category 1 pollutants)

- Implementation of SB 346
- Implementation of SB 757
- Implementation of Safer Consumer Products Regulations to reduce zinc in tires
- Implementation of USEPA Rulemaking to further reduce or remove lead from aviation gasoline
- Monitoring of California Product Stewardship Council Proposals, especially for Extended Producer Responsibility and other true source control measures
- Outreach to industries potentially contributing zinc to Watershed by all municipalities to encourage control of non-industrial process source of zinc.
- Outreach to restaurants and markets to encourage control of potential sources of bacteria
- Outreach to pet owners to clean up after their pets to reduce sources of bacteria

TSS Reduction (Soil Stabilization/Sediment Control)[2]

- Implementation of adopted TSS reduction ordinance(s) by Cities in Watershed
- Implementation of adopted parking lot sweeping ordinances by Cities in Watershed
- Implementation of agreements with utilities
- Enhanced erosion and sediment control at construction sites
- Stabilization of exposed soil not associated with construction sites
- Enhanced street sweeping
- Enhanced parking lot sweeping

Runoff Reduction and Stormwater Capture[2]

- Jurisdictional implementation for green streets
- Implementation of biofiltration and infiltration chambers for streets with wider parkways by Cities, subject to availability of funding
- Implementation of biofiltration and infiltration chambers for streets with narrow parkways by Cities, subject to availability of funding
- Encourage Cities and water purveyors to work together to implement stormwater capture and use or infiltration facilities consistent with AB 2403
- Encourage the use of permeable pavements in parking lots

[1] Initial emphasis on facilities that are probable metals and trash sources.
[2] Refer to Table 6-12 for implementation by sub-basin.

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- Encourage the use of cisterns and rain barrels to reduce the discharge of roof stormwater runoff

Trash Reduction and Control

- Watershed Group coordination with California Product Stewardship Council to reduce trash through reduction of packing materials and implementation of take-back programs
- Research regarding grant opportunities by Watershed Group to pay for installation of full capture systems for catch basins in high priority land use areas (ongoing)

Stormwater Financing

- To Be Determined

Priority Sub-basin Targets[3]

Targets	Acreage[4]	% LCC Watershed
Sub-basin 1	719.6	4.06
Sub-basin 2	1,241.1	7.00
Sub-basin 3	305.0	1.72
Sub-basin 5	331.6	1.87
Sub-basin 6	1,663.7	9.39
		24.04

[3] See Figure 1-4 and Attachment B. Special attention given to control measures serving priority sub-basins during this phase.

[4] Based on EPA TMDL acreages that include Caltrans and County acreages

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Table 6-11
WMP Implementation Schedule – Measures with Interim Milestones
Phase 4 (2024-2026) Tentative Plan

Runoff Reduction and Stormwater Capture

- Implementation of stormwater capture device at Reservoir Park by the City of Signal Hill, subject to availability of funding (Q3, 2024)
- Implementation of stormwater capture project at Progress Park by City of Paramount, subject to availability of funding (Q3, 2024)
- Implementation of stormwater capture project at Wardlow Park by City of Long Beach, subject to availability of funding (Q3, 2025)
- Development of concept plan for stormwater capture facility at Sims Park by City of Bellflower (2Q, 2024)
- Development of concept plan for stormwater capture facility at Pan American Park by City of Long Beach (2Q, 2024)
- Development of concept plan for stormwater capture facility at Long Beach Junior Golf Course by City of Long Beach (2Q, 2024)

Trash Reduction and Control

- Installation of full capture systems by Cities in 90% of catch basins serving high priority land use areas within the Watershed portion of each City, subject to the availability of funding (Q3, 2024)[1]
- Installation of full capture systems by Cities in 100% of catch basins serving high priority land use areas within the Watershed portion of each City, subject to the availability of funding (Q3, 2025)[1]

Stormwater Financing

- To Be Determined

	Priority Subbasin Targets[2]	
Targets	Acreage[3]	% LCC Watershed
Sub-basin 1	719.6	4.06
Sub-basin 2	1,241.1	7.00
Sub-basin 3	305.0	1.72
Sub-basin 5	331.6	1.87
Sub-basin 6	1,663.7	9.39
		24.04

[1] Presuming adoption of trash amendments by State Water Board in Spring 2015.

[2] See Figure 1-4 and Attachment B. Special attention given to control measures serving priority sub-basins during this phase.

[3] Based on EPA TMDL acreages that include Caltrans and County acreages.

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Table 6-12
Sub-Basin Implementation Measures

Target Sub-basin	Acreage	True Source Control BMPs	Runoff Reduction	Operational Source Ctrl BMPs	Sediment Control	Treatment Ctrl BMPs
Sub-basin 1 [Phase 4] (2024-2026) Responsible Jurisdiction: Long Beach	719.6 ac (4.06% of LCC watershed)	Copper reduction through implementation of SB 346 Lead reduction through implementation of SB 757 Lead reduction through implementation of EPA Rulemaking to further reduce or remove lead from aviation gasoline Zinc reduction through implementation of Safer Consumer Product Alternatives regulations	Reduction of landscape irrigation runoff through implementation of AB 1881 Seek grants for construction of capture and infiltration/use structural BMPs Promote installation of cisterns and rain barrels Installation of green street measures at key locations Seek grants for LID retrofit projects Promote use of porous pavement & distributed capture and infiltration structural BMPs	Outreach to priority industries identified as having high probability of generating copper, lead, or zinc, trucking companies, facilities with large parking lots, and automotive repair facilities to encourage implementation of cover and containment BMPs. Promote coating of exposed galvanized metal Implement requirements for coated galvanized metal for use when exposed	Enhanced street sweeping with vacuum and regenerative sweepers[1] Enhanced erosion and sediment control at construction sites Stabilization of exposed soils not associated with construction sites Implementation of TSS Reduction Ordinances Implementation of Parking Lot Sweeping Ordinances	Distributed LID measures associated with development projects Installation of green street measures at key locations Installation of full capture systems in catch basins in high priority land use areas Others to be determined

[1] Potential Measure; the City of Long Beach is not currently using regenerative or vacuum sweepers

RB-AR9146

Target Sub-basin	Acreage	True Source Control BMPs	Runoff Reduction	Operational Source Ctrl BMPs	Sediment Control	Treatment Ctrl BMPs
Sub-basin 2 [Phase 2] (2024-2026) Responsible Jurisdiction: Long Beach	1,241.1 ac (7% of LCC watershed)	Copper reduction through implementation of SB 346 Lead reduction through implementation of SB 757 Lead reduction through implementation of EPA Rulemaking to further reduce or remove lead from aviation gasoline Zinc reduction through implementation of Safer Consumer Product Alternatives regulations	Reduction of landscape irrigation runoff through implementation of AB 1881 Seek grants for construction of capture and infiltration/use structural BMPs Promote installation of cisterns and rain barrels Installation of green street measures at key locations Seek grants for LID retrofit projects Promote use of porous pavement & distributed capture and infiltration structural BMPs	Outreach to priority industries identified as having high probability of generating copper, lead, or zinc, trucking companies, facilities with large parking lots, and automotive repair facilities to encourage implementation of cover and containment BMPs Promote coating of exposed galvanized metal Implement requirements for coated galvanized metal for use when exposed	Enhanced street sweeping with vacuum and regenerative sweepers[1] Enhanced erosion and sediment control at construction sites Stabilization of exposed soils not associated with construction sites Implementation of TSS Reduction Ordinances Implementation of Parking Lot Sweeping Ordinances	Distributed LID measures associated with development projects Installation of green street measures at key locations Installation of full capture systems in catch basins in high priority land use areas Others to be determined

[1] Potential Measure; the City of Long Beach is not currently using regenerative or vacuum sweepers

RB-AR9147

Target Sub-basin	Acreage	True Source Control BMPs	Runoff Reduction	Operational Source Ctrl BMPs	Sediment Control	Treatment Ctrl BMPs
Sub-basin 3 [Phase 4] (2024-2026) Responsible Jurisdiction: Long Beach	305 ac (1.72% of LCC watershed)	Copper reduction through implementation of SB 346 Lead reduction through implementation of SB 757 Lead reduction through implementation of EPA Rulemaking to further reduce or remove lead from aviation gasoline Zinc reduction through implementation of Safer Consumer Product Alternatives regulations	Reduction of landscape irrigation runoff through implementation of AB 1881 Seek grants for construction of capture and infiltration/use structural BMPs Promote installation of cisterns and rain barrels Installation of green street measures at key locations Seek grants for LID retrofit projects Promote use of porous pavement & distributed capture and infiltration structural BMPs	Outreach to priority industries identified as having high probability of generating copper, lead, or zinc, trucking companies, facilities with large parking lots, and automotive repair facilities to encourage implementation of cover and containment BMPs Promote coating of exposed galvanized metal Implement requirements for coated galvanized metal for use when exposed	Enhanced street sweeping with vacuum and regenerative sweepers[1] Enhanced erosion and sediment control at construction sites Stabilization of exposed soils not associated with construction sites Implementation of TSS Reduction Ordinances Implementation of Parking Lot Sweeping Ordinances	Distributed LID measures associated with development projects Installation of green street measures at key locations Installation of full capture systems in catch basins in high priority land use areas Others to be determined

[1] Potential Measure; the City of Long Beach is not currently using regenerative or vacuum sweepers

RB-AR9148

Target Sub-basin	Acreage	True Source Control BMPs	Runoff Reduction	Operational Source Ctrl BMPs	Sediment Control	Treatment Ctrl BMPs
Sub-basin 4 [Phases 1 & 2] (2015-2020) Responsible Jurisdictions: Long Beach and Signal Hill	2,270.6 ac (12.8% of LCC watershed)	Copper reduction through implementation of SB 346 Lead reduction through implementation of SB 757 Lead reduction through implementation of EPA Proposed Rulemaking to further reduce or remove lead from aviation gasoline Zinc reduction through implementation of Safer Consumer Product Alternatives regulations	Reduction of landscape irrigation runoff through implementation of AB 1881 Seek grants for construction of capture and infiltration/use structural BMPs Promote installation of cisterns and rain barrels Installation of green street measures at key locations Seek grants for LID retrofit projects Promote use of porous pavement & distributed capture and infiltration structural BMPs Implementation of Stormwater Capture Project at Skylinks Golf Course (Phase 2)[2] Implementation of Stormwater Capture at Reservoir Park (Delayed until Phase 4)[2]	Outreach to priority industries identified as having high probability of generating copper, lead, or zinc, trucking companies, facilities with large parking lots, and automotive repair facilities to encourage implementation of cover and containment BMPs Promote coating of exposed galvanized metal Implement requirements for coated galvanized metal for use when exposed	Enhanced street sweeping with vacuum and regenerative sweepers[1] Enhanced erosion and sediment control at construction sites Stabilization of exposed soils not associated with construction sites Implementation of TSS Reduction Ordinances (Phase 2) Implementation of Parking Lot Sweeping Ordinances (Phase 2)	Distributed LID measures associated with development project Installation of green street measures at key locations Installation of full capture systems in catch basins in high priority land use areas Others to be determined

[1] Potential Measure for part of sub-basin; the City of Long Beach is not currently using regenerative or vacuum sweepers
[2] Subject to availability of funding

RB-AR9149

Target Sub-basin	Acreage	True Source Control BMPs	Runoff Reduction	Operational Source Ctrl BMPs	Sediment Control	Treatment Ctrl BMPs
Sub-basin 5 [Phases 3 & 4] (2021-2026) Responsible Jurisdiction: Long Beach	331.6 ac (1.87% of LCC watershed)	Copper reduction through implementation of SB 346 Lead reduction through implementation of SB 757 Lead reduction through implementation of EPA Proposed Rulemaking to further reduce or remove lead from aviation gasoline Zinc reduction through implementation of Safer Consumer Product Alternatives regulations	Reduction of landscape irrigation runoff through implementation of AB 1881 Seek grants for construction of capture and infiltration/use structural BMPs Promote installation of cisterns and rain barrels Installation of green street measures at key locations Seek grants for LID retrofit projects Promote use of porous pavement & distributed capture and infiltration structural BMPs	Outreach to priority industries identified as having high probability of generating copper, lead, or zinc, trucking companies, facilities with large parking lots, and automotive repair facilities to encourage implementation of cover and containment BMPs Promote coating of exposed galvanized metal Implement requirements for coated galvanized metal for use when exposed	Enhanced street sweeping with vacuum and regenerative sweepers[1] Enhanced erosion and sediment control at construction sites Stabilization of exposed soils not associated with construction sites Implementation of TSS Reduction Ordinances Implementation of Parking Lot Sweeping Ordinances	Distributed LID measures associated with development project Installation of green street measures at key locations Installation of full capture systems in catch basins in high priority land use areas Others to be determined

[1] Potential Measure; the City of Long Beach is not currently using regenerative or vacuum sweepers

RB-AR9150

Target Sub-basin	Acreage	True Source Control BMPs	Runoff Reduction	Operational Source Ctrl BMPs	Sediment Control	Treatment Ctrl BMPs
Sub-basin 6 [Phases 3 & 4] (2021-2026) Responsible Jurisdictions: Lakewood and Long Beach	1,663.7 ac (9.39% of LCC watershed)	Copper reduction through implementation of SB 346 Lead reduction through implementation of SB 757 Monitor USEPA Proposed Rulemaking to further reduce or remove lead from aviation gasoline Prepare petition for control of zinc in tires through Safer Consumer Product Regulations	Reduction of landscape irrigation runoff through implementation of AB 1881 Seek grants for construction of capture and infiltration/use structural BMPs Promote installation of cisterns and rain barrels Installation of green street measures at key locations Seek grants for LID retrofit projects Promote use of porous pavement & distributed capture and infiltration structural BMPs Implementation of Stormwater Capture Project at Skylinks Golf Course (Phase 3)[2]	Outreach to priority industries identified as having high probability of generating copper, lead, or zinc, trucking companies, facilities with large parking lots, and automotive repair facilities to encourage implementation of cover and containment BMPs Promote coating of exposed galvanized metal Develop specifications and requirements for coated galvanized metal for use when exposed	Enhanced street sweeping with vacuum and regenerative sweepers[1] Enhanced erosion and sediment control at construction sites Stabilization of exposed soils not associated with construction sites Implementation of TSS Reduction Ordinances Implementation of Parking Lot Sweeping Ordinances	Distributed LID measures associated with development projects Installation of green street measures at key locations Installation of full capture systems in catch basins in high priority land use areas Others to be determined

[1] Potential Measure for part of sub-basin; the City of Long Beach is not currently using regenerative or vacuum sweepers
[2] Subject to availability of funding

RB-AR9151

Target Sub-basin	Acreage	True Source Control BMPs	Runoff Reduction	Operational Source Ctrl BMPs	Sediment Control	Treatment Ctrl BMPs
Sub-basin 7 [Phases 2 & 3] (2018-2023) Responsible Jurisdictions: Lakewood and Long Beach	1,359.7 ac (7.68% of LCC watershed)	Copper reduction through implementation of SB 346 Lead reduction through implementation of SB 757 Lead reduction through implementation of EPA Rulemaking to further reduce or remove lead from aviation gasoline Zinc reduction through implementation of Safer Consumer Product Alternatives regulations	Reduction of landscape irrigation runoff through implementation of AB 1881 Seek grants for construction of capture and infiltration/use structural BMPs Promote installation of cisterns and rain barrels Installation of green street measures at key locations Seek grants for LID retrofit projects Promote use of porous pavement & distributed capture and infiltration structural BMPs Implementation of Stormwater Capture Project at Heartwell Park (Phase 3)[2] Implementation of Stormwater Capture Project at Pan American Park (Delayed until Phase 4)[2]	Outreach to priority industries identified as having high probability of generating copper, lead, or zinc, trucking companies, facilities with large parking lots, and automotive repair facilities to encourage implementation of cover and containment BMPs Promote coating of exposed galvanized metal Implement requirements for coated galvanized metal for use when exposed	Enhanced street sweeping with vacuum and regenerative sweepers[1] Enhanced erosion and sediment control at construction sites Stabilization of exposed soils not associated with construction sites Implementation of TSS Reduction Ordinances Implementation of Parking Lot Sweeping Ordinances	Distributed LID measures associated with development project Installation of green street measures at key locations Installation of full capture systems in catch basins in high priority land use areas Others to be determined

[1] Potential Measure for part of sub-basin; the City of Long Beach is not currently using regeneration or vacuum sweepers
[2] Subject to availability of funding

RB-AR9152

Target Sub-basin	Acreage	True Source Control BMPs	Runoff Reduction	Operational Source Ctrl BMPs	Sediment Control	Treatment Ctrl BMPs
Sub-basin 8 [Phases 1 & 2] (2015-2020) Responsible Jurisdictions: Bellflower and Lakewood	2,711.8 ac (15.3% of LCC watershed)	Copper reduction through implementation of SB 346 Lead reduction through implementation of SB 757 Monitor USEPA Proposed Rulemaking to further reduce or remove lead from aviation gasoline Prepare petition for control of zinc in tires through Safer Consumer Product Regulations	Reduction of landscape irrigation runoff through implementation of AB 1881 Seek grants for construction of capture and infiltration/use structural BMPs Promote installation of cisterns and rain barrels Installation of green street measures at key locations Seek grants for LID retrofit projects Promote use of porous pavement & distributed capture and infiltration structural BMPs Implementation of Stormwater Capture Project at Mayfair Park (Phase 2)[1]	Outreach to priority industries identified as having high probability of generating copper, lead, or zinc, trucking companies, facilities with large parking lots, and automotive repair facilities to encourage implementation of cover and containment BMPs Promote coating of exposed galvanized metal Develop specifications and requirements for coated galvanized metal for use when exposed	Enhanced street sweeping with vacuum and regenerative sweepers Enhanced erosion and sediment control at construction sites Stabilization of exposed soils not associated with construction sites Implementation of TSS Reduction Ordinances (Phase 2) Implementation of Parking Lot Sweeping Ordinances (Phase 2)	Distributed LID measures associated with development projects Installation of green street measures at key locations Installation of full capture systems in catch basins in high priority land use areas Others to be determined

[1] Subject to availability of funding

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Target Sub-basin	Acreage	True Source Control BMPs	Runoff Reduction	Operational Source Ctrl BMPs	Sediment Control	Treatment Ctrl BMPs
Sub-basin 9 [Phases 2 & 3] (2018-2023) Responsible Jurisdictions: Bellflower, Downey, Long Beach, and Paramount	3,709.3 ac (20.9% of LCC watershed)	Copper reduction through implementation of SB 346 Lead reduction through implementation of SB 757 Lead reduction through implementation of EPA Proposed Rulemaking to further reduce or remove lead from aviation gasoline Zinc reduction through implementation of Safer Consumer Product Alternatives regulations	Reduction of landscape irrigation runoff through implementation of AB 1881 Seek grants for construction of capture and infiltration/use structural BMPs Promote installation of cisterns and rain barrels Installation of green street measures at key locations Seek grants for LID retrofit projects Promote use of porous pavement & distributed capture and infiltration structural BMPs Implementation of stormwater capture project at Progress Park (Delayed until Phase 4)[2]	Outreach to priority industries identified as having high probability of generating copper, lead, or zinc, trucking companies, facilities with large parking lots, and automotive repair facilities to encourage implementation of cover and containment BMPs Promote coating of exposed galvanized metal Implement requirements for coated galvanized metal for use when exposed	Enhanced street sweeping with vacuum and regenerative sweepers[1] Enhanced erosion and sediment control at construction sites Stabilization of exposed soils not associated with construction sites Implementation of TSS Reduction Ordinances Implementation of Parking Lot Sweeping Ordinances	Distributed LID measures associated with development project Installation of green street measures at key locations Installation of full capture systems in catch basins in high priority land use areas Others to be determined

[1] Potential Measure for part of sub-basin; the City of Long Beach is not currently using regenerative or vacuum sweepers
[2] Subject to availability of funding

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Target Sub-basin	Acreage	True Source Control BMPs	Runoff Reduction	Operational Source Ctrl BMPs	Sediment Control	Treatment Ctrl BMPs
Sub-basin 10 [Phases 1 & 2] (2015-2020) Responsible Jurisdictions: Bellflower, Cerritos, Lakewood, and Long Beach	3,403.1 ac (19.2% of LCC watershed)	Copper reduction through implementation of SB 346 Lead reduction through implementation of SB 757 Monitor USEPA Proposed Rulemaking to further reduce or remove lead from aviation gasoline Prepare petition for control of zinc in tires through Safer Consumer Product Regulations	Reduction of landscape irrigation runoff through implementation of AB 1881 Seek grants for construction of capture and infiltration/use structural BMPs Promote installation of cisterns and rain barrels Installation of green street measures at key locations Seek grants for LID retrofit projects Promote use of porous pavement & distributed capture and infiltration structural BMPs Implementation of Stormwater Capture Project at Caruthers Park (Phase 2)[2] Implementation of Stormwater Capture Project at Heartwell Park (Delayed until Phase 3)[2]	Outreach to priority industries identified as having high probability of generating copper, lead, or zinc, trucking companies, facilities with large parking lots, and automotive repair facilities to encourage implementation of cover and containment BMPs Promote coating of exposed galvanized metal Develop specifications and requirements for coated galvanized metal for use when exposed	Enhanced street sweeping with vacuum and regenerative sweepers[1] Enhanced erosion and sediment control at construction sites Stabilization of exposed soils not associated with construction sites Implementation of TSS Reduction Ordinances (Phase 2) Implementation of Parking Lot Sweeping Ordinances (Phase 2)	Distributed LID measures associated with development projects Installation of green street measures at key locations Installation of full capture systems in catch basins in high priority land use areas Others to be determined

[1] Potential Measure for part of sub-basin; the City of Long Beach is not currently using regenerative or vacuum sweepers
[2] Subject to availability of funding

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7.0 Legal Authority

This section covers information, such as documentation and references/links to water quality ordinances for each participating agency, that demonstrates adequate legal authority to implement and enforce Watershed Control Measures (WCMs) identified in this plan and as required in Section VI.D.5.b.iv.6 of the MS4 Permit. The goal of these WCMs is to create an efficient program that focuses on Watershed priorities by meeting the following objectives:

- Prevent or eliminate non-stormwater discharges to the MS4 that are a source of pollutants from the MS4 to receiving waters.
- Implement pollutant controls necessary to achieve all applicable interim and final water quality-based effluent limitations and/or receiving water limitations pursuant to corresponding compliance schedules.
- Ensure that discharges from the MS4 do not cause or contribute to exceedances of receiving water limitations.

The WCMs include the minimum control measures, non-stormwater discharge measures and targeted control measures (i.e. controls to address TMDL and 303(d) listings). Since the requirement to incorporate these WCMs is an element of the MS4 Permits, the legal authority to implement them results from each agency's legal authority to implement the NPDES MS4 Permit.

Copies of seven participating agencies' legal authority certifications from their respective chief legal counsels can be found in Attachment F. The City of Long Beach's MS4 permit is on a separate timeline and a legal authority letter will be submitted separately. A status report will be included in the Long Beach separate area WMP when submitted. Certifications shall be prepared annually. Table 7-1 includes the section that covers water quality ordinances for each agency with a reference link.

Table 7-1 Water Quality Ordinance Language

City	Water Quality Ordinance	Reference
Bellflower	Title 13 - Public Services, Chapter 13.20, Stormwater and Runoff Pollution Control	http://qcode.us/codes/bellflower
13.20.030 Purpose and Intent (B) - *The intent of this chapter is to enhance and protect the water quality of the receiving waters of the United States in a manner that is consistent with the Clean Water Act and acts amendatory thereof or supplementary thereto, to applicable implementing regulations and the municipal NPDES permit and any amendment, revision, or re-issuance thereof.*		
Cerritos	Title 6 - Health and Sanitation, Chapter 6.32, Stormwater and Urban Runoff Pollution Prevention Controls	http://www.codepublishing.com/ca/cerritos.html
6.32.010 Purpose (C) - *Reducing pollutants in storm water and urban runoff to the maximum extent practicable. (Ord. 777 § 1 (part), 1997)*		
Downey	Article V- Sanitation, Chapter 7, Stormwater and Urban Runoff Pollution and Conveyance Controls	http://qcode.us/codes/downey/

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Section 5701. Watershed Management Program - *Notwithstanding other provisions in the Downey Municipal Codes, the MS4 Permit requires the City of Downey to implement the Watershed Management Program (WMP), and any subsequent amendments, are hereby incorporated into this Ordinance by reference. (Added by Ord. 1142, adopted 02-11-03; amended by Ord. 1320, adopted 11-12-13).*		
Lakewood	Article 05 (V) - Sanitation-Health, Chapter 8, Stormwater and Urban Runoff Pollution Control	http://weblink.lakewoodcity.org/weblink8/
5800 - Adoption of the Los Angeles County Stormwater Runoff Pollution Control Ordinance - *Except as otherwise provided in this Chapter, the stormwater runoff pollution control ordinance of the County of Los Angeles contained in Chapter 12.80 of Title 12 - Environmental Protection of the Los Angeles County Code relating to control of pollutants carried by stormwater and runoff adopted by the County of Los Angeles on June 9, 1998, is hereby adopted and made a part hereof as though set forth in full. The same shall hereafter constitute the Stormwater and Runoff Pollution Control Ordinance of the City of Lakewood relating to the control of pollutants carried by stormwater and runoff and discharging into receiving water of the United States.*		
Long Beach	Volume II-Title 18-Building and Construction, Chapter 18.61, NPDES and SUSMP Regulations	http://library.municode.com/index.aspx?clientId=16115
18.61.010 Purpose - *The purpose of this chapter is to provide regulations and give legal effect to certain requirements of the National Pollutant Discharge Elimination System (NPDES) permit issued to the City of Long Beach, and the subsequent requirements of the Standard Urban Storm Water Mitigation Plan (SUSMP), mandated by the California Regional Water Quality Control Board, Los Angeles Region (RWQCB). The intent of these regulations is to effectively prohibit non-storm water discharges into the storm drain systems or receiving waters and to require source control BMPs to prevent or reduce the discharge of pollutants into storm water to the maximum extent practicable.*		
Paramount	Chapter 48 - Urban Stormwater Management	http://www.paramountcity.com/code.cfm?task=detail2&ID=20
Sec. 48-2.1. Purpose and intent - *The purpose of this chapter is to protect the health and safety of the residents of the city by protecting the beneficial uses of receiving waters within the city from pollutants carried by storm water and non-storm water discharges. The intent of this chapter is to enhance and protect the water quality of the receiving waters of the city and the United States, consistent with the Act. (Ord. No. 892)* Sec. 48-2.2. Applicability of this chapter - *The provisions of this chapter shall apply to the discharge, deposit or disposal of any storm water and/or runoff to the storm drain system and/or receiving waters within any incorporated area covered by a NPDES municipal storm water permit. (Ord. No. 892)*		
Signal Hill	Chapter 12.16- Stormwater/ Urban Runoff	http://www.amlegal.com/library/ca/signalhill.shtml
12.16.020 Purpose and Intent - *The purpose of this chapter is to protect the public health, welfare and safety and to reduce the quantity of pollutants being discharged to the waters of the United States through: (D) The protection and enhancement of the quality of the waters of the United States in a manner consistent with the provisions of the Clean Water Act;*		
LACFCD	Flood Control District Code, Chapter 21 - Stormwater and Runoff Pollution Control	https://library.municode.com/index.aspx?clientId=16274
21.01 - Purpose and Intent - *The purpose and intent of this chapter is to regulate the stormwater and non-stormwater discharges to the facilities of the Los Angeles County Flood Control District for the protection of those facilities, the water quality of the waters in and downstream of those facilities, and the quality of the water that is being stored in water-bearing zones underground.*		

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8.0 Los Cerritos Channel Watershed Reasonable Assurance Analysis (RAA)

A key element of the WMP is the Reasonable Assurance Analysis (RAA), which is used to demonstrate "that the activities and control measures…will achieve applicable WQBELs and/or RWLs with compliance deadlines during the Permit term" (NPDES Permit Order No. R4-2012-0175, Section C.5.b.iv.(5); NPDES Permit Order No. R4-2014-0024, Section C.5.h.vii.(2)). Attachment A presents the revised RAA for the Los Cerritos Channel Watershed. While the Permits prescribe the RAA as a quantitative demonstration that control measures will be effective, the RAA also promotes a modeling process to identify and prioritize potential control measures to be implemented by the WMP. In other words, the RAA not only demonstrates the cumulative effectiveness of BMPs to be implemented, it also supports their selection. Furthermore, the RAA incorporates the applicable compliance dates and milestones for attainment of the WQBELs and RWLs, and therefore supports BMP scheduling.

The Watershed Management Modeling System (WMMS) was used to develop this RAA. WMMS is specified in the Permits as an optional tool to conduct the RAA. The Los Angeles County Flood Control District (LACFCD), through a joint effort with U.S. Environmental Protection Agency (USEPA), developed the WMMS specifically to support informed decisions associated with managing stormwater. The ultimate goal of the WMMS is to identify cost-effective water quality improvement projects through an integrated, watershed-based approach.

On March 25, 2014, the Los Angeles Regional Water Quality Control Board (Regional Board) issued "RAA Guidelines" (LARWQCB 2014) to provide information and guidance to assist permittees in development of the RAA. Attachment A provides appropriate documentation on the modeling assumptions that meet the RAA Guidelines.

The RAA describes the process for identifying milestones within the current and next Permit periods, as well as final milestones to meet applicable TMDLs. Modeling was performed to quantify necessary load reductions to achieve the milestones. Based on these load reduction targets, a pollutant reduction plan was established that outlines the types and sequencing of BMPs for each jurisdiction to achieve milestones throughout the schedule. The RAA provides a detailed list of the capacities needed for BMPs over time, incorporating the existing BMPs and control measures identified in the WMP. These recommendations serve as goals for each jurisdiction to seek opportunities for implementation over time, but strategies may change as opportunities for more cost-effective BMPs are identified throughout the schedule.

The RAA notes that flow monitoring data for the Los Cerritos Channel is required in order to evaluate simulated flow conditions against observed data. This data will be used to better characterize non-

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stormwater flow volumes to demonstrate that proposed volume retention BMPs will capture non-stormwater that would otherwise be discharged through the MS4 in the watershed Area.

Although it is impossible to guarantee a 100% capture of non-stormwater because of the possibility of an accident or the discharge of fire fighting discharges near the bottom of the Watershed, as explained elsewhere in this WMP, the current average dry-weather flows at Stearns Street are less than 0.5 cfs, and the Watershed Group is proposing to eliminate dry-weather flows. A current Proposition 84 project in the Watershed has discovered that periodic higher volume discharges do occur. These are being investigated, and it may be that they are permitted discharges that would not be subject to the non-stormwater discharge prohibitions. In any case, the Watershed Group is committed to monitor dry-weather flows to the extent practicable to provide data for a possible model recalibration during an adaptive management process.

The RAA for the Los Cerritos Channel Watershed is included in Attachment A.

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9.0 Coordinated Integrated Monitoring Program (CIMP)

The option of preparing a Coordinated Integrated Monitoring Program (CIMP) is provided in Attachment E of Order No. R4-2012-0175 and Attachment E of Order No. R4-2014-0024.

A Coordinated Integrated Monitoring Program (CIMP) is required to be submitted either separately or as part of a Watershed Management Plan (WMP). The CIMP is required to integrate requirements of the current Los Angeles County MS4 Permit, the City of Long Beach MS4 Permit, and TMDL monitoring requirements. This plan was developed to address five primary objects that include:

- Assess the chemical, physical, and biological impacts of discharges from the MS4s on receiving waters
- Assess compliance with receiving water limitations water limitations and water quality-based effluent limitations (WQBELs) established to implement TMDL wet and dry weather load allocations
- Characterize pollutant loads in MS4 discharges
- Identify sources of pollutants in MS4 discharges
- Measure and improve the effectiveness of pollutant controls implemented under the new MS4 permits.

The approach presented in the CIMP for the Los Cerritos Channel Watershed incorporates all objectives of the Attachment E Monitoring and Reporting Program (MRP) but provides a customized approach to address the objectives identified in the MRP for Stormwater Outfall Monitoring based upon the unique characteristics of the Los Cerritos Channel Watershed. Unlike other Watershed Management Groups (WMGs) in Los Angeles County, the LCC Watershed does not receive flow from other WMGs. External contributions of contaminants are limited to atmospheric deposition originating predominantly from major transportation corridors and facilities.

To facilitate review by the Regional Water Board, the CIMP for the Los Cerritos Channel Watershed has been prepared as a separate document and will be submitted separately. It addresses the MRP objectives related to:

- Receiving Water Monitoring
- Stormwater Outfall Monitoring
- Non-stormwater Outfall-Based Monitoring
- New Development/Redevelopment Effectiveness Training
- Regional Studies

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Section 10.0 Adaptive Management Process

10.1 Summary of Considerations for Adaptive Management Review

The adaptive management process is a critical component of the WMP; it makes the program much more than a static plan that could soon become outdated. "Adaptive Management" is another name for what the National Research Council (NRC) called "Adaptive Implementation" in its 2001 report entitled Assessing the TMDL Approach to Water Quality Management. The Council defined adaptive implementation as "a cyclical process in which TMDL plans are periodically assessed for their achievement of water quality standards including designated uses." The Council stated that, "if the implementation of the plan is not achieving the designated uses, scientific data and information should be used to revise the plan." The process envisioned by the National Research Council is presented in Figure 10-1.

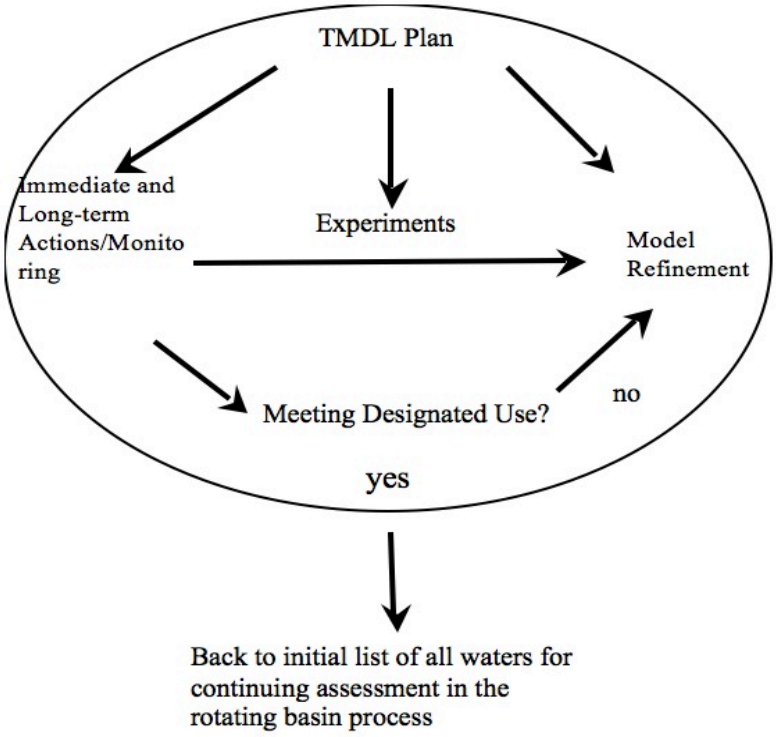

FIGURE 10-1. NRC Adaptive Implementation Flowchart
(Source: National Resource Council, *Assessing the TMDL Approach to Water Quality Management*, 2001.)

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The adaptive management process mandated by Order No. R4-2012-0175 extends the concept beyond TMDLs. It also includes all 303(d) listings of impairment and other exceedances of water quality standards (See Section 2 of this WMP).

In developing the adaptive management component of this WMP, the Watershed Group has leaned heavily on the thoughtful analysis of adaptive implementation by the Committee to Assess the Scientific Basis of the Total Maximum Daily Load Approach to Water Pollution Reduction that was assembled by the NRC to prepare its 2001 report. The Committee suggested that the adaptive implementation process should begin with initial actions that have a high degree of certainty and that future actions be based on 1) continued monitoring to determine how a waterbody responds to actions taken, and 2) carefully designed experiments in the watershed. The Committee appropriately referred to this approach as "a concurrent process of action and learning." The NRC Committee suggested a mix of actions, including immediate actions and an array of possible long-term actions. The Committee recognized that regardless of what immediate actions were taken, there may not be an immediate response in waterbody or biological conditions due to lag times between actions and responses – especially when pollutants are tightly bound to sediments. The Committee suggested that waterbodies be monitored to establish the trajectory of measured water quality criteria. The Committee described longer-term actions as those that show promise, but need further evaluation and development. Given the absence of dedicated revenue streams for funding stormwater quality projects within the watershed, the Watershed Group believes that developing funding sources for implementing longer-term actions is vital. The projected costs are much too great to be funded out of municipal General Fund budgets without adversely impacting other municipal programs.

The NRC Committee envisioned "success monitoring" following implementation action, such that if monitoring indicated a waterbody was meeting water quality standards, no further implementation actions would be taken and the waterbody would be returned to an "all waters" list where it would be monitored as part of a rotating basin process. The Committee also suggested that one of the most important applications of success monitoring data is to revise and improve the initial TMDL forecast over time. This concept is consistent with the application of TMDL reopeners to modify TMDLs based on new data and improved understanding of the underlying science. Stormwater is highly variable and episodic, leading to greater uncertainty in stormwater modeling. Over time this uncertainty can be reduced as monitoring data is gathered and physical, chemical, and biological processes are better understood.

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10.2 Process for Modifications to Watershed Management Program Resulting from Adaptive Management Review

Section VI.C.8.a I of Order No. R4-2012-0175 requires that Permittees implement an adaptive management process, every two years from the date of program approval, adapting the Watershed Management Program to become more effective based on several factors. This process fulfills the requirement in Part V.A.4 of the Order to address continuing exceedances of receiving water limitations.

The three key factors cited in the permit for consideration during the adaptive management process are the following compliance-related factors:

1) Progress toward achieving interim and/or final water quality-based effluent limitations and/or receiving water limitations in Part VI.E. and Attachments L through R, according to compliance schedules;

2) Progress toward achieving improved water quality in MS4 discharges and achieving receiving water limitations through implementation of the watershed control measures based on an evaluation of outfall-based monitoring data and receiving water monitoring data;

3) Achievement of interim milestones.

The Order also specifies four process-oriented factors that may be considered during the Adaptive Management Process, including:

1) Re-evaluation of the water quality priorities identified for the WMA based on more recent water quality data for discharges from the MS4 and the receiving water(s) and a reassessment of sources of pollutants in MS4 discharges;

2) Availability of new information and data from sources other than the Permittees' monitoring program(s) and a reassessment of sources of pollutants in MS4 discharges;

3) Regional Water Board recommendations; and

4) Recommendations for modifications in the Watershed Management Program solicited through a public participation process.

In addition, the Order indicates that the adaptive process is not limited to the enumerated factors. Any other relevant factors may also be considered.

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10.3 Los Cerritos Channel Adaptive Management Process

The adaptive management process for the Los Cerritos Channel Watershed is based on the experience of the municipalities and Caltrans working together to address the Los Cerritos Channel Metals TMDLs first proposed by USEPA in November 2008 and the working relationship established among the Permittees in the years since. In reality, the bi-annual process that will result in submission of an adaptive management report to the Regional Water Board every two years after approval of the WMP will be a continuous process.

Data from the receiving monitoring, watershed segmentation, and forensic monitoring components of the customized Coordinated Integrated Monitoring Program – as well as documentation of soil stabilization and sediment control and documentation of runoff reduction – will provide the critical basis for implementation of the adaptive management process during this permit cycle. Additional critical information will come from implementation of SB 346, development and implementation of zinc source control measures, implementation of Low Impact Development Ordinances and Green Streets Policies, documentation of trash control measures, documentation of runoff reduction measures, documentation of outreach programs, assessment of street sweeping effectiveness, and implementation of local and sub-watershed treatment control measures.

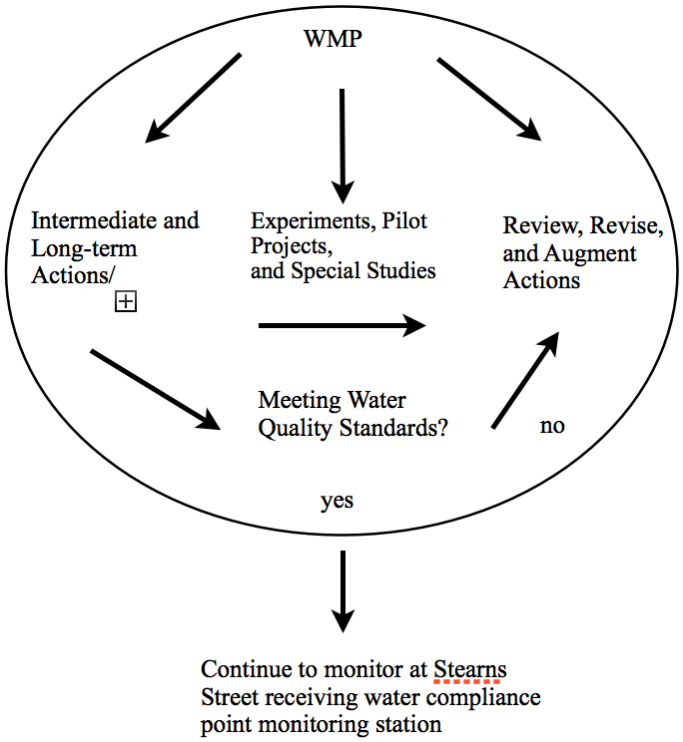

Figure 10-2. Los Cerritos Watershed Management Program Adaptive Management Flowchart

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In addition to the three compliance-related factors and the four process-oriented factors specified in Order No. R4-2012-0175, the Los Cerritos Channel Adaptive Management process will include evaluation of key assumptions, immediate and possible long-term actions, updates of maps and databases, and a discussion of stormwater funding measures. These factors include:

1) Evaluation of Immediate Actions, including:
   a) Minimum Control Measures implementation
   b) TSS Reduction Program implementation
   c) Dry-Weather Runoff Reduction Program implementation
   d) Proposition 84 Los Cerritos Channel Watershed Segmentation and LID Planning Project
   e) Targeted Enhanced Street Sweeping Program implementation
   f) Local No or Low Copper Brake Pad Education Program implementation
   g) Local No or Low Copper Pool Algaecide Education Program implementation
   h) Agreements for Locations of Initial Water Capture Devices
   i) Preliminary Design of Initial Capture Devices
   j) Safer Consumer Product Regulations support efforts
   k) EPA's Airport Lead Monitoring Study and FAA's Unleaded Avgas Transition Plan monitoring
   l) Monitoring of Greater Harbor Toxics TMDLs Regional Monitoring Coalition
   m) Water Control Policy for Developing California's Clean Water Act Section 303(d) List implementation monitoring
   n) Funding measure development monitoring
   o) Status of grant funding for stormwater capture projects

2) Evaluation or Re-evaluation of Long-Term Actions, including:
   a) Minimum control measures and other applicable immediate actions
   b) Low Impact Development Ordinances
   c) Green Streets Policies
   d) Full-capture trash control devices implementation
   e) Targeted installation of porous pavement
   f) Development and implementation of measures to reduce the release of zinc from municipal facilities and operations

3) Evaluation of Possible Long-Term Actions, including:
   a) Stormwater Capture and Infiltration Program implementation
   b) Stormwater Capture and Use Program implementation
   c) Additional dry-weather flow and targeted constituent monitoring with associated forensic monitoring (extension of Prop 84 project)

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d) Sand filter installation
e) Efforts to encourage the use of coated galvanized metal for exterior applications

4) Updating and refinement of storm drain, channel, and outfall mapping

5) Updating and refinement of storm drain, channel, and outfall database

6) Updating and refinement of land use mapping

7) Updating and refinement of land use database

The evaluation of key assumptions will include a review and evaluation of the assumptions of a 10% pollutant reduction for non-structural controls and a 25% reduction in irrigation. If it becomes apparent that either assumption is not supported, the Permittees commit to developing alternative controls.

10.4 Adaptive Management Process Reporting Program

Each adaptive management report will be structured based on the following topical outline:

- Executive Summary
- Assessment of progress toward achieving WQBELs and/or RWLs
- Assessment of progress toward achieving improved water quality in MS4 discharges
- Assessment of progress toward achievement of interim milestones
- Evaluation of water quality priorities
- Assessment of new information for sources other than the CIMP
- Assessment of Regional Water Board Recommendations
- Assessment of recommendations to the WMP from watershed stakeholders and the public
- Modifications to the WMP
- Updates and refinements to storm drain, channel, and outfall database
- Updates and refinements to land use database

The adaptive management report will be incorporated in the Annual Reports due on or before December 15th of the year in which a bi-annual anniversary of WMP approval occurs and as part of the Report of Waste Discharge due July 1, 2017.

Water quality data, information on the development and implementation of source control measures, sediment control, runoff reduction, BMP implementation, and program effectiveness will be gathered and accumulated annually in preparation for reporting on implementation of the adaptive management process every two years and future potential re-evaluation of the Reasonable Assurance Analysis.

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11.0 Reporting Program

11.1 Annual Report

The Watershed Group plans to eventually move to an integrated Watershed Annual Report. However, in the near future, annual reports will be submitted by individual Permittees. For now, the Watershed Group will prepare a WMP annual report to be attached to each participating agency's MS4 annual report for submittal to the Regional Water Board Executive Officer in an electronic format on or before December 15th. The WMP annual reports will present a summary of information that will allow the Regional Board to assess the implementation and effectiveness of the Watershed Management Program[1] The CIMP Annual Report will ultimately be attached to the integrated annual report. For now, copies of it will be attached to the individual MS4 annual reports.

The reporting process is intended to meet the following objectives:

- Each Permittee's participation in one or more Watershed Management Programs.
- The impact of each Permittee's stormwater and non-stormwater discharges on the receiving water.
- Compliance with receiving water limitations, numeric water quality-based effluent limitations, and non-stormwater action levels.
- The effectiveness of control measures in reducing discharges of pollutants from the MS4 to receiving waters.
- Whether the quality of MS4 discharges and the health of receiving waters is improving, staying the same, or declining as a result watershed management program efforts, and/or TMDL implementation measures, or other Minimum Control Measures.
- Whether changes in water quality can be attributed to pollutant controls imposed on new development, re-development, or retrofit projects.

Each report will include summaries for each of the following seven sections as required by the MS4 Permit:

1) Stormwater Control Measures – Including estimated cumulative change in percent EIA Since effective date of the Permit; summary of new development/re-development, retrofit, and other projects designed to intercept stormwater runoff constructed during the reporting year, including estimated total runoff volume captured; summary of actions taken to comply with the approved WMP; summary of riparian/wetlands restoration projects; summary of other MCMs as Permittee deems relevant; and status of multi-year projects continuing into subsequent years.

[1] Annual reports will cover the previous July 1st through June 30th time period.

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2) Effectiveness Assessment of Stormwater Control Measures – Including summary of rainfall data for the reporting year; hydrographs or flow data for applicable storms; and assessments and comparisons of water quality data, including summaries as to whether or not water quality is improving, staying the same, or declining;
3) Non-Stormwater Control Measures – Including estimates of the number of major outfalls within a Permittee's jurisdiction; number of outfalls screened for significant non-stormwater discharges for reporting year and cumulatively; and attribution of outfalls with confirmed significant non-stormwater discharges
4) Effectiveness Assessment of Non-Stormwater Control Measures – Including summary of the effectiveness of control measures implemented
5) Integrated Monitoring Compliance Report – Including summary of identified exceedances of outfall-based stormwater monitoring data, wet weather receiving water monitoring data, dry weather receiving water data and non-stormwater outfall monitoring data; summary of TIE data, if applicable; and description of efforts taken to mitigate and/or eliminate stormwater and non-stormwater discharges that exceed applicable WQBELs or action levels, if applicable
6) Adaptive Management Strategies – Including summary of effective control measures and of less effective control measures; description of significant changes to control measures anticipated to be made in the next year and a rationale for those changes; a detailed description of control measures to be applied to new development or redevelopment projects disturbing more than 50 acres; and status of all multi-year efforts not completed in the current year that will continue
7) Supporting Data and Information – Include a summary of all monitoring data and associated meta data

The participating agencies will submit annual reports as required by the MS4 Permit. The Regional Board is currently preparing a reporting format. Once available, the reporting form will be incorporated into the WMP as an appendix.

11.2 Watershed Summary Information

The WMP Annual Report will include information specified in Section XVII.B of Attachment E of Order No. R4-2012-0175 and Section XVII.A of Attachment E Order No. R4-2014-0024 in odd year Annual Reports. This information will include information related to:

- Watershed Management Area Information
- Sub-watershed (HUC-12) Description
- Permittees' Drainage Areas within the Watershed

The Watershed Group may reference the WMP in the odd-year report, when the required information is already included or addressed in the WMP, to satisfy baseline information requirements.

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11.3 TMDL Reporting

The Watershed Group will report progress of TMDL implementation per schedules in Section XIX of Attachment E of Order No. R4-2012-0175 and Order No. R4-2014-0024. The TMDL reporting that will be addressed is the Los Cerritos Channel Metals TMDLs. Section XIX.F of Attachment E specifies two types of annual reports related to the TMDL:

- Annual Monitoring Reports
- Annual Progress Reports

Both reports are due December 15 annually and will be incorporated into the CIMP Annual Reports required by Section XV of Attachment E.

11.4 Report of Waste Discharge

In accordance with Title 23, Division 3, Chapter 9 of the California Code of Regulations and Title 40, Part 122 of the Code of Federal Regulations, each Discharger shall file a Report of Waste Discharge (ROWD) as application for issuance of new waste discharge requirements no later than 180 days prior to the Order expiration date – December 28, 2017. The Watershed Group proposes to submit the ROWD on behalf of the Permittees within the Watershed on or before July 1, 2017.

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ATTACHMENT A:

REASONABLE ASSURANCE ANALYSIS FOR LOWER LOS ANGELES RIVER, LOS CERRITOS CHANNEL, AND LOWER SAN GABRIEL RIVER

Reasonable Assurance Analysis for Lower Los Angeles River, Los Cerritos Creek, and Lower San Gabriel River

Submitted to:

LLAR WMP Group LCC WMP Group LSGR WMP Group

Submitted by:

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January 15, 2015

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1. Introduction

The Municipal Separate Storm Sewer System Permit (Permits) for Los Angeles County[1] and the City of Long Beach[2] includes optional provisions for a Watershed Management Program (WMP) that allows permittees the flexibility to customize their stormwater programs to achieve compliance with applicable receiving water limitations (RWLs) and water quality based effluent limitations (WQBELs) through implementation of control measures. A key element of each WMP is the Reasonable Assurance Analysis (RAA), which is used to demonstrate "that the activities and control measures…will achieve applicable WQBELs and/or RWLs with compliance deadlines during the Permit term" (NPDES Permit Order No. R4-2012-0175, Section C.5.b.iv.[5], page 64; NPDES Permit Order No. R4-2014-0024, Section C.5.h.vii.[2]). This report presents the Reasonable Assurance Analysis (RAA) for the Lower Los Angeles River (LLAR), Los Cerritos Channel (LCC), and Lower San Gabriel River (LSGR) WMPs.

While the Permits prescribe the RAA as a quantitative demonstration that control measures (best management practices [BMPs]) will be effective, the RAA also promotes a modeling process to identify and prioritize potential control measures to be implemented by the WMP. In other words, the RAA not only demonstrates the cumulative effectiveness of BMPs to be implemented, it also supports their *selection*. Furthermore, the RAA incorporates the applicable compliance dates and milestones for attainment of the WQBELs and RWLs, and therefore supports BMP scheduling.

On March 25, 2014, the Los Angeles Regional Water Quality Control Board (Regional Board) issued "RAA Guidelines" (LARWQCB 2014) to provide information and guidance to assist permittees in development of the RAA. The approach herein is consistent with the RAA Guidelines.

This report is organized in nine sections, as follows:

- Section 1: Introduction
- Section 2: Applicable Interim and Final Requirements
- Section 3: Modeling System to be used for the RAA
- Section 4: Current/Baseline Pollutant Loading
- Section 5: Estimated Required Pollutant Reductions
- Section 6: Determination of BMP Capacity for RAA
- Section 7: Cumulative Volume Reduction Goals to Achieve Required Reductions
- Section 8: Pollutant Reduction Plan
- Section 9: References

[1] National Pollutant Discharge Elimination System Permit Order No. R4-2012-0175

[2] National Pollutant Discharge Elimination System Permit Order No. R4-2014-0024

2. Applicable Interim and Final Requirements

The WMPs for LLAR, LCC, and LSGR follow the process in the Permits and identify the Water Quality Priorities (WQ Priorities) including the highest (Category 1) Water Quality Priorities which are subject to Total Maximum Daily Loads (TMDLs) and WQBELs. Practically all of these TMDLs include associated compliance schedules that are considered in this RAA. The TMDL and WMP milestones/compliance dates establish the pace at which BMPs must be implemented. Traditionally, the approach of TMDL implementation plans has been focused on *final* TMDL compliance, whereas the Permit compliance paths offered to WMPs increase emphasis on *milestones*. In line with the RAA Guidelines, for all final TMDL and TMDL/WMP milestones that occur in the next two Permit cycles, the combination of BMPs expected to result in attainment of the corresponding Permit limits are identified.

The TMDL milestones for the LLAR, LCC, and LSGR WMP areas are shown in Table 2-2 through Table 2-4. The Permits require each WMP to provide reasonable assurance for the TMDL milestones that occur in the current Permit term. If applicable TMDLs do not prescribe a milestone in the current Permits, a milestone must be established. The array of TMDLs creates a potentially complicated sequence based on multiple pollutants, and thus this RAA includes a limiting pollutant analysis. As described in Section 5, the identified limiting pollutant for wet weather is zinc for LLAR, LCC, and LSGR. As such, the wet weather milestones for the Los Angeles River, Los Cerritos Channel, and San Gabriel River Metals TMDLs establish the pace of stormwater BMP implementation. The wet weather milestones established for the current Permits include the following:

- **Lower Los Angeles River:** Achieve 31% of the required reduction by September 30, 2017. This milestone was created for the WMP, as the metals TMDL includes a 25% milestone in 2012 (prior to the current Permit term) and a 50% milestone in 2024 (beyond the current Permit term). Achievement of this milestone for zinc provides reasonable assurance of achieving a similar or greater reduction for other WQ Priorities.
- **Los Cerritos Channel:** Achieve 10% of the required reduction[3] by September 30, 2017. This milestone is directly from the metals TMDL. Achievement of this milestone for zinc provides reasonable assurance of achieving a similar or greater reduction for other WQ Priorities.
- **Lower San Gabriel River:** Achieve 10% of the required reduction by September 30, 2017. This milestone is directly from the metals TMDL. Achievement of this milestone for zinc provides reasonable assurance of achieving a similar or greater reduction for other WQ Priorities.

The pollutant reduction plan to achieve these milestones is described in Section 8, along with the plan to achieve the milestones for the next Permit term (achieve 35% of the required reduction in LCC and LSGR and achieve 50% of the required reduction in LLAR). A summary of the milestones within the current and next Permit terms and final milestone based on final TMDLs are summarized in Table 2-1. The required reductions that form the basis of the milestones are calculated in Section 5.

[3] The interim milestones are expressed in terms of the *required* reduction not total reduction (e.g., if the required reduction to attain final limits is 50%, then the 10% milestone equates to a 5% reduction). These reductions are calculated in Section 5.

Table 2-1. Summary of schedule for interim and final milestones

WMP Area	Milestone 1 (2017)	Milestone 2 (interim date of applicable metals TMDL)	Milestone 3 (final date of applicable metals TMDL)
LLAR	31%	50%	100%
LCC	10%	35%	100%
LSGR	10%	35%	100%

Table 2-2. Schedule of TMDL milestones for the Lower LA River

TMDL	Constituents	Compliance Goal	Weather Condition	Compliance Dates and Compliance Milestone (Bolded numbers indicated milestone deadlines within the current Permit term) [1]									
				2012	**2013**	**2014**	**2015**	**2016**	2020	2024	2028	2032	2037
LAR Nutrients	Ammonia-N, Nitrate-N, Nitrite-N, Nitrate-N+Nitrite-N	Meet WQBELs	All	Pre 2012									
				Final									
LAR Trash	Trash	% Reduction	All	9/30	9/30	9/30	9/30	9/30					
				70%	80%	**90%**	**96.70%**	**100%**					
LAR Metals	Copper, Lead	% of MS4 area Meets WQBELs	Dry	1/11					1/11	1/11			
				50%					75%	100%			
	Copper, Lead, Zinc, Cadmium	% of MS4 area Meets WQBELs	Wet	1/11						1/11	1/11		
				25%						50%	100%		
LA River Bacteria	*E. coli*	Meet WQBELs	Wet and Dry[2]										3/23
													Final
Dominguez Channel and LA/LB Harbors Toxics	Sediment: DDTs, PCBs, Copper, Lead, Zinc, PAHs	Meet WQBELs	All	12/28								3/23	
				Interim								Final	
Long Beach City Beaches and LAR Estuary Bacteria	Total Coliform, Fecal Coliform, Enterococcus	Meet WLAs	All	USEPA TMDLs, which do not contain interim milestones or implementation schedule. The Permits allow MS4 Permittees to propose a schedule in a WMP.									

[1] The Permit term is assumed to be five years from the Los Angeles County Permit effective date or December 27, 2017.

[2] The schedule for attaining the dry weather Bacteria TMDL is not shown in Table 3-2, which is stepwise by reach/segment and depends on whether a Load Reduction Strategy is developed for implementation.

Table 2-3. Schedule of TMDL milestones for Los Cerritos Channel WMP

TMDL	Constituents	Compliance Goal	Weather Condition	Compliance Dates and Compliance Milestone (Bolded numbers indicated milestone deadlines within the current Permit term) [1]									
				2012	**2013**	**2014**	**2015**	**2016**	2017	2020	2023	2026	2032
Los Cerritos Channel Metals	Copper	% Load Reduction or % of MS4 area Meets WQBELs	Dry						9/30	9/30			
									30%	70%	100%		
	Copper, Lead, Zinc	% Load Reduction or % of MS4 area Meets WQBELs	Wet						9/30	9/30			
									10%	35%	70%	100%	
Dominguez Channel and LA/LB Harbors Toxics	Sediment: DDTs, PCBs, Copper, Lead, Zinc, PAHs	Meet WQBELs	All	12/28									3/23
				Interim									Final

[1] The Permit term is assumed to be five years from the Los Angeles County Permit effective date or December 27, 2017.

Table 2-4. Schedule of TMDL milestones for the Lower San Gabriel River WMP

TMDL	Constituents	Compliance Goal	Weather Condition	Compliance Dates and Compliance Milestone (Bolded numbers indicated milestone deadlines within the current Permit term) [1]									
				2012	**2013**	**2014**	**2015**	**2016**	2017	2020	2023	2026	2032
San Gabriel River Metals	Copper, Selenium	% Load Reduction or % of MS4 area Meets WQBELs	Dry						9/30	9/30			
									30%	70%	100%		
	Copper, Lead, Zinc	% Load Reduction or % of MS4 area Meets WQBELs	Wet						9/30	9/30			
									10%	35%	70%	100%	
Dominguez Channel and LA/LB Harbors Toxics	Sediment: DDTs, PCBs, Copper, Lead, Zinc, PAHs	Meet WQBELs	All	12/28									3/23
				Interim									Final

[1] The Permit term is assumed to be five years from the Los Angeles County Permit effective date or December 27, 2017.

3. Modeling System used for the RAA

The Watershed Management Modeling System (WMMS) was used to develop this RAA. WMMS is specified in the Permits as a potential tool to conduct the RAA. The Los Angeles County Flood Control District (LACFCD), through a joint effort with U.S. Environmental Protection Agency (USEPA), developed WMMS specifically to support informed decisions associated with managing stormwater. The ultimate goal of WMMS is to identify cost-effective water quality improvement projects through an integrated, watershed-based approach. The WMMS encompasses Los Angeles County's coastal watersheds of approximately 3,100 square miles, representing 2,566 subwatersheds (Figure 3-1). As described in the following subsections, WMMS is a modeling system that incorporates three tools: (1) the watershed model for prediction of long-term hydrology and pollutant loading, (2) a BMP model, and (3) a BMP optimization tool to support regional, cost-effective planning efforts. A version of WMMS is available for public download from LACFCD.

The version of WMMS to be used for the RAA in the LLAR, LLC, and LSGR WMPs is customized from the public download version, including the following modification/enhancements:

- Updates to meteorological records to represent the last 10 years (per the RAA Guidelines) and to allow for simulation of the design storm;
- Calibration adjustments to incorporate the most recent 10 years of water quality data collected at the nearby mass emission station;
- Application of a second-tier of BMP optimization using System for Urban Stormwater Treatment and Analysis INtegration (SUSTAIN), which replaces the Nonlinearity-Interval Mapping Scheme (NIMS) component of WMMS.
- Optimization of BMP effectiveness for removal of bacteria pollutants (rather than metals only); and
- Updates to Geographic Information System (GIS) layers, as available.

The subwatersheds in the LLAR, LLC, and LSGR WMP areas that are represented by WMMS are shown in Figure 3-2 through Figure 3-4, which include modifications to confine to jurisdictional boundaries included in these WMP areas. Also shown are the "RAA assessment points", which are used to calculate required load reductions (described in Section 5).

3.1. Watershed Model - LSPC

The watershed model included within WMMS is the Loading Simulation Program C++ (LSPC) (Shen et al. 2004; Tetra Tech and USEPA 2002; USEPA 2003). LSPC is a watershed modeling system for simulating watershed hydrology, erosion, and water quality processes, as well as in-stream transport processes. LSPC also integrates a geographic information system (GIS), comprehensive data storage and management capabilities, and a data analysis/post-processing system into a convenient PC-based Windows environment. The algorithms of LSPC are identical to a subset of those in the Hydrologic Simulation Program–FORTRAN (HSPF) model with selected additions, such as algorithms to dynamically address land use change over time. Another advantage of LSPC is that there is no inherent limit to the size and resolution of the model than can be developed, making it an attractive option for modeling the Los Angeles region watersheds. USEPA's Office of Research and Development (Athens, Georgia) first made LSPC available as a component of USEPA's National TMDL Toolbox (http://www.epa.gov/athens/wwqtsc/index.html). LSPC has been further enhanced with expanded capabilities since its original public release.

The WMMS development effort culminated in a comprehensive watershed model of the Los Angeles County Flood Control District that includes the unique hydrology and hydraulics of the system and characterization of water quality loading, fate, and transport for all the key TMDL constituents (LACDPW 2010a, 2010b). Since the original development of the WMMS LSPC model, Los Angeles County personnel have independently updated the model with meteorological data through April 2012.

To support the objectives of the WMPs, jurisdictional boundaries were also intersected with the WMMS LSPC model subwatersheds resulting in a finer resolution spatial unit for modeling. Model land use was then resampled using this subwatershed-jurisdiction intersect, properly distributing land use categories at the jurisdictional level for attributing sources, while maintaining hydrologic connectivity within the watershed model. This refinement introduced a new layer of resolution, facilitating the rollup of modeled results by jurisdiction to better support source attribution and implementation responsibilities among the participating entities.

Figure 3-1. WMMS model domain and represented land uses and slopes by subwatershed

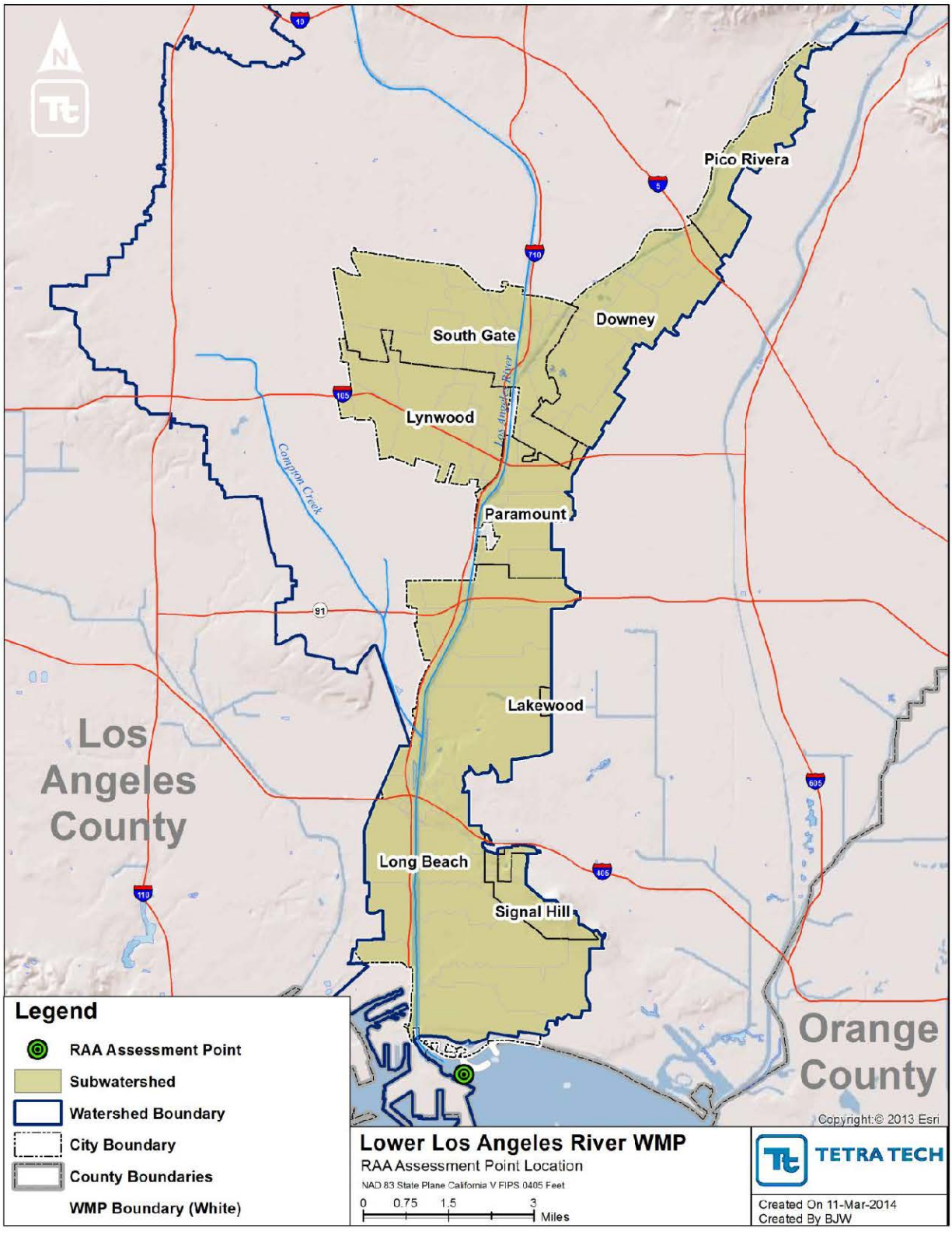

Figure 3-2. Lower LA River WMP Area subwatersheds represented by WMMS

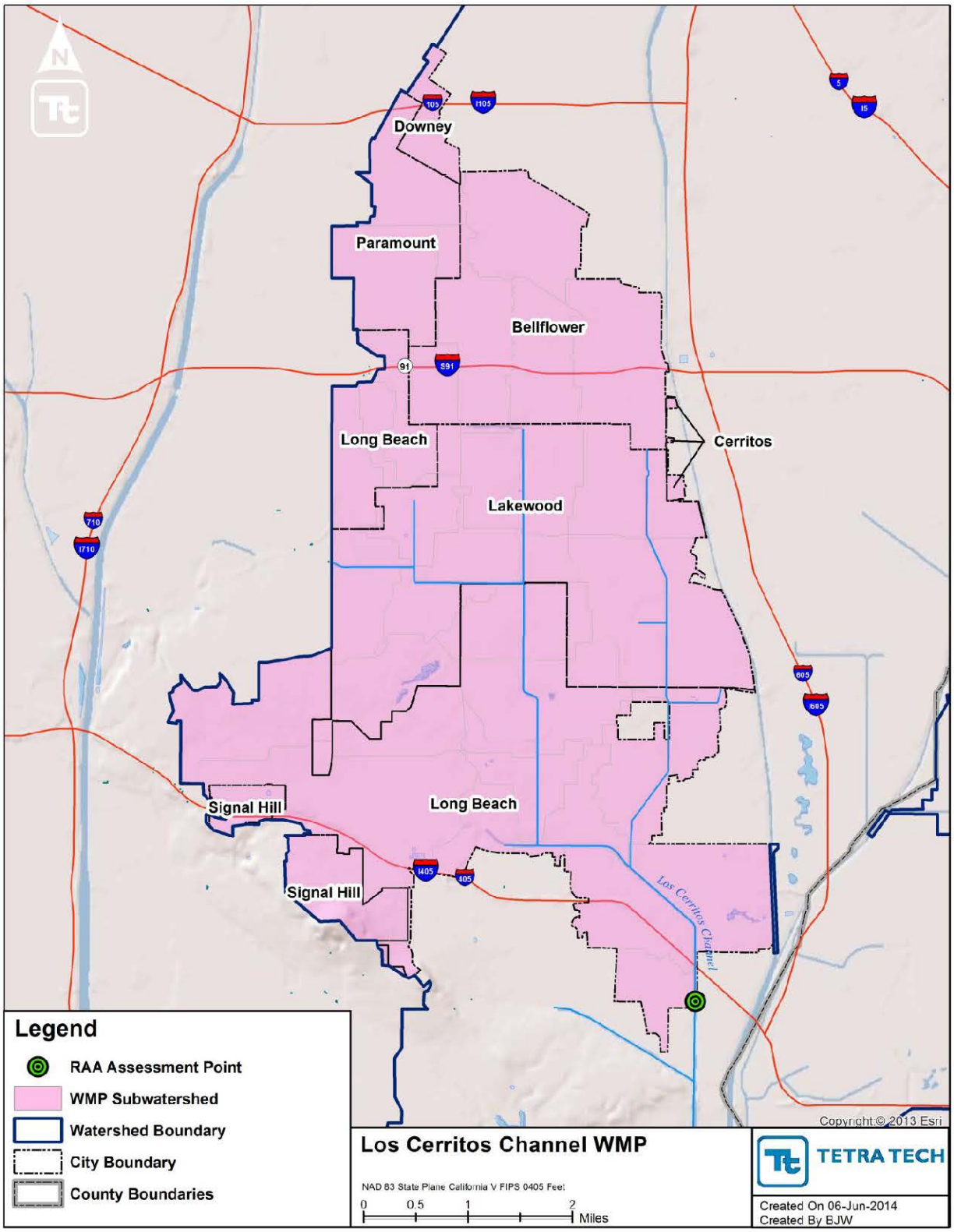

Figure 3-3. Los Cerritos WMP Area subwatersheds represented by WMMS

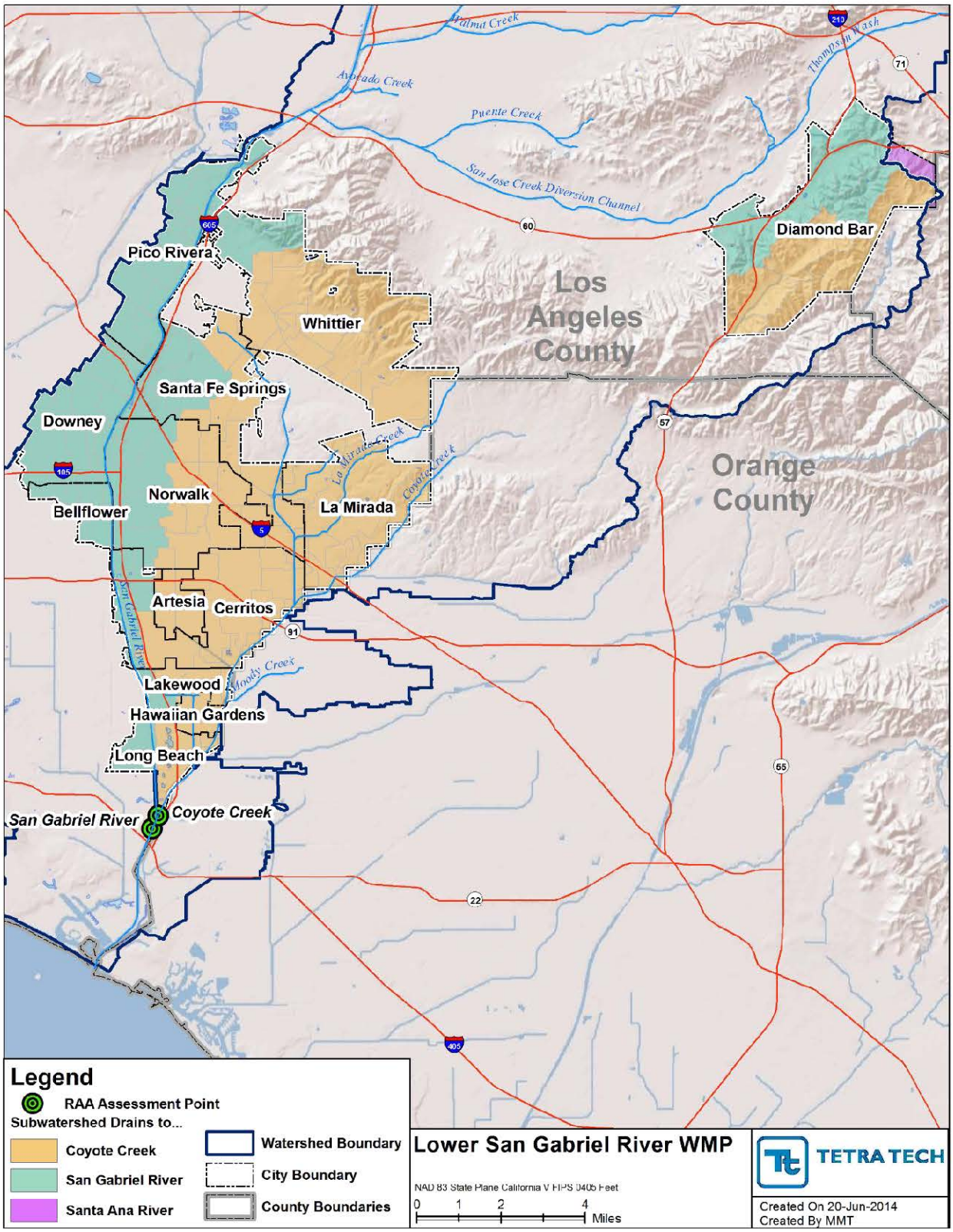

Figure 3-4. Lower San Gabriel River WMP Area subwatersheds represented by WMMS

3.2. Small-Scale BMP Model – SUSTAIN

The System for Urban Stormwater Treatment and Analysis INtegration (SUSTAIN) was developed by USEPA to support practitioners in developing cost-effective management plans for municipal storm water programs and evaluating and selecting BMPs to achieve water resource goals (USEPA, 2009). It was specifically developed as a decision-support system for selection and placement of BMPs at strategic locations in urban watersheds. It includes a process-based continuous simulation BMP module for representing flow and pollutant transport routing through various types of structural BMPs. Users are given the option to select from various algorithms for certain processes (e.g., flow routing, infiltration, etc.) depending on available data, consistency with coupled modeling assumptions, and the level of detail required. Figure 2-3 shows images from the SUSTAIN model user interface and documentation depicting some of the available BMP simulation options in a watershed context.

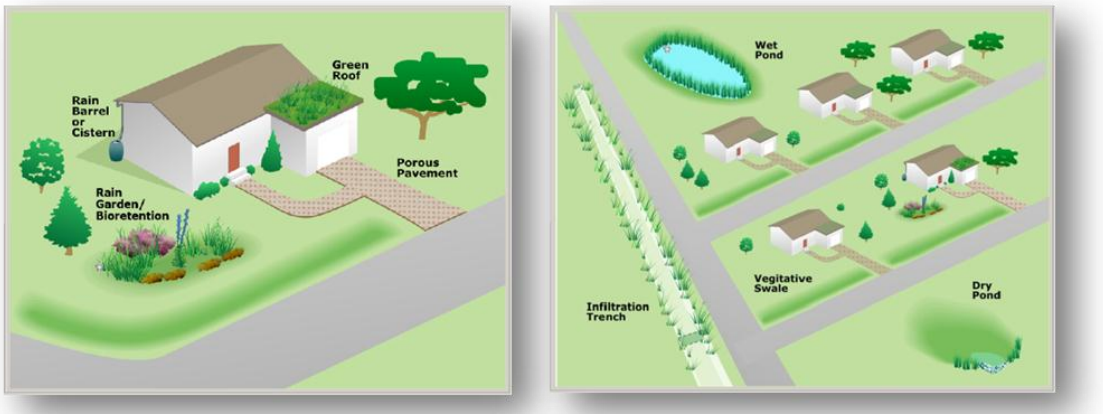

Figure 2-3. SUSTAIN model interface illustrating some available BMPs in watershed settings

SUSTAIN extends the capabilities and functionality of traditionally available models by providing integrated analysis of water quantity, quality, and *cost factors*. The SUSTAIN model in WMMS includes a cost database comprised of typical BMP component cost data from a number of published sources including BMPs constructed and maintained in Los Angeles County. SUSTAIN considers certain BMP properties as "decision variables," meaning that they are permitted to change within a given range during model simulation to support BMP selection and placement optimization. As BMP size changes, so do cost and performance. SUSTAIN runs iteratively to generate a cost-effectiveness curve comprised of optimized BMP combinations within the modeled study area (e.g., the model evaluates the optimal width and depth of certain BMPs to determine the most cost-effective configurations for planning purposes).

3.3. Large-Scale BMP Optimization Tool – NIMS/SUSTAIN

WMMS was specifically designed to dynamically evaluate effectiveness of BMPs implemented in subwatersheds for meeting downstream RWLs while maximizing cost-benefit. WMMS employs optimization based on an algorithm names Nonlinearity-Interval Mapping Scheme (NIMS) to navigate through the many potential scenarios of BMP strategies and identify the strategies that are the most cost effective (Zou et al. 2010). Given the relatively small spatial scale of the WMP area, NIMS was not applied for this study. Instead, a two-tiered approach was applied using the NSGA-II solution technique available in SUSTAIN. For Tier 1, treatment capacities were optimized for each contributing segment, which resulted in unique cost-effectiveness curves for each segment based on available opportunities therein. For Tier 2, the search space was composed of Tier 1 solutions, thereby streamlining the search process. The resulting Tier 2 curve represents the optimal large scale solution because it is comprised of optimized Tier 1 solutions. This approach is especially useful for prioritizing areas for management for scheduling implementation milestones as described in Section 8.

4. Current/Baseline Pollutant Loading

The LSPC model within WMMS was reconfigured and recalibrated specifically for the WMP areas to provide an estimate of current/existing pollutant loads from jurisdictions within the WMPs. Reconfiguration of model subwatersheds was performed to provide specific accounting of loadings from individual jurisdictions. Calibrations were performed to meet specifications of the RAA Guidelines (LARWQCB 2014).

4.1. Model Calibration to Existing Conditions

The LSPC watershed model was originally calibrated for hydrology using a regional approach relying on USGS observed daily streamflow datasets through Water Year (WY) 2006 (LACDPW 2010a). Water Quality was then calibrated using small-scale, land use level water quality monitoring data to develop representative event mean concentrations by land use (LACDPW 2010b). Model performance was also validated at the mass emissions monitoring stations in the context of a county-wide modeling effort. The calibration period for the original WMMS LSPC model began in 1996 and ended in 2006. For the RAA, an analysis was performed to evaluate performance of the LSPC model as it relates to the LLAR, LCC, and LSGR watersheds to understand and benchmark its applicability for use as a baseline condition. The evaluation of monitoring data was extended beyond the original WMMS-LSPC calibration to include the period from 10/1/2001 through 9/30/2011 incorporating both the average year (WY 2008) and 90th percentile (WY 2003) year.

Data available for the LACDPW water quality and hydrologic monitoring stations, S10 and F319 were used to reexamine simulated water quality and hydrology conditions in LA River. The two stations are co-located just south of the West Wardlow Road overpass and drain approximately 800 square miles, or nearly the entire LA River watershed. The monitoring stations were selected for comparison due to their location near the outlet of the LA River watershed, which encompasses the aggregate contributions of all upstream pollutant sources. The selected flow gage, F319, was also used to calibrate the WMMS LSPC model and, therefore, links the current and previous efforts. Water quality and hydrologic records for WYs 2003–2011 were compared to the simulated watershed model output to determine the necessary model parameter adjustments to establish an up-to-date model calibration. The locations of these two gages are presented in Figure 4-1. Statistical summaries and flow regime analysis of the water quality monitoring datasets from the Los Angeles River mass emission station S10 are presented in Attachment E.

Watershed model simulation of existing water quality conditions for the LCC watershed were evaluated for WYs 2003–2011 using data collected at the City of Long Beach Stearns Street monitoring location, just north of interstate 405. The water quality monitoring location is positioned at the WMP hydrologic outlet and captures the cumulative watershed loading effects impacting water quality conditions in this 27 square mile portion of the LCC watershed. No flow monitoring data are available in the watershed, thus simulated flow conditions could not be evaluated against observed data for LCC. The location of the water quality monitoring is presented in Figure 4-1 below and statistical summaries of the monitoring dataset are presented in Attachment E.

For the LSGR, hydrology was re-assessed at two monitoring locations using available data from WYs 2001-2011 The two monitoring locations selected include USGS 11087020 San Gabriel River at Whittier Narrows Dam CA and the LACDPW streamflow gage F354 located along Coyote Creek south of Spring Street (coincident with mass emission station S13). The USGS gage was selected for continuity with the development and calibration of the original WMMS LSPC modeling system. The primary monitoring location selected to calibrate water quality for LSGR was the LA County mass emission station S14. The San Gabriel River Monitoring Station is located below San Gabriel River Parkway in Pico Rivera. At this location the upstream tributary area is 450 square miles (LACDPW 2013). A second mass emission station, the Coyote Creek Monitoring Station (S13) located below Spring Street in the lower San Gabriel River watershed was also used to validate the water quality calibration. The locations of these two gages are presented below in Figure 4-1. Statistical summaries and flow regime analysis of the water quality monitoring datasets from the San Gabriel River and Coyote Creek mass emission stations S14 and S13 are presented in Attachment E.

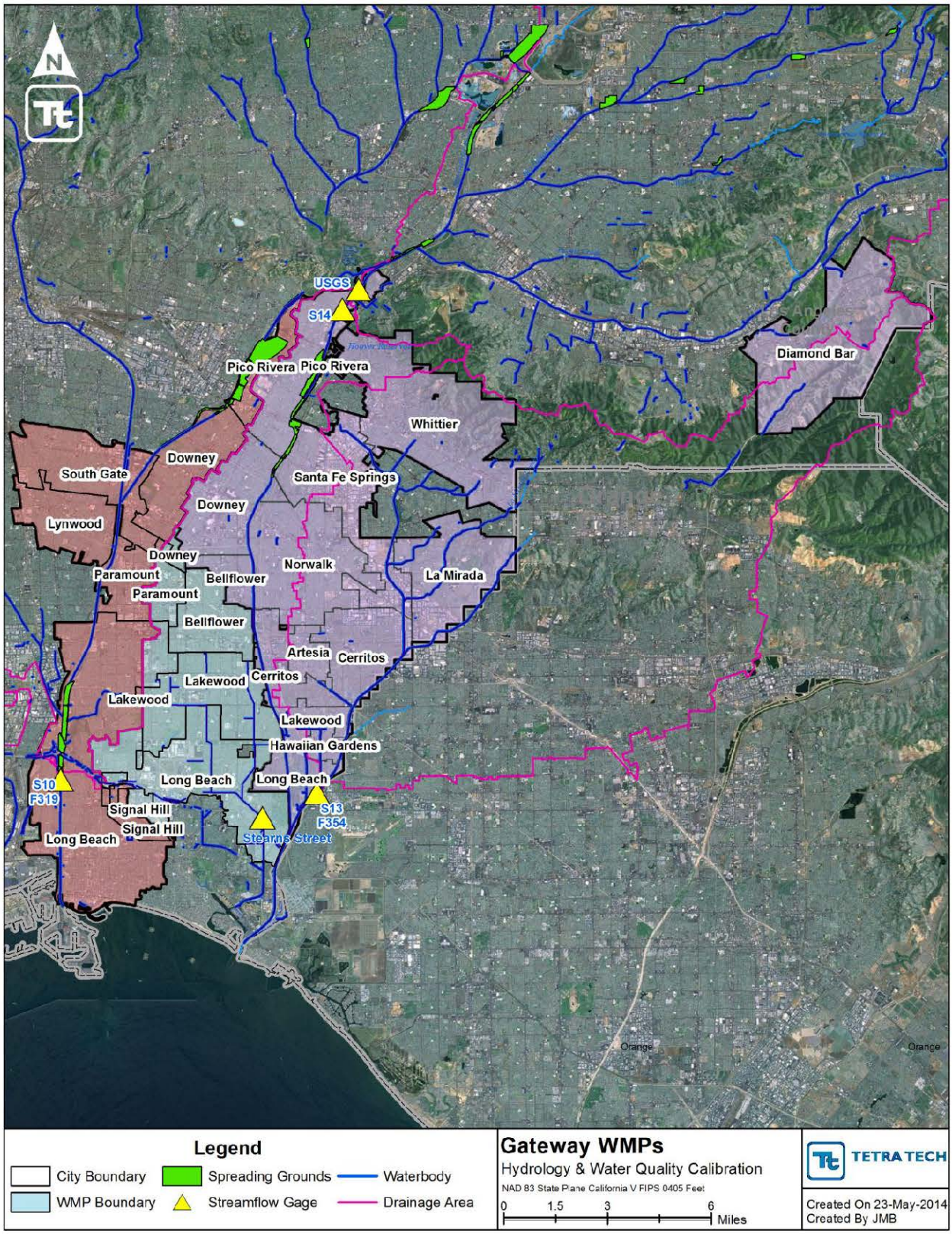

Figure 4-1. WMP groups hydrology and water quality calibration sites.

To demonstrate the ability to predict the effect of watershed processes and management actions, model calibration and validation are necessary and critical steps in any model application. Acceptable model calibration criteria for

benchmarking an RAA were developed by the Regional Board and are listed below in Table 4-1 (LARWQCB 2014). The objectives of establishing model assessment criteria are to ensure the calibrated model reflects all the model conditions and properly utilizes the available modeling parameters, thus yielding meaningful results. The lower bound of "Fair" level of agreement listed in Table 4-1 is considered a target tolerance for the model calibration process.

Table 4-1. Model assessment criteria from the RAA Guidelines

Constituent Group	Percent Difference Between Modeled and Observed		
	Very Good	Good	Fair
Hydrology / Flow	0 – 10	>10 – 15	>15 – 25
Sediment	0 – 20	>20 – 30	>30 – 40
Water Quality	0 – 15	>15 – 25	>25 – 35
Pesticides / Toxics	0 – 20	>20 – 30	>30 – 40

4.1.1. Hydrology Calibration

Table 4-2 and Table 4-3 present the hydrology calibration assessment for the Lower Los Angeles River and Lower San Gabriel River gages, respectively. Nash-Sutcliffle efficiency is a correlation coefficient commonly used in hydrological modeling to measure how well a model predicts temporal variation. A value of 1.0 means a perfect match between modeled and observed. A value of 0 means that the computed mean of observed data is as good a predictor as the model. A negative value means that the data-mean is a better predictor than the model. Because the Regional Board guidance only required annual average flow volume metric, evaluating Nash-Sutcliffe helped to demonstrate that the model also performed well at predicting *intra-annual* flow variablilty.

Table 4-2. Summary of model hydrology calibration performance for Lower Los Angeles River

Water Quality Parameter	Model Period	Hydrology Parameter	Modeled vs. Observed Volume (% Error)	Regional Board Guidance Assessment
In-stream flow at Los Angeles River below Wardlow Road (LA DPW F319)	10/1/2002 – 9/30/2011	Flow Volume	8.72	Very Good
		Nash-Sutcliffe	0.680	n/a

Table 4-3. Summary of model hydrology calibration performance for Lower San Gabriel River

Water Quality Parameter	Model Period	Hydrology Parameter	Modeled vs. Observed Volume (% Error)	Regional Board Guidance Assessment
In-stream flow at SAN GABRIEL R AB WHITTIER NARROWS DAM CA (USGS 1108702)	10/1/2001 – 9/30/2011	Flow Volume	-3.31	Very Good
		Nash-Sutcliffe	0.64	n/a
Coyote Creek near Spring Street (LA DPW F354)	10/1/2003 – 9/30/2011	Flow Volume	-6.17	Very Good
		Nash-Sutcliffe	0.62	n/a

4.1.2. Water Quality Calibration

Water quality calibration for the LLAR, LCC, and LSGR incorporated sampling from LA County mass emission stations at S10 (LA River), Strearns Street (LCC), and S13 and S14 along Coyote Creek and the San Gabriel River, respectively. The updated observed concentration data collected at these sites were used to refine the calibration and benchmark model performance. Daily observed loads were calculated by multiplying observed concentration and daily observed flow. Daily loads were estimated for LCC using simulated flows due to the lack of observed data. The percent error between this daily observed load and the daily modeled load was then calculated for each constituent. The results of this evaluation at the two gages are presented in Table 4-4 through Table 4-7.

Table 4-4. Summary of model performance by constituent at the Los Angeles River (S10) monitoring location

Water Quality Parameter	Sample Count	Modeled vs. Observed Load (% Error)	Regional Board Guidance Assessment
Total Sediment	91	-6.8	Very Good
Total Copper	58	-3.4	Very Good
Total Zinc	58	-18.1	Good
Total Lead	52	-0.1	Very Good
Fecal Coliform	57	-5.1	Very Good
Total Nitrogen	58	-4.0	Very Good
Total Phosphorous	57	6.9	Very Good

Table 4-5. Summary of model performance by constituent at Los Cerritos Channel (Stearns St.) monitoring location

Water Quality Parameter	Sample Count	Modeled vs. Observed Load (% Error)	Regional Board Guidance Assessment
Total Sediment	85	2.7	Very Good
Total Copper	57	-2.1	Very Good
Total Zinc	56	1.5	Very Good
Total Lead	57	2.2	Very Good
Fecal Coliform	55	1.0	Very Good
Total Nitrogen	56	17.5	Good
Total Phosphorous	56	-0.4	Very Good

Table 4-6. Summary of model performance by constituent at the San Gabriel River (S14) monitoring location

Water Quality Parameter	Sample Count	Modeled vs. Observed Load (% Error)	Regional Board Guidance Assessment
Total Sediment	45	8.57	Very Good
Total Copper	42	-9	Very Good
Total Zinc	44	16.1	Very Good
Total Lead	44	-3.97	Very Good
Fecal Coliform	43	1.85	Very Good
Total Nitrogen	*Not evaluated at this location*		
Total Phosphorous	44	-2.27	Very Good

Table 4-7. Summary of model performance by constituent at the Coyote Creek (S13) monitoring location

Water Quality Parameter	Sample Count	Modeled vs. Observed Load (% Error)	Regional Board Guidance Assessment
Total Sediment	42	1.28	Very Good
Total Copper	27	-28.9	Fair
Total Zinc	27	-32.44	Fair
Total Lead	25	-1.58	Very Good
Fecal Coliform	24	-34.48	Fair
Total Nitrogen	*Not evaluated at this location*		
Total Phosphorous			

Two fecal coliform samples were removed from the observed dataset at the San Gabriel River S14 mass emission station prior to performing the load calculation. These two samples appear to be outliers in the dataset with concentration values 10-100x greater than the remaining samples. These observations occurred on 10/17/2005 and 10/13/2009.

For pollutants not explicitly represented in the WMMS LSPC model, and for dry weather analysis, 90th percentile concentrations were calculated based on observed monitoring data at the LACDPW mass emission sites. The 90th percentile concentration was used for compliance with the Regional Board RAA guidelines (LARWQCB 2014). A summary of the 90th percentile concentrations for each constituent and waterbody are presented below in Table 4-8. For subsequent load reduction analyses, these concentrations were assumed for all wet or dry weather conditions they were assigned to represent existing conditions within their respective watersheds.

Table 4-8. 90th percentile concentrations assumed for non-modeled pollutants

Waterbody	Pollutant	Wet Weather	Dry Weather	90th Percentile Concentration	Units
Los Angeles River (S10)	DDT	●		0.005[1]	ug/L
	PCBs	●		0.0325[1]	ug/L
	PAHs	●		0.835[1]	ug/L
	Cadmium	●		4.8	ug/l
	Copper		●	25.68	ug/l
	Lead		●	3.43	ug/l
	E. coli		●	19,600	MPN/100 mL
Los Cerritos Channel (Stearns)	DDT	●		0.005[1]	ug/L
	PCBs	●		0.0325[1]	ug/L
	PAHs	●		0.835[1]	ug/L
	Copper		●	25.4	ug/l
	E. coli		●	14,200	MPN/100 mL
San Gabriel River (S14)	DDT	●		0.005[1]	ug/L
	PCBs	●		0.0325[1]	ug/L
	PAHs	●		0.835[1]	ug/L
	Copper		●	29.89	ug/l
	Selenium		●	4.77	ug/l
	E. coli		●	2,190	MPN/100 mL
Coyote Creek (S13)	DDT	●		0.005[1]	ug/L
	PCBs	●		0.0325[1]	ug/L
	PAHs	●		0.835[1]	ug/L
	Copper		●	28.54	ug/l
	E. coli		●	11,500	MPN/100 mL

[1] DDT, PCBs and PAHs were below MDL, so concentrations were assumed half MDL.

4.2. Current Best Management Practices/Minimum Control Measures

It is important to note the model calibration incorporates local stormwater BMPs implemented through late 2012 into the baseline condition. The only BMPs/control devices that were explicitly incorporated into the baseline model were the Dominguez Gap basins. All other BMPs, which individually were assumed to have a small effect on water quality at the watershed scale, are implicitly represented in the baseline condition. BMPs implemented in 2013 can be categorized as WMP implementation measures and their volume/load reductions are a component of the pollutant reduction plan for attaining interim and final milestones.

5. Estimated Required Pollutant Load Reductions

This section provides a description of the process for identifying critical conditions and calculating required load reductions to meet interim and final limitations.

5.1. Selected Average (Interim) and Critical (Final) Conditions

The RAA Guidelines specify that average conditions shall be used to establish load reductions for interim milestones and critical conditions shall be used to establish load reductions for final limits. In addition, the Permits provide two pathways for addressing WQ Priorities (see Figure 5-1):

- Volume-based: Retain the standard runoff volume from the 85th percentile, 24-hour storm
- Load-based: Achieve the necessary pollutant load reductions to attain Permit limits

Both types of numeric goals were evaluated as part of this RAA.

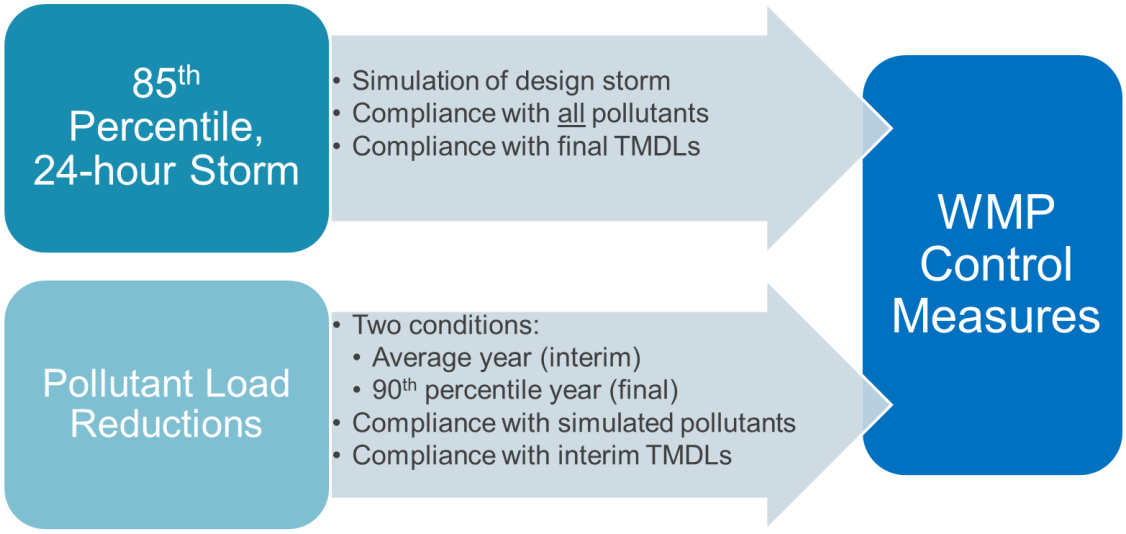

Figure 5-1. Two Types of Numeric Goals and WMP Compliance Paths according to the Permits

5.2. Representative Conditions for Wet Weather

Two approaches were considered and ultimately used in the RAA to represent wet weather critical conditions: the 90th percentile wet year and 85th percentile, 24-hour (design) storm, as described in the following subsections.

5.2.1. Average and 90th Percentile Wet Years

This RAA is based on continuous simulation, and a "representative" year-long time period was selected to represent average and critical conditions, which allows the modeling to capture the variability of rainfall and storm sizes/conditions. For LLAR, LCC, and LSGR, WY2008 was selected as the representative year for average conditions and WY2003 was selected as the representative year for the 90th percentile critical wet conditions.

To select these average and critical years for the RAA, the following steps were taken:

1. **Calculated key rainfall metrics for the last 25-years:** the average and critical years were identified by aggregating data from available rain gages across the entire Los Angeles River and San Gabriel River watersheds (LCC is in between, so the analysis for LLAR and LSGR also applies to LLC). For

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comparison, other regional watersheds were also analyzed and presented. The two key metrics evaluated were: (1) total annual rainfall, and (2) average rainfall per wet day (with wet days defined as days with rainfall totals greater than 0.1 inches). The first is clearly an indicator of volume, while the second is an indicator of rainfall intensity. To evaluate long-term conditions, the analysis covered 25 water years (WY) from 1987 through 2011—the total rainfall for each precipitation gage was area-weighted and aggregated into annual totals by water year (i.e. previous October through current September).

2. **Selected years from the most recent 10-years that are most representative of average and 90th percentile**: per the RAA Guidelines, the most recent 10-year period represented in the available data were used to develop the RAA. Table 5-1 and Table 5-2 show average rainfall volumes and intensities (inches per wet day), respectively, for the most recent 10 years compared against the entire 25-years. Both the average and 90th percentile values were compared across the 10- and 25-year records. For the San Gabriel River, 2007-08 is a representative average year based on both the rainfall volume (Table 5-1) and intensity (Table 5-2) metrics. Because BMP performance is typically intensity-dependent, average rainfall per wet day (Table 5-2) was selected as a better metric for use in determining the 90th percentile than annual average rainfall (Table 5-1), which led to selection of 2002-03 as the critical year.

It should be noted that wet weather conditions were also reflective on the definition of dry/wet days. As described in Section 5, for analysis of non-bacteria pollutants (including the limiting pollutant zinc) days with greater than 90th percentile daily average flow were flagged as "wet," which aligns with the critical condition used for the LAR and LSGR metals TMDLs.

5.2.2. 85th Percentile, 24-hour Storm

The design storm is identified in the RAA Guidelines as an acceptable critical condition, and capture of design storm volumes by BMPs is a specified compliance metric in the Permits for TMDLs. The design storm was evaluated and used as a wet weather critical condition for the RAA. As described above, the design storm is a volume-based standard. Each subwatershed within each WMP area has a unique 85th percentile runoff volume, due to varying rainfall amounts and land characteristics (imperviousness, soils, slope, and the like). The rainfall depths associated with the 85th percentile, 24-hour storm are shown in Figure 5-2, based on rolling 24-hour intervals for the 25-year period between October 1, 1987 and September 30, 2011. Within the WMP area, the 85th percentile rainfall depth values range between 0.72 and 1.08 inches.

To determine the "standard volume" associated the design storm, initial conditions were set in LSPC to reflect representative conditions at the start of the simulation, along with regionally derived infiltration rates, and 85th percentile rainfall depths were used as rainfall boundary conditions. At each location the storm distribution presented in Figure 5-3 was used to temporally distribute the 24-hour rainfall volumes (LACDPW 2006). The model was then run to predict the associated runoff volumes for each subwatershed in the WMP area. Those runoff volumes represent the volumes that would need to be retained in order to attain the numeric goals associated with the 85th percentile, 24-hour storm.

Shown in Figure 5-4 are the rainfall depths and runoff depths (runoff volume divided by subwatershed area) associated with the design storm for each subwatershed in the WMP areas. About 50 percent of the subwatersheds in all three WMP areas experiences 0.4 inches or more of runoff under the 85th percentile, 24-hour storm, while about 10 percent of the area experiences about 0.55 inches or more of runoff. Figure 5-5 summarizes the total design storm volumes (in acre-feet) for each jurisdiction. The runoff depths for each subwatershed in the WMP area are graphically shown in Figure 5-6, Figure 5-7, and Figure 5-8.

Table 5-1. Average Rainfall Depths (Water Years 2002–2011 vs. 25-year Average and 90th Percentile)

Year	Average Rainfall Totals (in./year)				
	Ballona Creek	Dominguez Channel	Malibu Creek	San Gabriel River	Los Angeles River
2001-02	25.4	19.1	28.1	30.6	30.5
2002-03	17.1	13.9	20.8	23	20.4
2003-04	10.2	8.1	9.2	13.7	11.2
2004-05	39.3	28.4	42.6	49.6	46.7
2005-06	14.1	9.8	16.9	17.9	17.5
2006-07	4.3	3.1	6.8	6.4	5.8
2007-08	13.2	11.9	18.6	19.4	17.5
2008-09	9.6	8.5	12.3	14.6	12.5
2009-10	16.8	14.9	20.3	24.1	20.5
2010-11	21.2	18.5	25.3	28.5	25.7
Avg. (1987-2011)	15.9	12.5	18.4	20.7	19.2
90th %ile (1987-2011)	30.8	22.9	34.7	37.8	36.9

Red Box: WMP Watersheds. Blue highlighted cells are the two years in each basin with the smallest difference from the 25-year average. Orange cells have the smallest difference from the 90th percentile of the 25-year record.

Table 5-2. Average Rainfall Intensity (Water Years 2002–2011 vs. 25-year Average and 90th Percentile)

Year	Average Rainfall Per Wet Day (in./wet day)				
	Ballona Creek	Dominguez Channel	Malibu Creek	San Gabriel River	Los Angeles River
2001-02	0.36	0.32	0.41	0.42	0.36
2002-03	0.79	0.66	0.88	0.92	0.84
2003-04	0.61	0.48	0.61	0.66	0.58
2004-05	0.98	0.69	1.03	1.07	1.03
2005-06	0.53	0.41	0.61	0.64	0.61
2006-07	0.31	0.27	0.39	0.41	0.37
2007-08	0.56	0.52	0.68	0.76	0.71
2008-09	0.49	0.48	0.56	0.65	0.57
2009-10	0.64	0.6	0.71	0.82	0.72
2010-11	0.62	0.58	0.73	0.76	0.7
Avg. (1987-2011)	0.59	0.52	0.67	0.72	0.66
90th %ile (1987-2011)	0.78	0.66	0.91	0.97	0.89

Red Box: WMP Watersheds. Blue highlighted cells are the two years in each basin with the smallest difference from the 25-year average. Orange cells have the smallest difference from the 90th percentile of the 25-year record.

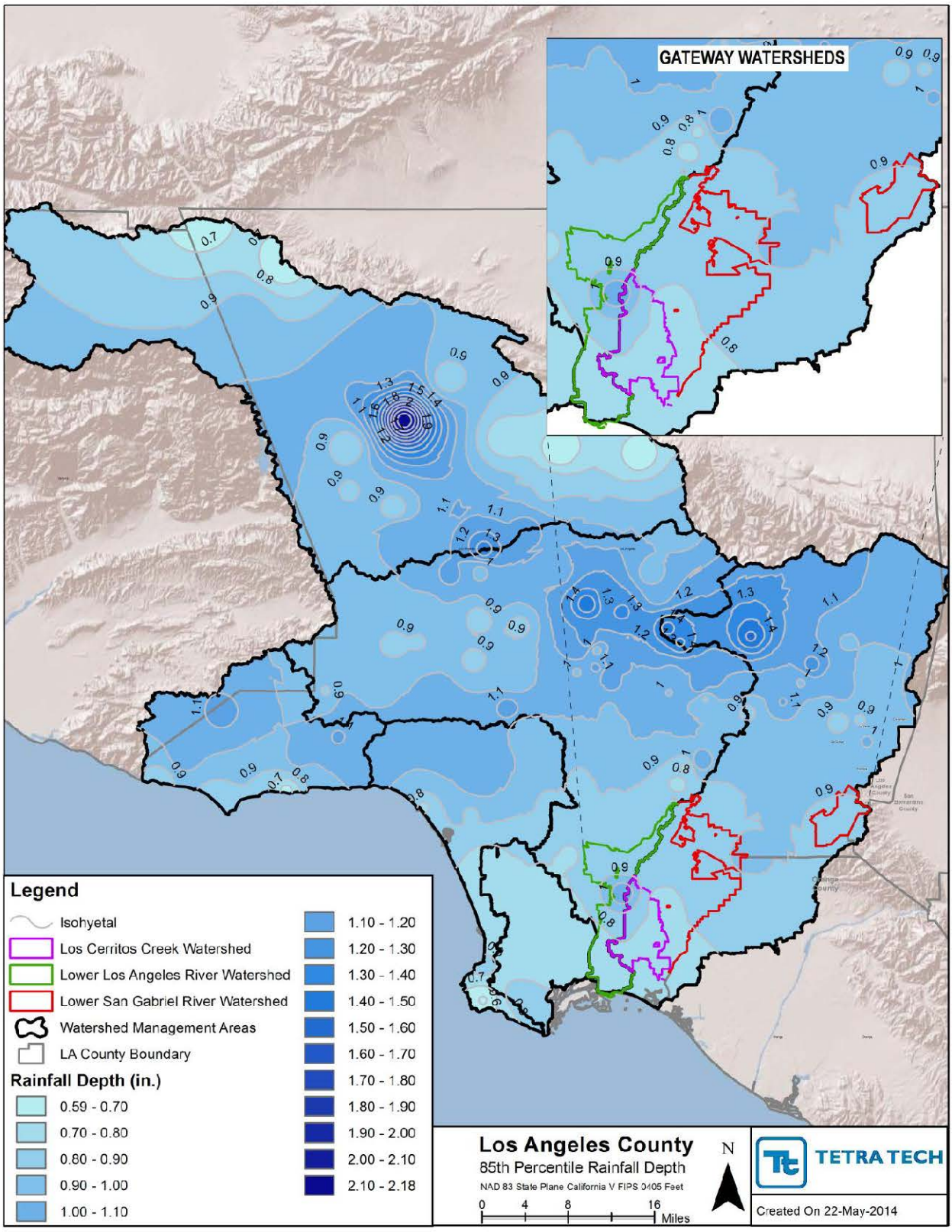

Figure 5-2. Rainfall depths associated with the 85th percentile, 24-hour storm.

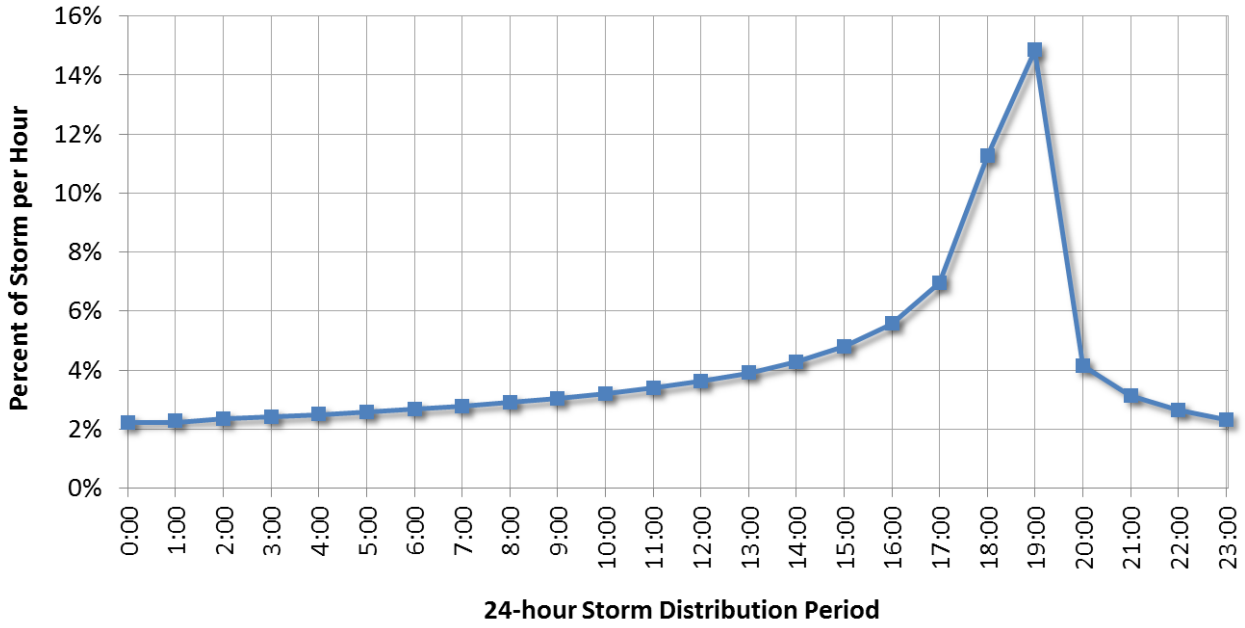

Figure 5-3. Temporal Distribution for 85th Percentile 24-hour Storm for LSPC Simulation.

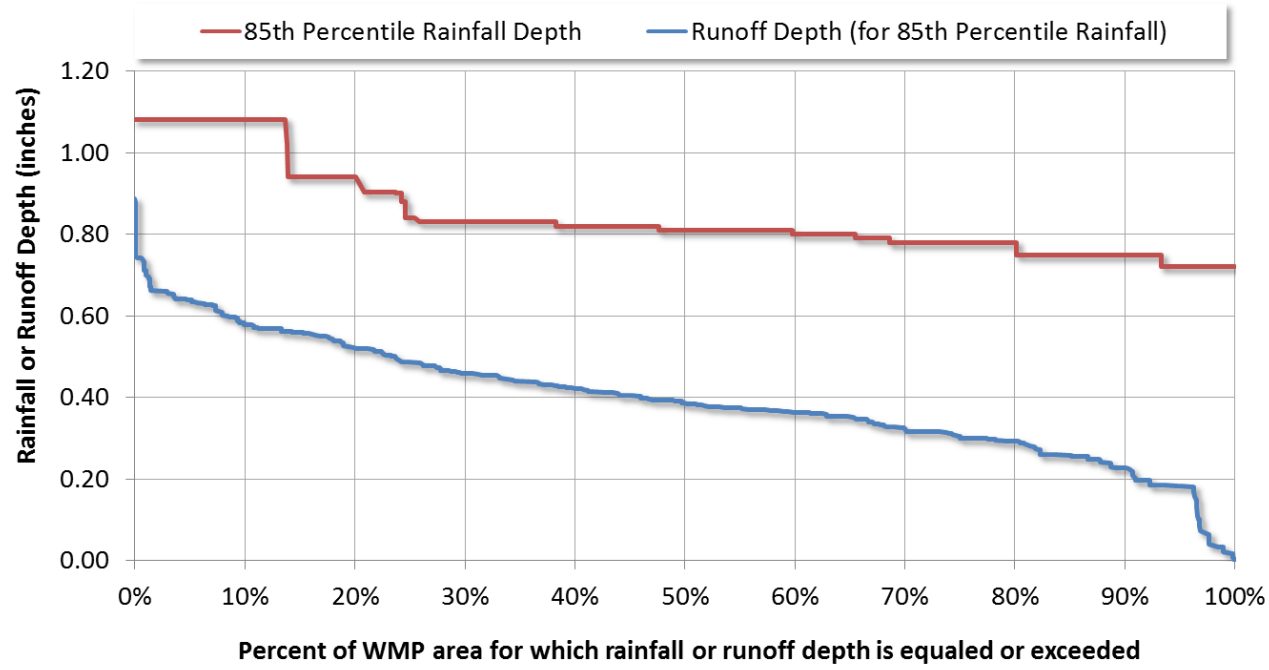

Figure 5-4. Rainfall and Runoff Depths Associated with 85th Percentile Rainfall in the WMP subwatersheds.

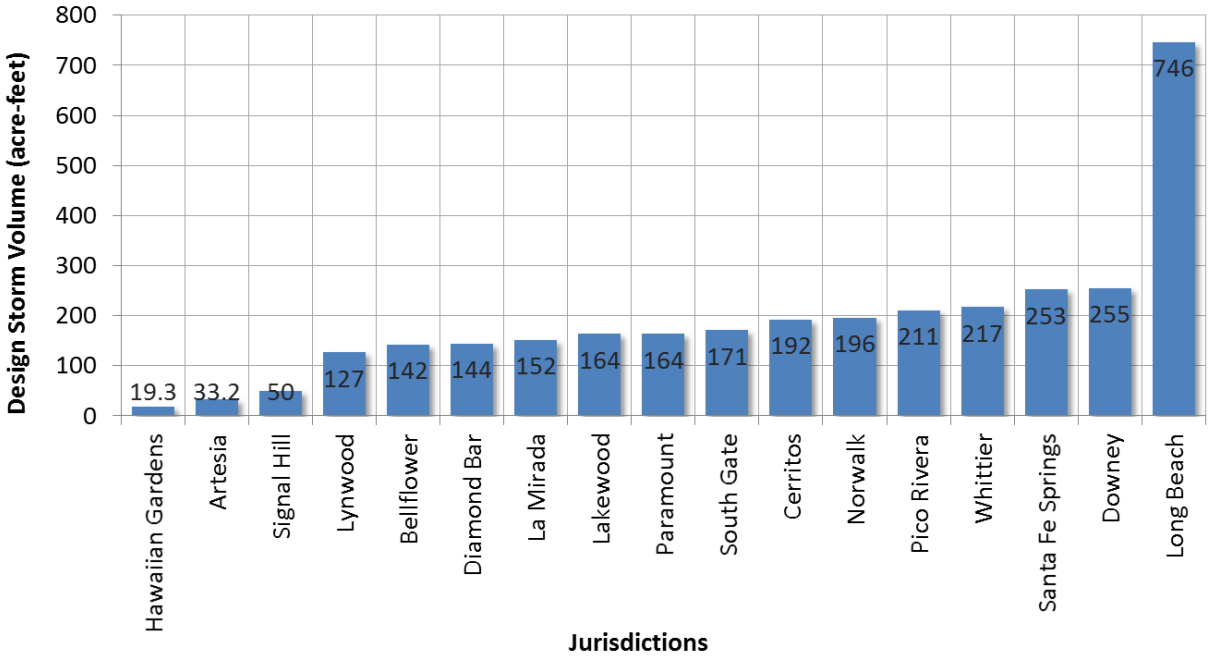

Figure 5-5. Runoff Volume Associated with the 85th Percentile, 24-hour Storm (by jurisdiction).

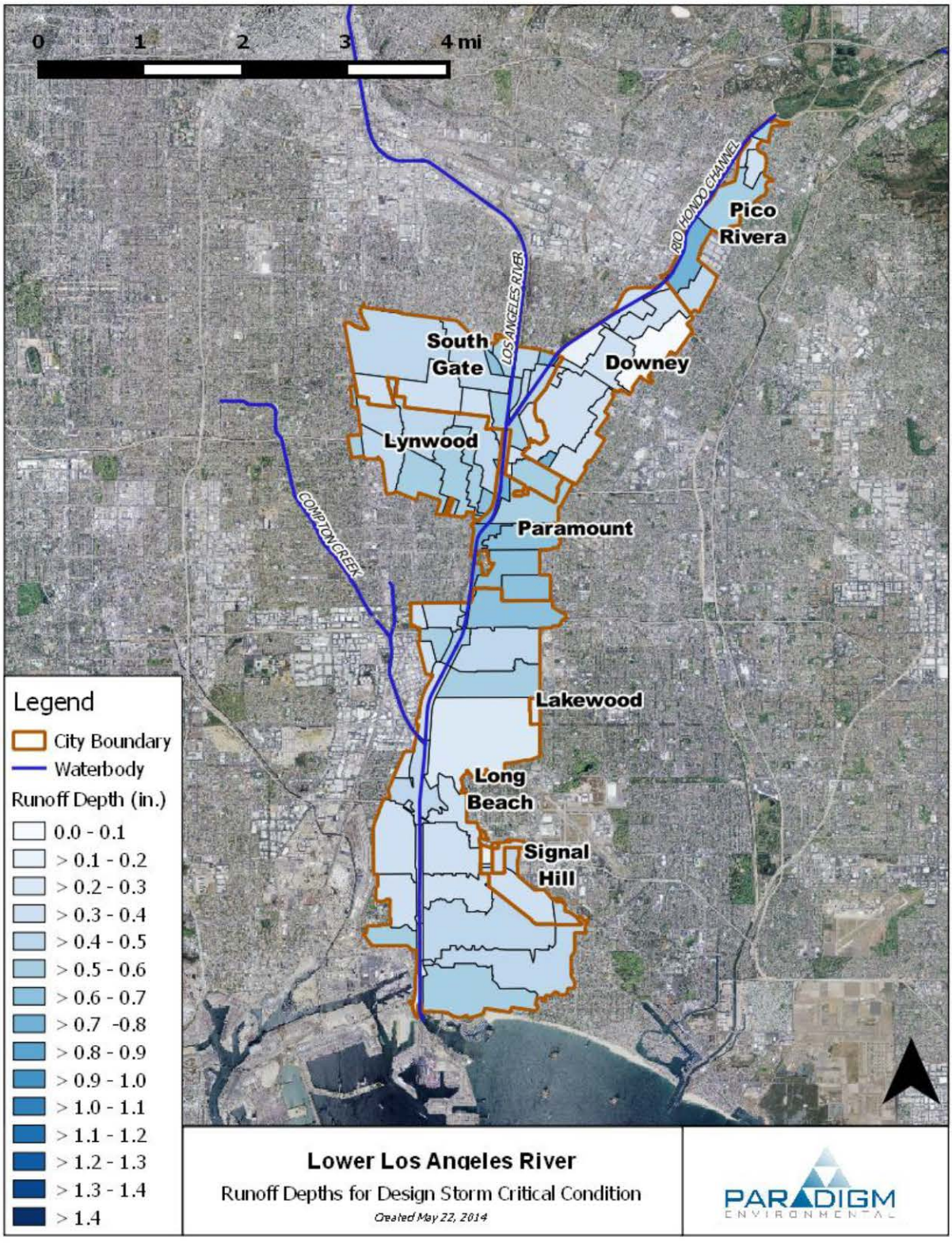

Figure 5-6. Runoff Associated with the 85th Percentile, 24-hour Storm for Lower Los Angeles River.

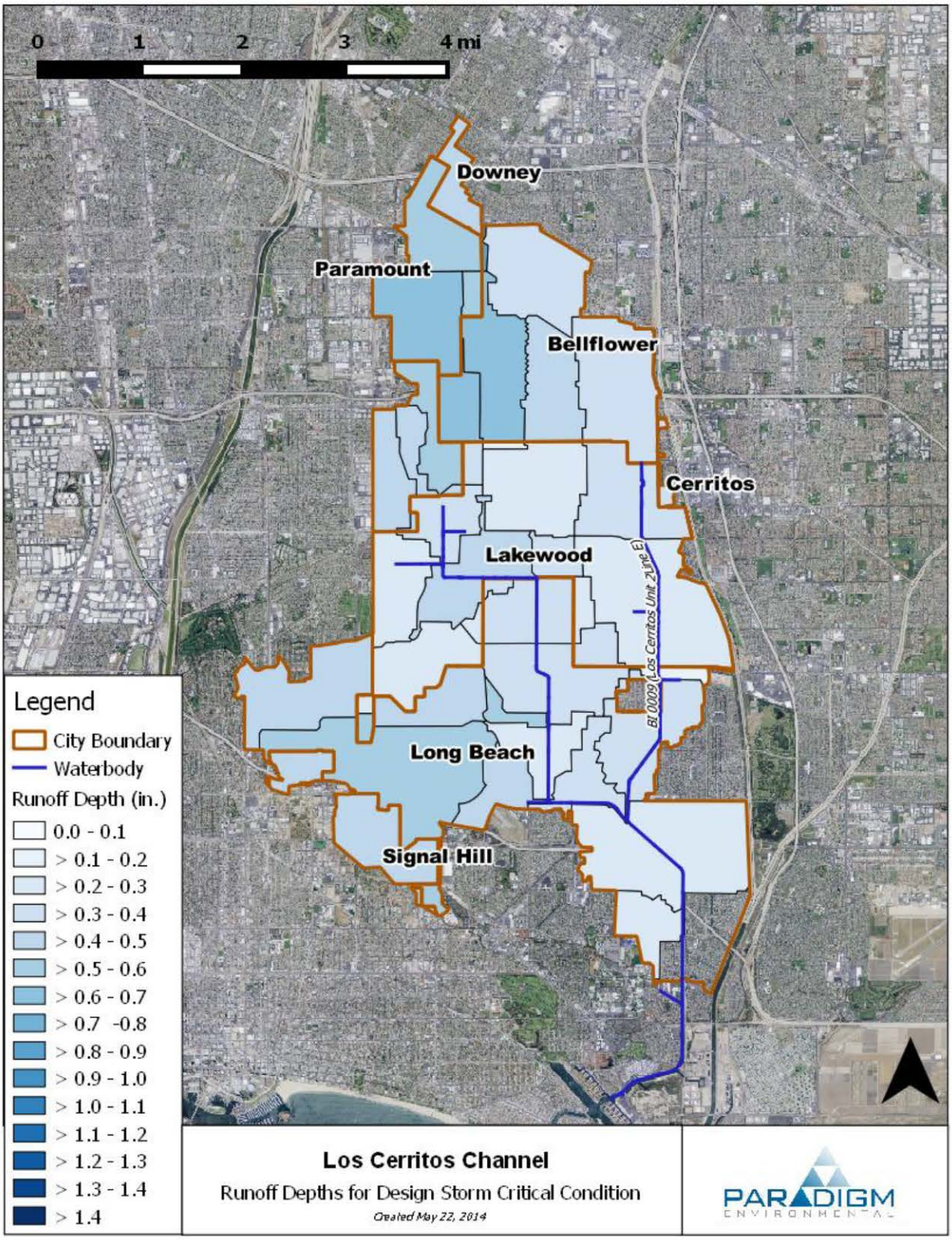

Figure 5-7. Runoff Associated with the 85th Percentile, 24-hour Storm for Los Cerritos Channel.

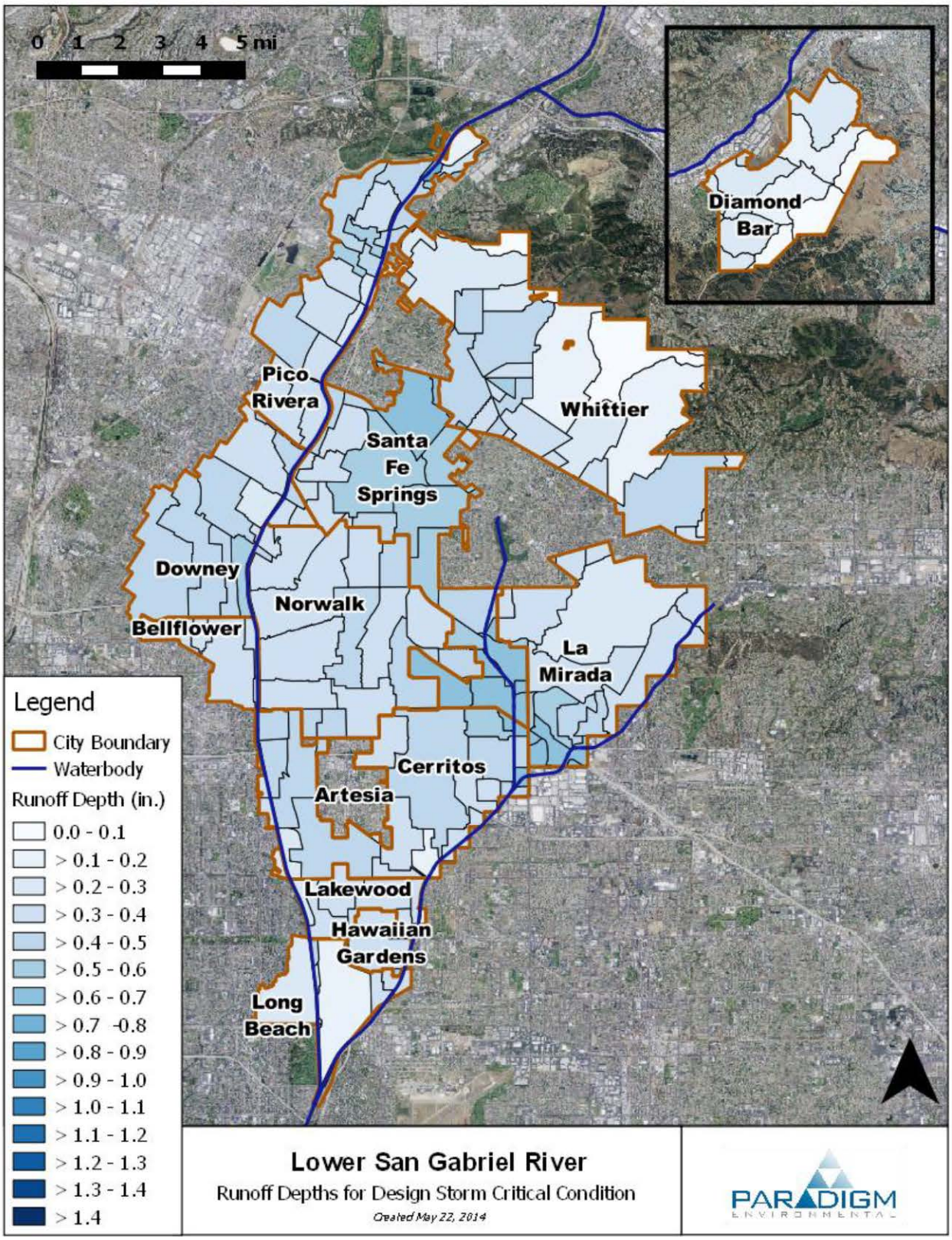

Figure 5-8. Runoff Associated with the 85th Percentile, 24-hour Storm for Lower San Gabriel River.

5.2.3. Representative Conditions for Dry Weather

Although clearly defined definitions exist for wet periods, definitions for dry periods are less clearly defined. Wet weather periods are either defined in terms of rainfall or instream flow. For bacteria, a wet day is one with a rainfall total greater than 0.1 inches plus the three subsequent days, while metals criteria define wet days as those with instream flow above the 90th percentile. One seemingly intuitive way of defining a dry period is simply to use the "non-wet" days represented as the inverse of wet days. However, summary of model results indicate some residual influence of wet weather among the "non-wet" days. This presents some challenges for estimating loads and evaluating dry weather compliance because BMP planning would be better served by choosing design conditions that are more influenced by natural background baseflow and/or anthropogenic activities such as point source discharges or dry weather runoff from irrigation (instead of post-rain event interflow).

The RAA Guidelines recommend using the most recent 10 years of data for modeling scenarios to ensure that the plans are based on a representative range of wet and dry conditions. Regional precipitation and instream flow patterns are highly variable; therefore, a representative dry period is one that consistently represents minimal influence to wet weather conditions. To identify a representative dry period, the analysis covered 25 WYs from 1987 through 2011. The following steps were taken:

1. The total rainfall for each precipitation gage in the study area was summarized and classified into wet and non-wet periods according to the bacteria criteria definition for wet weather (i.e. days with rainfall > 0.1 inches plus the three subsequent days).
2. Dry periods were evaluated on a monthly time scale. Table 5-3 shows the average number of consecutive 30-day dry periods, counted by month of the associated mid-interval date, for each of the rainfall gages within the three WMP areas over the 25 years of rainfall evaluated. The color-ramp indicates relative dryness, with red being driest. Table 5-3 indicates that on average, the months of June, July, and August are the driest months in the year, averaging 24-30 consecutive dry intervals. Note that because this table counts mid-interval dates by month, values approaching 30 actually indicate continuous dry intervals approaching 60 days (15 days on either side of the 30 day interval).
3. Select periods within the average and critical year were identified for dry weather simulations. The areal coverage or non-wet intervals in the two selected representative years (2008 and 2003) were compared against the 10-year period (2001-2011) and the long-term 25-year period (1998-2011). Figure 5-9, Figure 5-10, and Figure 5-11 show the selected representative dry period against summaries of non-wet weather conditions in the LLAR, LCC, and LSGR WMP areas, respectively. Within the two selected years, the 45-day period between 8/17 and 9/30 was found to be the most representative of dry weather conditions because (1) no rainfall occurred at any of the gages throughout all three WMP areas, (2) it was during a time of the year that was historically shown to experience the least amount of spatially-weighted rainfall in a year, and (3) it was late in the summer following an extended period of no rainfall for both 2003 and 2008.

The identified periods between 8/17 and 9/20 during the average and critical years were used for subsequent dry weather simulations for the dry weather component of the RAA.

Table 5-3. Consecutive 30-day Dry Periods per month by WMP and rainfall gage (10/1/1987 – 9/30/2011)

WMP	StaID	Average Number of Consecutive 30-Day Dry Intervals Per Month (10/1/1987 – 9/30/2011)											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Los Cerritos Channel	D1254	2.2	1.9	6.2	11.9	22.3	25.2	28.9	28.9	21.4	12.7	7.8	4.4
	D1255	2.8	1.8	4.4	8.8	20.3	25.1	29.7	29.8	21.8	13.0	7.3	2.9
	D225	3.0	2.3	6.3	10.5	20.6	24.7	28.8	29.5	21.4	13.1	9.1	3.6
	D388	2.1	1.3	3.8	8.5	18.6	24.0	27.6	29.2	21.0	12.3	5.1	3.2
	D415	1.9	1.2	5.7	9.6	19.0	24.0	28.1	29.1	23.4	13.1	8.9	3.7
Lower Los Angeles River	D1113	4.2	2.5	8.3	9.8	19.5	24.4	28.1	27.8	23.6	13.7	8.8	4.5
	D1114	1.6	1.1	4.0	8.9	19.6	25.1	29.7	29.6	20.8	12.3	5.5	3.0
	D1256	2.1	1.4	4.8	10.4	20.5	24.6	28.8	29.8	23.5	14.2	6.2	3.1
	D291	3.3	1.1	5.0	8.8	19.4	24.4	28.7	28.4	21.9	11.6	4.6	3.5
	D388	2.1	1.3	3.8	8.5	18.6	24.0	27.6	29.2	21.0	12.3	5.1	3.2
	D415	1.9	1.2	5.7	9.6	19.0	24.0	28.1	29.1	23.4	13.1	8.9	3.7
Lower San Gabriel River	D106	4.2	0.6	6.0	10.9	19.7	24.6	28.6	29.0	23.9	14.0	8.2	4.0
	D1088	2.2	1.0	3.8	9.0	17.6	24.1	28.5	29.0	20.9	12.6	5.9	2.7
	D1095	2.4	0.5	4.4	10.0	19.2	24.6	28.6	29.1	21.2	14.2	7.1	4.2
	D1114	1.6	1.1	4.0	8.9	19.6	25.1	29.7	29.6	20.8	12.3	5.5	3.0
	D1254	2.2	1.9	6.2	11.9	22.3	25.2	28.9	28.9	21.4	12.7	7.8	4.4
	D1255	2.8	1.8	4.4	8.8	20.3	25.1	29.7	29.8	21.8	13.0	7.3	2.9
	D1256	2.1	1.4	4.8	10.4	20.5	24.6	28.8	29.8	23.5	14.2	6.2	3.1
	D1257	2.0	0.5	4.5	10.6	18.9	24.4	28.6	29.8	21.2	10.3	5.7	3.0
	D1271	1.8	1.6	3.9	9.4	18.1	24.4	28.6	29.7	21.6	11.7	7.3	3.4
	D156	3.0	1.5	5.2	10.1	19.2	24.6	28.5	29.3	21.0	13.4	7.2	5.0
	D17	1.7	1.2	5.2	9.1	17.5	22.4	28.6	29.0	22.6	11.3	5.2	3.7
	D225	3.0	2.3	6.3	10.5	20.6	24.7	28.8	29.5	21.4	13.1	9.1	3.6
	D269	1.8	0.5	4.2	8.1	18.0	24.2	28.6	29.1	22.2	13.0	6.7	3.2

Legend: Wet → Dry

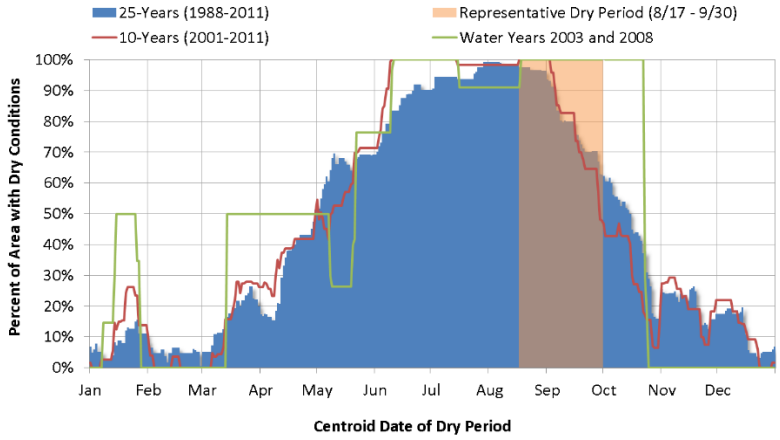

Figure 5-9. Spatiotemporal summary of non-wet weather conditions in the Lower Los Angeles River WMP area.

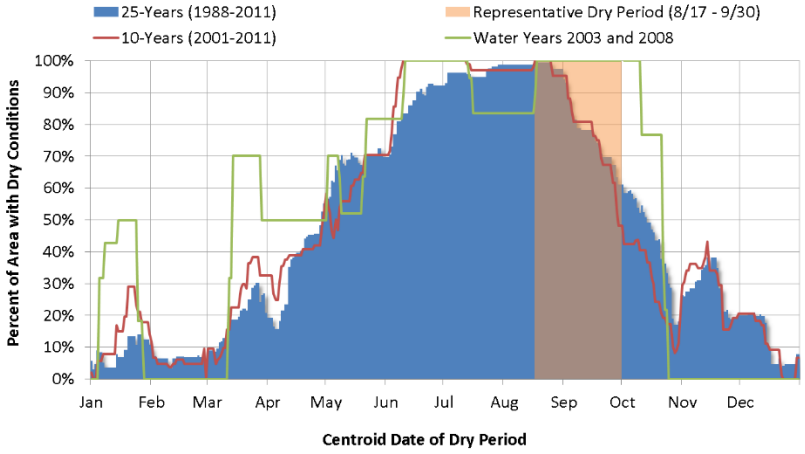

Figure 5-10. Analysis of summary of non-wet weather conditions in the Los Cerritos Channel WMP area.

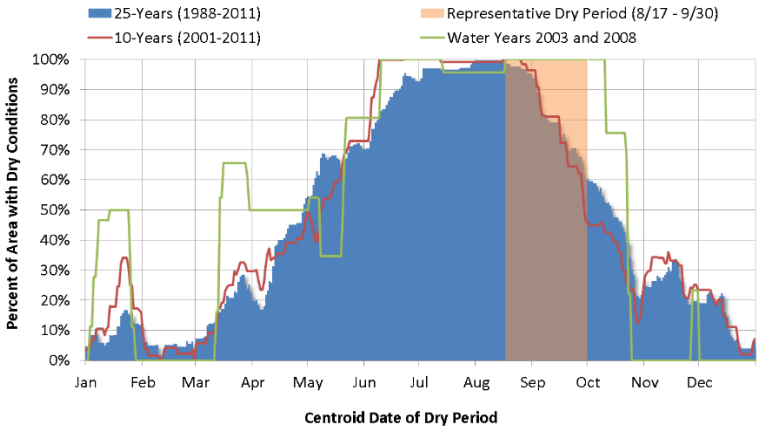

Figure 5-11. Spatiotemporal summary of non-wet weather conditions in the Lower San Gabriel River WMP area.

5.3. Calculated Required Pollutant Reductions to Achieve Final Limits

Using the average storm year (2007-08) and 90th percentile storm year (2002-03), required pollutant reductions were calculated for attainment of interim and final limitations, respectively, applicable to each WMP area. Per the RAA Guidelines, the percent reduction used to determine the control measures necessary to attain interim milestones shall be based on the average year, while the control measures for attainment of the final limits are based on the 90th percentile year.

Required load reductions were evaluated at RAA Assessment Points located at the bottom-most discharge from each WMP areas (shown in Figure 3-2 through Figure 3-4). The RAA Assessment Points represent locations where the collective discharge from each jurisdiction with each WMP area can be assessed to contribute to pollutant loads to the receiving waters. Pollutant loads outside of the WMP areas are not considered in this loading analysis at the RAA Assessment Points, although in reality other loads exist. However, transport of pollutant loads from individual jurisdictions within the WMP areas are considered, including the effect of LACFCD infrastructure and other hydraulic features that can impede flows and associated pollutant loads to the location of the RAA Assessment Points. The result is an accounting system that provides reasonable tracking and estimation of required load reductions throughout each individual WMP area so that meaningful goals can be set for BMP implementation planning.

Applicable targets for wet and dry conditions for Category 1 WQ Priorities (corresponding to the TMDLs within each watershed) are listed in Table 5-4 and Table 5-5, respectively. These targets were used to establish the daily "exceedance load" and daily "allowable load". The differences in these loads, as predicted by LSPC, were tracked across the average year and 90th percentile year and used to calculate the required pollutant reduction. While Category 1 WQ Priorities were emphasized, targets were also applied for Category 2 and Category 3 WQ Priorities. In particular, to provide a comprehensive WMP planning approach, copper, lead, zinc and *E. coli* were assessed for all RAA assessment points (even if a TMDL is not applicable).

For bacteria targets, it should be noted that Allowable Exceedance Days and high flow suspension (HFS) days were incorporated (if applicable) into the percent reduction calculation. The approach of the LA River Bacteria TMDL was used to align Exceedance Days and HFS days. The HFS applies to LLAR and LSGR but not LCC (and thus HFS days were not incorporated into the required reduction calculation for LCC). For LSGR and LCC, a bacteria TMDL has not been adopted but the RAA Guidelines state that targets and critical conditions from other TMDLs in the region should be utilized. If the Allowable Exceedance Days were removed from the percent reduction calculations for LSGR and LCC, the required reductions would increase.

Table 5-4. Applicable wet weather TMDL targets for Category 1 WQ Priorities

WMP Area	Waterbody	Pollutant	Target	Source
LLAR	LAR Reach 1 (freshwater)	Cd kg/d	$2.8x10^{-9}$ X daily storm volume (L) - 1.8	WQBEL
	LAR Reach 1 (freshwater)	Cu kg/d	$1.5x10^{-8}$ X daily storm volume (L) - 9.5	WQBEL
	LAR Reach 1 (freshwater)	Pb kg/d	$5.6x10^{-8}$ X daily storm volume (L) - 3.85	WQBEL
	LAR Reach 1 (freshwater)	Zn kg/d	$1.4x10^{-7}$ X daily storm volume (L) - 83	WQBEL
	All LLAR	DDT ug/kg TSS	1.58	Harbor Toxics TMDL
	All LLAR	PCBs ug/kg TSS	22.7	Harbor Toxics TMDL
	All LLAR	PAHs ug/kg TSS	4,022	Harbor Toxics TMDL
	LAR Reach 1 (freshwater)	*E-coli* MPN/100mL	235 (exceedances allowed during HFS days and 10 exceedance days)	WQBEL

WMP Area	Waterbody	Pollutant	Target	Source
LCC	All LCC	Cu g/d	$4.709X10^{-6}$ X daily storm volume (L)	WQBEL
	All LCC	Pb g/d	$26.852X10^{-6}$ X daily storm volume (L)	WQBEL
	All LCC	Zn g/d	$46.027X10^{-6}$ X daily storm volume (L)	WQBEL
	All LCC	DDT ug/kg TSS	1.58	Harbor Toxics TMDL
	All LCC	PCBs ug/kg TSS	22.7	Harbor Toxics TMDL
	All LCC	PAHs ug/kg TSS	4,022	Harbor Toxics TMDL
LSGR	SG Reach 2	Pb ug/L	81.34	WQBEL
	Coyote Cr.	Cu ug/L	24.71	WQBEL
	Coyote Cr.	Pb ug/L	96.99	WQBEL
	Coyote Cr.	Zn ug/L	144.57	WQBEL
	SG Reach 1 & Coyote Cr.	DDT ug/kg TSS	1.58	Harbor Toxics TMDL
	SG Reach 1 & Coyote Cr.	PCBs ug/kg TSS	22.7	Harbor Toxics TMDL
	SG Reach 1 & Coyote Cr.	PAHs ug/kg TSS	4,022	Harbor Toxics TMDL

Table 5-5. Applicable dry weather TMDL targets for Category 1 WQ Priorities

WMP Area	Waterbody	Pollutant	Target	Source
LLAR	LAR Reach 1 (freshwater)	Cu ug/L	23	WQBEL
	LAR Reach 1 (freshwater)	Pb ug/L	12	WQBEL
	LAR Reach 1 (freshwater)	*E-coli* MPN/100mL	126	WQBEL
LCC	All LCC	Cu g/d	67.2	WQBEL
	All LCC	*E-coli* MPN/100mL	126	WQBEL
LSGR	SG Reach 1	Cu ug/L	18	WQBEL
	SG Reach 1	*E-coli* MPN/100mL	126	WQBEL
	San Jose Cr. Reach 1&2	Se ug/L	5	WQBEL
	San Jose Cr. Reach 1&2	*E-coli* MPN/100mL	126	WQBEL
	Coyote Cr.	Cu kg/d	0.941	WQBEL
	Coyote Cr.	*E-coli* MPN/100mL	126	WQBEL

5.3.1. Wet-Weather Required Pollutant Reductions

The wet weather pollutant baseline loading and reduction targets for average and critical conditions are summarized in Table 5-6 and Table 5-7 respetively (all WMP areas) and shown graphically in Figure 5-12 through Figure 5-15 (individual WMP areas). These analyses were used to determine the limiting pollutant. The limiting pollutant is defined as the pollutant requiring the greatest load reduction, and BMPs implemented to achieve the limiting pollutant reductions are protective of other pollutant reductions (e.g., sediment or volume reductions). In Table 5-6. Wet-weather pollutant baseline loading by WMP area with analysis of limiting pollutants

WMP	Year[1]	Organics (kg)			Metals (kg)			Bacteria (Billion #)[1]
		DDT	PCB	PAH	TCu [2]	TPb	TZn [3]	E-Coli
Lower Los Angeles River (LLAR)	2003	0.12	0.77	19.80	2,437	2,464	11,153	2.78E+07
	2008	0.09	0.61	15.59	1,935	1,968	8,878	5.46E+07
Los Cerritos Channel (LCC)	2003	0.07	0.45	11.60	1,611	1,719	7,481	2.55E+08
	2008	0.05	0.35	9.13	505	386	2,607	2.40E+08
Lower San Gabriel River (LSGR)	2003	0.06	0.42	10.80	768	544	3,805	2.06E+06
	2008	0.05	0.33	8.50	393	337	2,512	1.98E+06
Coyote Creek (CC)	2003	0.11	0.71	18.20	1,640	1,197	8,373	6.57E+05
	2008	0.09	0.56	14.33	839	736	5,450	6.72E+06

Color ramps highlight potentially limiting (Red) vs. pollutants determined to be non-limiting for this analysis (Blue)

1. LLAR, LSGR, CC bacteria loads are for bacteria wet-days and exclude high flow suspension (HFS) days. LCC bacteria loads are for bacteria wet-days
2. Red box: Organics managed through sediment and associated metals reduction. Organic load reductions above influenced by assigned concentrations at half the MDLs (monitoring data below MDLs), and therefore are suspect and not considered limiting. Cu is not limiting after brake-pad reductions
3. Blue Box: Zinc is limiting pollutant for the 90th percentile year
4. Metals loads are for wet-weather days (90th percentile flow and greater)
5. Organics are summarized on an annual basis

Table 5-7, the red color gradient highlights limiting pollutants, with a deeper red generally indicating a more limiting pollutant. Zinc was identified as the limiting pollutant for each WMP area[4]. The determination of limiting pollutant considered implementation actions to control the pollutant – for example, Senate Bill 346 will result in significant reductions of copper loading from brake pads. Because total source control measures are not on the horizon for zinc, it becomes the limiting pollutant instead of copper. The evaluation of copper and organics as limiting pollutants and rationale for their exclusion is described below.

Although DDT and PCBs were estimated to have high load reduction requirements to meet WQBELs, they were not identified as limiting pollutants because the maximum detection limits (MDLs) used for the analysis heavily affected the calculated required reductions. Rather than use LSPC for reduction calculations, monitoring data were used directly and many reported concentrations for DDT, PCBs, and PAHs were below MDLs, so concentrations were assumed in the model to equal half the MDL. The MDL is above the target leading to non-detects requiring reductions. Of course, toxics will be addressed by control measures implemented for zinc. The Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters Toxic Pollutants TMDL states that

[4] In LSGR, a higher percent reduction for bacteria was calculated for the average year than the 90th percentile (see Figure 5-14). Although total annual rainfall in 2008 and 2003 were virtually identical over the entire SGR watershed (20.5 and 20.4 inches/year, respectively), 2003 had fewer wet days than 2008, resulting in relatively more intense events on average (about 18 percent higher). As a result, 2003 had more HFS days than 2008—exceedances during HFS days are not considered when computing the required load reduction, lowering the required reduction.

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"implementation of other TMDLs in the watershed may contribute to the implementation of this TMDL," and implementation of the effective TMDLs in Los Angeles River and San Gabriel River are integrated within Phase I of the implementation of the toxics TMDL (LARWQCB and USEPA 2011). As a result, DDT, PCBs, and PAHs were not represented in Figure 5-12 through Figure 5-15.

Although copper was calculated to have a higher required reduction than zinc, the effect of Senate Bill 346 is expected to reduce those reductions without any implementation of structural control measures. The Brake Pad Partnership was formed in 1999 as a collaboration of cities, industry, and other entities to address the lack of information and research regarding the impact of brake debris material in the environment. After its formation, the Brake Pad Partnership commissioned several technical studies to better quantify the fate and transport of copper to San Francisco Bay including a detailed source assessment. Overall findings of the study estimated that of the anthropogenic sources of copper, approximately 35 percent are attributed to brake pad releases (BPP 2010). Even if the reduction was only half of this amount, the adjustment to the required copper reduction would still result in zinc being the limiting pollutant in LLAR, LCC, and LSGR.

After excluding organics and total copper for the reasons described previously, total zinc becomes the limiting pollutant in each of the WMP areas during the 90th percentile year. In other words, reductions of zinc during WMP implementation will drive reduction of other pollutants, particularly because the pollutant reduction plan emphasizes sediment control (other pollutants are typically transported with sediment) and retention/infiltration rather than pollutant treatment.

Plots showing the differences between the baseline loads, allowable loads, and exceedance loads are shown in Attachment F.

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Table 5-6. Wet-weather pollutant baseline loading by WMP area with analysis of limiting pollutants

WMP	Year[1]	Organics (kg)			Metals (kg)			Bacteria (Billion #)[1]
		DDT	PCB	PAH	TCu [2]	TPb	TZn [3]	E-Coli
Lower Los Angeles River (LLAR)	2003	0.12	0.77	19.80	2,437	2,464	11,153	2.78E+07
	2008	0.09	0.61	15.59	1,935	1,968	8,878	5.46E+07
Los Cerritos Channel (LCC)	2003	0.07	0.45	11.60	1,611	1,719	7,481	2.55E+08
	2008	0.05	0.35	9.13	505	386	2,607	2.40E+08
Lower San Gabriel River (LSGR)	2003	0.06	0.42	10.80	768	544	3,805	2.06E+06
	2008	0.05	0.33	8.50	393	337	2,512	1.98E+06
Coyote Creek (CC)	2003	0.11	0.71	18.20	1,640	1,197	8,373	6.57E+05
	2008	0.09	0.56	14.33	839	736	5,450	6.72E+06

Color ramps highlight potentially limiting (Red) vs. pollutants determined to be non-limiting for this analysis (Blue)

6. LLAR, LSGR, CC bacteria loads are for bacteria wet-days and exclude high flow suspension (HFS) days. LCC bacteria loads are for bacteria wet-days
7. Red box: Organics managed through sediment and associated metals reduction. Organic load reductions above influenced by assigned concentrations at half the MDLs (monitoring data below MDLs), and therefore are suspect and not considered limiting. Cu is not limiting after brake-pad reductions
8. Blue Box: Zinc is limiting pollutant for the 90th percentile year
9. Metals loads are for wet-weather days (90th percentile flow and greater)
10. Organics are summarized on an annual basis

Table 5-7. Wet-weather pollutant reduction targets by WMP area with analysis of limiting pollutants[5]

WMP	Year	Organics			Metals			Bacteria
		DDT	PCB	PAH	TCu [2]	TPb	TZn [3]	E-Coli
Lower Los Angeles River (LLAR)	2003	87.3%	72.0%	0.0%	84.1%	38.6%	67.4%	23.4%
	2008	90.0%	77.9%	0.0%	82.8%	32.9%	64.9%	45.1%
Los Cerritos Channel (LCC)	2003	86.6%	70.3%	0.0%	95.6%	76.7%	90.8%	40.4%
	2008	89.6%	77.1%	0.0%	87.1%	3.6%	75.6%	47.9%
Lower San Gabriel River (LSGR)	2003	79.5%	54.6%	0.0%	40.1%	0.0%	29.3%	22.9%
	2008	91.4%	80.7%	0.0%	18.0%	0.0%	25.0%[4]	53.0%
Coyote Creek (CC)	2003	75.9%	46.8%	0.0%	37.5%	0.0%	28.3%	19.1%
	2008	91.3%	76.8%	0.0%	22.7%	0.0%	30.4%[4]	59.2%

Color ramps highlight potentially limiting (Red) vs. pollutants determined to be non-limiting for this analysis (Blue)

1. Average year is 2008 and 90th percentile year is 2003
2. Red box: Organics managed through sediment and associated metals reduction. Organic load reductions above influenced by assigned concentrations at half the MDLs (monitoring data below MDLs), and therefore are suspect and not considered limiting. Cu is not limiting after brake-pad reductions
3. Blue Box: Zinc is limiting pollutant for the 90th percentile year
4. Bacteria reduction target is lower in 2003 than 2008 because more days were classified as HFS

[5] For the Diamond Bar jurisdiction of the San Gabriel River WMP area, a portion flows to the Santa Ana River. Since this area is open space and therefore not associated with MS4 runoff, no reductions were determined necessary. Loadings for the 90th percentile year from this area are 1.16 kg/year of total Cu, 0.87 kg/year of total Pb, 5.21 kg/year of total Zn, and 4.91x10^{12} #/year of E-coli.

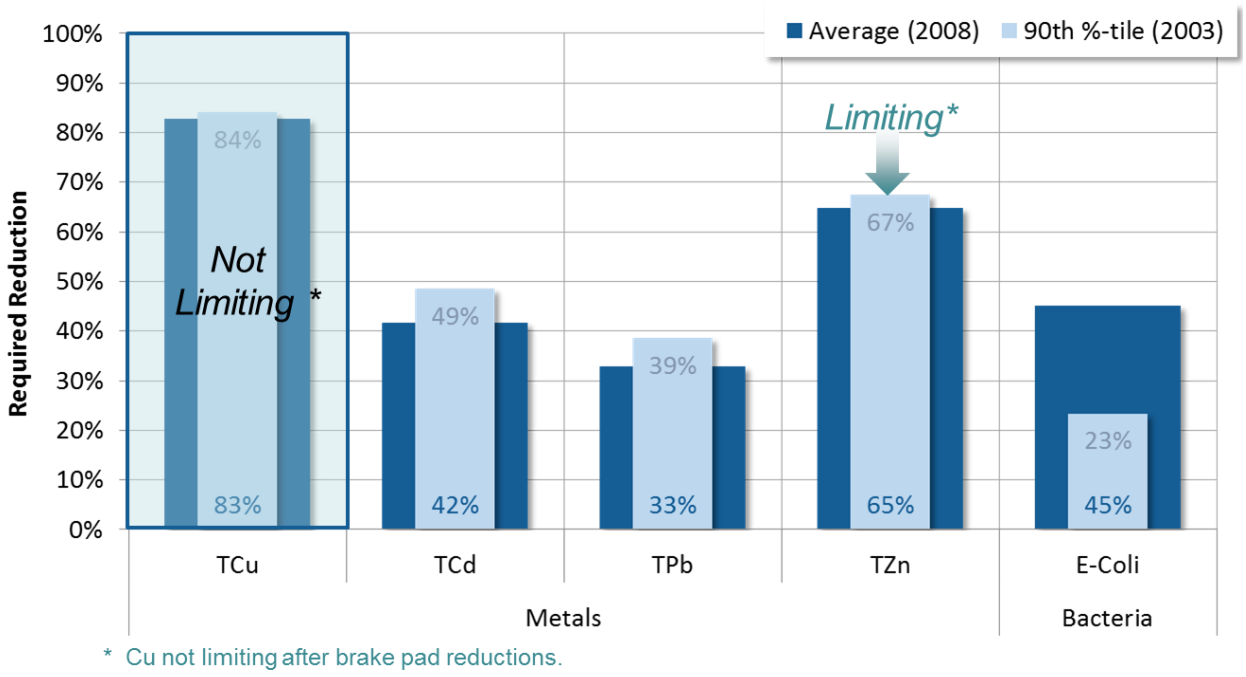

Figure 5-12. Wet-weather pollutant reduction targets and limiting pollutant for Lower Los Angeles River WMP.[6]

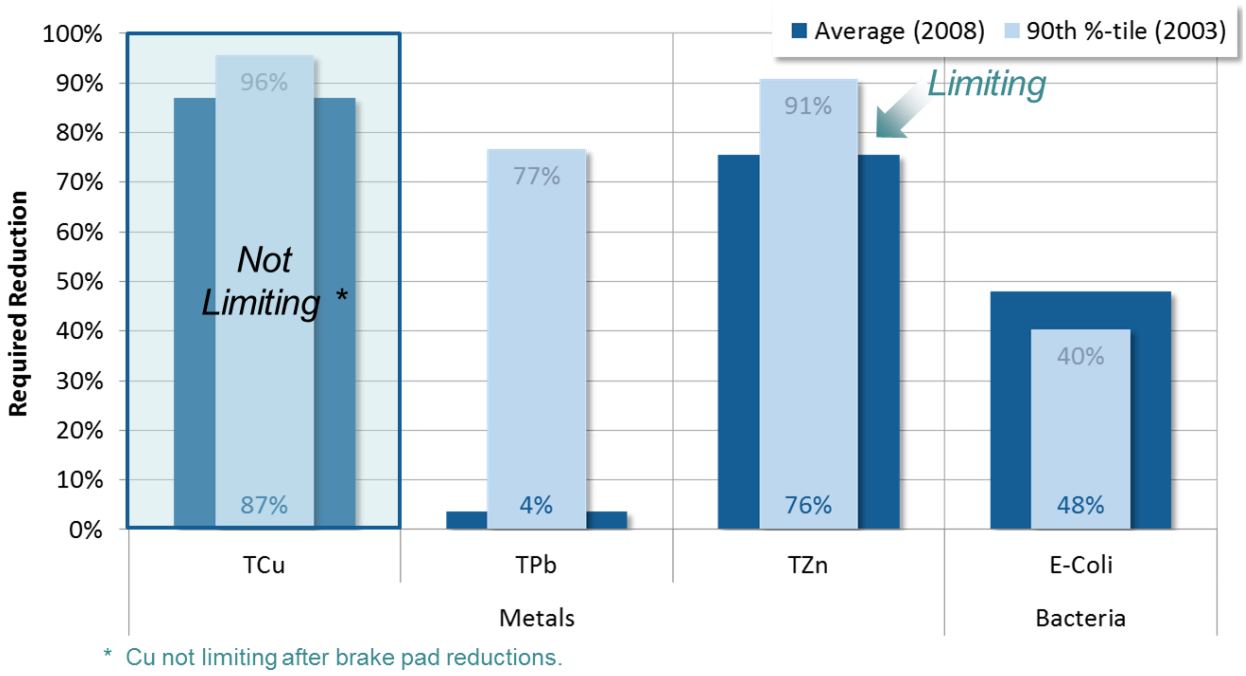

Figure 5-13. Wet-weather pollutant reduction targets and limiting pollutant for Los Cerritos Chanel WMP.

[6] Note that the Los Cerritos Channel TMDLs for Metals requires no reduction of Pb.

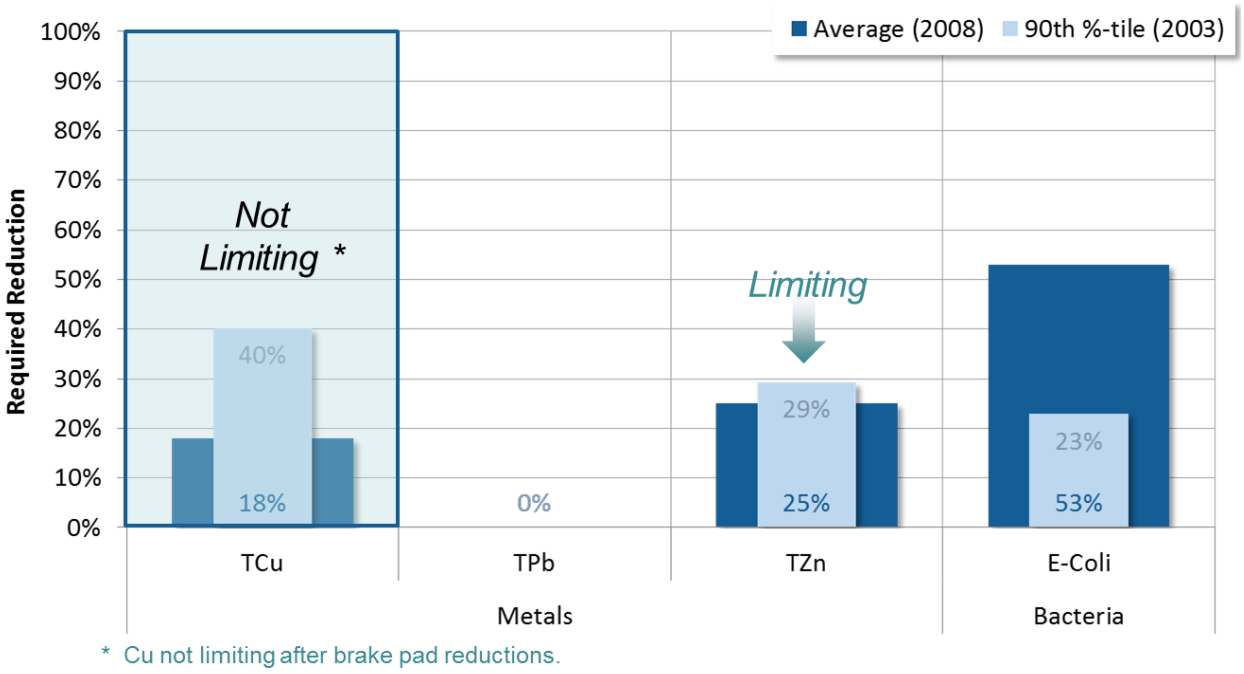

Figure 5-14. Wet-weather pollutant reduction targets and limiting pollutant for Lower San Gabriel River.

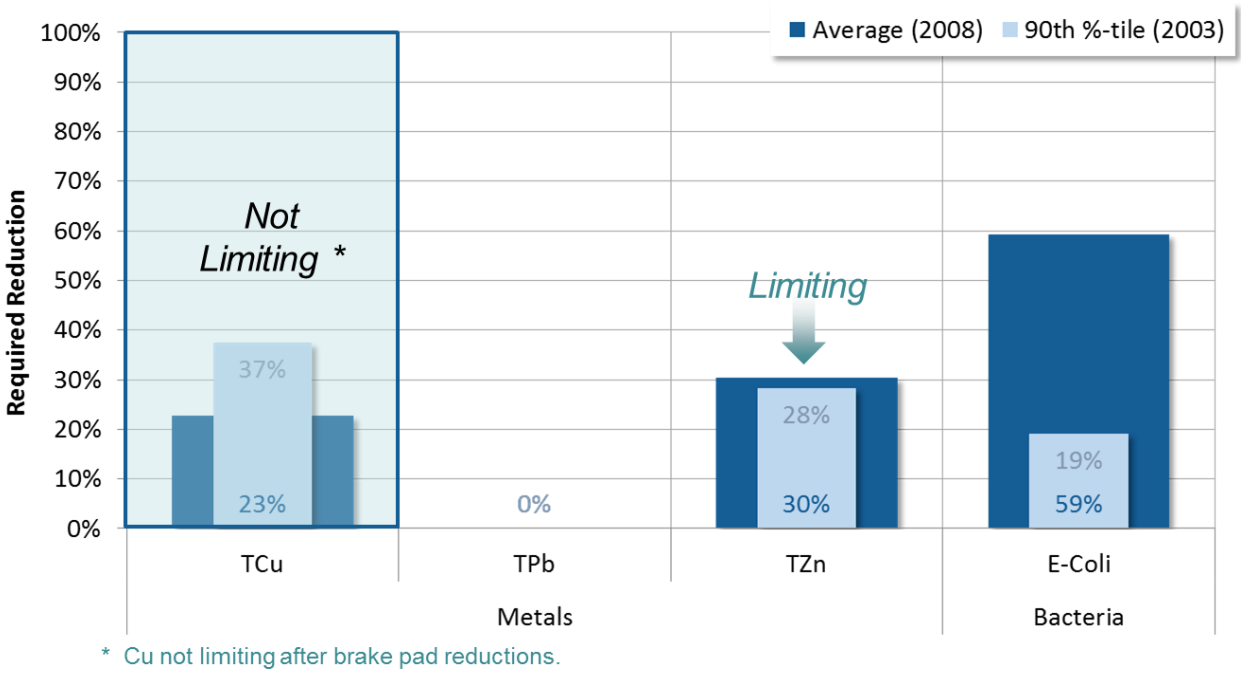

Figure 5-15. Wet-weather pollutant reduction targets and limiting pollutant for Coyote Creek.

5.3.2. Dry-Weather Pollutant Reduction Targets

Using the representative dry-weather period of August 17 through September 30, as defined in Section 5.2.3, modeled instream flow was multiplied by the observed dry weather concentrations to get existing conditions loads, which are shown in Table 5-8. Likewise, target concentrations were also multiplied by modeled instream flow to get allowable load for each waterbody, which is shown in Table 5-9. Finally, Table 5-10 summarizes dry-weather reduction targets for each listed segment for both the average year and the 90th percentile year.

For dry weather, bacteria is the limiting pollutant (not zinc) because the required reductions are much higher than other pollutants. Reductions of bacteria during WMP implementation will drive reductions of other pollutants.

Table 5-8. Modeled existing condition dry-weather loads by water body

Existing Condition		Dry Weather Flow (cfs)		Existing Load (kg/day or MPN/day)		
Waterbody	**Pollutant**	**2003**	**2008**	**2003**	**2008**	**Mean**
LAR Reach 1 (freshwater)	Cu ug/L	99.97	65.63	6.28	4.12	5.20
LAR Reach 1 (freshwater)	Pb ug/L	99.97	65.63	0.84	0.55	0.69
LAR Reach 1 (freshwater)	*E. coli* MPN/100ml	99.97	65.63	4.79E+13	3.15E+13	3.97E+13
LCC	Cu ug/L	4.65	2.20	0.29	0.14	0.21
LCC	*E. coli* MPN/100ml	4.65	2.20	1.62E+12	7.64E+11	1.19E+12
SG Reach 1	Cu ug/L	69.04	75.36	5.05	5.51	5.28
SG Reach 1	*E. coli* MPN/100ml	69.04	75.36	3.70E+12	4.04E+12	3.87E+12
San Jose Cr. Reach 1 & 2	Se ug/L	12.54	19.62	0.06	0.09	0.07
San Jose Cr. Reach 1 & 2	*E. coli* MPN/100ml	12.54	19.62	6.72E+11	1.05E+12	8.62E+11
Coyote Cr.	Cu ug/L	19.65	15.69	1.37	1.10	1.23
Coyote Cr.	*E. coli* MPN/100ml	19.65	15.69	5.53E+12	4.41E+12	4.97E+12

Table 5-9. Allowable TMDL dry-weather loads by water body

Existing Condition		Dry Weather Flow (cfs)		Allowable Load (kg/day or MPN/day)		
Waterbody	**Pollutant**	**2003**	**2008**	**2003**	**2008**	**Mean**
LAR Reach 1 (freshwater)	Cu ug/L	99.97	65.63	5.63	3.69	4.66
LAR Reach 1 (freshwater)	Pb ug/L	99.97	65.63	2.94*	1.93*	2.43*
LAR Reach 1 (freshwater)	*E. coli* MPN/100ml	99.97	65.63	3.08E+11	2.02E+11	2.55E+11
LCC	Cu ug/L	4.65	2.20	0.07	0.07	0.07
LCC	*E. coli* MPN/100ml	4.65	2.20	1.43E+10	6.78E+09	1.06E+10
SG Reach 1	Cu ug/L	69.04	75.36	3.04	3.32	3.18
SG Reach 1	*E. coli* MPN/100ml	69.04	75.36	2.13E+11	2.32E+11	2.23E+11
San Jose Cr. Reach 1 & 2	Se ug/L	12.54	19.62	0.15*	0.24*	0.20*
San Jose Cr. Reach 1 & 2	*E. coli* MPN/100ml	12.54	19.62	3.87E+10	6.05E+10	4.96E+10
Coyote Cr.	Cu ug/L	19.65	15.69	0.94	0.94	0.94
Coyote Cr.	*E. coli* MPN/100ml	19.65	15.69	6.06E+10	4.48E+10	5.45E+10

*Existing dry-weather loads are currently below the allowable loads thus showing compliance for this pollutant.

Table 5-10. Required dry-weather percent reductions by water body

WMP	Waterbody	Pollutant	Required Dry-Weather Percent Reductions		
			2003	**2008**	**Mean**
LLAR	LAR Reach 1 (freshwater)	Cu	10%	10%	10%
	LAR Reach 1 (freshwater)	Pb	0%	0%	0%
	LAR Reach 1 (freshwater)	*E. coli*	99.36%	99.36%	99.36%
LCC	LCC	Cu	76.74%	50.85%	68.43%
	LCC	*E. coli*	99.11%	99.11%	99.11%
LSGR	Coyote Cr.	Cu	31.42%	14.11%	23.73%
	Coyote Cr.	*E. coli*	98.90%	98.90%	98.90%
	SG Reach 1	Cu	39.78%	39.78%	39.78%
	SG Reach 1	*E. coli*	94.25%	94.25%	94.25%
	San Jose Cr. Reach 1 & 2	Se	0%	0%	0%
	San Jose Cr. Reach 1 & 2	*E. coli*	94.25%	94.25%	94.25%

Color Ramp shows relative magnitude of reductions—darker means higher reductions

6. Determination of Potential BMP Capacity for RAA

The process for determining the necessary cumulative BMP capacity depends on the type of numeric goal being addressed. As shown in Figure 6-1, the volume-based (design storm) approach, necessary BMP capacity was determined through a design storm analysis. For the load-based (pollutant reduction), the analysis leveraged the optimization routines in the customized WMMS. An initial step in the RAA was a comparison of the volume reductions required by the load-based and volume-based numeric goals, to support selection of the wet weather critical conditions.

For LLAR, LCC, and LSGR, the 90th percentile WY (2002-03) weather was selected as the critical condition for wet weather.

Details on the analyses performed to determine potential BMP treatment capacity are provided in Attachment A. The attachment describes the approach for incorporating nonstructural BMPs, accounting for the effect of LACFCD infrastructure, and separating the contribution from non-MS4 sources.

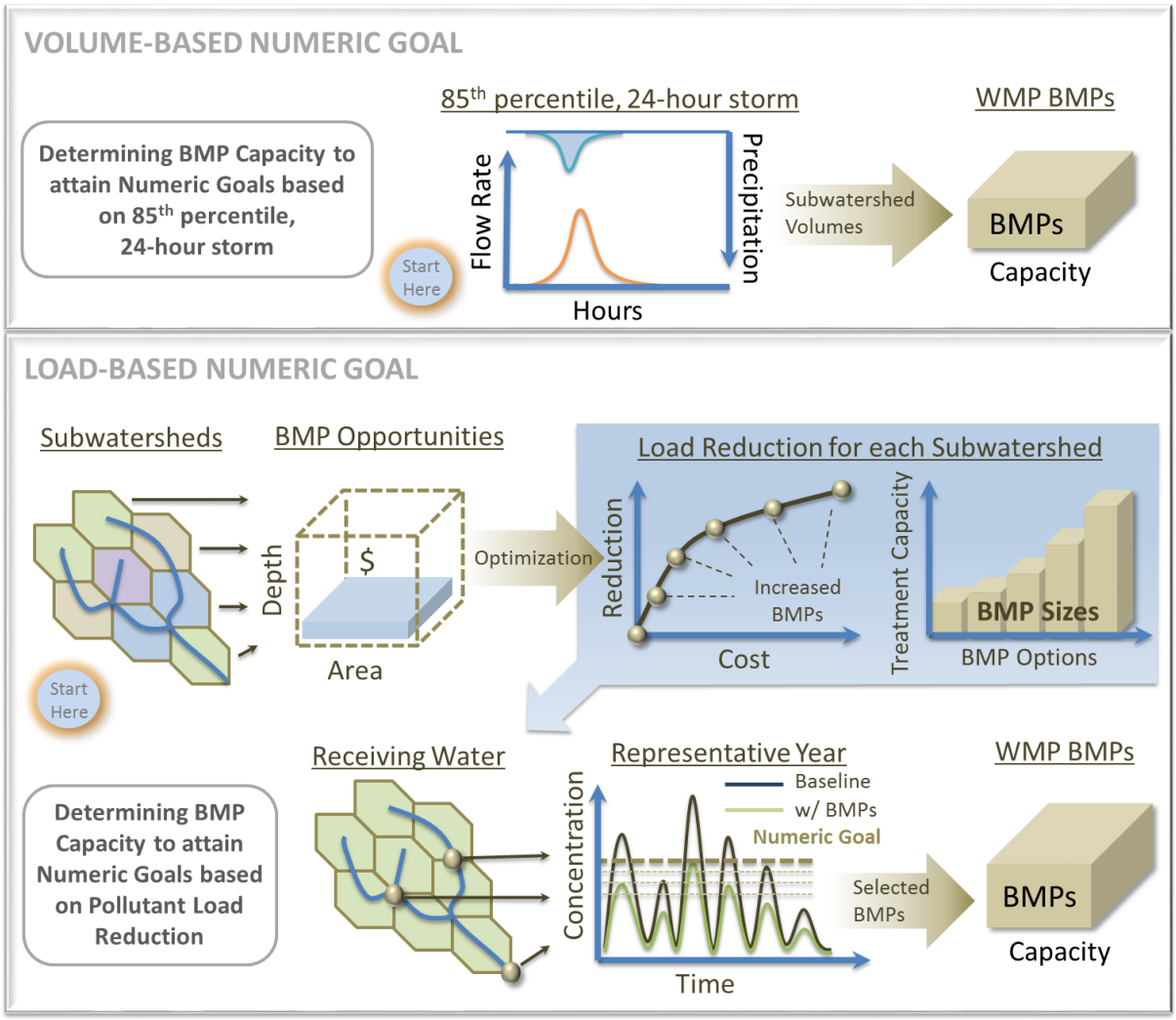

Figure 6-1. Illustration of Process for Determining Required BMP Capacities for the WMP using Volume-Based (top panel) and Load-Based (bottom panel) Numeric Goals.

7. Cumulative Volume Reduction Goals to Achieve Required Pollutant Reductions

The first output of the RAA is a series of "volume reduction goals" for each subwatershed and jurisdiction in the WMP area. WMMS was used to determine the stormwater retention volumes for each subwatershed that would achieve the required load reductions, as reported in this section. These calculated runoff reduction volumes for each subwatershed are a surrogate compliance metric for the responsible agencies. It should be noted that upon implementation, opportunities may arise where flow-through BMPs may provide similar ultimate pollutant load reduction, and may replace the need to implement volume-based reduction BMPs.

These volumes also form the basis for selection of BMPs to achieve those volume reductions, as described in Section 9 and Attachment A.

7.1. Volume Reductions for Structural BMPs

Structural BMPs were modeled using the assumptions outlined in Attachment A. BMP capacities were optimized across the entire study area to achieve the final milestone pollutant reduction requirements at each of the assessment points. Instead of summarizing optimization results in terms of BMP capacity, which is really specific to the network described in Attachment A, the results were summarized as required *annual* wet-weather retention volume (in acre-feet). This provides a volumetric basis that is (1) closely related to load reduction and (2) readily transferable as a control target for parallel BMP modeling at a finer resolution. Because the volumes were isolated to wet days, it is also not skewed by dry-weather runoff retention. The following subsections provide more details about the wet- and dry-weather analysis components.

7.1.1. Wet Weather

Using the structural BMP routing network in WMMS (described in Attachment A), the required *annual* wet-weather retention volume (in acre-feet) were calculated using the critical year time series. For milestones, the percent reduction was based on average year targets while final limits were based on critical year targets. The reported annual volumes are (1) based on required load reductions and (2) ready for BMP modeling at a finer resolution. A 10 percent load reduction was assumed to result from implementation of all nonstructural control measures outlined in the WMPs, setting the foundation of WMP implementation, and structural control measures provide additional load reduction.

Table 7-1 through Table 7-4 present incremental and cumulative retention volumes required to achieve each load reduction milestone by jurisdiction. The milestones are based on the metals TMDLs as described in Section 2. In order to calculate the incremental volume reductions for each milestone, optimization was performed for each jurisdiction to (1) emphasize BMP implementation in subwatersheds that volume reduction could most cost effectively reduce pollutants and (2) establish a cost-effective sequence of subwatersheds for each jurisdiction to achieve the milestones over time. In other words, WMMS was used to develop an implementation schedule that provides early gains in receiving water quality.

Table 7-1. Annual volume reduction goals to achieve interim and final milestones for Lower Los Angeles River WMP by jurisdiction

Jurisdiction	Total Critical Year Storm Volume Target (acre-ft/year)		
	Milestone	Incremental	Cumulative[1]
Downey	31%	143.8	143.8
	50%	221.7	365.5
	Final	360.5	726.0
Lakewood	31%	14.3	14.3
	50%	0.0	14.3
	Final	0.0	14.3
Long Beach	31%	540.7	540.7
	50%	1090.8	1,631.5
	Final	2270.1	3,901.7
Lynwood	31%	303.3	303.3
	50%	185.2	488.6
	Final	619.6	1,108.1
Paramount	31%	181.8	181.8
	50%	227.8	409.6
	Final	579.2	988.8
Pico Rivera	31%	365.3	365.3
	50%	0.0	365.3
	Final	12.0	377.3
Signal Hill	31%	32.8	32.8
	50%	106.6	139.4
	Final	58.4	197.9
South Gate	31%	229.3	229.3
	50%	343.2	572.6
	Final	940.0	1,512.6

1: Color Ramp highlights relative amount of required retention volume for milestones: darker is more, lighter is less
2: Includes full implementation of planned non-structural practices

Table 7-2. Annual volume reduction goals to achieve interim and final milestones for Los Cerritos Channel WMP by jurisdiction

Jurisdiction	Total Critical Year Storm Volume Target (acre-ft/year)		
	Milestone	Incremental	Cumulative[1]
Bellflower	10%	NS	NS
	35%	336.1	336.1
	Final	801.3	1,137.4
Cerritos	10%	NS	NS
	35%	9.7	9.7
	Final	3.2	12.9
Downey	10%	NS	NS
	35%	77.0	77.0
	Final	35.8	112.8
Lakewood	10%	NS	NS
	35%	282.4	282.4
	Final	874.8	1,157.2
Long Beach	10%	NS	NS
	35%	560.9	560.9
	Final	2115.2	2,676.1
Paramount	10%	NS	NS
	35%	278.8	278.8
	Final	353.1	631.9
Signal Hill	10%	NS	NS
	35%	269.9	269.9
	Final	52.7	322.6

1: Color Ramp highlights relative amount of required retention volume for milestones: darker is more, lighter is less
NS: Non-structural practices achieve 10% milestone

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Table 7-3. Annual volume reduction goals to achieve interim and final milestones for Lower San Gabriel River WMP

Jurisdiction	Total Critical Year Storm Volume Target (acre-ft/year)		
	Milestone	Incremental	Cumulative[1]
Artesia	10%	NS	NS
	35%	1.1	1.1
	Final	0.0	1.1
Bellflower	10%	NS	NS
	35%	1.3	1.3
	Final	61.5	62.8
Cerritos	10%	NS	NS
	35%	6.6	6.6
	Final	52.8	59.4
Diamond Bar	10%	NS	NS
	35%	0.3	0.3
	Final	32.8	33.0
Downey	10%	NS	NS
	35%	4.3	4.3
	Final	259.6	263.9
Lakewood	10%	NS	NS
	35%	7.4	7.4
	Final	2.2	9.6
Long Beach	10%	NS	NS
	35%	26.9	26.9
	Final	2.3	29.2
Norwalk	10%	NS	NS
	35%	0.8	0.8
	Final	136.1	136.9
Pico Rivera	10%	NS	NS
	35%	0.2	0.2
	Final	74.8	75.1
Santa Fe Springs	10%	NS	NS
	35%	0.0	0.0
	Final	106.0	106.0
Whittier	10%	NS	NS
	35%	0.0	0.0
	Final	7.5	7.5

1: Color Ramp highlights relative amount of required retention volume for milestones: darker is more, lighter is less
NS: Non-structural practices achieve 10% milestone

Table 7-4. Annual volume reduction goals to achieve interim and final milestones for the Coyote Creek portion of Lower San Gabriel River WMP by jurisdiction

Jurisdiction	Total Critical Year Storm Volume Target (acre-ft/year)		
	Milestone	Incremental	Cumulative[1]
Artesia	10%	NS	NS
	35%	47.9	47.9
	Final	0.0	47.9
Cerritos	10%	NS	NS
	35%	0.1	0.1
	Final	194.2	194.3
Diamond Bar	10%	NS	NS
	35%	1.0	1.0
	Final	73.0	74.0
Hawaiian Gardens	10%	NS	NS
	35%	27.0	27.0
	Final	3.4	30.4
La Mirada	10%	NS	NS
	35%	0.8	0.8
	Final	174.9	175.7
Lakewood	10%	NS	NS
	35%	17.5	17.5
	Final	8.2	25.7
Long Beach	10%	NS	NS
	35%	37.5	37.5
	Final	0.0	37.5
Norwalk	10%	NS	NS
	35%	3.0	3.0
	Final	149.5	152.5
Santa Fe Springs	10%	NS	NS
	35%	0.4	0.4
	Final	260.3	260.7
Whittier	10%	NS	NS
	35%	2.1	2.1
	Final	252.6	254.7

1: Color Ramp highlights relative amount of required retention volume for milestones: darker is more, lighter is less
NS: Non-structural practices achieve 10% milestone

7.1.2. Dry Weather

Dry-weather reductions from non-structural BMPs were calculated using flow from representative dry period (Section 5.2) of 8/17/2003 through 9/30/2003 and 90th percentile concentrations calculated from observed data (Section 5.2.1). Similar to wet weather, a 10% load reduction is assumed to result from the cumulative effect of nonstructural BMPs. Also, the effects of a 25% reduction in irrigation of urban grass was explicitly simulated in the model to estimate the resulting associated reduction of dry weather flows at the RAA Assessment Points. Irrigation was modeled as artificial rainfall within the LSPC model as a function of the potential evapotranspiration of urban grass. Once irrigation was reduced 25%, this directly impacted a large portion of the nonstormwater discharges drivin primarily from over irrigation and impacts on dry weather flows were significant. The projected effect of non-structural and irrigation controls on dry weather flow and loads is presented in Table 7-5. Since *E. Coli* is the limiting dry weather pollutant with required reductions in excess of 90%, the remaining volume reduction not controlled by non-structural measures will be treated by the structural BMPs described in the previous section.

Table 7-5. Projected dry weather reductions from non-structural control measures

Watershed	Constituent	Quantity (Volume or Mass)			Percent Reduction Achieved	
		Baseline	NM	NS	NM	NS
Lower Los Angeles River	Flow (M Gal.)	198.3	178.5	86.6	10.0%	56.4%
	Copper (kg)	19.28	17.35	8.42	10.0%	56.4%
	Lead (kg)	2.58	2.32	1.12	10.0%	56.4%
	E. Coli (Billion MPN)	147,166	132,449	64,230	10.0%	56.4%
Los Cerritos Channel	Flow (M Gal.)	133.6	120.2	56.3	10.0%	57.8%
	Copper (kg)	12.84	11.56	5.42	10.0%	57.8%
	E. Coli (Billion MPN)	71,808	64,627	30,277	10.0%	57.8%
Lower San Gabriel River	Flow (M Gal.)	163.3	147.0	71.2	10.0%	56.4%
	Copper (kg)	18.48	16.63	8.06	10.0%	56.4%
	Selenium (kg)	2.95	2.65	1.29	10.0%	56.4%
	E. Coli (Billion MPN)	13,540	12,186	5,903	10.0%	56.4%
Coyote Creek	Flow (M Gal.)	213.4	192.0	88.4	10.0%	58.6%
	Copper (kg)	23.05	20.75	9.55	10.0%	58.6%
	E. Coli (Billion MPN)	92,887	83,599	38,491	10.0%	58.6%

NM: Non-modeled non-structural practices achieve 10% reduction

NS: Non-structural 25% irrigation reduction practices achieve an additional approximately 60% reduction

8. MS4 Volume Reduction Goals to Achieve Required Pollutant Reductions

Each jurisdiction in the Group's WMP area is subject to stormwater runoff from non-MS4 facilities. In particular, Caltrans roads and facilities regulated by nontraditional or general industrial permits contribute to the runoff volume for each subwatershed. It will be important for these entities to retain their runoff and/or eliminate their cause/contribution to receiving water exceedances. The runoff from these non-MS4 facilities was therefore estimated and subtracted from the cumulative volume reduction goal (Section 7) to establish the MS4 responsible targets as described in Attachment A.

8.1. Summary of MS4 Responsible Reduction Goals

Runoff volumes estimated for non-MS4 permitted areas and Caltrans were subtracted from the reduction target to generate the required MS4 treatment capacity shown in Table 8-1 through Table 8-4.

Table 8-1. Lower Los Angeles River Critical Year Runoff Volume from MS4 and Non-MS4 Facilities

Jurisdiction	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
Downey	726.0	654.7	71.2
Lakewood	14.3	14.3	-
Long Beach	3,901.7	3,039.6	862.1
Lynwood	1,108.1	667.9	440.2
Paramount	988.8	606.1	382.7
Pico Rivera	377.3	287.2	90.0
Signal Hill	197.9	188.9	9.0
South Gate	1,512.6	1,174.3	338.2
TOTAL	8,826.5	6,633.1	2,193.5

Table 8-2. Los Cerritos Channel Critical Year Runoff Volume from MS4 and Non-MS4 Facilities

Jurisdiction	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
Bellflower	1,137.4	990.4	147.0
Cerritos	12.9	12.9	0.0
Downey	112.8	93.0	19.8
Lakewood	1,157.2	1,152.1	5.1
Long Beach	2,676.1	1,629.8	1,046.2
Paramount	631.9	525.5	106.4
Signal Hill	322.6	284.3	38.3
TOTAL	6,050.9	4,688.0	1,364.8

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Table 8-3. San Gabriel River Critical Year Runoff Volume from MS4 and Non-MS4 Facilities

Jurisdiction	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
Artesia	1.1	1.1	0.0
Bellflower	62.8	57.4	5.4
Cerritos	59.4	4.1	55.3
Diamond Bar	33.0	1.1	32.0
Downey	263.9	87.3	176.7
Lakewood	9.6	2.2	7.4
Long Beach	29.2	29.2	0.0
Norwalk	136.9	4.8	132.1
Pico Rivera	75.1	60.4	14.7
Santa Fe Springs	106.0	30.3	75.8
Whittier	7.5	7.1	0.4
TOTAL	784.6	284.9	499.7

Table 8-4. Coyote Creek Critical Year Runoff Volume from MS4 and Non-MS4 Facilities

Jurisdiction	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
Artesia	47.9	15.9	32.0
Cerritos	194.3	56.7	137.6
Diamond Bar	74.0	36.7	37.4
Hawaiian Gardens	30.4	27.1	3.4
La Mirada	175.7	124.9	50.8
Lakewood	25.7	19.7	6.0
Long Beach	37.5	0.0	37.5
Norwalk	152.5	52.5	99.9
Santa Fe Springs	260.7	12.6	248.1
Whittier	254.7	200.1	54.6
TOTAL	1,253.4	546.1	707.3

9. Pollutant Reduction Plan

The BMPs used to achieve the MS4 volume reduction goals in Section 8 are not, per se, a component of the Permit compliance determination. Instead, over time each agency will report and demonstrate that the *cumulative* effect of projects implemented over time add up to the required reductions for interim milestones and final targets (reported as "MS4 Compliance Target"). However, the initial scenario of BMPs for WMP implementation (referred to as a Pollutant Reduction Plan in the RAA Guidelines) and their costs may be the most beneficial outcome of the WMP. A detailed WMP implementation scenario is presented in Attachment B, broken down by jurisdiction and subwatershed. The volume reductions are separated among right-of-way (ROW) BMPs and Low Impact Development (LID) on public parcels (in combination with nonstructural BMPs).

The Pollutant Reduction Plan is considered an "initial" scenario because over time, through adaptive management, the responsible agencies will likely "shift" among different types of BMPs (e.g., increase implementation of green streets and reduce implementation of regional BMPs) or substitute alterative BMPs altogether (e.g., implement dry wells instead of green streets). These shifts will be supported by analyses to show the substituted BMPs provide an equivalent volume reduction as the replaced BMPs.

9.1. Existing/Planned Regional Control Measures

Existing regional BMPs play an integral part in measuring the current reductions and need for future control measures. The annual volume or load removed from the existing and planned regional control measures were subtracted from the MS4 responsible runoff to determine the remaining treatment volume required. Detailed information for the existing and planned regional control measures is found in Attachment A.

The existing and planned regional control measure information was provided for the Lower Los Angeles River and Lower San Gabriel River. The jurisdictions that were impacted are listed with the associated annual reduction provided by these facilities in Table 9-1 and Table 9-2.

Table 9-1. Lower Los Angeles River Critical Year Existing/Planned Regional BMP Runoff Volume Reductions

Jurisdiction	COMPLIANCE TARGET		
	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Existing/Planned Regional BMP Reductions (acre-ft/year)	Remaining MS4 Responsible Critical Year Storm Volume (acre-ft/year)
Lakewood	14.3	6.4	7.9
Long Beach	3,039.6	633.4	2,406.2
Signal Hill	188.9	22.7	166.2

Table 9-2. Lower San Gabriel River Critical Year Existing/Planned Regional BMP Runoff Volume Reductions

Jurisdiction	COMPLIANCE TARGET		
	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Existing/Planned Regional BMP Reductions (acre-ft/year)	Remaining MS4 Responsible Critical Year Storm Volume (acre-ft/year)
Downey	87.3	24.0	63.3

9.2. Future Control Measures for Attainment of Interim and Final Limits

The Pollutant Reduction Plans for wet and dry weather illustrate the sequencial BMP implementation strategy to attain all interim and final limits. Within each of the jurisdictions, the subwatershed subareas were individually prioritized and associated with milestones on the basis of cost-effectiveness for zinc removal. The optimization modeling results presented in Section 7 and Figure 9-1, Figure 9-2 and Figure 9-3 shown below identify the prioritization of subwatershed implementation based on the most effective combination of BMPs. The implementation schedule outlined in the Pollutant Reduction Plans for wet and dry weather are based upon this prioritization. The plans are presented in the following subsections.

9.2.1. Wet Weather

The interim and final targets are presented in total acre-feet per year that requires treatement through structural BMPs (less the non-MS4 and existing regional volumes as described in Sections 8 and 9.1). To properly capture the annual volume, BMPs are sized to the minimum volume needed to capture the target annual volume. Thus, the BMPs are presented as a volume (acre-feet) that has the ability to capture the required annual total to meet compliance.

An overall jurisdictional summary table is presented in Table 9-3 that outlines the required BMP volume to achieve compliance in the associated WMP group. The BMP volumes are the sum of existing distributed BMPs, potential green street BMPs, LID on public parcels, and remaining BMP volume that must be implemented as regional (or other) projects as necessary to meet the annual volume reduction target.

Table 9-4 through Table 9-7 outlines the jurisdiction-wide BMP volume targets necessary to meet the annual volume interim and final limits established in Section 8. Each distributed BMP was associated with a jurisdictional subwatershed and the associated implementation schedule, thus summing their impact across different interim goals. The remaining BMP volume after accounting for existing distributed BMPs is spread across right-of-way BMPs, LID on public parcels, and remaining BMP volume including potential regional projects. Priority was given to LID on public parcels, followed by right-of-way BMPs and finally other BMPs. The incremental column shows the total additional BMP volume required for each milestone while the cumulative measures the total BMP volume required by each milestone to hit the final compliance targets. Deatiled discussion on how the BMPs in the right-of-way and LID on public parcels were determined is found in Attachment A. Detailed tables are provided in Attachment B for each jurisdiction and associated subwatersheds. Detailed tables describing the existing distributed BMPs are found in Attachment D.

Table 9-3. Jurisdictional Final Target BMP Volumes by WMP Group

	LLAR	LCC	LSGR - SGR	LSGR - CC	
Jurisdiction	**Total BMP Volume to Achieve Compliance (acre-ft)**	**Total BMP Volume to Achieve Compliance (acre-ft)**	**Total BMP Volume to Achieve Compliance (acre-ft)**	**Total BMP Volume to Achieve Compliance (acre-ft)**	**TOTAL**
Artesia	-	-	0.1	1.1	**1.2**
Bellflower	-	118.2	5.5	-	**123.7**
Cerritos	-	1.6	0.6	6.4	**8.6**
Diamond Bar	-	-	0.2	8.9	**9.1**
Downey	83.4	10.2	17.5	-	**111.2**
Hawaiian Gardens	-	-	-	2.2	**2.2**
La Mirada	-	-	-	15.2	**15.2**
Lakewood	1.2	169.5	0.4	1.9	**173.0**
Long Beach	319.1	208.7	2.7	0.0	**530.5**
Lynwood	95.5	-	-	-	**95.5**
Norwalk	-	-	0.3	4.7	**5.0**
Paramount	76.6	55.1	-	-	**131.7**
Pico Rivera	41.2	-	10.8	-	**52.0**
Santa Fe Springs	-	-	4.9	2.1	**7.0**
Signal Hill	22.3	28.6	-	-	**50.9**
South Gate	173.0	-	-	-	**173.0**
Whittier	-	-	1.4	39.1	**40.5**
TOTAL	**812.3**	**591.9**	**44.4**	**81.6**	**1,530.2**

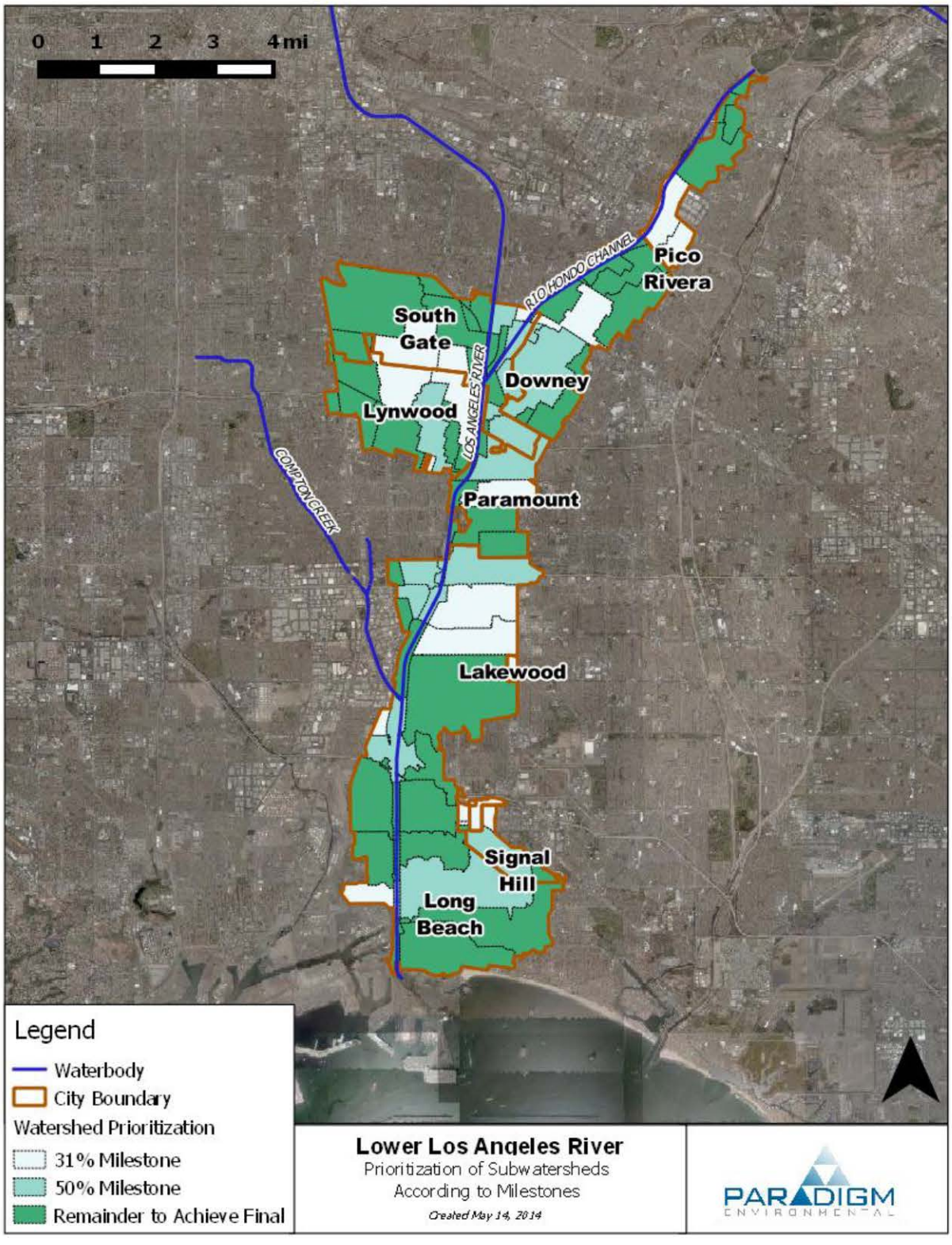

Figure 9-1. LLAR implementation areas associated with Interim and final milestones.

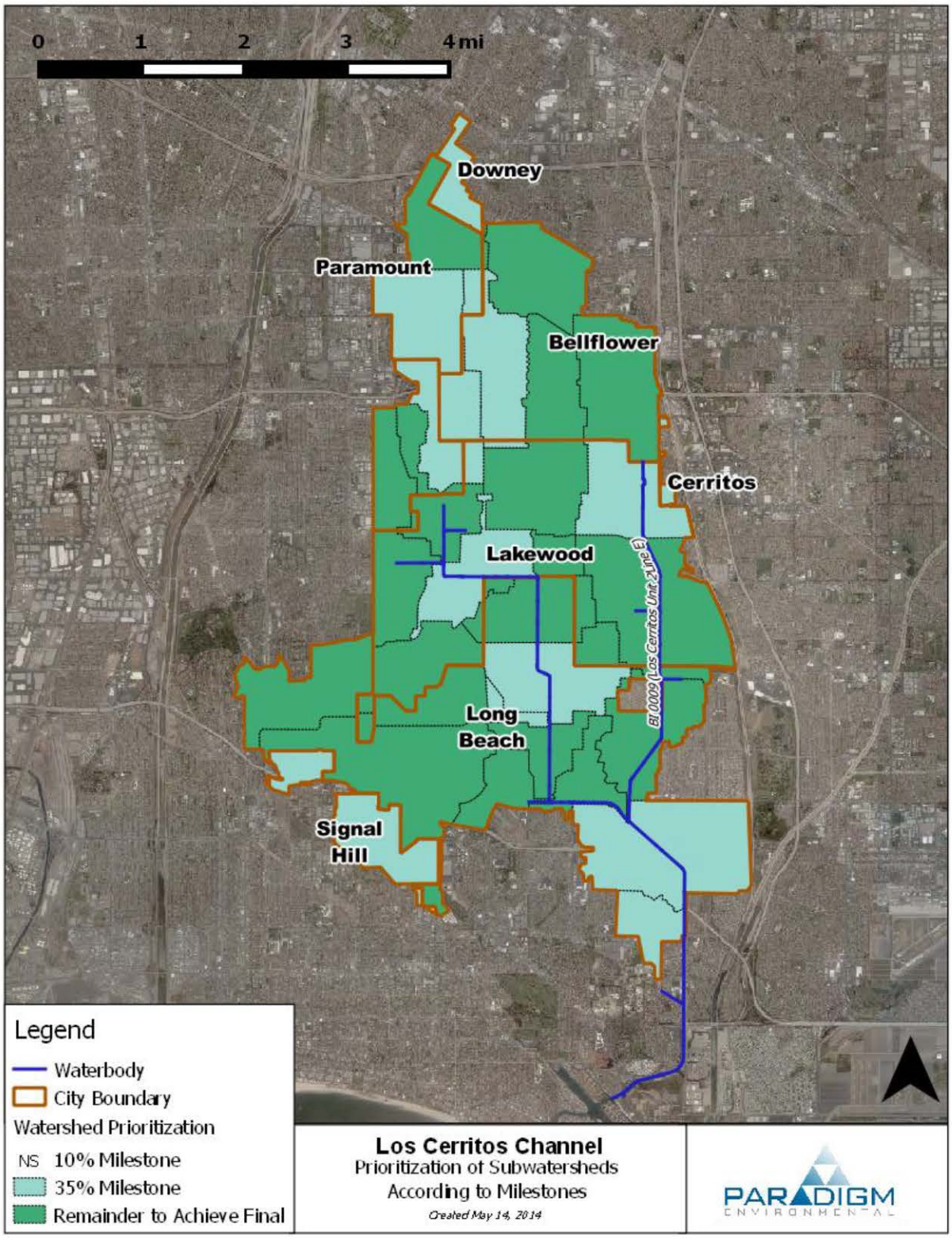

Figure 9-2. LCC implementation areas associated with Interim and final milestones.

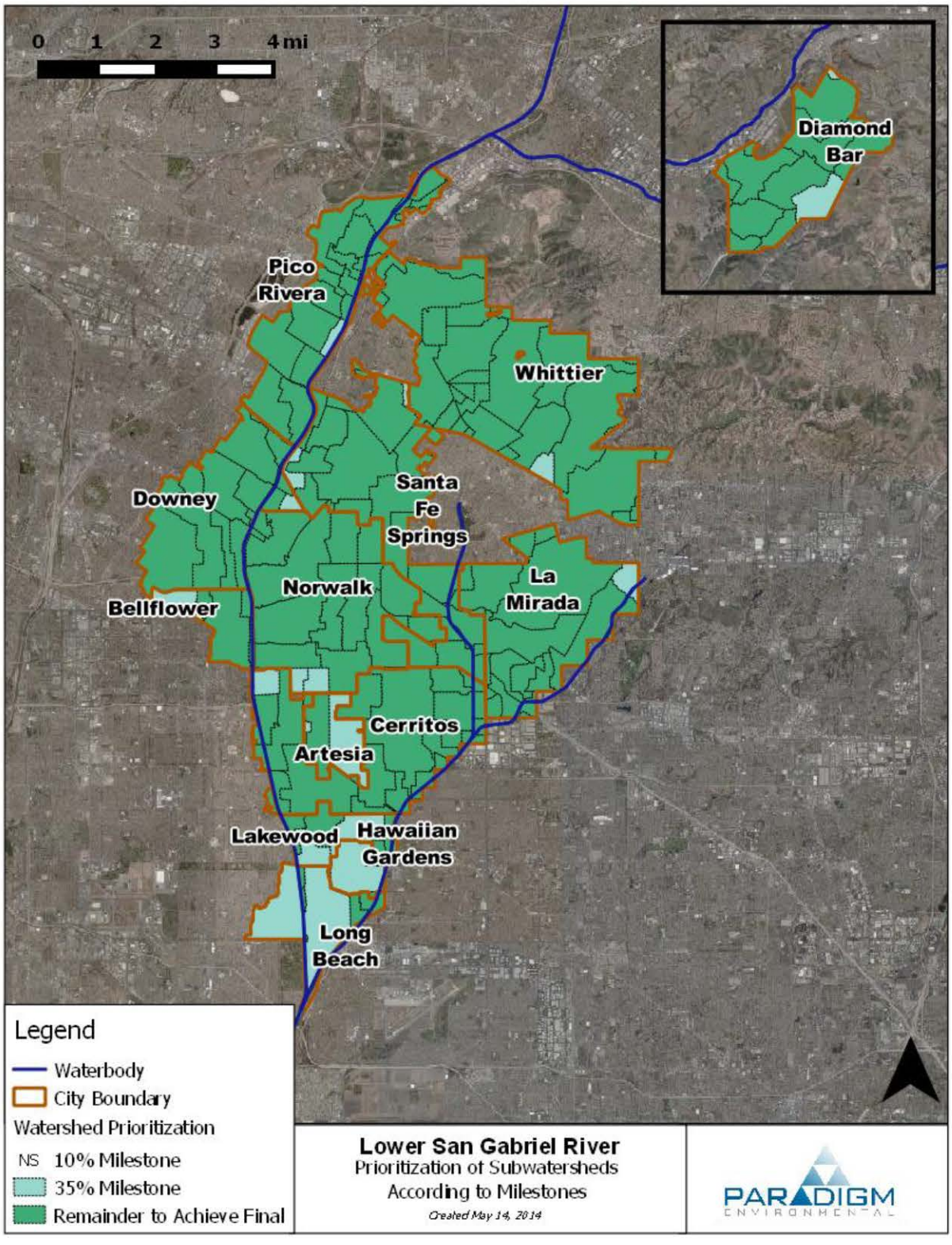

Figure 9-3. LSGR implementation areas associated with Interim and final milestones.

Table 9-4. Lower Los Angeles River Pollutant Reduction Plan for Attainment of Interim and Final Limits

Jurisdiction	Milestone	COMPLIANCE TARGET		POLLUTANT REDUCTION PLAN						
		Remaining MS4 Responsible Critical Year Storm Volume* (acre-ft/year)		Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)		Estimated Potential LID on Public Parcels Volume (acre-ft)		Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	
		Incremental	Cumulative		Incremental	Cumulative	Incremental	Cumulative	Incremental	Cumulative
Downey	31%	143.8	143.8	1.1	12.2	12.2	0.7	0.7	7.1	7.1
	50%	187.1	330.9	0.7	2.5	14.7	10.1	10.8	0.6	7.7
	Final	323.9	654.7	2.0	31.2	45.9	4.4	15.3	10.7	18.4
Lakewood	31%	7.9	7.9	NA	1.1	1.1	0.0	0.0	-	-
	50%	-	7.9		-	1.1	-	0.0	-	-
	Final	-	7.9		-	1.1	-	0.0	-	-
Long Beach	31%	6.5	6.5	NA	1.0	1.0	0.0	0.0	-	-
	50%	567.0	573.5		40.3	41.3	7.5	7.5	24.7	24.7
	Final	1,832.7	2,406.2		113.4	154.6	20.8	28.3	111.5	136.2
Lynwood	31%	235.9	235.9	NA	18.4	18.4	2.7	2.7	13.1	13.1
	50%	134.9	370.8		12.8	31.2	3.8	6.5	0.1	13.2
	Final	297.2	667.9		22.7	53.9	4.5	11.1	17.3	30.5
Paramount	31%	163.7	163.7	0.1	9.0	9.0	1.7	1.7	10.2	10.2
	50%	65.7	229.4		7.4	16.4	0.8	2.5	0.3	10.4
	Final	376.6	606.1		14.9	31.2	2.1	4.7	30.2	40.6
Pico Rivera	31%	275.3	275.2	NA	11.5	11.5	0.5	0.5	27.4	27.4
	50%	-	275.2		-	11.5	-	0.5	-	27.4
	Final	12.0	287.2		1.3	12.8	0.0	0.5	0.5	27.9
Signal Hill	31%	8.5	8.5	0.2	0.8	0.8	0.2	0.2	0.2	0.2
	50%	105.8	114.3		7.0	7.8	0.9	1.1	5.9	6.1
	Final	51.9	166.2		2.2	10.0	0.0	1.1	4.9	11.0
South Gate	31%	229.3	229.3	4.7	23.2	23.2	0.9	0.9	6.5	6.5
	50%	198.1	427.4		15.0	38.3	0.8	1.7	12.6	19.1
	Final	746.9	1,174.3		49.3	87.5	5.1	6.8	54.7	73.8

Table 9-5. Los Cerritos Channel Pollutant Reduction Plan for Attainment of Interim and Final Limits

Jurisdiction	Milestone	COMPLIANCE TARGET		POLLUTANT REDUCTION PLAN							
		Remaining MS4 Responsible Critical Year Storm Volume* (acre-ft/year)		Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)		Estimated Potential LID on Public Parcels Volume (acre-ft)		Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	
		Incremental	Cumulative		Incremental	Cumulative	Incremental	Cumulative	Incremental	Cumulative
Bellflower	10%	NS	NS		-	-	-	-	-	-
	35%	244.4	244.4	NA	15.1	15.1	1.2	1.2	16.2	16.2
	Final	746.0	990.4		43.0	58.1	3.2	4.5	39.4	55.6
Cerritos	10%	NS	NS		-	-	-	-	-	-
	35%	9.7	9.7	NA	1.0	1.0	0.0	0.0	0.5	0.5
	Final	3.2	12.9		-	1.0	-	0.0	0.1	0.6
Downey	10%	NS	NS		-	-	-	-	-	-
	35%	57.2	57.2	0.1	5.3	5.3	0.0	0.0	2.7	2.7
	Final	35.8	93.0		-	5.3	-	0.0	2.1	4.8
Lakewood	10%	NS	NS		-	-	-	-	-	-
	35%	282.4	282.4	NA	31.5	31.5	4.7	4.7	6.9	6.9
	Final	869.7	1,152.1		90.0	121.5	7.0	11.8	29.3	36.2
Long Beach	10%	NS	NS		-	-	-	-	-	-
	35%	473.5	473.5	NA	33.8	33.8	12.3	12.3	16.4	16.4
	Final	1,156.3	1,629.8		87.9	121.7	9.5	21.8	48.9	65.3
Paramount	10%	NS	NS		-	-	-	-	-	-
	35%	267.0	267.0	NA	14.3	14.3	3.0	3.0	17.1	17.1
	Final	258.5	525.5		8.5	22.8	3.5	6.4	8.7	25.8
Signal Hill	10%	NS	NS		-	-	-	-	-	-
	35%	231.6	231.6	0.0	11.2	11.2	1.2	1.2	14.2	14.2
	Final	52.7	284.3		-	11.2	-	1.2	2.0	16.2

NS: Non-structural practices achieve 10% milestone

NA: No information/not enough information provided

*Runoff from non-MS4 sources and reductions fro existing regional BMPs are excluded from compliance target (see Attachment A)

Table 9-6. San Gabriel River Pollutant Reduction Plan for Attainment of Interim and Final Limits

Jurisdiction	Milestone	COMPLIANCE TARGET		POLLUTANT REDUCTION PLAN						
		Remaining MS4 Responsible Critical Year Storm Volume* (acre-ft/year)		Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)		Estimated Potential LID on Public Parcels Volume (acre-ft)		Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	
		Incremental	Cumulative		Incremental	Cumulative	Incremental	Cumulative	Incremental	Cumulative
Artesia	10%	NS	NS	NA	-	-	-	-	-	-
	35%	1.1	1.1		-	-	0.1	0.1	-	-
	Final	-	1.1		-	-	-	0.1	-	-
Bellflower	10%	NS	NS	NA	-	-	-	-	-	-
	35%	1.3	1.3		0.2	0.2	0.0	0.0	-	-
	Final	56.1	57.4		1.5	1.8	3.7	3.7	0.0	0.0
Cerritos	10%	NS	NS	NA	-	-	-	-	-	-
	35%	-	-		-	-	-	-	-	-
	Final	4.1	4.1		0.6	0.6	0.0	0.0	-	-
Diamond Bar	10%	NS	NS	NA	-	-	-	-	-	-
	35%	-	-		-	-	-	-	-	-
	Final	1.1	1.1		0.2	0.2	-	-	-	-
Downey	10%	NS	NS		-	-	-	-	-	-
	35%	-	-		-	-	-	-	-	-
	Final	63.3	63.3	7.1	10.0	10.0	0.4	0.4	-	-
Lakewood	10%	NS	NS	NA	-	-	-	-	-	-
	35%	-	-		-	-	-	-	-	-
	Final	2.2	2.2		0.2	0.2	0.0	0.0	0.1	0.1
Long Beach	10%	NS	NS	NA	-	-	-	-	-	-
	35%	26.9	26.9		1.1	1.1	1.3	1.3	-	-
	Final	2.3	29.2		0.3	1.4	-	1.3	0.0	0.0

Jurisdiction	Milestone	COMPLIANCE TARGET		POLLUTANT REDUCTION PLAN						
		Remaining MS4 Responsible Critical Year Storm Volume* (acre-ft/year)		Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)		Estimated Potential LID on Public Parcels Volume (acre-ft)		Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	
		Incremental	Cumulative		Incremental	Cumulative	Incremental	Cumulative	Incremental	Cumulative
Norwalk	10%	NS	NS	NA	-	-	-	-	-	-
	35%	0.8	0.8		-	-	0.1	0.1	-	-
	Final	4.0	4.8		-	-	0.3	0.3	-	-
Pico Rivera	10%	NS	NS	NA	-	-	-	-	-	-
	35%	0.2	0.2		0.0	0.0	-	-	-	-
	Final	60.2	60.4		10.7	10.8	-	-	0.0	0.0
Santa Fe Springs	10%	NS	NS	NA	-	-	-	-	-	-
	35%	-	-		-	-	-	-	-	-
	Final	30.3	30.3		4.6	4.6	-	-	0.3	0.3
Whittier	10%	NS	NS	NA	-	-	-	-	-	-
	35%	0.0	0.0		-	-	-	-	0.0	0.0
	Final	7.1	7.1		1.4	1.4	-	-	-	0.0

NS: Non-structural practices achieve 10% milestone

NA: No information/not enough information provided

*Runoff from non-MS4 sources and reductions fro existing regional BMPs are excluded from compliance target (see Attachment A)

Table 9-7. Coyote Creek Pollutant Reduction Plan for Attainment of Interim and Final Limits

Jurisdiction	Milestone	COMPLIANCE TARGET		POLLUTANT REDUCTION PLAN						
		Remaining MS4 Responsible Critical Year Storm Volume* (acre-ft/year)		Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)		Estimated Potential LID on Public Parcels Volume (acre-ft)		Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	
		Incremental	Cumulative		Incremental	Cumulative	Incremental	Cumulative	Incremental	Cumulative
Artesia	10%	NS	NS	NA	-	-	-	-	-	-
	35%	15.9	15.9		-	-	1.1	1.1	-	-
	Final	-	15.9		-	-	-	1.1	-	-
Cerritos	10%	NS	NS	NA	-	-	-	-	-	-
	35%	0.1	0.1		0.0	0.0	-	-	-	-
	Final	56.6	56.7		3.0	3.1	3.4	3.4	-	-
Diamond Bar	10%	NS	NS	NA	-	-	-	-	-	-
	35%	1.0	1.0		0.3	0.3	-	-	-	-
	Final	35.6	36.7		8.0	8.2	-	-	0.7	0.7
Hawaiian Gardens	10%	NS	NS	NA	-	-	-	-	-	-
	35%	23.6	23.6		0.3	0.3	1.5	1.5	-	-
	Final	3.4	27.1		0.2	0.6	0.1	1.6	0.0	0.0
La Mirada	10%	NS	NS	NA	-	-	-	-	-	-
	35%	-	-		-	-	-	-	-	-
	Final	124.9	124.9		9.6	9.6	5.6	5.6	-	-
Lakewood	10%	NS	NS	NA	-	-	-	-	-	-
	35%	17.5	17.5		0.9	0.9	0.7	0.7	-	-
	Final	2.3	19.7		-	0.9	0.3	0.9	-	-
Long Beach	10%	NS	NS	NA	-	-	-	-	-	-
	35%	-	-		-	-	-	-	-	-
	Final	0.0	0.0		-	-	0.0	0.0	-	-

Jurisdiction	Milestone	COMPLIANCE TARGET		POLLUTANT REDUCTION PLAN						
		Remaining MS4 Responsible Critical Year Storm Volume* (acre-ft/year)		Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)		Estimated Potential LID on Public Parcels Volume (acre-ft)		Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	
		Incremental	Cumulative		Incremental	Cumulative	Incremental	Cumulative	Incremental	Cumulative
Norwalk	10%	NS	NS	NA	-	-	-	-	-	-
	35%	1.6	1.6		-	-	0.2	0.2	-	-
	Final	50.9	52.5		1.4	1.4	3.2	3.4	-	-
Santa Fe Springs	10%	NS	NS	NA	-	-	-	-	-	-
	35%	-	-		-	-	-	-	-	-
	Final	12.6	12.6		1.0	1.0	-	-	1.1	1.1
Whittier	10%	NS	NS	NA	-	-	-	-	-	-
	35%	-	-		-	-	-	-	-	-
	Final	200.1	200.1		39.0	39.0	-	-	0.0	0.0

NS: Non-structural practices achieve 10% milestone

NA: No information/not enough information provided

*Runoff from non-MS4 sources and reductions fro existing regional BMPs are excluded from compliance target (see Attachment A)

9.2.2. Dry Weather

Dry weather reductions are attained through a combination of non-structural practices and structural BMPs as they are implemented as part of the wet weather attainment of limits. As wet-weather BMPs are implemented, they serve to remove the dry-weather flows thus meeting the compliance set forth to achieve dry-weather reductions. As a summary of the dry weather analysis, Table 9-8 through Table 9-11 outline the jurisdiction-wide attainment of interim and final milestones for dry weather. The reduction from implemented BMPs compares the actual dry-weather reduction versus the compliance target.

Table 9-8. Lower Los Angeles River Dry Weather Pollutant Reduction Plan for Attainment of Interim and Final Limits

Jurisdiction	Milestone	Dry Weather *E. coli* Load Reduction	
		Compliance Target	Reduction from Implemented BMPs
Downey	31%	30.8%	65.9%
	50%	49.7%	76.9%
	Final	99.4%	99.4%
Lakewood	31%	30.8%	99.4%
	50%	49.7%	99.4%
	Final	99.4%	99.4%
Long Beach	31%	30.8%	62.1%
	50%	49.7%	74.3%
	Final	99.4%	99.4%
Lynwood	31%	30.8%	71.8%
	50%	49.7%	80.2%
	Final	99.4%	99.4%
Paramount	31%	30.8%	51.0%
	50%	49.7%	72.4%
	Final	99.4%	99.4%
Pico Rivera	31%	30.8%	71.8%
	50%	49.7%	71.8%
	Final	99.4%	99.4%
Signal Hill	31%	30.8%	69.3%
	50%	49.7%	94.9%
	Final	99.4%	99.4%
South Gate	31%	30.8%	62.8%
	50%	49.7%	75.9%
	Final	99.4%	99.4%

Table 9-9. Los Cerritos Channel Dry Weather Pollutant Reduction Plan for Attainment of Interim and Final Limits

Jurisdiction	Milestone	Dry Weather *E. coli* Load Reduction	
		Compliance Target	Reduction from Implemented BMPs
Bellflower	10%	9.9%	58.1%
	35%	34.7%	71.4%
	Final	99.1%	99.1%
Cerritos	10%	9.9%	56.4%
	35%	34.7%	99.1%
	Final	99.1%	99.1%
Downey	10%	9.9%	59.8%
	35%	34.7%	99.1%
	Final	99.1%	99.1%
Lakewood	10%	9.9%	55.6%
	35%	34.7%	69.6%
	Final	99.1%	99.1%
Long Beach	10%	9.9%	60.1%
	35%	34.7%	76.9%
	Fin al	99.1%	99.1%
Paramount	10%	9.9%	52.8%
	35%	34.7%	79.8%
	Final	99.1%	99.1%
Signal Hill	10%	9.9%	60.8%
	35%	34.7%	99.1%
	Final	99.1%	99.1%

Table 9-10. San Gabriel River Dry Weather Pollutant Reduction Plan for Attainment of Interim and Final Limits

Jurisdiction	Milestone	Dry Weather *E. coli* Load Reduction	
		Compliance Target	Reduction from Implemented BMPs
Artesia	10%	9.4%	57.6%
	35%	33.0%	94.3%
	Final	94.25%	94.25%
Bellflower	10%	9.4%	49.9%
	35%	33.0%	57.6%
	Final	94.25%	94.25%
Cerritos	10%	9.4%	43.7%
	35%	33.0%	48.1%
	Final	94.25%	94.25%
Diamond Bar	10%	9.4%	58.2%
	35%	33.0%	58.8%
	Final	94.25%	94.25%
Downey	10%	9.4%	57.4%
	35%	33.0%	58.1%
	Final	94.25%	94.25%
Lakewood	10%	9.4%	43.1%
	35%	33.0%	73.7%
	Final	94.25%	94.25%
Long Beach	10%	9.4%	46.6%
	35%	33.0%	91.6%
	Final	94.25%	94.25%
Norwalk	10%	9.4%	54.8%
	35%	33.0%	55.7%
	Final	94.25%	94.25%
Pico Rivera	10%	9.4%	51.8%
	35%	33.0%	51.9%
	Final	94.25%	94.25%
Santa Fe Springs	10%	9.4%	54.4%
	35%	33.0%	57.9%
	Final	94.25%	94.25%
Whittier	10%	9.4%	57.9%
	35%	33.0%	58.0%
	Final	94.25%	94.25%

Table 9-11. Coyote Creek Dry Weather Pollutant Reduction Plan for Attainment of Interim and Final Limits

Jurisdiction	Milestone	Dry Weather *E. coli* Load Reduction	
		Compliance Target	Reduction from Implemented BMPs
Artesia	10%	9.9%	60.9%
	35%	34.6%	85.1%
	Final	98.9%	98.9%
Cerritos	10%	9.9%	56.3%
	35%	34.6%	56.3%
	Final	98.9%	98.9%
Diamond Bar	10%	9.9%	61.3%
	35%	34.6%	65.9%
	Final	98.9%	98.9%
Hawaiian Gardens	10%	9.9%	59.7%
	35%	34.6%	96.9%
	Final	98.9%	98.9%
La Mirada	10%	9.9%	57.4%
	35%	34.6%	58.7%
	Final	98.9%	98.9%
Lakewood	10%	9.9%	60.7%
	35%	34.6%	76.5%
	Final	98.9%	98.9%
Long Beach	10%	9.9%	54.5%
	35%	34.6%	91.9%
	Final	98.9%	98.9%
Norwalk	10%	9.9%	59.2%
	35%	34.6%	60.8%
	Final	98.9%	98.9%
Santa Fe Springs	10%	9.9%	51.7%
	35%	34.6%	52.0%
	Final	98.9%	98.9%
Whittier	10%	9.9%	60.7%
	35%	34.6%	61.4%
	Final	98.9%	98.9%

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Attachment A: DETERMINATION OF BMP TREATMENT CAPACITY

Submitted to:

LLAR WMP Group LCC WMP Group LSGR WMP Group

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January 15, 2015

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1. Determination of BMP Treatment Capacity

The process for determining the necessary cumulative BMP capacity depends on the type of numeric goal being addressed. As shown in Figure 1-1, the volume-based (design storm) approach, necessary BMP capacity was determined through a design storm analysis. For the load-based (pollutant reduction), the analysis leveraged the optimization routines in the customized WMMS. An initial step in the RAA was a comparison of the volume reductions required by the load-based and volume-based numeric goals, to support selection of the wet weather critical conditions.

This appendix describes key analyses conducted to determine the potential capacity of different BMPs including non-structural BMPs. In addition, it describes the approach for non-MS4 sources.

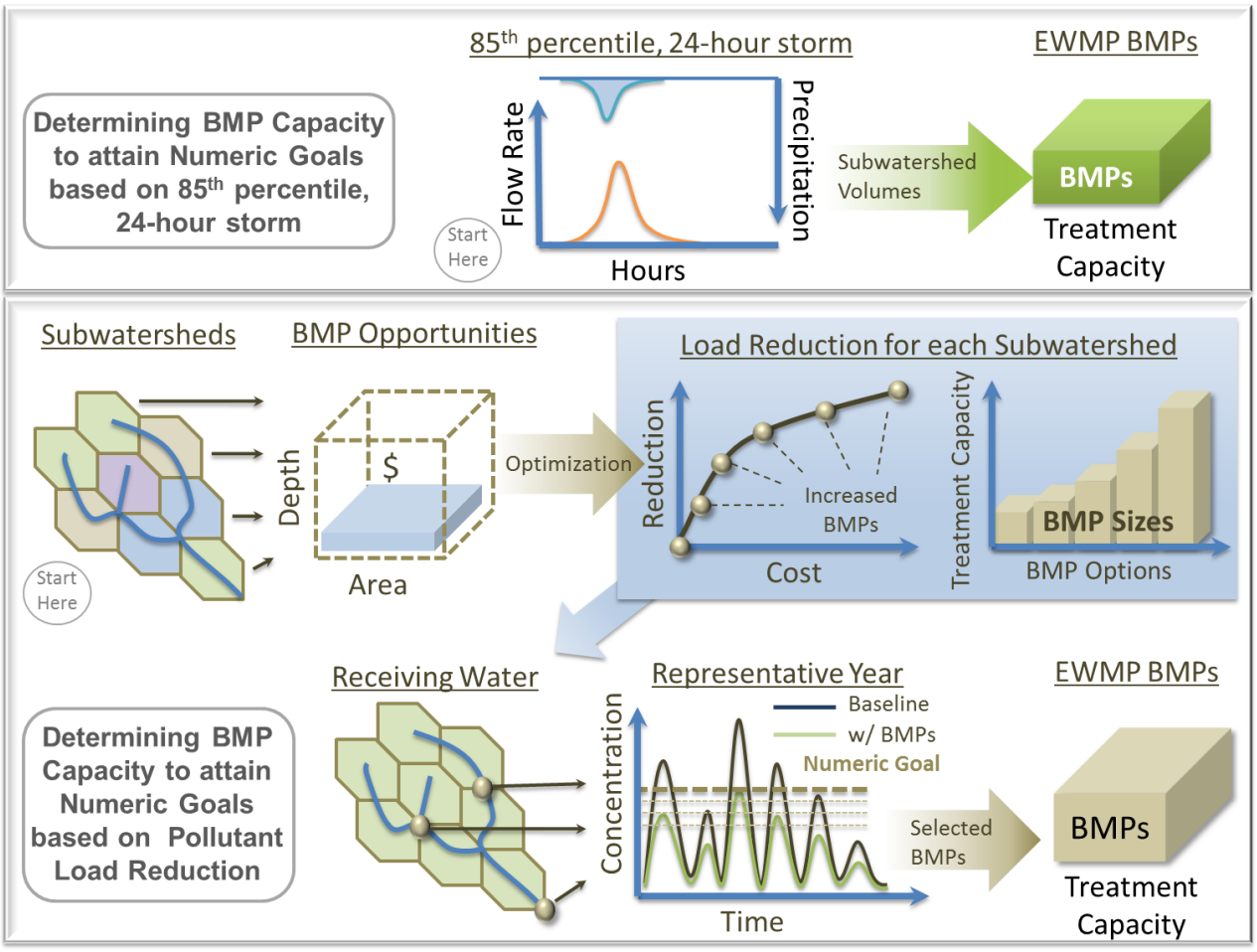

Figure 1-1. Illustration of Process for Determining Required BMP Capacities for the WMP using Volume-Based (top panel) and Load-Based (bottom panel) Numeric Goals.

1.1. Load Reduction Optimization Modeling Analysis

During development of WMMS, distributed BMPs were modeled at the subwatershed-scale using a generalized BMP treatment train. Depending on the land use type, different types of BMPs were applied. The three generalized BMP pathways were: (1) transportation, (2) residential, and (3) commercial/industrial/institutional. A conceptual schematic of the BMP network and pathways is presented in Figure 1-2 (LACDPW 2011).

For the RAA, subwatershed-scale SUSTAIN models were developed using the WMMS modeling assumptions. Each BMP from the treatment train described in Figure 1-2 was configured consistently with modeling performed during development of the WMMS system and followed the Regional Board RAA guidelines. A summary of key BMP parameters used for RAA modeling are presented in Table 1-1. Background infiltration rates were changed from those used during WMMS development (0.5 inches per hour) to site-specific infiltrations rates provided in the Los Angeles County Hydrology Manual and associated spatial datasets (LACDPW 2006). These rates also deviate somewhat from the values suggested in the RAA Guidelines (0.1 – 0.3 inches per hour); however, the data are locally-derived, published and reliable which provides adequate justification for their use.

First, SUSTAIN models were configured using the existing condition watershed model runoff timeseries and land use distributions as inputs, and benchmarked against the aggregated LSPC model results to establish baseline consistency. Second, using the SUSTAIN configuration with the respective BMP opportunities per pathway (as presented in Figure 1-2) in each subwatershed, optimization runs were formulated to maximize zinc reduction (i.e. the limiting target pollutant) while minimizing total estimated implementation cost. This resulted in a matrix of high-resolution cost-effectiveness curves for each subwatershed. Finally, a Tier-II optimization framework was configured to collectively optimize target load reductions at the downstream assessment point, with an added equitability constraint to ensure that each jurisdiction shared proportionally in the reduction effort. For the Tier-II optimization, instead of the decision variables being individual BMPs within a network like before, they were comprised of individual solutions taken off the cost-effectiveness curves at each subwatershed. The primary objective was to quantify the stormwater retention volume and load reductions provided by the collective actions occurring within each contributing jurisdiction tributary to the assessment point.

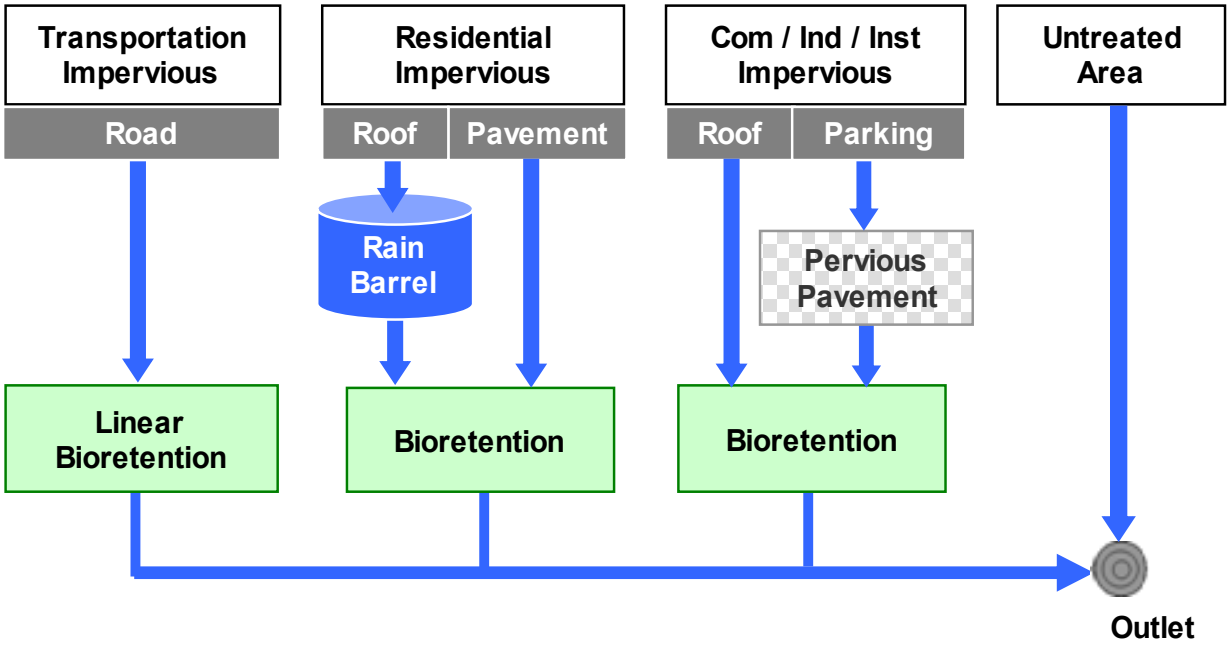

Figure 1-2. Conceptual schematic of the WMMS aggregate BMP treatment train (LACDPW 2011b).

Table 1-1. BMP parameters used in the load reduction modeling analysis

Constituent Group	Rain Barrel	Bioretention	Porous Pavement
Media Infiltration Rate (in/hr)	n/a	0.1 – 0.9	0.1 – 0.9
Substrate Layer Porosity (fraction)	n/a	0.4	0.4
Substrate Layer Field Capacity (fraction)	n/a	0.3	0.055
Substrate Layer Wilting Point (fraction)	n/a	0.1	0.05
Underdrain Gravel Porosity (fraction)	n/a	0.5	0.45
Vegetative Parameter, A (unitless)	n/a	0.6	1.0
Background Infiltration Rate (in/hr)	n/a	0.1 – 0.9	0.1 – 0.9
First Order Decay Rate (1/day)[1]	0.2 – 0.8	0.2 – 0.8	0.2 – 0.8
Underdrain Filtration Rate (%)[1]	n/a	0.5 – 0.9	0.5 – 0.9

1. Rates vary by pollutant and the type of BMP soil media

1.2. BMP Capacity Analysis for the Rights-of-Way

A key consideration for WMP implementation is the potential BMP capacity that could be provided by rights-of-way (ROW). In order to highlight the potential structural BMP implementation approaches to meet the volume targets, a BMP opportunity analysis was conducted. Two broad categories of BMPs – ROW BMPs and LID on public parcels – were used to describe the networks of BMPs needed to meet the target reductions.

This section describes how right-of-ways were evaluated for opportunities to locate BMPs and evaluate the key components that affect the ability of the ROW BMP networks to be effective: space available in the ROW, types of BMPs to site in the ROW, drainage areas that could potentially be treated by ROW BMPs, and estimated BMP infiltration rates.

Stormwater BMPs in the ROW are treatment systems arranged linearly within the street ROW and are designed to reduce runoff volumes and improve runoff water quality from the roadway and adjacent parcels. Implementing BMPs in the ROW provides an opportunity to meet water quality goals by locating BMPs in areas owned or controlled by a municipality to avoid the cost of land acquisition or establishing an easement. Implementing BMPs in the ROW allows for direct control of construction, maintenance, and monitoring activities by the responsible jurisdiction. Bioretention and permeable pavement are typically best suited for implementation in the ROW

Figure 1-3. Conceptual schematic of ROW BMPs with an underdrain (Arrows indicate water pathways).

Not all roads are suited for ROW BMP retrofits; therefore, screening is required to eliminate roads where ROW BMP retrofits are impractical or infeasible due to physical constraints. While ROW BMP retrofits can be implemented in a variety of settings, the physical characteristics of the road itself such as the road type, local topography, and depth to groundwater can significantly influence the practicality of designing and constructing these features. A screening protocol was established to identify realistic opportunities for retrofits based on the best available GIS data. The opportunities identified during this process provide the foundation for the engineering analysis to determine the volume of stormwater that can be treated by ROW BMP retrofits in the subject watersheds. This section describes the data and the screening process used to identify the best available roads for ROW BMP retrofits.

1.2.1. Data Used

To evaluate BMP opportunities and available implementation areas, several key data sets were processed and formatted. Table 1-2 outlines the data set names, formats, descriptions, and sources.

Table 1-2. Summary of Data

Data Set	Format	Description	Source
Parcels	GIS Shapefile	Outlines property boundaries and sizes	Los Angeles County (LAC) Assessor
Roads	GIS Shapefile	Shows street centerline network & classification by Topologically Integrated Geographic Encoding and Reference (TIGER)	LAC GIS Portal
Land Use	GIS Shapefile	Subdivides the region into predefined land use categories with similar runoff properties. Each individual land use feature identifies the associated percent impervious coverage.	LAC WMMS Model
Subwatersheds	GIS Shapefile	Defines drainage areas to selected outlet points	LAC WMMS Model
Slopes	GIS Shapefile	Classifies regions by the slope category	LAC WMMS Model
Soils	GIS Shapefile	Outlines spatial extents of dominant soil types	LAC GIS Portal
Jurisdictions	GIS Shapefile	Establishes city and county boundaries	LAC GIS Portal
Drainage Network	GIS Shapefile	Identifies stormwater structure layout and conveyance methods	LAC GIS Portal
Groundwater Contours	GIS Shapefile	Illustrates groundwater depth as measured from the surface	LAC BOS
Soil Runoff Coefficient Curves	PDF File	Curves characterize effect of rainfall intensity on runoff coefficient per soil type	Hydrology Manual Appendix C (LADPW 2006)
Aerial Imagery	Layer File	Orthoimage of entire region	ESRI Maps & Data Imagery
Runoff Rates	Time Series	Hourly runoff for land uses for the continuous simulation model	LAC WMMS Model

1.2.2. ROW BMP Screening

High traffic volumes, speed limits, slopes, and groundwater tables, impact the feasibility of ROW BMP implementation. Road classification data contains information typically useful for determining if the street is subject to high traffic volumes and speeds, and Census TIGER road data provides the best available road classification information for the study area. Table 1-3 shows the Master Address File (MAF)/TIGER Feature Classification Codes (MTFCC) deemed appropriate for ROW BMP retrofit opportunities. Only roads with the MTFCCs listed in Table 1-3 can be considered for ROW BMP retrofits in this screening analysis. All other roads are screened out.

Table 1-3. ROW BMP MTFCC

MTFCC	Description
S1400	Local neighborhood road, rural road, city street
S1730	Alley
S1780	Parking lot road

In addition to the screening of road types, opportunities were further screened to remove segments that have steep slopes. BMP implementation on streets with grades greater than 10 percent present engineering challenges that substantially reduce the cost effectiveness of the retrofit opportunity. From the available slope information, roads were considered as retrofit opportunities if the slope was less than 10 percent.

The final screen applied to the roads is the depth to groundwater. Implementing ROW BMPs in areas where the groundwater table is high is not recommended due to the fact that the BMPs are rendered ineffective due to their storage capacity being seriously diminished with groundwater inflow. From the groundwater contours provided, roads were eliminated as opportunities if the depth to groundwater was less than 10 feet. Attachment C highlights the areas identified with groundwater depths of 10 feet or less. The highlighted areas provide a starting point for elimination, however it should be noted that further evaluation may be necessary based on local knowledge of areas with high groundwater tables or daylighting of perched groundwater layers as identified by the jurisdictions.

The results of the ROW BMP screening are presented in Attachment C. Attachment C shows the roads available for retrofit (highlighted in green) versus all of the roads within the study area. An overall watershed map and individual jurisdictional maps for each watershed show all the identified retrofit opportunities. The maps indicate that a majority of the roads within each jurisdiction pass through the screening as potential retrofits. It should be noted that due to the coarse nature of the road classification data, only freeways, highways, and major roads were eliminated in the classification screening process. In practice, retrofitting every street that passed through the screening will likely not be feasible and adaptive management strategies will be necessary in the future to further refine the road classification data layer to more accurately identify road types suitable for ROW BMP retrofits.

The screened opportunities were used as the basis to evaluate the potential runoff volume reduction provided by ROW BMP implementations. In the following section, an engineering assessment is presented that determines the ROW BMP contributing drainage areas and the overall volume reductions achieved through ROW BMP implementation.

1.2.3. ROW BMP Configuration

The three most important assumptions necessary to evaluate BMP volume reduction performance are (1) the physical BMP configuration assumptions, (2) the contributing drainage area characteristics, and (3) the in-situ soil infiltration rates. By understanding the area draining to the BMPs and the volume capacity and function of the BMPs, an assessment can be performed to evaluate the potential of ROW retrofit BMPs to capture the required runoff volume in each subwatershed. This section summarizes the information and processes used to establish BMP configuration assumptions to be used for the runoff analysis presented in the following section.

1.2.4. BMP Assumptions Based on Green Streets

ROW BMPs consists of multiple types and combinations of stormwater treatment options. A well-established and often utilized ROW BMP is green streets. Green streets provide multiple benefits for pollutant and volume reduction and have been implemented in locations throughout the nation. In the future and as updates are made to the WMP, other ROW BMPs may be incorporated to achieve the required volume reductions.

Green streets typically consist of bioretention areas between the curb and sidewalk (herein referred to as the parkway) and/or permeable pavement within the parking lane. Prior to evaluating green street BMP treatment capacity, it is imperative to establish a configuration that can be assumed for typical implementation watershed-wide. This establishes the parkway space needed for the BMPs (plan view) and also determines the hydraulic function and storage capacity of the subsurface systems.

Bioretention systems are surface and subsurface water filtration systems, which use vegetation and underlying soils to store, filter, and reduce runoff volume while removing pollutants. Figure 1-4 represents a typical bioretention system incorporated into a green street design. Bioretention systems consist of a ponding depth and engineered soil media depth to treat runoff. Table 1-4 outlines typical widths, depths, and soil parameters associated with green street bioretention cells. Green streets were assumed to have no underdrains because the

WMP emphasizes low impact development and stormwater volume reduction to achieve pollutant load reductions.

Driveways and utilities limit the road length that can be converted into a green street. From past experience and aerial imagery review in the local watersheds, it was determined that 30 percent of the road length could be considered as the maximum possibility for conversion into bioretention area. This factor was used to limit the total length of potential green street bioretention areas. The parameters outlined above and in the table below were assumed to be the typical green street BMP implementation configuration for the screening analysis and the BMP treatment capacity evaluation described in the next section.

Table 1-4. BMP Design and Modeling Parameters for Subsequent Analyses

Component	Design Parameter	Value
Ponding Area	Depth	0.8 feet
	Width	4.0 feet
Media Layer	Depth	3.0 feet
	Porosity	0.4
Overall Profile	Effective Depth[1]	2.0 feet

[1] Effective depth is the maximum equivalent depth of water stored within the bioretention area less the depth displaced by soil media (vertical summation of surface ponding depth and void storage depth)

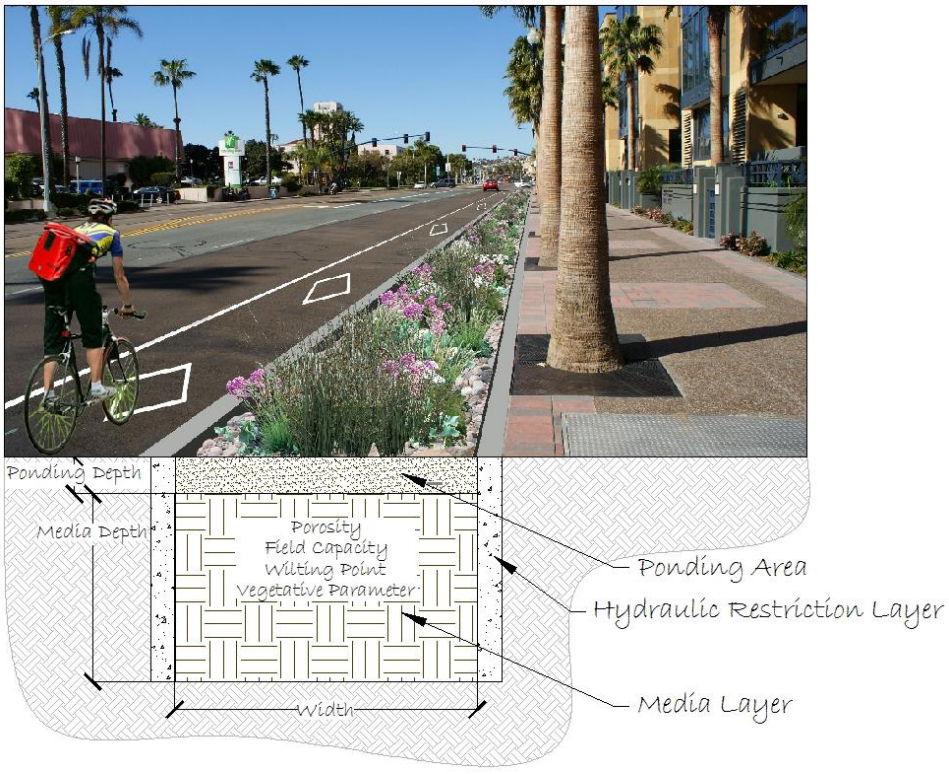

Figure 1-4. Typical bioretention section view (City of San Diego 2011).

Contributing Drainage Area Analysis

The purpose of this analysis was to realistically represent the area, type, and impervious coverage of land draining to potential green streets throughout the entire watershed. This is a critical step in WMP development because it predicts what volume of runoff can be assumed treated by green streets and what remaining (untreated) runoff must be routed to regional BMPs or addressed in other ways. The following engineering analyses were performed at a subwatershed-scale within the limits of available data and resources to estimate the maximum potential green street treatment capacity; given more detailed street-by-street drainage area data, the assumptions and results presented herein could be refined in future efforts to optimize green street treatment capacity. Figure 1-5 illustrates a simplified routing schematic used to represent the available runoff flow pathways to green street and regional BMPs throughout the watershed. The following subsections explain how each representative drainage area illustrated in Figure 1-5 was characterized.

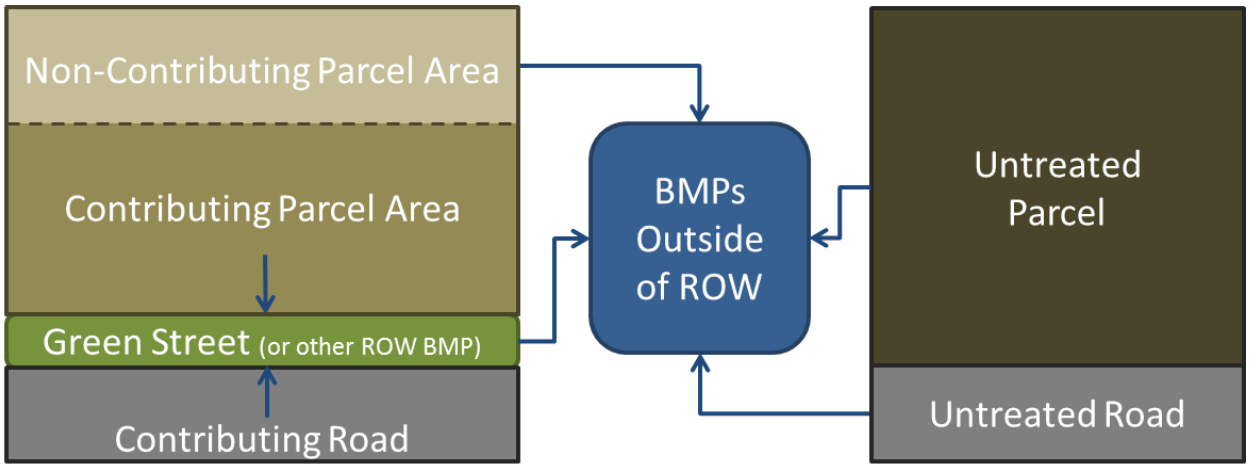

Figure 1-5. Green streets model schematic (arrows denote direction of runoff routing; figure not to scale).

Typical Parcel Size & Street Frontage Analysis

The nature of the green street analysis requires an understanding of typical parcel sizes and how much of the parcel drains to the ROW. Much of the runoff from parcels and the road drains to the ROW and is conveyed downstream through curb, gutter, and pipes. By identifying the typical parcel size, frontage length, and associated road area that drains to a candidate right-of-way area (Figure 1-6) the total area draining to potential green street retrofit opportunities was extrapolated throughout the watershed. For purposes of this study, only the high-density residential, multifamily residential, commercial, institutional, and industrial land uses were considered as contributing substantial runoff to the ROW (all other land uses contain minimal impervious area and thus contribute insubstantial runoff to the ROW).

The typical parcel size for each land use was determined by identifying all parcels for each land use. Once all the parcels were selected, the median parcel size for each land use was calculated and tabulated. This method evaluated thousands of parcels throughout the entire watershed and provided the most accurate depiction of the typical parcel size for each land use based on available data. Results are shown in Table 1-5.

Each parcel is adjacent to a portion of the ROW where the green street would be implemented. A subset of parcels approximate to the median parcel size for each land use was selected to determine the average frontage length. The portion of the selected parcels that was in contact with the ROW was measured using desktop analysis tools and averaged between all parcels of the same land use. Results are shown in Table 1-5.

Road area draining to green streets constitutes a substantial component of the total impervious drainage area. To establish road drainage areas, typical road widths were defined by sampling representative road segments located in each land use. Widths were measured from curb-to-curb using aerial orthoimagery and reported to the nearest even integer. The median sampled road width for each land use was calculated and compared with the City of Los Angeles Standard Street Dimensions (City of Los Angeles Bureau of Engineering 1999) for validation. To predict the resulting contributing road areas, the previously measured frontage length was multiplied by half the road width. Roads were assumed to be crowned; therefore, only half of the width would drain to one side of the road. Results are shown in Table 1-5.

As discussed in Section 1.2.4, only 30 percent of the frontage length could be converted into bioretention area. This factor was multiplied by the frontage length and used in limiting the total length of bioretention available within the model, as presented in Table 1-5.

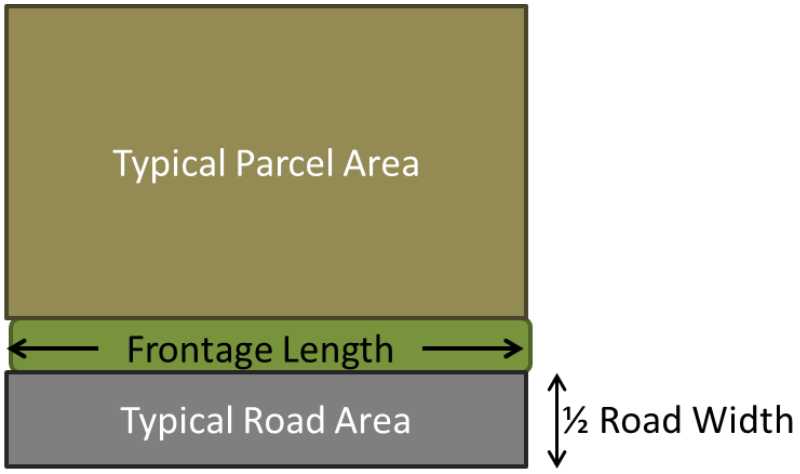

Figure 1-6. Typical parcel area, road width, road area, and frontage length schematic (figure not to scale)

Table 1-5. Typical parcel area, road area, and frontage length

Land Use	Typical Parcel Area (ft^2)	Frontage Length (ft)	Typical Road Width (ft)	Typical Road Area (ft^2)	BMP Length (ft)
High-density Residential	6,528	57	38	1,083	17
Multifamily Residential	13,526	60	30	900	18
Commercial	12,429	100	63	3,150	30
Institutional	38,215	143	37	2,646	43
Industrial	26,467	117	46	2,691	35
Other Land Use (Open Space, Vacant, etc.)	n/a[1]	100	40	2,000	30

[1] assumed not draining to ROW

Contributing Parcel Area Analysis

Many parcels will not always entirely drain to the ROW because portions can be retained on-site or flow onto an adjacent property. The actual volume of water that can be treated by a green street BMP was determined by identifying the typical proportion of the parcel that drains to the ROW (as shown in context of the model

schematic in Figure 1-7). This step also determines the area, and associated runoff, that is *not* expected to drain to green streets and is routed directly to downstream regional facilities or other practices (herein referred to as non-contributing parcel area).

The contributing areas to the green street BMPs were found using random sampling and identifying the surrounding parcel drainage patterns. Parcels were selected using a random number generator and drainage areas were determined on a desktop analysis using topography, aerial imagery, and drainage infrastructure features. The average contributing percentage was identified by evaluating multiple sites. Table 1-6 shows the percent contributing areas by land use that were determined from this analysis.

The impervious coverage of contributing parcel areas was also characterized during this step so that runoff could be simulated and routed to green streets in each land use. This was performed by tabulating the imperviousness data from the WMMS Model for each individual land use feature. The area-weighted mean impervious coverage was then calculated for each land use type. Results are tabulated for each land use in Table 1-6.

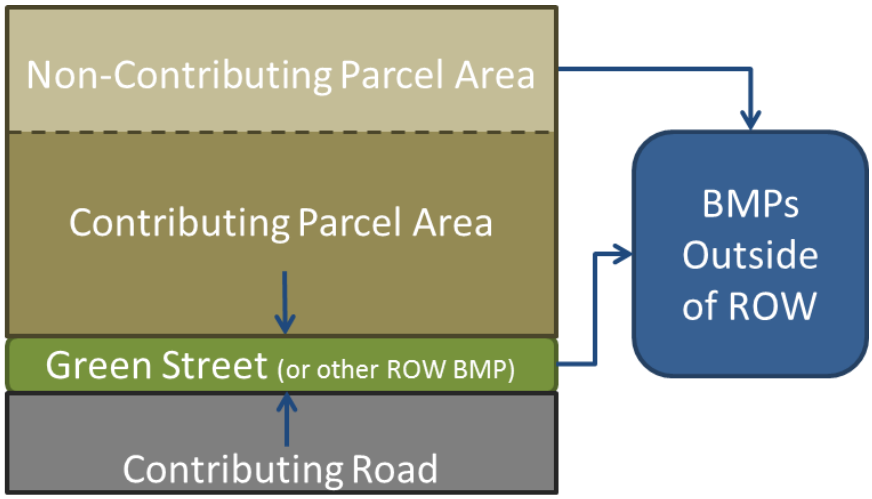

Figure 1-7. Parcel contributing area to ROW (impervious varies by land use; arrows denote direction of runoff routing; figure not to scale).

Table 1-6. Contributing area percentage by land use

Land Use	Contributing to ROW	Non-contributing to ROW	Percent Impervious
High-density Residential	80%	20%	36%
Multifamily Residential	80%	20%	60%
Commercial	80%	20%	90%
Institutional	80%	20%	72%
Industrial	35%	65%	66%
Other Land Use (Open Space, Vacant, etc.)	0%	100%	n/a

Untreated Roads Tabulation

Untreated roads consist of roadways with steep slopes, classifications not suited for green street implementation, or adjacent to open space or vacant parcels. Untreated road and associated adjacent parcel area that will ultimately drain to other BMPs was tabulated using available GIS data and screening results from Section 1.2.2 (conceptually illustrated in Figure 1-8).

Because green streets are implemented in the linear environment of the transportation corridor, it was assumed that the percentage of parcel area draining to green streets would be proportional to the percentage of suitable roads for green streets (as identified in Section 1.2.2) in each subwatershed. In other words, parcels associated with unsuitable roads were assumed to bypass green street treatment and routed directly to other facilities (these areas are defined herein as *untreated parcels*). The total treated and untreated parcel areas were reconciled with the total areas of each land use (per subwatershed) in the WMMS Model for validation and consistency.

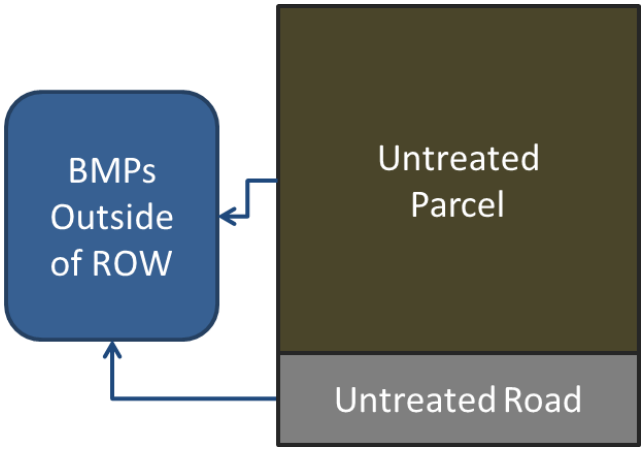

Figure 1-8. Schematic depicting untreated parcel and untreated road runoff routing (arrows denote direction of runoff routing; figure not to scale).

Summary of Contributing Drainage Areas

Results of the preceding analyses are presented in Figure 1-9. Areas that were assumed *un*treated by green streets include unsuitable roads and adjacent parcels, portions of suitable parcels that do not drain to the ROW, and predominantly pervious parcels (Open Space, Vacant, etc.), as discussed in preceding subsections; runoff from these untreated areas is assumed routed directly to regional facilities. Note that contributing areas are not necessarily proportional to contributing runoff due to variation in impervious coverage; runoff routing resulting from the preceding analyses is presented in the following section.

Given more detailed street-by-street engineering analyses, the potential area treated by green streets could be optimized, but the results below represent realistic estimates based on sound engineering judgment and currently available data and resources. Adaptive management strategies could target specific land uses that tend to bypass green street treatment (e.g. runoff, and associated treatment capacity, generated by industrial areas could be addressed through relevant industrial permits or onsite BMPs). Additional discussion on adaptive management strategies is provided in Section 8 of the main report.

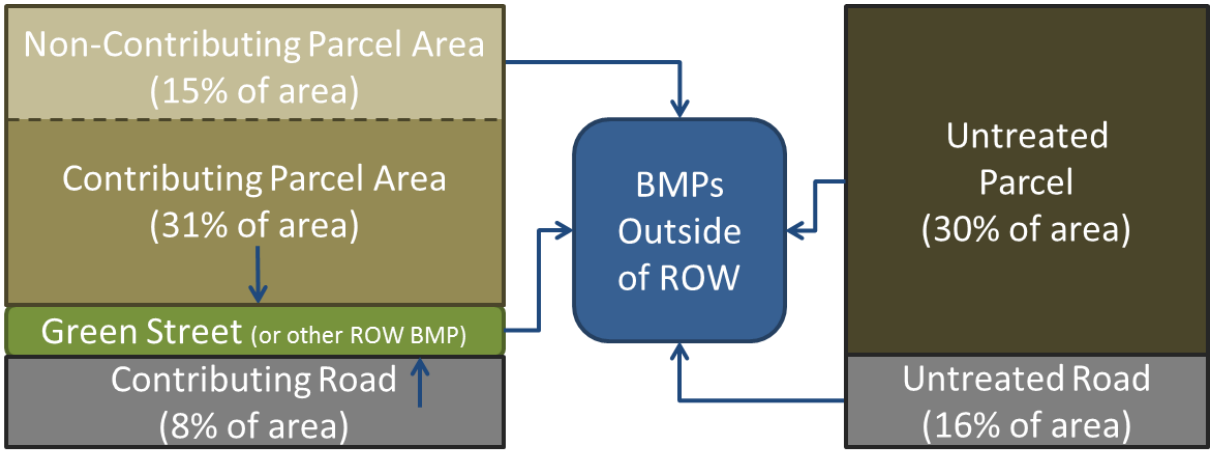

Figure 1-9. Schematic characterizing approximate distribution of routing to BMPs in the ROW for all WMP areas (arrows denote direction of runoff routing; figure not to scale).

BMP Infiltration Rates by Subwatershed

The purpose of performing the subwatershed infiltration rate analysis was to assign an average green street BMP infiltration rate to each subwatershed using soils data. Infiltration rates were assigned at the subwatershed level, which is the finest resolution at which the model performs hydrologic and water quality computations.

Soil data coverage provided through the LACDPW categorized soil unit areas into soil types. Runoff coefficient curves reported in the Hydrology Manual were developed by LACDPW for each soil type using double ring infiltrometer tests performed on areas of homogeneous runoff characteristics (LACDPW 2006). LADPW employed a sprinkling-type infiltrometer to perform the tests in each homogeneous area.

Runoff coefficient curves represent the response of the runoff coefficient (defined as the ratio of runoff to rainfall from a land area) to varying rainfall intensities. Each curve displays an inflection point representing the rainfall intensity at which substantial runoff initiates. According to LADPW (2006), each curve was assigned a minimum runoff coefficient of 0.1, "indicating that there is some runoff even at the smallest rainfall intensities." If it is assumed that substantial runoff initiates when the intensity of rainfall is greater than the soil's inherent infiltration rate, then the infiltration rate can be assumed equal to the rainfall intensity at the inflection point (less the assumed minimum runoff).

As demonstrated conceptually in Figure 1-10, the inflection point, and subsequently calculated infiltration rate, for each unique soil type in the WMP areas were identified using the runoff coefficient curves in Appendix C of the *Hydrology Manual* (LADPW 2006). Subwatershed areas were then intersected with the soil type coverage to calculate an area-weighted infiltration rate. Attachment C shows the distribution of the infiltration rates.

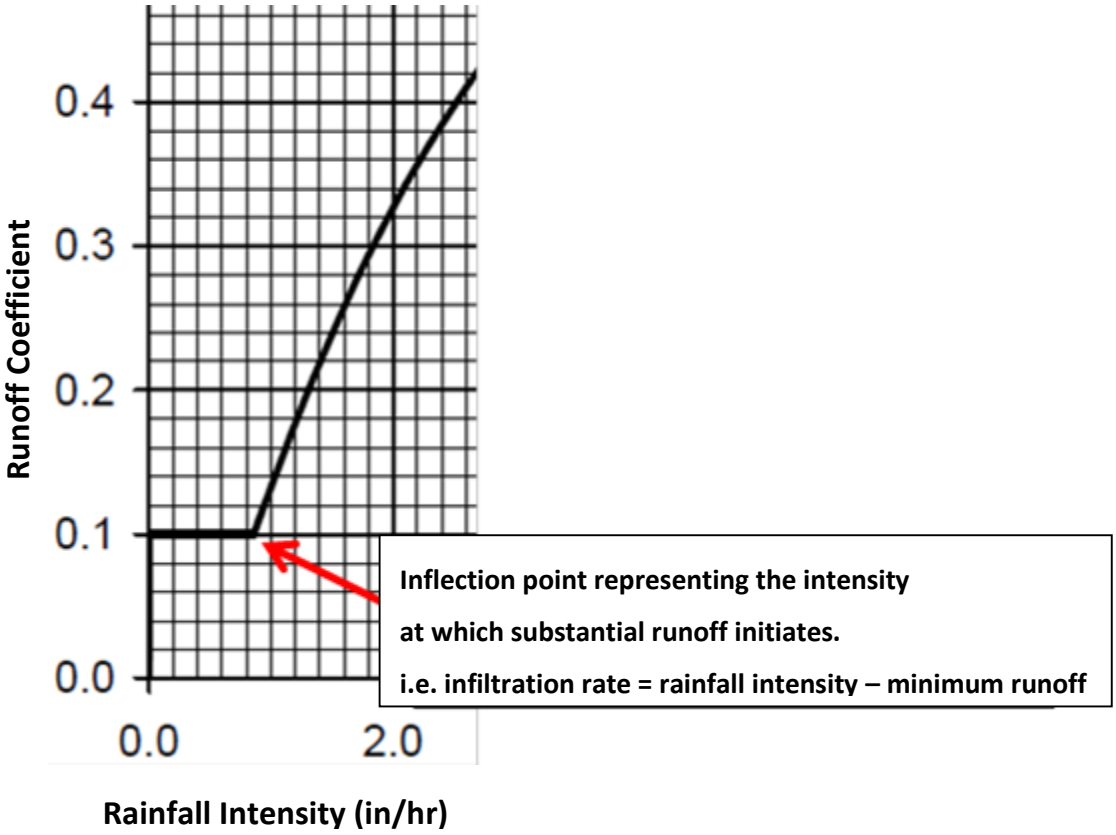

Figure 1-10. Example determination of runoff coefficient inflection point for an arbitrary soil type in Appendix C of LACDPW (2006).

1.3. LID on Public Parcels Assessment

Retrofitting public parcels with LID can be an efficient strategy for reducing stormwater runoff. This method allows municipalities the flexibility to prioritize and schedule stormwater projects to coincide with improvements that are already on the books (such as scheduled parking lot resurfacing, utility work, and public park improvements). Implementing LID on public parcels also allows municipalities the freedom to construct, inspect, and maintain BMPs without the need to purchase private property or to create stormwater easements.

The spatial extent of public parcels in each subwatershed was identified by selecting all parcels labeled as public by their assessors identification number (AIN). A total of 7,052 acres of public land was identified during this process (7% of the total WMP area). Each public parcel was assumed to implement BMPs that would treat the 85th percentile, 24-hour storm. The BMP volume was assumed to equal the 85th percentile, 24-hour storm depth times the impervious area.

LID retrofits are not feasible in all locations due to steep slopes, soil contamination hazards, and other constrains. The total runoff to be retained on public parcels was therefore discounted by 30% in order to provide a more realistic goal; this estimate was made in the lack of more detailed data, based on past LID screening exercises performed in Los Angeles County. The discount factor should be refined as actual public project sites are screened and prioritized.

1.4. Existing, Planned, and Potential BMPs

Existing and planned BMPs throughout the WMP areas were identified by the jurisdictions. These BMPs will provide capacity to reduce the annual storm runoff volume and demonstrate progress towards achieving the target runoff volume reduction.

1.4.1. Modeled Existing/Planned Subwatershed-Scale Regional BMPs

Regional BMPs that treat large portions of, or entire, subwatersheds (i.e. those with drainage areas larger than 50 acres) were modeled to quantify the impact to the upstream jurisdictions. The modeling approach and predicted performance for these specific sites is detailed in the following subsections. It is important to note that modeling was performed at a planning level coincident with the resolution of the subwatershed-scale WMMS model. Limited data were available to represent the sites, so conservative engineering assumptions were applied where appropriate. The calculated equivalent volume reductions from the BMPs can be refined during the adaptive management process once detailed design and monitoring data become available for the sites.

DeForest Wetlands Project

The DeForest Wetlands Project is located along the east bank of the Los Angeles River in the City of Long Beach and is comprised of approximately 34 acres of restored terrestrial and freshwater habitat and recreational amenities. The Project provides both groundwater recharge and surface water quality improvement. Site and modeling details are listed in Table 1-7.

Table 1-7. DeForest Wetlands Project details

Parameter	Value	Unit	Notes, Assumptions
Site Overview			
WMP Area	Lower Los Angeles River		
Location	City of Long Beach		
Status	In Development		
Compliance Targets for Contributing Subwatersheds[1]	**248.7**	**ac-ft/yr**	Subwatershed 486066
	247.6	**ac-ft/yr**	Subwatershed 486068
Given Details			
Drainage Area	1490	ac	Delineated in GIS using WMMS subwatershed boundaries
Average Annual Infiltration Volume	15-35	ac-ft/yr	Per Section 3 of the WMP
Average Annual Treated Volume	800-1000	ac-ft/yr	Per Section 3 of the WMP; assumed volume is fully treated by wetland pollutant removal mechanisms prior to discharge; assumed treated volume is in addition to infiltration volume
Annual Runoff Volume Entering Wetland[1]	1589	ac-ft/yr	WMMS output
Annual Zinc Load Entering Wetland[1]	1808	lb Zn/yr	WMMS output
Wetland Zinc Effluent Concentration	20	µg/L	Upper limit of 95% confidence interval for wetland channels, per RAA Guidelines (LARWQCB 2014)
Modeling Results			
Estimated Annual Zinc Load Reduced by Infiltration[1]	17.1	lb Zn/yr	Assumed loading associated with minimum average infiltrated runoff; assumed load sequestered in sediments and/or sorbed to underlying soils
Estimated Annual Zinc Load Reduced by Wetland Functions[1]	535	lb Zn/yr	Reduction associated with treated volume; calculated by subtracting average effluent load associated with minimum treated volume from annual influent loading
Estimated Zinc Load Reduction	30.5%		

Relative to Annual Runoff[1]			
Estimated Zinc Load Reduction Relative to Compliance Target[1]	97.7%		
Estimated Equivalent Annual Volume Reduction[1]	**243.1**	**ac-ft/yr**	Subwatershed 486066
	242.0	**ac-ft/yr**	Subwatershed 486068

[1] Indicated annual volumes are referenced to the critical year

Dominguez Gap Wetlands Project

The Dominguez Gap Wetlands Project consists of two treatment wetlands situated on the east and west banks of the Los Angeles River that features habitat and recreational amenities. The East Basin is a 37-ac facility that is dewatered manually by a pump. The West Basin primarily functions as an infiltration basin and is approximately 15 acres. Table 1-8 and Table 1-10 characterize the site and modeling details of the East and West Basins, respectively.

Table 1-8. Dominguez Gap East Wetlands Project – East Basin details

Parameter	Value	Unit	Notes, Assumptions
Site Overview			
WMP Area	Lower Los Angeles River		
Location	City of Long Beach		
Status	Complete		
Compliance Targets for Contributing Subwatersheds[1]	**346.9**	**ac-ft/yr**	Subwatershed 486014
	14.3	**ac-ft/yr**	Subwatershed 446014
Given Details			
Drainage Area	2075	ac	Delineated in GIS using WMMS subwatershed boundaries
Maximum Volume Treated per Storm Event	71	ac-ft	Per Section 3 of the WMP; assumed volume is fully treated by wetland pollutant removal mechanisms prior to discharge
Maximum Annual Volume Treated[1]	526	ac-ft/yr	Based on storm events recorded for critical year; assumed all storm event runoff volume treated up to 71 ac-ft
Annual Runoff Volume Entering Wetland[1]	913	ac-ft/yr	WMMS output
Annual Zinc Load Entering Wetland[1]	934	lb Zn/yr	WMMS output
Wetland Zinc Effluent Concentration	20	µg/L	Upper limit of 95% confidence interval for wetland channels, per RAA Guidelines (LARWQCB 2014)
Modeling Results			
Annual Zinc Load Reduced by Infiltration[1]	unknown	lb Zn/yr	Site soil information or monitored data required
Annual Zinc Load Reduced by Wetland Functions[1]	202	lb Zn/yr	Reduction associated with treated volume; calculated by subtracting average effluent load associated with minimum treated volume from annual influent loading
Zinc Load Reduction Relative to Annual Runoff[1]	22%		
Zinc Load Reduction Relative to Compliance Target[1]	55%		
Equivalent Annual Volume Reduction[1]	**191.7**	**ac-ft/yr**	Subwatershed 486014
	6.4	**ac-ft/yr**	Subwatershed 446014

[1] Indicated annual volumes are referenced to the critical year

Table 1-9. Dominguez Gap Wetlands Project – West Basin details

Parameter	Value	Unit	Notes, Assumptions
Site Overview			
WMP Area	Lower Los Angeles River		
Location	City of Long Beach		
Status	Complete		
Compliance Targets for Contributing Subwatersheds[1]	**152.0**	**ac-ft/yr**	Subwatershed 486013 (41% contributes to West Basin)
	7.4	**ac-ft/yr**	Subwatershed 486015
Given Details			
Drainage Area	299	ac	Delineated in GIS using WMMS subwatershed boundaries
Annual Runoff Volume Infiltrated	All	ac-ft/yr	Per Section 3 of the WMP, no connection to Los Angeles River
Modeling Results			
Subwatershed 486013 Annual Runoff Volume Infiltrated[1]	47%		41% of subwatershed area contributes 47% of runoff volume to the basin
Subwatershed 446015Annual Runoff Volume Infiltrated	100%		100% of subwatershed area contributing
Equivalent Annual Volume Reduction[1]	**152.0**	**ac-ft/yr**	Subwatershed 486013 (compliance target is 43% annual reduction, so meets target)
	7.4	**ac-ft/yr**	Subwatershed 446015

[1] Indicated annual volumes are referenced to the critical year

Willow Springs Park

The Willow Springs Park project will convert a public parcel to a 47-acre park. The park will contain bioswales and a water feature integrated into a recreational spaces. Table 1-10 Characterizes the site and modeling details.

Table 1-10. Willow Springs Park details

Parameter	Value	Unit	Notes, Assumptions
Site Overview			
WMP Area	Lower Los Angeles River		
Location	City of Long Beach		
Status	In Development		
Compliance Targets for Contributing Subwatersheds[1]	**26.5**	**ac-ft/yr**	Subwatershed 776012
	7.2	**ac-ft/yr**	Subwatershed 486012
Given Details			
Drainage Area	211	ac	Delineated in GIS using WMMS subwatershed boundaries
Total BMP Footprint	11	Ac	Per Section 3 of the WMP; natural channels/bioswales with very high infiltration rates
Underlying soil infiltration rates	0.9	In/hr	WMMS
Subwatershed area contributing	95%		
Modeling Results			
Maximum infiltration rate over footprint of BMP	0.83	ac-ft/hr	Assumed constant infiltration over entire footprint, applied to each time step of model runoff output draining to park – meets compliance target via infiltration
Equivalent Annual Volume Reduction[1]	**26.5**	**ac-ft/yr**	Subwatershed 776012
	7.2	**ac-ft/yr**	Subwatershed 446012

[1] Indicated annual volumes are referenced to the critical year

Discovery Park Infiltration Basin

An existing infiltration basin located at 12400 Columbia Way in the City of Downey treats runoff from approximately 51 acres (5% of the subwatershed in which the site is located). Field observations indicate that the facility has capacity to infiltration runoff at a rate of 2 in/hr (equivalent to approximately 4 ac-ft/day) in addition to detention storage. Table 1-11 reports the simplified modeling assumptions for this BMP – upon further evaluation of as-built conditions, the associated volume reduction can be refined during the adaptive management process.

Table 1-11. Discovery Park Infiltration Basin details

Parameter	Value	Unit	Notes, Assumptions
Site Overview			
WMP Area	Lower San Gabriel River		
Location	City of Downey		
Status	Complete		
Compliance Targets for Treated Subwatersheds[1]	**80.6**	**ac-ft/yr**	Subwatershed 245115
Given Details			
Drainage Area	51	ac	
Observed Infiltration Rate	4	ac-ft/day	Per Gerald Green, personal communication, 2014, February 2
Percentage of Subwatershed Contributing to BMP	5%		
Approximate Runoff Volume Draining to BMP[1]	44	ac-ft/yr	WMMS
Modeling Results			
Equivalent Annual Volume Reduction[1]	**24**	**ac-ft/yr**	Assumed constant infiltration over entire footprint, applied to each time step of model runoff output draining to park

[1] Indicated annual volumes are referenced to the critical year

Parque Dos Rios

Parque Dos Rios is located at the confluence of the Los Angeles River and Rio Hondo River. An approximately 30-ac area between the freeway and the Los Angeles River will be converted to an infiltration basin to treat additional upstream area. Currently, the site is self-retaining open space and is characterized in the baseline model as such. No further runoff volume reductions were calculated for this site; as design details are finalized for the infiltration basin improvements, associated volume reductions can be applied towards upstream jurisdictional compliance targets.

1.4.2. Identified Parcel-Scale Regional and Distributed BMPs

The jurisdictions within the WMP areas compiled detailed lists of BMPs intended to treat areas smaller than 50 acres. As with the preceding regional BMPs, these strategies represent progress towards achieving the compliance target in each respective jurisdiction. The distributed BMPs are listed in Attachment D and can be applied towards meeting the compliance targets in each jurisdiction.

The WMP groups have identified additional potential regional BMPs and these are listed in Section 3 for LCC and Section 4 for LLAR and LSGR of the respective WMP.

1.5. Non-MS4 Facility Runoff

Each jurisdiction is the Group's WMP area is subject to stormwater runoff from non-MS4 facilities. In particular, Caltrans roads and facilities regulated by nontraditional or general industrial permits contribute to the runoff volume for each subwatershed. It will be important for these entities to retain their runoff and/or eliminate their cause/contribution to receiving water exceedances. The runoff from these non-MS4 facilities was therefore estimated and subtracted from the treatment target as described below.

1.5.1. Non-MS4 Permitted Areas

Non-MS4 permitted areas were identified based on the address list of permittees on the State Water Resources Control Board (SWRCB) website. Using the address information, corresponding parcel areas were selected using the LA County Assessor Parcel Viewer and the associated GIS Shapefile. The percentage of permitted land use area relative to the total land use area was calculated and the associated non-MS4 permitted area runoff as extracted from the WMMS runoff response output.

1.5.2. Caltrans

The design storm runoff generated by Caltrans facilities was estimated using WMMS land use data. Areas labeled as Transportation consist of freeways and other extensive transportation facilities that tend to fall under Caltrans jurisdiction (versus areas labeled as Secondary Roads, which are managed by local transportation departments); these areas were assumed to be Caltrans facilities. Runoff from Transportation land uses, less runoff from any overlapping non-MS4 permitted areas identified above, was extracted from the WMMS model output for each subwatershed.

1.6. Institutional BMPs and Minimum Control Measures

It is challenging to accurately quantify most institutional BMP and minimum control measure (MCM) benefits in terms of pollutant load reductions because they generally require extensive survey and monitoring information to quantify. In addition, nonstructural BMPs may target pollutants, land uses, or populations, resulting in different load reductions depending on the implementation technique. A number of MCMs are outlined in each WMP, representing an array of practices to most effectively address pollutants at their source or affect their transport. For the purposes of the RAA, a 10% reduction was assumed to represent the cumulative impact of these practices during both wet and dry conditions. Another explicitly modeled nonstructural BMP was a goal to reduce 25% of irrigation of urban vegetation, a goal that can result from a myriad of practices ranging from public education, enforcement, incentive programs, creative water rate structures, etc. The 25% reduction in irrigation was modeled directly in LSPC and is the primary driver for dry weather flow reductions. Pollutant load reductions from these nonstructural BMPs were subtracted from loads simulated in the baseline model to quantify progress towards meeting the watershed numeric goals. Results of both the 10% reduction for collective MCMs, in addition to irrigation reduction, are presented in Section 7 of the main RAA report for both wet and dry conditions.

Attachment B: Detailed Jurisdictional Compliance Tables

Submitted to:

LLAR WMP Group LCC WMP Group LSGR WMP Group

Submitted by:

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B1. Lower Los Angeles River WMP – MS4 vs Non-MS4

B1.1. City of Downey

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
6076	17.1	17.0	0.1
6077	123.0	123.0	-
6079	210.3	176.4	33.9
6082	0.3	0.3	-
6100	11.4	10.7	0.7
6102	143.8	143.8	-
6103	0.0	-	0.0
6104	37.1	37.1	-
6106	100.2	76.4	23.9
6111	82.1	69.5	12.6
6113	0.6	0.6	0.0
Grand Total	726.0	654.7	71.2

B1.2. City of Lakewood

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
6014	14.3	14.3	-
Grand Total	14.3	14.3	-

B1.3. City of Long Beach

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
6001	17.7	0.0	17.7
6002	387.5	378.7	8.8
6003	430.0	429.9	0.1
6004	3.4	2.4	1.0
6005	29.9	6.6	23.3
6006	55.9	35.9	20.0
6007	110.5	67.0	43.5
6008	172.5	144.0	28.5
6009	160.5	159.5	1.1
6010	128.3	100.8	27.5
6011	202.2	184.8	17.4
6012	7.2	0.0	7.2
6013	152.0	12.3	139.6
6014	346.9	346.9	-
6015	7.4	4.3	3.1
6016	3.0	0.0	3.0
6017	1.9	1.1	0.9
6018	49.3	45.8	3.5
6065	89.8	36.7	53.2
6066	248.7	202.6	46.1
6067	83.9	25.3	58.6
6068	247.6	222.5	25.1
6069	102.2	42.6	59.6
6070	83.4	22.2	61.2
6071	276.3	94.4	181.9
6072	0.3	0.3	-
7016	503.6	473.3	30.3
Grand Total	3,901.7	3,039.6	862.1

B1.4. City of Lynwood

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
6023	40.3	26.3	13.9
6024	16.1	10.6	5.4
6028	11.2	11.2	-
6030	168.8	45.2	123.6
6031	145.5	133.0	12.5
6032	115.7	60.5	55.2
6033	130.0	113.3	16.6
6074	185.2	134.9	50.4
6078	59.8	0.0	59.8
6080	146.6	91.7	54.9
6081	76.8	41.3	35.5
6082	12.2	0.0	12.2
Grand Total	1,108.1	667.9	440.2

B1.5. City of Paramount

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
6069	0.0	0.0	-
6071	157.1	120.7	36.4
6072	183.8	172.9	10.9
6073	124.1	61.4	62.6
6075	181.8	163.7	18.1
6076	227.8	65.7	162.1
6078	112.3	21.7	90.6
6080	1.9	0.0	1.9
Grand Total	988.8	606.1	382.7

B1.6. City of Pico Rivera

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
6106	86.5	44.3	42.2
6111	0.0	0.0	0.0
6112	5.9	1.4	4.5
6113	272.8	229.5	43.3
6114	0.0	0.0	-
6115	0.0	0.0	-
6116	0.0	0.0	-
6117	0.0	0.0	-
6126	12.0	12.0	-
6129	0.0	0.0	-
Grand Total	377.3	287.2	90.0

B1.7. City of Signal Hill

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
6002	106.6	105.8	0.8
6003	43.7	43.7	-
6007	6.4	0.0	6.4
6009	8.3	8.2	0.1
6011	6.3	6.0	0.3
6012	26.6	25.2	1.4
Grand Total	197.9	188.9	9.0

B1.8. City of South Gate

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
6031	148.6	148.6	-
6033	70.0	61.9	8.1
6034	422.9	416.7	6.3
6076	125.9	92.5	33.4
6078	0.0	0.0	-
6079	68.9	54.4	14.6
6080	48.7	48.7	-
6082	137.6	82.8	54.7
6083	36.2	11.5	24.7
6084	159.7	137.8	21.9
6085	67.8	0.0	67.8
6089	35.7	18.3	17.4
6090	43.8	3.4	40.4
6096	0.6	0.6	-
6098	0.1	0.1	-
6100	80.6	51.2	29.4
6101	25.0	25.0	-
6102	6.3	6.3	-
6104	7.4	7.4	-
6350	18.6	0.0	18.6
6351	8.2	7.1	1.0
Grand Total	1,512.6	1,174.3	338.2

B2. Lower Los Angeles River WMP – Compliance Tables

B2.1. City of Downey

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
6076	Final	17.0	-	-	1.2	-	1.2
6077	Final	123.0	0.3	11.8	1.2	6.4	19.6
6079	50%	176.4	0.7	1.7	10.1	-	12.5
6082	Final	0.3	-	-	0.0	0.0	0.0
6100	50%	10.7	0.0	0.8	0.0	0.6	1.4
6102	31%	143.8	1.1	12.2	0.7	7.1	21.1
6103	Final	-	0.7	-	-	-	0.7
6104	Final	37.1	0.3	3.2	0.0	0.9	4.5
6106	Final	76.4	0.4	9.1	1.6	-	11.1
6111	Final	69.5	0.3	7.1	0.5	3.3	11.2
6113	Final	0.6	-	0.0	-	0.1	0.1
Grand Total		654.7	3.8	45.9	15.3	18.4	83.4

B2.2. City of Lakewood

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
6014	31%	7.9	-	1.1	0.0	-	1.2
Grand Total		7.9	-	1.1	0.0	-	1.2

B2.3. City of Long Beach

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
6001	Final	-	-	-	-	-	-
6002	50%	378.7	-	23.8	5.2	19.3	48.3
6003	Final	429.9	-	22.4	1.4	32.8	56.5
6004	50%	2.4	-	0.1	-	0.3	0.3
6005	31%	6.6	-	1.0	0.0	-	1.0
6006	Final	35.9	-	0.3	0.1	4.1	4.5
6007	Final	67.0	-	6.4	0.1	4.0	10.6
6008	Final	144.0	-	13.9	2.0	3.5	19.4
6009	Final	159.5	-	11.5	0.7	9.2	21.4
6010	Final	100.8	-	8.2	0.9	4.8	13.9
6011	Final	184.8	-	14.4	0.9	9.6	24.9
6012	31%	-	-	-	-	-	-
6013	50%	-	-	-	-	-	-
6014	Final	155.2	-	15.0	7.9	-	22.9
6015	31%	-	-	-	-	-	-
6016	Final	-	-	-	-	-	-
6017	50%	1.1	-	-	-	0.1	0.1
6018	Final	45.8	-	4.3	-	2.6	6.9
6065	Final	36.7	-	0.4	0.0	4.6	5.0
6066	31%	-	-	-	-	-	-
6067	50%	25.3	-	2.6	0.3	0.5	3.3
6068	31%	-	-	-	-	-	-
6069	50%	42.6	-	0.6	0.0	3.5	4.1
6070	50%	22.2	-	2.7	0.4	-	3.1
6071	50%	94.4	-	10.5	1.6	1.0	13.1
6072	50%	0.3	-	0.0	-	0.0	0.0
7016	Final	473.3	-	16.5	6.9	36.3	59.7
Grand Total		2,406.2	-	154.6	28.3	136.2	319.1

B2.4. City of Lynwood

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
6023	Final	26.3	-	1.0	0.7	1.6	3.3
6024	Final	10.6	-	0.4	-	1.1	1.4
6028	31%	11.2	-	0.8	-	0.9	1.7
6030	Final	45.2	-	4.0	2.4	-	6.4
6031	31%	133.0	-	9.9	2.0	7.5	19.4
6032	Final	60.5	-	6.0	0.4	3.4	9.8
6033	Final	113.3	-	7.4	0.2	10.7	18.2
6074	50%	134.9	-	12.8	3.8	0.1	16.8
6078	Final	-	-	-	-	-	-
6080	31%	91.7	-	7.7	0.7	4.7	13.2
6081	Final	41.3	-	4.0	0.8	0.5	5.3
6082	Final	-	-	-	-	-	-
Grand Total		667.9	-	53.9	11.1	30.5	95.5

B2.5. City of Paramount

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
6069	31%	0.0	-	-	-	-	-
6071	Final	120.7	0.0	4.9	0.9	9.9	15.6
6072	Final	172.9	0.0	7.6	1.1	13.9	22.6
6073	Final	61.4	-	1.9	0.2	4.6	6.6
6075	31%	163.7	-	9.0	1.7	10.2	20.9
6076	50%	65.7	-	7.4	0.8	0.3	8.6
6078	Final	21.7	-	0.5	0.0	1.8	2.3
6080	Final	-	-	-	-	-	-
Grand Total		606.1	0.1	31.2	4.7	40.6	76.6

B2.6. City of Pico Rivera

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
6106	31%	44.3	-	5.9	0.5	0.2	6.5
6111	Final	-	-	-	-	-	-
6112	31%	1.4	-	0.0	-	0.1	0.2
6113	31%	229.5	-	5.6	0.0	27.0	32.7
6114	Final	-	-	-	-	-	-
6115	Final	0.0	-	-	-	0.0	0.0
6116	Final	-	-	-	-	-	-
6117	Final	-	-	-	-	-	-
6126	Final	12.0	-	1.3	0.0	0.5	1.8
6129	Final	-	-	-	-	-	-
Grand Total		287.2	-	12.8	0.5	27.9	41.2

B2.7. City of Signal Hill

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
6002	50%	105.8	-	7.0	0.9	5.9	13.9
6003	Final	43.7	-	1.9	0.0	4.2	6.0
6007	Final	-	-	-	-	-	-
6009	Final	8.2	0.1	0.3	-	0.7	1.1
6011	31%	6.0	0.1	0.8	-	0.2	1.1
6012	31%	2.5	-	0.0	0.2	-	0.2
Grand Total		166.2	0.2	10.0	1.1	11.0	22.3

B2.8. City of South Gate

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
6031	31%	148.6	-	16.9	0.8	5.3	22.9
6033	Final	61.9	-	4.5	0.3	4.8	9.5
6034	Final	416.7	-	30.0	3.8	25.3	59.0
6076	50%	92.5	-	7.5	0.7	5.1	13.2
6078	Final	-	-	-	-	-	-
6079	50%	54.4	-	4.9	0.1	3.4	8.4
6080	31%	48.7	-	5.8	-	2.5	8.3
6082	Final	82.8	0.0	4.3	0.1	9.4	13.8
6083	Final	11.5	-	0.7	-	0.9	1.6
6084	Final	137.8	4.7	8.3	0.8	5.9	19.8
6085	50%	-	-	-	-	-	-
6089	Final	18.3	-	0.8	0.2	1.8	2.7
6090	Final	3.4	-	0.6	-	-	0.6
6096	31%	0.6	-	0.0	0.0	0.0	0.1
6098	31%	0.1	-	-	0.0	-	0.0
6100	50%	51.2	-	2.6	0.0	4.2	6.8
6101	31%	25.0	-	0.5	0.1	2.6	3.3
6102	31%	6.3	-	-	-	0.8	0.8
6104	Final	7.4	-	0.0	0.0	0.9	1.0
6350	Final	-	-	-	-	-	-
6351	Final	7.1	-	0.0	0.0	1.1	1.1
Grand Total		1,174.3	4.7	87.5	6.8	73.8	173.0

B3. Los Cerritos Channel WMP – MS4 vs Non-MS4

B3.1. City of Bellflower

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5507	305.0	268.1	36.9
5517	154.4	137.7	16.7
5518	235.2	233.5	1.7
5519	289.1	235.8	53.2
5523	138.8	100.4	38.5
5524	14.8	14.8	-
Grand Total	1,137.4	990.4	147.0

B3.2. City of Cerritos

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5506	0.0	0.0	-
5507	12.9	12.9	0.0
Grand Total	12.9	12.9	0.0

B3.3. City of Downey

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5524	112.8	93.0	19.8
Grand Total	112.8	93.0	19.8

B3.4. City of Lakewood

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5506	226.6	226.5	0.0
5507	176.3	176.3	-
5510	20.7	19.9	0.8
5512	143.1	138.8	4.3
5514	35.3	35.3	-
5515	26.6	26.6	-
5516	31.9	31.9	-
5517	134.4	134.4	-
5519	9.5	9.5	-
5520	164.5	164.5	-
5521	95.2	95.2	-
5522	71.9	71.9	-
5523	21.4	21.4	-
Grand Total	1,157.2	1,152.1	5.1

B3.5. City of Long Beach

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5501	0.3	0.3	0.0
5502	0.5	0.2	0.2
5503	78.2	77.8	0.4
5504	349.2	300.9	48.2
5505	133.3	130.5	2.8
5506	8.6	8.6	0.0
5508	74.6	65.6	9.0
5509	129.3	25.6	103.7
5510	807.6	152.2	655.3
5511	50.5	48.5	2.0
5512	454.0	329.5	124.5
5513	32.5	30.5	2.0
5514	153.5	152.8	0.7
5515	91.0	91.0	-
5520	7.4	7.4	-
5521	108.7	49.2	59.5
5522	50.8	48.6	2.2
5523	146.4	110.7	35.7
Grand Total	2,676.1	1,629.8	1,046.2

B3.6. City of Paramount

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5519	36.5	35.4	1.2
5523	343.3	332.6	10.7
5524	252.1	157.5	94.6
Grand Total	631.9	525.5	106.4

B3.7. City of Signal Hill

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5510	322.6	284.3	38.3
Grand Total	322.6	284.3	38.3

RB-AR9279

B4. Los Cerritos Channel WMP - Compliance Tables

B4.1. City of Bellflower

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5507	Final	268.1	-	16.7	1.2	13.2	31.1
5517	Final	137.7	-	9.3	0.8	9.3	19.4
5518	Final	233.5	-	16.8	1.2	10.2	28.2
5519	35%	176.3	-	11.4	0.9	12.1	24.4
	Final	59.5	-	-	-	3.6	3.6
5523	35%	68.0	-	3.7	0.4	4.1	8.2
	Final	32.3	-	-	-	2.0	2.0
5524	Final	14.8	-	0.2	-	1.2	1.4
Grand Total		990.4	-	58.1	4.5	55.6	118.2

B4.2. City of Cerritos

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5506	Final	0.0	-	-	-	0.0	0.0
5507	35%	9.7	-	1.0	0.0	0.5	1.4
	Final	3.2	-	-	-	0.1	0.1
Grand Total		12.9	-	1.0	0.0	0.6	1.6

B4.3. City of Downey

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5524	35%	57.2	0.1	5.3	0.0	2.7	8.1
	Final	35.8	-	-	-	2.1	2.1
Grand Total		93.0	0.1	5.3	0.0	4.8	10.2

B4.4. City of Lakewood

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5506	Final	226.5	-	31.4	2.1	5.1	38.5
5507	35%	131.0	-	15.4	2.6	1.5	19.5
	Final	45.2	-	-	-	3.6	3.6
5510	Final	19.9	-	0.4	-	1.5	1.9
5512	Final	138.8	-	7.7	0.2	7.0	14.9
5514	Final	35.3	-	3.7	1.3	0.4	5.4
5515	Final	26.6	-	3.9	0.2	0.5	4.6
5516	Final	31.9	-	4.0	0.4	0.8	5.3
5517	Final	134.4	-	18.6	1.4	2.8	22.9
5519	35%	3.1	-	0.2	-	0.2	0.4
	Final	6.4	-	-	-	0.1	0.1
5520	35%	130.9	-	14.0	2.1	4.4	20.6
	Final	33.5	-	-	-	3.3	3.3
5521	Final	95.2	-	11.6	0.6	2.2	14.3
5522	Final	71.9	-	8.7	0.8	1.6	11.1
5523	35%	17.4	-	1.9	-	0.7	2.6
	Final	4.0	-	-	-	0.3	0.3
Grand Total		1,152.1	-	121.5	11.8	36.2	169.5

B4.5. City of Long Beach

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5501	35%	0.1	-	0.0	0.0	0.0	0.0
	Final	0.1	-	-	-	0.0	0.0
5502	35%	0.1	-	0.0	0.0	0.0	0.0
	Final	0.2	-	-	-	0.0	0.0
5503	35%	57.7	-	4.2	2.3	2.0	8.5
	Final	20.1	-	-	-	1.7	1.7
5504	35%	196.6	-	10.2	3.3	8.7	22.2
	Final	104.4	-	-	-	5.5	5.5
5505	Final	130.5	-	15.9	1.6	3.2	20.7
5506	Final	8.6	-	0.1	0.2	0.4	0.7
5508	Final	65.6	-	7.7	0.9	1.7	10.3
5509	Final	25.6	-	-	2.2	-	2.2
5510	Final	152.2	-	9.8	0.9	6.1	16.8
5511	Final	48.5	-	6.7	0.2	1.3	8.1
5512	Final	329.5	-	22.2	1.7	16.8	40.7
5513	35%	23.9	-	1.5	0.1	2.1	3.7
	Final	6.6	-	-	-	0.4	0.4
5514	35%	106.0	-	10.9	5.9	-	16.7
	Final	46.8	-	3.7	-	2.8	6.5
5515	Final	91.0	-	10.8	1.7	2.3	14.9
5520	Final	7.4	-	0.8	-	0.3	1.2
5521	Final	49.2	-	6.0	0.1	1.8	7.9
5522	Final	48.6	-	4.2	0.0	3.1	7.3
5523	35%	89.3	-	7.0	0.8	3.5	11.3
	Final	21.4	-	-	-	1.6	1.6
Grand Total		1,629.8	-	121.7	21.8	65.3	208.7

B4.6. City of Paramount

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5519	35%	24.0	-	1.9	0.2	1.4	3.5
	Final	11.4	-	-	-	0.6	0.6
5523	35%	243.0	-	12.4	2.8	15.7	30.9
	Final	89.6	-	-	-	4.1	4.1
5524	Final	157.5	-	8.5	3.5	4.0	16.0
Grand Total		525.5	-	22.8	6.4	25.9	55.1

B4.7. City of Signal Hill

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5510	35%	231.6	0.0	11.2	1.2	14.2	26.6
	Final	52.7	-	-	-	2.0	2.0
Grand Total		284.3	0.0	11.2	1.2	16.2	28.6

B5. Lower San Gabriel River (San Gabriel River) WMP – MS4 vs Non-MS4

B5.1. City of Artesia

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5109	1.1	1.1	-
Grand Total	1.1	1.1	-

B5.2. City of Bellflower

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5110	0.0	0.0	-
5112	0.7	0.6	0.2
5113	56.8	51.5	5.3
5114	0.0	0.0	-
5115	1.3	1.3	-
5116	0.1	0.1	-
5118	3.9	3.9	-
Grand Total	62.8	57.4	5.4

B5.3. City of Cerritos

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5107	0.0	0.0	-
5108	0.0	0.0	-
5109	40.7	0.0	40.7
5110	2.9	2.9	-
5111	6.8	0.0	6.8
5112	2.3	1.2	1.2
5113	0.0	0.0	-
5516	6.6	0.0	6.6
Grand Total	59.4	4.1	55.3

B5.4. City of Diamond Bar

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5197	0.0	0.0	-
5198	0.0	0.0	-
5203	12.6	0.0	12.6
5204	3.8	0.0	3.8
5205	1.0	1.0	-
5212	15.3	0.0	15.3
5213	0.3	0.0	0.3
Grand Total	33.0	1.1	32.0

B5.5. City of Downey

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5113	0.0	0.0	-
5114	78.3	22.4	55.9
5115	80.6	0.0	80.6
5118	0.0	0.0	0.0
5119	52.5	52.5	-
5122	4.3	0.0	4.3
5124	0.0	0.0	0.0
5125	38.4	2.5	35.8
5126	9.8	9.8	-
5127	0.0	0.0	-
5128	0.0	0.0	-
Grand Total	263.9	87.3	176.7

B5.6. City of Lakewood

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5105	0.8	0.8	-
5106	7.4	0.0	7.4
5107	0.0	0.0	-
5108	1.4	1.4	-
5110	0.0	0.0	-
Grand Total	9.6	2.2	7.4

B5.7. City of Long Beach

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5102	0.0	0.0	-
5103	26.9	26.9	-
5104	2.3	2.3	-
5105	0.0	0.0	-
5106	0.0	0.0	-
Grand Total	29.2	29.2	-

B5.8. City of Norwalk

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5109	0.8	0.8	-
5116	0.5	0.0	0.5
5117	14.5	0.0	14.5
5118	3.7	0.1	3.5
5120	39.1	0.0	39.1
5121	41.5	3.9	37.6
5122	34.7	0.0	34.7
5124	2.2	0.0	2.2
Grand Total	136.9	4.8	132.1

B5.9. City of Pico Rivera

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5127	0.0	0.0	-
5128	10.9	6.4	4.5
5130	6.2	6.1	0.1
5131	17.2	11.7	5.5
5132	0.0	0.0	-
5135	4.3	4.3	-
5136	7.2	7.2	-
5137	0.2	0.2	-
5139	7.8	7.8	-
5140	0.0	0.0	-
5141	4.9	4.9	-
5142	0.0	0.0	-
5143	8.9	8.9	-
5144	3.8	0.0	3.8
5145	1.7	1.7	-
5147	0.0	0.0	-
5148	0.2	0.2	0.0
5149	0.0	0.0	-
5150	0.3	0.0	0.3
5151	0.3	0.0	0.3
5153	1.0	1.0	-
5154	0.0	0.0	-
Grand Total	75.1	60.4	14.7

B5.10. City of Santa Fe Springs

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5120	3.1	3.1	0.0
5122	11.0	0.0	11.0
5123	80.0	23.9	56.2
5127	0.0	0.0	0.0
5129	4.5	0.0	4.5
5130	1.7	0.0	1.7
5132	0.0	0.0	-
5133	0.1	0.0	0.1
5134	5.6	3.3	2.3
5135	0.0	0.0	-
Grand Total	106.0	30.3	75.8

B5.11. City of Whittier

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5138	7.1	7.1	-
5142	0.0	0.0	0.0
5146	0.4	0.0	0.4
5147	0.0	0.0	-
5148	0.0	0.0	-
5153	0.0	0.0	-
5173	0.0	0.0	-
Grand Total	7.5	7.1	0.4

B6. Lower San Gabriel River (San Gabriel River) WMP – Compliance Tables

B6.1. City of Artesia

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5109	35%	1.1	-	-	0.1	-	0.1
Grand Total		1.1	-	-	0.1	-	0.1

B6.2. City of Bellflower

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5110	Final	0.0	-	-	-	0.0	0.0
5112	Final	0.6	-	0.1	0.0	-	0.1
5113	Final	51.5	-	0.9	3.4	-	4.3
5114	Final	-	-	-	-	-	-
5115	35%	1.3	-	0.2	0.0	-	0.2
5116	Final	0.1	-	-	-	0.0	0.0
5118	Final	3.9	-	0.6	0.3	-	0.9
Grand Total		57.4	-	1.8	3.7	0.0	5.5

B6.3. City of Cerritos

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5107	Final	-	-	-	-	-	-
5108	Final	-	-	-	-	-	-
5109	Final	-	-	-	-	-	-
5110	Final	2.9	-	0.4	0.0	-	0.4
5111	Final	-	-	-	-	-	-
5112	Final	1.2	-	0.2	0.0	-	0.2
5113	Final	-	-	-	-	-	-
5116	35%	-	-	-	-	-	-
Grand Total		4.1	-	0.6	0.0	-	0.6

B6.4. City of Diamond Bar

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5197	Final	0.0	-	0.0	-	-	0.0
5198	Final	-	-	-	-	-	-
5203	Final	-	-	-	-	-	-
5204	Final	-	-	-	-	-	-
5205	Final	1.0	-	0.2	-	-	0.2
5212	Final	-	-	-	-	-	-
5213	35%	-	-	-	-	-	-
Grand Total		1.1	-	0.2	-	-	0.2

B6.5. City of Downey

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5113	Final	-	1.0	-	-	-	1.0
5114	Final	22.4	0.8	2.1	0.4	-	3.3
5115	Final	-	0.6	-	-	-	0.6
5118	Final	-	0.6	-	-	-	0.6
5119	Final	52.5	3.3	6.4	-	-	9.7
5122	35%	-	0.0	-	-	-	0.0
5124	Final	-	0.0	-	-	-	0.0
5125	Final	2.5	0.4	0.1	-	-	0.5
5126	Final	9.8	0.3	1.4	-	-	1.7
5127	Final	-	0.1	-	-	-	0.1
5128	Final	-	0.0	-	-	-	0.0
Grand Total		87.3	7.1	10.0	0.4	-	17.5

B6.6. City of Lakewood

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5105	Final	0.8	-	-	0.0	0.1	0.1
5106	35%	-	-	-	-	-	-
5107	Final	-	-	-	-	-	-
5108	Final	1.4	-	0.2	0.0	-	0.2
5110	Final	-	-	-	-	-	-
Grand Total		2.2	-	0.2	0.0	0.1	0.4

B6.7. City of Long Beach

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5102	Final	-	-	-	-	-	-
5103	35%	26.9	-	1.1	1.3	-	2.4
5104	Final	2.3	-	0.3	-	-	0.3
5105	Final	-	-	-	-	-	-
5106	Final	0.0	-	-	-	0.0	0.0
Grand Total		29.2	-	1.4	1.3	0.0	2.7

B6.8. City of Norwalk

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5109	35%	0.8	-	-	0.1	-	0.1
5116	Final	-	-	-	-	-	-
5117	Final	-	-	-	-	-	-
5118	Final	0.1	-	-	0.0	-	0.0
5120	Final	-	-	-	-	-	-
5121	Final	3.9	-	-	0.3	-	0.3
5122	Final	-	-	-	-	-	-
5124	Final	-	-	-	-	-	-
Grand Total		4.8	-	-	0.3	-	0.3

B6.9. City of Pico Rivera

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5127	Final	0.0	-	-	-	0.0	0.0
5128	Final	6.4	-	1.2	-	-	1.2
5130	Final	6.1	-	1.1	-	-	1.1
5131	Final	11.7	-	2.0	-	-	2.0
5132	Final	0.0	-	-	-	0.0	0.0
5135	Final	4.3	-	0.8	-	-	0.8
5136	Final	7.2	-	1.3	-	-	1.3
5137	35%	0.2	-	0.0	-	-	0.0
5139	Final	7.8	-	1.4	-	-	1.4
5140	Final	-	-	-	-	-	-
5141	Final	4.9	-	0.8	-	-	0.8
5142	Final	-	-	-	-	-	-
5143	Final	8.9	-	1.6	-	-	1.6
5144	Final	-	-	-	-	-	-
5145	Final	1.7	-	0.3	-	-	0.3
5147	Final	-	-	-	-	-	-
5148	Final	0.2	-	0.0	-	-	0.0
5149	Final	0.0	-	-	-	-	-
5150	Final	-	-	-	-	-	-
5151	Final	-	-	-	-	-	-
5153	Final	1.0	-	0.2	-	-	0.2
5154	Final	-	-	-	-	-	-
Grand Total		60.4	-	10.8	-	0.0	10.8

B6.10. City of Santa Fe Springs

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5120	Final	3.1	-	0.2	-	0.3	0.5
5122	Final	-	-	-	-	-	-
5123	Final	23.9	-	3.8	-	-	3.8
5127	35%	-	-	-	-	-	-
5129	Final	-	-	-	-	-	-
5130	Final	-	-	-	-	-	-
5132	Final	-	-	-	-	-	-
5133	Final	-	-	-	-	-	-
5134	Final	3.3	-	0.6	-	-	0.6
5135	Final	0.0	-	0.0	-	0.0	0.0
Grand Total		30.3	-	4.6	-	0.3	4.9

B6.11. City of Whittier

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5138	Final	7.1	-	1.4	-	-	1.4
5142	Final	-	-	-	-	-	-
5146	Final	-	-	-	-	-	-
5147	Final	-	-	-	-	-	-
5148	Final	-	-	-	-	-	-
5153	35%	0.0	-	-	-	0.0	0.0
5173	Final	-	-	-	-	-	-
Grand Total		7.1	-	1.4	-	0.0	1.4

B7. Lower San Gabriel River WMP (Coyote Creek) – MS4 vs Non-MS4

B7.1. City of Artesia

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5008	0.0	0.0	-
5018	47.9	15.9	32.0
Grand Total	47.9	15.9	32.0

B7.2. City of Cerritos

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5008	41.7	7.7	34.0
5016	0.0	0.0	-
5017	4.3	4.3	-
5018	49.7	14.9	34.8
5023	0.0	0.0	-
5024	48.7	0.0	48.7
5026	5.8	5.8	0.1
5028	12.2	0.0	12.2
5029	4.9	4.9	-
5030	0.1	0.1	0.0
5035	3.8	0.0	3.8
5036	2.2	1.2	1.0
5038	0.0	0.0	-
5059	16.0	15.1	0.8
5060	0.0	0.0	-
5061	4.9	2.6	2.3
Grand Total	194.3	56.7	137.6

B7.3. City of Diamond Bar

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5053	0.0	0.0	-
5054	1.0	1.0	-
5055	8.4	8.4	-
5056	10.6	0.0	10.6
5057	26.8	0.0	26.8
5058	27.2	27.2	-
Grand Total	74.0	36.7	37.4

B7.4. City of Hawaiian Gardens

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5004	0.0	0.0	-
5007	27.0	23.6	3.4
5009	0.1	0.1	-
5013	1.3	1.3	-
5014	2.1	2.1	-
Grand Total	30.4	27.1	3.4

B7.5. City of La Mirada

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5037	0.0	0.0	-
5038	1.1	0.0	1.1
5039	7.5	0.0	7.5
5040	2.1	0.0	2.1
5041	2.0	0.0	2.0
5042	0.0	0.0	0.0
5043	34.8	19.1	15.7
5044	0.8	0.0	0.8
5045	0.8	0.0	0.8
5059	1.4	1.4	-
5060	0.9	0.0	0.9
5062	40.4	20.5	19.9
5063	37.0	37.0	-
5064	0.0	0.0	-
5067	0.0	0.0	-
5069	40.3	40.3	-
5070	0.0	0.0	-
5073	5.7	5.7	-
5074	0.8	0.8	-
5080	0.0	0.0	-
Grand Total	175.7	124.9	50.8

B7.6. City of Lakewood

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5004	0.0	0.0	-
5007	17.5	17.5	0.0
5008	8.2	2.3	5.9
5014	0.0	0.0	-
5015	0.0	0.0	-
5016	0.0	0.0	-
5017	0.0	0.0	-
Grand Total	25.7	19.7	6.0

B7.7. City of Long Beach

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5003	0.0	0.0	0.0
5004	37.5	0.0	37.5
5005	0.0	0.0	-
5007	0.0	0.0	-
5009	0.0	0.0	-
5013	0.0	0.0	-
Grand Total	37.5	0.0	37.5

B7.8. City of Norwalk

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5008	3.0	1.6	1.3
5018	36.0	2.0	34.0
5019	41.5	24.3	17.2
5020	0.0	0.0	-
5021	43.4	16.9	26.5
5022	28.7	7.7	21.0
5024	0.0	0.0	-
5025	0.0	0.0	-
5060	0.0	0.0	-
5068	0.0	0.0	-
5071	0.0	0.0	-
5073	0.0	0.0	-
Grand Total	152.5	52.5	99.9

B7.9. City of Santa Fe Springs

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5019	0.0	0.0	-
5020	27.7	0.0	27.7
5022	13.5	0.0	13.5
5024	0.0	0.0	-
5025	31.2	0.0	31.2
5060	28.9	0.0	28.9
5061	0.0	0.0	-
5062	2.6	0.0	2.6
5067	19.4	0.0	19.4
5068	6.1	0.0	6.1
5069	2.3	0.0	2.3
5071	50.5	0.0	50.5
5072	2.6	2.6	-
5073	23.5	0.0	23.5
5084	1.4	1.4	-
5089	19.8	0.0	19.8
5092	1.1	1.1	-
5093	22.1	0.0	22.1
5094	7.4	7.4	-
5095	0.4	0.0	0.4
Grand Total	260.7	12.6	248.1

B7.10. City of Whittier

Subwatershed	COMPLIANCE TARGET – FINAL MILESTONE		
	Total Critical Year Storm Volume Target (acre-ft/year)	MS4 Responsible Critical Year Storm Volume Runoff (acre-ft/year)	Non-MS4 Runoff – Industrial Permitted & Caltrans (acre-ft/year)
5045	0.0	0.0	-
5064	0.0	0.0	-
5065	3.7	3.7	-
5070	0.0	0.0	-
5079	18.5	11.7	6.8
5080	52.6	26.0	26.5
5081	2.1	0.0	2.1
5082	6.8	0.2	6.6
5083	0.0	0.0	-
5086	1.7	0.0	1.7
5087	21.0	20.8	0.2
5088	25.0	24.7	0.3
5089	0.6	0.5	0.1
5090	0.8	0.8	-
5091	6.6	5.7	0.9
5092	13.8	8.9	4.9
5093	0.0	0.0	-
5094	0.6	0.6	-
5095	24.2	21.1	3.1
5096	3.8	3.8	-
5097	5.2	5.2	-
5098	48.7	47.9	0.7
5099	11.3	10.6	0.7
5100	7.3	7.3	-
5101	0.6	0.6	-
Grand Total	254.7	200.1	54.6

B8. Lower San Gabriel River WMP (Coyote Creek) – Compliance Tables

B8.1. City of Artesia

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5008	Final	-	-	-	-	-	-
5018	35%	15.9	-	-	1.1	-	1.1
Grand Total		15.9	-	-	1.1	-	1.1

B8.2. City of Cerritos

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5008	Final	7.7	-	-	0.9	-	0.9
5016	Final	-	-	-	-	-	-
5017	Final	4.3	-	-	0.5	-	0.5
5018	Final	14.9	-	-	1.1	-	1.1
5023	Final	-	-	-	-	-	-
5024	Final	-	-	-	-	-	-
5026	Final	5.8	-	1.0	0.0	-	1.0
5028	Final	-	-	-	-	-	-
5029	Final	4.9	-	0.3	0.2	-	0.6
5030	35%	0.1	-	0.0	-	-	0.0
5035	Final	-	-	-	-	-	-
5036	Final	1.2	-	0.2	0.0	-	0.2
5038	Final	-	-	-	-	-	-
5059	Final	15.1	-	1.6	0.5	-	2.0
5060	Final	-	-	-	-	-	-
5061	Final	2.6	-	-	0.2	-	0.2
Grand Total		56.7	-	3.1	3.4	-	6.4

B8.3. City of Diamond Bar

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5053	Final	-	-	-	-	-	-
5054	35%	1.0	-	0.3	-	-	0.3
5055	Final	8.4	-	1.2	-	0.7	1.9
5056	Final	-	-	-	-	-	-
5057	Final	-	-	-	-	-	-
5058	Final	27.2	-	6.7	-	-	6.7
Grand Total		36.7	-	8.2	-	0.7	8.9

B8.4. City of Hawaiian Gardens

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5004	Final	-	-	-	-	-	-
5007	35%	23.6	-	0.3	1.5	-	1.8
5009	Final	0.1	-	-	-	0.0	0.0
5013	Final	1.3	-	-	0.1	-	0.1
5014	Final	2.1	-	0.2	0.0	-	0.3
Grand Total		27.1	-	0.6	1.6	0.0	2.2

B8.5. City of La Mirada

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5037	Final	-	-	-	-	-	-
5038	Final	-	-	-	-	-	-
5039	Final	-	-	-	-	-	-
5040	Final	-	-	-	-	-	-
5041	Final	-	-	-	-	-	-
5042	Final	-	-	-	-	-	-
5043	Final	19.1	-	1.9	0.6	-	2.5
5044	Final	-	-	-	-	-	-
5045	35%	-	-	-	-	-	-
5059	Final	1.4	-	0.3	-	-	0.3
5060	Final	-	-	-	-	-	-
5062	Final	20.5	-	1.0	1.1	-	2.1
5063	Final	37.0	-	-	3.0	-	3.0
5064	Final	-	-	-	-	-	-
5067	Final	-	-	-	-	-	-
5069	Final	40.3	-	5.3	0.9	-	6.2
5070	Final	-	-	-	-	-	-
5073	Final	5.7	-	1.0	-	-	1.0
5074	Final	0.8	-	0.1	-	-	0.1
5080	Final	-	-	-	-	-	-
Grand Total		124.9	-	9.6	5.6	-	15.2

B8.6. City of Lakewood

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5004	Final	-	-	-	-	-	-
5007	35%	17.5	-	0.9	0.7	-	1.6
5008	Final	2.3	-	-	0.3	-	0.3
5014	Final	-	-	-	-	-	-
5015	Final	-	-	-	-	-	-
5016	Final	-	-	-	-	-	-
5017	Final	-	-	-	-	-	-
Grand Total		19.7	-	0.9	0.9	-	1.9

B8.7. City of Long Beach

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5003	Final	-	-	-	-	-	-
5004	35%	-	-	-	-	-	-
5005	Final	-	-	-	-	-	-
5007	Final	-	-	-	-	-	-
5009	Final	-	-	-	-	-	-
5013	Final	0.0	-	-	0.0	-	0.0
Grand Total		0.0	-	-	0.0	-	0.0

B8.8. City of Norwalk

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5008	35%	1.6	-	-	0.2	-	0.2
5018	Final	2.0	-	-	0.2	-	0.2
5019	Final	24.3	-	-	1.8	-	1.8
5020	Final	-	-	-	-	-	-
5021	Final	16.9	-	-	1.3	-	1.3
5022	Final	7.7	-	1.4	-	-	1.4
5024	Final	-	-	-	-	-	-
5025	Final	-	-	-	-	-	-
5060	Final	-	-	-	-	-	-
5068	Final	-	-	-	-	-	-
5071	Final	-	-	-	-	-	-
5073	Final	-	-	-	-	-	-
Grand Total		52.5	-	1.4	3.4	-	4.7

B8.9. City of Santa Fe Springs

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5019	Final	0.0	-	-	-	0.0	0.0
5020	Final	-	-	-	-	-	-
5022	Final	-	-	-	-	-	-
5024	Final	-	-	-	-	-	-
5025	Final	-	-	-	-	-	-
5060	Final	-	-	-	-	-	-
5061	Final	-	-	-	-	-	-
5062	Final	-	-	-	-	-	-
5067	Final	-	-	-	-	-	-
5068	Final	-	-	-	-	-	-
5069	Final	-	-	-	-	-	-
5071	Final	-	-	-	-	-	-
5072	Final	2.6	-	0.3	-	0.1	0.4
5073	Final	-	-	-	-	-	-
5084	Final	1.4	-	0.2	-	-	0.2
5089	Final	-	-	-	-	-	-
5092	Final	1.1	-	0.1	-	0.2	0.2
5093	Final	-	-	-	-	-	-
5094	Final	7.4	-	0.4	-	0.9	1.2
5095	35%	-	-	-	-	-	-
Grand Total		12.6	-	1.0	-	1.1	2.1

B8.10. City of Whittier

Subwatershed	Milestone	COMPLIANCE TARGET	POLLUTANT REDUCTION PLAN				
		Remaining MS4 Responsible Critical Year Volume (acre-ft/year)	Existing Distributed BMP Volume (acre-ft)	Total Estimated Right-of-Way BMP Volume (acre-ft)	Estimated Potential LID on Public Parcels Volume (acre-ft)	Remaining BMP Volume (Potentially Regional BMPs) (acre-ft)	Total BMP Volume to Achieve Compliance (acre-ft)
5045	Final	0.0	-	-	-	0.0	0.0
5064	Final	-	-	-	-	-	-
5065	Final	3.7	-	0.8	-	-	0.8
5070	Final	0.0	-	-	-	0.0	0.0
5079	Final	11.7	-	2.5	-	-	2.5
5080	Final	26.0	-	5.5	-	-	5.5
5081	35%	-	-	-	-	-	-
5082	Final	0.2	-	0.0	-	-	0.0
5083	Final	-	-	-	-	-	-
5086	Final	-	-	-	-	-	-
5087	Final	20.8	-	4.1	-	-	4.1
5088	Final	24.7	-	5.4	-	-	5.4
5089	Final	0.5	-	0.1	-	-	0.1
5090	Final	0.8	-	0.2	-	-	0.2
5091	Final	5.7	-	1.1	-	-	1.1
5092	Final	8.9	-	1.7	-	-	1.7
5093	Final	0.0	-	-	-	0.0	0.0
5094	Final	0.6	-	0.1	-	0.0	0.1
5095	Final	21.1	-	3.9	-	-	3.9
5096	Final	3.8	-	0.7	-	-	0.7
5097	Final	5.2	-	1.0	-	-	1.0
5098	Final	47.9	-	8.7	-	-	8.7
5099	Final	10.6	-	1.9	-	-	1.9
5100	Final	7.3	-	1.4	-	-	1.4
5101	Final	0.6	-	0.1	-	-	0.1
Grand Total		200.1	-	39.0	-	0.0	39.1

Attachment C: Supporting Figures for Watershed Control Measures

Submitted to:

LLAR WMP Group LCC WMP Group LSGR WMP Group

Submitted by:

Tetra Tech
9444 Balboa Ave., Suite 215
San Diego, CA 92123

June 6, 2014

Figure 1. LLAR Downey Subwatershed IDs

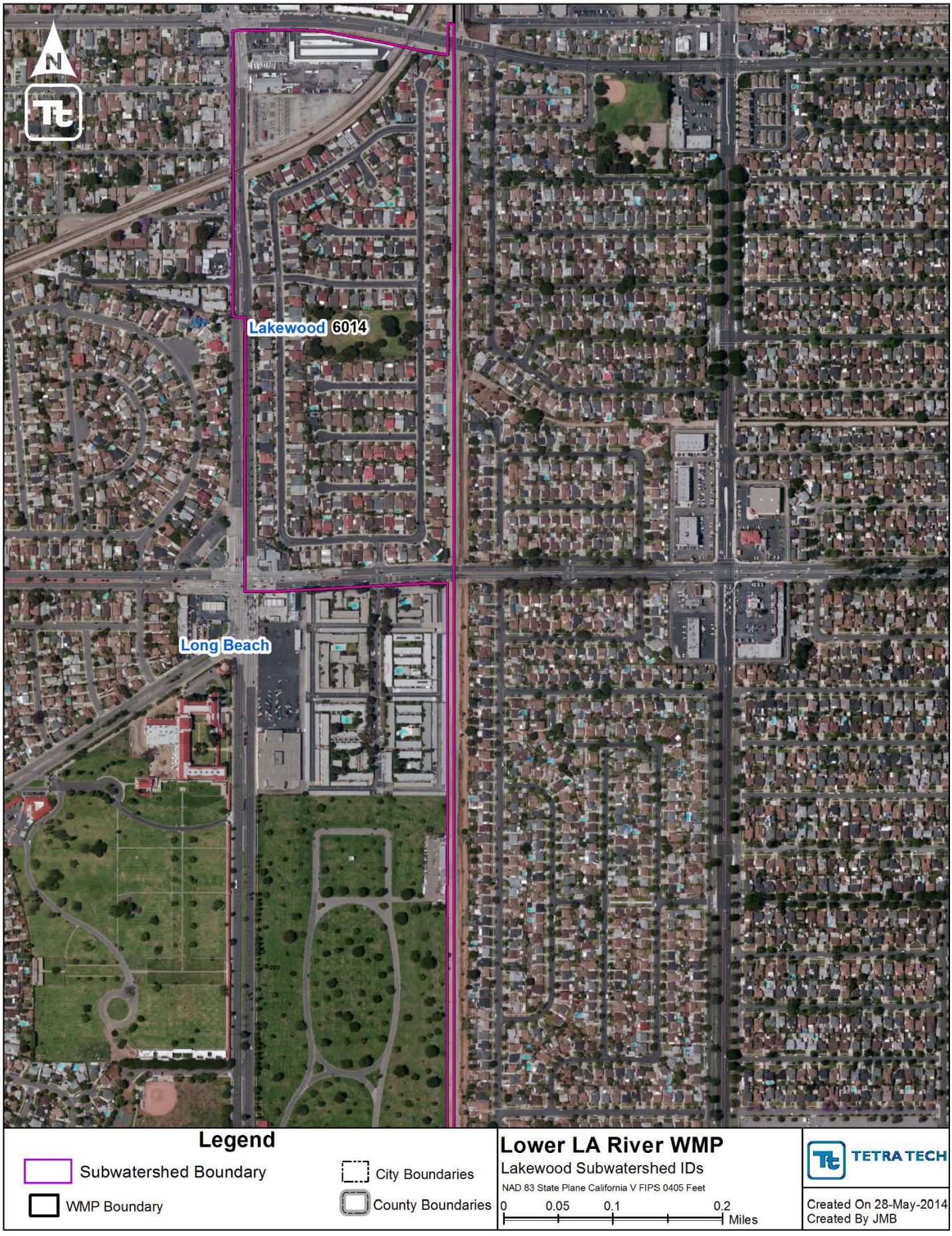

Figure 2. LLAR Lakewood Subwatershed IDs

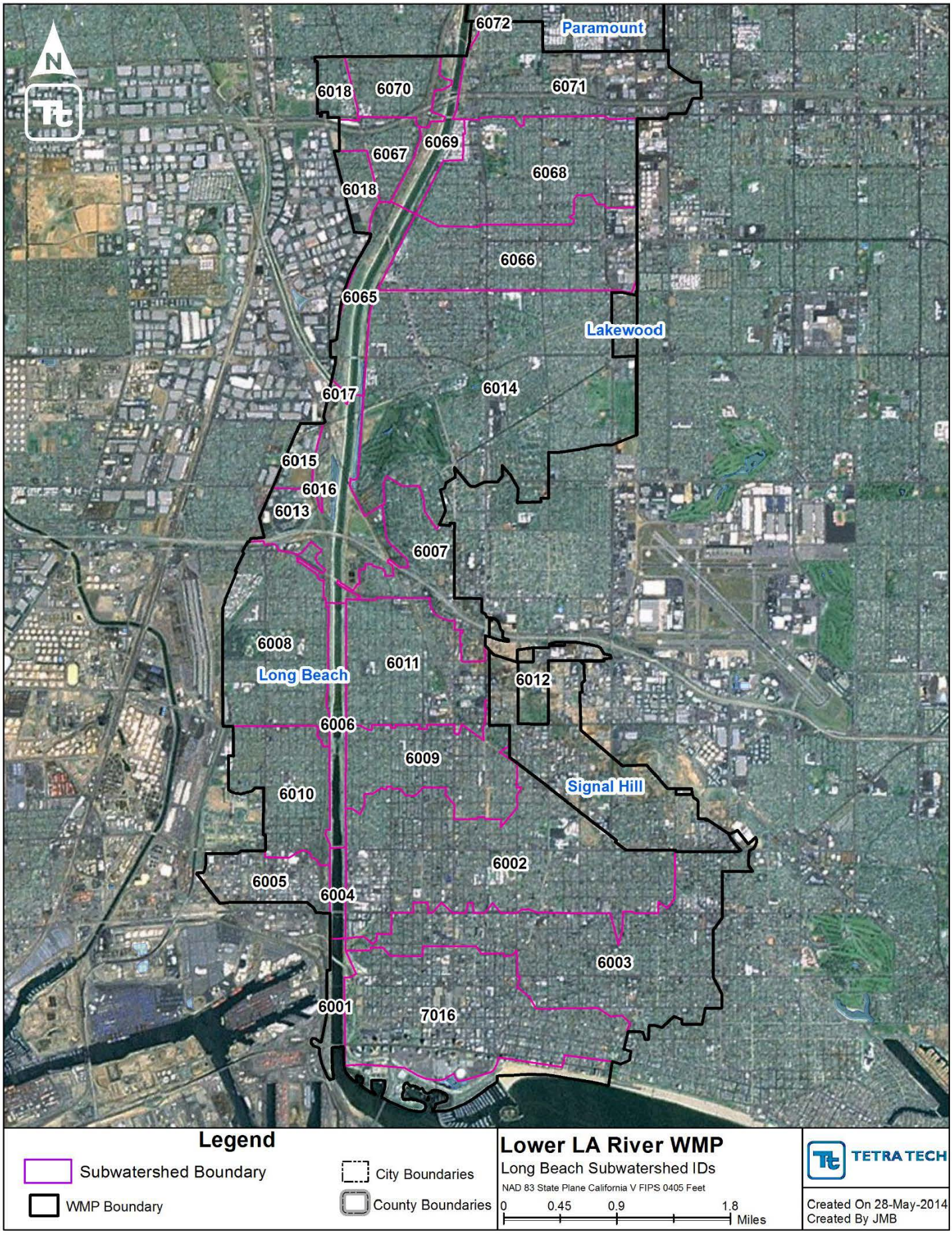

Figure 3. LLAR Long Beach Subwatershed IDs

Figure 4. LLAR Lynwood Subwatershed IDs

Figure 5. LLAR Paramount Subwatershed IDs

Figure 6. LLAR Pico Rivera Subwatershed IDs

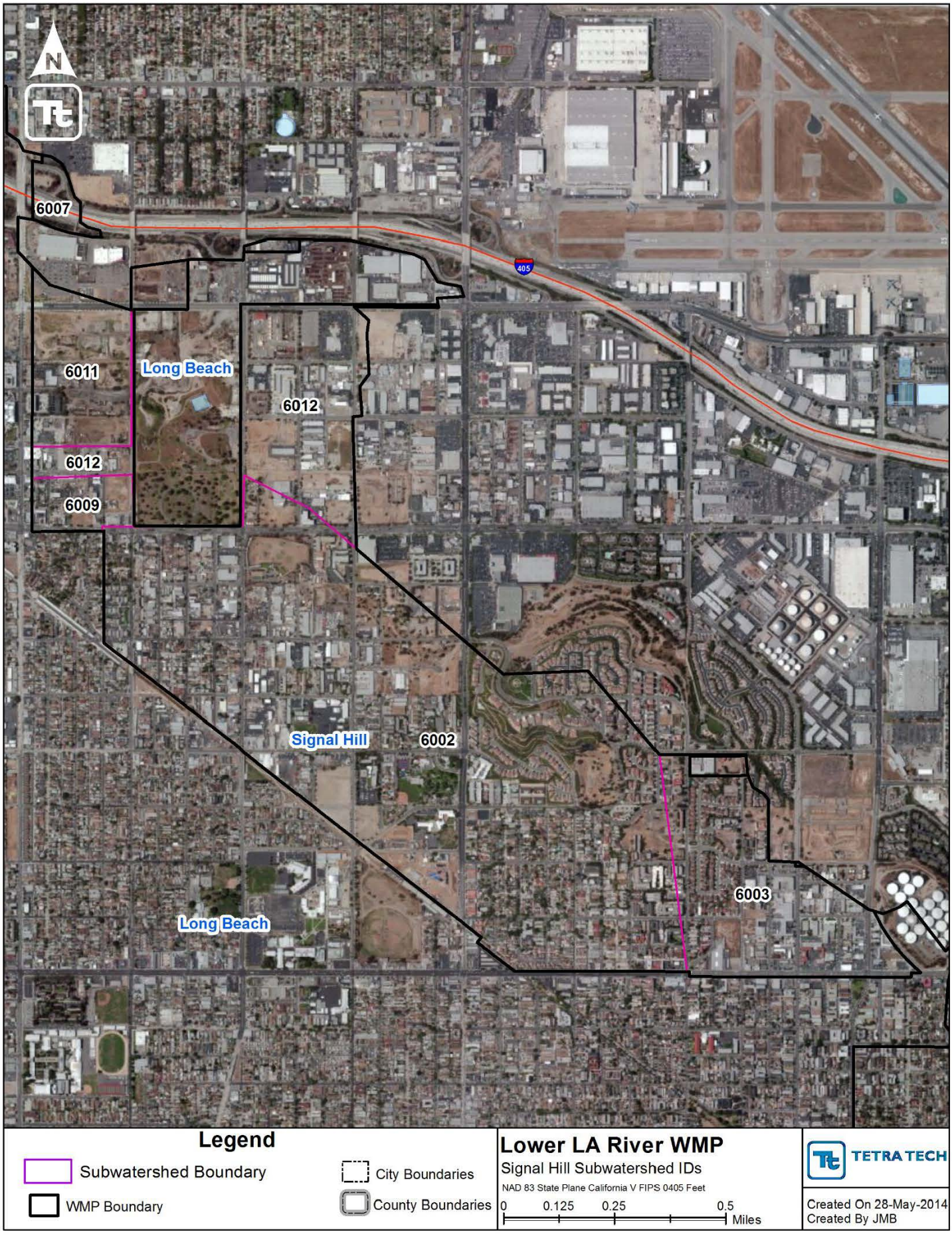

Figure 7. LLAR Signal Hill Subwatershed IDs

Figure 8. LLAR South Gate Subwatershed IDs

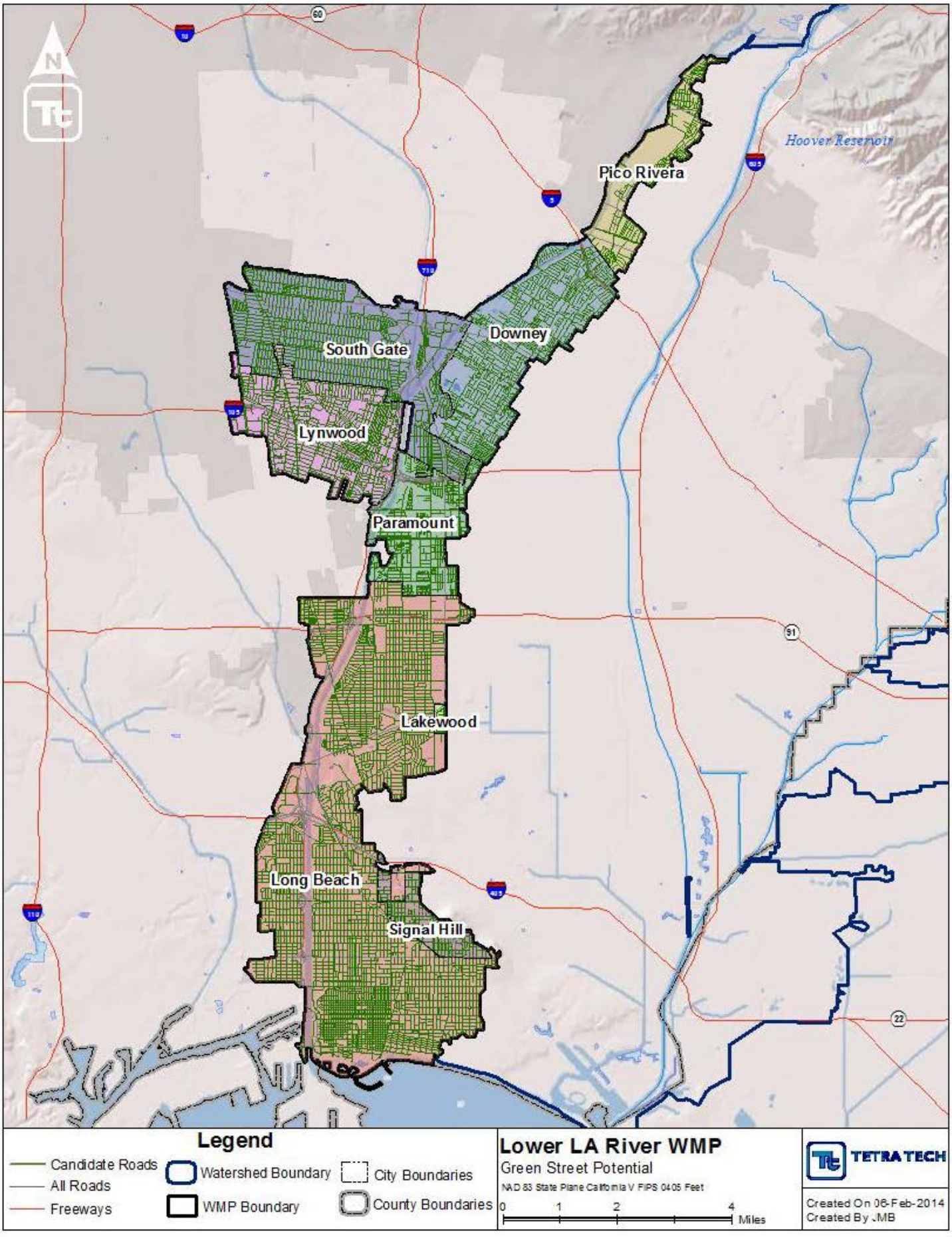

Figure 9. LLAR ROW BMP Potential Opportunities

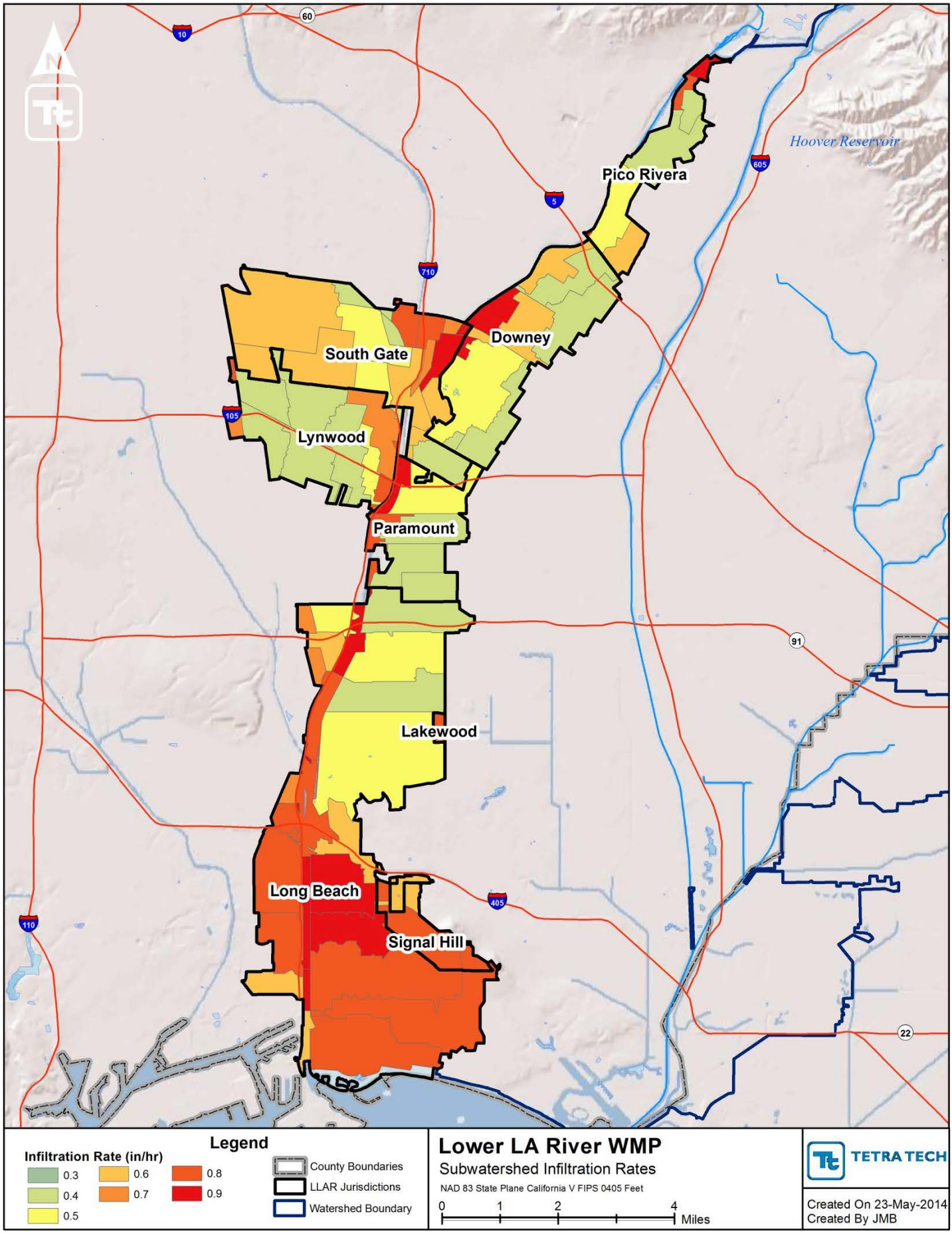

Figure 10. LLAR Subwatershed Infiltration Rates

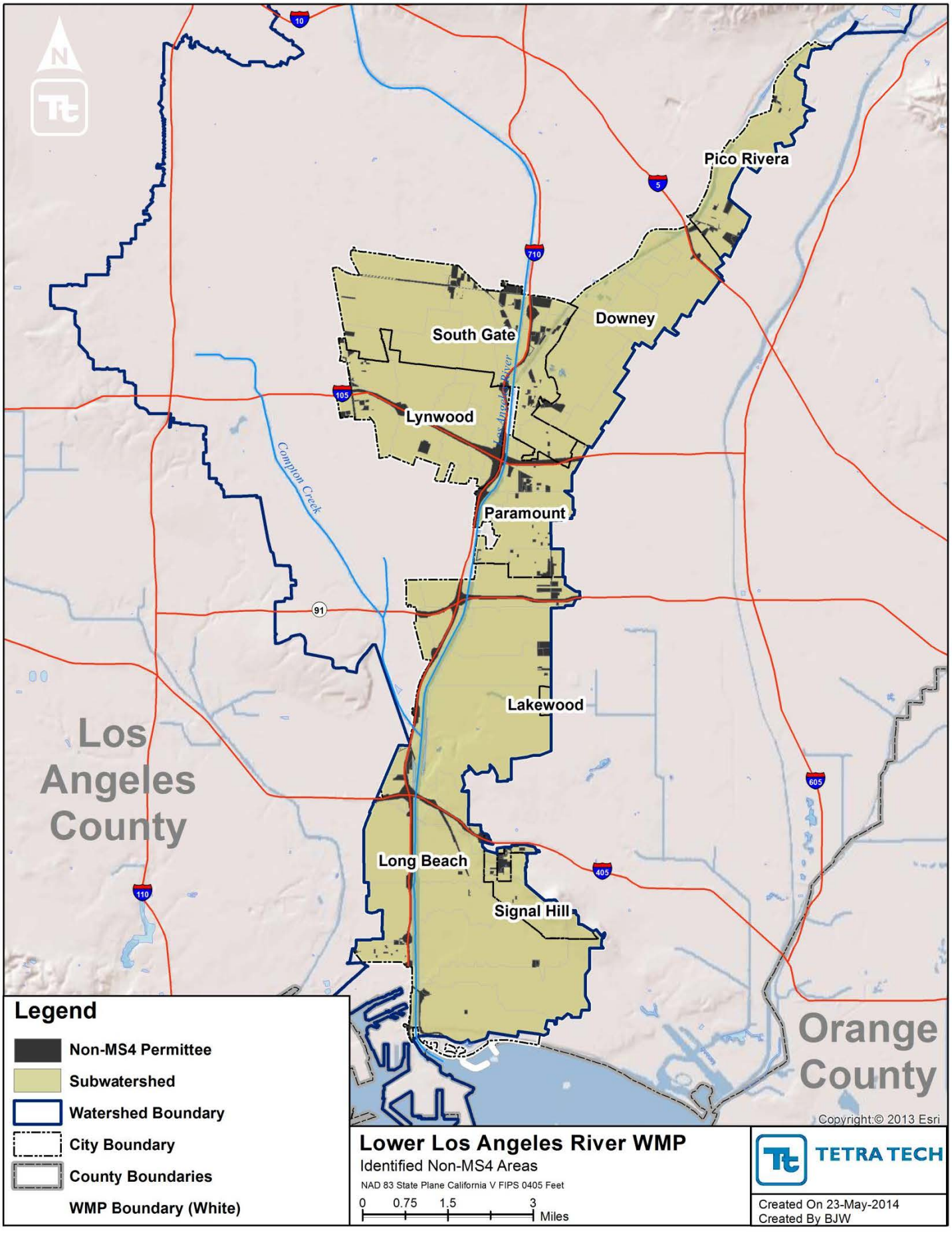

Figure 11. LLAR Non-MS4 Permittees

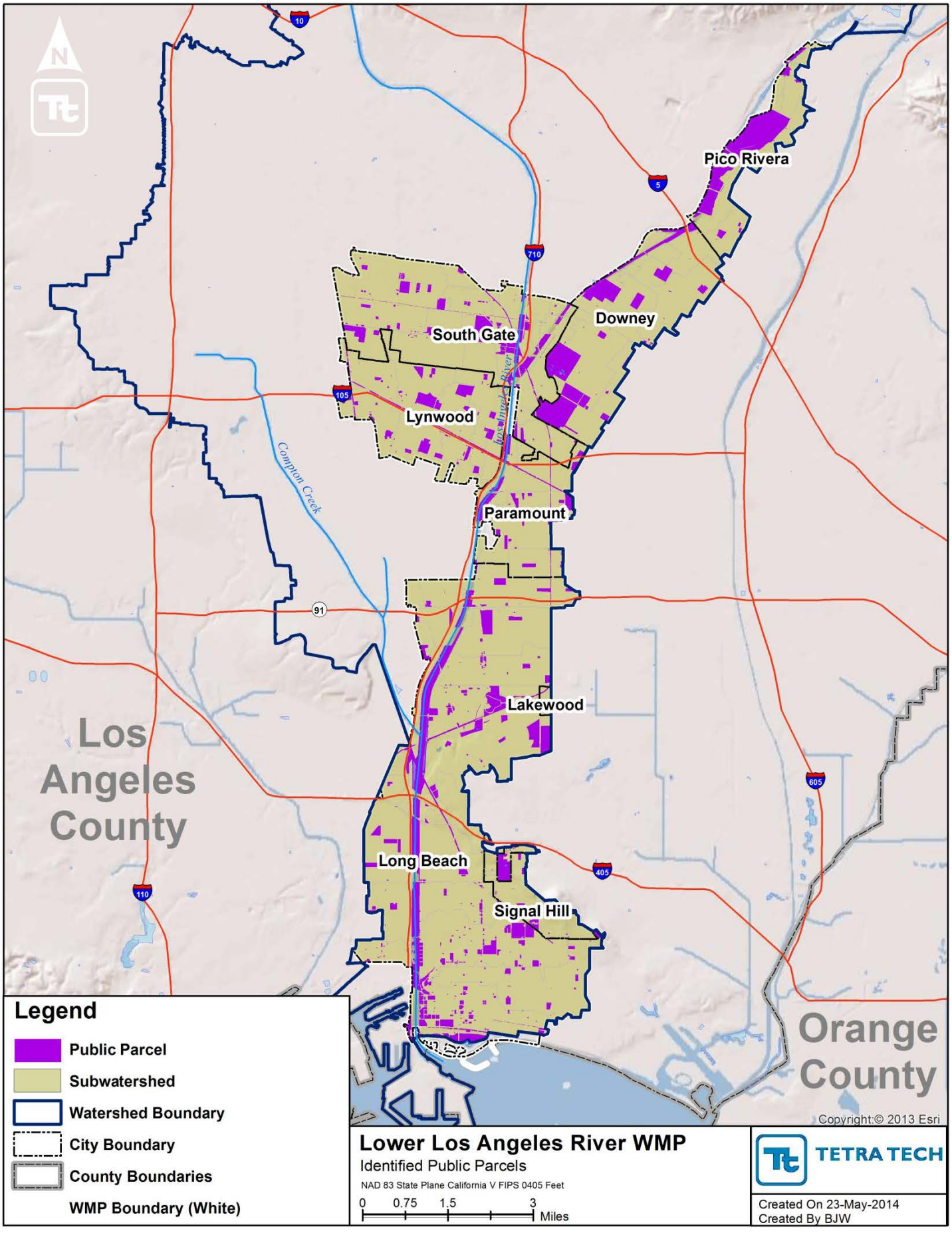

Figure 12. LLAR identified public parcels

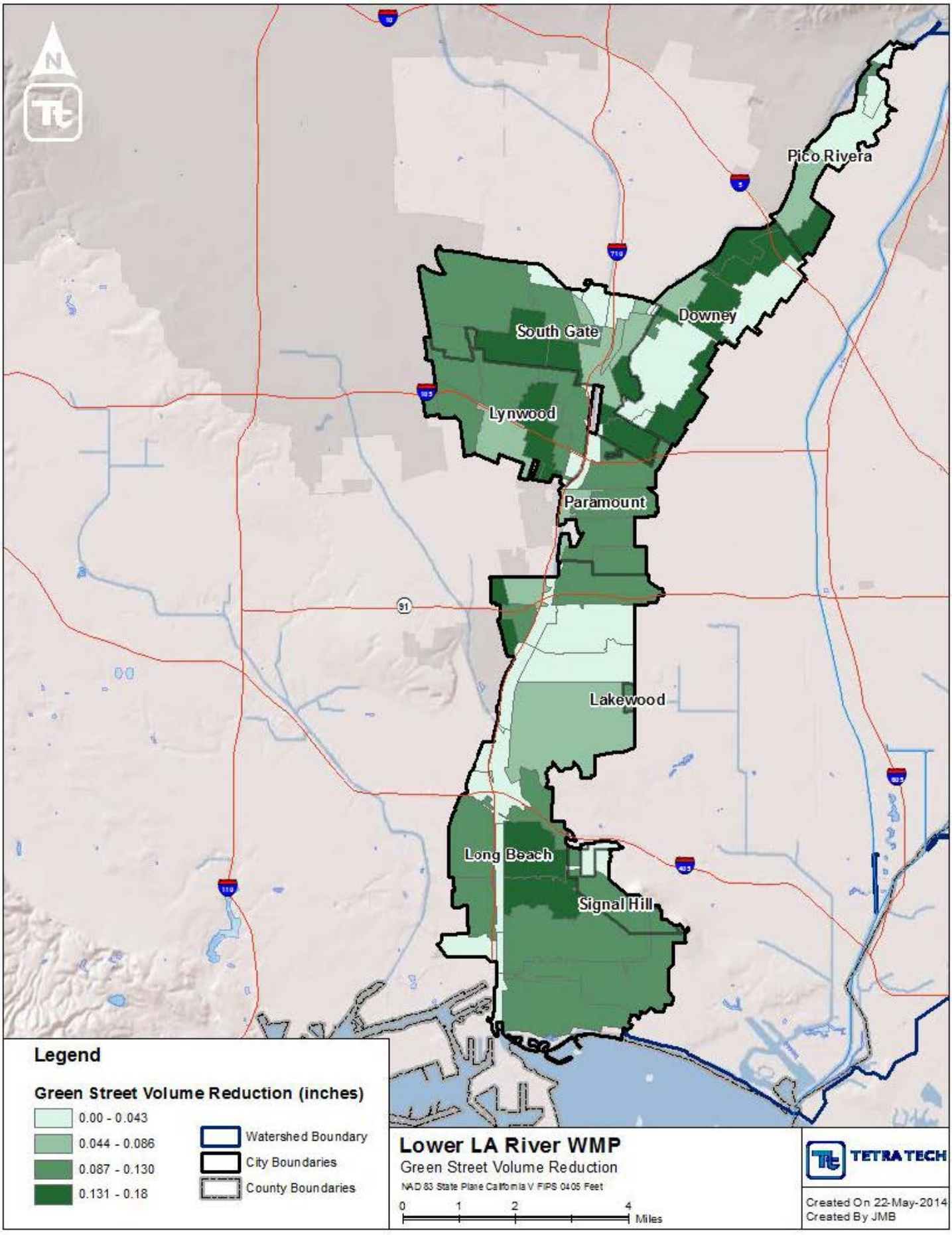

Figure 13. LLAR ROW BMP Volume Reduction

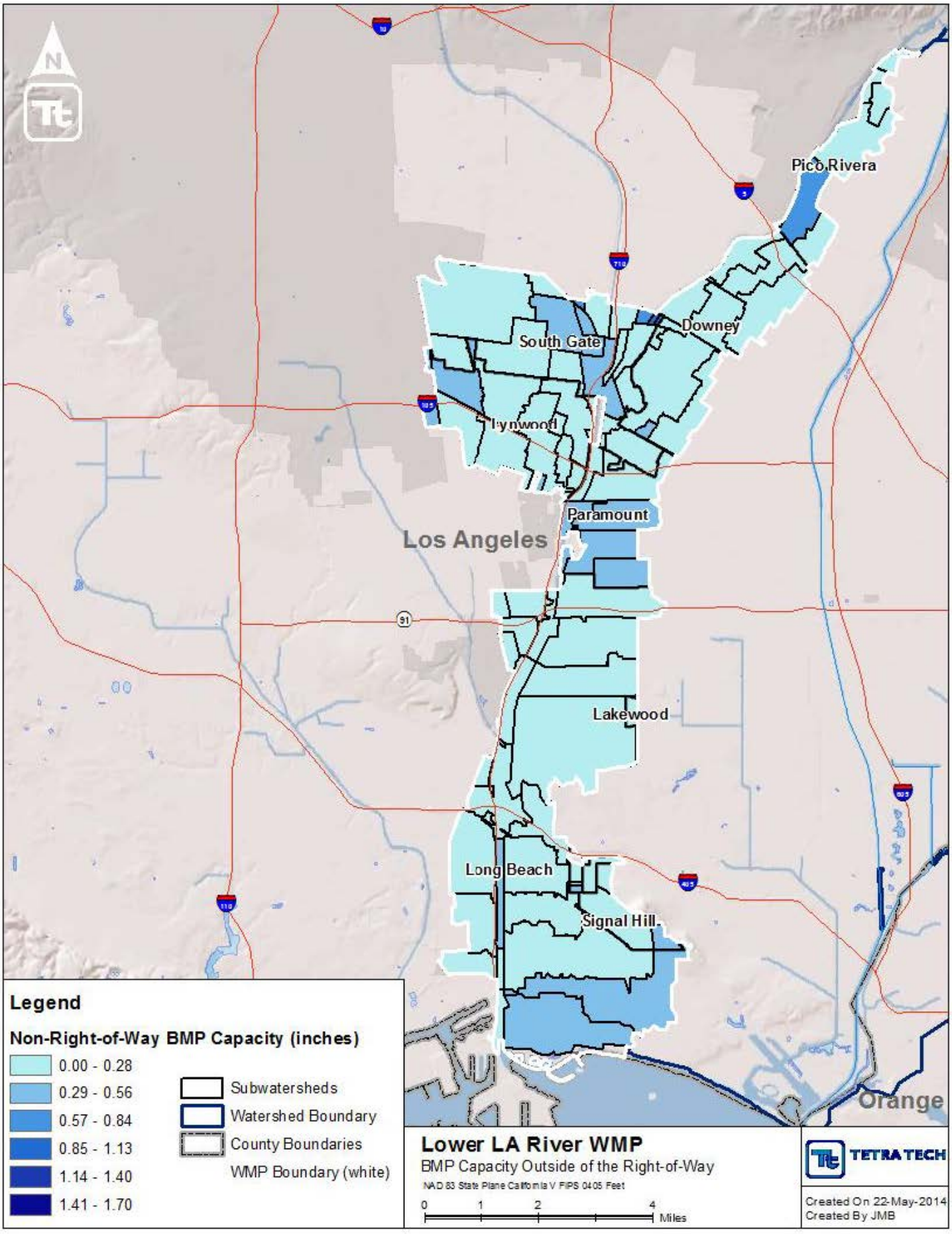

Figure 14. LLAR BMP capacity outside of the right-of-way

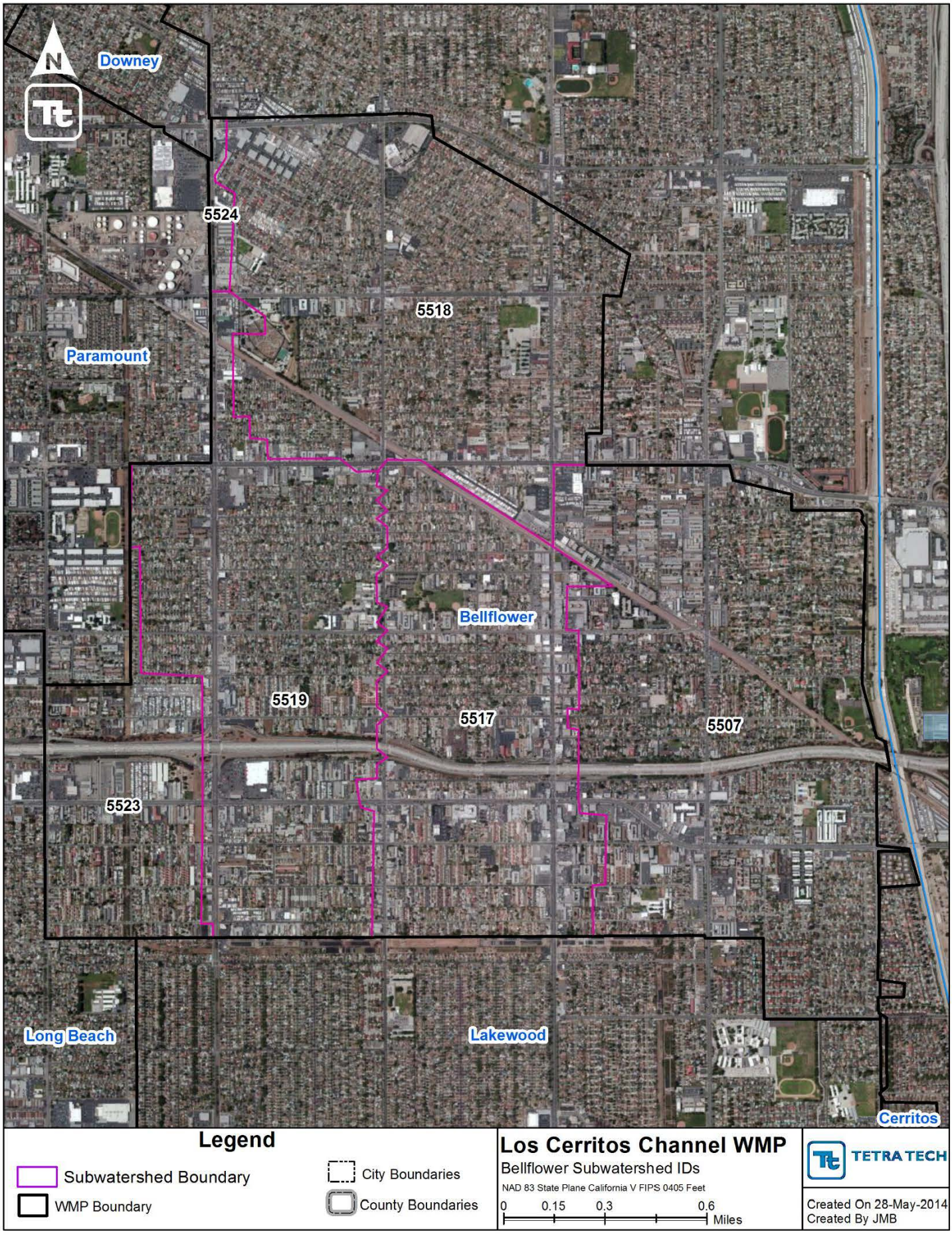

Figure 15. LCC Bellflower Subwatershed IDs

Figure 16. LCC Cerritos Subwatershed IDs

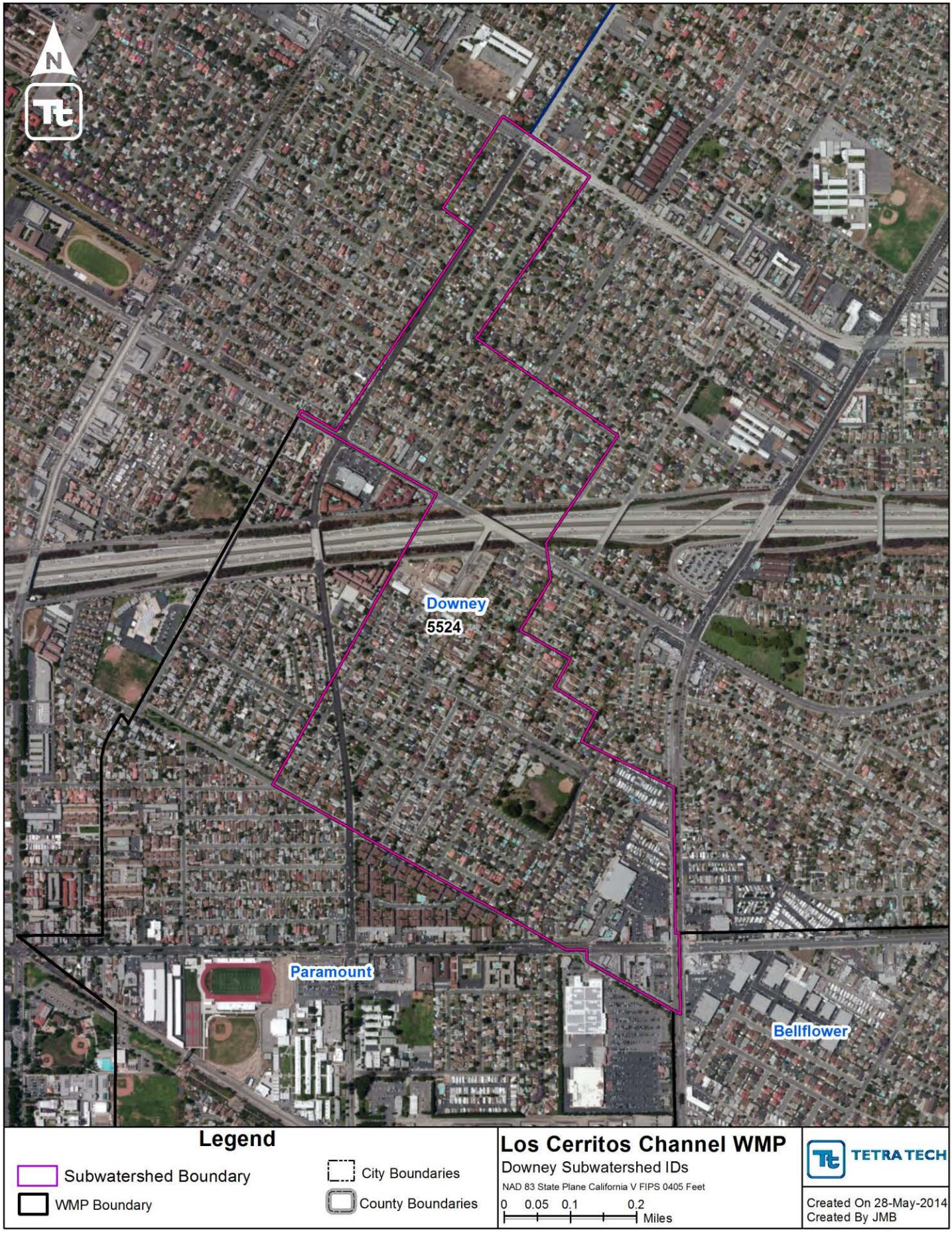

Figure 17. LCC Downey Subwatershed IDs

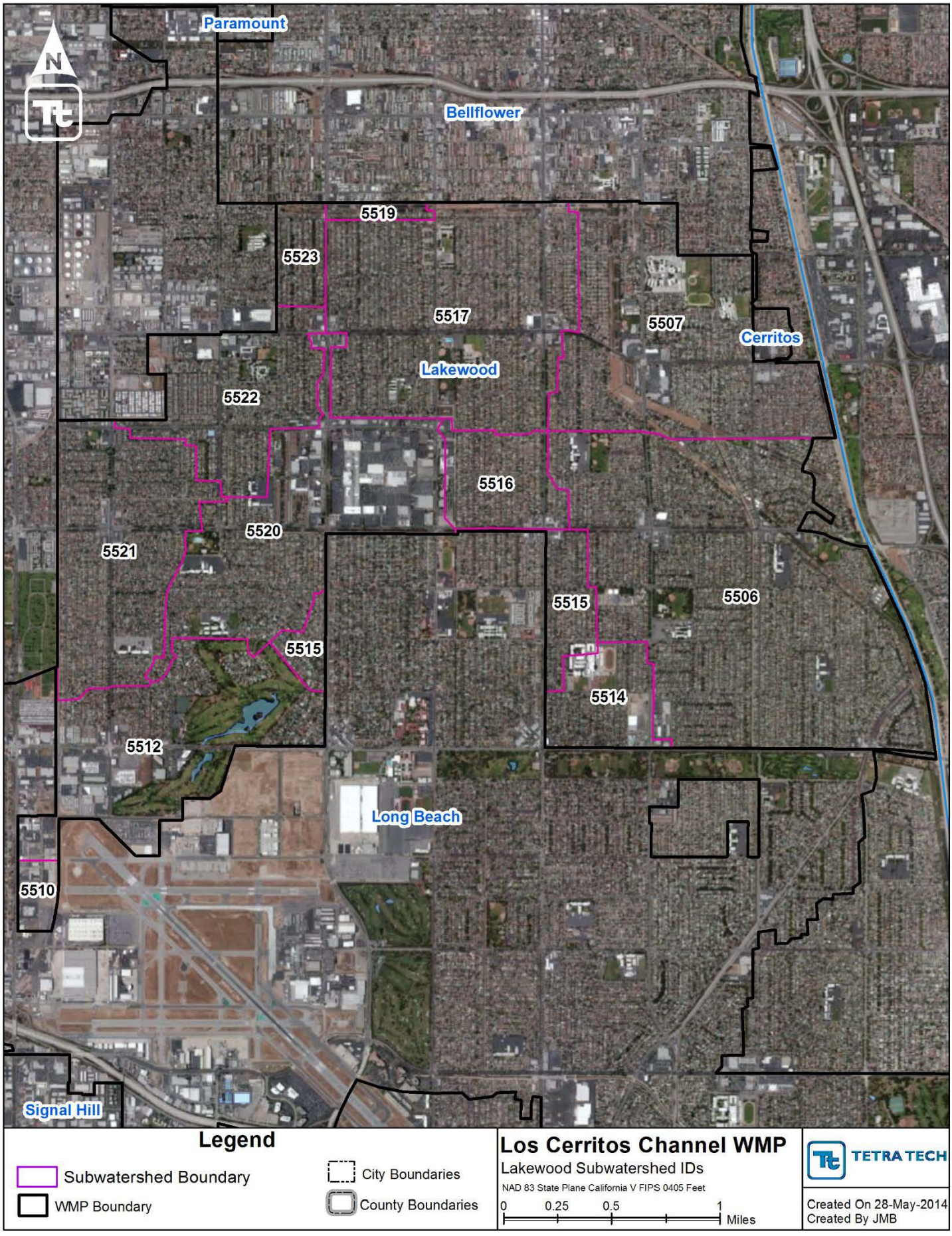

Figure 18. LCC Lakewood Subwatershed IDs

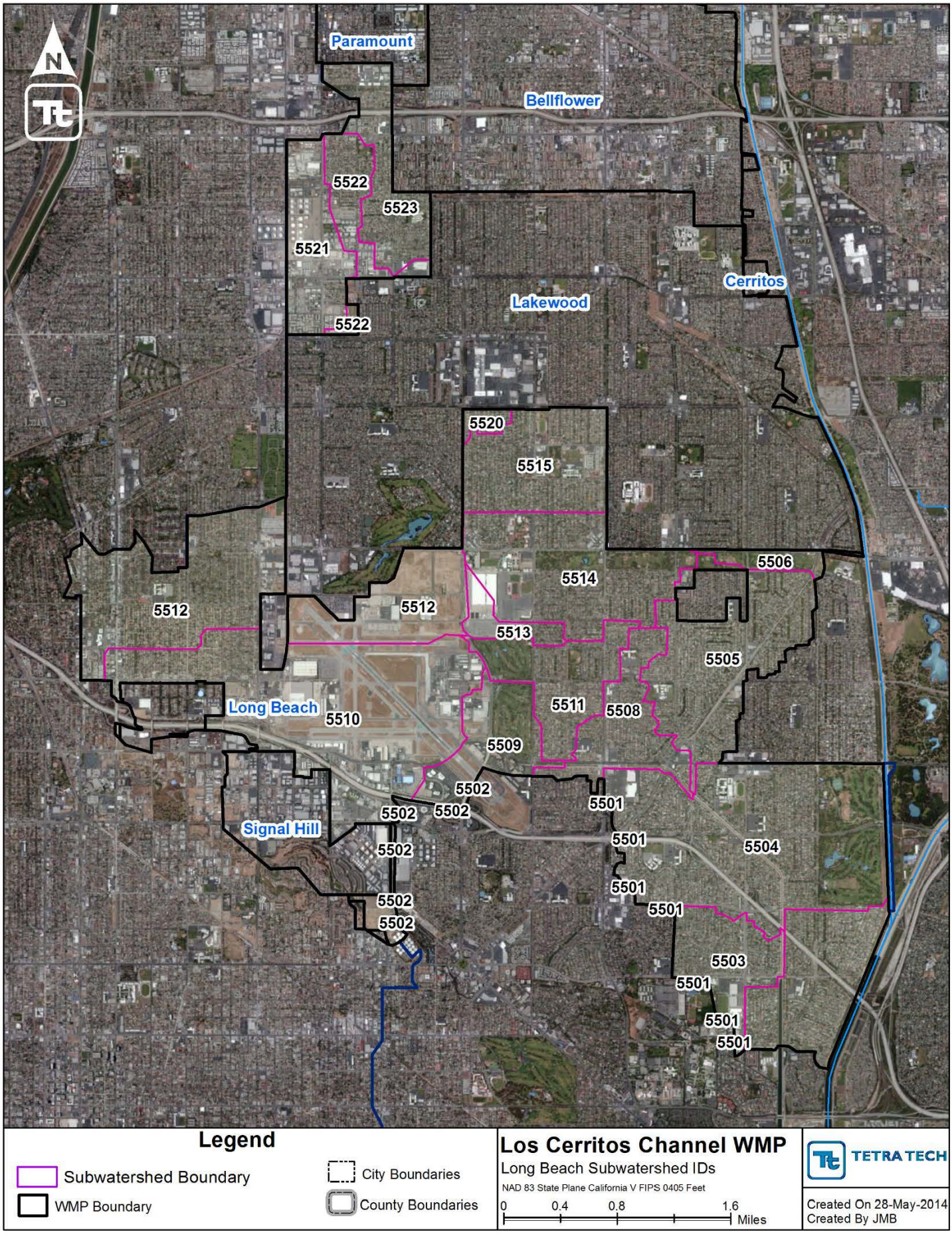

Figure 19. LCC Long Beach Subwatershed IDs

Figure 20. LCC Paramount Subwatershed IDs

Figure 21. LCC Signal Hill Subwatershed IDs

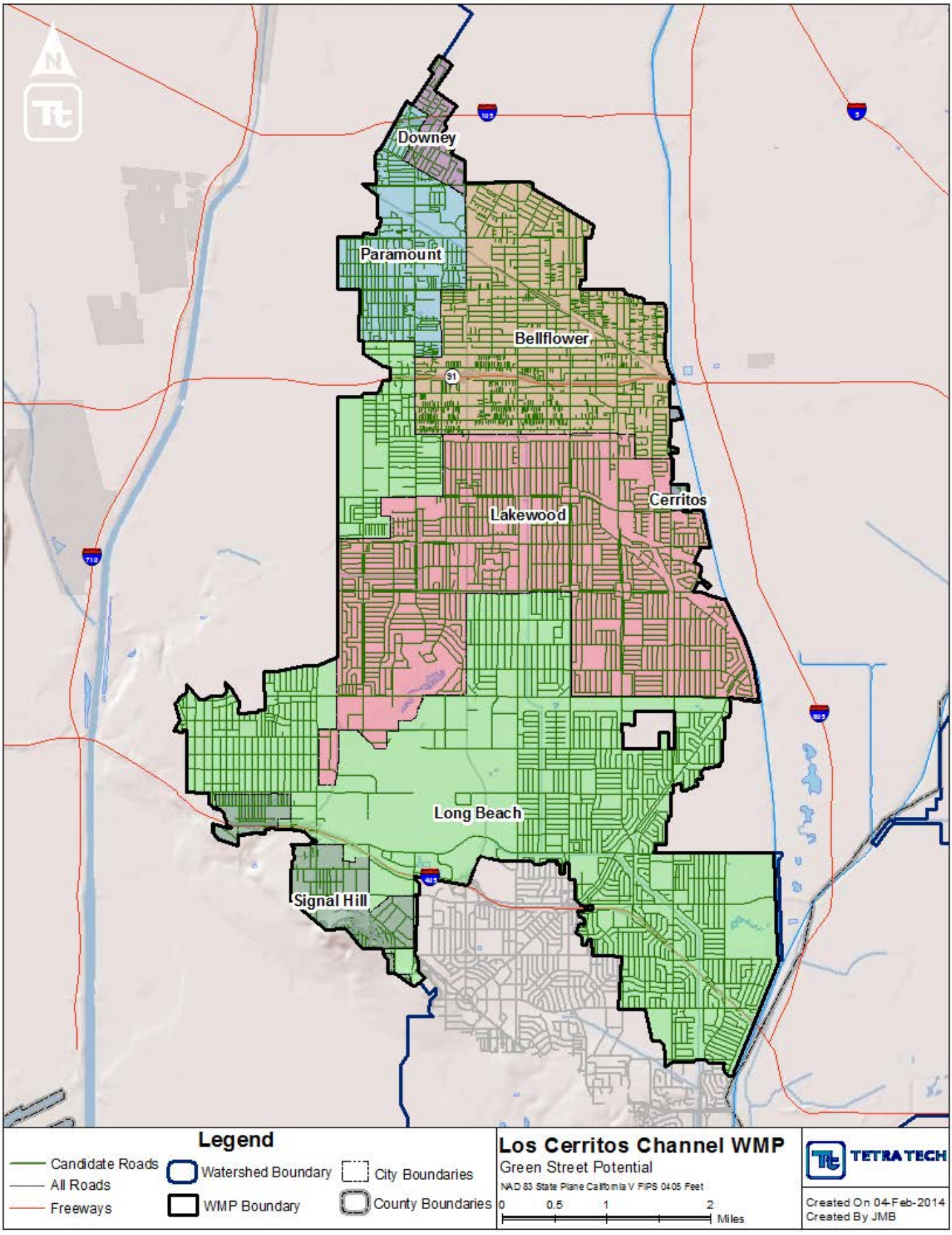

Figure 22. LCC ROW BMP Potential Opportunities

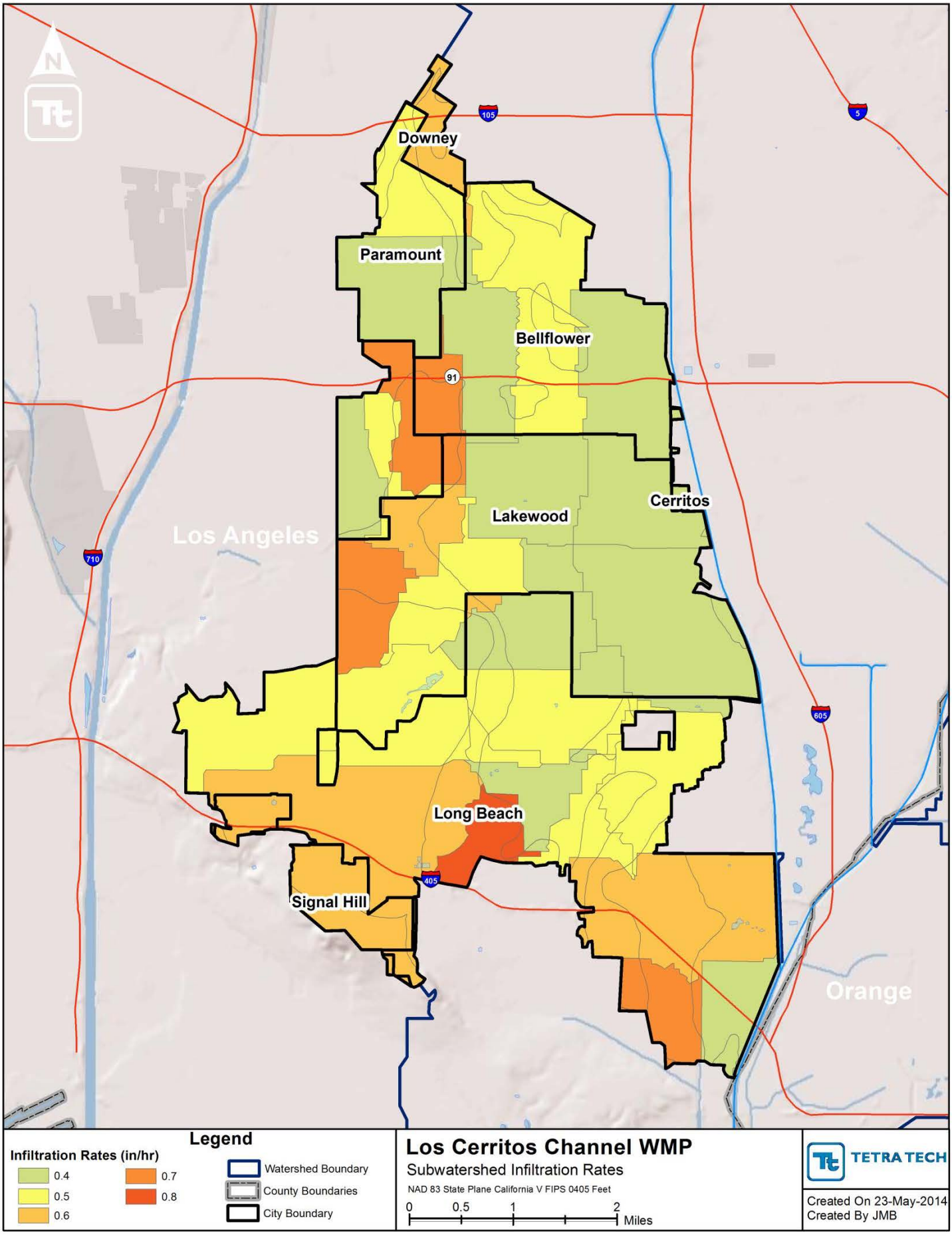

Figure 23. LCC Subwatershed Infiltration Rates

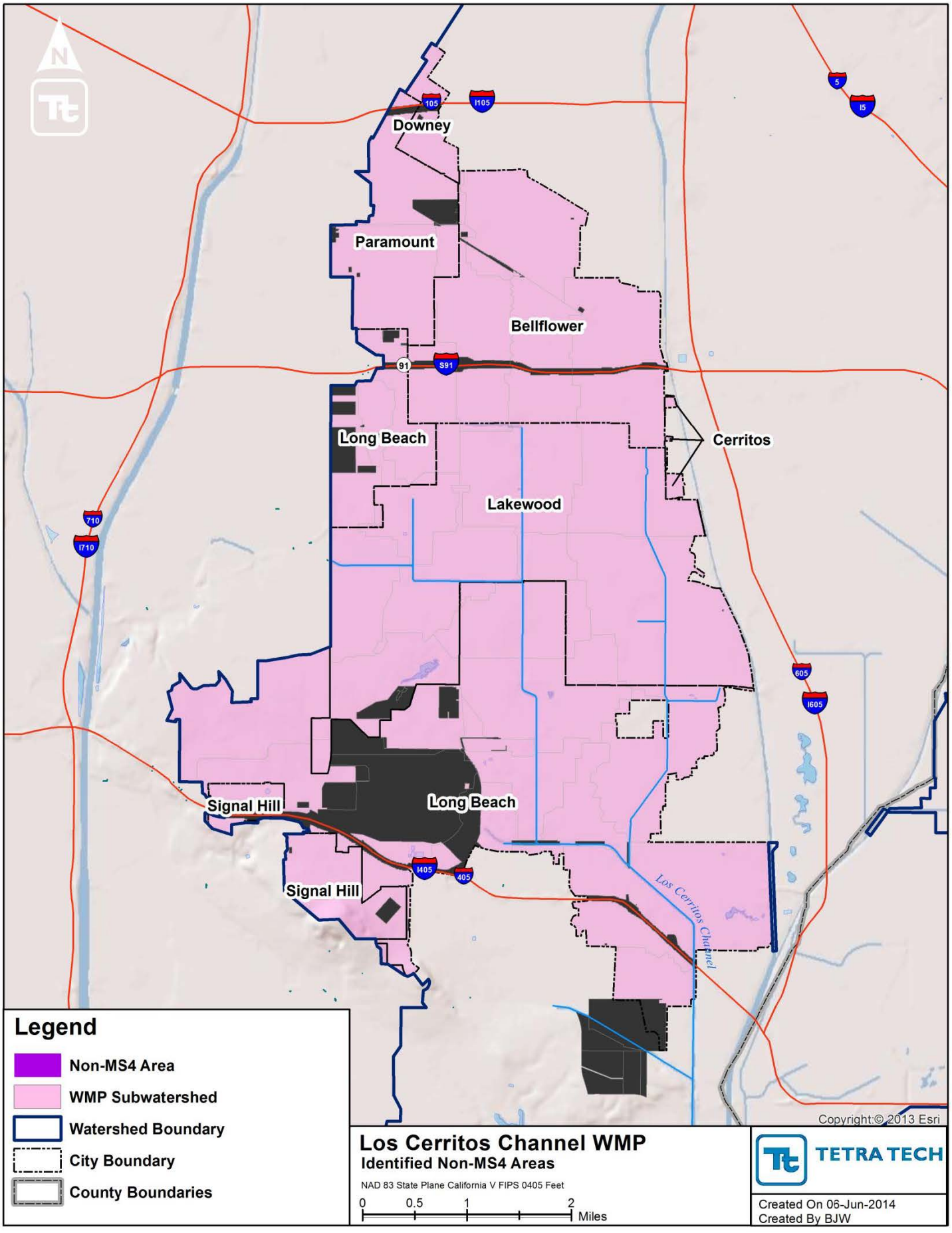

Figure 24. LCC Non-MS4 Permittees

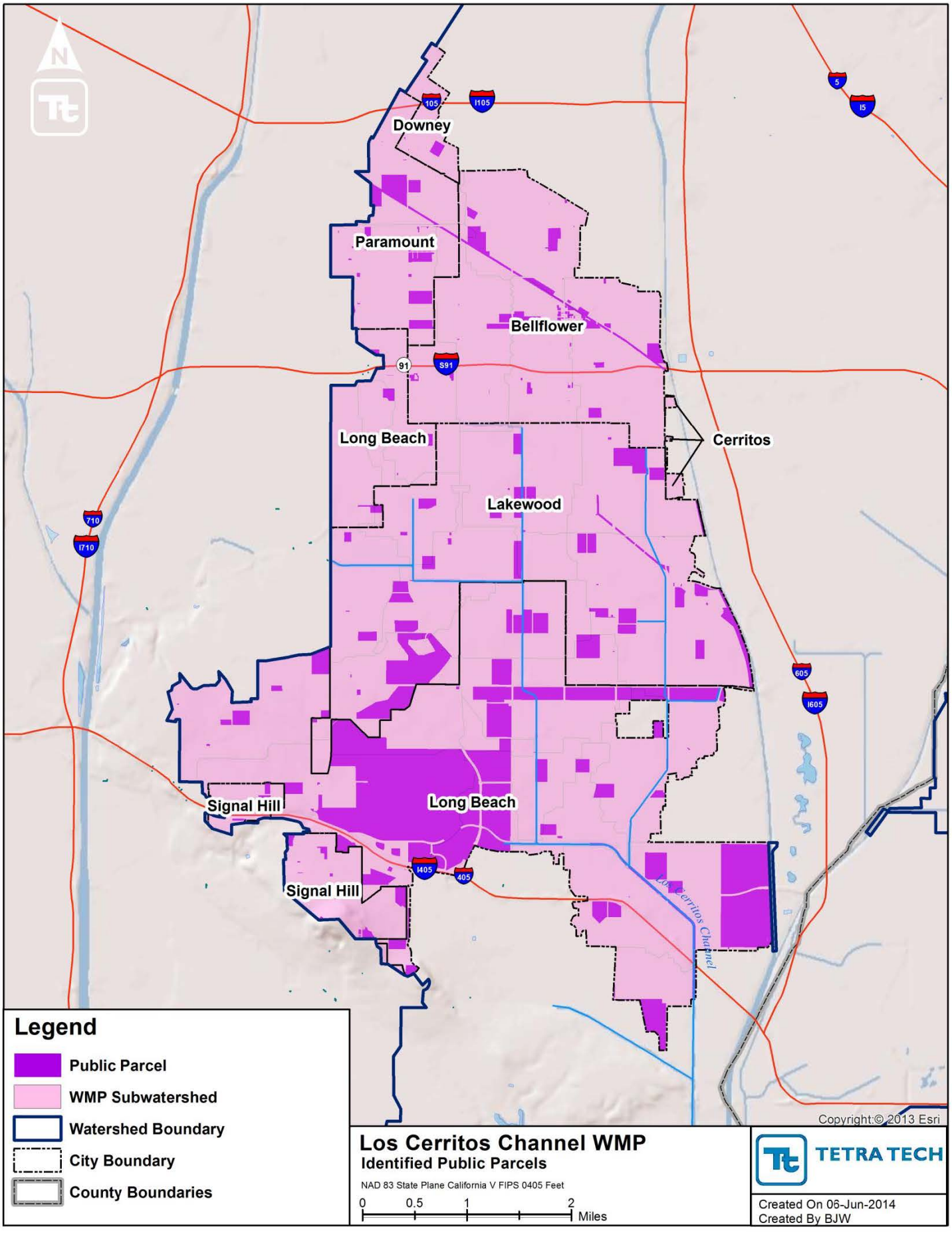

Figure 25. LCC identified public parcels

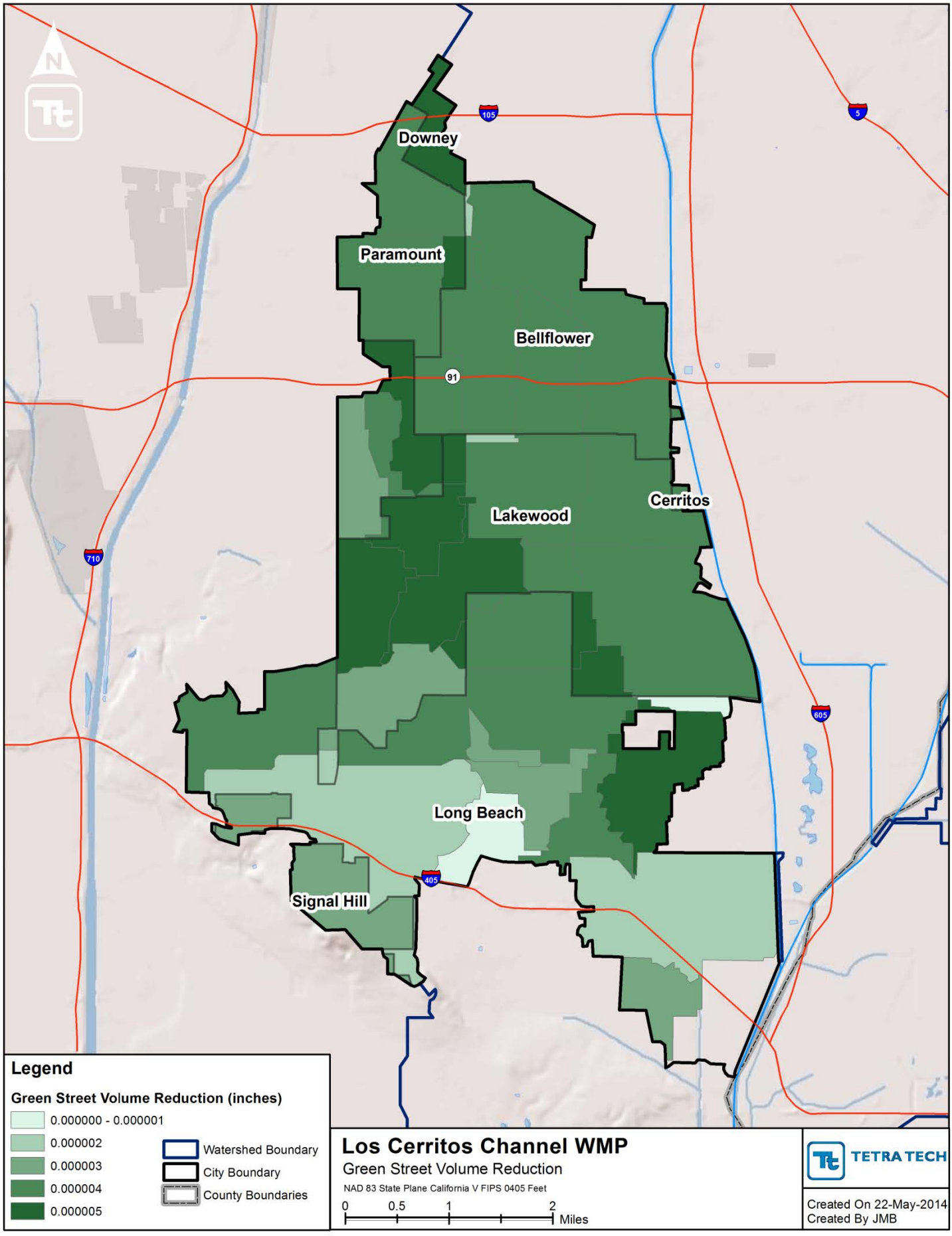

Figure 26. LCC ROW BMP Volume Reduction

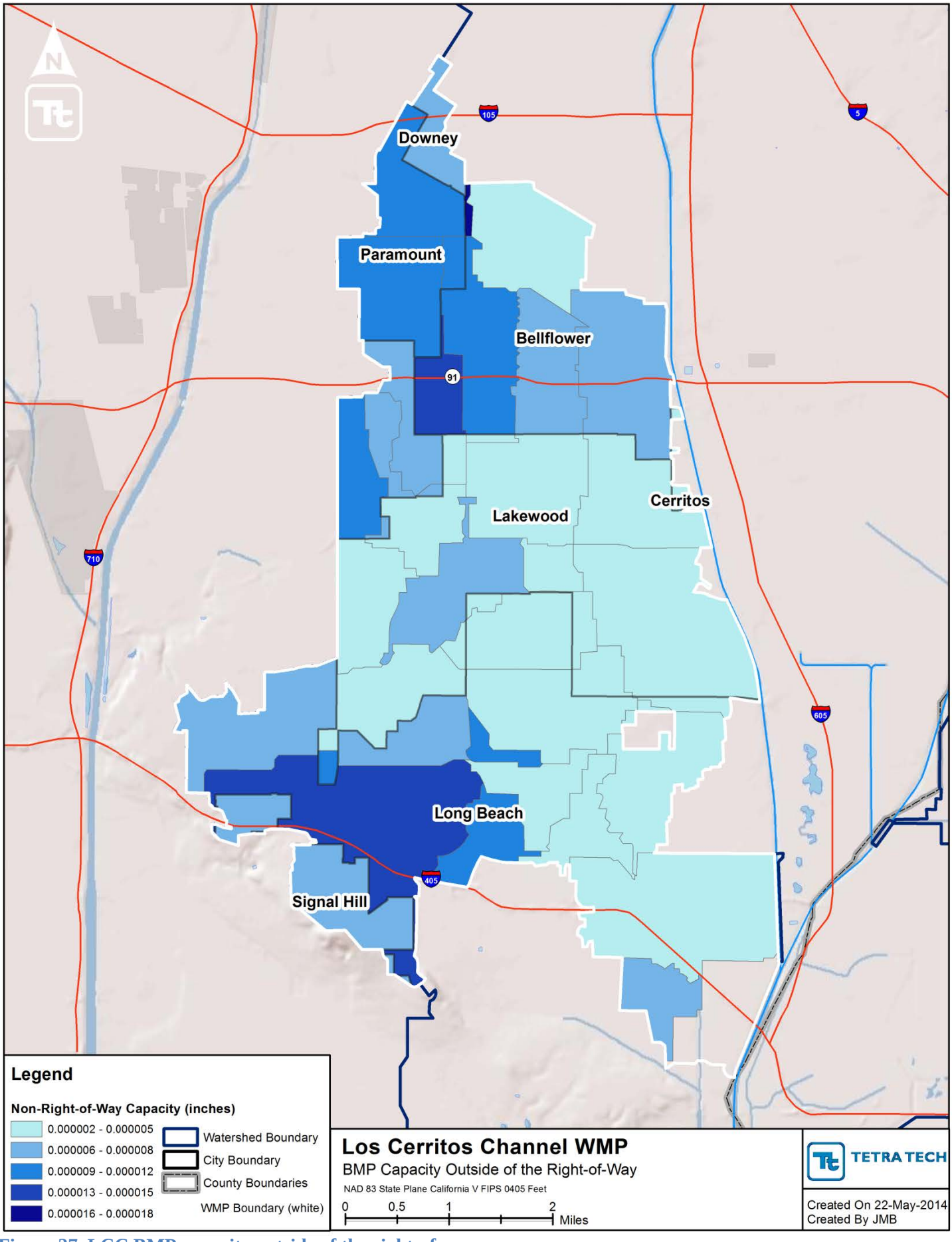

Figure 27. LCC BMP capacity outside of the right-of-way

Figure 28. LSGR (SGR) Artesia Subwatershed IDs

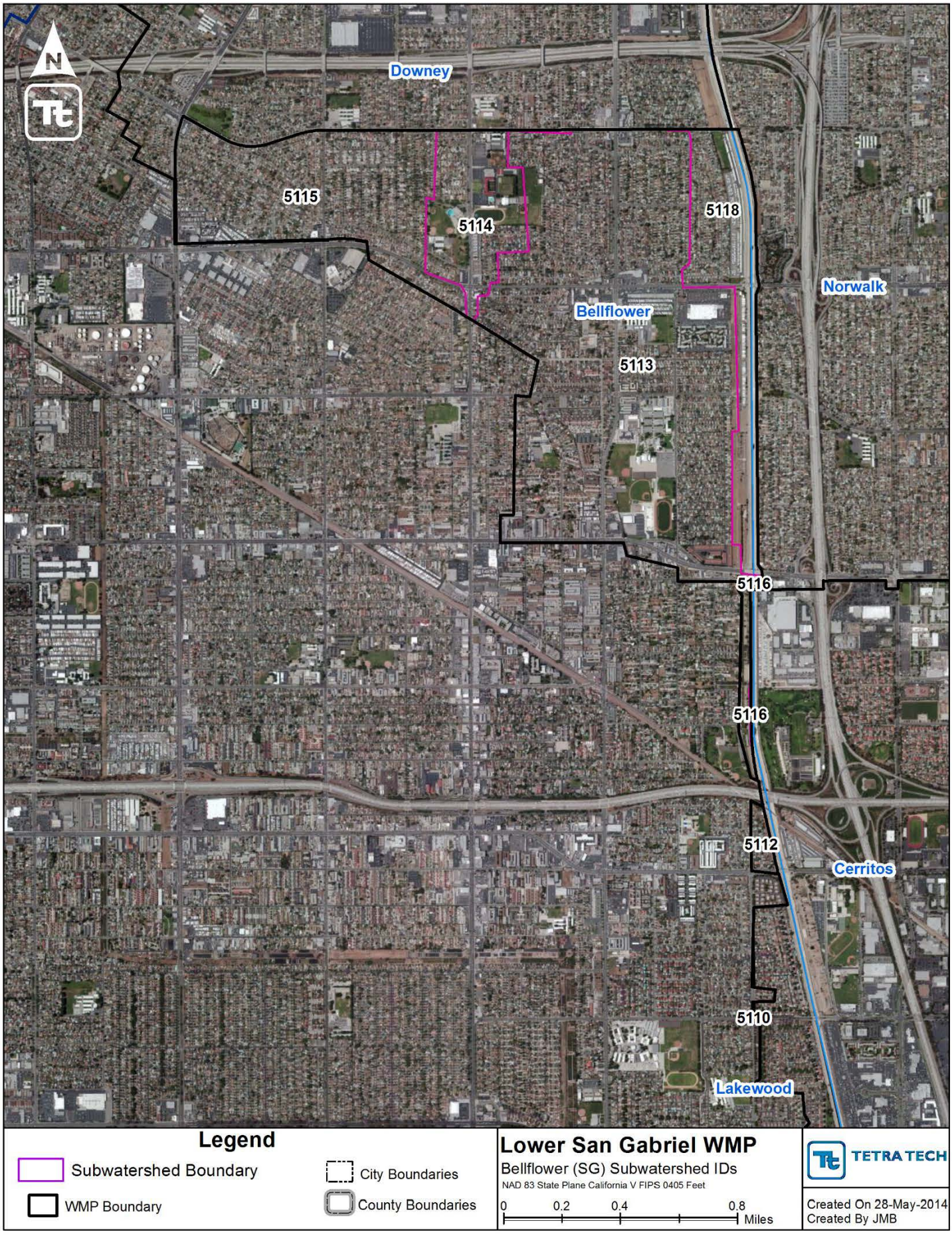

Figure 29. LSGR (SGR) Bellflower Subwatershed IDs

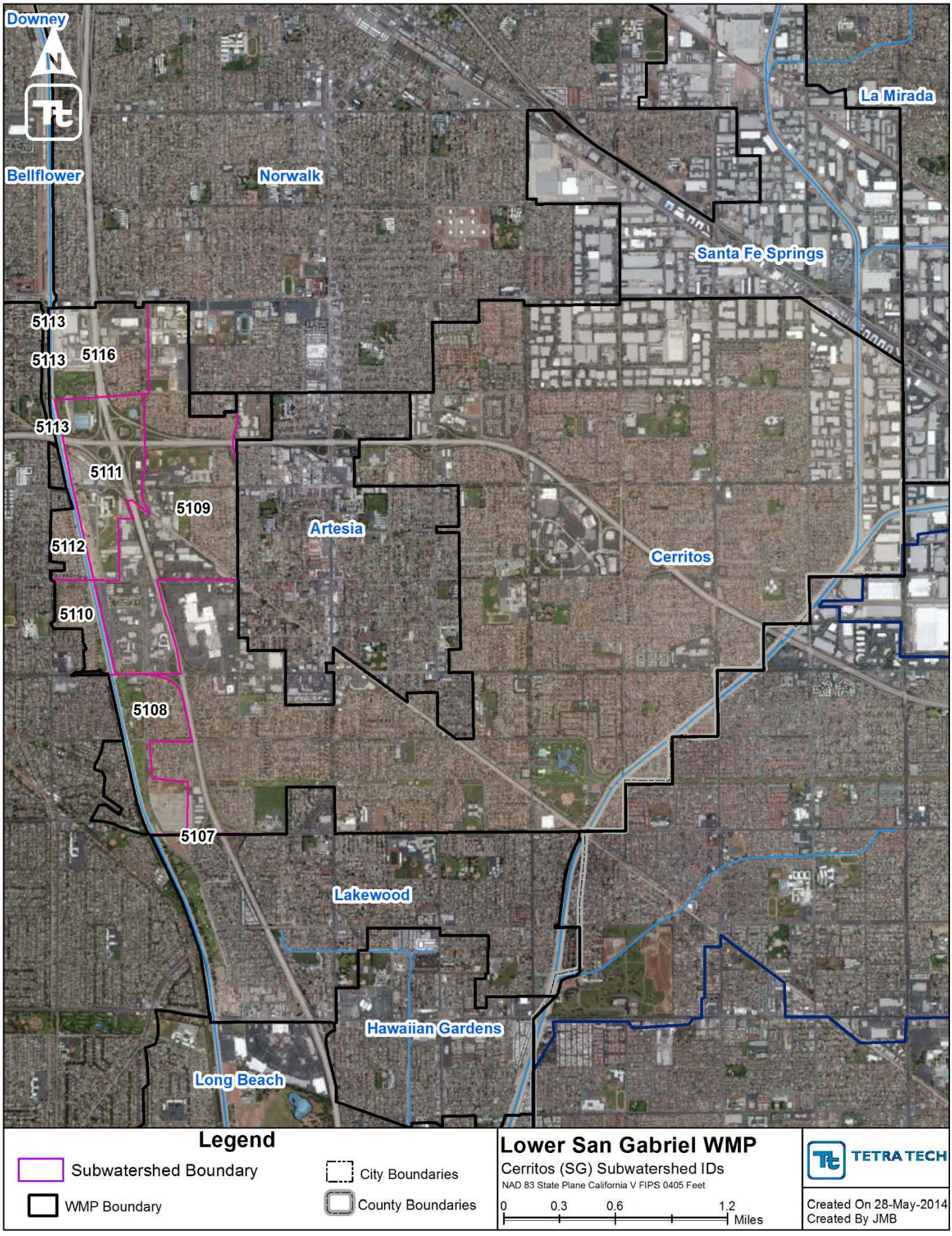

Figure 30. LSGR (SGR) Cerritos Subwatershed IDs

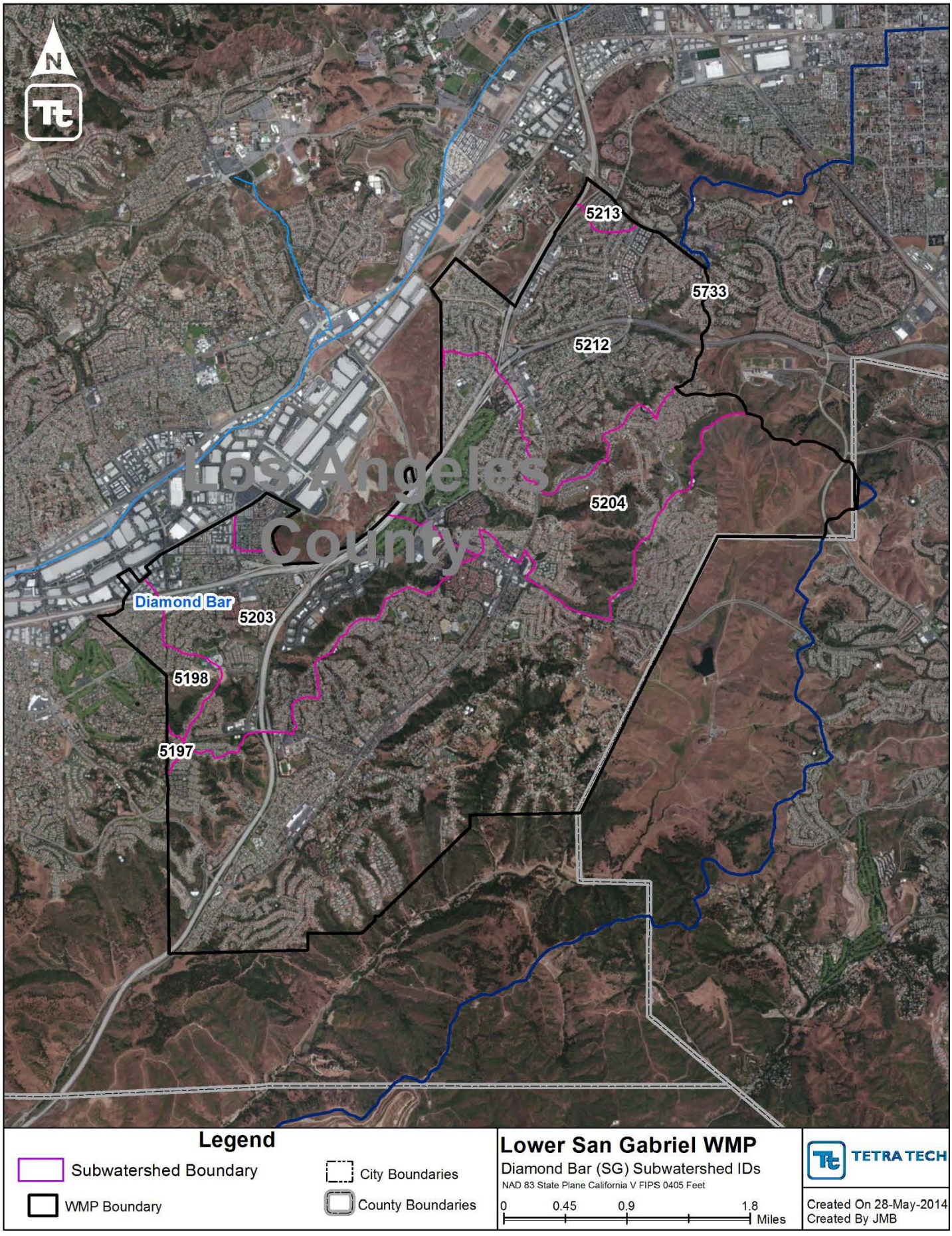

Figure 31. LSGR (SGR) Diamond Bar Subwatershed IDs

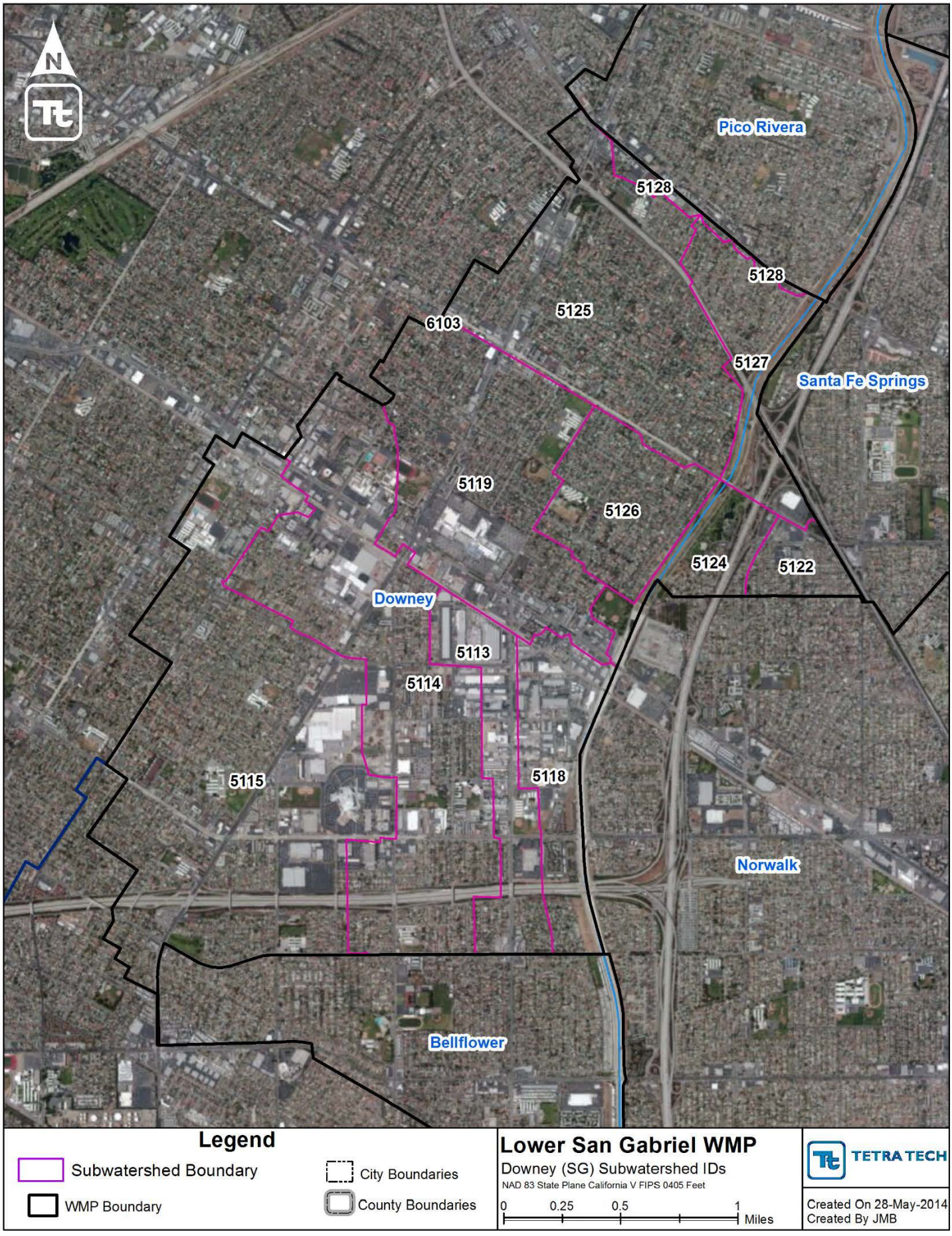

Figure 32. LSGR (SGR) Downey Subwatershed IDs

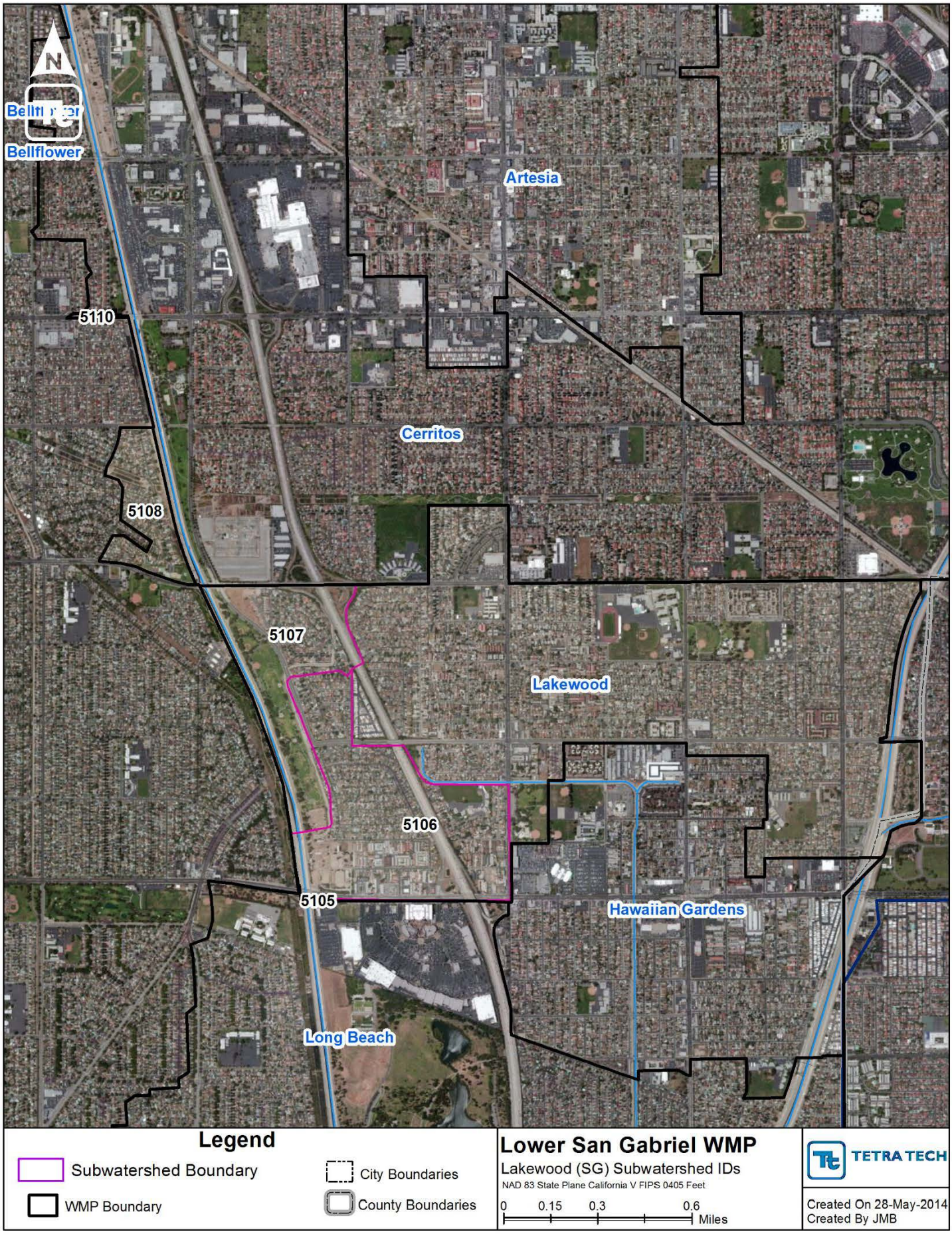

Figure 33. LSGR (SGR) Lakewood Subwatershed IDs

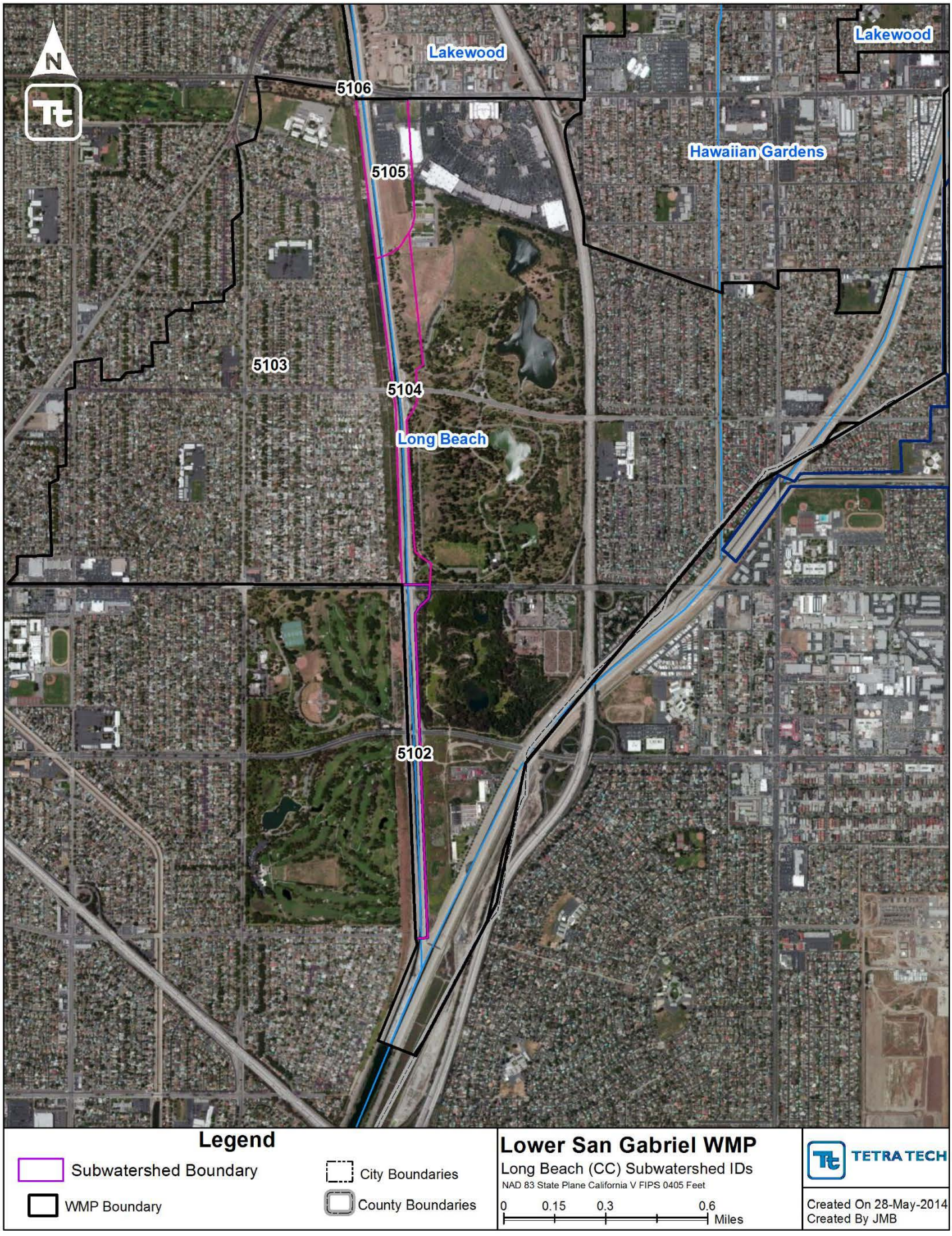

Figure 34. LSGR (SGR) Long Beach Subwatershed IDs

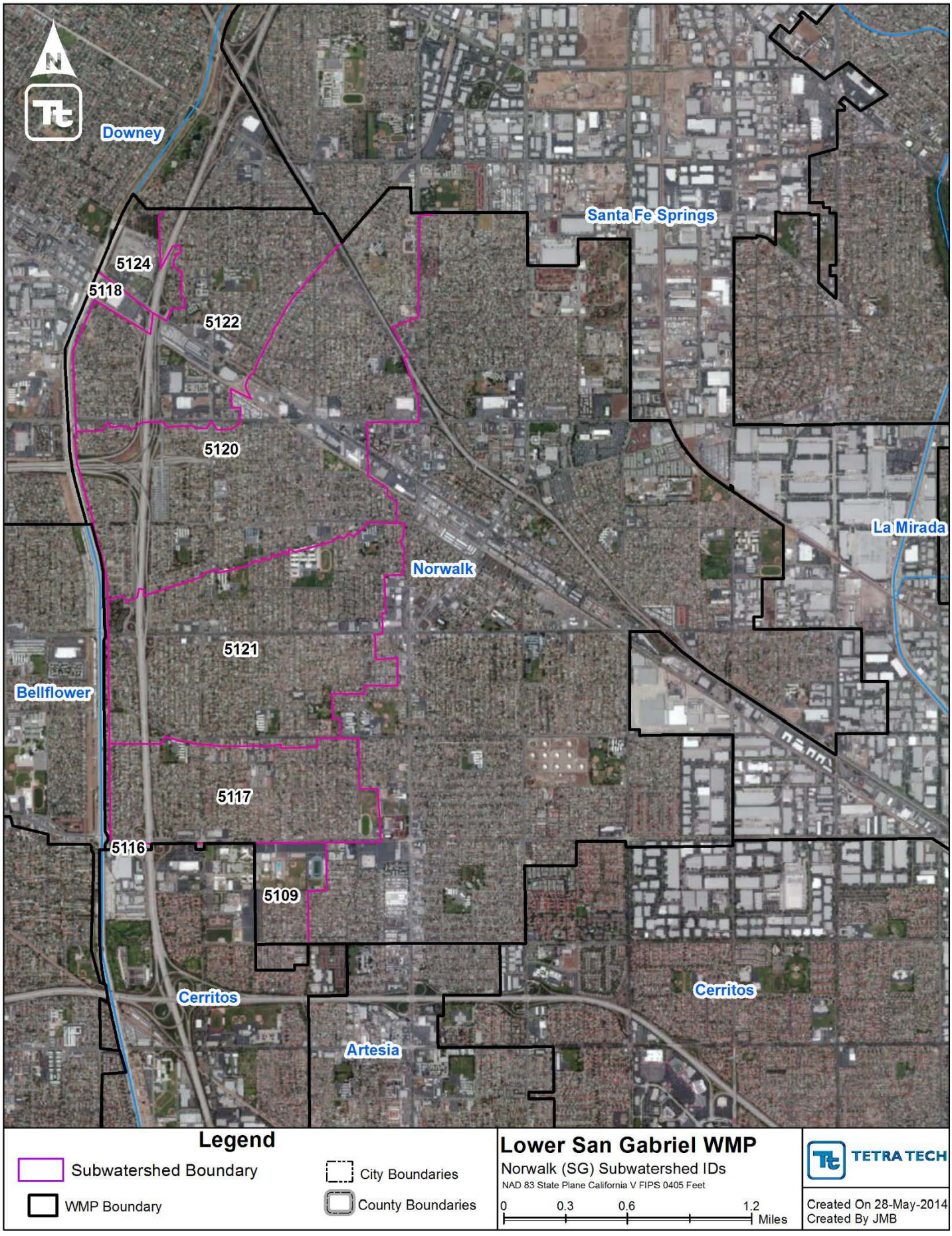

Figure 35. LSGR (SGR) Norwalk Subwatershed IDs

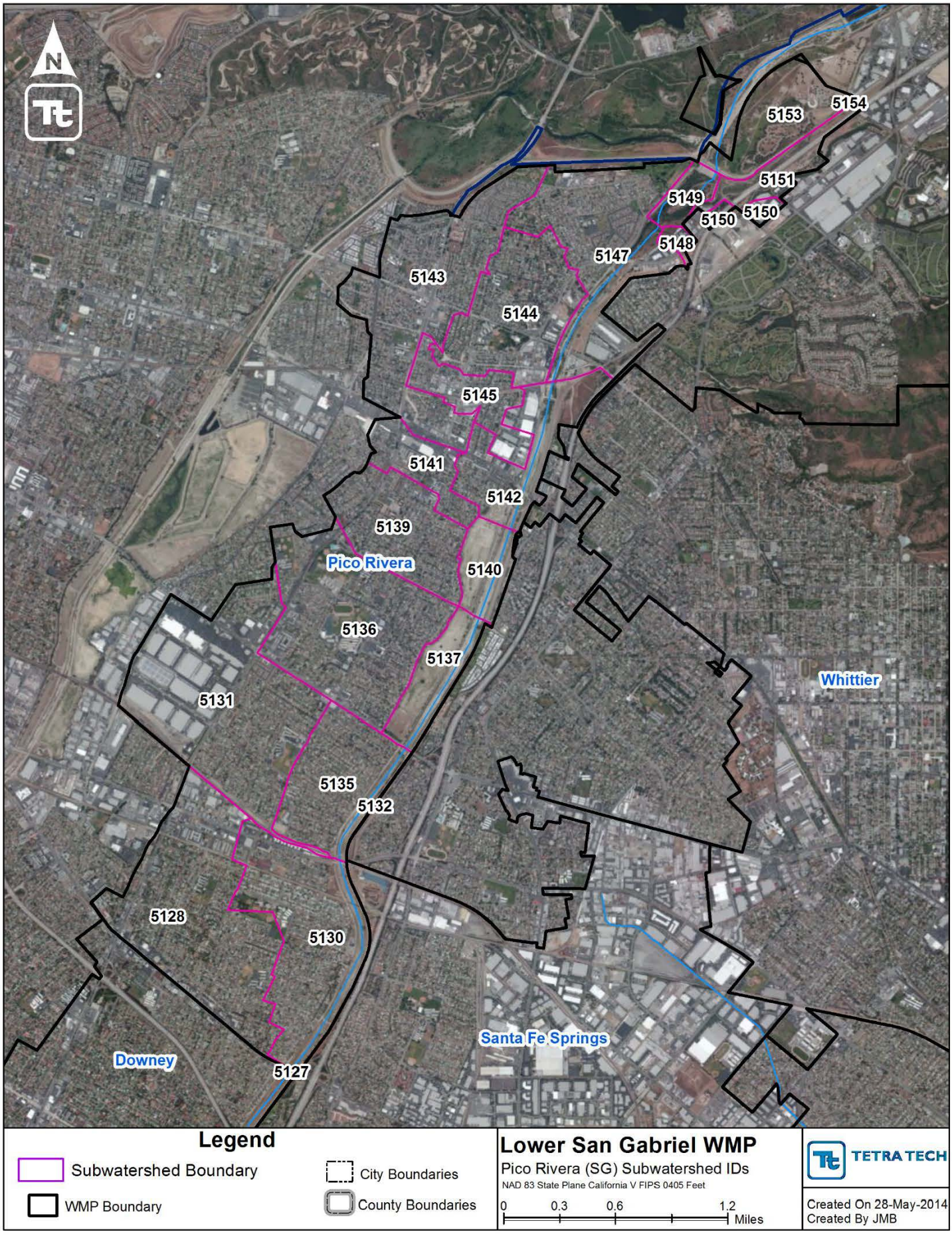

Figure 36. LSGR (SGR) Pico Rivera Subwatershed IDs

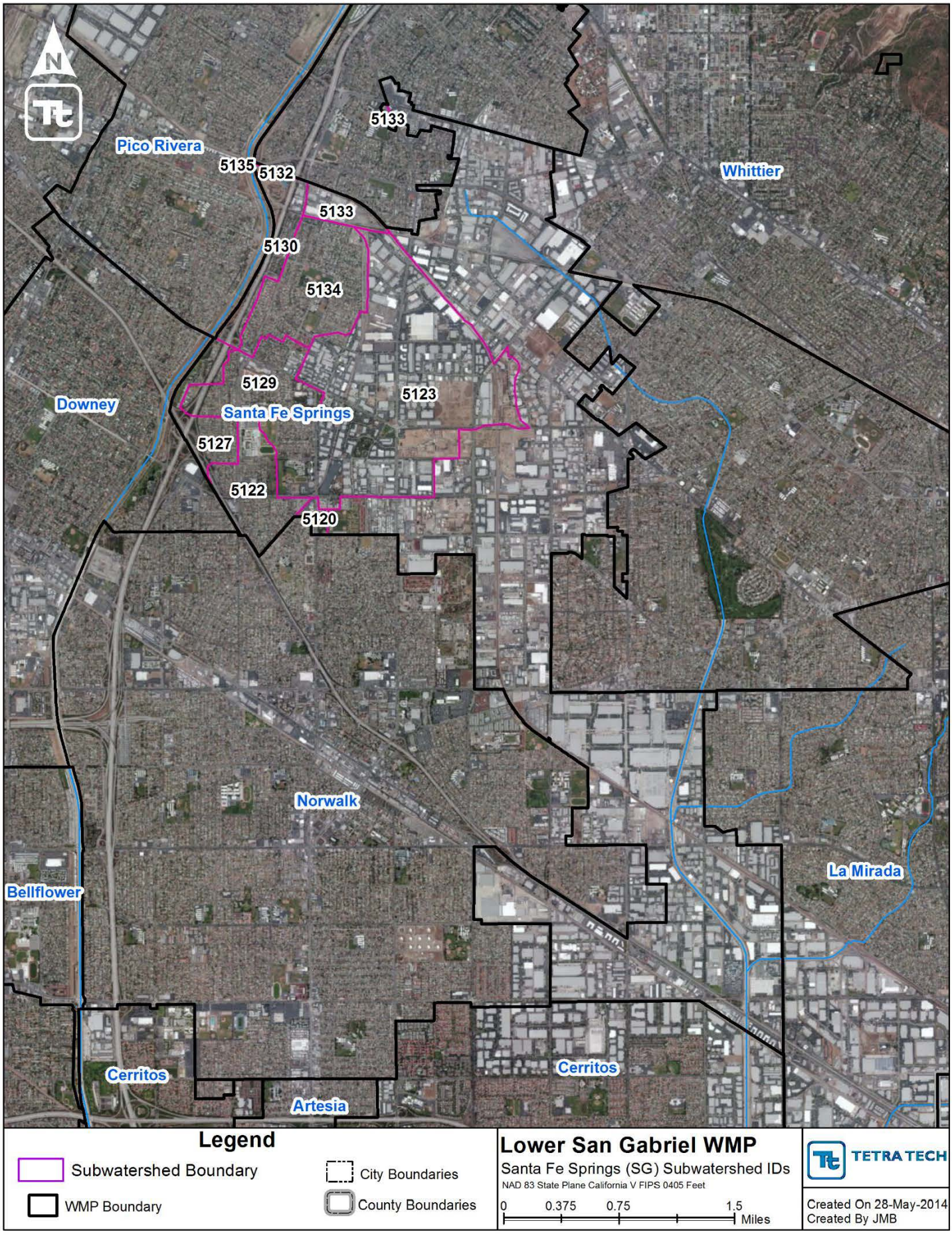

Figure 37. LSGR (SGR) Santa Fe Springs Subwatershed IDs

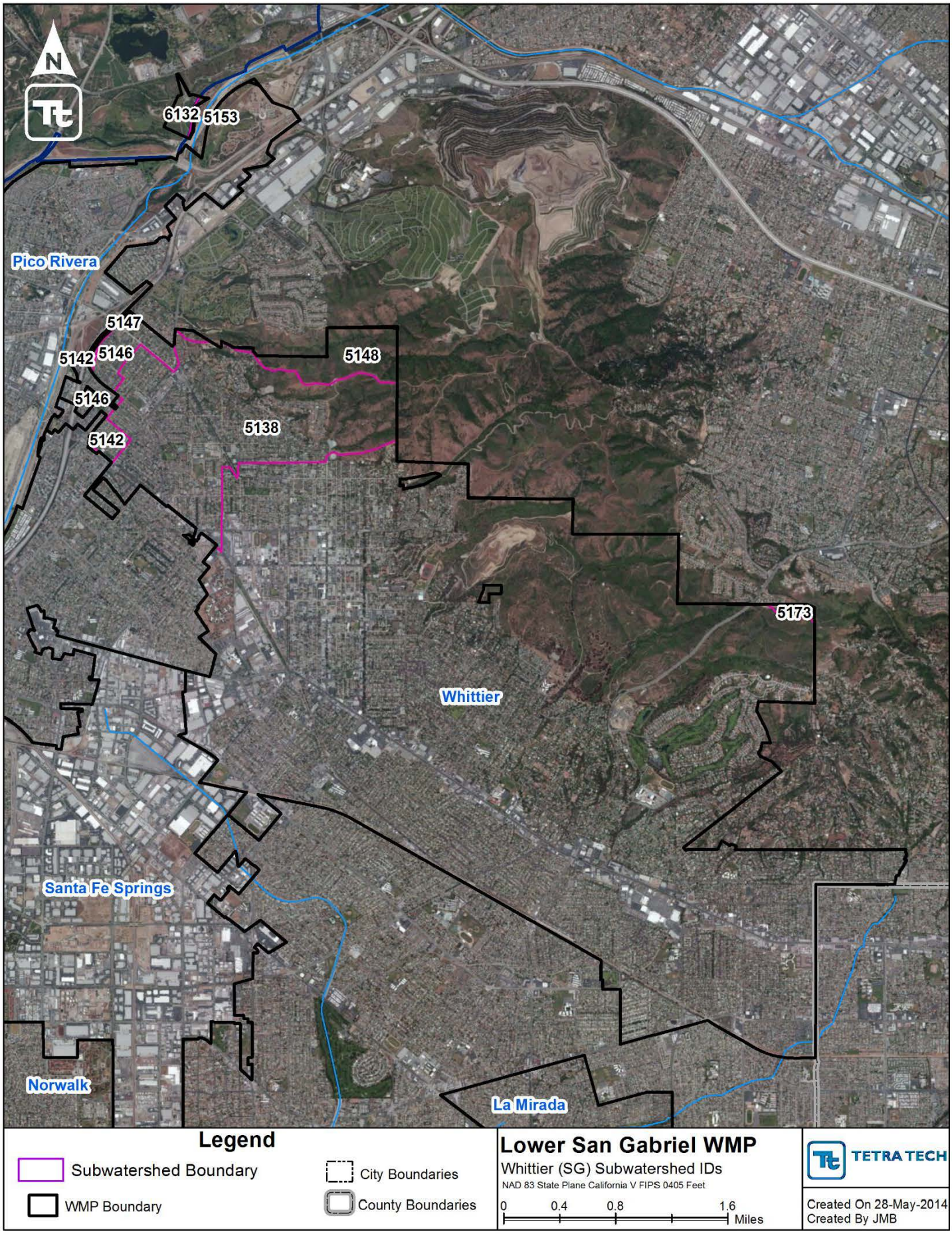

Figure 38. LSGR (SGR) Whittier Subwatershed IDs

Figure 39. LSGR (CC) Artesia Subwatershed IDs

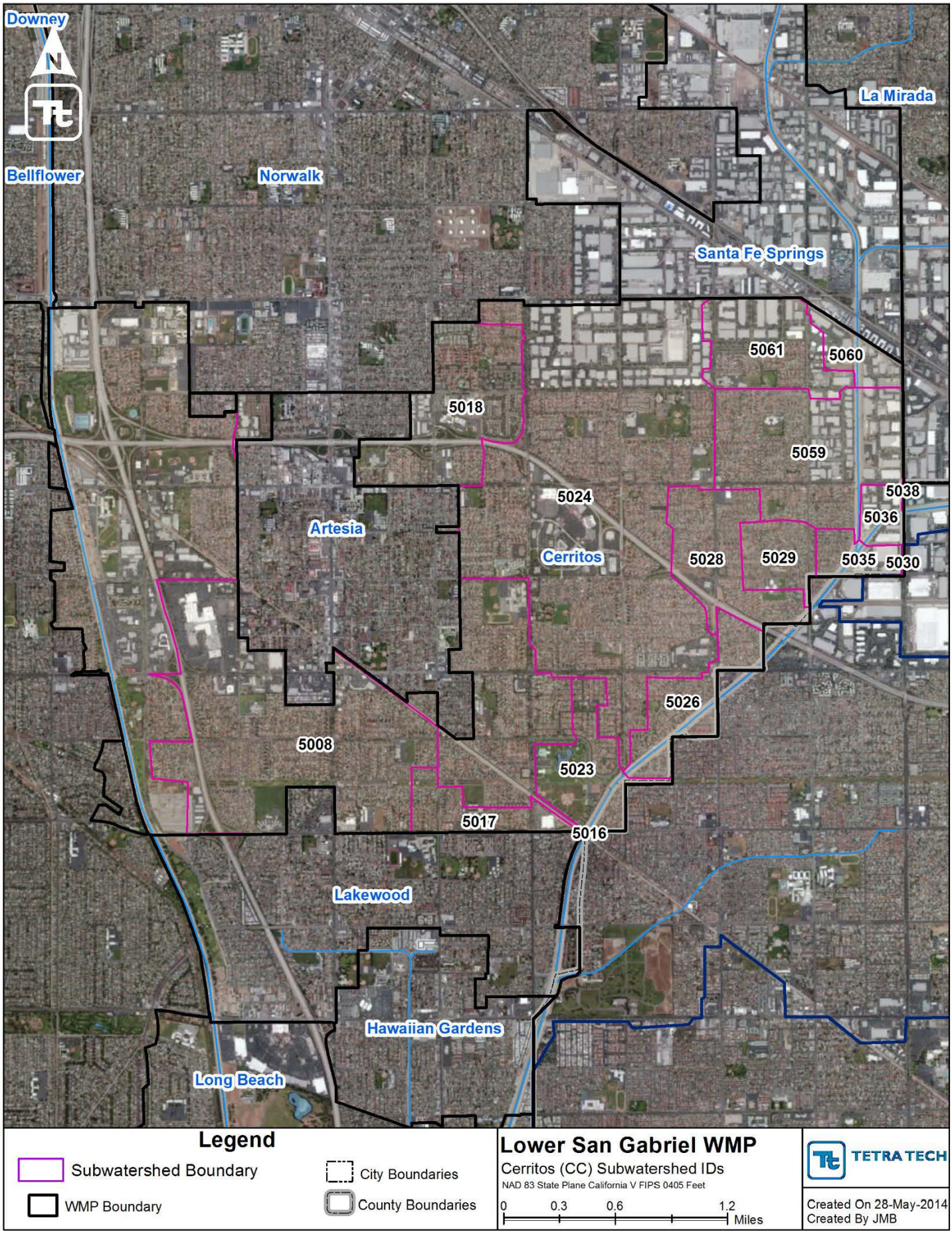

Figure 40. LSGR (CC) Cerritos Subwatershed IDs

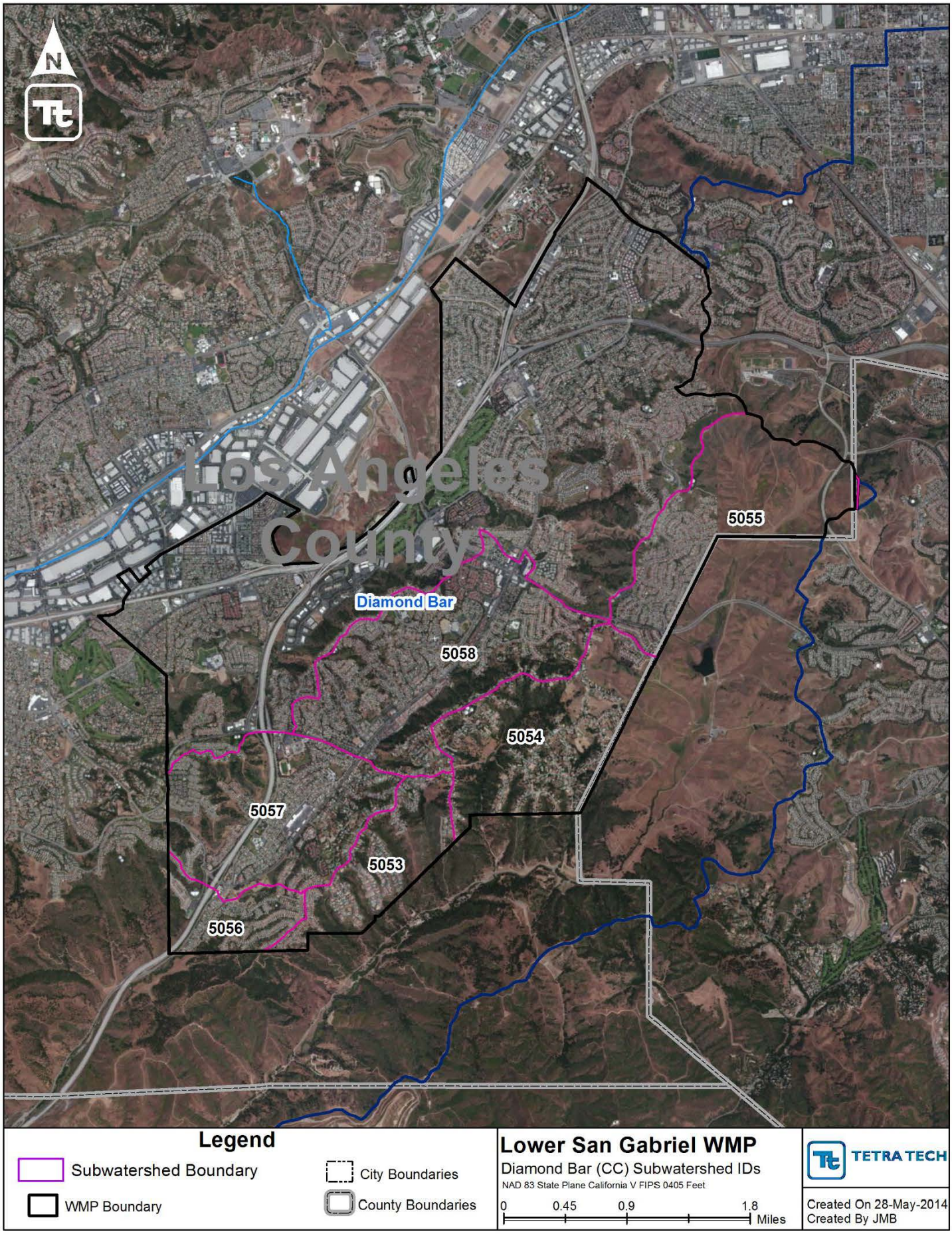

Figure 41. LSGR (CC) Diamond Bar Subwatershed IDs

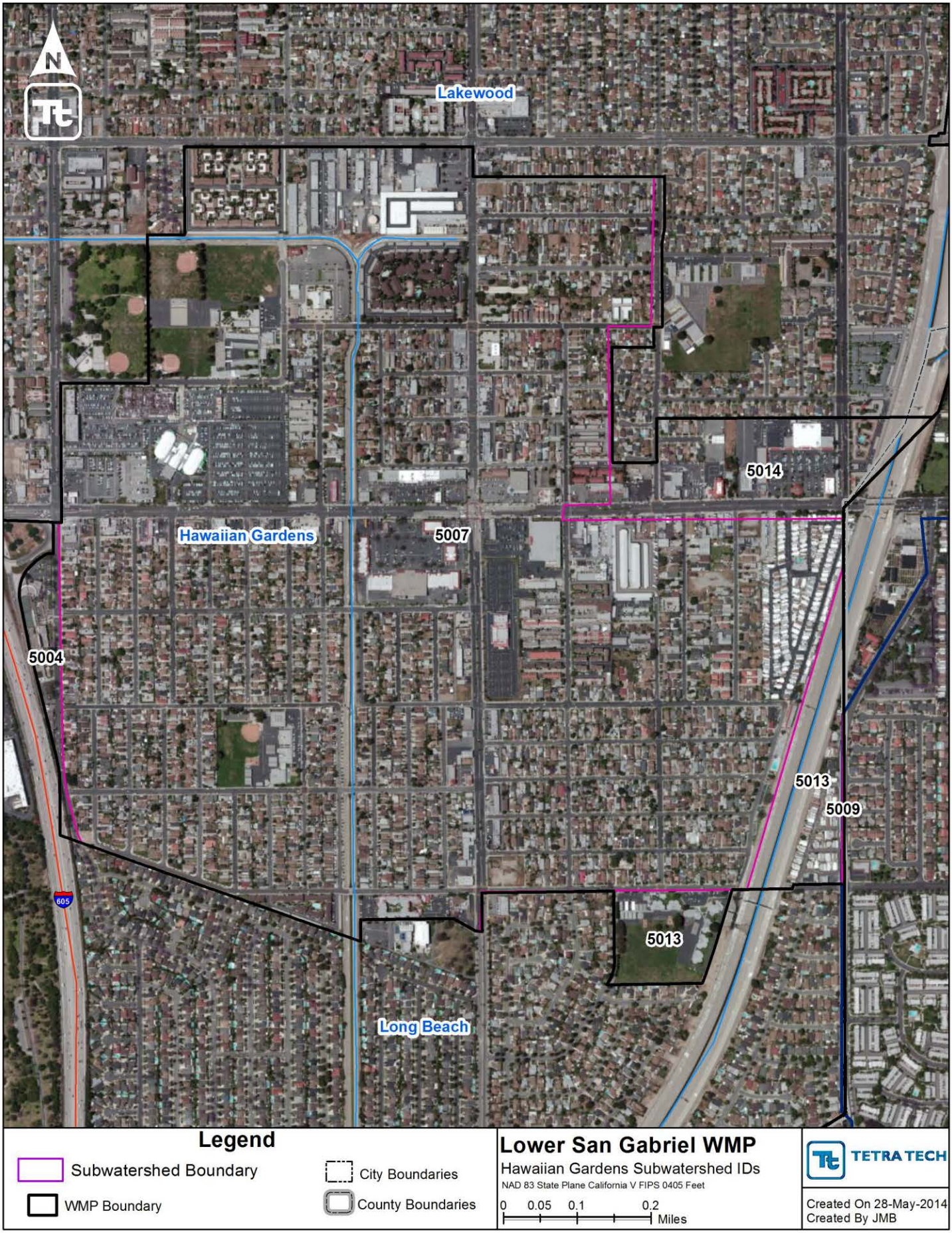

Figure 42. LSGR (CC) Hawaiian Gardens Subwatershed IDs

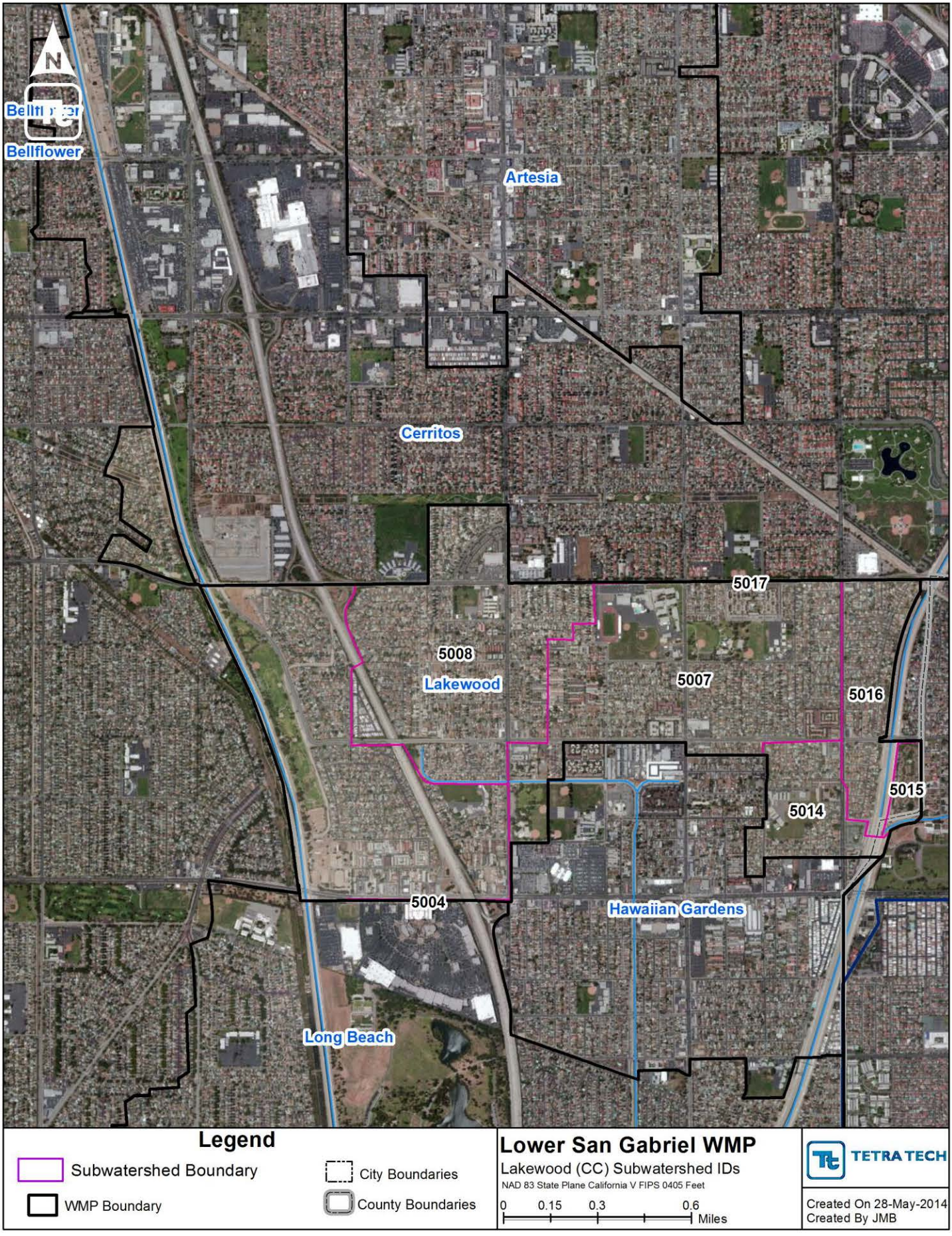

Figure 43. LSGR (CC) Lakewood Subwatershed IDs

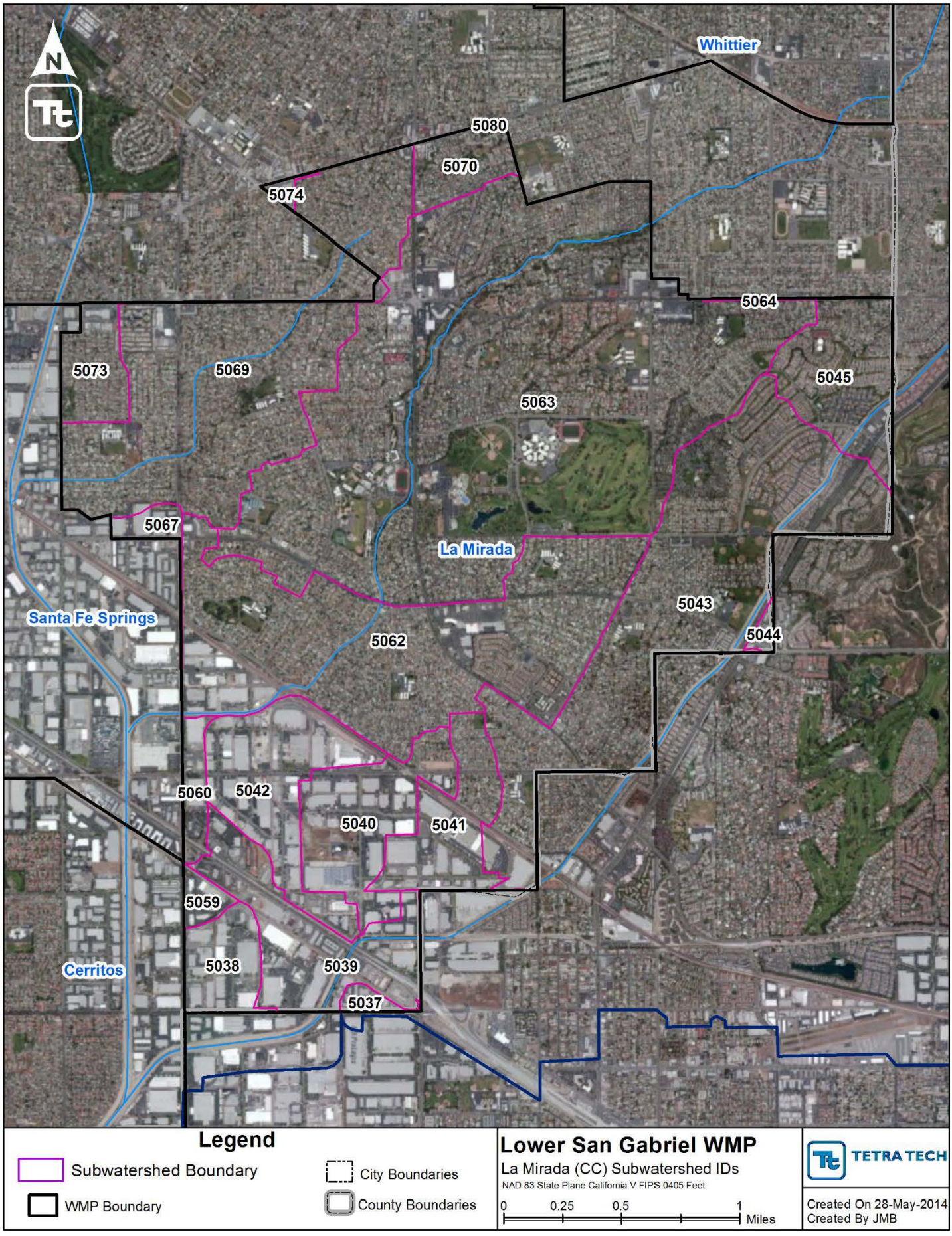

Figure 44. LSGR (CC) La Mirada Subwatershed IDs

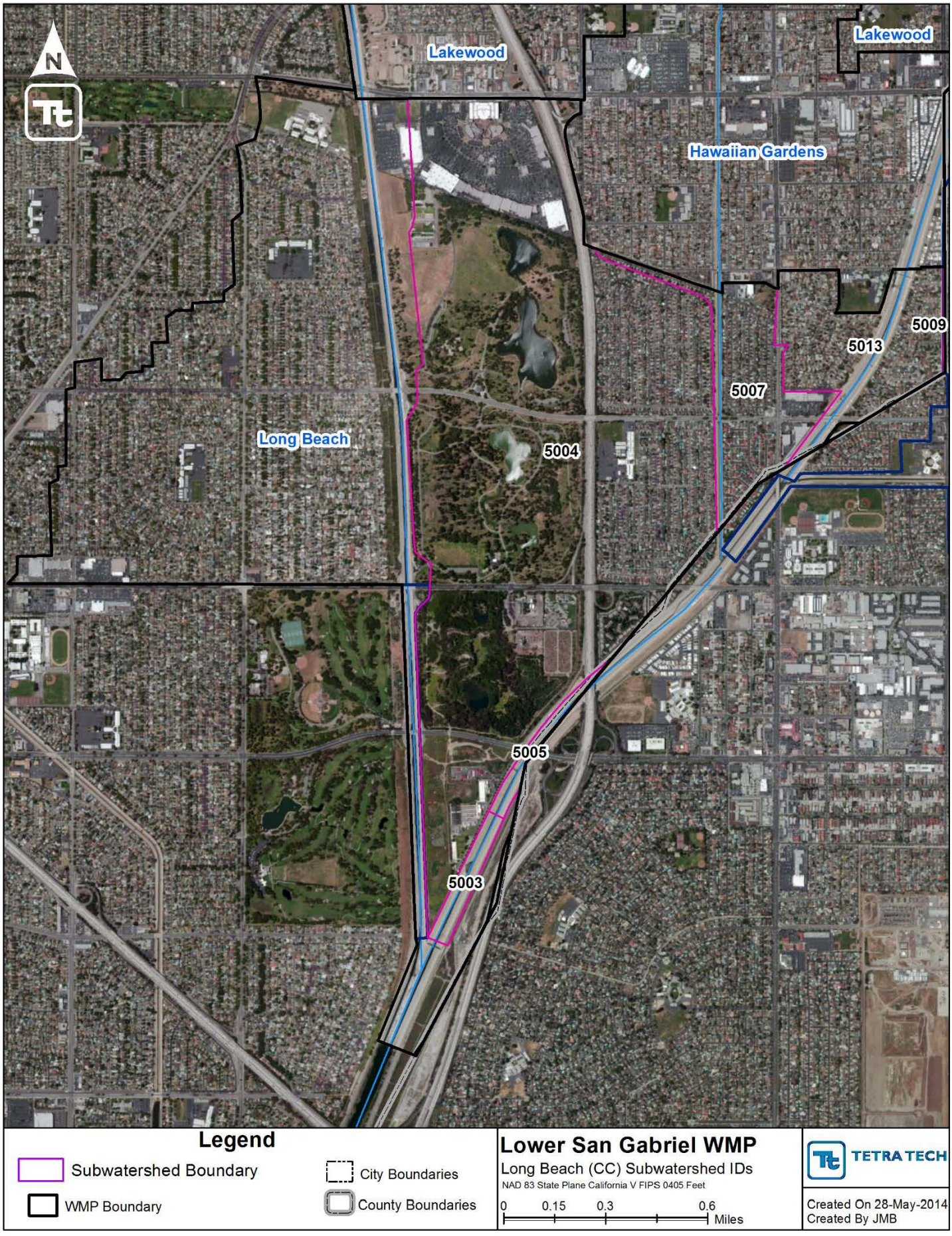

Figure 45. LSGR (CC) Long Beach Subwatershed IDs

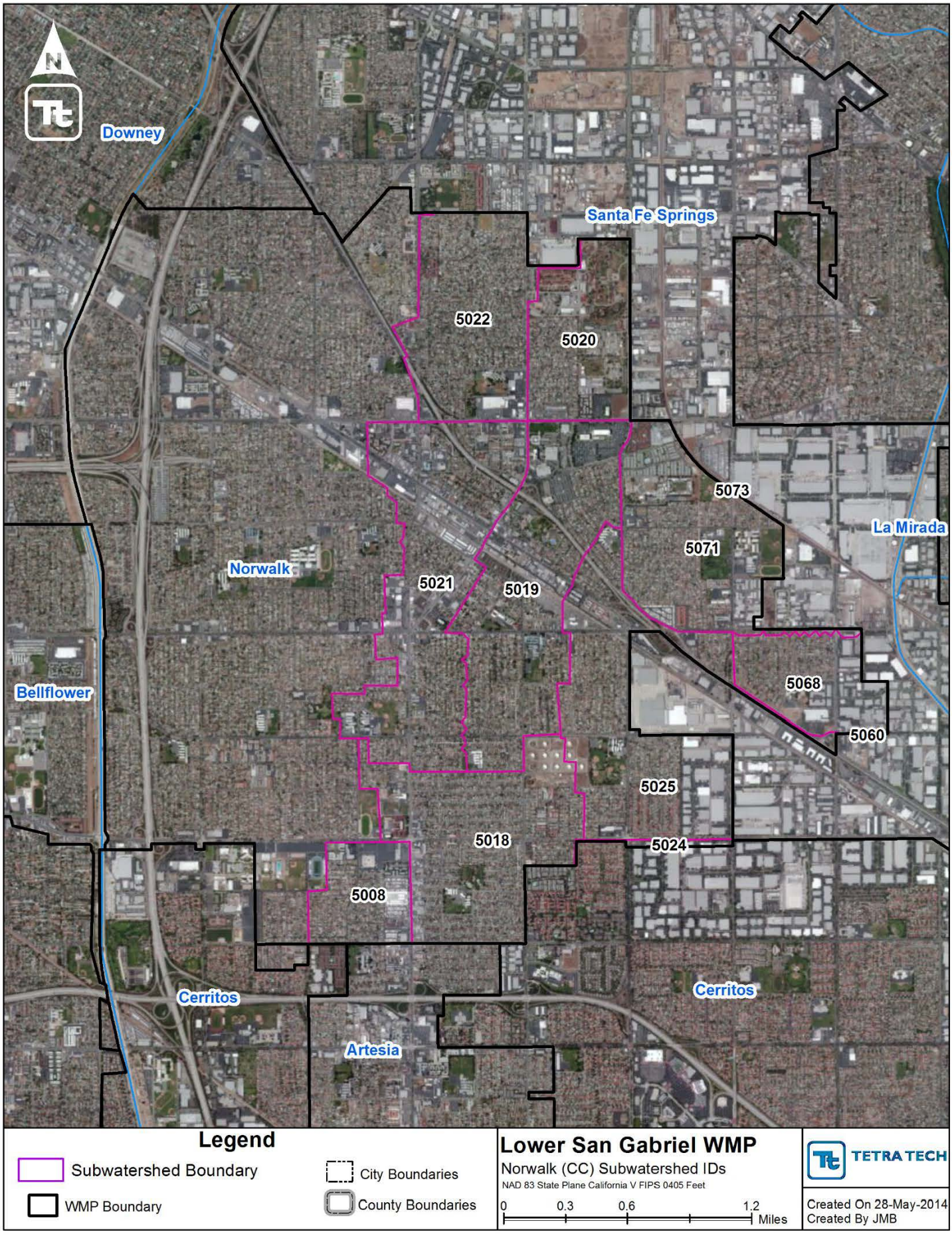

Figure 46. LSGR (CC) Norwalk Subwatershed IDs

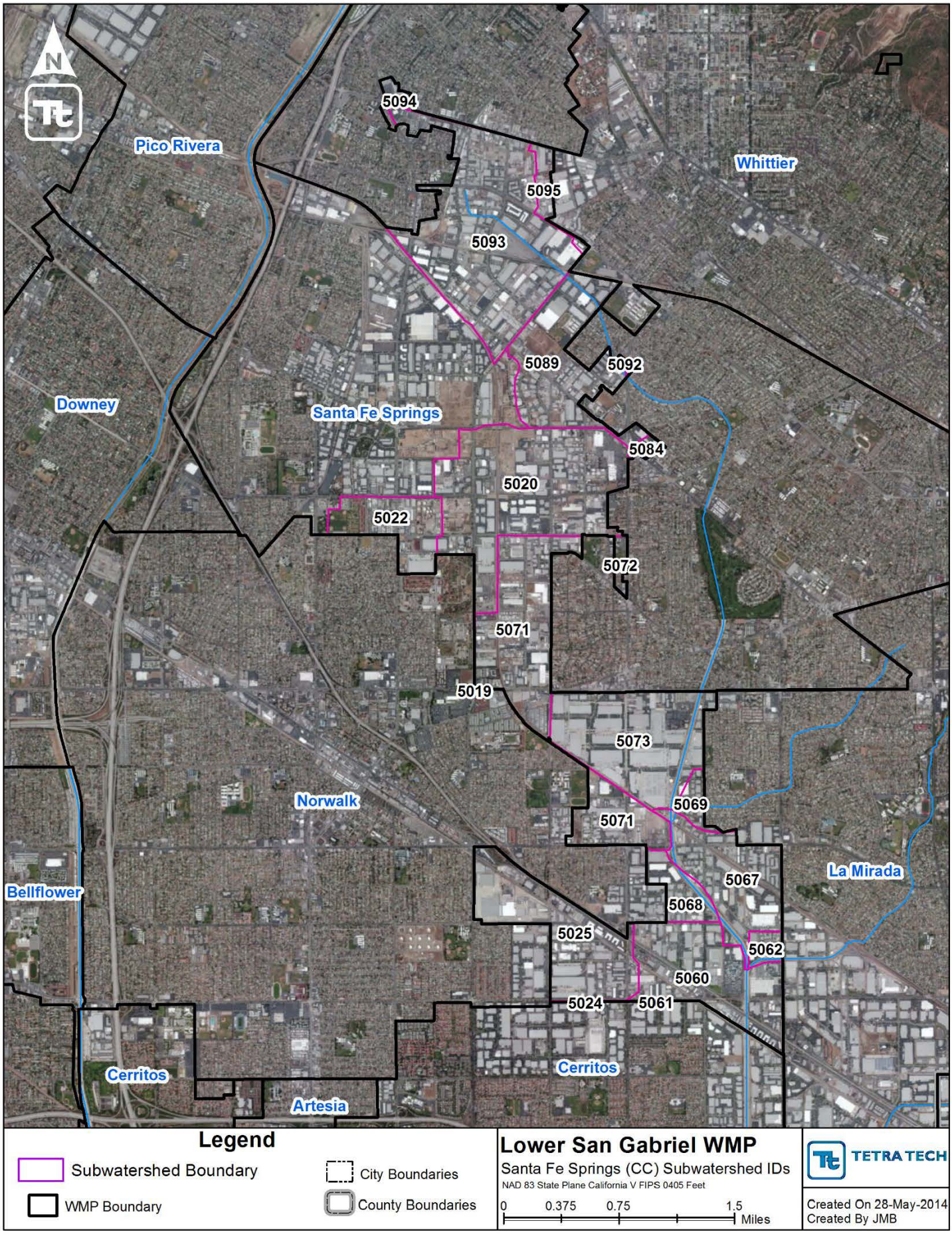

Figure 47. LSGR (CC) Santa Fe Springs Subwatershed IDs

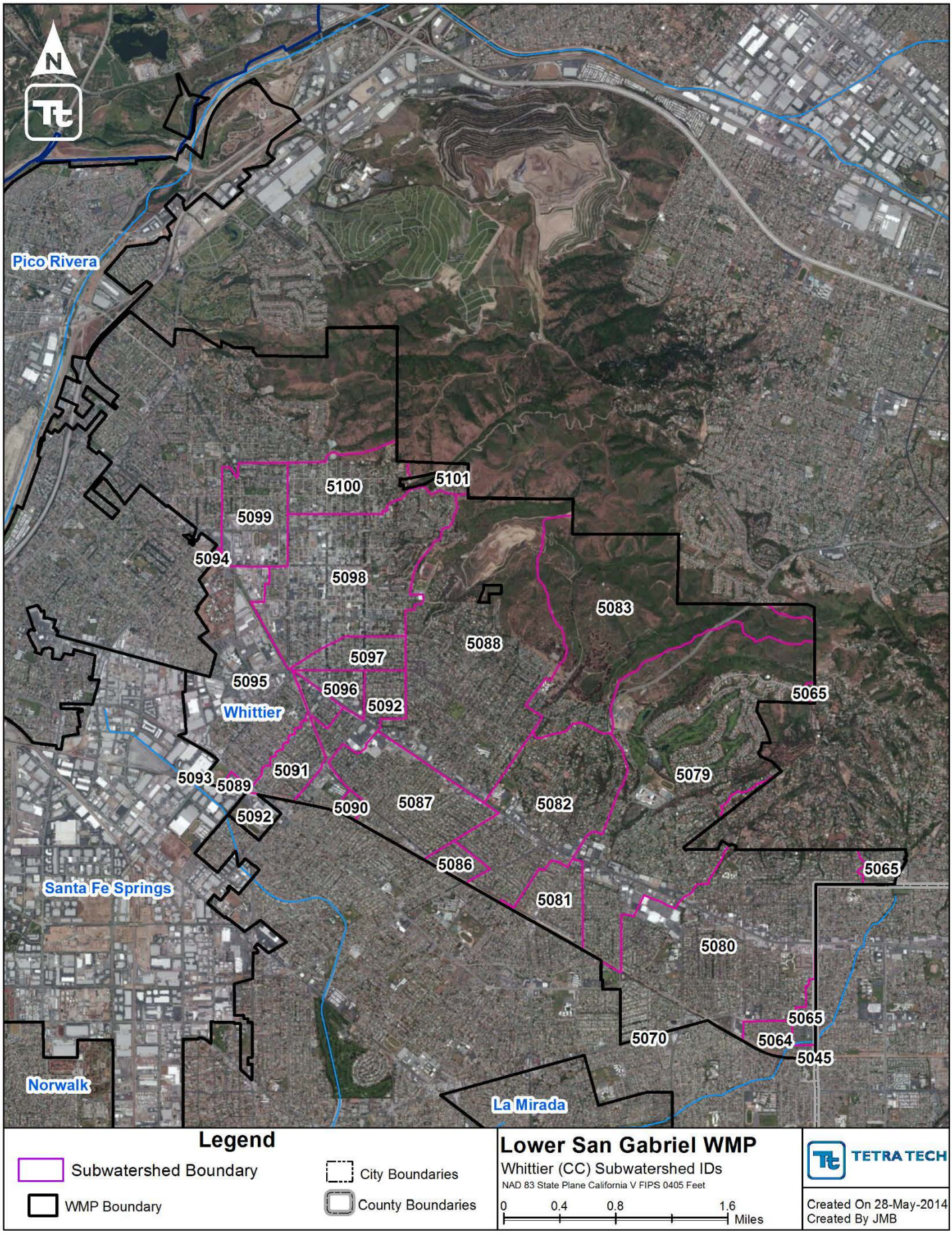

Figure 48. LSGR (CC) Whittier Subwatershed IDs

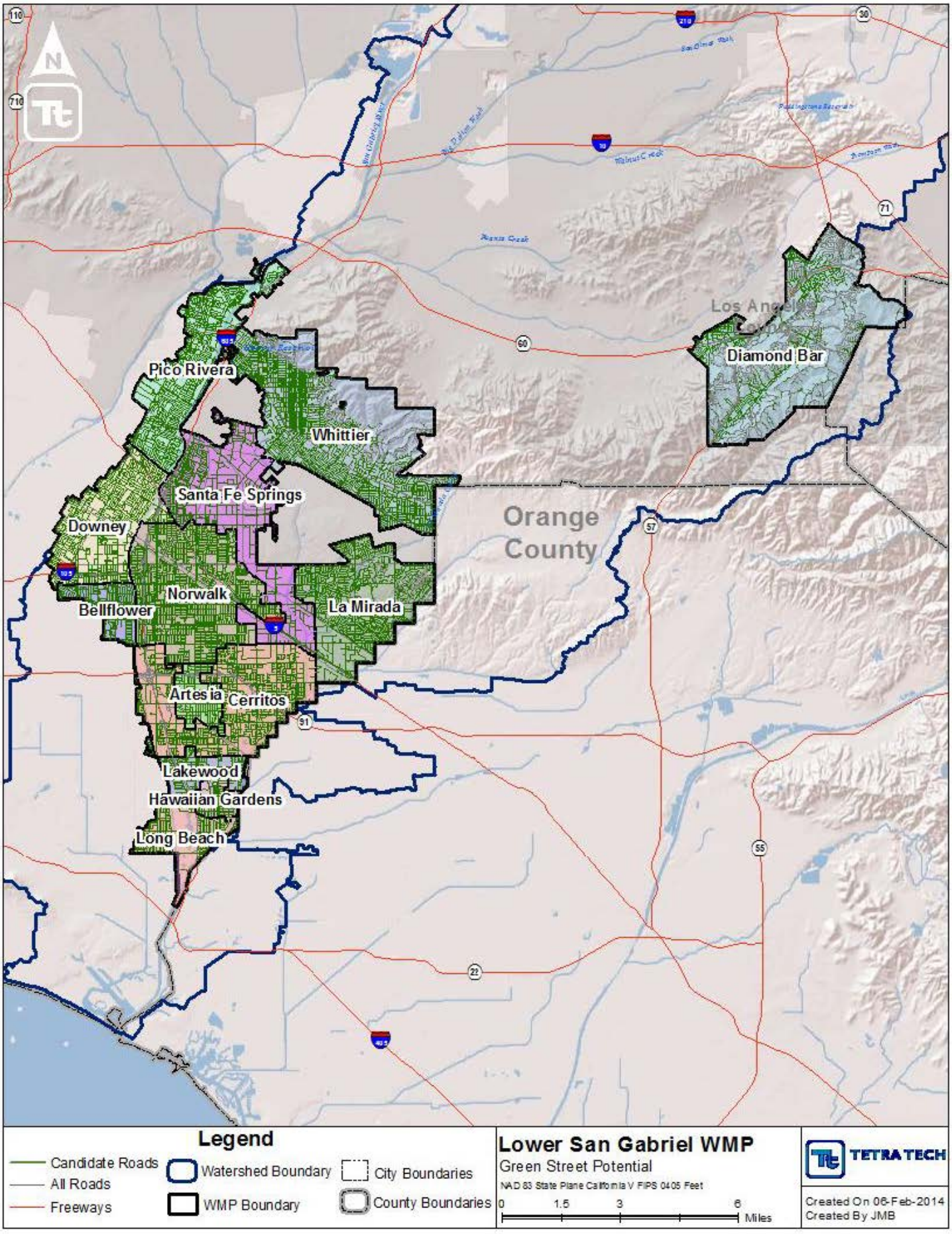

Figure 49. LSGR ROW BMP Potential Opportunities

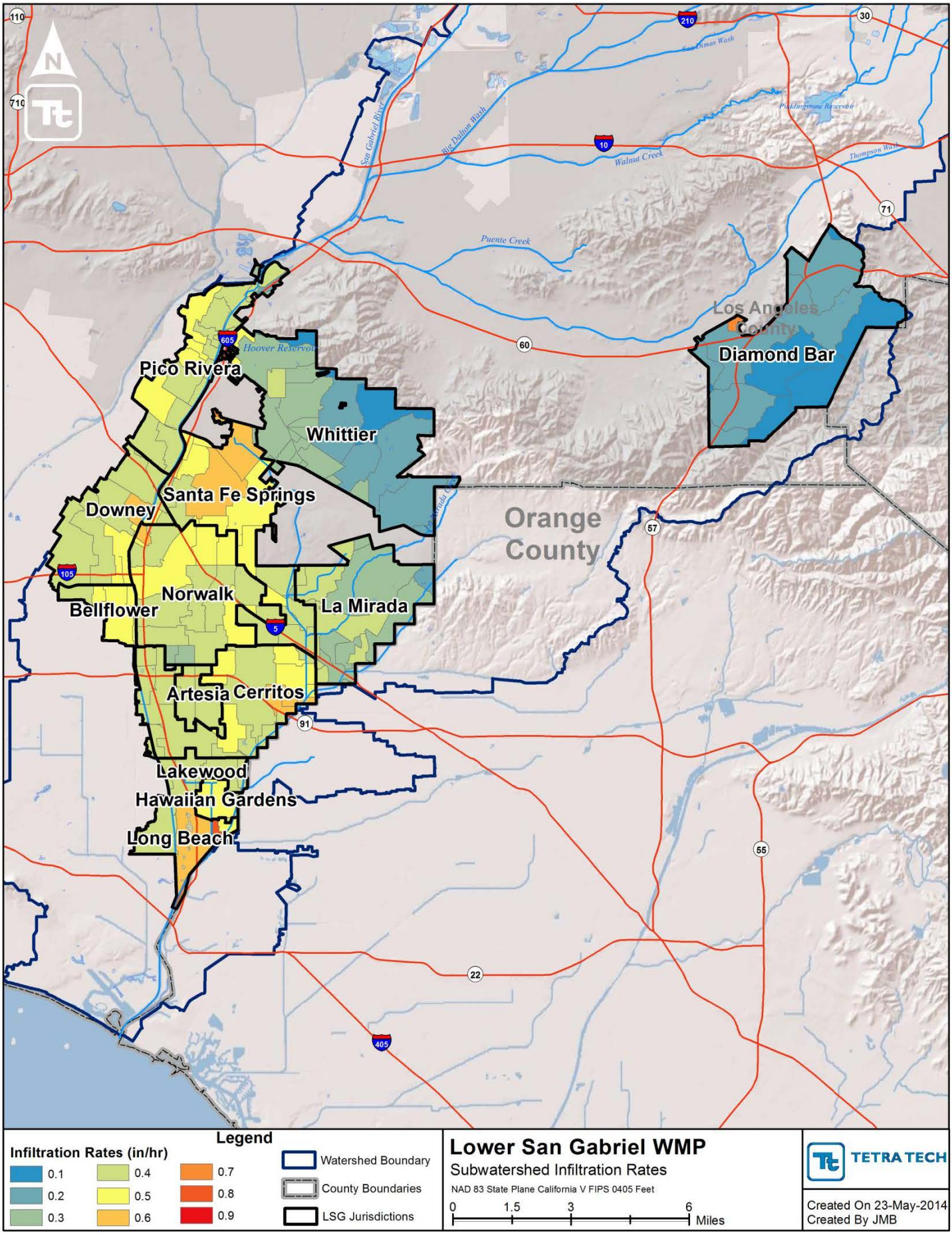

Figure 50. LSGR Subwatershed Infiltration Rates

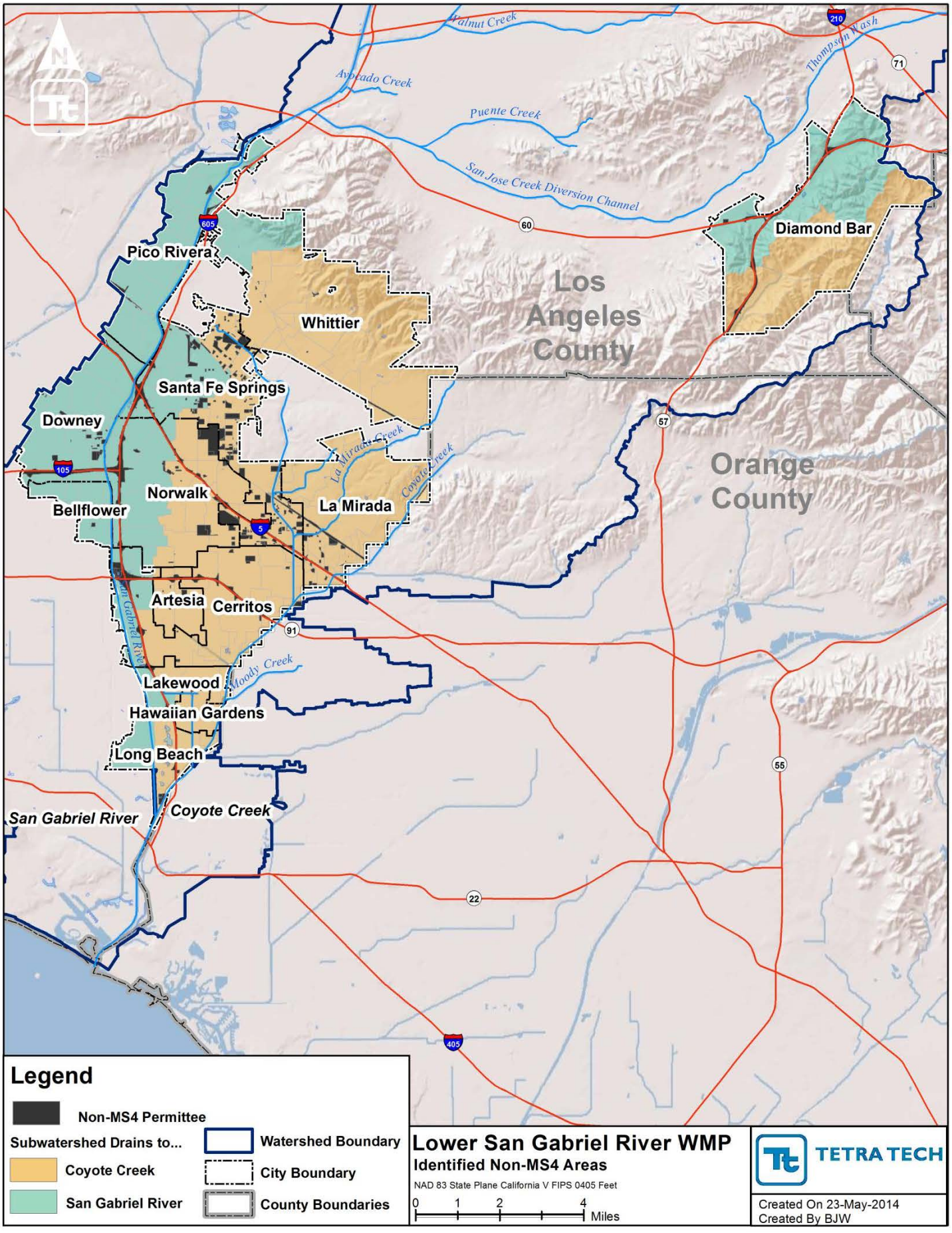

Figure 51. LSGR Non-MS4 Permittees

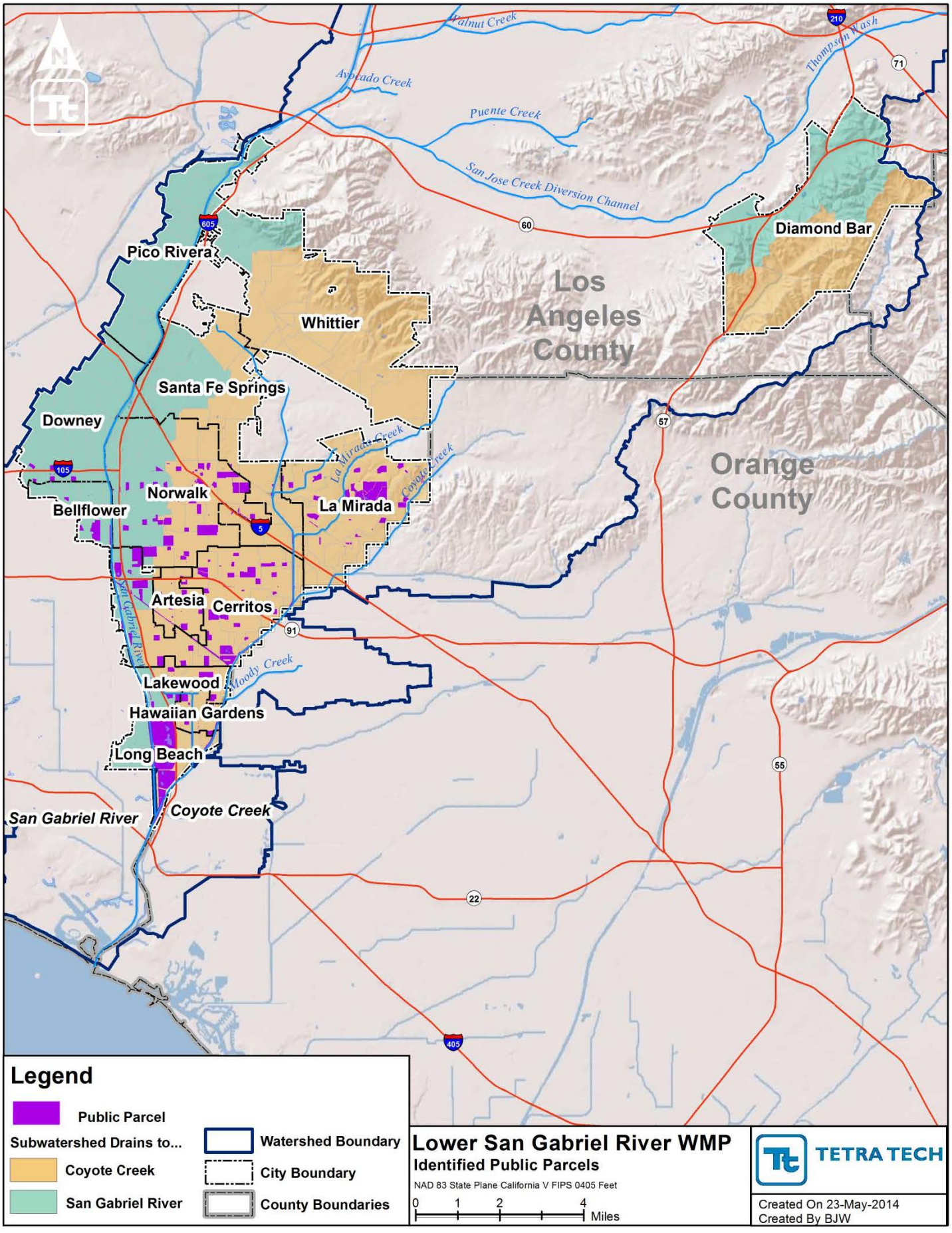

Figure 52. LSGR identified public parcels

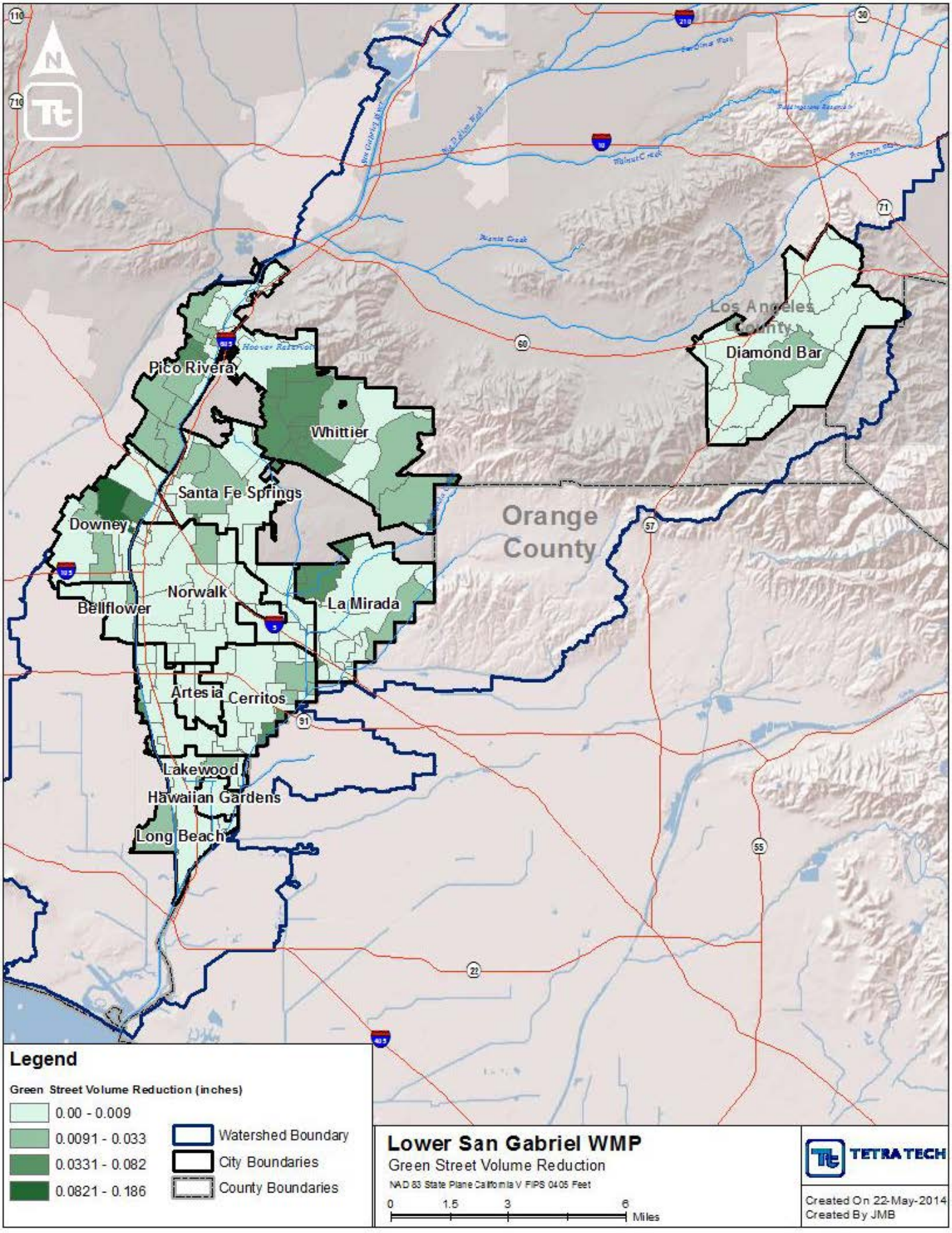

Figure 53. LSGR ROW BMP Volume Reduction

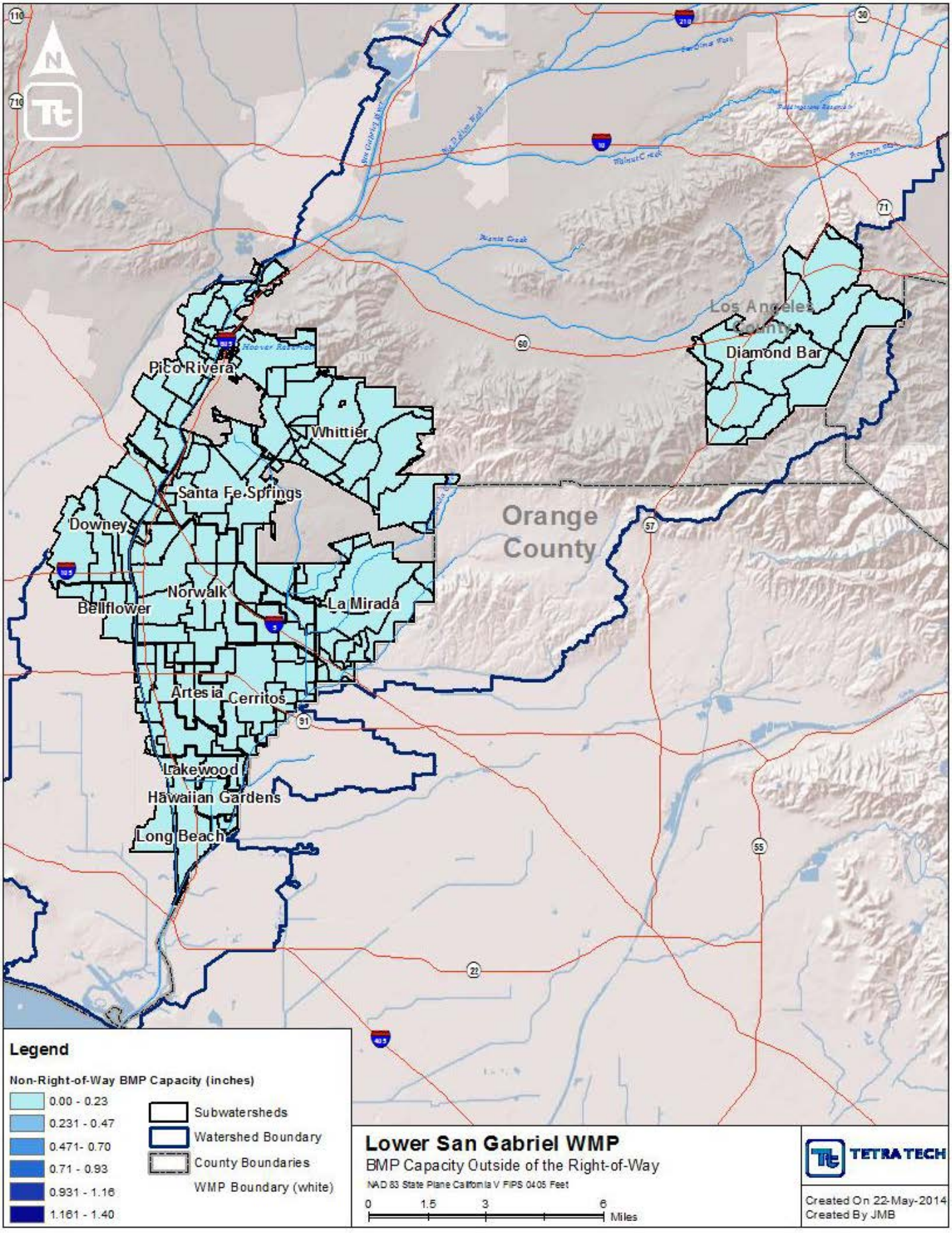

Figure 54. LSGR BMP capacity outside of the right-of-way

Attachment D: Existing and Planned BMPs

Submitted to:

LLAR WMP Group LCC WMP Group LSGR WMP Group

Submitted by:

Tetra Tech
9444 Balboa Ave., Suite 215
San Diego, CA 92123

January 15, 2015

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D1. Existing and Planned BMPs

The following tables summarize existing and planned BMPs in each jurisdiction.

D1.1. City of Bellflower

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Bioretention / Biofiltration	Existing	Riverview Park Infiltration Trenches	2012	10500 Somerset Blvd.	33.896662	-118.11016	105113	16	ac		
Bioretention / Biofiltration	Existing	Riverview Park Infiltration Trenches	2012	10500 Somerset Blvd.	33.896662	-118.11016	105113	16	ac		
Flow-Through Treatment BMP	Existing	Commercial Gas Station and mart	2008	14300 Bellflower Blvd	33.901581	-118.124915	105114	0.42	ac		
Flow-Through Treatment BMP	Existing	Commercial Storage	2005	10526 Rosecrans	33.902009	-118.108102	575118	19.5	ac		
Infiltration BMPs	Existing	St George Church	2012	15725 Cornuta	33.890539	-118.120735	105113	1.36	ac		
Infiltration BMPs	Existing	Autozone	2012	10239 Rosecrans	33.902265	-118.114834	105113	0.78	ac		

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Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Flow Through Treatment BMP	Existing	8314 SECOND ST	2/14/2014		33.9409	-118.13243	245114	1322	sf	0.153	cfs
Flow Through Treatment BMP	Existing	10030 LAKEWOOD	8/17/2007		33.9477	-118.11664	245125	24560	sf	0.17	cfs
Infiltration BMP	Existing	12327 WOODRUFF AV	2/14/2014		33.91989	-118.11706	245113	6894.4	sf	430.9	cf
Infiltration BMP	Existing	12145 WOODRUFF	7/8/2008		33.92338	-118.11805	245113	3200	sf	200	cf
Infiltration BMP	Existing	9500 WASHBURN	2/14/2014		33.92366	-118.1172	245113	342000	sf	9500	cf
Infiltration BMP	Existing	9236 HALL	4/17/2007		33.92972	-118.12155	245113	411840	sf	25740	cf
Infiltration BMP	Existing	9737 IMPERIAL	6/22/2010		33.91761	-118.11961	245114	5600	sf	350	cf
Infiltration BMP	Existing	12254 BELLFLOWER	9/13/2003		33.9214	-118.1239	245114	57600	sf	3600	cf
Infiltration BMP	Existing	11904 BELLFLOWER	2/14/2014		33.92607	-118.12515	245114	5400	sf	300	cf
Infiltration BMP	Existing	11610 LAKEWOOD	9/28/2007		33.93101	-118.12594	245114	91520	sf	5720	cf
Infiltration BMP	Existing	8329 DAVIS	6/15/2010		33.9366	-118.13379	245114	12608	sf	788	cf
Infiltration BMP	Existing	8522 FIRESTONE	2/16/2005		33.93678	-118.12978	245114	105456	sf	6591	cf
Infiltration BMP	Existing	8320 FIRESTONE BLVD	1/1/2010		33.9387	-118.13176	245114	90660	sf	525	cf

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Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9060 IMPERIAL	4/15/2005		33.91646	-118.13532	245115	7056	sf	441	cf
Infiltration BMP	Existing	8141 DE PALMAQ	6/30/2003		33.93618	-118.1402	245115	443008	sf	27688	cf
Infiltration BMP	Existing	8317 DAVIS ST	2/14/2014		33.93683	-118.13441	245115	13920	sf	870	cf
Infiltration BMP	Existing	8333 IOWA	10/11/2001		33.93756	-118.13356	245115	9808	sf	613	cf
Infiltration BMP	Existing	8100 PHLOX	5/20/2004		33.93956	-118.13854	245115	14400	sf	900	cf
Infiltration BMP	Existing	11040 BROOKSHIRE	1/1/2014		33.93932	-118.12496	245119	1923616	sf	120226	cf
Infiltration BMP	Existing	11136 DOLLISON	6/22/2010		33.93448	-118.09613	245122	13824	sf	864	cf
Infiltration BMP	Existing	10239 PICO VISTA	4/7/2003		33.939	-118.10316	245126	2176	sf	136	cf
Infiltration BMP	Existing	10233 PICO VISTA	4/7/2003		33.93914	-118.10305	245126	2176	sf	136	cf
Infiltration BMP	Existing	10228 PICO VISTA	4/7/2003		33.93919	-118.10235	245126	5856	sf	366	cf
Infiltration BMP	Existing	10229 PICO VISTA	4/7/2003		33.93928	-118.10295	245126	2176	sf	136	cf
Infiltration BMP	Existing	10223 PICO VISTA	4/7/2003		33.93946	-118.10289	245126	2048	sf	128	cf
Infiltration BMP	Existing	10218 PICO VISTA	4/7/2003		33.93947	-118.10223	245126	5952	sf	372	cf
Infiltration BMP	Existing	10215 PICO VISTA	4/7/2003		33.93962	-118.10237	245126	2112	sf	132	cf
Infiltration BMP	Existing	10211 PICO VISTA	4/7/2003		33.93969	-118.10255	245126	2304	sf	144	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	10219 PICO VISTA	4/7/2003		33.93975	-118.10273	245126	2304	sf	144	cf
Infiltration BMP	Existing	12800 PARAMOUNT	9/16/2008		33.92108	-118.15383	246077	3168	sf	198	cf
Infiltration BMP	Existing	7930 STEWARD & GRAY	11/18/2004		33.93539	-118.14527	246077	1600	sf	100	cf
Infiltration BMP	Existing	12229 JULIUS	1/1/2006		33.93343	-118.1561	246079	944	sf	59	cf
Infiltration BMP	Existing	7845 BENARES ST	6/14/2001		33.93839	-118.14549	246079	3568	sf	223	cf
Infiltration BMP	Existing	7841 BENARES ST	6/14/2001		33.93851	-118.14537	246079	1760	sf	110	cf
Infiltration BMP	Existing	7837 BENARES ST	6/14/2001		33.93863	-118.14528	246079	1760	sf	110	cf
Infiltration BMP	Existing	7848 BENARES ST	6/14/2001		33.93863	-118.14598	246079	10640	sf	665	cf
Infiltration BMP	Existing	7833 BENARES ST	6/14/2001		33.93875	-118.14518	246079	1760	sf	110	cf
Infiltration BMP	Existing	7844 BENARES ST	6/14/2001		33.93876	-118.14591	246079	2000	sf	125	cf
Infiltration BMP	Existing	7840 BENARES ST	6/14/2001		33.93886	-118.14578	246079	2000	sf	125	cf
Infiltration BMP	Existing	11706 RIVES	6/14/2001		33.93888	-118.14506	246079	1760	sf	110	cf
Infiltration BMP	Existing	7816 BENARES ST	6/14/2001		33.93896	-118.14553	246079	9600	sf	600	cf
Infiltration BMP	Existing	7812 BENARES ST	6/14/2001		33.93904	-118.14568	246079	1760	sf	110	cf
Infiltration BMP	Existing	11726 RIVES	6/14/2001		33.93904	-118.14614	246079	1920	sf	120	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7808 BENARES ST	6/14/2001		33.93911	-118.14583	246079	1760	sf	110	cf
Infiltration BMP	Existing	7808 BENARES ST	6/14/2001		33.93919	-118.14598	246079	1760	sf	110	cf
Infiltration BMP	Existing	7821 BENARES ST	6/14/2001		33.93921	-118.14506	246079	1872	sf	117	cf
Infiltration BMP	Existing	7804 BENARES ST	6/14/2001		33.93926	-118.14613	246079	9760	sf	610	cf
Infiltration BMP	Existing	7817 BENARES ST	6/14/2001		33.93931	-118.14525	246079	1760	sf	110	cf
Infiltration BMP	Existing	7813 BENARES ST	6/14/2001		33.93938	-118.14542	246079	1760	sf	110	cf
Infiltration BMP	Existing	7809 BENARES ST	6/14/2001		33.93945	-118.14557	246079	1760	sf	110	cf
Infiltration BMP	Existing	7805 BENARES ST	6/14/2001		33.93953	-118.14572	246079	1760	sf	110	cf
Infiltration BMP	Existing	7801 BENARES ST	6/14/2001		33.93961	-118.14587	246079	9600	sf	600	cf
Infiltration BMP	Existing	7140 FIRESTONE	10/3/2005		33.94707	-118.15469	246079	24048	sf	1503	cf
Infiltration BMP	Existing	8233 FIRESTONE	6/21/2010		33.94076	-118.13358	246102	91648	sf	5728	cf
Infiltration BMP	Existing	7814 FIRESTONE	2/14/2014		33.94418	-118.14232	246102	3000	sf	125	cf
Infiltration BMP	Existing	7676 FIRESTONE	2/26/2004		33.94527	-118.144	246102	213824	sf	13364	cf
Infiltration BMP	Existing	7201 FIRESTONE	4/19/2007		33.94821	-118.15273	246102	34352	sf	2147	cf
Infiltration BMP	Existing	7360 FLORENCE	6/21/2010		33.95872	-118.141	246102	14496	sf	906	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8129 FLORENCE	6/23/2010		33.95231	-118.12677	246103	8880	sf	555	cf
Infiltration BMP	Existing	8605 GALLATIN ROAD	2/14/2014		33.95768	-118.11432	246103	85792	sf	5362	cf
Infiltration BMP	Existing	9276 DOWNEY	1/4/2007		33.95901	-118.11926	246103	6400	sf	400	cf
Infiltration BMP	Existing	8801 LAKEWOOD	7/14/2006		33.96317	-118.11498	246106	18352	sf	1147	cf
Infiltration BMP	Existing	7880 TELEGRAPH	11/14/2004		33.97112	-118.12113	246111	123104	sf	7694	cf
Permeable Pavement	Existing	9449 IMPERIAL	6/22/2010		33.91809	-118.12656	245115	32160	sf	2010	cf
Permeable Pavement	Existing	9565 FIRESTONE	6/3/2008		33.93043	-118.11175	245119	18928	sf	1183	cf
Permeable Pavement	Existing	12628 PARAMOUNT	2/14/2014		33.92329	-118.15283	246077	15000	sf	284	cf
Permeable Pavement	Existing	11555 PARAMOUNT	2/14/2014		33.94116	-118.14067	246077	8125	sf	400	cf
Permeable Pavement	Existing	8043 SECOND ST	1/1/2009		33.94254	-118.13737	246102	105023	sf	6787	cf
Permeable Pavement	Existing	9250 LAKEWOOD	2/14/2014		33.95768	-118.1153	246103	24662	sf	939	cf
Regional Detention Facility	Existing	9341 IMPERIAL	5/6/2004		33.91918	-118.12898	245115	664624	sf	41539	cf
Regional Infiltration Facility	Existing	12074 LAKEWOOD	5/22/2005		33.9257	-118.13203	245115	960800	sf	60050	cf
Regional Infiltration Facility	Existing	12002 LAKEWOOD	5/22/2005		33.9261	-118.13169	245115	605264	sf	37829	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8764 FIRESTONE	8/14/2008	6523923.595890	6523923.595890	1798908.496460	245119	20064	sf	1254	cf
Infiltration BMP	Existing	9915 DOWNEY	9/27/2005	6523909.682530	6523909.682530	1805554.600030	246103	2265	sf	142	cf
Infiltration BMP	Existing	7602 RUNDELL	1/27/2006	6514863.657960	6514863.657960	1798182.489930	246079	2265	sf	142	cf
Infiltration BMP	Existing	10403 SAMOLINE	10/3/2005	6521224.982130	6521224.982130	1804890.047210	246102	2265	sf	142	cf
Infiltration BMP	Existing	12516 DOLAN	11/18/2005	6518146.741440	6518146.741440	1794105.551200	245115	1698	sf	106	cf
Infiltration BMP	Existing	7845 QUILL	3/28/2006	6515351.811960	6515351.811960	1796427.555720	246079	1698	sf	106	cf
Infiltration BMP	Existing	10435 BIRCHDALE	5/19/2005	6524444.362750	6524444.362750	1802478.415410	245119	1132	sf	71	cf
Infiltration BMP	Existing	8538 ALBIA	9/23/2005	6520089.101510	6520089.101510	1795567.094110	245115	566	sf	35	cf
Infiltration BMP	Existing	12159 CORNUTA	9/16/2005	6525392.928460	6525392.928460	1794233.560240	245114	566	sf	35	cf
Infiltration BMP	Existing	8064 DACOSTA	7/7/2005	6523365.354910	6523365.354910	1805913.806160	246103	566	sf	35	cf
Infiltration BMP	Existing	8551 DALEN	10/6/2005	6518205.327280	6518205.327280	1792517.271110	245115	566	sf	35	cf
Infiltration BMP	Existing	8318 DINSDALE	6/15/2006	6523907.628300	6523907.628300	1804895.972630	246103	566	sf	35	cf
Infiltration BMP	Existing	12641 DOLAN	9/2/2005	6517370.498610	6517370.498610	1793094.154440	245115	566	sf	35	cf
Infiltration BMP	Existing	12837 DOWNEY	6/13/2008	6516221.544620	6516221.544620	1792552.216840	246077	566	sf	35	cf
Infiltration BMP	Existing	12608 DUNROBIN	1/1/2007	6525044.715110	6525044.715110	1792041.222140	245114	566	sf	35	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7715 GAINFORD	5/9/2006	6521302.031220	6521302.031220	1807578.393730	246106	566	sf	35	cf
Infiltration BMP	Existing	12337 HORLEY	6/20/2007	6514828.837130	6514828.837130	1797233.894880	246079	566	sf	35	cf
Infiltration BMP	Existing	12619 IBBETSON	4/7/2008	6525826.717640	6525826.717640	1791950.694670	245114	566	sf	35	cf
Infiltration BMP	Existing	12142 MARBEL	5/5/2008	6521265.537710	6521265.537710	1794924.230550	245115	566	sf	35	cf
Infiltration BMP	Existing	12228 NORLAIN	6/24/2005	6513924.473210	6513924.473210	1798288.206130	246079	566	sf	35	cf
Infiltration BMP	Existing	11733 PATTON	12/9/2005	6521629.388810	6521629.388810	1797656.681610	245114	566	sf	35	cf
Infiltration BMP	Existing	11712 PRUESS	3/29/2006	6518005.349510	6518005.349510	1799785.098800	246077	566	sf	35	cf
Infiltration BMP	Existing	8605 SAMOLINE	10/23/2006	6525562.919850	6525562.919850	1810382.622670	246106	566	sf	35	cf
Infiltration BMP	Existing	7814 SPRINGER	7/20/2005	6515325.745000	6515325.745000	1796943.250000	246079	566	sf	35	cf
Infiltration BMP	Existing	7406 THIRD	9/23/2005	6517102.209740	6517102.209740	1803992.224080	246102	566	sf	35	cf
Infiltration BMP	Existing	8836 TWEEDY	8/21/2006	6524333.205540	6524333.205540	1809897.996880	246106	566	sf	35	cf
Infiltration BMP	Existing	9702 TWEEDY	8/30/2005	6522704.033740	6522704.033740	1807211.824630	246103	566	sf	35	cf
Infiltration BMP	Existing	11414 PARAMOUNT	11/17/2006	6519592.558830	6519592.558830	1800943.348310	245115	37135	sf	2321	cf
Infiltration BMP	Existing	8077 FLORENCE AV	1/1/2009	6523000.000000	6523000.000000	1805200.000000	246103	31872	sf	1992	cf
Infiltration BMP	Existing	8351 FLORENCE	11/29/2005	6524092.726100	6524092.726100	1804613.455750	246103	8252	sf	516	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	11003 LAKEWOOD	1/1/2006	6524400.000000	6524400.000000	1799800.000000	245119	8252	sf	516	cf
Infiltration BMP	Existing	9288 LUBEC	6/21/2010	6528705.843900	6528705.843900	1803218.787040	245125	8252	sf	516	cf
Infiltration BMP	Existing	13240 BARLIN	6/24/2005	6517118.017720	6517118.017720	1789361.126310	245524	6189	sf	387	cf
Infiltration BMP	Existing	9802 BROOKSHIRE	4/24/2007	6525737.765210	6525737.765210	1805415.750650	246103	6189	sf	387	cf
Infiltration BMP	Existing	9026 SUVA	10/5/2006	6527186.692380	6527186.692380	1804858.393970	245125	6189	sf	387	cf
Infiltration BMP	Existing	7325 IRWINGROVE	4/27/2005	6518419.969630	6518419.969630	1807291.337240	246102	5158	sf	322	cf
Infiltration BMP	Existing	10064 PANGBORN	8/16/2005	6529846.676910	6529846.676910	1801177.429270	245125	5158	sf	322	cf
Infiltration BMP	Existing	8102 THIRD	3/4/2009	6520617.238210	6520617.238210	1801805.039980	246103	7616	sf	476	cf
Infiltration BMP	Existing	12200 BELLFLOWER	11/4/2008	6524061.916580	6524061.916580	1794195.827920	245114	4126	sf	258	cf
Infiltration BMP	Existing	9818 BIRCHDALE	12/28/2005	6526194.448530	6526194.448530	1804634.814020	245125	4126	sf	258	cf
Infiltration BMP	Existing	10419 BROOKSHIRE	7/30/2007	6523842.460000	6523842.460000	1803179.994160	245119	4126	sf	258	cf
Infiltration BMP	Existing	10432 BROOKSHIRE	2/14/2007	6523911.001360	6523911.001360	1803018.354450	245119	4126	sf	258	cf
Infiltration BMP	Existing	10329 CASANES	1/1/2006	6528565.218740	6528565.218740	1800358.453120	245126	4126	sf	258	cf
Infiltration BMP	Existing	13221 CORRIGAN	3/9/2006	6523120.117490	6523120.117490	1789965.324450	245114	4126	sf	258	cf
Infiltration BMP	Existing	8816 ELSTON	12/28/2005	6526840.850650	6526840.850650	1808666.263650	246103	4126	sf	258	cf

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Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9278 GAINFORD	6/15/2005	6528421.969980	6528421.969980	1803000.469050	245125	4126	sf	258	cf
Infiltration BMP	Existing	7340 IRWINGROVE	12/6/2005	6518415.507880	6518415.507880	1806990.616650	246102	4126	sf	258	cf
Infiltration BMP	Existing	9055 IRWINGROVE	10/17/2006	6526414.238800	6526414.238800	1802422.724820	245119	4126	sf	258	cf
Infiltration BMP	Existing	9005 KRISTIN	1/1/2006	6524171.005660	6524171.005660	1809376.398810	246106	4126	sf	258	cf
Infiltration BMP	Existing	9015 KRISTIN	1/1/2006	6524137.396040	6524137.396040	1809320.713720	246106	4126	sf	258	cf
Infiltration BMP	Existing	10014 LA REINA	11/3/2005	6523603.973220	6523603.973220	1805275.605180	246103	4126	sf	258	cf
Infiltration BMP	Existing	8334 LEXINGTON	3/20/2006	6523900.000000	6523900.000000	1804200.000000	246103	4126	sf	258	cf
Infiltration BMP	Existing	7114 LUXOR	7/27/2005	6513446.571340	6513446.571340	1802395.175860	246100	4126	sf	258	cf
Infiltration BMP	Existing	10348 PANGBORN	10/12/2006	6529020.867850	6529020.867850	1800144.106260	245126	4126	sf	258	cf
Infiltration BMP	Existing	7268 PELLET	12/8/2005	6516203.991240	6516203.991240	1804244.566160	246104	4126	sf	258	cf
Infiltration BMP	Existing	9821 RIVES	9/12/2005	6521261.613640	6521261.613640	1807221.725140	246106	4126	sf	258	cf
Infiltration BMP	Existing	10427 STAMPS	2/27/2006	6523141.588150	6523141.588150	1803526.008280	246103	4126	sf	258	cf
Infiltration BMP	Existing	8325 TEXAS	8/30/2007	6520789.744350	6520789.744350	1799109.948610	245114	4126	sf	258	cf
Infiltration BMP	Existing	9211 ARRINGTON	6/21/2010	6527822.609270	6527822.609270	1805896.813180	245125	3095	sf	193	cf
Infiltration BMP	Existing	10372 BIRCHDALE	1/17/2006	6524786.108330	6524786.108330	1802711.833690	245119	2660	sf	166	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9509 BROCK	10/6/2005	6524084.133490	6524084.133490	1807438.122200	246103	3095	sf	193	cf
Infiltration BMP	Existing	9600 CORD	5/12/2008	6529842.639410	6529842.639410	1803668.379590	245125	3095	sf	193	cf
Infiltration BMP	Existing	10943 CORD	3/13/2007	6526539.555830	6526539.555830	1798046.595190	245119	3095	sf	193	cf
Infiltration BMP	Existing	12569 DOLAN	9/27/2006	6517675.526540	6517675.526540	1793796.546690	245115	3095	sf	193	cf
Infiltration BMP	Existing	9252A ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	3095	sf	193	cf
Infiltration BMP	Existing	9252B ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	3095	sf	193	cf
Infiltration BMP	Existing	9258A ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	3095	sf	193	cf
Infiltration BMP	Existing	9258B ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	3095	sf	193	cf
Infiltration BMP	Existing	9258C ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	3095	sf	193	cf
Infiltration BMP	Existing	9622 HALEDON	3/16/2006	6528283.868130	6528283.868130	1804260.791520	245125	3095	sf	193	cf
Infiltration BMP	Existing	11442 JULIUS	7/26/2007	6517126.240320	6517126.240320	1802109.297720	246079	3095	sf	193	cf
Infiltration BMP	Existing	10026 MATTOCK	1/1/2006	6530326.462180	6530326.462180	1801330.602850	245125	3095	sf	193	cf
Infiltration BMP	Existing	9303 PARAMOUNT	3/14/2006	6523934.101920	6523934.101920	1808355.150660	246106	3095	sf	193	cf
Infiltration BMP	Existing	8739 PARKCLIFF	1/23/2006	6516653.896010	6516653.896010	1788072.265990	245524	2063	sf	129	cf
Infiltration BMP	Existing	9303 PARROT	1/4/2007	6524270.384450	6524270.384450	1808221.036420	246106	3095	sf	193	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7313 PELLET	6/22/2010	6516478.702600	6516478.702600	1804386.841100	246104	3095	sf	193	cf
Infiltration BMP	Existing	10473 PICO VISTA	1/21/2009	6529579.260180	6529579.260180	1798825.132300	245126	3095	sf	193	cf
Infiltration BMP	Existing	7840 THIRD	8/29/2007	6519254.945150	6519254.945150	1802616.251380	246102	3095	sf	193	cf
Infiltration BMP	Existing	8347 VISTA DEL ROSA	7/26/2007	6527061.884710	6527061.884710	1808864.927170	246106	3095	sf	193	cf
Infiltration BMP	Existing	11632 ADENMOOR	6/15/2005	6524141.212380	6524141.212380	1797138.142940	245114	2063	sf	129	cf
Infiltration BMP	Existing	7124 ADWEN	12/20/2007	6513937.816490	6513937.816490	1803059.644840	246100	2063	sf	129	cf
Infiltration BMP	Existing	7258 ADWEN	1/3/2008	6515068.905460	6515068.905460	1802384.347520	246079	2063	sf	129	cf
Infiltration BMP	Existing	7646 ADWEN	10/6/2005	6517037.957040	6517037.957040	1801170.785850	246079	2063	sf	129	cf
Infiltration BMP	Existing	7702 ADWEN	5/11/2006	6517121.727310	6517121.727310	1801116.179360	246079	2063	sf	129	cf
Infiltration BMP	Existing	13032 AIRPOINT	5/14/2007	6517972.459000	6517972.459000	1790335.341940	245115	2063	sf	129	cf
Infiltration BMP	Existing	8455 ALAMEDA	8/7/2008	6519558.018350	6519558.018350	1795721.453060	245115	2063	sf	129	cf
Infiltration BMP	Existing	8632 ALAMEDA	11/2/2006	6520500.318510	6520500.318510	1795019.322380	245115	2063	sf	129	cf
Infiltration BMP	Existing	7945 ALBIA	10/11/2005	6516993.544600	6516993.544600	1797608.073070	246079	2063	sf	129	cf
Infiltration BMP	Existing	8704 ALBIA	5/28/2008	6520928.243910	6520928.243910	1795073.644330	245115	2063	sf	129	cf
Infiltration BMP	Existing	7845 ARNETT	6/18/2010	6518353.322440	6518353.322440	1801165.354440	246079	2063	sf	129	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9217 ARRINGTON	3/27/2006	6527795.727670	6527795.727670	1805838.303240	245125	2063	sf	129	cf
Infiltration BMP	Existing	7870 BAYSINGER	2/8/2008	6521311.922790	6521311.922790	1805484.679070	246102	2063	sf	129	cf
Infiltration BMP	Existing	9964 BELCHER	5/16/2007	6525622.979960	6525622.979960	1789815.793090	245113	2063	sf	129	cf
Infiltration BMP	Existing	12556 BELLDER	8/17/2007	6518567.857140	6518567.857140	1793310.793680	245115	2063	sf	129	cf
Infiltration BMP	Existing	11614 BELLFLOWER	11/7/2008	6523771.271210	6523771.271210	1797348.312220	245114	2063	sf	129	cf
Infiltration BMP	Existing	11802 BELLMAN	3/9/2007	6521898.080850	6521898.080850	1797268.375540	245114	2063	sf	129	cf
Infiltration BMP	Existing	7502 BENARES	1/30/2009	6515952.395710	6515952.395710	1801162.932420	246079	2063	sf	129	cf
Infiltration BMP	Existing	7824 BORSON	5/24/2007	6514090.231790	6514090.231790	1794571.039330	246077	2063	sf	129	cf
Infiltration BMP	Existing	7442 BROOKMILL	2/6/2006	6515991.568850	6515991.568850	1801492.813950	246079	2063	sf	129	cf
Infiltration BMP	Existing	9202 BUELL	7/21/2008	6526325.599230	6526325.599230	1799668.061170	245119	2063	sf	129	cf
Infiltration BMP	Existing	9340 BUELL	8/9/2006	6527287.659290	6527287.659290	1799162.594770	245126	2063	sf	129	cf
Infiltration BMP	Existing	8707 BYERS	3/15/2006	6521183.641890	6521183.641890	1796053.567730	245115	2063	sf	129	cf
Infiltration BMP	Existing	10446 CASANES	10/26/2006	6528470.793910	6528470.793910	1799828.787480	245126	2063	sf	129	cf
Infiltration BMP	Existing	10932 CASANES	11/17/2005	6527225.467210	6527225.467210	1797760.272650	245119	2063	sf	129	cf
Infiltration BMP	Existing	13341 CASTANA	10/28/2005	6517576.502130	6517576.502130	1788949.477410	245524	2063	sf	129	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7408 CECILIA	10/27/2005	6517829.130300	6517829.130300	1804625.827460	246102	2063	sf	129	cf
Infiltration BMP	Existing	7604 CECILIA	5/14/2007	6518455.494160	6518455.494160	1804215.794590	246102	2063	sf	129	cf
Infiltration BMP	Existing	9116 CHANEY	12/19/2005	6529189.877980	6529189.877980	1805493.817150	245125	2063	sf	129	cf
Infiltration BMP	Existing	8210 CHEYENNE	3/18/2008	6515440.785260	6515440.785260	1792057.306890	246077	2063	sf	129	cf
Infiltration BMP	Existing	9663 CLANCEY	8/17/2005	6527712.819630	6527712.819630	1804149.908320	245125	2063	sf	129	cf
Infiltration BMP	Existing	10708 CLANCEY	12/9/2005	6525546.299290	6525546.299290	1800088.746900	245119	2063	sf	129	cf
Infiltration BMP	Existing	8336 CLETA	5/8/2006	6520552.025180	6520552.025180	1798452.238760	245114	2063	sf	129	cf
Infiltration BMP	Existing	8557 CLETA	7/24/2006	6521804.225790	6521804.225790	1798033.515210	245114	2063	sf	129	cf
Infiltration BMP	Existing	8532 COLE	11/7/2005	6521000.000000	6521000.000000	1796400.000000	245115	2063	sf	129	cf
Infiltration BMP	Existing	9003 CORD	6/23/2010	6530731.156250	6530731.156250	1805583.409840	245127	2063	sf	129	cf
Infiltration BMP	Existing	9203 CORD	11/14/2008	6530209.591170	6530209.591170	1804419.169900	245125	2063	sf	129	cf
Infiltration BMP	Existing	13029 CORNUTA	5/17/2007	6525511.407030	6525511.407030	1790564.440990	245113	2063	sf	129	cf
Infiltration BMP	Existing	13102 CORNUTA	8/2/2007	6525701.503660	6525701.503660	1790504.914950	245113	2063	sf	129	cf
Infiltration BMP	Existing	13130 CORNUTA	6/25/2007	6525701.486250	6525701.486250	1790230.251310	245113	2063	sf	129	cf
Infiltration BMP	Existing	9245 DALEWOOD	9/23/2005	6532196.615620	6532196.615620	1804345.945760	245127	2063	sf	129	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	13440 DEMPSTER	10/26/2006	6516234.168650	6516234.168650	1789111.153470	245524	2063	sf	129	cf
Infiltration BMP	Existing	13448 DEMPSTER	5/10/2007	6516184.596670	6516184.596670	1789023.378330	245524	2063	sf	129	cf
Infiltration BMP	Existing	8125 DINSDALE	12/20/2005	6523223.693140	6523223.693140	1805447.514320	246103	2063	sf	129	cf
Infiltration BMP	Existing	10343 DOLAN	3/7/2007	6523688.489440	6523688.489440	1803733.392340	246103	2063	sf	129	cf
Infiltration BMP	Existing	10616 DOLAN	12/8/2005	6523091.688370	6523091.688370	1802186.196180	246103	2063	sf	129	cf
Infiltration BMP	Existing	8451 DONOVAN	10/20/2006	6518824.326830	6518824.326830	1794831.678890	245115	2063	sf	129	cf
Infiltration BMP	Existing	11915 DOWNEY	9/26/2007	6519404.158310	6519404.158310	1797577.606330	245115	2063	sf	129	cf
Infiltration BMP	Existing	12269 DOWNEY	3/16/2006	6518129.427940	6518129.427940	1795616.200900	246077	2063	sf	129	cf
Infiltration BMP	Existing	12631 DUNROBIN	1/14/2009	6524865.692630	6524865.692630	1791809.740080	245114	2063	sf	129	cf
Infiltration BMP	Existing	12644 DUNROBIN	12/27/2006	6525045.107610	6525045.107610	1791670.201830	245114	2063	sf	129	cf
Infiltration BMP	Existing	13212 DUNROBIN	3/6/2008	6525046.199690	6525046.199690	1790094.955960	245114	2063	sf	129	cf
Infiltration BMP	Existing	9018 EGLISE	6/18/2010	6530595.364130	6530595.364130	1805560.296250	245127	2063	sf	129	cf
Infiltration BMP	Existing	9252C ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9252D ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9252E ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9254A ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9254B ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9254C ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9254D ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9254E ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9258D ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9258E ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9260E ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9260A ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9260B ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9260C ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9260D ELM VISTA	4/5/2006	6524400.000000	6524400.000000	1795600.000000	245114	2063	sf	129	cf
Infiltration BMP	Existing	8902 ELSTON	6/22/2010	6526760.905110	6526760.905110	1808606.155990	246103	2063	sf	129	cf
Infiltration BMP	Existing	8420 EUCALYPTUS	11/1/2007	6518268.185230	6518268.185230	1794519.531140	245115	2063	sf	129	cf
Infiltration BMP	Existing	8543 FARM	7/14/2008	6524366.648200	6524366.648200	1802748.102990	245119	2063	sf	129	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7963 FIFTH	4/13/2007	6520492.297340	6520492.297340	1803181.748460	246103	2063	sf	129	cf
Infiltration BMP	Existing	7606 FINEVALE	7/23/2007	6522317.087820	6522317.087820	1809781.757910	246111	2063	sf	129	cf
Infiltration BMP	Existing	8740 FIRESTONE	2/5/2008	6523707.154590	6523707.154590	1799037.579000	245119	2063	sf	129	cf
Infiltration BMP	Existing	8663 FONTANA	8/11/2005	6522041.808010	6522041.808010	1796935.622550	245114	2063	sf	129	cf
Infiltration BMP	Existing	7435 FOSTORIA	8/30/2005	6517713.795360	6517713.795360	1804555.032870	246102	2063	sf	129	cf
Infiltration BMP	Existing	7611 FOSTORIA	7/5/2007	6518456.715640	6518456.715640	1804071.041810	246102	2063	sf	129	cf
Infiltration BMP	Existing	8029 FOURTH	6/15/2006	6520786.200710	6520786.200710	1802533.409070	246103	2063	sf	129	cf
Infiltration BMP	Existing	8524 GAINFORD	6/27/2008	6525485.453790	6525485.453790	1804820.431910	245125	2063	sf	129	cf
Infiltration BMP	Existing	9332 GAINFORD	7/20/2006	6528750.550820	6528750.550820	1802746.272930	245125	2063	sf	129	cf
Infiltration BMP	Existing	9330 GALLATIN	8/2/2007	6529116.628720	6529116.628720	1804180.197000	245125	2063	sf	129	cf
Infiltration BMP	Existing	12271 GLYNN	10/18/2005	6518435.603700	6518435.603700	1795389.616520	245115	2063	sf	129	cf
Infiltration BMP	Existing	9123 HALEDON	1/23/2006	6528738.408770	6528738.408770	1805747.051990	245125	2063	sf	129	cf
Infiltration BMP	Existing	7915 HARPER	2/7/2006	6520609.146350	6520609.146350	1804298.454990	246102	2063	sf	129	cf
Infiltration BMP	Existing	9108 HASTY	8/23/2006	6531133.870830	6531133.870830	1805211.202040	245127	2063	sf	129	cf
Infiltration BMP	Existing	10840 HASTY	1/16/2008	6527245.272860	6527245.272860	1798387.513250	245119	2063	sf	129	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7468 HONDO	12/31/2008	6513888.485770	6513888.485770	1797503.008930	246079	2063	sf	129	cf
Infiltration BMP	Existing	7838 HONDO	2/26/2008	6515366.533450	6515366.533450	1796561.911100	246079	2063	sf	129	cf
Infiltration BMP	Existing	7926 HONDO	7/25/2006	6515828.269550	6515828.269550	1796282.236280	246079	2063	sf	129	cf
Infiltration BMP	Existing	12023 HORTON	10/5/2005	6515547.066470	6515547.066470	1799512.855270	246079	1032	sf	64	cf
Infiltration BMP	Existing	10234 JULIUS	11/5/2009	6519723.348540	6519723.348540	1806551.787860	246102	2063	sf	129	cf
Infiltration BMP	Existing	11828 JULIUS	1/3/2008	6515976.382140	6515976.382140	1800524.752810	246079	2063	sf	129	cf
Infiltration BMP	Existing	9256 KLINEDALE	12/4/2007	6531745.367500	6531745.367500	1804500.031620	245127	2063	sf	129	cf
Infiltration BMP	Existing	9452 KLINEDALE	4/24/2008	6531257.497660	6531257.497660	1803653.019950	245127	2063	sf	129	cf
Infiltration BMP	Existing	9031 LEMORAN	1/30/2009	6529792.995960	6529792.995960	1806045.812140	245125	2063	sf	129	cf
Infiltration BMP	Existing	9910 LESTERFORD	8/3/2005	6531140.582200	6531140.582200	1801442.142180	245125	2063	sf	129	cf
Infiltration BMP	Existing	8533 LOWMAN	1/3/2008	6525796.079270	6525796.079270	1810845.309540	246106	2063	sf	129	cf
Infiltration BMP	Existing	8349 LUBEC	12/27/2006	6524776.248350	6524776.248350	1805794.753990	246103	2063	sf	129	cf
Infiltration BMP	Existing	7630 LUXOR	6/27/2005	6516552.896900	6516552.896900	1800452.817120	246079	2063	sf	129	cf
Infiltration BMP	Existing	12342 MARBEL	3/23/2006	6520586.635090	6520586.635090	1793799.804370	245115	2063	sf	129	cf
Infiltration BMP	Existing	9045 MARGARET ST	1/1/2006	6524143.176440	6524143.176440	1798109.987740	245114	2063	sf	129	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	10410 MATTOCK	10/2/2007	6529164.649420	6529164.649420	1799820.803610	245126	2063	sf	129	cf
Infiltration BMP	Existing	10615 MATTOCK	2/22/2006	6528479.681880	6528479.681880	1798952.207590	245126	2063	sf	129	cf
Infiltration BMP	Existing	9136 MELDAR	3/1/2007	6526738.891530	6526738.891530	1807241.651780	246103	2063	sf	129	cf
Infiltration BMP	Existing	7437 MULLER	10/3/2005	6518230.115820	6518230.115820	1805283.479580	246102	1032	sf	64	cf
Infiltration BMP	Existing	7452 MULLER	10/3/2005	6518271.461030	6518271.461030	1805049.518080	246102	2063	sf	129	cf
Infiltration BMP	Existing	10715 NEW	8/9/2007	6521988.945450	6521988.945450	1802370.638520	246103	2063	sf	129	cf
Infiltration BMP	Existing	10715 NEW	7/14/2008	6521988.945450	6521988.945450	1802370.638520	246103	2063	sf	129	cf
Infiltration BMP	Existing	10261 NEWVILLE	10/30/2007	6529641.666020	6529641.666020	1800383.942770	245126	2063	sf	129	cf
Infiltration BMP	Existing	10311 NEWVILLE	1/29/2009	6529538.574620	6529538.574620	1800214.882210	245126	2063	sf	129	cf
Infiltration BMP	Existing	10420 NEWVILLE	4/11/2008	6529346.061190	6529346.061190	1799529.176420	245126	2063	sf	129	cf
Infiltration BMP	Existing	10524 NEWVILLE	6/11/2007	6529062.272820	6529062.272820	1798916.257500	245126	2063	sf	129	cf
Infiltration BMP	Existing	9842 NORLAIN	3/9/2007	6519878.070320	6519878.070320	1807987.575840	246111	2063	sf	129	cf
Infiltration BMP	Existing	10403 PANGBORN	9/16/2005	6528806.561730	6528806.561730	1800136.574080	245126	2063	sf	129	cf
Infiltration BMP	Existing	10421 PANGBORN	6/5/2006	6528710.057740	6528710.057740	1799977.600600	245126	2063	sf	129	cf
Infiltration BMP	Existing	10903 PANGBORN	5/12/2008	6527497.056040	6527497.056040	1797964.159830	245119	2063	sf	129	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9508 PARAMOUNT	7/23/2007	6523724.334180	6523724.334180	1807653.518330	246106	2063	sf	129	cf
Infiltration BMP	Existing	9709 PARROT	6/20/2008	6523336.123150	6523336.123150	1806770.831150	246103	2063	sf	129	cf
Infiltration BMP	Existing	7107 PELLET	10/26/2005	6515228.221140	6515228.221140	1805197.090730	246104	2063	sf	129	cf
Infiltration BMP	Existing	10316 PICO VISTA	6/22/2010	6530326.941520	6530326.941520	1799752.739480	245126	2063	sf	129	cf
Infiltration BMP	Existing	10459 PICO VISTA	8/20/2008	6529643.308750	6529643.308750	1798930.291180	245126	2063	sf	129	cf
Infiltration BMP	Existing	11809 POMERING	1/25/2008	6515588.727520	6515588.727520	1800891.851040	246079	2063	sf	129	cf
Infiltration BMP	Existing	11821 POMERING	11/20/2008	6515535.205010	6515535.205010	1800794.072400	246079	2063	sf	129	cf
Infiltration BMP	Existing	9050 PRISCILLA	2/21/2007	6519218.937330	6519218.937330	1790014.532510	245115	2063	sf	129	cf
Infiltration BMP	Existing	8230 PURITAN	7/12/2007	6515756.650110	6515756.650110	1792196.388750	246077	2063	sf	129	cf
Infiltration BMP	Existing	8107 RAVILLER	6/22/2010	6524405.759790	6524405.759790	1808219.110840	246106	2063	sf	129	cf
Infiltration BMP	Existing	9940 RICHEON	12/26/2007	6520640.158150	6520640.158150	1807053.597690	246106	2063	sf	129	cf
Infiltration BMP	Existing	12015 RICHEON	6/21/2010	6515852.443580	6515852.443580	1799404.256870	246079	2063	sf	129	cf
Infiltration BMP	Existing	7336 RIO HONDO PL	12/26/2007	6516915.991390	6516915.991390	1804928.334260	246104	2063	sf	129	cf
Infiltration BMP	Existing	8418 RIVES	9/30/2005	6525367.917230	6525367.917230	1811575.863460	246106	1032	sf	64	cf
Infiltration BMP	Existing	11638 RIVES	11/2/2006	6517541.202300	6517541.202300	1800577.741160	246079	2063	sf	129	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	11706 RIVES	10/16/2006	6517702.333530	6517702.333530	1800238.435400	246079	2063	sf	129	cf
Infiltration BMP	Existing	12436 ROSE	11/6/2006	6520776.455000	6520776.455000	1793075.765000	245115	2063	sf	129	cf
Infiltration BMP	Existing	12033 SAMOLINE	2/22/2008	6517025.771360	6517025.771360	1798249.691900	246079	2063	sf	129	cf
Infiltration BMP	Existing	12051 SAMOLINE	9/3/2008	6516919.542440	6516919.542440	1798077.846870	246079	2063	sf	129	cf
Infiltration BMP	Existing	12302 SAMOLINE	6/22/2010	6516399.204110	6516399.204110	1796321.463670	246077	2063	sf	129	cf
Infiltration BMP	Existing	7921 SECOND	2/15/2006	6519427.915180	6519427.915180	1802349.970040	246102	2063	sf	129	cf
Infiltration BMP	Existing	9700 SHELLEYFIELD	7/17/2008	6527622.312900	6527622.312900	1804250.399390	245125	2063	sf	129	cf
Infiltration BMP	Existing	10553 SHELLEYFIELD	6/11/2008	6525493.222190	6525493.222190	1800845.190450	245119	2063	sf	129	cf
Infiltration BMP	Existing	8732 SMALLWOOD	2/16/2006	6524307.398160	6524307.398160	1810444.440300	246106	2063	sf	129	cf
Infiltration BMP	Existing	8816 SMALLWOOD	10/11/2005	6524123.348010	6524123.348010	1810138.117570	246106	2063	sf	129	cf
Infiltration BMP	Existing	9127 SONGFEST	12/1/2005	6531508.595900	6531508.595900	1805094.820630	245127	2063	sf	129	cf
Infiltration BMP	Existing	9143 STEWART & GRAY	11/30/2005	6523803.019500	6523803.019500	1796254.085000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9211 STEWART & GRAY	11/27/2006	6524190.537790	6524190.537790	1796254.765000	245114	2063	sf	129	cf
Infiltration BMP	Existing	9112 STOAKES	8/23/2006	6526782.391540	6526782.391540	1807626.036510	246103	2063	sf	129	cf
Infiltration BMP	Existing	9533 SUVA	6/27/2006	6530409.847860	6530409.847860	1802701.771860	245125	2063	sf	129	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9729 TRISTAN	10/18/2005	6526617.474570	6526617.474570	1804798.283870	245125	2063	sf	129	cf
Infiltration BMP	Existing	9216 TWEEDY	12/9/2005	6523630.155980	6523630.155980	1808715.397490	246106	2063	sf	129	cf
Infiltration BMP	Existing	13602 VERDURA	6/28/2007	6516296.473820	6516296.473820	1788728.235150	245524	2063	sf	129	cf
Infiltration BMP	Existing	10305 VULTEE	10/9/2006	6525949.622700	6525949.622700	1802510.250780	245119	2063	sf	129	cf
Infiltration BMP	Existing	10017 WILEY BURKE	6/22/2010	6520091.056520	6520091.056520	1807145.868160	246106	2063	sf	129	cf
Infiltration BMP	Existing	8538 ADOREE	9/26/2007	6517768.216360	6517768.216360	1792006.503470	245115	1032	sf	64	cf
Infiltration BMP	Existing	9407 ADOREE	1/1/2006	6522413.313750	6522413.313750	1791106.017430	245115	1032	sf	64	cf
Infiltration BMP	Existing	7134 ADWEN	1/1/2005	6514021.670500	6514021.670500	1803005.164870	246100	1032	sf	64	cf
Infiltration BMP	Existing	7343 ADWEN	9/4/2007	6515521.914470	6515521.914470	1802266.858280	246079	1032	sf	64	cf
Infiltration BMP	Existing	7743 ADWEN	12/5/2006	6517543.195590	6517543.195590	1801041.561520	246079	1032	sf	64	cf
Infiltration BMP	Existing	7802 ADWEN	10/18/2005	6517699.212930	6517699.212930	1800872.280990	246079	1032	sf	64	cf
Infiltration BMP	Existing	7828 ADWEN	8/4/2005	6517918.117250	6517918.117250	1800738.511970	246079	1032	sf	64	cf
Infiltration BMP	Existing	7852 ADWEN	1/9/2009	6518131.432520	6518131.432520	1800607.974520	246079	1032	sf	64	cf
Infiltration BMP	Existing	7855 ADWEN	11/23/2005	6518235.708380	6518235.708380	1800774.963010	246079	1032	sf	64	cf
Infiltration BMP	Existing	12823 AIRPOINT	6/29/2007	6518348.749200	6518348.749200	1791281.430170	245115	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8441 ALAMEDA	10/31/2005	6519442.769190	6519442.769190	1795780.926380	245115	1032	sf	64	cf
Infiltration BMP	Existing	8549 ALAMEDA	6/23/2010	6520129.148230	6520129.148230	1795426.542360	245115	1032	sf	64	cf
Infiltration BMP	Existing	8448 ALBIA	1/1/2007	6519556.734390	6519556.734390	1795840.452920	245115	1032	sf	64	cf
Infiltration BMP	Existing	8528 ALBIA	2/27/2007	6520000.245000	6520000.245000	1795612.955000	245115	1032	sf	64	cf
Infiltration BMP	Existing	9718 ALIWIN	8/2/2005	6532030.038780	6532030.038780	1804115.104340	245127	1032	sf	64	cf
Infiltration BMP	Existing	7936 ALLENGROVE	1/22/2007	6524421.678930	6524421.678930	1809567.173140	246106	1032	sf	64	cf
Infiltration BMP	Existing	8116 ALLENGROVE	12/5/2005	6525137.825210	6525137.825210	1808747.451430	246106	1032	sf	64	cf
Infiltration BMP	Existing	9166 ANGELL	9/2/2008	6520625.089300	6520625.089300	1790394.866750	245115	1032	sf	64	cf
Infiltration BMP	Existing	9351 APPLEBY	1/3/2008	6529580.566170	6529580.566170	1804445.997380	245125	1032	sf	64	cf
Infiltration BMP	Existing	9520 ARDINE	10/6/2005	6527613.323800	6527613.323800	1797533.903060	245119	1032	sf	64	cf
Infiltration BMP	Existing	7814 ARNETT	6/22/2010	6517981.553910	6517981.553910	1801095.347060	246079	1032	sf	64	cf
Infiltration BMP	Existing	7815 ARNETT	6/22/2010	6518066.490340	6518066.490340	1801237.713920	246079	1032	sf	64	cf
Infiltration BMP	Existing	7832 ARNETT	1/11/2007	6518132.684800	6518132.684800	1801021.243050	246079	1032	sf	64	cf
Infiltration BMP	Existing	8241 ARNETT	11/29/2006	6520442.071210	6520442.071210	1799867.842140	245115	1032	sf	64	cf
Infiltration BMP	Existing	7743 BAIRNSDALE	5/16/2006	6523474.546480	6523474.546480	1810551.323320	246106	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	12904 BARLIN	1/15/2009	6518150.890370	6518150.890370	1791163.941140	245115	1032	sf	64	cf
Infiltration BMP	Existing	13247 BARLIN	5/5/2005	6516868.829160	6516868.829160	1789428.146200	245524	1032	sf	64	cf
Infiltration BMP	Existing	7871 BAYSINGER	1/10/2007	6521422.493960	6521422.493960	1805635.813480	246102	1032	sf	64	cf
Infiltration BMP	Existing	8607 BAYSINGER	1/1/2005	6525304.240800	6525304.240800	1803291.716200	245119	1032	sf	64	cf
Infiltration BMP	Existing	9131 BAYSINGER	9/10/2008	6526918.982970	6526918.982970	1802474.767100	245119	1032	sf	64	cf
Infiltration BMP	Existing	9411 BAYSINGER	9/24/2007	6528736.042510	6528736.042510	1801262.782730	245126	1032	sf	64	cf
Infiltration BMP	Existing	9320 BELCHER	4/10/2007	6520600.361450	6520600.361450	1789754.109890	245115	1032	sf	64	cf
Infiltration BMP	Existing	9969 BELCHER	7/29/2009	6525669.288070	6525669.288070	1789992.480470	245113	1032	sf	64	cf
Infiltration BMP	Existing	10375 BELDER	6/22/2010	6522812.240000	6522812.240000	1803043.757460	246103	1032	sf	64	cf
Infiltration BMP	Existing	7441 BENARES	10/25/2005	6515921.019300	6515921.019300	1801396.174500	246079	1032	sf	64	cf
Infiltration BMP	Existing	7503 BENARES	1/16/2008	6516046.045620	6516046.045620	1801313.189720	246079	1032	sf	64	cf
Infiltration BMP	Existing	11014 BENFIELD	12/19/2005	6531918.630750	6531918.630750	1797937.959120	245122	1032	sf	64	cf
Infiltration BMP	Existing	8555 BIGBY	8/22/2005	6524606.668030	6524606.668030	1802914.545010	245119	1032	sf	64	cf
Infiltration BMP	Existing	9308 BIGBY	12/18/2008	6527591.908660	6527591.908660	1800839.109380	245126	1032	sf	64	cf
Infiltration BMP	Existing	9345 BIGBY	5/16/2006	6527999.312020	6527999.312020	1800803.102000	245126	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9389 BIGBY	9/20/2007	6528361.925530	6528361.925530	1800582.426270	245126	1032	sf	64	cf
Infiltration BMP	Existing	8246 BIRCHCREST	11/28/2005	6526713.325530	6526713.325530	1809350.628180	246106	1032	sf	64	cf
Infiltration BMP	Existing	10434 BIRCHDALE	12/2/2008	6524586.579650	6524586.579650	1802390.820140	245119	1032	sf	64	cf
Infiltration BMP	Existing	8812 BIRCHLEAF	5/3/2007	6527457.897210	6527457.897210	1808468.377860	246103	1032	sf	64	cf
Infiltration BMP	Existing	8912 BIRCHLEAF	10/9/2007	6527209.329660	6527209.329660	1808281.543500	246103	1032	sf	64	cf
Infiltration BMP	Existing	13330 BIXLER	3/21/2007	6516259.886220	6516259.886220	1789972.109000	245524	1032	sf	64	cf
Infiltration BMP	Existing	13411 BIXLER	9/30/2008	6515914.285010	6515914.285010	1789635.314360	245524	1032	sf	64	cf
Infiltration BMP	Existing	13425 BIXLER	8/17/2005	6515841.147610	6515841.147610	1789505.869380	245524	1032	sf	64	cf
Infiltration BMP	Existing	13454 BIXLER	5/10/2007	6515808.905200	6515808.905200	1789174.120800	245524	1032	sf	64	cf
Infiltration BMP	Existing	8220 BLANDWOOD	6/22/2010	6526086.691350	6526086.691350	1808873.058080	246103	1032	sf	64	cf
Infiltration BMP	Existing	12809 BLODGETT	1/1/2006	6518629.647540	6518629.647540	1791208.759970	245115	1032	sf	64	cf
Infiltration BMP	Existing	13026 BLODGETT	1/1/2005	6518225.401930	6518225.401930	1790248.943990	245115	1032	sf	64	cf
Infiltration BMP	Existing	13045 BLODGETT	10/6/2005	6517990.284020	6517990.284020	1790176.483690	245115	1032	sf	64	cf
Infiltration BMP	Existing	13114 BLODGETT	10/6/2005	6517888.613290	6517888.613290	1789931.616790	245115	1032	sf	64	cf
Infiltration BMP	Existing	7931 BORSON	9/6/2006	6514752.824370	6514752.824370	1794266.718830	246077	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8202 BORSON	6/5/2006	6516202.097710	6516202.097710	1793267.543860	246077	1032	sf	64	cf
Infiltration BMP	Existing	8428 BORSON	11/21/2008	6517449.915190	6517449.915190	1792528.167220	245115	1032	sf	64	cf
Infiltration BMP	Existing	8515 BORSON	3/14/2005	6517771.929480	6517771.929480	1792500.505870	245115	1032	sf	64	cf
Infiltration BMP	Existing	8345 BOYNE	6/18/2010	6519344.143470	6519344.143470	1796446.421390	245115	1032	sf	64	cf
Infiltration BMP	Existing	8402 BOYNE	1/1/2005	6519302.113240	6519302.113240	1796279.573520	245115	1032	sf	64	cf
Infiltration BMP	Existing	8525 BOYNE	7/20/2006	6520189.715440	6520189.715440	1796009.699660	245115	1032	sf	64	cf
Infiltration BMP	Existing	8528 BOYNE	2/22/2007	6520138.661540	6520138.661540	1795848.718800	245115	1032	sf	64	cf
Infiltration BMP	Existing	8613 BOYSON	1/1/2006	6520167.899980	6520167.899980	1794794.451220	245115	1032	sf	64	cf
Infiltration BMP	Existing	8647 BOYSON	7/29/2008	6520447.155570	6520447.155570	1794619.557270	245115	1032	sf	64	cf
Infiltration BMP	Existing	10216 BRANSCOMB	2/21/2007	6526794.108720	6526794.108720	1790310.156040	245113	1032	sf	64	cf
Infiltration BMP	Existing	10291 BRANSCOMB	7/25/2006	6527529.378260	6527529.378260	1790458.207730	245118	1032	sf	64	cf
Infiltration BMP	Existing	9624 BROCK	4/22/2005	6523849.153810	6523849.153810	1806723.688440	246103	1032	sf	64	cf
Infiltration BMP	Existing	12351 BROCK	9/3/2008	6516676.858850	6516676.858850	1795612.256100	246077	1032	sf	64	cf
Infiltration BMP	Existing	12608 BROCK	2/11/2005	6516008.590090	6516008.590090	1794308.259250	246077	1032	sf	64	cf
Infiltration BMP	Existing	8269 BROOKGREEN	1/1/2006	6526709.836510	6526709.836510	1808858.860970	246103	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7847 BROOKMILL	6/21/2010	6518005.266020	6518005.266020	1800484.266850	246079	1032	sf	64	cf
Infiltration BMP	Existing	8025 BROOKPARK	1/1/2005	6525207.617130	6525207.617130	1809814.105880	246106	1032	sf	64	cf
Infiltration BMP	Existing	9707 BROOKSHIRE	3/14/2005	6525762.512240	6525762.512240	1805795.982660	246103	1032	sf	64	cf
Infiltration BMP	Existing	10429 BROOKSHIRE	1/19/2005	6523911.001360	6523911.001360	1803018.354450	245119	1032	sf	64	cf
Infiltration BMP	Existing	12404 BROOKSHIRE	6/25/2007	6518808.785660	6518808.785660	1794169.944640	245115	1032	sf	64	cf
Infiltration BMP	Existing	7622 BRUNACHE	10/31/2007	6515665.309920	6515665.309920	1799097.073030	246079	1032	sf	64	cf
Infiltration BMP	Existing	8216 BRUNACHE	11/6/2007	6518414.904440	6518414.904440	1797242.748270	245115	1032	sf	64	cf
Infiltration BMP	Existing	9033 BUCKLES	6/21/2010	6523179.898540	6523179.898540	1796909.863810	245114	1032	sf	64	cf
Infiltration BMP	Existing	7540 BUELL	1/1/2004	6518499.698980	6518499.698980	1804545.470300	246102	1032	sf	64	cf
Infiltration BMP	Existing	9330 BUELL	2/15/2006	6527195.126160	6527195.126160	1799219.087810	245126	1032	sf	64	cf
Infiltration BMP	Existing	9351 BUELL	6/21/2010	6527484.251630	6527484.251630	1799288.621620	245126	1032	sf	64	cf
Infiltration BMP	Existing	9634 BUELL	3/16/2006	6528774.281270	6528774.281270	1798139.573770	245126	1032	sf	64	cf
Infiltration BMP	Existing	9067 BUHMAN	11/20/2007	6530056.595350	6530056.595350	1805336.923900	245125	1032	sf	64	cf
Infiltration BMP	Existing	9208 BUHMAN	6/16/2008	6529799.831660	6529799.831660	1804544.819190	245125	1032	sf	64	cf
Infiltration BMP	Existing	10237 CASANES	3/23/2006	6528975.248660	6528975.248660	1801017.460740	245126	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	10321 CASANES	1/1/2007	6528597.524650	6528597.524650	1800411.412530	245126	1032	sf	64	cf
Infiltration BMP	Existing	10403 CASANES	12/21/2005	6528532.829940	6528532.829940	1800305.536240	245126	1032	sf	64	cf
Infiltration BMP	Existing	10408 CASANES	1/1/2005	6528665.671960	6528665.671960	1800149.799930	245126	1032	sf	64	cf
Infiltration BMP	Existing	10812 CASANES	3/14/2005	6527610.698650	6527610.698650	1798391.295520	245119	1032	sf	64	cf
Infiltration BMP	Existing	10835 CASANES	4/1/2008	6527345.484730	6527345.484730	1798305.683780	245119	1032	sf	64	cf
Infiltration BMP	Existing	10944 CASANES	1/1/2006	6527151.352860	6527151.352860	1797710.972890	245119	1032	sf	64	cf
Infiltration BMP	Existing	8457 CAVEL	9/24/2007	6519984.576530	6519984.576530	1796420.555450	245115	1032	sf	64	cf
Infiltration BMP	Existing	9502 CECILIA	10/11/2007	6527927.079440	6527927.079440	1798327.652080	245126	1032	sf	64	cf
Infiltration BMP	Existing	9531 CECILIA	8/23/2006	6528208.236430	6528208.236430	1798317.933420	245126	1032	sf	64	cf
Infiltration BMP	Existing	9435 CEDARTREE	6/22/2010	6530636.457520	6530636.457520	1805866.234670	245127	1032	sf	64	cf
Infiltration BMP	Existing	9010 CHANEY	11/30/2005	6529789.693370	6529789.693370	1806340.793150	245125	1032	sf	64	cf
Infiltration BMP	Existing	9011 CHANEY	1/31/2006	6529640.900410	6529640.900410	1806424.653160	245125	1032	sf	64	cf
Infiltration BMP	Existing	9134 CHANEY	1/1/2005	6529119.825860	6529119.825860	1805332.958450	245125	1032	sf	64	cf
Infiltration BMP	Existing	10252 CHANEY	1/1/2006	6527373.631100	6527373.631100	1801932.130180	245119	1032	sf	64	cf
Infiltration BMP	Existing	10530 CHANEY	6/3/2008	6526461.472620	6526461.472620	1800532.795270	245119	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8355 CHARLOMA	9/16/2005	6524931.861530	6524931.861530	1806017.636180	246103	1032	sf	64	cf
Infiltration BMP	Existing	9037 CHARLOMA	9/25/2007	6527230.271760	6527230.271760	1804669.291940	245125	1032	sf	64	cf
Infiltration BMP	Existing	8565 CHEROKEE	2/14/2008	6524386.530150	6524386.530150	1802386.701010	245119	1032	sf	64	cf
Infiltration BMP	Existing	8030 CHEYENNE	1/1/2005	6514573.751210	6514573.751210	1792580.925090	246077	1032	sf	64	cf
Infiltration BMP	Existing	8117 CHEYENNE	4/10/2006	6515045.470000	6515045.470000	1792480.065000	246077	1032	sf	64	cf
Infiltration BMP	Existing	8418 CHEYENNE	1/1/2006	6516589.334020	6516589.334020	1791278.419980	245524	1032	sf	64	cf
Infiltration BMP	Existing	9303 CLANCEY	4/3/2006	6528228.489510	6528228.489510	1805319.961840	245125	1032	sf	64	cf
Infiltration BMP	Existing	10518 CLANCEY	3/9/2007	6526045.670270	6526045.670270	1800904.969960	245119	1032	sf	64	cf
Infiltration BMP	Existing	8316 CLETA	4/3/2007	6520383.826830	6520383.826830	1798544.940710	245114	1032	sf	64	cf
Infiltration BMP	Existing	8529 CLETA	1/1/2004	6521562.602410	6521562.602410	1798134.090240	245114	1032	sf	64	cf
Infiltration BMP	Existing	13113 COLDBROOK	6/13/2007	6524340.025750	6524340.025750	1790440.866070	245114	3095	sf	193	cf
Infiltration BMP	Existing	13227 COLDBROOK	2/22/2008	6524428.823880	6524428.823880	1789883.562480	245114	1032	sf	64	cf
Infiltration BMP	Existing	8554 COMOLETTE	6/21/2010	6517765.395020	6517765.395020	1791693.915800	245115	1032	sf	64	cf
Infiltration BMP	Existing	8417 CONKLIN	1/1/2006	6516931.143420	6516931.143420	1791819.671020	245524	1032	sf	64	cf
Infiltration BMP	Existing	7219 COOLGROVE	4/25/2006	6521787.460350	6521787.460350	1811479.001950	246111	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7605 COOLGROVE	6/22/2010	6522636.872680	6522636.872680	1810413.845850	246111	1032	sf	64	cf
Infiltration BMP	Existing	10210 CORD	2/12/2009	6528662.670970	6528662.670970	1801499.064930	245126	1032	sf	64	cf
Infiltration BMP	Existing	7706 COREY	6/22/2010	6515304.522120	6515304.522120	1798247.325380	246079	1032	sf	64	cf
Infiltration BMP	Existing	11708 CORRIGAN	5/30/2006	6523410.919990	6523410.919990	1796690.721900	245114	1032	sf	64	cf
Infiltration BMP	Existing	13227 CORRIGAN	4/11/2006	6523118.258510	6523118.258510	1789898.574120	245114	1032	sf	64	cf
Infiltration BMP	Existing	10809 CROSSDALE	1/30/2006	6532012.269030	6532012.269030	1798722.436870	245122	1032	sf	64	cf
Infiltration BMP	Existing	7803 DACOSTA	1/1/2006	6521705.534400	6521705.534400	1807011.928190	246106	1032	sf	64	cf
Infiltration BMP	Existing	7808 DACOSTA	3/29/2007	6521675.640660	6521675.640660	1806840.332210	246106	1032	sf	64	cf
Infiltration BMP	Existing	7826 DACOSTA	3/23/2007	6521825.889640	6521825.889640	1806744.301550	246106	1032	sf	64	cf
Infiltration BMP	Existing	8064 DACOSTA	1/6/2009	6523365.354910	6523365.354910	1805913.806160	246103	1032	sf	64	cf
Infiltration BMP	Existing	9242 DALEWOOD	5/17/2007	6532339.520890	6532339.520890	1804239.830010	245127	1032	sf	64	cf
Infiltration BMP	Existing	7044 DE PALMA	1/30/2006	6513058.006240	6513058.006240	1802286.102090	246100	1032	sf	64	cf
Infiltration BMP	Existing	7956 DE PALMA	7/28/2005	6517915.235930	6517915.235930	1799223.139650	246077	1032	sf	64	cf
Infiltration BMP	Existing	8232 DE PALMA	12/10/2008	6519342.730110	6519342.730110	1798392.424410	245115	1032	sf	64	cf
Infiltration BMP	Existing	13134 DEMING	2/6/2007	6518053.947000	6518053.947000	1789691.993030	245115	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	13240 DEMING	8/12/2005	6518068.820530	6518068.820530	1789032.682680	245115	1032	sf	64	cf
Infiltration BMP	Existing	13415 DEMPSTER	1/1/2007	6516194.546390	6516194.546390	1789419.790430	245524	1032	sf	64	cf
Infiltration BMP	Existing	13434 DEMPSTER	1/12/2006	6516258.965410	6516258.965410	1789155.039770	245524	1032	sf	64	cf
Infiltration BMP	Existing	13452 DEMPSTER	9/20/2005	6516159.819690	6516159.819690	1788979.483200	245524	1032	sf	64	cf
Infiltration BMP	Existing	7324 DINSDALE	6/21/2010	6518936.024560	6518936.024560	1807958.155410	246106	1032	sf	64	cf
Infiltration BMP	Existing	8352 DINSDALE	12/19/2005	6524191.795240	6524191.795240	1804722.231880	246103	1032	sf	64	cf
Infiltration BMP	Existing	9325 DINSDALE	7/3/2007	6528635.640220	6528635.640220	1802187.000380	245125	1032	sf	64	cf
Infiltration BMP	Existing	9812 DOLAN	1/10/2007	6524918.033470	6524918.033470	1805427.859430	246103	1032	sf	64	cf
Infiltration BMP	Existing	10410 DOLAN	9/19/2007	6523686.660150	6523686.660150	1803351.652190	245119	1032	sf	64	cf
Infiltration BMP	Existing	12522 DOLAN	12/9/2005	6518109.498100	6518109.498100	1794046.260040	245115	1032	sf	64	cf
Infiltration BMP	Existing	12634 DOLAN	4/11/2006	6517527.198260	6517527.198260	1793053.966010	245115	1032	sf	64	cf
Infiltration BMP	Existing	12712 DOLAN	4/27/2005	6517393.756980	6517393.756980	1792842.640770	245115	1032	sf	64	cf
Infiltration BMP	Existing	8740 DONOVAN	11/2/2006	6520467.711390	6520467.711390	1793463.175520	245115	1032	sf	64	cf
Infiltration BMP	Existing	6408 DOS RIOS	3/7/2007	6523246.583700	6523246.583700	1811462.058000	246111	1032	sf	64	cf
Infiltration BMP	Existing	6420 DOS RIOS	7/14/2008	6523082.430580	6523082.430580	1811381.024700	246111	1032	sf	64	cf

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Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	6449 DOS RIOS	8/23/2005	6522675.424950	6522675.424950	1811505.638050	246111	1032	sf	64	cf
Infiltration BMP	Existing	6481 DOS RIOS	8/8/2007	6522296.417970	6522296.417970	1811546.494500	246111	1032	sf	64	cf
Infiltration BMP	Existing	9532 DOWNEY	9/21/2007	6524828.225510	6524828.225510	1806555.186060	246103	1032	sf	64	cf
Infiltration BMP	Existing	12115 DOWNEY	8/12/2005	6518801.058860	6518801.058860	1796628.276370	245115	1032	sf	64	cf
Infiltration BMP	Existing	12116 DOWNEY	7/24/2008	6518985.048760	6518985.048760	1796501.621880	245115	1032	sf	64	cf
Infiltration BMP	Existing	12545 DOWNEY	7/7/2005	6517126.997680	6517126.997680	1794204.833310	246077	1032	sf	64	cf
Infiltration BMP	Existing	13620 DOWNEY	10/24/2007	6515777.167020	6515777.167020	1788934.803130	245524	1032	sf	64	cf
Infiltration BMP	Existing	9756 DOWNEY SANFORD BRIDGE	11/6/2008	6530232.905320	6530232.905320	1802732.275270	245125	1032	sf	64	cf
Infiltration BMP	Existing	12109 DUNROBIN	5/27/2008	6524849.554990	6524849.554990	1794742.565720	245114	1032	sf	64	cf
Infiltration BMP	Existing	12602 DUNROBIN	4/21/2008	6525045.021790	6525045.021790	1792096.938130	245114	1032	sf	64	cf
Infiltration BMP	Existing	13118 DUNROBIN	8/1/2008	6525045.611060	6525045.611060	1790357.500340	245114	1032	sf	64	cf
Infiltration BMP	Existing	13447 EARNSHAW	3/4/2005	6516486.580000	6516486.580000	1788881.960000	245524	1032	sf	64	cf
Infiltration BMP	Existing	12246 EASTBROOK	7/3/2007	6525290.855020	6525290.855020	1793729.113600	245114	1032	sf	64	cf
Infiltration BMP	Existing	13102 EASTBROOK	5/30/2006	6525376.065000	6525376.065000	1790509.718450	245114	1032	sf	64	cf
Infiltration BMP	Existing	13207 EASTBROOK	1/1/2006	6525181.215010	6525181.215010	1790147.343800	245114	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9010 EGLISE	6/22/2010	6530616.481070	6530616.481070	1805612.930940	245127	1032	sf	64	cf
Infiltration BMP	Existing	9124 EGLISE	1/1/2006	6530099.347460	6530099.347460	1804464.036140	245125	1032	sf	64	cf
Infiltration BMP	Existing	10228 EGLISE	6/16/2008	6528317.527320	6528317.527320	1801552.496190	245126	1032	sf	64	cf
Infiltration BMP	Existing	8432 EUCALYPTUS	6/21/2010	6518375.883890	6518375.883890	1794450.252220	245115	1032	sf	64	cf
Infiltration BMP	Existing	8451 EUCALYPTUS	11/5/2008	6518648.903650	6518648.903650	1794509.449160	245115	1032	sf	64	cf
Infiltration BMP	Existing	8449 EVEREST	9/20/2006	6518402.636450	6518402.636450	1794253.840980	245115	1032	sf	64	cf
Infiltration BMP	Existing	9036 FARM	1/1/2005	6525791.032450	6525791.032450	1801568.335890	245119	1032	sf	64	cf
Infiltration BMP	Existing	9068 FARM	1/1/2005	6526062.157630	6526062.157630	1801402.977290	245119	1032	sf	64	cf
Infiltration BMP	Existing	8334 FIFTH	6/24/2005	6522409.331110	6522409.331110	1801742.536430	245114	1032	sf	64	cf
Infiltration BMP	Existing	8540 FIFTH	1/1/2005	6523591.182480	6523591.182480	1801021.450470	245114	1032	sf	64	cf
Infiltration BMP	Existing	7238 FLORENCE	11/14/2005	6518231.298960	6518231.298960	1807648.949310	246104	1032	sf	64	cf
Infiltration BMP	Existing	8324 FONTANA	1/1/2006	6519936.868340	6519936.868340	1797701.691440	245115	1032	sf	64	cf
Infiltration BMP	Existing	7322 FOSTER BRIDGE	6/18/2010	6520302.817760	6520302.817760	1810322.849060	246111	1032	sf	64	cf
Infiltration BMP	Existing	7441 FOSTORIA	10/25/2005	6517764.674110	6517764.674110	1804520.953030	246102	1032	sf	64	cf
Infiltration BMP	Existing	7520 FOSTORIA	1/20/2006	6517974.460950	6517974.460950	1804167.759820	246102	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7639 FOSTORIA	7/27/2007	6518691.469740	6518691.469740	1803918.676960	246102	1032	sf	64	cf
Infiltration BMP	Existing	7915 FOURTH	5/29/2007	6519890.537430	6519890.537430	1803170.158590	246102	1032	sf	64	cf
Infiltration BMP	Existing	7922 FOURTH	1/1/2005	6519878.319950	6519878.319950	1802959.531390	246102	1032	sf	64	cf
Infiltration BMP	Existing	7411 FOURTH PL	9/10/2007	6517375.746060	6517375.746060	1804408.156270	246102	1032	sf	64	cf
Infiltration BMP	Existing	7519 FOURTH PL	6/23/2005	6517868.488420	6517868.488420	1804088.501010	246102	1032	sf	64	cf
Infiltration BMP	Existing	7329 GAINFORD	9/20/2007	6519599.973200	6519599.973200	1808409.397520	246111	1032	sf	64	cf
Infiltration BMP	Existing	7725 GAINFORD	6/21/2010	6521357.607460	6521357.607460	1807543.814610	246106	1032	sf	64	cf
Infiltration BMP	Existing	7735 GAINFORD	12/15/2006	6521461.236080	6521461.236080	1807480.220630	246106	1032	sf	64	cf
Infiltration BMP	Existing	7771 GAINFORD	12/3/2007	6521758.954890	6521758.954890	1807297.289390	246106	1032	sf	64	cf
Infiltration BMP	Existing	8353 GAINFORD	1/4/2007	6524689.963810	6524689.963810	1805534.024270	246103	1032	sf	64	cf
Infiltration BMP	Existing	8553 GAINFORD	4/7/2008	6525875.670020	6525875.670020	1804802.065800	245125	1032	sf	64	cf
Infiltration BMP	Existing	9114 GAINFORD	6/23/2010	6527375.967240	6527375.967240	1803418.253090	245125	1032	sf	64	cf
Infiltration BMP	Existing	8319 GALLATIN	6/23/2010	6525634.222480	6525634.222480	1807445.394810	246103	1032	sf	64	cf
Infiltration BMP	Existing	9069 GALLATIN	3/1/2005	6527846.830170	6527846.830170	1805432.059660	245125	1032	sf	64	cf
Infiltration BMP	Existing	9243 GALLATIN	6/19/2006	6528915.102070	6528915.102070	1804595.777040	245125	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8408 GALT	6/18/2010	6520848.594160	6520848.594160	1798562.646220	245114	1032	sf	64	cf
Infiltration BMP	Existing	8435 GALT	12/27/2005	6521154.530230	6521154.530230	1798569.782020	245114	1032	sf	64	cf
Infiltration BMP	Existing	9119 GARNISH	6/22/2010	6529517.516530	6529517.516530	1805110.082900	245125	1032	sf	64	cf
Infiltration BMP	Existing	9136 GARNISH	2/5/2007	6529607.954040	6529607.954040	1804869.027300	245125	1032	sf	64	cf
Infiltration BMP	Existing	9024 GAYMONT	8/28/2007	6523451.624790	6523451.624790	1809501.434890	246111	1032	sf	64	cf
Infiltration BMP	Existing	12636 GLYNN	10/25/2005	6517337.921050	6517337.921050	1793251.757000	245524	1032	sf	64	cf
Infiltration BMP	Existing	12751 GLYNN	1/1/2005	6516780.406550	6516780.406550	1792749.927780	245524	1032	sf	64	cf
Infiltration BMP	Existing	12755 GLYNN	6/18/2010	6516753.778610	6516753.778610	1792707.557200	245524	1032	sf	64	cf
Infiltration BMP	Existing	12912 GLYNN	1/1/2005	6516567.905690	6516567.905690	1791996.175300	245524	1032	sf	64	cf
Infiltration BMP	Existing	8731 GUATEMALA	10/30/2008	6523507.693960	6523507.693960	1811098.218950	246106	1032	sf	64	cf
Infiltration BMP	Existing	9203 GUATEMALA	3/23/2006	6521893.308510	6521893.308510	1810154.570390	246111	1032	sf	64	cf
Infiltration BMP	Existing	9959 GUATEMALA	6/23/2010	6518699.649950	6518699.649950	1808234.818150	246111	1032	sf	64	cf
Infiltration BMP	Existing	13537 GUNDERSON	3/3/2008	6517350.406160	6517350.406160	1787757.556610	245524	1032	sf	64	cf
Infiltration BMP	Existing	13547 GUNDERSON	6/19/2006	6517298.502270	6517298.502270	1787667.099660	245524	1032	sf	64	cf
Infiltration BMP	Existing	11538 GURLEY	5/3/2005	6520211.328840	6520211.328840	1799382.602480	245115	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	11935 GURLEY	6/18/2010	6519051.777570	6519051.777570	1797582.114550	245115	1032	sf	64	cf
Infiltration BMP	Existing	12019 GURLEY	6/18/2010	6518869.145640	6518869.145640	1797295.091770	245115	1032	sf	64	cf
Infiltration BMP	Existing	12052 GURLEY	1/10/2006	6518841.793230	6518841.793230	1796925.916150	245115	1032	sf	64	cf
Infiltration BMP	Existing	12117 GURLEY	1/1/2007	6518497.250390	6518497.250390	1796711.283370	245115	1032	sf	64	cf
Infiltration BMP	Existing	9117 HALEDON	7/31/2006	6528761.573350	6528761.573350	1805801.190120	245125	1032	sf	64	cf
Infiltration BMP	Existing	10341 HALEDON	5/1/2006	6526657.457480	6526657.457480	1801653.926760	245119	1032	sf	64	cf
Infiltration BMP	Existing	10349 HALEDON	2/8/2005	6526618.690140	6526618.690140	1801591.635520	245119	1032	sf	64	cf
Infiltration BMP	Existing	10425 HALEDON	4/14/2005	6526424.760130	6526424.760130	1801280.406410	245119	1032	sf	64	cf
Infiltration BMP	Existing	10439 HALEDON	9/30/2005	6526346.747570	6526346.747570	1801155.573630	245119	1032	sf	64	cf
Infiltration BMP	Existing	10525 HALEDON	1/28/2005	6526113.410380	6526113.410380	1800804.505840	245119	1032	sf	64	cf
Infiltration BMP	Existing	10550 HALEDON	12/19/2005	6526112.578950	6526112.578950	1800485.376650	245119	1032	sf	64	cf
Infiltration BMP	Existing	9049 HALL ROAD	4/30/2008	6523684.587500	6523684.587500	1797586.831540	245114	1032	sf	64	cf
Infiltration BMP	Existing	7215 HANNON	12/19/2008	6521498.261440	6521498.261440	1811442.204100	246111	1032	sf	64	cf
Infiltration BMP	Existing	13005 HANWELL	2/11/2009	6519590.457150	6519590.457150	1789492.134120	245115	1032	sf	64	cf
Infiltration BMP	Existing	9022 HASTY	10/13/2005	6531232.650260	6531232.650260	1805433.916070	245127	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9205 HASTY	6/22/2010	6530848.690890	6530848.690890	1804978.371330	245127	1032	sf	64	cf
Infiltration BMP	Existing	9206 HASTY	1/1/2005	6531000.691980	6531000.691980	1804885.411940	245127	1032	sf	64	cf
Infiltration BMP	Existing	9241 HASTY	1/1/2006	6530719.487200	6530719.487200	1804649.180550	245127	1032	sf	64	cf
Infiltration BMP	Existing	7736 HONDO	2/8/2005	6514830.078530	6514830.078530	1796886.774430	246079	1032	sf	64	cf
Infiltration BMP	Existing	7753 HONDO	1/24/2007	6515005.269000	6515005.269000	1796951.957630	246079	1032	sf	64	cf
Infiltration BMP	Existing	7803 HONDO	10/11/2005	6515156.509020	6515156.509020	1796903.351830	246079	1032	sf	64	cf
Infiltration BMP	Existing	7808 HONDO	6/22/2010	6515109.805390	6515109.805390	1796717.393590	246079	1032	sf	64	cf
Infiltration BMP	Existing	7814 HONDO	7/25/2008	6515161.093050	6515161.093050	1796686.379320	246079	1032	sf	64	cf
Infiltration BMP	Existing	7920 HONDO	8/21/2006	6515777.018460	6515777.018460	1796313.217950	246079	1032	sf	64	cf
Infiltration BMP	Existing	7932 HONDO	1/1/2006	6515879.568480	6515879.568480	1796251.099580	246079	1032	sf	64	cf
Infiltration BMP	Existing	9008 HORLEY	7/19/2007	6523080.991430	6523080.991430	1809910.740800	246111	1032	sf	64	cf
Infiltration BMP	Existing	9838 HORLEY	7/3/2008	6521155.061500	6521155.061500	1807271.870840	246106	1032	sf	64	cf
Infiltration BMP	Existing	12307 HORLEY	1/1/2005	6514989.782150	6514989.782150	1797487.116040	246079	1032	sf	64	cf
Infiltration BMP	Existing	11427 HORTON	11/23/2005	6517266.456490	6517266.456490	1802136.009270	246079	1032	sf	64	cf
Infiltration BMP	Existing	11553 HORTON	4/21/2005	6516872.120940	6516872.120940	1801498.085040	246079	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	11708 HORTON	10/25/2005	6516455.941870	6516455.941870	1800783.417100	246079	1032	sf	64	cf
Infiltration BMP	Existing	12646 IBBETSON	5/6/2005	6526008.756240	6526008.756240	1791650.535870	245114	1032	sf	64	cf
Infiltration BMP	Existing	8217 IMPERIAL	1/5/2009	6516889.628840	6516889.628840	1794092.786860	246077	1032	sf	64	cf
Infiltration BMP	Existing	7320 IRWINGROVE	1/1/2006	6518255.802480	6518255.802480	1807084.876440	246102	1032	sf	64	cf
Infiltration BMP	Existing	7710 IRWINGROVE	12/11/2007	6520151.425540	6520151.425540	1805902.138310	246102	1032	sf	64	cf
Infiltration BMP	Existing	12208 IZETTA	1/1/2006	6524718.745010	6524718.745010	1794118.344290	245114	1032	sf	64	cf
Infiltration BMP	Existing	12252 IZETTA	7/10/2008	6524718.900100	6524718.900100	1793666.382200	245114	1032	sf	64	cf
Infiltration BMP	Existing	12631 IZETTA	8/28/2007	6524602.625920	6524602.625920	1791809.267080	245114	1032	sf	64	cf
Infiltration BMP	Existing	10228 JULIUS	5/20/2008	6519748.327880	6519748.327880	1806603.074440	246102	1032	sf	64	cf
Infiltration BMP	Existing	10234 JULIUS	6/22/2010	6519723.348540	6519723.348540	1806551.787860	246102	1032	sf	64	cf
Infiltration BMP	Existing	11848 JULIUS	6/23/2010	6515875.825190	6515875.825190	1800351.825190	246079	1032	sf	64	cf
Infiltration BMP	Existing	11859 JULIUS	8/23/2005	6515676.490910	6515676.490910	1800355.137490	246079	1032	sf	64	cf
Infiltration BMP	Existing	11865 JULIUS	11/13/2006	6515650.173870	6515650.173870	1800309.916770	246079	1032	sf	64	cf
Infiltration BMP	Existing	12129 JULIUS	9/29/2005	6514728.334670	6514728.334670	1798846.683770	246079	1032	sf	64	cf
Infiltration BMP	Existing	9263 KLINEDALE	6/21/2010	6531573.525950	6531573.525950	1804517.918460	245127	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9205 LA REINA	11/27/2006	6525690.537020	6525690.537020	1808255.600740	246103	1032	sf	64	cf
Infiltration BMP	Existing	9251 LA REINA	8/10/2007	6525325.121400	6525325.121400	1807968.316200	246103	1032	sf	64	cf
Infiltration BMP	Existing	9260 LA REINA	6/14/2007	6525343.506110	6525343.506110	1807785.350080	246103	1032	sf	64	cf
Infiltration BMP	Existing	9633 LA REINA	9/24/2007	6524180.010720	6524180.010720	1806496.849820	246103	1032	sf	64	cf
Infiltration BMP	Existing	10026 LA REINA	1/1/2005	6523542.730590	6523542.730590	1805175.247470	246103	1032	sf	64	cf
Infiltration BMP	Existing	10219 LA REINA	5/25/2006	6522978.941790	6522978.941790	1804778.433210	246103	1032	sf	64	cf
Infiltration BMP	Existing	8346 LA VILLA	8/29/2005	6522426.709000	6522426.709000	1801414.465390	245114	1032	sf	64	cf
Infiltration BMP	Existing	9524 LA VILLA	9/27/2005	6527942.492070	6527942.492070	1797972.664540	245119	1032	sf	64	cf
Infiltration BMP	Existing	14305 LAKEWOOD	1/1/2006	6518183.322800	6518183.322800	1787270.059950	245524	1032	sf	64	cf
Infiltration BMP	Existing	8218 LANKIN	3/28/2006	6516908.705740	6516908.705740	1794755.893760	246077	1032	sf	64	cf
Infiltration BMP	Existing	13407 LAURELDALE	10/25/2005	6516128.982330	6516128.982330	1789557.891060	245524	1032	sf	64	cf
Infiltration BMP	Existing	11034 LE FLOSS	3/21/2008	6531318.633350	6531318.633350	1797718.334360	245124	1032	sf	64	cf
Infiltration BMP	Existing	9013 LEMORAN	3/16/2006	6529860.990680	6529860.990680	1806212.694780	245125	1032	sf	64	cf
Infiltration BMP	Existing	10036 LESTERFORD	1/11/2006	6530911.516090	6530911.516090	1801094.347740	245125	1032	sf	64	cf
Infiltration BMP	Existing	8355 LEXINGTON	6/15/2005	6523932.891700	6523932.891700	1804236.927600	246103	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7432 LUBEC	7/8/2005	6519806.105180	6519806.105180	1808430.037290	246111	1032	sf	64	cf
Infiltration BMP	Existing	9318 LUBEC	1/1/2006	6528946.832250	6528946.832250	1803071.454980	245125	1032	sf	64	cf
Infiltration BMP	Existing	7341 LUXOR	9/30/2005	6515165.173860	6515165.173860	1801559.243950	246079	1032	sf	64	cf
Infiltration BMP	Existing	7743 LUXOR	8/18/2006	6517197.964320	6517197.964320	1800308.569440	246079	1032	sf	64	cf
Infiltration BMP	Existing	7809 LUXOR	1/1/2006	6517239.593210	6517239.593210	1799986.863830	246079	1032	sf	64	cf
Infiltration BMP	Existing	7982 LUXOR	7/3/2007	6518306.219270	6518306.219270	1799333.376300	246077	1032	sf	64	cf
Infiltration BMP	Existing	8509 LUXOR	12/31/2008	6521183.510000	6521183.510000	1797885.775000	245114	1032	sf	64	cf
Infiltration BMP	Existing	11505 MAC GOVERN	5/1/2006	6519990.708800	6519990.708800	1799977.759420	245115	1032	sf	64	cf
Infiltration BMP	Existing	11527 MAC GOVERN	11/19/2007	6519889.562820	6519889.562820	1799806.361750	245115	1032	sf	64	cf
Infiltration BMP	Existing	8518 MANATEE	4/27/2005	6521541.591450	6521541.591450	1798287.495050	245114	1032	sf	64	cf
Infiltration BMP	Existing	12306 MARBEL	12/29/2005	6520780.434840	6520780.434840	1794110.003960	245115	1032	sf	64	cf
Infiltration BMP	Existing	12322 MARBEL	8/24/2005	6520697.258530	6520697.258530	1793976.926170	245115	1032	sf	64	cf
Infiltration BMP	Existing	10423 MATTOCK	11/21/2008	6528946.576280	6528946.576280	1799798.739650	245126	1032	sf	64	cf
Infiltration BMP	Existing	10527 MATTOCK	1/11/2007	6528618.163260	6528618.163260	1799183.483330	245126	1032	sf	64	cf
Infiltration BMP	Existing	8602 MEADOW	2/28/2008	6519007.155950	6519007.155950	1793158.643900	245115	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8606 MEADOW	10/26/2006	6519050.372960	6519050.372960	1793129.529230	245115	1032	sf	64	cf
Infiltration BMP	Existing	8739 MEADOW	12/17/2007	6520051.313480	6520051.313480	1792689.390880	245115	1032	sf	64	cf
Infiltration BMP	Existing	9106 MELDAR	4/23/2007	6526980.004600	6526980.004600	1807421.893550	246103	1032	sf	64	cf
Infiltration BMP	Existing	7819 MELVA	1/1/2005	6515811.952890	6515811.952890	1797638.263460	246079	1032	sf	64	cf
Infiltration BMP	Existing	8609 MELVA	4/6/2007	6520260.479750	6520260.479750	1795043.474460	245115	1032	sf	64	cf
Infiltration BMP	Existing	9558 METRO	4/3/2008	6531485.802060	6531485.802060	1804114.777900	245127	1032	sf	64	cf
Infiltration BMP	Existing	11711 MITLA	7/13/2005	6513453.724060	6513453.724060	1802912.278240	246100	1032	sf	64	cf
Infiltration BMP	Existing	11819 MORNING	6/21/2010	6517496.555960	6517496.555960	1799723.226450	246077	1032	sf	64	cf
Infiltration BMP	Existing	12070 MORNING	9/13/2006	6516788.931410	6516788.931410	1797957.975300	246079	1032	sf	64	cf
Infiltration BMP	Existing	8637 MORY	1/1/2005	6520217.929830	6520217.929830	1794453.857040	245115	1032	sf	64	cf
Infiltration BMP	Existing	10903 MYRTLE	10/25/2005	6520809.999180	6520809.999180	1802308.735020	246103	1032	sf	64	cf
Infiltration BMP	Existing	8208 NADA	6/29/2005	6518679.653960	6518679.653960	1797804.552950	245115	1032	sf	64	cf
Infiltration BMP	Existing	8249 NADA	2/12/2008	6519111.183860	6519111.183860	1797730.010570	245115	1032	sf	64	cf
Infiltration BMP	Existing	9458 NANCE	6/20/2005	6526752.832360	6526752.832360	1796717.105850	245119	1032	sf	64	cf
Infiltration BMP	Existing	10609 NEDRA	6/3/2005	6522752.614640	6522752.614640	1802538.434710	246103	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	10850 NEWVILLE	7/3/2007	6528159.933410	6528159.933410	1797635.549950	245119	1032	sf	64	cf
Infiltration BMP	Existing	7510 NOREN	5/23/2006	6520838.348300	6520838.348300	1809064.222230	246111	1032	sf	64	cf
Infiltration BMP	Existing	11720 NORLAIN	9/22/2006	6515696.110230	6515696.110230	1801264.632180	246079	1032	sf	64	cf
Infiltration BMP	Existing	12336 NORLAIN	8/1/2007	6513658.838460	6513658.838460	1797875.767390	246079	1032	sf	64	cf
Infiltration BMP	Existing	11628 OLD RIVER SCHOOL	1/1/2006	6515797.838400	6515797.838400	1801876.521840	246079	1032	sf	64	cf
Infiltration BMP	Existing	8521 ORANGE	3/9/2007	6519427.831130	6519427.831130	1794911.101980	245115	1032	sf	64	cf
Infiltration BMP	Existing	9255 ORIZABA	2/15/2006	6525108.451310	6525108.451310	1808168.208600	246103	1032	sf	64	cf
Infiltration BMP	Existing	9719 ORIZABA	8/8/2007	6523780.810110	6523780.810110	1806377.528150	246103	1032	sf	64	cf
Infiltration BMP	Existing	12615 ORIZABA	1/27/2006	6516062.877730	6516062.877730	1794206.618320	246077	1032	sf	64	cf
Infiltration BMP	Existing	8511 OTTO	4/12/2005	6525130.700850	6525130.700850	1804530.864040	245125	1032	sf	64	cf
Infiltration BMP	Existing	9933 PANGBORN	6/29/2006	6530067.434760	6530067.434760	1801915.181390	245125	1032	sf	64	cf
Infiltration BMP	Existing	10202 PANGBORN	1/1/2006	6529571.236640	6529571.236640	1801045.668670	245125	1032	sf	64	cf
Infiltration BMP	Existing	11009 PANGBORN	1/31/2007	6527339.080190	6527339.080190	1797691.116980	245119	1032	sf	64	cf
Infiltration BMP	Existing	9530 PARAMOUNT	7/14/2005	6523601.663290	6523601.663290	1807461.311510	246103	1032	sf	64	cf
Infiltration BMP	Existing	9624 PARAMOUNT	5/9/2005	6523328.526550	6523328.526550	1807031.980170	246103	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8603 PARROT	3/14/2006	6526080.240790	6526080.240790	1809719.746830	246106	1032	sf	64	cf
Infiltration BMP	Existing	9625 PARROT	1/1/2005	6523451.735380	6523451.735380	1806960.011690	246103	1032	sf	64	cf
Infiltration BMP	Existing	9708 PARROT	6/29/2006	6523491.321500	6523491.321500	1806678.668660	246103	1032	sf	64	cf
Infiltration BMP	Existing	12045 PARROT	6/22/2010	6517861.439330	6517861.439330	1797868.798060	246077	1032	sf	64	cf
Infiltration BMP	Existing	12751 PARROT	12/14/2006	6515222.728500	6515222.728500	1793830.999240	246077	1032	sf	64	cf
Infiltration BMP	Existing	7130 PELLET	1/27/2005	6515276.387650	6515276.387650	1804845.311440	246104	1032	sf	64	cf
Infiltration BMP	Existing	7323 PELLET	1/1/2005	6516571.171210	6516571.171210	1804327.110650	246104	1032	sf	64	cf
Infiltration BMP	Existing	7354 PELLET	1/1/2006	6516665.448760	6516665.448760	1803945.359790	246102	1032	sf	64	cf
Infiltration BMP	Existing	7861 PHLOX	9/17/2007	6518688.116640	6518688.116640	1801430.417420	246079	1032	sf	64	cf
Infiltration BMP	Existing	10620 PICO VISTA	3/7/2007	6529428.403390	6529428.403390	1798283.402620	245126	1032	sf	64	cf
Infiltration BMP	Existing	10635 PICO VISTA	8/28/2007	6529197.816790	6529197.816790	1798270.093070	245126	1032	sf	64	cf
Infiltration BMP	Existing	7530 PIVOT	11/23/2005	6516899.016370	6516899.016370	1802660.318910	246079	1032	sf	64	cf
Infiltration BMP	Existing	7709 PIVOT	10/11/2005	6517859.569570	6517859.569570	1802212.124870	246079	1032	sf	64	cf
Infiltration BMP	Existing	7753 PIVOT	6/14/2005	6518241.212950	6518241.212950	1801966.921690	246079	1032	sf	64	cf
Infiltration BMP	Existing	11974 POMERING	6/18/2010	6515116.938670	6515116.938670	1799645.797070	246079	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8732 PRICHARD ST	1/12/2009	6516786.371080	6516786.371080	1788406.289900	245524	1032	sf	64	cf
Infiltration BMP	Existing	8734 PRICHARD ST	1/12/2009	6516831.574810	6516831.574810	1788380.860770	245524	1032	sf	64	cf
Infiltration BMP	Existing	8738 PRICHARD ST	1/12/2009	6516876.454020	6516876.454020	1788355.597890	245524	1032	sf	64	cf
Infiltration BMP	Existing	8740 PRICHARD ST	1/12/2009	6516921.333860	6516921.333860	1788330.343610	245524	1032	sf	64	cf
Infiltration BMP	Existing	8240 PRISCILLA	9/13/2007	6515555.844810	6515555.844810	1791697.292180	246077	1032	sf	64	cf
Infiltration BMP	Existing	9044 PRISCILLA	8/18/2005	6519169.042140	6519169.042140	1790017.667840	245115	1032	sf	64	cf
Infiltration BMP	Existing	9060 PRISCILLA	6/21/2010	6519318.719160	6519318.719160	1790008.270400	245115	1032	sf	64	cf
Infiltration BMP	Existing	11448 PRUESS	1/1/2006	6518742.114860	6518742.114860	1801046.878700	246077	1032	sf	64	cf
Infiltration BMP	Existing	11609 PRUESS	11/16/2006	6518299.675980	6518299.675980	1800455.121300	246077	1032	sf	64	cf
Infiltration BMP	Existing	11619 PRUESS	6/10/2005	6518270.484730	6518270.484730	1800355.677990	246077	1032	sf	64	cf
Infiltration BMP	Existing	11708 PRUESS	1/18/2005	6518033.994760	6518033.994760	1799832.073440	246077	1032	sf	64	cf
Infiltration BMP	Existing	8121 PURITAN	6/5/2006	6515245.448070	6515245.448070	1792698.037730	246077	1032	sf	64	cf
Infiltration BMP	Existing	7707 QUILL	6/1/2007	6514508.683200	6514508.683200	1796937.770200	246079	1032	sf	64	cf
Infiltration BMP	Existing	8108 QUOIT	6/5/2008	6516594.034560	6516594.034560	1795288.918170	246077	1032	sf	64	cf
Infiltration BMP	Existing	9109 RAVILLER	2/6/2007	6527953.464140	6527953.464140	1804924.402110	245125	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9367 RAVILLER	1/1/2006	6529435.914270	6529435.914270	1803746.913820	245125	1032	sf	64	cf
Infiltration BMP	Existing	9728 RICHEON	6/18/2010	6521201.804800	6521201.804800	1807962.626360	246106	1032	sf	64	cf
Infiltration BMP	Existing	12217 RICHEON	1/1/2005	6514937.033870	6514937.033870	1797986.477150	246079	1032	sf	64	cf
Infiltration BMP	Existing	12336 RICHEON	1/10/2007	6514721.816510	6514721.816510	1797298.695230	246079	1032	sf	64	cf
Infiltration BMP	Existing	12342 RICHEON	1/1/2005	6514694.932100	6514694.932100	1797256.523880	246079	1032	sf	64	cf
Infiltration BMP	Existing	12352 RICHEON	10/30/2008	6514641.834370	6514641.834370	1797172.034360	246079	1032	sf	64	cf
Infiltration BMP	Existing	11010 RIO HONDO	2/6/2006	6514511.989690	6514511.989690	1805412.886430	246104	1032	sf	64	cf
Infiltration BMP	Existing	8515 RIVES	2/6/2006	6524958.575190	6524958.575190	1811619.081610	246111	1032	sf	64	cf
Infiltration BMP	Existing	8546 RIVES	6/14/2010	6524726.063490	6524726.063490	1811337.492550	246106	1032	sf	64	cf
Infiltration BMP	Existing	11828 RIVES	1/1/2006	6517020.372820	6517020.372820	1799741.223590	246079	1032	sf	64	cf
Infiltration BMP	Existing	12056 RIVES	10/7/2005	6516252.097820	6516252.097820	1798479.870770	246079	1032	sf	64	cf
Infiltration BMP	Existing	12213 RIVES	6/7/2007	6515544.034920	6515544.034920	1797794.303030	246079	1032	sf	64	cf
Infiltration BMP	Existing	12301 RIVES	1/27/2006	6515274.134590	6515274.134590	1797373.251430	246079	1032	sf	64	cf
Infiltration BMP	Existing	12542 ROSE	6/18/2010	6520775.320830	6520775.320830	1792425.734550	245115	1032	sf	64	cf
Infiltration BMP	Existing	7444 RUNDELL	9/28/2006	6514195.392880	6514195.392880	1798477.819400	246079	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7458 RUNDELL	1/1/2006	6514328.036950	6514328.036950	1798395.544300	246079	1032	sf	64	cf
Infiltration BMP	Existing	8734 RUPP	5/24/2007	6518769.625610	6518769.625610	1791861.464390	245115	1032	sf	64	cf
Infiltration BMP	Existing	9206 SAMOLINE	9/20/2006	6524105.922670	6524105.922670	1808777.784250	246106	1032	sf	64	cf
Infiltration BMP	Existing	9363 SAMOLINE	2/12/2009	6523342.697990	6523342.697990	1808041.206940	246106	1032	sf	64	cf
Infiltration BMP	Existing	9630 SAMOLINE	1/1/2006	6523000.405210	6523000.405210	1807164.143360	246103	1032	sf	64	cf
Infiltration BMP	Existing	12041 SAMOLINE	6/23/2010	6516971.702030	6516971.702030	1798170.274910	246079	1032	sf	64	cf
Infiltration BMP	Existing	10629 SHELLEYFIELD	6/21/2010	6525284.582980	6525284.582980	1800508.363190	245119	1032	sf	64	cf
Infiltration BMP	Existing	9118 SHERIDELL	6/22/2010	6528683.896100	6528683.896100	1805941.227670	245125	1032	sf	64	cf
Infiltration BMP	Existing	10042 SIDEVIEW	6/21/2010	6529464.806690	6529464.806690	1801729.923910	245125	1032	sf	64	cf
Infiltration BMP	Existing	8349 SIXTH	6/21/2010	6522706.066860	6522706.066860	1802231.249170	245114	1032	sf	64	cf
Infiltration BMP	Existing	8363 SIXTH	6/18/2010	6522832.335670	6522832.335670	1802150.209500	245114	1032	sf	64	cf
Infiltration BMP	Existing	8532 SIXTH	6/23/2010	6523697.106090	6523697.106090	1801388.440460	245119	1032	sf	64	cf
Infiltration BMP	Existing	8514 SMALLWOOD	8/24/2006	6525167.581560	6525167.581560	1811228.866910	246106	1032	sf	64	cf
Infiltration BMP	Existing	12007 SMALLWOOD	1/1/2005	6516682.861570	6516682.861570	1798786.226940	246079	1032	sf	64	cf
Infiltration BMP	Existing	12936 SMALLWOOD	7/31/2006	6513688.714060	6513688.714060	1793540.982580	246077	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9235 SONGFEST	6/14/2006	6531351.855720	6531351.855720	1804709.858310	245127	1032	sf	64	cf
Infiltration BMP	Existing	7939 SPRINGER	10/6/2006	6516193.792450	6516193.792450	1796630.732180	246079	1032	sf	64	cf
Infiltration BMP	Existing	9306 STAMPS	6/21/2010	6525546.826990	6525546.826990	1807197.501010	246103	1032	sf	64	cf
Infiltration BMP	Existing	10446 STAMPS	1/1/2005	6523214.650320	6523214.650320	1803242.228000	246103	1032	sf	64	cf
Infiltration BMP	Existing	10536 STAMPS	6/1/2006	6522871.528480	6522871.528480	1802783.838380	246103	1032	sf	64	cf
Infiltration BMP	Existing	13219 STANBRIDGE	9/17/2007	6522806.618420	6522806.618420	1790045.381220	245114	1032	sf	64	cf
Infiltration BMP	Existing	8723 STEWART & GRAY	2/11/2009	6522100.372490	6522100.372490	1796545.507760	245114	1032	sf	64	cf
Infiltration BMP	Existing	9028 STOAKES	8/17/2007	6527221.634250	6527221.634250	1807951.198320	246103	1032	sf	64	cf
Infiltration BMP	Existing	7809 SUVA	1/13/2009	6522703.875430	6522703.875430	1808490.998990	246106	1032	sf	64	cf
Infiltration BMP	Existing	7827 SUVA	1/1/2006	6522849.829890	6522849.829890	1808368.560310	246106	1032	sf	64	cf
Infiltration BMP	Existing	8564 SUVA	1/1/2006	6526403.328390	6526403.328390	1805373.281490	245125	1032	sf	64	cf
Infiltration BMP	Existing	9943 TECUM	4/11/2008	6519363.349470	6519363.349470	1808047.658450	246111	1032	sf	64	cf
Infiltration BMP	Existing	9636 TELEGRAPH	5/8/2006	6531995.042290	6531995.042290	1804929.677680	245128	1032	sf	64	cf
Infiltration BMP	Existing	7968 THIRD	6/21/2005	6519929.169700	6519929.169700	1802199.016820	246102	1032	sf	64	cf
Infiltration BMP	Existing	9819 TRISTAN	10/7/2005	6526302.584780	6526302.584780	1804524.383680	245125	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9253 TRUE	1/1/2005	6531891.994890	6531891.994890	1804462.821310	245127	1032	sf	64	cf
Infiltration BMP	Existing	8843 TWEEDY	9/12/2006	6524140.679400	6524140.679400	1809940.135780	246106	1032	sf	64	cf
Infiltration BMP	Existing	9012 TWEEDY	1/1/2005	6523977.735950	6523977.735950	1809300.273240	246106	1032	sf	64	cf
Infiltration BMP	Existing	9029 TWEEDY	1/1/2006	6523763.012330	6523763.012330	1809288.681880	246106	1032	sf	64	cf
Infiltration BMP	Existing	9612 TWEEDY	6/22/2010	6522847.016620	6522847.016620	1807449.028980	246106	1032	sf	64	cf
Infiltration BMP	Existing	9636 TWEEDY	10/11/2005	6522732.626430	6522732.626430	1807259.266340	246103	1032	sf	64	cf
Infiltration BMP	Existing	9714 TWEEDY	7/24/2006	6522647.237500	6522647.237500	1807116.822930	246103	1032	sf	64	cf
Infiltration BMP	Existing	9718 TWEEDY	9/22/2008	6522619.325230	6522619.325230	1807068.990310	246103	1032	sf	64	cf
Infiltration BMP	Existing	9730 TWEEDY	6/18/2010	6522565.360970	6522565.360970	1806976.155270	246103	1032	sf	64	cf
Infiltration BMP	Existing	13409 VERDURA	1/1/2006	6516484.588360	6516484.588360	1789346.159960	245524	1032	sf	64	cf
Infiltration BMP	Existing	8607 VIA AMORITA	1/19/2006	6524994.226680	6524994.226680	1803003.226520	245119	1032	sf	64	cf
Infiltration BMP	Existing	9356 VIA AMORITA	4/27/2005	6528170.664540	6528170.664540	1800850.979140	245126	1032	sf	64	cf
Infiltration BMP	Existing	7402 VIA RIO NIDO	2/10/2005	6518371.376580	6518371.376580	1806186.704160	246102	1032	sf	64	cf
Infiltration BMP	Existing	8303 VISTA DEL RIO	5/1/2007	6526003.249760	6526003.249760	1808077.011440	246103	1032	sf	64	cf
Infiltration BMP	Existing	8303 VISTA DEL ROSA	4/26/2007	6526763.242710	6526763.242710	1809159.607970	246106	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8351 VISTA DEL ROSA	12/19/2005	6527091.635630	6527091.635630	1808824.632820	246106	2063	sf	129	cf
Infiltration BMP	Existing	10265 VULTEE	4/24/2006	6525980.530560	6525980.530560	1802568.772980	245119	1032	sf	64	cf
Infiltration BMP	Existing	10339 VULTEE	6/18/2010	6525804.209560	6525804.209560	1802209.879860	245119	1032	sf	64	cf
Infiltration BMP	Existing	12709 VULTEE	3/9/2007	6519587.948000	6519587.948000	1791264.714830	245115	1032	sf	64	cf
Infiltration BMP	Existing	12725 WHITEWOOD	7/26/2005	6520341.668580	6520341.668580	1791179.460770	245115	1032	sf	64	cf
Infiltration BMP	Existing	9702 WILEY BURKE	6/21/2010	6521126.099980	6521126.099980	1808337.656530	246106	1032	sf	64	cf
Infiltration BMP	Existing	9750 WILEY BURKE	12/11/2006	6520822.729060	6520822.729060	1807995.132410	246106	1032	sf	64	cf
Infiltration BMP	Existing	9925 WILEY BURKE	1/10/2007	6520271.299840	6520271.299840	1807447.007570	246106	1032	sf	64	cf
Infiltration BMP	Existing	10540 WILEY BURKE	6/21/2007	6519089.326110	6519089.326110	1805048.306870	246102	1032	sf	64	cf
Infiltration BMP	Existing	10643 WOODRUFF	1/1/2006	6526887.322420	6526887.322420	1799535.375650	245119	1032	sf	64	cf
Infiltration BMP	Existing	7515 YANKEY	10/24/2006	6515115.108440	6515115.108440	1798924.389740	246079	1032	sf	64	cf
Infiltration BMP	Existing	10047 CASANES	1/1/2006	6529512.635540	6529512.635540	1801587.658100	245125	1032	sf	64	cf
Infiltration BMP	Existing	9220 CORD	1/1/2004	6530296.778820	6530296.778820	1804178.901350	245125	1032	sf	64	cf
Infiltration BMP	Existing	10040 MATTOCK	1/1/2006	6530247.042350	6530247.042350	1801200.601240	245125	1032	sf	64	cf
Infiltration BMP	Existing	10018 PANGBORN	1/1/2006	6530084.251260	6530084.251260	1801567.525640	245125	1032	sf	64	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	12053 PATTON	10/19/2004	6520642.037410	6520642.037410	1796050.004800	245115	1032	sf	64	cf
Infiltration BMP	Existing	12048 SAMOLINE	3/20/2007	6517021.712450	6517021.712450	1798014.455830	246079	2063	sf	129	cf
Infiltration BMP	Existing	7879 FLORENCE	2/14/2014	6521700.000000	6521700.000000	1806100.000000	246103	16504	sf	1032	cf
Infiltration BMP	Existing	9020 FIRESTONE	9/12/2008	6524113.023390	6524113.023390	1798572.164290	245119	70288	sf	4393	cf
Infiltration BMP	Existing	7910 FIRESTONE	6/28/2005	6519165.968790	6519165.968790	1801736.513180	246102	55686	sf	3480	cf
Infiltration BMP	Existing	7252 FIRESTONE	5/19/2004	6515489.000650	6515489.000650	1803082.633110	246079	36224	sf	2264	cf
Infiltration BMP	Existing	12256 PARAMOUNT	3/13/2006	6516813.225030	6516813.225030	1796497.685630	246077	34112	sf	2132	cf
Infiltration BMP	Existing	9462 FIRESTONE BL	2/14/2014	6526885.862260	6526885.862260	1797100.585140	245119	35437	sf	2215	cf
Infiltration BMP	Existing	8250 FIRESTONE BLVD	2/14/2014	6521000.000000	6521000.000000	1800300.000000	245115	59085	sf	3693	cf
Infiltration BMP	Existing	8018 TELEGRAPH	8/20/2004	6526800.000000	6526800.000000	1809400.000000	246106	35437	sf	2215	cf
Infiltration BMP	Existing	7447 FIRESTONE BLVD	7/9/2009	6516971.590923	6516971.590923	1803474.089243	246102	43124	sf	2192	cf
Infiltration BMP	Existing	9126 FLORENCE	4/25/2008	6526980.883730	6526980.883730	1802613.015890	245119	29248	sf	1828	cf
Infiltration BMP	Existing	11111 OLD RIVER SCHOOL	6/15/2004	6515500.000000	6515500.000000	1803800.000000	246102	27843	sf	1740	cf
Infiltration BMP	Existing	9634 WASHBURN	5/25/2004	6526574.558590	6526574.558590	1794738.334020	245118	35712	sf	2232	cf
Infiltration BMP	Existing	9475 FIRESTONE	9/20/2004	6527102.470060	6527102.470060	1797292.175990	245119	25078	sf	1567	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9125 IMPERIAL	9/17/2007	6520700.000000	6520700.000000	1792100.000000	245115	53104	sf	3319	cf
Infiltration BMP	Existing	11231 RIVES	4/25/2006	6518392.506170	6518392.506170	1802335.247680	246102	20250	sf	1266	cf
Infiltration BMP	Existing	7936 QUILL	8/23/2006	6515830.400000	6515830.400000	1795880.196930	246079	18984	sf	1187	cf
Infiltration BMP	Existing	8337 FONTANA	8/11/2005	6520206.194620	6520206.194620	1797870.434810	245114	36672	sf	2292	cf
Infiltration BMP	Existing	10225 LESTERFORD	6/22/2010	6530244.844140	6530244.844140	1800567.187010	245126	17718	sf	1107	cf
Infiltration BMP	Existing	7915 FLORENCE	8/11/2009	6522019.025220	6522019.025220	1805973.779210	246103	20192	sf	1262	cf
Infiltration BMP	Existing	11229 PARAMOUNT	3/16/2004	6519482.925030	6519482.925030	1801457.806750	246102	16453	sf	1028	cf
Infiltration BMP	Existing	8103 COLE	5/1/2007	6518213.448370	6518213.448370	1798049.118910	246077	0	sf	0	cf
Infiltration BMP	Existing	8722 BOYNE	7/1/2008	6521213.643060	6521213.643060	1795216.473800	245115	11390	sf	712	cf
Infiltration BMP	Existing	10612 LESTERFORD	6/14/2006	6529218.389270	6529218.389270	1798513.115960	245126	11390	sf	712	cf
Infiltration BMP	Existing	8444 LEXINGTON	4/24/2006	6524361.433930	6524361.433930	1803767.599820	246103	11390	sf	712	cf
Infiltration BMP	Existing	13221 BARLIN	10/10/2006	6516992.431610	6516992.431610	1789646.610200	245524	10125	sf	633	cf
Infiltration BMP	Existing	9611 GARNISH	6/7/2007	6529217.309540	6529217.309540	1803965.758960	245125	10125	sf	633	cf
Infiltration BMP	Existing	7118 PELLET	12/3/2008	6515184.074160	6515184.074160	1804905.113850	246104	10125	sf	633	cf
Infiltration BMP	Existing	9325 RIVES AM	2/14/2014	6522517.375370	6522517.375370	1808878.723180	246111	10125	sf	633	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9371 SUVA	3/13/2007	6529247.009310	6529247.009310	1803484.685240	245125	10125	sf	633	cf
Infiltration BMP	Existing	8556 FLORENCE	1/1/2006	6525137.675720	6525137.675720	1803770.147850	245125	8859	sf	554	cf
Infiltration BMP	Existing	9755 IMPERIAL	3/29/2006	6525700.000000	6525700.000000	1792200.000000	245114	8859	sf	554	cf
Infiltration BMP	Existing	10000 IMPERIAL	3/29/2006	6527246.839530	6527246.839530	1791706.604350	245118	8859	sf	554	cf
Infiltration BMP	Existing	10030 LESTERFORD	6/21/2010	6530953.991420	6530953.991420	1801165.004470	245125	8859	sf	554	cf
Infiltration BMP	Existing	7235 LUXOR	12/12/2005	6514593.326010	6514593.326010	1801941.887350	246079	8859	sf	554	cf
Infiltration BMP	Existing	8115 STEWART & GRAY	3/25/2009	6518648.406750	6518648.406750	1798495.150040	246077	11760	sf	735	cf
Infiltration BMP	Existing	9804 BROOKSHIRE	5/2/2007	6525737.765210	6525737.765210	1805415.750650	246103	7594	sf	475	cf
Infiltration BMP	Existing	7830 DANVERS	12/18/2008	6523967.248740	6523967.248740	1810379.348050	246106	7594	sf	475	cf
Infiltration BMP	Existing	8357 FLORENCE	11/29/2005	6524137.162990	6524137.162990	1804589.285090	246103	7594	sf	475	cf
Infiltration BMP	Existing	8562 FLORENCE	1/1/2006	6525210.620820	6525210.620820	1803736.004200	245125	7594	sf	475	cf
Infiltration BMP	Existing	10735 LAKEWOOD	1/19/2007	6524698.379320	6524698.379320	1800460.893140	245119	8640	sf	540	cf
Infiltration BMP	Existing	9732 ORIZABA	6/5/2008	6523842.356050	6523842.356050	1806158.297200	246103	7594	sf	475	cf
Infiltration BMP	Existing	12066 SAMOLINE	6/18/2010	6517119.562750	6517119.562750	1797806.070750	246079	7594	sf	475	cf
Infiltration BMP	Existing	7711 SECOND	6/21/2010	6518493.103400	6518493.103400	1802942.740750	246102	7594	sf	475	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9517 STOAKES	6/21/2010	6525287.319840	6525287.319840	1806612.266920	246103	7594	sf	475	cf
Infiltration BMP	Existing	12133 ANDERBERG	6/26/2009	6518010.879310	6518010.879310	1796818.463370	245115	6328	sf	396	cf
Infiltration BMP	Existing	9115 BROCK	6/21/2010	6524898.717190	6524898.717190	1808433.166330	246106	6328	sf	396	cf
Infiltration BMP	Existing	9541 CECILIA	6/23/2010	6528302.087900	6528302.087900	1798262.111790	245126	6328	sf	396	cf
Infiltration BMP	Existing	10243 CORD	11/4/2008	6528334.164460	6528334.164460	1801344.678940	245126	6328	sf	396	cf
Infiltration BMP	Existing	13108 CORNUTA	6/21/2010	6525701.475550	6525701.475550	1790449.882450	245113	6328	sf	396	cf
Infiltration BMP	Existing	8129 DACOSTA	8/5/2008	6523736.839560	6523736.839560	1805716.362640	246103	6328	sf	396	cf
Infiltration BMP	Existing	7247 DINWIDDIE	6/22/2010	6515896.418780	6515896.418780	1804170.223670	246104	6328	sf	396	cf
Infiltration BMP	Existing	12002A DOWNEY	8/24/2005	6519100.000000	6519100.000000	1797100.000000	245115	6328	sf	396	cf
Infiltration BMP	Existing	12002C DOWNEY	8/24/2005	6519100.000000	6519100.000000	1797100.000000	245115	6328	sf	396	cf
Infiltration BMP	Existing	8529 EUCALYPTUS	6/18/2010	6519136.171020	6519136.171020	1794210.333930	245115	6328	sf	396	cf
Infiltration BMP	Existing	9204 LA REINA	6/22/2010	6525799.255250	6525799.255250	1808110.827020	246103	6328	sf	396	cf
Infiltration BMP	Existing	9241 LUBEC	6/21/2010	6528410.398740	6528410.398740	1803633.947240	245125	6328	sf	396	cf
Infiltration BMP	Existing	10051 MATTOCK	9/25/2008	6530040.953970	6530040.953970	1801237.222590	245125	6328	sf	396	cf
Infiltration BMP	Existing	12273 PLANETT	6/21/2010	6518942.439290	6518942.439290	1795136.426680	245115	6328	sf	396	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9075 RAVILLER	4/9/2007	6527819.498980	6527819.498980	1805031.907810	245125	6328	sf	396	cf
Infiltration BMP	Existing	7149 ADWEN	5/31/2006	6514275.907390	6514275.907390	1803122.312290	246079	5062	sf	316	cf
Infiltration BMP	Existing	8703 ALAMEDA	9/14/2005	6520830.700880	6520830.700880	1795016.469260	245115	4594	sf	287	cf
Infiltration BMP	Existing	9242 APPLEBY	11/21/2008	6528866.478730	6528866.478730	1804798.824690	245125	5062	sf	316	cf
Infiltration BMP	Existing	9926 BELLDER	3/19/2007	6525715.329050	6525715.329050	1804487.716960	245125	5062	sf	316	cf
Infiltration BMP	Existing	11715 BELLFLOWER	6/15/2009	6523530.688010	6523530.688010	1796655.823230	245114	5062	sf	316	cf
Infiltration BMP	Existing	8019 BERGMAN	10/22/2008	6517711.829130	6517711.829130	1797726.503570	246077	5062	sf	316	cf
Infiltration BMP	Existing	8417 BIGBY	7/23/2007	6523908.146010	6523908.146010	1803525.055670	245119	5062	sf	316	cf
Infiltration BMP	Existing	10004 BIRCHDALE	1/23/2006	6525798.638290	6525798.638290	1803985.957400	245125	5062	sf	316	cf
Infiltration BMP	Existing	9951 BROOKSHIRE	6/18/2010	6525004.036100	6525004.036100	1804835.952720	246103	5062	sf	316	cf
Infiltration BMP	Existing	10927 BROOKSHIRE AV	2/14/2014	6522640.981090	6522640.981090	1800949.695110	245114	5062	sf	316	cf
Infiltration BMP	Existing	10304 CLANCEY	9/19/2008	6526762.243870	6526762.243870	1802017.295250	245119	5062	sf	316	cf
Infiltration BMP	Existing	7213 DINWIDDIE	6/21/2010	6515644.523280	6515644.523280	1804333.457340	246104	5062	sf	316	cf
Infiltration BMP	Existing	9245 DOWNEY	9/19/2007	6525582.317560	6525582.317560	1807792.114420	246103	5062	sf	316	cf
Infiltration BMP	Existing	12002B DOWNEY	8/24/2005	6519100.000000	6519100.000000	1797100.000000	245115	5062	sf	316	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	12002D DOWNEY	8/24/2005	6519100.000000	6519100.000000	1797100.000000	245115	5062	sf	316	cf
Infiltration BMP	Existing	10250 EGLISE AV	2/14/2014	6528202.138900	6528202.138900	1801366.096440	245126	5062	sf	316	cf
Infiltration BMP	Existing	8719 ELMONT	6/18/2010	6526144.563940	6526144.563940	1809393.110180	246106	5062	sf	316	cf
Infiltration BMP	Existing	9355 FLORENCE	7/30/2007	6528769.559400	6528769.559400	1801814.385750	245125	5062	sf	316	cf
Infiltration BMP	Existing	9252 GALLATIN	3/29/2006	6528859.757520	6528859.757520	1804394.594600	245125	5062	sf	316	cf
Infiltration BMP	Existing	9553 GALLATIN	7/28/2004	6530910.776140	6530910.776140	1803037.898220	245125	5062	sf	316	cf
Infiltration BMP	Existing	9724 GARNISH	1/14/2008	6529062.109120	6529062.109120	1803453.035240	245125	5062	sf	316	cf
Infiltration BMP	Existing	8610 GUATEMALA	10/24/2006	6524386.905480	6524386.905480	1811339.167280	246106	5062	sf	316	cf
Infiltration BMP	Existing	10214 HORLEY	8/14/2007	6520372.544870	6520372.544870	1806355.591210	246102	5062	sf	316	cf
Infiltration BMP	Existing	10513 JULIUS	1/22/2009	6518877.932890	6518877.932890	1805532.376750	246102	5062	sf	316	cf
Infiltration BMP	Existing	9204 LA REINA	4/18/2007	6525799.255250	6525799.255250	1808110.827020	246103	5062	sf	316	cf
Infiltration BMP	Existing	9528 LEMORAN	8/29/2008	6529000.799820	6529000.799820	1804066.473220	245125	5062	sf	316	cf
Infiltration BMP	Existing	7334 LUXOR	4/25/2007	6514999.892740	6514999.892740	1801407.207050	246079	5062	sf	316	cf
Infiltration BMP	Existing	9226 MANZANAR	7/8/2005	6526470.419470	6526470.419470	1806685.422630	246103	5062	sf	316	cf
Infiltration BMP	Existing	10524 MATTOCK	2/5/2009	6528788.349750	6528788.349750	1799096.345380	245126	5062	sf	316	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	12123 ORIZABA	12/28/2005	6517943.193960	6517943.193960	1797041.752750	245115	5062	sf	316	cf
Infiltration BMP	Existing	7130 PELLET	6/4/2008	6515276.387650	6515276.387650	1804845.311440	246104	5062	sf	316	cf
Infiltration BMP	Existing	8322 PURITAN	6/14/2007	6516164.281440	6516164.281440	1791774.558840	245524	5062	sf	316	cf
Infiltration BMP	Existing	7312 RIO FLORA	6/18/2010	6516577.089870	6516577.089870	1804589.040390	246104	5062	sf	316	cf
Infiltration BMP	Existing	9331 SAMOLINE	2/17/2006	6523511.819100	6523511.819100	1808307.819060	246106	5062	sf	316	cf
Infiltration BMP	Existing	8015 SEVENTH	8/16/2005	6521322.893520	6521322.893520	1803640.949260	246103	5062	sf	316	cf
Infiltration BMP	Existing	7821 SIXTH	12/6/2005	6519846.881130	6519846.881130	1804004.436800	246102	5062	sf	316	cf
Infiltration BMP	Existing	8409 SIXTH	12/10/2008	6523050.669740	6523050.669740	1802016.668700	245114	5062	sf	316	cf
Infiltration BMP	Existing	9317 STAMPS	1/30/2007	6525356.702810	6525356.702810	1807182.805460	246103	5062	sf	316	cf
Infiltration BMP	Existing	9322 STAMPS	3/16/2006	6525453.602600	6525453.602600	1807062.934260	246103	5062	sf	316	cf
Infiltration BMP	Existing	10443 STAMPS	5/21/2008	6523061.022110	6523061.022110	1803394.248860	246103	5062	sf	316	cf
Infiltration BMP	Existing	10517 STAMPS	6/18/2010	6522812.240000	6522812.240000	1803043.757460	246103	5062	sf	316	cf
Infiltration BMP	Existing	9444 STOAKES	5/22/2007	6525587.983230	6525587.983230	1806625.551490	246103	5062	sf	316	cf
Infiltration BMP	Existing	8329 VISTA DEL RIO	6/18/2010	6526300.133280	6526300.133280	1808123.116520	246103	5062	sf	316	cf
Infiltration BMP	Existing	8368 VISTA DEL RIO	6/1/2007	6526427.553640	6526427.553640	1807729.596630	246103	5062	sf	316	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8543 ALBIA	1/1/2006	6520215.566510	6520215.566510	1795689.212970	245115	3797	sf	237	cf
Infiltration BMP	Existing	7162 BENARES	1/1/2008	6514067.610360	6514067.610360	1802493.217160	246079	3797	sf	237	cf
Infiltration BMP	Existing	12812 BLODGETT	6/8/2009	6518629.647540	6518629.647540	1791208.759970	245115	3797	sf	237	cf
Infiltration BMP	Existing	9503 BROCK AV	2/14/2014	6524115.247920	6524115.247920	1807488.010330	246106	3797	sf	237	cf
Infiltration BMP	Existing	9045 BUCKLES	12/11/2008	6523278.581350	6523278.581350	1796905.300470	245114	3797	sf	237	cf
Infiltration BMP	Existing	10045 CHANEY	7/5/2007	6527656.534860	6527656.534860	1802672.871800	245125	3797	sf	237	cf
Infiltration BMP	Existing	8714 CHEROKEE	5/1/2007	6525056.428300	6525056.428300	1801833.489170	245119	3797	sf	237	cf
Infiltration BMP	Existing	10729 CLANCEY	7/5/2007	6525292.127080	6525292.127080	1799996.460370	245119	3797	sf	237	cf
Infiltration BMP	Existing	8215 COMOLETTE	5/18/2006	6516024.585540	6516024.585540	1792904.896040	246077	3563	sf	223	cf
Infiltration BMP	Existing	7809 DACOSTA	10/5/2007	6521756.096640	6521756.096640	1806979.884160	246106	3797	sf	237	cf
Infiltration BMP	Existing	10424 DOLAN AV	2/14/2014	6523609.999510	6523609.999510	1803226.099470	245119	3797	sf	237	cf
Infiltration BMP	Existing	12337 DUNROBIN	6/21/2010	6524854.924990	6524854.924990	1793158.910710	245114	3797	sf	237	cf
Infiltration BMP	Existing	13234 DUNROBIN	9/30/2005	6525046.618370	6525046.618370	1789885.630870	245114	3797	sf	237	cf
Infiltration BMP	Existing	12612 EASTBROOK	5/30/2006	6525374.680490	6525374.680490	1791988.629320	245114	3797	sf	237	cf
Infiltration BMP	Existing	9400 FLORENCE	7/8/2005	6528900.299250	6528900.299250	1801380.002980	245126	3797	sf	237	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7823 FOURTH PL	9/16/2005	6519381.530610	6519381.530610	1803107.418050	246102	3797	sf	237	cf
Infiltration BMP	Existing	7826 GAINFORD	10/13/2005	6521963.408230	6521963.408230	1806968.662960	246106	3797	sf	237	cf
Infiltration BMP	Existing	7909 GALLATIN	4/27/2006	6523955.572760	6523955.572760	1809190.106160	246106	3797	sf	237	cf
Infiltration BMP	Existing	9118 GARNISH	6/21/2010	6529677.777690	6529677.777690	1805040.238300	245125	3797	sf	237	cf
Infiltration BMP	Existing	12752 GLYNN	6/18/2010	6516929.257070	6516929.257070	1792615.717350	245524	3797	sf	237	cf
Infiltration BMP	Existing	9116 HALEDON	3/2/2006	6528925.738880	6528925.738880	1805732.953010	245125	3797	sf	237	cf
Infiltration BMP	Existing	12819 IBBETSON	11/23/2005	6525827.025010	6525827.025010	1791350.711010	245114	3797	sf	237	cf
Infiltration BMP	Existing	9528 LEMORAN	8/26/2008	6528914.390000	6528914.390000	1804053.870620	245125	3797	sf	237	cf
Infiltration BMP	Existing	10514 LESTERFORD	2/14/2006	6529382.491640	6529382.491640	1798787.162960	245126	3797	sf	237	cf
Infiltration BMP	Existing	9030 LUBEC	2/9/2006	6526996.357320	6526996.357320	1804242.372880	245125	3797	sf	237	cf
Infiltration BMP	Existing	9264 LUBEC	4/19/2006	6528519.099740	6528519.099740	1803331.221940	245125	3797	sf	237	cf
Infiltration BMP	Existing	8545 LUBEC ST	2/14/2014	6525866.355120	6525866.355120	1805123.134500	246103	3797	sf	237	cf
Infiltration BMP	Existing	9247 MANZANAR	10/30/2006	6526227.935330	6526227.935330	1806695.994430	246103	3797	sf	237	cf
Infiltration BMP	Existing	7866 MELVA	6/20/2006	6516126.027390	6516126.027390	1797191.628010	246079	3797	sf	237	cf
Infiltration BMP	Existing	12109 MORNING	5/16/2006	6516408.716280	6516408.716280	1797765.727430	246079	3797	sf	237	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7332 NADA	6/18/2007	6514319.703850	6514319.703850	1800394.247560	246079	3797	sf	237	cf
Infiltration BMP	Existing	7334 NADA	6/18/2007	6514319.703850	6514319.703850	1800394.247560	246079	3797	sf	237	cf
Infiltration BMP	Existing	9821 NEWVILLE	7/30/2007	6530987.438110	6530987.438110	1802116.080780	245125	3797	sf	237	cf
Infiltration BMP	Existing	10268 NEWVILLE	4/24/2007	6529747.604150	6529747.604150	1800228.046080	245126	3797	sf	237	cf
Infiltration BMP	Existing	12280 ORIZABA	6/18/2010	6517505.248620	6517505.248620	1795784.740290	246077	3797	sf	237	cf
Infiltration BMP	Existing	10404 PANGBORN	6/18/2010	6528952.556500	6528952.556500	1800031.154520	245126	3797	sf	237	cf
Infiltration BMP	Existing	12531 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	3797	sf	237	cf
Infiltration BMP	Existing	12537 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	3797	sf	237	cf
Infiltration BMP	Existing	11994 POMERING	2/23/2005	6514993.390330	6514993.390330	1799517.781680	246079	3797	sf	237	cf
Infiltration BMP	Existing	9525 QUINN	2/8/2007	6528803.711540	6528803.711540	1799421.544220	245126	3797	sf	237	cf
Infiltration BMP	Existing	8048 QUOIT	1/21/2009	6516443.407630	6516443.407630	1795348.218010	246077	3797	sf	237	cf
Infiltration BMP	Existing	12326 SAMOLINE	8/29/2008	6516269.535370	6516269.535370	1796118.615320	246077	3797	sf	237	cf
Infiltration BMP	Existing	12504 SMALLWOOD	9/30/2008	6515227.996100	6515227.996100	1795705.820110	246079	3797	sf	237	cf
Infiltration BMP	Existing	9520 STEWART & GRAY	4/10/2008	6526628.650930	6526628.650930	1796061.800920	245118	3797	sf	237	cf
Infiltration BMP	Existing	7411 THIRD	6/2/2006	6517216.302090	6517216.302090	1804140.837740	246102	3797	sf	237	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	12706 WHITEWOOD	9/20/2007	6520505.791550	6520505.791550	1791390.733010	245115	3797	sf	237	cf
Infiltration BMP	Existing	9049 HALL ROAD	2/9/2007	6523684.587500	6523684.587500	1797586.831540	245114	2531	sf	158	cf
Infiltration BMP	Existing	7118 ADWEN	1/27/2006	6513895.884030	6513895.884030	1803086.756410	246100	2531	sf	158	cf
Infiltration BMP	Existing	13202 BARLIN	2/14/2007	6517303.317510	6517303.317510	1789688.349400	245524	2531	sf	158	cf
Infiltration BMP	Existing	10216 BELLMAN	1/5/2009	6525703.110200	6525703.110200	1803293.056930	245119	2531	sf	158	cf
Infiltration BMP	Existing	11809 BELLMAN	2/8/2006	6521732.804620	6521732.804620	1797303.369450	245114	2531	sf	158	cf
Infiltration BMP	Existing	7117 BENARES	8/10/2006	6513814.981610	6513814.981610	1802936.506930	246079	2531	sf	158	cf
Infiltration BMP	Existing	9108 BIGBY	11/23/2005	6526215.785230	6526215.785230	1801649.270450	245119	2531	sf	158	cf
Infiltration BMP	Existing	10213 BIRCHDALE	4/19/2006	6525304.414970	6525304.414970	1803562.084330	245119	2531	sf	158	cf
Infiltration BMP	Existing	9004 BIRCHLEAF	3/7/2007	6527047.235450	6527047.235450	1808159.837050	246103	2531	sf	158	cf
Infiltration BMP	Existing	13126 BLODGETT	8/18/2005	6517829.686700	6517829.686700	1789824.186060	245115	2531	sf	158	cf
Infiltration BMP	Existing	9508 BROCK	2/27/2006	6524228.012180	6524228.012180	1807355.118100	246103	2531	sf	158	cf
Infiltration BMP	Existing	7418 BROOKMILL	7/25/2008	6515791.043440	6515791.043440	1801624.672750	246079	2531	sf	158	cf
Infiltration BMP	Existing	12201 BROOKSHIRE	6/22/2010	6519506.452440	6519506.452440	1795585.950880	245115	2531	sf	158	cf
Infiltration BMP	Existing	7942 BRUNACHE	11/28/2005	6517219.149000	6517219.149000	1798061.073260	246079	2531	sf	158	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9349 CECILIA	9/25/2008	6527282.306940	6527282.306940	1798988.874460	245126	2531	sf	158	cf
Infiltration BMP	Existing	9365 CECILIA	6/18/2010	6527411.791310	6527411.791310	1798910.665650	245126	2531	sf	158	cf
Infiltration BMP	Existing	9608 CECILIA	1/1/2007	6528406.351870	6528406.351870	1798010.127160	245126	2531	sf	158	cf
Infiltration BMP	Existing	9624 CEDARTREE	8/8/2005	6531911.946630	6531911.946630	1804673.812930	245127	2531	sf	158	cf
Infiltration BMP	Existing	8519 CLETA	9/10/2007	6521470.081710	6521470.081710	1798172.541560	245114	2531	sf	158	cf
Infiltration BMP	Existing	7803 CONKLIN	9/2/2005	6513317.560580	6513317.560580	1793980.901190	246077	2297	sf	144	cf
Infiltration BMP	Existing	12816 CORNUTA	10/9/2006	6525701.592160	6525701.592160	1791350.505200	245114	2531	sf	158	cf
Infiltration BMP	Existing	8018 DANVERS	1/26/2009	6524882.345060	6524882.345060	1809453.159850	246106	2531	sf	158	cf
Infiltration BMP	Existing	8517 DEVENIR	10/11/2005	6517399.640210	6517399.640210	1791811.493450	245115	2531	sf	158	cf
Infiltration BMP	Existing	8049 DINSDALE	6/15/2006	6522974.989820	6522974.989820	1805624.556380	246103	2531	sf	158	cf
Infiltration BMP	Existing	9317 DINSDALE	11/5/2008	6528560.545810	6528560.545810	1802232.852640	245125	2531	sf	158	cf
Infiltration BMP	Existing	8510 DONOVAN	7/5/2005	6519046.837890	6519046.837890	1794446.597550	245115	2531	sf	158	cf
Infiltration BMP	Existing	8415 DONOVAN ST	2/14/2014	6518508.946270	6518508.946270	1795018.898890	245115	2531	sf	158	cf
Infiltration BMP	Existing	9635 DOWNEY	7/15/2004	6524420.085960	6524420.085960	1806308.452290	246103	2531	sf	158	cf
Infiltration BMP	Existing	9830 DOWNEY	1/1/2006	6524176.121770	6524176.121770	1805651.929490	246103	2531	sf	158	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	12718 DOWNEY	8/30/2007	6516814.229160	6516814.229160	1793075.140590	245524	2531	sf	158	cf
Infiltration BMP	Existing	12650 DUNROBIN	7/27/2007	6525045.587920	6525045.587920	1791614.482510	245114	2531	sf	158	cf
Infiltration BMP	Existing	9067 EGLISE	9/30/2005	6530265.716940	6530265.716940	1805184.414240	245127	2531	sf	158	cf
Infiltration BMP	Existing	9131 EGLISE	1/16/2009	6529904.336320	6529904.336320	1804464.041860	245125	2531	sf	158	cf
Infiltration BMP	Existing	8573 ELEVENTH	4/24/2006	6525253.900610	6525253.900610	1803595.328980	245119	2531	sf	158	cf
Infiltration BMP	Existing	9061 FARM ST	2/14/2014	6526099.027600	6526099.027600	1801582.141470	245119	2531	sf	158	cf
Infiltration BMP	Existing	7936 FOURTH	1/26/2006	6520005.666040	6520005.666040	1802880.634680	246103	2531	sf	158	cf
Infiltration BMP	Existing	7829 FOURTH PL	2/14/2014	6519381.530610	6519381.530610	1803107.418050	246102	2531	sf	158	cf
Infiltration BMP	Existing	7528 GAINFORD	6/18/2010	6520331.076350	6520331.076350	1807734.704270	246106	1266	sf	79	cf
Infiltration BMP	Existing	8150 GALLATIN	1/14/2008	6524851.065410	6524851.065410	1807922.731550	246103	2531	sf	158	cf
Infiltration BMP	Existing	9068 GALLATIN	7/18/2005	6527754.167230	6527754.167230	1805244.499940	245125	2531	sf	158	cf
Infiltration BMP	Existing	12703 GLENSHIRE	8/18/2006	6520090.968440	6520090.968440	1791341.816710	245115	2531	sf	158	cf
Infiltration BMP	Existing	8703 GUATEMALA	6/18/2010	6523747.929510	6523747.929510	1811239.685330	246111	2531	sf	158	cf
Infiltration BMP	Existing	9903 GUATEMALA	6/21/2010	6519189.043810	6519189.043810	1808530.913060	246111	2531	sf	158	cf
Infiltration BMP	Existing	9208 HALEDON	3/29/2007	6528788.981770	6528788.981770	1805412.621690	245125	2531	sf	158	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9083 HALL	12/8/2005	6524025.781090	6524025.781090	1797583.104370	245114	2531	sf	158	cf
Infiltration BMP	Existing	10348 HASTY	9/14/2006	6528480.545700	6528480.545700	1800482.839460	245126	2531	sf	158	cf
Infiltration BMP	Existing	7844 HONDO	7/8/2005	6515417.898670	6515417.898670	1796530.778030	246079	2531	sf	158	cf
Infiltration BMP	Existing	9244 HORLEY	6/22/2006	6522498.248530	6522498.248530	1809199.750130	246111	2531	sf	158	cf
Infiltration BMP	Existing	12612 IBBETSON	2/9/2007	6526008.655610	6526008.655610	1792000.536540	245114	2531	sf	158	cf
Infiltration BMP	Existing	7214 IRWINGROVE	8/17/2007	6517736.835580	6517736.835580	1807424.228480	246104	2531	sf	158	cf
Infiltration BMP	Existing	10209 JULIUS	6/21/2010	6519702.452650	6519702.452650	1806880.883230	246102	2531	sf	158	cf
Infiltration BMP	Existing	10341 JULIUS	6/4/2008	6519700.000000	6519700.000000	1806100.000000	246102	2531	sf	158	cf
Infiltration BMP	Existing	12313 JULIUS	6/21/2010	6514155.209020	6514155.209020	1797936.932020	246079	2531	sf	158	cf
Infiltration BMP	Existing	7944 KINGBEE	5/31/2007	6516311.045420	6516311.045420	1796702.710410	246079	2531	sf	158	cf
Infiltration BMP	Existing	9605 LA REINA	6/18/2010	6524325.141120	6524325.141120	1806744.664340	246103	2531	sf	158	cf
Infiltration BMP	Existing	10074 LESTERFORD	4/12/2006	6530716.286370	6530716.286370	1800772.683680	245125	2531	sf	158	cf
Infiltration BMP	Existing	9626 LUBEC	6/21/2005	6530889.535260	6530889.535260	1801910.718740	245125	2531	sf	158	cf
Infiltration BMP	Existing	7156 LUXOR	10/28/2005	6513800.826420	6513800.826420	1802169.595300	246100	2531	sf	158	cf
Infiltration BMP	Existing	9202 MANZANAR	4/13/2004	6526663.177850	6526663.177850	1806830.315690	246103	2531	sf	158	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9020 MARGARET	10/2/2006	6523822.925930	6523822.925930	1798066.530690	245114	2531	sf	158	cf
Infiltration BMP	Existing	9127 MELDAR	4/29/2004	6526710.714590	6526710.714590	1807437.827920	246103	2531	sf	158	cf
Infiltration BMP	Existing	11814 MORNING	9/2/2005	6517648.916460	6517648.916460	1799680.107480	246077	2531	sf	158	cf
Infiltration BMP	Existing	7440 MULLER	11/7/2006	6518162.654940	6518162.654940	1805120.460880	246102	2531	sf	158	cf
Infiltration BMP	Existing	12334 ORIZABA	5/5/2005	6517231.678930	6517231.678930	1795384.927500	246077	2531	sf	158	cf
Infiltration BMP	Existing	9311 OTTO	2/2/2008	6528809.245500	6528809.245500	1802513.951810	245125	2531	sf	158	cf
Infiltration BMP	Existing	10436 PANGBORN	7/6/2006	6528781.443840	6528781.443840	1799746.387720	245126	2531	sf	158	cf
Infiltration BMP	Existing	12533 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	12531 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	12531 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	12533 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	12533 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	12533 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	12535 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	12535 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	12535 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	12535 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	12537 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	12537 PARAMOUNT	9/11/2003	6515510.297280	6515510.297280	1795114.190420	246079	2531	sf	158	cf
Infiltration BMP	Existing	9008 PARROT	6/22/2010	6524997.125330	6524997.125330	1808680.720210	246106	2531	sf	158	cf
Infiltration BMP	Existing	9530 PARROT	10/11/2006	6523866.950960	6523866.950960	1807305.627380	246103	2531	sf	158	cf
Infiltration BMP	Existing	7125 PELLET	11/21/2005	6515366.521160	6515366.521160	1805107.133170	246104	2531	sf	158	cf
Infiltration BMP	Existing	7335 PELLET	2/15/2007	6516661.302200	6516661.302200	1804268.401510	246104	2531	sf	158	cf
Infiltration BMP	Existing	7348 PELLET	6/22/2010	6516619.400060	6516619.400060	1803975.379460	246102	2531	sf	158	cf
Infiltration BMP	Existing	10433 PICO VISTA	6/21/2010	6529704.381130	6529704.381130	1799155.408730	245126	2531	sf	158	cf
Infiltration BMP	Existing	7629 PIVOT	6/4/2008	6517523.064870	6517523.064870	1802428.507060	246079	2531	sf	158	cf
Infiltration BMP	Existing	11962 POMERING	2/24/2006	6515175.131420	6515175.131420	1799743.806870	246079	2531	sf	158	cf
Infiltration BMP	Existing	8133 PRISCILLA	6/22/2010	6515078.400000	6515078.400000	1792153.440000	246077	2531	sf	158	cf
Infiltration BMP	Existing	7603 QUILL	2/28/2007	6514155.935840	6514155.935840	1797151.984960	246079	2531	sf	158	cf
Infiltration BMP	Existing	11539 RICHEON	7/8/2005	6517174.382020	6517174.382020	1801464.078770	246079	2531	sf	158	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	6545 RIVERGROVE	10/11/2005	6520696.757140	6520696.757140	1811248.378990	246111	2531	sf	158	cf
Infiltration BMP	Existing	9320 SAMOLINE	11/3/2006	6523716.410960	6523716.410960	1808296.703240	246106	2531	sf	158	cf
Infiltration BMP	Existing	9602 SAMOLINE	11/23/2005	6523146.135200	6523146.135200	1807399.732010	246103	2531	sf	158	cf
Infiltration BMP	Existing	12015 SAMOLINE	9/29/2008	6517129.601540	6517129.601540	1798409.043860	246079	2531	sf	158	cf
Infiltration BMP	Existing	12048 SAMOLINE	6/22/2010	6517021.712450	6517021.712450	1798014.455830	246079	2531	sf	158	cf
Infiltration BMP	Existing	7962 SECOND	10/3/2007	6519694.108620	6519694.108620	1801968.426700	246102	2531	sf	158	cf
Infiltration BMP	Existing	7712 SEVERY ST	1/1/2008	6524575.222650	6524575.222650	1807124.160130	246103	2531	sf	158	cf
Infiltration BMP	Existing	7331 SHADYOAK	1/16/2009	6521597.847660	6521597.847660	1810725.646550	246111	2531	sf	158	cf
Infiltration BMP	Existing	9103 SHERIDELL	10/29/2007	6528594.889520	6528594.889520	1806159.584670	245125	2531	sf	158	cf
Infiltration BMP	Existing	8345 SIXTH	4/23/2008	6522663.428460	6522663.428460	1802257.170290	245114	2531	sf	158	cf
Infiltration BMP	Existing	9124 STOAKES	4/29/2004	6526659.033140	6526659.033140	1807538.875170	246103	2531	sf	158	cf
Infiltration BMP	Existing	9906 TECUM	8/26/2008	6519710.324270	6519710.324270	1808196.223590	246111	2531	sf	158	cf
Infiltration BMP	Existing	9520 TELEGRAPH	12/4/2008	6531301.476840	6531301.476840	1805512.099740	245127	2531	sf	158	cf
Infiltration BMP	Existing	8302 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	1840	sf	115	cf
Infiltration BMP	Existing	8304 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8306 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8308 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8310 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8312 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8314 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8316 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8318 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8320 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8322 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8324 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8326 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8328 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8330 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8332 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8334 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8336 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8338 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8340 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8342 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8344 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8346 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8348 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8350 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	8352 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	2531	sf	158	cf
Infiltration BMP	Existing	7438 THIRD	11/10/2005	6517353.808450	6517353.808450	1803828.489190	246102	2531	sf	158	cf
Infiltration BMP	Existing	7955 THIRD	1/30/2006	6519871.299810	6519871.299810	1802440.525110	246103	2531	sf	158	cf
Infiltration BMP	Existing	9819 TRISTAN	11/19/2007	6526302.584780	6526302.584780	1804524.383680	245125	2531	sf	158	cf
Infiltration BMP	Existing	8555 VIA AMORITA	10/27/2008	6524751.467620	6524751.467620	1803150.610950	245119	2531	sf	158	cf
Infiltration BMP	Existing	9631 WILEY BURKE	3/27/2006	6521095.475640	6521095.475640	1808618.175130	246106	2531	sf	158	cf
Infiltration BMP	Existing	10419 WILEY BURKE	3/7/2008	6519382.492080	6519382.492080	1805731.311650	246102	2531	sf	158	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7319 ADWEN	2/22/2006	6515346.754980	6515346.754980	1802425.342900	246079	1266	sf	79	cf
Infiltration BMP	Existing	13033 AIRPOINT	6/14/2010	6517837.198260	6517837.198260	1790420.981040	245115	1266	sf	79	cf
Infiltration BMP	Existing	8446 ALAMEDA	6/24/2005	6519341.878190	6519341.878190	1795502.737620	245115	1266	sf	79	cf
Infiltration BMP	Existing	9336 APPLEBY	3/9/2006	6529377.514420	6529377.514420	1804389.744220	245125	1266	sf	79	cf
Infiltration BMP	Existing	9540 ARDINE	1/1/2006	6527800.346060	6527800.346060	1797420.079620	245119	1266	sf	79	cf
Infiltration BMP	Existing	7849 ARNETT	7/8/2005	6518395.700160	6518395.700160	1801138.921810	246079	1266	sf	79	cf
Infiltration BMP	Existing	8645 BAYSINGER	11/10/2005	6525612.031290	6525612.031290	1803108.706240	245119	1266	sf	79	cf
Infiltration BMP	Existing	9210 BELCHER	10/12/2006	6519891.840050	6519891.840050	1789806.904790	245115	1266	sf	79	cf
Infiltration BMP	Existing	9245 BELCHER	9/4/2007	6520247.532430	6520247.532430	1789967.036150	245115	1266	sf	79	cf
Infiltration BMP	Existing	10234 BELCHER	6/18/2010	6527119.239350	6527119.239350	1789810.183210	245113	1266	sf	79	cf
Infiltration BMP	Existing	10285 BELCHER	6/21/2010	6527612.081010	6527612.081010	1789959.646450	245118	1266	sf	79	cf
Infiltration BMP	Existing	10028 BELLDER	1/1/2006	6525360.965940	6525360.965940	1803913.208580	245125	1266	sf	79	cf
Infiltration BMP	Existing	10304 BELLMAN	6/1/2005	6525418.498520	6525418.498520	1803041.069680	245119	1266	sf	79	cf
Infiltration BMP	Existing	11014 BENFIELD	6/24/2008	6531918.630750	6531918.630750	1797937.959120	245122	1266	sf	79	cf
Infiltration BMP	Existing	9324 BIRCHBARK	10/7/2005	6524879.129350	6524879.129350	1807661.831210	246103	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7847 BLANDWOOD	6/29/2006	6525016.522210	6525016.522210	1811074.341940	246106	1266	sf	79	cf
Infiltration BMP	Existing	8415 BORSON	10/9/2006	6517421.536650	6517421.536650	1792735.849280	245115	1266	sf	79	cf
Infiltration BMP	Existing	8710 BOYNE	6/29/2006	6521119.595500	6521119.595500	1795272.757840	245115	1266	sf	79	cf
Infiltration BMP	Existing	8910 BROCK	2/3/2009	6525582.226600	6525582.226600	1808734.892600	246106	1266	sf	79	cf
Infiltration BMP	Existing	9702 BROCK	9/25/2006	6523765.203820	6523765.203820	1806580.253440	246103	1266	sf	79	cf
Infiltration BMP	Existing	9730 BROCK	10/16/2009	6523625.354460	6523625.354460	1806340.478590	246103	1266	sf	79	cf
Infiltration BMP	Existing	7550 BROOKMILL	9/25/2006	6516432.435790	6516432.435790	1801137.496710	246079	1266	sf	79	cf
Infiltration BMP	Existing	10360 BROOKSHIRE	8/2/2005	6524254.056510	6524254.056510	1803200.425100	245119	1266	sf	79	cf
Infiltration BMP	Existing	9336 BUELL	5/4/2007	6527241.052050	6527241.052050	1799190.479610	245126	1266	sf	79	cf
Infiltration BMP	Existing	9408 BUELL	1/1/2007	6527563.840160	6527563.840160	1798993.546660	245126	1266	sf	79	cf
Infiltration BMP	Existing	10210 CASANES	7/20/2005	6529273.829610	6529273.829610	1801143.143100	245125	1266	sf	79	cf
Infiltration BMP	Existing	10308 CASANES	6/9/2005	6528827.020030	6528827.020030	1800415.364480	245126	1266	sf	79	cf
Infiltration BMP	Existing	10845 CASANES	12/4/2007	6527288.943480	6527288.943480	1798213.890680	245119	1266	sf	79	cf
Infiltration BMP	Existing	10922 CASANES	8/3/2005	6527279.490710	6527279.490710	1797849.792160	245119	1266	sf	79	cf
Infiltration BMP	Existing	8715 CAVEL	6/22/2010	6521261.550160	6521261.550160	1795688.489420	245115	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9707 CEDARTREE	5/25/2006	6532283.863380	6532283.863380	1804587.051690	245127	1266	sf	79	cf
Infiltration BMP	Existing	10260 CHANEY	6/21/2010	6527337.911630	6527337.911630	1801874.691650	245119	1266	sf	79	cf
Infiltration BMP	Existing	10362 CHANEY	9/4/2007	6526983.558290	6526983.558290	1801306.071650	245119	1266	sf	79	cf
Infiltration BMP	Existing	9246 CLANCEY	5/1/2007	6528479.118010	6528479.118010	1805448.947460	245125	1266	sf	79	cf
Infiltration BMP	Existing	10546 CLANCEY	5/26/2005	6525904.831900	6525904.831900	1800674.595520	245119	1266	sf	79	cf
Infiltration BMP	Existing	12658 COLDBROOK	6/25/2009	6524501.637760	6524501.637760	1791525.543010	245114	1266	sf	79	cf
Infiltration BMP	Existing	8111 COMOLETTE	12/18/2006	6515465.796840	6515465.796840	1793242.397990	246077	1266	sf	79	cf
Infiltration BMP	Existing	8140 COMOLETTE	12/2/2008	6515640.775000	6515640.775000	1792943.865000	246077	1266	sf	79	cf
Infiltration BMP	Existing	8316 COMOLETTE	5/23/2005	6516475.681440	6516475.681440	1792370.081790	245524	1266	sf	79	cf
Infiltration BMP	Existing	9325 CORD	3/21/2008	6529940.912480	6529940.912480	1803762.584020	245125	1266	sf	79	cf
Infiltration BMP	Existing	7732 COREY	1/8/2009	6515481.796500	6515481.796500	1798137.416600	246079	1266	sf	79	cf
Infiltration BMP	Existing	11810 CORRIGAN	3/4/2009	6523411.287590	6523411.287590	1796210.739300	245114	1266	sf	79	cf
Infiltration BMP	Existing	10925 CROSSDALE	6/9/2005	6532012.125130	6532012.125130	1798163.740010	245122	1266	sf	79	cf
Infiltration BMP	Existing	7757 DACOSTA	6/7/2005	6521506.383470	6521506.383470	1807138.583520	246106	1266	sf	79	cf
Infiltration BMP	Existing	8324 DAVIS	6/15/2005	6520852.481770	6520852.481770	1799213.987880	245114	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8517 DEVENIR	2/19/2008	6517399.640210	6517399.640210	1791811.493450	245115	1266	sf	79	cf
Infiltration BMP	Existing	7345 DINSDALE	9/29/2005	6519203.299320	6519203.299320	1808002.090250	246111	1266	sf	79	cf
Infiltration BMP	Existing	8330 DINSDALE	6/21/2010	6524002.238290	6524002.238290	1804838.107610	246103	1266	sf	79	cf
Infiltration BMP	Existing	10340 DOLAN	8/15/2007	6523856.967630	6523856.967630	1803630.622810	245119	1266	sf	79	cf
Infiltration BMP	Existing	12260 DOLAN	4/5/2006	6518910.565000	6518910.565000	1795264.305000	245115	1266	sf	79	cf
Infiltration BMP	Existing	12521 DOLAN	7/19/2007	6517914.404040	6517914.404040	1794175.419610	245115	1266	sf	79	cf
Infiltration BMP	Existing	12621 DOLAN	8/17/2007	6517501.190610	6517501.190610	1793293.644730	245115	1266	sf	79	cf
Infiltration BMP	Existing	12308 DOWNEY	4/19/2007	6518251.608680	6518251.608680	1795363.261670	245115	1266	sf	79	cf
Infiltration BMP	Existing	12532 DOWNEY	10/11/2005	6517442.718730	6517442.718730	1794104.887260	245115	1266	sf	79	cf
Infiltration BMP	Existing	12820 DOWNEY	5/17/2007	6516486.923440	6516486.923440	1792584.707230	245524	1266	sf	79	cf
Infiltration BMP	Existing	12603 DUNROBIN	6/22/2010	6524864.880980	6524864.880980	1792095.613000	245114	1266	sf	79	cf
Infiltration BMP	Existing	12643 DUNROBIN	11/21/2006	6524865.889210	6524865.889210	1791696.268120	245114	1266	sf	79	cf
Infiltration BMP	Existing	12818 DUNROBIN	12/15/2006	6525044.191110	6525044.191110	1791331.787300	245114	1266	sf	79	cf
Infiltration BMP	Existing	12823 DUNROBIN	2/12/2008	6524866.593650	6524866.593650	1791299.463030	245114	1266	sf	79	cf
Infiltration BMP	Existing	13024 DUNROBIN	5/24/2005	6525048.058670	6525048.058670	1790633.750860	245114	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	13240 DUNROBIN	10/1/2008	6525046.731200	6525046.731200	1789833.348360	245114	1266	sf	79	cf
Infiltration BMP	Existing	13638 EARNSHAW	9/16/2005	6516330.576340	6516330.576340	1788317.037630	245524	1266	sf	79	cf
Infiltration BMP	Existing	12155 EASTBROOK	9/16/2005	6525128.882510	6525128.882510	1794289.182720	245114	2297	sf	144	cf
Infiltration BMP	Existing	9125 EGLISE	1/24/2007	6529928.564580	6529928.564580	1804520.963270	245125	1266	sf	79	cf
Infiltration BMP	Existing	10213 EGLISE	10/14/2008	6528271.447820	6528271.447820	1801803.093100	245126	1266	sf	79	cf
Infiltration BMP	Existing	8331 EVEREST	2/21/2007	6517984.856770	6517984.856770	1794526.994330	245115	1266	sf	79	cf
Infiltration BMP	Existing	9037 FARM	6/18/2010	6525882.141210	6525882.141210	1801714.480720	245119	1266	sf	79	cf
Infiltration BMP	Existing	9542 FARM	11/15/2005	6529019.221950	6529019.221950	1799423.700160	245126	1266	sf	79	cf
Infiltration BMP	Existing	8445 FIFTH	6/24/2005	6523180.907390	6523180.907390	1801530.163340	245114	1266	sf	79	cf
Infiltration BMP	Existing	8529 FIFTH	9/23/2005	6523578.003250	6523578.003250	1801288.543780	245114	1266	sf	79	cf
Infiltration BMP	Existing	9221 FOSTER	2/16/2008	6519835.324440	6519835.324440	1789377.664880	245115	1266	sf	79	cf
Infiltration BMP	Existing	9303 FOSTER	8/9/2006	6520280.515660	6520280.515660	1789513.941670	245115	1266	sf	79	cf
Infiltration BMP	Existing	9536 FOSTORIA	10/13/2005	6527900.524680	6527900.524680	1797686.001250	245119	1266	sf	79	cf
Infiltration BMP	Existing	7339 GAINFORD	11/5/2007	6519739.997490	6519739.997490	1808338.936030	246111	1266	sf	79	cf
Infiltration BMP	Existing	8426 GAINFORD	1/7/2008	6524961.213810	6524961.213810	1805124.602410	246103	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	9315 GAINFORD	7/5/2005	6528715.710300	6528715.710300	1803034.881460	245125	1266	sf	79	cf
Infiltration BMP	Existing	9641 GAINFORD	10/16/2006	6530976.949360	6530976.949360	1801752.372100	245125	1266	sf	79	cf
Infiltration BMP	Existing	9357 GALLATIN	4/17/2006	6529509.957360	6529509.957360	1804133.004270	245125	1266	sf	79	cf
Infiltration BMP	Existing	8411 GALT	7/18/2007	6520931.662600	6520931.662600	1798681.676310	245114	1266	sf	79	cf
Infiltration BMP	Existing	8125 GARDENDALE	10/3/2007	6514840.842010	6514840.842010	1791988.219650	246077	1266	sf	79	cf
Infiltration BMP	Existing	7553 GLENCLIFF	11/5/2008	6521939.189570	6521939.189570	1809565.009220	246111	1266	sf	79	cf
Infiltration BMP	Existing	12615 GURLEY	9/8/2008	6516705.632650	6516705.632650	1793818.816440	246077	1266	sf	79	cf
Infiltration BMP	Existing	10557 HALEDON	3/22/2006	6525946.687500	6525946.687500	1800529.637640	245119	1266	sf	79	cf
Infiltration BMP	Existing	10714 HALEDON	7/11/2008	6525734.412480	6525734.412480	1799854.605530	245119	1266	sf	79	cf
Infiltration BMP	Existing	9101 HALL	7/19/2007	6524088.768660	6524088.768660	1797585.986810	245114	1266	sf	79	cf
Infiltration BMP	Existing	7416 HONDO	11/21/2007	6513414.170490	6513414.170490	1797767.919490	246079	1266	sf	79	cf
Infiltration BMP	Existing	7927 HONDO	1/8/2007	6515926.722240	6515926.722240	1796435.751150	246079	1266	sf	79	cf
Infiltration BMP	Existing	9228 HORLEY	7/20/2005	6522584.029360	6522584.029360	1809343.702000	246111	1266	sf	79	cf
Infiltration BMP	Existing	9929 HORLEY	6/23/2005	6520827.895940	6520827.895940	1807104.698370	246106	1266	sf	79	cf
Infiltration BMP	Existing	12316 HORLEY	1/1/2007	6515085.680000	6515085.680000	1797312.060000	246079	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	11544 HORTON	5/1/2006	6517050.314050	6517050.314050	1801482.158860	246079	1266	sf	79	cf
Infiltration BMP	Existing	12619 IBBETSON	12/26/2007	6525826.717640	6525826.717640	1791950.694670	245114	1266	sf	79	cf
Infiltration BMP	Existing	12816 IBBETSON	11/23/2005	6526008.922590	6526008.922590	1791350.504040	245114	1266	sf	79	cf
Infiltration BMP	Existing	9030 IOWA	8/29/2007	6523719.000250	6523719.000250	1797706.215730	245114	1266	sf	79	cf
Infiltration BMP	Existing	9036 IOWA	1/23/2006	6523761.535660	6523761.535660	1797679.990250	245114	1266	sf	79	cf
Infiltration BMP	Existing	7214 IRWINGROVE	2/7/2008	6517736.835580	6517736.835580	1807424.228480	246104	1266	sf	79	cf
Infiltration BMP	Existing	7425 IRWINGROVE	11/22/2005	6519037.305040	6519037.305040	1806826.286520	246102	1266	sf	79	cf
Infiltration BMP	Existing	7431 IVO	5/23/2005	6520452.019960	6520452.019960	1808862.657860	246106	1266	sf	79	cf
Infiltration BMP	Existing	12258 IZETTA	11/19/2008	6524718.529730	6524718.529730	1793607.751080	245114	1266	sf	79	cf
Infiltration BMP	Existing	11427 JULIUS	10/6/2005	6517068.729490	6517068.729490	1802337.821610	246079	1266	sf	79	cf
Infiltration BMP	Existing	7863 KINGBEE	6/2/2005	6515998.395150	6515998.395150	1797104.463380	246079	1266	sf	79	cf
Infiltration BMP	Existing	10633 LA REINA	6/7/2005	6521844.406030	6521844.406030	1802801.159980	246103	1266	sf	79	cf
Infiltration BMP	Existing	10726 LA REINA	9/20/2005	6521763.725850	6521763.725850	1802369.001800	246103	1266	sf	79	cf
Infiltration BMP	Existing	10717 LAKEWOOD	1/1/2005	6524762.764130	6524762.764130	1800632.321080	245119	1266	sf	79	cf
Infiltration BMP	Existing	13229 LAKEWOOD	8/30/2005	6518145.854860	6518145.854860	1789091.323220	245115	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8248 LANKIN	5/16/2007	6517152.534650	6517152.534650	1794608.293130	246077	1266	sf	79	cf
Infiltration BMP	Existing	13413 LAURELDALE	9/4/2007	6516097.983610	6516097.983610	1789503.029570	245524	1266	sf	79	cf
Infiltration BMP	Existing	9040 LEMORAN	9/16/2005	6529896.207920	6529896.207920	1805874.052840	245125	1266	sf	79	cf
Infiltration BMP	Existing	10225 LESTERFORD	12/22/2005	6530244.844140	6530244.844140	1800567.187010	245126	1266	sf	79	cf
Infiltration BMP	Existing	10415 LESTERFORD	6/22/2010	6529502.521580	6529502.521580	1799500.525910	245126	1266	sf	79	cf
Infiltration BMP	Existing	10730 LESTERFORD	6/8/2005	6528927.837490	6528927.837490	1798058.051080	245126	1266	sf	79	cf
Infiltration BMP	Existing	8020 LUBEC	3/8/2007	6523117.786070	6523117.786070	1806398.918760	246103	1266	sf	79	cf
Infiltration BMP	Existing	9230 LUBEC	9/30/2005	6528205.943320	6528205.943320	1803519.420650	245125	1266	sf	79	cf
Infiltration BMP	Existing	7259 LUXOR	1/1/2007	6514801.884280	6514801.884280	1801808.218080	246079	1266	sf	79	cf
Infiltration BMP	Existing	7315 LUXOR	3/16/2006	6514953.117040	6514953.117040	1801695.155730	246079	1266	sf	79	cf
Infiltration BMP	Existing	8444 LUXOR	11/10/2005	6520775.356850	6520775.356850	1797851.842110	245114	1266	sf	79	cf
Infiltration BMP	Existing	9102 MANZANAR	7/20/2005	6527192.246670	6527192.246670	1807219.965690	246103	1266	sf	79	cf
Infiltration BMP	Existing	10434 MANZANAR	6/7/2005	6523771.930100	6523771.930100	1803007.033470	245119	1266	sf	79	cf
Infiltration BMP	Existing	11109 MARBEL	7/20/2006	6523692.717760	6523692.717760	1799490.635090	245119	1266	sf	79	cf
Infiltration BMP	Existing	12108 MARBEL	1/31/2006	6521445.538760	6521445.538760	1795214.942010	245115	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7830 MELVA	1/1/2006	6515802.415360	6515802.415360	1797387.108860	246079	1266	sf	79	cf
Infiltration BMP	Existing	7844 MELVA	1/5/2006	6515910.196660	6515910.196660	1797321.983490	246079	1266	sf	79	cf
Infiltration BMP	Existing	12120 MORNING	8/14/2008	6516533.621320	6516533.621320	1797558.681060	246079	1266	sf	79	cf
Infiltration BMP	Existing	7339 NADA	7/8/2005	6514489.286480	6514489.286480	1800567.411080	246079	1266	sf	79	cf
Infiltration BMP	Existing	7351 NADA	6/23/2008	6514590.536380	6514590.536380	1800503.774190	246079	1266	sf	79	cf
Infiltration BMP	Existing	8202 NADA	1/9/2006	6518631.371590	6518631.371590	1797835.542430	245115	1266	sf	79	cf
Infiltration BMP	Existing	7415 NOREN	7/26/2005	6520794.671000	6520794.671000	1809286.272790	246111	1266	sf	79	cf
Infiltration BMP	Existing	9921 NORLAIN	11/3/2008	6519614.140210	6519614.140210	1807835.435830	246111	1266	sf	79	cf
Infiltration BMP	Existing	8127 ORANGE	6/23/2010	6517401.744430	6517401.744430	1796403.841780	246077	1266	sf	79	cf
Infiltration BMP	Existing	9554 ORIZABA	8/19/2005	6524235.753500	6524235.753500	1806817.618650	246103	1266	sf	79	cf
Infiltration BMP	Existing	12333 ORIZABA	1/23/2006	6517077.475660	6517077.475660	1795538.435260	246077	1266	sf	79	cf
Infiltration BMP	Existing	10834 PANGBORN	9/17/2007	6527760.431910	6527760.431910	1798051.772160	245119	1266	sf	79	cf
Infiltration BMP	Existing	7156 PELLET	6/22/2010	6515507.126970	6515507.126970	1804695.751890	246104	1266	sf	79	cf
Infiltration BMP	Existing	9466 PELLET	5/26/2005	6527082.799410	6527082.799410	1797550.782940	245119	1266	sf	79	cf
Infiltration BMP	Existing	10238 PICO VISTA	7/22/2008	6530559.495000	6530559.495000	1800212.246520	245126	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	7706 PIVOT	6/18/2010	6517776.543940	6517776.543940	1802077.153370	246079	1266	sf	79	cf
Infiltration BMP	Existing	11951 POMERING	6/18/2010	6515072.562230	6515072.562230	1799936.867790	246079	1266	sf	79	cf
Infiltration BMP	Existing	12010 POMERING	9/20/2005	6514897.027930	6514897.027930	1799318.472210	246079	1266	sf	79	cf
Infiltration BMP	Existing	7803 PURITAN	6/22/2010	6513186.710850	6513186.710850	1793767.422040	246077	1266	sf	79	cf
Infiltration BMP	Existing	8249 QUOIT	5/17/2007	6517406.484080	6517406.484080	1795006.472870	246077	1266	sf	79	cf
Infiltration BMP	Existing	8506 RAVILLER	6/22/2010	6526200.032280	6526200.032280	1805944.598850	246103	1266	sf	79	cf
Infiltration BMP	Existing	9441 RAVILLER	10/7/2005	6529831.524430	6529831.524430	1803323.207760	245125	1266	sf	79	cf
Infiltration BMP	Existing	7110 RIO FLORA	6/1/2010	6515643.202310	6515643.202310	1805187.382260	246104	1266	sf	79	cf
Infiltration BMP	Existing	7371 RIO HONDO PL	7/11/2005	6517283.740950	6517283.740950	1804924.767440	246104	1266	sf	79	cf
Infiltration BMP	Existing	10802 RIVES	3/23/2007	6519422.470020	6519422.470020	1803623.413330	246102	1266	sf	79	cf
Infiltration BMP	Existing	11916 RIVES	2/6/2007	6516737.168290	6516737.168290	1799258.165990	246079	1266	sf	79	cf
Infiltration BMP	Existing	10912 RYERSON	7/14/2005	6515882.754330	6515882.754330	1804962.955590	246104	1266	sf	79	cf
Infiltration BMP	Existing	9505 SAMOLINE	6/21/2010	6523279.038200	6523279.038200	1807936.970620	246106	1266	sf	79	cf
Infiltration BMP	Existing	9631 SAMOLINE	9/4/2007	6522855.010000	6522855.010000	1807250.890000	246103	1266	sf	79	cf
Infiltration BMP	Existing	12030 SAMOLINE	9/23/2005	6517133.868790	6517133.868790	1798177.361600	246079	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	12238 SAMOLINE	9/8/2006	6516738.176240	6516738.176240	1796883.684630	246079	1266	sf	79	cf
Infiltration BMP	Existing	7915 SECOND	3/23/2006	6519374.854020	6519374.854020	1802382.905560	246102	1266	sf	79	cf
Infiltration BMP	Existing	7816 SEVENTH	3/27/2007	6519884.790380	6519884.790380	1804163.292550	246102	1266	sf	79	cf
Infiltration BMP	Existing	8646 SEVENTH	1/3/2006	6524439.566780	6524439.566780	1801605.289810	245119	1266	sf	79	cf
Infiltration BMP	Existing	9225 SIDEVIEW	4/24/2006	6531114.889310	6531114.889310	1804872.365930	245127	1266	sf	79	cf
Infiltration BMP	Existing	8810 SMALLWOOD	6/20/2005	6524153.815510	6524153.815510	1810188.858090	246106	1266	sf	79	cf
Infiltration BMP	Existing	9264 SONGFEST	6/10/2008	6531394.983570	6531394.983570	1804360.661210	245127	1266	sf	79	cf
Infiltration BMP	Existing	7838 SPRINGER	11/21/2006	6515530.871940	6515530.871940	1796818.950680	246079	1266	sf	79	cf
Infiltration BMP	Existing	7844 SPRINGER	3/18/2008	6515582.250000	6515582.250000	1796787.835000	246079	1266	sf	79	cf
Infiltration BMP	Existing	10517 STAMPS	8/18/2005	6522812.240000	6522812.240000	1803043.757460	246103	1266	sf	79	cf
Infiltration BMP	Existing	9520 STEWART & GRAY	2/27/2009	6526628.650930	6526628.650930	1796061.800920	245118	1266	sf	79	cf
Infiltration BMP	Existing	8840 STOAKES	7/15/2005	6527643.045070	6527643.045070	1808263.273840	245125	1266	sf	79	cf
Infiltration BMP	Existing	11831 SUSAN	5/25/2006	6514568.915250	6514568.915250	1801466.560490	246079	1266	sf	79	cf
Infiltration BMP	Existing	8354 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	1266	sf	79	cf
Infiltration BMP	Existing	8356 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	1266	sf	79	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8358 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	1266	sf	79	cf
Infiltration BMP	Existing	8360 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	1266	sf	79	cf
Infiltration BMP	Existing	8362 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	1266	sf	79	cf
Infiltration BMP	Existing	8364 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	1266	sf	79	cf
Infiltration BMP	Existing	8366 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	1266	sf	79	cf
Infiltration BMP	Existing	8368 TELEGRAPH	1/5/2004	6526800.000000	6526800.000000	1809400.000000	246106	1266	sf	79	cf
Infiltration BMP	Existing	7420 THIRD	9/20/2007	6517202.761340	6517202.761340	1803926.714420	246102	1266	sf	79	cf
Infiltration BMP	Existing	7964 THIRD	2/21/2006	6519886.681280	6519886.681280	1802225.378910	246102	1266	sf	79	cf
Infiltration BMP	Existing	9532 TWEEDY	4/20/2007	6523025.939870	6523025.939870	1807743.953100	246106	1266	sf	79	cf
Infiltration BMP	Existing	7347 VIA RIO NIDO	8/1/2007	6518199.953350	6518199.953350	1806523.073370	246104	1266	sf	79	cf
Infiltration BMP	Existing	10419 WILEY BURKE	1/2/2008	6519382.492080	6519382.492080	1805731.311650	246102	1266	sf	79	cf
Infiltration BMP	Existing	10442 WILEY BURKE	1/1/2007	6519428.439440	6519428.439440	1805422.866650	246102	1266	sf	79	cf
Infiltration BMP	Existing	12639 WOODRUFF	12/22/2006	6526127.737740	6526127.737740	1791800.878460	245113	1266	sf	79	cf
Infiltration BMP	Existing	12356 DOWNEY	4/29/2004	6518006.757310	6518006.757310	1794978.083160	245115	5062	sf	316	cf
Infiltration BMP	Existing	10613 NEWVILLE	4/21/2004	6528761.027810	6528761.027810	1798786.621380	245126	2531	sf	158	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	10627 OLD RIVER SCHOOL	7/24/2003	6515233.048270	6515233.048270	1805631.128330	246104	174752	sf	10922	cf
Infiltration BMP	Existing	9215 HALL	12/9/2002	6524758.793890	6524758.793890	1797647.866960	245113	74592	sf	4662	cf
Infiltration BMP	Existing	10933 LAKEWOOD BLVD	10/5/2005	6524600.000000	6524600.000000	1800100.000000	245119	6400	sf	400	cf
Infiltration BMP	Existing	12322 SAMOLINE	7/8/2005	6516301.814120	6516301.814120	1796169.128220	246077	4256	sf	266	cf
Infiltration BMP	Existing	12731 LAKEWOOD	9/17/2003	6519215.285000	6519215.285000	1791371.090000	245115	2128	sf	133	cf
Infiltration BMP	Existing	12739 LAKEWOOD	9/17/2003	6519200.000000	6519200.000000	1791100.000000	245115	2128	sf	133	cf
Infiltration BMP	Existing	8927 BIRCHLEAF	7/11/2006	6527008.160170	6527008.160170	1808327.449830	246103	1056	sf	66	cf
Infiltration BMP	Existing	11929 POMERING	5/1/2006	6515108.241040	6515108.241040	1800149.473170	246079	1056	sf	66	cf
Infiltration BMP	Existing	12240 WOODRUFF	3/19/2010	6526758.991120	6526758.991120	1793878.747920	245118	300224	sf	18764	cf
Infiltration BMP	Existing	12222 WOODRUFF	9/14/2009	6526625.121210	6526625.121210	1794009.479990	245118	70200	sf	4388	cf
Infiltration BMP	Existing	7624 FIRESTONE	1/1/2008	6517500.000000	6517500.000000	1802600.000000	246079	41632	sf	2602	cf
Infiltration BMP	Existing	7714 STEWART & GRAY	4/9/2007	6516397.756580	6516397.756580	1799563.749470	246079	30016	sf	1876	cf
Infiltration BMP	Existing	9637 LAKEWOOD	10/2/2008	6526780.802630	6526780.802630	1805111.536210	245125	15136	sf	946	cf
Infiltration BMP	Existing	12428 BENEDICT	6/14/2007	6525687.022380	6525687.022380	1792528.538110	245114	8080	sf	505	cf
Infiltration BMP	Existing	7774 DINSDALE	2/14/2014	6521332.495780	6521332.495780	1806385.183840	246103	4680	sf	293	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMP	Existing	8030 IMPERIAL HWY	2/14/2014	6515729.368090	6515729.368090	1794471.493939	246077	41789	sf	2000	cf
Infiltration BMP	Existing	9623 IMPERIAL HWY	2/14/2014	6524482.209740	6524482.209740	1792569.983950	245114	35408	sf	2213	cf
Infiltration BMP	Existing	10531 LAKEWOOD BL	2/14/2014	6525178.634060	6525178.634060	1801497.338680	245119	5840	sf	365	cf
Infiltration BMP	Existing	8121 FOURTH ST	2/14/2014	6521147.926450	6521147.926450	1802216.858440	246103	4680	sf	293	cf
Infiltration BMP	Existing	8123 FOURTH ST	2/14/2014	6521147.926450	6521147.926450	1802216.858440	246103	4680	sf	293	cf
Infiltration BMP	Existing	8555 TENTH ST	2/14/2014	6524962.328390	6524962.328390	1803501.510410	245119	4680	sf	293	cf
Infiltration BMP	Existing	9356 BUELL ST	2/14/2014	6527425.774610	6527425.774610	1799078.145910	245126	3120	sf	195	cf
Infiltration BMP	Existing	8449 COLE ST	2/14/2014	6520362.597670	6520362.597670	1796910.373080	245115	1560	sf	98	cf

D1.3. City of Lakewood

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Flow-Through Treatment BMP	Existing	Filterra Tree Wells (2)		Paramount & Arbor	33.843398	-118.159673	445521				
Infiltration BMP	Existing	Retention Basin at Cherry Cove Park			33.850296	-118.165478	446014				

RB-AR9450

D1.4. City of Paramount

Type of BMP	Existing or Planned ?	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Bioswales	Existing	Landscape Swale	2012	Texaco/Alondra	33.889066	-118.171849	606071	37,500	sf	2109	cf
Bioswales	Existing	Landscape Swale	2012	Orange/Windmill	33.891602	-118.177436	606072	0.6	ac	1470	cf

RB-AR9451

D1.5. City of Pico Rivera

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Site-Scale Detention Basin	Existing	French drains at Smith Park	2013	6016 Rosemead Blvd				16	ac		
Site-Scale Detention Basin	Existing	French drains at Rio Vista	2013	Coffman Pico Road				7	ac		
Bioswales	Existing	Beverly Boulevard medians	2012	Beverly Blvd				5280	sf		
Permeable Pavement	Existing	Pico Park permeable pavement	2012	9528 Beverly Blvd				12	ac		
Bioswales	Existing	Telegraph Road medians	2013	Telegraph Rd from Rosemead Blvd to Eastside limit				5280	sf		
Bioswales	Planned	Paramount Blvd medians	2016	Paramount Blvd from Whittier Blvd to Mines Ave				5280	sf		
Infiltration BMPs	Planned	Two (2) Filterra Systems	2016	various				1	ac		
Infiltration BMPs	Existing	City of Pico Rivera City Hall	2011	8615 Passons Blvd				2.75	ac		
Infiltration BMPs	Existing	Rivera Park	2012	9530 Shade Lane				16	ac		

D1.6. City of Signal Hill

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Bioretention / Biofiltration		Palm Drive Business Center	2/19/2008	2445 N Palm Drive	33.801973	-118.157962	775510	1	ac		
Bioretention / Biofiltration		Aragon Townhomes & Duplexes (City View)	3/9/2007	1902 (1890) Oribaza Ave	33.790924	-118.156725	776003	93,780	sf		
Bioretention / Biofiltration		EDCO Recycling & Transfer		2755 California Avenue	33.807881	-118.181769	776011	9,583	sf		
Bioretention / Biofiltration		EDCO Recycling & Transfer		2756 California Avenue	33.807881	-118.181769	776011	17,424	sf		
Bioretention / Biofiltration		EDCO Recycling & Transfer		2757 California Avenue	33.807881	-118.181769	776011	33,106	sf		
Bioretention / Biofiltration		EDCO Recycling & Transfer		2758 California Avenue	33.807881	-118.181769	776011	10,454	sf		
Bioretention / Biofiltration		EDCO Recycling & Transfer		2759 California Avenue	33.807881	-118.181769	776011	78,486	sf		
Bioretention / Biofiltration		2-Story Building and Parking Lot	12/28/2010	2653 Walnut Avenue	33.805754	-118.171978	776012	0.51	ac		
Bioretention / Biofiltration		EDCO Administrative Terminal	8/1/2011	950 27th Street	33.806179	-118.1812	776012	9583	sf	0.06	cfs
Bioretention / Biofiltration		EDCO Administrative Terminal	8/2/2011	951 27th Street	33.806179	-118.1812	776012	17424	sf	0.08	cfs
Bioretention / Biofiltration		EDCO Administrative Terminal	8/3/2011	952 27th Street	33.806179	-118.1812	776012	33106	sf	0.14	cfs
Bioretention / Biofiltration		EDCO Administrative Terminal	8/4/2011	953 27th Street	33.806179	-118.1812	776012	10454	sf	0.08	cfs
Bioretention / Biofiltration		Fantasy Castle	6/30/2009	2801 Walnut Ave	33.808289	118.171777		1,584	sf		
Bioswales	Existing	Fresh and Easy Neighborhood Market	11/16/2010	3300 Atlantic Avenue	33.817504	-118.184643	485510	18,000	sf	931	cf

RB-AR9453

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Bioswales	Existing	Fresh and Easy Neighborhood Market	11/17/2010	3301 Atlantic Avenue	33.817504	-118.184643	485510	120	sf	7	cf
Bioswales	Existing	Fresh and Easy Neighborhood Market	11/18/2010	3302 Atlantic Avenue	33.817504	-118.184643	485510	10,904	sf	542	cf
Bioswales	Existing	Signal Hill Police Station and Emergency Operation	5/26/2011	2745 Walnut Avenue	33.807067	-118.171984	775510	115,870	sf		
Bioswales	Existing	Jack in the Box	10/21/2008	802 Spring Street	33.812049	-118.182595	775510	12,000	sf		
Bioswales		Boiler Tech Warehouse	10/2/2009	2503 Cerritos Avenue	33.802564	-118.177391	776002	6,754	sf		
Bioswales		Aragon Townhomes & Duplexes (City View)	3/11/2007	1904 (1890) Oribaza Ave	33.790924	-118.156725	776003	31,100	sf		
Bioswales		Fantasy Castle	6/29/2009	2800 Walnut Ave	33.808289	118.171777		32,883	sf		
Flow-Through Treatment BMP	Existing	Petco, Party City	3/3/2009	3100 Atlantic Ave	33.813946	-118.184789	485510				
Flow-Through Treatment BMP	Existing	Petco, Party City	3/4/2009	3101 Atlantic Ave	33.813946	-118.184789	485510				
Flow-Through Treatment BMP	Existing	The Home Depot		3100 Atlantic Avenue	33.813946	-118.184789	485510	3.65	ac		
Flow-Through Treatment BMP	Existing	The Home Depot		3101 Atlantic Avenue	33.813946	-118.184789	485510	7.99	ac		
Flow-Through Treatment BMP	Existing	The Home Depot		3102 Atlantic Avenue	33.813946	-118.184789	485510	3.28	ac		

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Flow-Through Treatment BMP	Existing	The Home Depot		3103 Atlantic Avenue	33.813946	-118.184789	485510	4.79	ac		
Flow-Through Treatment BMP		Palm Drive Business Center	2/20/2008	2446 N Palm Drive	33.801973	-118.157962	775510	7,000	sf		
Flow-Through Treatment BMP	Existing	Fresh & Easy	11/17/2009	2475 Cherry Avenue	33.802363	-118.168152	775510	0.68	ac		
Flow-Through Treatment BMP	Existing	Fresh & Easy	11/18/2009	2476 Cherry Avenue	33.802363	-118.168152	775510	0.58	ac		
Flow-Through Treatment BMP	Existing	US Bank	9/17/2008	2615 Cherry Ave	33.804856	-118.167999	775510	18732	sf		
Flow-Through Treatment BMP	Existing	Signal Hill Industrial Center		2665-2745 Temple Ave	33.80648	-118.159782	775510	143,312	sf		
Flow-Through Treatment BMP	Existing	Tanker Interior Washing Facility		1710 E 29th Street	33.80935	-118.170824	775510	10,000	sf		
Flow-Through Treatment BMP	Existing	Delius Restaurant	7/14/2006	2951 Cherry Ave	33.81111	-118.168077	775510	32,000	sf		
Flow-Through Treatment BMP	Existing	Jack in the Box	10/20/2008	801 Spring Street	33.812049	-118.182595	775510	12,000	sf		

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Flow-Through Treatment BMP	Existing	Target (T-2319)	2/13/2007	950 E 33rd Street	33.816767	-118.181488	775510	178,600	sf		
Flow-Through Treatment BMP	Existing	Hawk Industries	5/8/2007	1245 E. 23rd Street	33.799126	-118.17577	776002	27,322	sf		
Flow-Through Treatment BMP	Existing	Hawk Industries	5/9/2007	1246 E. 23rd Street	33.799126	-118.17577	776002	1575	sf		
Flow-Through Treatment BMP		Boiler Tech Warehouse	9/30/2009	2501 Cerritos Avenue	33.802564	-118.177391	776002	6,754	sf		
Flow-Through Treatment BMP	Existing	Las Brisas II Community Housing	1/11/2006	2400-2418 California Ave	33.803504	-118.180639	776002	16,247	sf		
Flow-Through Treatment BMP	Existing	Las Brisas II Community Housing	1/12/2006	2400-2418 California Ave	33.803504	-118.180639	776002	25,047	sf		
Flow-Through Treatment BMP	Existing	Villagio	12/5/2005	2550 Gundry Ave	33.803577	-118.173289	776002	61,000	sf		
Flow-Through Treatment BMP	Existing	Villagio	12/6/2005	2551 Gundry Ave	33.803577	-118.173289	776002	30,492	sf		
Flow-Through Treatment BMP	Existing	Villagio	12/7/2005	2552 Gundry Ave	33.803577	-118.173289	776002	4,356	sf		

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Flow-Through Treatment BMP		Aragon Townhomes & Duplexes (City View)	3/6/2007	1899 (1890) Oribaza Ave	33.790924	-118.156725	776003	31,350	sf		
Flow-Through Treatment BMP		Aragon Townhomes & Duplexes (City View)	3/7/2007	1900 (1890) Oribaza Ave	33.790924	-118.156725	776003	63,400	sf		
Flow-Through Treatment BMP		In-N-Out Burger	5/27/2011	799 E. Spring Street	33.812066	-118.183197	776011	65,220	sf		
Flow-Through Treatment BMP		Shoreline Fabricators	8/1/2007	2652 Gundry Ave	33.805493	-118.173804	776012	16,300	sf		
Flow-Through Treatment BMP		Shoreline Fabricators	8/2/2007	2653 Gundry Ave	33.805493	-118.173804	776012	1,395	sf		
Flow-Through Treatment BMP		2-Story Building and Parking Lot	12/29/2010	2654 Walnut Avenue	33.805754	-118.171978	776012				
Flow-Through Treatment BMP		Islamic Center	5/29/2009	996 27th St	33.806216	-118.180729	776012	5000	sf		
Flow-Through Treatment BMP		Crescent Square Development	8/10/2007	1600-1799 Green House Place				136,955	sf		
Infiltration BMPs	Existing	Fresh & Easy	11/19/2009	2477 Cherry Avenue	33.802363	-118.168152	775510	76,143	sf		
Infiltration BMPs	Existing	US Bank	9/19/2008	2617 Cherry Ave	33.804856	-118.167999	775510	18732	sf		

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMPs	Planned	Applebee's	3/12/2013	899 E. Spring Street	33.812089	-118.181855	775510	23,580	sf		
Infiltration BMPs	Existing	Hawk Industries	5/10/2007	1247 E. 23rd Street	33.799126	-118.17577	776002	27,322	sf		
Infiltration BMPs		Boiler Tech Warehouse	10/1/2009	2502 Cerritos Avenue	33.802564	-118.177391	776002	6,754	sf		
Infiltration BMPs		Pacific Walk	1/4/2011	PCH and Orizaba Avenue	33.789847	-118.156748	776003	100,200	sf		
Infiltration BMPs		Pacific Walk	1/5/2011	PCH and Orizaba Avenue	33.789847	-118.156748	776003	149,015	sf		
Infiltration BMPs		Pacific Walk	1/6/2011	PCH and Orizaba Avenue	33.789847	-118.156748	776003	1,300	sf		
Infiltration BMPs		Aragon Townhomes & Duplexes (City View)	3/8/2007	1901 (1890) Oribaza Ave	33.790924	-118.156725	776003	94,750	sf		
Infiltration BMPs		Aragon Townhomes & Duplexes (City View)	3/10/2007	1903 (1890) Oribaza Ave	33.790924	-118.156725	776003	93,780	sf		
Infiltration BMPs	Planned	Willow Street Medical Office Building	12/9/2013	845 E. Willow Street	33.804664	-118.182279	776009	22,651	sf	1095	cf
Infiltration BMPs	Planned	Willow Street Medical Office Building	12/10/2013	846 E. Willow Street	33.804664	-118.182279	776009	37,304	sf	1890	cf
Infiltration BMPs		In-N-Out Burger	5/28/2011	800 E. Spring Street	33.812066	-118.183197	776011	65,220	sf	3425	cf
Infiltration BMPs		Shoreline Fabricators	8/3/2007	2654 Gundry Ave	33.805493	-118.173804	776012	16,300	sf		
Infiltration BMPs		Islamic Center	5/28/2009	995 27th St	33.806216	-118.180729	776012	5000	sf		
Infiltration BMPs	Existing	A & A Ready Mix Concrete	8/1/2007	900 E. Patterson	33.806664	-118.182206	776012	2	ac		
Permeable Pavement	Existing	US Bank	9/18/2008	2616 Cherry Ave	33.804856	-118.167999	775510	60	sf		

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Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Permeable Pavement	Existing	Hawk Industries	5/11/2007	1248 E. 23rd Street	33.799126	-118.17577	776002	5,628	sf		

D1.7. City of South Gate

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Bioretention / Biofiltration		Self Storage	9/15/2008	2405 Southern Ave	33.953436	-118.229363	796034	0.25	ac		
Bioretention / Biofiltration		Hollydale Plaza	3/30/2010	12222 Garfield Avenue	33.915655	-118.168383	796076	15,278	sf		
Bioretention / Biofiltration		Atlantic Avenue Improvements	4/21/2010	Atlantice from Abbott to Firestone	33.943066	-118.181112	796084	7.44	ac		
Bioretention / Biofiltration	Planned	azalea	11/25/2012	4641 Firestone Blvd.	33.952413	-118.187909	796084	7,328	sf	0.22	cfs
Bioswales		South Gate McDonald's	9/30/2013	3313 Tweedy Boulevard	33.945113	-118.211464	796034	5,119	sf		
Bioswales		South Gate McDonald's	10/1/2013	3314 Tweedy Boulevard	33.945113	-118.211464	796034	5,545	sf		
Bioswales		Commercial Center	10/4/2010	9200 Califlornia Avenue	33.950805	-118.206221	796034	12,367	sf		
Bioswales		Commercial Center	10/5/2010	9201 Califlornia Avenue	33.950805	-118.206221	796034	4,263	sf		
Bioswales		Hot Mix Asphalt Plant	5/11/2001	5626 Southern Avenue	33.944913	-118.168148	796083	2.7	ac		
Bioswales		Goals Soccer Centers - South Gate	2/9/2010	9599 Pinehurst Avenue	33.945107	-118.182378	796084	53,142	sf		
Flow-Through Treatment BMP	Existing	South Gate McDonald's	9/26/2013	3309 Tweedy Boulevard	33.945113	-118.211464	796034	2,394	sf		
Flow-Through Treatment BMP		South Gate McDonald's	9/28/2013	3311 Tweedy Boulevard	33.945113	-118.211464	796034	2,436	sf		

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Flow-Through Treatment BMP	Existing	Walgreens	7/24/2006	9830 Long Beach	33.946082	-118.215937	796034	48,725	sf		
Flow-Through Treatment BMP	Existing	King's Car Wash	11/29/2006	9801-9807 Long Beach Blvd	33.946452	-118.216775	796034	10,461	sf		
Flow-Through Treatment BMP		King's Car Wash	12/1/2006	9801-9807 Long Beach Blvd	33.946452	-118.216775	796034				
Flow-Through Treatment BMP	Existing	Sarina Townhomes	2/12/2007	9321 State Street	33.950368	-118.21325	796034	14,375	sf		
Flow-Through Treatment BMP		Commercial Center	10/6/2010	9202 Califlornia Avenue	33.950805	-118.206221	796034	16,630	sf		
Flow-Through Treatment BMP		Office Bldg	12/20/2007	3830 Firestone Blvd	33.953324	-118.201934	796034	1,000	sf		
Flow-Through Treatment BMP		Office Bldg	12/21/2007	3831 Firestone Blvd	33.953324	-118.201934	796034	112,000	sf		
Flow-Through Treatment BMP		Office Bldg	12/20/2007	3800 Firestone Blvd	33.95348	-118.202386	796034	1,000	sf		
Flow-Through Treatment BMP		Office Bldg	12/21/2007	3801 Firestone Blvd	33.95348	-118.202386	796034	112,000	sf		

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Flow-Through Treatment BMP	Planned	Calden Court Appartments	9/27/2013	8901 Calden Avenue	33.95515	-118.228736	796034	219,543	sf		
Flow-Through Treatment BMP		Hollydale Plaza	3/31/2010	12223 Garfield Avenue	33.915655	-118.168383	796076	27,381	sf		
Flow-Through Treatment BMP	Existing	Sherwin Inc	4/10/2007	5530 Borwick Ave	33.925749	-118.172611	796082	7,892	sf		
Flow-Through Treatment BMP		Hot Mix Asphalt Plant	5/10/2001	5625 Southern Avenue	33.944913	-118.168148	796083	9.5	ac		
Flow-Through Treatment BMP		Atlantic Avenue Improvements	4/22/2010	Atlantice from Abbott to Firestone	33.943066	-118.181112	796084	13.32	ac		
Flow-Through Treatment BMP		Goals Soccer Centers - South Gate	2/11/2010	9601 Pinehurst Avenue	33.945107	-118.182378	796084	70,036	sf		
Flow-Through Treatment BMP		Goals Soccer Centers - South Gate	2/12/2010	9602 Pinehurst Avenue	33.945107	-118.182378	796084	37,897	sf		
Flow-Through Treatment BMP		Goals Soccer Centers - South Gate	2/13/2010	9603 Pinehurst Avenue	33.945107	-118.182378	796084	63,400	sf		
Flow-Through Treatment BMP	Planned	azalea	11/24/2012	4640 Firestone Blvd.	33.952413	-118.187909	796084	1,583,819	sf		

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Flow-Through Treatment BMP	Existing	Interior Removal Specialist Demolition	5/21/2007	9309 Rayo Ave	33.949331	-118.17896	796089				
Flow-Through Treatment BMP		Interior Removal Specialist Demolition	5/22/2007	9310 Rayo Ave	33.949331	-118.17896	796089				
Flow-Through Treatment BMP		Interior Removal Specialist Demolition	5/23/2007	9311 Rayo Ave	33.949331	-118.17896	796089				
Flow-Through Treatment BMP		Interior Removal Specialist Demolition	5/24/2007	9312 Rayo Ave	33.949331	-118.17896	796089				
Flow-Through Treatment BMP		Petrochem Manufacturing	12/18/2006	8401 Quartz	33.957949	-118.191835	796090	162,305	sf		
Flow-Through Treatment BMP		Petrochem Manufacturing	12/19/2006	8402 Quartz	33.957949	-118.191835	796090	51,401	sf		
Infiltration BMPs		South Gate McDonald's	9/27/2013	3310 Tweedy Boulevard	33.945113	-118.211464	796034	2,394	sf		
Infiltration BMPs		South Gate McDonald's	9/29/2013	3312 Tweedy Boulevard	33.945113	-118.211464	796034	2,436	sf		
Infiltration BMPs		South Gate McDonald's	10/4/2013	3317 Tweedy Boulevard	33.945113	-118.211464	796034	3,743	sf		
Infiltration BMPs		King's Car Wash	11/30/2006	9801-9807 Long Beach Blvd	33.946452	-118.216775	796034	3,047	sf		
Infiltration BMPs		Sarina Townhomes	2/13/2007	9322 State Street	33.950368	-118.21325	796034	17,519	sf		

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMPs		Office Bldg	12/22/2007	3832 Firestone Blvd	33.953324	-118.201934	796034	112,000	sf		
Infiltration BMPs		Office Bldg	12/22/2007	3802 Firestone Blvd	33.95348	-118.202386	796034	112,000	sf		
Infiltration BMPs	Existing	Family Dollar	10/8/2012	3610 Firestone	33.95374	-118.204546	796034		sf		
Infiltration BMPs	Planned	Calden Court Appartments	9/28/2013	8902 Calden Avenue	33.95515	-118.228736	796034	219,543	sf		
Infiltration BMPs		South Gate Ward Building New Parking Lot	10/15/2010	2771 Liberty Boulevard	33.961969	-118.220918	796034	14,811	sf		
Infiltration BMPs		Sherwin Inc	4/11/2007	5531 Borwick Ave	33.925749	-118.172611	796082	7,892	sf		
Infiltration BMPs		Atlantic Avenue Improvements	4/23/2010	Atlantice from Abbott to Firestone	33.943066	-118.181112	796084	22,400	sf		
Infiltration BMPs		Batting Cages	11/4/2010	9599 Pinehurst Avenue	33.945107	-118.182378	796084	7,953	sf		
Infiltration BMPs		Goals Soccer Centers - South Gate	2/10/2010	9600 Pinehurst Avenue	33.945107	-118.182378	796084	113	sf		
Infiltration BMPs		Goals Soccer Centers - South Gate	2/14/2010	9604 Pinehurst Avenue	33.945107	-118.182378	796084	171,333	sf		
Infiltration BMPs	Planned	azalea	11/19/2012	4635 Firestone Blvd.	33.952413	-118.187909	796084	444,636	sf	31,365	cf
Infiltration BMPs	Planned	azalea	11/20/2012	4636 Firestone Blvd.	33.952413	-118.187909	796084	110,869	sf	12,946	cf
Infiltration BMPs	Planned	azalea	11/21/2012	4637 Firestone Blvd.	33.952413	-118.187909	796084	582,860	sf	72,234	cf
Infiltration BMPs	Planned	azalea	11/22/2012	4638 Firestone Blvd.	33.952413	-118.187909	796084	222,727	sf	25,348	cf
Infiltration BMPs	Planned	azalea	11/23/2012	4639 Firestone Blvd.	33.952413	-118.187909	796084	222,727	sf	64,314	cf

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Infiltration BMPs	Existing	New South Central Properties, LLC	5/28/2009	8600 Rheem Ave	33.955566	-118.192042	796084	20,960	sf		
Infiltration BMPs		LA Water	8/4/2010	9415 Burtis	33.947369	-118.176109	796350	154,538	sf		
Permeable Pavement		South Gate McDonald's	10/2/2013	3315 Tweedy Boulevard	33.945113	-118.211464	796034	8,697	sf		
Permeable Pavement		South Gate McDonald's	10/3/2013	3316 Tweedy Boulevard	33.945113	-118.211464	796034	3,550	sf		

D1.8. City of Whittier

Type of BMP	Existing or Planned	BMP Name	Year Constructed or Planned	Location (Lat/long, or cross streets)	Latitude	Longitude	Sub-watershed	Contributing Area	Unit	Total Capture Volume or Flow Rate	Unit
Bioretention / Biofiltration	Planned	GWT Biolswale	2014	Greenway Trail from to	33.972121	-118.044253	895098				
Bioretention / Biofiltration	Planned	Whittier Blvd Widening and Bioswale	2017	Whittier Blvd from to							
Green Streets (Describe)	Planned	Lower Uptown reverse drains	2014	Milton, Newlin, Comstock from La Cuarta to Walnut	33.970199	-118.039721	895098		TBD		TBD
Site-Scale Detention Basin	Existing	Police Building and City Hall Storm Drainage	2010	13230 Penn St	33.974748	-118.03371	895098				

RB-AR9465

Attachment E: SUPPORTING CALIBRATION DATA

Submitted to:

LLAR WMP Group LCC WMP Group LSGR WMP Group

Submitted by:

Tetra Tech
9444 Balboa Ave., Suite 215
San Diego, CA 92123

January 15, 2015

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1. Lower San Gabriel River

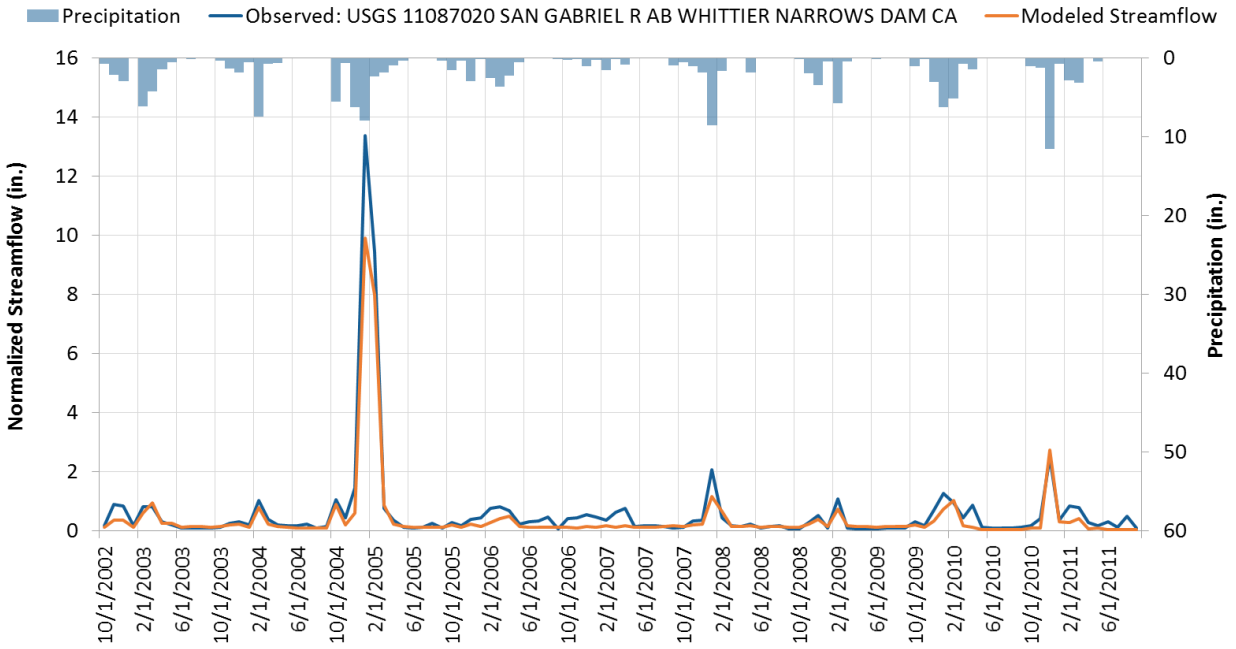


Figure 1. Monthly hydrograph for USGS 11087020 SAN GABRIEL R AB WHITTIER NARROWS DAM CA (10/1/2002 – 9/30/2011).

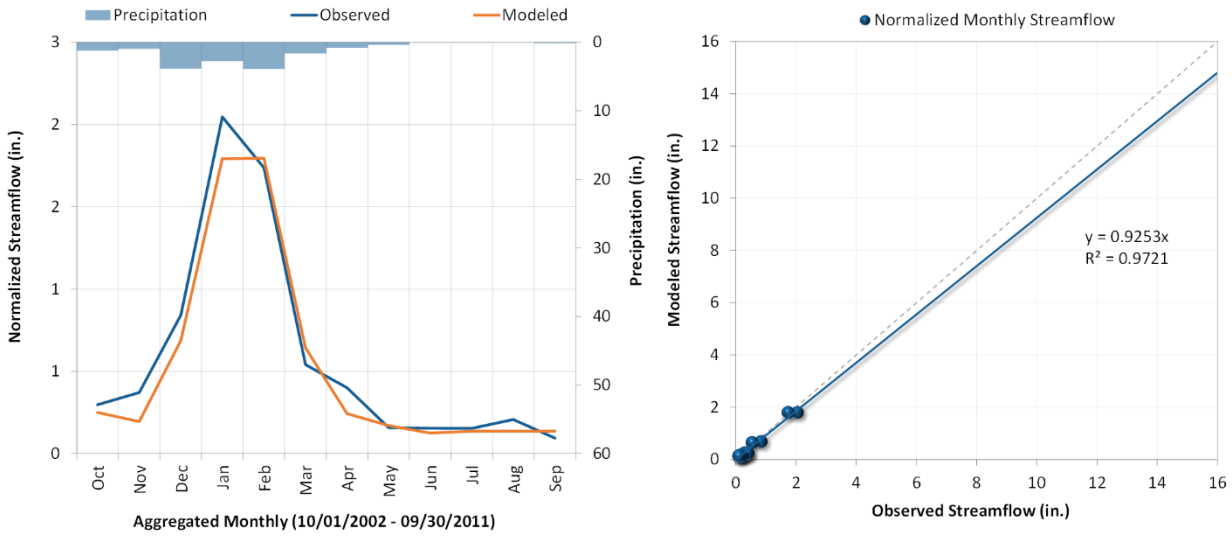


Figure 2. Aggregated monthly hydrograph for USGS 11087020 SAN GABRIEL R AB WHITTIER NARROWS DAM CA (10/1/2002 – 9/30/2011).

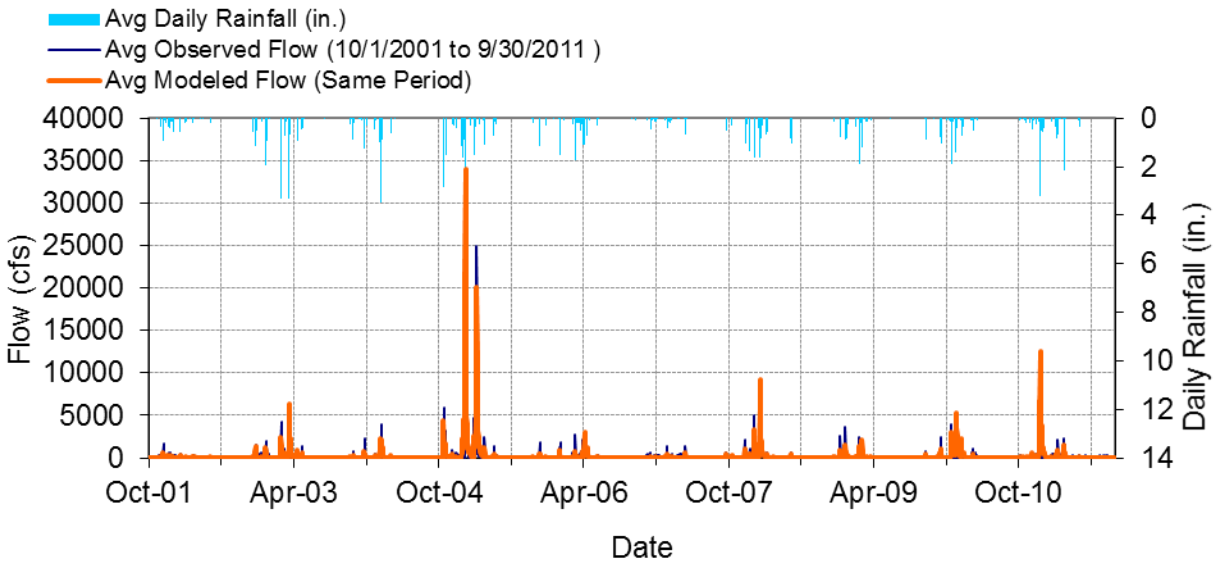
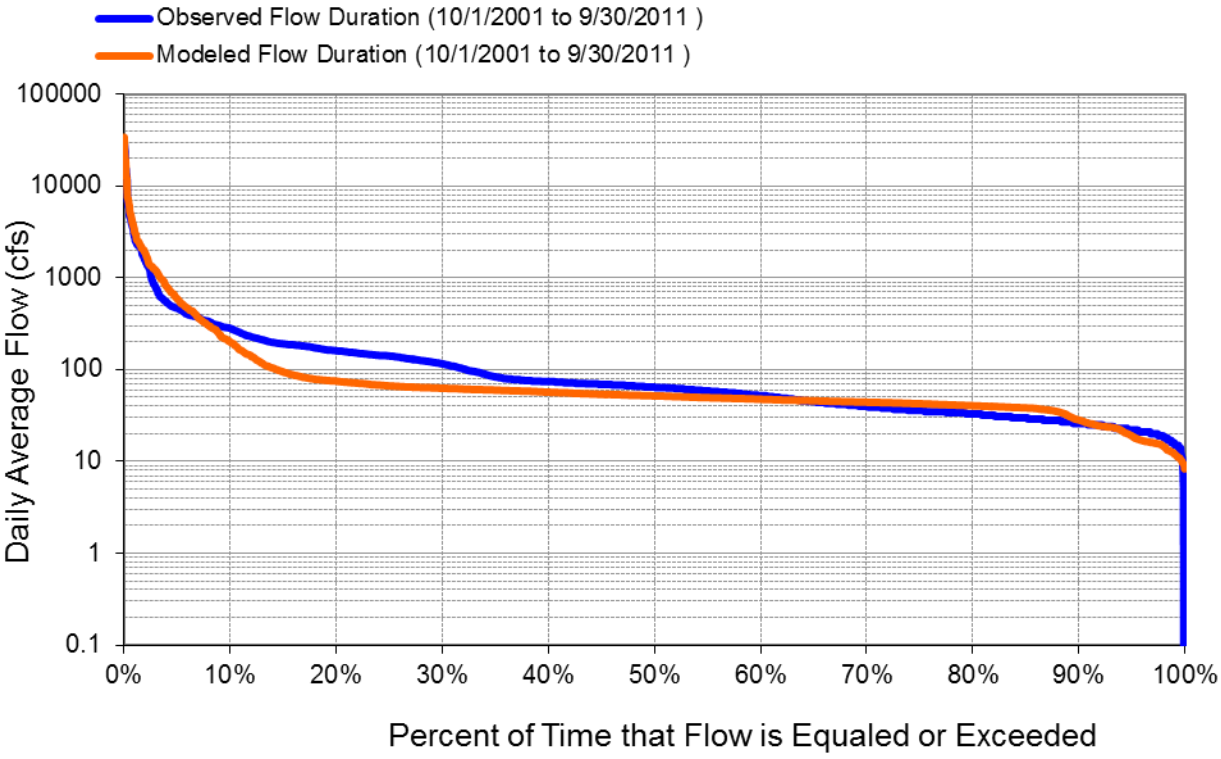


Figure 3. Mean daily flow for USGS 11087020 SAN GABRIEL R AB WHITTIER NARROWS DAM CA (10/1/2002 – 9/30/2011).



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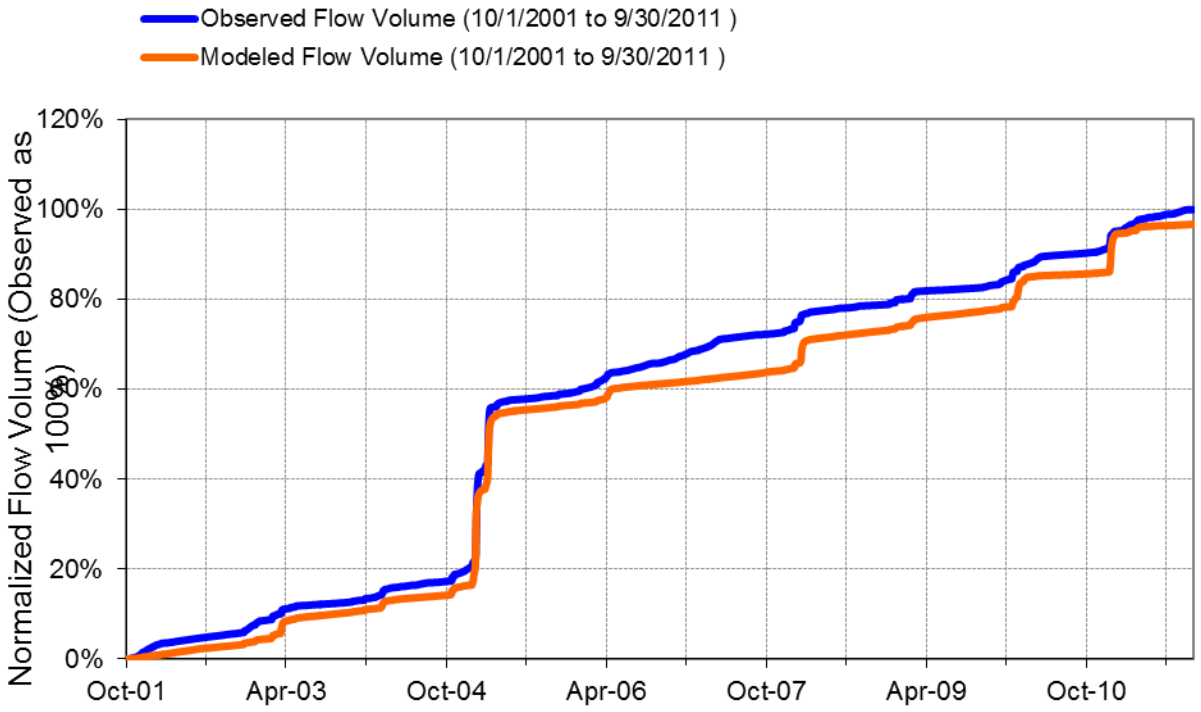

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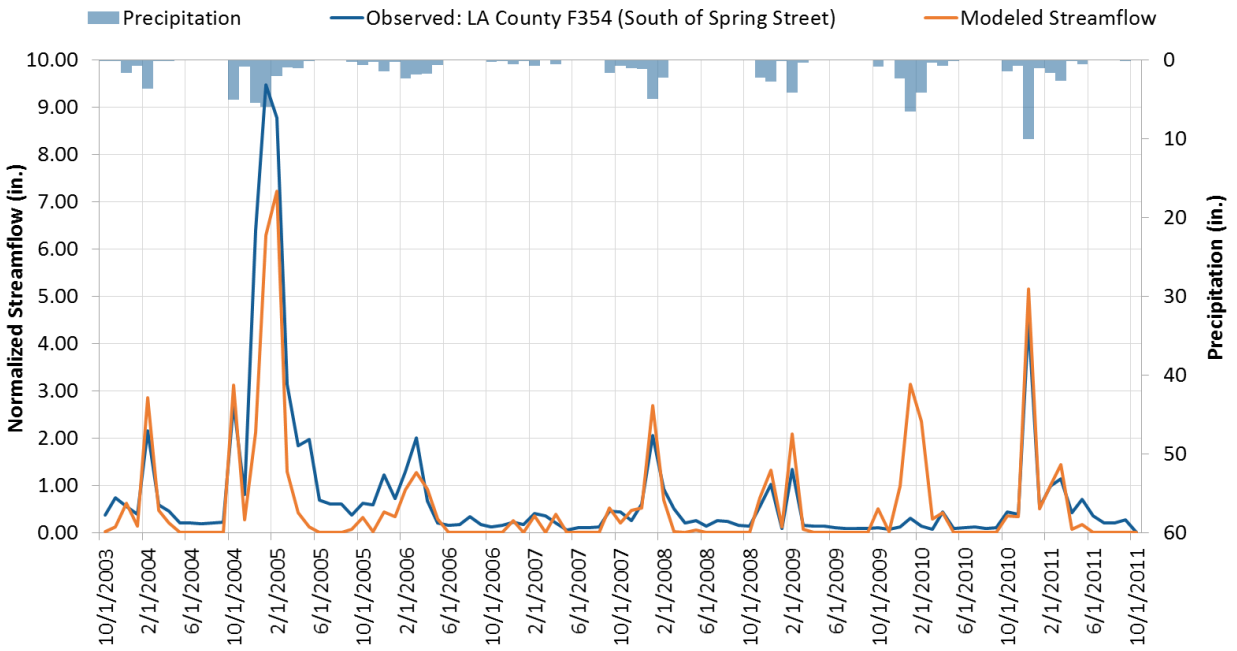

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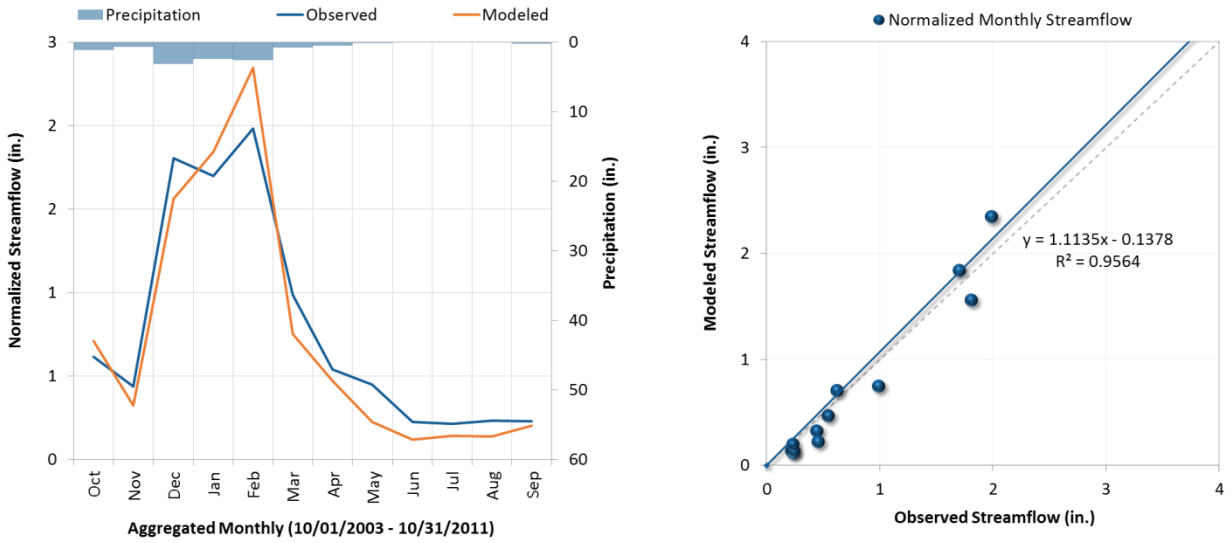

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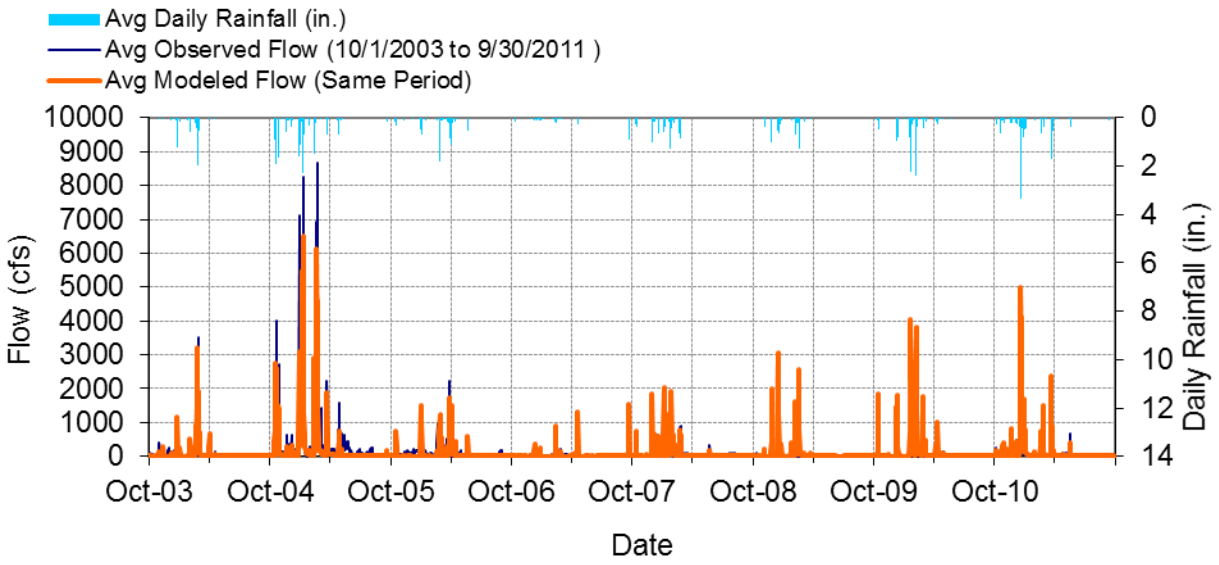

Figure 8. Mean daily flow for USGS 11089200 COYOTE C NR BUENA PARK CA (10/1/2003 – 9/30/2011.

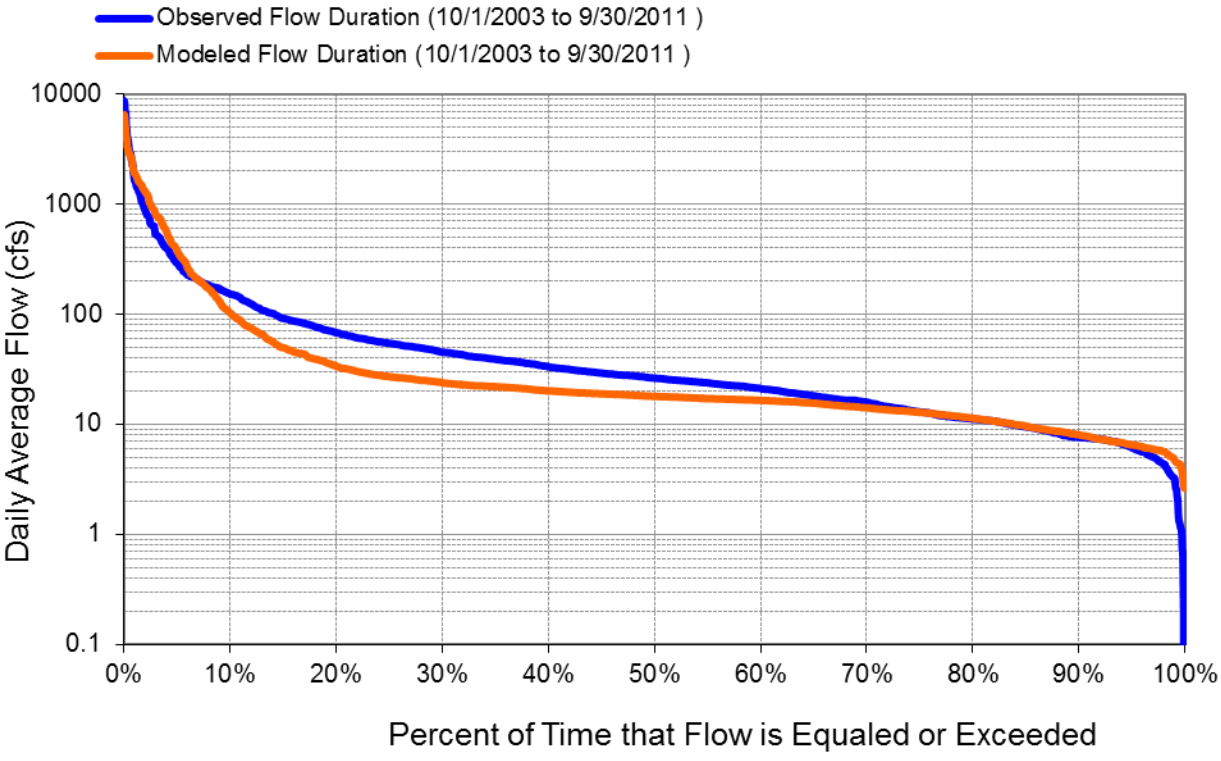

Figure 9. Daily flow exceedance for USGS 11089200 COYOTE C NR BUENA PARK CA (10/1/2003 – 9/30/2011.

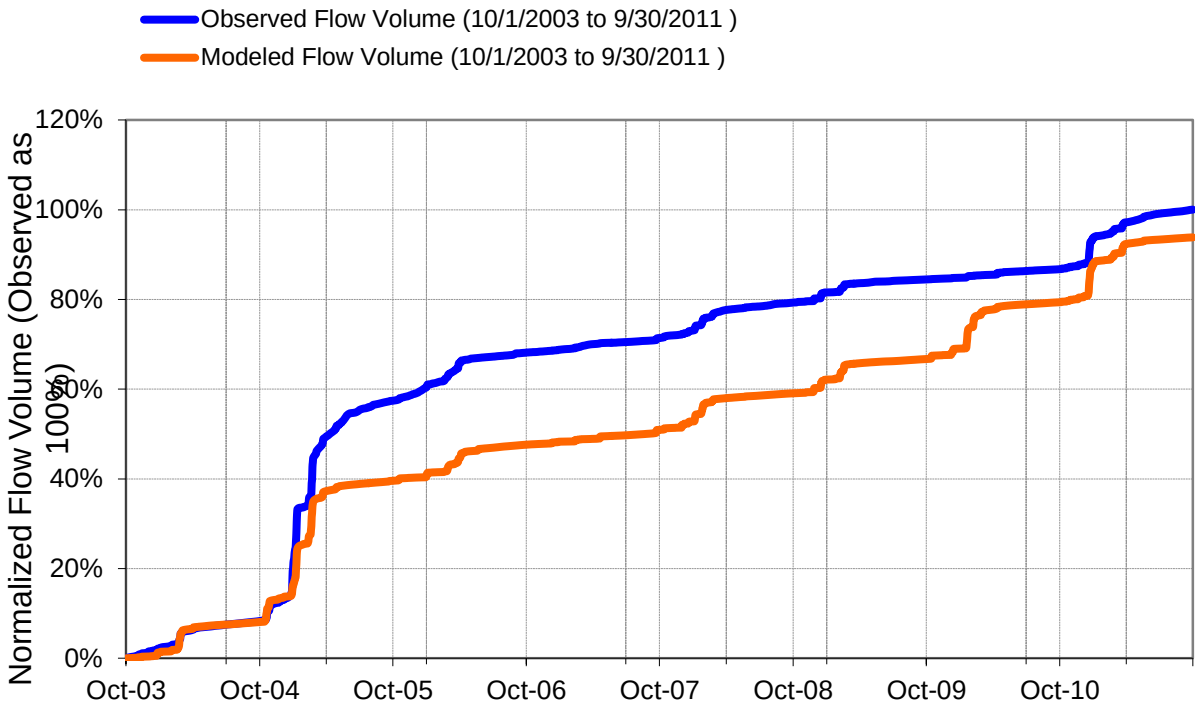

Figure 10. Flow accumulation for USGS 11089200 COYOTE C NR BUENA PARK CA (10/1/2003 – 9/30/2011.

Table 1. Summary of water quality data evaluated for the Lower San Gabriel River

Gage	Constituent	Minimum	Q1	Median	Q3	Maximum
S14	Total Copper (ug/l)	5.0	10.5	13.1	23.9	81.4
S13	Total Copper (ug/l)	0.5	11.8	28.1	48.3	351.0
S14	Total Lead (ug/l)	0.7	1.4	2.9	8.2	56.0
S13	Total Lead (ug/l)	0.2	1.1	10.2	19.2	147.0
S14	TSS (mg/L)	5.0	16.8	38.0	169.8	1258.0
S13	TSS (mg/L)	1.0	48.0	97.0	230.5	1556.0
S14	Total Zinc (ug/l)	19.8	36.6	61.0	86.9	440.0
S13	Total Zinc (ug/l)	1.0	62.0	135.0	241.5	2010.0
S14	Fecal Coliform (MPN/100mL)	20	300	1,300	50,000	16,000,000
S13	FC (MPN/100mL)	20	1,300	16,000	90,000	2,200,000
S14	Total Nitrogen (mg/l)	-	-	-	-	-
S13	Total Nitrogen (mg/l)	-	-	-	-	-
S14	Total Phosphorous (mg/l)	0.05	0.11	0.18	0.41	0.86
S13	Total Phosphorous (mg/l)	-	-	-	-	-

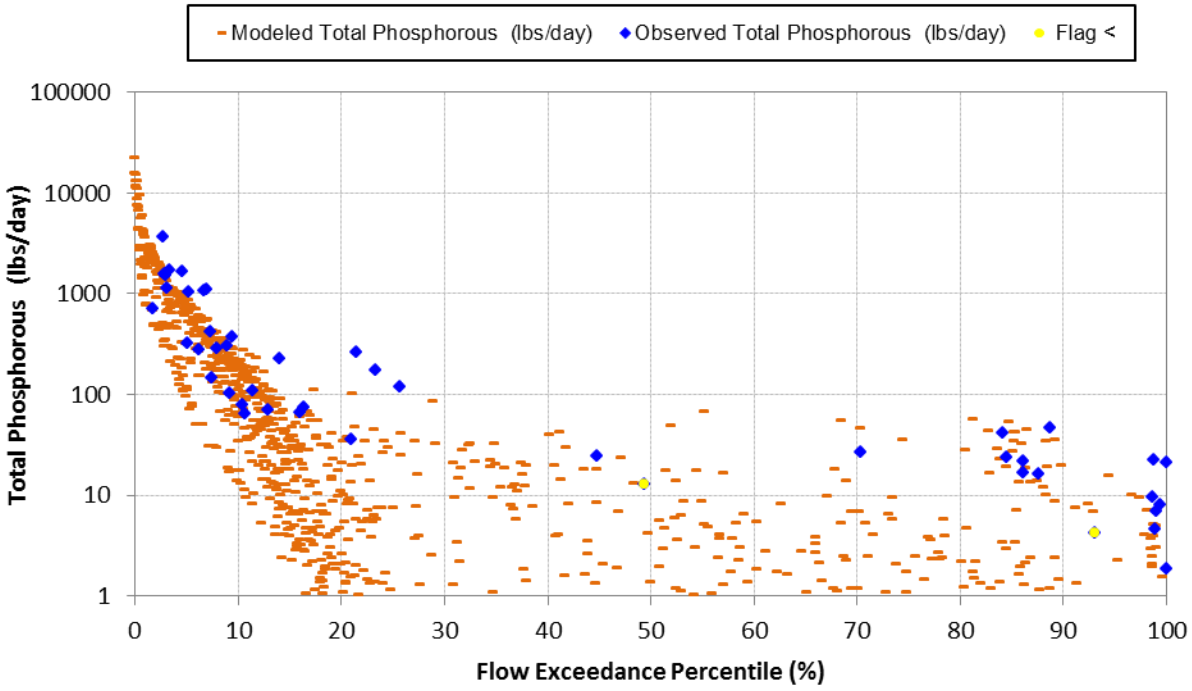

Figure 11. Simulated vs. observed load duration plots for Total Phosphorous (10/1/2002 through 9/30/2011) at San Gabriel River mass emission station S14.

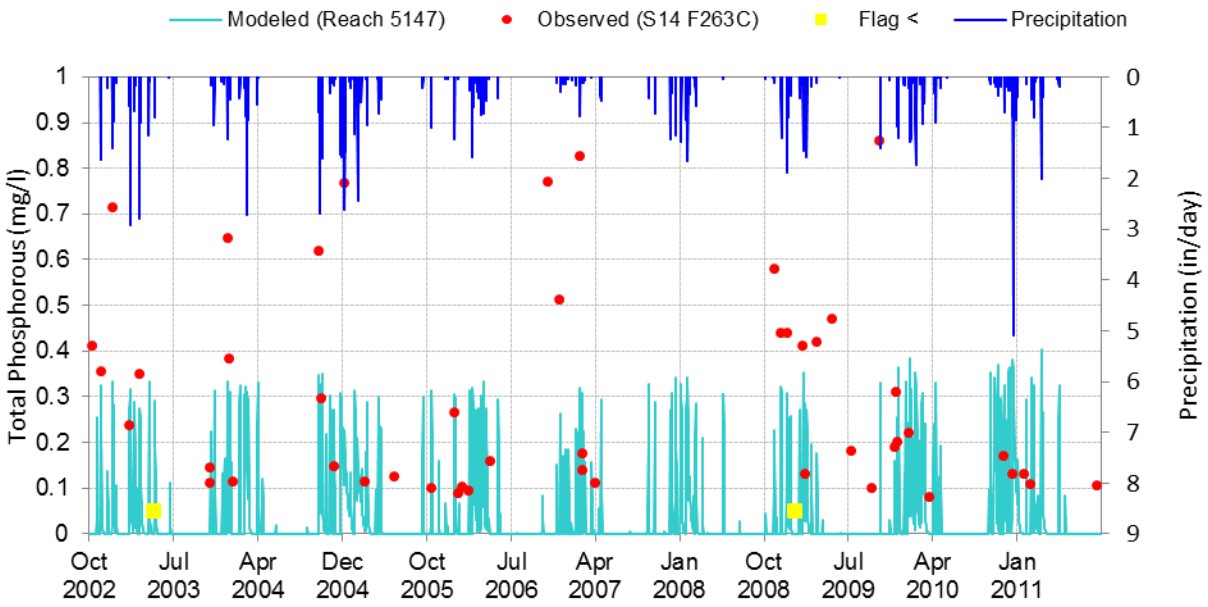

Figure 12. Simulated vs. observed time series plots for Total Phosphorous (10/1/2002 through 9/30/2011) at San Gabriel River mass emission station S14.

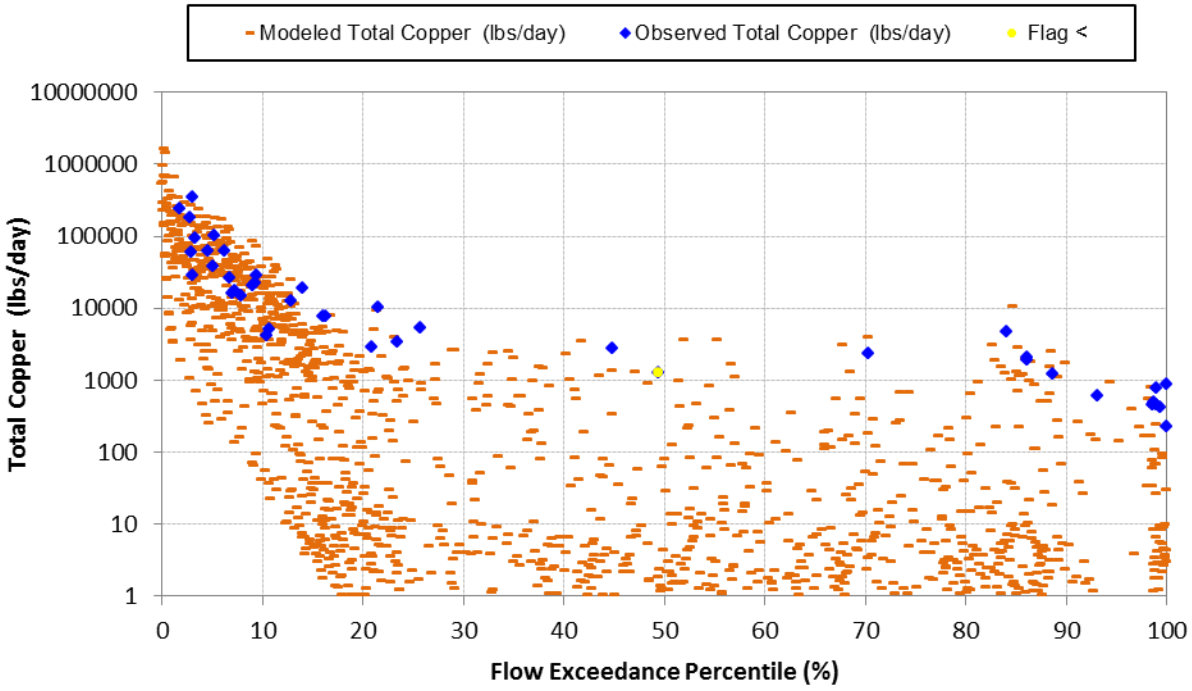

Figure 13. Simulated vs. observed load duration plots for Total Copper (10/1/2002 through 9/30/2011) at San Gabriel River mass emission station S14.

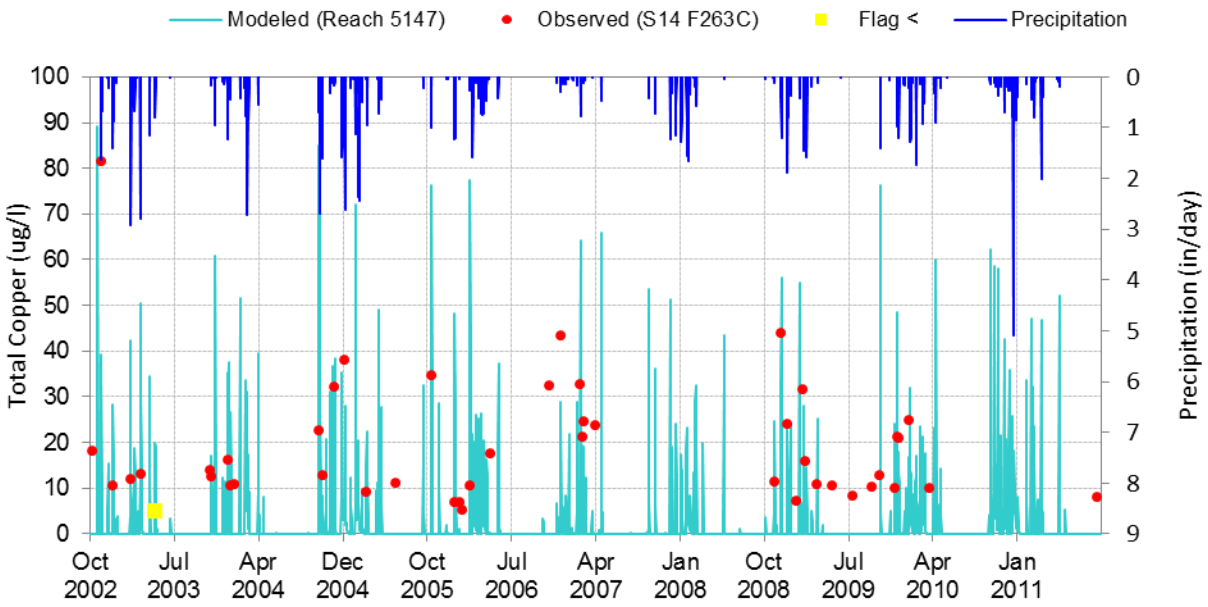

Figure 14. Simulated vs. observed timeseries plots for Total Copper (10/1/2002 through 9/30/2011) at San Gabriel River mass emission station S14.

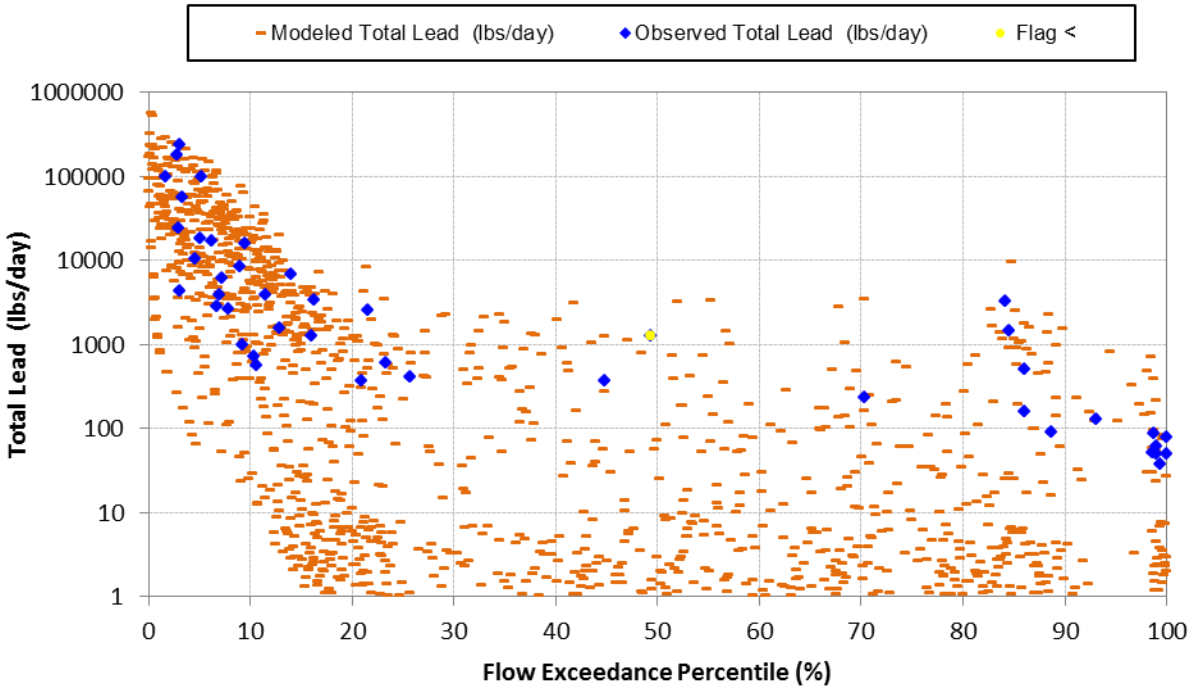

Figure 15. Simulated vs. observed load duration plots for Total Lead (10/1/2002 through 9/30/2011) at San Gabriel River mass emission station S14.

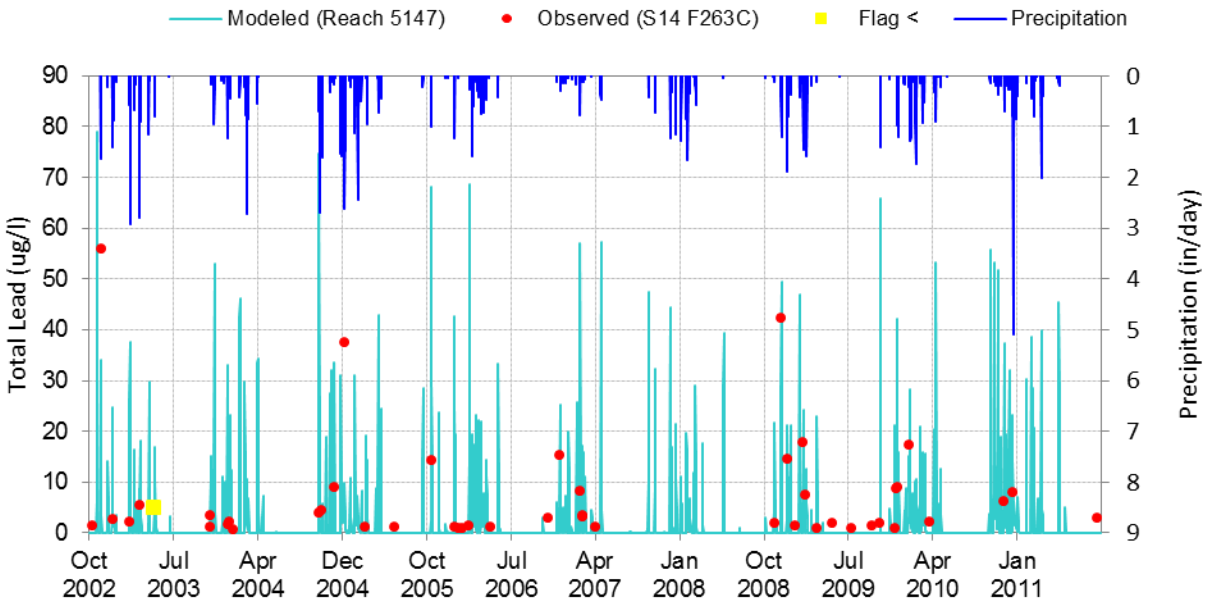

Figure 16. Simulated vs. observed timeseries plots for Total Lead (10/1/2002 through 9/30/2011) at San Gabriel River mass emission station S14.

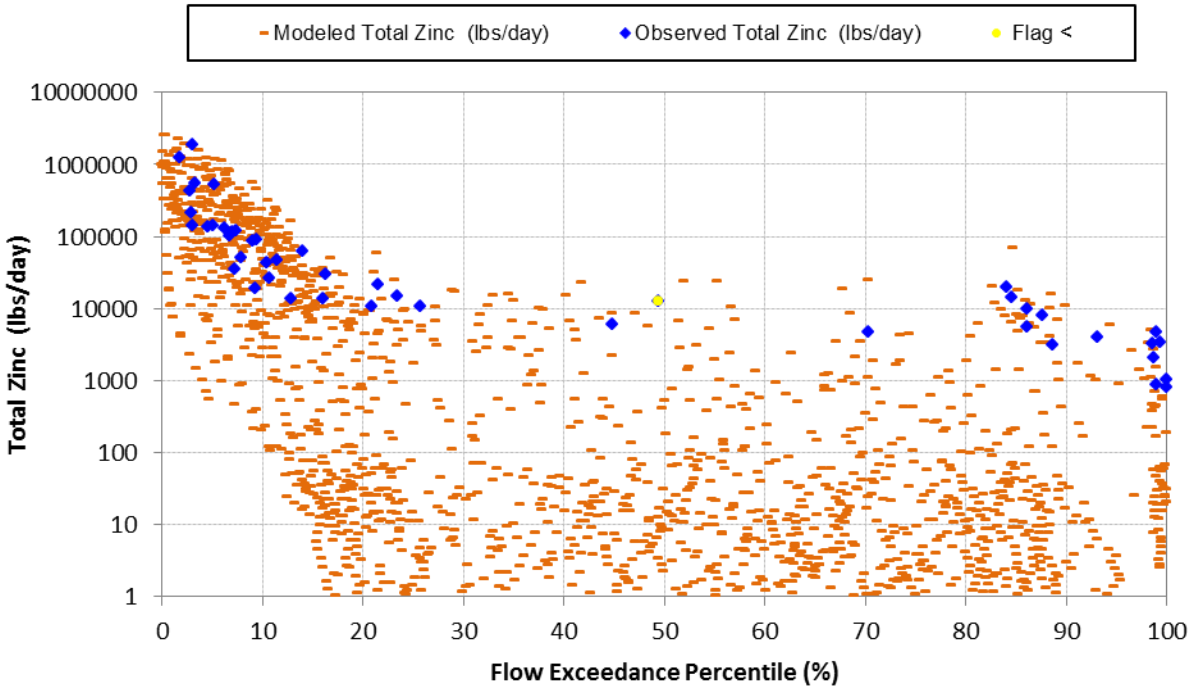

Figure 17. Simulated vs. observed load duration plots for Total Zinc (10/1/2002 through 9/30/2011) at San Gabriel River mass emission station S14.

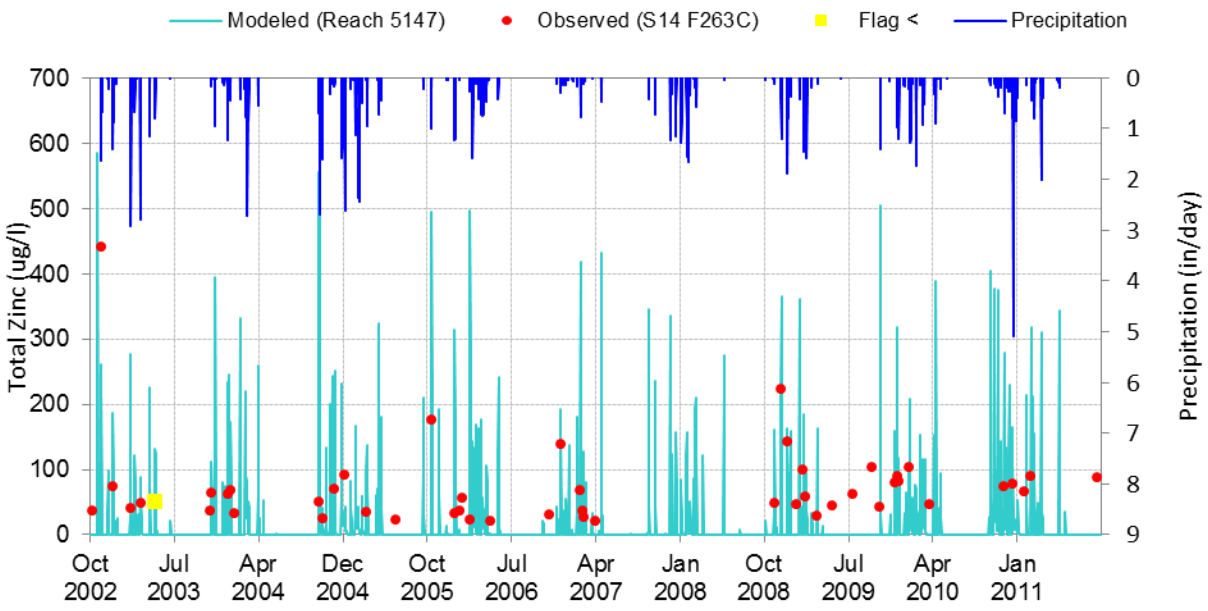

Figure 18. Simulated vs. observed timeseries plots for Total Zinc (10/1/2002 through 9/30/2011) at San Gabriel River mass emission station S14.

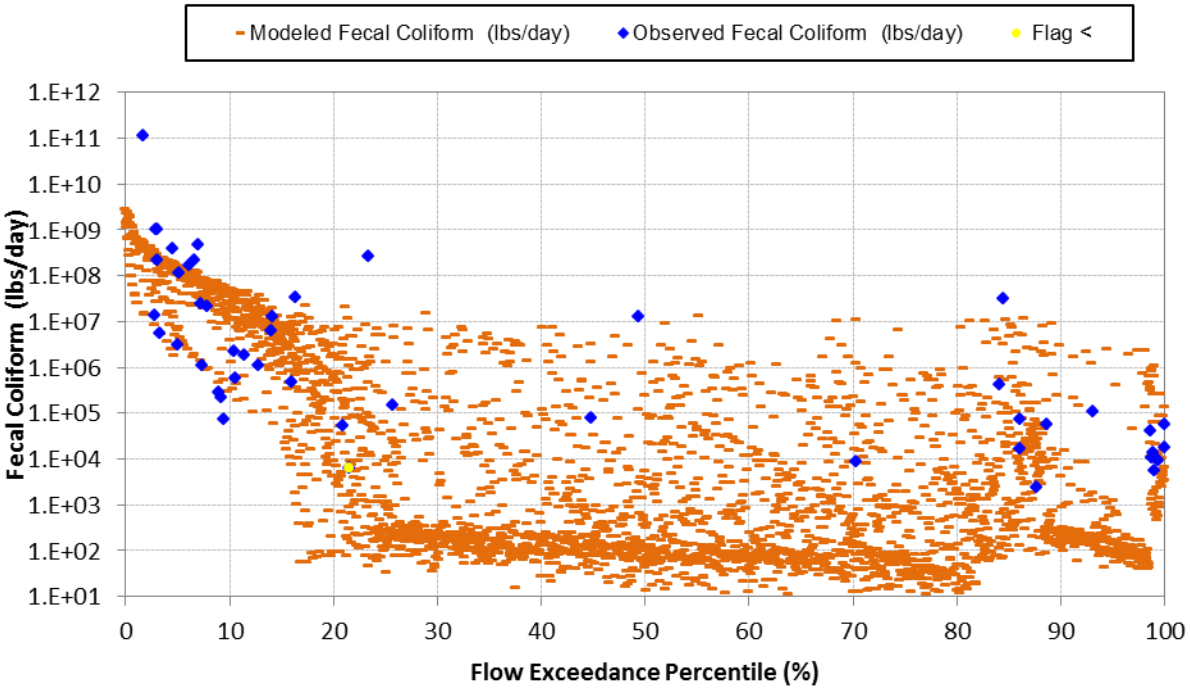

Figure 19. Simulated vs. observed load duration plots for Fecal Coliform (10/1/2002 through 9/30/2011).

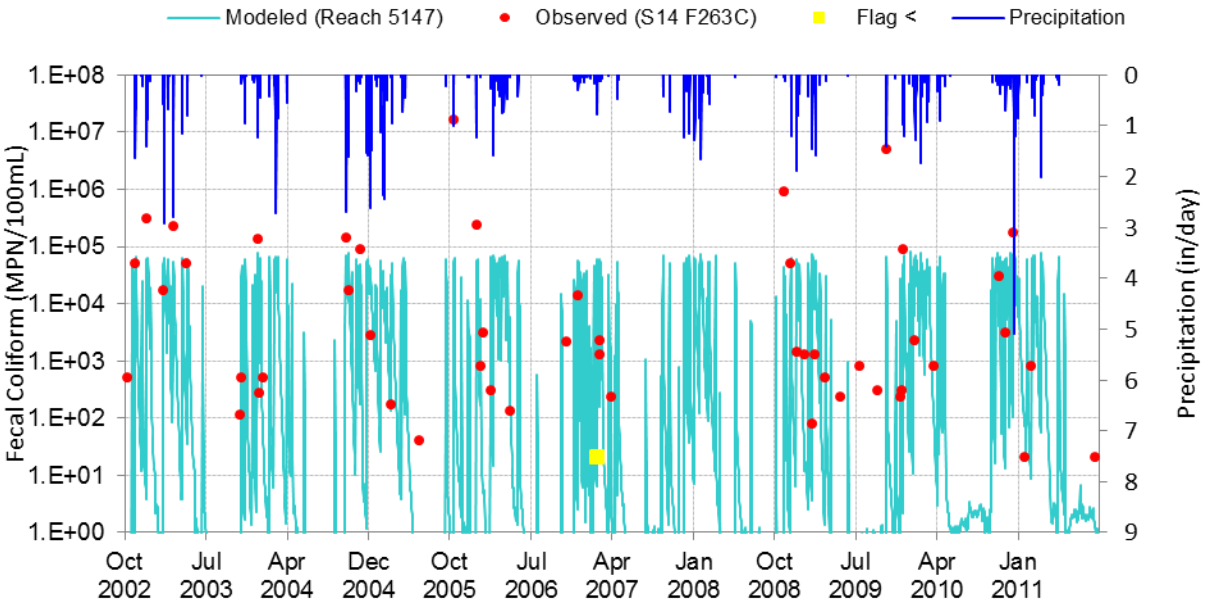

Figure 20. Simulated vs. observed timeseries plots for Fecal Coliform (10/1/2002 through 9/30/2011).

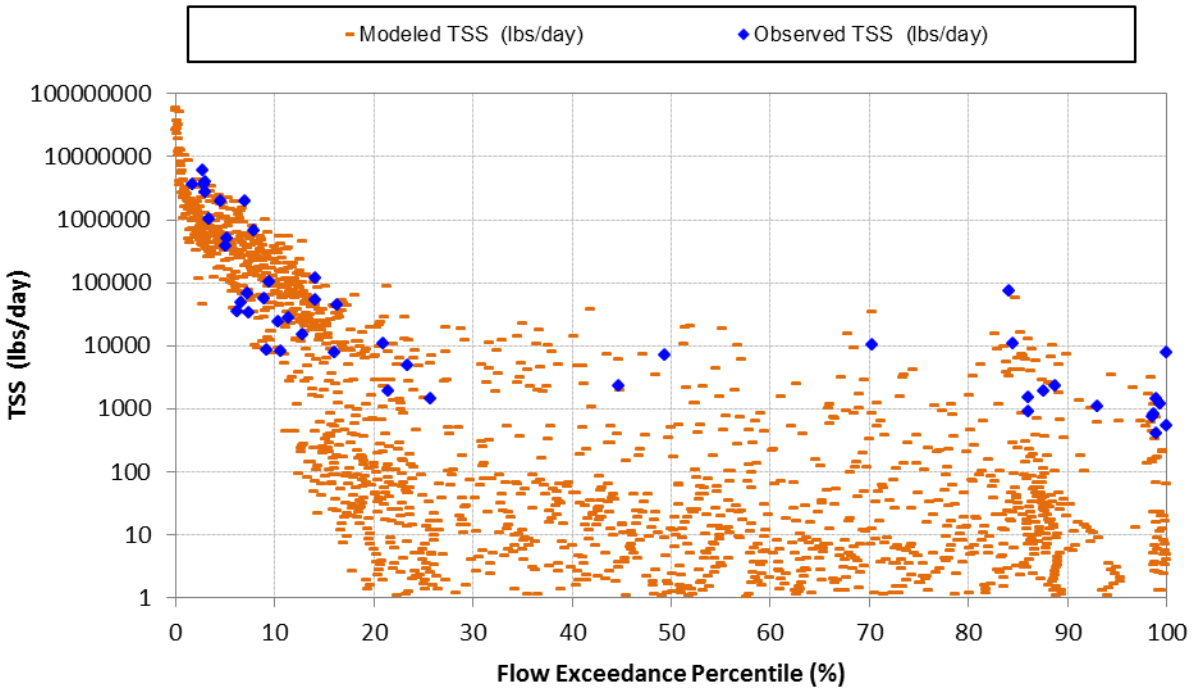

Figure 21. Simulated vs. observed load duration plots for Total Sediment (10/1/2002 through 9/30/2011).

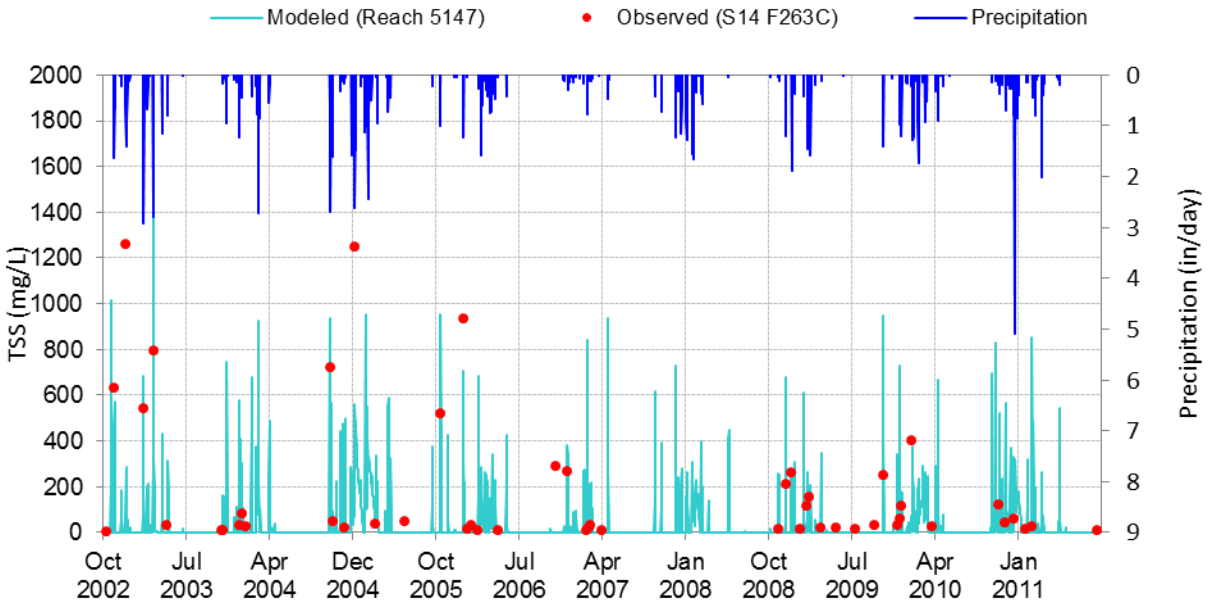

Figure 22. Simulated vs. observed time series plots for Total Sediment (10/1/2002 through 9/30/2011).

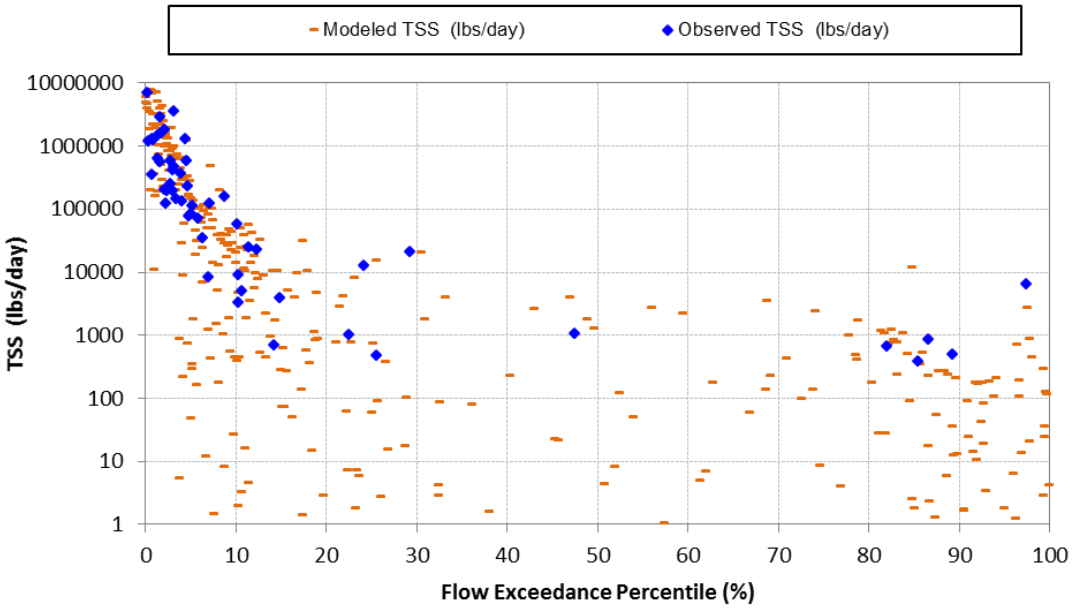

Figure 23. Simulated vs. observed load duration plots for Total Sediment (10/1/2002 through 9/30/2011) at Coyote Creek mass emission station S13.

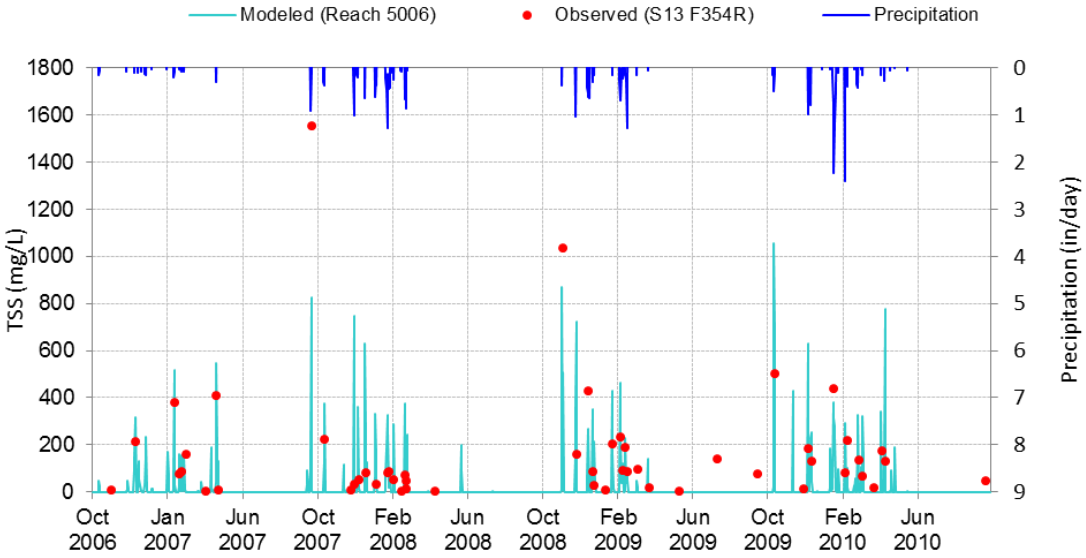

Figure 24. Simulated vs. observed timeseries plots for Total Sediment (10/1/2006 through 9/30/2010) at Coyote Creek mass emission station S13.

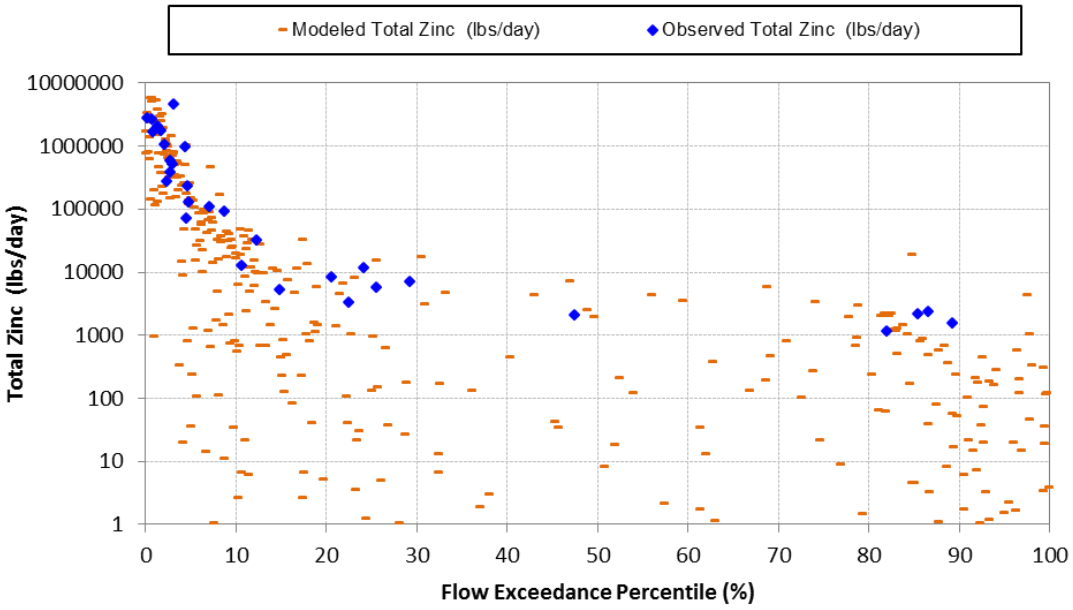

Figure 25. Simulated vs. observed load duration plots for Total Zinc (10/1/2006 through 9/30/2010) at Coyote Creek mass emission station S13.

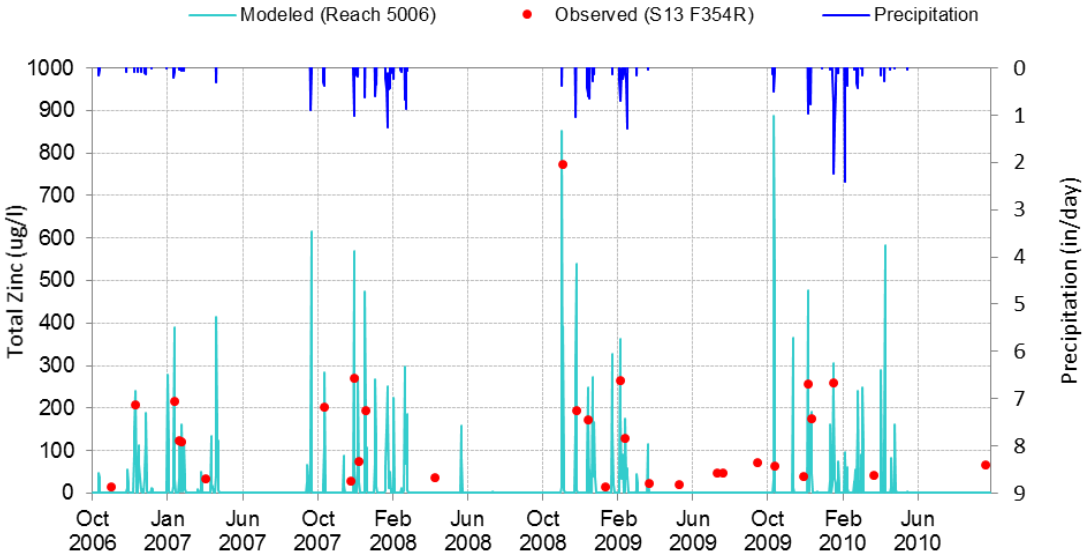

Figure 26. Simulated vs. observed timeseries plots for Total Zinc (10/1/2006 through 9/30/2010) at Coyote Creek mass emission station S13.

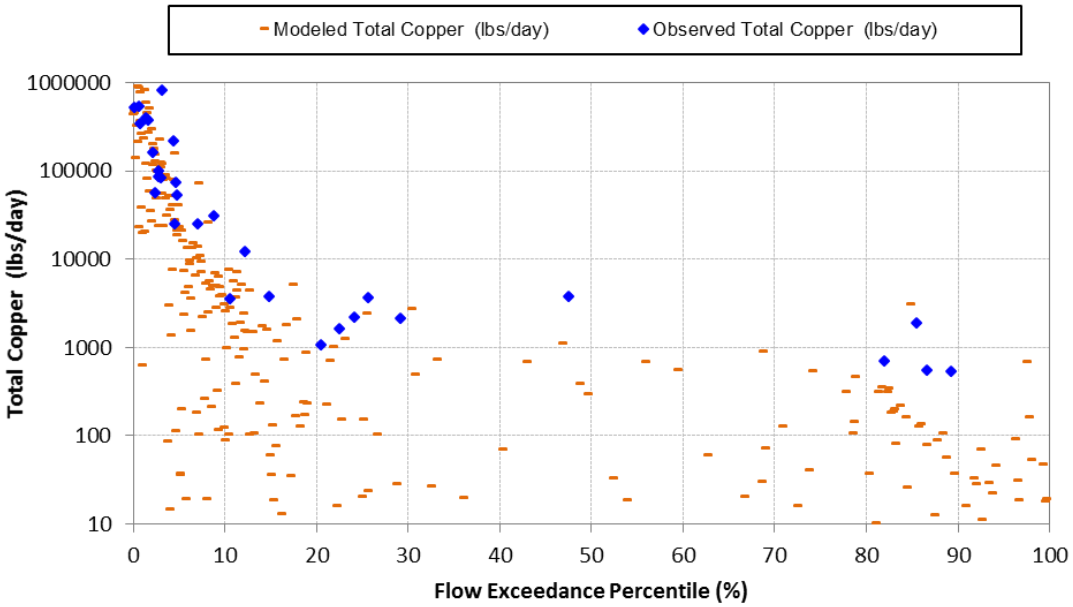

Figure 27. Simulated vs. observed load duration plots for Total Copper (10/1/2006 through 9/30/2010) at Coyote Creek mass emission station S13.

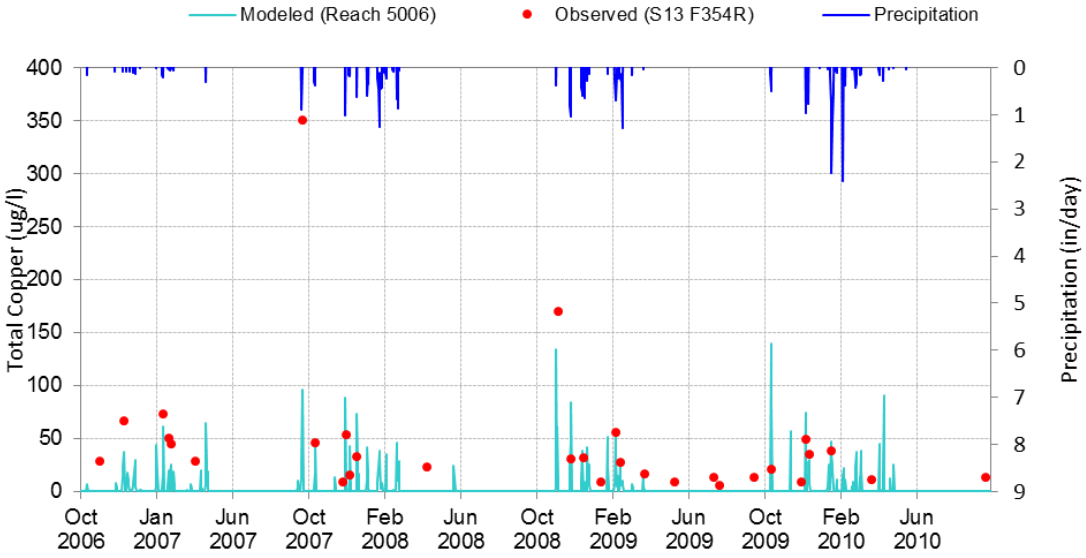

Figure 28. Simulated vs. observed timeseries plots for Total Copper (10/1/2006 through 9/30/2010) at Coyote Creek mass emission station S13.

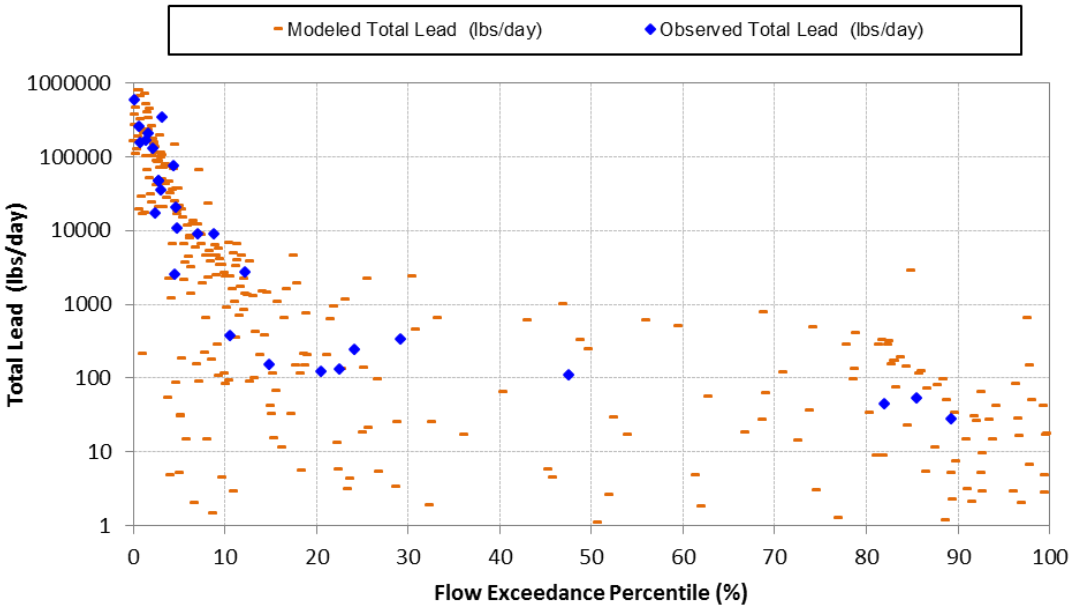

Figure 29 Simulated vs. observed load duration plots for Total Lead (10/1/2006 through 9/30/2010) at Coyote Creek mass emission station S13.

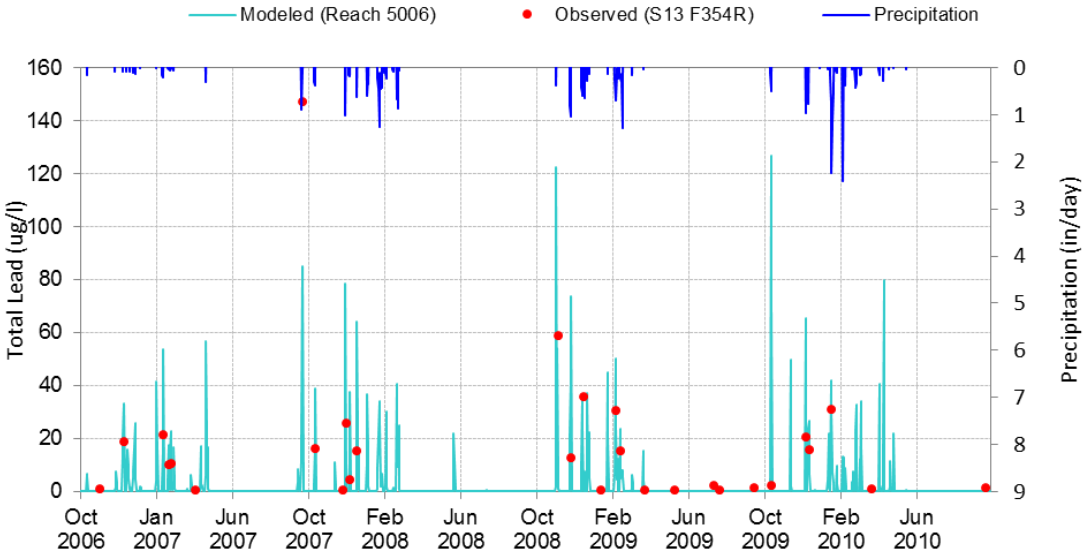

Figure 30. Simulated vs. observed timeseries plots for Total Lead (10/1/2006 through 9/30/2010) at Coyote Creek mass emission station S13.

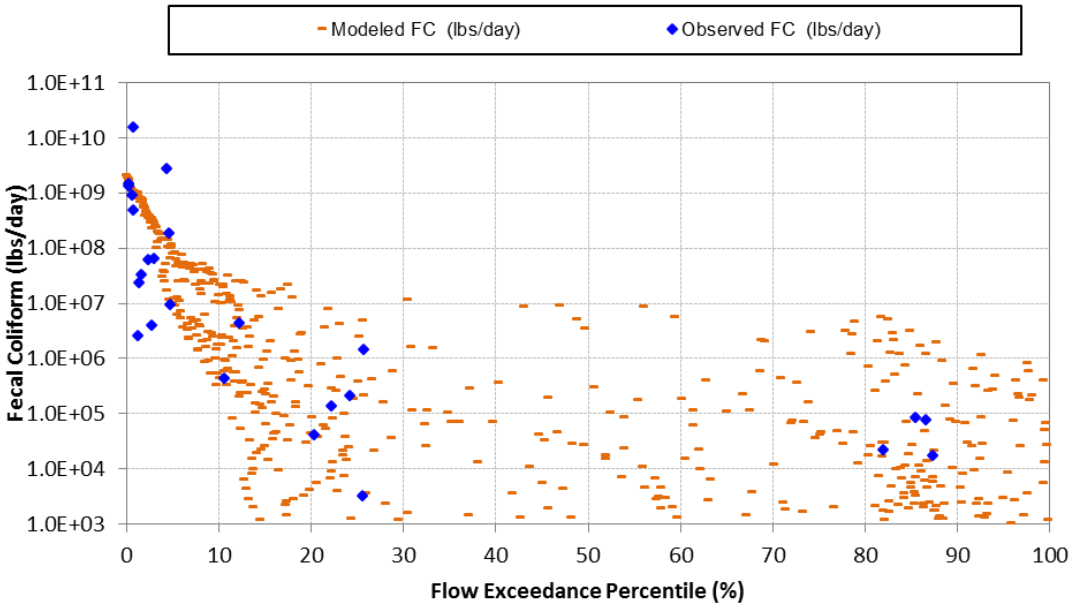

Figure 31. Simulated vs. observed load duration plots for Fecal Coliform (10/1/2006 through 9/30/2010) at Coyote Creek mass emission station S13.

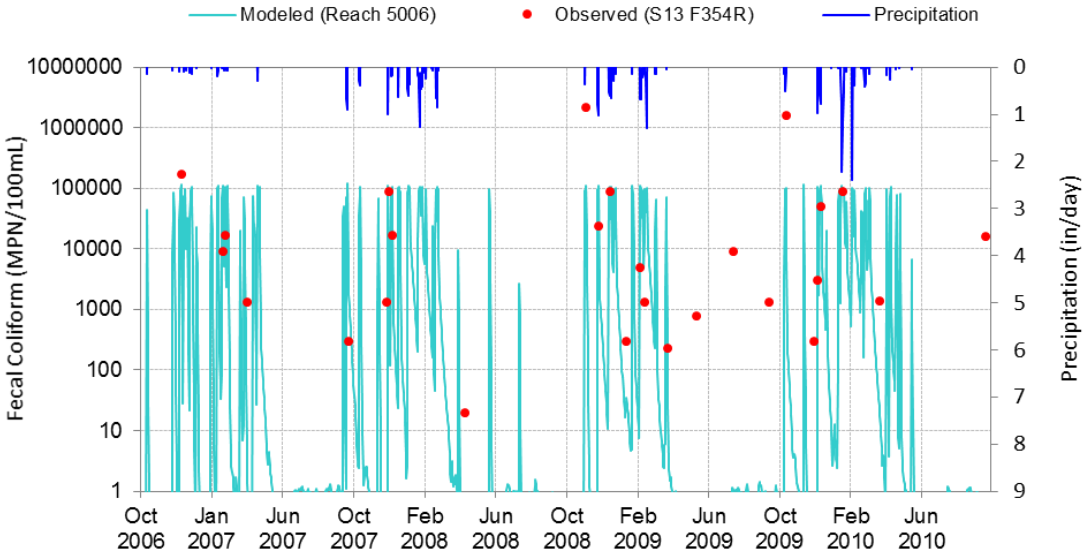

Figure 32. Simulated vs. observed timeseries plots for Fecal Coliform (10/1/2006 through 9/30/2010) at Coyote Creek mass emission station S13.

2. Lower Los Angeles River

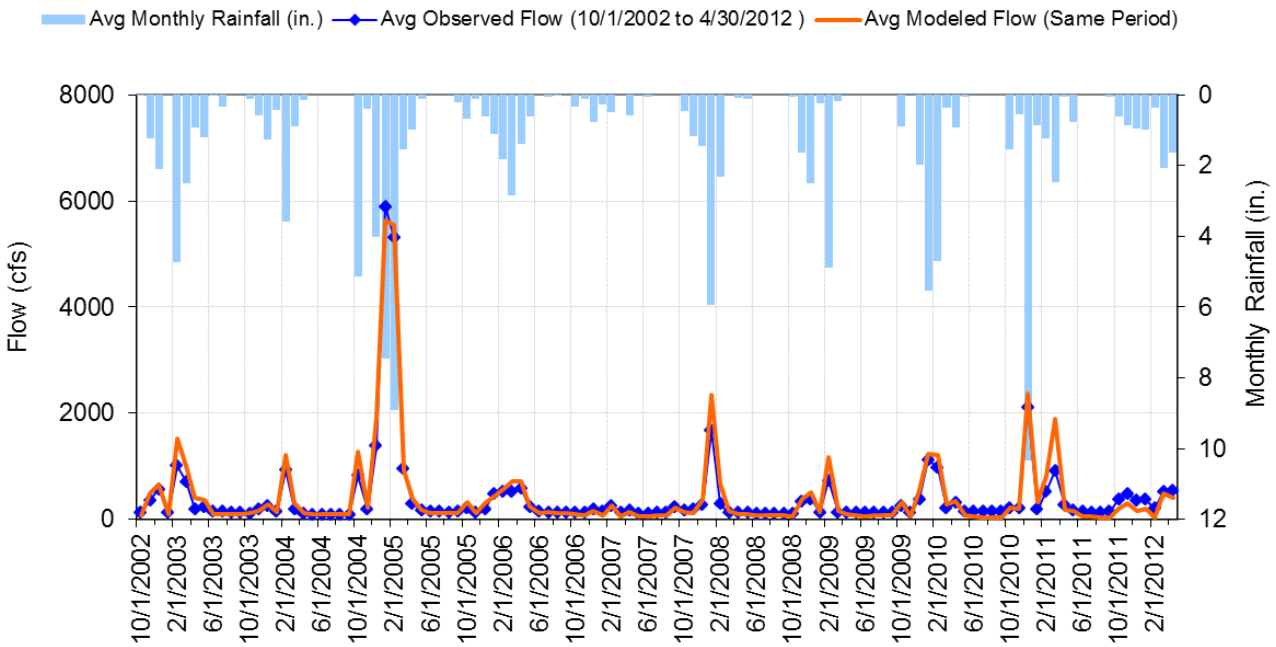

Figure 33. Monthly hydrograph for LA DPW Los Angeles River below Wardlow Road (10/1/2002 – 9/30/2011).

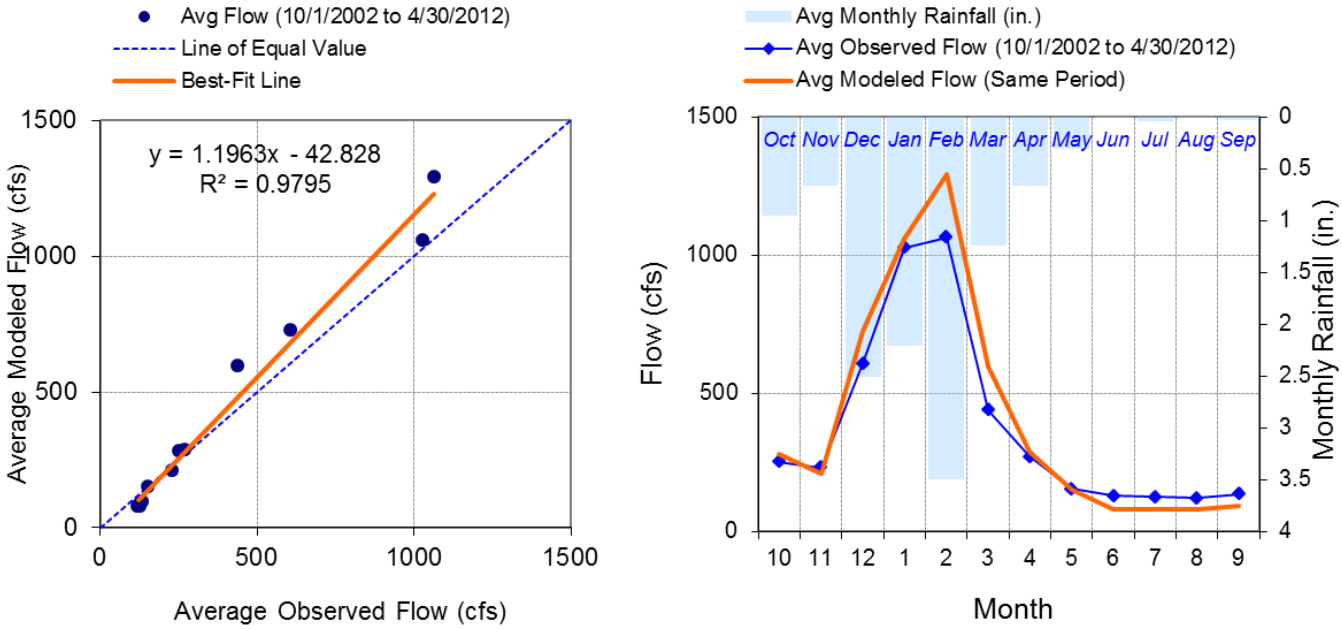

Figure 34. Aggregated monthly hydrograph for LA DPW Los Angeles River below Wardlow Road (10/1/2002 – 9/30/2011).

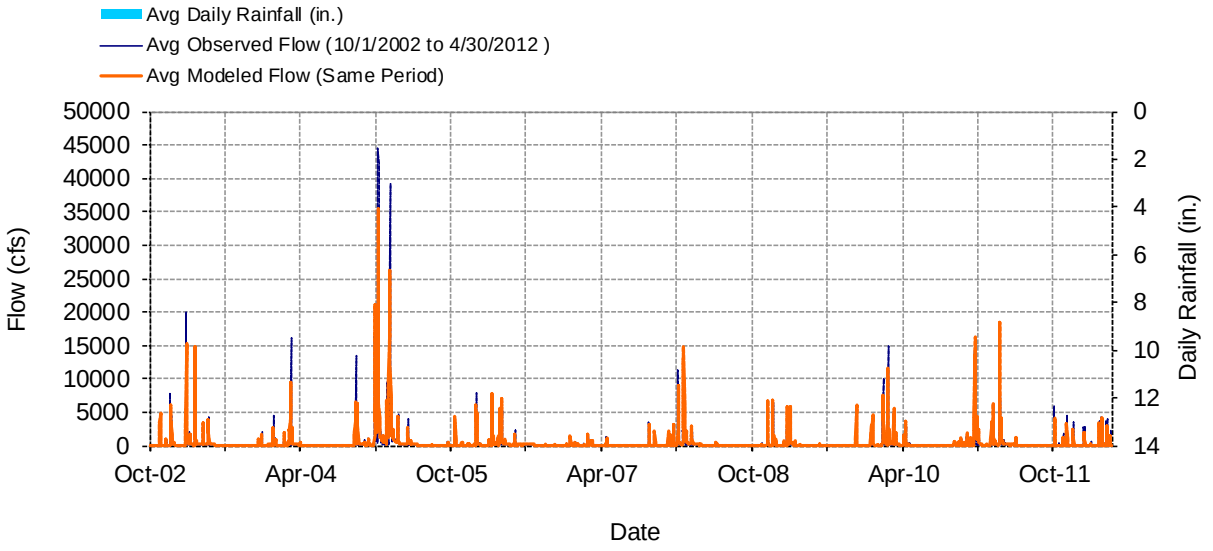

Figure 35. Mean daily flow for LA DPW Los Angeles River below Wardlow Road (10/1/2002 – 9/30/2011).

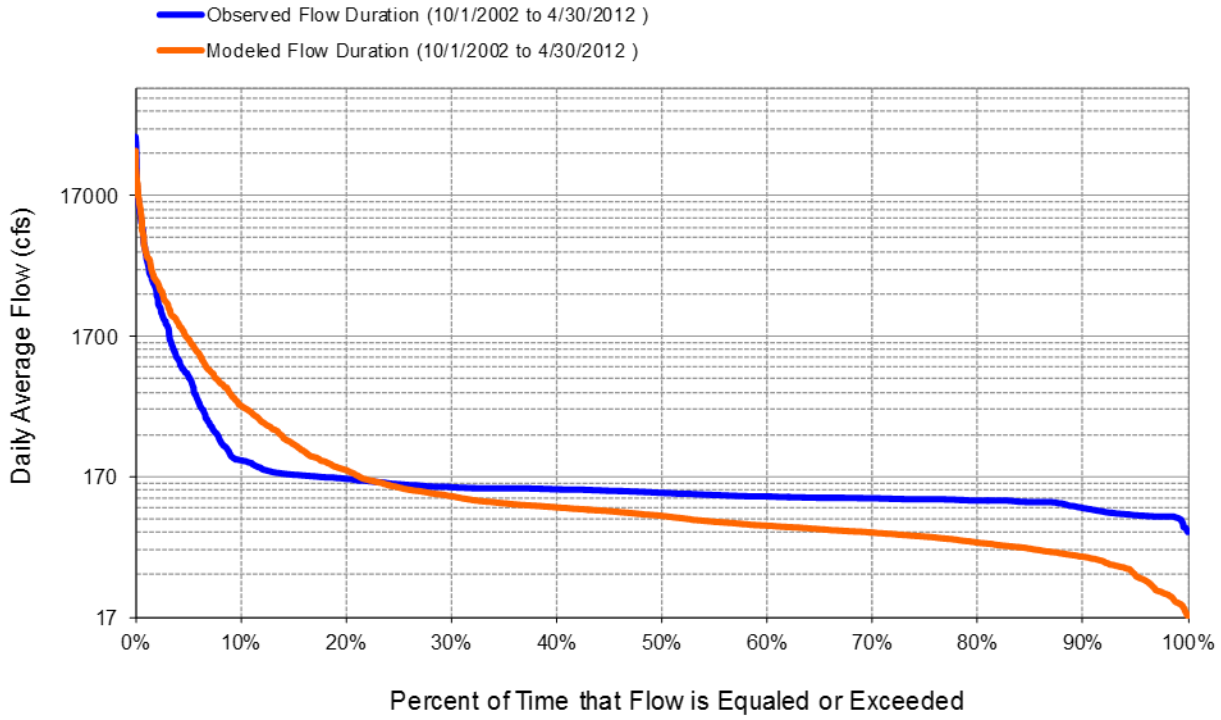

Figure 36. Daily flow exceedance for LA DPW Los Angeles River below Wardlow Road (10/1/2002 – 9/30/2011).

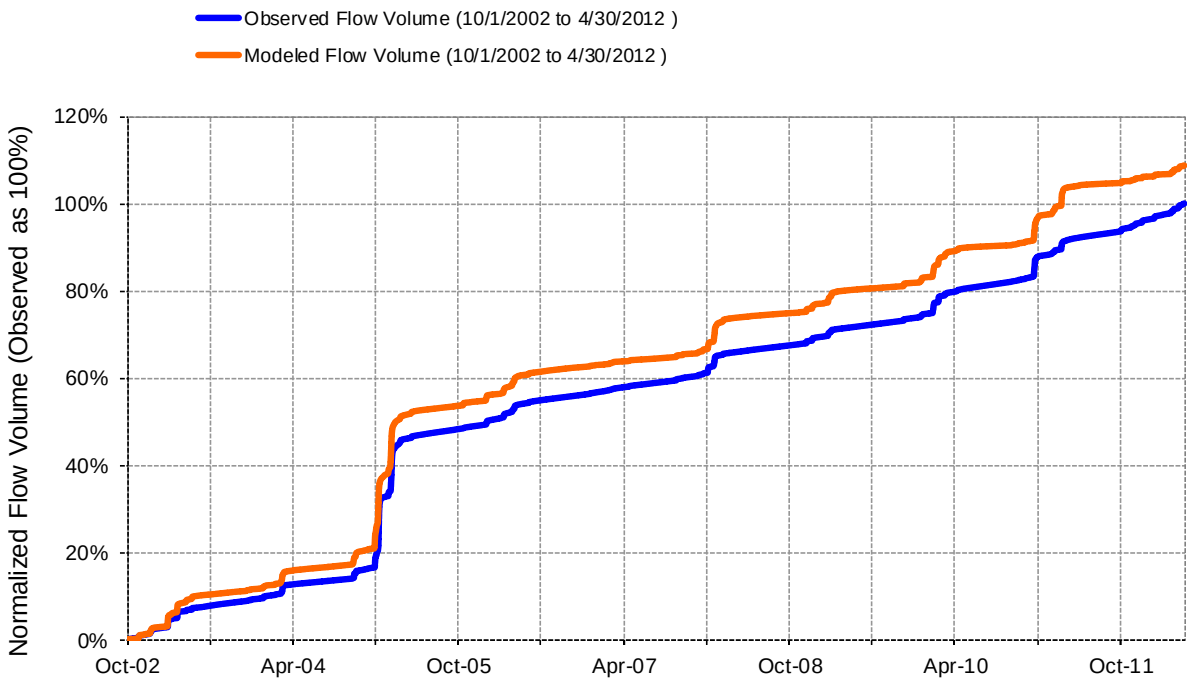

Figure 37. Flow accumulation for LA DPW Los Angeles River below Wardlow Road (10/1/2002 – 9/30/2011).

Table 2. Summary of water quality data evaluated for the Lower Los Angeles River

Gage	Constituent	Minimum	Q1	Median	Q3	Maximum
S10	Total Copper (ug/l)	0.5	12.975	25.8	49.55	424
S10	Total Lead (ug/l)	0.2	2.45	15.6	35.775	1070
S10	TSS (mg/L)	1	63	142.5	295	2280
S10	Total Zinc (ug/l)	22.3	63.85	124	261.75	2590
S10	Fecal Coliform (MPN/100mL)	20	500	24000	240000	24000000
S10	Total Nitrogen (mg/l)	0.03	0.60245	1.064	1.725	6.75
S10	Total Phosphorous (mg/l)	0.05	0.24	0.3785	0.538	8.24

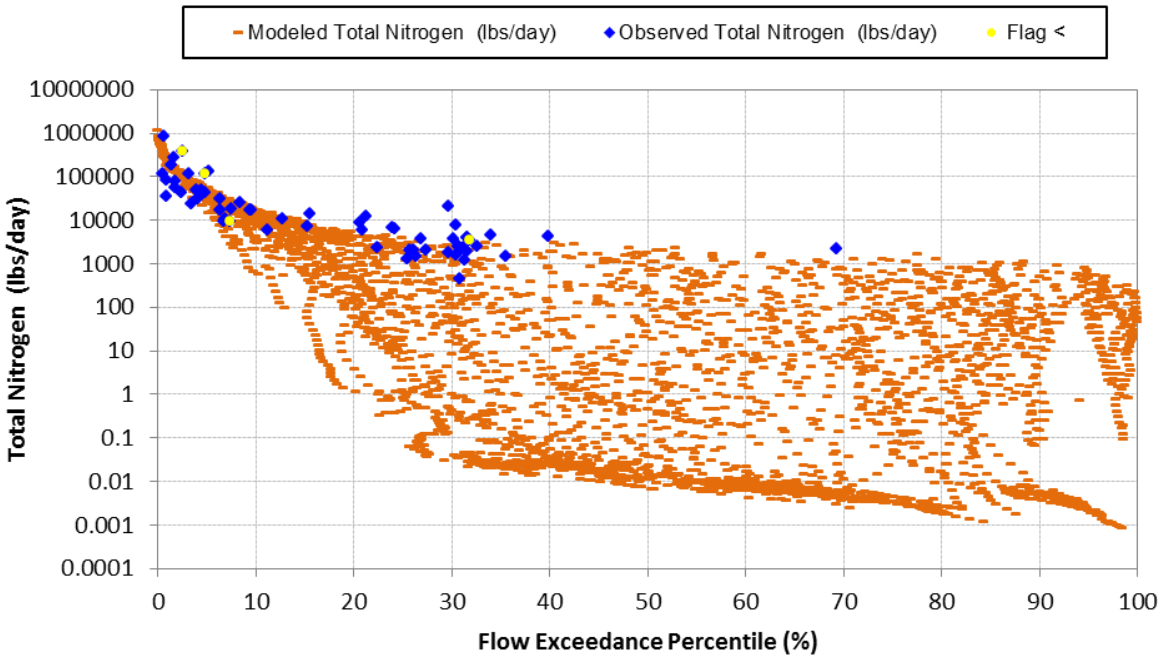

Figure 38. Simulated vs. observed time series plots for Total Nitrogen (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

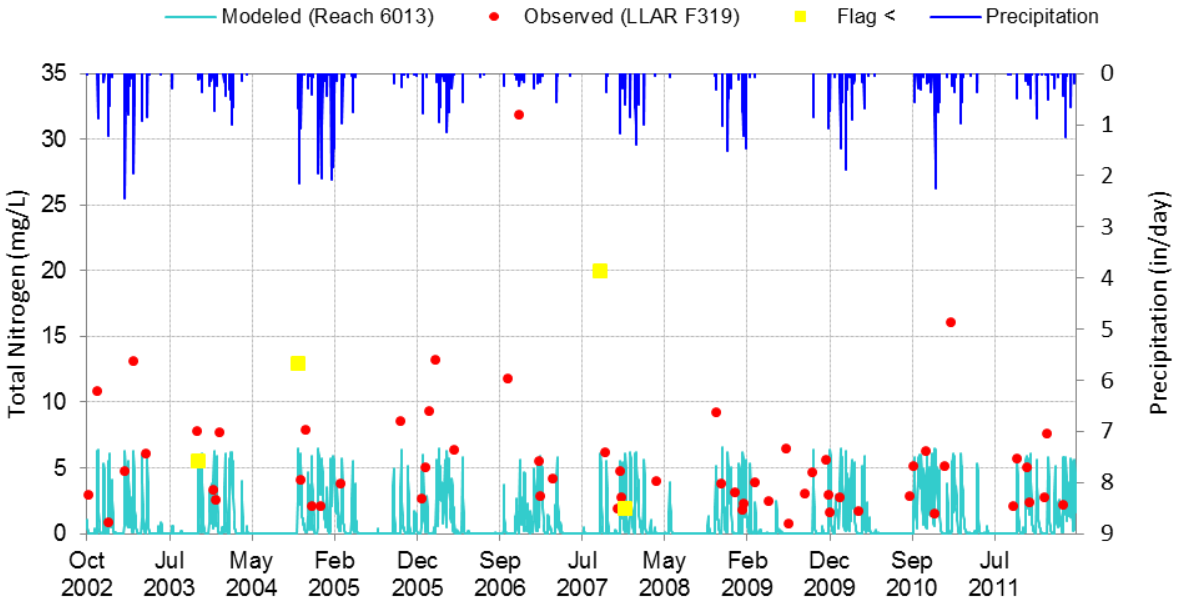

Figure 39. Simulated vs. observed time series plots for Total Nitrogen (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

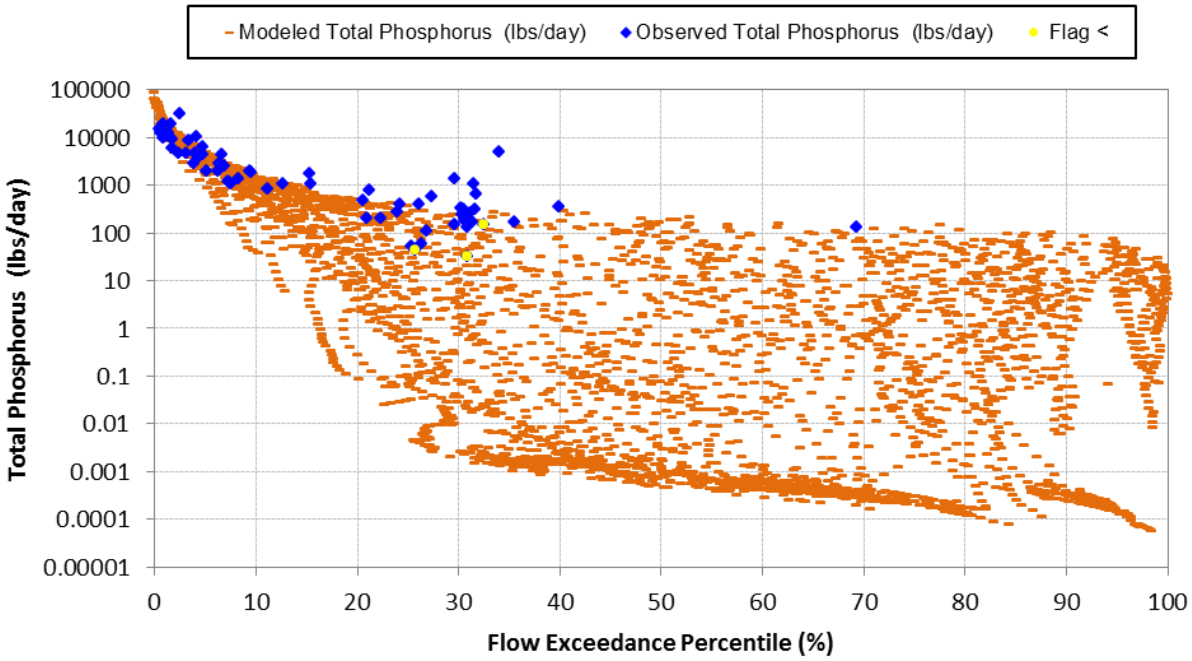

Figure 40. Simulated vs. observed load duration plots for Total Phosphorous (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

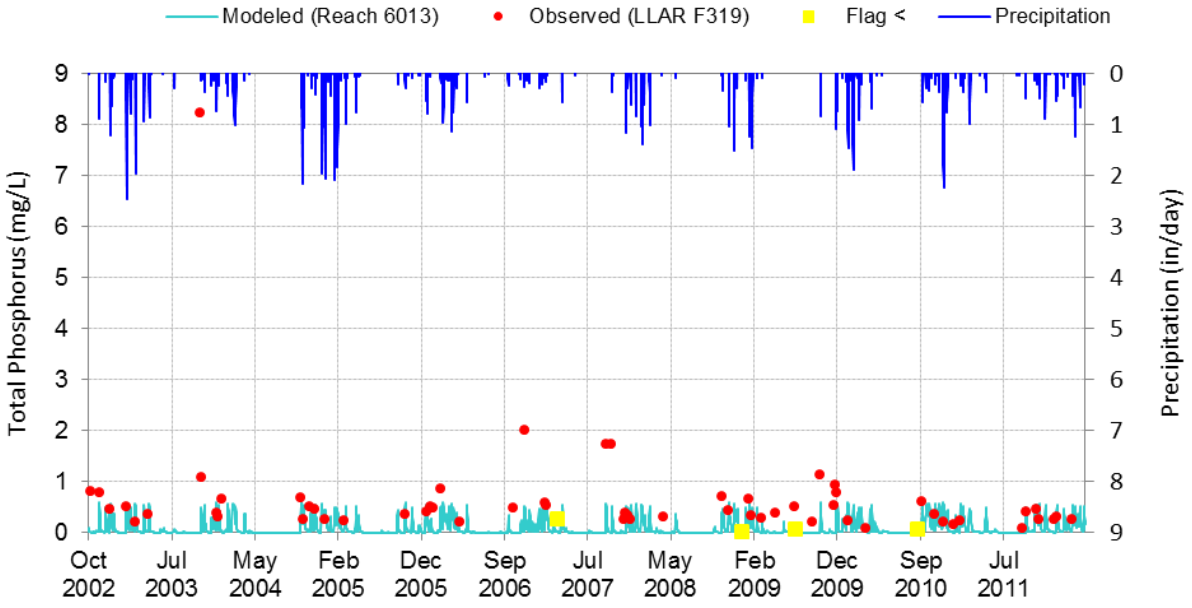

Figure 41. Simulated vs. observed time series plots for Total Phosphorous (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

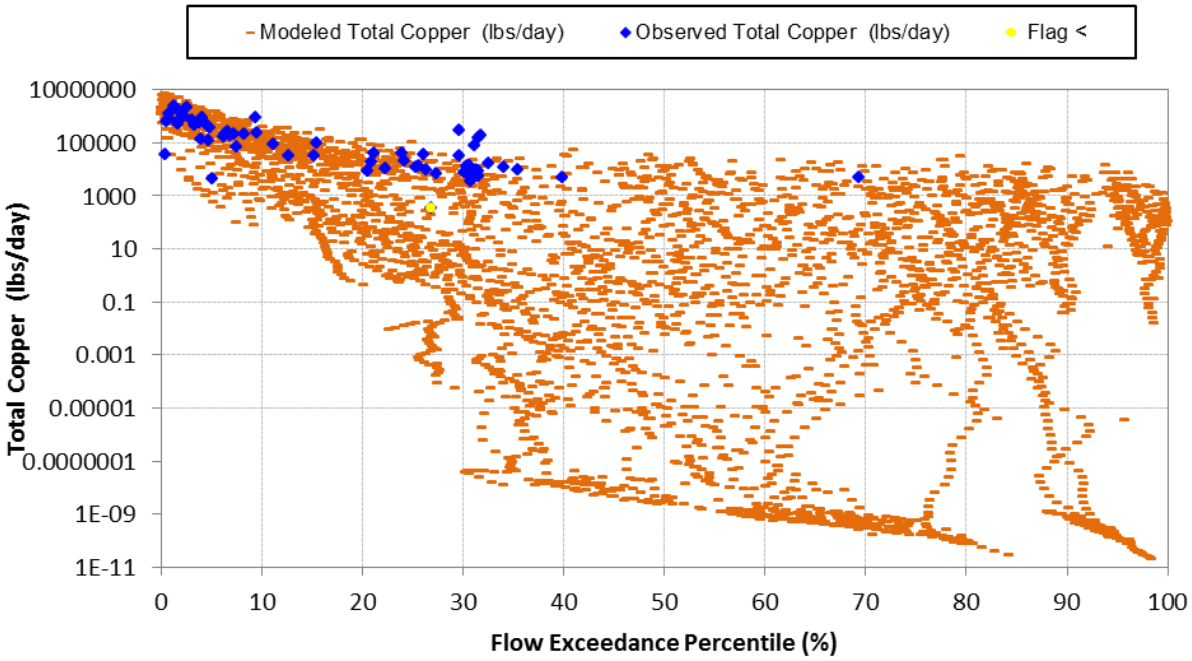

Figure 42. Simulated vs. observed load duration plots for Total Copper (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

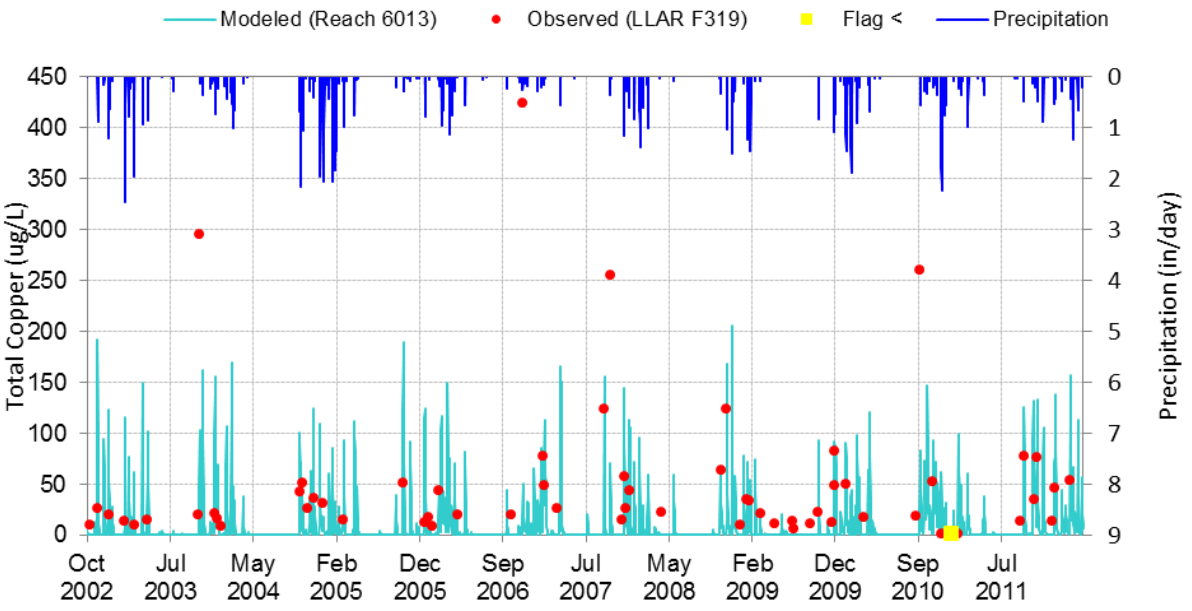

Figure 43. Simulated vs. observed timeseries plots for Total Copper (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

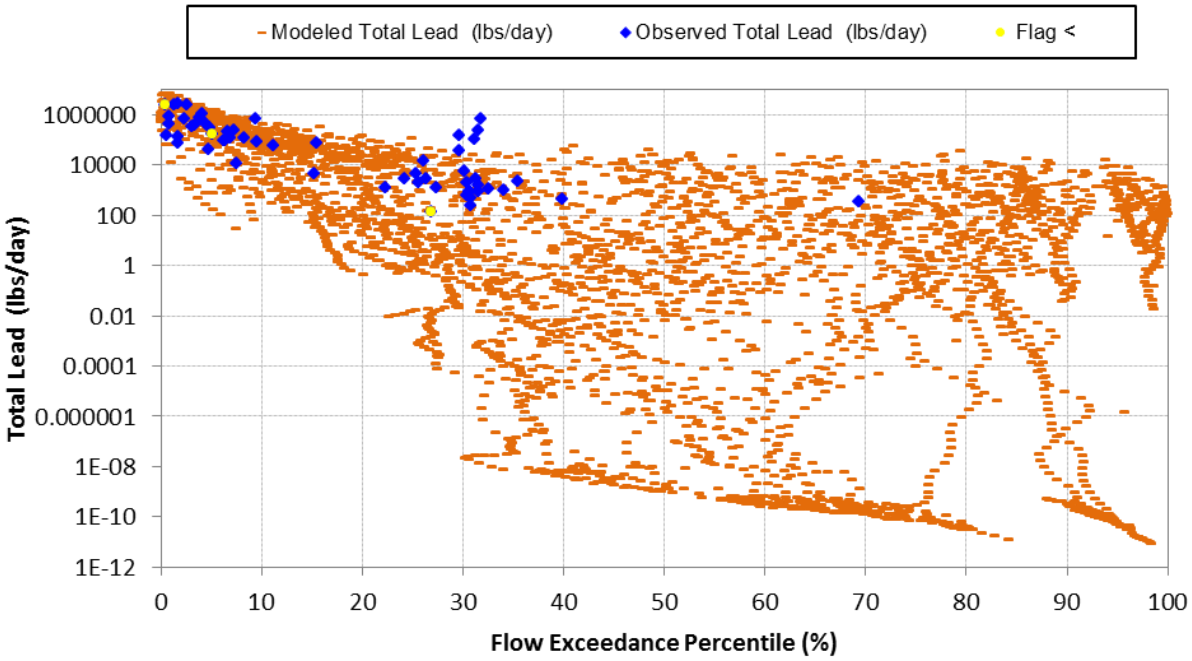

Figure 44. Simulated vs. observed load duration plots for Total Lead (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

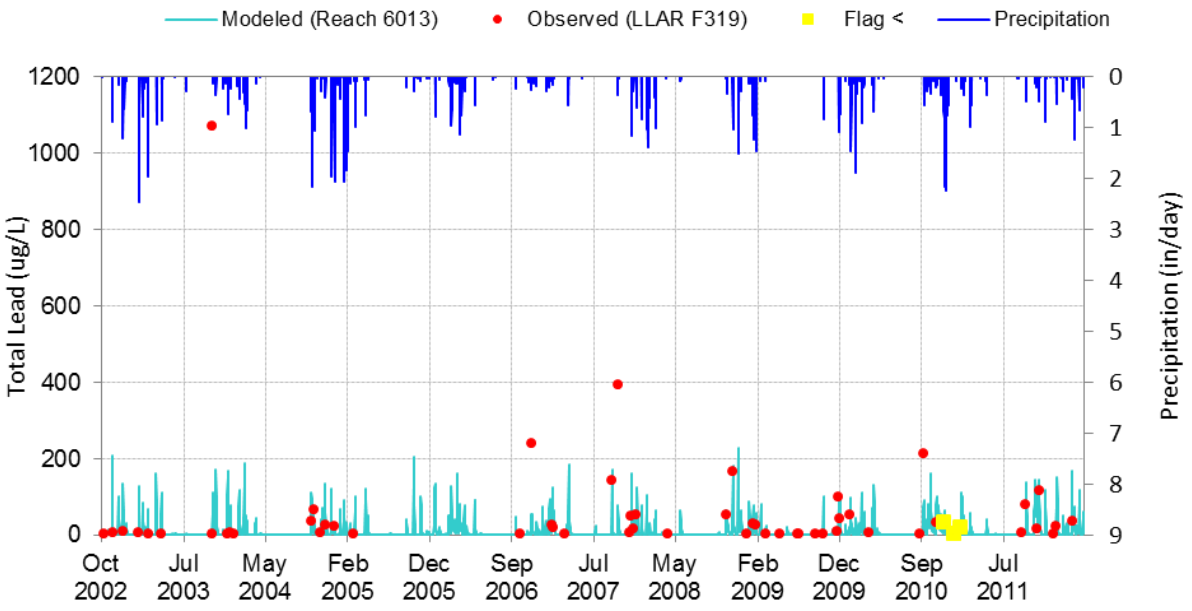

Figure 45. Simulated vs. observed timeseries plots for Total Lead (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

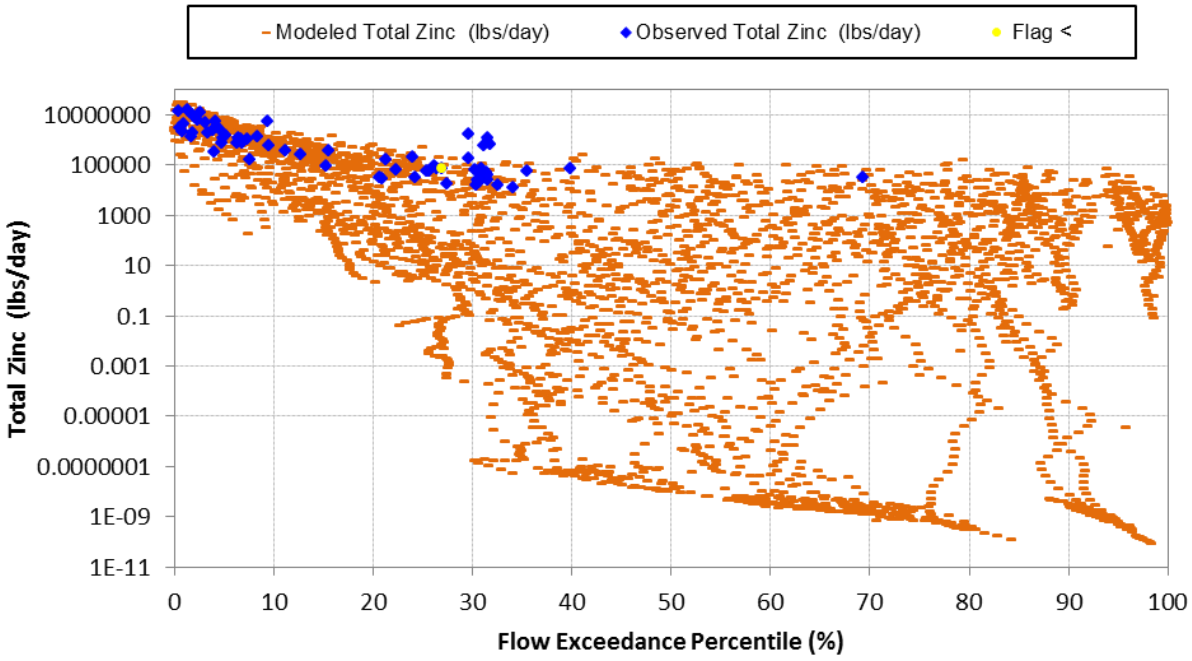

Figure 46. Simulated vs. observed load duration plots for Total Zinc (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

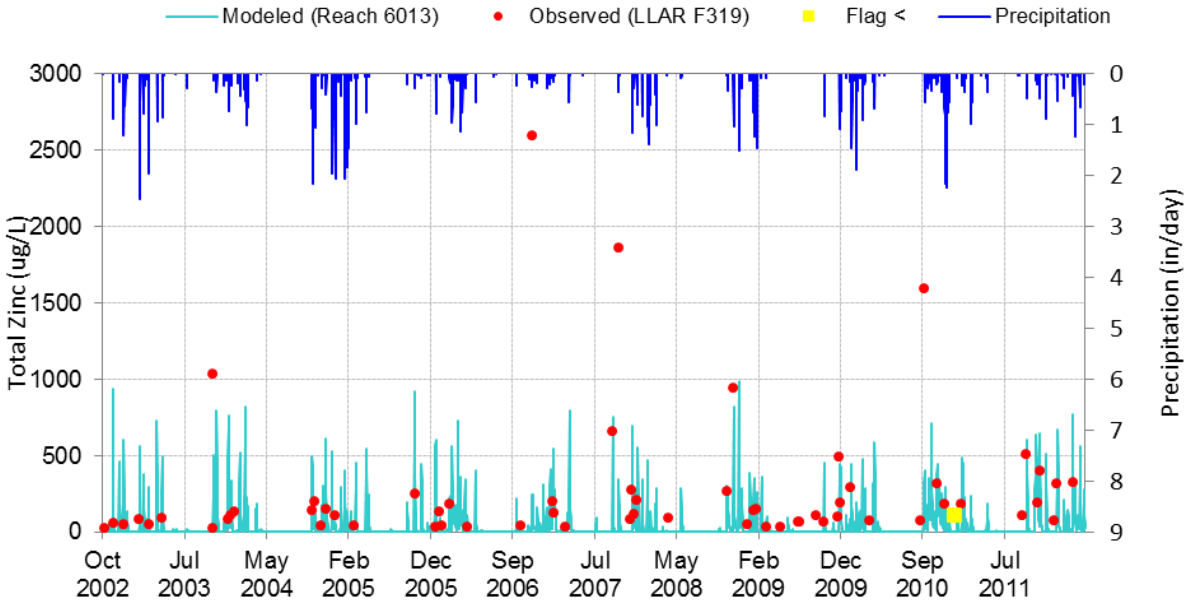

Figure 47. Simulated vs. observed timeseries plots for Total Zinc (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

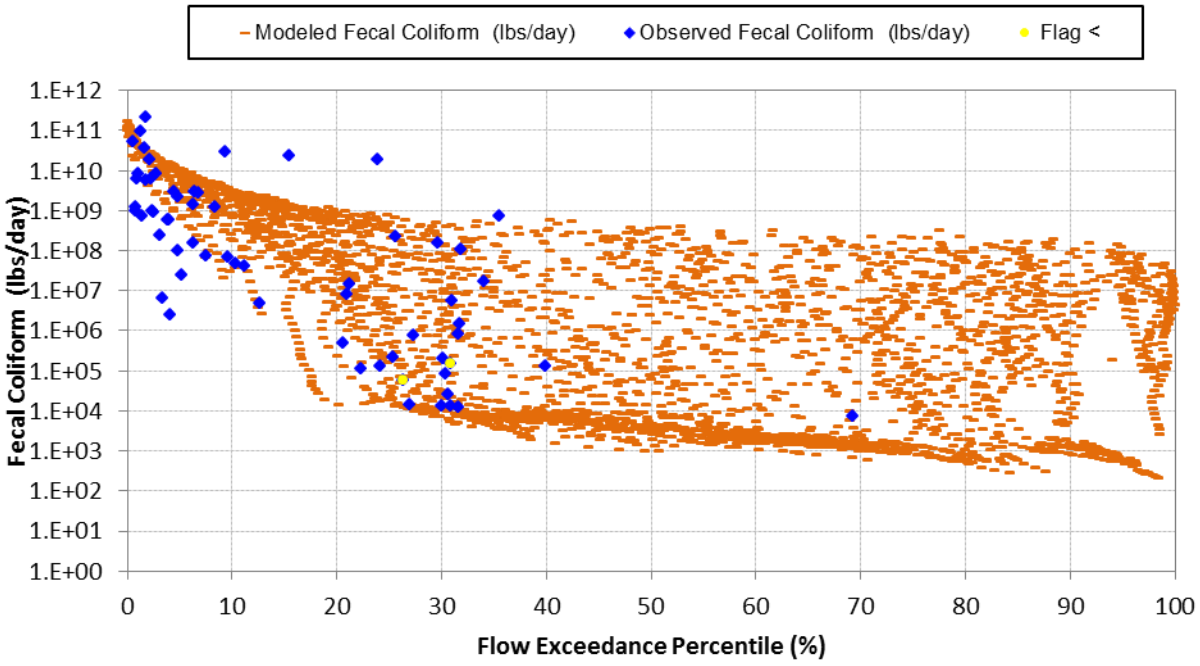

Figure 48. Simulated vs. observed load duration plots for Fecal Coliform (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

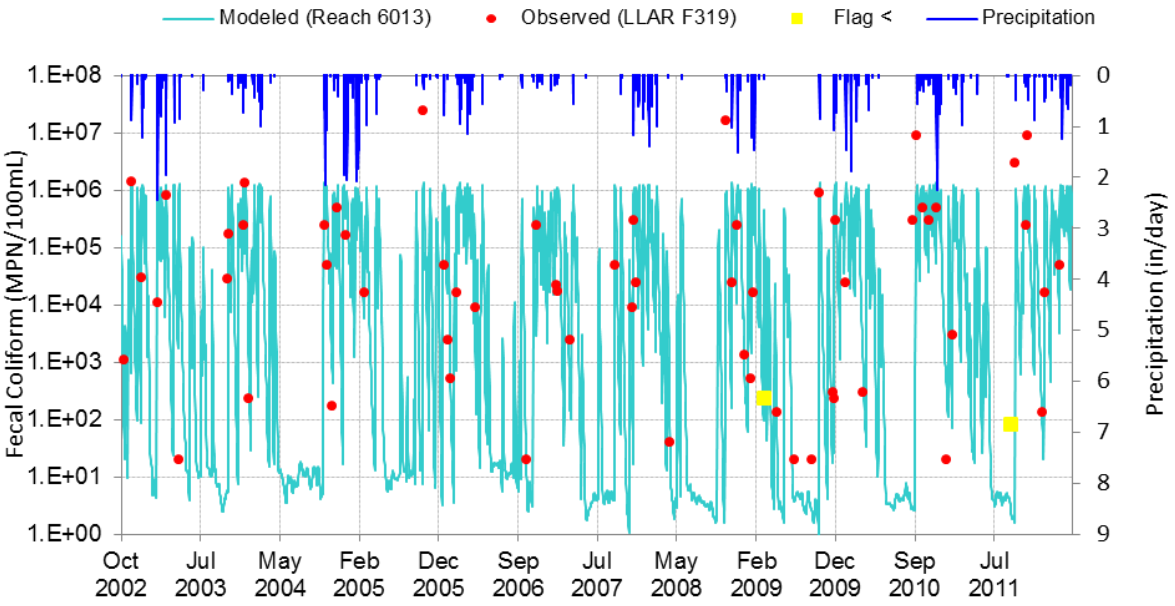

Figure 49. Simulated vs. observed timeseries plots for Fecal Coliform (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

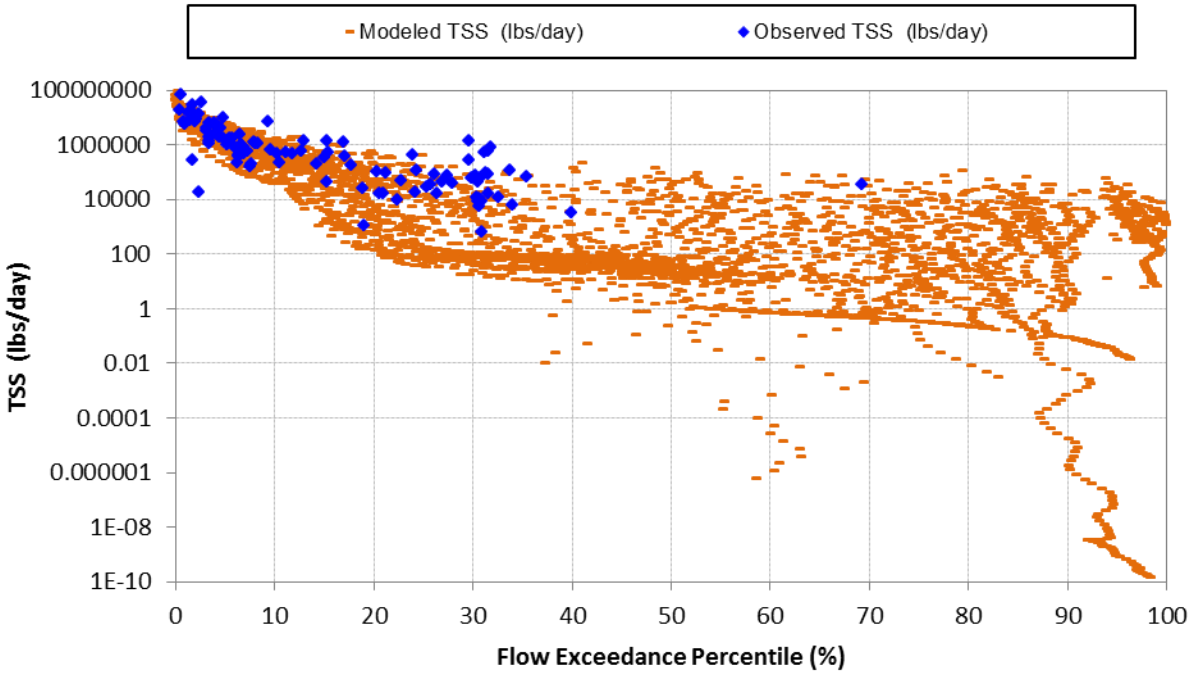

Figure 50. Simulated vs. observed load duration plots for Total Sediment (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

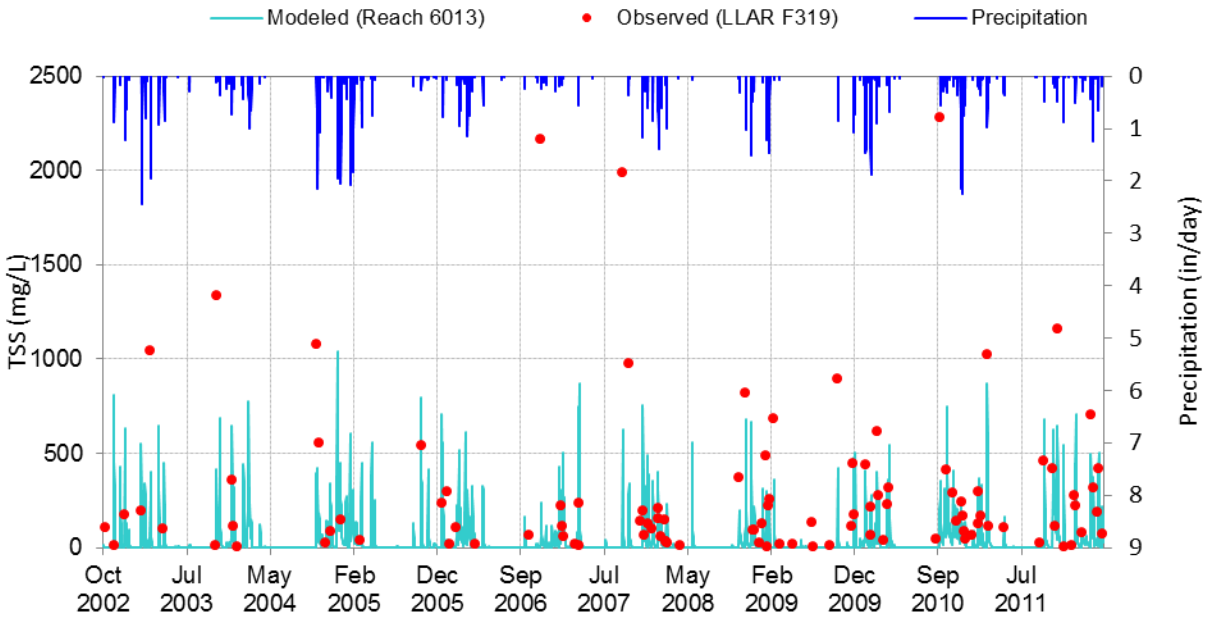

Figure 51. Simulated vs. observed time series plots for Total Sediment (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

3. Los Cerritos Channel

Table 3. Summary of water quality data evaluated for Los Cerritos Channel

Gage	Constituent	Minimum	Q1	Median	Q3	Maximum
Stearns St.	Total Copper (ug/l)	8.4	17.25	25	43.5	240
Stearns St.	Total Lead (ug/l)	0.78	3.025	17	41.75	370
Stearns St.	TSS (mg/L)	2	52.5	110	210	1700
Stearns St.	Total Zinc (ug/l)	9.5	33	180	390	2600
Stearns St.	Fecal Coliform (MPN/100mL)	18	2275	8000	28500	1600000
Stearns St.	Total Nitrogen (mg/l)	0.9	2.147	3.292	4.532	23.7
Stearns St.	Total Phosphorous (mg/l)	0.083	0.22	0.53	0.91	6.2

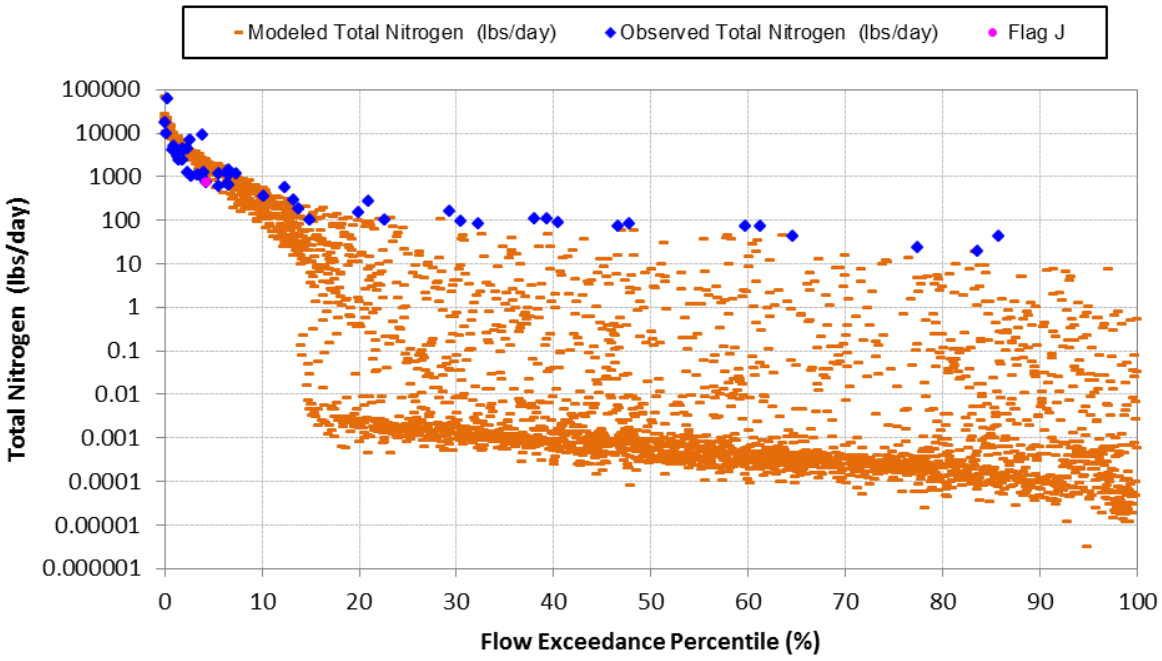

Figure 52. Simulated vs. observed time series plots for Total Nitrogen (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

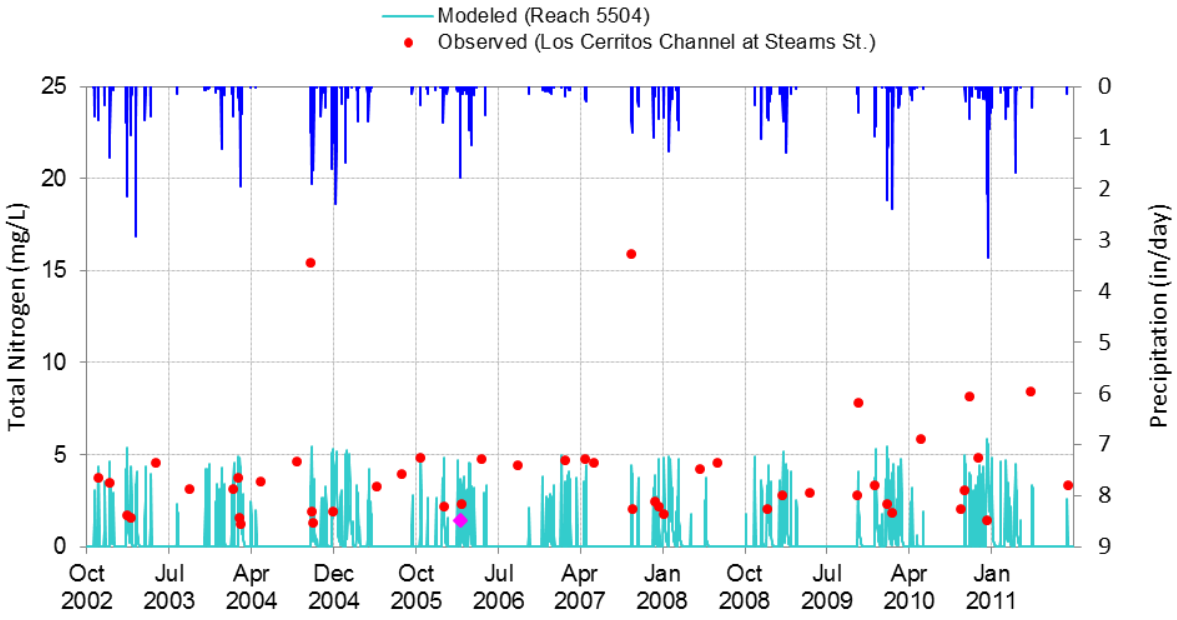

Figure 53. Simulated vs. observed time series plots for Total Nitrogen (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

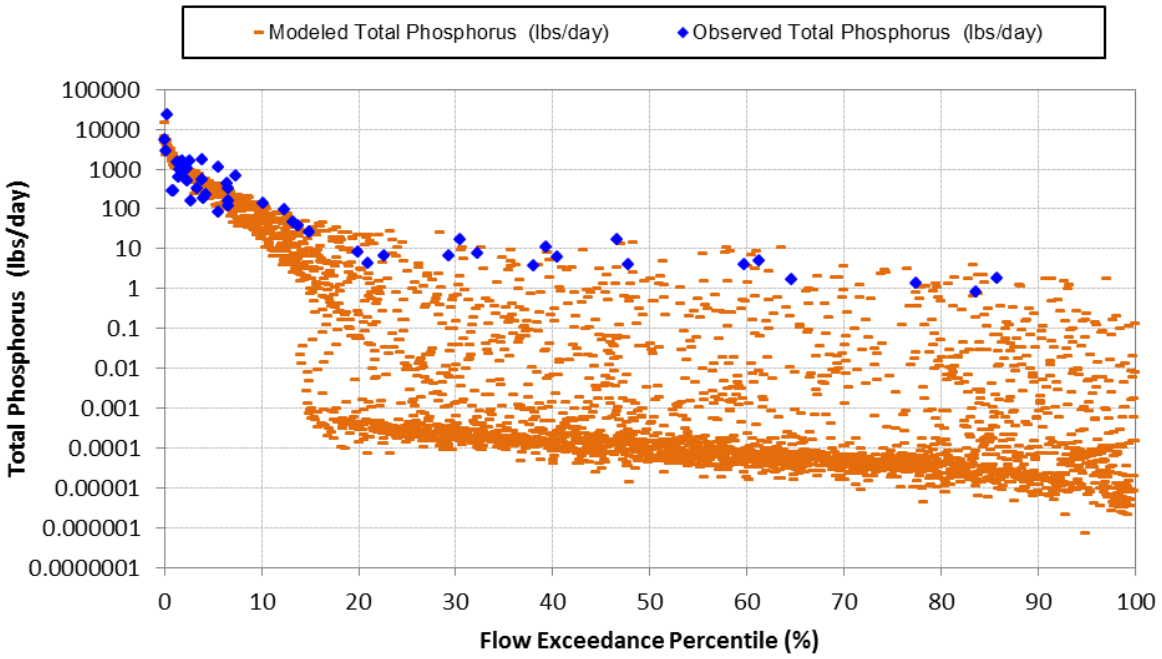

Figure 54. Simulated vs. observed load duration plots for Total Phosphorous (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

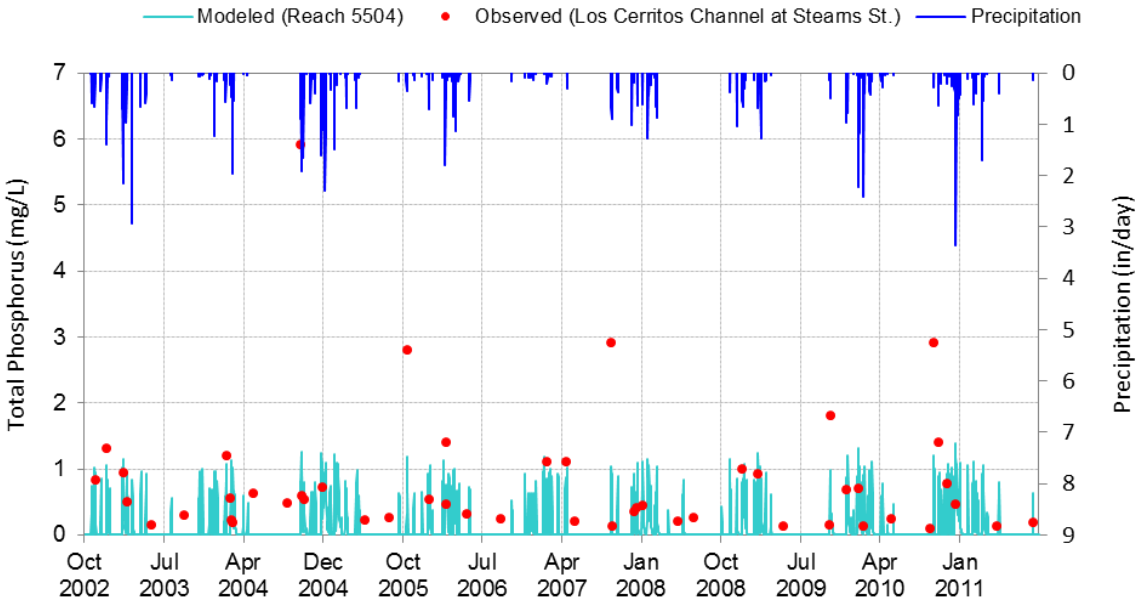

Figure 55. Simulated vs. observed time series plots for Total Phosphorous (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

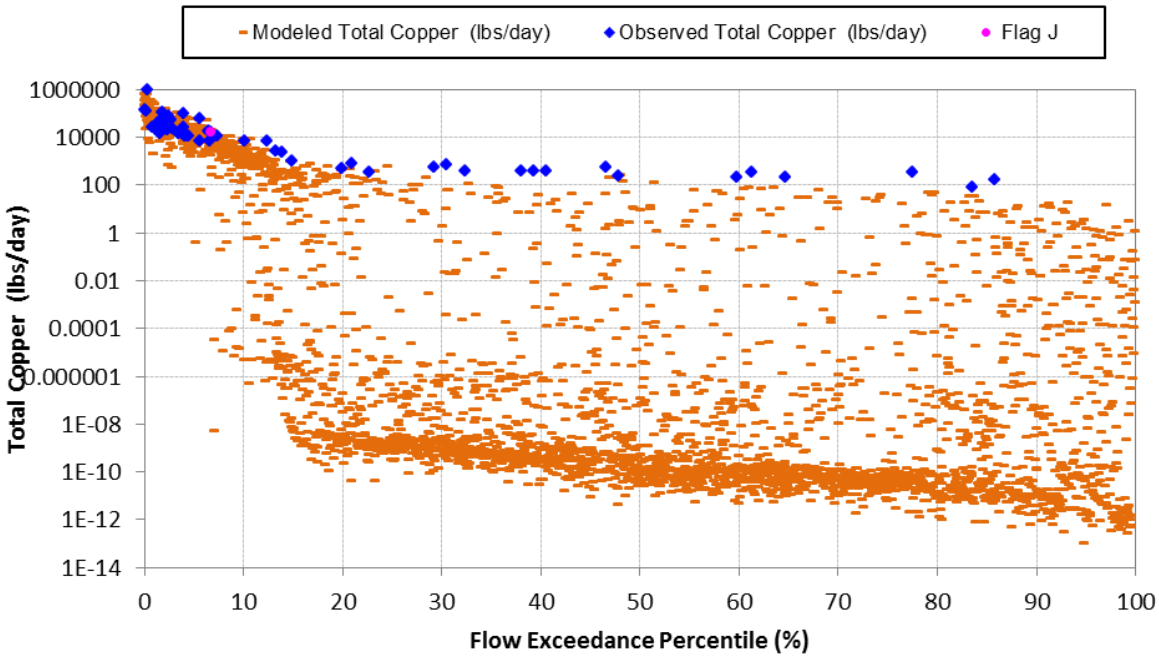

Figure 56. Simulated vs. observed load duration plots for Total Copper (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

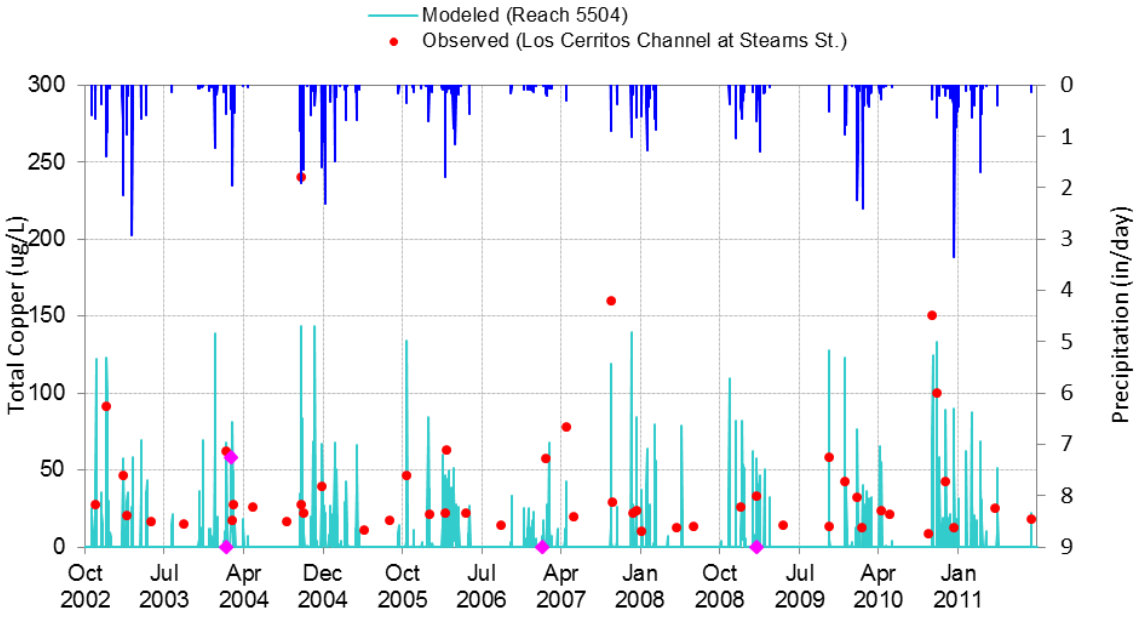

Figure 57. Simulated vs. observed timeseries plots for Total Copper (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

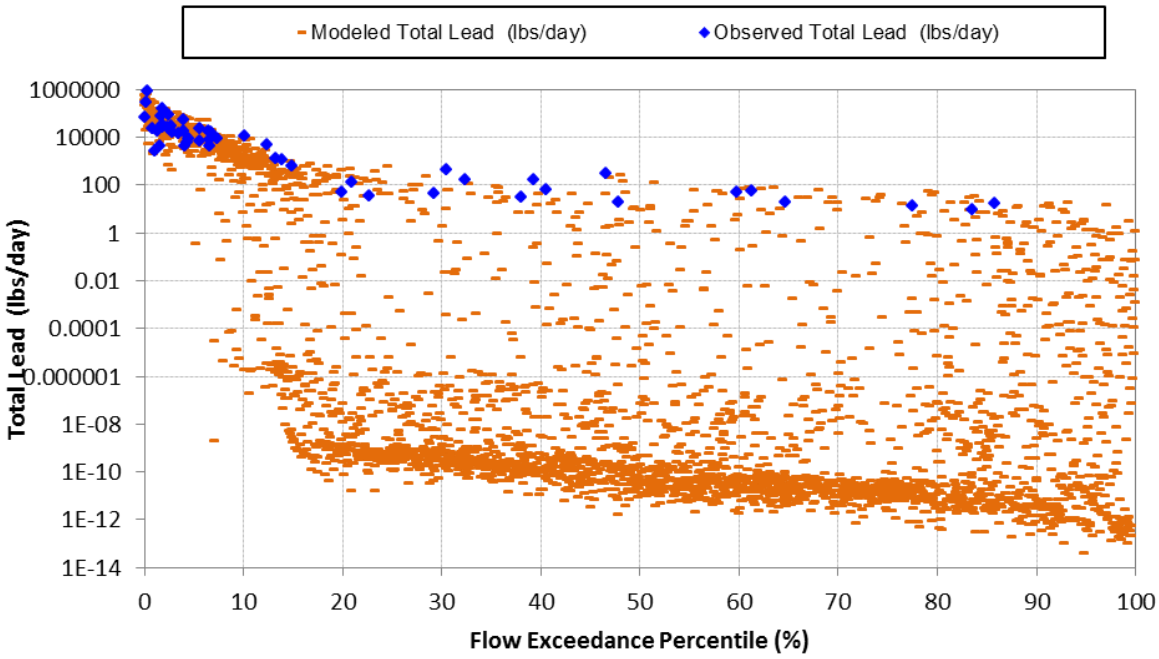

Figure 58. Simulated vs. observed load duration plots for Total Lead (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

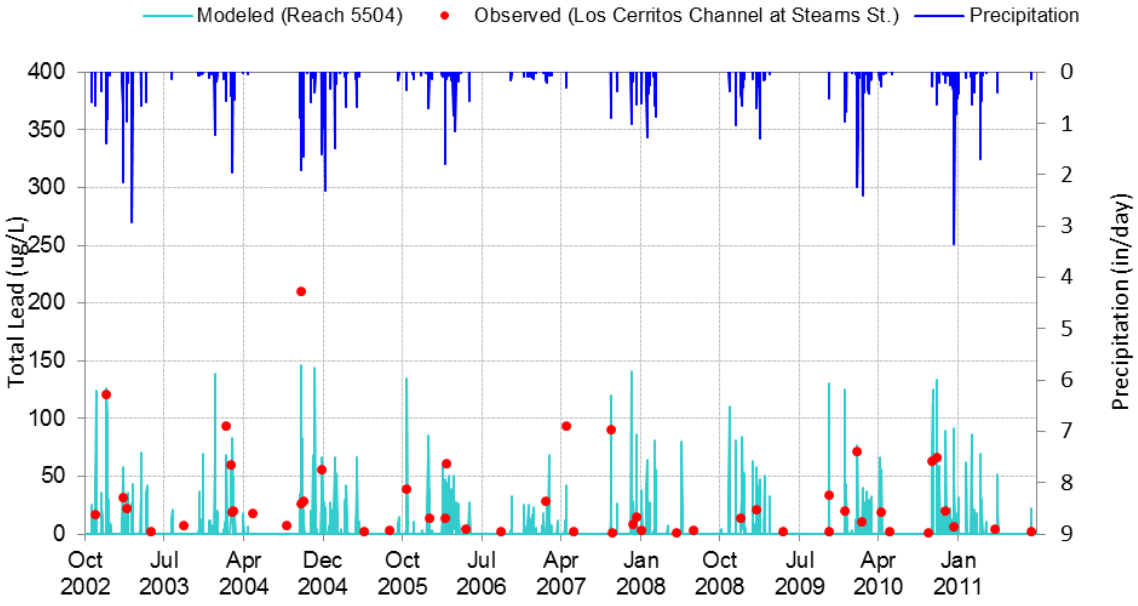

Figure 59. Simulated vs. observed timeseries plots for Total Lead (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

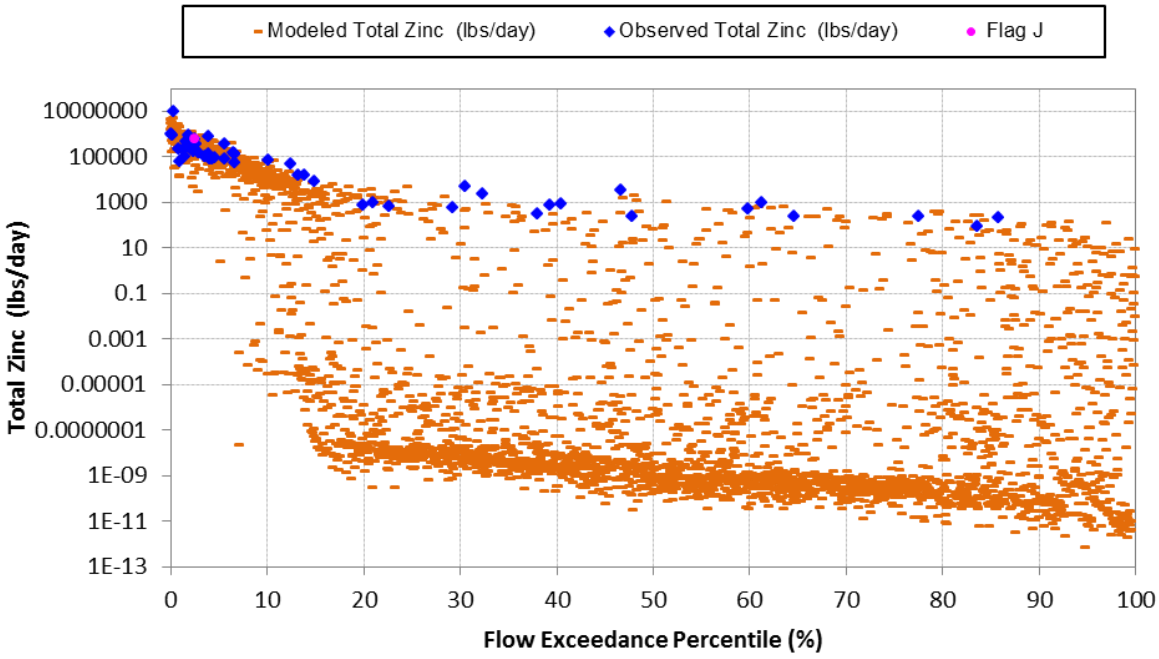

Figure 60. Simulated vs. observed load duration plots for Total Zinc (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

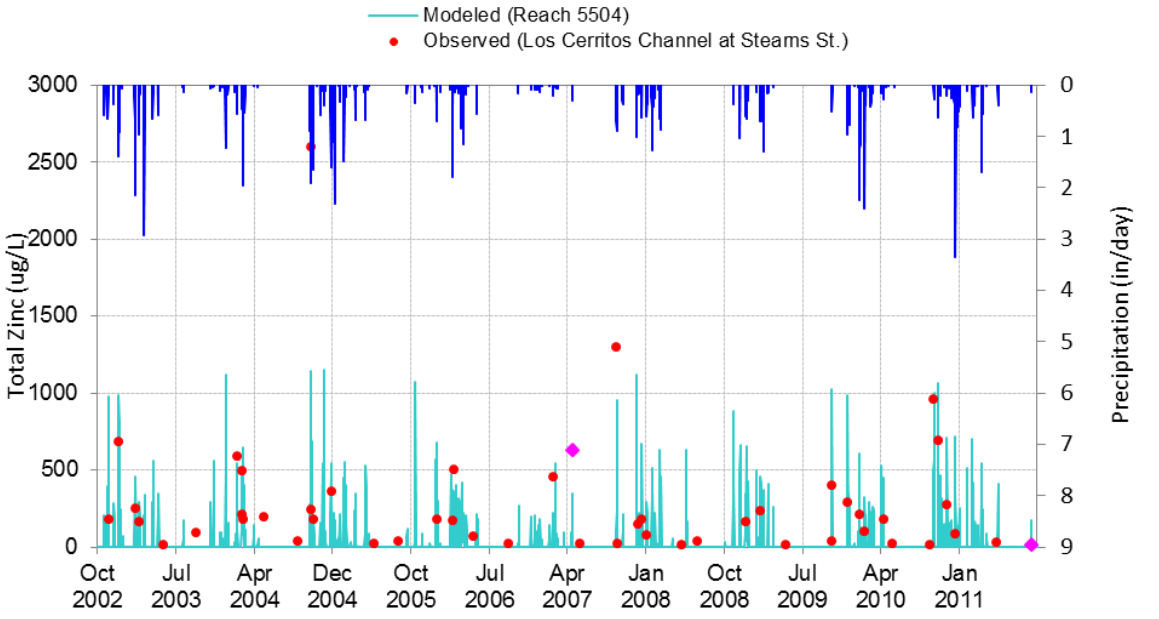

Figure 61. Simulated vs. observed timeseries plots for Total Zinc (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

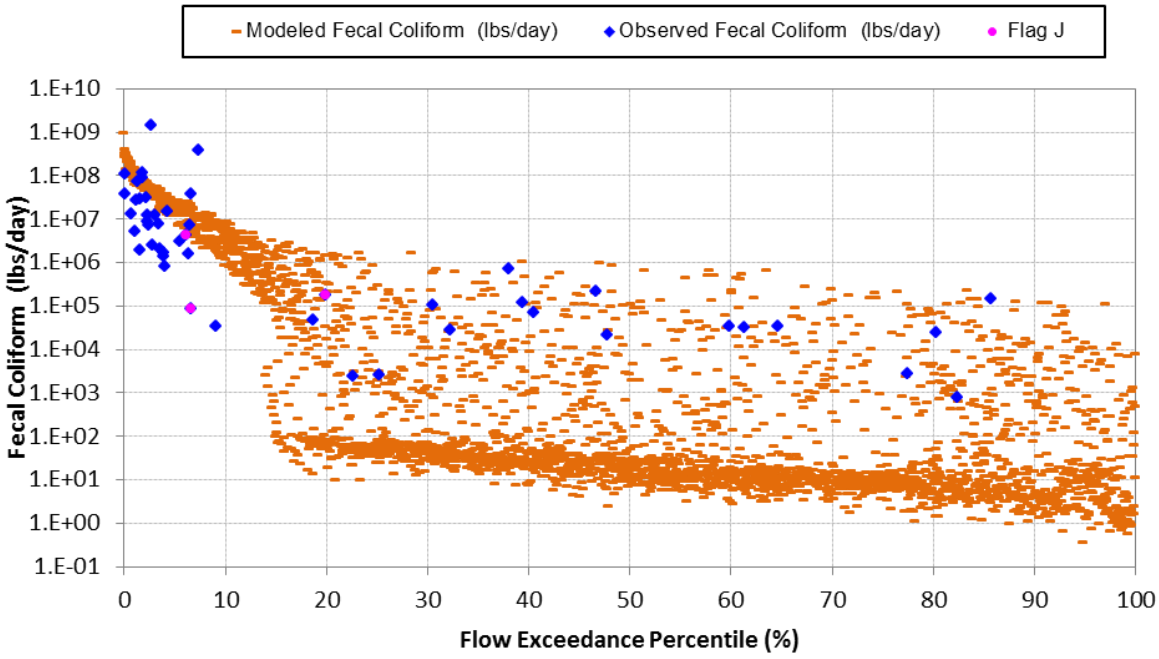

Figure 62. Simulated vs. observed load duration plots for Fecal Coliform (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

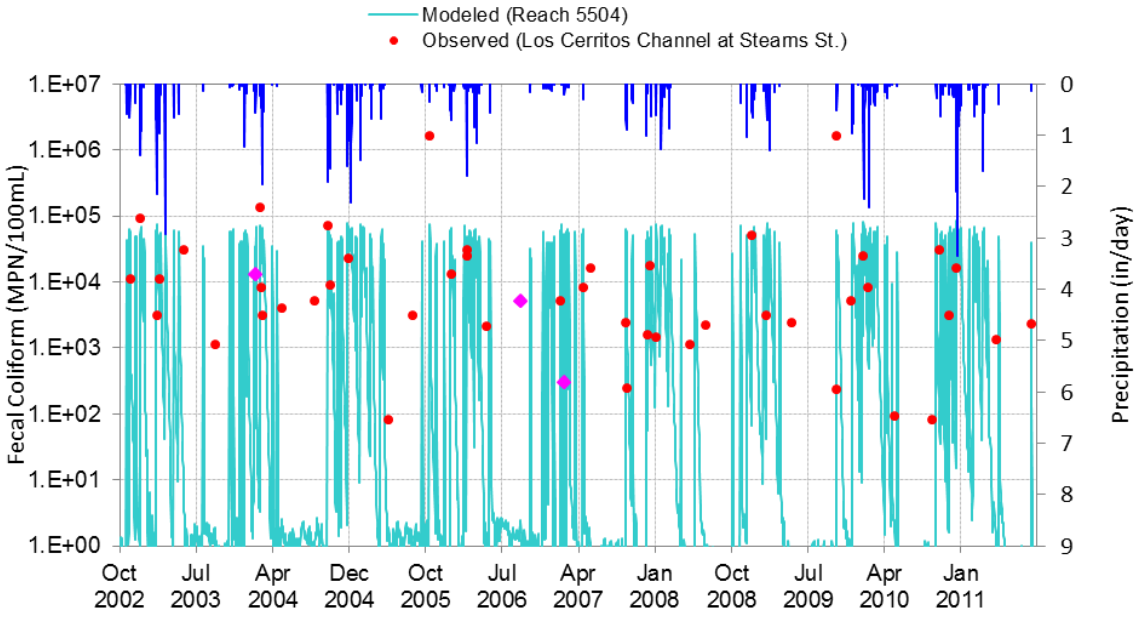

Figure 63. Simulated vs. observed timeseries plots for Fecal Coliform (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

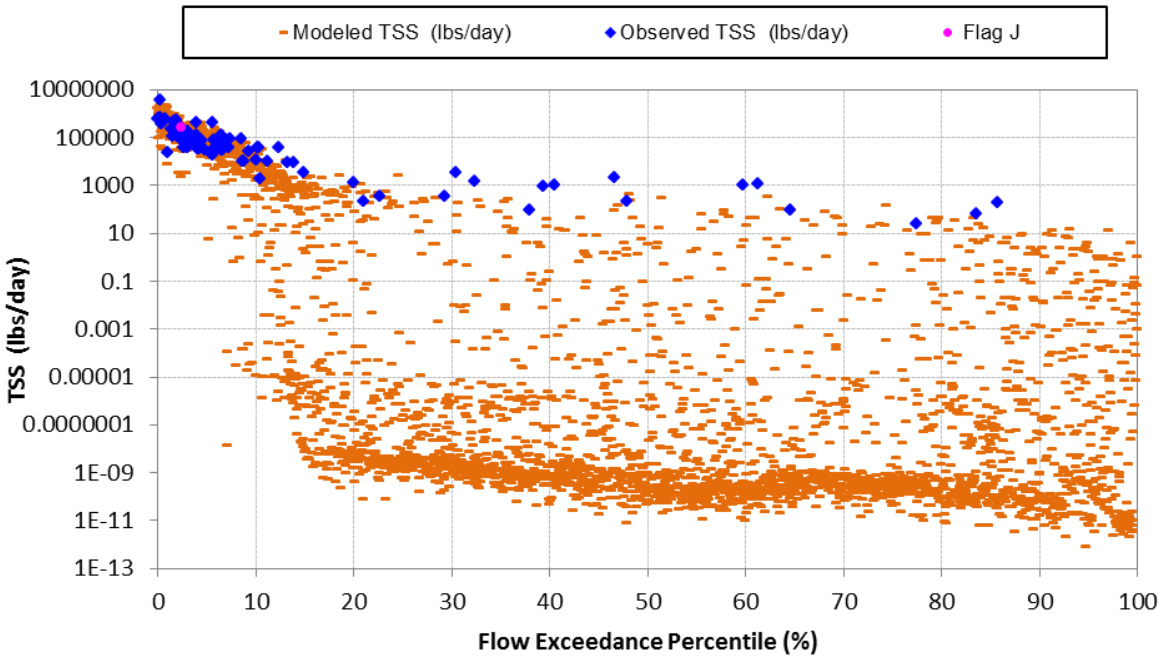

Figure 64. Simulated vs. observed load duration plots for Total Sediment (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

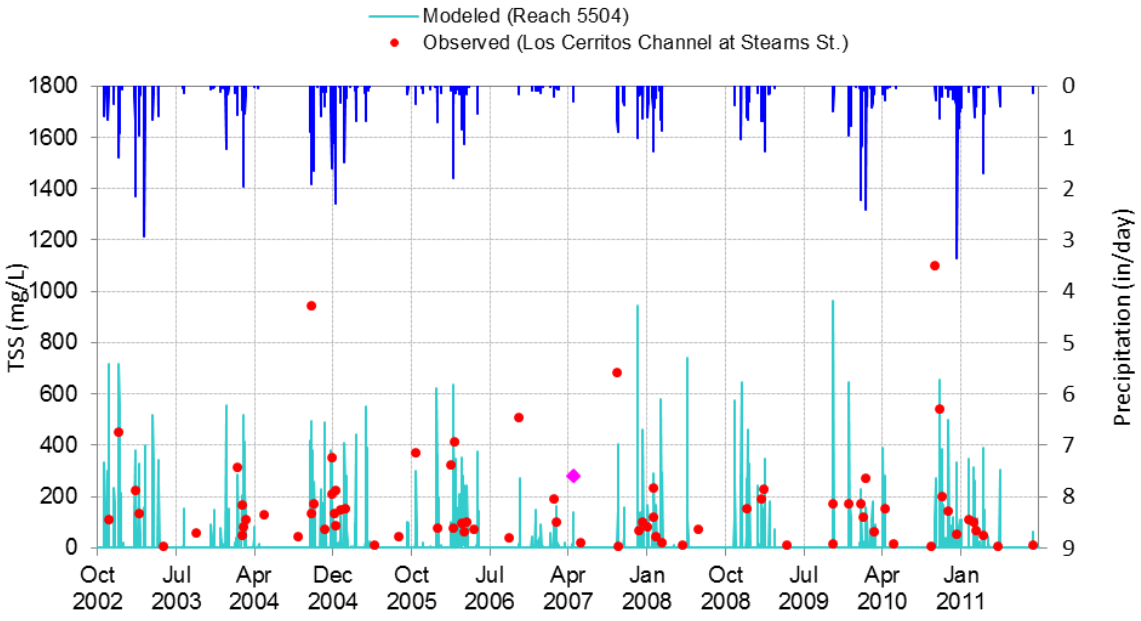

Figure 65. Simulated vs. observed time series plots for Total Sediment (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station.

Attachment F: Modeled Existing Versus Allowable Pollutant Loadings Plots

Submitted to:

LLAR WMP Group LCC WMP Group LSGR WMP Group

Submitted by:

Tetra Tech
9444 Balboa Ave., Suite 215
San Diego, CA 92123

January 15, 2015

RB-AR9507

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Figure 3. Modeled existing vs. allowable observed timeseries plots for Total Zinc (10/1/2002 through 9/30/2011) at San Gabriel River mass emission station S14. 5

Figure 4. Modeled existing vs. allowable observed timeseries plots for Total Copper (10/1/2006 through 9/30/2011) at Coyote Creek mass emission station S13. 6

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Figure 8. Modeled existing vs. allowable observed timeseries plots for Total Lead (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10. 9

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Figure 10. Modeled existing vs. allowable observed timeseries plots for Total Copper (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station. 10

Figure 11. Modeled existing vs. allowable observed timeseries plots for Total Lead (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station. 11

Figure 12. Modeled existing vs. allowable observed timeseries plots for Total Zinc (10/1/2002 through 9/30/2011) at Los Cerritos Channel LA DPW Stearns Street monitoring station. 11

1. Lower San Gabriel River

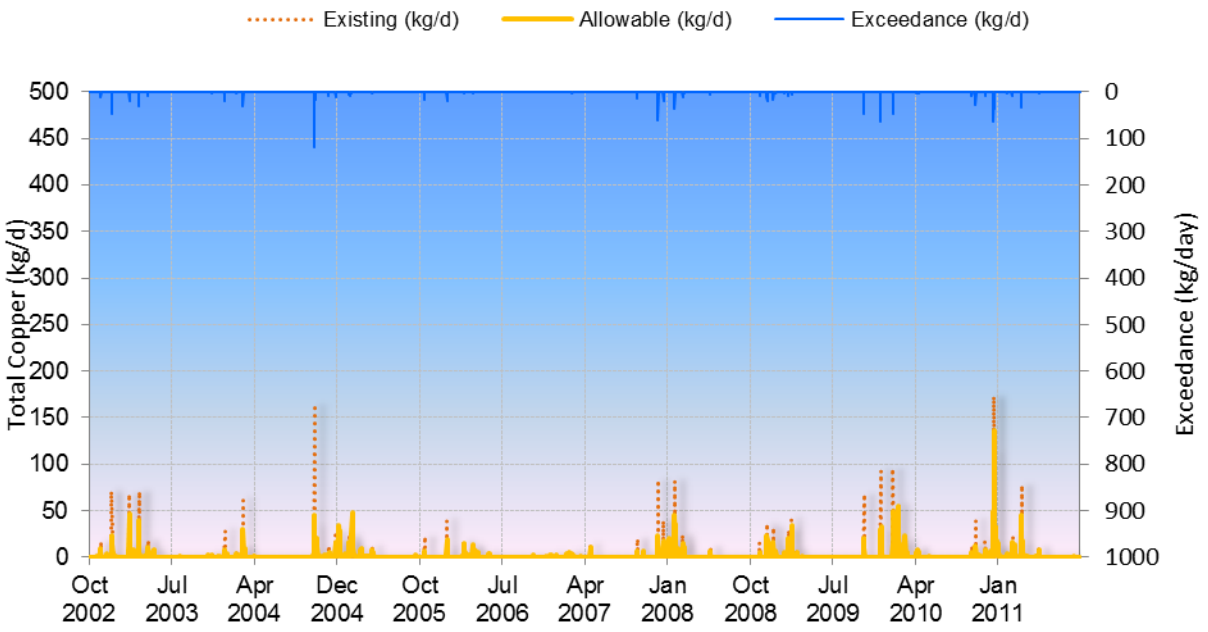
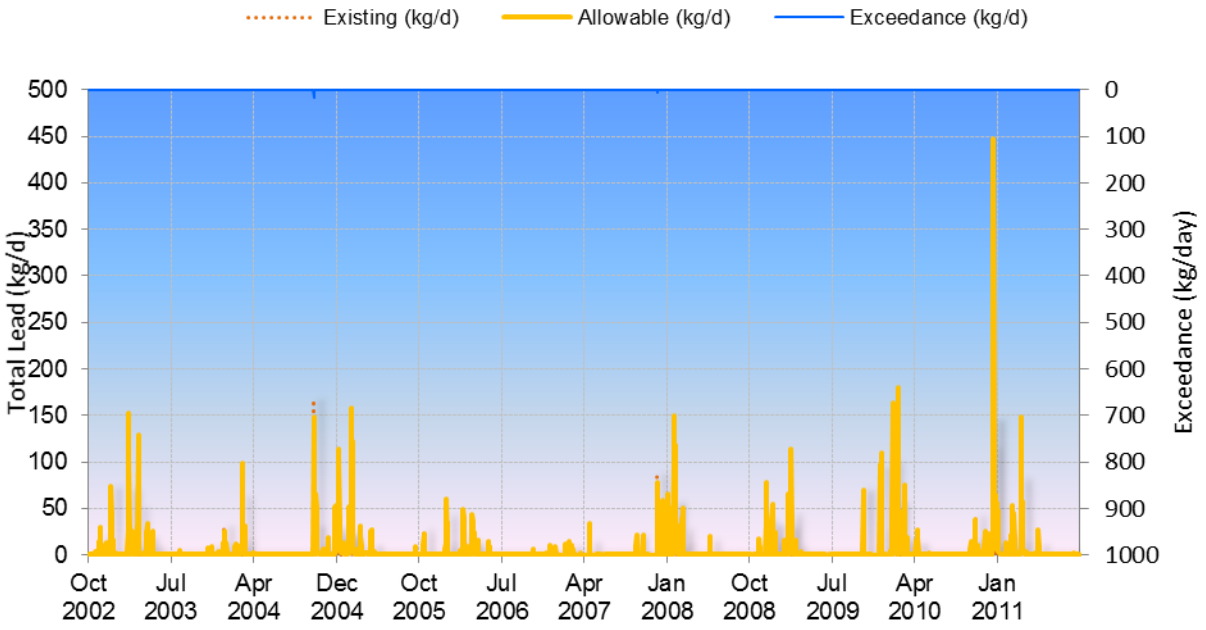


Figure 1. Modeled existing vs. allowable observed timeseries plots for Total Copper (10/1/2002 through 9/30/2011) at San Gabriel River mass emission station S14.



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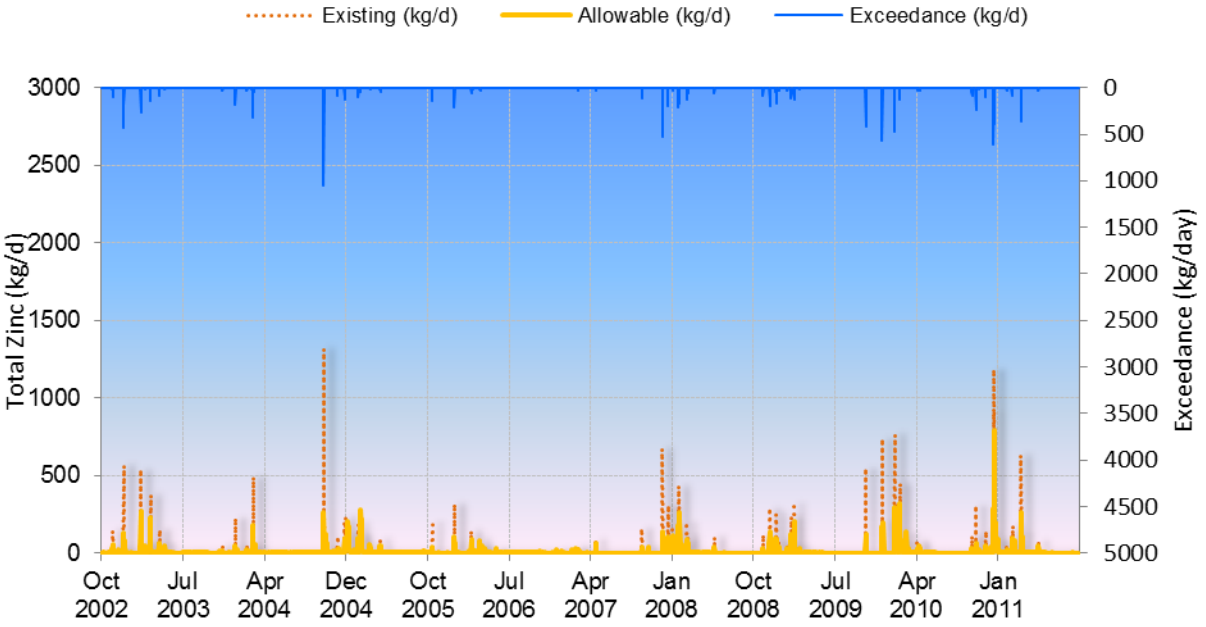

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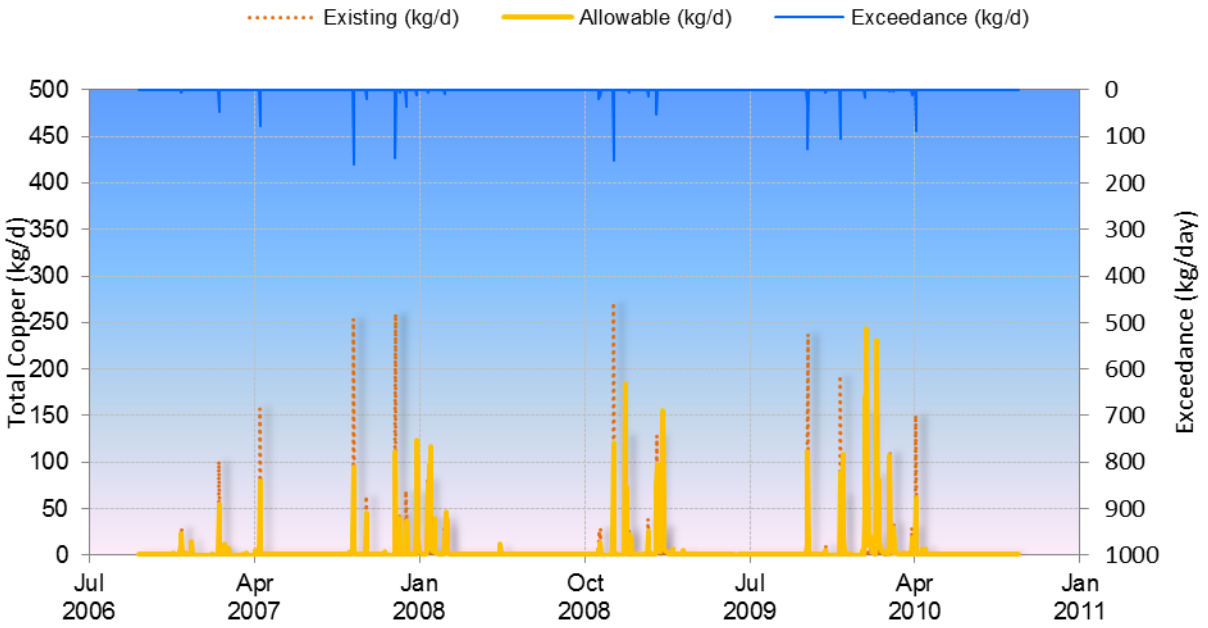
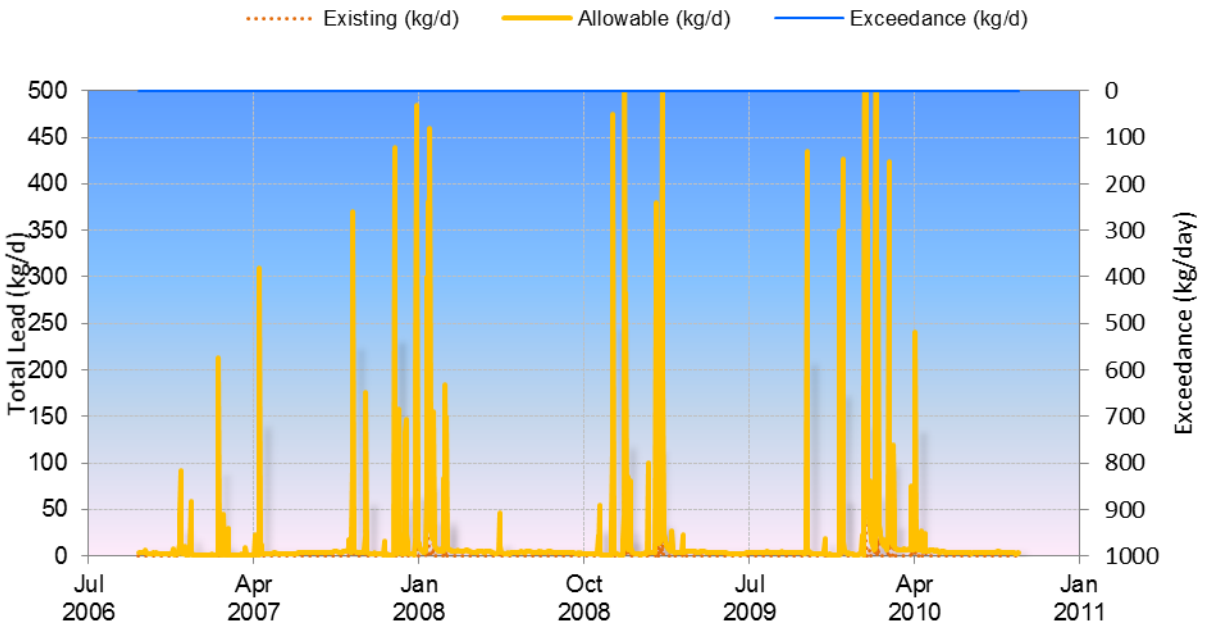


Figure 4. Modeled existing vs. allowable observed timeseries plots for Total Copper (10/1/2006 through 9/30/2011) at Coyote Creek mass emission station S13.



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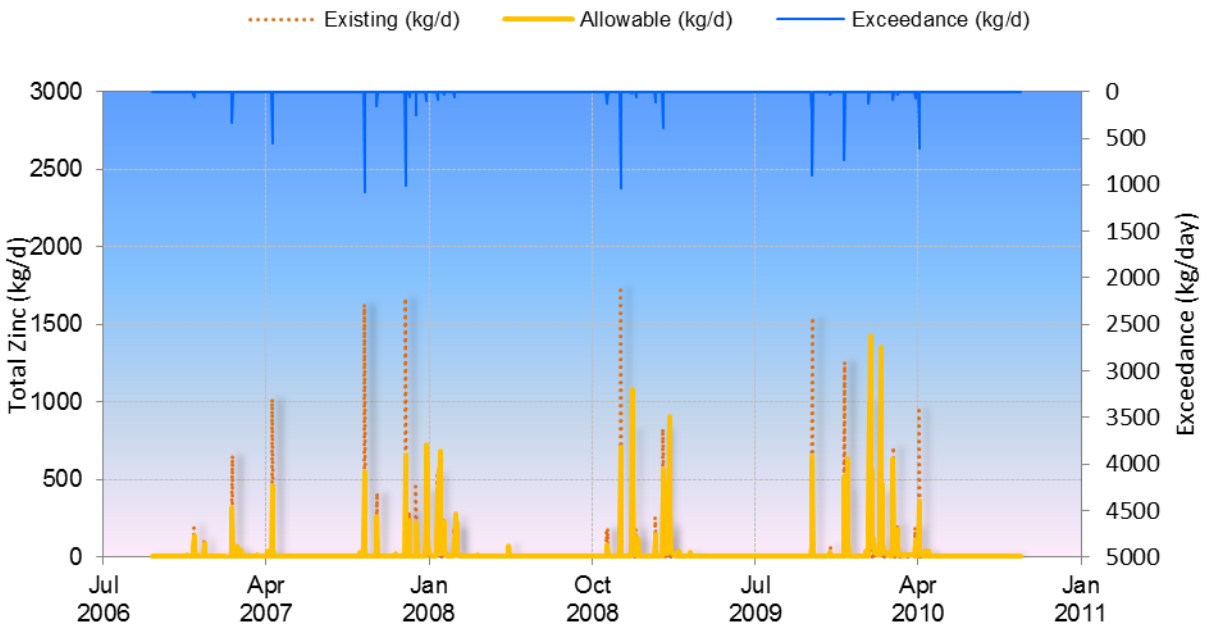
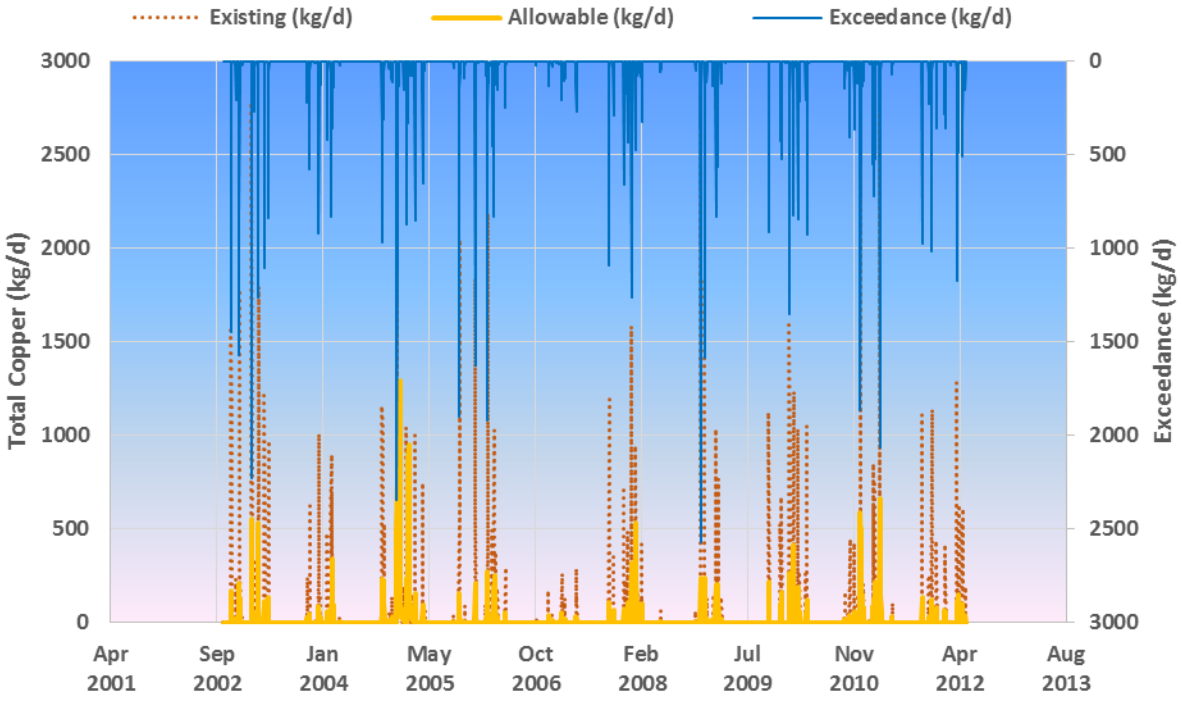


Figure 6. Modeled existing vs. allowable observed timeseries plots for Total Zinc (10/1/2006 through 9/30/2011) at Coyote Creek mass emission station S13.

2. Lower Los Angeles River



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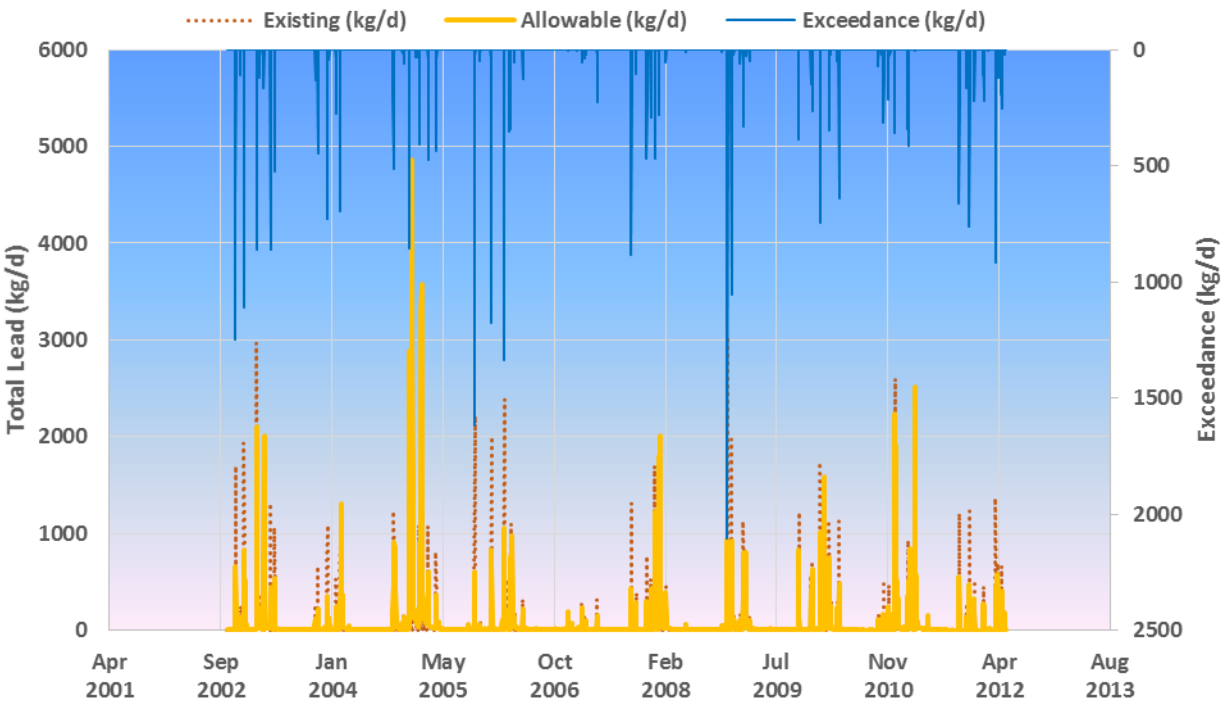

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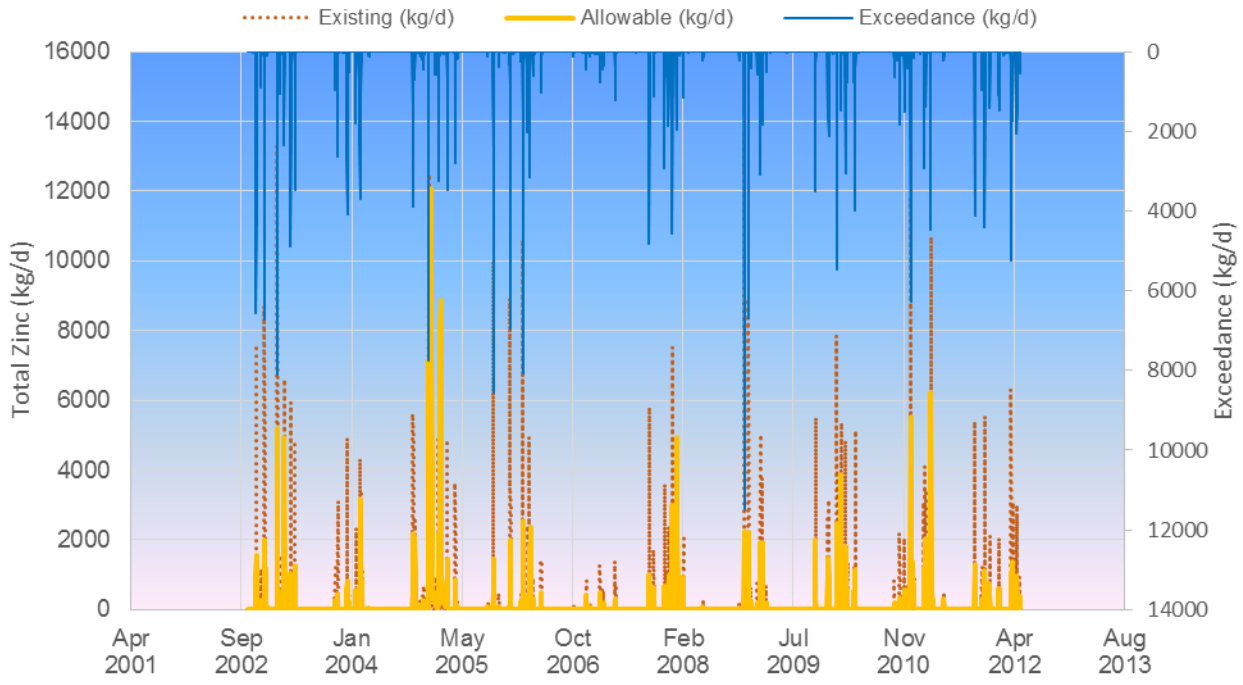


Figure 9. Modeled existing vs. allowable observed timeseries plots for Total Zinc (10/1/2002 through 9/30/2011) at Los Angeles River mass emission station S10.

3. Los Cerritos Channel

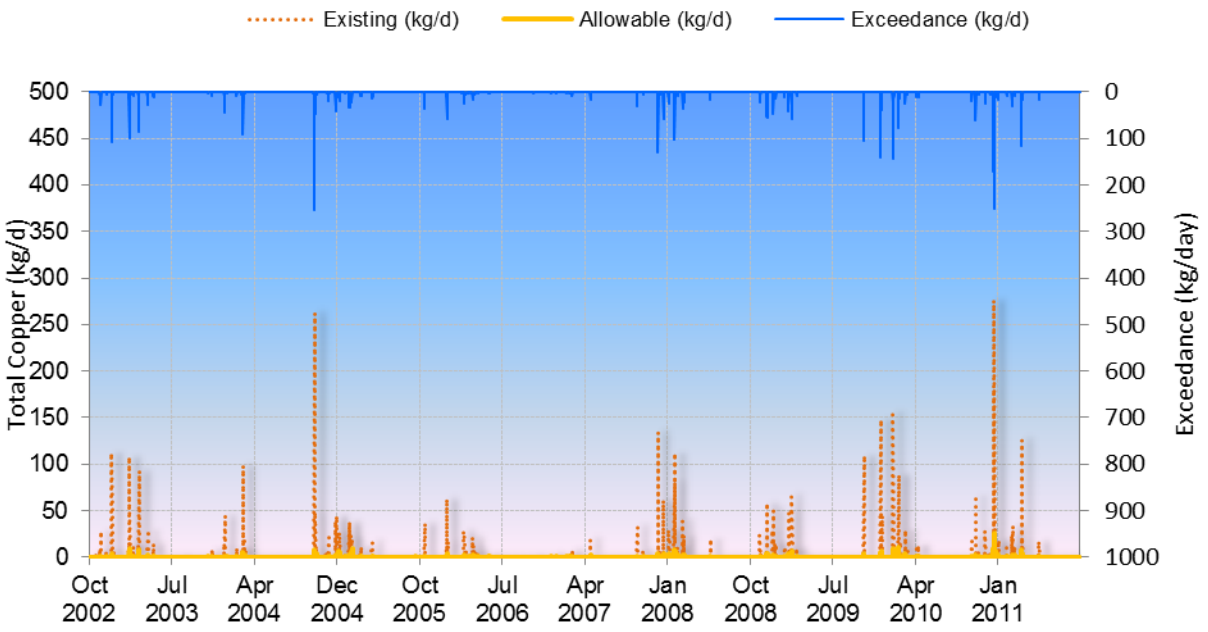


Figure 10. Modeled existing vs. allowable observed timeseries plots for Total Copper (10/1/2002 through 9/30/2011) at Los Cerritos Channel City of Long Beach Stearns Street monitoring station.

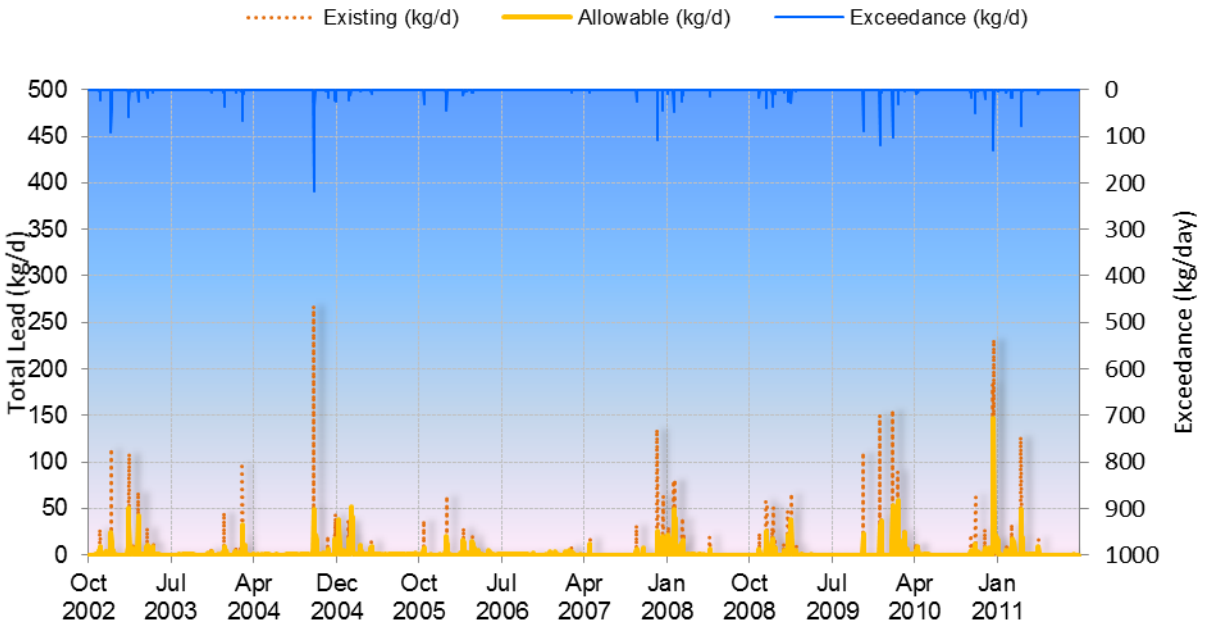


Figure 11. Modeled existing vs. allowable observed timeseries plots for Total Lead (10/1/2002 through 9/30/2011) at Los Cerritos Channel City of Long Beach Stearns Street monitoring station.

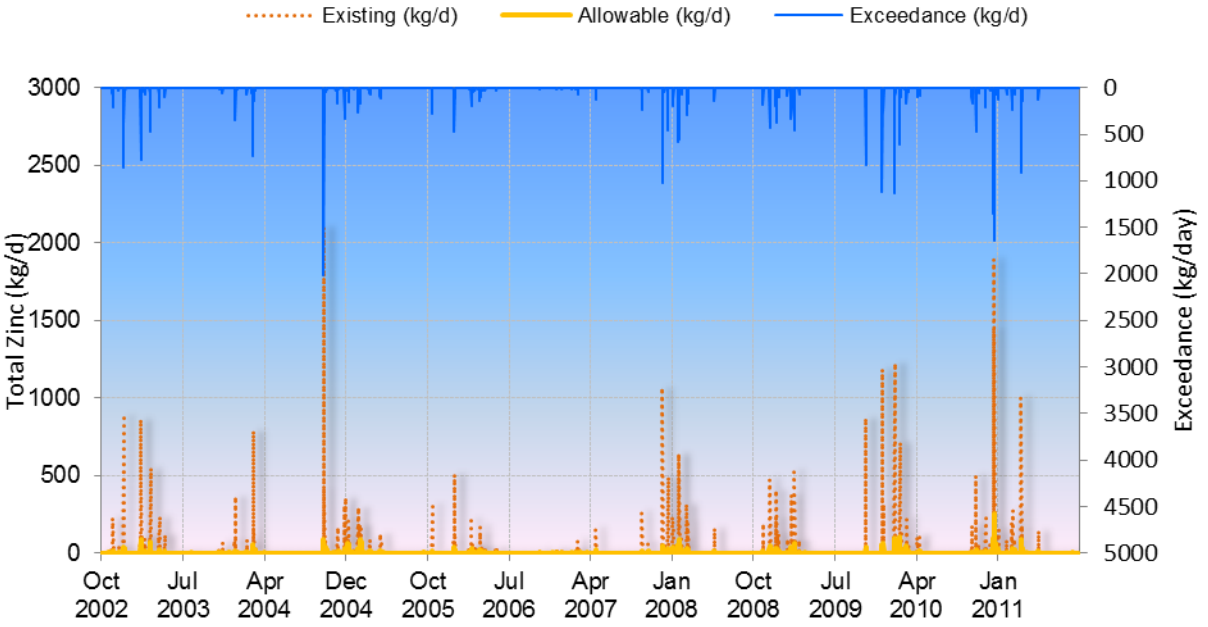
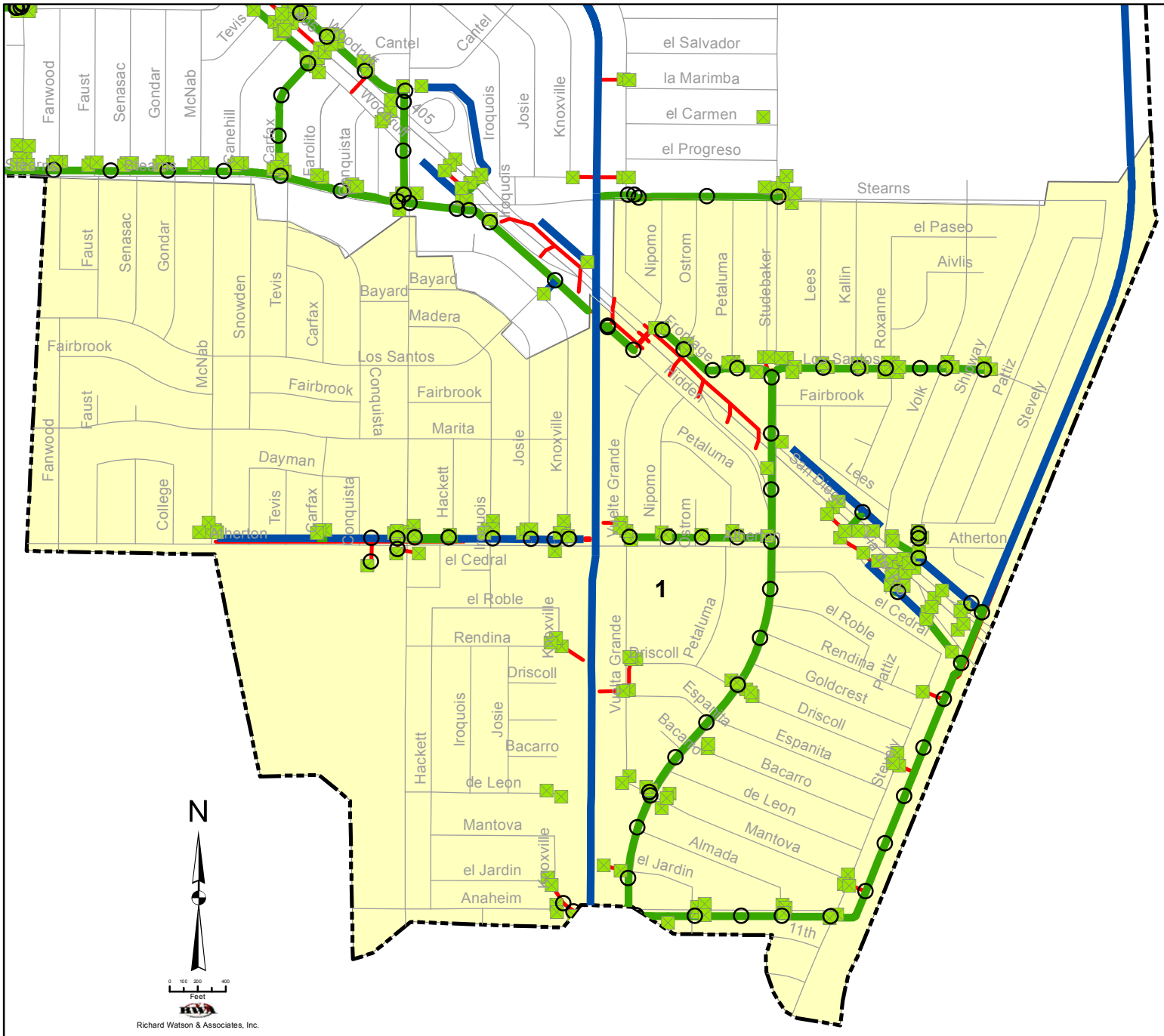


Figure 12. Modeled existing vs. allowable observed timeseries plots for Total Zinc (10/1/2002 through 9/30/2011) at Los Cerritos Channel City of Long Beach Stearns Street monitoring station.

ATTACHMENT B:

LOS CERRITOS CHANNEL SUB-BASIN EXHIBITS

Los Cerritos Channel TMDL Sub-Basin 1



Legend

- LACFCD MH
- LACFCD Catch Basin
- LACFCD Open Channel
- LACFCD Gravity Main
- City Storm Line
- Street Centerlines

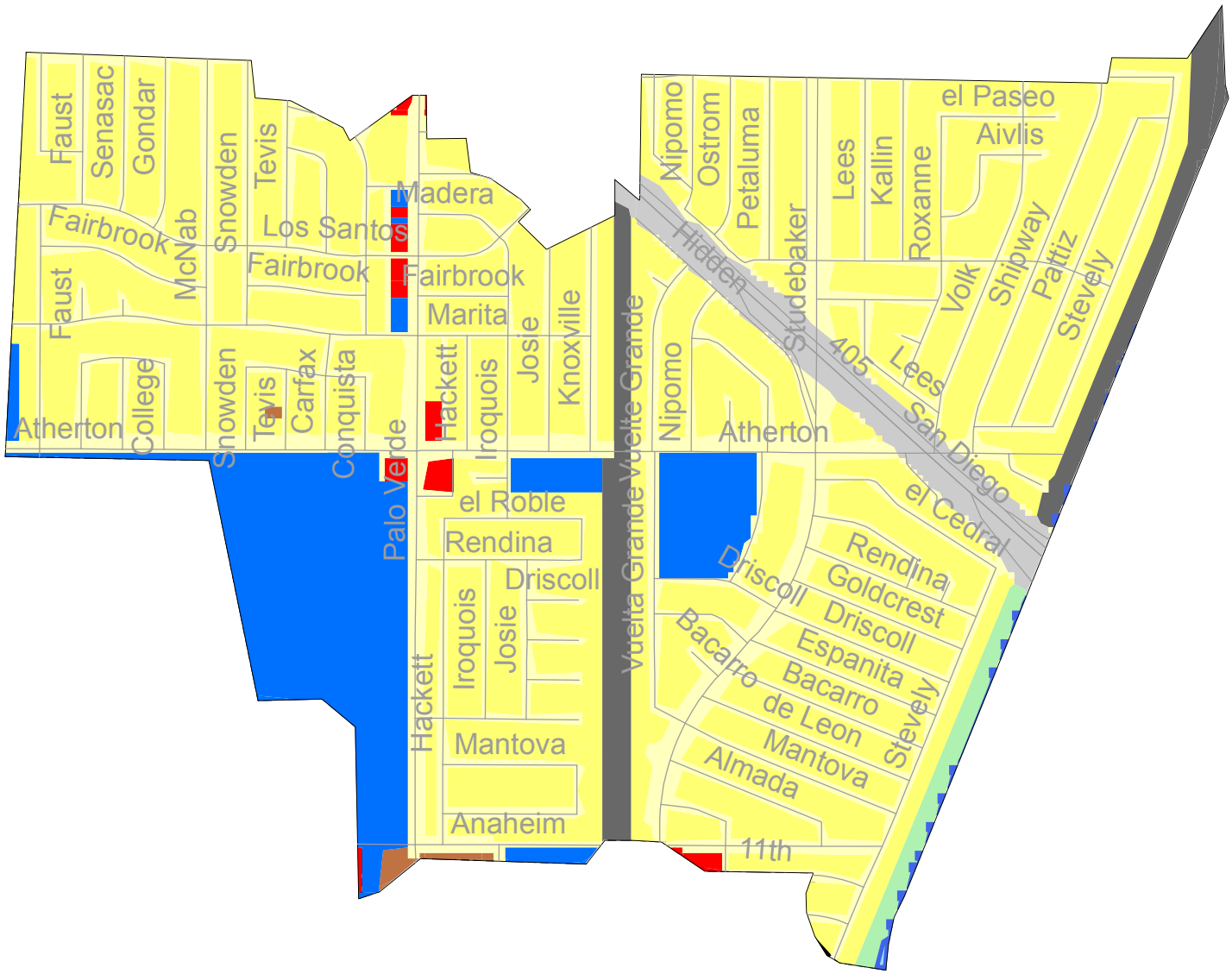
Sub-Basin	Acreage
1	720.3

RB-AR9519

Prepared by: ECKERSALL, LLC

Date: 1/13/2014

Los Cerritos Channel TMDL Sub Basin 1
Hydrologic Response Units



Legend

Hydrologic Response Units

- HD SFR
- LD SFRM
- LD SFR Steep S
- MF
- Commercial
- Institutional
- Industrial
- Transportation
- Secondary Roads
- Agriculture Moderate Slope D
- Vacant Moderate Slope D
- Vacant Steep Slope D
- Water Bodies

Sub Basin	Acreage
1	720

Street Centerlines

N

0 3,250 6,500 13,000

Inches

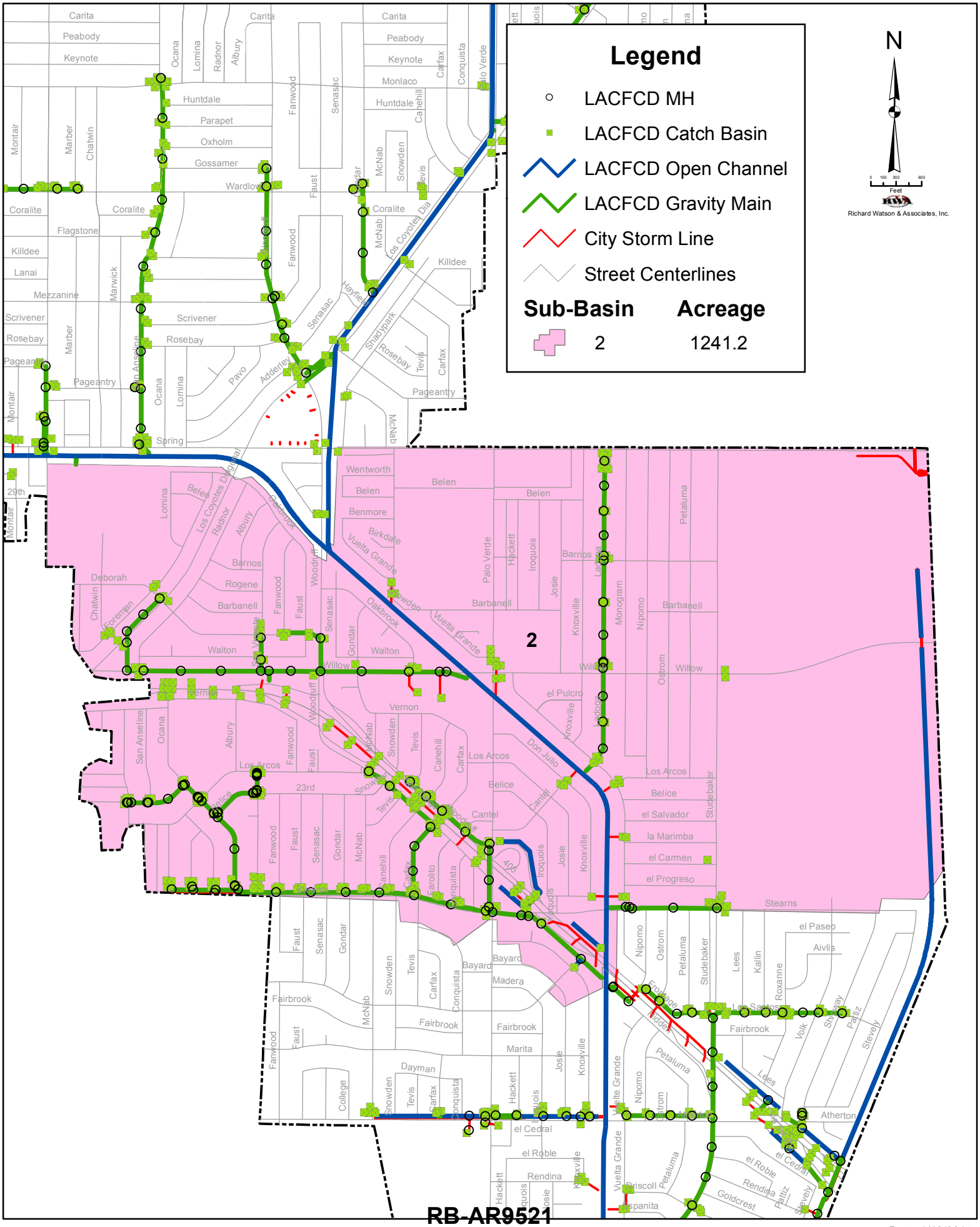
Richard Watson & Associates, Inc.

RB-AR9520

Prepared by: ECKERSALL, LLC

Date: 3/4/2014

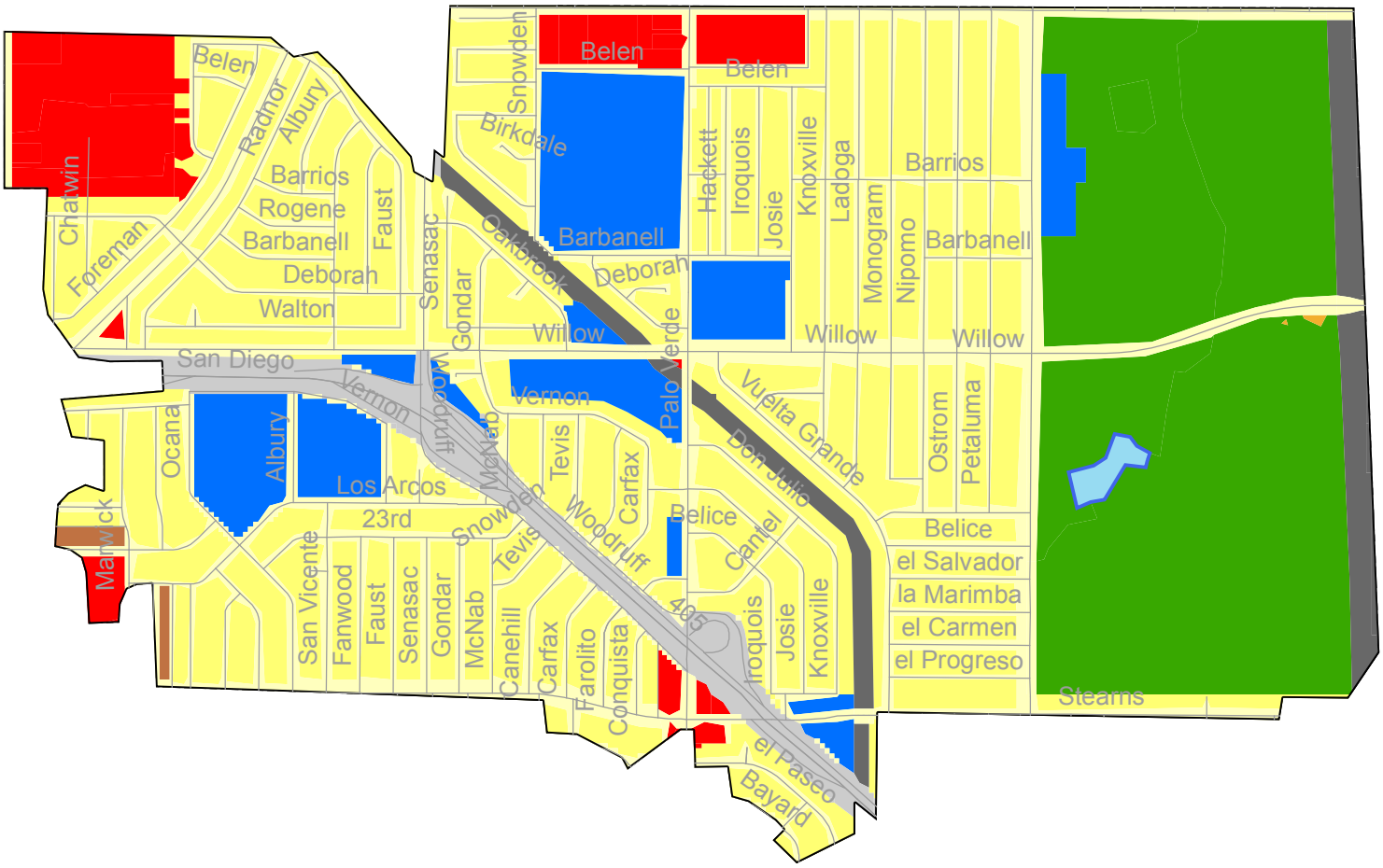
Los Cerritos Channel TMDL Sub-Basin 2



Prepared by: ECKERSALL, LLC

Date: 1/13/2014

Los Cerritos Channel TMDL Sub Basin 2
Hydrologic Response Units



Legend

Hydrologic Response Units

- HD SFR
- LD SFRM
- LD SFR Steep S
- MF
- Commercial
- Institutional
- Industrial
- Transportation
- Secondary Roads
- Agriculture Moderate Slope D
- Vacant Moderate Slope D
- Vacant Steep Slope D
- Water Bodies

Sub Basin 2

Acreage 1241

Street Centerlines

N

0 4,125 8,250 16,500
Inches

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RB-AR9522

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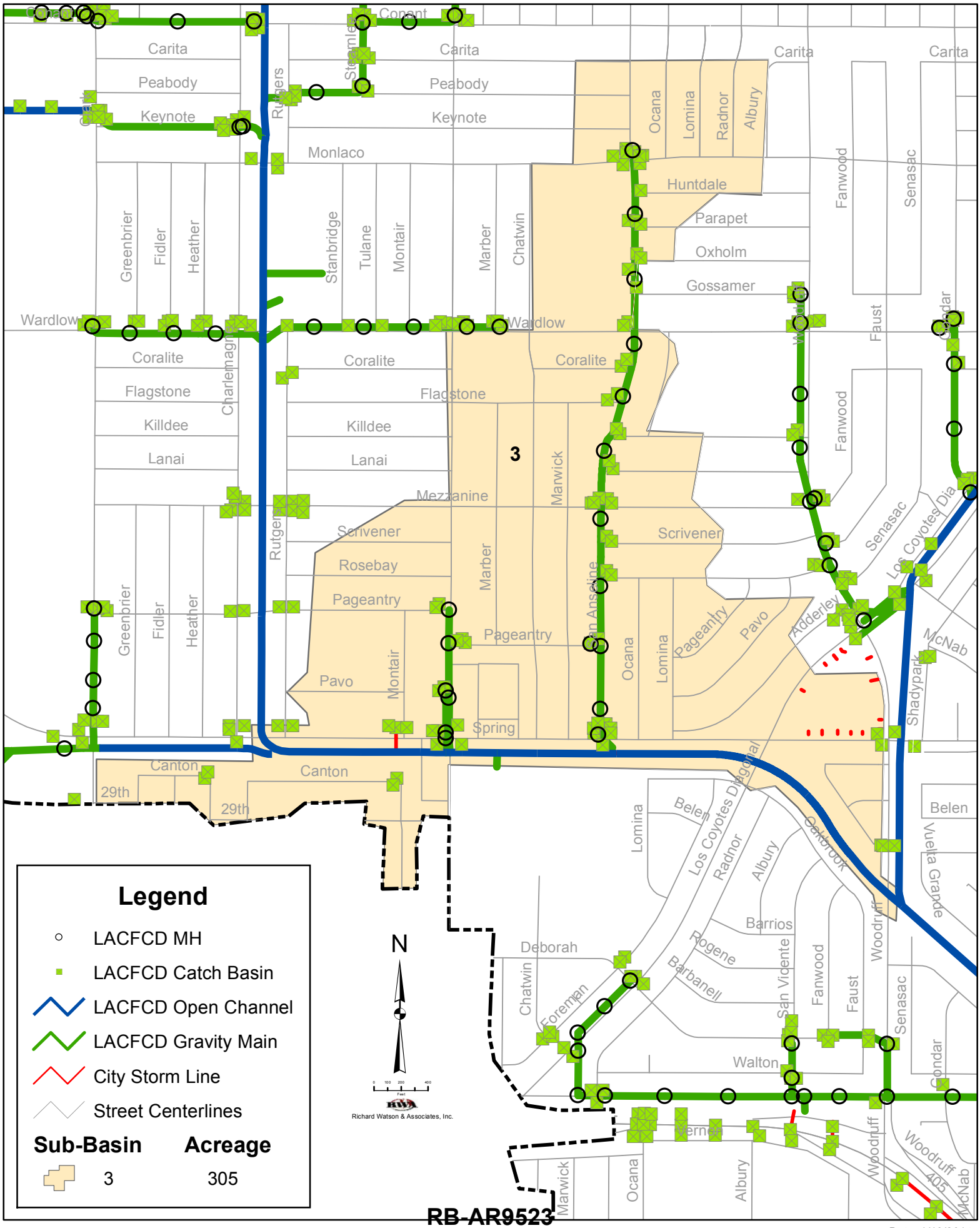
Date: 3/4/2014

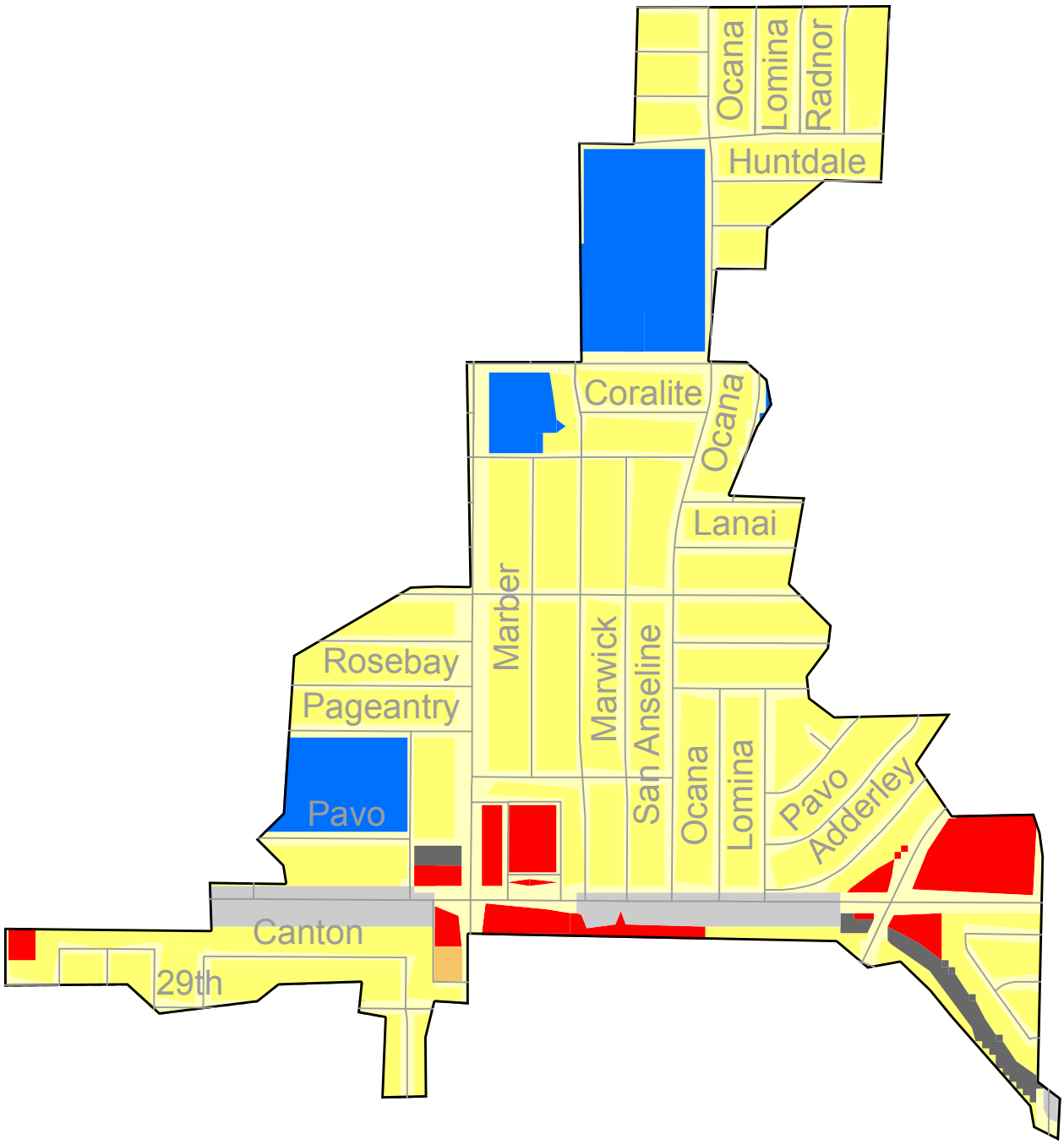
Los Cerritos Channel TMDL Sub-Basin 3



Prepared by: ECKERSALL, LLC

Date: 1/13/2014

Los Cerritos Channel TMDL Sub Basin 3
Hydrologic Response Units



Legend

Hydrologic Response Units

- HD SFR
- LD SFRM
- LD SFR Steep S
- MF
- Commercial
- Institutional
- Industrial
- Transportation
- Secondary Roads
- Agriculture Moderate Slope D
- Vacant Moderate Slope D
- Vacant Steep Slope D
- Water Bodies

Sub Basin
3

Acreage
305

Street Centerlines

N

0 2,750 5,500 11,000
Inches

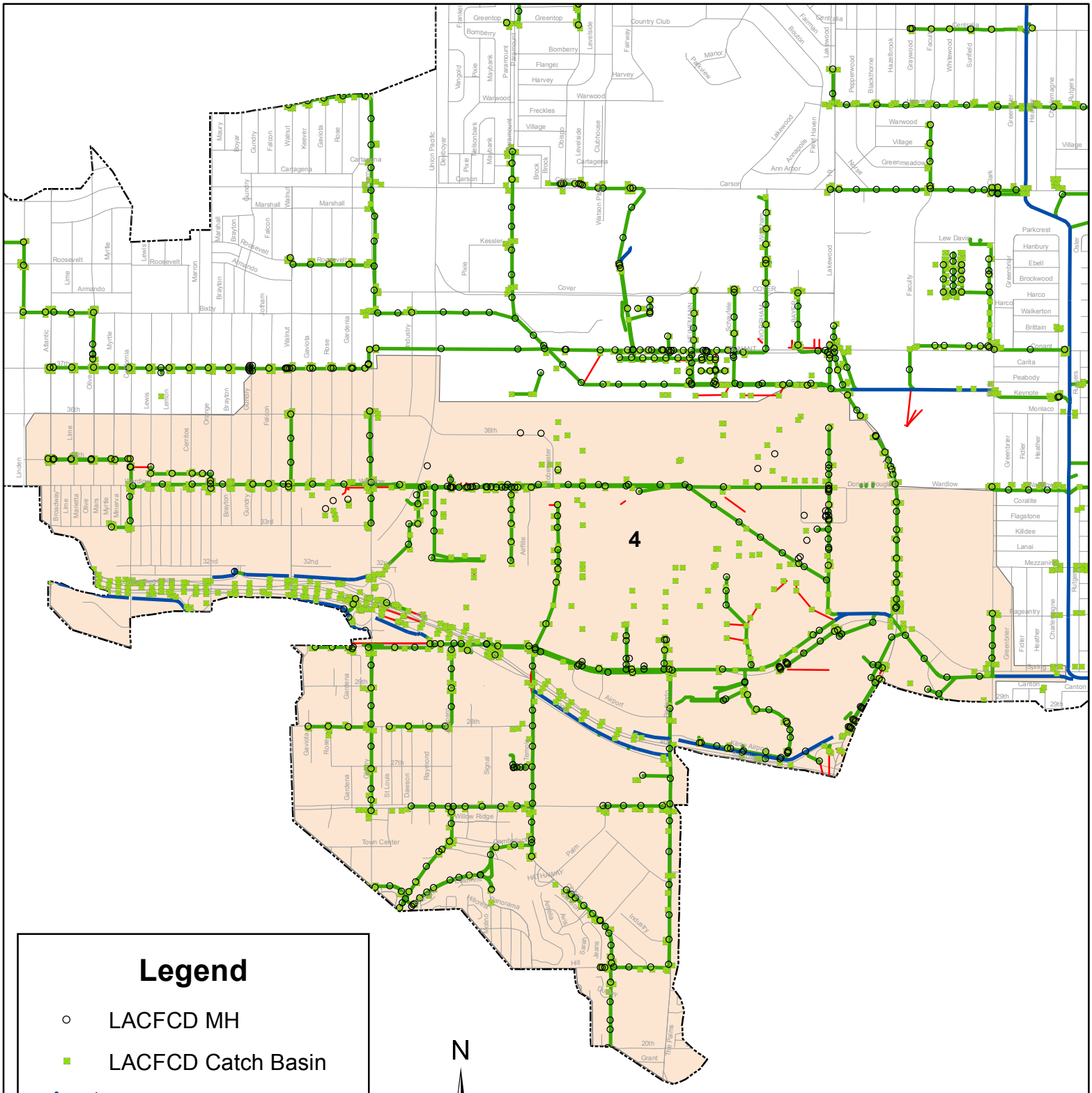
Richard Watson & Associates, Inc.

RB-AR9524

Prepared by: ECKERSALL, LLC

Date: 3/4/2014

Los Cerritos Channel TMDL Sub-Basin 4



Legend

- LACFCD MH
- LACFCD Catch Basin
- LACFCD Open Channel
- LACFCD Gravity Main
- City Storm Line
- Street Centerlines

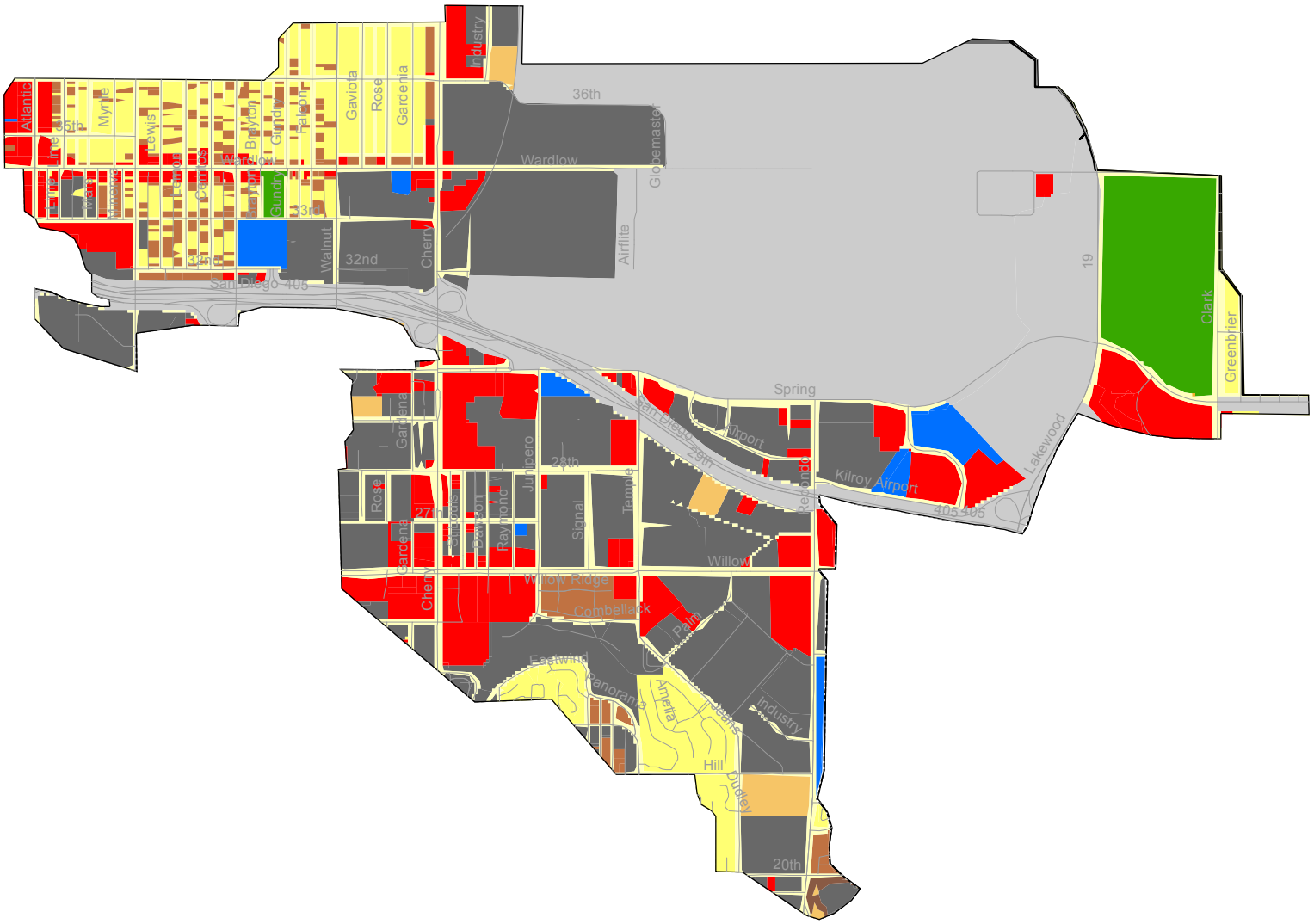
Sub-Basin	Acreage
4	2270

RB-AR9525

Prepared by: ECKERSALL, LLC

Date: 1/13/2014

Los Cerritos Channel TMDL Sub Basin 4
Hydrologic Response Units



Legend

Hydrologic Response Units

- HD SFR
- LD SFRM
- LD SFR Steep S
- MF
- Commercial
- Institutional
- Industrial
- Transportation
- Secondary Roads
- Agriculture Moderate Slope D
- Vacant Moderate Slope D
- Vacant Steep Slope D
- Water Bodies

Sub Basin
4

Acreage
2270

Street Centerlines

N

0 6,500 13,000 26,000
Inches

Richard Watson & Associates, Inc.

RB-AR9526

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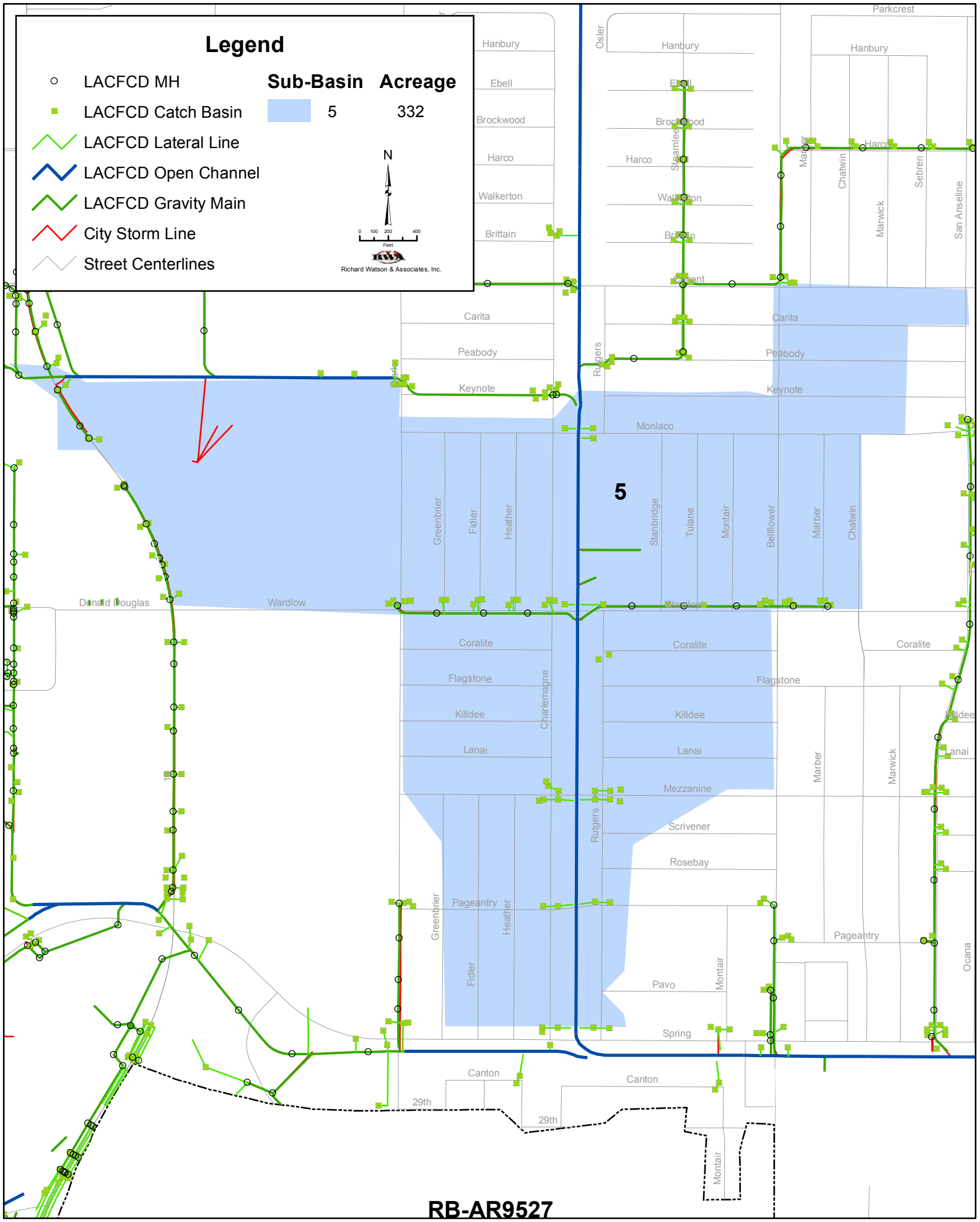
Date: 3/4/2014

Los Cerritos Channel TMDL Sub-Basin 5



RB-AR9527

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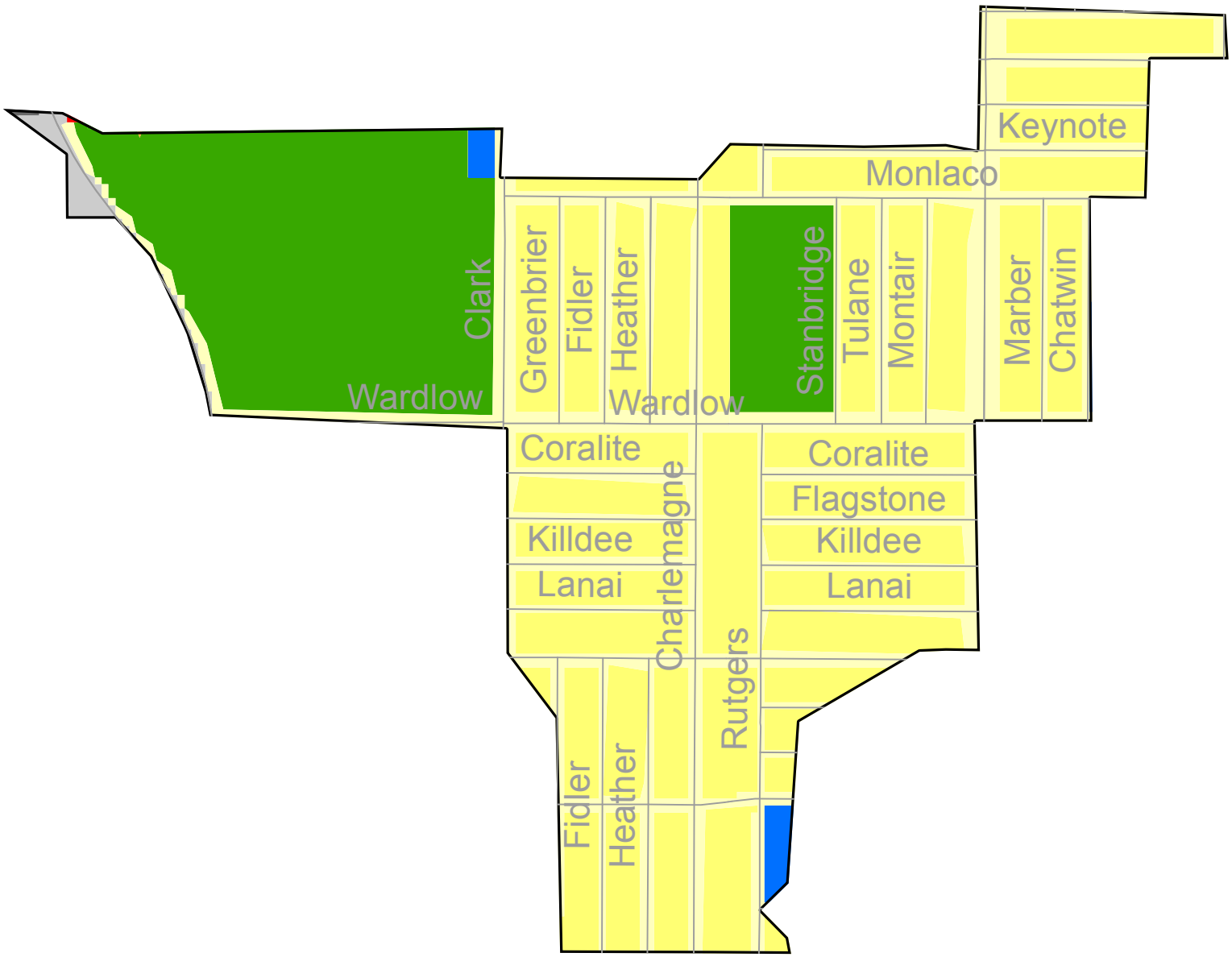
Date: 1/9/2014

Los Cerritos Channel TMDL Sub Basin 5
Hydrologic Response Units



Legend

Hydrologic Response Units

- HD SFR
- LD SFRM
- LD SFR Steep S
- MF
- Commercial
- Institutional
- Industrial
- Transportation
- Secondary Roads
- Agriculture Moderate Slope D
- Vacant Moderate Slope D
- Vacant Steep Slope D
- Water Bodies

Sub Basin
5

Acreage
332

Street Centerlines

N

0 2,600 5,200 10,400
Inches

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RB-AR9528

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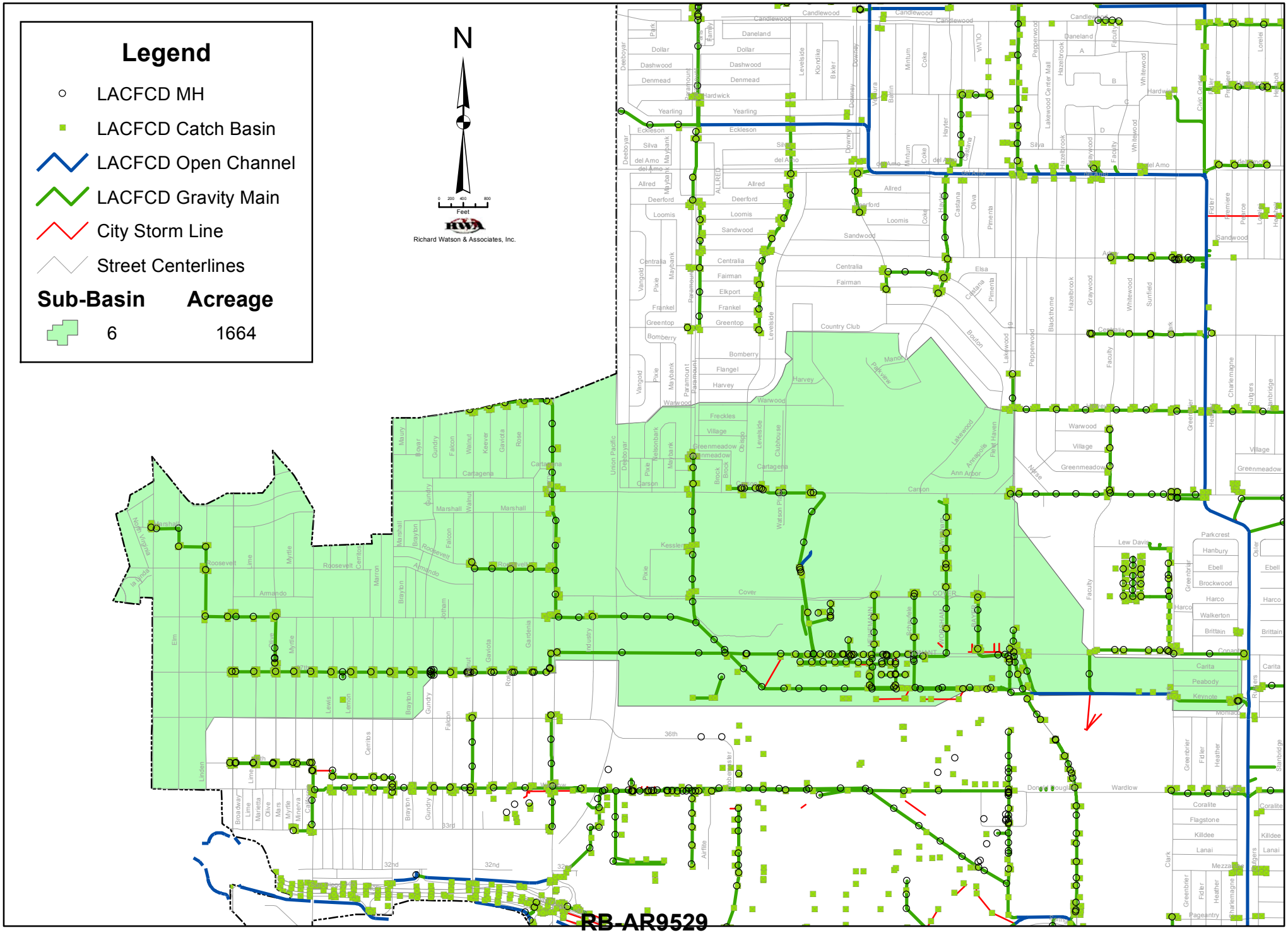
Date: 3/4/2014

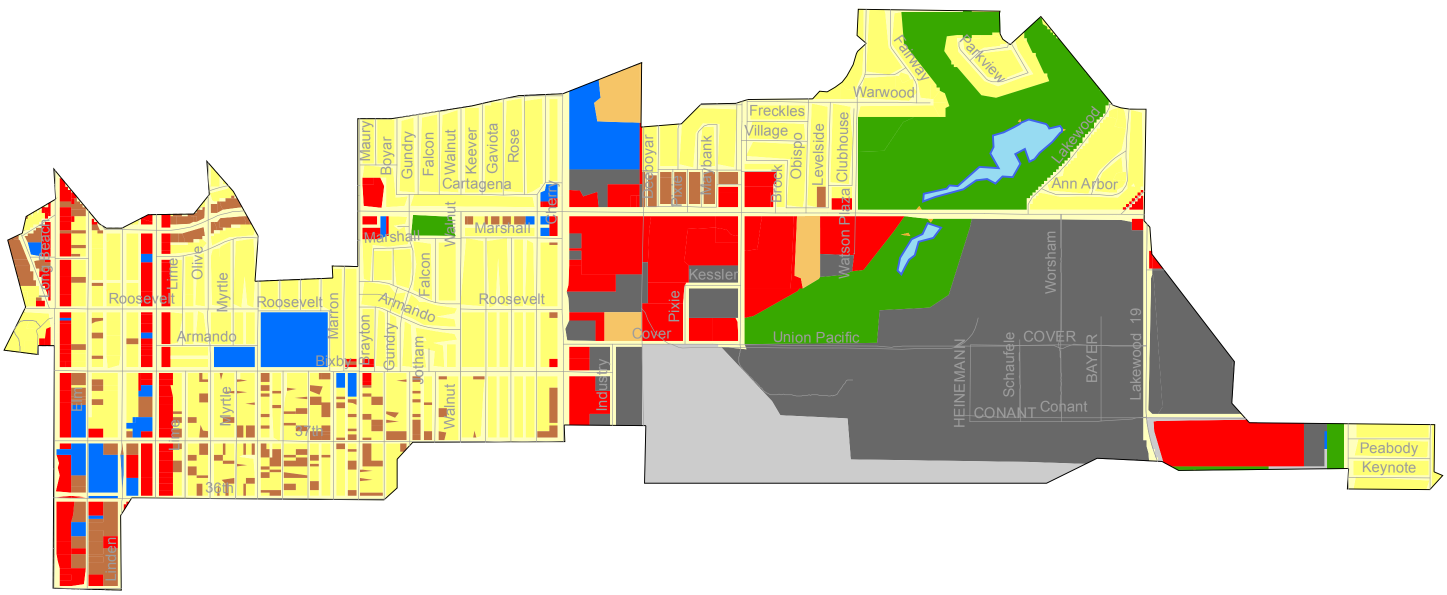
Los Cerritos Channel TMDL Sub-Basin 6



Prepared by: ECKERSALL, LLC

Date: 1/13/2014

Los Cerritos Channel TMDL Sub Basin 6
Hydrologic Response Units



Legend

Hydrologic Response Units

HD SFR	Commercial	Secondary Roads	Water Bodies
LD SFRM	Institutional	Agriculture Moderate Slope D	
LD SFR Steep S	Industrial	Vacant Moderate Slope D	
MF	Transportation	Vacant Steep Slope D	

Sub Basin 6

Acreage 1664

Street Centerlines

N

0 7,500 15,000 30,000
Inches

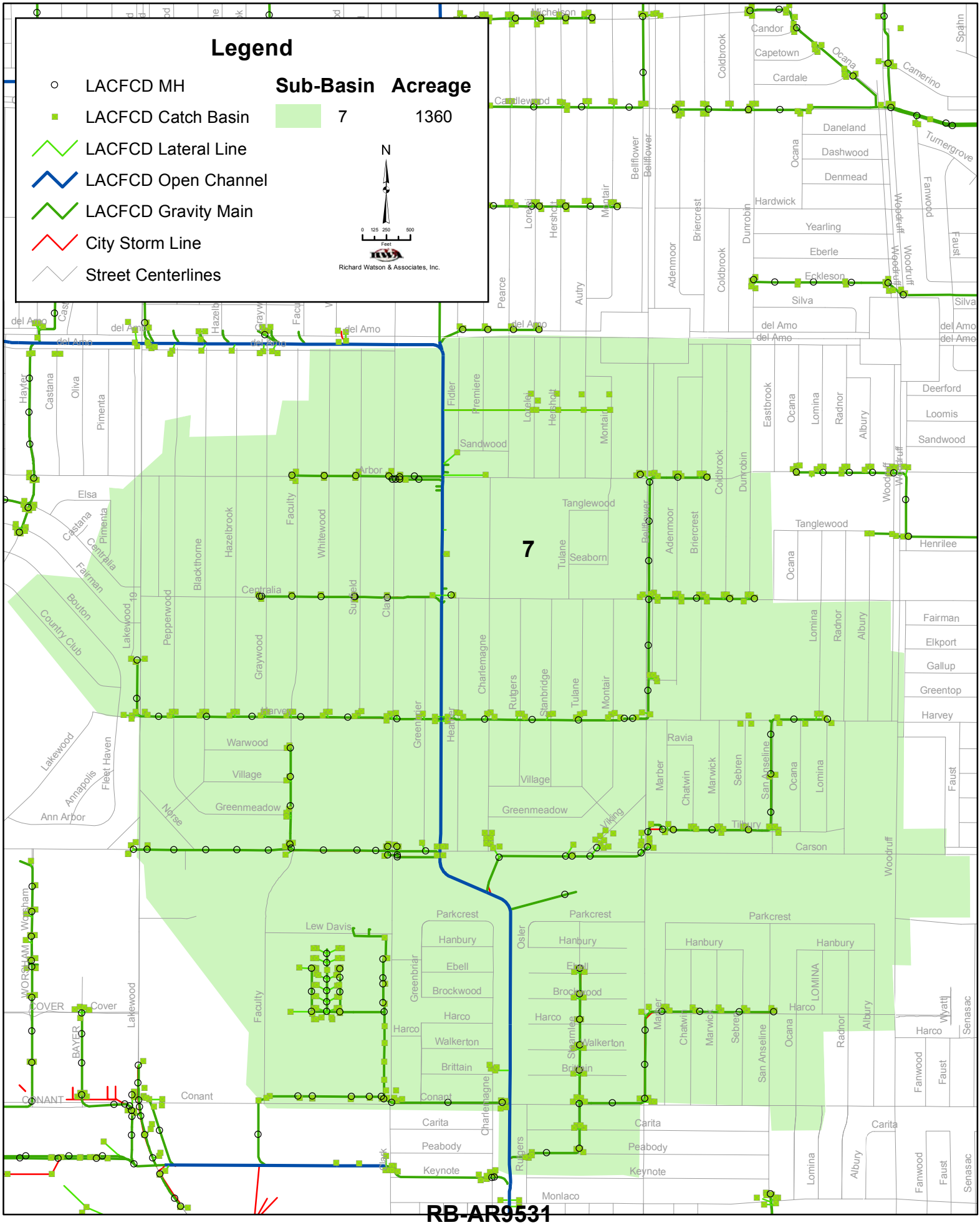
Richard Watson & Associates, Inc.

RB-AR9530

Prepared by: ECKERSALL, LLC

Date: 3/4/2014

Los Cerritos Channel TMDL Sub-Basin 7

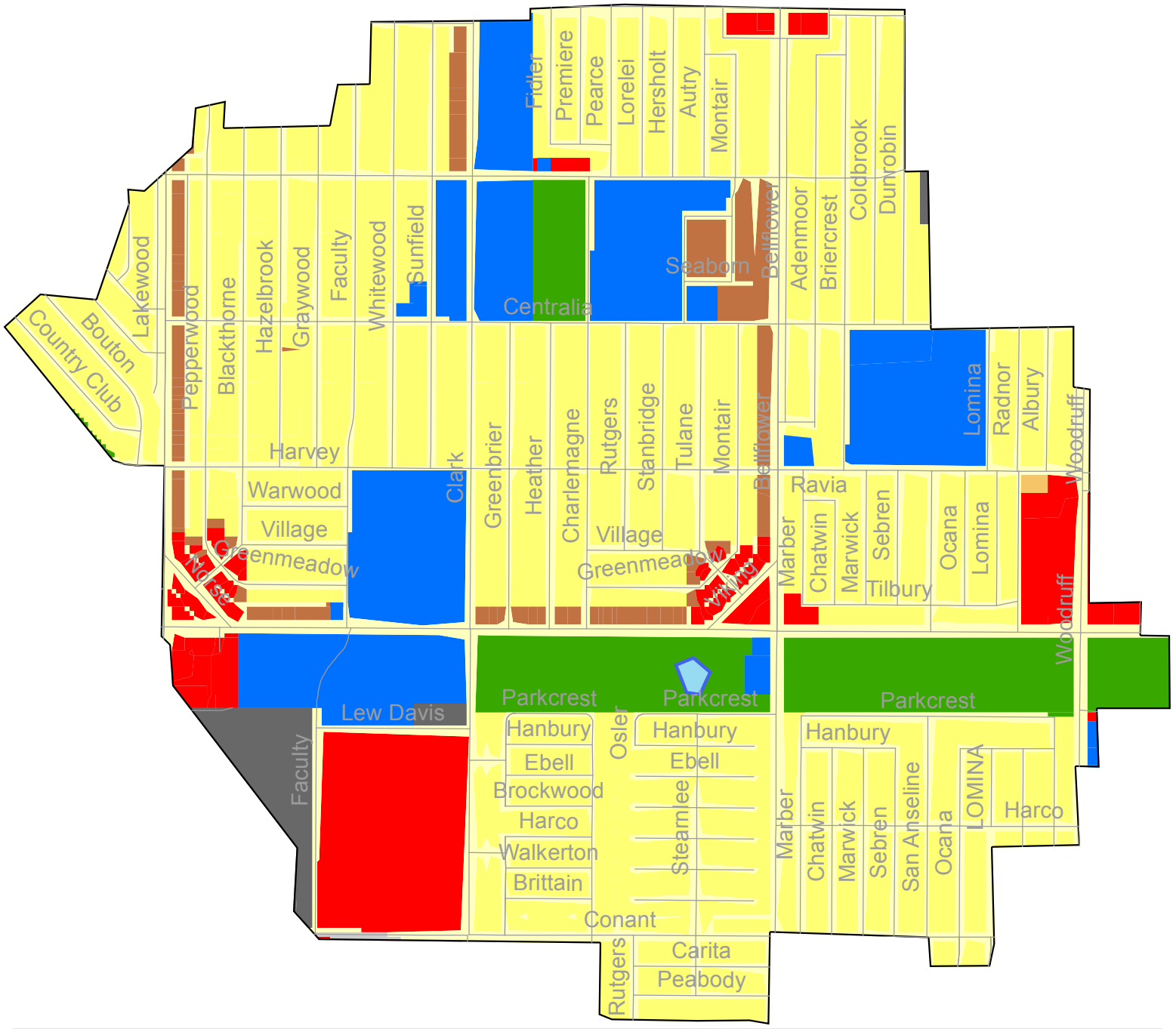


RB-AR9531

Prepared by: ECKERSALL, LLC

Date: 1/9/2014

Los Cerritos Channel TMDL Sub Basin 7
Hydrologic Response Units



Legend

Hydrologic Response Units

- HD SFR
- LD SFRM
- LD SFR Steep S
- MF
- Commercial
- Institutional
- Industrial
- Transportation
- Secondary Roads
- Agriculture Moderate Slope D
- Vacant Moderate Slope D
- Vacant Steep Slope D
- Water Bodies

Sub Basin
7

Acreage
1360

Street Centerlines

N

0 3,750 7,500 15,000
Inches

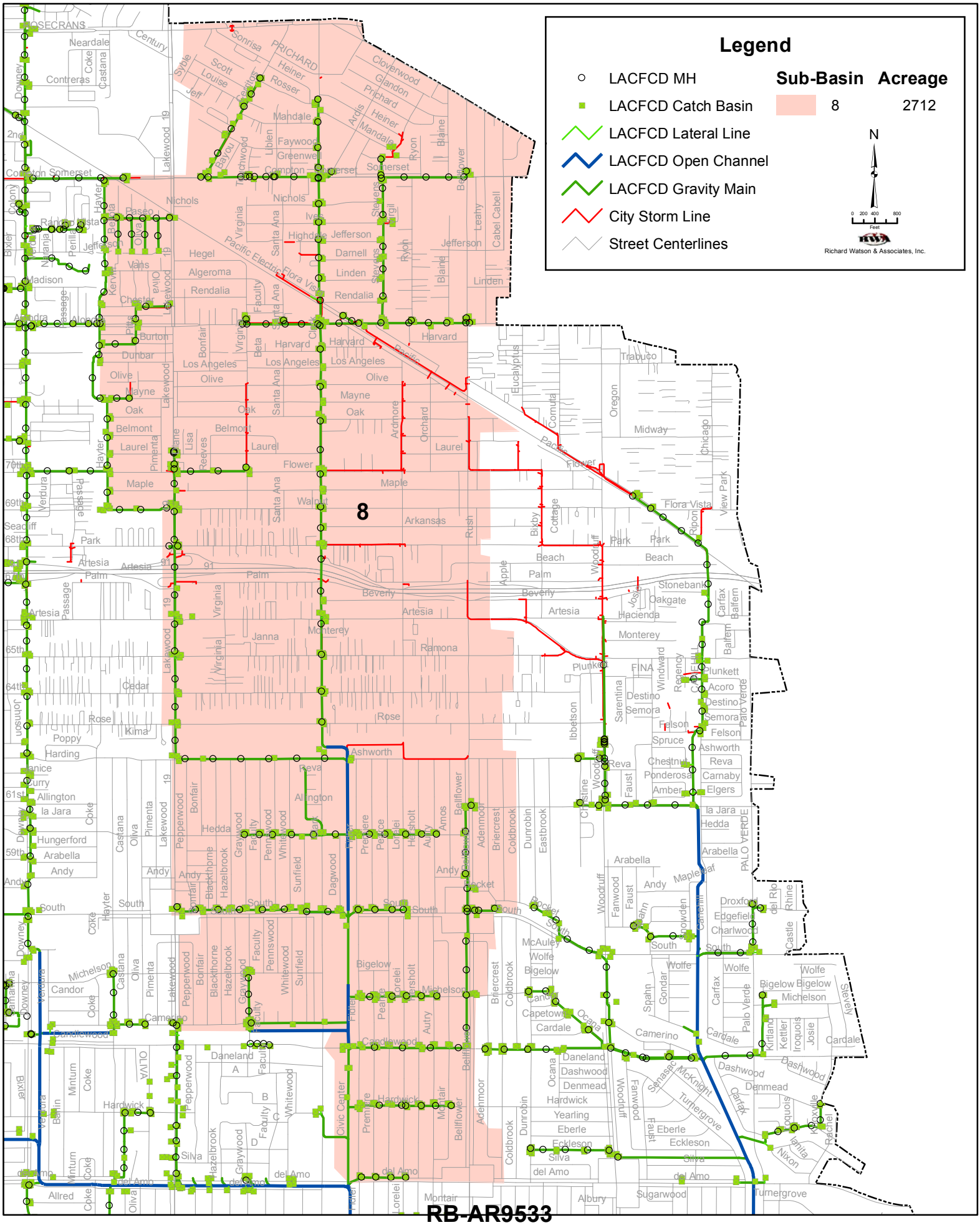
Richard Watson & Associates, Inc.

RB-AR9532

Prepared by: ECKERSALL, LLC

Date: 3/4/2014

Los Cerritos Channel TMDL Sub-Basin 8



RB-AR9533

Prepared by: ECKERSALL, LLC

Date: 1/9/2014

Los Cerritos Channel TMDL Sub Basin 8
Hydrologic Response Units

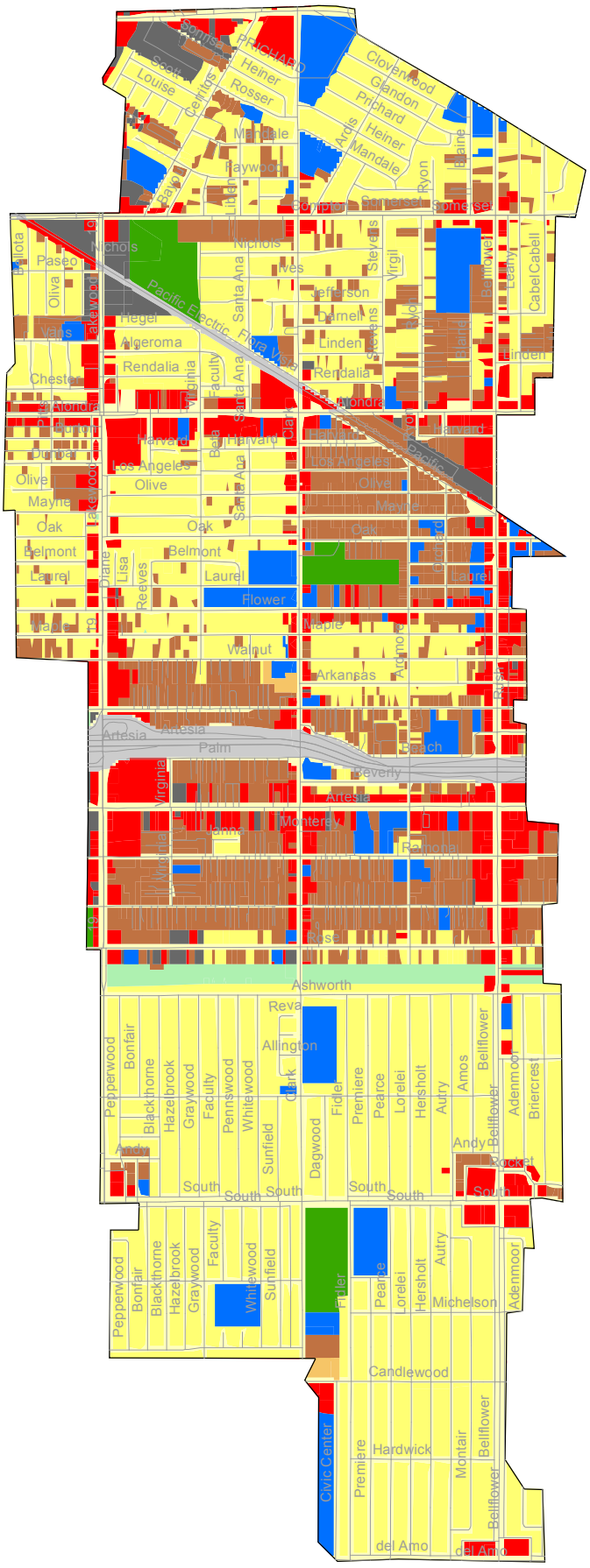
Legend

Hydrologic Response Units

- HD SFR
- LD SFRM
- LD SFR Steep S
- MF
- Commercial
- Institutional
- Industrial
- Transportation
- Secondary Roads
- Agriculture Moderate Slope D
- Vacant Moderate Slope D
- Vacant Steep Slope D
- Water Bodies

Sub Basin	Acreage
8	2712

- Street Centerlines



N

0 7,000 14,000 28,000
Inches

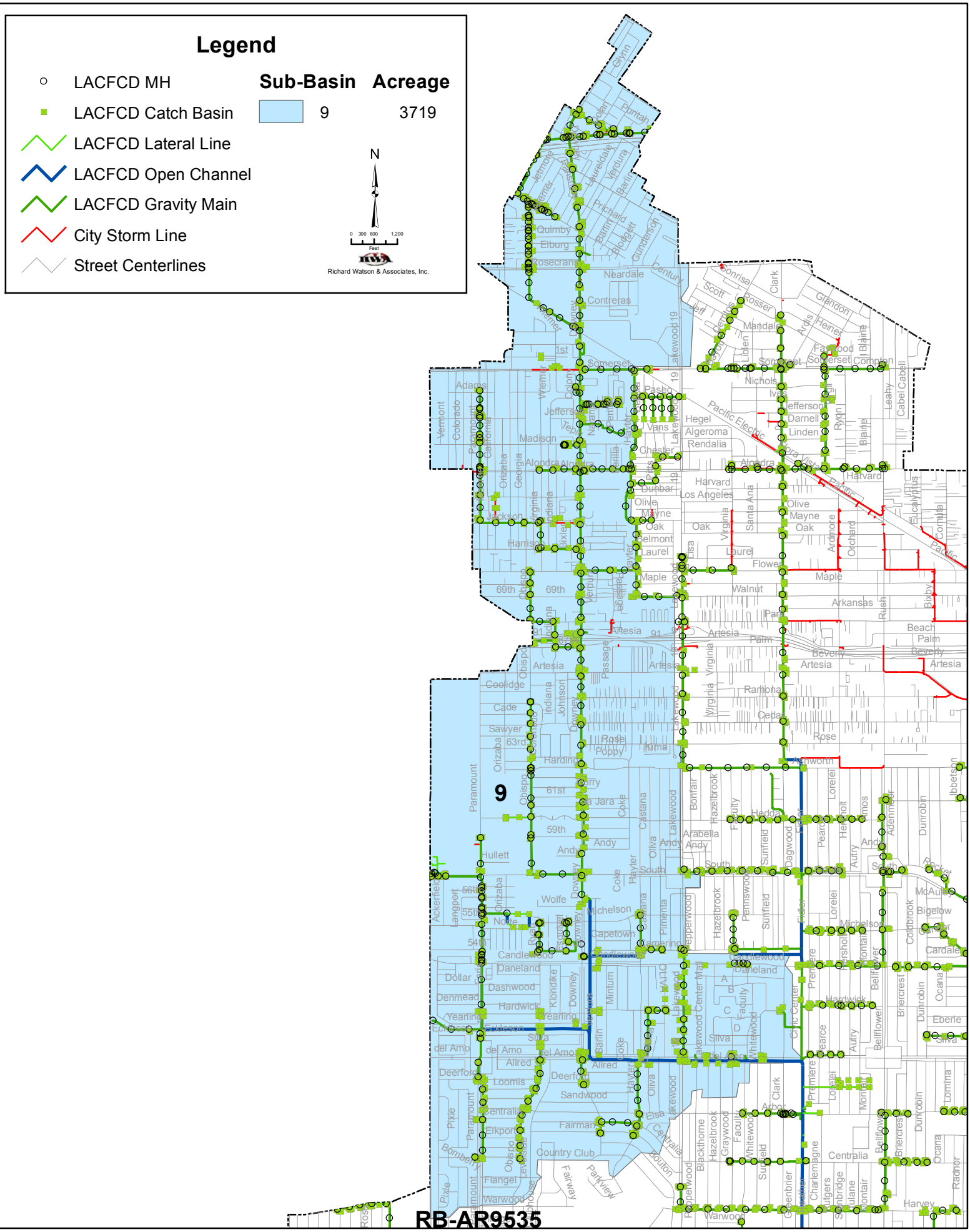
Richard Watson & Associates, Inc.

RB-AR9534

Prepared by: ECKERSALL, LLC

Date: 3/4/2014

Los Cerritos Channel TMDL Sub-Basin 9



Prepared by: ECKERSALL, LLC

Date: 1/9/2014

Los Cerritos Channel TMDL Sub Basin 9
Hydrologic Response Units

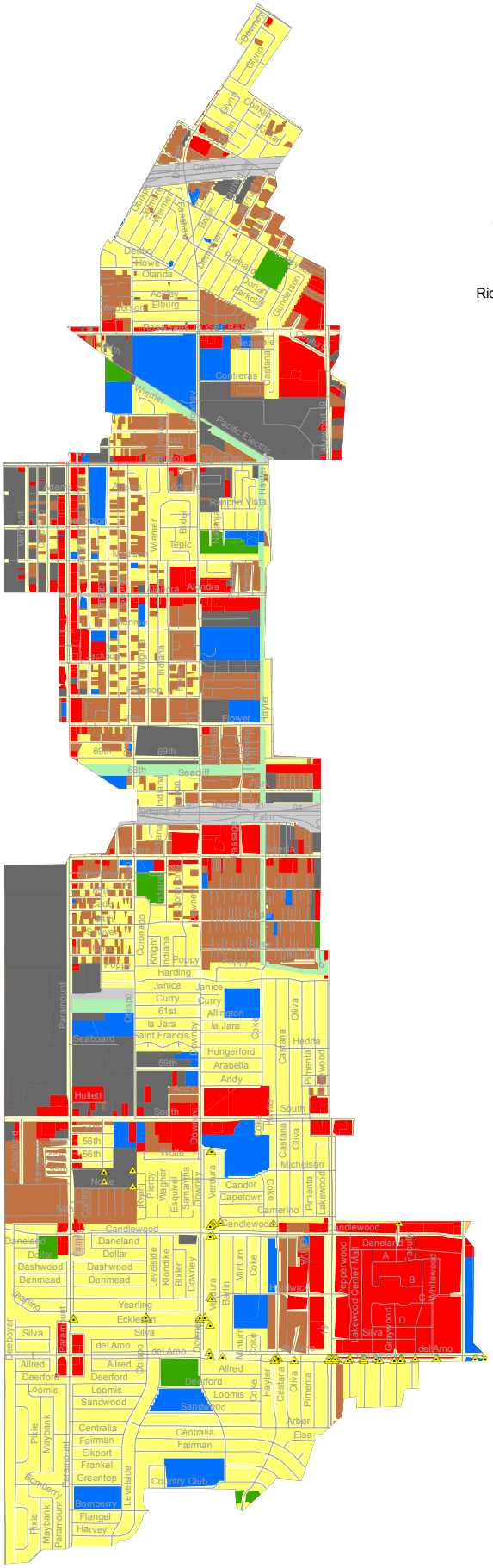
Legend

Hydrologic Response Units

- HD SFR
- LD SFRM
- LD SFR Steep S
- MF
- Commercial
- Institutional
- Industrial
- Transportation
- Secondary Roads
- Agriculture Moderate Slope D
- Vacant Moderate Slope D
- Vacant Steep Slope D
- Water Bodies

Sub Basin	Acreage
9	3718

- Street Centerlines



N

0 10,000 20,000 40,000
Inches

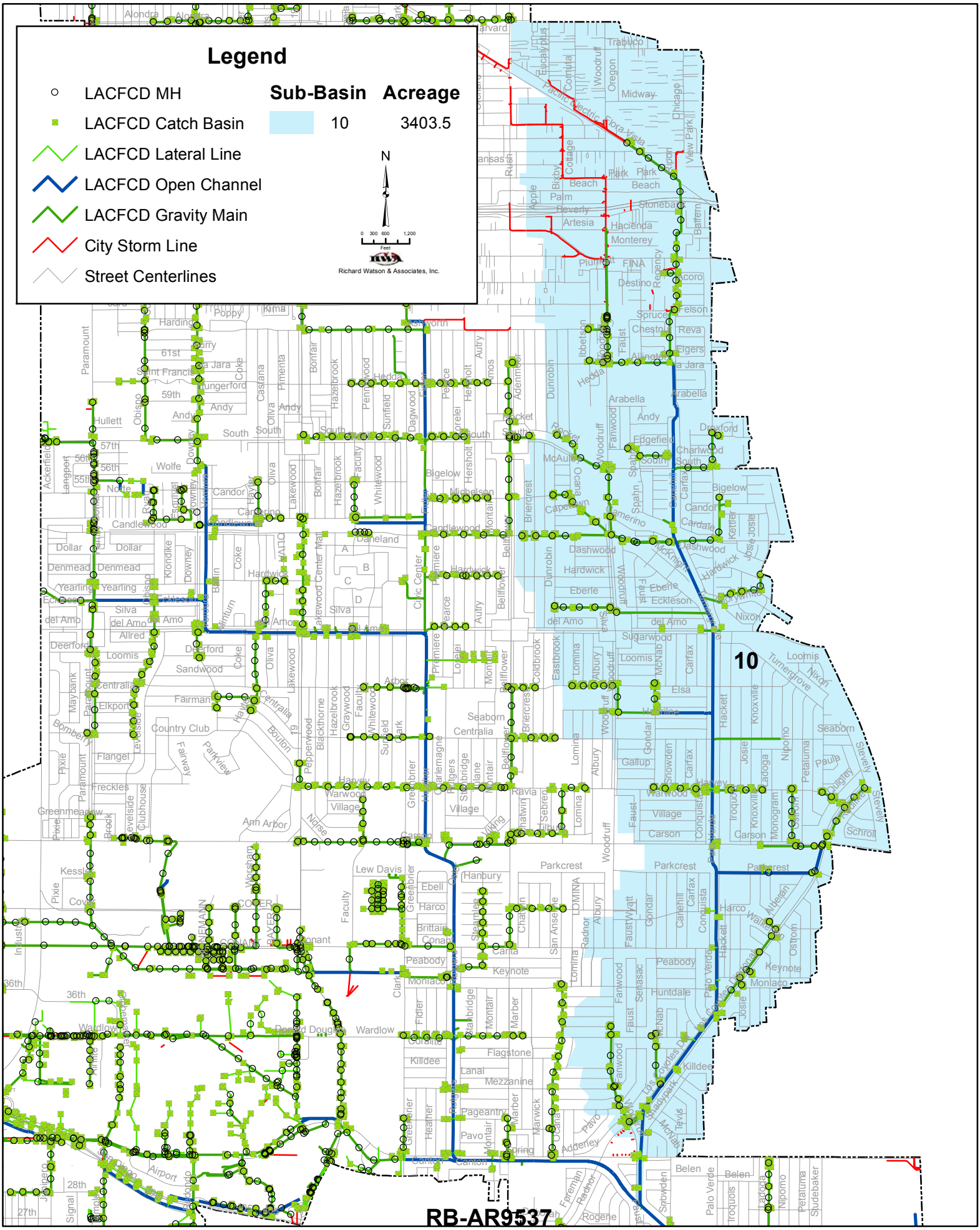
Richard Watson & Associates, Inc.

RB-AR9536

Prepared by: ECKERSALL, LLC

Date: 3/3/2014

Los Cerritos Channel TMDL Sub-Basin 10



Prepared by: ECKERSALL, LLC

Date: 1/9/2014

Los Cerritos Channel TMDL Sub Basin 10
Hydrologic Response Units

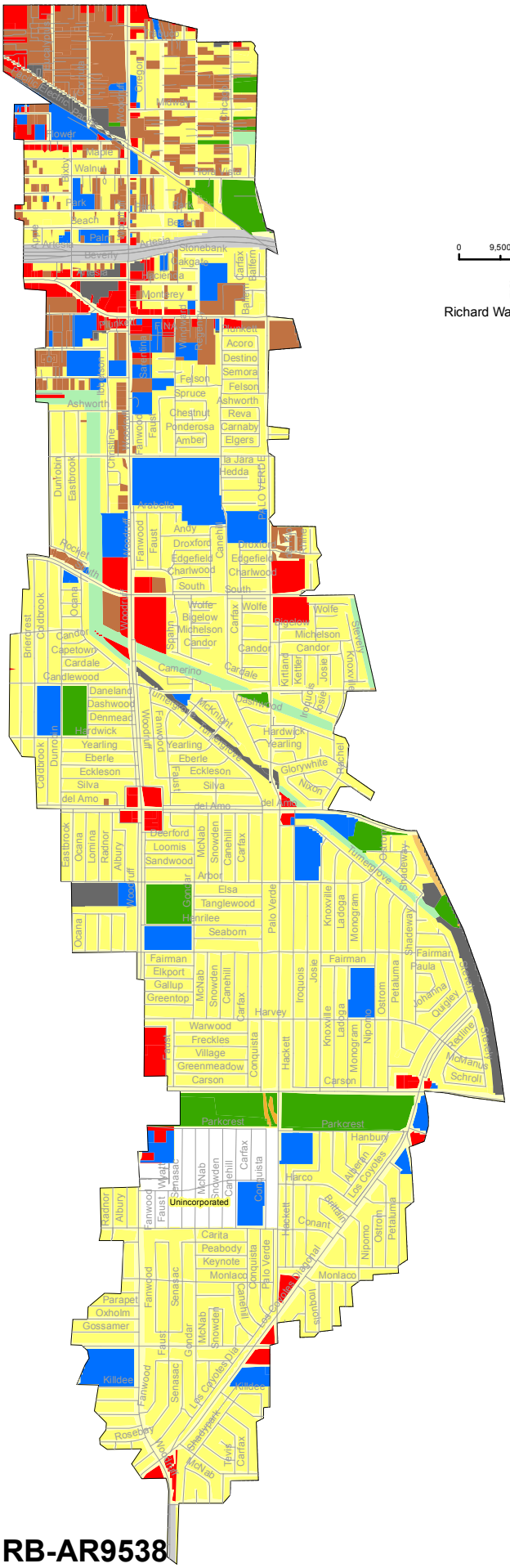
Legend

Hydrologic Response Units

- HD SFR
- LD SFRM
- LD SFR Steep S
- MF
- Commercial
- Institutional
- Industrial
- Transportation
- Secondary Roads
- Agriculture Moderate Slope D
- Vacant Moderate Slope D
- Vacant Steep Slope D
- Water Bodies

Sub Basin	Acreage
10	3403

Street Centerlines



N

0 9,500 19,000 38,000
Inches

Richard Watson & Associates, Inc.

RB-AR9538

Prepared by: ECKERSALL, LLC

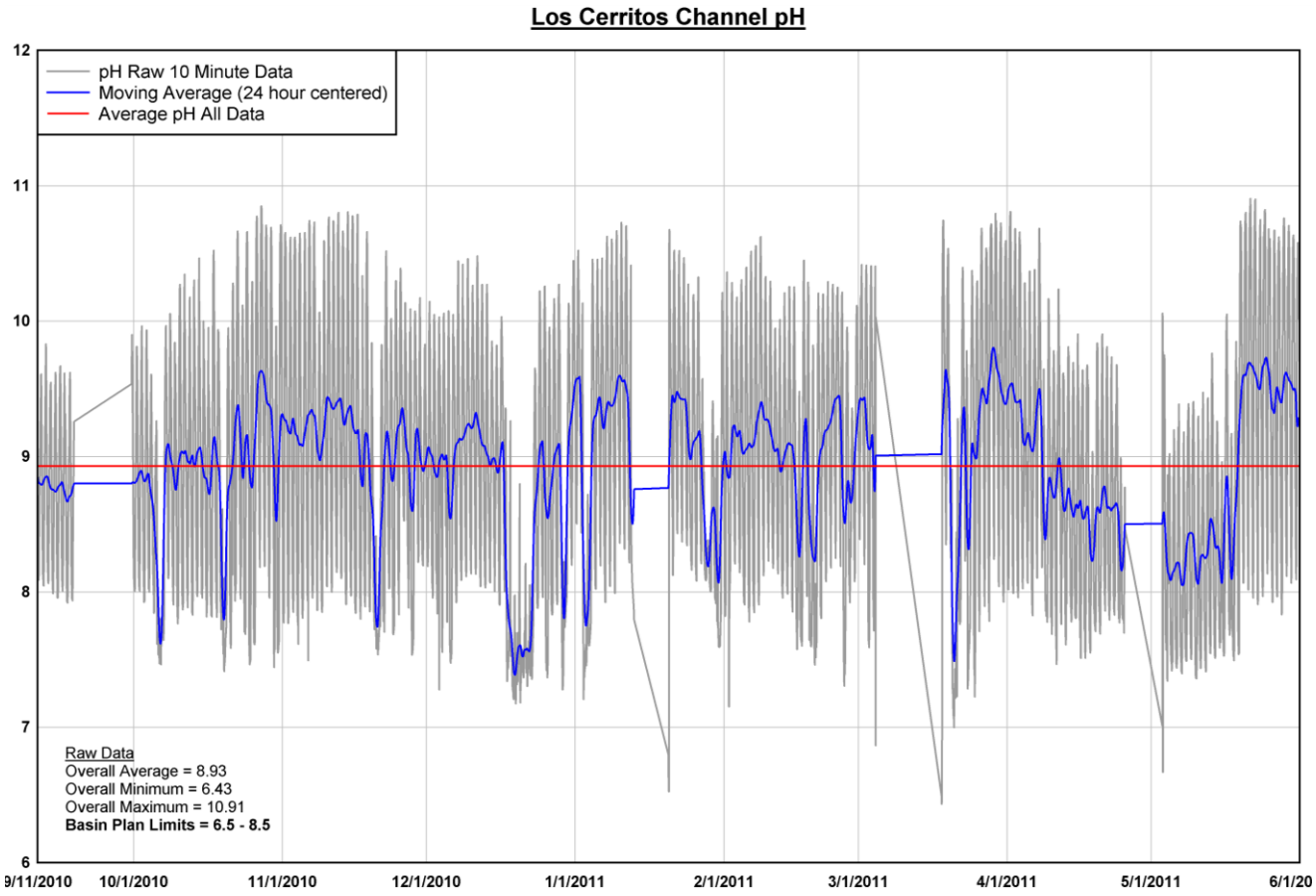
Date: 3/4/2014

ATTACHMENT C:

REVIEW OF LOS CERRITOS CHANNEL WATERSHED AMMONIA AND pH DATA

REVIEW OF LOS CERRITOS CHANNEL WATERSHED AMMONIA AND pH DATA

IMPLICATIONS FOR 303d DELISTING



Prepared For:
Los Cerritos Channel Watershed Group

Cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill and the Los Angeles County Flood Control District

KINNETIC LABORATORIES INCORPORATED

RWA

January, 2015

RB-AR9540

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ATTACHMENTS

Attachment 1. Summary of pH and Ammonia Data from City of Long Beach MS4 NPDES Storm Water Monitoring Site on the Los Cerritos Channel at Stearns Street along with Potential Toxicity Calculations (Excel Spreadsheet File).

Attachment 2. Kinnetic Laboratories, Inc. 2005. City of Long Beach Annual Stormwater Monitoring Report (2004/2005. Appendix B. Los Cerritos Channel Dry Weather Upstream Investigation

Attachment 3 Kinnetic Laboratories, Inc. 2009. City of Long Beach Annual Stormwater Monitoring Report (2008/2009). Appendix B. Los Cerritos Channel Dry Weather Copper and Bacteria Source Investigation.

Attachment 4. Kinnetic Laboratories, Inc. 2011. City of Long Beach Stormwater Monitoring Report. Appendix D. Continuous Measurement of pH and Temperature in the Los Cerritos Channel.

REVIEW OF LOS CERRITOS CHANNEL WATERSHED AMMONIA AND pH DATA

IMPLICATIONS FOR 303d DELISTING

Prepared for the Los Cerritos Channel Watershed Group
Cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill and the Los Angeles County Flood Control District

Prepared by Kinnetic Laboratories, Inc. and Richard Watson & Associates
January, 2015

1.0 INTRODUCTION AND PURPOSE

The freshwater portion of the Los Cerritos Channel was 303d listed by the Los Angeles Regional Water Quality Control Board for ammonia nitrogen (NH_3-N) in 2002 and pH in 2010. The purpose of this document is to summarize and analyze all available ammonia and pH data for the Los Cerritos Channel in order to consider delisting ammonia and pH.

This document summarizes ammonia and pH data from the Los Cerritos Channel developed as part of the City of Long Beach storm water monitoring program. The data set includes all storm water and dry weather monitoring conducted in the Los Cerritos Channel at the Stearns Street monitoring site since 2001. This site is the TMDL compliance site for the Los Cerritos Channel Metals TMDLs. In addition, several special studies conducted in the Los Cerritos Channel by the City of Long Beach's monitoring program have provided supplemental data on pH in the both the open channel and pipes with flows discharging to the open channel. Analysis of these data is carried out with respect to acute and chronic toxicity criteria as prescribed the Basin Plan amended that uses USEPA, 1999 criteria. In addition, the special studies carried out in the Los Cerritos Channel by the City of Long Beach's monitoring program have provided supplemental data on pH cycling in the concrete channels.

2.0 AVAILABLE DATA

Ammonia and pH values are from composited samples from the wet weather storm events that have been monitored since the year 2001. For dry weather, ammonia values are from 24-hour composite samples taken in the fall and spring of each monitoring year. For dry weather, field measurements of pH and temperature were used to assist in evaluating the criteria. All data has been reported in the City of Long Beach's annual NPDES storm water monitoring reports. These data are attached as Appendices to this document.

Several dry weather surveys taken early in the City of Long Beach's identified occasional high pH values in the open concrete channel at the Stearns Street monitoring site. In 2002 the Regional Board added a requirement to conduct an upstream investigation if pH values of 9.0 or greater were encountered during these dry weather surveys at the Stearns Street monitoring site. Subsequently, elevated pH values measured at Stearns Street prompted an upstream survey initially in the concrete channel just above the monitoring site, and subsequently extending up into the Los Cerritos Channel Watershed tributaries (Kinnetic Laboratories, 2005), (Attachment 1). High pH values (9.45 to 10.9 during the day) were found in all the upstream channels, and furthermore, pH was found to rise during the day and drop at night. The results of this investigation supported the hypothesis that the elevated pH values in the shallow flow in the open concrete channels are caused by photosynthetic activity. Attached algae on the channel bottom in the channel consume carbon dioxide (CO_2) while undergoing photosynthesis. Algal growths typical of open channels during dry weather conditions cause high concentrations of dissolved oxygen in the water. The removal of CO_2 from the water causes bicarbonate and carbonate ions to react with hydrogen ions

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(H^+) to form more CO_2. The loss of H^+ from the water causes the pH to increase. During the night, respiration of the algae and bacteria in the channel cause the CO_2 to be released and oxygen to be consumed. This allows the pH drop during the night. The diurnal cycling of pH is a common occurrence in open waterways. Alkalinity provides buffering capacity such that high alkalinity water should be expected to have less extreme diurnal changes in pH.

A Los Cerritos Channel dry weather copper and bacteria upstream source investigation again documented the occurrence of elevated pH values (Kinnetic Laboratories, 2009, Attachment 2). Importantly it also documented that the elevated pH values occurred only in the open channels, but not in the outfalls draining into the channel as these pipes were not subject to sunshine necessary to support algae growth.

Finally, another special study was conducted (Kinnetic Laboratories, 2011, Attachment 3) to provide better documentation of the daily fluctuations in pH that occur over the course of a year. This study also showed excessively high pH values within the open portions of the channel, not the outfalls. A precision and stable pH logger was calibrated and installed on a bridge abutment under the Stearns Street Bridge to provide a better understanding of pH cycling. The meter was briefly removed and checked with pH standards and a laboratory thermometer during each maintenance visit. Time series records of pH, temperature, solar radiation and rainfall in the Los Cerritos Channel at Stearns Street resulted from this study that extended from September 10, 2010 to June 1, 2011. Results were as follows:

- Both pH and temperature records showed repetitive, pronounced 24-hour sinusoidal oscillations that supported the earlier conclusion that they are controlled by natural biological and physical processes common to all sites with similar conditions within the concrete channels (Figure 1).
- These 24-hour signals are muted and depressed by major storm flows in the Channel, but also immediately continue during the intervening winter dry periods, even in the absence of major filamentous algal mats (Figures 1 and 2).
- Hourly averaged pH values in the channel were pH 7.98 for rain days, pH 9 for dry days, and pH 8.93 as an overall average of all data, but with maximum values during the days of pH 10.49 to 10.91. Minimum values were from pH 6.43 to 7.04 for the various wet/dry categories (Figure 3).
- With the pH average or median just below 9.0 for all days other than during storm events, the upper limits of the Basin Plan water quality objective of pH 8.5 is routinely exceeded most of the year during dry weather (inclusive of summer dry and winter dry periods).

Recent inspections of outfalls within the Los Cerritos Channel Watershed (Kinnetic Laboratories, 2015) have provided further evidence that pH (using narrow range pH paper as an indicator) is not elevated in any outfalls with flowing or seeping discharges into the open channel.

3.0 ANALYSIS OF pH and AMMONIA DATA

Toxicity Analysis. Ammonia and pH data have been summarized in spreadsheets together with calculations with respect to toxicity criteria and are provided as Attachment 4. Aquatic life water quality criteria from the USEPA document (USEPA, 1999) were used to calculate acute and chronic toxicity as a function of temperature and pH in order to be consistent with the current Basin Plan. Calculations made with the latest USEPA guidance document (USEPA, 2013) yielded similar results for acute toxicity and only showed a few more chronic violations at a temperature of 15 ^{0}C. These latter calculations are also included in the attached Excel Spreadsheet (Attachment 4).

For wet weather, results of the toxicity calculations show only one exceedance of acute and chronic ammonia criteria occurred out of 45 records obtained at the Stearns Street monitoring site during the last 13 years. These results are summarized in Table 1 below and are fully documented in the Excel spreadsheet provided in Attachment 4.

For dry weather, ammonia concentrations in 24-hour composite samples were paired with field measurements of pH data available from the Stearns Street monitoring station at the lower end of the

freshwater portion of the Los Cerritos Channel watershed monitoring. The dry weather results for this site are summarized in Table 2 below as well as in the spreadsheet of Attachment 4.

For dry weather, the data available from this site show that no acute toxicity has been encountered. Ammonia chronic aquatic life criteria were not historically exceeded frequently for dry weather discharges from the Los Cerritos Channel as measured at the Stearns Street monitoring site. However, for the past few years, dry weather chronic exceedances have been observed more frequently with four chronic exceedances having been recorded since 2009 at the higher temperature of 20 ^{0}C. These have been due to slowly rising ammonia concentrations in combination with high pH values in the channel. This increase has been associated with dry weather base flows which have decreased to approximately 10 to 20% of the flows measured in 2009 and decreased by 80% to 90% compared to dry weather flow measurements taken in 2003. One recent winter dry weather survey (January, 2015) resulted in higher flows and lower pH values. These factors resulted in no exceedances of chronic ammonia criteria.

Ammonia Concentrations. Ammonia concentrations of NH_3-N measured in the channel have been low, generally in the range of 0.2 to 0.7 mg/l with higher values generally not exceeding about 1.0 mg/l. In contrast, the Los Angeles River TMDL established WLAs for NH_3-N for a 1-hour average of 8.7mg/l and a 30 day average of 2.4 mg/l.

However, natural pH excursions in the Los Cerritos Channel low-flow summer season can cause dry weather exceedances with respect to chronic toxicity as high pH results in most of the ammonia being converted to unionized ammonia which is the most toxic form.

Flows to the Channel from outfalls during the dry season are well within the limits of the Basin Plan for pH (Kinnetic Laboratories 2009, 2011, 2015). Special upstream studies for copper sources done as part of the Long Beach storm water monitoring program, and recent upstream outfall inspections carried out for the new permit requirements showed that these discharges are almost uniformly close to pH 7.0 to 7.5 (Kinnetic Laboratories, 2015).

The dry weather channel has low flows during the summer which consist of a couple of inches of water running over a bottom attached algae mat. During the dry season, temperature and pH have strong diurnal patterns driven by primary production of the algal mats in the shallow water. During the day the algae causes dissolved oxygen levels to become supersaturated. The removal of CO_2 associated with the algal production causes pH to elevate reaching a peak in the mid-afternoon. Similarly, temperatures also peak around this time. At night, both temperature and pH drop significantly due to microbial consumption and respiration. We expect that our point measurements of pH and temperature are more likely to be biased high relative to 24-hour averages or the 30-day averages that the chronic criteria are expected to use.

These natural diurnal cycles in pH have been documented in the Los Cerritos Channel by use of a precision recording pH meter that was deployed at the Stearns Street monitoring site in early September 2010 and recorded continually until late May 2011, thus covering both dry summer season conditions and winter wet seasons for both storm events and wet weather dry seasons. These data were reported in the 2010-2011 Long Beach annual monitoring report and Appendix D of this annual report is attached to this present document. The results of this study showed that pH varied diurnally in Los Cerritos channel from about 6.5 to 10.8 with an average of about 9.0 unless interrupted by rain events. The amplitude of these pH variations was large because of the low volume of flowing water flowing above a healthy mat of attached algae.

4.0 CONCLUSIONS

From analyses of available data, the following conclusions can be drawn:

- Large excursions of pH occur in the Los Cerritos Channel with the pH average or median just below 9.0 for all days other than during storm events. The upper limits of the Basin Plan water quality objective of pH 8.5 is routinely exceeded most of the year during dry weather (inclusive of summer dry and winter dry periods).
- High excursions of pH cause exceedances of the chronic ammonia criteria within the Channel even though ammonia concentrations are generally low.

The Basin Plan states that the pH of inland surface waters shall not be depressed below 6.5 or raised above 8.5 as a result of waste discharges. Ambient pH levels shall not be changed more than 0.5 units from natural conditions as a result of waste discharges. Data reviewed above show that the high pH excursions are not caused by inputs of high pH wastewaters. Rather, the large pH excursions observed during dry weather flow conditions are the result of natural diurnal pH cycling caused by photosynthesis and respiration processes.

Data from the Long Beach stormwater monitoring program plus that of special studies have shown that exceedances of ammonia chronic aquatic life criteria are not caused by either excessive NH_3-N concentrations nor by waste inputs. The exceedance of chronic ammonia criteria are caused by the natural high excursions of pH due to photosynthesis/respiration cycles in these channels.

5.0 TABLES AND FIGURES

Table 1. WET WEATHER – Ammonia Criteria Exceedances at Stearns Street Compliance Site

Evaluation of Basin Plan Criteria

Wet Season	Measured Values		Acute Criteria		Chronic Criteria based upon Two Selected Temperatures			
					T=15 degrees C		T=20 degrees C	
Storm Year	NH3-N	pH	1-hour avg	Exceed (Y/N)	30-day avg	Exceed (Y/N)	30-day avg	Exceed (Y/N)
LB-01	1.20	6.90	39.16	N	5.93	N	4.30	N
LB-01	0.87	7.20	29.54	N	5.22	N	3.78	N
LB-01	0.73	7.00	36.09	N	5.73	N	4.15	N
LB-01	0.54	7.30	26.21	N	4.92	N	3.57	N
LB-01	0.48	7.20	29.54	N	5.22	N	3.78	N
LB-02	1.50	7.40	22.97	N	4.59	N	3.32	N
LB-02	0.69	7.40	22.97	N	4.59	N	3.32	N
LB-03	0.90	6.80	42.00	N	6.10	N	4.42	N
LB-03	0.51	6.70	44.57	N	6.25	N	4.52	N
LB-03	0.29	6.20	53.17	N	6.66	N	4.82	N
LB-03	0.29	6.30	51.97	N	6.61	N	4.79	N
LB-04	0.72	7.08	33.52	N	5.54	N	4.02	N
LB-04	0.39	8.03	7.94	N	2.26	N	1.64	N
LB-04	0.23	6.71	44.32	N	6.23	N	4.52	N
LB-05	2.50	7.07	33.84	N	5.57	N	4.03	N
LB-05	0.19	6.80	42.00	N	6.10	N	4.42	N
LB-05	0.12	7.02	35.46	N	5.68	N	4.12	N
LB-05	0.26	7.02	35.46	N	5.68	N	4.12	N
LB-06	0.73	7.50	19.89	N	4.23	N	3.06	N
LB-06	0.39	8.27	5.00	N	1.55	N	1.12	N
LB-06	0.24	6.80	42.00	N	6.10	N	4.42	N
LB-06	0.31	7.40	22.97	N	4.59	N	3.32	N
LB-07	0.62	8.04	7.79	N	2.23	N	1.61	N
LB-07	0.93	8.87	1.64	N	0.57	Y	0.42	Y
LB-08	1.40	7.07	33.84	N	5.57	N	4.03	N
LB-08	0.48	7.54	18.72	N	4.08	N	2.96	N
LB-08	0.37	6.56	47.67	N	6.41	N	4.64	N
LB-08	0.29	7.82	11.71	N	3.01	N	2.18	N
LB-09	0.29	6.84	40.89	N	6.04	N	4.37	N
LB-09	0.33	7.62	16.49	N	3.78	N	2.74	N
LB-10	0.64	7.39	23.29	N	4.62	N	3.35	N
LB-10	0.51	8.07	7.36	N	2.13	N	1.54	N
LB-10	0.19	7.51	19.59	N	4.19	N	3.04	N
LB-10	0.24	7.48	20.49	N	4.30	N	3.12	N
LB-11	0.80	7.60	17.03	N	3.85	N	2.79	N
LB-11	1.00	7.50	19.89	N	4.23	N	3.06	N
LB-11	0.38	7.80	12.14	N	3.09	N	2.23	N
LB-11	0.16	7.50	19.89	N	4.23	N	3.06	N
LB-12	0.77	7.14	31.54	N	5.39	N	3.90	N
LB-12	0.47	7.50	19.89	N	4.23	N	3.06	N
LB-12	0.66	7.61	16.76	N	3.82	N	2.76	N
LB-12	0.53	7.40	22.97	N	4.59	N	3.32	N
LB-13	0.30	6.92	38.56	N	5.89	N	4.27	N
LB-14	0.50	7.26	27.54	N	5.05	N	3.66	N
LB-14	0.58	7.42	22.34	N	4.52	N	3.27	N
AVG-	**0.59**	**7.30**						

Table 2. **DRY WEATHER – Ammonia Criteria Exceedances at Stearns Street Compliance Site**

Evaluation of Basin Plan Criteria

Dry Season	Measured Values		Acute Criteria		Chronic Criteria based upon Two Selected Temperatures			
					T=15 degrees C		T=20 degrees C	
Storm Year	NH3-N	pH	1-hour avg	Exceed (Y/N)	30-day avg	Exceed (Y/N)	30-day avg	Exceed (Y/N)
LB-01	0.74	8.88	1.61	N	0.56	Y	0.41	Y
LB-02	0.58	8.17	6.07	N	1.82	N	1.32	N
LB-02	0.15	8.72	2.13	N	0.73	N	0.53	N
LB-03	0.17	8.40	3.88	N	1.25	N	0.91	N
LB-03	0.16	8.29	4.81	N	1.50	N	1.09	N
LB-04	0.10	8.45	3.53	N	1.15	N	0.83	N
LB-04	0.10	8.82	1.78	N	0.62	N	0.45	N
LB-05	0.14	8.98	1.37	N	0.49	N	0.35	N
LB-05	0.12	8.21	5.62	N	1.71	N	1.24	N
LB-06	0.10	8.31	4.62	N	1.45	N	1.05	N
LB-06	0.10	8.80	1.84	N	0.64	N	0.46	N
LB-07	0.16	8.75	2.01	N	0.69	N	0.50	N
LB-07	0.11	8.52	3.08	N	1.02	N	0.74	N
LB-08	0.13	8.14	6.43	N	1.91	N	1.38	N
LB-08	0.15	8.74	2.05	N	0.71	N	0.51	N
LB-09	0.25	8.69	2.24	N	0.77	N	0.56	N
LB-09	0.10	8.25	5.20	N	1.60	N	1.16	N
LB-10	0.24	9.38	0.80	N	0.29	N	0.21	Y
LB-10	0.22	9.63	0.63	N	0.24	N	0.17	Y
LB-11	0.32	8.15	6.31	N	1.88	N	1.36	N
LB-11	0.11	8.77	1.94	N	0.67	N	0.49	N
LB-12	0.30	9.15	1.06	N	0.38	N	0.28	Y
LB-12	0.24	8.69	2.24	N	0.77	N	0.56	N
LB-13	0.29	8.01	8.25	N	2.33	N	1.68	N
LB-13	0.41	7.52	19.30	N	4.16	N	3.01	N
LB-14	0.44	8.16	6.19	N	1.85	N	1.34	N
LB-14	0.66	8.7	2.20	N	0.75	N	0.55	Y
LB-15	0.10	8.08	7.22	N	2.10	N	1.52	N
AVG-	**0.24**	**8.55**						

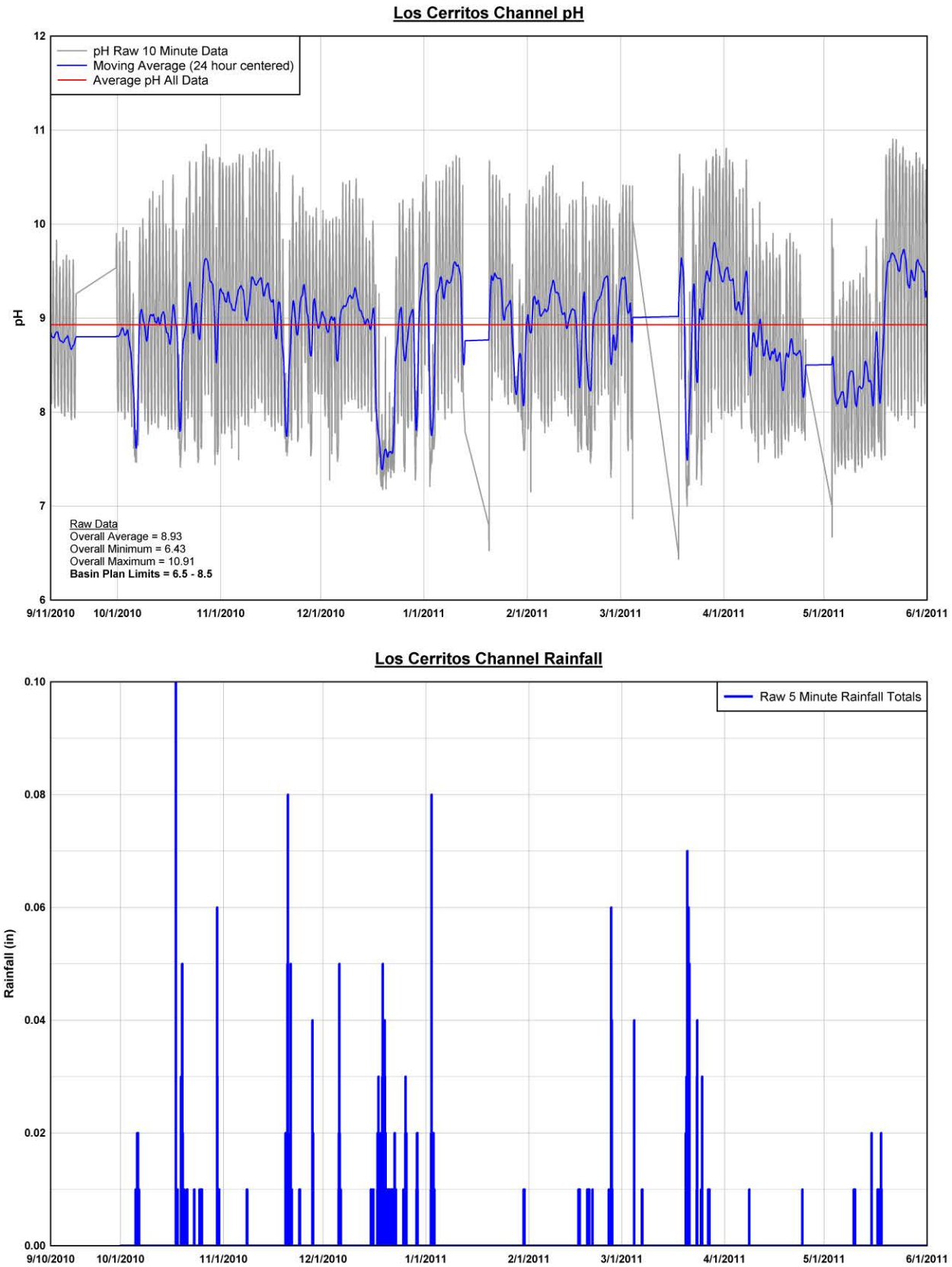

Figure 1. Continuous pH Record at Cerritos Channel Stearns Street Monitoring Site (Above) along with Rainfall (Below), September 10, 2010 to June 1, 2011

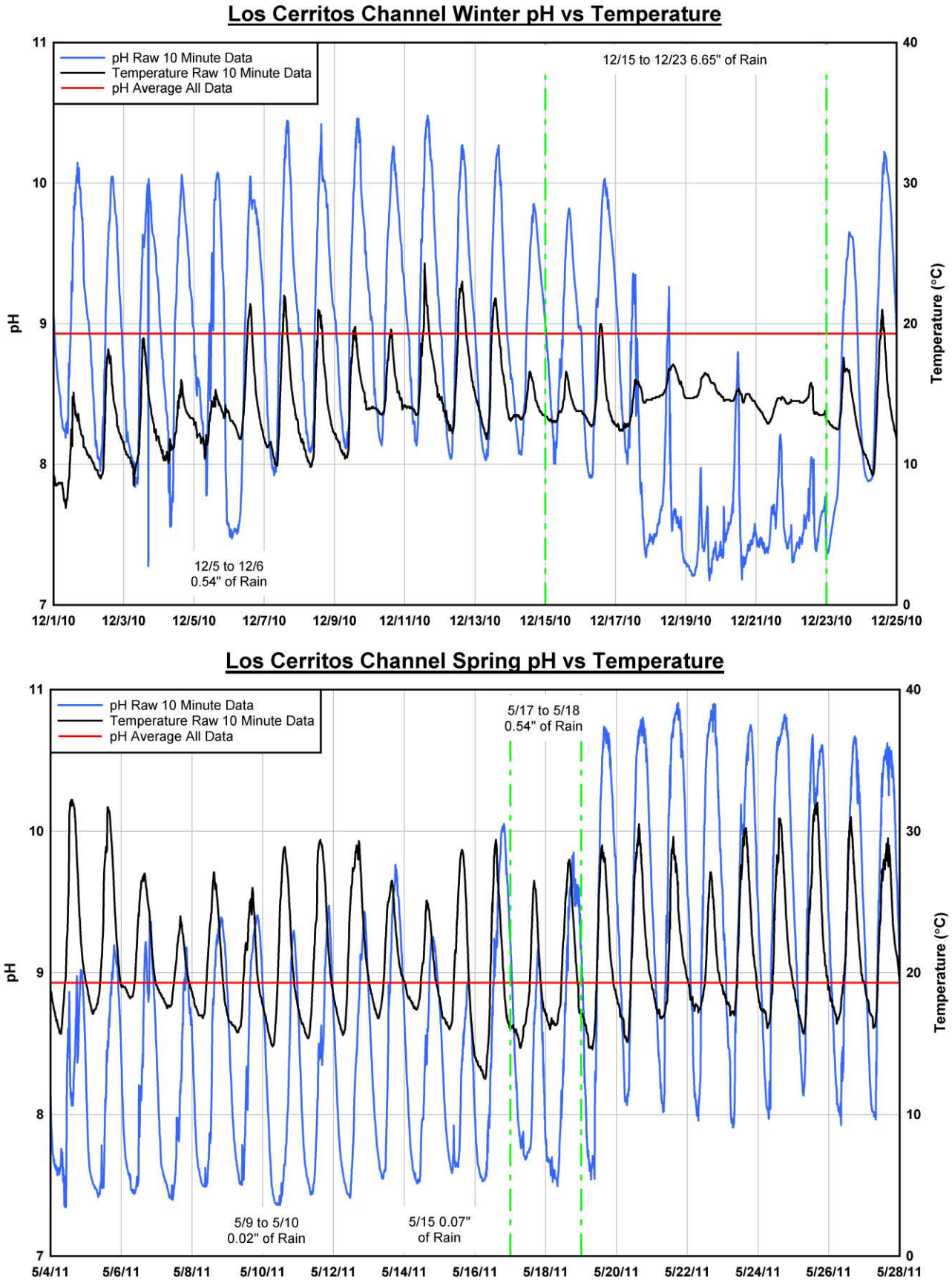

Figure 2. Cycling of pH and Temperature in Winter and Summer

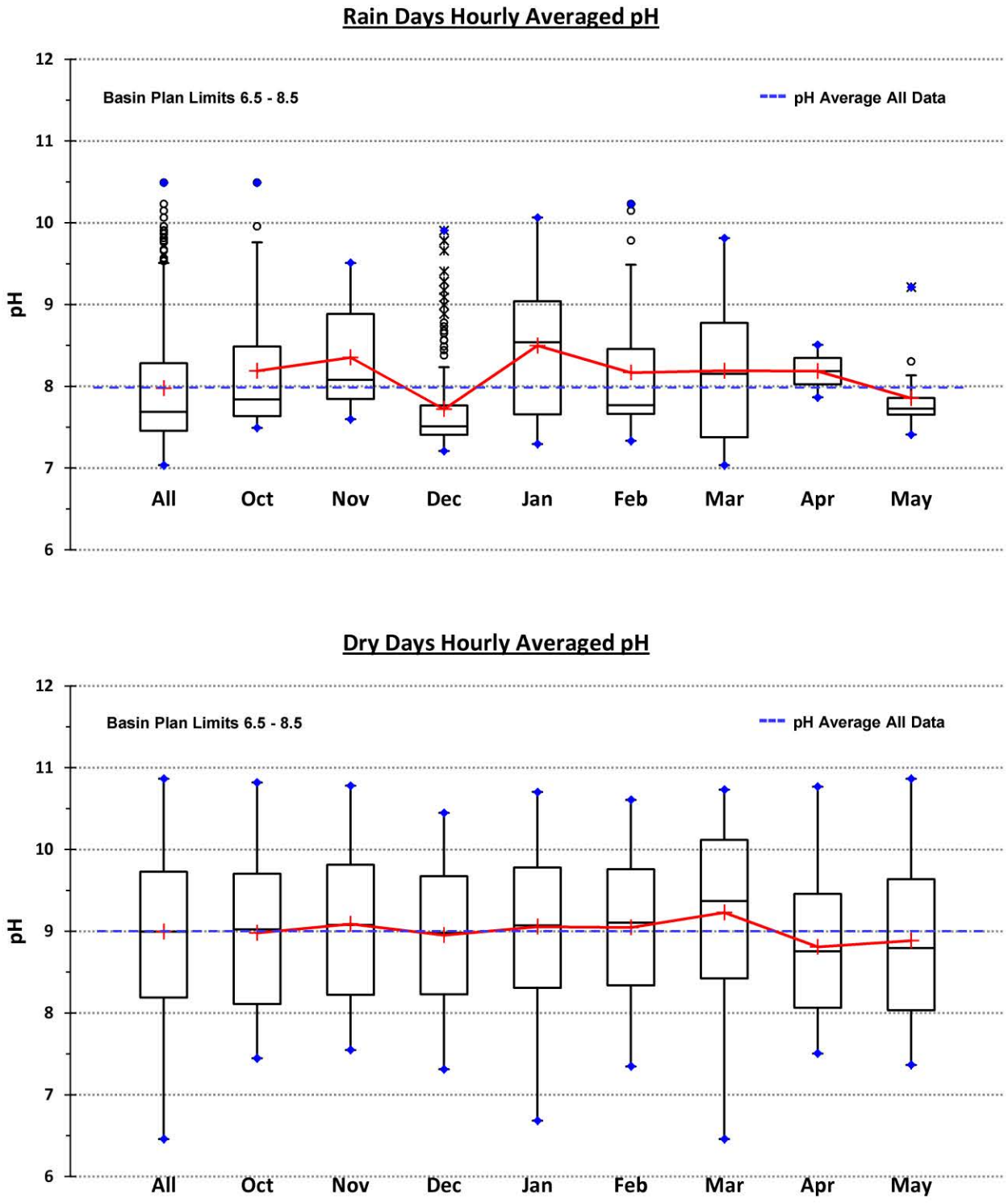

Figure 3. Box Plots of Averaged pH for Rain Days (Above) and for Dry Days (Below)

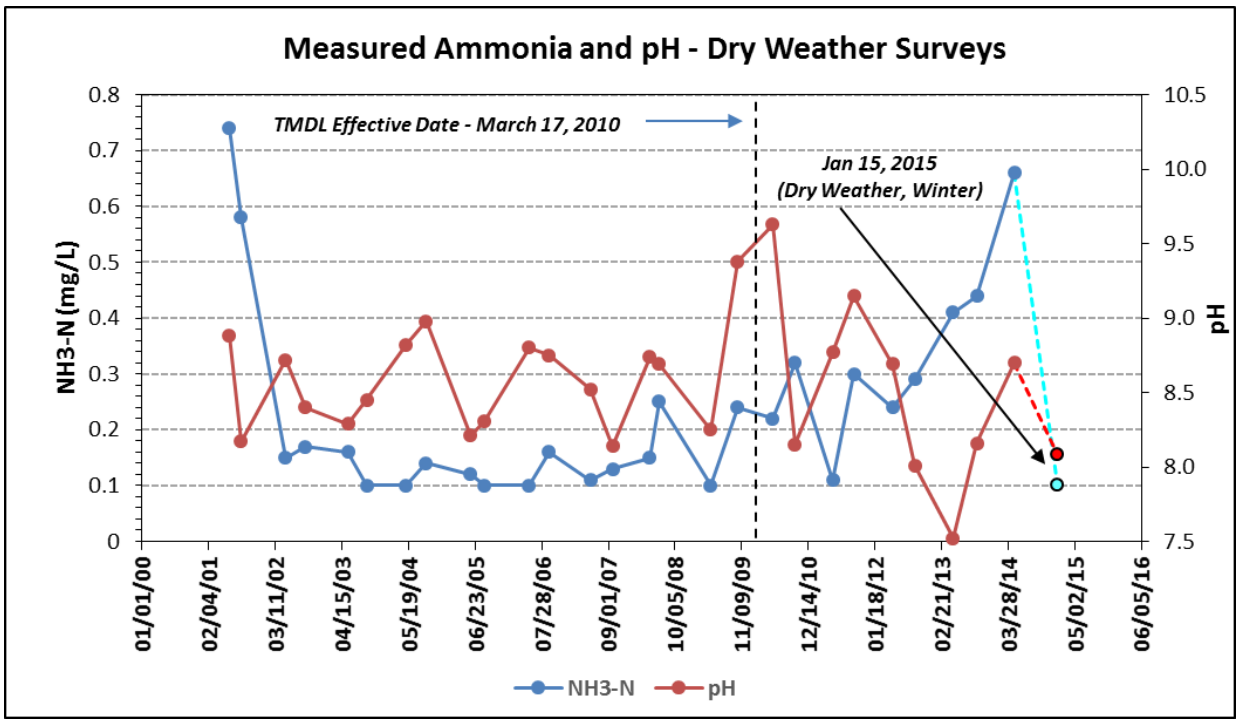

Figure 4. **Los Cerritos Channel Ammonia Nitrogen and pH at Stearns Street**

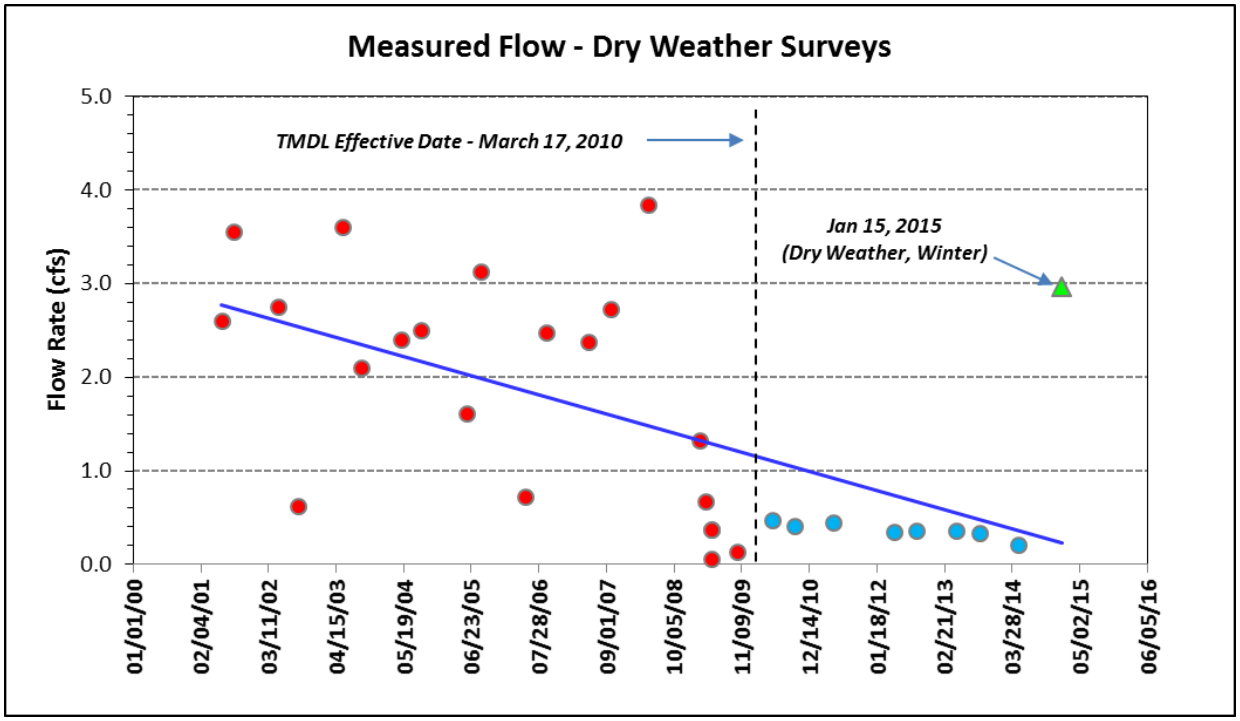

Figure 5. **Measured Dry Weather Flow at Stearns Street in the Los Cerritos Channel.**

6.0 REFERENCES CITED

Kinnetic Laboratories, Inc. 2005. City of Long Beach Stormwater Monitoring Report 2004/2005. NPDES Permit No. CAS004003. Appendix B. Los Cerritos Channel Dry Weather Upstream Investigation.

Kinnetic Laboratories, Inc. 2009. City of Long Beach Stormwater Monitoring Report 2008/2009. NPDES Permit No. CAS004003. Appendix B. Los Cerritos Channel Dry Weather Copper and Bacteria Source Investigation.

Kinnetic Laboratories, Inc. 2011. City of Long Beach Stormwater Monitoring Report 2010/2011. NPDES Permit No. CAS004003. Appendix D. Continuous Measurement of pH and Temperature in the Los Cerritos Channel.

Kinnetic Laboratories, Inc., 2015. Storm Water Outfall Inspections Los Cerritos Channel Watershed. Prepared for the Gateway Water Authority, Cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill and the Los Angeles County Flood Control District.

United States Environmental Protection Agency. 1999. 1999 Update of Ambient Water Quality Criteria for Ammonia. EPA-822-R-99-014. National Technical Information Service, Springfield, VA.

USEPA, 2013. Aquatic Life Ambient Water Quality Criteria for Ammonia – Freshwater, 2013. United States Office of Water 4304T. EPA 822-R-13-001, April 2013. Environmental Protection Agency.

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ATTACHMENTS

Attachment 1. **Kinnetic Laboratories, Inc. 2005. City of Long Beach Annual Storm Water Monitoring Report (2004/2005. Appendix B. Los Cerritos Channel Dry Weather Upstream Investigation**

Reference: Kinnetic Laboratories, Inc. 2005. City of Long Beach Stromwater Monitoring Report 2004/2005. NPDES Permit No. CAS004003. Appendix B. Los Cerritos Channel Dry Weather Upstream Investigation.

Appendix B

Los Cerritos Channel Dry Weather Upstream Investigation

APPENDIX B
LOS CERRITOS CHANNEL DRY WEATHER UPSTREAM INVESTIGATION

1.0 DRY WEATHER UPSTREAM INVESTIGATIONS

Several dry weather surveys conducted early in the program found occasional high pH values at monitoring sites located in open concrete channels. In 2002, the Regional Board added a requirement to conduct upstream investigations if pH values of 9.0 or greater were encountered during the surveys. Elevated pH values were measured in the composite dry weather sample taken at the Los Cerritos Channel station during the August 31, 2004. Upon measurement of the composite bottle pH, an immediate upstream investigation was initiated.

The field crew initially walked approximately 1000 feet upstream in the Los Cerritos Channel to look for possible sources. Measurements of pH tended to increase from 10.02 at the monitoring site to 10.42 to 10.52 at all upstream sites. No sources of water with elevated pH were identified. The crew then went upstream to Spring Street near the junction of the Los Cerritos and Palo Verde Channels. Similar, high pH measurements (10.14 to 10.43) were found in waters above the confluence of these channels, at the mouth of the Palo Verde Channel, and downstream of the confluence. Further investigations were conducted upstream of this site in the vicinity of the Clark Channel. The pH measurements in this region of the Los Cerritos Channel were lower (9.30 to 9.82) but still elevated. Further investigation was halted due to the late hour and approaching darkness.

Since the source could not be quickly located, a follow-up watershed investigation was conducted on September 3, 2004. Eleven sites (Figure 1, Table 1) were visited throughout the watershed including the two major tributaries to the Los Cerritos Channel starting from the Los Cerritos Channel monitoring site (Figure 2). Field estimates of flow were taken using conventional dry weather flow procedures. The average width and depth of the flow were measured for a 10 foot section of the channel. Velocity over the 10-foot section was measured based upon measuring the time required for particles to drift through the segment. Dissolved oxygen was measured with a YSI Model 58 meter. Temperature, salinity and pH were measured with a YSI Model 63 meter. Water samples for measurement of alkalinity were taken for measurement in the laboratory.

Partial measurements were taken at two additional sites. A pH measurement was taken from a trickle flow entering the Clark Channel beneath the Conant Street Bridge (Clark – Outfall; Figure 3). The measured value of 8.17 from this small pipe was the lowest value recorded during the survey. Although pH of water from this outfall was within normal ranges, this site had an unusual mineral formation. In another case only flow was measured at the mouth of the Palo Verde Channel for comparison with flow in the Los Cerritos Channel downstream of the junction of the two conveyances.

The results of this survey are shown in Table 2 and Figures 4 through 8. The survey showed evidence of high pH water throughout the open conveyances of the Los Cerritos Channel and both major tributaries, the Palo Verde and Clark Channels. Measured pH values typically ranged from 9.45 to 10.90. An initial pH check conducted in the morning (0845) at site CC1-A resulted in a pH of 8.93, just under the trigger of 9.0 that was set to initiate upstream investigations. Three hours later (1146), pH had risen to 9.50 and the upstream investigation was started. Flows generally decreased at upstream sites with the exception of flows measured at CC2-A located in the Los Cerritos Channel just downstream of the mouth of the Palo Verde Channel. Total alkalinity ranged from 90 to 173 mg/L. Alkalinity provides an indication of the buffering capacity of the water. Alkalinity values of 100 to 200 would be expected to have a stabilizing effect.

Water temperature and dissolved oxygen were extremely high at all sites. Temperatures ranged from 23.8 to 31.5 °C. Temperatures also tended to increase over the course of the day reaching the higher portion of the range around 1500. Dissolved oxygen levels ranged from just over 11 mg/L to greater than 20 mg/L at several sites.

The results of this investigation support the initial hypothesis that the elevated pH values in these shallow open concrete channels are caused by photosynthetic activity. Evidence suggests that pH increases during the day. Algae in the channels consume carbon dioxide (CO_2) while undergoing photosynthesis. Algal growths typical of open channels during summer, dry weather conditions are shown in a photograph of flows observed during the upstream investigation in the Del Amo Channel (Figure 9) at the upper end of the watershed. Evidence of high photosynthetic activity is typically evident in the form of the high concentrations of dissolved oxygen in the water as well as visual evidence of bubbles being generated as the water becomes oversaturated from oxygen. The removal of CO_2 from the water causes bicarbonate and carbonate ions to react with hydrogen ions (H^+) to form more CO_2. The loss of H^+ from the water causes the pH to increase. During the night, respiration of the algae and bacteria in the channel would cause CO_2 to be released and oxygen to be consumed. This allows the pH drop during the night. The diurnal cycling of pH is a common occurrence in open waterways. Alkalinity provides buffering capacity such that high alkalinity water should be expected to have less extreme diurnal changes in pH.

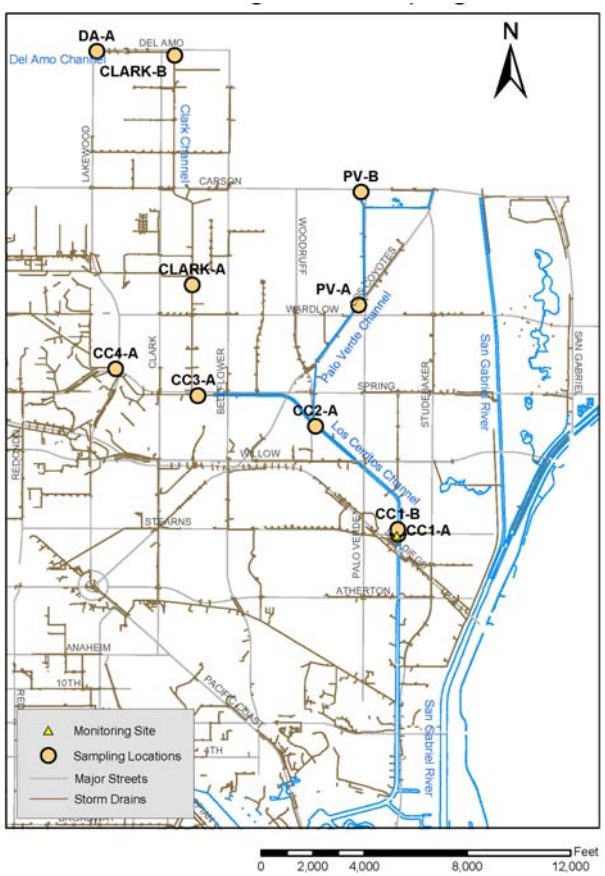

Figure 2. Los Cerritos Channel Watershed Investigation Sites

Figure 1. Dry Weather Flow at the Los Cerritos Monitoring Station, 9/3/04.

Figure 3. Concretions from Outfall into the Clark Channel under the Conant St. Bridge.

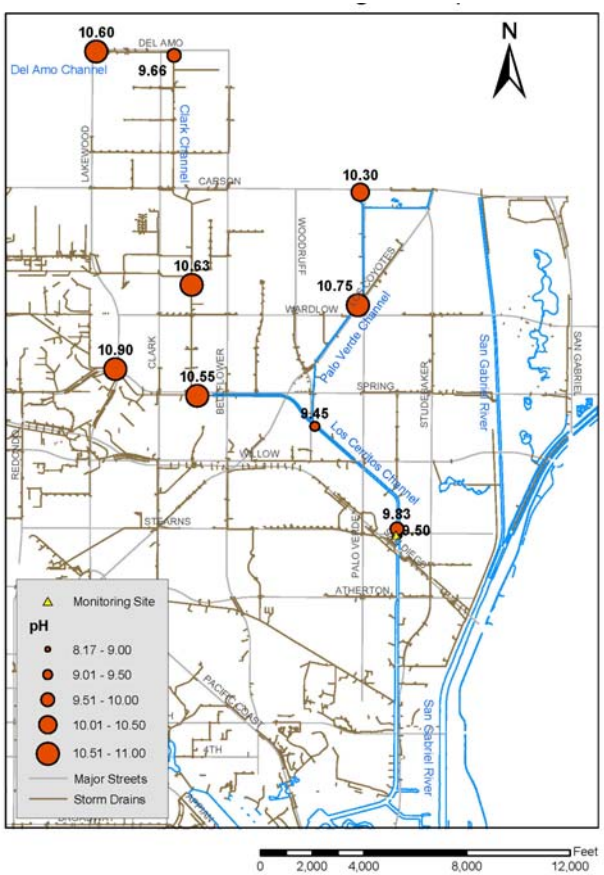

Figure 4. Measured pH at each Los Cerritos Channel Watershed Site.

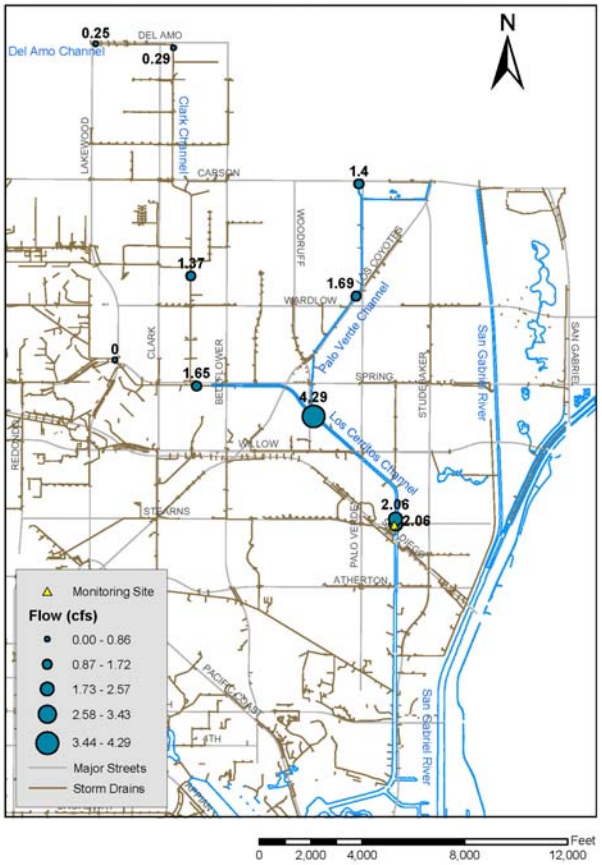

Figure 5. Flow measured at each Los Cerritos Channel Watershed Site.

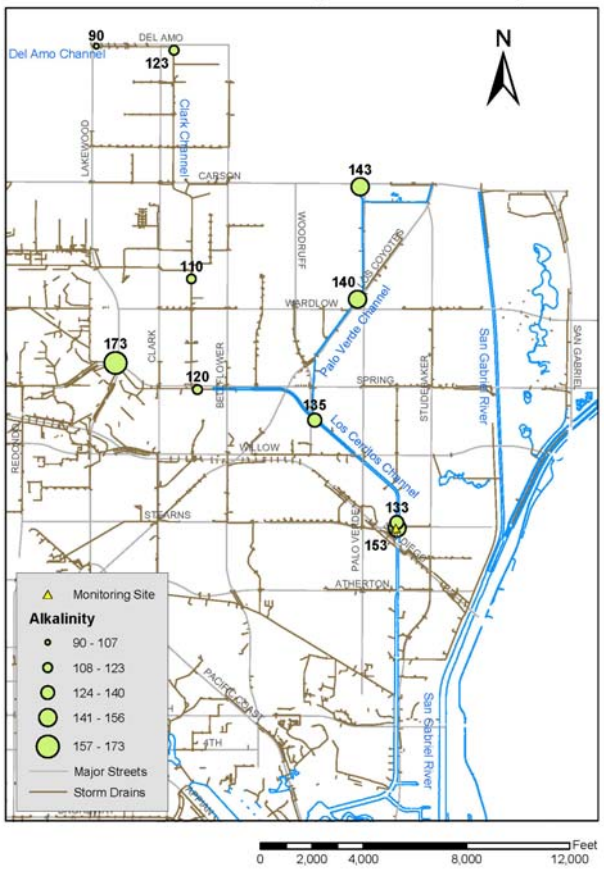

Figure 7. Total Alkalinity measured at each Los Cerritos Channel Watershed Site.

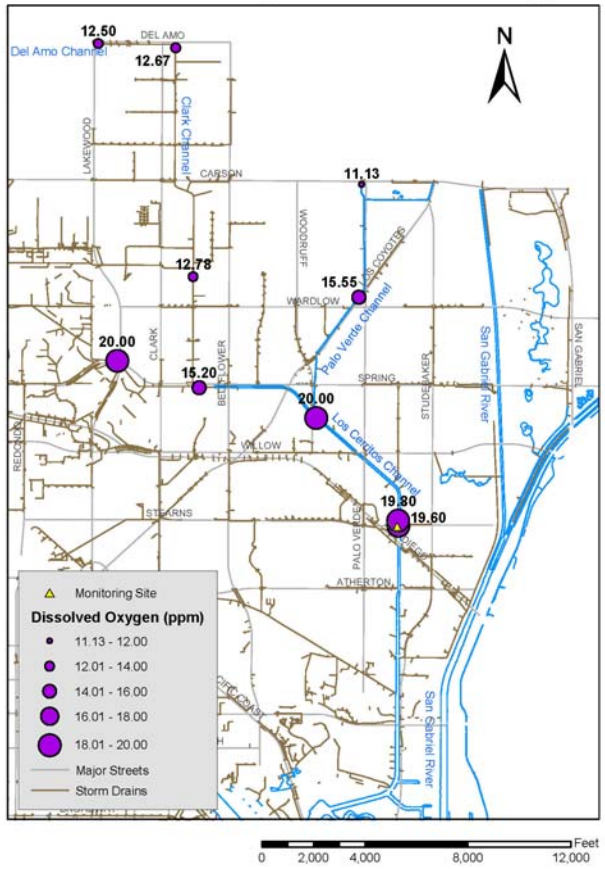

Figure 6. Dissolved Oxygen measured at each Los Cerritos Channel Watershed Site.

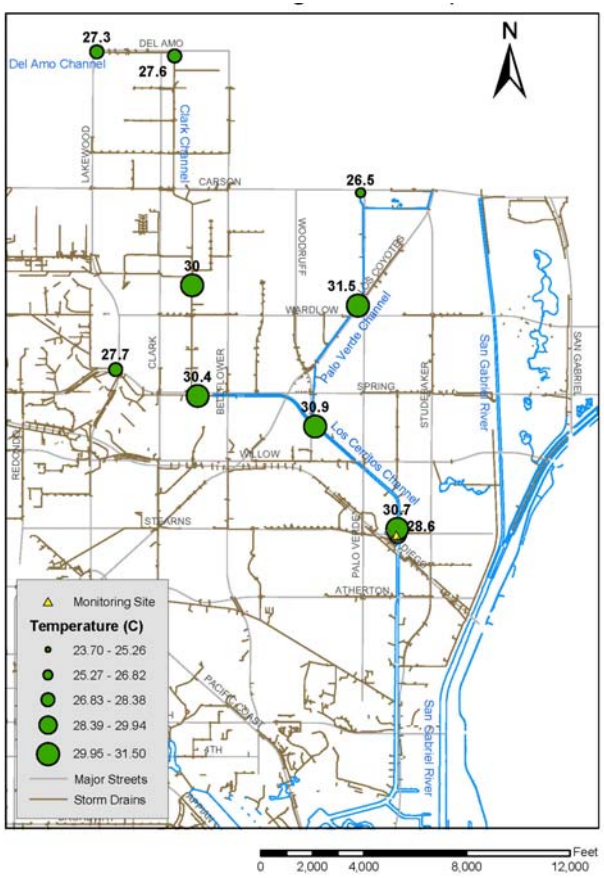

Figure 9. Water Temperature measured at each Los Cerritos Watershed Site.

Figure 8. Dry Weather Flow in the Del Amo Channel showing Typical Dry Season Algal Growth found in Open Channels with Consistent Low Flows.

Table 1. Sampling Locations in the Los Cerritos Channel Watershed

Site Name	Site Description	Latitude[1]	Longitude
CC1-A	Los Cerritos Channel Below Stearns St. bridge	33.79544	118.10352
CC1-B	Los Cerritos Channel at first outfall upstream of Stearns	33.79601	118.10356
CC2-A	Los Cerritos Channel below confluence with Palo Verde Channel	33.80695	118.11408
PV-MOUTH	Palo Verde Channel above confluence with Los Cerritos Channel	33.81070	118.11408
PV-A	Palo Verde Channel west of Palo Verde Ave. and Los Coyotes Diagonal	33.81987	118.10862
PV-B	Palo Verde Channel south of Carson St.	33.83192	118.10832
CC3-A	Los Cerritos Channel below confluence w/ Clark Channel	33.81020	118.12907
CLARK-A	Clark Channel below Monlaco Rd.	33.82201	118.12982
CLARK-OUTFALL	39-inch outfall (106+25) into Clark Channel under the Conant St. bridge	33.82509	118.12982
CLARK-B	Clark Channel south of Del Amo Blvd. Below the confluence of the Clark and Del Amo Channels	33.84647	118.13210
DA-A	Del Amo Channel east of Lakewood Ave.	33.84690	118.14201
CC4-A	Los Cerritos Channel west of Lakewood Ave., north of Spring St.	33.81301	118.13953

1. All positions based upon NAD 1983 datum

Table 2. Summary of the Results of the Upstream Investigation in the Los Cerritos Channel Watershed.

Site Name	Arrival Time	Temp °C	pH	DO mg/L	Salinity (ppt)	Flow (cfs)	Alkalinity (mg/L)			
							Bicarbonate	Carbonate	Hydroxide	Total Alkalinity
CC1-A	8:45	23.8	8.93	15.25	0.5	2.06				
CC1-A	11:46	28.6	9.50	19.60	0.4	2.06	95.0	45.0	< 5.0	153
CC1-B	12:16	30.7	9.83	19.80	0.4	2.06	52.0	54.0	< 5.0	133
CC2-A	12:46	30.9	9.45	>20	0.4	4.29	49.0	57.0	< 5.0	135
PV-MOUTH	12:50					1.63				
PV-A	13:21	31.5	10.75	15.55	0.5	1.69	< 5.0	60.0	14.0	140
PV-B	14:00	26.5	10.30	11.13	0.4	1.40	< 5.0	84.0	< 5.0	143
CC3-A	15:35	30.4	10.55	15.20	0.4	1.65	< 5.0	69.0	< 5.0	120
CLARK-A	15:54	30.0	10.63	12.78	0.8	1.37	< 5.0	57.0	5.1	110
CLARK-OUTFALL	16:21	23.7	8.17							
CLARK-B	16:40	27.6	9.66	12.67	0.4	0.29	34.0	51.0	< 5.0	123
DA-A	17:00	27.3	10.60	12.50	0.4	0.25	< 5.0	51.0	< 5.0	90
CC4-A	17:45	27.7	10.90	>20	0.4	0.00	< 5.0	87.0	9.0	173

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Attachment 2 **Kinnetic Laboratories, Inc. 2009. City of Long Beach Annual Storm Water Monitoring Report (2008/2009). Appendix B. Los Cerritos Channel Dry Weather Copper and Bacteria Source Investigation.**

Reference: Kinnetic Laboratories, Inc. 2009. City of Long Beach Stromwater Monitoring Report 2008/2009. NPDES Permit No. CAS004003. Appendix B. Los Cerritos Channel Dry Weather Copper and Bacteria Source Investigation.

Los Cerritos Channel Dry Weather Copper and Bacteria Source Investigation

Prepared for:

City of Long Beach
Stormwater Management Program

Prepared by:

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July 2009

DRAFT

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INTRODUCTION

The Los Cerritos Channel was included on the 2006 California 303(d) list as an impaired waterbody for metals (copper, zinc, and lead), ammonia, trash, chlordane (sediment), bis(2ethylhexyl)phthalate/DEHP and coliform bacteria (California State Water Resources Control Boardand 2006.) Although the 303(d) list does not differentiate between the freshwater and estuarine portions of the Los Cerritos Channel, the recent draft metals TMDL (EPA, Region 9, 2008) recognized both differences between the freshwater portion of the Los Cerritos Channel and seasonal differences. Among the listed metals, only copper was considered a concern during periods of dry weather. Although not addressed in the current TMDL coliform bacteria are also often elevated during both wet and dry periods.

This investigation was designed as a special study to investigate sources of copper and fecal indicator bacteria that contribute to the elevated copper and bacteria concentrations and loads in the Los Cerritos Channel during dry weather conditions. The investigation was conducted to better address several of the long term objectives of the City's stormwater monitoring program listed below.

- Estimate annual mass emissions of pollutants discharged to surface waters through the MS4;
- Evaluate water column and sediment toxicity in receiving waters;
- Evaluate impact of stormwater/urban runoff on marine life in receiving waters;
- Determine and prioritize pollutants of concern in stormwater;
- Identify pollutant sources on the basis of flow sampling, facility inspections, and ICID investigations; and
- Evaluate BMP effectiveness.

The Draft Los Cerritos Channel Total Maximum Daily Loads for Metals (TMDL) document dated November, 2008 proposed dry weather numeric targets for copper in the Los Cerritos Channel based upon the long term average hardness (176 mg/L) of dry weather discharges as measured at the mass emission monitoring station for the Los Cerritos Channel (Table 1). The default CTR conversion factor of 0.96 was used to calculate a target for copper measured as total recoverable copper.

Table 1. Dry Weather Numeric Targets in Terms of Dissolved and Total Recoverable Fraction as Proposed in EPA's Draft Metals TMDL.

Metal	Target* (µg/L) Dissolved	Conversion Factor	Target (µg/L) Total Recoverable
Copper	14.3	0.96	14.9

The copper dry-weather loading capacity (TMDL) for Los Cerritos Channel was then calculated as 14.9 µg/L X 2.98 cfs X 0.00539 (conversion factor) = **0.239 lbs/day**, which is **108.4 grams/day**, expressed as total recoverable metals. A small portion of this (0.14 grams/day) was allocated to direct atmospheric deposition leaving an allocation of **108.26 grams/day** of total recoverable copper for stormwater permittees.

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The historical flow-weighted mean concentrations of copper in dry weather discharges from the Los Cerritos Channel were 12.66 µg/L (dissolved) and 18.06 (total) at the time the Draft TMDL was developed. These were used to estimate historical dry weather loads of 0.203 lbs/day (dissolved) and 0.290 lbs/day (total). Based upon these estimates of average loads and the proposed TMDL load limit, the historical loads will need to be reduced by more than 21% for the average loading to be able to meet the TMDL limits.

METHODS

FIELD SAMPLING AND CHEMICAL ANALYSIS

Five major channels comprise the Los Cerritos Channel watershed within the City limits (Figure 1). The main stem of the Los Cerritos Channel runs N-S in the vicinity of the Stearns St. mass emission monitoring site. Going upstream, the open channel turns to the west until becoming fully enclosed at the edge of the Long Beach Daugherty Airport. The Palo Verde Channel runs N-S roughly parallel to the San Gabriel River and is the first channel to join the Los Cerritos Channel as one moves upstream from the monitoring site. The Clark Channel also runs N-S and is the next upstream channel that feeds into the main stem of the Los Cerritos Channel. The open portion of the Wardlow Channel is relatively short. A portion of the Wardlow Channel runs E-W along the edge of the Skylinks Municipal Golf Course starting from the northern edge of the Long Beach Airport property and discharging into the Clark Channel after briefly becoming enclosed under a residential area. The Del Amo Channel also runs E-W along the northern edge of the boundary between the City of Long Beach and Lakewood before entering the Clark Channel.

Storm drain inputs and in-channel water were sampled in the open channel portion of the Los Cerritos Channel watershed during each of three synoptic surveys. These were conducted on March 3, April 9 and May 11, 2009. The last rain prior to the March 3 survey occurred 14 days earlier and was measured at 0.48 inches. The April 9 survey was preceded by 18 days of dry weather and the prior rainfall was only 0.06 inches. No rain fell between the April 9 and May 11, 2009 surveys.

Surveys were conducted at intervals of approximately one month. By spacing the surveys roughly one month apart, data from each previous survey could be reviewed and sampling strategies adjusted if necessary. Each of the surveys started in the Los Cerritos Channel downstream of the Stearns Avenue Bridge. The survey proceeded upstream in order to avoid upstream disturbances that might impact sampling. Sampling of the channels was originally planned to be conducted primarily near locations where major segments of the drainage system merged. After the first survey, sampling was increased along each channel to improve spatial resolution. Whenever two major segments of the channel merged, samples were taken in the main channel below the tributary, just upstream of the tributary and within the tributary. A total of 70 in-channel sites and 48 outfalls were sampled during the three surveys. All outfalls with flow were sampled during each survey.

Typical Dry Weather Flow Showing Algal Growth

Differential GPS measurements were used to identify the locations of all sampling sites with the exception of a few sites located beneath bridges where accurate GPS readings

could not be attained. At each site flow was measured using the area/velocity method or by the timed volumetric method, depending upon the type of flow and specific conditions at each site. The irregular channel bottom combined with heavy algal growth contributed to low accuracy of flow measurement. Therefore flow measurements in the channel should be considered best estimates.

General water parameters were measured using a Hydrolab Quanta Water Quality Monitoring System. The sonde was equipped with sensors for temperature, specific conductivity, pH, dissolved oxygen, and turbidity. Due to the low flows and shallow depths, the instrument was rarely able to be used for *in situ* measurements. A secondary container was required to collect sufficient volume to obtain measurements. This undoubtedly adds uncertainty to the dissolved oxygen measurements but was considered to still provide valuable information in assessing whether loads from storm drains had caused substantial depressions in oxygen content.

Grab samples were collected for total and dissolved copper, total hardness, total and fecal coliform and enterococcus. Samples were immediately placed on ice and delivered to state certified laboratories within required holding time. Copper and total hardness were analyzed by Soil Control Lab and fecal indicator bacteria were analyzed by CRG Marine Laboratories. Analysis of fecal indicator bacteria was performed using Idexx Quantitray methods with added dilutions to assure that quantitative measurements would be reported in all cases.

Table 2. Analytical Methods and Reporting Limits

Constituent	Method Detection Limit	Reporting Limit	Units	Method
Total Hardness	1.0	10	mg/L	EPA 130.2
Total/Dissolved Copper	0.5	0.098	µg/L	EPA 200.8
Total Coliform	10	24×10^9	MPN/100 ml	Idexx QuantiTray
E. coli	10	24×10^9	MPN/100 ml	Idexx QuantiTray
Enterococcus	10	24×10^9	MPN/100 ml	Idexx QuantiTray

DATA ANALYSIS

Results of the flow and water quality sampling were analyzed for spatial and temporal patterns. All data were plotted using ArcGIS to assist in assessment of spatial and temporal patterns. Loads were calculated for each location to assist in assessing the importance of each outfall or tributary and for comparison with the proposed dry weather TMDL at the Los Cerritos Channel mass emission monitoring site at Stearns St. Means and ranges of flow and concentration for storm drains and in-channel sites were analyzed by survey date and by combining the results of all three sampling dates. Regressions were performed on measured concentrations of total and dissolved copper for each survey in order to evaluate suitability of using the default CTR translator for estimation of daily load limits for total recoverable copper.

RESULTS AND DISCUSSION

The following sections summarize the results of the three dry weather surveys in the open channel portion of the Los Cerritos Channel watershed in Long Beach. Field and laboratory results are summarized for each survey in Table 3 through Table 8. Descriptive statistics of data from the main channels and outfalls are provided in Table 9, Table 10, and Table 11. Instanteous Loads were calculated for each oufall and sampling location within the main channel. These results are summarized in Table 13 through Table 18.

The results are graphically summarized in a series GIS maps in Appendix A. The results of flow measurements; concentrations of total and dissolved copper, concentrations of three fecal indicator bacteria are mapped separately for data from the main channels and outfalls that were discharging to the channels during each survey. These spatial representations of the flow and concentration data are followed by the GIS maps of loading data for copper and fecal indicator bacteria.

FLOW

Low flows were experienced during all three surveys (Table 3, Table 5, and Table 7; Appendix A Figures A-1 through A-3). Flows measured at the Los Cerritos Channel Stearns Street monitoring station were 1.32 cfs during the first survey, 0.67 cfs during the second and 0.37 cfs during the final survey. Flows exceeding those measured at Stearns Street were encountered at upstream locations during both the second and third surveys. During the second survey, the highest flow (1.48 cfs) was measured in the Del Amo Channel along the northern edge of the City limits. Similarly, during the third survey, highest flows occurred in the upper portion of the Clark Channel (0.86 cfs) and in the Del Amo Channel (0.67 cfs).

Each survey took over eight hours to complete such that flow differences could be related to temporal differences. The ability to accurately resolve flows with water depths typically less than an inch, irregular bottoms and heavy algal growth also are major factors impacting the flow measurements. Periods of heavy wind in the channels would occasionally be observed to cause brief flow reversals. The flow measurements within the channels should therefore be considered as reasonable approximations.

Measurements of flow from outfalls were very accurate since most could be determined by the time necessary to fill a 1-liter container. Total flows from outfall comprised just 4% of the flow measured at Stearns Street during the first survey but, during subsequent surveys, flow contributions from outfalls to the open channels became more important. Flow rates from outfalls increased from a total of 0.05 cfs during the first survey to 0.11 cfs during the second. With the lower flow rates in the main channel, contributions from monitored outfalls increased to 16% of flow at the Stearns St. site. By the third survey total flow from outfalls increased to 0.20 cfs accounting for roughly half of the flow measured in the channel. One outfall (WC-07) in the Wardlow Channel was the source of 60% of the total flow from outfalls in the first two surveys and 85% of the flow in the third survey.

WATER QUALITY

The relationship between dissolved and total copper was examined during each survey (Figure 2) by regression. The low concentrations of suspended sediment allowed for direct comparisons without consideration of suspended solids (Figure 2). Within each survey, the proportions of copper in the dissolved form were relatively constant showed variation among surveys. The percentage of copper in the dissolved form ranged from 62% in the second survey to 88% in the first survey. Stein and

Tiefenthaler's (2005) dry weather studies in Ballona Creek indicated that the proportion of dissolved copper in dry weather runoff from both outfalls and open channels was similar and roughly was in the dissolved form. In all cases, the dissolved to total recoverable ratios are notably lower than the default CTR translator value of 0.96.

Dry weather discharges sampled in from the main channels and the outfalls had very different water quality characteristics (Figure 3 and Figure 4; Table 9 through Table 11). .

The differences in water quality characteristics were anticipated and are attributable to exposure to sunlight in the open channels. The exposure to sunlight warms the water and induces the heavy algal growth that is typical of the open channels. The photosynthetic activity removes carbon dioxide from the water and releases oxygen. The uptake of carbon dioxide causes the increase in pH. The extent of the shift is largely dependent on the alkalinity or buffering capacity. The exposure of the water to ultraviolet light also reduces the concentrations of bacteria. At night, respiration of the algae typically reverses the process causing oxygen levels and pH to drop.

Exceedances of the CTR chronic criterion for dissolved copper occurred commonly during all three dry weather surveys (Table 12). Overall 23 of the 70 samples taken in the main channels exceeded the chronic CTR criterion. Six of these exceeded the acute CTR criterion. A similar fraction of the 48 outfall samples also exceeded the CTR chronic criterion. Six of the outfall samples also exceeded the acute criterion. No one particular segment of the watershed had obviously higher levels of exceedences but the Wardlow Channel was unique in not having any samples with exceedences. Part of the reason for this condition was likely the result of relatively high volumes of very clean water that are pumped into the channel from a groundwater treatment facility near Lakewood Blvd. As noted earlier, water from this site can, at times, represent a large proportion of the measured flows from outfalls.

A few cases of exceptionally high concentrations of total recoverable and dissolved copper were encountered during the study but no systematic pattern was evident through all surveys. During the first survey, copper was measured at 1500 ug/L (total) and 750 ug/L (dissolved) in water coming from the enclosed portion of the Clark Channel at the northern boundary of the City of Long Beach. The water also had other unique water quality characteristics. The water was high in conductivity (4.92 mS/cm) and hardness (1800 mg/L). The water also had the lowest pH (7.7) of any channel site. The water temperature was among the lowest measured in the open channels but comparable to other channel sites where water was exiting a closed conveyance. Flow measurements could not be taken at this site due to darkness combined with shallow, braided flow through dense algae. Based upon the general water quality characteristics, this discharge was suspected to have been from a swimming pool but this hypothesis could not be verified.

Total recoverable copper concentrations measured at the Stearns Street monitoring site were below the TMDL concentration-based limit of 14.9 ug/L during the first and third surveys but exceeded the concentration limit during the second survey. Some unusually high concentrations of total recoverable copper (as high as 540 ug/L at CC-12) were measured at several outfalls into in the Los Cerritos Channel during the third survey (Table 8). Upon analysis of the data from this survey, four outfall sites in the Los Cerritos Channel had substantially different ratios of dissolved to total recoverable copper. A review of the field notes indicated that flap gates at these sites would have prevented any measurement of flow or collection of water because of dispersed leakage around the flap gate. The field crew propped open the flap gates at these sites and allowed what they perceived to be adequate time for flows to restabilize before sampling. It is clear that the brief increase in flow caused by this procedure caused resuspension of fine particulate copper at these sites. The time required for flows to stabilize was not nearly sufficient to allow equilibrium conditions to be achieved in terms of water quality. The total recoverable copper values for each site sampled in this manner were identified and excluded from the

previous analysis of the ratios of dissolved to total recoverable copper. The dissolved copper concentrations at these sites are believed to be relatively unimpacted based upon their similarity with concentrations measured at other outfall locations. The ease with which the reservoir of particulate copper was disturbed in the pipes suggests that similar increases would occur with episodic increases in flow or first flush storm events. Since the mass of the reservoir of particulate copper in any one of these pipes is unknown, it is difficult to assess the significance of brief flow increases/disturbances on total recoverable copper loads.

As expected, concentrations of fecal indicator bacteria were highly variable. Concentrations of all fecal indicator bacteria were lowest during the first survey (Table 3 and Table 4). Total coliform and *E. coli* measured at the Stearns Street monitoring location during the first survey were below Rec-1 water quality standards. During the second survey (Table 5 and Table 6), bacterial levels were broadly elevated throughout most of the watershed but were exceptionally high at the Stearns Street sampling location and several open channel sites located just upstream. Several sites in the upper reaches of the Wardlow and Del Amo channels also had notably high levels of bacteria. Both *E. coli* and enterococcus concentrations exceeded 2000 MPN/100 ml at these sites and total coliform was in excess of 12,000,000 MPN/100 ml at the Del Amo channel site.

LOADS

Calculations of loads for total and dissolved copper as well as fecal indicator bacteria are presented in Table 13 through Table 18. Loads from outfalls are summed for comparisons to those measured at the Stearns Street mass emission monitoring station. This station was the first site sampled in the Los Cerritos Channel during each survey and the first channel station listed on all tables. Load data are also graphically displayed on GIS maps in Appendix A (Figures A-34 to A-63).

Total copper loads measured at the Stearns Street monitoring site were 38.6 g/day during the first survey, 31.3 g/day during the second survey and just 6.8 g/day during the third survey. Slightly higher loading rates were measured at upstream locations in the watershed during the second survey. Loading rates in the Del Amo Channel reached 43.3 g/day. Loading rates for total copper in the lower Clark Channel and the intersection of the Los Cerritos Channel and Palo Verde Channel were 36.7 g/day and 42.9 g/day. The exceptionally low loading rates measured during the third survey were also low at most locations throughout the watershed except for one site in the Clark Channel just below the junction with the Del Amo Channel. The loading rate at this site was measured at 22.4 g/day.

In all cases, loading rates for total copper were far below the proposed TMDL Waste Load Allocation of 108.26 g/day. Thus the highest loading rate measured anywhere in the watershed during all three surveys was still just 40% of the proposed dry weather WLA for the stormwater permittees.

Although the total copper loads measured in the main channels decreased substantially from the first to the third surveys, the total loads from outfalls generally increased. During the first survey, only 0.181 g/day of copper was attributable to outfalls. Outfall loading rates increased to 1.079 g/day during the second survey. Increases in loading rates during the third survey (7.5 g/day) were impacted by elevated concentrations of total recoverable copper measured at sites where flap gates were opened. Eliminating those sites from the calculations still results in roughly 3 g/day which represents a substantial proportion of the 6.8 g/day of total copper measured at the Stearns Street monitoring site.

Loads of fecal indicator bacteria coming from monitored outfalls during the first survey accounted for roughly 20% of the total load at the downstream Stearns Street monitoring site. During the second survey, loads from outfalls represented 10 to 20 percent of the *E. coli* and total coliform loads and 5

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percent of the enterococcus loads. The relative importance of inputs from local outfalls increased during the third survey. In the final survey loads from outfalls represented roughly half of the *E. coli* and total coliform loads at the channel compliance site (Stearns Street) but loads of total coliform from outfalls were three times the load in the channel.

SUMMARY AND CONCLUSIONS

Three dry weather surveys were conducted in open channel portion of the Los Cerritos Channel Watershed located within the City of Long Beach.

- Flows measured at the Los Cerritos Channel Stearns Street monitoring station were 1.32 cfs during the first survey, 0.67 cfs during the second and 0.37 cfs during the final survey. These reflect a general decrease in dry weather runoff at this location.
- The percentage of copper in the dissolved form ranged from 62% in the second survey to 88% in the first survey. This compares to the roughly 80% dissolved copper in Ballona Creek dry weather investigations but is far less than the CTR default value of 96% used for developing the draft TMDL limits in terms of total recoverable copper.
- Dry weather discharges sampled in from the main channels and the outfalls had very different water quality characteristics. Water in the main channels was typically warmer by 2-3°C, had pH levels in excess of 1 full unit higher, had twice the oxygen content and twice the turbidity. There was no consistent pattern of differences between dry weather flows sampled in the main channel and water from outfalls. Concentrations of fecal indicator bacteria were consistently higher in water sampled from the outfalls but this was most evident in the case of total coliform where the geometric mean of water from outfalls was an order of magnitude greater than in water from the main channels.
- Copper was measured at 1500 ug/L (total) and 750 ug/L (dissolved) in water coming from the enclosed portion of the Clark Channel at the northern boundary of the City of Long Beach. The water was high in conductivity (4.92 mS/cm) and hardness (1800 mg/L). The water also had the lowest pH (7.7) of any channel site. The water temperature was among the lowest measured in the open channels but comparable to other channel sites where water was exiting a closed conveyance.
- Exceedances of the CTR chronic criterion for dissolved copper occurred commonly during all three dry weather surveys (Table 12). Overall 23 of the 70 samples taken in the main channels exceeded the chronic CTR criterion. Six of these exceeded the acute CTR criterion. A similar fraction of the 48 outfall samples also exceeded the CTR chronic criterion. Six of the outfall samples also exceeded the acute criterion.
- A few cases of exceptionally high concentrations of total recoverable and dissolved copper were encountered during the study but no systematic pattern was evident through all surveys. During the first survey, copper was measured at 1500 ug/L (total) and 750 ug/L (dissolved) in water coming from the enclosed portion of the Clark Channel at the northern boundary of the City of Long Beach.
- Total copper loads measured at the Stearns Street monitoring site were 38.6 g/day during the first survey, 31.3 g/day during the second survey and just 6.8 g/day during the third survey**. In all cases, loading rates for total copper were far below the proposed TMDL Waste Load Allocation of 108.26 g/day**. Thus the highest loading rate measured anywhere in the watershed during all three surveys was still just 40% of the proposed dry weather WLA for the stormwater permittees.

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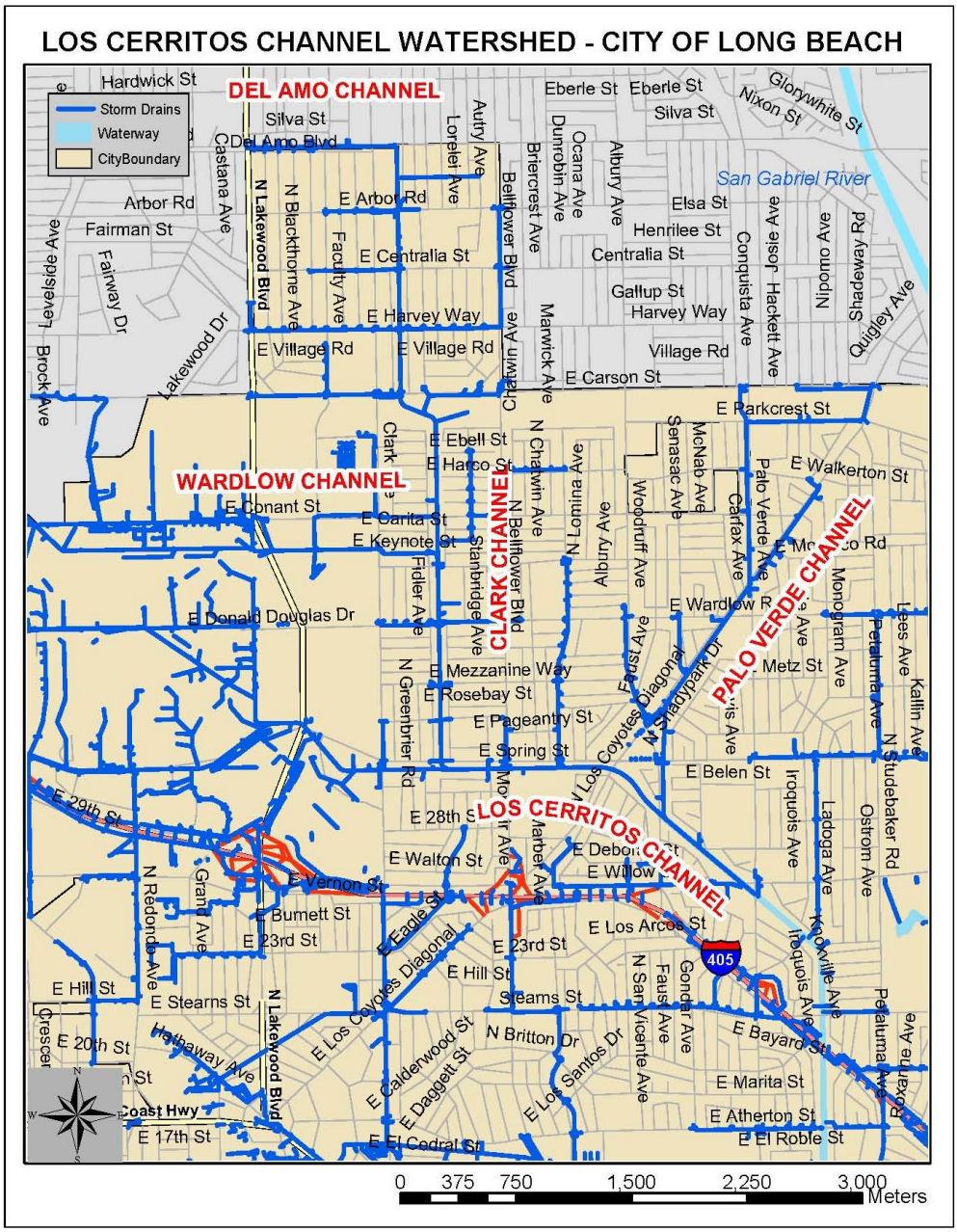

Figure 1. **City of Long Beach, Los Cerritos Channel Watershed.**

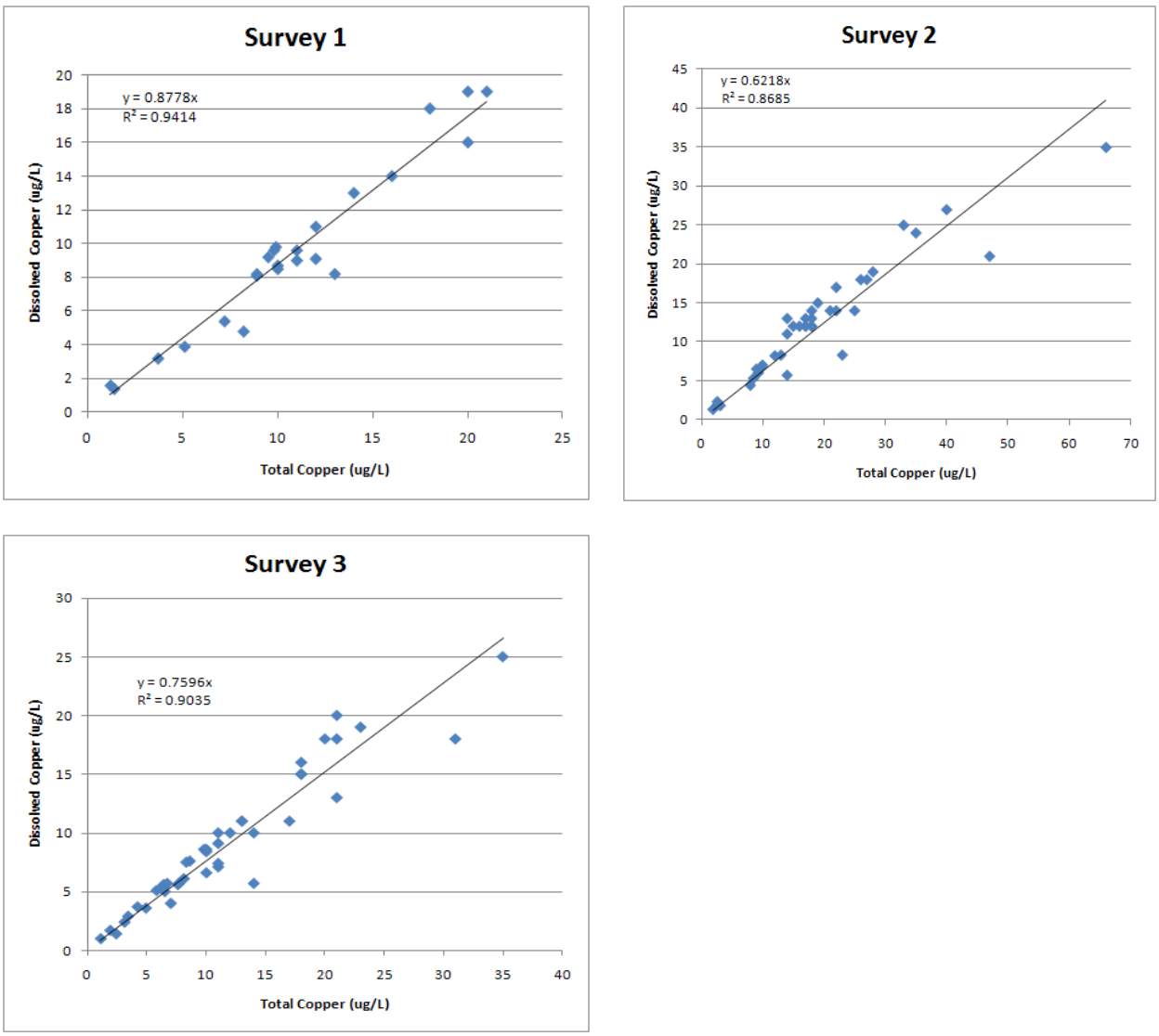

Figure 2. Regressions of All Total and Dissolved Copper Measurements taken during the Three Surveys.

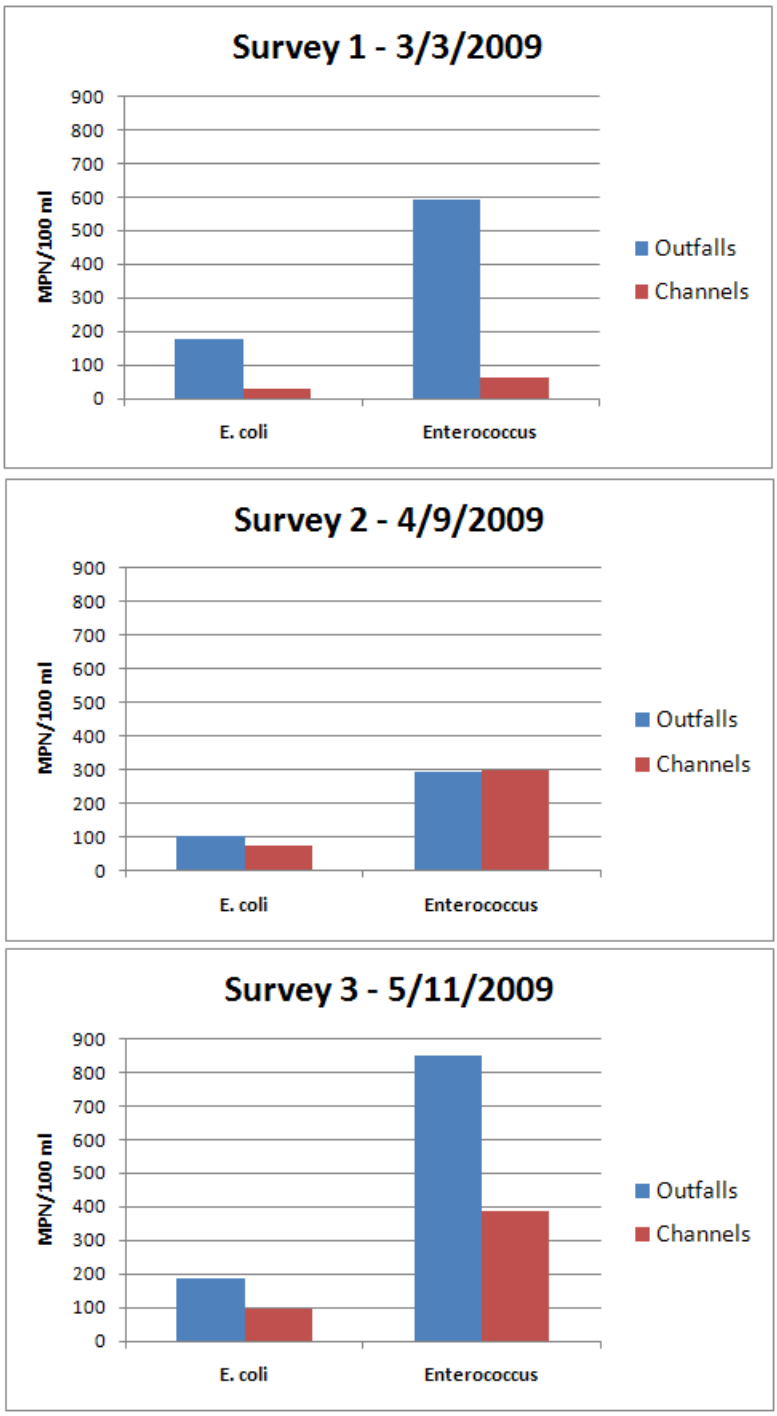

Figure 3. Comparison of Geometric Mean Concentrations of *E. coli* and Enterococcus in Water from Outfalls and the Main Channels during Each Survey.

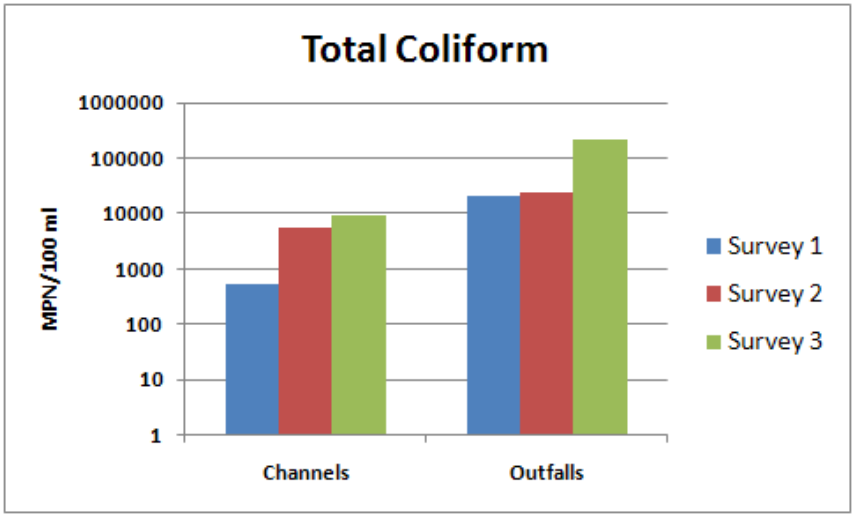

Figure 4. Comparison of Geometric Mean Concentrations of Total Coliform Measured in the Channels and Outfalls during Each Survey.

Table 3. Results of Measurements Taken in the Main Channels during Survey 1 - 3/03/2009.

Site Number	Latitude	Longitude	Depth (ft.)	Flow (cfs)	Temp. (°C)	pH	Cond. (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Enterococcus (MPN/100ml)	Total Coli (MPN/100ml)
LOS CERRITOS															
CC-01-A	33.79529	-118.10359	0.14	1.31503	20.0	9.3	0.730	14.8	8.5	120	12	11	134	109	4106
CC-02-A	33.80701	-118.11418	0.1	1.07143	23.0	9.2	0.964	14.9	5.4	180	10	9.0	122	63	2613
CC-02-B	33.08757	-118.11485	0.1	0.80662	24.2	9.3	0.974	15.5	15.0	180	11	9.0	120	20	4611
CC-02-D	33.08757	-118.11485	0.1	0.80662	24.2	9.3	0.974	15.5	15.0	180	12	9.0	73	5	3282
CC-03-A	33.81073	-118.12917	0.07	0.34955	26.0	10.4	1.065	10.2	60.0	140	9.0	8.0	5	20	52
CC-03-B	33.81017	-118.12967	0.06	0.11324	27.1	10.8	0.648	15.9	20.5	94	18	18	5	5	31
CC-04	33.81302	-118.13950		DND	14.5	10.1	0.523	9.3	273	120	25	12	759	754	17850
PALO VERDE															
PVMOUTH-01	33.80762	-118.11437	0.04	0.05063	28.2	10.5	0.531	16.1	3.3	110	10	10	5	85	5
PVMOUTH-01	33.80762	-118.11437	0.04	0.05063	28.2	10.5	0.531	16.1	3.3	110	10	9.0	5	108	5
PV-02	33.83182	-118.10837	0.02	0.02350	18.6	10.7	1.034	9.8	8.0	110	10	9.0	5	108	776
CLARK															
CLK-01-A	33.81031	-118.12958	0.015	0.09449	26.1	10.5	1.115	12.5	20.0	140	10	9.0	5	31	131
CLK-02-A	33.82259	-118.12985	0.06	0.06443	17.9	9.5	1.450	13.2	2.0	250	9.0	8.0	5	31	1333
CLK-02-B	33.82279	-118.12980	0.055	0.15696	17.1	9.4	1.452	12.6	3.9	250	10	10	5	62	1236
CLK-04-B	33.84691	-118.13225		DND	15.0	7.7	4.92	7.2	87.1	1800	1500	750	404	359	2382
WARDLOW															
WC-01-B	33.82277	-118.12989	0.65	DND	14.5	9.7	0.569	9.6	21.1	64	7.0	5.0	908	97	4106
DEL AMO															
DA-01-A	33.84682	-118.13137		DND	17.6	10.1	0.542	6.6	38.1	150	11	10	10	96	1850

Table 4. Results of Measurements Taken in the Flowing Outfalls during Survey 1 - 3/03/2009

Site Number	Latitude	Longitude	Depth (ft.)	Flow (cfs)	Temp. (°C)	pH	Cond. (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Enterococcus (MPN/100ml)	Total Coli (MPN/100ml)
LOS CERRITOS															
CCO-02-A	3/3/2009	33.79329		0.00109	16.4	8.1	1.406	7.75	1.2	200	8.0	5.0	5	839	46110
CCO-09-A	3/3/2009	33.79944		0.00020	17.3	8.2	0.742	7.12	11.0	130	14	13	111990	127400	204600
CCO-14-A	3/3/2009	33.80306		0.00060	19.2	8.2	0.711	9.06	0.0	130	20	16	5	110	5200
CCO-24-A	3/3/2009	33.81033		0.00014	17.4	8.1	0.569	6.92	41.2	110	13	8.0	173	197	4611000
CLARK															
CKO-09-A	33.81862	-118.12987		0.00051	17.9	8.2	0.641	7.52	4.8	110	5.0	4.0	4106	1317	54750
CKO-17-A	33.82349	-118.12981		0.00017	15.2	7.9	0.945	8.42	10.1	140	20	19	54750	16580	512000
CKO-20-A	33.82499	-118.12981		0.01201	17.4	8.1	2.00	8.25	11.0	570	1.2	1.6	5	63	3873
CKO-22-A	33.83118	-118.13060		0.00145	14.8	8.5	0.703	9.58	2.7	160	16	14	86	1616	43520
PALO VERDE															
PV-08	33.81327	-118.11408		0.00127	19.2	8.1	0.970	7.91	1.7	240	4.0	3.0	135	209	3076
WARDLOW															
WC-26	33.82333	-118.14131		0.03310	17.6	8.5	0.560	8.99	0.0	94	1.4	1.4	5	5	5

Table 5. Results of Measurements Taken in the Main Channel during Survey 2 - 4/09/2009.

Site Number	Latitude	Longitude	Depth (ft.)	Flow (cfs)	Temp. (°C)	pH	Cond. (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Enterococcus (MPN/100ml)	Total Coli (MPN/100ml)
LOS CERRITOS															
CC-A	33.79503	-118.10355	0.14	0.67299	13.9	7.85	1.122	6.71	7.1	110	19	15	7409	26460	478973
CC-B	33.80697	-118.11405	0.1	1.03079	14.79	8.67	1.215	7.8	5.7	130	17	12	25572	86955	448898
CC-C	33.80803	-118.11543	0.1	0.38622	15.02	8.68	1.266	9.44	10.1	150	15	12	595	1635	212323
CC-D	33.81025	-118.12920	0.1	0.61074	18.38	9.3	1.09	16.29	26.0	180	14	11	1644	6037	129460
CC-E	33.81020	-118.12967	0.07	0.07232	20.38	9.58	0.779	18.41	35.1	140	21	14	172	172	57593
CC-F	33.81038	-118.13350	0.06	0.19097	21.7	9.36	0.81	19.17	30.1	160	18	12	1126	1593	161098
CC-H	33.81038	-118.13350		0.19097	21.7	9.36	0.81	19.17	30.1	160	18	12	561	939	152081
CC-G	33.81305	-118.13958		0.06002	26.25	10.75	0.701	21.42	19.5	120	17	13	7	7	76
PALO VERDE															
PV-A	33.80768	-118.11436	0.04	0.00576	17.24	9.31	0.48	16.01	8.6	130	18	14	860	1170	27550
PV-B	33.83168	-118.10841	0.04	0.02571	24.1	9.57	0.647	12.6	11.2	190	33	25	233	934	112600
PV-D	33.83168	-118.10841	0.02	0.02571	24.1	9.57	0.647	12.6	11.2	190	35	24	253	1081	48700
PV-C	33.82005	-118.10852		0.00666	22.57	9.61	0.655	14.28	35.1	140	28	19	20	108	29090
CLARK															
CK-A	33.81089	-118.12985	0.015	1.07180	28.18	10.14	0.994	16.78	9.4	130	14	13	131	524	3120
CK-B	33.81900	-118.12983	0.06	0.21309	26.42	10.59	1.043	17.86	235.0	130	17	12	26	386	52
CK-C	33.82259	-118.12986	0.055	0.39932	21.75	10.02	0.859	15.44	9.8	150	16	12	49	830	98
CK-D	33.82296	-118.12981		0.11219	25.74	10.76	1.152	16.42	5.7	150	18	13	14	173	14
CK-E	33.83268	-118.13227		0.08571	19.35	10.95	1.048	13.17	13.4	140	22	14	63	5777	277
CK-F	33.84665	-118.13214		0.56018	19.54	10.04	0.948	15.24	51.4	180	22	17	562	3303	4215703
CK-G	33.84695	-118.13225		0.01313	15.66	8.49	1.171	8.5	396	250	26	18	72	393	63811
CK-H	33.84695	-118.13225		0.01313	15.66	8.49	1.171	8.5	396	260	27	18	97	270	45412
WARDLOW															
WC-A	33.82279	-118.12987	0.65	DND	15.24	9.31	0.826	12.45	12.8	140	13	8.3	0	0	0
WC-B	33.82275	-118.12984		0.07576	15.03	9.77	0.793	9.09	10.8	120	9	6.0	222	949	8547
WC-C	33.82330	-118.13420		0.09155	25.3	10.98	0.883	15.35	32.9	100	10	7.0	11	92	11
WC-D	33.82332	-118.13682		0.03371	24.28	10.97	0.866	15.79	109	110	10	6.6	4	8	4
WC-E	33.82331	-118.14165		0.20652	17.42	8.4	0.6	9.04	40	150	8	4.4	2092	2062	64372
DEL AMO															
DA-A	33.84685	-118.13236		0.41963	19.58	10.62	0.799	12.37	67.4	98	25	14	51	883	796681
DA-B	33.84687	-118.14217		1.47578	18.66	10.28	0.516	8.8	9.7	76	12	8.2	2239	14009	12449388

Table 6. Results of Measurements Taken in the Flowing Outfalls during Survey 2 - 4/09/2009.

Site Number	Latitude	Longitude	Depth (ft.)	Flow (cfs)	Temp. (°C)	pH	Cond. (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Enterococcus (MPN/100ml)	Total Coli (MPN/100ml)
LOS CERRITOS															
CC-02	33.79333	-118.10361		DND	14.59	7.54	1.113	4.61	80.7	230	16	4.3	85	389	79800
CC-04	33.79568	-118.10326		0.00019	15.75	8.15	0.786	7.27	7.5	140	9.7	6.7	121	1616	2755000
CC-06	33.79597	-118.10371		0.00177	16.96	7.92	0.582	7.21	4.7	100	8.5	5.3	5	5	4106
CC-07	33.79791	-118.10330		0.00012	16.15	7.66	0.711	5.02	8.8	110	14	5.7	5794	9804	275500
CC-14	33.80306	-118.10894		0.00012	18.02	8.03	0.905	7.25	8.6	190	120	81	10	97	198630
CC-14.5	33.80468	-118.11061		0.00045	18.22	8.42	1.001	9.73	3.5	160	2.6	2.3	5	10	63
CC-19	33.81036	-118.12134		0.00353	16.27	7.91	0.919	6.08	8.4	180	23	8	11870	14136	435200
CC-24	33.81037	-118.12524		0.00106	18.08	8.15	0.71	7.5	2.3	130	9	7	8164	3255	173290
CLARK															
CK-06	33.81520	-118.12981		0.00006	19.29	8.02	8.4	7.03	32.0	1000	47	21	256	980	2143000
CK-17	33.82354	-118.12981		0.00039	16.49	7.8	0.981	6.49	7.1	190	66	35	1789	2909	32550
CK-20	33.82501	-118.12986		0.00706	19.07	8.12	1.96	6.73	0.8	670	1.9	1.3	5	450	2046
PALO VERDE															
PV-08	33.81334	-118.11408		0.00090	16.56	8.02	1.093	8.57	3.7	320	3.1	1.8	10	31	19350
PV-22	33.82111	-118.10794		0.00044	17.47	7.91	1.318	7.8	6	160	40	27	75	134	6488
WARDLOW															
WC-07	33.82331	-118.14136		0.09775	21.02	8.49	0.522	9.36	2.2	99	2.6	1.9	5	5	5

Table 7. Results of Measurements Taken in the Main Channel during Survey - 5/11/2009.

Site Number	Latitude	Longitude	Depth (ft.)	Flow (cfs)	Temp. (°C)	pH	Cond. (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Enterococcus (MPN/100ml)	Total Coli (MPN/100ml)
LOS CERRITOS															
CC-A	33.79530	-118.10352	0.14	0.371399	17.63	7.37	1.540	4.04	4.00	300	7.7	5.7	350	1607	54600
CC-B	33.80688	-118.11394	0.1	0.216654	17.56	7.57	1.58	4.60	6.90	310	6.4	5.4	474	171	28800
CC-C	33.80758	-118.11484	0.1	0.404367	17.52	7.9	1.55	5.48	5.60	300	5.8	5.1	63	63	34500
CC-D	33.81025	-118.12936	0.1	0.659095	18.34	8.59	1.313	10.09	24.90	290	6.4	5.6	171	228	68670
CC-E	33.81017	-118.12966	0.07	0.097693	18.78	8.85	0.866	11.63	18.80	200	6.2	5.3	4611	789	52900
CC-F	33.81036	-118.13358	0.06	0.181429	18.63	8.59	0.783	10.19	21.20	190	11	7.1	3873	1723	70600
CC-G	33.81306	-118.13958		0.164550	20.17	9.42	0.665	17.35	37.90	150	7.6	5.6	933	98	72700
CC-H	33.79530	-118.10352		0.371399	17.63	7.37	1.540	4.04	4.00	300	10	6.6	355	1515	75400
PALO VERDE															
PV-A	33.80309	-118.10883	0.04	0.063158	21.5	9.04	1.171	15.91	45.50	250	18	16	3448	1850	54750
PV-B	33.83165	-118.10835	0.04	0.052419	28.11	10.26	1.029	13.74	40.00	190	20	18	158	6131	1918
PV-C	33.82011	-118.10851		0.057874	28.87	10.28	1.243	12.90	17.80	180	21	20	5	134	71
PV-D	33.83165	-118.10835	0.02	0.052419	28.11	10.26	1.029	13.74	40.00	190	21	18	341	5475	4611
CLARK															
CK-A	33.81032	-118.12962	0.015	0.175781	18.22	8.66	1.357	10.37	6.00	310	6.5	5.0	480	368	22470
CK-B	33.81913	-118.12984	0.06	0.330999	22.9	9.13	1.473	14.39	9.90	320	8.6	7.6	573	299	81640
CK-C	33.82257	-118.12984	0.055	0.253102	23.43	9.13	0.817	11.15	4.90	170	4.2	3.7	121	272	27000
CK-D	33.82280	-118.12978		0.207334	31.36	10.23	1.38	14.15	8.10	230	9.8	8.6	5	5	31
CK-E	33.83251	-118.13232		0.160506	31.63	10.65	1.281	12.44	11.40	190	10	8.6	5	41	5
CK-F	33.84658	-118.13220		0.855652	32.22	10.02	0.86	13.55	8.50	140	12	10	10	243	20140
CK-H	33.84658	-118.13220		0.855652	32.22	10.02	0.86	13.55	8.50	140	11	10	10	435	9208
CK-G	33.84695	-118.13225		0.043824	19.38	8.08	1.66	5.89	6.20	440	14	10	4352	2014	228200
WARDLOW															
WC-A	33.84685	-118.13236	0.65	DND	18.63	8.57	0.778	7.38	14.70	170	7.0	4.0	10	288	12960
WC-B	33.82275	-118.12984		0.059761	18.45	8.86	0.716	7.56	3.40	160	3.4	2.9	226	364	24890
WC-C	33.82329	-118.13418		0.096330	27.65	10.62	0.791	12.08	18.40	93	10	8.4	5	1187	2909
WC-D	33.82335	-118.14137		0.155102	24.34	9.42	0.8	15.40	61.80	180	11	9.1	5	5	5
DEL AMO															
DA-A	33.84679	-118.13234		0.436813	32.4	10.11	0.955	12.25	11.30	140	13	11	5	771	18500
DA-C	33.84679	-118.13234		0.436813	32.4	10.11	0.955	12.25	11.30	150	13	11	10	1119	10170
DA-B	33.84686	-118.14210		0.673923	28.52	9.94	0.706	13.19	3.90	120	8.3	7.5	52	1616	81640

Shaded lines are field duplicates of preceding site.

Table 8. Results of Measurements Taken in the Flowing Outfalls during Survey 3 - 5/11/2009

Site Number	Latitude	Longitude	Depth (ft.)	Flow (cfs)	Temp. (°C)	pH	Cond. (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Enterococcus (MPN/100ml)	Total Coli (MPN/100ml)
LOS CERRITOS															
CC-02	33.79333	-118.10369		0.008977	17.08	7.49	1.082	2.16	9.60	190	**7.0**[1]	5.7	414	288	32550
CC-04	33.79564	-118.10331		0.000233	19.05	7.96	0.867	4.09	10.40	180	4.8[1]	3.7	63	12033	410600
CC-05	33.79591	-118.10333		0.000007	DND	DND	DND	DND	DND				149	331	30100
CC-06	33.79594	-118.10365		DND	DND	DND	DND	DND	DND	200	8.1	6.1	201	583	275500
CC-09	33.79942	-118.10358		0.000306	18.6	7.64	0.9	3.40	38.20	180	**35**[1]	12	1246	8664	6015000
CC-11	33.80006	-118.10430		0.000088	DND	DND	DND	DND	DND	170	**37**[1]	15	145	211	46110
CC-12	33.80004	-118.10472		0.001914	19.61	8.02	1.436	5.73	22.60	270	**540**[1]	15	8664	3076	2987000
CC-14	33.80307	-118.10885		0.004032	20.67	8.08	0.824	7.20	27.80	160	**210**[1]	24	836	7330	275000
CC-19	33.81035	-118.12130		0.007063	19.32	7.79	0.808	6.31	21.10	150	6.7	5.7	201	31	86640
CC-22	33.81016	-118.12230		0.000706	19.6	7.79	0.652	5.82	5.50	140	4.9	3.6	5	63	100600
CC-24	33.81036	-118.12532		0.005297	21.4	7.95	0.79	6.37	112.00	160	14	5.7	86	5172	435200
CC-29	33.81015	-118.12663		0.000118	18.93	8.06	1.223	6.78	5.50	180	23	19	1421	4080	1046200
CLARK															
CK-01	33.81076	-118.12995		0.000118	18.76	8.12	0.986	7.80	16.60	180	11	7.4	10	331	197000
CK-06	33.81517	-118.12980		0.000942	19.13	7.9	1.58	5.57	67.20	270	180	73	6867	34100	4611000
CK-08	33.81866	-118.12980		0.000824	19.11	7.92	1.1	6.30	5.00	200	17	11	2359	10500	457000
CK-15	33.82228	-118.12990		0.003531	23.9	7.87	0.616	6.34	2.40	120	3.1	2.4	2987	631	613100
CK-17	33.82354	-118.12981		0.000471	18.72	8.42	1.186	5.69	23.10	200	21	13	624	836	104620
CK-20	33.82501	-118.12968		0.010594	21.01	7.98	1.94	7.73	0.00	650	1.1	1.0	10	5	2481
CK-22	33.83117	-118.13067		0.000589	18.17	8.4	0.752	8.15	1.90	180	18	15	153	2359	4611000
CK-34	33.83607	-118.13214		0.014832	19.15	8.43	0.725	7.87	3.10	200	18	15	393	1000	22820
CK-48	33.84486	-118.13212		0.000153	21.84	8.6	0.965	9.17	7.30	170	35	25	10	1210	34480
PALO VERDE															
PV-08	33.81333	-118.11406		0.001695	19.3	7.92	1.038	6.99	7.20	300	2.4	1.4	328	1243	1872000
PV-10	33.81342	-118.11406		0.010373	21.7	7.52	0.972	7.34	85.00	180	31	18	10	8664	3448000
WARDLOW															
WC-07	33.82332	-118.14133		0.125000	23.67	8.35	0.616	8.28	5.50	140	1.9	1.7	185	317	10710
DEL AMO															
DA-14	33.84687	-118.14127		0.000216	18.73	8.83	1.039	8.67	2.60	370	110	88	5	5	18600

1. Sites were disturbed prior to sampling by propping open the tide gate. Gates were opened since leaking flows around the tide gate could not otherwise be collected or quantified. Water was allowed to reach an equilibrium flow prior to sampling but analysis of the data from these sites indicates that the opening of the tide gate disturbed particulate copper that did not settle. Most of these sites had elevated total recoverable copper with normal levels of dissolved copper.

Table 9. Descriptive Statistics of Flow and Water Quality at Channel and Outfall Sites – Survey 1

CHANNELS

Statistic	Flow (cfs)	Temp. (°C)	pH	Cond (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Entero. (MPN/100ml)	Total Coliform (MPN/100ml)
No. of observations	14	14	14	14	14	14	14	14	14	14	14	14
Minimum	0.023	14.5	7.7	0.523	6.6	2	64	7	5	5	5	5
Maximum	1.315	28.2	10.8	4.92	16.1	273	1800	1500	750	908	754	17850
1st Quartile	0.072	17.2	9.3	0.589	9.6	6.1	113	10	9	5	31	72
Median	**0.135**	**19.3**	**9.9**	**0.969**	**12.6**	**17.5**	**140**	**10**	**10**	8	74	1592
3rd Quartile	0.692	25.5	10.5	1.103	14.9	33.9	180	12	11	131	105	3733
Mean	0.405	20.7	9.8	1.18	12	40.4	265	118	63	178	131	2879
Geometric mean	0.187	20.1	9.8	0.949	11.6	15.9	165	16	13	**30**	**64**	**530**

OUTFALLS

Statistic	Flow (cfs)	Temp. (°C)	pH	Cond (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Entero. (MPN/100ml)	Total Coliform (MPN/100ml)
No. of observations	10	10	10	10	10	10	10	10	10	10	10	10
Minimum	0.00014	14.8	7.9	0.56	6.9	0	94	1.2	1.4	5	5	5
Maximum	0.0331	19.2	8.5	2	9.6	41.2	570	20	19	111990	127400	4611000
1st Quartile	0.00028	16.6	8.1	0.657	7.6	1.3	115	4.3	3.3	5	132	4205
Median	**0.00084**	**17.4**	**8.2**	**0.727**	**8.1**	**3.8**	**135**	**10.5**	**6.5**	111	524	44815
3rd Quartile	0.00141	17.8	8.2	0.964	8.8	10.8	190	15.5	13.8	3123	1541	167138
Mean	0.00505	17.2	8.2	0.925	8.2	8.4	188	10.3	8.5	17126	14834	548413
Geometric mean	0.00102	17.2	8.2	0.849	8.1		161	7.1	6	**178**	**593**	**20969**

Table 10. Descriptive Statistics of Flow and Water Quality at Channel and Outfall Sites – Survey 2

CHANNELS

Statistic	Flow (cfs)	Temp. (°C)	pH	Cond (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Entero. (MPN/100ml)	Total Coliform (MPN/100ml)
No. of observations	26	27	27	27	27	27	27	27	27	27	27	27
Minimum	0.006	13.9	7.7	0.48	6.7	5.7	76	8	4	5	5	5
Maximum	1.476	28.2	11.0	1.266	21.4	396	260	35	25	2239	14009	12449388
1st Quartile	0.040	16.5	9.3	0.740	9.3	10.3	125	14	11.5	13	91	125
Median	**0.152**	**19.6**	**9.6**	**0.859**	**14.3**	**19.5**	**140**	**18**	**13**	110	404	27550
3rd Quartile	0.415	24.1	10.4	1.069	16.4	88.2	160	22	14.5	278	1007	80650
Mean	0.309	20.3	9.7	0.885	13.7	60.3	148	18.6	13	1633	5806	722442
Geometric mean	0.122	19.9	9.6	0.856	13.0	24.8	142	17.4	12	**73**	**297**	**5564**

OUTFALLS

Statistic	Flow (cfs)	Temp. (°C)	pH	Cond (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Entero. (MPN/100ml)	Total Coliform (MPN/100ml)
No. of observations	14	14	14	14	14	14	14	14	14	14	14	14
Minimum	0.00014	14.6	7.5	0.522	4.6	0.8	99	1.9	1.3	5	5	5
Maximum	0.0331	21.0	8.5	8.400	9.7	80.7	1000	120	81	11870	14136	2755000
1st Quartile	0.00019	16.3	7.9	0.730	6.6	3.6	132.5	4.5	2.8	6	48	4702
Median	**0.00045**	**17.2**	**8.0**	**0.950**	**7.2**	**6.6**	**170**	**11.9**	**6.1**	80	420	56175
3rd Quartile	0.00177	18.2	8.1	1.108	7.7	8.6	220	37.8	17.8	1406	2586	256283
Mean	0.00505	17.4	8.0	1.500	7.2	12.6	263	26.0	14.9	2014	2416	437502
Geometric mean	0.00079	17.4	8.0	1.070	7.1	6.2	200	12.5	7.1	**102**	**294**	**23999**

Table 11. Descriptive Statistics of Flow and Water Quality at Channel and Outfall Sites – Survey 3

CHANNELS

Statistic	Flow (cfs)	Temp. (°C)	pH	Cond (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Entero. (MPN/100ml)	Total Coliform (MPN/100ml)
No. of observations	26	27	27	27	27	27	27	27	27	27	27	27
Minimum	0.044	17.3	7.4	0.665	4.0	3.4	93	3.4	2.9	5	5	5
Maximum	0.856	32.4	10.7	1.66	17.4	61.8	440	21	20	4611	6131	228200
1st Quartile	0.097	18.5	8.6	0.809	8.8	6.1	155	6.8	5.5	13	91	126
Median	**0.194**	**22.9**	**9.1**	**1.029**	**12.3**	**11.3**	**190**	**10**	**7.6**	110	404	27550
3rd Quartile	0.396	28.7	10.1	1.369	13.6	20.0	295	12.5	10	278	1008	80650
Mean	0.286	24.0	9.2	1.100	11.1	16.9	215	10.5	8.7	765	1067	39233
Geometric mean	0.196	23.3	9.2	1.055	10.3	11.9	201	9.5	7.8	**98**	**387**	**9018**

OUTFALLS

Statistic	Flow (cfs)	Temp. (°C)	pH	Cond (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Enterococcus (MPN/100ml)	Total Coliform (MPN/100ml)
No. of observations	24	22	22	22	22	22	24	24	24	25	25	25
Minimum	0.000007	17.1	17.5	0.616	2.2	0.0	120	1.1	1.0	5	5	2481
Maximum	0.12500	23.9	8.8	1.94	9.2	112	650	540	88	8664	34100	6015000
1st Quartile	0.00023	18.8	7.9	0.795	5.8	5.1	167	6.3	5.2	63	317	34480
Median	**0.00088**	**19.2**	**8.0**	**0.969**	**6.6**	**8.5**	**180**	**17.5**	**11.5**	201	1000	275000
3rd Quartile	0.00574	20.9	8.3	1.096	7.8	23.0	200	35	15.8	836	5172	1046200
Mean	0.00825	19.9	8.1	1.000	6.5	21.8	214	55.8	16.1	1095	4122	1109732
Geometric mean	0.00110	19.8	8.0	0.961	6.3		199	16.6	9.0	**188**	**850**	**218568**

Table 12. Summary of Sample Counts from the Open Channels and Outfalls Compared with Frequency of Exceedances of Dissolved Copper Water Quality Criteria.

SURVEY NUMBER	LOCATION	# OF SAMPLES	# >CTR CHRONIC	# >CTR ACUTE
Survey 1 3/3/2009	**Channels**	**16**	**5**	**2**
	Los Cerritos	7	3	1
	Palo Verde	3	1	0
	Clark	4	1	1
	Wardlow	1	0	0
	Del Amo	1	0	0
	Outfalls	**10**	**4**	**1**
	Los Cerritos	4	2	0
	Palo Verde	1	0	0
	Clark	4	2	1
	Wardlow	1	0	0
	Del Amo	0	0	0
Survey 2 4/9/2009	**Channels**	**27**	**15**	**4**
	Los Cerritos	8	4	1
	Palo Verde	4	4	2
	Clark	8	5	0
	Wardlow	5	0	0
	Del Amo	2	2	1
	Outfalls	**14**	**3**	**2**
	Los Cerritos	8	1	1
	Palo Verde	2	1	0
	Clark	3	1	1
	Wardlow	1	0	0
	Del Amo	0	0	0
Survey 3 5/11/2009	**Channels**	**27**	**3**	**0**
	Los Cerritos	8	0	0
	Palo Verde	4	3	0
	Clark	8	0	0
	Wardlow	4	0	0
	Del Amo	3	0	0
	Outfalls	**24**	**8**	**3**
	Los Cerritos	11	3	1
	Palo Verde	2	1	0
	Clark	9	3	1
	Wardlow	1	0	0
	Del Amo	1	1	1
ALL SURVEYS COMBINED	**Channels**	**70**	**23**	**6**
	Los Cerritos	23	7	2
	Palo Verde	11	8	2
	Clark	20	6	1
	Wardlow	10	0	0
	Del Amo	6	2	1
	Outfalls	**48**	**15**	**6**
	Los Cerritos	23	6	2
	Palo Verde	5	2	0
	Clark	16	6	3
	Wardlow	3	0	0
	Del Amo	1	1	1

Table 13. Loads of Fecal Indicator Bacteria and Copper from all Main Channels – Survey 1

	E_coli (10^6mpn/day)	Enterococcus (10^6 mpn/day)	Total_Coliform (10^6 mpn /day)	Diss_Copper (g/day)	Total_Copper (g/day)
LOS CERRITOS[2]					
CC-01-A[3]	4311	3507	132103	35.4	38.6
CC-02-A	3198	1651	68495	22.3	26.2
CC-02-B	2368	395	90996	17.8	21.7
CC-02-D[1]	1441		64769	18.0	23.7
CC-03-A		171	445	6.9	7.6
CC-03-B			86	5.0	5.0
CC-04					
PALO VERDE					
PVMOUTH-01		105		1.2	1.2
PVMOUTH-01		134		1.1	1.2
PV-02		168	446	1.1	1.2
CLARK					
CLK-01-A		72	303	2.0	2.3
CLK-02-A		49	2101	1.3	1.4
CLK-02-B		238	4746	3.7	3.8
CLK-04-B					
WARDLOW					
WC-01-B[4]					
DEL AMO					
DA-01-A[4]					

1. Shaded lines indicate field replicates of previous sample.
2. Sites are ordered starting from the lower portion of each channel and moving upstream.
3. Los Cerritos CC-01-A located at the Stearns St. mass emission monitoring site.
4. Flow rates could not be determined at these sites which prohibited load calculations

Table 14. Loads of Fecal Indicator Bacteria and Copper from all Monitored Outfalls – Survey 1

	E_coli (10^6mpn/day)	Enterococcus (10^6 mpn/day)	Total_Coliform (10^6 mpn /day)	Diss_Copper (g/day)	Total_Copper (g/day)
LOS CERRITOS					
CCO-02-A		22	1229	0.013	0.022
CCO-09-A	558	635	1020	0.006	0.007
CCO-14-A		1.6	76	0.023	0.029
CCO-24-A	0.6	0.7	15493	0.003	0.004
subtotal	**559**	**660**	**17818**	**0.045**	**0.062**
CLARK					
CKO-09-A	51	16	683	0.005	0.006
CKO-17-A	233	70	2175	0.008	0.008
CLK-20-A		19	1138	0.047	0.035
CLK-22-A	3.1	57	1546	0.050	0.057
subtotal	**287**	**163**	**5542**	**0.110**	**0.107**
PALO VERDE					
PV-08	4.2	6.5	95.6	0.010	0.011
subtotal	**4.2**	**6.5**	**95.6**	**0.010**	**0.011**
WARDLOW					
WC-26				0.113	0.113
subtotal				**0.113**	**0.113**
TOTAL OUTFALLS	**850**	**829**	**23455**	**0.165**	**0.181**

Table 15. Loads of Fecal Indicator Bacteria and Copper from all Main Channels – Survey 2

	E_coli (10^6mpn/day)	Enterococcus (10^6 mpn/day)	Total_Coliform (10^6 mpn /day)	Diss_Copper (g/day)	Total_Copper (g/day)
LOS CERRITOS[2]					
CC-A[3]	7409	26460	478973	24.7	31.3
CC-B	25572	86955	448898	30.3	42.9
CC-C	595	1635	212323	11.3	14.2
CC-D	1644	6037	129460	16.4	20.9
CC-E	172	172	57593	2.5	3.7
CC-F	1126	1593	161098	5.6	8.4
CC-H[1]	561	939	152081	5.6	8.4
CC-G			76.4	1.9	2.5
PALO VERDE					
PV-A	121	165	3881	0.2	0.3
PV-B	147	588	70839	1.6	2.1
PV-D	159	680	30638	1.5	2.2
PV-C	3.3	18	4740	0.3	0.5
CLARK					
CK-A		524	3120	34.1	36.7
CK-B		386	52	6.3	8.9
CK-C		830	98	11.7	15.6
CK-D		173		3.6	4.9
CK-E	63	5777	277	2.9	4.6
CK-F	562	3303	4215703	23.3	30.2
CK-G	72	393	63811	0.6	0.8
CK-H	97	270	45412	0.6	0.9
WARDLOW					
WC-A					
WC-B	222	949	8547	1.1	1.7
WC-C		92		1.6	2.2
WC-D		8.2		0.5	0.8
WC-E	2092	2062	64372	2.2	4.0
DEL AMO					
DA-A		883	796681	14	26
DA-B	2239	14009	12449388	30	43

1. Shaded lines indicate field replicates of previous sample.
2. Sites are ordered starting from the lower portion of each channel and moving upstream.
3. Los Cerritos CC-A located at the Stearns St. mass emission monitoring site.

Table 16. Loads of Fecal Indicator Bacteria and Copper from all Monitored Outfalls – Survey 2

	E_coli (10^6mpn/day)	Enterococcus (10^6 mpn/day)	Total_Coliform (10^6 mpn /day)	Diss_Copper (g/day)	Total_Copper (g/day)
LOS CERRITOS					
CC-02					
CC-04	0.6	7.4	12695	0.003	0.004
CC-06	0.0	0.0	177	0.023	0.037
CC-07	17.4	29.4	825	0.002	0.004
CC-14	0.0	0.3	572	0.023	0.035
CC-14.5	0.0	0.1	0.7	0.003	0.003
CC-19	1026	1221	37601	0.072	0.199
CC-24	212	84.4	4492	0.017	0.023
subtotal	**1255**	**1343**	**56362**	**0.142**	**0.305**
CLARK					
CK-06	0.4	1.4	3086	0.003	0.007
CK-17	17.2	27.9	312	0.034	0.063
CK-20	0.0	77.8	354	0.022	0.033
subtotal	**17.5**	**107.1**	**3752**	**0.059**	**0.103**
PALO VERDE					
PV-08	0.2	0.7	428	0.004	0.007
PV-22	0.8	1.4	69	0.029	0.043
subtotal	**1.0**	**2.1**	**496.9**	**0.033**	**0.050**
WARDLOW					
WC-07				0.454	0.622
subtotal				**0.454**	**0.622**
TOTAL OUTFALL	**1274**	**1452**	**60611**	**0.688**	**1.079**

Table 17. Loads of Fecal Indicator Bacteria and Copper from all Main Channels - Survey 3

	E_coli (10^6mpn/day)	Enterococcus (10^6 mpn/day)	Total_Coliform (10^6 mpn /day)	Diss_Copper (g/day)	Total_Copper (g/day)
LOS CERRITOS[2]					
CC-A[3]	3092	14602	496126	5.0	6.8
CC-H[1]	3136	13766	685126	5.8	8.8
CC-B	2443	906	152658	2.8	3.3
CC-C	606	623	341313	4.9	5.6
CC-D	2681	3677	1107322	8.8	10.0
CC-E	10715	1886	126439	1.2	1.4
CC-F	16714	7648	313378	3.1	4.7
CC-G	3652	395	292678	2.2	3.0
PALO VERDE					
PV-A	5180	2859	84600	2.4	2.7
PV-B	197	7863	2460	2.2	2.5
PV-D	425	7022	5914	2.2	2.6
PV-C	7	190	101	2.8	2.9
CLARK					
CK-A	2007	1583	96635	2.1	2.7
CK-B	4511	2421	661132	6.0	6.8
CK-C	728	1684	167193	2.2	2.5
CK-D	25	25	157	4.2	4.8
CK-E	19	161	20	3.3	3.8
CK-F	204	5087	421614	20.4	24.4
CK-H	204	9106	192762	20.4	22.4
CK-G	4537	2159	244676	1.0	1.5
WARDLOW					
WC-A					
WC-B	321	532	36392	0.4	0.5
WC-C	11	2798	6856	1.9	2.3
WC-D	18	19	19	3.4	4.1
DEL AMO					
DA-A	52	8240	197709	11.4	13.5
DA-C	104	11959	108686	11.4	13.5
DA-B	834	26645	1346084	12.0	13.3

1. Shaded lines indicate field replicates of previous sample.
2. Sites are ordered starting from the lower portion of each channel and moving upstream.
3. Los Cerritos CC-A located at the Stearns St. mass emission monitoring site.

Table 18. Loads of Fecal Indicator Bacteria and Copper from all Monitored Outfalls – Survey 3

Site Number	E_coli (10^6mpn/day)	Enterococcus (10^6 mpn/day)	Total_Coliform (10^6 mpn /day)	Diss_Copper (g/day)	Total_Copper (g/day)
CERRITOS					
CC-02	88.4	63.2	7149	0.122	0.149
CC-04	0.35	68.5	2338	0.002	0.003
CC-05	0.03	0.06	5		
CC-06					
CC-09	9.1	64.9	45039	0.009	0.025
CC-11	0.30	0.46	100	0.003	0.008
CC-12	394	144	139858	0.068	2.458
CC-14	80	723	27125	0.230	2.014
CC-19	34	5.4	14971	0.096	0.113
CC-22	0.08	1.1	1738	0.006	0.008
CC-24	10.8	670	56401	0.072	0.176
CC-29	4.0	11.7	3013	0.005	0.006
subtotal	**621**	**1753**	**297739**	**0.6**	**5.0**
CLARK					
CK-01	0.03	0.95	567	0.002	0.003
CK-06	154	786	106235	0.164	0.403
CK-08	46	212	9213	0.022	0.033
CK-15	251	55	52971	0.020	0.026
CK-17	7.0	9.6	1205	0.015	0.024
CK-20	2.5	1.3	643	0.025	0.028
CK-22	2.1	34.0	66397	0.021	0.025
CK-34	139	363	8281	0.529	0.635
CK-48	0.04	4.5	129	0.009	0.013
subtotal	**601**	**1465**	**245642**	**0.8**	**1.2**
PALO VERDE					
PV-08	13.2	51.5	77634	0.006	0.010
PV-10	2.47	2199	875086	0.444	0.765
subtotal	**16**	**2250**	**952720**	**0.4**	**0.8**
WARDLOW					
WC-07	550	969	32754	0.505	0.565
subtotal	**550**	**969**	**32754**	**0.5**	**0.6**
DEL AMO					
DA-14	0.03	0.03	98	0.045	0.056
subtotal	**0.03**	**0.03**	**98**	**0.05**	**0.06**
TOTAL OUTFALLS	**1788**	**6438**	**1,528,952**	**2.4**	**7.5**

APPENDIX A

GIS Plots of Flow, Concentration and Calculated Loads Measured in The Main Channel and Flowing Outfalls

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Figures

Figure A 1. Flow (cfs) Measured in the Main Channel during Survey 1. 1
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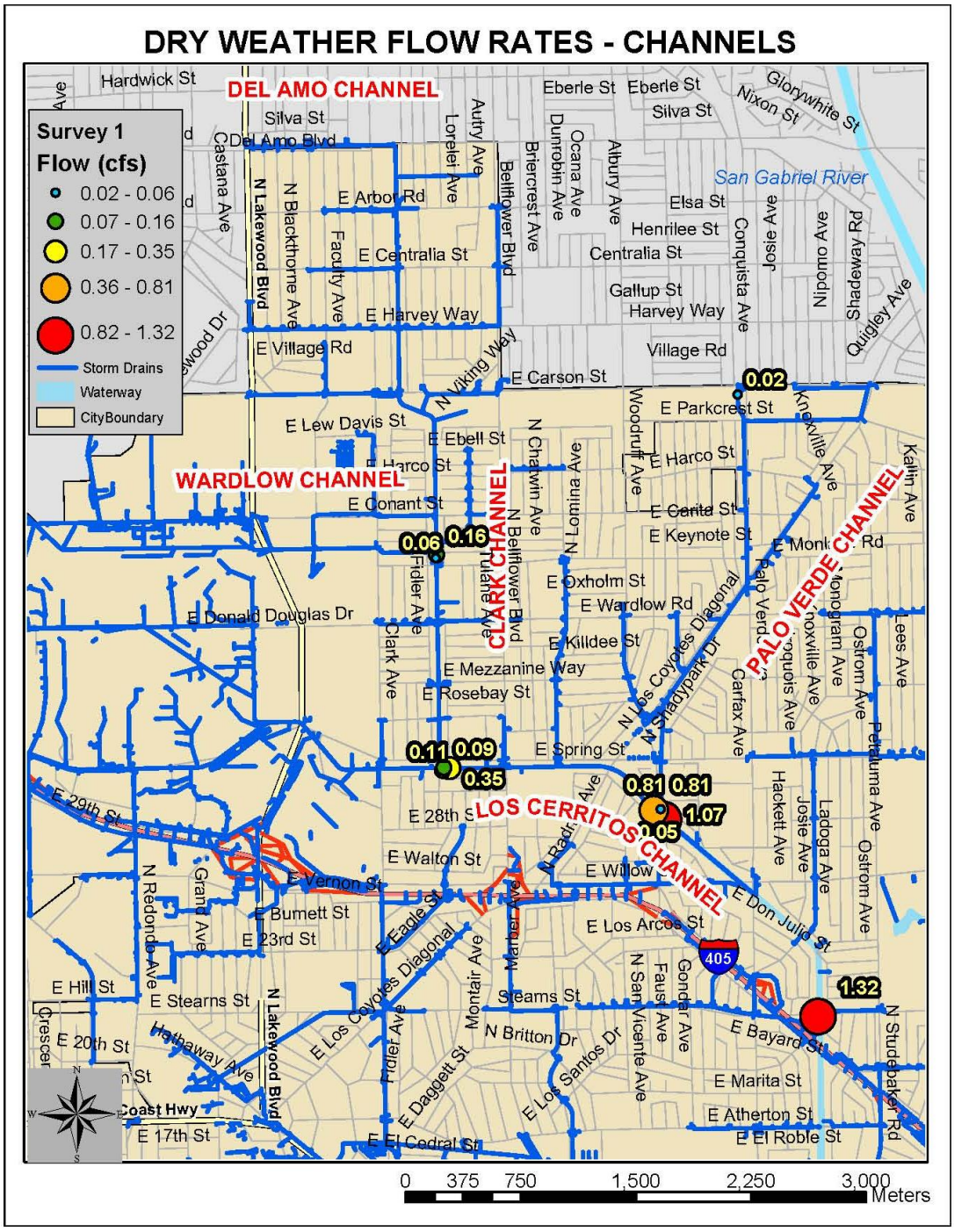
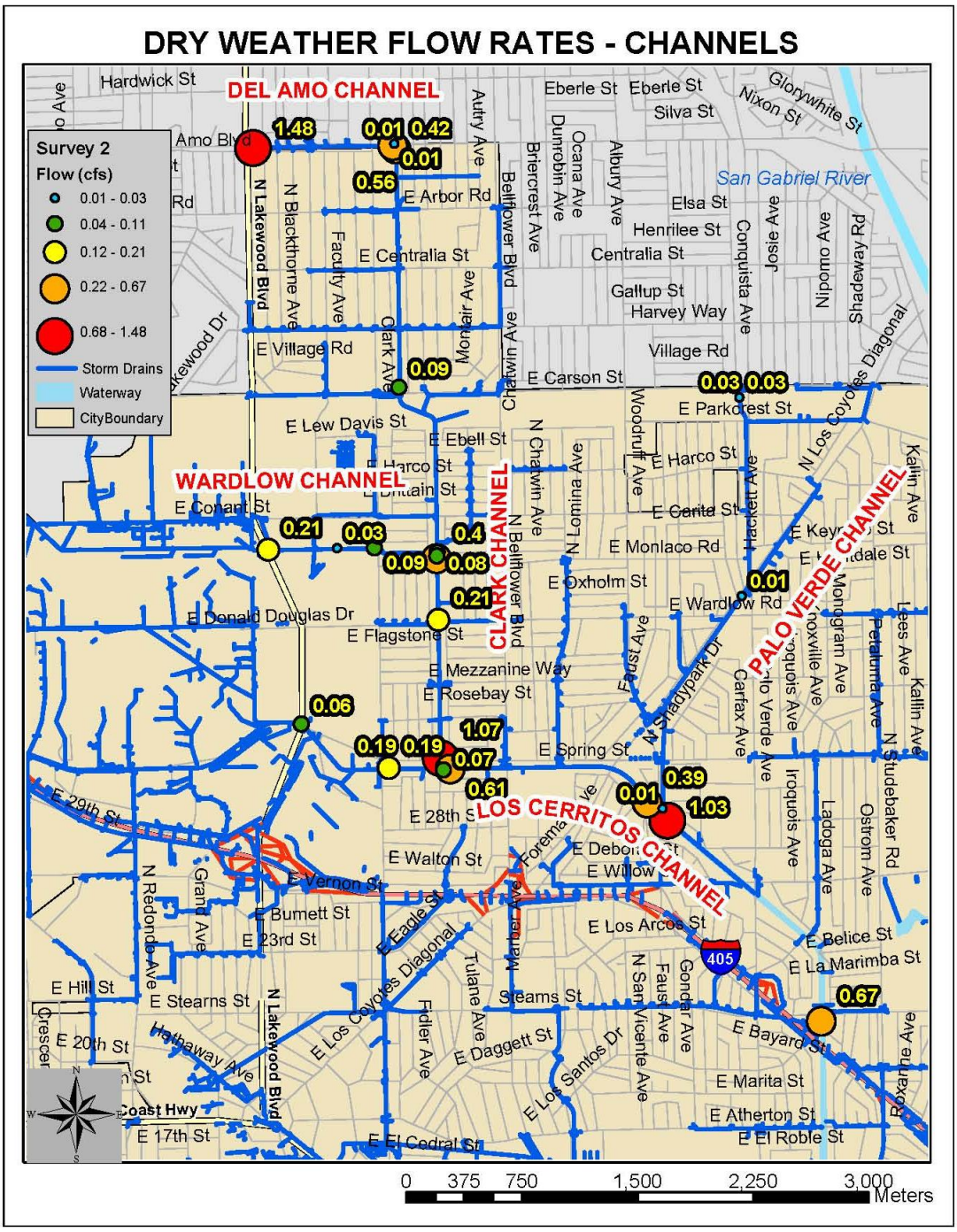


Figure A 1. **Flow (cfs) Measured in the Main Channel during Survey 1.**



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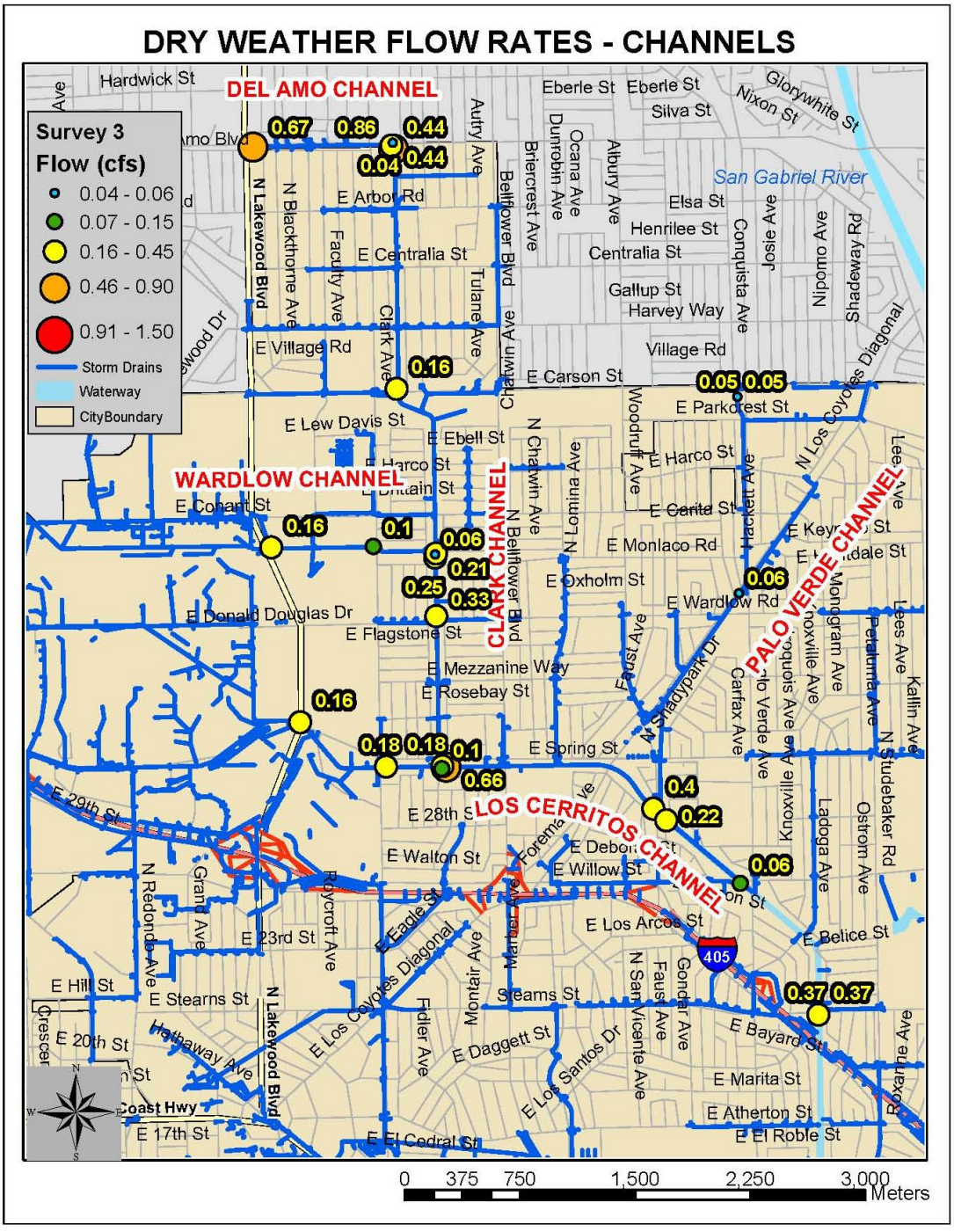

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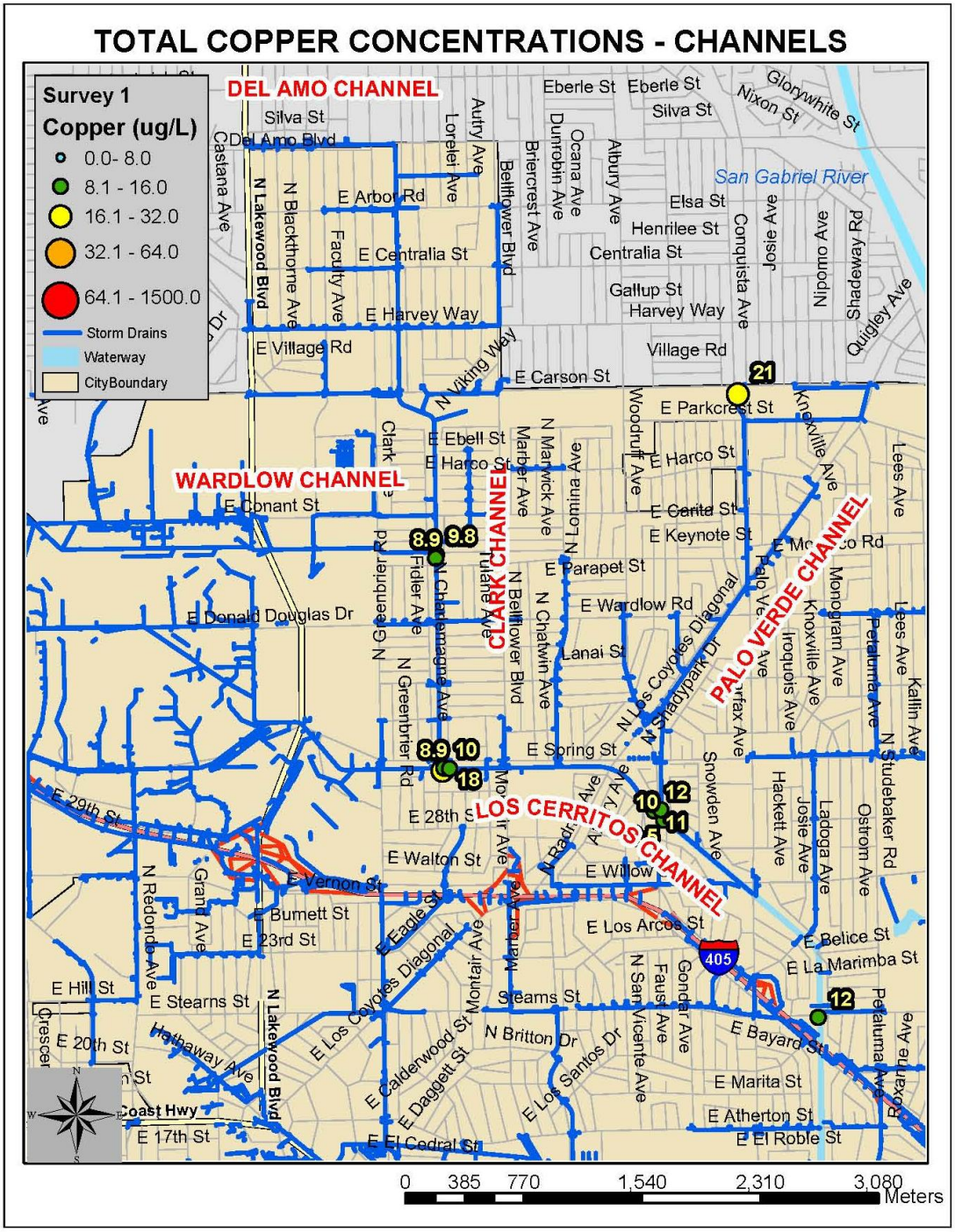
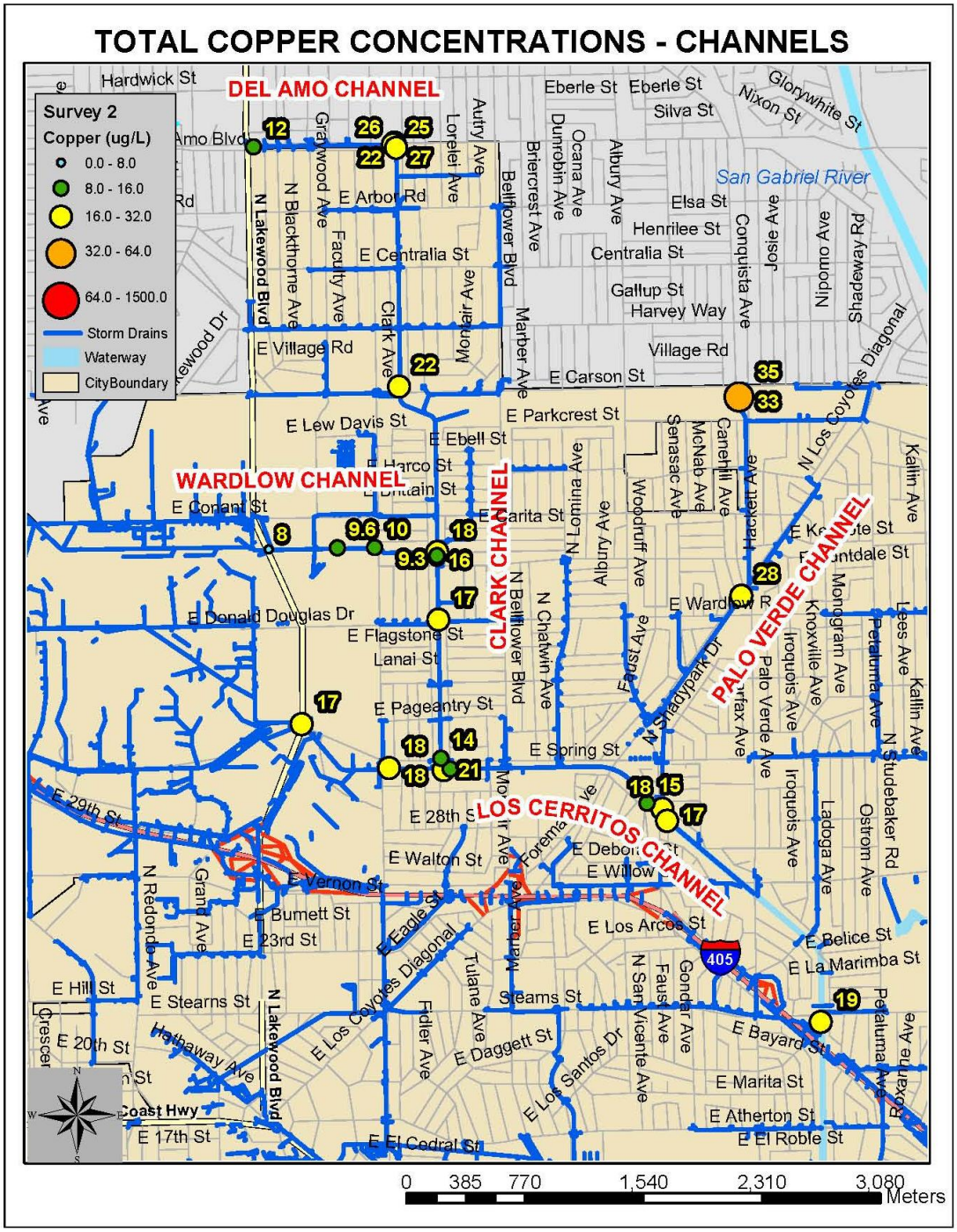


Figure A-4. **Concentrations of Total Copper Measured in the Main Channel during Survey 1.**



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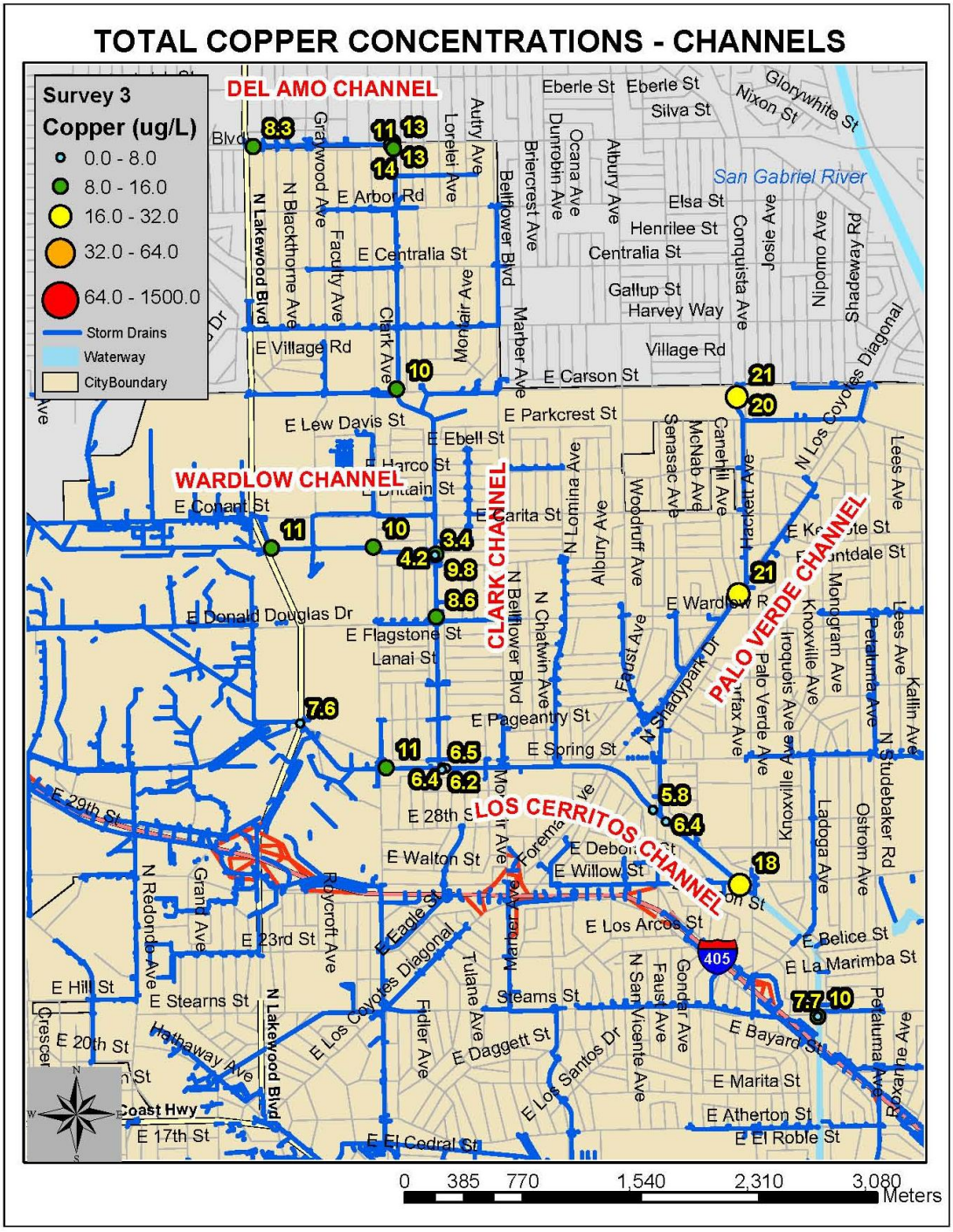

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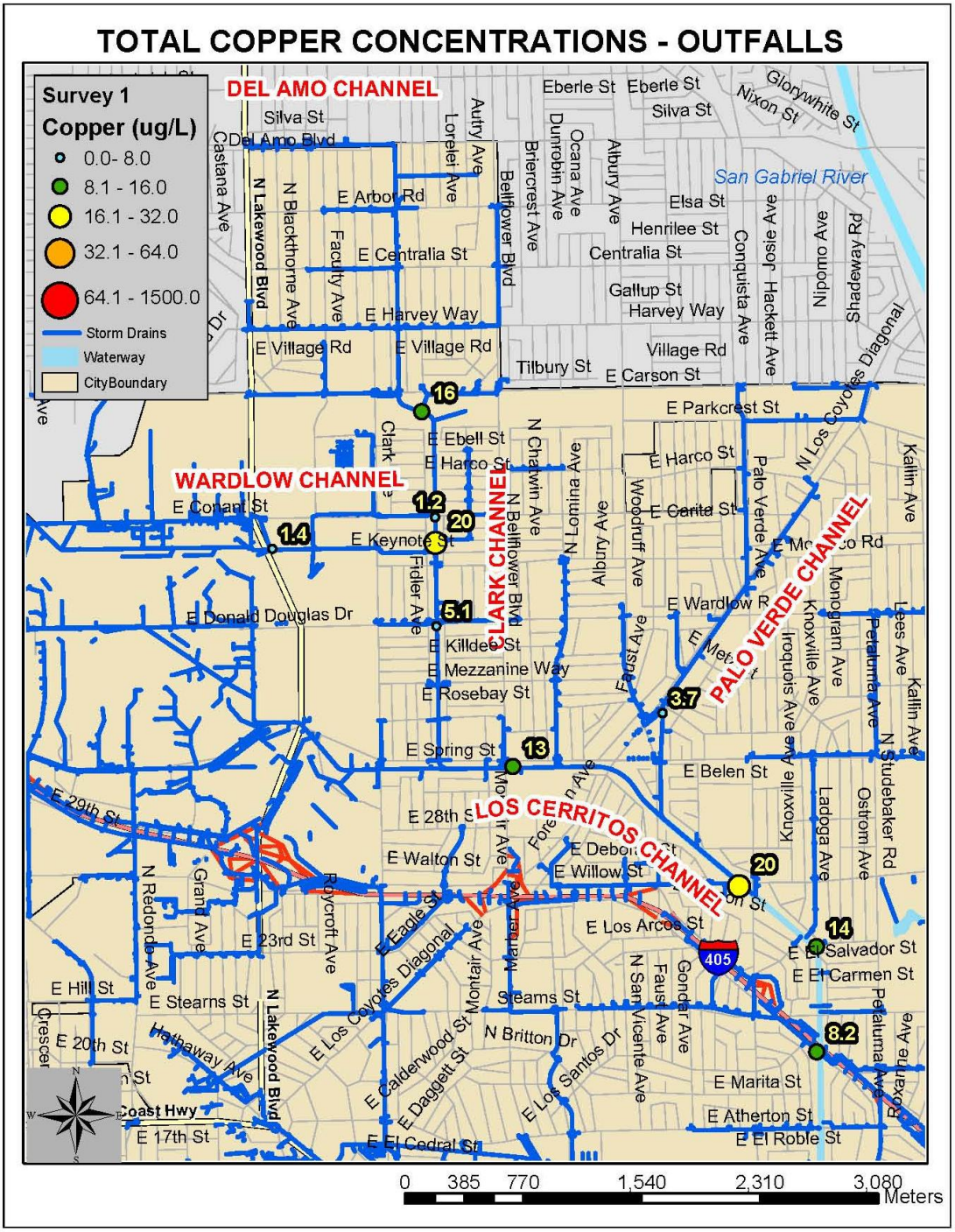
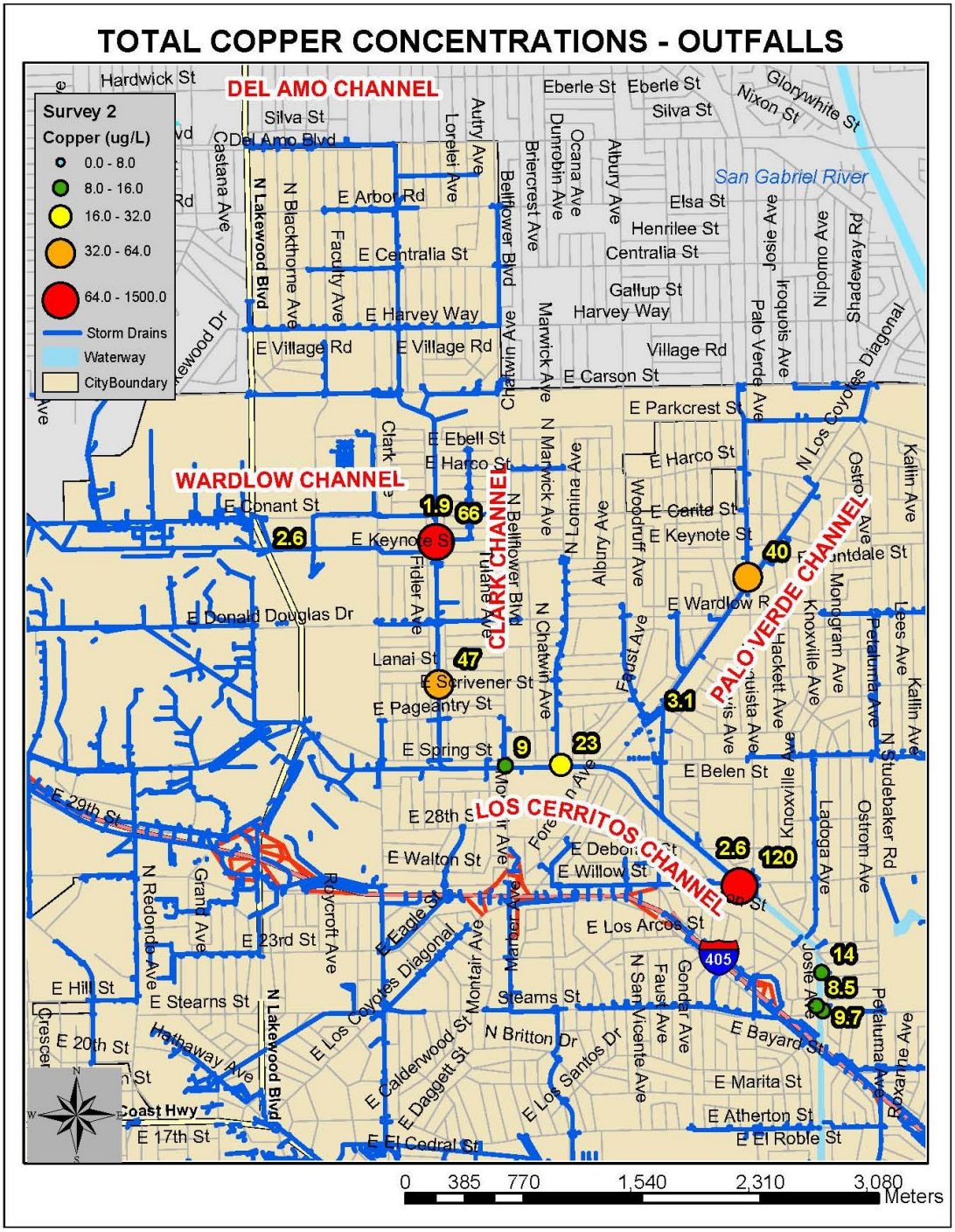


Figure A-7. **Concentrations of Total Copper Measured at Flowing Outfalls during Survey 1.**



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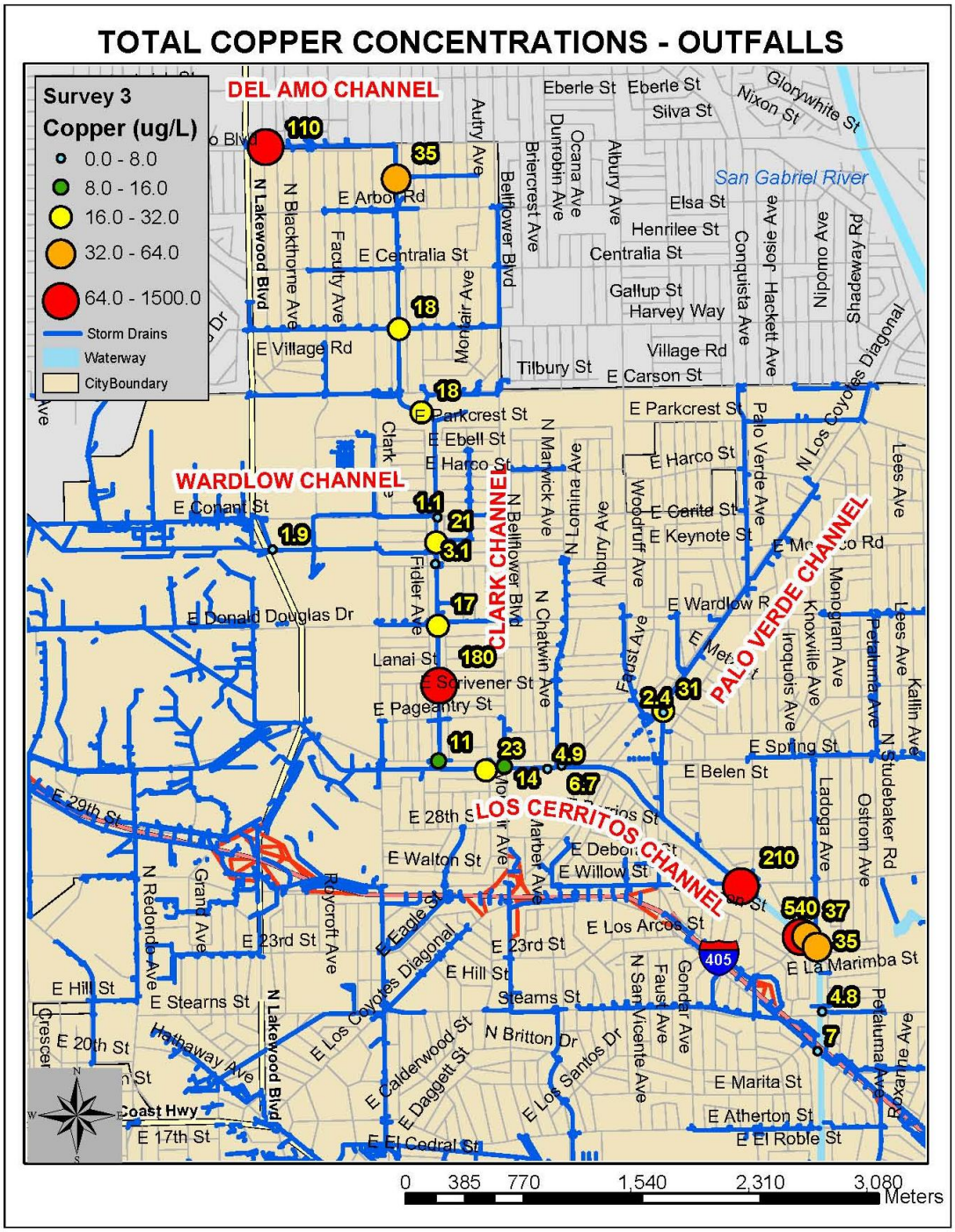

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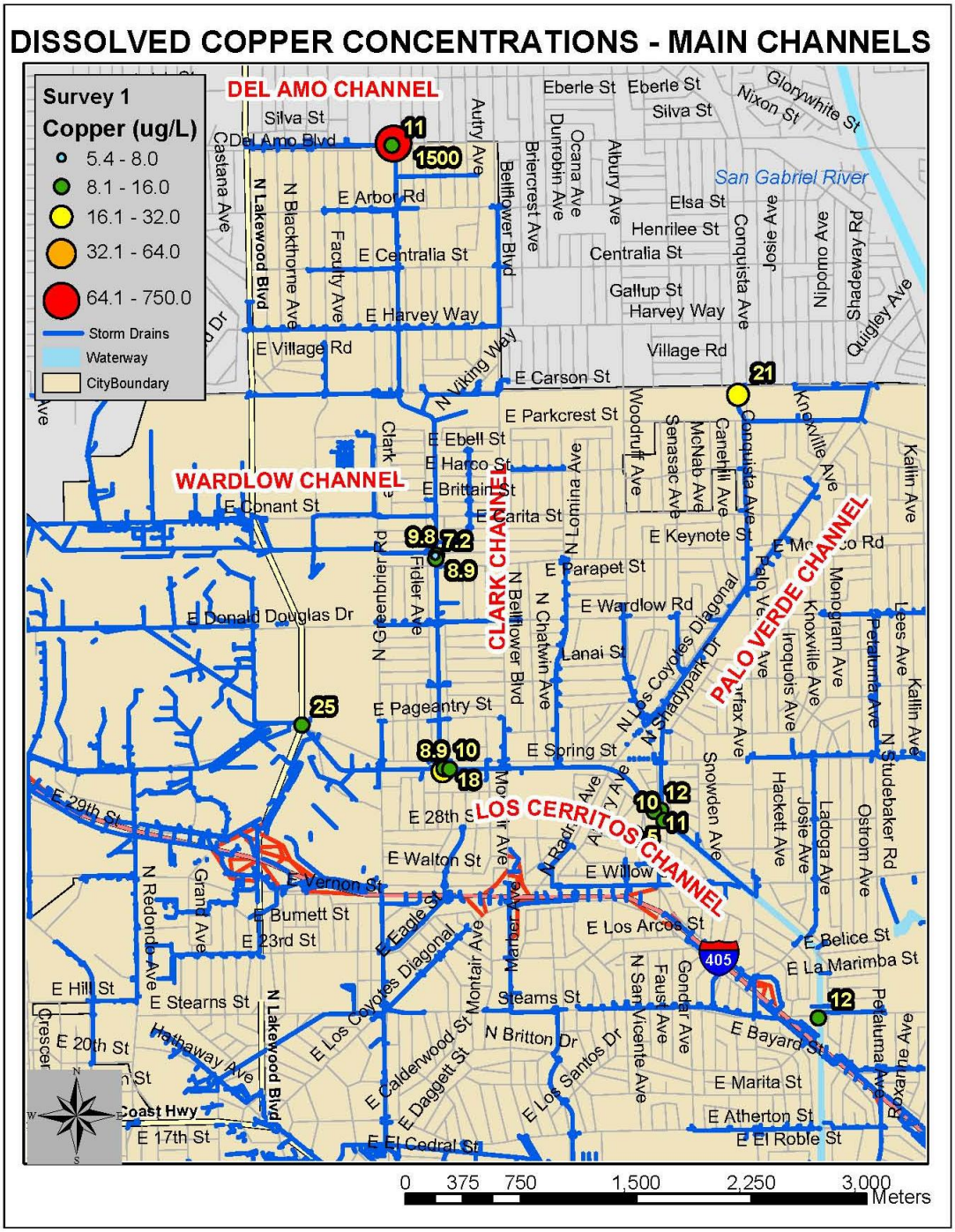

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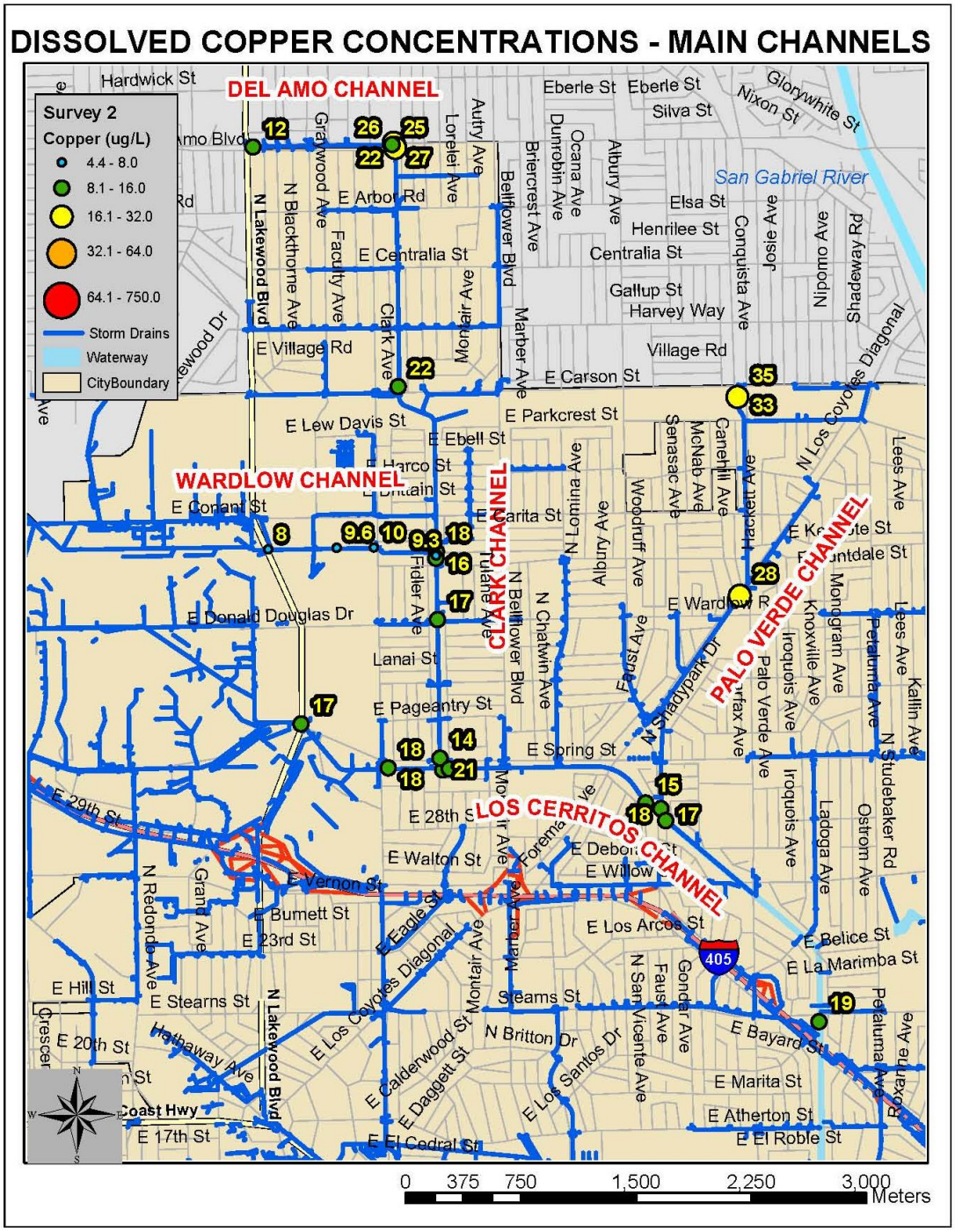

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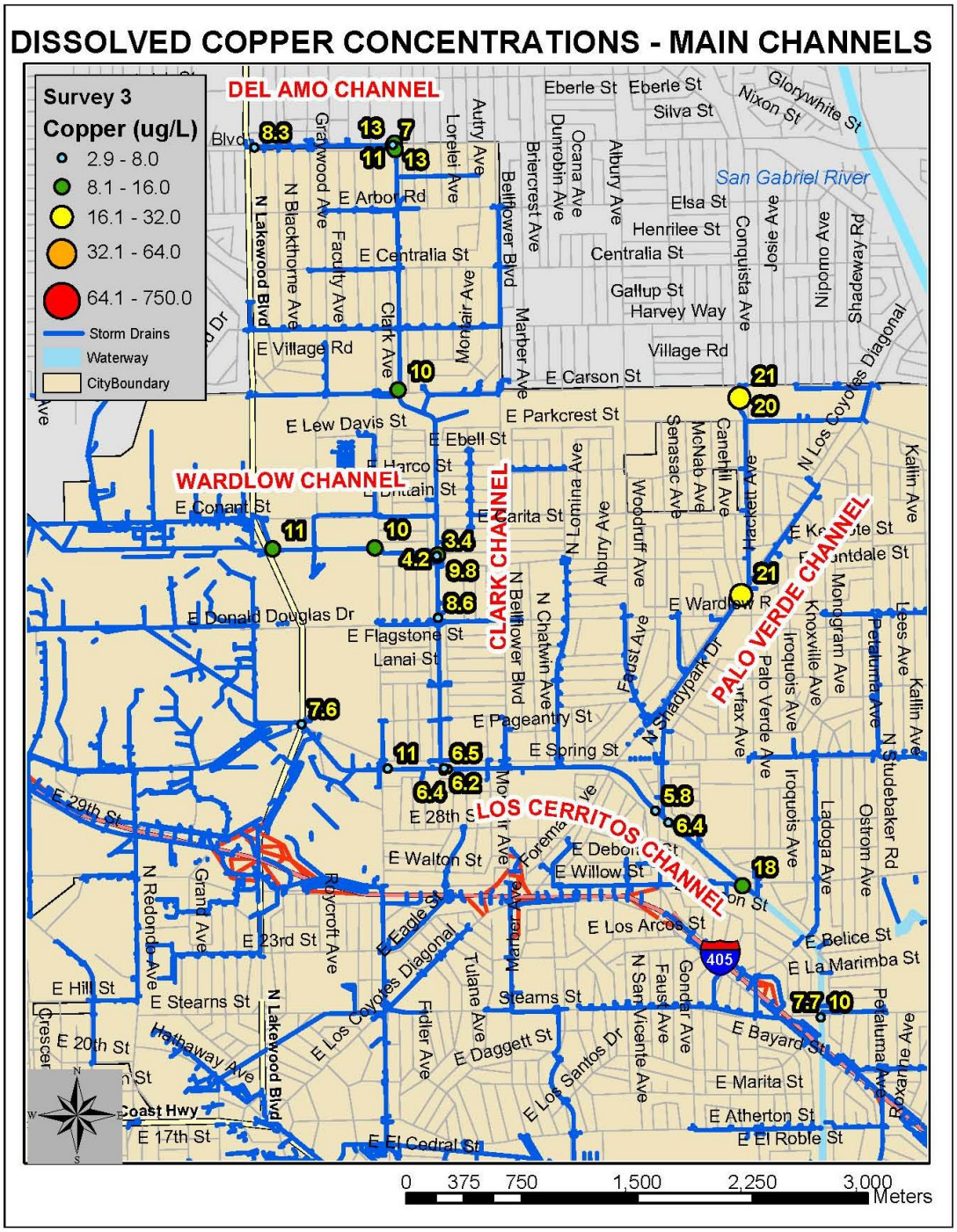
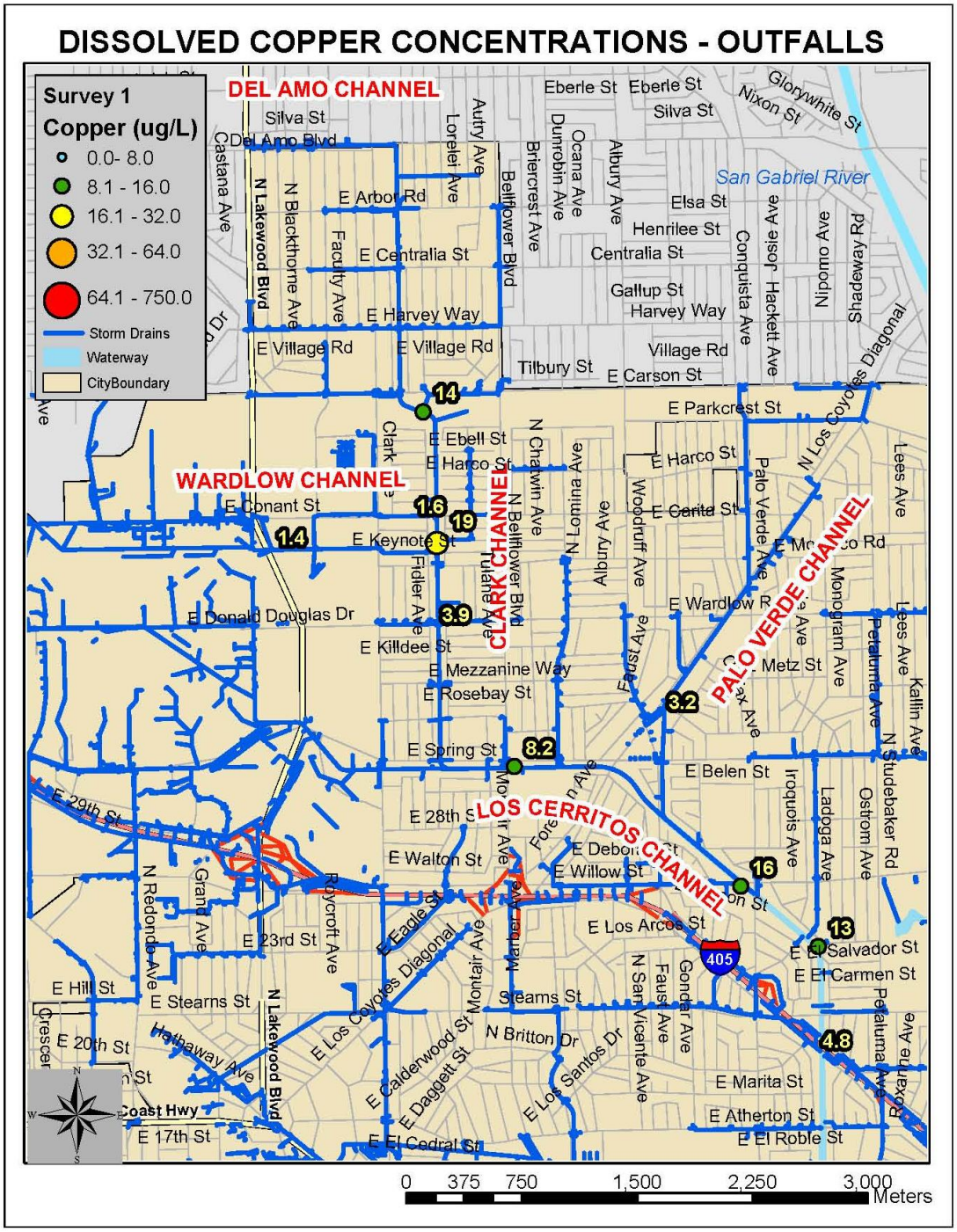


Figure A-12. Concentrations of Dissolved Copper Measured in the Main Channel during Survey 3.



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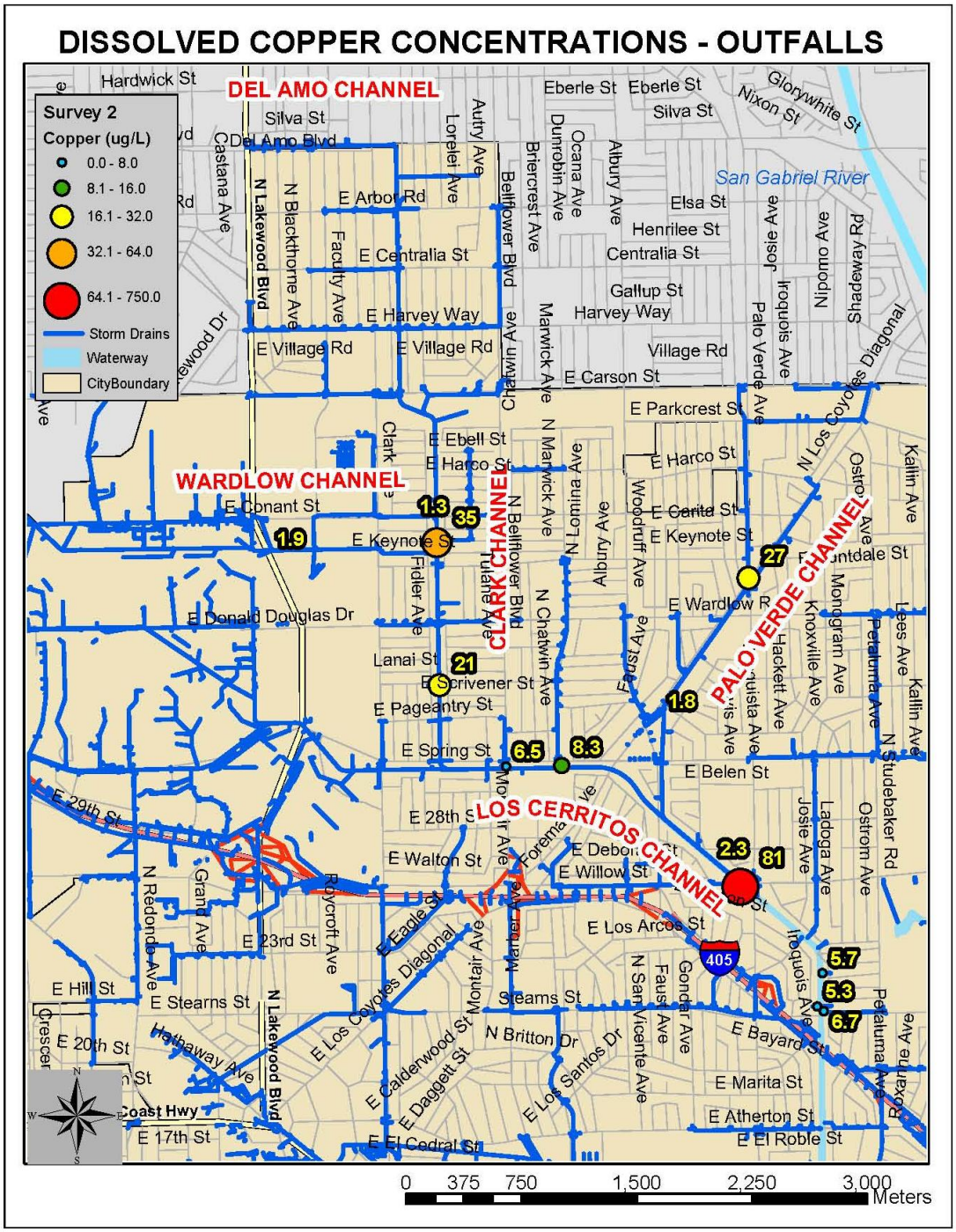

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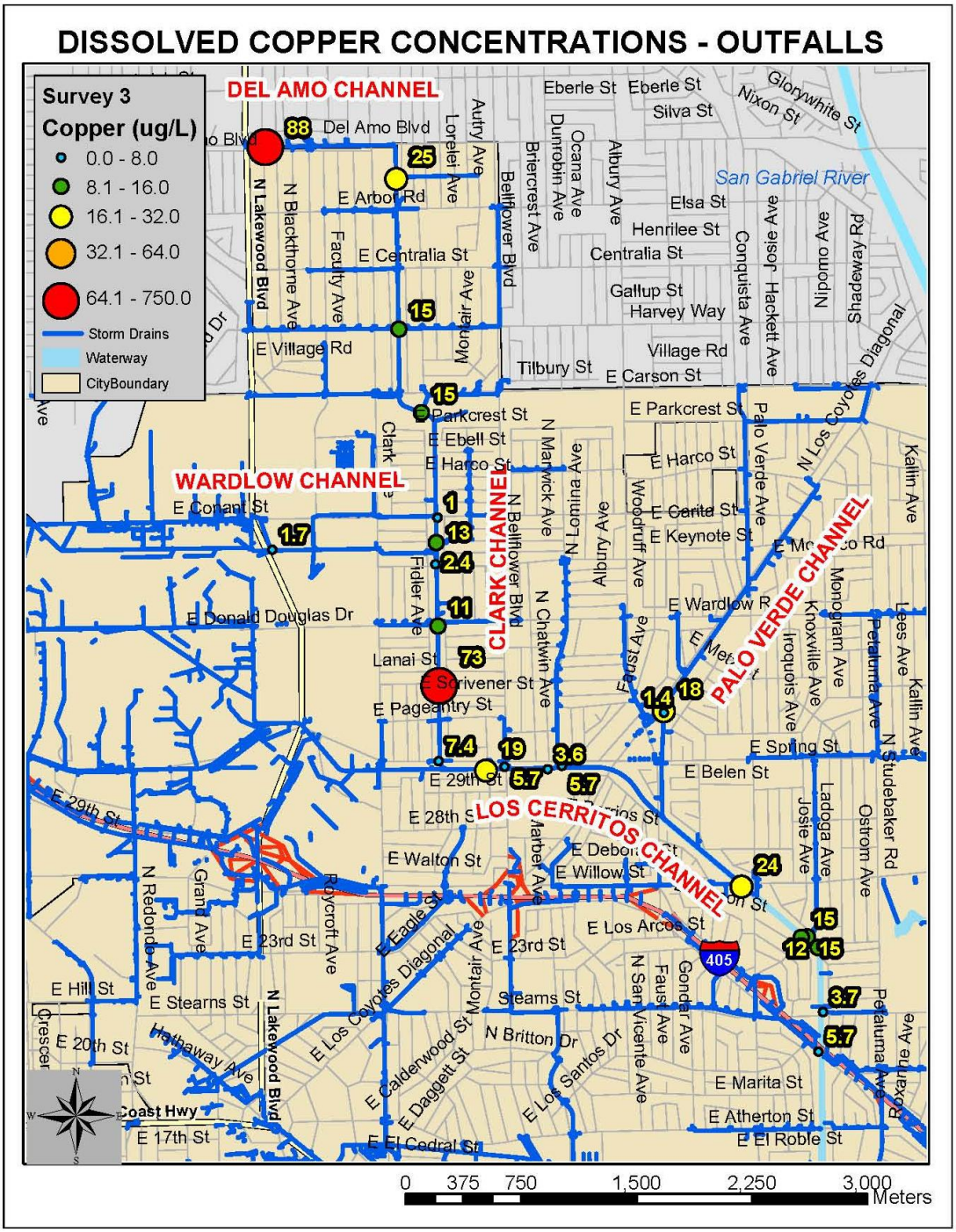


Figure A-15. Concentrations of Dissolved Copper Measured in Flowing Outfalls during Survey 3.

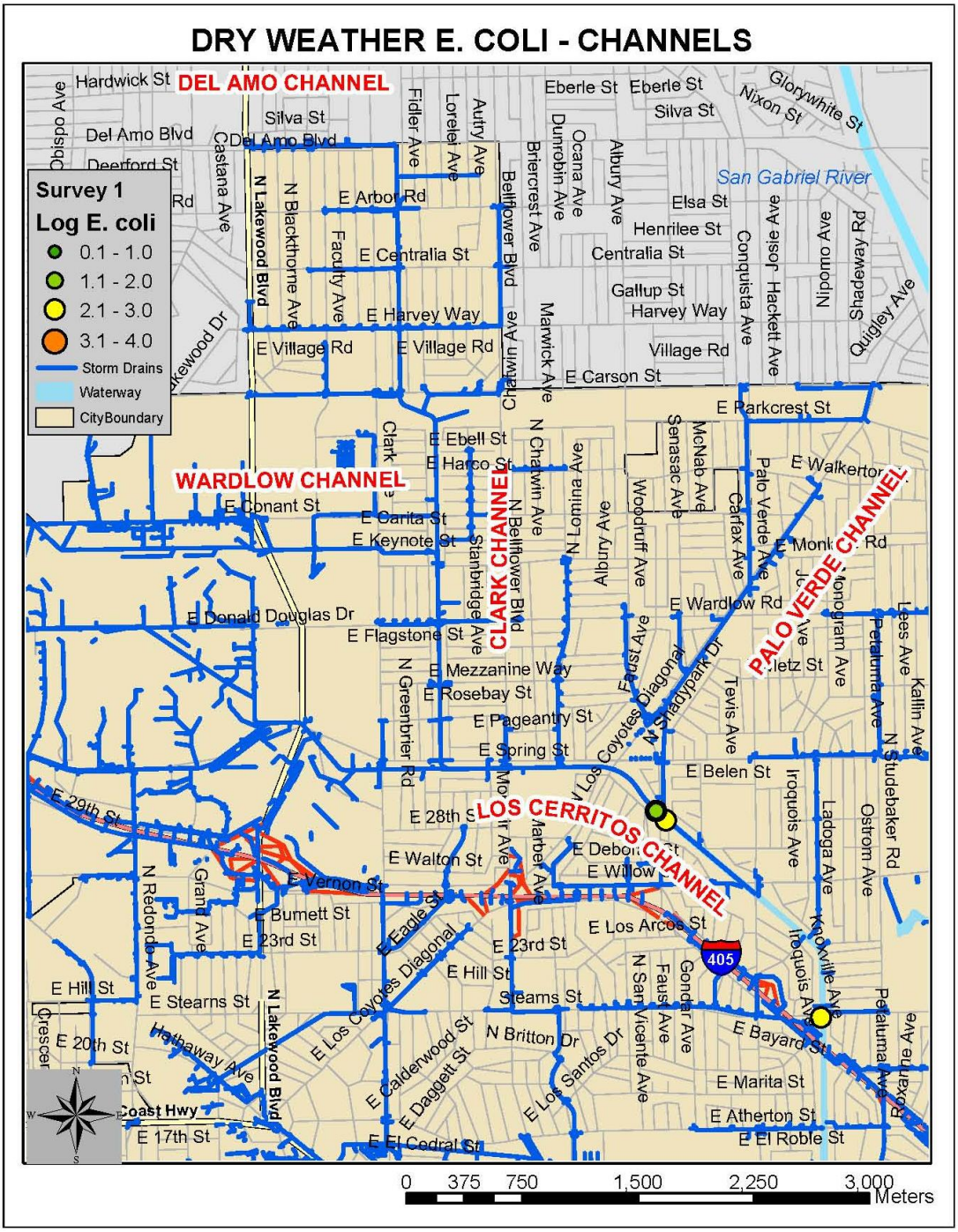
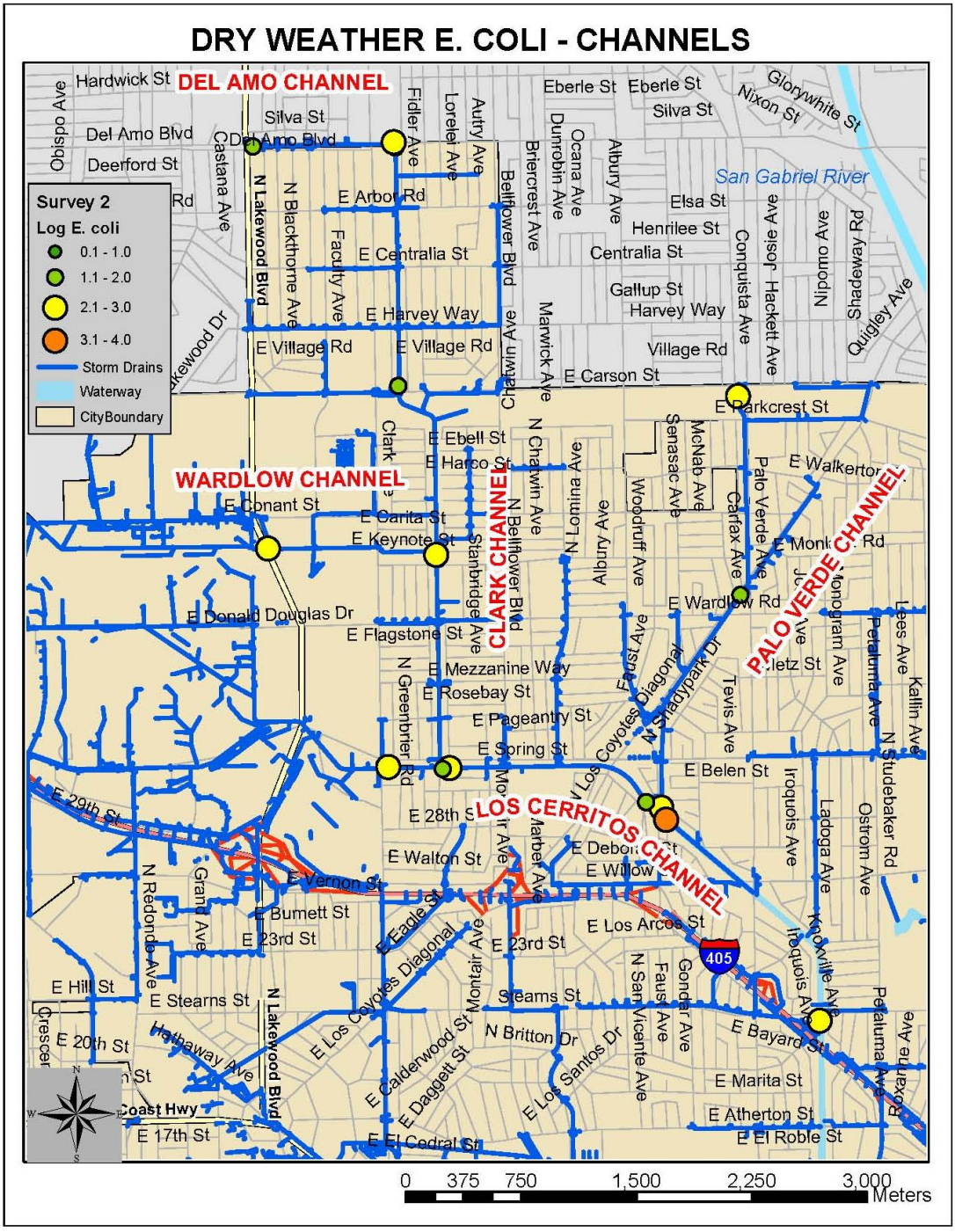


Figure A-16. Concentrations of *E. coli* (Log MPN/100 ml) Measured in Main Channels during Survey 1.



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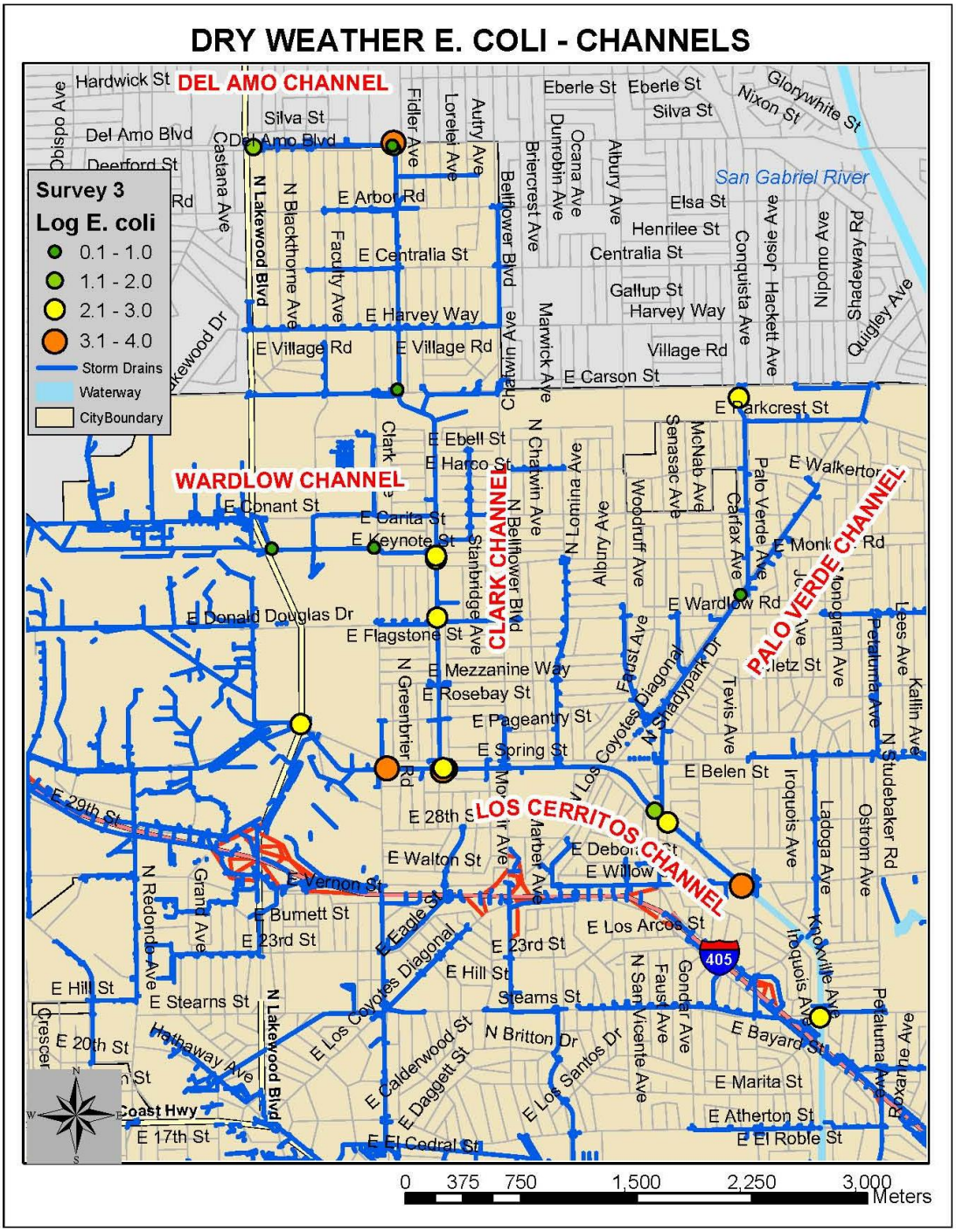


Figure A-18. Concentrations of *E. coli* (Log MPN/100 ml) Measured in Main Channels during Survey 3.

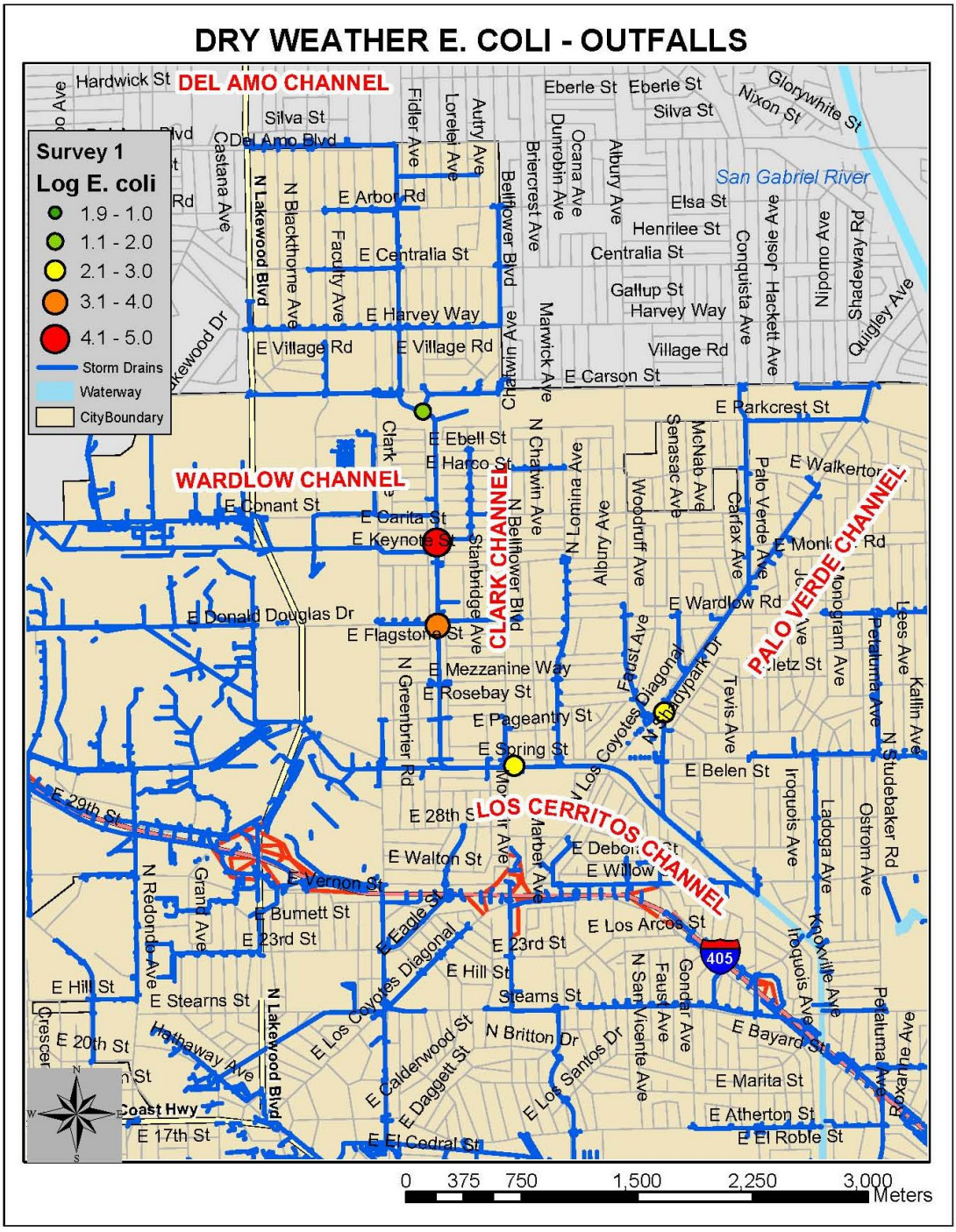
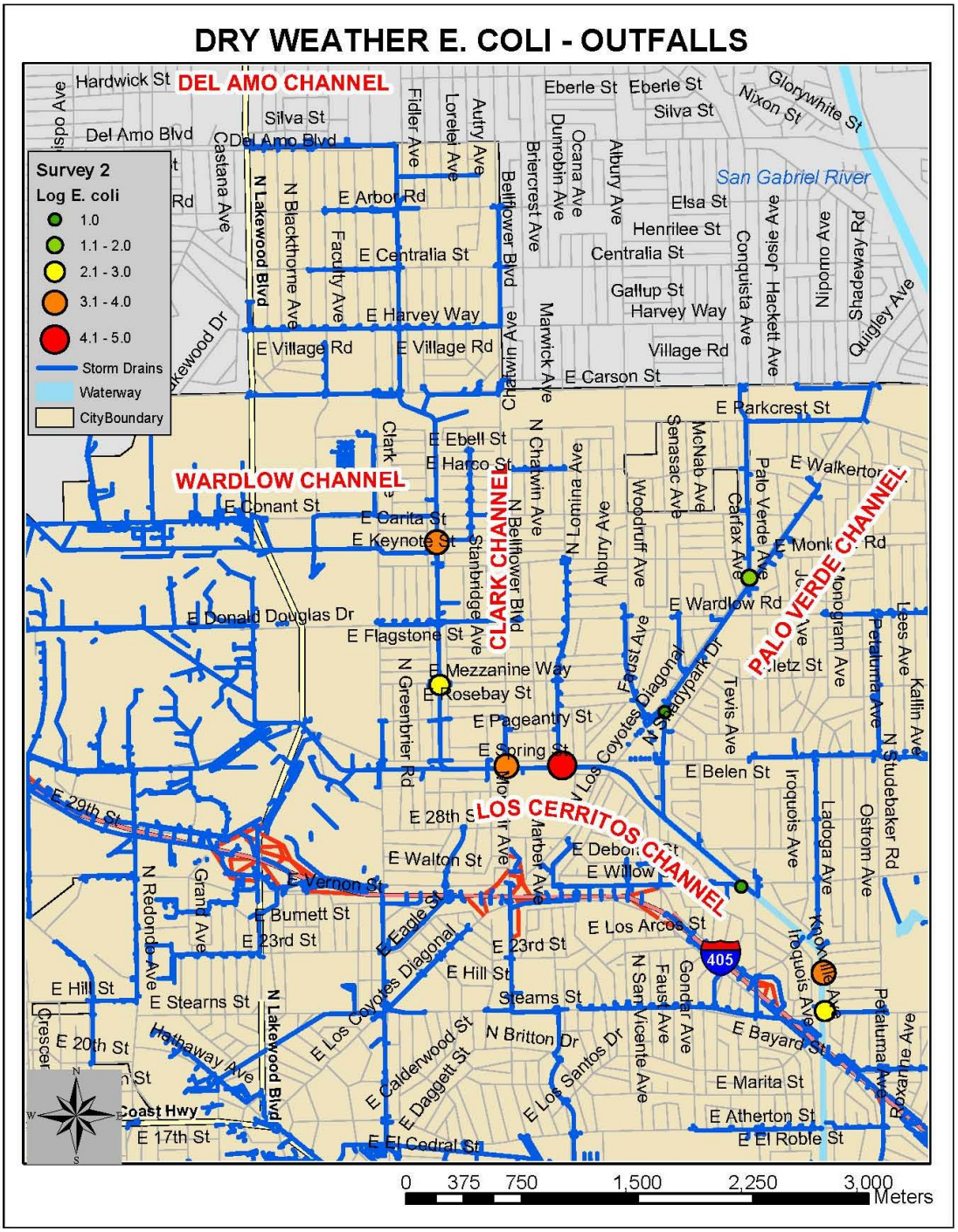


Figure A-19. **Concentrations of *E. coli* (Log MPN/100 ml) Measured in Flowing Outfalls during Survey 1.**



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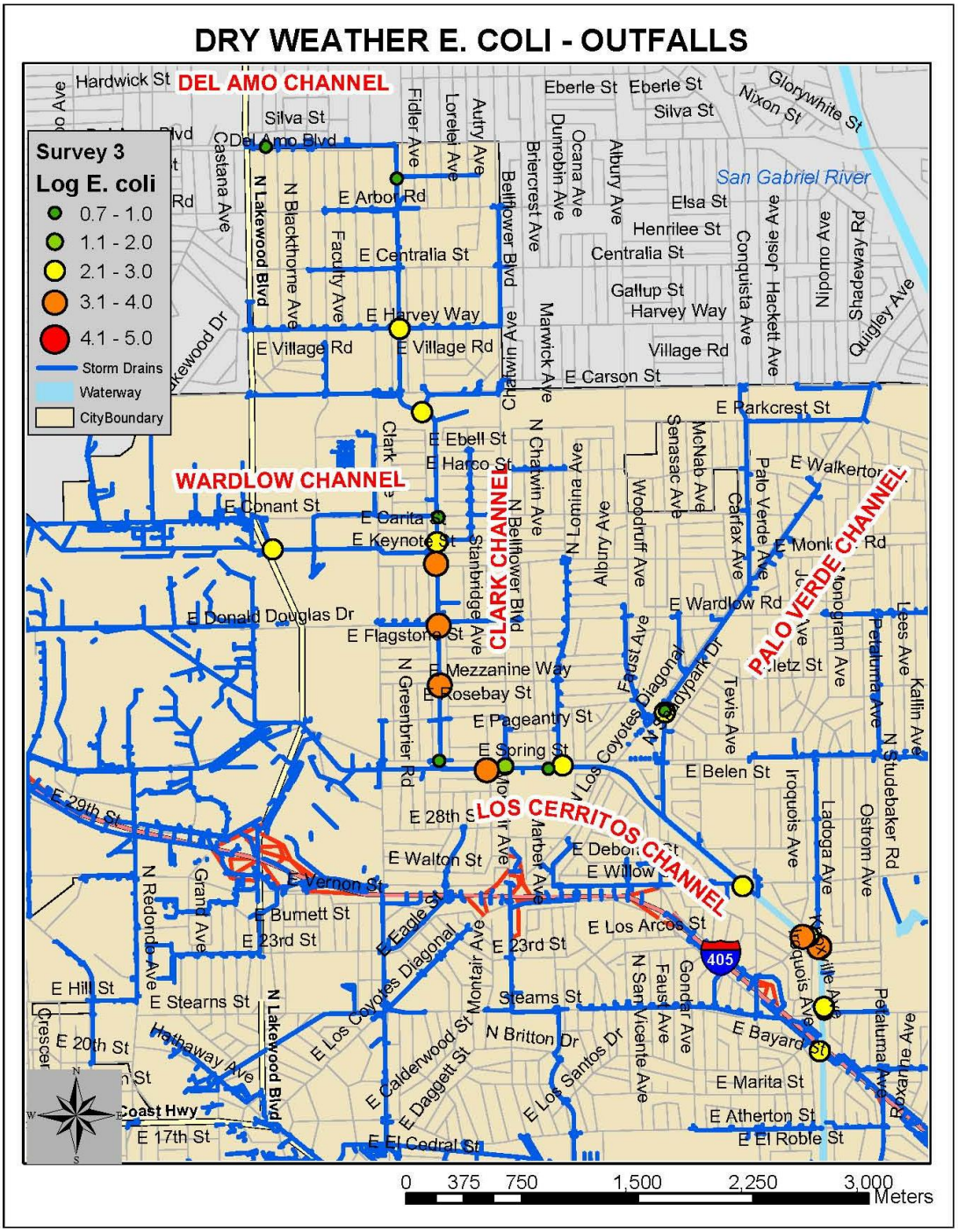


Figure A-21. Concentrations of *E. coli* (Log MPN/100 ml) Measured in Flowing Outfalls during Survey 3.

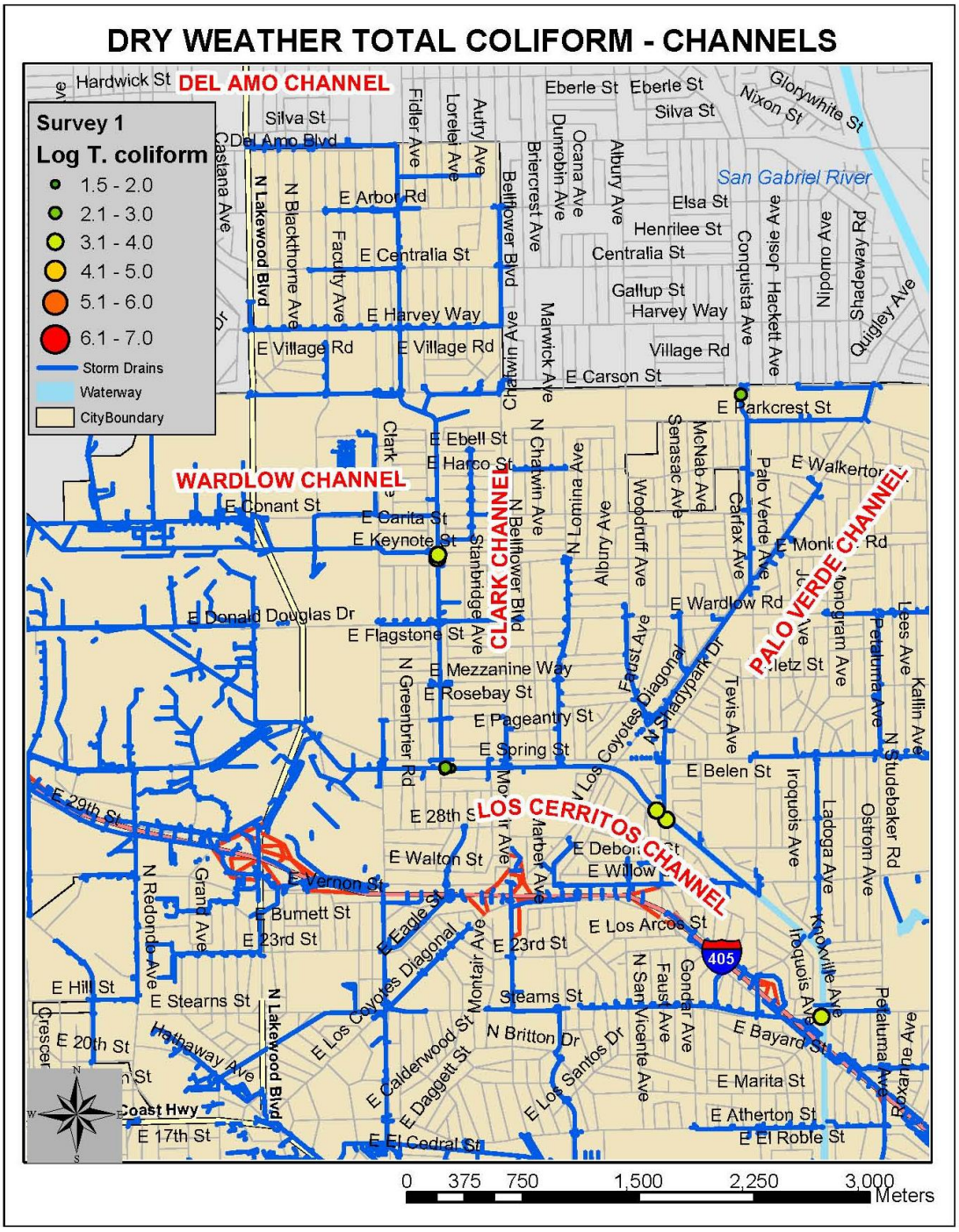
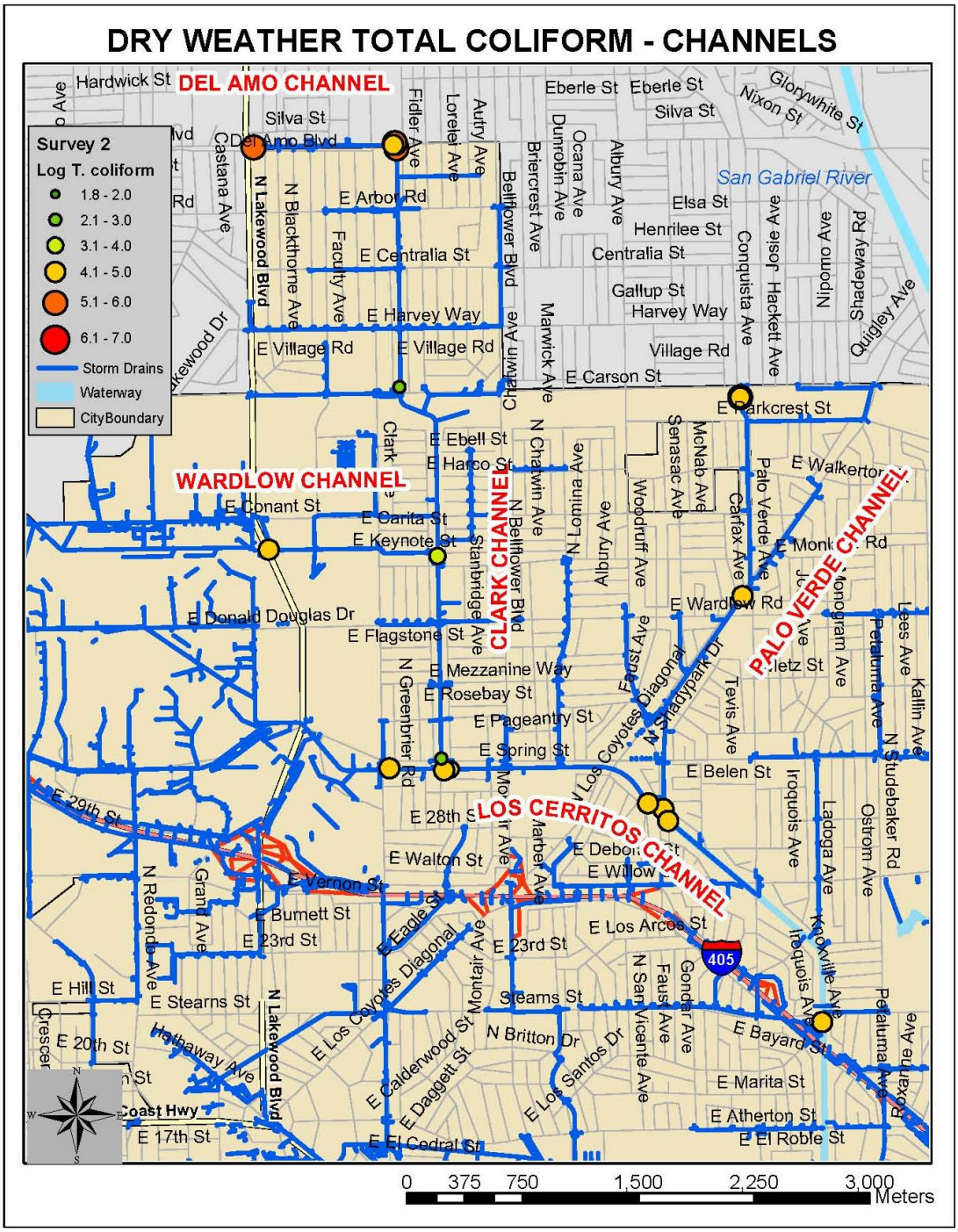


Figure A-22. **Concentrations of Total Coliform (Log MPN/100 ml) Measured in Main Channels during Survey 1.**



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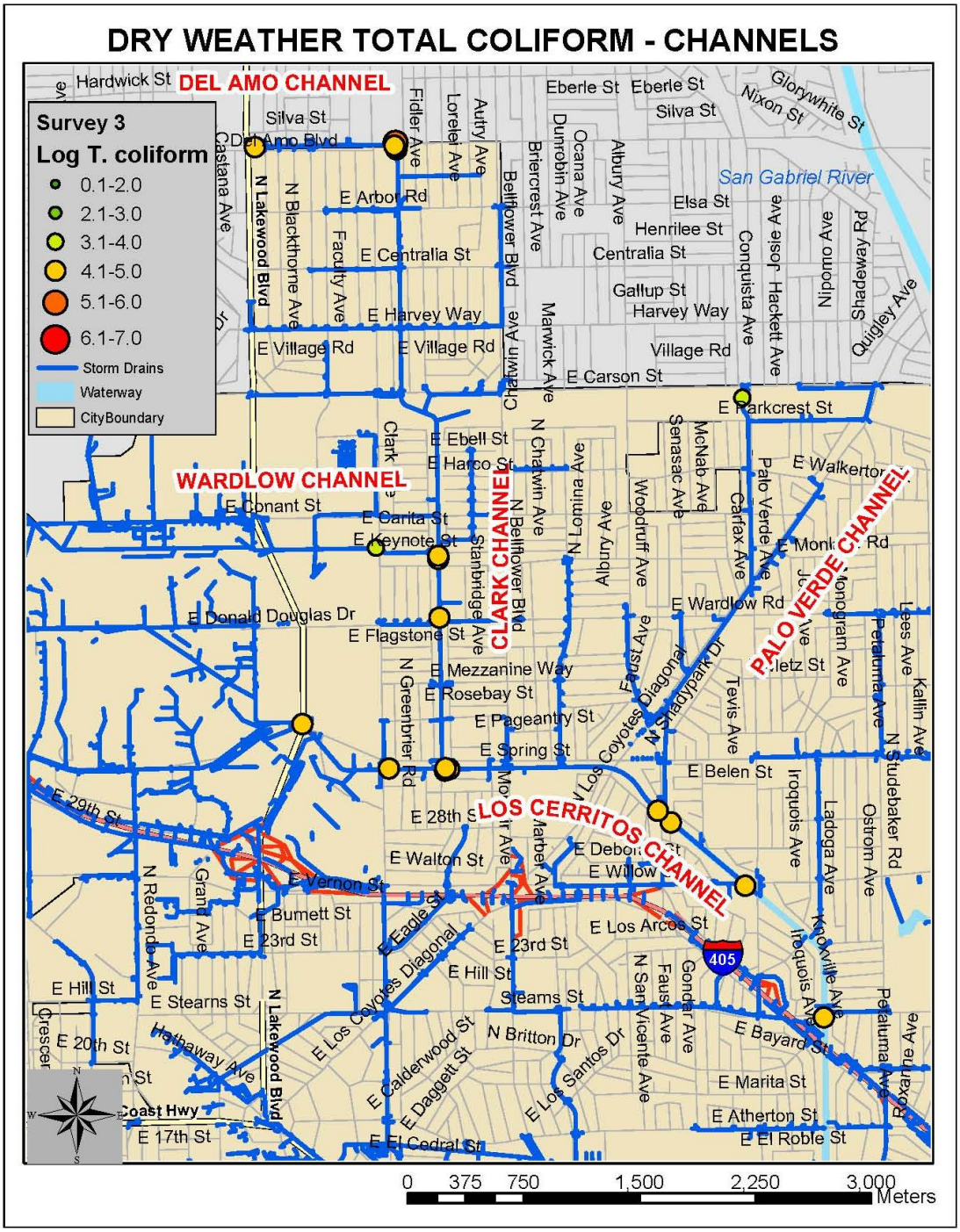

Figure A-24. **Concentrations of Total Coliform (Log MPN/100 ml) Measured in Main Channels during Survey 3.**

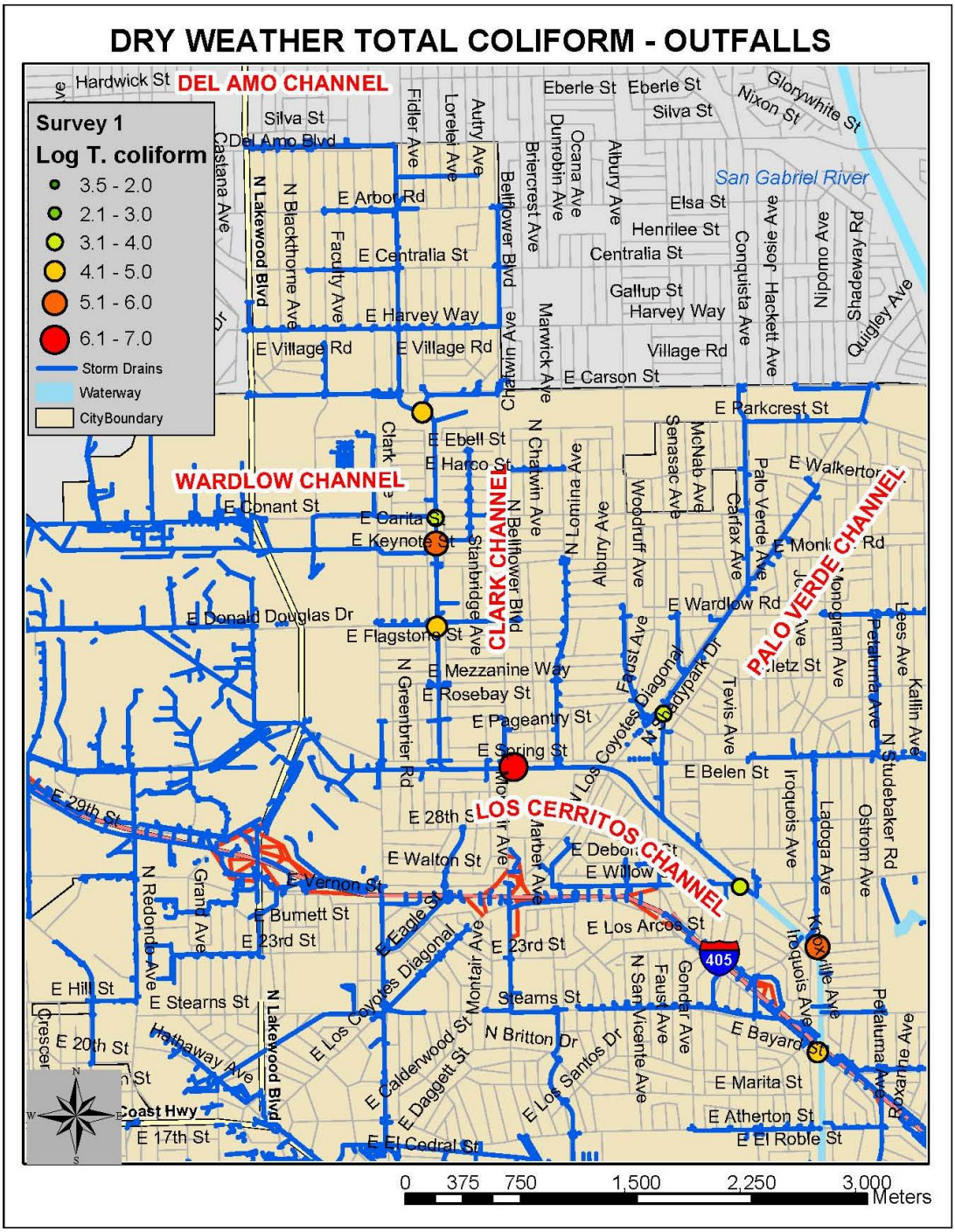

Figure A-25. **Concentrations of Total Coliform (Log MPN/100 ml) Measured in Flowing Outfalls during Survey 1.**

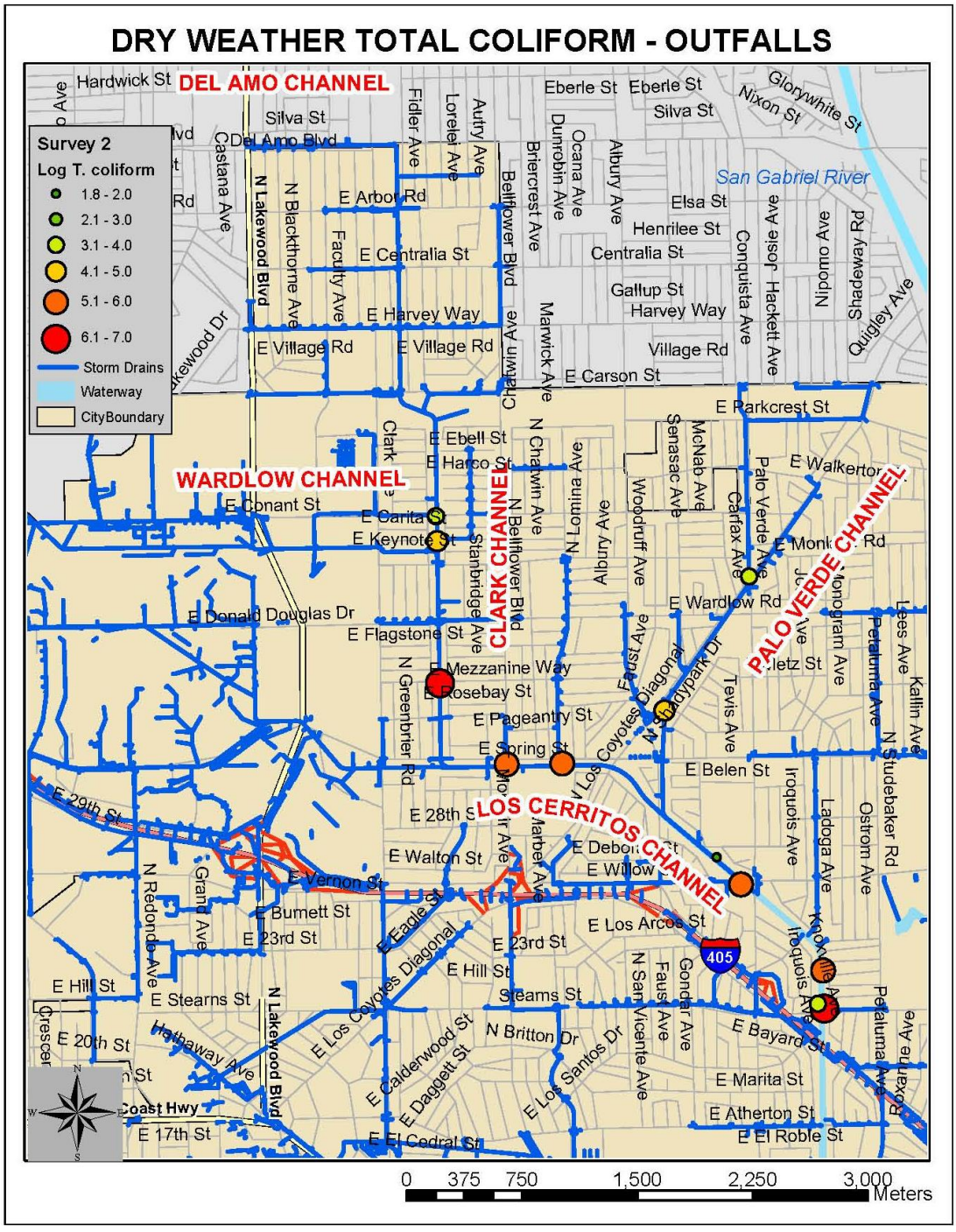

Figure A-26. **Concentrations of Total Coliform (Log MPN/100 ml) Measured in Flowing Outfalls during Survey 2.**

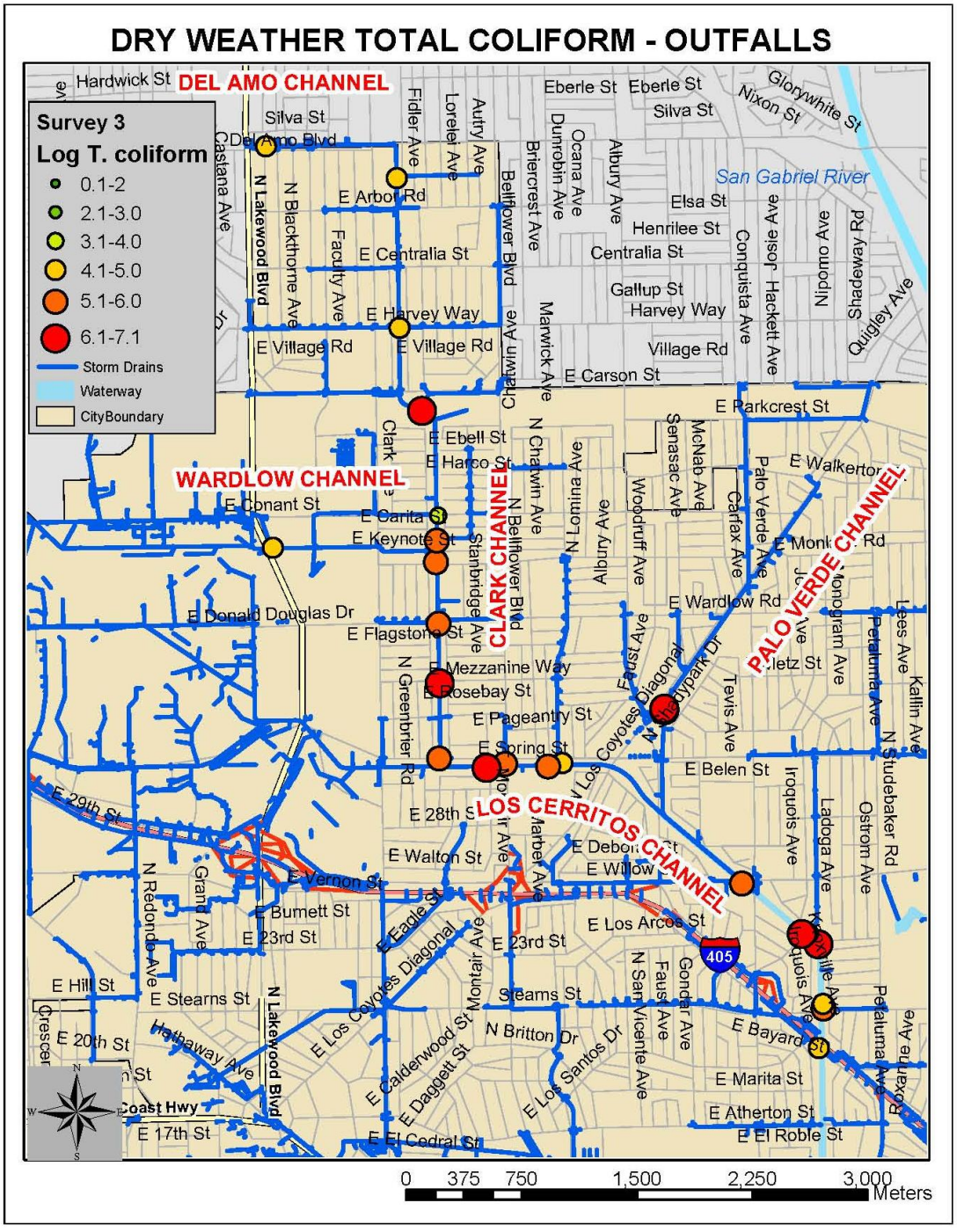

Figure A-27. **Concentrations of Total Coliform (Log MPN/100 ml) Measured in Flowing Outfalls during Survey 3.**

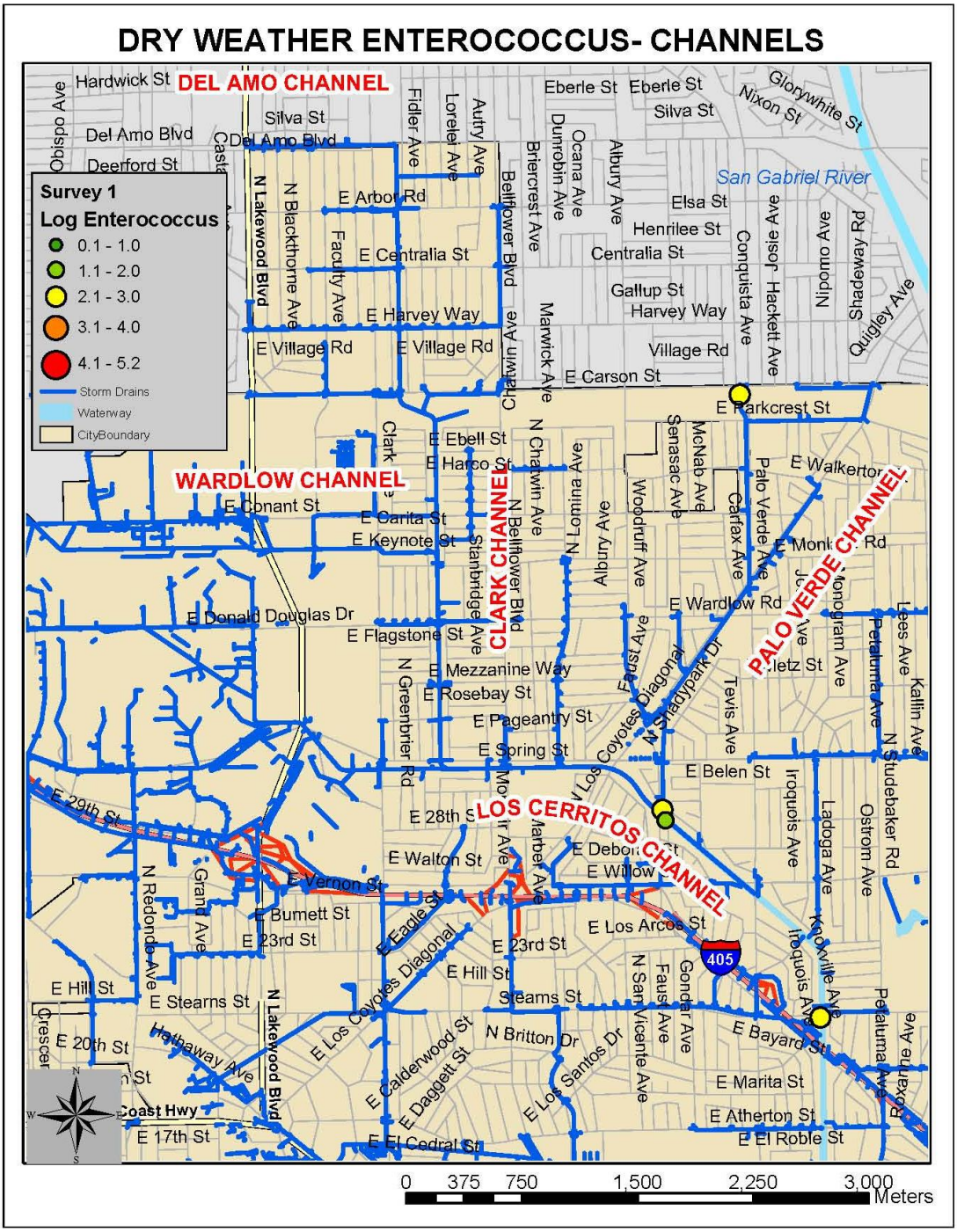

Figure A-28. Concentrations of Enterococcus (Log MPN/100 ml) Measured in Main Channels during Survey 1.

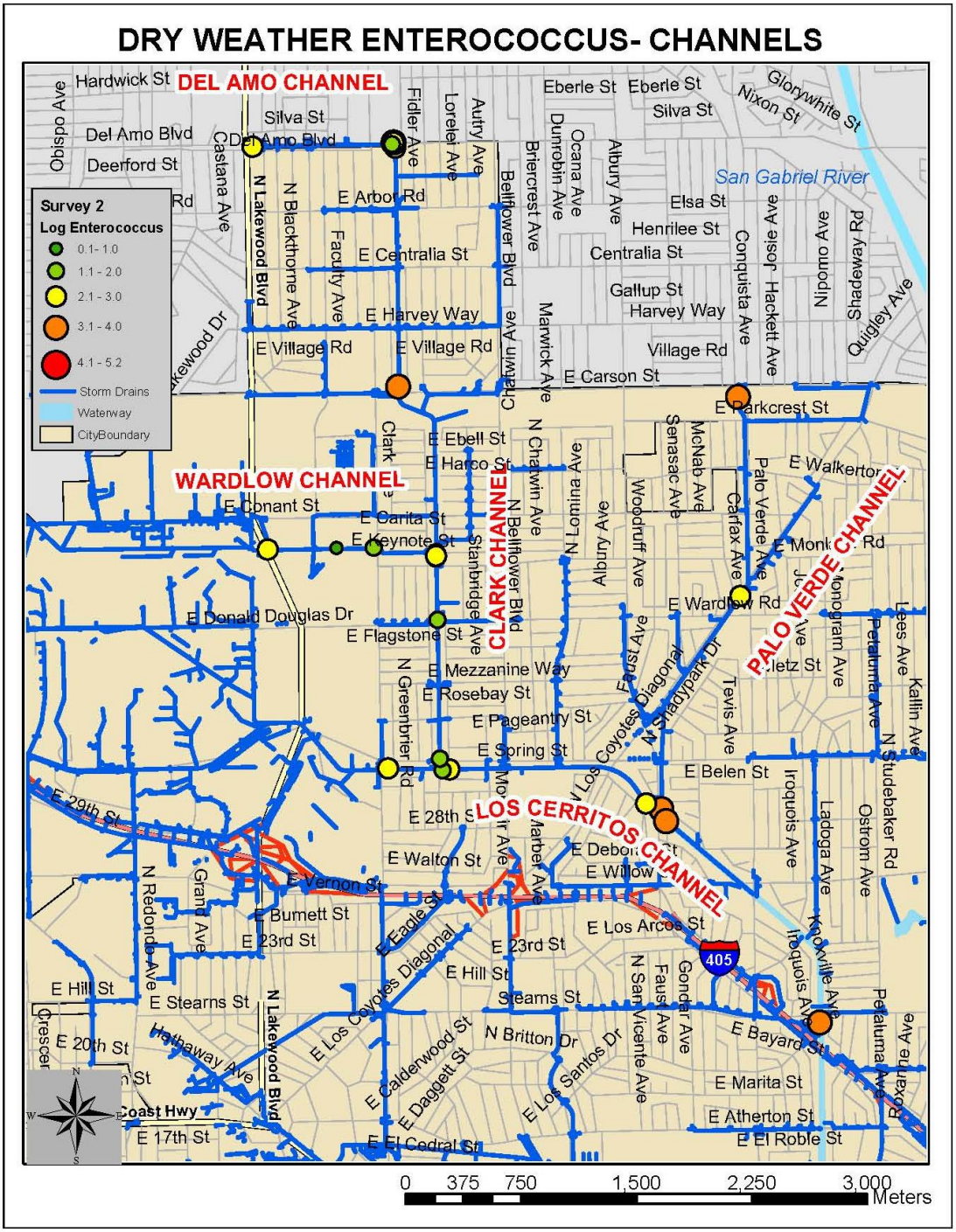

Figure A-29. Concentrations of Enterococcus (Log MPN/100 ml) Measured in Main Channels during Survey 2.

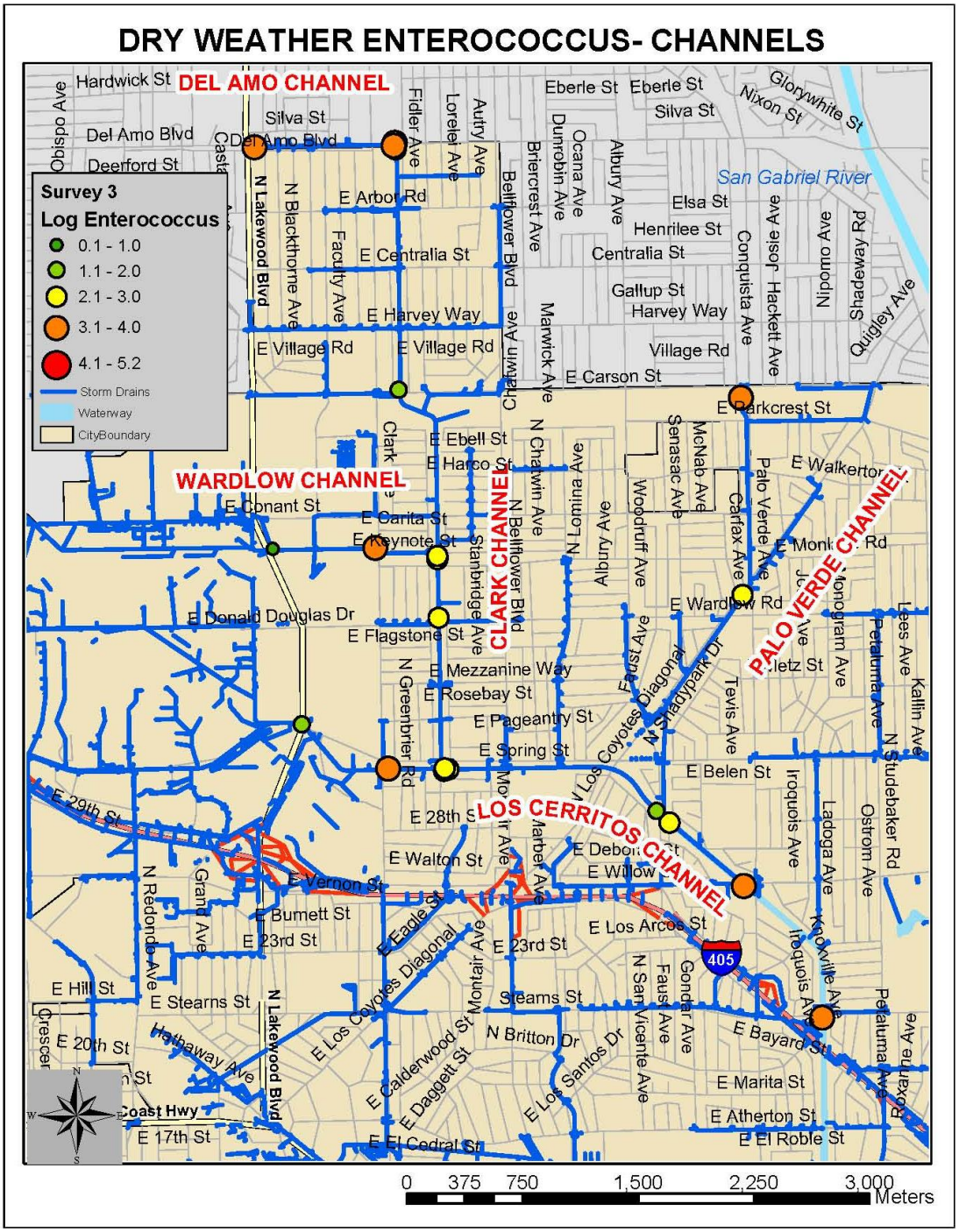

Figure A-30. Concentrations of Enterococcus (Log MPN/100 ml) Measured in Main Channels during Survey 3.

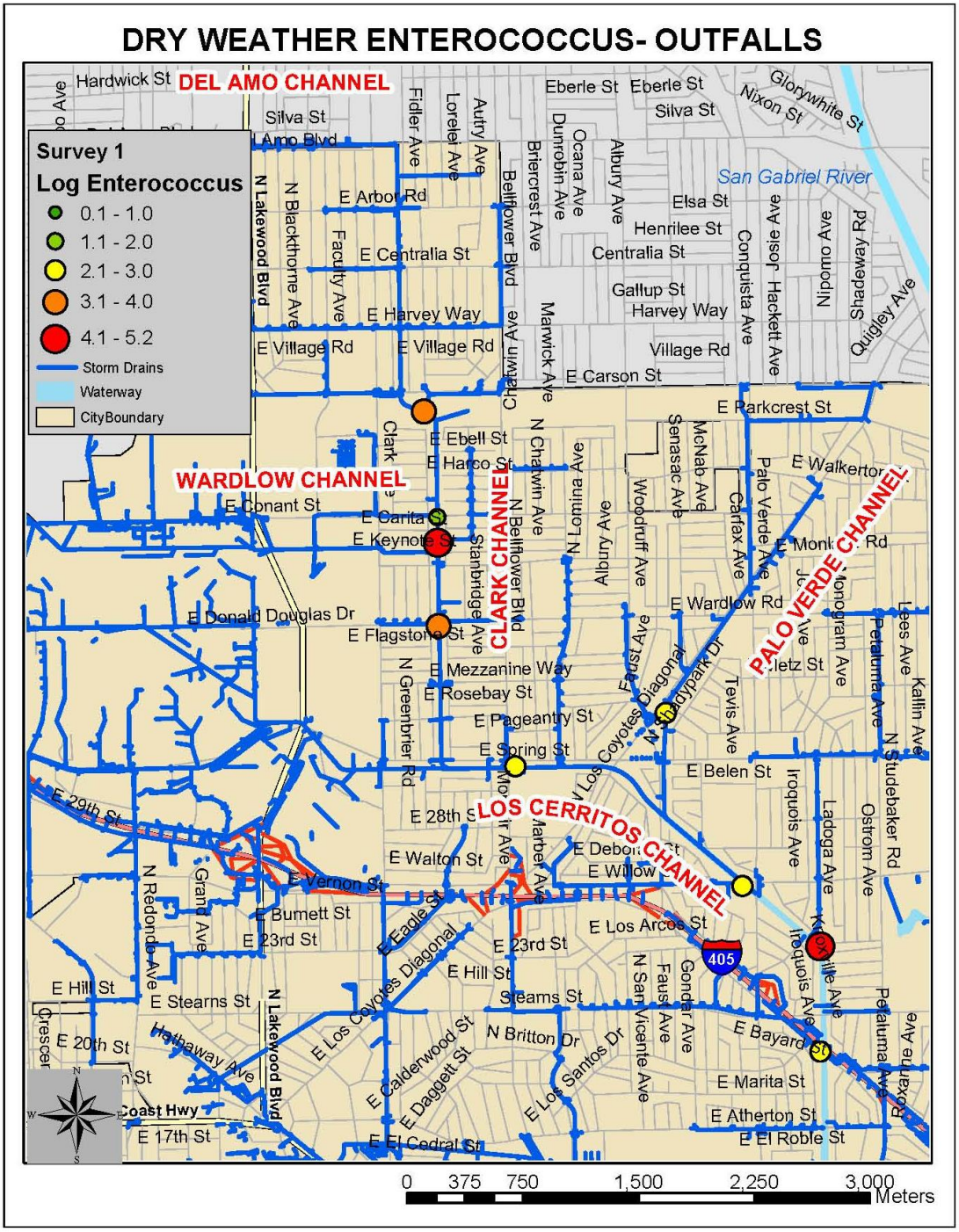

Figure A-31. **Concentrations of Enterococcus (Log MPN/100 ml) Measured in Flowing Outfalls during Survey 1.**

Figure A-32. **Concentrations of Enterococcus (Log MPN/100 ml) Measured in Flowing Outfalls during Survey 2.**

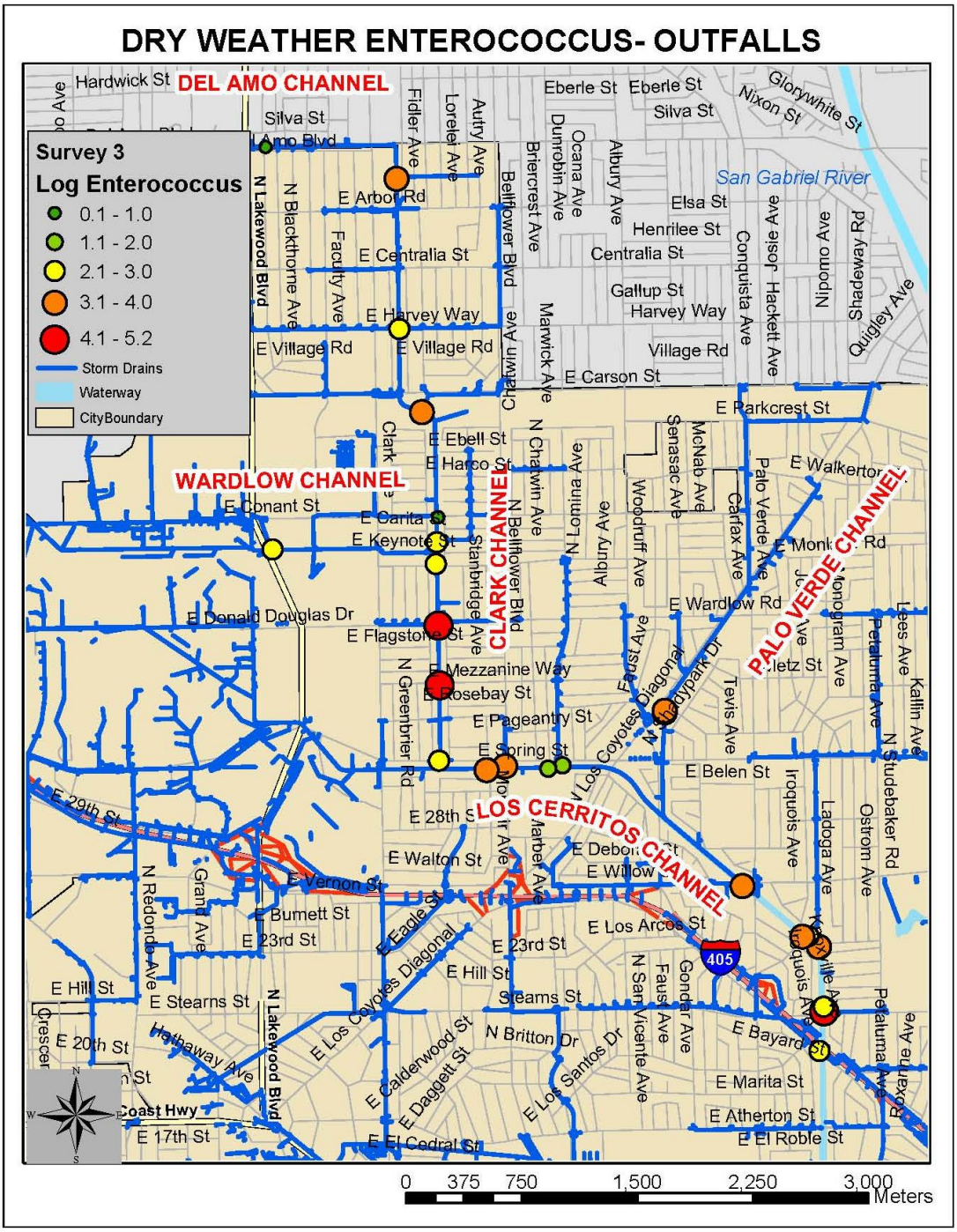

Figure A-33. **Concentrations of Enterococcus (Log MPN/100 ml) Measured in Flowing Outfalls during Survey 3.**

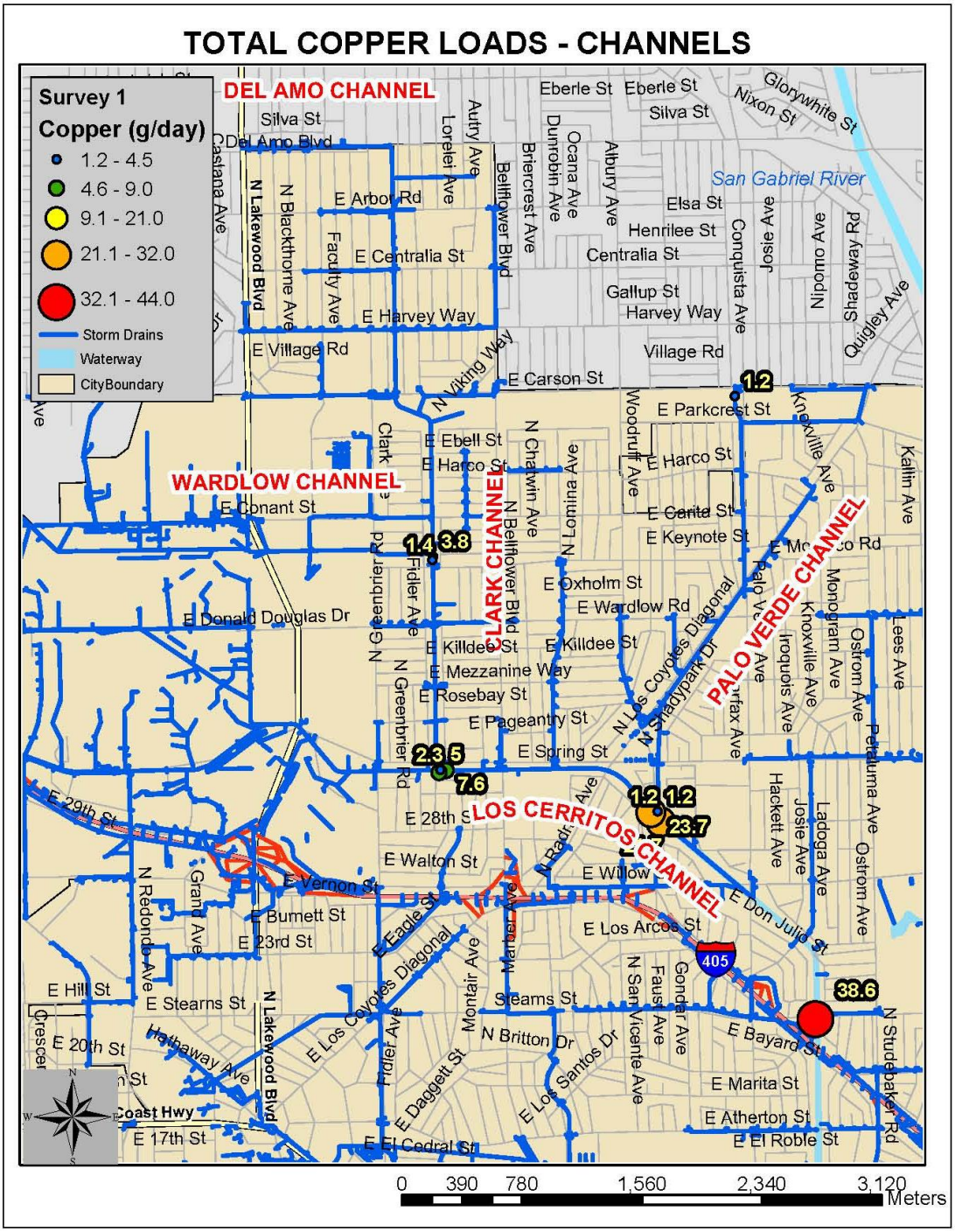

Figure A-34. Total Copper Loads Measured in Main Channels during Survey 1.

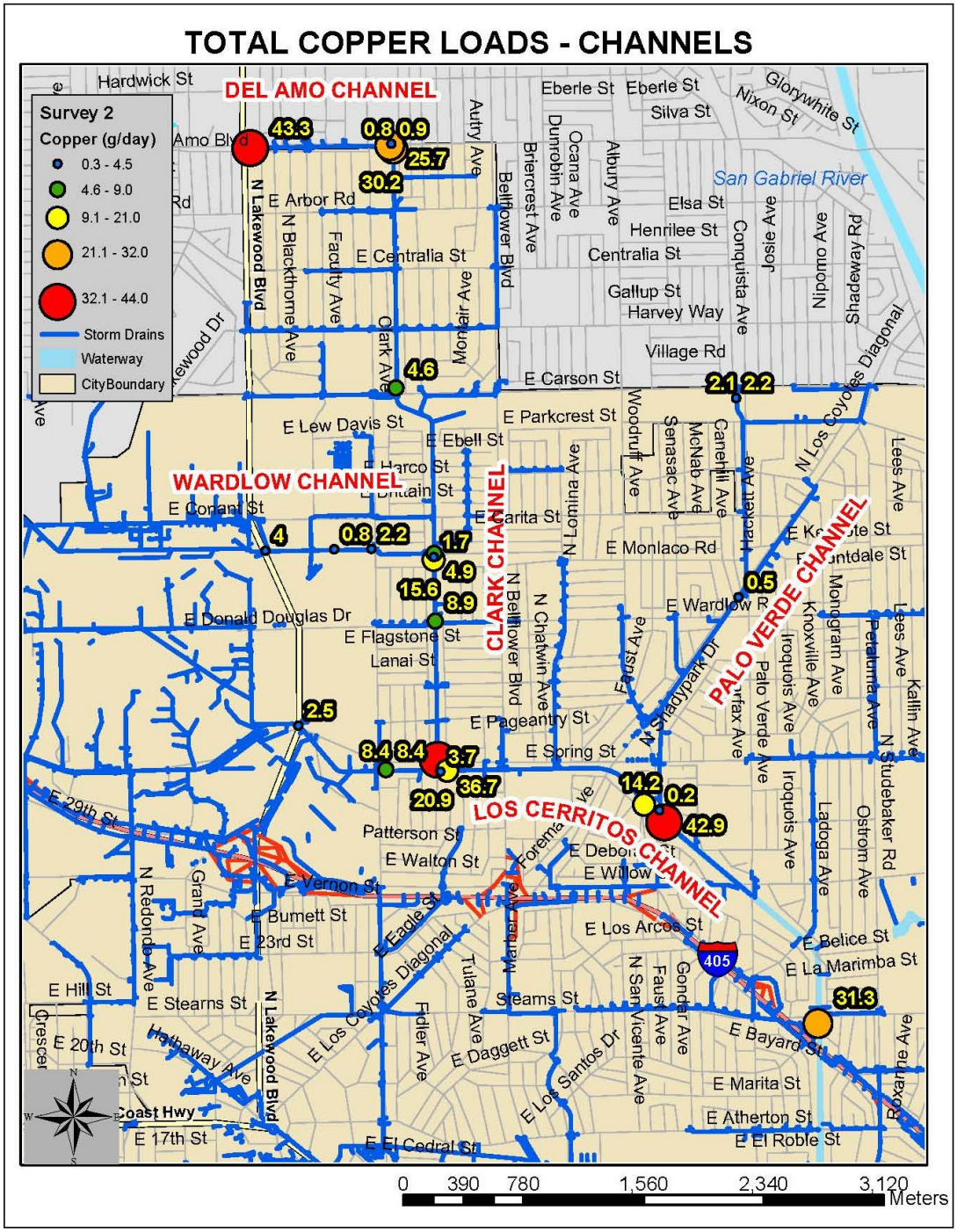

Figure A-35. **Total Copper Loads Measured in Main Channels during Survey2.**

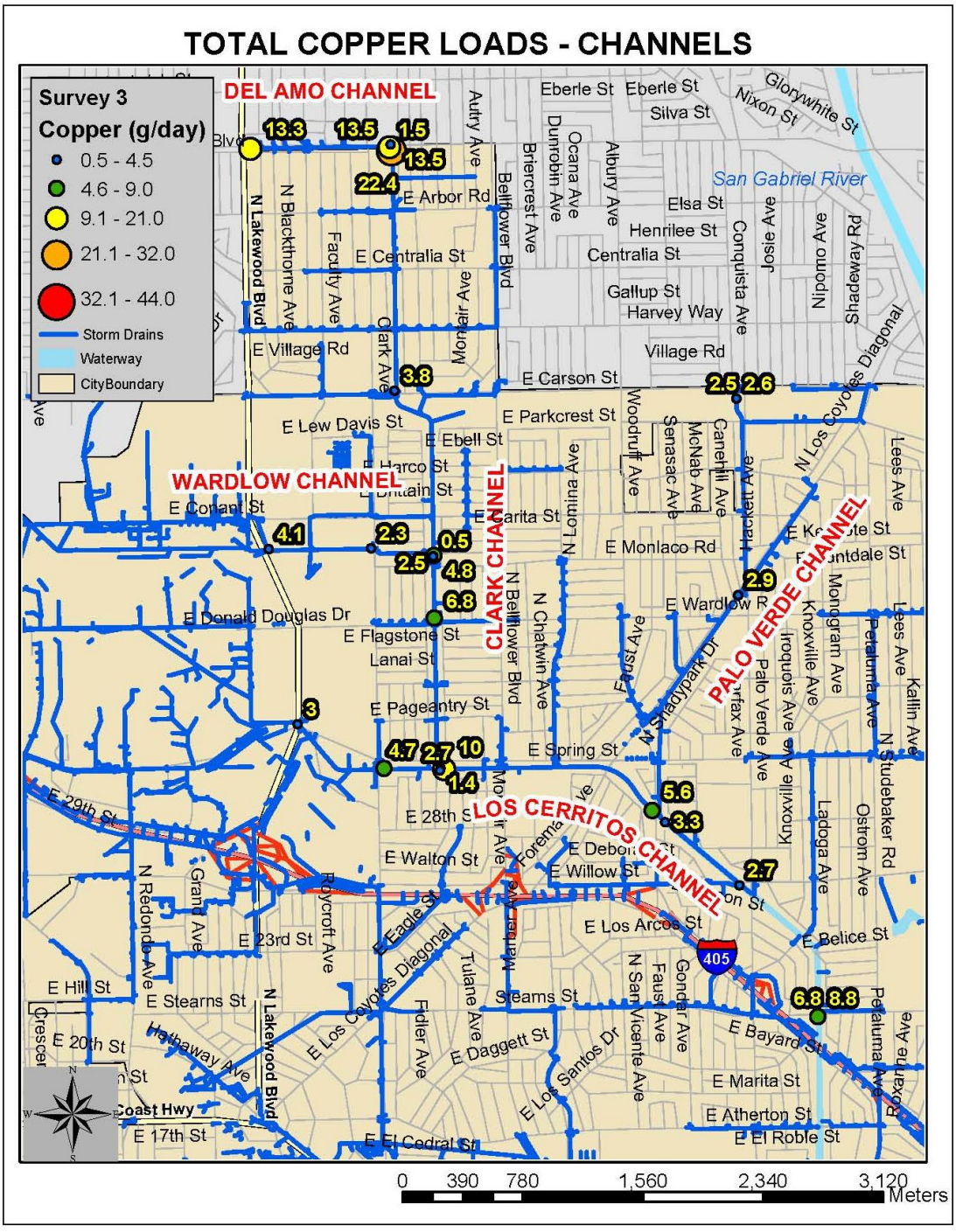

Figure A-36. **Total Copper Loads Measured in Main Channels during Survey3.**

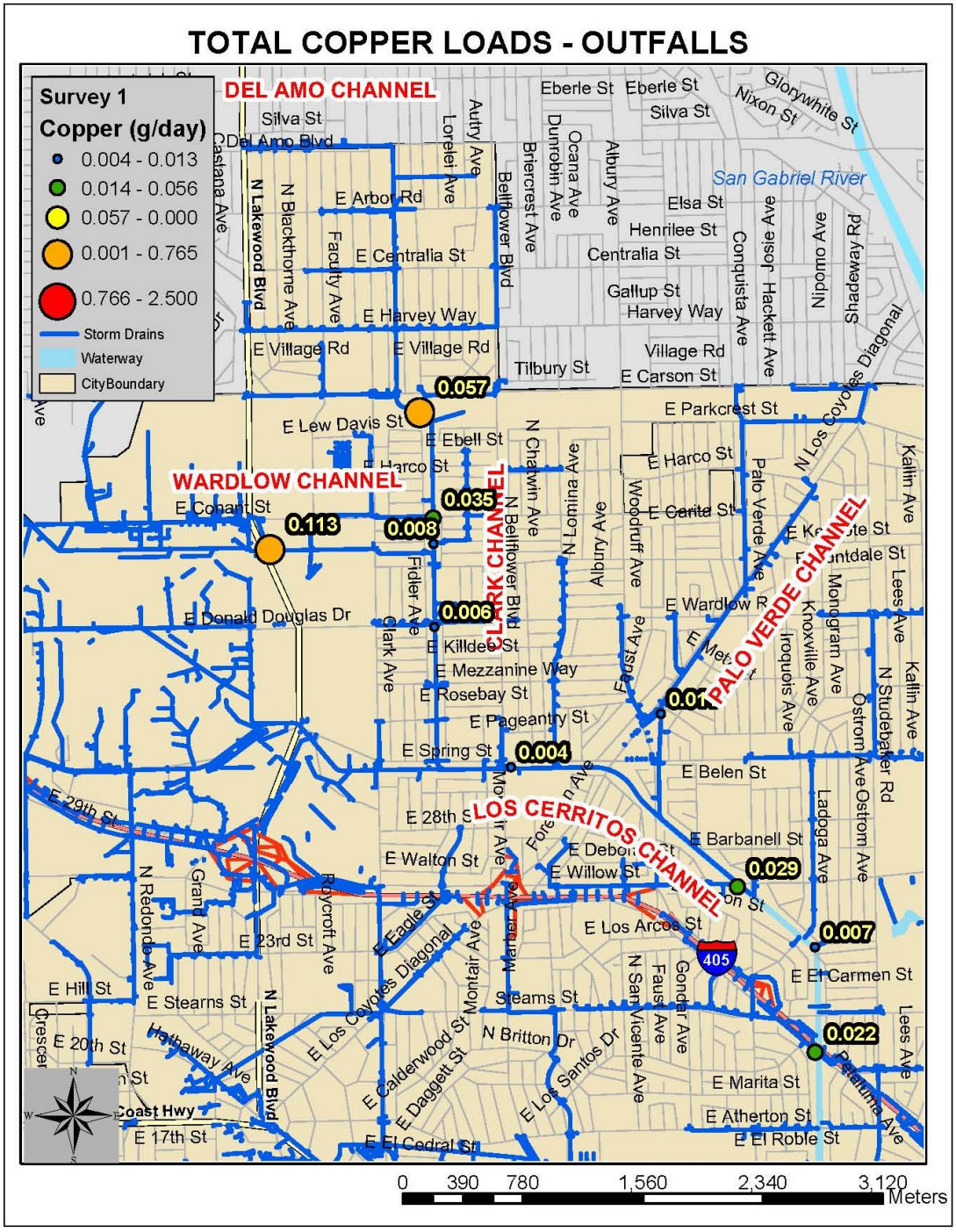

Figure A-37. **Total Copper Loads Measured in Flowing Outfalls during Survey 1.**

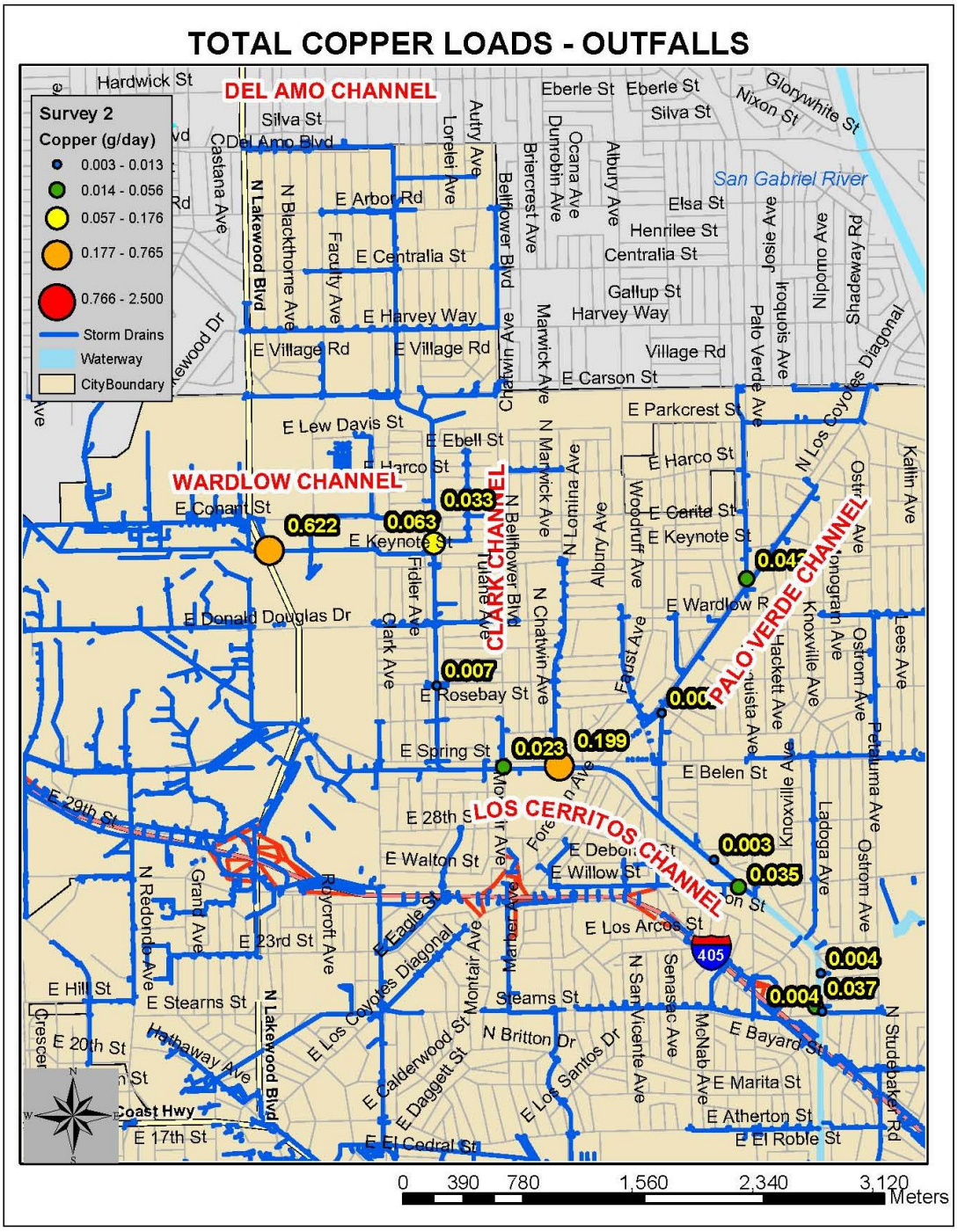

Figure A-38. Total Copper Loads Measured in Flowing Outfalls during Survey 2.

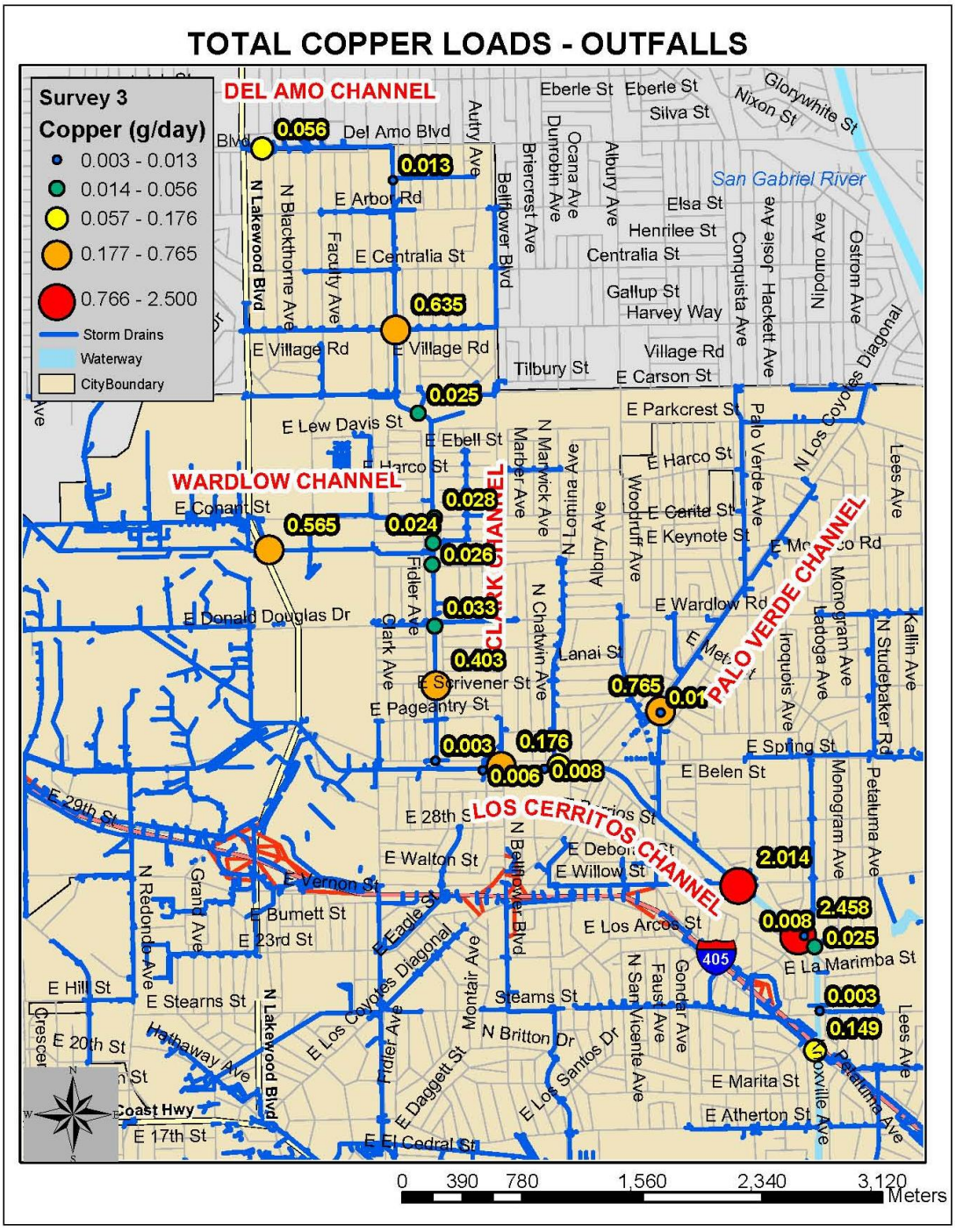

Figure A-39. Total Copper Loads Measured in Flowing Outfalls during Survey 3.

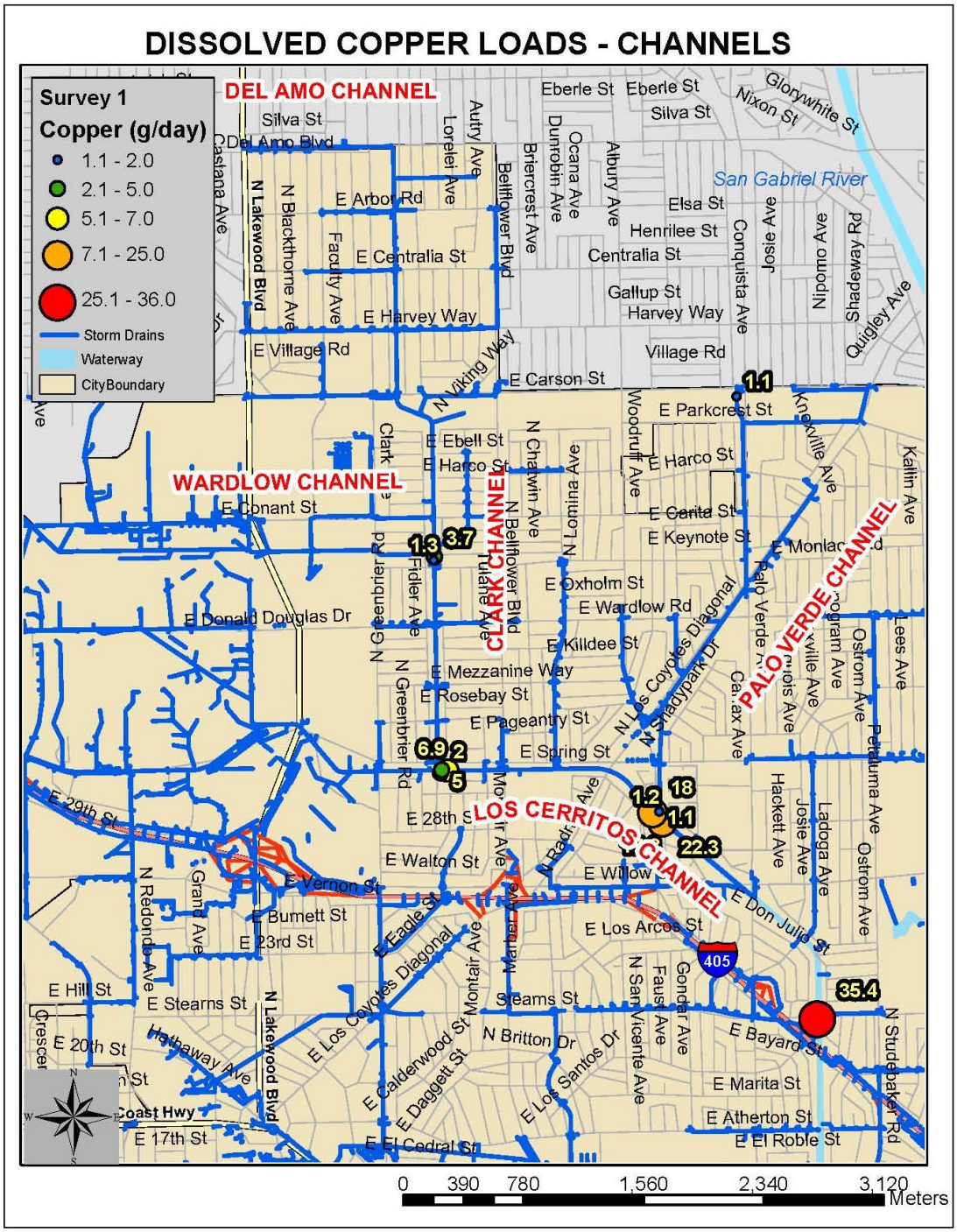

Figure A-40. **Dissolved Copper Loads Measured in Main Channels during Survey 1.**

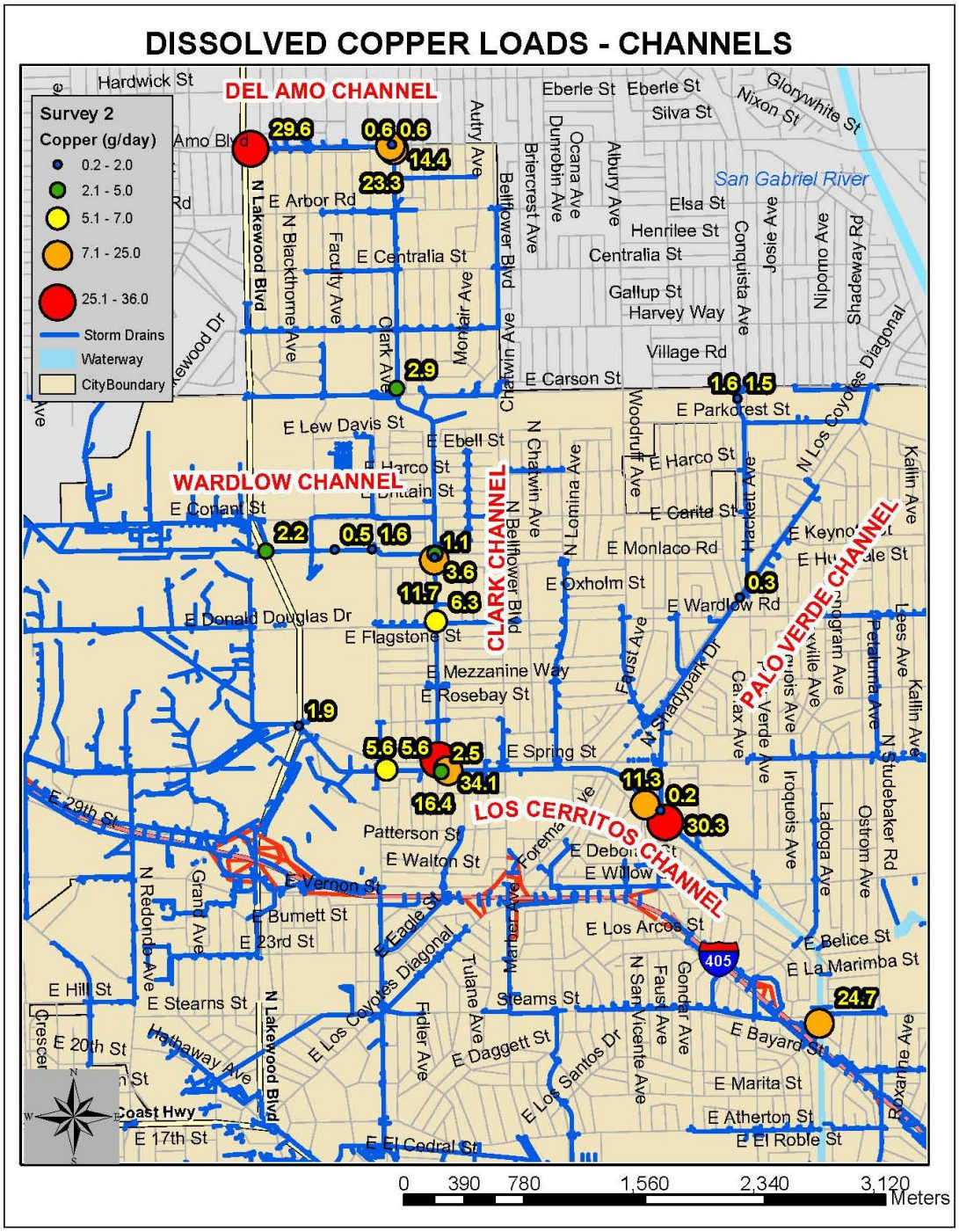

Figure A-41. Dissolved Copper Loads Measured in Main Channels during Survey 2.

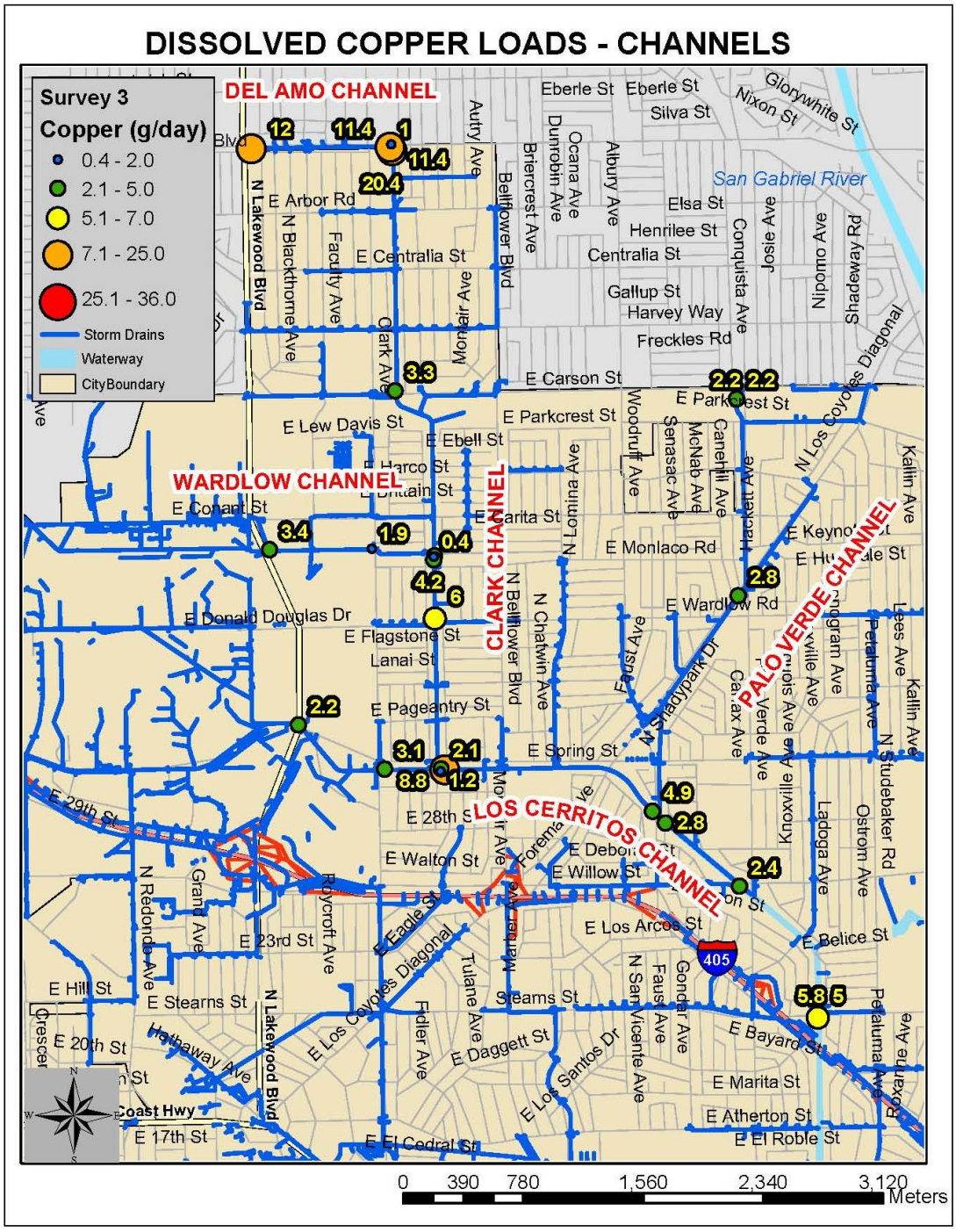

Figure A-42. **Dissolved Copper Loads Measured in Main Channels during Survey 3.**

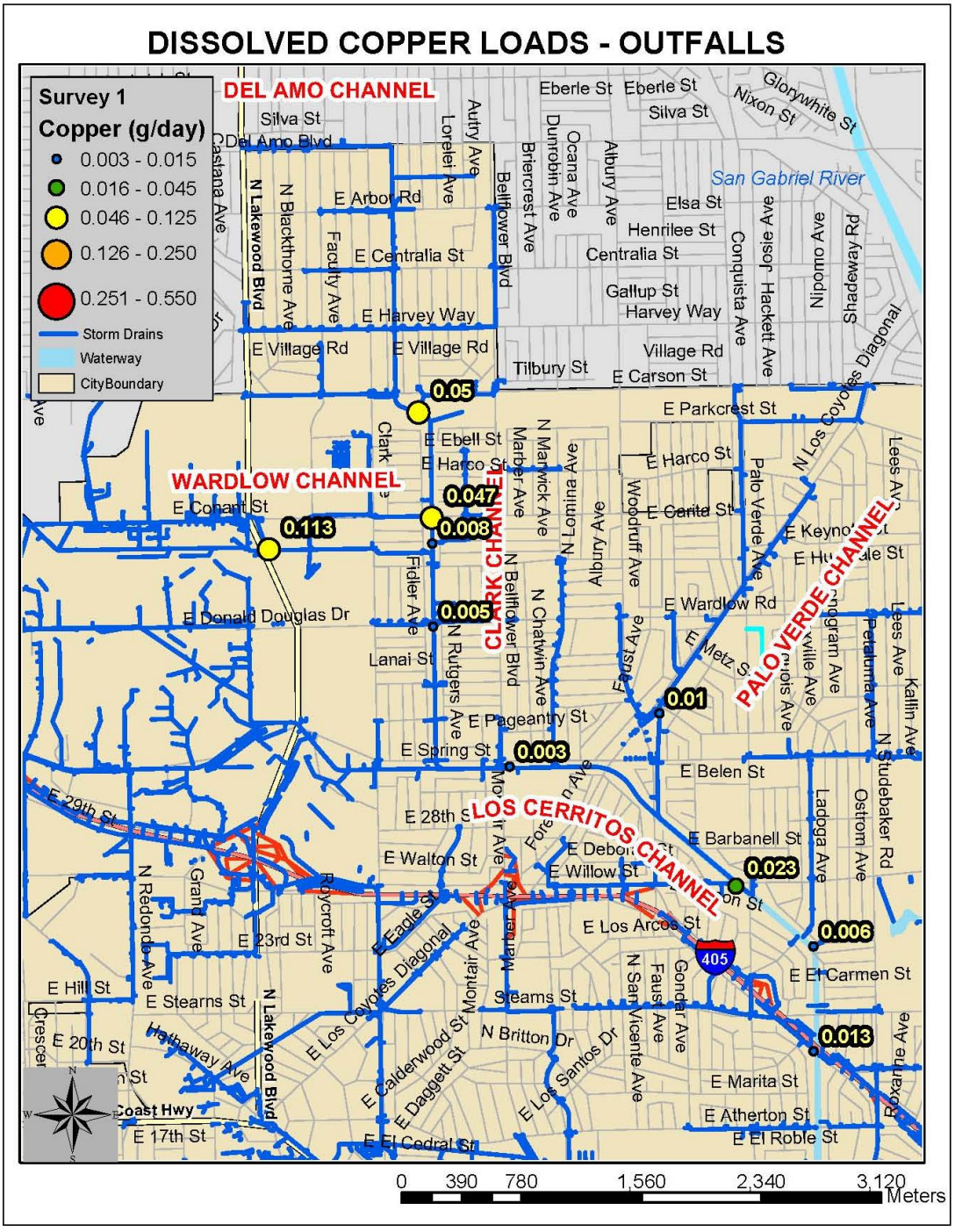

Figure A-43. Dissolved Copper Loads Measured in Flowing Outfalls during Survey 1.

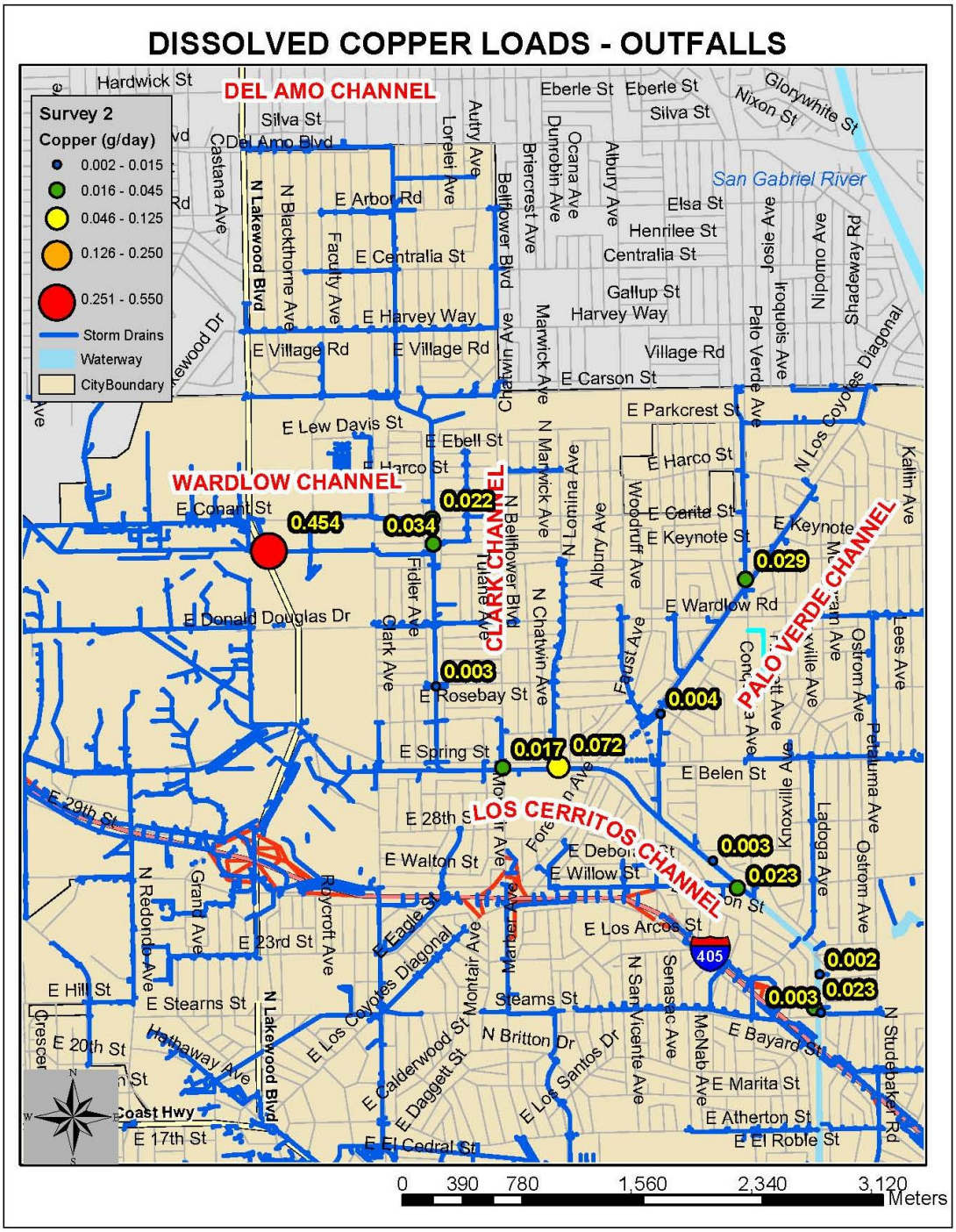

Figure A-44. Dissolved Copper Loads Measured in Flowing Outfalls during Survey 2.

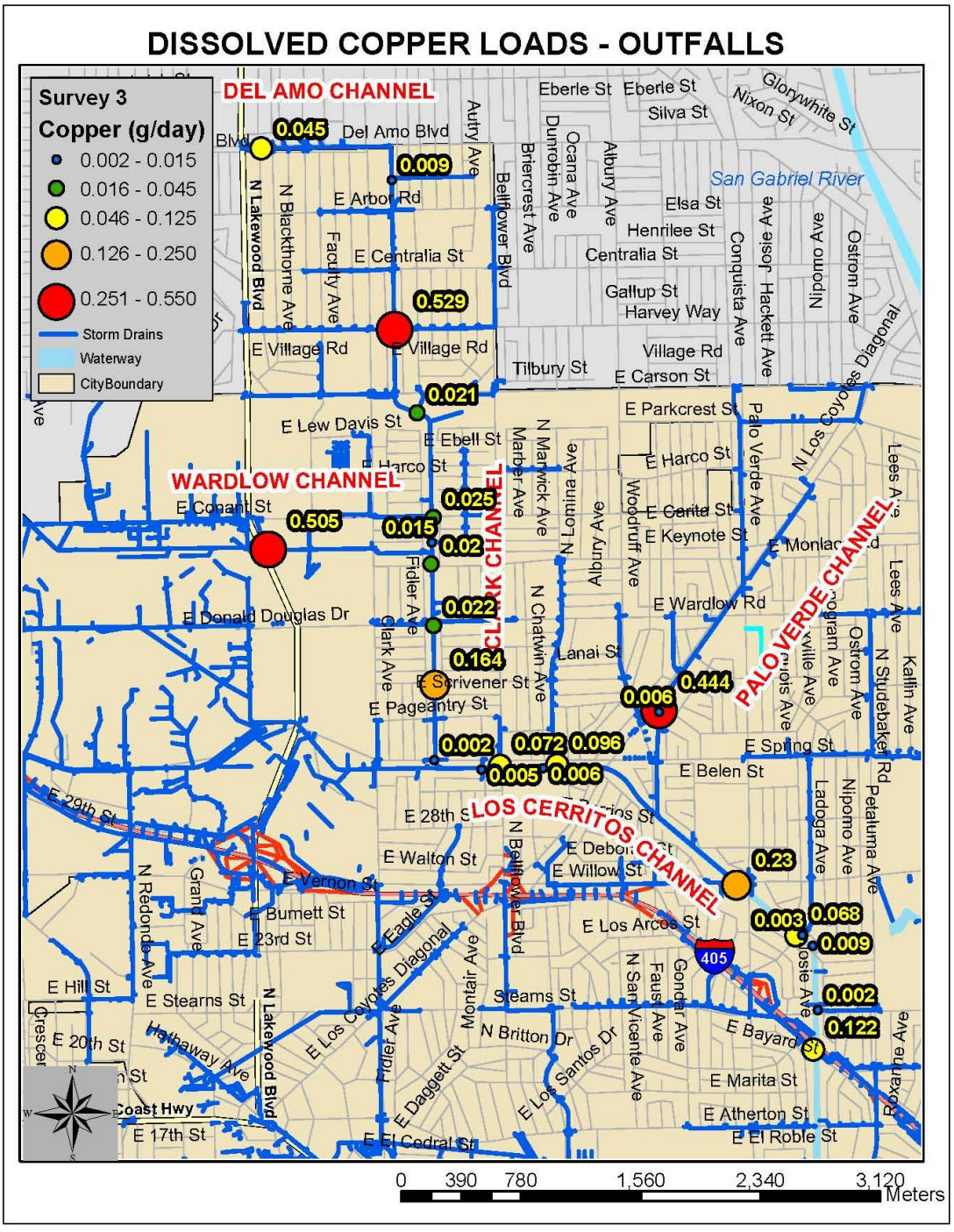

Figure A-45. Dissolved Copper Loads Measured in Flowing Outfalls during Survey 3.

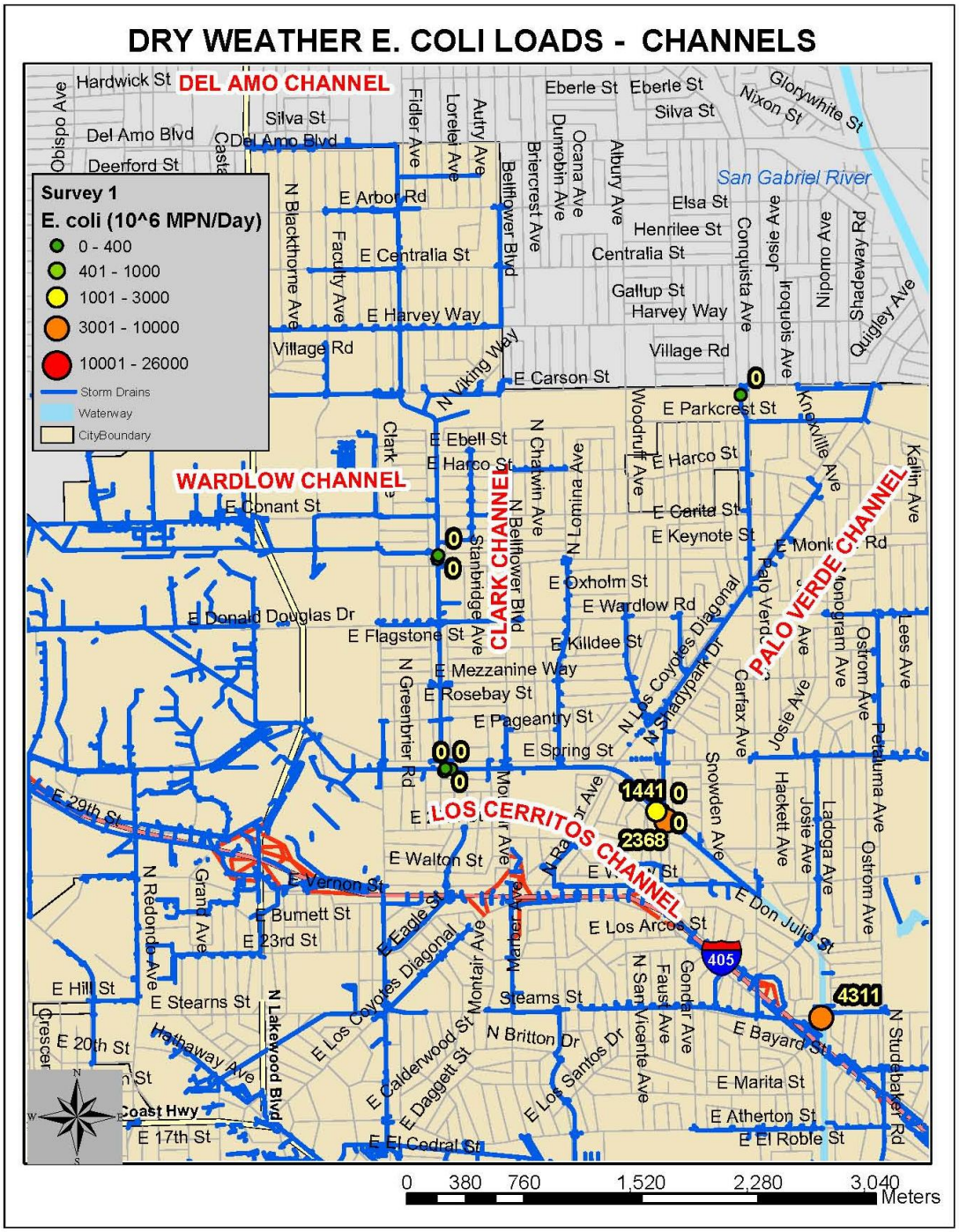

Figure A-46. ***E. coli*** **Loads Measured in Main Channels during Survey 1.**

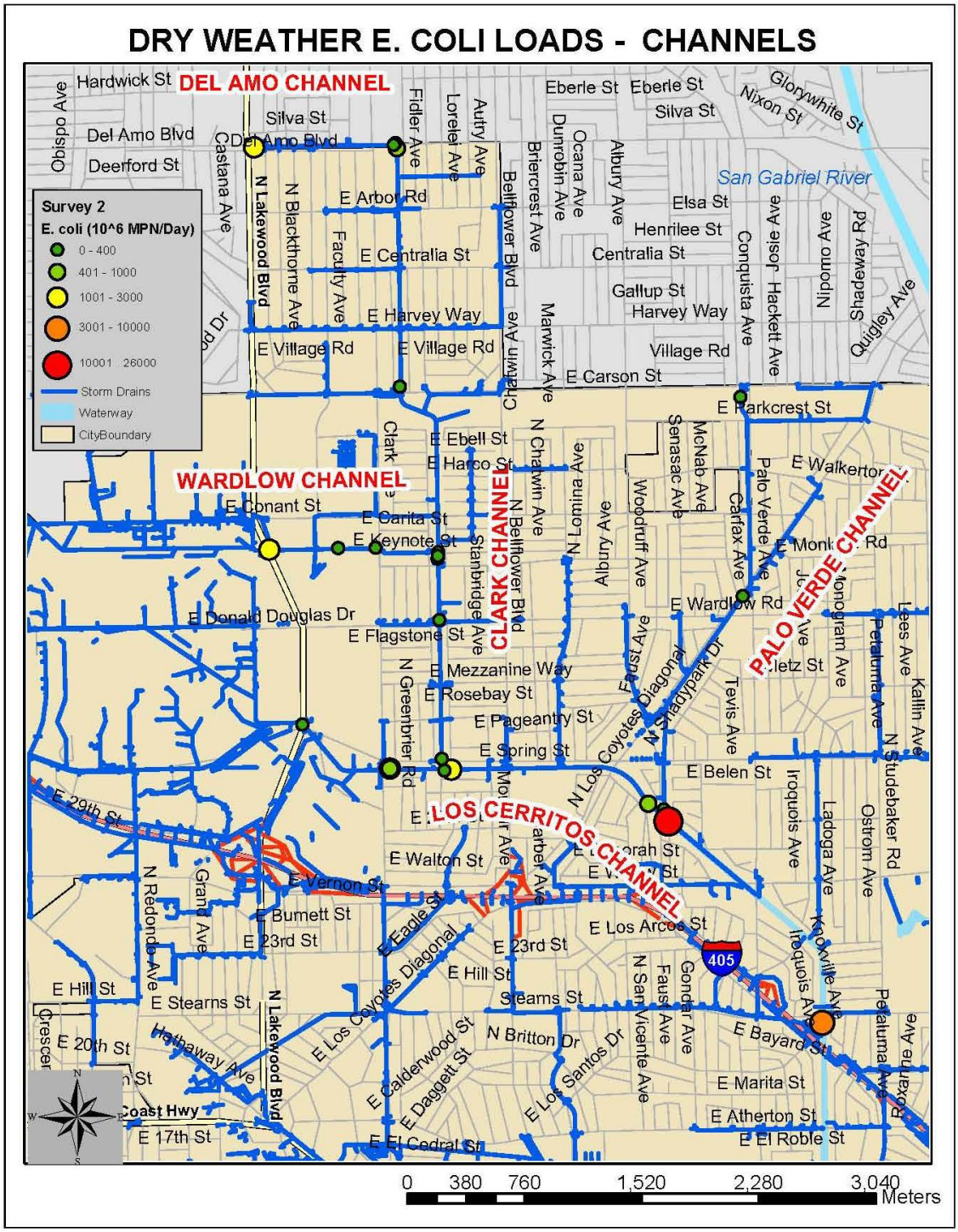

Figure A-47. ***E. coli*** **Loads Measured in Main Channels during Survey 2.**

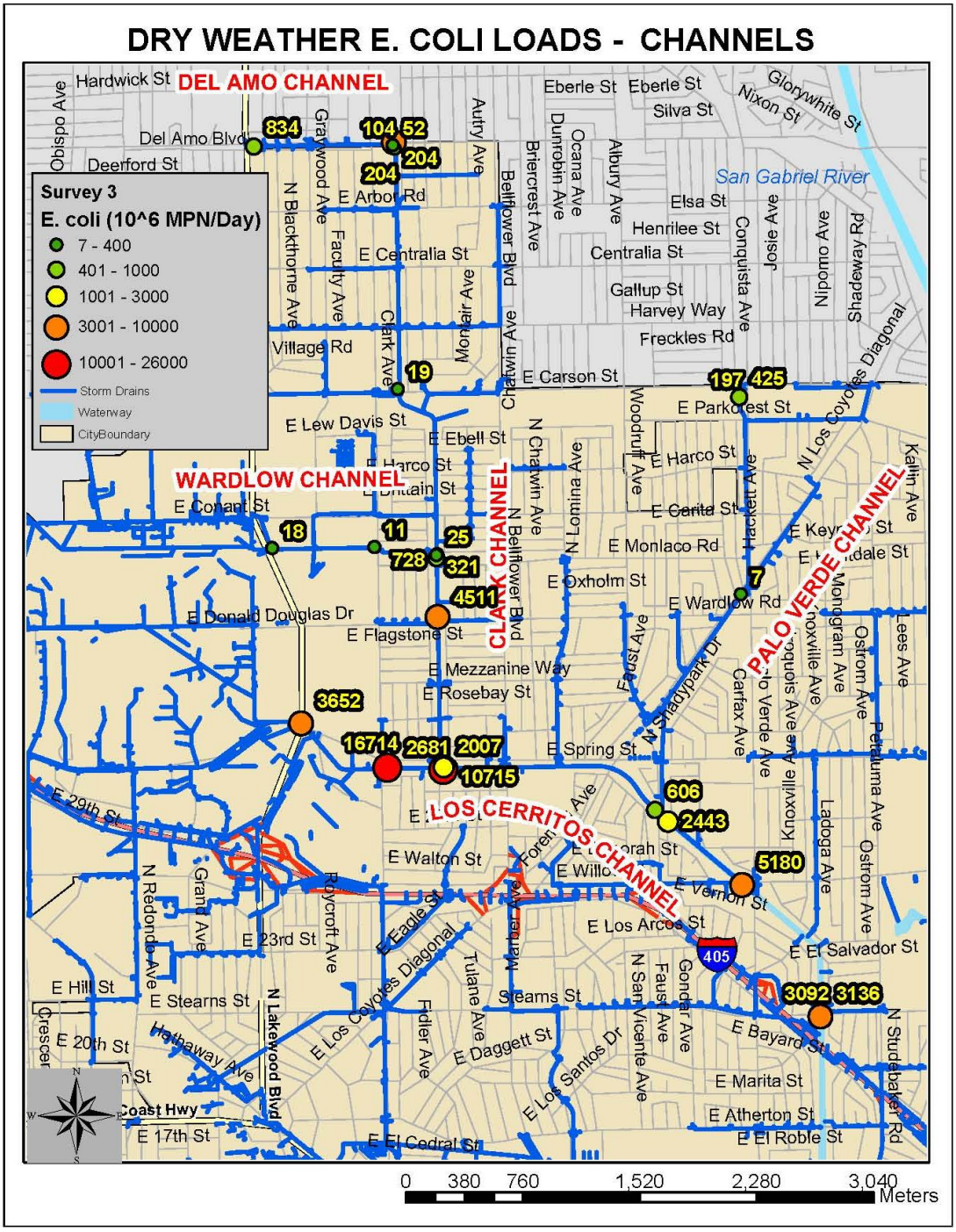

Figure A-48. ***E. coli*** **Loads Measured in Main Channels during Survey 3.**

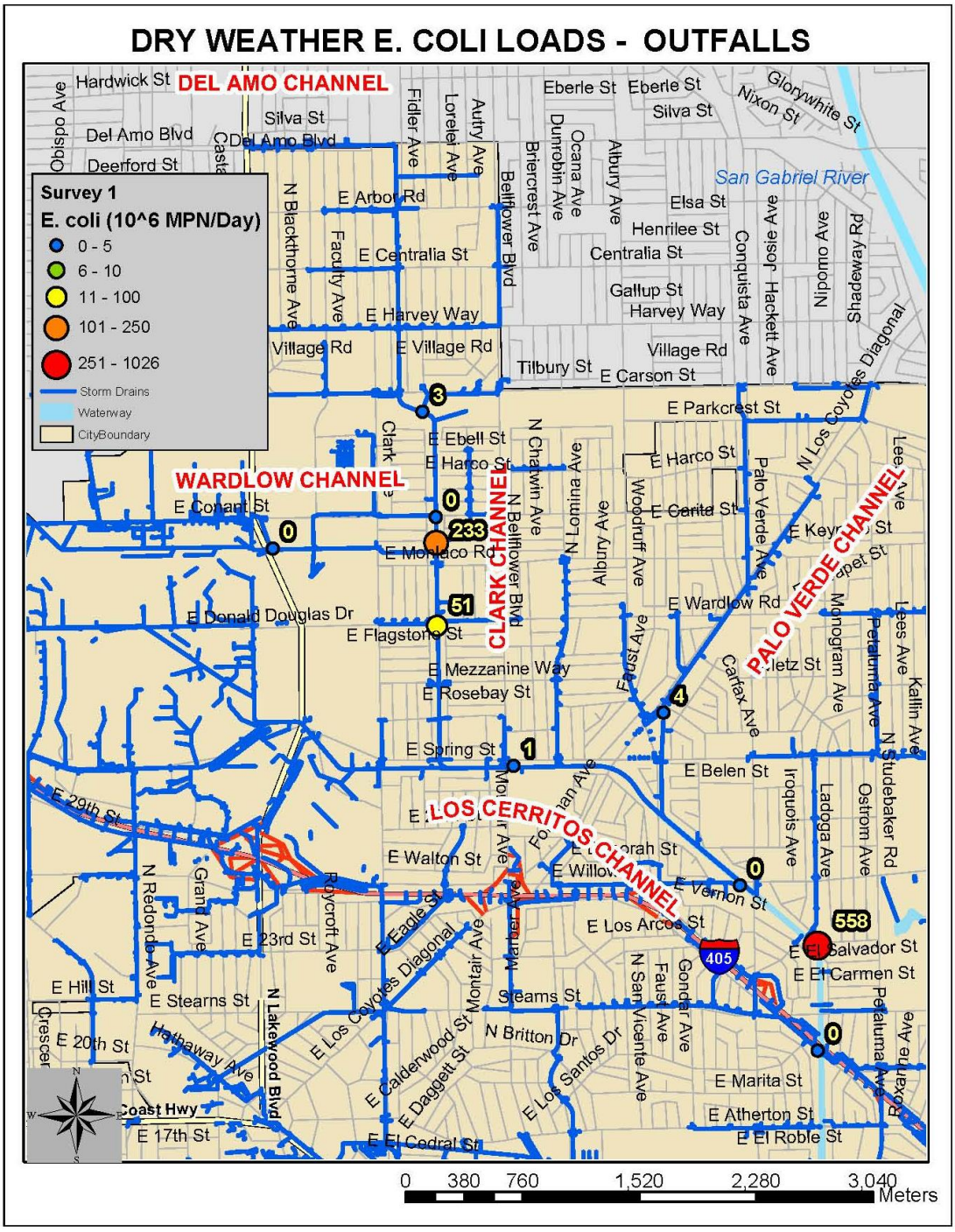

Figure A-49. ***E. coli*** **Loads Measured in Flowing Outfalls during Survey 1.**

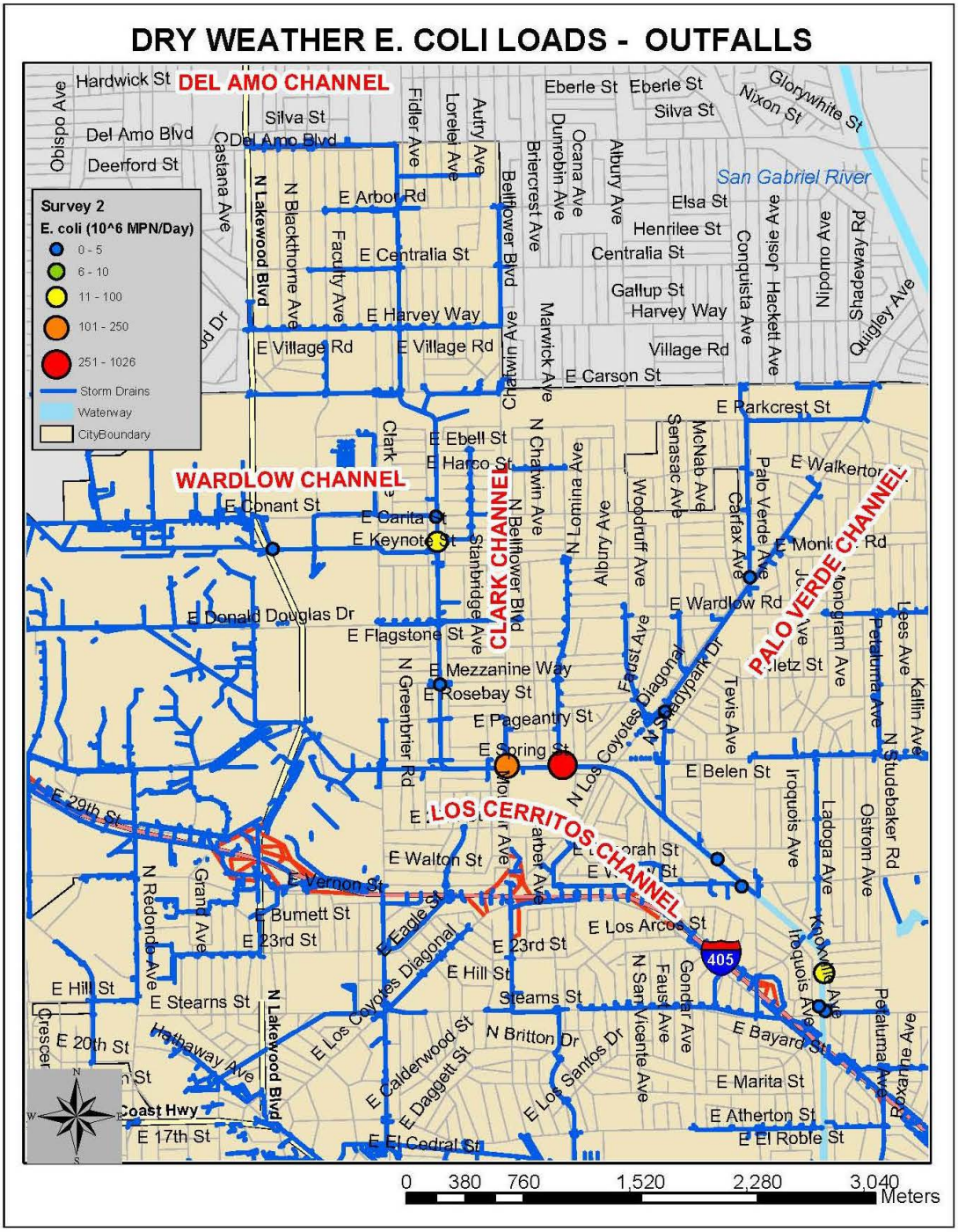

Figure A-50. ***E. coli*** **Loads Measured in Flowing Outfalls during Survey 2.**

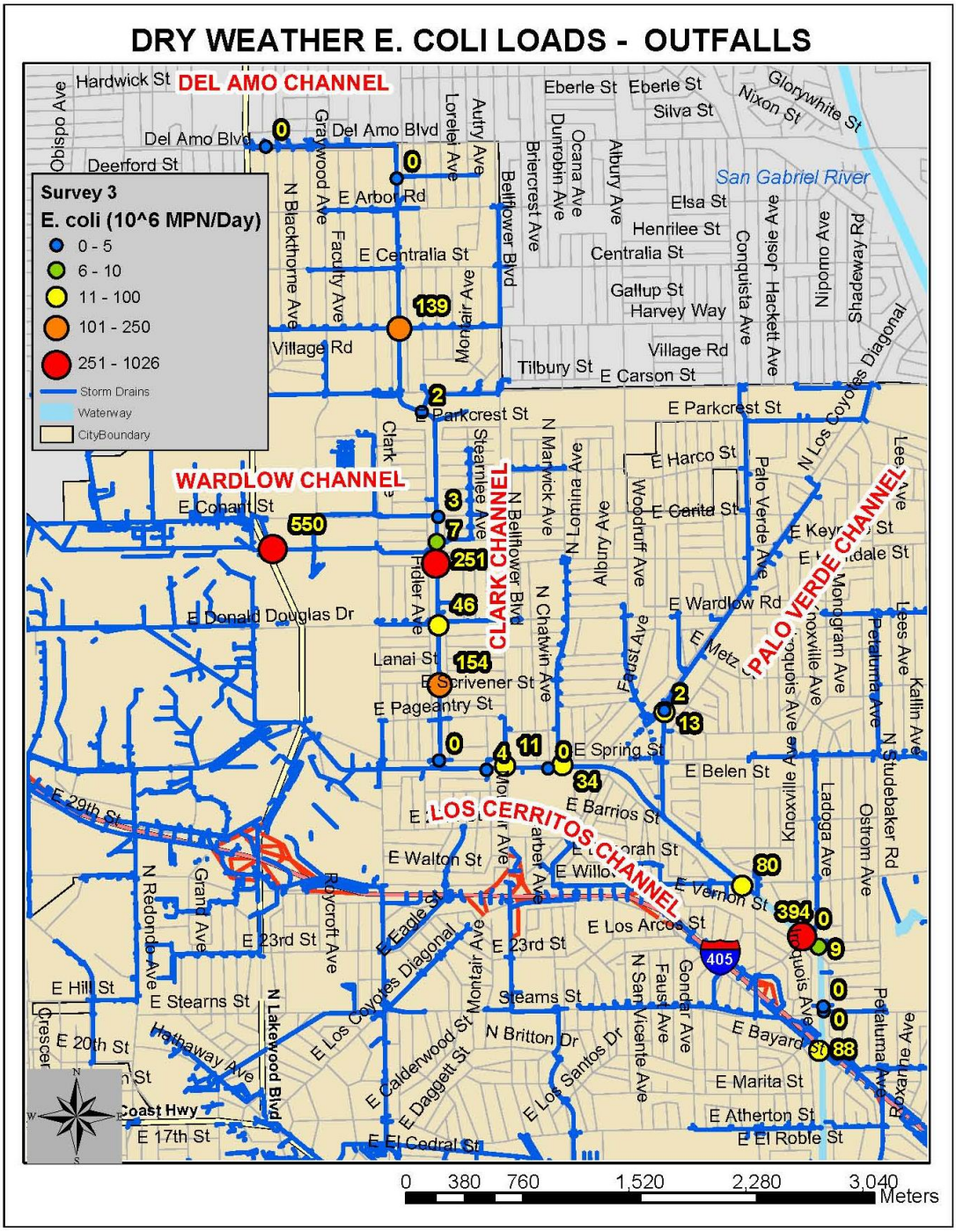

Figure A-51. ***E. coli*** **Loads Measured in Flowing Outfalls during Survey 3.**

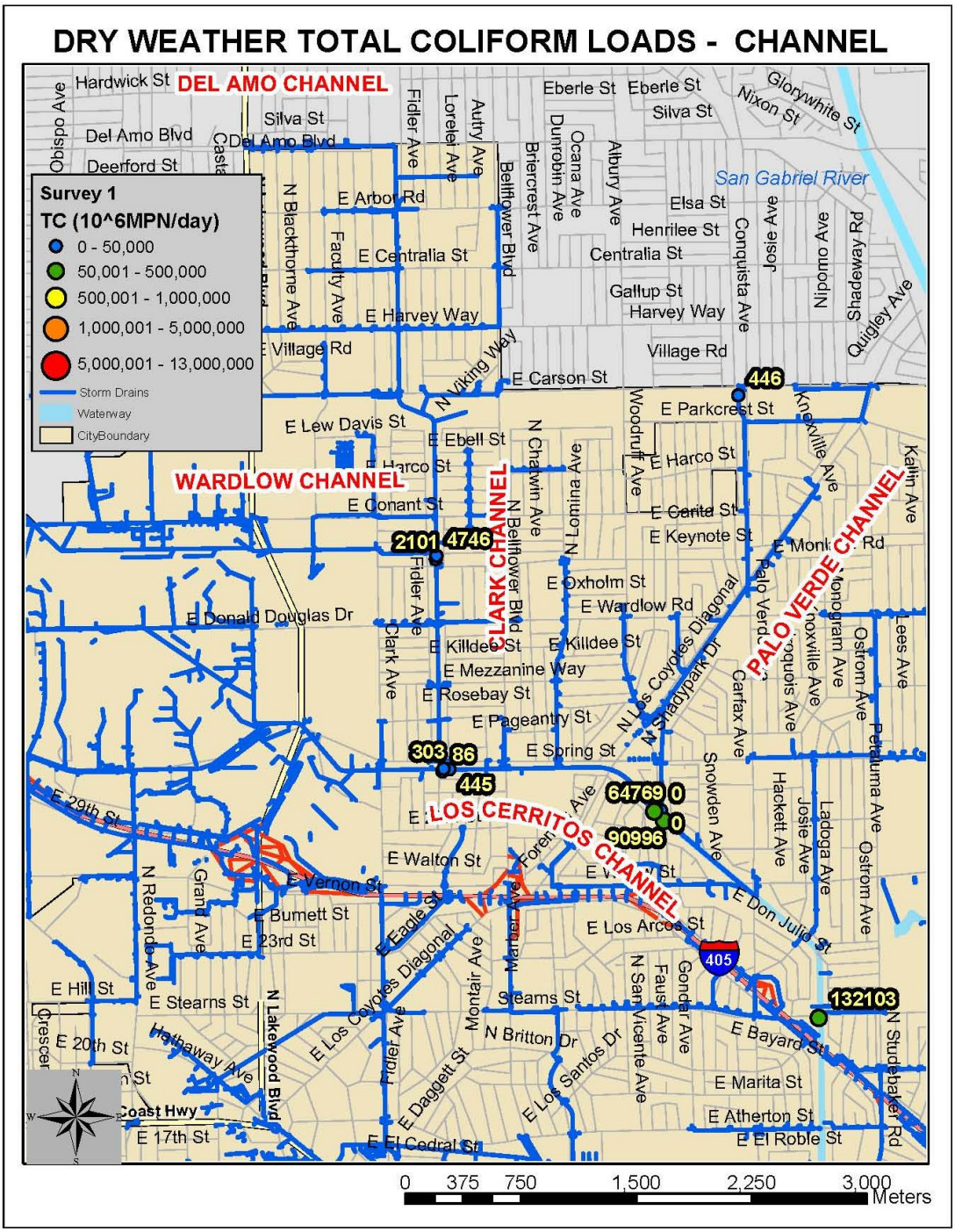

Figure A-52. **Total Coliform Loads Measured in Main Channels during Survey 1.**

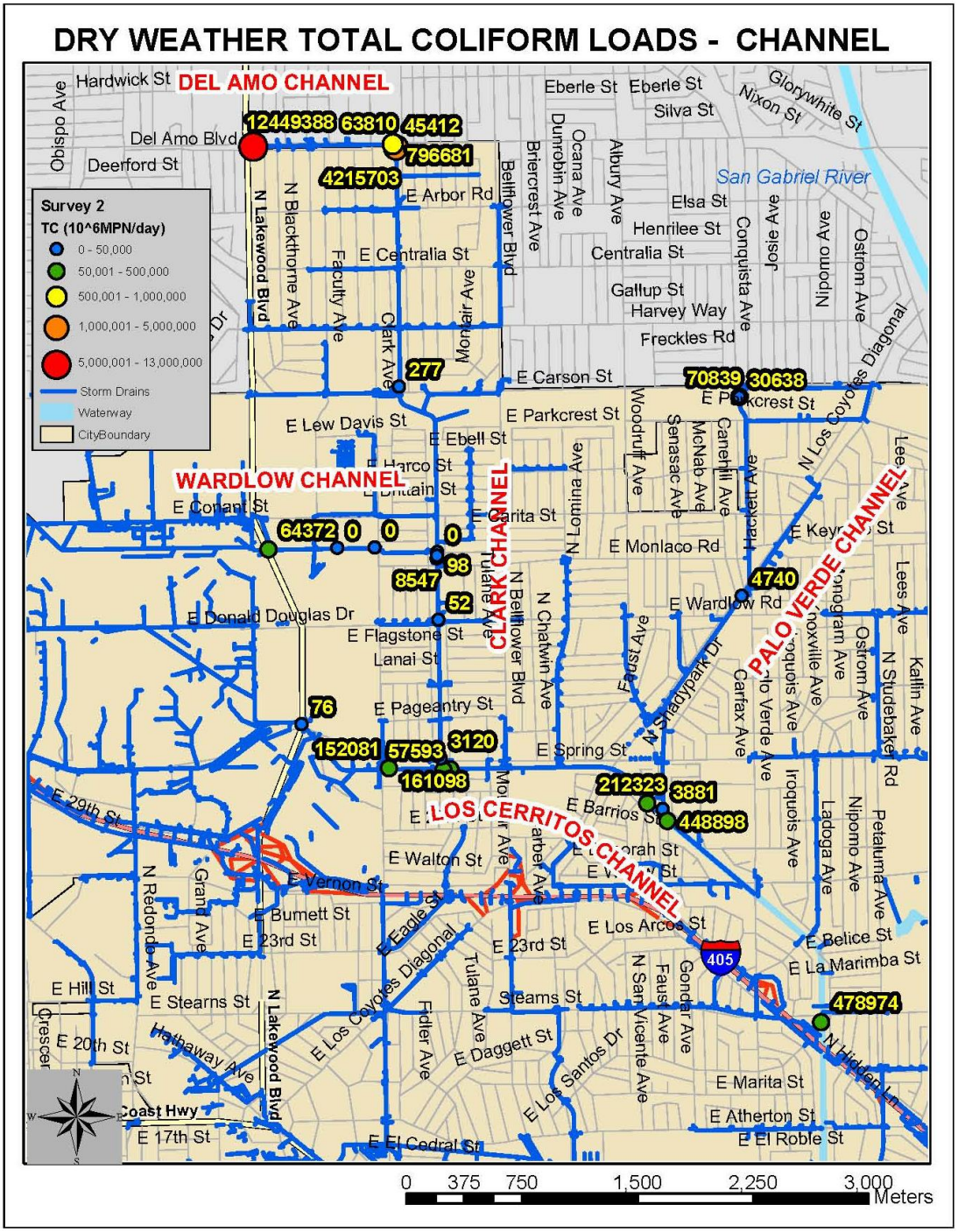

Figure A-53. Total Coliform Loads Measured in Main Channels during Survey 2.

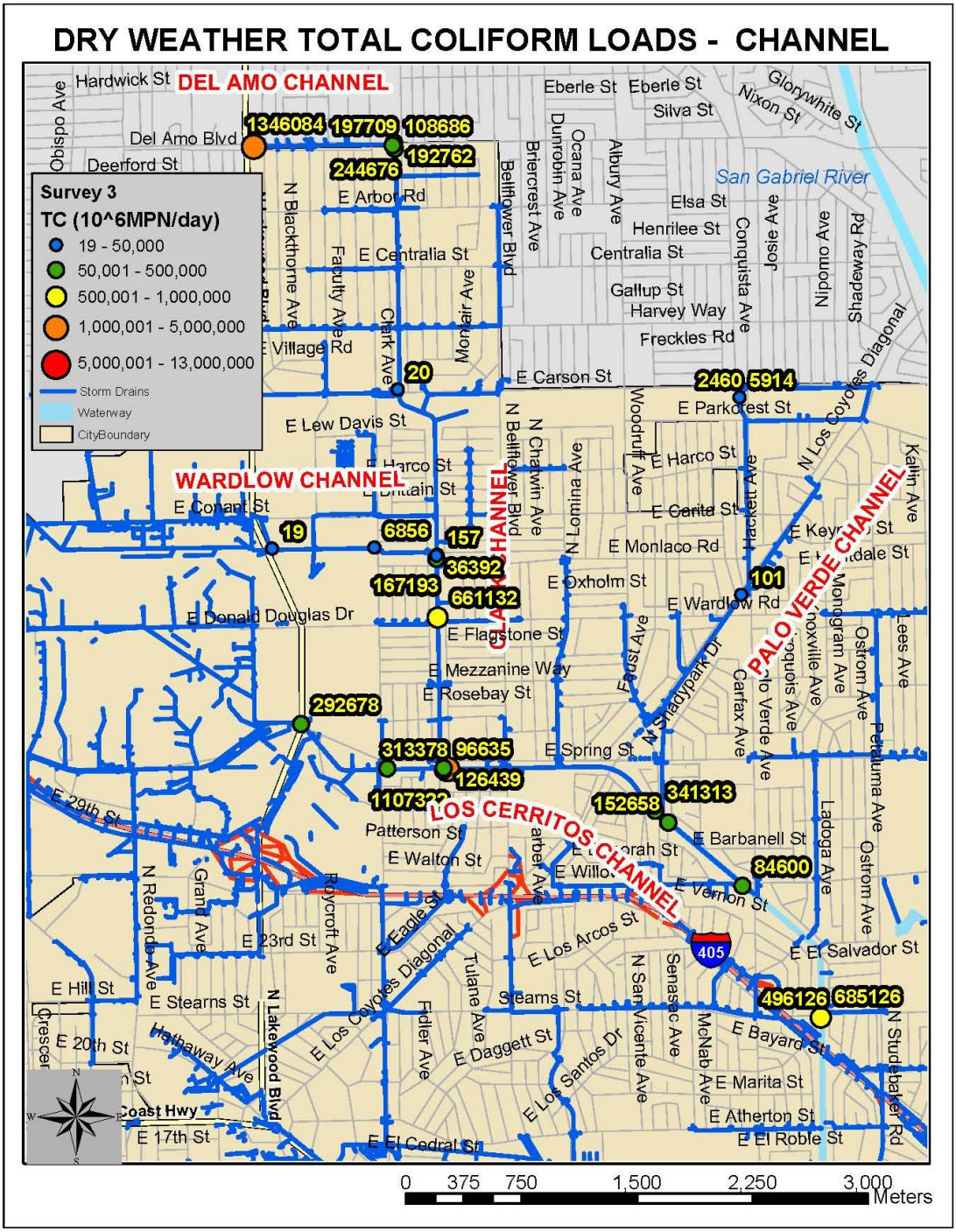

Figure A-54. **Total Coliform Loads Measured in Main Channels during Survey 3.**

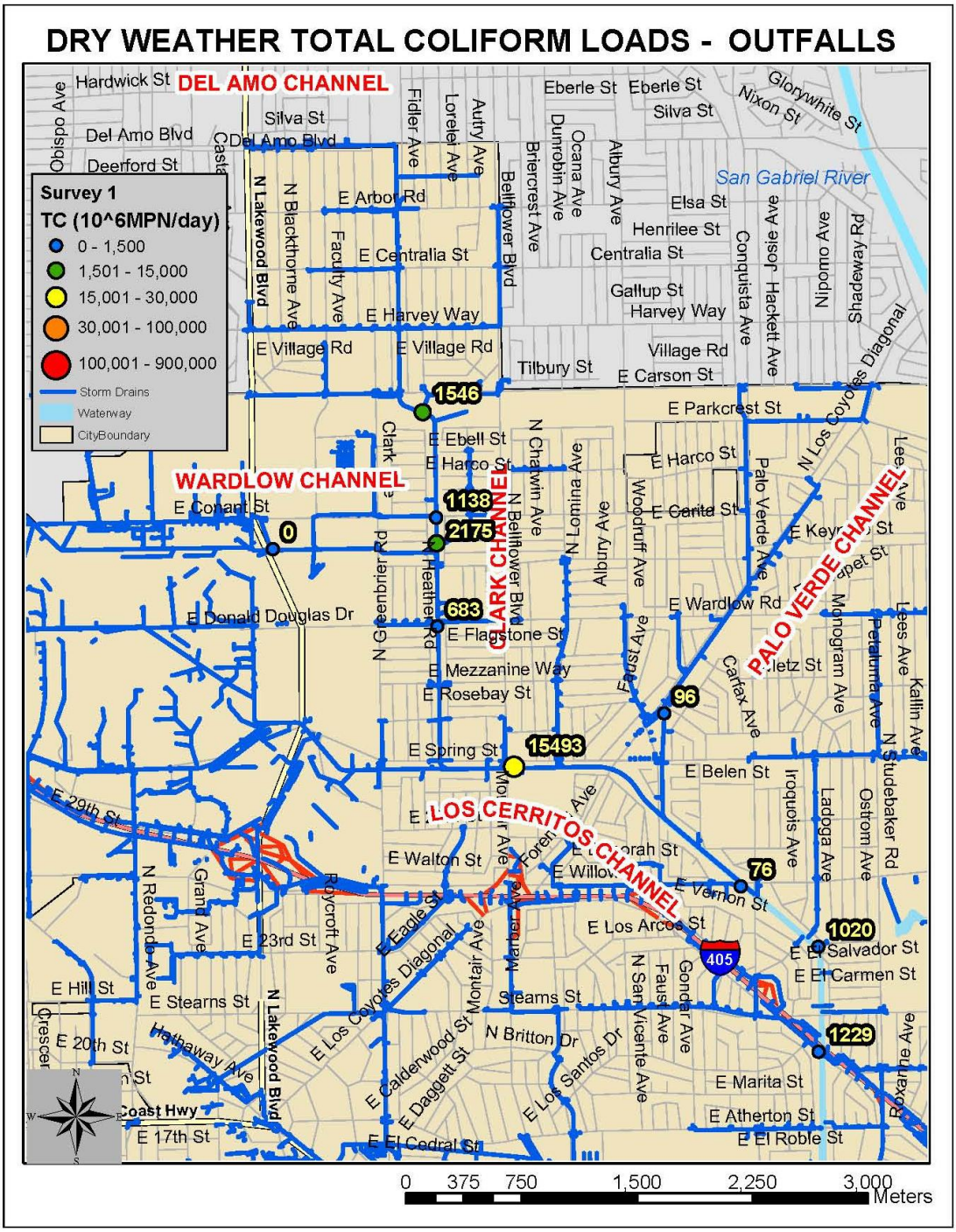

Figure A-55. Total Coliform Loads Measured in Flowing Outfalls during Survey 1.

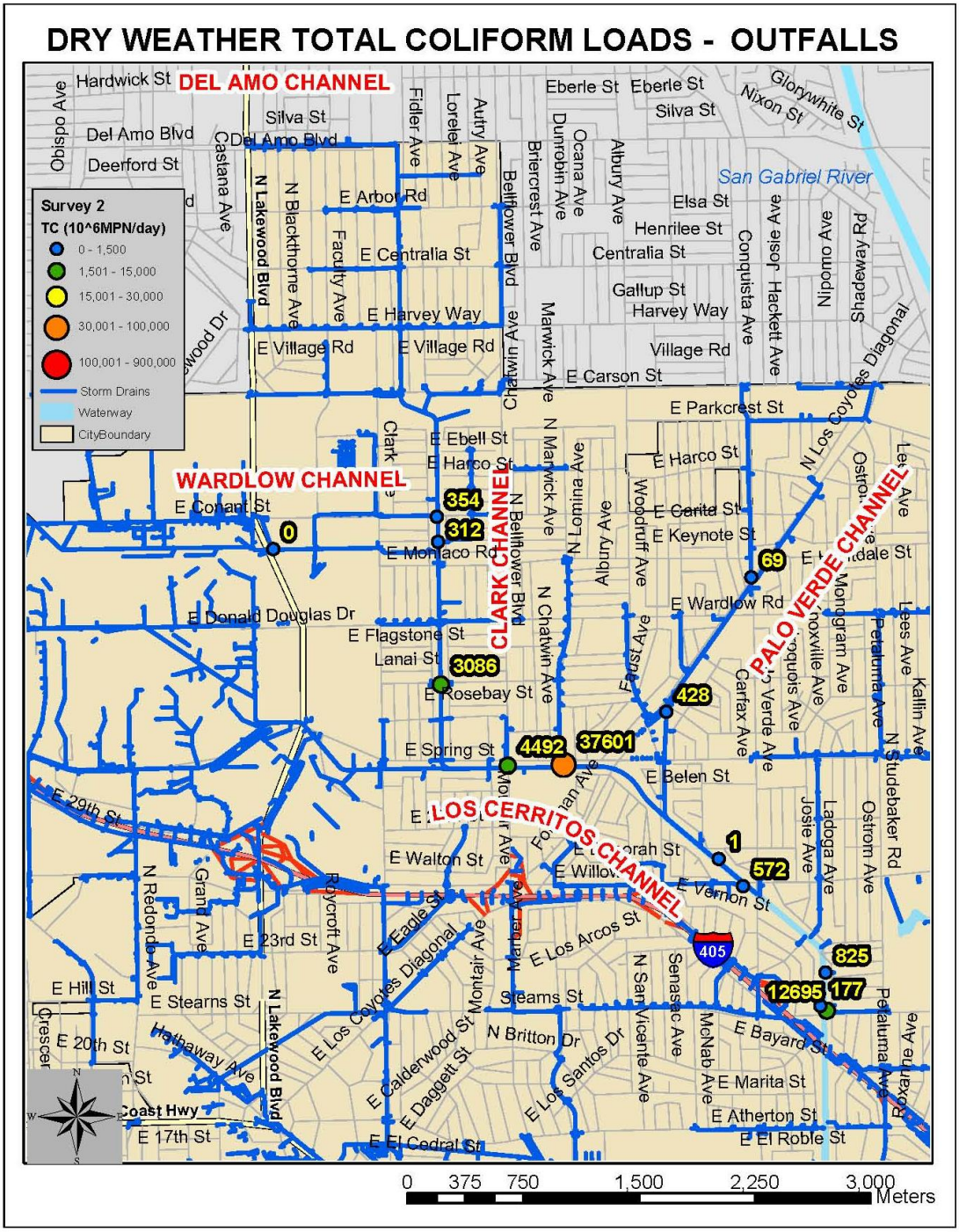

Figure A-56. Total Coliform Loads Measured in Flowing Outfalls during Survey 2.

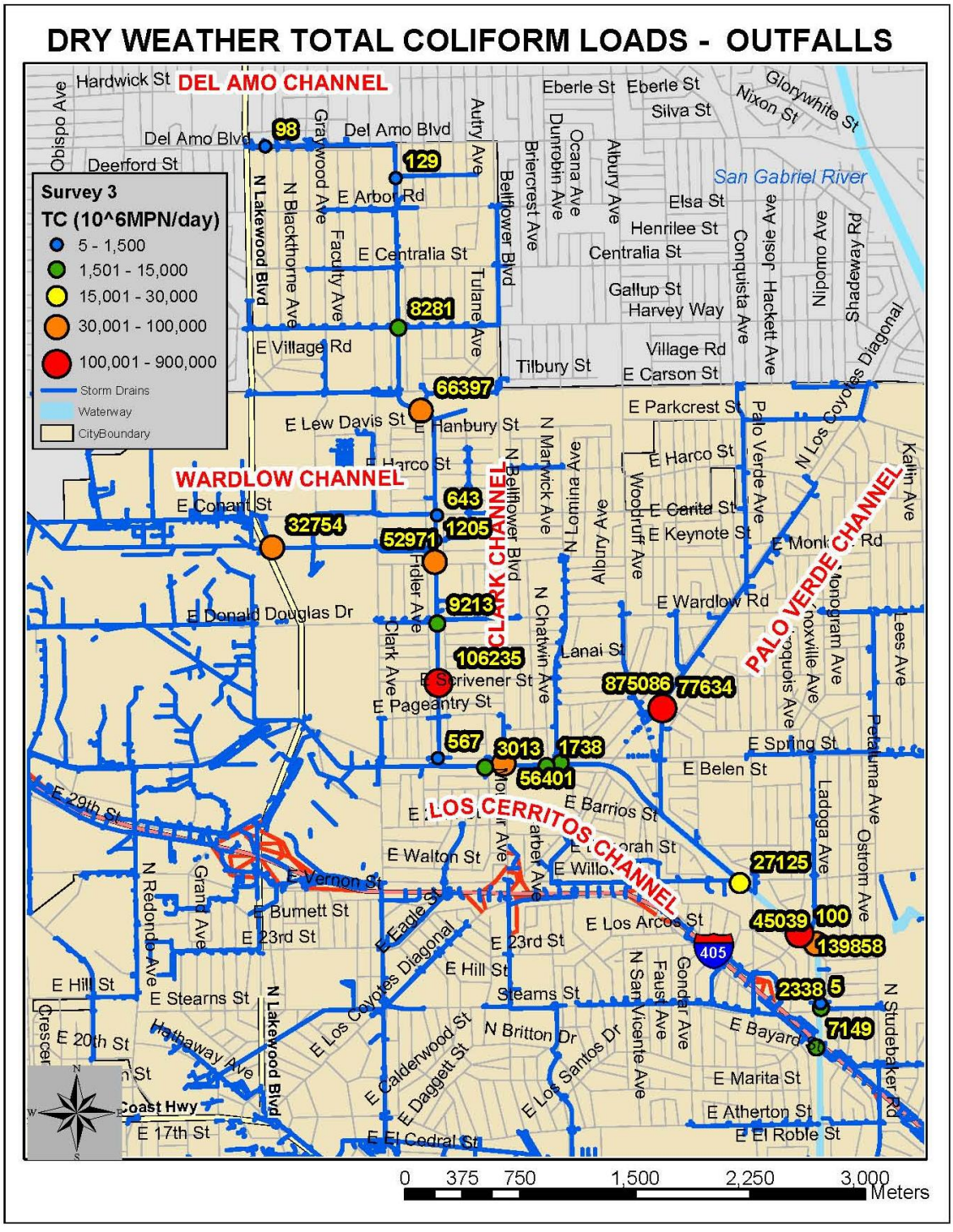

Figure A-57. Total Coliform Loads Measured in Flowing Outfalls during Survey 3.

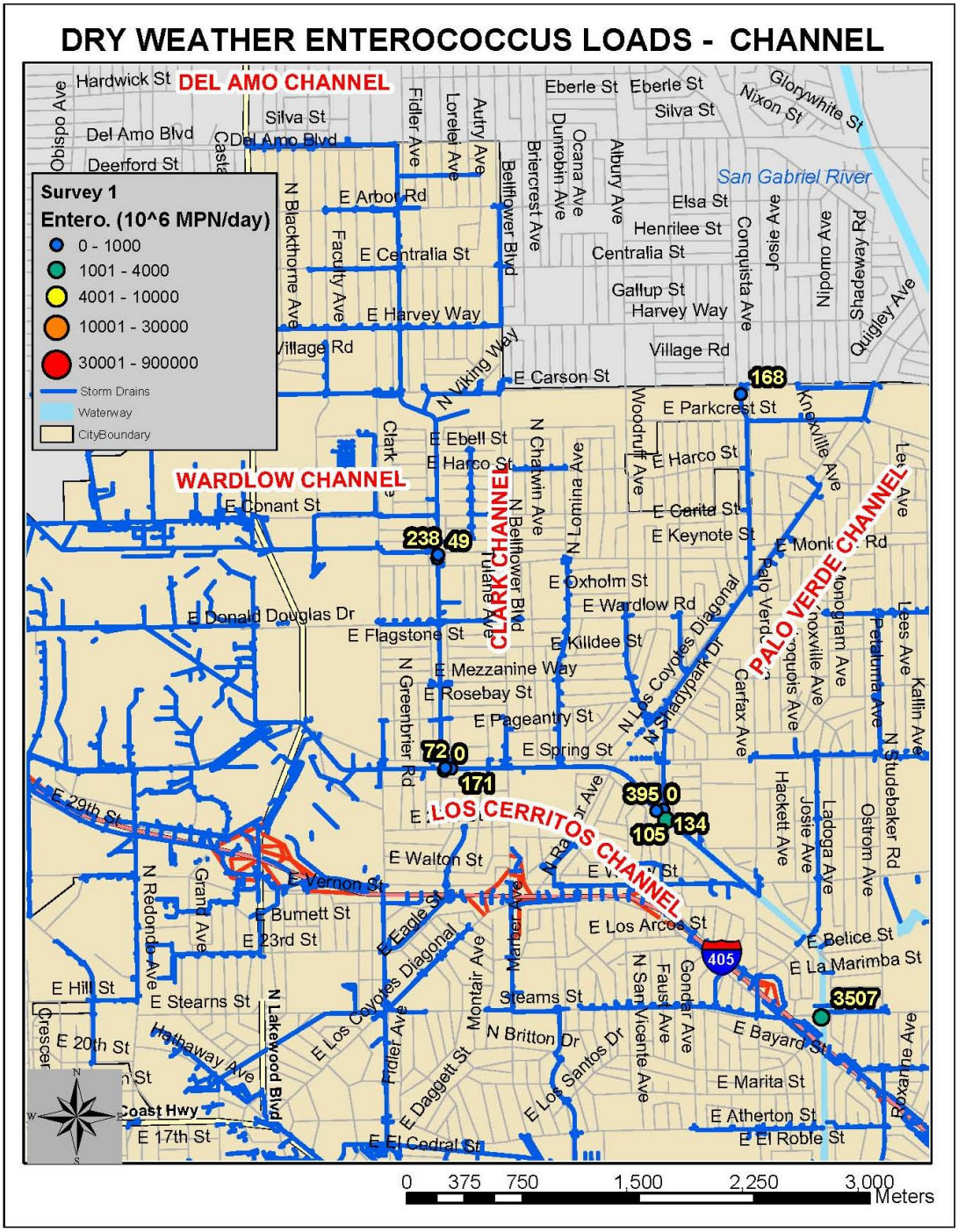

Figure A-58. **Enterococcus Loads Measured in Main Channels during Survey 1.**

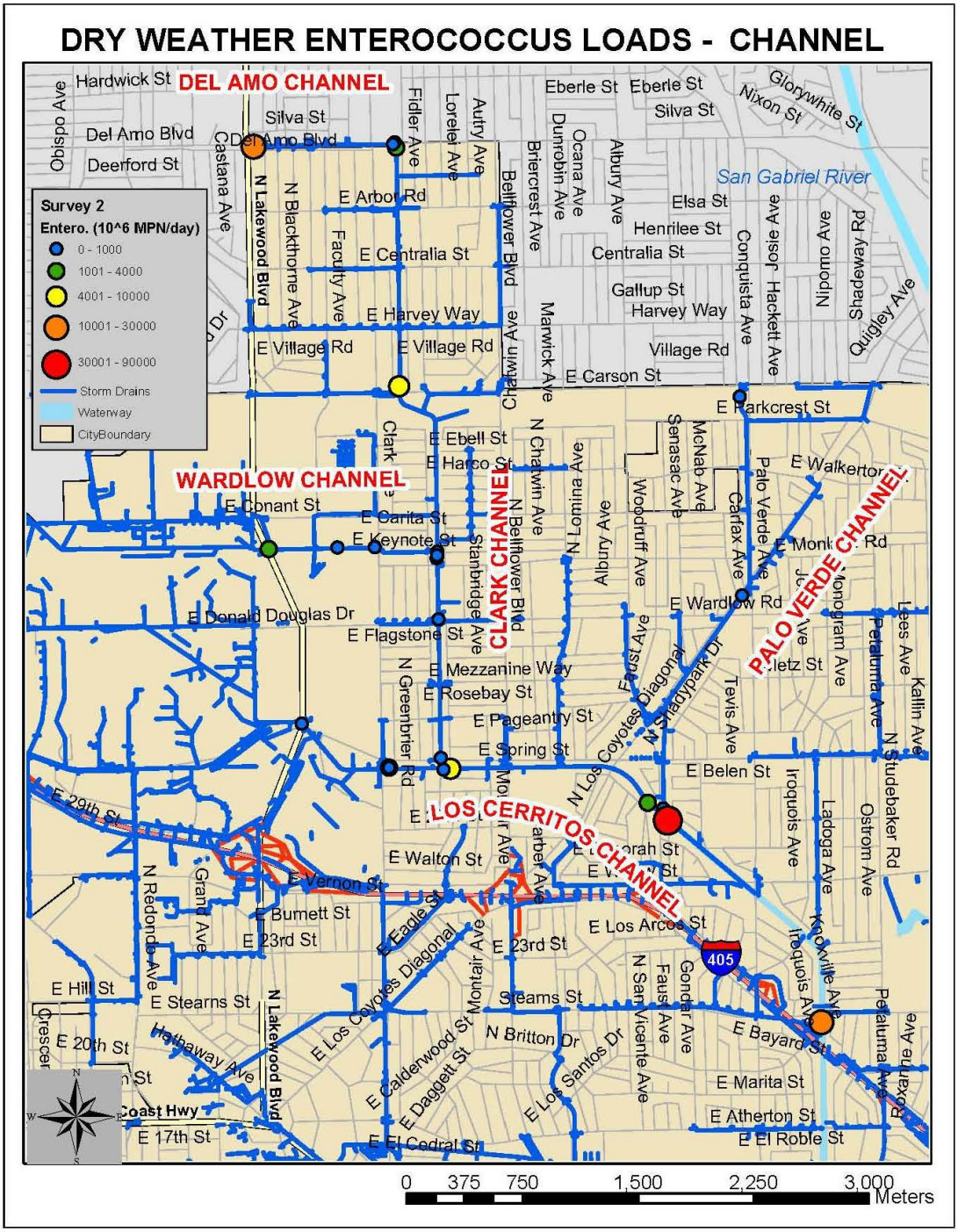

Figure A-59. Enterococcus Loads Measured in Main Channels during Survey 2.

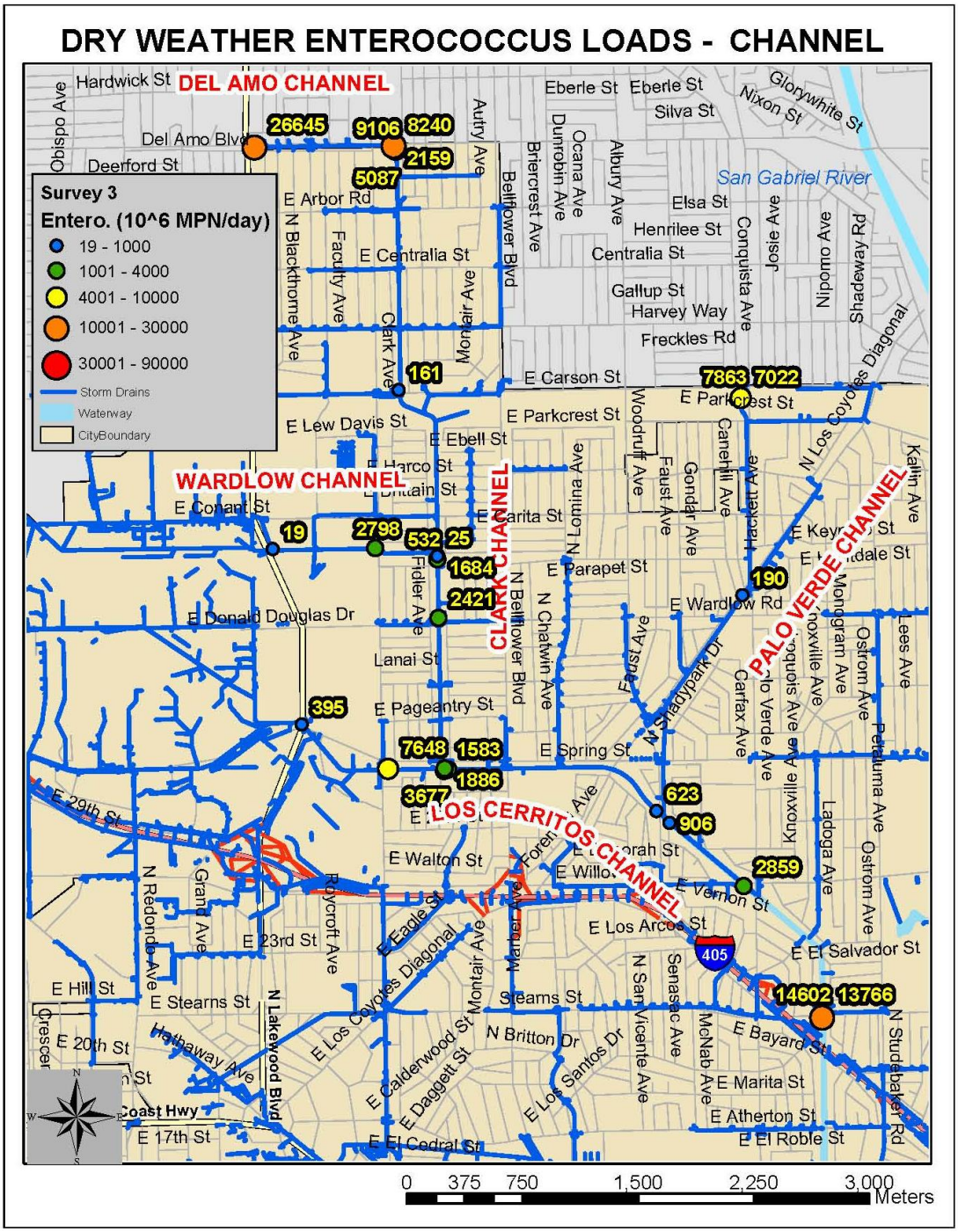

Figure A-60. Enterococcus Loads Measured in Main Channels during Survey 3.

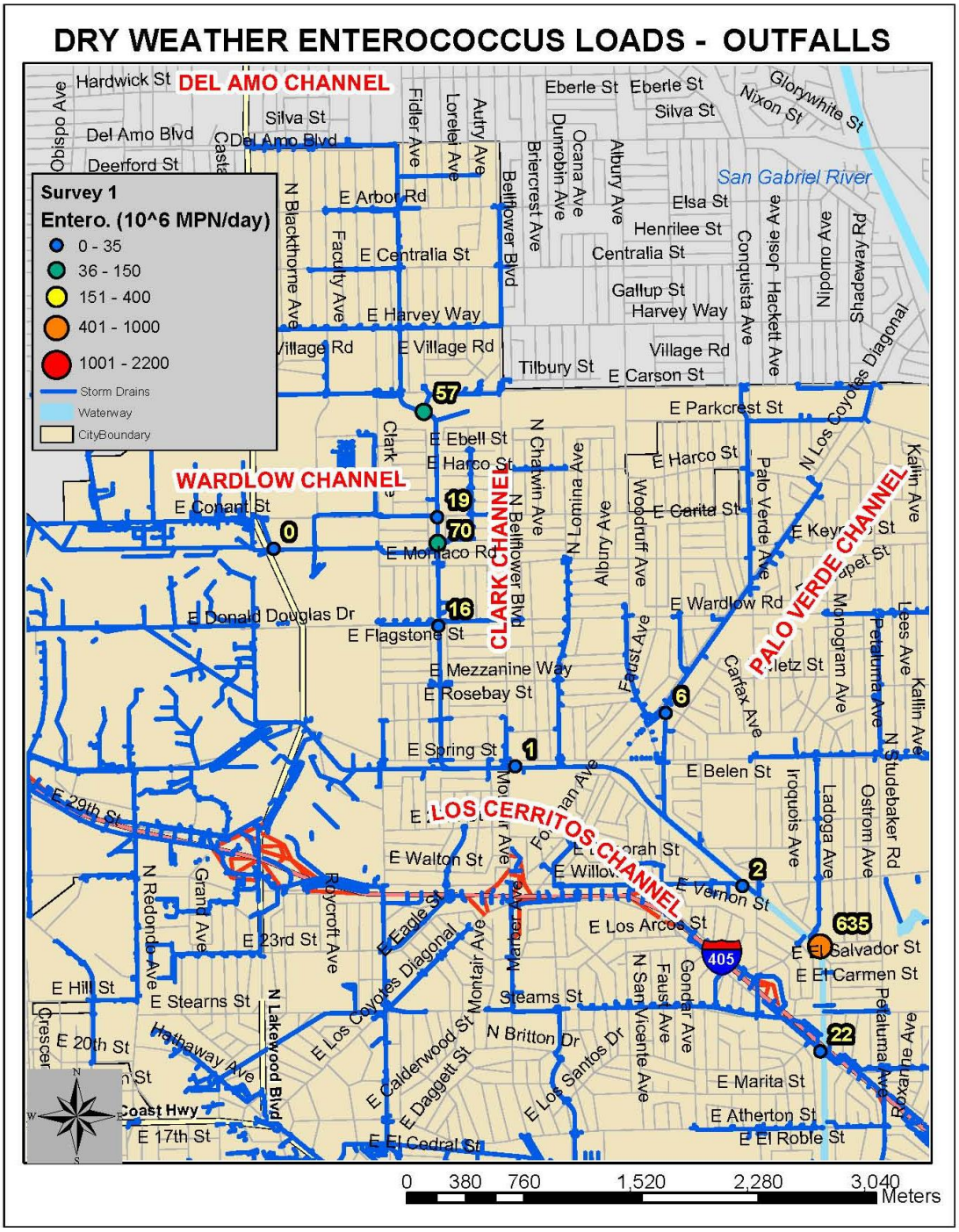

Figure A-61. Enterococcus Loads Measured in Flowing Outfalls during Survey 1.

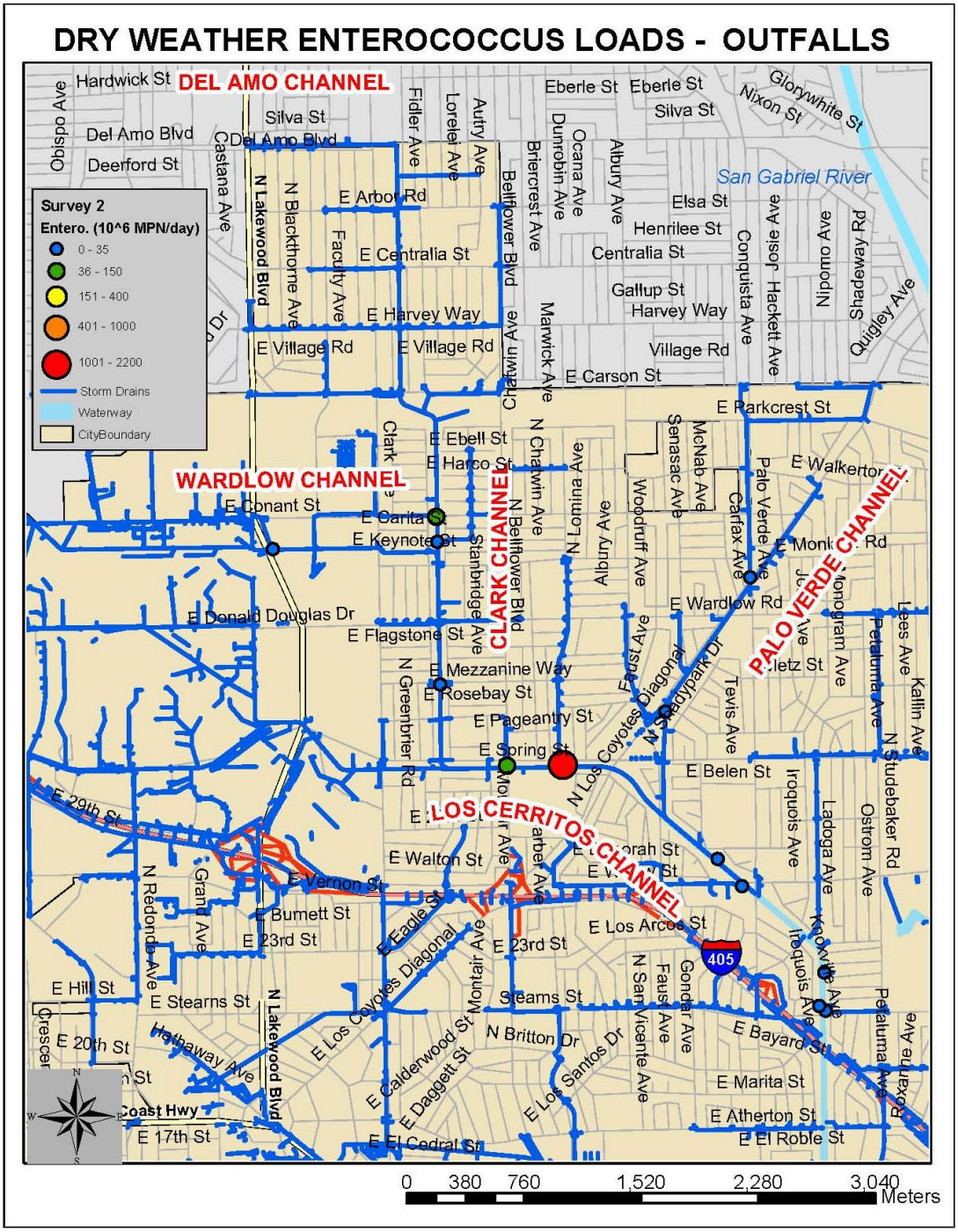

Figure A-62. Enterococcus Loads Measured in Flowing Outfalls during Survey 2.

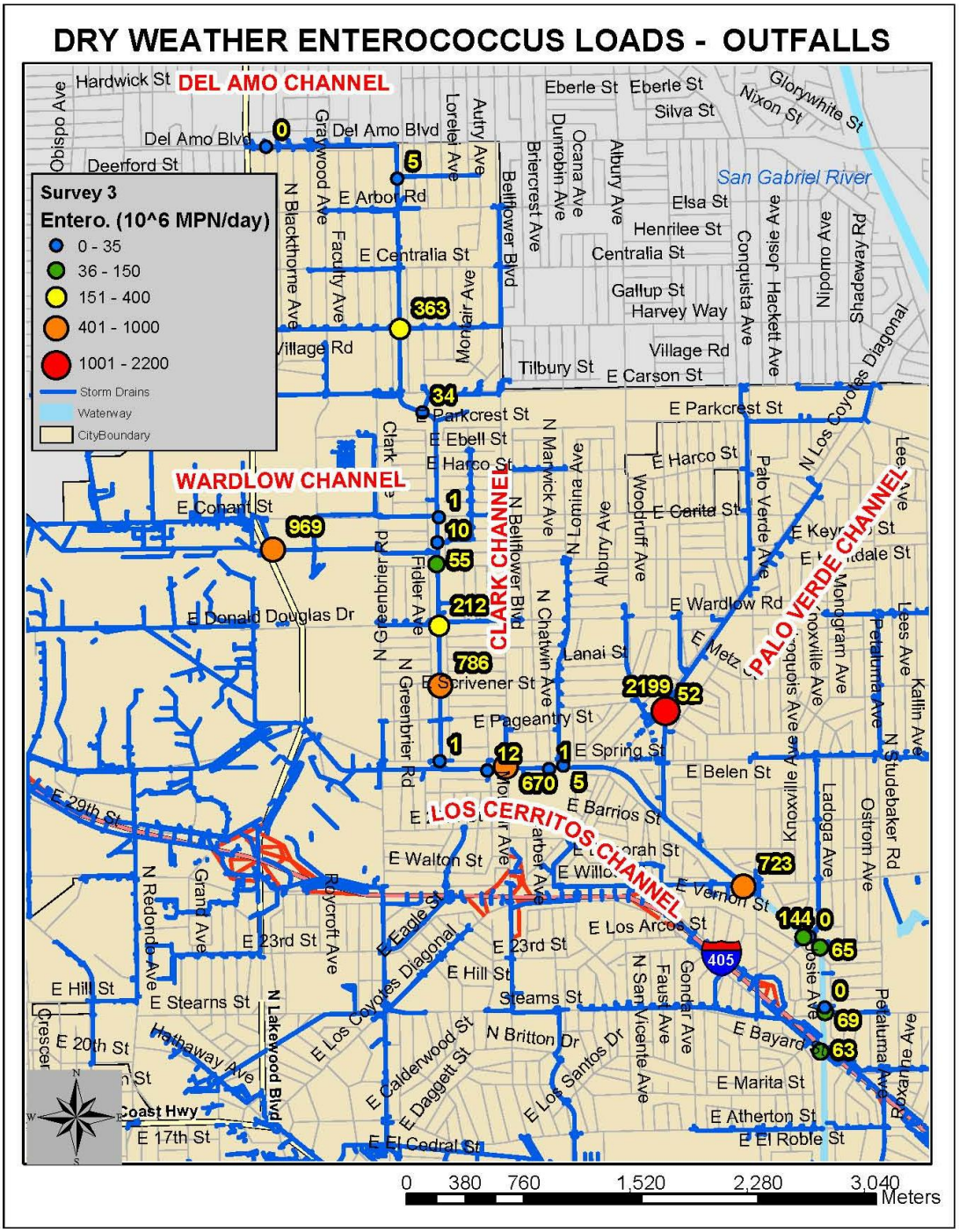

Figure A-63. Enterococcus Loads Measured in Flowing Outfalls during Survey 3.

Attachment 3. **Kinnetic Laboratories, Inc. 2011. City of Long Beach Storm Water Monitoring Report. Appendix D. Continuous Measurement of pH and Temperature in the Los Cerritos Channel.**

Reference: Kinnetic Laboratories, Inc. 2011. City of Long Beach Stromwater Monitoring Report 2010/2011. NPDES Permit No. CAS004003. Appendix D. Continuous Measurement of pH and Temperature in the Los Cerritos Channel.

APPENDIX D
CYCLING OF pH VALUES IN LOS CERRITOS CHANNEL
CITY OF LONG BEACH, CA

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EXECUTIVE SUMMARY

The Basin Plan (CRWQCB, 1994) specifies water quality objectives for pH of 6.5 to 8.5 for inland water, and bays and estuaries. Measurements of pH in Los Cerritos Channel have been routinely taken as part of the City's dry weather water quality monitoring studies required under its NPDES stormwater permit. These values have frequently been measured at levels greater than pH 9.0 (Kinnetic Laboratories 2005, 2009). Initially, pH was measured only at the NPDES mass emission monitoring site in the Los Cerritos Channel. The sampling site is located just below Stearns Street near the end of the freshwater portion of the drainage. The elevation of the channel bottom at this site is such that tidal effects are limited to periods of spring tides. In accordance with permit requirements, subsequent upstream source surveys were conducted in order to determine the source of elevated pH levels in the watershed. The following is a summary of the results of those initial surveys:

- Dry weather exceedances of the pH 8.5 objective was common in the upper Los Cerritos Channel and the upper branches, the Palo Verde Channel, the Clark Channel, Del Amo Channel, and the Wardlow Channel with pH values up to 10.5 or more.
- Dry weather discharges from outfalls entering the open channel from enclosed pipes and box culverts were characterized by uniformly lower pH values of approximately 8.0 and always below pH 9.0.
- These initial upstream investigations showed that pH tended to increase later in the survey day suggesting that they were likely influenced by photosynthetic activity and temperature increases in these shallow Channel flows.

From early data, the initial hypothesis was that the elevated pH values in these shallow open concrete channels are caused by photosynthetic activity during the day. Respiration of algae and bacteria in the biofilm was suggested to be the cause for the decreases in pH overnight. This present report details results of the deployment of a continuous recording instrument that was emplaced in the Los Cerritos Channel at the Stearns Street monitoring station in order to provide documentation of the expected daily and seasonal excursions of both pH and temperature. Except for brief periods when the instrument was pulled for data retrieval and calibration checks, this instrument recorded pH and temperature of the flowing water at intervals of 10 minutes between September 10, 2010 and May 1, 2011.

Results of these continuous recordings are reported below and can be summarized as follows:

- Both pH and temperature records show repetitive, pronounced 24-hour sinusoidal oscillations that support the earlier conclusion that they are controlled by biological and physical processes common to all sites with similar conditions.
- These 24-hour signals are muted and depressed by major storm flows in the Channel, but also immediately

Figure D-1. Typical Dry Weather Flow Showing Algal Growth.

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continue during the intervening winter dry periods even in the absence of major filamentous algal mats.

- Hourly averaged pH values in the Channel were pH 7.98 for rain days, pH 9.00 for dry days, and pH 8.93 as an average of all data, but with maximum values during the days of pH 10.49 to 10.91. Minimum values were from pH 6.43 to 7.04 for the various wet/dry categories.
- With the pH average or median just below 9.0 for all days other than during storm events, the upper limits of the Basin Plan water quality objective of pH 8.5 is routinely exceeded most of the year (inclusive of summer dry and winter dry periods).

BACKGROUND

Over the past ten to eleven years, a substantial number of pH and other conventional water quality measurements have been recorded from the main channels and enclosed outfalls that discharge to the open portion of the Los Cerritos Channel watershed. The following sections provide a summary of these studies and provide a brief history of work completed in this watershed.

Early Dry Weather Measurements in the Los Cerritos Channel

Several dry weather surveys in the Los Cerritos Channel conducted early in the program found high pH values at monitoring sites located in the open concrete channels. In 2002, the Regional Board added a requirement to conduct upstream investigations if pH values of 8.5 or greater were encountered during the surveys.

August, 2004. On August 31, 2004 (Kinnetic Laboratories, 2005) elevated pH values were measured in a time-composite dry weather sample taken at the Los Cerritos Channel station which is located below Stearns Street near the end of the Channel but above tide elevation. Upon measurement of the composite bottle pH, an immediate upstream investigation was initiated.

The field crew initially walked approximately 1000 feet upstream in the Los Cerritos Channel to look for possible sources. Measurements of pH tended to increase from 10.02 at the monitoring site to 10.42 to 10.52 at all upstream sites. No sources of water with elevated pH were identified. The crew then went upstream to Spring Street near the junction of the Los Cerritos and Palo Verde Channels. Similar, high pH measurements (10.14 to 10.43) were found in waters above the confluence of these channels, at the mouth of the Palo Verde Channel, and downstream of the confluence. Further investigations were conducted upstream of this site in the vicinity of the Clark Channel. The pH measurements in this region of the Los Cerritos Channel were lower (9.30 to 9.82) but still elevated. Further investigation was halted due to the late hour and approaching darkness.

September, 2004. Since the source of high pH water was not found to be the result of a nearby source discharge, a follow-up watershed investigation was conducted on September 3, 2004 (Kinnetic Laboratories, 2005). Twelve sites (Table D-1) were visited throughout the watershed starting from the Los Cerritos Channel monitoring site and incorporating the two major tributaries to the Los Cerritos Channel (Figure D-2). Field estimates of flow were taken using conventional dry weather flow procedures. The average width and depth of the flow were measured for a 10 foot section of the channel. Velocity over the 10-foot section was measured based upon measuring the time required for particles to drift through the segment. Dissolved oxygen was measured with a YSI Model 58 meter. Temperature, salinity and pH were measured with a YSI Model 63 meter. Water samples for measurement of alkalinity were taken for measurement in the laboratory.

The results of this survey are shown in Table D-2. The survey showed evidence of high pH water throughout the open conveyances of the Los Cerritos Channel and both major tributaries, the Palo Verde and Clark Channels. Measured pH values typically ranged from 9.45 to 10.90. An initial pH check conducted in the morning (0845) at site CC1-A resulted in a pH of 8.93, just under the trigger of 9.0 that was set to initiate upstream investigations. Three hours later (1146), pH had risen to 9.50 and the upstream investigation was started. Flows generally decreased at upstream sites with the exception of flows measured at CC2-A located in the Los Cerritos Channel just downstream of the mouth of the Palo Verde Channel. Total alkalinity ranged from 90 to 173 mg/L. Alkalinity provides an indication of the

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buffering capacity of the water. Alkalinity values of 100 to 200 would be expected to have a stabilizing effect.

Water temperature and dissolved oxygen were extremely high at all sites. Temperatures ranged from 23.8 to 31.5 °C. Temperatures also tended to increase over the course of the day reaching the higher portion of the range around 1500. Dissolved oxygen levels ranged from just over 11 mg/L to greater than 20 mg/L at several sites indicating that dissolved oxygen was well into supersaturated conditions. Based upon these results the initial hypothesis was that the elevated pH values in these shallow open concrete channels are caused by photosynthetic activity.

Los Cerritos Watershed Surveys, 2009. Extensive surveys were made in the Los Cerritos Channel Watershed (Figure D-4) on March 3, April 9, and May 11, 2009 as part of a copper source study (Kinnetic Laboratories, 2009). Multiple sites were sampled within the Los Cerritos, Palo Verde, Clark, Wardlow, and Del Amo Channels as well as 10 to 24 outfalls that were observed to have measurable discharges into these Channels. Detailed tables of results were included in the original annual report (Kinnetic Laboratories, 2009) but descriptive statistics of the accompanying results are also given in Tables D-3, D-4, and D-5 below.

Results of these three surveys (Tables D-3 through D-5) show the following:

- Median pH of Channel waters ranged from pH 9.1 to 9.9 with maximum values of pH 10.7 to 11.0 and minimum values of pH 7.4 to 7.7.
- Median pH of outfall discharges was pH 8.0 to 8.2 with maximum values of pH 8.5 to 8.8 and minimum values of pH 7.4 to 7.9.
- The results of these more extensive watershed surveys provided further verification that the pH of the Channel waters routinely range above the pH 8.5 Basin Plan objective, but do not fall below the pH 6.5 lower limit.

Interestingly, the results also show that the elevated pH values in the open channels were not due to discharges of water from the enclosed outfalls along the channel since the measured pH of these discharge waters were almost all within the range of acceptable values established in the Basin Plan.

Thus these results provided further evidence of elevated and oscillating pH values within the Channels that correspond with expected effects of daily photosynthetic activity, respiration, temperature, and buffering capacity provided by alkalinity.

Purpose and Scope of Present pH Studies in Cerritos Channel

The purpose of this present study was to provide better documentation of the daily fluctuations in pH over the range of conditions that occur over the course of a year. These data were also intended to provide improved information for calculation of chronic ammonia-N criteria that require use of 30-average pH values.

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Table D-1. Sampling Locations in the Los Cerritos Channel Watershed.

Site Name	Site Description	Latitude[1]	Longitude
CC1-A	Los Cerritos Channel Below Stearns St. bridge	33.79544	118.10352
CC1-B	Los Cerritos Channel at first outfall upstream of Stearns	33.79601	118.10356
CC2-A	Los Cerritos Channel below confluence with Palo Verde Channel	33.80695	118.11408
PV-MOUTH	Palo Verde Channel above confluence with Los Cerritos Channel	33.81070	118.11408
PV-A	Palo Verde Channel west of Palo Verde Ave. and Los Coyotes Diagonal	33.81987	118.10862
PV-B	Palo Verde Channel south of Carson St.	33.83192	118.10832
CC3-A	Los Cerritos Channel below confluence w/ Clark Channel	33.81020	118.12907
CLARK-A	Clark Channel below Monlaco Rd.	33.82201	118.12982
CLARK-OUTFALL	39-inch outfall (106+25) into Clark Channel under the Conant St. bridge	33.82509	118.12982
CLARK-B	Clark Channel south of Del Amo Blvd. Below the confluence of the Clark and Del Amo Channels	33.84647	118.13210
DA-A	Del Amo Channel east of Lakewood Ave.	33.84690	118.14201
CC4-A	Los Cerritos Channel west of Lakewood Ave., north of Spring St.	33.81301	118.13953

1. All positions based upon NAD 1983 datum

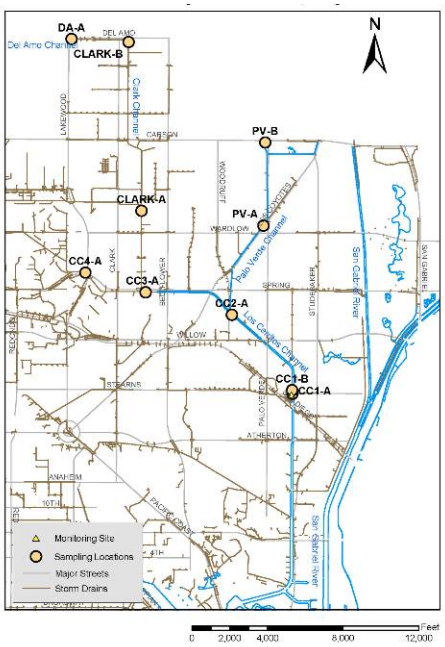

Figure D- 2. Watershed Investigation Sites 2004.

Figure D-3. Typical Dry Season Growth, Del Amo Channel.

Table D-2. Summary of the Results of the 2004 Upstream Investigation in the Los Cerritos Channel Watershed.

Site Name	Arrival Time	Temp °C	pH	DO mg/L	Salinity (ppt)	Flow (cfs)	Alkalinity (mg/L)			
							Bicarbonate	Carbonate	Hydroxide	Total Alkalinity
CC1-A	8:45	23.8	8.93	15.25	0.5	2.06				
CC1-A	11:46	28.6	9.50	19.60	0.4	2.06	95.0	45.0	< 5.0	153
CC1-B	12:16	30.7	9.83	19.80	0.4	2.06	52.0	54.0	< 5.0	133
CC2-A	12:46	30.9	9.45	>20	0.4	4.29	49.0	57.0	< 5.0	135
PV-MOUTH	12:50					1.63				
PV-A	13:21	31.5	10.75	15.55	0.5	1.69	< 5.0	60.0	14.0	140
PV-B	14:00	26.5	10.30	11.13	0.4	1.40	< 5.0	84.0	< 5.0	143
CC3-A	15:35	30.4	10.55	15.20	0.4	1.65	< 5.0	69.0	< 5.0	120
CLARK-A	15:54	30.0	10.63	12.78	0.8	1.37	< 5.0	57.0	5.1	110
CLARK-OUTFALL	16:21	23.7	8.17							
CLARK-B	16:40	27.6	9.66	12.67	0.4	0.29	34.0	51.0	< 5.0	123
DA-A	17:00	27.3	10.60	12.50	0.4	0.25	< 5.0	51.0	< 5.0	90
CC4-A	17:45	27.7	10.90	>20	0.4	0.00	< 5.0	87.0	9.0	173

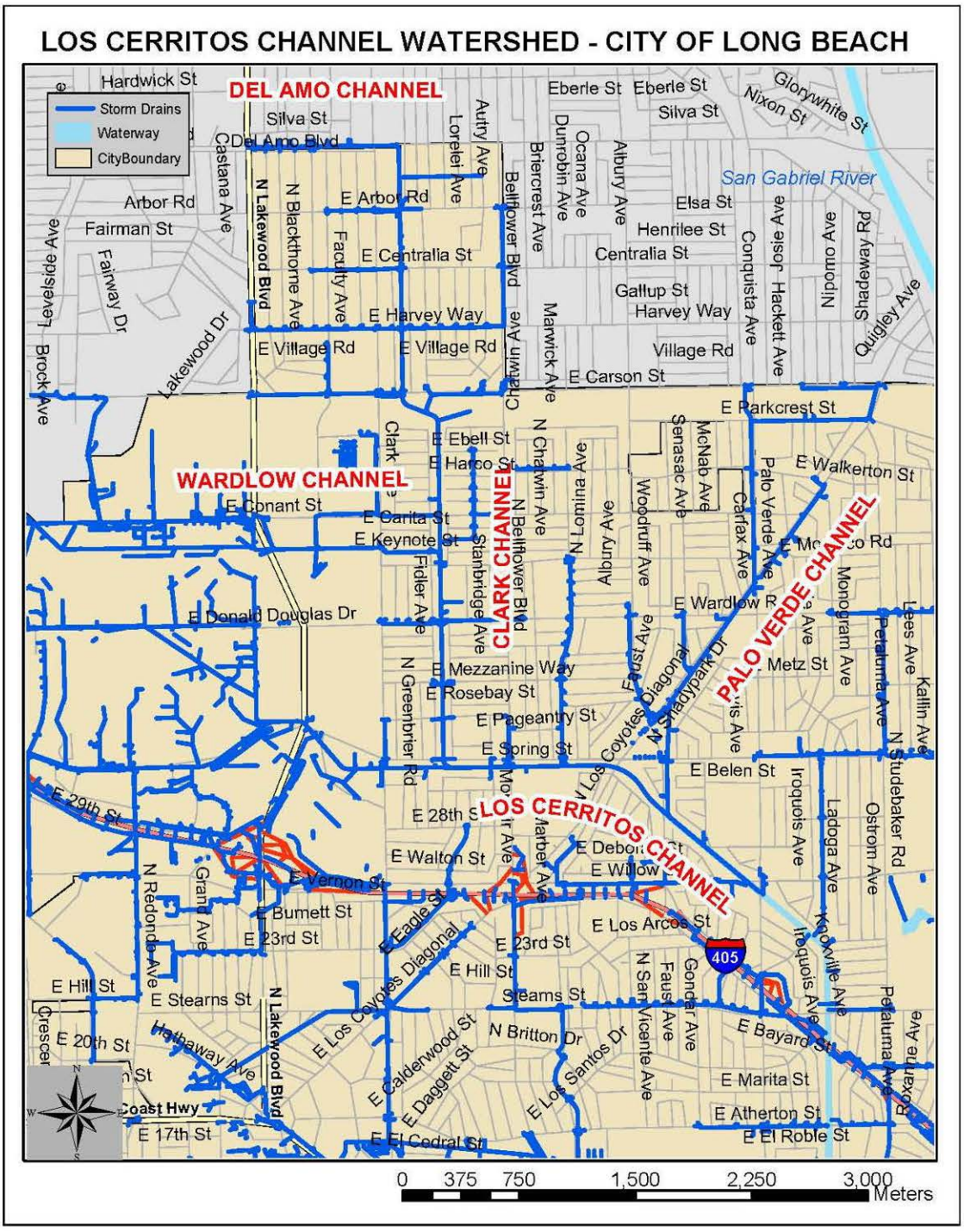

Figure D-4. City of Long Beach Los Cerritos Channel Watershed.

Table D-3. Descriptive Statistics of Flow and Water Quality at Channel and Outfall Sites – Survey 1 (March 3, 2009).

CHANNELS

Statistic	Flow (cfs)	Temp. (°C)	pH	Cond (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Entero. (MPN/100ml)	Total Coliform (MPN/100ml)
No. of observations	14	14	14	14	14	14	14	14	14	14	14	14
Minimum	0.023	14.5	7.7	0.523	6.6	2	64	7	5	5	5	5
Maximum	1.315	28.2	10.8	4.92	16.1	273	1800	1500	750	908	754	17850
1st Quartile	0.072	17.2	9.3	0.589	9.6	6.1	113	10	9	5	31	72
Median	**0.135**	**19.3**	**9.9**	**0.969**	**12.6**	**17.5**	**140**	**10**	**10**	8	74	1592
3rd Quartile	0.692	25.5	10.5	1.103	14.9	33.9	180	12	11	131	105	3733
Mean	0.405	20.7	9.8	1.18	12	40.4	265	118	63	178	131	2879
Geometric mean	0.187	20.1	9.8	0.949	11.6	15.9	165	16	13	**30**	**64**	**530**

OUTFALLS

Statistic	Flow (cfs)	Temp. (°C)	pH	Cond (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Entero. (MPN/100ml)	Total Coliform (MPN/100ml)
No. of observations	10	10	10	10	10	10	10	10	10	10	10	10
Minimum	0.00014	14.8	7.9	0.56	6.9	0	94	1.2	1.4	5	5	5
Maximum	0.0331	19.2	8.5	2	9.6	41.2	570	20	19	111990	127400	4611000
1st Quartile	0.00028	16.6	8.1	0.657	7.6	1.3	115	4.3	3.3	5	132	4205
Median	**0.00084**	**17.4**	**8.2**	**0.727**	**8.1**	**3.8**	**135**	**10.5**	**6.5**	111	524	44815
3rd Quartile	0.00141	17.8	8.2	0.964	8.8	10.8	190	15.5	13.8	3123	1541	167138
Mean	0.00505	17.2	8.2	0.925	8.2	8.4	188	10.3	8.5	17126	14834	548413
Geometric mean	0.00102	17.2	8.2	0.849	8.1		161	7.1	6	**178**	**593**	**20969**

Table D- 4. Descriptive Statistics of Flow and Water Quality at Channel and Outfall Sites – Survey 2 (April 9, 2009).

CHANNELS

Statistic	Flow (cfs)	Temp. (°C)	pH	Cond (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Entero. (MPN/100ml)	Total Coliform (MPN/100ml)
No. of observations	26	27	27	27	27	27	27	27	27	27	27	27
Minimum	0.006	13.9	7.7	0.48	6.7	5.7	76	8	4	5	5	5
Maximum	1.476	28.2	11.0	1.266	21.4	396	260	35	25	2239	14009	12449388
1st Quartile	0.040	16.5	9.3	0.740	9.3	10.3	125	14	11.5	13	91	125
Median	**0.152**	**19.6**	**9.6**	**0.859**	**14.3**	**19.5**	**140**	**18**	**13**	110	404	27550
3rd Quartile	0.415	24.1	10.4	1.069	16.4	88.2	160	22	14.5	278	1007	80650
Mean	0.309	20.3	9.7	0.885	13.7	60.3	148	18.6	13	1633	5806	722442
Geometric mean	0.122	19.9	9.6	0.856	13.0	24.8	142	17.4	12	**73**	**297**	**5564**

OUTFALLS

Statistic	Flow (cfs)	Temp. (°C)	pH	Cond (mS/cm)	DO (mg/L)	Turb. (NTU)	Hardness (mg/L)	Tot. Cu (ug/L)	Diss. Cu (ug/L)	E. coli (MPN/100ml)	Entero. (MPN/100ml)	Total Coliform (MPN/100ml)
No. of observations	14	14	14	14	14	14	14	14	14	14	14	14
Minimum	0.00014	14.6	7.5	0.522	4.6	0.8	99	1.9	1.3	5	5	5
Maximum	0.0331	21.0	8.5	8.400	9.7	80.7	1000	120	81	11870	14136	2755000
1st Quartile	0.00019	16.3	7.9	0.730	6.6	3.6	132.5	4.5	2.8	6	48	4702
Median	**0.00045**	**17.2**	**8.0**	**0.950**	**7.2**	**6.6**	**170**	**11.9**	**6.1**	80	420	56175
3rd Quartile	0.00177	18.2	8.1	1.108	7.7	8.6	220	37.8	17.8	1406	2586	256283
Mean	0.00505	17.4	8.0	1.500	7.2	12.6	263	26.0	14.9	2014	2416	437502
Geometric mean	0.00079	17.4	8.0	1.070	7.1	6.2	200	12.5	7.1	**102**	**294**	**23999**

Table D-5. Descriptive Statistics of Flow and Water Quality at Channel and Outfall Sites – Survey 3 (May 11, 2009).

CHANNELS												
Statistic	**Flow (cfs)**	**Temp. (°C)**	**pH**	**Cond (mS/cm)**	**DO (mg/L)**	**Turb. (NTU)**	**Hardness (mg/L)**	**Tot. Cu (ug/L)**	**Diss. Cu (ug/L)**	**E. coli (MPN/100ml)**	**Entero. (MPN/100ml)**	**Total Coliform (MPN/100ml)**
No. of observations	26	27	27	27	27	27	27	27	27	27	27	27
Minimum	0.044	17.3	7.4	0.665	4.0	3.4	93	3.4	2.9	5	5	5
Maximum	0.856	32.4	10.7	1.66	17.4	61.8	440	21	20	4611	6131	228200
1st Quartile	0.097	18.5	8.6	0.809	8.8	6.1	155	6.8	5.5	13	91	126
Median	**0.194**	**22.9**	**9.1**	**1.029**	**12.3**	**11.3**	**190**	**10**	**7.6**	110	404	27550
3rd Quartile	0.396	28.7	10.1	1.369	13.6	20.0	295	12.5	10	278	1008	80650
Mean	0.286	24.0	9.2	1.100	11.1	16.9	215	10.5	8.7	765	1067	39233
Geometric mean	0.196	23.3	9.2	1.055	10.3	11.9	201	9.5	7.8	**98**	**387**	**9018**

OUTFALLS												
Statistic	**Flow (cfs)**	**Temp. (°C)**	**pH**	**Cond (mS/cm)**	**DO (mg/L)**	**Turb. (NTU)**	**Hardness (mg/L)**	**Tot. Cu (ug/L)**	**Diss. Cu (ug/L)**	**E. coli (MPN/100ml)**	**Enterococcus (MPN/100ml)**	**Total Coliform (MPN/100ml)**
No. of observations	24	22	22	22	22	22	24	24	24	25	25	25
Minimum	0.000007	17.1	7.5	0.616	2.2	0.0	120	1.1	1.0	5	5	2481
Maximum	0.12500	23.9	8.8	1.94	9.2	112	650	540	88	8664	34100	6015000
1st Quartile	0.00023	18.8	7.9	0.795	5.8	5.1	167	6.3	5.2	63	317	34480
Median	**0.00088**	**19.2**	**8.0**	**0.969**	**6.6**	**8.5**	**180**	**17.5**	**11.5**	201	1000	275000
3rd Quartile	0.00574	20.9	8.3	1.096	7.8	23.0	200	35	15.8	836	5172	1046200
Mean	0.00825	19.9	8.1	1.000	6.5	21.8	214	55.8	16.1	1095	4122	1109732
Geometric mean	0.00110	19.8	8.0	0.961	6.3		199	16.6	9.0	**188**	**850**	**218568**

METHODS

In order to obtain continuous records of pH and temperature of water in the Los Cerritos Channel, a WTW pH logger (WQL-pH) fitted with a SensoLyt® WQL pH electrode was installed on a bridge abutment under the Stearns Street Bridge. The logger was set to record temperature and pH at intervals of 10 minutes throughout the deployment. The meter was installed in the middle of the channel below the bridge at a location that ensured the sensors would remain immersed throughout dry weather periods.

Figure D-5. Dry Weather Flow at the Los Cerritos Monitoring Station

The SensoLyt® WQL pH electode records pH in the range of 2 to 12 pH units with an accuracy of ≤ 0.005± 1 digit, and temperature in the range of -5.0°C to 105°C with an accuracy of ≤ 0.1K ± 1 digit. The meter was calibrated before emplacement and checked subsequently each 4 to 6 weeks during maintenance visits with pH standards and a laboratory thermometer and was found to be a stable and reliable instrument.

RESULTS

The continuous series of pH and temperature measurements were taken during the period of September 10, 2010 to May 1, 2011 to obtain both dry and wet season data to document daily, seasonal and event-driven variations in the cycling of pH and temperature. Data were plotted for the full record of deployment in Figure D-6 (upper two plots).

Two features of these data are immediately apparent. First, the strong 24-hour cycle in water temperature and pH is clear and persistent throughout the dry weather season and during dry weather periods throughout the winter. These 24-hour signals are muted in response to significant rain events but reestablish almost immediately after the runoff subsided from these rain events. Secondly, the overall average pH measured in Los Cerritos Channel at the Stearns Street monitoring station is just under pH 9.0 with a daily maximum of up to pH 10.9 thus exceeding Basin Plan objectives of pH 8.5 maximum. Though average solar radiation and average water temperatures drop during the winter, the pH values remain high, and the 24-hour cycle continues along with pH exceedances above pH 8.5.

A closer examination of the 24-hour cycle in temperature and pH is shown in expanded plots of two selected shorter time plots given in Figure D-7, the upper plot for a section of winter record, and the lower plot for a section of record in the spring. Both records show that there is a daily lag between the rise in water temperature and the pH response. A major storm event over a protracted number of days is obvious in the winter record by reduced cycling and pH values depressed to levels less than pH 8.0, but the cycling and pH exceedances resume within a few days. A significant but only one day duration rain occurring in the spring record had much less impact, but pH values actually increased in the following days.

In order to examine the daily cycling more closely, all days of record were averaged versus time of day with the results displayed in Figure D-8. The upper plot shows the results for all rain days, while the lower plot shows the results for all dry days. Both of these plots show temperature and pH hourly averages being lower during the night and increasing during the day. For the rain days, hourly averaged pH was 8.0 overall with maximum pH averaging 8.5. For most of the record comprising all dry days, the same pattern occurred of rising temperature and pH values during the daytime hours. For the dry days (lower plot) the overall average pH was 9.0, with the average maximums of pH 10 occurring late in the afternoon, and the average minimums of about pH 8.0 occurring about at sunrise.

Descriptive statistics for the pH time series data are given in Figure D-9 and numerically in Table D-6. Figure D-9 shows an overall rain day average pH of about 8.0 with a median of pH 7.7, though individual month statistical results are more scattered due to heavier influences of more rain days occurring in December. Nevertheless, maximum pH values for some of the rain days are up to pH 10.5. For the dry days, both the average and median values are about pH 9 with maximum values just below pH 11 and minimum values barely below pH 6.5.

DISCUSSION

The results of this investigation support the initial hypothesis that the elevated pH values in these shallow open concrete channels are caused by photosynthetic activity. Early evidence from discrete sampling in the upper channels suggested that pH increases during the day. These survey results also show that the elevated pH in the Los Cerritos Channel Watershed is not coming from high pH discharges in outfalls that drain into the upper Channels. The present results of the time series measurements of temperature and pH taken at the Stearns Street monitoring site in Los Cerritos Channel above tidal influence show the strong persistent 24-hour signal of temperature and pH values and confirm this hypothesis that the high pH values in the Channel are due to this natural process of algal growth. In addition, these latter time series data show that pH cycling and pH exceedances of the Basin Plan objectives also occur during winter dry weather conditions, starting immediately after muting effects of runoff from significant rain events.

Algae in the channels consume carbon dioxide (CO_2) while undergoing photosynthesis. Algal growths of filimentaeous algae are observed in the open channels typically during summer, dry weather conditions. Evidence of high photosynthetic activity is typically evident in the form of the high concentrations of dissolved oxygen in the water as well as visual evidence of bubbles being generated as the water becomes oversaturated from oxygen. The removal of CO_2 from the water causes bicarbonate and carbonate ions to react with hydrogen ions (H^+) to form more CO_2. The loss of H^+ from the water causes the pH to increase. During the night, respiration of the algae and bacteria in the channel would cause CO_2 to be released and oxygen to be consumed. This allows the pH drop during the night. The diurnal cycling of pH is a common occurrence in open waterways and in shallow lakes. Alkalinity provides buffering capacity such that high alkalinity water has less extreme diurnal changes in pH.

Daily cycling of pH and temperature and high peaks of pH values is a well documented phenomena in streams, ponds, or shallow lakes where shallow water and lack of sufficient vegetation for shading from sunlight allows sufficient photosynthetic activity to produce swings of 1.5 pH units or greater. Examples of high pH resulting from this natural photosynthetic activity can be found in streams and lakes as diverse as those in Hawaii (Tomlinson and DeCarlo, 2001), Oregon (DEQ, 2002), and Montana (Gammons et. al, 2007, Parker et.al. 2007). Phytoplankton diversity and cyanobacterial dominance have been studied in the shallow Santa Olalla Lake in southwestern Spain which is in an area dominated by a Mediterranean-type climate with dry hot summers and low-rainfall winters similar to Southern California (Lopez-Archilla et al., 2003). This lake has an average pH 9.52 with maxima > 10.5 and contained several species of green algae, diatoms, and euglenoids and several cyanobacteria.

Studies carried out in freshwater ponds in the southern United States with respect to management strategies to control pH have been carried out by Tucker and D'Abramo, 2008. They state that chemical interactions among carbon dioxide, hydrogen ions, and the anions that produce alkalinity buffer the pH of most natural waters in a range of about 6 to 8.5. In the absence of processes that add or remove carbon dioxide, the initial pH of water in contact with air depends on its alkalinity. Waters with low alkalinities have an initial pH at the low end of that range, while water of higher alkalinities have higher pH. Adding or removing carbon dioxide causes pH to rise or fall from that initial value. Adding carbon dioxide pushes the previously defined chemical reaction toward the side of forming carbonic acid and hydrogen ions and causing pH to decrease. Removing carbon dioxide pulls the reaction to the other side thereby removing hydrogen ions and causing pH to increase. The amount of variation from the initial pH depends on the amount of carbon dioxide added or removed and the alkalinity, which tends to buffer or reduce the effect of changes in carbon dioxide concentrations.

They state that difficulties in managing pH arise because the term high pH describes not only a chemical property, but also the outcome of many interacting chemical and biological processes. A solution to high pH problems must be to alter pond biology so that the net daily carbon dioxide uptake in near zero by reducing photosynthesis or increasing respiration both of which pose practical difficulties. For pond management, establishing a balance between the hardness and alkalinity helps, addition of alum or an organic substance that will decompose over time to release carbon dioxide into the water, or control of plant growth through shading or use of aquatic herbicides, the latter use in ponds usually to change one type of plant community to a more desirable type. All of these management methods appear to be very difficult if applied to shallow, slow moving water in miles of concrete channels.

CONCLUSIONS

Exceedances of pH above the Basin Plan objective of 8.5 occur in the upper channels of the Los Cerritos Watershed in both summer dry and winter dry periods. Early evidence from discrete sampling in the upper channels of the Los Cerritos Watershed suggested that pH increases during the day. These survey results also showed that the elevated pH in the Los Cerritos Channel Watershed is not coming from high pH discharges in outfalls that drain into the upper Channels. The present results of the time series measurements of temperature and pH taken at the Stearns Street monitoring site in Los Cerritos Channel above tidal influence show the strong persistent 24-hour signal of temperature and pH values and confirm the hypothesis that the high pH values in the Channel are due to this natural process of algal growth.

RB-AR9684

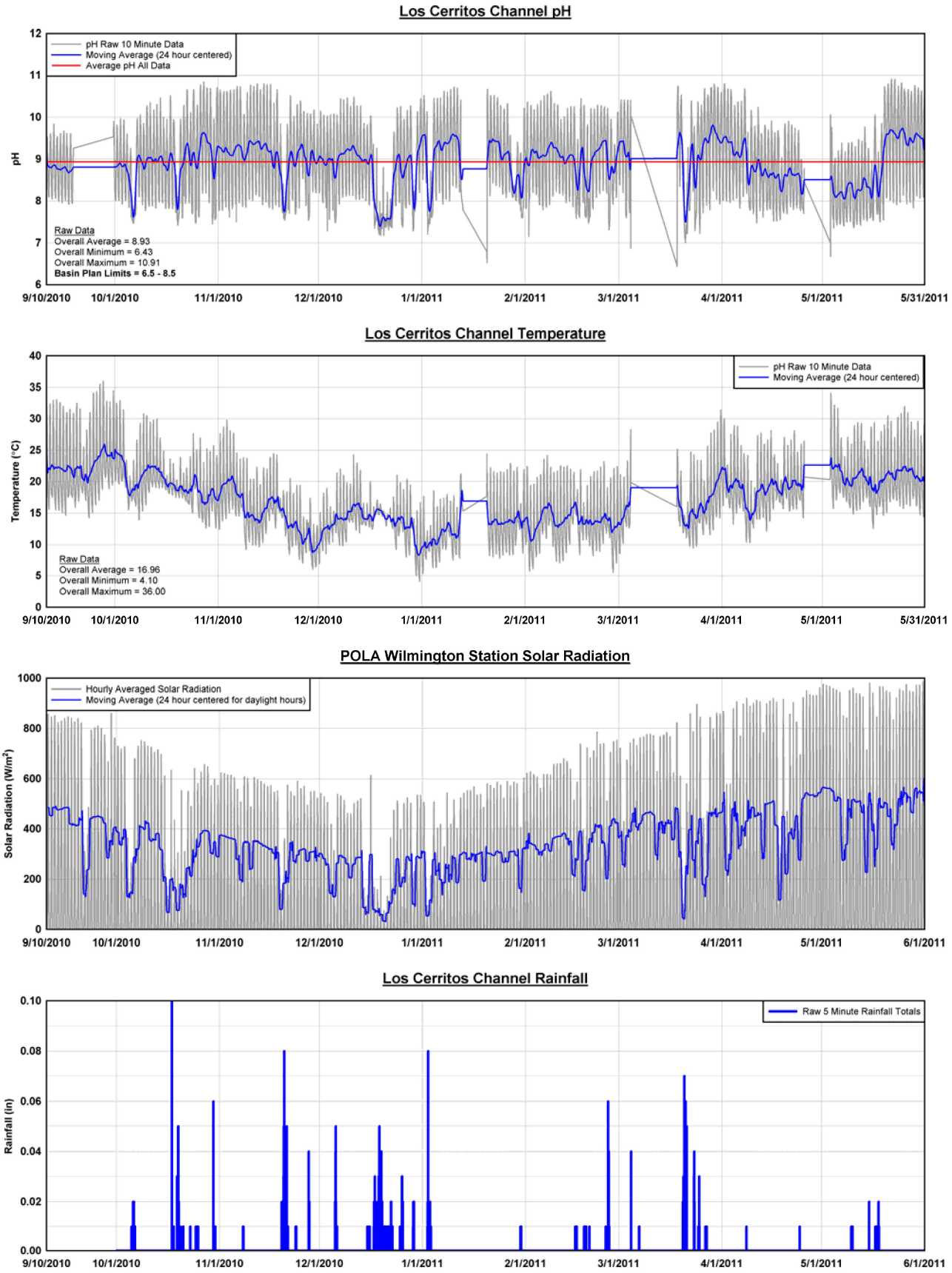

Figure D-6. Time Series Records of pH, Temperature, Solar Radiation and Rainfall in Los Cerritos Channel at Stearns Street. September 10, 2010 to June 1, 2011.

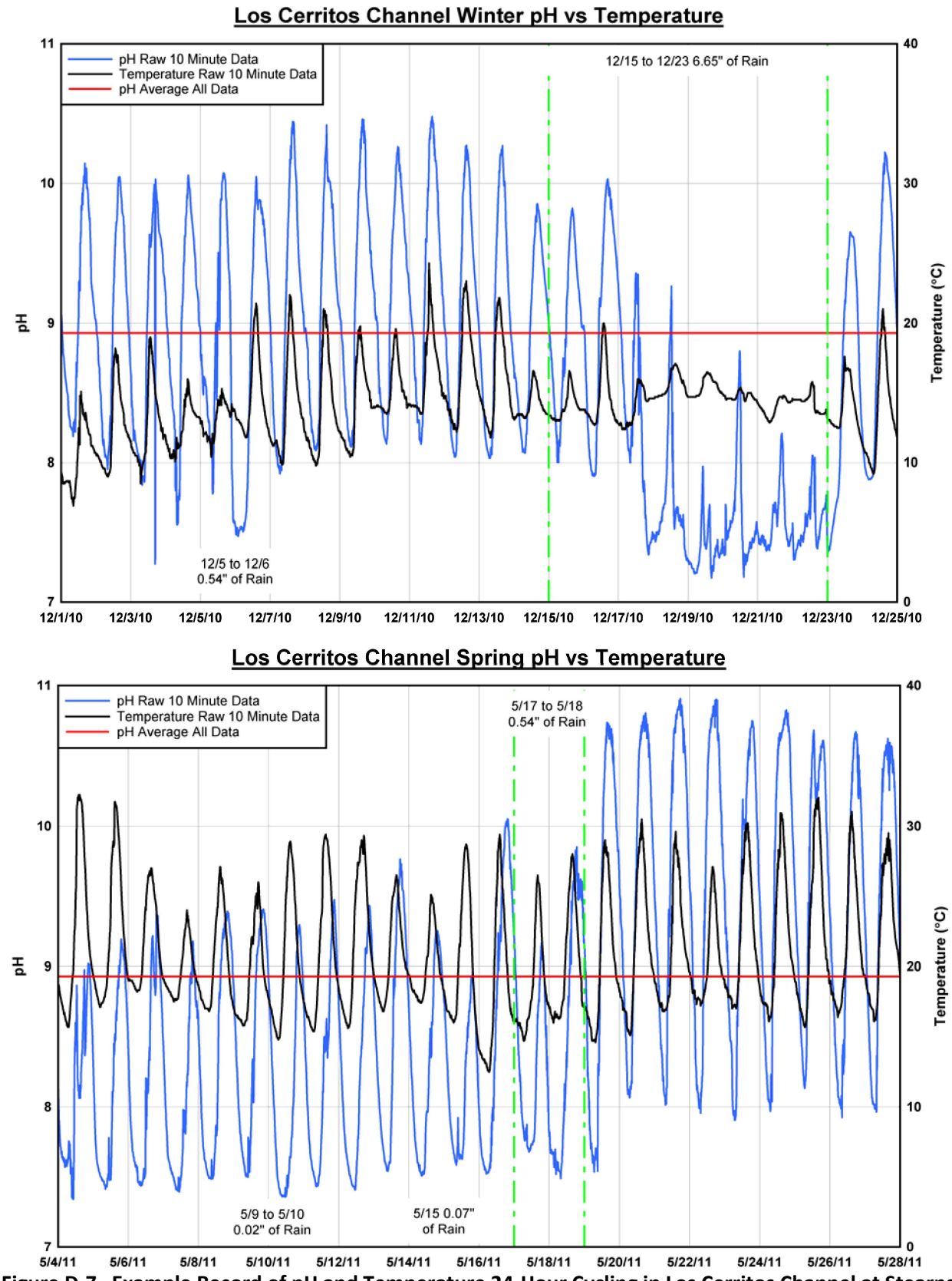

Figure D-7. Example Record of pH and Temperature 24-Hour Cycling in Los Cerritos Channel at Stearns Street. Winter (Above) and Spring (Below) Seasons.

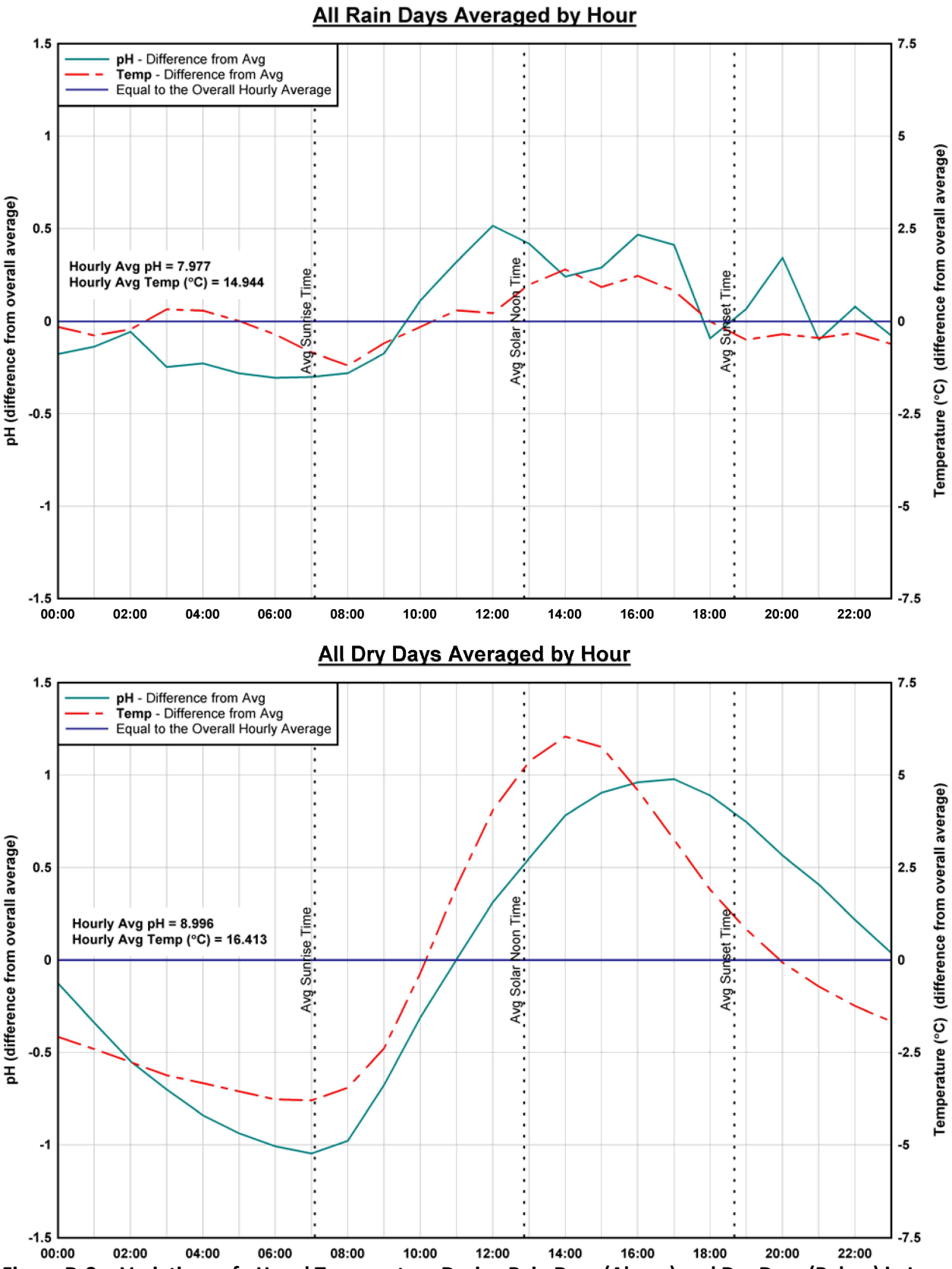

Figure D-8. Variations of pH and Temperature During Rain Days (Above) and Dry Days (Below) in Los Cerritos Channel at Stearns Street.

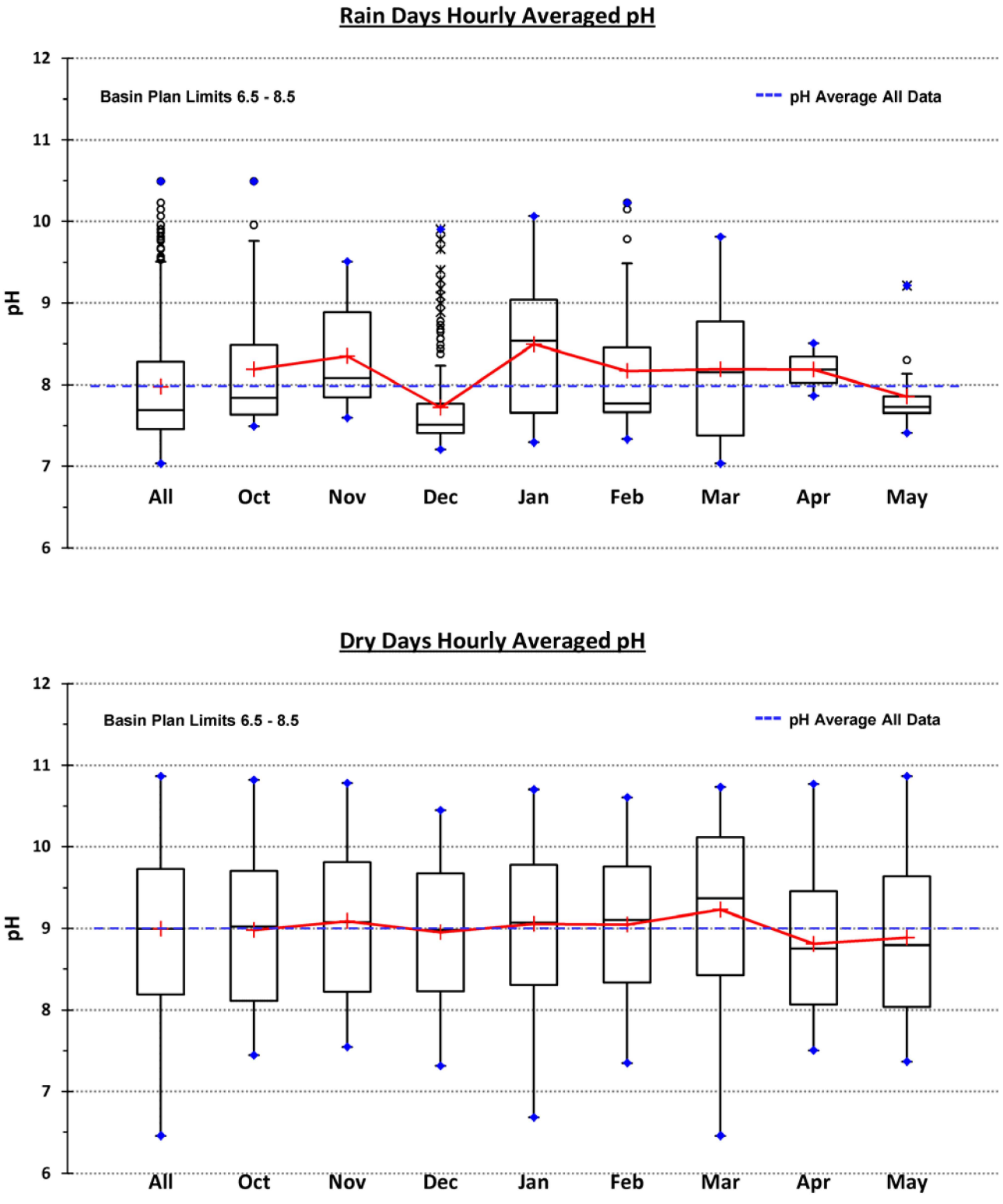

Figure D-9. Variability of pH in Los Cerritos Channel at Stearns Street for Rain Days (Above) and for Dry Days (Below).

Table D-6. Descriptive Statistics for pH at Los Cerritos Channel Monitoring Station.

pH on Rain Days (hourly averaged, Sept. not included)

Yr/Month	Min	Avg	Max	StdDev	CV(%)	Rainfall (in)
2010						
Oct	7.49	8.19	10.49	0.75	9.21	1.74
Nov	7.60	8.35	9.51	0.67	7.99	0.73
Dec	7.21	7.72	9.90	0.54	7.01	8.6
2011						
Jan	7.30	8.50	10.06	0.88	10.35	0.97
Feb	7.33	8.17	10.23	0.84	10.24	0.93
Mar	7.04	8.19	9.81	0.91	11.12	2.65
Apr	7.87	8.19	8.51	0.45	5.55	0.03
May	7.41	7.86	9.21	0.42	5.38	0.63
All	**7.04**	**7.98**	**10.49**	**0.73**	**9.09**	**16.28**

pH on Dry Days (hourly Averaged, Sept. not included)

Yr/Month	Min	Avg	Max	StdDev	CV(%)	Rainfall (in)
2010						
Oct	7.45	8.98	10.82	0.92	10.19	0
Nov	7.55	9.09	10.78	0.92	10.16	0
Dec	7.31	8.95	10.45	0.82	9.11	0
2011						
Jan	6.69	9.06	10.70	0.87	9.66	0
Feb	7.35	9.05	10.61	0.81	8.90	0
Mar	6.46	9.23	10.73	1.02	11.01	0
Apr	7.51	8.81	10.77	0.82	9.27	0
May	7.37	8.89	10.87	1.02	11.47	0
All	**6.46**	**9.00**	**10.87**	**0.90**	**10.05**	**0**

All Raw pH Data

Yr/Month	Min	Avg	Max	StdDev	CV(%)	Rainfall (in)
2010						
Sep	7.92	8.80	9.90	0.57	6.45	-
Oct	7.41	8.90	10.85	0.90	10.15	1.74
Nov	7.49	9.07	10.81	0.93	10.23	0.73
Dec	7.18	8.71	10.48	0.92	10.52	8.6
2011						
Jan	6.52	9.04	10.73	0.88	9.77	0.97
Feb	7.15	9.01	10.62	0.83	9.21	0.93
Mar	6.43	9.14	10.80	1.05	11.53	2.65
Apr	7.47	8.81	10.81	0.82	9.31	0.03
May	6.67	8.86	10.91	1.03	11.58	0.63
All	**6.43**	**8.93**	**10.91**	**0.92**	**10.28**	**16.28**

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Attachment 4. **Summary of pH and Ammonia Data from City of Long Beach MS4 NPDES Storm Water Monitoring Site on the Los Cerritos Channel at Stearns Street along with Potential Toxicity Calculations**

(Excel Spreadsheet, Electronic File Only)

RB-AR9691

ATTACHMENT D:

SUPPORT FOR ASSUMPTION OF SB 346 IMPLEMENTATION EFFECTIVENESS

1. Memo: Estimate of Urban Runoff Copper Reduction in Los Angeles County for the Brake Pad Reductions Mandated by SB 346

2. Brake Pad Copper Reduction Calculations Spreadsheet

3. Memo: Brake Pad Copper Reduction – Metrics for Tracking Progress

tdc environmental

MEMO

TO: Richard Watson, Richard Watson & Associates, Inc. **DATE:** Feb. 14, 2013
FROM: Kelly D. Moran, Ph.D. **PROJECT:** 86
SUBJECT: Estimate of Urban Runoff Copper Reduction in Los Angeles County from the Brake Pad Copper Reductions Mandated by SB 346

Summary

This memorandum provides an estimate of urban runoff copper reductions from the brake pad copper reductions mandated by SB 346. The estimate is designed for urban runoff management planning purposes in Los Angeles County.

The estimate relies on available information, which was largely developed through the lengthy collaboration among brake pad manufacturers, government agencies, and environmental groups in the Brake Pad Partnership (BPP). Since certain elements of the brake pad copper reduction schedule are unknown at this time due to the proprietary nature of product formulation and sales data, the estimates rely on a series of reasonable assumptions that were developed on the basis of available data. Three scenarios (see Table 1) were developed to span the reasonable range of industry product modification schedules.

Table 1. Copper Reduction Scenario Summary

Year*	Scenario 1 - One Step Reduction	Scenario 2 - Two Step Reduction	Scenario 3 - Aftermarket Exemption from 0.5% Copper
2014	<0.5% copper brake pads start appearing on new vehicles	<5% copper brake pads start appearing on new vehicles	<5% copper brake pads start appearing on new vehicles
2015			
2016			
2017			
2018		<0.5% copper brake pads start appearing on new vehicles	<0.5% copper brake pads start appearing on new vehicles
2019			
2020			
2021	All new vehicle brake pads <0.5% copper	All new vehicle brake pads <5% copper	All new vehicle brake pads <5% copper
2022			
2023	All replacement pads <0.5% copper	All replacement pads <5% copper	All replacement pads <5% copper
2024			
2025		All new vehicle brake pads <0.5% copper	All new vehicle brake pads <0.5% copper
2026			
2027		All replacement pads <0.5% copper	
2028			

*Key Los Angeles River Metals TMDL compliance dates are highlighted.

For each scenario, quantitative estimates of urban runoff copper reductions were generated through spreadsheet calculations. The resulting estimates summarized in Table 2 are in the form of a percentage reduction in copper in urban runoff in years of interest for TMDL compliance in Los Angeles County (2020, 2024, and 2028) and in 2032.

Table 2. Estimated Urban Runoff Copper Reduction from Brake Pads Alone

Year	Scenario 1 - One Step Reduction	Scenario 2 - Two Step Reduction	Scenario 3 - Aftermarket Exemption from 0.5% Copper
2020	29%	17%	17%
2024	60%	45%	39%
2028	61%	60%	49%
2032	61%	61%	55%

The most significant uncertainties in these estimates are in brake pad copper reduction schedules, brake pad copper contents, and watershed response times (which are affected by watershed-specific characteristics and variation in annual rainfall volumes).

Background

A simple action—vehicle drivers hitting the brakes—released about 600,000 kilograms (1.3 million pounds) of copper into California's environment in 2010. Each time vehicle brakes engage, a tiny amount of fine dust wears off of the vehicle's brake pads. When it rains, some of this dust washes into urban runoff. Scientific studies indicate that dust generated by vehicle brakes is by far the most significant source of copper in urban watersheds. In California's most urbanized watersheds, brake pad copper is estimated to comprise more than 60% of all copper in urban runoff (Donigian 2009[1]).

A California law enacted in 2010, SB 346 (Kehoe) set in place a program that will nearly eliminate copper use in brake pads. SB 346 requires that brake pads sold in California contain no more than 5% copper by weight by 2021, and no more than 0.5% by 2025. According to a representative industry analysis, as of 2006 brake pads contained an average of about 8% copper by weight (BPP 2008). The law also limits dangerous—but fortunately less common—brake pad pollutants, by prohibiting sale of brake pads containing more than trace amounts of lead, mercury, asbestos, cadmium, and hexavalent chromium in 2014. To avoid replacing one environmental problem with another, SB 346 requires manufacturers to examine new formulations carefully and to select alternatives that pose less potential hazard to public health and the environment. Consumer safety will be ensured through a limited deadline extension process for the 2025 0.5% copper requirement (available starting only when a manufacturer demonstrates that no alternative brake friction materials will be safe and available) and by provisions allowing continued sales of replacement brake pads for older vehicles. Starting in 2014, a brake pad copper content certification and labeling system established by SB 346 will provide for ready identification of brake pads with the lowest copper content.

Following California's model, the State of Washington also enacted restrictions on brake pad copper content in 2010 (Washington State 2010). Washington's law provides slightly different exemptions than California's law—notably a much narrower exemption for

[1] See references list at the end of the memorandum.

"aftermarket" brake pads that replace the "original equipment" brake pads sold with new vehicles. Washington law also has another important difference from California law—it requires manufacturers to provide Washington State Department of Ecology with periodic reports of brake pad copper, antimony, nickel, and zinc content, starting in 2013.

Due to the importance of California's vehicle market and the interconnection of vehicle parts distribution systems throughout North America, brake pad manufacturers expect that it is unlikely that any manufacturer will produce California-specific or Washington-specific products (MEMA 2012a). Instead, copper reduction will be integrated throughout the entire North American brake pad market (MEMA 2012a).

In the two years since SB 346 was enacted, the vehicle industry has actively engaged in implementing the law (Moran 2011). Compliance certification markings, box markings, and certified chemical analysis methods have been adopted (SAE 2011; SAE 2012; MEMA 2012b). Washington State has adopted regulations specifying testing, marking, and reporting requirements (Washington Department of Ecology 2012). Although quantitative information about brake pad copper reductions is not yet available, strong industry attention to low-copper and copper-free brake pads and promotion of these pads by companies already offering them (Honeywell undated; FDP Brake 2010-2012; Williams undated; Fastmagna.com 2010; Bendix 2012; Phoenix 2010; ALCO 2012; Wilson 2012; Crowe 2012; Aftermarket News 2012; Murphy 2012) provides evidence that implementation is underway and is proceeding in accordance with the process and time frames anticipated by the Brake Pad Partnership (BPP 1996-2012).

Summary of Available Information

This section summarizes the available information that forms the basis for the brake copper reduction estimates.

Brake Pad Copper Reduction Schedule. In 1999, the Brake Manufacturer's Council committed to offer new low-copper brake pad materials to customers within 5 years of any BPP decision that brake pads are a major copper source (Lawrence 1999). This commitment was triggered by the BPP in late 2008. As discussed above, many manufacturers are currently offering low copper and copper-free brake pads to customers. The timelines in SB 346 and Washington state law provided eight years after the 2013 reformulation commitment for vehicle manufacturers to re-engineer all vehicle platforms to incorporate the new brake pad formulations (BPP 1996-2012). This timeframe was specifically selected to allow vehicle manufacturers to complete the required brake system re-engineering in conjunction with their regular re-engineering of vehicle platforms. Both laws provide for a second overlapping vehicle re-engineering cycle to reach the 2025 0.5% copper standard, which required technology that was not in sight when the laws were adopted in 2010 (but that is now commercially available as documented above).

Brake Pad Copper Content. Through the BPP, brake pad manufacturers reported brake pad copper content annually from 1998-2006 for the highest sales volume new vehicles (BPP 2008). In 2006, original equipment brake pads contained an overall average of 8.2% copper by weight. This average represents a mixture of high-copper brake pads (10-20% copper) and brake pads with no intentionally added copper. In 2008, manufacturers collected formulation type data to estimate the fraction of the market

comprised of no-copper brake pads (Phipps 2008). Because the BPP reporting covered only original equipment brake pads (those sold on new vehicles), the BPP developed a separate estimate of the copper content in aftermarket (replacement) brake pads (Rosselot 2009). Until Washington State's reporting begins, BPP data are the best available information about brake pad copper content.

Brake Pad Replacement Frequency. Brake pad material wears off gradually over the course of the lifetime of the pad. To support the work of the BPP, manufacturers shared propriety market survey data characterizing the replacement frequencies of original equipment and aftermarket brake pads (BPP 1996-2012; AAIA 2008). These data showed that on average, original equipment brake pads are replaced when a vehicle is 3-4 years old. Because older vehicles are driven fewer miles per year (FHWA 2009; Santos 2011), their aftermarket brake pads are only replaced at a rate of about 21% per year (AAIA 2008).

Vehicle Fleet Characterization. The California Department of Finance periodically publishes summaries of vehicle registration data (DOF 2009). These summaries provide vehicle age distributions and the fraction of vehicle registrations by type (light-duty, heavy-duty, motorcycle, trailer). In addition to these data, information from the Southern California Association of Governments' transportation monitoring and information system (SCAG 2012) and the BPP (BPP 1996-2012 and Rosselot 2010) provide the basis for assuming that neglecting contributions from vehicles other than light-duty vehicles will not introduce significant error in the copper reduction estimate.

Copper in Urban Runoff. The Brake Pad Partnership (BPP) completed peer-reviewed scientific studies to characterize brake pad emissions (BMC PEC 2006; Haselden 2004; Schlautman 2006), examine all environmental copper sources (Rosselot 2006a; Rosselot 2006b), and develop quantitative estimates of the brake pad copper contribution to total stormwater copper loads using linked air and watershed models (Pun 2006a; Pun 2006b; Donigian 2007; Donigian 2009).

The BPP's "Upper Colma" modeling watershed is most similar to watersheds in Los Angeles region because of its combination of high urbanization, high traffic levels, and location surrounded by other urban areas. In this watershed, brake pad copper was estimated to comprise 58-66% of total anthropogenic copper.

BPP modeling estimated watershed response time to brake pad copper reductions (Donigian 2009). For the Los Angeles region, watershed response time is assumed to be similar to the BPP's estimates for highly urbanized watersheds with concrete lined channels. In the most highly impervious watersheds, watershed response time is relatively quick, with >70% copper reductions estimated the first year after a change in brake pad reformulation and nearly 90% reduction in 5 years. Concrete channels were found to further reduce these watershed response time.

Computational Assumptions

The copper reduction estimates rely on a series of reasonable assumptions that were developed on the basis of available data. These assumptions are detailed in Table 3.

Table 3. Assumptions Used in Development of Copper Reduction Estimates

Assumption	Basis	References
Brake Pad Copper Reduction Schedule Assumptions – Original Equipment Brake Pads		
By January 1, 2021, all original equipment brake pads will contain less than 5% copper. By January 1, 2025, all original equipment brake pads will contain less than 0.5% copper	Requirements of SB 346	SB 346
Extension requests for 0.5% copper requirement will be relatively limited.	Difficulty of extension process and short time frame for each extension, long time frame for development of alternatives, industry press and informal communications indicating that alternatives are becoming available.	SB 346; BPP 1996-2012; Honeywell undated; FDP Brake 2010-2012; Williams undated; Fastmagna.com 2010; Bendix 2012; Phoenix 2010; ALCO 2012; Wilson 2012; Crowe 2012; Aftermarket News 2012
Lower copper brake pads will be phased in on new vehicles at a constant rate over an 8-year period prior to each compliance deadline.	Estimates from brake pad and vehicle manufacturers, who have consistently explained that they plan to introduce new brake pads when completing the cyclical re-engineering of vehicle platforms. Recent industry press and brake pad manufacturer announcements have been consistent with the statements made during development of legislation.	MEMA 2010; BPP 1996-2012; Honeywell undated; FDP Brake 2010-2012; Williams undated; Fastmagna.com 2010; Bendix 2012; Phoenix 2010; ALCO 2012; Wilson 2012; Crowe 2012; Aftermarket News 2012; Murphy 2012
Washington State will require new vehicle brake pads to contain less than 0.5% copper by January 1, 2025 (same schedule as California).	Washington State law establishes the same compliance date as California law for brake pads less than 5% copper, but does not establish a firm date for requiring brake pads less than 0.5% copper. Washington must conduct a review to set the compliance date. Washington's review will start in 2015. When the review is complete, manufacturers will have 8 years to comply. Washington's review process and decision will take 1-2 years, setting up timing for implementation on 1/1/25. To establish the compliance date, Washington must find that <0.5% copper pads are available. Market information indicates this may already be true. Formulation data that must be reported to Washington in 2013 is likely to provide a scientific basis for Washington's decision. The industry and the two states have worked to harmonize the implementation of the California and Washington laws.	Washington State 2010; Moran 2011; ; Honeywell undated; FDP Brake 2010-2012; Williams undated; Fastmagna.com 2010; Bendix 2012; Phoenix 2010; ALCO 2012; Wilson 2012; Crowe 2012; Aftermarket News 2012; Murphy 2012

Table 3. Assumptions Used in Development of Copper Reduction Estimates (Continued)

Assumption	Basis	References
Brake Pad Copper Reduction Schedule Assumptions – Aftermarket (Replacement) Brake Pads		
Non-compliant replacement brake pads for pre-2021 and pre-2025 vehicles may be sold indefinitely.	Provision of SB 346	SB 346
Under Washington state law, starting on January 1, 2021, all newly manufactured replacement brake pads must contain less than 5% copper. Non-compliant replacement brake pads manufactured prior to January 1, 2021 may be sold until December 31, 2030. Non-compliant replacement brake pads may be sold indefinitely, but only if they are identical to original equipment brake pads.	Washington State law	Washington State 2010; Washington Department of Ecology 2012
Washington State's exemption for original equipment brake pads that are identical to the ones sold with the new vehicle will have only a small effect.	Original equipment services pads that are identical to the ones sold with the vehicle comprise a very small fraction of the market because for cost reasons, even vehicle dealers switch from these pads to lower cost vehicle manufacturer approved service pads a few years later. Vehicle manufacturers protested the narrow nature of this exemption during development of Washington's legislation and its regulations.	BPP 1996-2012
Recognizing that brake pad sales lag behind shipments of new products due to the inventory "turn time" in the brake pad supply chain, only 45% of brake pads sold in a given year are shipped in that year. The remaining sales are comprised of brake pads shipped in the previous year (30%) and brake pads shipped two years prior (25%).	A typical replacement brake pad inventory "turn time" is <2 years. Some low volume pads may be held in inventories for as long as ten years. Inventory carrying costs hold down inventory volumes. Brake pad inventory turn time is longer than other retail inventory turn times because of the plethora of vehicle models and some manufacturers' historic lack of standardization of parts across vehicle models.	BPP 1996-2012
Replacement brake pads for vehicles manufactured with low copper brake pads will also be low in copper, even if the vehicle is manufactured prior to compliance deadlines.	Braking performance will be most easily matched with lower copper formulations. Lower copper formulations will almost certainly be lower cost, which is an important factor in the largely price-driven aftermarket.	BPP 1996-2012

Table 3. Assumptions Used in Development of Copper Reduction Estimates (Continued)

Assumption	Basis	References
Replacement brake pads containing lower levels copper that are designed for vehicles manufactured with high copper brake pads will phase in at a constant rate starting in 2014. The end of the phase in period will be determined by Washington's compliance deadlines.	Since safety standard apply to new vehicles—and not to brake pads—there is no specific regulatory constraint on aftermarket brake pad formulations. Drivers for the aftermarket include cost, safety, and customer acceptance. Since copper is an expensive ingredient, cost considerations point toward early reformulation. Aftermarket manufacturers have a history of making products available to fit new vehicles within a few months of the vehicle's initial manufacture, suggesting that they will make products available on a schedule that phases in over the same general time period as the phase in for original equipment brake pads. Press releases and industry websites indicate that brake pads containing <5% copper and brake pads containing less than 0.5% are both already available. Manufacturers may be less motivated to introduce new products for old vehicles, which present the need to design pads with characteristics similar to those provided by high copper brake pads.	BPP 1996-2012; Honeywell undated; FDP Brake 2010-2012; Williams undated; Fastmagna.com 2010; Bendix 2012; Phoenix 2010; ALCO 2012; Wilson 2012; Crowe 2012; Aftermarket News 2012; Murphy 2012
Brake Pad Copper Content Assumptions		
82% of Original Equipment brake pads contain copper; these pads contain 10-20% copper by weight. 18% of Original Equipment brake pads are semi-metallic, containing <0.5% copper. These pads contain a low level of copper (0.1%) due to the presence of traces of copper in other ingredients.	Analysis of brake pad formulation data collected in Brake Manufacturers' Council annual surveys and BPP Steering Committee discussions of brake pad copper content by formulation type.	MEMA 2010; Phipps 2008; BPP 1996-2012
Original equipment brake pads currently contain an overall average of 8.2% copper by weight	Brake pad copper content data collected in Brake Manufacturers' Council annual surveys for the BPP. Although this is the best available data set, the survey was not designed for use in loading estimates. The most recent survey was in 2006. Newer data are currently unavailable.	BPP 2008
Brake pads meeting the <5% copper requirement will contain an average of 4% copper by weight. Brake pads meeting the <0.5% copper requirement will contain an average of 0.1% copper by weight.	Due to variation in materials input and manufacturing processes for brake pads (which are heterogeneous materials), to ensure compliance, products will need to be designed with copper content well below compliance levels. Since copper does not serve a useful design purpose below 1% concentrations, brake pads containing less than 0.5% copper will only contain trace copper introduced via impurities in other ingredients (e.g., recycled metals).	BPP 1996-2012
Aftermarket brake pads currently contain an overall average of 5% copper by weight.	Estimate made for the Brake Pad Partnership based on the very limited available data on aftermarket brake pads. Copper content is lower due to the high cost of copper as an ingredient and the cost sensitivity of the aftermarket.	Rosselot 2009

Table 3. Assumptions Used in Development of Copper Reduction Estimates (Continued)

Assumption	Basis	References
About 34% of aftermarket brake pads currently contain less than 0.5% copper. The current rate of replacing high copper original equipment brake with <0.5% copper brake pads will not decline and will grow only as aftermarket brake pads are re-engineered.	As compared to original equipment brake pads, a greater fraction of replacement pads are likely to contain less than 0.5% copper. Informal estimates of the copper free fraction of replacement pads have been as high as 50%. In the absence of other information, 34% of replacement brake pads as assumed to be copper free; this value is the midpoint between 18% and 50%. Similarly, in the absence of other information, the fraction of vehicles that started with high copper brake pads but that receive copper free replacement brake pads is assumed to remain constant until re-engineering starts.	BPP 1996-2012; Antenora 2012; MEMA 2012
Brake Pad Replacement Assumptions		
Original equipment brake pads are replaced when vehicle is 3.5 years old.	Brake pads are typically replaced after 3-4 years of service, after about 35,000-40,000 miles of driving.	BPP 1996-2012
Vehicles more than 3.5 years old have their brake pads replaced once every 5 years.	Automotive Aftermarket Industry Association survey data of the aftermarket indicate that 20-22% of vehicles more than 3 years old have their brake pads replaced each year. Older vehicles likely have a lower brake pad replacement rate than new vehicles because vehicle miles traveled falls with vehicle age.	AAIA 2008; BPP 1996-2012; FHWA 2009; Santos 2011
Vehicle Fleet Assumptions		
The age distribution of California's vehicle fleet will remain essentially the same as the distribution in 2007	No available information suggests that future distributions will change dramatically. The gyrations in vehicle sales volumes during the economic downturn appear to have ended.	DOF 2009. Table J3: "Distribution Of Fee-Paid Registrations By Type And Year First Registered California, 2007."
Heavy-duty (truck) brake copper contributions are small.	SCAG vehicle miles traveled (VMT) data show trucks comprise less than 3.5% of total vehicle miles traveled in Los Angeles County. Trucks have larger brake pads, but since consumer acceptance issues (noise, braking comfort) that have driven copper in use in vehicles are not present in this market, copper use is believed to be low.	SCAG 2012; Gilroy 2011; BPP 1996-2012
Motorcycle contributions are small	Motorcycles are estimated to be <1% of statewide brake pad copper emissions.	Rosselot 2010
Trailer contributions are small	Trailers comprise less than 10% of total California vehicle registrations. Trailers probably comprise a relatively small portion of the vehicle miles traveled in the Los Angeles region because they are primarily used on heavy-duty trucks (see above) and for recreational purposes.	DOF 2009. Table J5: "Registration of Motor Vehicles and Trailers which Paid Fees by Type of Vehicle California, 1971 to 2007."; SCAG 2012
Other vehicle types exempted from SB 346 release negligible quantities of copper	Brake Pad Partnership informal analysis	BPP 1996-2012

Table 3. Assumptions Used in Development of Copper Reduction Estimates (Continued)

Assumption	Basis	References
Vehicle Miles Traveled (VMT) Assumptions		
Brake pad wear is proportional to VMT	Information provided by brake pad manufacturers to the Brake Pad Partnership.	Phipps 2006
VMT will not change significantly in coming years.	SCAG data showing VMT was basically flat from 2002 through 2009. Increasing gasoline prices and legislation, regulation, and planning activities to reduce VMT because of climate change should stabilize—and may actually reduce—future VMT.	SCAG 2012
The relative fraction of vehicle miles traveled on highways (as compared to city streets) will not change significantly in coming years.	Brake Pad manufacturer data show that brake pad wear rates on city streets are 5-10 times greater than emissions on highways, due to lower use of brake pads per mile traveled on highways. As long as the relative proportion of vehicle miles traveled on theses two types of road does not change, this does not affect load estimates.	Phipps 2006
Urban Runoff Assumptions		
Urban Runoff Copper Fraction = 62%	In the most highly urbanized watersheds, brake pad copper comprises 58-66% of total anthropogenic copper.	Donigian 2009
Watershed response time in Los Angeles County = 1 year	In the most highly impervious San Francisco Bay area watersheds without concrete channels, watershed response time is relatively quick, with >70% copper reductions estimated the first year after brake pad reformulation and nearly 90% reduction in 5 years. Modeling suggests that channelized watersheds experience a slightly quicker wash out period than the natural channels modeled in the San Francisco Bay area. Weather introduces uncertainty into predicted copper reduction schedules. Wet weather and large storms mobilize copper in watersheds, increasing the speed of copper reductions. Dry years reduce the washout, increasing the length of time that it takes for brake pad copper reductions to be fully reflected in waterways. Modelers found that dry water year scenarios slightly increased washout time, by at most a few years.	Donigian 2009

Brake Pad Copper Reduction Scenarios

The following three scenarios were developed on the basis of available information to bracket the range of potential rates of brake pad copper reduction. Each scenario is based on a different potential pathway for the market transition to the brake pads containing less than 0.5% copper.

Scenario 1 (One-Step Reduction) – Virtually all original equipment (new vehicle) and aftermarket (replacement) brake pads are reformulated to <0.5% copper by January 1, 2021 (first SB 346 copper compliance deadline). Virtually all aftermarket brake pads containing higher copper levels that remain in distributor and retailer inventories are sold within two years of this date.

Brake pad, brake systems, and new vehicle manufacturers would greatly reduce their engineering costs for the transition to low copper brake pads if they can move directly to brake pads with less than 0.5% copper. This scenario describes the copper reductions that would occur if brake pad manufacturers complete product reformulation in a single cycle, thus avoiding two rounds of re-engineering of their products and their manufacturing processes. The primary basis for this scenario is the assumption that all manufacturers can quickly develop products containing less than 0.5% copper that meet all manufacturing, cost, and customer requirements.

Although available information about product formulation changes is currently limited, there is some evidence suggesting that this scenario may occur. The original equipment brake pad industry appears to be attempting to move directly to the lowest copper brake pads (Moran 2011). At least three major vehicle manufacturers have requested that suppliers provide brake pads with less than 0.5% copper for their new vehicle models (Murphy 2012). Press releases and communications with industry members indicate that companies are currently bringing to market brake pads with less than 0.5% copper that are designed to replicate the braking performance properties of higher copper formulations. These new brake pads will be appearing in some 2014 vehicle models (BPP 1996-2012; Murphy 2012).

For aftermarket brake pads, this scenario assumes that Washington State requirements will drive the market transition. Unlike California law, Washington law has very narrow exemptions for aftermarket brake pads (Washington State 2010). Due to the complexity of brake pad distribution chains, if higher copper brake pads enter national distribution systems after Washington's compliance deadlines, manufacturers and retailers will have trouble avoiding non-compliance with Washington requirements (BPP 2008-2010). Consequently, brake manufacturers have stated their intent to implement brake pad copper reductions nationally (MEMA 2012a).

The primary exemption for aftermarket brake pads under Washington law is an allowance for "inventory runoff" of brake pads manufactured prior to the compliance deadline (Washington State 2010). To ensure compliance, brake pad manufacture date must be marked on pads; this date marking is part of the nationwide brake pad compliance marking system (SAE 2012). Typical replacement brake pad inventory turnover time is less than two years (Brake Pad Partnership 1996-2012). Thus, after two years, most brake pads more than two years old have been sold.

Another consideration for the aftermarket is that copper is far more expensive than other brake pad ingredients (BPP 1996-2012). Since price is the primary customer interest in the aftermarket, manufacturers have a financial incentive to eliminate copper in aftermarket brake pads.

This scenario also may avoid the need for purchase of special chemical analysis equipment for manufacturers to monitor products for compliance with the 5% copper standard. In brake pad materials (friction materials), copper concentration measurements around 5% copper pose unique chemical analysis challenges that do not occur at the 0.5% level (Brake Pad Partnership 1996-2012). Developing manufacturing process controls for this copper concentration would cause manufacturers to incur one-time costs that have only short-term benefits.

The primary shortcomings of this scenario are:

(1) Some manufacturers may not successfully develop brake pads containing less than 0.5% copper that meet all manufacturing, cost, and customer requirements soon enough to transition all of their products by the above dates.

(2) Some manufacturers may delay transitions until legal deadlines.

(3) Washington State may provide broader exemptions when it implements its requirement for brake pads to contain less than 0.5% copper, delaying the aftermarket transition to the lowest copper brake pads.

This scenario is optimistic. It is included to show the earliest reasonable dates for achievement of brake copper reductions.

Scenario 2 (Two-Step Reduction) – Virtually all original equipment (new vehicle) brake pads are reformulated to <5% copper by January 1, 2021 and <0.5% copper by 2025 (SB 346 compliance deadlines), with minimal use of exemptions and extensions. Virtually all higher copper aftermarket (replacement) brake pads remaining in inventories are sold within two years of each compliance date.

This scenario assumes that brake pad manufacturers will implement a two-step transition to the lowest copper brake pads, based on legal deadlines. Under this scenario, in the first step manufacturers would replace current high copper products with products containing less than 5% copper. Manufacturers would delay introduction of products with less than 0.5% copper for several years, which would provide additional time for development of formulations containing less than 0.5% copper.

The 5% standard is included in California and Washington laws because when the laws were adopted, brake pad manufacturers indicated that most companies were capable of producing brake pads meeting the 5% standard (BPP 2008-2010). The long transition time provided in the laws before all new vehicles are required to meet the 5% standard was to provide adequate time for re-engineering of the braking systems of every new vehicle that currently uses higher copper brake pads (MEMA 2010).

When the laws were passed, manufacturers indicated that companies would need to develop new formulation approaches to formulate brake pads with less than 0.5% copper while meeting all manufacturing, cost, and customer requirements. SB 346 provided an

additional four years after the 5% standard takes effect to provide extra time for manufacturers to develop the new formulation approaches.

SB 346 was designed to allow vehicle manufacturers to re-engineer vehicle brake systems concurrent with their other periodic vehicle platform re-engineering, which occurs about once every 8 years for most vehicles (Brake Pad Partnership 2008; MEMA 2010). Before a newly re-engineered brake system reaches the market, the brakes go through several years of engineering design, product validations, and performance and safety testing by brake pad manufacturers and vehicle manufacturers (Brake Pad Partnership 2008; MEMA 2010). The timelines in SB 346 provided about 4 years for these activities to be conducted in parallel with formulation development (2010-2013), which occur prior to the sales of the first re-engineered less than 5% copper brake pad new vehicles in 2014. Because the compliance deadline for brake pads with less then 0.5% copper is only four years after the 5% deadline, within 4 years of the introduction of the less than 5% copper brake pad vehicles (2018), manufacturers will begin introducing vehicles with less than 0.5% copper brake pads so as to completely re-engineer all vehicles to meet the 0.5% standard by 2025.

Although the original equipment brake pad industry appears to be attempting to move directly to the lowest copper brake pads, it appears that a few companies are currently bringing brake pads less than 5% copper but more than 0.5% copper to the market in order to provide customers with immediate access to lower copper brake pads (Crowe 2012; Honeywell undated; BPP 1996-2012). The fraction of the overall brake pad market that makes a two-step transition will largely be determined by the success of each company's product formulators in developing less than 0.5% products that meet their company's and customer's manufacturing, cost, and performance requirements.

For aftermarket brake pads, this scenario is based on the assumption that Washington State requirements will drive the aftermarket transition.

The primary shortcomings of this scenario are:

(1) This scenario is not consistent with early evidence suggesting that the original equipment brake pad industry appears to be attempting to move directly to the lowest copper brake pads (see above).

(2) Washington State may provide broader exemptions when it implements its requirement for brake pads to contain less than 0.5% copper, delaying the aftermarket transition to the lowest copper brake pads.

Scenario 3 (Aftermarket Exemption from 0.5% Copper Standard) – Virtually all original equipment (new vehicle) brake pads are reformulated to <5% copper by January 1, 2021 and <0.5% copper by 2025 (SB 346 compliance deadlines), with minimal use of exemptions and extensions. Higher copper aftermarket (replacement) brake pads for vehicles manufactured prior to compliance dates continue to be sold indefinitely.

Like Scenario 2, this scenario assumes that original equipment brake pad manufacturers will implement a two-step transition to the lowest copper brake pads in accordance with the compliance dates in SB 346. Where it differs from Scenario 2 is in the aftermarket. This scenario assumes that Washington State deviates from the policy in its current law and provides a broad aftermarket brake pad exemption similar to the exemption in SB

346 when it implements its requirement for brake pads to contain less than 0.5% copper. The exemption in SB 346 is a permanent exemption for all aftermarket brake pads designed to fit vehicles manufactured prior to California's compliance deadlines in 2021 and 2025. Such an exemption would delay the aftermarket transition to the lowest copper brake pads by allowing high copper replacement brake pads to be sold for vehicles manufactured prior to compliance deadlines.

Under this scenario, aftermarket brake pad manufacturers would maintain the current copper content in their brake pads that are made for use in vehicles manufactured prior to 2021 and 2025. This would avoid the need for manufacturers to develop lower copper brake pads that meet the same performance characteristics as the higher copper brake pads.

Since this exemption is based on the premise that aftermarket brake pads should be designed to be similar to the original equipment brake pads, this scenario assumes that aftermarket brake pads for vehicles that originally have low copper or copper free brake pads will have the same copper content as the originals.

The primary shortcomings of this scenario are:

(1) This scenario is not consistent with early evidence suggesting that the original equipment brake pad industry appears to be attempting to move directly to the lowest copper brake pads (see above).

(2) When establishing regulatory requirements, states ordinarily rely on the precedents established in their state's own authorizing legislation.

Results

Using the assumptions in Table 3, copper reductions were estimated for three scenarios. An attached Excel spreadsheet contains the calculations. The results are presented in Tables 4, 5, and 6. The tables present the estimated average on-road brake pad copper content, the estimated reduction as compared to current (baseline) levels, and the estimated subsequent reduction in copper levels in urban runoff. To account for the watershed lag time, the urban runoff copper reductions are estimated to occur one year after the brake pad copper reductions.

Although every effort was made to develop scenarios that bracket the range of possible copper reduction schedules and to base reduction estimates on reasonable assumptions, these estimates may not account for all possibilities. For example, if high copper brake pads continue to be used in the small populations of exempted vehicles (e.g., motorcycles), the ultimate reduction levels could be slightly less than the anticipated maximum reduction of 61%. In the relatively unlikely event that DTSC allows substantial extensions, the pace of reductions could be slower than estimated in any of the scenarios.

Although these estimates are based on the best available information, they are uncertain. The most significant uncertainties are in brake pad copper reduction schedules, brake pad copper contents, and watershed response times (which are affected by watershed-specific characteristics and variation in annual rainfall volumes). As the brake pad reformulation process unfolds, data will become available from Washington State and brake pad certification organizations that can reduce most of these uncertainties.

Table 4. Scenario 1 - Estimated Urban Runoff Copper Reduction from Brake Pads

Year*	Scenario 1 - One Step Reduction		
	On-Road Average Brake Pad Copper	Estimated Brake Pad Copper Reduction	Estimated Urban Runoff Copper Reduction from Brake Pads Alone
Baseline (2013 and prior years)	6.1%	--	
2019	3.2%	47%	
2020			**29%**
2023	0.2%	97%	
2024			**59%**
2027	0.1%	98%	
2028			**61%**
2031	0.1%	98%	
2032			61%

*Key Los Angeles River Metals TMDL compliance dates are highlighted.

Table 5. Scenario 2 - Estimated Urban Runoff Copper Reduction from Brake Pads

Year*	Scenario 2 - Two Step Reduction		
	On-Road Average Brake Pad Copper	Estimated Brake Pad Copper Reduction	Estimated Urban Runoff Copper Reduction from Brake Pads Alone
Baseline (2013 and prior years)	6.1%	--	
2019	4.4%	28%	
2020			**17%**
2023	1.6%	73%	
2024			**45%**
2027	0.2%	96%	
2028			**60%**
2031	0.1%	98%	
2032			61%

*Key Los Angeles River Metals TMDL compliance dates are highlighted.

Table 6. Scenario 3 - Estimated Urban Runoff Copper Reduction from Brake Pads

Year*	Scenario 3 - Aftermarket Exemption from 0.5% Copper		
	On-Road Average Brake Pad Copper	Estimated Brake Pad Copper Reduction	Estimated Urban Runoff Copper Reduction from Brake Pads Alone
Baseline (2013 and prior years)	6.1%	--	
2019	4.4%	28%	
2020			**17%**
2023	2.3%	63%	
2024			**39%**
2027	1.2%	80%	
2028			**49%**
2031	0.7%	88%	
2032			55%

*Key Los Angeles River Metals TMDL compliance dates are highlighted.

Recommendations

1. When data from implementation of SB 346 and Washington State law become available, consider updating these copper reduction estimates. Washington State's collection of brake pad formulation data every 3 years starting in 2013 and certification agency records, which will be available by 2014, will provide the first data on brake pad copper content since 2006. Starting in 2014, certification agencies will make available lists of brake pads certifications. These lists can be used to determine the fraction of brake pads that are on the market that meet the 5% and 0.5% copper standards. This information can be used not only to update the estimates, but also to refine the assumptions to reduce some of the most important uncertainties in the copper reduction estimates.

2. To reduce peak copper levels, examine the potential for controlling localized high-copper discharges. Copper levels in urban runoff are a combination of baseline copper sources (largely brake pads), localized high-copper sources (e.g., copper roofs, copper-emitting industry), and irregular discharges of copper-containing wastewaters.

   While copper roofs are relatively uncommon, they have relatively high copper runoff concentrations (which may exceed 1,000 micrograms per liter) (TDC Environmental 2004). Event-based discharges may also contain high copper, particularly in dry weather. Examples of dry weather event-based discharges are: water from emptying pools, spas, and fountains (copper from copper pipe corrosion and algaecides) and improper discharge of solutions used to create a green patina on a copper roof (TDC Environmental 2004; LWA 2006).

   San Francisco Bay Area municipalities created resources for development of possible management strategies for other major copper sources (LWA 2006). These resources identify a specific set of potential control measures for each major copper source, define activity and effectiveness metrics for control measure implementation, and lay out a recommended sequence for implementation of

control measures for each source category. The strategies for architectural copper (Section 2) and pool, spa, and fountain algaecides (Section 3, strategies CP-1 through CP-3) are of greatest potential interest for Los Angeles River Copper TMDL compliance. To facilitate effective implementation, each strategy involves a phased implementation process, starting with collecting information and conducting targeted education programs. Subsequently, strategies move from voluntary programs to focused regulatory. Strategy designs, which focus on controlling discharges at the source, aim to minimize both disruption to affected private entities and government implementation costs. To monitor effectiveness, the strategies include tracking and reporting of strategy-specific indicators.

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Scenario Summary

Year	Scenario 1 - One Step Reduction	Scenario 2 - Two Step Reduction	Scenario 3 - Aftermarket Exemption from 0.5% Copper
Baseline (2013 and prior years)			
2014	0.5% copper brake pads begin to phase in to new vehicles	5% copper brake pads begin to phase into new vehicles	5% copper brake pads begin to phase into new vehicles
2015			
2016			
2017			
2018		0.5% copper brake pads begin to phase into new vehicles	0.5% copper brake pads begin to phase into new vehicles
2019			
2020			
2021	All OE Pads <0.5% copper	All OE Pads <5% copper	All OE Pads <5% copper
2022			
2023	All replacement Pads <0.5% copper	All replacement pads <5% copper	All replacement pads <5% copper
2024			
2025		All OE Pads <0.5% copper	All OE Pads <0.5% copper
2026			
2027		All replacement pads <0.5% copper	
2028			
2029			
2030			
2031			
2032			

Key TMDL compliance dates for the LA River are shown in **bold**

Results Summary

Year	Scenario 1 - One Step Reduction			Scer
	On-Road Average Brake Pad Copper	Estimated Brake Pad Copper Reduction	Estimated Urban Runoff Copper Reduction from Brake Pads Alone	On-Road Average Brake Pad Copper
Baseline (2013 and prior years)	6.1%	--		6.1%
2014				
2015				
2016				
2017				
2018				
2019	3.2%	47%		4.4%
2020			**29.4%**	
2021				
2022				
2023	0.2%	97%		1.6%
2024			**59.9%**	
2025				
2026				
2027	0.1%	98%		0.2%
2028			**61.0%**	
2029				
2030				
2031	0.1%	98%		0.1%
2032			**61.0%**	

Key TMDL compliance dates for the LA River are shown in **bold**

nario 2 - Two Step Reduction		Scenario 3 - Aftermarket Exemption from 0.5% Copper		
Estimated Brake Pad Copper Reduction	Estimated Urban Runoff Copper Reduction from Brake Pads Alone	On-Road Average Brake Pad Copper	Estimated Brake Pad Copper Reduction	Estimated Urban Runoff Copper Reduction from Brake Pads Alone
--		6.1%	--	
28%		4.4%	28%	
	17.5%			**17.3%**
73%		2.3%	63%	
	45.4%			**38.9%**
96%		1.2%	80%	
	59.6%			**49.4%**
98%		0.7%	88%	
	61.0%			**54.6%**

Scenario 1 Estimated Brake Pad Copper Content

Original Equipment (OE)

Year Vehicle Manufactured	OE Pad Notes	OE Pad Copper Content (Year average)	Fraction of Model Year Vehicles with <0.5% Copper OE Pads	Fraction of Model Year Vehicles with High Copper OE Pads (average 10% Cu)
2013 and prior years	Overall average of 8.2%, comprised of 18% at 0.1% Cu and 82% at 10% Cu	8.2%	18%	82%
2014	First year of 8 year process of re-engineering new vehicles to have brake pads meeting 0.5% copper standard	7.2%	28%	72%
2015		6.2%	39%	62%
2016		5.2%	49%	51%
2017		4.2%	59%	41%
2018		3.1%	69%	31%
2019		2.1%	80%	21%
2020		1.1%	90%	10%
2021 and thereafter	All new vehicles have brake pads with <0.5% copper	0.1%	100%	0%

Aftermarket Replacement Brake Pads for Fraction of Vehicles with High Copper OE Brake Pads

Year Replacement Pad Manufactured	Replacement Pad Notes	High-Cu Replacement Pad Copper Content (Average Shipped)	High-Cu Replacement Pad Copper Content (Average Sold)*
2013 and prior years	Aftermarket brake pads start with an overall average of 5% copper, comprised of 34% at 0.1% Cu and 66% at 7.5% Cu. Replacements for the 18% of vehicles that always had <0.5% copper (see table above) are excluded in this calculation.	6.1%	6.1%
2014	New low copper pads start phasing in	5.3%	5.7%
2015		4.6%	5.2%
2016		3.8%	4.4%
2017		3.1%	3.7%
2018		2.3%	2.9%
2019		1.6%	2.2%
2020		0.8%	1.4%
2021	All new replacement brake pads contain <0.5% copper, but older brake pads in distribution system still are being sold	0.1%	0.7%
2022		0.1%	0.3%
2023 and thereafter	All replacement brake pads contain <0.5% copper	0.1%	0.1%

*Sales assumption: 45% of product manufactured and sold in the same year; 30% of products sold are manufacturered in previous year; the remaining 25% of products sold were manufactured 2 years prior to sale. Sales of older products are assumed to involve small volumes.

Aftermarket Replacement Brake Pads for Fraction of Vehicles with Low Copper OE Brake Pads

Assumed to be the same copper content as OE brake pad (i.e., 0.1%)

Scenario 2 Estimated Brake Pad Copper Content

Original Equipment (OE)

Year Vehicle Manufactured	OE Pad Notes	OE Pad Copper Content (Year average)	Fraction of Model Year Vehicles with <5% but >0.5% Copper OE Pads	Fraction of Model Year Vehicles with <0.5% Copper OE Pads	Fraction of Model Year Vehicles with High Copper OE Pads (average 10% Cu)
2013 and prior years	Overall average of 8.2%, comprised of 18% at 0.1% Cu and 82% at 10% Cu	8.2%	0%	18%	82%
2014	First year of 8 year process of re-engineering new vehicles to have brake pads meeting 5% copper standard	7.6%	10%	18%	72%
2015		7.0%	21%	18%	62%
2016		6.4%	31%	18%	51%
2017		5.8%	41%	18%	41%
2018	Fifth year of 8 year process of re-engineering new vehicles to have brake pads meeting 5% copper standard, but now vehicles are engineered to meet 0.5% standard because this also is the first year of 8 year process of re-engineering new vehicles to have brake pads meeting 0.5% copper standard	4.7%	41%	28%	31%
2019		3.7%	41%	39%	21%
2020		2.7%	41%	49%	10%
2021	First year of 4 year process of re-engineering new vehicles previously re-engineered with <5% copper brake pads to have brake pads meeting 0.5% copper standard	1.7%	41%	59%	0%
2022		1.3%	31%	69%	0%
2023		0.9%	21%	80%	0%
2024		0.5%	10%	90%	0%
2025 and thereafter	All new vehicles have brake pads with <0.5% copper	0.1%	0%	100%	0%

Aftermarket Replacement Brake Pads for Vehicles with High Copper OE Brake Pads (and, starting in 2021, for vehicles with OE brake pads between 5% and 0.5%)

Year Replacement Pad Manufactured	Replacement Pad Notes	Replacement Pad Copper Content (Average Shipped)	Replacement Pad Copper Content (Average Sold)*
2013 and prior years	Aftermarket brake pads start with an overall average of 5% copper, comprised of 34% at 0.1% Cu and 66% at 7.5% Cu. Replacements for the 18% of vehicles that always had <0.5% copper (see table above) are excluded in this calculation.	6.1%	6.1%
2014	Brake pads with <5% copper pads start phasing in for cars that were originally engineered with high copper OE brake pads	5.7%	5.9%
2015		5.4%	5.6%
2016		5.0%	5.3%
2017		4.6%	4.9%
2018	Brake pads with <0.5% copper pads start phasing in for cars that were originally engineered with high copper OE brake pads	3.9%	4.4%
2019		3.2%	3.8%
2020		2.4%	3.0%
2021	All new replacement brake pads contain <5% copper, but older brake pads in distribution system still are being sold	1.7%	2.3%
2022		1.3%	1.7%
2023		0.9%	1.2%
2024		0.5%	0.8%
2025	All new replacement brake pads contain <0.5% copper, but older brake pads in distribution system still are being sold	0.1%	0.4%
2026		0.1%	0.2%
2027 and thereafter	All replacement brake pads contain <0.5% copper	0.1%	0.1%

*Sales assumption: 45% of product manufactured and sold in the same year; 30% of products sold are manufacturered in previous year; the remaining 25% of products sold were manufactured 2 years prior to sale. Sales of older products are assumed to involve small volumes.

Aftermarket Replacement Brake Pads for Vehicles with <0.5% Copper OE Brake Pads
Assumed to be the same copper content as OE brake pad for all vehicles with <0.5% copper OE pads.

Aftermarket Replacement Brake Pads for Vehicles with 5% Copper OE Brake Pads through 2020
Assumed to be the same copper content as OE brake pads for all vehicles with <5% copper OE pads through 2020; however, when the value in the table above is less, then the value in the table above is assumed. Starting in 2021, see above table for replacement pads for high-copper OE pads

Scenario 3 Estimated Brake Pad Copper Content

Original Equipment (OE)

Year Vehicle Manufactured	OE Pad Notes	OE Pad Copper Content (Year average)	Fraction of Model Year Vehicles with <5% but >0.5% Copper OE Pads	Fraction of Model Year Vehicles with <0.5% Copper OE Pads	Fraction of Model Year Vehicles with High Copper OE Pads (average 10% Cu)
2013 and prior years	Overall average of 8.2%, comprised of 18% at 0.1% Cu and 82% at 10% Cu	8.2%	0%	18%	82%
2014	First year of 8 year process of re-engineering new vehicles to have brake pads meeting 5% copper standard	7.6%	10%	18%	72%
2015		7.0%	21%	18%	62%
2016		6.4%	31%	18%	51%
2017		5.8%	41%	18%	41%
2018	Fifth year of 8 year process of re-engineering new vehicles to have brake pads meeting 5% copper standard, but now vehicles are engineered to meet 0.5% standard because this also is the first year of 8 year process of re-engineering new vehicles to have brake pads meeting 0.5% copper standard	4.7%	41%	28%	31%
2019		3.7%	41%	39%	21%
2020		2.7%	41%	49%	10%
2021	First year of 4 year process of re-engineering new vehicles previously re-engineered with <5% copper brake pads to have brake pads meeting 0.5% copper standard	1.7%	41%	59%	0%
2022		1.3%	31%	69%	0%
2023		0.9%	21%	80%	0%
2024		0.5%	10%	90%	0%
2025 and thereafter	All new vehicles have brake pads with <0.5% copper	0.1%	0%	100%	0%

Aftermarket Replacement Brake Pads for Vehicles with High Copper OE Brake Pads

Year Replacement Pad Manufactured	Replacement Pad Notes	Replacement Pad Copper Content (Average Shipped)	Replacement Pad Copper Content (Average Sold)*
2013 and prior years	Aftermarket brake pads start with an overall average of 5% copper, comprised of 34% at 0.1% Cu and 66% at 7.5% Cu. Replacements for the 18% of vehicles that always had <0.5% copper (see table above) are excluded in this calculation.	6.1%	6.1%
2014	Brake pads with <5% copper pads start phasing in for cars that were originally engineered with high copper OE brake pads	5.7%	5.9%
2015		5.4%	5.6%
2016		5.0%	5.3%
2017		4.6%	4.9%
2018		4.3%	4.6%
2019		3.9%	4.2%
2020		3.6%	3.9%
2021	All new replacement brake pads contain <5% copper, but older brake pads in distribution system still are being sold	3.2%	3.5%
2022		3.2%	3.3%
2023 and thereafter	All replacement brake pads for high and mid-copper OE pads contain <5% copper and 16% (same percentage as in 2013) contain 0.1% Cu	3.2%	3.2%

*Sales assumption: 45% of product manufactured and sold in the same year; 30% of products sold are manufacturered in previous year; the remaining 25% of products sold were manufactured 2 years prior to sale. Sales of older products are assumed to involve small volumes.

Aftermarket Replacement Brake Pads for Vehicles with <5% Copper or <0.5% Copper OE Brake Pads

Assumed to be the same copper content as OE brake pad until the value in the table above is less, then the value in the table above is assumed.

Estimated Vehicle Manufacturing Year Distributions by Year

Year Vehicle Manufactured	2013 and Prior	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
2013 and prior	100.0%	88.6%	78.3%	68.9%	60.5%	53.0%	46.2%	39.8%	33.9%	28.8%	24.6%
2014	0.0%	11.4%	10.3%	9.4%	8.4%	7.5%	6.8%	6.4%	5.9%	5.1%	4.2%
2015	0.0%	0.0%	11.4%	10.3%	9.4%	8.4%	7.5%	6.8%	6.4%	5.9%	5.1%
2016	0.0%	0.0%	0.0%	11.4%	10.3%	9.4%	8.4%	7.5%	6.8%	6.4%	5.9%
2017	0.0%	0.0%	0.0%	0.0%	11.4%	10.3%	9.4%	8.4%	7.5%	6.8%	6.4%
2018	0.0%	0.0%	0.0%	0.0%	0.0%	11.4%	10.3%	9.4%	8.4%	7.5%	6.8%
2019	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	11.4%	10.3%	9.4%	8.4%	7.5%
2020	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	11.4%	10.3%	9.4%	8.4%
2021	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	11.4%	10.3%	9.4%
2022	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	11.4%	10.3%
2023	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	11.4%
2024	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2025	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2026	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2027	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2028	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2029	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2030	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2031	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2032	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Source: Assumed that vehicle age distributions will remain the same as those in 2007
California Department of Finance (2009). California Statistical Abstract Table J3. Distribution Of Fee-F

2024	2025	2026	2027	2028	2029	2030	2031	2032
21.1%	18.1%	15.5%	13.2%	11.3%	9.7%	8.2%	6.8%	5.6%
3.5%	3.0%	2.6%	2.3%	1.9%	1.6%	1.5%	1.4%	1.2%
4.2%	3.5%	3.0%	2.6%	2.3%	1.9%	1.6%	1.5%	1.4%
5.1%	4.2%	3.5%	3.0%	2.6%	2.3%	1.9%	1.6%	1.5%
5.9%	5.1%	4.2%	3.5%	3.0%	2.6%	2.3%	1.9%	1.6%
6.4%	5.9%	5.1%	4.2%	3.5%	3.0%	2.6%	2.3%	1.9%
6.8%	6.4%	5.9%	5.1%	4.2%	3.5%	3.0%	2.6%	2.3%
7.5%	6.8%	6.4%	5.9%	5.1%	4.2%	3.5%	3.0%	2.6%
8.4%	7.5%	6.8%	6.4%	5.9%	5.1%	4.2%	3.5%	3.0%
9.4%	8.4%	7.5%	6.8%	6.4%	5.9%	5.1%	4.2%	3.5%
10.3%	9.4%	8.4%	7.5%	6.8%	6.4%	5.9%	5.1%	4.2%
11.4%	10.3%	9.4%	8.4%	7.5%	6.8%	6.4%	5.9%	5.1%
0.0%	11.4%	10.3%	9.4%	8.4%	7.5%	6.8%	6.4%	5.9%
0.0%	0.0%	11.4%	10.3%	9.4%	8.4%	7.5%	6.8%	6.4%
0.0%	0.0%	0.0%	11.4%	10.3%	9.4%	8.4%	7.5%	6.8%
0.0%	0.0%	0.0%	0.0%	11.4%	10.3%	9.4%	8.4%	7.5%
0.0%	0.0%	0.0%	0.0%	0.0%	11.4%	10.3%	9.4%	8.4%
0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	11.4%	10.3%	9.4%
0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	11.4%	10.3%
0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	11.4%

Paid Registrations By Type And Year First Registered California, 2007.

Baseline Years

Baseline for All Scenarios

Year Vehicle Manufactured	OE Pad Fraction	Aftermarket Pad Fraction	OE Pad Cu Concentration (Avg.)	Aftermarket Pad Cu Concentration (Avg.)	Average on-Road Brake Pad Copper Content
2013 and prior	0.35	0.65	8.2%	5.0%	6.1%

Baseline On-Road Average Brake Pad Copper Content	6.1%

2019 On-Road Brake Pad Copper Content Estimates

Year Vehicle Manufactured	% Vehicles on Road in 2019	OE Pad Fraction	Aftermarket Pad Fraction	Year aftermarket pad installed*	OE Pad Cu Concentration (Avg.)
2013 and prior	46.2%	0	1	2016	8.2%
2014	6.8%	0	1	2017	7.2%
2015	7.5%	0	1	2018	6.2%
2016	8.4%	0.5	0.5	2019	5.2%
2017	9.4%	1	0		4.2%
2018	10.3%	1	0		3.1%
2019	11.4%	1	0		2.1%

Year Vehicle Manufactured	% Vehicles on Road in 2019	OE Pad Fraction	Aftermarket Pad Fraction	Year aftermarket pad installed	OE Pad Cu Concentration (Avg.)
2013 and prior	46.2%	0	1	2016	8.2%
2014	6.8%	0	1	2017	7.6%
2015	7.5%	0	1	2018	7.0%
2016	8.4%	0.5	0.5	2019	6.4%
2017	9.4%	1	0		5.8%
2018	10.3%	1	0		4.7%
2019	11.4%	1	0		3.7%

Year Vehicle Manufactured	% Vehicles on Road in 2019	OE Pad Fraction	Aftermarket Pad Fraction	Year aftermarket pad installed	OE Pad Cu Concentration (Avg.)
2013 and prior	46.2%	0	1	2016	8.2%
2014	6.8%	0	1	2017	7.6%
2015	7.5%	0	1	2018	7.0%
2016	8.4%	0.5	0.5	2019	6.4%
2017	9.4%	1	0		5.8%
2018	10.3%	1	0		4.7%
2019	11.4%	1	0		3.7%

*For computational simplicity, replacement pad installations are grouped by calenda
**Throught the calculations, these values reflect the copper concentration in afterm

Scenario 1

Aftermarket Brake Pads Used for High Cu OE Replacement Concentration (Avg.)**	Aftermarket Brake Pads Used for <0.5% Cu OE Replacement Concentration (Avg.)	Fraction of Model Year Vehicles with <0.5% Copper OE Pads	Fraction of Model Year Vehicles with High Copper OE Pads	Average on-Road Brake Pad Copper Content
4.4%	0.1%	18.0%	82.0%	3.6%
3.7%	0.1%	28.3%	71.8%	2.7%
2.9%	0.1%	38.5%	61.5%	1.8%
2.2%	0.1%	48.8%	51.3%	3.2%
				4.2%
				3.1%
				2.1%

On-Road Average Brake Pad Copper Content	Scenario 1

Scenario 2

Aftermarket Brake Pads Used for High Cu OE Replacement Concentration (Avg.)	Aftermarket Brake Pads Used for <5% Cu and >0.5% OE Replacement Concentration (Avg.)	Aftermarket Brake Pads Used for <0.5% Cu OE Replacement Concentration (Avg.)	Fraction of Model Year Vehicles with High Copper OE Pads	Fraction of Model Year Vehicles with <5% but >0.5% Copper OE Pads
5.3%	4.0%	0.1%	82.0%	0.0%
4.9%	4.0%	0.1%	71.8%	10.3%
4.4%	4.0%	0.1%	61.5%	20.5%
3.8%	3.8%	0.1%	51.3%	30.8%

On-Road Average Brake Pad Copper Content

Scenario 3

Aftermarket Brake Pads Used for High Cu OE Replacement Concentration (Avg.)	Aftermarket Brake Pads Used for <5% Cu and >0.5% OE Replacement Concentration (Avg.)	Aftermarket Brake Pads Used for <0.5% Cu OE Replacement Concentration (Avg.)	Fraction of Model Year Vehicles with High Copper OE Pads	Fraction of Model Year Vehicles with <5% but >0.5% Copper OE Pads
5.3%	4.0%	0.1%	82.0%	0.0%
4.9%	4.0%	0.1%	71.8%	10.3%
4.6%	4.0%	0.1%	61.5%	20.5%
4.2%	4.0%	0.1%	51.3%	30.8%

On-Road Average Brake Pad Copper Content

ar year over a five-year cycle. This effectively slightly reduces the average lifetime of the first se
arket pads that were sold the year that the aftermarket brake pad was installed.

Avg. On-Road Cu Content x % of All Vehicles on Road in 2019
0.01680
0.00182
0.00138
0.00267
0.00391
0.00324
0.00243
3.23%

Fraction of Model Year Vehicles with <0.5% Copper OE Pads	Average on-Road Brake Pad Copper Content	Avg. On-Road Cu Content x % of All Vehicles on Road in 2019
18.0%	4.3%	0.02007
18.0%	4.0%	0.00270
18.0%	3.5%	0.00265
18.0%	4.7%	0.00399
	5.8%	0.00542
	4.7%	0.00489
	3.7%	0.00425
Scenario 2		**4.40%**

Fraction of Model Year Vehicles with <0.5% Copper OE Pads	Average on-Road Brake Pad Copper Content	Avg. On-Road Cu Content x % of All Vehicles on Road in 2019
18.0%	4.3%	0.02007
18.0%	4.0%	0.00270
18.0%	3.7%	0.00274
18.0%	4.9%	0.00412
	5.8%	0.00542
	4.7%	0.00489
	3.7%	0.00425
Scenario 3		**4.42%**

t of aftermarket brake pads.

2023 On-Road Brake Pad Copper Content Estimates

Year Vehicle Manufactured	% Vehicles on Road in 2023	OE Pad Fraction	Aftermarket Pad Fraction	Year aftermarket pad installed*	OE Pad Cu Concentration (Avg.)
2013 and prior	24.6%	0	1	2021	8.2%
2014	4.2%	0	1	2022	7.2%
2015	5.1%	0	1	2023	6.2%
2016	5.9%	0	1	2019	5.2%
2017	6.4%	0	1	2020	4.2%
2018	6.8%	0	1	2021	3.1%
2019	7.5%	0	1	2022	2.1%
2020	8.4%	0.5	0.5	2023	1.1%
2021	9.4%	1	0		0.1%
2022	10.3%	1	0		0.1%
2023	11.4%	1	0		0.1%

Year Vehicle Manufactured	% Vehicles on Road in 2023	OE Pad Fraction	Aftermarket Pad Fraction	Year aftermarket pad installed	OE Pad Cu Concentration (Avg.)
2013 and prior	24.6%	0	1	2021	8.2%
2014	4.2%	0	1	2022	7.6%
2015	5.1%	0	1	2023	7.0%
2016	5.9%	0	1	2019	6.4%
2017	6.4%	0	1	2020	5.8%
2018	6.8%	0	1	2021	4.7%
2019	7.5%	0	1	2022	3.7%
2020	8.4%	0.5	0.5	2023	2.7%

2021	9.4%	1	0		1.7%
2022	10.3%	1	0		1.3%
2023	11.4%	1	0		0.9%

Year Vehicle Manufactured	% Vehicles on Road in 2023	OE Pad Fraction	Aftermarket Pad Fraction	Year aftermarket pad installed	OE Pad Cu Concentration (Avg.)
2013 and prior	24.6%	0	1	2021	8.2%
2014	4.2%	0	1	2022	7.6%
2015	5.1%	0	1	2023	7.0%
2016	5.9%	0	1	2019	6.4%
2017	6.4%	0	1	2020	5.8%
2018	6.8%	0	1	2021	4.7%
2019	7.5%	0	1	2022	3.7%
2020	8.4%	0.5	0.5	2023	2.7%
2021	9.4%	1	0		1.7%
2022	10.3%	1	0		1.3%
2023	11.4%	1	0		0.9%

*For computational simplicity, replacement pad installations are grouped by calenda
**Throught the calculations, these values reflect the copper concentration in afterm

Scenario 1

Aftermarket Brake Pads Used for High Cu OE Replacement Concentration (Avg.)**	Aftermarket Brake Pads Used for <0.5% Cu OE Replacement Concentration (Avg.)	Fraction of Model Year Vehicles with <0.5% Copper OE Pads	Fraction of Model Year Vehicles with High Copper OE Pads	Average on-Road Brake Pad Copper Content
0.1%	0.1%	18.0%	82.0%	0.1%
0.1%	0.1%	28.3%	71.8%	0.1%
0.1%	0.1%	38.5%	61.5%	0.1%
1.6%	0.1%	48.8%	51.3%	0.9%
0.8%	0.1%	59.0%	41.0%	0.4%
0.1%	0.1%	69.3%	30.8%	0.1%
0.1%	0.1%	79.5%	20.5%	0.1%
0.1%	0.1%	89.8%	10.3%	0.6%
				0.1%
				0.1%
				0.1%

On-Road Average Brake Pad Copper Content	Scenario 1

Scenario 2

Aftermarket Brake Pads Used for High Cu OE Replacement Concentration (Avg.)	Aftermarket Brake Pads Used for <5% Cu and >0.5% OE Replacement Concentration (Avg.)	Aftermarket Brake Pads Used for <0.5% Cu OE Replacement Concentration (Avg.)	Fraction of Model Year Vehicles with High Copper OE Pads	Fraction of Model Year Vehicles with <5% but >0.5% Copper OE Pads
2.3%	2.3%	0.1%	82.0%	0.0%
1.7%	1.7%	0.1%	71.8%	10.3%
1.2%	1.2%	0.1%	61.5%	20.5%
3.8%	3.8%	0.1%	51.3%	30.8%
3.0%	3.0%	0.1%	41.0%	41.0%
2.3%	2.3%	0.1%	30.8%	41.0%
1.7%	1.7%	0.1%	20.5%	41.0%
1.2%	1.2%	0.1%	10.3%	41.0%

On-Road Average Brake Pad Copper Content

			Scenario 3	
Aftermarket Brake Pads Used for High Cu OE Replacement Concentration (Avg.)	**Aftermarket Brake Pads Used for <5% Cu and >0.5% OE Replacement Concentration (Avg.)**	**Aftermarket Brake Pads Used for <0.5% Cu OE Replacement Concentration (Avg.)**	**Fraction of Model Year Vehicles with High Copper OE Pads**	**Fraction of Model Year Vehicles with <5% but >0.5% Copper OE Pads**
3.5%	3.5%	0.1%	82.0%	0.0%
3.3%	3.3%	0.1%	71.8%	10.3%
3.2%	3.2%	0.1%	61.5%	20.5%
4.2%	4.0%	0.1%	51.3%	30.8%
3.9%	3.9%	0.1%	41.0%	41.0%
3.5%	3.5%	0.1%	30.8%	41.0%
3.3%	3.3%	0.1%	20.5%	41.0%
3.2%	3.2%	0.1%	10.3%	41.0%

On-Road Average Brake Pad Copper Content

ar year over a five-year cycle. This effectively slightly reduces the average lifetime of the first se
arket pads that were sold the year that the aftermarket brake pad was installed.

Avg. On-Road Cu Content x % of All Vehicles on Road in 2023
0.00025
0.00004
0.00005
0.00051
0.00026
0.00007
0.00007
0.00051
0.00009
0.00010
0.00011
0.21%

Fraction of Model Year Vehicles with <0.5% Copper OE Pads	Average on-Road Brake Pad Copper Content	Avg. On-Road Cu Content x % of All Vehicles on Road in 2023
18.0%	1.9%	0.00461
18.0%	1.4%	0.00058
18.0%	1.0%	0.00051
18.0%	3.1%	0.00184
18.0%	2.5%	0.00158
28.3%	1.7%	0.00113
38.5%	1.1%	0.00080
48.8%	1.7%	0.00142

	1.7%	0.00160
	1.3%	0.00134
	0.9%	0.00103

Scenario 2	**1.64%**

Fraction of Model Year Vehicles with <0.5% Copper OE Pads	Average on-Road Brake Pad Copper Content	Avg. On-Road Cu Content x % of All Vehicles on Road in 2023
18.0%	2.9%	0.00715
18.0%	2.7%	0.00114
18.0%	2.7%	0.00136
18.0%	3.4%	0.00202
18.0%	3.2%	0.00203
28.3%	2.6%	0.00174
38.5%	2.1%	0.00156
48.8%	2.2%	0.00186
	1.7%	0.00160
	1.3%	0.00134
	0.9%	0.00103

Scenario 3	**2.28%**

t of aftermarket brake pads.

2027 On-Road Brake Pad Copper Content Estimates

Year Vehicle Manufactured	% Vehicles on Road in 2027	OE Pad Fraction	Aftermarket Pad Fraction	Year aftermarket pad installed*	OE Pad Cu Concentration (Avg.)
2013 and prior	13.2%	0	1	2026	8.2%
2014	2.3%	0	1	2027	7.2%
2015	2.6%	0	1	2023	6.2%
2016	3.0%	0	1	2024	5.2%
2017	3.5%	0	1	2025	4.2%
2018	4.2%	0	1	2026	3.1%
2019	5.1%	0	1	2027	2.1%
2020	5.9%	0	1	2023	1.1%
2021	6.4%	0	1	2024	0.1%
2022	6.8%	0	1	2025	0.1%
2023	7.5%	0	1	2026	0.1%
2024	8.4%	0.5	0.5	2027	0.1%
2025	9.4%	1	0		0.1%
2026	10.3%	1	0		0.1%
2027	11.4%	1	0		0.1%

Year Vehicle Manufactured	% Vehicles on Road in 2027	OE Pad Fraction	Aftermarket Pad Fraction	Year aftermarket pad installed	OE Pad Cu Concentration (Avg.)
2013 and prior	13.2%	0	1	2026	8.2%
2014	2.3%	0	1	2027	7.6%
2015	2.6%	0	1	2023	7.0%
2016	3.0%	0	1	2024	6.4%

2017	3.5%	0	1	2025	5.8%
2018	4.2%	0	1	2026	4.7%
2019	5.1%	0	1	2027	3.7%
2020	5.9%	0	1	2023	2.7%
2021	6.4%	0	1	2024	1.7%
2022	6.8%	0	1	2025	1.3%
2023	7.5%	0	1	2026	0.9%
2024	8.4%	0.5	0.5	2027	0.5%
2025	9.4%	1	0		0.1%
2026	10.3%	1	0		0.1%
2027	11.4%	1	0		0.1%

Year Vehicle Manufactured	% Vehicles on Road in 2027	OE Pad Fraction	Aftermarket Pad Fraction	Year aftermarket pad installed	OE Pad Cu Concentration (Avg.)
2013 and prior	13.2%	0	1	2026	8.2%
2014	2.3%	0	1	2027	7.6%
2015	2.6%	0	1	2023	7.0%
2016	3.0%	0	1	2024	6.4%
2017	3.5%	0	1	2025	5.8%
2018	4.2%	0	1	2026	4.7%
2019	5.1%	0	1	2027	3.7%
2020	5.9%	0	1	2023	2.7%
2021	6.4%	0	1	2024	1.7%
2022	6.8%	0	1	2025	1.3%
2023	7.5%	0	1	2026	0.9%
2024	8.4%	0.5	0.5	2027	0.5%
2025	9.4%	1	0		0.1%
2026	10.3%	1	0		0.1%
2027	11.4%	1	0		0.1%

*For computational simplicity, replacement pad installations are grouped by calenda
**Throught the calculations, these values reflect the copper concentration in afterm

Scenario 1

Aftermarket Brake Pads Used for High Cu OE Replacement Concentration (Avg.)**	Aftermarket Brake Pads Used for <0.5% Cu OE Replacement Concentration (Avg.)	Fraction of Model Year Vehicles with <0.5% Copper OE Pads	Fraction of Model Year Vehicles with High Copper OE Pads	Average on-Road Brake Pad Copper Content
0.1%	0.1%	18.0%	82.0%	0.1%
0.1%	0.1%	28.3%	71.8%	0.1%
0.1%	0.1%	38.5%	61.5%	0.1%
0.1%	0.1%	48.8%	51.3%	0.1%
0.1%	0.1%	59.0%	41.0%	0.1%
0.1%	0.1%	69.3%	30.8%	0.1%
0.1%	0.1%	79.5%	20.5%	0.1%
0.1%	0.1%	89.8%	10.3%	0.1%
0.1%	0.1%	100.0%	0.0%	0.1%
0.1%	0.1%	100.0%	0.0%	0.1%
0.1%	0.1%	100.0%	0.0%	0.1%
0.1%	0.1%	100.0%	0.0%	0.1%
				0.1%
				0.1%
				0.1%

On-Road Average Brake Pad Copper Content	Scenario 1

Scenario 2

Aftermarket Brake Pads Used for High Cu OE Replacement Concentration (Avg.)	Aftermarket Brake Pads Used for <5% Cu and >0.5% OE Replacement Concentration (Avg.)	Aftermarket Brake Pads Used for <0.5% Cu OE Replacement Concentration (Avg.)	Fraction of Model Year Vehicles with High Copper OE Pads	Fraction of Model Year Vehicles with <5% but >0.5% Copper OE Pads
0.2%	0.2%	0.1%	82.0%	0.0%
0.1%	0.1%	0.1%	71.8%	10.3%
1.2%	1.2%	0.1%	61.5%	20.5%
0.8%	0.8%	0.1%	51.3%	30.8%

0.4%	0.4%	0.1%	41.0%	41.0%
0.2%	0.2%	0.1%	30.8%	41.0%
0.1%	0.1%	0.1%	20.5%	41.0%
1.2%	1.2%	0.1%	10.3%	41.0%
0.8%	0.8%	0.1%	0.0%	41.0%
0.4%	0.4%	0.1%	0.0%	30.8%
0.2%	0.2%	0.1%	0.0%	20.5%
0.1%	0.1%	0.1%	0.0%	10.3%

On-Road Average Brake Pad Copper Content

Scenario 3

Aftermarket Brake Pads Used for High Cu OE Replacement Concentration (Avg.)	Aftermarket Brake Pads Used for <5% Cu and >0.5% OE Replacement Concentration (Avg.)	Aftermarket Brake Pads Used for <0.5% Cu OE Replacement Concentration (Avg.)	Fraction of Model Year Vehicles with High Copper OE Pads	Fraction of Model Year Vehicles with <5% but >0.5% Copper OE Pads
3.2%	3.2%	0.1%	82.0%	0.0%
3.2%	3.2%	0.1%	71.8%	10.3%
3.2%	3.2%	0.1%	61.5%	20.5%
3.2%	3.2%	0.1%	51.3%	30.8%
3.2%	3.2%	0.1%	41.0%	41.0%
3.2%	3.2%	0.1%	30.8%	41.0%
3.2%	3.2%	0.1%	20.5%	41.0%
3.2%	3.2%	0.1%	10.3%	41.0%
3.2%	3.2%	0.1%	0.0%	41.0%
3.2%	3.2%	0.1%	0.0%	30.8%
3.2%	3.2%	0.1%	0.0%	20.5%
3.2%	3.2%	0.1%	0.0%	10.3%

On-Road Average Brake Pad Copper Content

ar year over a five-year cycle. This effectively slightly reduces the average lifetime of the first se
arket pads that were sold the year that the aftermarket brake pad was installed.

Avg. On-Road Cu Content x % of All Vehicles on Road in 2027
0.00013
0.00002
0.00003
0.00003
0.00004
0.00004
0.00005
0.00006
0.00006
0.00007
0.00007
0.00008
0.00009
0.00010
0.00011
0.10%

Fraction of Model Year Vehicles with <0.5% Copper OE Pads	Average on-Road Brake Pad Copper Content	Avg. On-Road Cu Content x % of All Vehicles on Road in 2027
18.0%	0.2%	0.00024
18.0%	0.1%	0.00002
18.0%	1.0%	0.00026
18.0%	0.7%	0.00020

18.0%	0.4%	0.00013
28.3%	0.2%	0.00007
38.5%	0.1%	0.00005
48.8%	0.7%	0.00039
59.0%	0.4%	0.00025
69.3%	0.2%	0.00013
79.5%	0.1%	0.00009
89.8%	0.3%	0.00025
	0.1%	0.00009
	0.1%	0.00010
	0.1%	0.00011

Scenario 2	**0.24%**

Fraction of Model Year Vehicles with <0.5% Copper OE Pads	Average on-Road Brake Pad Copper Content	Avg. On-Road Cu Content x % of All Vehicles on Road in 2027
18.0%	2.7%	0.00353
18.0%	2.7%	0.00062
18.0%	2.7%	0.00070
18.0%	2.7%	0.00080
18.0%	2.7%	0.00094
28.3%	2.4%	0.00098
38.5%	2.0%	0.00103
48.8%	1.7%	0.00101
59.0%	1.4%	0.00088
69.3%	1.1%	0.00073
79.5%	0.7%	0.00056
89.8%	0.5%	0.00039
	0.1%	0.00009
	0.1%	0.00010
	0.1%	0.00011

Scenario 3	**1.25%**

et of aftermarket brake pads.

2031 On-Road Brake Pad Copper Content Estimates

Year Vehicle Manufactured	% Vehicles on Road in 2031	OE Pad Fraction	Aftermarket Pad Fraction	Year aftermarket pad installed*	OE Pad Cu Concentration (Avg.)
2013 and prior	6.8%	0	1	2031	8.2%
2014	1.4%	0	1	2027	7.2%
2015	1.5%	0	1	2028	6.2%
2016	1.6%	0	1	2029	5.2%
2017	1.9%	0	1	2030	4.2%
2018	2.3%	0	1	2031	3.1%
2019	2.6%	0	1	2027	2.1%
2020	3.0%	0	1	2028	1.1%
2021	3.5%	0	1	2029	0.1%
2022	4.2%	0	1	2030	0.1%
2023	5.1%	0	1	2031	0.1%
2024	5.9%	0	1	2027	0.1%
2025	6.4%	0	1	2028	0.1%
2026	6.8%	0	1	2029	0.1%
2027	7.5%	0	1	2030	0.1%
2028	8.4%	0.5	0.5	2031	0.1%
2029	9.4%	1	0		0.1%
2030	10.3%	1	0		0.1%
2031	11.4%	1	0		0.1%

Year Vehicle Manufactured	% Vehicles on Road in 2031	OE Pad Fraction	Aftermarket Pad Fraction	Year aftermarket pad installed	OE Pad Cu Concentration (Avg.)

2013 and prior	6.8%	0	1	2031	8.2%
2014	1.4%	0	1	2027	7.6%
2015	1.5%	0	1	2028	7.0%
2016	1.6%	0	1	2029	6.4%
2017	1.9%	0	1	2030	5.8%
2018	2.3%	0	1	2031	4.7%
2019	2.6%	0	1	2027	3.7%
2020	3.0%	0	1	2028	2.7%
2021	3.5%	0	1	2029	1.7%
2022	4.2%	0	1	2030	1.3%
2023	5.1%	0	1	2031	0.9%
2024	5.9%	0	1	2027	0.5%
2025	6.4%	0	1	2028	0.1%
2026	6.8%	0	1	2029	0.1%
2027	7.5%	0	1	2030	0.1%
2028	8.4%	0.5	0.5	2031	0.1%
2029	9.4%	1	0		0.1%
2030	10.3%	1	0		0.1%
2031	11.4%	1	0		0.1%

Year Vehicle Manufactured	% Vehicles on Road in 2031	OE Pad Fraction	Aftermarket Pad Fraction	Year aftermarket pad installed	OE Pad Cu Concentration (Avg.)
2013 and prior	6.8%	0	1	2031	8.2%
2014	1.4%	0	1	2027	7.6%
2015	1.5%	0	1	2028	7.0%
2016	1.6%	0	1	2029	6.4%
2017	1.9%	0	1	2030	5.8%
2018	2.3%	0	1	2031	4.7%
2019	2.6%	0	1	2027	3.7%
2020	3.0%	0	1	2028	2.7%
2021	3.5%	0	1	2029	1.7%
2022	4.2%	0	1	2030	1.3%
2023	5.1%	0	1	2031	0.9%
2024	5.9%	0.5	0.5	2027	0.5%

2025	6.4%	1	0	2028	0.1%
2026	6.8%	1	0	2029	0.1%
2027	7.5%	1	0	2030	0.1%
2028	8.4%	0.5	0.5	2031	0.1%
2029	9.4%	1	0		0.1%
2030	10.3%	1	0		0.1%
2031	11.4%	1	0		0.1%

*For computational simplicity, replacement pad installations are grouped by calenda
**Throught the calculations, these values reflect the copper concentration in afterm

Scenario 1

Aftermarket Brake Pads Used for High Cu OE Replacement Concentration (Avg.)**	Aftermarket Brake Pads Used for <0.5% Cu OE Replacement Concentration (Avg.)	Fraction of Model Year Vehicles with <0.5% Copper OE Pads	Fraction of Model Year Vehicles with High Copper OE Pads	Average on-Road Brake Pad Copper Content
0.1%	0.1%	18.0%	82.0%	0.1%
0.1%	0.1%	28.3%	71.8%	0.1%
0.1%	0.1%	38.5%	61.5%	0.1%
0.1%	0.1%	48.8%	51.3%	0.1%
0.1%	0.1%	59.0%	41.0%	0.1%
0.1%	0.1%	69.3%	30.8%	0.1%
0.1%	0.1%	79.5%	20.5%	0.1%
0.1%	0.1%	89.8%	10.3%	0.1%
0.1%	0.1%	100.0%	0.0%	0.1%
0.1%	0.1%	100.0%	0.0%	0.1%
0.1%	0.1%	100.0%	0.0%	0.1%
0.1%	0.1%	100.0%	0.0%	0.1%
0.1%	0.1%	100.0%	0.0%	0.1%
0.1%	0.1%	100.0%	0.0%	0.1%
0.1%	0.1%	100.0%	0.0%	0.1%
0.1%	0.1%	100.0%	0.0%	0.1%
				0.1%
				0.1%
				0.1%

On-Road Average Brake Pad Copper Content	Scenario 1

Scenario 2

Aftermarket Brake Pads Used for High Cu OE Replacement Concentration (Avg.)	Aftermarket Brake Pads Used for <5% Cu and >0.5% OE Replacement Concentration (Avg.)	Aftermarket Brake Pads Used for <0.5% Cu OE Replacement Concentration (Avg.)	Fraction of Model Year Vehicles with High Copper OE Pads	Fraction of Model Year Vehicles with <5% but >0.5% Copper OE Pads

0.1%	0.1%	0.1%	82.0%	0.0%
0.1%	0.1%	0.1%	71.8%	10.3%
0.1%	0.1%	0.1%	61.5%	20.5%
0.1%	0.1%	0.1%	51.3%	30.8%
0.1%	0.1%	0.1%	41.0%	41.0%
0.1%	0.1%	0.1%	30.8%	41.0%
0.1%	0.1%	0.1%	20.5%	41.0%
0.1%	0.1%	0.1%	10.3%	41.0%
0.1%	0.1%	0.1%	0.0%	41.0%
0.1%	0.1%	0.1%	0.0%	30.8%
0.1%	0.1%	0.1%	0.0%	20.5%
0.1%	0.1%	0.1%	0.0%	10.3%
0.1%	0.1%	0.1%	0.0%	0.0%
0.1%	0.1%	0.1%	0.0%	0.0%
0.1%	0.1%	0.1%	0.0%	0.0%
0.1%	0.1%	0.1%	0.0%	0.0%

On-Road Average Brake Pad Copper Content

Scenario 3

Aftermarket Brake Pads Used for High Cu OE Replacement Concentration (Avg.)	Aftermarket Brake Pads Used for <5% Cu and >0.5% OE Replacement Concentration (Avg.)	Aftermarket Brake Pads Used for <0.5% Cu OE Replacement Concentration (Avg.)	Fraction of Model Year Vehicles with High Copper OE Pads	Fraction of Model Year Vehicles with <5% but >0.5% Copper OE Pads
3.2%	3.2%	0.1%	82.0%	0.0%
3.2%	3.2%	0.1%	71.8%	10.3%
3.2%	3.2%	0.1%	61.5%	20.5%
3.2%	3.2%	0.1%	51.3%	30.8%
3.2%	3.2%	0.1%	41.0%	41.0%
3.2%	3.2%	0.1%	30.8%	41.0%
3.2%	3.2%	0.1%	20.5%	41.0%
3.2%	3.2%	0.1%	10.3%	41.0%
3.2%	3.2%	0.1%	0.0%	41.0%
3.2%	3.2%	0.1%	0.0%	30.8%
3.2%	3.2%	0.1%	0.0%	20.5%
3.2%	3.2%	0.1%	0.0%	10.3%

3.2%	3.2%	0.1%	0.0%	0.0%
3.2%	3.2%	0.1%	0.0%	0.0%
3.2%	3.2%	0.1%	0.0%	0.0%
3.2%	3.2%	0.1%	0.0%	0.0%

On-Road Average Brake Pad Copper Content

ar year over a five-year cycle. This effectively slightly reduces the average lifetime of the first set of arket pads that were sold the year that the aftermarket brake pad was installed.

Avg. On-Road Cu Content x % of All Vehicles on Road in 2031
0.00007
0.00001
0.00001
0.00002
0.00002
0.00002
0.00003
0.00003
0.00004
0.00004
0.00005
0.00006
0.00006
0.00007
0.00007
0.00008
0.00009
0.00010
0.00011
0.10%

Fraction of Model Year Vehicles with <0.5% Copper OE Pads	Average on-Road Brake Pad Copper Content	Avg. On-Road Cu Content x % of All Vehicles on Road in 2031

18.0%	0.1%	0.00007
18.0%	0.1%	0.00001
18.0%	0.1%	0.00001
18.0%	0.1%	0.00002
18.0%	0.1%	0.00002
28.3%	0.1%	0.00002
38.5%	0.1%	0.00003
48.8%	0.1%	0.00003
59.0%	0.1%	0.00004
69.3%	0.1%	0.00004
79.5%	0.1%	0.00005
89.8%	0.1%	0.00006
100.0%	0.1%	0.00006
100.0%	0.1%	0.00007
100.0%	0.1%	0.00007
100.0%	0.1%	0.00008
	0.1%	0.00009
	0.1%	0.00010
	0.1%	0.00011

Scenario 2	**0.10%**

Fraction of Model Year Vehicles with <0.5% Copper OE Pads	**Average on-Road Brake Pad Copper Content**	**Avg. On-Road Cu Content x % of All Vehicles on Road in 2031**
18.0%	2.7%	0.00181
18.0%	2.7%	0.00038
18.0%	2.7%	0.00039
18.0%	2.7%	0.00043
18.0%	2.7%	0.00051
28.3%	2.4%	0.00055
38.5%	2.0%	0.00053
48.8%	1.7%	0.00051
59.0%	1.4%	0.00049
69.3%	1.1%	0.00044
79.5%	0.7%	0.00038
89.8%	0.5%	0.00027

100.0%	0.1%	0.00006
100.0%	0.1%	0.00007
100.0%	0.1%	0.00007
100.0%	0.1%	0.00008
	0.1%	0.00009
	0.1%	0.00010
	0.1%	0.00011

Scenario 3	**0.73%**

aftermarket brake pads.

Brake Pad Copper Reduction - Metrics for Tracking Progress

Technical Memo

California Stormwater Quality Association

December 1, 2014

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

RB-AR9748

tdc environmental

MEMO

TO:	CASQA	**DATE:**	December 1, 2014
FROM:	Kelly D. Moran, Ph.D.	**PROJECT:**	79
SUBJECT:	Brake Pad Copper Reduction – Metrics for Tracking Progress		

To protect water quality, California law requires near elimination of copper in vehicle brake pads by 2025. Many California municipal urban runoff programs are relying on brake pad copper reduction as a piece of their plans to comply with requirements to reduce copper in urban runoff. This memorandum identifies quantitative metrics that can be used to track the pace of brake pad copper reduction and provides current and baseline values for each metric.

Based on data detailed below, it is apparent that brake pad copper reductions are underway—and are well ahead of regulatory deadlines. Average brake pad formulation copper content—currently 5.6%—has dropped about 30% since 2006. "Copper-free" (<0.5% copper) brake pad formulations have become widely available, comprising 41.2% of all available formulations. Most of the vehicle industry appears to be planning to transition to <0.5% copper brake pads prior to the first copper reduction compliance deadline in 2021.

Background

Scientific studies indicate that dust generated by vehicle brakes is by far the most significant source of copper in urban watersheds. In California's most urbanized watersheds, brake pad copper is estimated to comprise more than 60% of all copper in urban runoff.[1] A California law enacted in 2010, SB 346 (Kehoe) set in place a program that will nearly eliminate copper use in brake pads. SB 346 requires that brake pads sold in California contain no more than 5% copper by weight by 2021, and no more than 0.5% by 2025. The long implementation schedule in SB 346 was designed to provide time to develop new brake pad formulations and to effect a smooth transition by the vehicle industry to the lowest copper brake pads.

Following California's model, the State of Washington also enacted restrictions on brake pad copper content in 2010 (Washington State 2010).[2] Washington's law is similar to California's, but provides a much narrower exemption for "aftermarket" brake pads that replace the "original equipment" brake pads sold with new vehicles. The narrow exemption effectively requires essentially all brake pads to meet SB 346 deadlines.

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[1] Donigian, A.S., B. R. Bicknell and E. Wolfram (2009). *Modeling the Contribution of Copper from Brake Wear Debris to the San Francisco Bay. Phase 2*. Prepared by AQUA TERRA Consultants for the Brake Pad Partnership.

[2] Washington State (2010). Washington Senate Bill 6557 (Senate Environment, Water & Energy Committee). Brake Friction Material. Statutes of 2010, Chapter 70.285 RCW.

Due to the importance of California's vehicle market and the interconnection of vehicle parts distribution systems throughout North America, brake pad manufacturers expect that it is unlikely that any manufacturer will produce California-specific or Washington-specific products. Instead, copper reduction will be integrated throughout the entire North American brake pad market.[3] U.S. EPA and the vehicle industry will likely soon be signing a "Copper-free Brake Initiative" Memorandum of Understanding to cement an industry commitment to nationwide brake pad copper reductions.

SB 346 compliance certification markings (brake pad and box markings) and chemical testing methods have been established by the automobile industry.[4] Washington State has adopted regulations specifying testing, marking, and reporting requirements.[5] California regulations specifying certification, testing, and marking requirements are in development.[6]

The brake pad testing and certification system is up and running, with NSF International serving as the sole certification organization. More than 4,500 brake friction materials have been certified, many of them with at lowest copper (<0.5%) level.

Brake pad copper reduction is already well underway, as demonstrated by the data below. The success and speed of the transition was plainly apparent at the October 2014 Society of Automotive Engineers Brake Colloquium, where many brake pad manufacturers touted their <0.5% copper products and several vehicle manufacturers shared their positive evaluation of the new products and detailed plans for an orderly transition of their entire North American vehicle lines—and most global production—to <0.5% copper by 2021.

Society of Automotive Engineers conference presentations, industry marketing materials, and informal communications with industry members indicate that most of the automotive industry is moving directly to <0.5% copper for the 2021 compliance deadline, thus avoiding a second cycle of reformulations.

Brake Pad Copper Reduction Tracking Metrics

Publicly available data sources were reviewed to identify the best available quantitative metrics for tracking brake pad copper reductions. Because manufacturer sales data are proprietary, no public data set is available to calculate actual on-road brake copper content; however, two excellent quantitative metrics are available to track the pace of brake pad copper content reduction.

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[3] Motor and Equipment Manufacturers Association (MEMA) (2014). "Copper in Brake Friction" http://www.aftermarketsuppliers.org/Councils/Brake-Manufacturers-Council-BMC/Copper-in-Brake-Friction Accessed Nov. 7.

[4] Society of Automotive Engineers (SAE) (2011). *Measurement of Copper and Other Elements in Brake Friction Materials*. SAE Technical Standard J2975; Society of Automotive Engineers (SAE) (2012). *Friction Coefficient Identification and Environmental Marking System for Brake Linings*. SAE Technical Standard J866; Motor and Equipment Manufacturers Association (MEMA) (2012). 3-Stage Certification Logo.

[5] Washington Department of Ecology (2012). *Better Brakes Rule*. Chapter 173-901 Washington Administrative Code. Publication 12-04-027.

[6] California Department of Toxic Substances Control (2014). "Limiting Copper in Brake Pads" http://www.dtsc.ca.gov/PollutionPrevention/BrakePads.cfm Accessed Nov. 7.

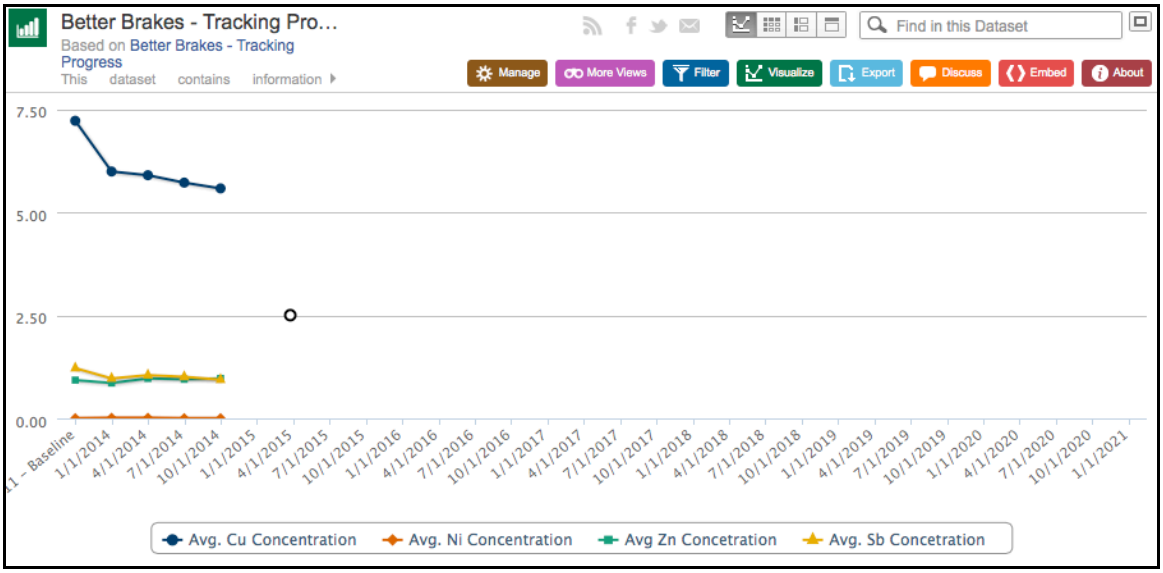
Metric #1 - Washington Ecology Report of Industry-Wide Average Brake Pad Formulation Copper Content

Unlike California's SB 346, Washington law requires manufacturers to provide Washington State Department of Ecology ("Ecology") with periodic reports of brake pad copper, antimony, nickel, and zinc content.[7] This reporting is accomplished in conjunction with the brake pad formulation certification process. After certification, the brake pad certification organization (NSF International) provides Ecology with quarterly reports containing a summary of the chemical testing report for each certified brake pad formulation. The chemical testing report includes the formulation's copper, antimony, nickel, and zinc content. The Washington process included a one-time "baseline" report of the copper, antimony, nickel, and zinc content in 2011 brake pad formulations.

Ecology uses the data it receives on each individual formulation to compute the industry-wide average copper, antimony, nickel, and zinc content for all certified brake pad formulations. Because manufacturers are not required to report sales data for each brake pad formulation, Ecology cannot calculate the true average on-road brake pad copper content. Consequently, the Ecology industry-wide average may not necessarily be the same as the true average on-road brake pad copper content.

Ecology has created a graph tracking the average certified brake pad formulation copper, antimony, nickel, and zinc (Figure 1). The graph shows the 2011 baseline values and data from quarterly reports, which started in January 2014. This graph is available on the Internet at http://www.ecy.wa.gov/programs/hwtr/laws_rules/BBtracking.html

Figure 1. Washington Ecology Tracking Graphic for Average Copper, Antimony, Nickel, and Zinc Content of Certified Brake Pad Formulations



Ecology intends to update the graph quarterly. Resources permitting, updates should be posted in each year in early February, May, August, and November.

[7] This provision, which was originally drafted by CASQA to support anticipated compliance reporting needs of its members, was omitted from the final version of SB 346 to avoid duplication with the Washington law (which had already been adopted) and to minimize costs for the state of California.

According to a representative industry analysis provided to the Brake Pad Partnership, in 2006 brake pads contained an estimated average of about 8% copper by weight.[8] Ecology data indicate that brake pad copper content dropped to about 7.2% in 2011, and has subsequently fallen to 5.6% (October 2014), a 30% reduction from the 2006 Brake Pad Partnership estimate.

Metric #2 – Fraction of Brake Pad Formulations with the "N" (<0.5% copper) Certification

The sole current brake pad certification organization, NSF International, maintains a public list of all brake pad formulations that have been certified as to their copper content (and other metals and asbestos). The list, which provides the specific certification level for each certified formulation, is available in the Internet at http://info.nsf.org/Certified/autorp/listings.asp?standard=SAEJ2975. This report is updated daily with new certifications. Brake pad formulations with <0.5% copper have the "N" certification.

As of November 7, 2014, NSF had certified 4,679 formulations, 1,931 (41.2%) of which have the "N" certification (the remainder have higher copper content). This is a substantial increase since 2006, when about 18% of original equipment and about one-third of replacement ("aftermarket") brake pads were estimated to contain <0.5% copper.[9] Just in the short period since July 24, 2014, the number of "N" certified brake formulations has increased nearly 20%, and the fraction of "N" certified brake pads has increased from 39.2% to 41.2%.[10] Although the NSF website does not provide lists other than the current list, the trend can be tracked through periodic downloading of the NSF certification list.

At this time, no brake pad certification organization other than NSF International exists. Although additional certification organizations are not currently contemplated, there is a potential that the industry may use more than one certification organization. When this metric is updated, data from all certification organizations should be included.

Summary

Two quantitative metrics are available to track the pace of brake pad copper content reduction: (1) the Washington Ecology report of industry-wide average brake pad formulation copper content and (2) the fraction of brake pad formulations with the "N" (<0.5% copper) certification.

Currently, copper brake pad formulations meeting the lowest copper content standard (<0.5% copper) are widely available. Average brake pad formulation copper content (5.6%) has dropped about 30% since 2006. Most of the vehicle industry appears to be planning to transition to <0.5% copper brake pads prior to the first SB 346 copper reduction compliance deadline in 2021.

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[8] Brake Pad Partnership (BPP) (2008). *Copper Use Monitoring Program Results for Model Years 1998-2006*. Prepared by Sustainable Conservation for the Brake Pad Partnership Steering Committee.
[9] Phipps, M. (2008). "An Analysis of the 2006 Copper Monitoring Results." Prepared for the Brake Pad Partnership; and Brake Pad Partnership (BPP) (1996-2012), and information shared with author at Brake Pad Partnership Steering Committee meetings.
[10] On July 24, 2014, 1,612 of 4,108 total formulations had the "N" certification.

ATTACHMENT E:

MINIMUM CONTROL MEASURE GUIDANCE

Watershed Management Program

MCM Guidance

Public Information and Participation Program

Introduction

Permit §VI.D.5.a (LA)/ §VII.F.1 (LB)

Each participating city is required to develop and implement a Public Information and Participation Program (PIPP) that includes the requirements listed in Permit §VI.D.5.a (LB §VII.F). This document provides guidance that the participating cities can follow to implement a PIPP in compliance with the Permit.

The objectives of the PIPP are to:

- Measurably increase the knowledge of the target audiences about the MS4, the adverse impacts of stormwater pollution on receiving waters and potential solutions to mitigate the impacts.
- Measurably change the waste disposal and stormwater pollution generation behavior of target audiences by developing and encouraging the implementation of appropriate alternatives.
- Involve and engage a diversity of socio-economic groups and ethnic communities in Los Angeles County to participate in mitigating the impacts of stormwater pollution.

PIPP Implementation

Permit §VI.D.5.b (LA)/§VII.F.2 (LB)

The PIPP is implemented using the following approaches:

- By participating in a County-wide PIPP,
- By participating in one or more Watershed Group sponsored PIPPs, and
- individually within its jurisdiction.

Cities participating in a County-wide or Watershed Group PIPP provide contact info for their staff responsible for stormwater public education activities to the designated PIPP coordinator. Changes in contact information are provided within 30 days of the date that the change occurred.

Public Participation

Permit §VI.D.5.c (LA)/§VII.F.3 (LB)

Public Reporting

The means for public reporting of clogged catch basin inlets and illicit discharges/dumping, faded or missing catch basin labels, and general stormwater and non-stormwater pollution prevention information is provided through the use of the countywide 888-CLEAN-LA hotline. In addition, each participating city:

- Includes the reporting information – updated when necessary – in public information and the government pages of the telephone book as they are developed or published.
- Identifies staff or departments who will serve as the contact person(s) and will make this information available on its website.
- Provides current, updated hotline contact information to the general public within its jurisdiction.

RB-AR9755

Events

Events are organized to target residents and population subgroups. The purpose of the events is to educate and involve the community in stormwater and non-stormwater pollution prevention activities, such as education seminars, clean-ups, and community catch basin stenciling.

Residential Outreach Program

Permit §VI.D.5.d (LA)/§VII.F.4 (LB)

With the exception of item 5, which is no longer an element of the countywide PIP Program, each city implements the following activities for the Residential Outreach Program as part of a countywide program:

1. Conduct stormwater pollution prevention public service announcements and advertising campaigns
2. Prepare public education materials that include information on the proper handling (i.e., disposal, storage and/or use) of:
    a. Vehicle waste fluids
    b. Household waste materials (i.e., trash and household hazardous waste, including personal care products and pharmaceuticals)
    c. Construction waste materials
    d. Pesticides and fertilizers (including integrated pest management (IPM) practices to promote reduced use of pesticides)
    e. Green waste (including lawn clippings and leaves)
    f. Animal wastes
3. Distribute activity specific stormwater pollution prevention public education materials at the following points of purchase:
    a. Automotive parts stores
    b. Home improvement centers / lumber yards / hardware stores/paint stores
    c. Landscaping / gardening centers
    d. Pet shops / feed stores
4. Maintain stormwater websites or provide links to stormwater websites via each participating city's website. This includes educational material and opportunities for the public to participate in stormwater pollution prevention and clean-up activities listed in Part VI.D.4 of the Permit.
5. Provide independent, parochial, and public schools within each participating city's jurisdiction with materials to educate school children (K-12) on stormwater pollution. Material may include videos, live presentations and other information. A useful source of materials to work with, or leverage, is other statewide agencies and associations. These associations include the State Water Board's "Erase the Waste" educational program and the California Environmental Education Interagency Network (CEEIN) to implement this requirement.
6. When implementing the above activities, use effective strategies to educate and involve ethnic communities in stormwater pollution prevention through culturally effective methods.

Industrial/Commercial Facilities Program

Each participating city is required to implement an industrial/commercial facilities program that includes the provisions listed in Permit § VI.D.6 (LB §VII.G). This document provides guidance that the participating cities can follow to implement an industrial/commercial facilities program in compliance with the Permit.

Introduction

Permit § VI.D.6.a (LA)/ §VII.G.1 (LB)

The Industrial/Commercial Facilities Program is designed to prevent illicit discharges into the MS4 and receiving waters, reduce industrial/commercial discharges of stormwater to the maximum extent practicable, and prevent industrial/commercial discharges from the MS4 from causing or contributing to a violation of receiving water limitations. The program consists of the following components:

- Track,
- Educate,
- Inspect and
- Ensure compliance with municipal ordinances at industrial/commercial facilities determined to be critical sources of pollutants in stormwater.

Track Critical Industrial/Commercial Sources

Permit § VI.D.6.b (LA)/ §VII.G.2 (LB)

The critical sources to be tracked are listed in Table ICF-1.

Table ICF-1: Critical Sources

Facility Category	Facility	
Commercial Facilities	Restaurants	
	Automotive service facilities (including those located at automotive dealerships)	
	Retail Gasoline Outlets	
	Nurseries and Nursery Centers (Merchant Wholesalers, Nondurable Goods, and Retail Trade)	
Industrial Facilities	USEPA "Phase I" Facilities[1]	
	Other federally-mandated facilities[2]	Municipal landfills
		Hazardous waste treatment, disposal, and recovery facilities
		Industrial facilities subject to § 313 "Toxic Release Inventory" reporting requirements of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA)[3]
General Facilities	All other commercial or industrial facilities determined to potentially contribute a substantial pollutant load to the MS4.	

[1] as specified in 40 CFR §122.26(b)(14)(i)-(xi)
[2] as specified in 40 CFR §122.26(d)(2)(iv)(C)
[3] 42 U.S.C. § 11023

Critical source facilities are tracked in an electronic database management system. The information stored for each critical source in the inventory is listed in Table ICF-2.

Table ICF-2: Inventory Information for Critical Sources

Information Category		Information
General	Name	Facility Name
	Location	Facility address
		Facility latitude and longitude coordinates
		Receiving water
	Contact	Owner/operator name
		Mailing address
		Phone number
		Email (if available)
Business Type		Standard Industrial Classification (SIC) code and/or North American Industry Classification System (NAICS) code
		Narrative description of the activities performed and/or principal products produced
Water quality		Status of exposure of materials to stormwater
		Pollutants generated by facility activities (A-ICF-1)
		Identification of whether the facility is tributary to a waterbody segment with impairments[4] for pollutants that are also generated by the facility.
Prioritization		High, medium or low. The default priority is medium.
NPDES Permit		For applicable facilities, identify coverage under the State Water Board's General NPDES Permit for the Discharge of Stormwater Associated with Industrial Activities (Industrial General Permit) or other individual or general NPDES permits or any waiver issued by the Regional or State Water Board pertaining to stormwater discharges.
		For Industrial General Permit facilities, identify whether the facility has filed a No Exposure Certification with the State Water Board.

Update Inventory

The critical sources inventory is updated at least annually. The update is accomplished through the collection of new information from sources such as field activities and readily available inter/intra-agency records (e.g. business licenses, pretreatment permits, sanitary sewer connection permits and the State Water Resources Control Board's Storm Water Multiple Application and Report Tracking System (SMARTS)).

[4] CWA § 303(d) listed or subject to a TMDL

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Prioritization

Prioritizing facilities by their potential water quality impact provides an excellent opportunity to optimize the effectiveness of the Industrial/Commercial Facilities Program. The three inventory fields under the "Water Quality" category of Table ICF-2 provide information that allows for such a facility prioritization. Based on these fields, the following tables establish a method to prioritize all industrial/commercial facilities into three graded tiers – High, Medium and Low. The City may follow an alternative prioritization method provided it results in a similar three-tiered scheme. In order to maintain a minimum inspection frequency equivalent to the mandates of the MS4 Permit, a condition must be applied to the prioritization process. This condition is explained on the following page.

Prioritization factors

Factor	Description
A	Status of exposure of materials and industrial/commercial activities to stormwater
B	Identification of whether the facility is tributary to a waterbody segment with impairments[5] for pollutants that are also generated by the facility
C	Other factors determined by the City, such as size of facility, presence of exposed soil or history of stormwater violations

Utilizing these factors, follow steps 1, 2 and 3 below:

1. Collect necessary information to evaluate factors

Factor	Initial method	Subsequent method
A	Satellite imagery	Results of stormwater inspection
B	Cross reference Table ICF-4 or 5 with tributary TMDL/ 303(d) pollutants*	Cross reference inspection results with tributary TMDL/ 303(d) pollutants
C	Varies	

* See Pages ICF-9 and 10.

2. Evaluate factors

Factor	Result	Score
A	Low or no exposure	0
	Moderate exposure	½
	Significant exposure	1
B	No**	0
	Yes***	1
C	Low	0
	Medium	½
	High	1

** No pollutant generation/impairment matches
*** ≥ 1 pollutant generation/impairment matches

3. Prioritize facilities

		C Score		
		0	**½**	**1**
A×B Score	**0**	Low	Medium	High
	½	Medium	High	High
	1	High	High	High

This method serves only as a guide to prioritization. The City may also prioritize facilities based on a qualitative assessment of factors A, B and C.

Figure ICF-1: Industrial/Commercial Facility Prioritization Scheme

[5] CWA § 303(d) listed or subject to a TMDL

Step 3 may also be expressed by the relationships $A \cdot B + C \geq 1 \rightarrow$ High, $1 > A \cdot B + C > 0 \rightarrow$ Medium and $A \cdot B + C = 0 \rightarrow$ Low. The purpose of multiplying A and B is to scale the impact of the presence of the pollutants at a facility (B) by the likelihood that they will be discharged to the MS4 (A). Factor C quantifies water quality concerns that are independent of A or B and as such is incorporated through addition. The purpose of this numerical approach is to provide consistency to the prioritization process. It is intended solely as a guide. The City may also prioritize facilities based on a qualitative assessment of factors A, B and C as listed in Figure ICF-1.

Prioritization Condition

The facility prioritization impacts the inspection frequency. In fact the main objective of prioritizing the facilities is to adjust the inspection schedule to focus efforts on water quality priorities. The intent is not to reduce the total number of inspections. In order to maintain a total number of inspections in line with the expectations of the MS4 Permit (i.e. result in the same number of average inspections per year as a semi-quinquennial frequency), one additional condition must be imposed:

The total number of low priority facilities is less than or equal to 3 times the number of high priority facilities.

Prioritization condition

Prioritization Frequency

The default priority for a facility is Medium. Prioritization and reprioritization may be conducted at any time based on the discretion of the City. Figure ICF-2 is a flowchart of the prioritization process.

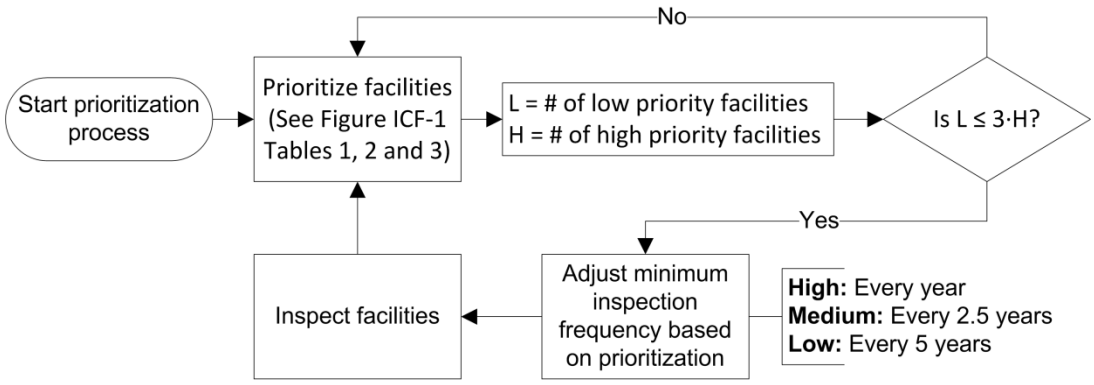

Figure ICF-2: Prioritization Process

Educate Industrial/Commercial Sources

Permit § VI.D.6.c (LA)/ §VII.G.3 (LB)

At least once during the five-year period of the MS4 Permit, the owner/operator of each of the inventoried critical sources is notified of the BMP requirements applicable to the facility/source.

Business Assistance Program

The Business Assistance Program provides technical information to businesses to facilitate their efforts to reduce the discharge of pollutants in stormwater. Assistance is targeted to select business sectors or small businesses upon a determination that their activities may be contributing substantial pollutant loads to the MS4 or receiving water. Assistance may include technical guidance and provision of educational materials. The Program includes at least one of the following components:

- **Technical Guidance** – Provide on-site technical assistance, telephone, or e-mail consultation regarding the responsibilities of businesses to reduce the discharge of pollutants, procedural requirements, and available guidance documents. Guidance methods include but are not limited to:
    - Technical guidance through the critical source inspection program. During an inspection the inspector provides to the business owner/operator 1) on-site technical assistance and 2) contact information for continued consultation. The inspector may also refer staff to relevant fact sheets from the *CASQA Industrial and Commercial BMP Handbook*.
    - Technical guidance initiated with businesses through an informational letter, email, webpage or social media. The notice provides contact information of relevant stormwater staff for business assistance as well as hyperlinks to available guidance documents such as the *CASQA Industrial and Commercial BMP Handbook*.
- **Educational Materials** – Distribute stormwater pollution prevention educational materials to operators of 1) auto repair shops, car wash facilities, restaurants and 2) mobile sources including automobile/equipment repair, washing, or detailing, power washing services, mobile carpet, drape, or upholstery cleaning services, swimming pool, water softener, and spa services, portable sanitary services and commercial applicators and distributors of pesticides, herbicides and fertilizers, if present. Material sources and distribution methods include but are not limited to:
    - Distribution method – The presence of these businesses within an agency's jurisdiction may be determined through business licenses or other readily available inter/intra-agency records.
    - Material sources – Educational materials are available at USEPA's Nonpoint Source (NPS) Outreach Toolbox at http://cfpub.epa.gov/npstbx/index.html. The toolbox is a database of nationwide public education materials that is intended for use by state and local campaigns. The toolbox contains a variety of resources to help develop an effective and targeted outreach campaign.

Inspect Critical Industrial/Commercial Sources

Modified from Permit §VI.D.6.d-e (LA)/ §VII.G.4-5(LB)

Frequency of Inspections

Following the facility prioritization method described in this guidance document, the City will inspect high priority facilities annually, medium priority facilities semi-quinquennially (once every 2.5 years) and low priority facilities quinquennially (once every five years). The frequencies may be altered by the exclusions defined in the following section. The prioritization condition on Page ICF-4 ensures at least the same average number of inspections conducted per year as the semi-quinquennial frequency defined in the MS4 Permit.

The City will conduct the first compliance inspection of industrial/commercial facilities within one year of the approval of the Watershed Management Program by the Executive Officer. There will be a minimum interval of six months between the first and the second mandatory compliance inspections.

Exclusions to the Frequency of Industrial Inspections

Exclusion of Facilities Previously Inspected by the Regional Water Board

The State Water Board's Stormwater Multiple Application and Report Tracking System (SMARTS) database[6] is reviewed at defined intervals to determine if an industrial facility has recently been inspected by the Regional Water Board. The first interval is two years after the effective date of the MS4 Permit (LA: December 28, 2014, LB: March 28,, 2016) and the second interval is four years after the effective date (LA: December 28, 2016, LB: March 28, 2018). If it is determined through the review that the Regional Water Board conducted an inspection of a facility within the prior 24 month period, then the facility does not require an inspection.

No Exposure Verification

The initial inspection identifies those facilities that have filed a No Exposure Certification with the State Water Board. Three to four years after the effective date of the MS4 Permit, a second inspection is performed for at least 25% of the facilities identified to have filed a No Exposure Certification. The purpose of this inspection is to verify the continuity of the no exposure status.

Scope of Inspections

A template inspection form is included as Attachment ICF-A.

Scope of Commercial Inspections

Commercial critical source facilities are inspected to confirm that stormwater and non-stormwater BMPs are effectively implemented in compliance with municipal ordinances. At each facility, inspectors verify that the operator is implementing effective source control BMPs for each corresponding activity. The implementation of additional BMPs is required where stormwater from the MS4 discharges to a significant ecological area (SEA), a water body subject to TMDL provisions[7], or a CWA §303(d) listed impaired water body. For those BMPs that are not adequately protective of water quality standards, additional site-specific controls may be required.

Scope of Mandatory Industrial Facility Inspections

At each industrial critical source the inspector confirms that the facility

- Has a current Waste Discharge Identification (WDID) number for coverage under the Industrial General Permit, and that a Storm Water Pollution Prevention Plan (SWPPP) is available on-site; or
- Has applied for, and has received a current No Exposure Certification for facilities subject to this requirement;
- Is effectively implementing BMPs in compliance with municipal ordinances. Facilities must implement the source control BMPs identified in Table ICF-3, unless the pollutant generating activity does not occur. Additional BMPs must be implemented where stormwater from the MS4 discharges to a water body subject to TMDL Provisions in Part VI.E of the MS4 Permit, or a CWA § 303(d) listed impaired water body. If the specified BMPs are not adequately protective of water quality standards, additional site-specific controls may be required. For critical sources that discharge to MS4s that discharge to SEAs, operators must implement additional pollutant-specific controls to reduce pollutants in stormwater runoff that are causing or contributing to

[6] SMARTS is accessible at https://smarts.waterboards.ca.gov/smarts/faces/SwSmartsLogin.jsp
[7] As described in Part VI.E of the MS4 Permit

exceedances of water quality standards.

- Applicable industrial facilities identified as not having either a current WDID or No Exposure Certification are notified that they must obtain coverage under the Industrial General Permit and will be referred to the Regional Water Board per the Progressive Enforcement Policy procedures identified in Part VI.D.2 of the MS4 Permit.

Source Control BMPs

Permit § VI.D.6.f (LA)/ §VII.G.6 (LB)

Effective source control BMPs for the activities listed in Table ICF-3 are implemented at commercial and industrial facilities, unless the pollutant generating activity does not occur:

Significant Ecological Areas (SEAs)

Permit § VI.D.6.g (LA)/ §VII.H (LB)

For critical sources that discharge to MS4s that discharge to SEAs, each Permittee will require operators to implement additional pollutant-specific controls to reduce pollutants in stormwater runoff that are causing or contributing to exceedances of water quality standards.

Progressive Enforcement

Permit § VI.D.6.h (LA)/ §VII.I (LB)

Each Permittee will implement its Progressive Enforcement Policy to ensure that Industrial / Commercial facilities are brought into compliance with all stormwater requirements within a reasonable time period. See Part VI.D.2 of the MS4 Permit for requirements for the development and implementation of a Progressive Enforcement Policy.

Table ICF-3: Source Control BMPs at Commercial and Industrial Facilities

Pollutant-Generating Activity	BMP Description	BMP Fact Sheet*
Unauthorized Non-Storm water Discharges	Effective elimination of non-stormwater discharges	SC-10
Accidental Spills/ Leaks	Implementation of effective spills/ leaks prevention and response procedures	SC-11
Vehicle/ Equipment Fueling	Implementation of effective fueling source control devices and practices	SC-20
Vehicle/ Equipment Cleaning	Implementation of effective equipment/vehicle cleaning practices and appropriate wash water management practices	SC-21
Vehicle/ Equipment Repair	Implementation of effective vehicle/ equipment repair practices and source control devices	SC-22
Outdoor Liquid Storage	Implementation of effective outdoor liquid storage source controls and practices	SC-31
Outdoor Equipment Operations	Implementation of effective outdoor equipment source control devices and practices	SC-32
Outdoor Storage of Raw Materials	Implementation of effective source control practices and structural devices	SC-33
Storage and Handling of Solid Waste	Implementation of effective solid waste storage/ handling practices and appropriate control measures	SC-34
Building and Grounds Maintenance	Implementation of effective facility maintenance practices	SC-41
Parking/ Storage Area Maintenance	Implementation of effective parking/ storage area designs and housekeeping/ maintenance practices	SC-43
Stormwater Conveyance System Maintenance	Implementation of proper conveyance system operation and maintenance protocols	SC-44
Pollutant-Generating Activity	**BMP Description from Regional Water Board Resolution No. 98-08**	
Sidewalk Washing	1. Remove trash, debris, and free standing oil/grease spills/leaks (use absorbent material, if necessary) from the area before washing; and 2. Use high pressure, low volume spray washing using only potable water with no cleaning agents at an average usage of 0.006 gallons per square feet of sidewalk area.	
Street Washing	Collect and divert wash water to the sanitary sewer – publically owned treatment works (POTW). Note: POTW approval may be needed.	

* Source: CASQA Industrial and Commercial Stormwater BMP Handbook, 2003

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Table ICF-4: Potential Pollutants from Industrial Activities*

Activity or Facility Type	Potential Pollutants								
	Sediments	Nutrients	Metals	Organics and Toxicants**	Floatable Materials	Oxygen-Demanding Substances	Oil and Grease	Bacteria	Pesticides
Vehicle & Equipment Fueling			X	X					
Vehicle & Equipment Washing and Steam Cleaning	X	X	X	X		X	X		
Vehicle & Equipment Maintenance and Repair			X	X			X		
Outdoor Loading & Unloading of Materials	X	X	X	X	X	X	X		
Outdoor Container Storage of Liquids		X	X	X		X	X		X
Outdoor Process Equipment Operations and Maintenance	X		X	X			X		
Outdoor Storage of Raw Materials, Products, and Byproducts	X	X	X	X	X	X	X		
Waste Handling & Disposal			X	X	X	X	X	X	
Contaminated or Erodible Surface Areas	X	X	X	X	X	X	X	X	
Building and Grounds Maintenance	X	X	X		X	X		X	X
Building Repair, Remodeling, and Construction	X		X		X	X			
Parking/Storage Area Maintenance			X	X	X		X		

* Source: CASQA Industrial and Commercial Stormwater BMP Handbook, 2003

** This includes all toxic pollutants other than pesticides

Table ICF-5: Potential Pollutants by Industrial/Commercial Facility Type*

Activity or Facility Type	Potential Pollutants								
	Sediments	Nutrients	Metals	Organics and Toxicants**	Floatable Materials	Oxygen-Demanding Substances	Oil and Grease	Bacteria	Pesticides
Vehicle mechanical repair, maintenance, fueling, or cleaning	X	X	X	X		X	X		
Airplane mechanical repair, maintenance, fueling, or cleaning	X	X	X	X		X	X		
Boat mechanical repair, maintenance, fueling, or cleaning	X	X	X	X		X	X		
Equipment repair, maintenance, fueling, or cleaning	X	X	X	X		X	X		
Automobile and other vehicle body repair or painting			X	X			X		
Mobile automobile or other vehicle washing	X	X	X			X	X		
Automobile (or other vehicle) parking lots and storage			X		X		X		
Retail or wholesale fueling			X	X	X		X		
Pest control services									X
Eating or drinking establishments		X		X	X	X	X	X	X
Mobile carpet, drape or furniture cleaning	X			X					
Cement mixing or cutting	X								
Masonry	X								
Painting and coating			X	X			X		
Botanical or zoological gardens and exhibits	X	X			X	X		X	X
Landscaping	X	X			X	X		X	X
Nurseries and greenhouses	X	X			X	X		X	X
Golf courses, parks and other recreational areas/facilities	X	X			X	X		X	X
Cemeteries	X	X			X	X		X	X
Pool and fountain cleaning		X	X	X	X	X		X	
Marinas			X	X	X	X	X	X	
Port-a-Potty servicing		X			X	X		X	

* Source: Orange County Drainage Area Management Plan, 2003

** This includes all toxic pollutants other than pesticides

Planning and Land Development Program

The Cities are required to implement a Planning and Land Development program that includes the provisions listed in the MS4 Permit (LA MS4 Permit §VI.D.7, LB MS4 Permit §VII.J). This document provides guidance that the participating cities can follow to implement a Planning and Land Development program in compliance with the MS4 Permit.

Introduction

Permit §VI.D.7.a (LA)/§VII.J.1 (LB)

The Planning and Land Development Program for all New Development and Redevelopment projects subject to the MS4 Permit includes measures to:

- Lessen the water quality impacts of development by using smart growth practices such as compact development, directing development towards existing communities via infill or redevelopment, and safeguarding of environmentally sensitive areas.
- Minimize the adverse impacts from stormwater runoff on the biological integrity of Natural Drainage Systems and the beneficial uses of water bodies in accordance with requirements under CEQA (Cal. Pub. Resources Code §21000 et seq.).
- Minimize the percentage of impervious surfaces on land developments by minimizing soil compaction during construction, designing projects to minimize the impervious area footprint, and employing Low Impact Development (LID) design principles to mimic pre-development hydrology through infiltration, evapotranspiration and rainfall harvest and use.
- Maintain existing riparian buffers and enhance riparian buffers when possible.
- Minimize pollutant loadings from impervious surfaces such as roof tops, parking lots, and roadways through the use of properly designed, technically appropriate BMPs (including Source Control BMPs such as good housekeeping practices), LID Strategies, and Treatment Control BMPs.
- Properly select, design and maintain LID and Hydromodification Control BMPs to address pollutants that are likely to be generated, reduce changes to pre-development hydrology, assure long-term function, and avoid the breeding of vectors.[1]
- Prioritize the selection of BMPs to remove stormwater pollutants, reduce stormwater runoff volume, and beneficially use stormwater to support an integrated approach to protecting water quality and managing water resources in the following order of preference:
    - On-site infiltration, bioretention and/or rainfall harvest and use.
    - On-site biofiltration, off-site groundwater replenishment, and/or off-site retrofit.

[1] Treatment BMPs when designed to drain within 96 hours of the end of rainfall minimize the potential for the breeding of vectors. See California Department of Public Health *Best Management Practices for Mosquito Control in California* (2012) at http://www.westnile.ca.gov/resources.php

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Applicability *Permit §VI.D.7.b (LA)/§VII.J.2-3 (LB)*

New Development Projects

The New Development and Redevelopment categories below will require a Standard Urban Stormwater Mitigation Plan (SUSMP), also known as a Low Impact Development (LID) Plan, containing stormwater mitigation measures in compliance with MS4 Permit requirements. Development projects subject to conditioning and approval for the design and implementation of post-construction controls to mitigate stormwater pollution, prior to completion of the project(s), are listed below:

1. All development projects (including single family hillside homes) equal to 1 acre or greater of disturbed area and adding more than 10,000 square feet of impervious surface area
2. Industrial parks with 10,000 square feet or more of surface area
3. Commercial malls with 10,000 square feet or more surface area
4. Retail gasoline outlets with 5,000 square feet or more of surface area
5. Restaurants (SIC 5812) with 5,000 square feet or more of surface area
6. Parking lots with 5,000 square feet or more of impervious surface area, or with 25 or more parking spaces
7. Automotive service facilities (SIC 5013, 5014, 5511, 5541, 7532-7534 and 7536-7539) with 5,000 square feet or more of surface area
8. Projects located in or directly adjacent to, or discharging directly to a Significant Ecological Area (SEA), where the development will:
    a. Discharge stormwater runoff that is likely to impact a sensitive biological species or habitat; and
    b. Create 2,500 square feet or more of impervious surface area
9. Redevelopment projects in subject categories that meet Redevelopment thresholds identified below

Redevelopment Projects

Redevelopment projects subject to agency conditioning and approval for the design and implementation of post-construction controls to mitigate stormwater pollution, prior to completion of the project(s), are:

1. Land-disturbing activity that results in the creation or addition or replacement of 5,000 square feet or more of impervious surface area on an already developed site on development categories identified above.
2. Where Redevelopment results in an alteration to more than fifty percent of impervious surfaces of a previously existing development, and the existing development was not subject to post-construction stormwater quality control requirements, the entire project must be mitigated.
3. Where Redevelopment results in an alteration of less than fifty percent of impervious surfaces of a previously existing development, and the existing development was not subject to post-construction stormwater quality control requirements, only the alteration must be mitigated, and not the entire

development.

4. Redevelopment does not include routine maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, original purpose of facility or emergency Redevelopment activity required to protect public health and safety. Impervious surface replacement, such as the reconstruction of parking lots and roadways which does not disturb additional area and maintains the original grade and alignment, is considered a routine maintenance activity. Redevelopment does not include the repaving of existing roads to maintain original line and grade.
5. Existing single-family dwelling and accessory structures are exempt from the Redevelopment requirements unless such projects create, add, or replace 10,000 square feet of impervious surface area.

Special Provisions

1. Street and road construction of 10,000 square feet or more of impervious surface area
    a. These projects will follow an approved green streets manual to the maximum extent practicable. Street and road construction applies to standalone streets, roads, highways, and freeway projects, and also applies to streets within larger projects. The Cities will require a Standard Urban Mitigation Plan (SUSMP), also known as a Low Impact Development (LID) Plan, containing stormwater mitigation measures in compliance with the approved green streets manual requirements.
2. Single family hillside homes will require a less extensive plan. To the extent that an agency may lawfully impose conditions, mitigation measures or other requirements on the development or construction of a single-family home in a hillside area as defined in the applicable agency's Code and Ordinances, the Cities will require that during the construction of a single-family hillside home, the following measures are implemented:
    a. Conserve natural areas
    b. Protect slopes and channels
    c. Provide storm drain system stenciling and signage
    d. Divert roof runoff to vegetated areas before discharge unless the diversion would result in slope instability
    e. Direct surface flow to vegetated areas before discharge unless the diversion would result in slope instability.

New Development/ Redevelopment Project Performance Criteria *Permit §VI.D.7.c (LA)/§VII.J.4 (LB)*

Integrated Water Quality/Flow Reduction/Resources Management Criteria

All New Development and Redevelopment projects identified above will control pollutants, pollutant loads, and runoff volume emanating from the project site by: (1) minimizing the impervious surface area and (2) controlling runoff from impervious surfaces through infiltration, bioretention and/or rainfall harvest and use.

Projects will retain on-site the Stormwater Quality Design Volume (SWQDv) defined as the runoff from the 0.75-inch, 24-hour rain event or the 85th percentile, 24-hour rain event, as determined from the Los Angeles County 85th percentile precipitation isohyetal map[2], *whichever is greater*. Exceptions include technical infeasibility, opportunity for regional groundwater replenishment, local ordinance equivalence, or hydromodification, as described in the sections below.

When evaluating the potential for on-site retention, the Cities will consider the maximum potential for evapotranspiration from green roofs and rainfall harvest and use.

Alternative Compliance for Technical Infeasibility or Opportunity for Regional Groundwater Replenishment

In instances of technical infeasibility or where a project has been determined to provide an opportunity to replenish regional groundwater supplies at an offsite location, the Cities may allow projects to comply with the MS4 Permit through the alternative compliance measures as described below:

1. To demonstrate technical infeasibility, the project applicant must demonstrate that the project cannot reliably retain 100 percent of the SWQDv on-site, even with the maximum application of green roofs and rainwater harvest and use, and that compliance with the applicable post-construction requirements would be technically infeasible by submitting a site-specific hydrologic and/or design analysis conducted and endorsed by a registered professional engineer, geologist, architect, and/or landscape architect. Conditions where technical infeasibility may result including those indicated in

[2] Found at <http://ladpw.org/wrd/publication/engineering/Final_Report-Probability_Analysis_of_85th_Percentile_24-hr_Rainfall1.pdf>

2. Table PLD- **1** below. To utilize alternative compliance measures to replenish groundwater at an offsite location, the project applicant will demonstrate *(i)* why it is not advantageous to replenish groundwater at the project site, *(ii)* that groundwater can be used for beneficial purposes at the offsite location, and *(iii)* that the alternative measures will also provide equal or greater water quality benefits to the receiving surface water than the Water Quality/Flow Reduction/Resource Management Criteria.

Table PLD- 1: Technical Infeasibility Criteria

1.	The infiltration rate of saturated in-situ soils is less than 0.3 inch per hour and it is not technically feasible to amend the in-situ soils to attain an infiltration rate necessary to achieve reliable performance of infiltration or bioretention BMPs in retaining the SWQDv on-site.
2.	Locations where seasonal high groundwater is within 5 to 10 feet of the surface,
3.	Locations within 100 feet of a groundwater well used for drinking water,
4.	Brownfield development sites where infiltration poses a risk of causing pollutant mobilization,
5.	Other locations where pollutant mobilization is a documented concern. Pollutant mobilization is considered a documented concern at or near properties that are contaminated or store hazardous substances underground.
6.	Locations with potential geotechnical hazards
7.	Smart growth and infill or Redevelopment locations where the density and/ or nature of the project would create significant difficulty for compliance with the on-site volume retention requirement.

Alternative Compliance Measures

When a project applicant has demonstrated that it is technically infeasible to retain 100 percent of the SWQDv on-site, or is proposing an alternative offsite project to replenish regional groundwater supplies, the agency will require one of the following mitigation options:

1. On-site Biofiltration

   If using biofiltration due to demonstrated technical infeasibility, then the project must biofiltrate 1.5 times the portion of the SWQDv that is not reliably retained on-site, as calculated by Equation 1 below.

   $$B_v = 1.5 * [SWQD_v - R_V]$$ *Equation 1*

   Where:

   Bv = biofiltration volume

   SWQDv = the stormwater runoff from a 0.75 inch, 24-hour storm or the 85th percentile storm[3], *whichever is greater*.

   Rv = volume reliably retained on-site

   The MS4 Permit does not mention flowrate based biotreatment BMPs; however, proprietary biotreatment systems are often sized using flowrate rather than volume. Additionally, in cases where a pump is needed prior to entering the biotreatment BMP, the system requires sizing based on the controlled flow from the pump. Therefore, if it is infeasible to size a biotreatment BMP with volume-based calculations, the flowrate may be substituted in lieu of volume. Similarly, the flow rate must be determined using the design storm of 0.75 inch, 24-hour storm event or the 85th percentile storm[1], whichever is greater.

   Conditions for On-site Biofiltration include the following:

   a. Biofiltration systems will meet the design specifications provided in Attachment H to the MS4 Permit unless otherwise approved by the Regional Water Board Executive Officer.

[3] Found at <http://ladpw.org/wrd/publication/engineering/Final_Report-Probability_Analysis_of_85th_Percentile_24-hr_Rainfall1.pdf>

b. Biofiltration systems discharging to a receiving water that is included on the Clean Water Act section 303(d) list of impaired water quality-limited water bodies due to nitrogen compounds or related effects will be designed and maintained to achieve enhanced nitrogen removal capability. See Attachment H of the MS4 Permit for design criteria for underdrain placement to achieve enhanced nitrogen removal.

2. Offsite Infiltration

Offsite infiltration when implemented will use infiltration or bioretention BMPs to intercept a volume of stormwater runoff equal to the SWQDv, less the volume of stormwater runoff reliably retained on-site, at an approved offsite project and provide pollutant reduction (treatment) of the stormwater runoff discharged from the project site in accordance with the Water Quality Mitigation Criteria. The required offsite mitigation volume will be calculated by Equation 2 below.

$$M_v = 1.0 * [SWQD_v - R_v] \qquad \textit{Equation 2}$$

Where:

M_v = mitigation volume

$SWQD_v$ = runoff from the 0.75 inch, 24-hour storm event or the 85th percentile storm[4], *whichever is greater*

R_v = the volume of stormwater runoff reliably retained on-site.

3. Groundwater Replenishment Projects

Regional projects to replenish regional groundwater supplies at offsite locations may be proposed, provided the groundwater supply has a designated beneficial use in the Basin Plan. Regional groundwater replenishment projects must use infiltration, groundwater replenishment, or bioretention BMPs to intercept a volume of stormwater runoff equal to the SWQDv for New Development and Redevelopment projects, subject to conditioning and approval for the design and implementation of post-construction controls, within the approved project area. The projects must provide pollutant reduction (treatment) of the stormwater runoff discharged from development projects, within the project area, subject to conditioning and approval for the design and implementation of post-construction controls to mitigate stormwater pollution in accordance with the Water Quality Mitigation Criteria.

Regional groundwater replenishment projects being implemented in lieu of onsite controls will mitigate the volume as calculated using Equation 2 above.

Regional groundwater replenishment projects will be located in the same sub-watershed (defined as draining to the same HUC-12 hydrologic area in the Basin Plan) as the New Development or Redevelopment projects which did not implement on-site retention BMPs. Locations outside of the HUC-12 but within the HUC-10 subwatershed area may be considered if there are no opportunities within the HUC-12 subwatershed or if greater pollutant reductions and/or groundwater

[4] Found at <http://ladpw.org/wrd/publication/engineering/Final_Report-Probability_Analysis_of_85th_Percentile_24-hr_Rainfall1.pdf>

replenishment can be achieved at a location within the expanded HUC-10 subwatershed. *The use of a mitigation, groundwater replenishment, or retrofit project outside of the HUC-12 subwatershed is subject to the approval of the Executive Officer of the Regional Water Board*.

4. Offsite Project -Retrofit Existing Development

   Use infiltration, bioretention, rainfall harvest and use and/or biofiltration BMPs to retrofit an existing development, with similar land uses as the New Development or land uses associated with comparable or higher stormwater runoff event mean concentrations (EMCs) than the new development. Comparison of EMCs for different land uses will be based on published data from studies performed in southern California. The retrofit plan will be designed and constructed to:

   a. Intercept a volume of stormwater runoff equal to the mitigation volume (Mv) as described above in Equation 2, except biofiltration BMPs will be designed to meet the biofiltration volume or flowrate as described in Equation 1, and

   b. Provide pollutant reduction (treatment) of the stormwater runoff from the project site as described in the Water Quality Mitigation Criteria.

5. Conditions for Offsite Projects

   Project applicants seeking to utilize these alternative compliance provisions may propose other offsite projects, which the agency in which the project is located may approve if they meet the requirements of this subpart.

   a. Location of offsite projects. Offsite projects will be located in the same sub-watershed (defined as draining to the same HUC-12 hydrologic area in the Basin Plan) as the New Development or Redevelopment project. Locations outside of the HUC-12 but within the HUC-10 subwatershed area may be considered if there are no opportunities within the HUC-12 subwatershed or if greater pollutant reductions and/or groundwater replenishment can be achieved at a location within the expanded HUC-10 subwatershed. *The use of a mitigation, groundwater replenishment, or retrofit project outside of the HUC-12 subwatershed is subject to the approval of the Executive Officer of the Regional Water Board.*

   b. Project applicant must demonstrate that equal benefits to groundwater recharge can be met on the project site.

   c. A prioritized list of potential offsite mitigation, groundwater replenishment and/or retrofit projects will be developed within each agency, and when feasible, the mitigation will be directed to the highest priority project within the same HUC-12 or if approved by the Regional Water Board Executive Officer, the HUC-10 drainage area, as the New Development project.

   d. Infiltration/bioretention will be the preferred LID BMP for offsite mitigation or groundwater replenishment projects. Offsite retrofit projects may include green streets, parking lot retrofits, green roofs, and rainfall harvest and use. Biofiltration BMPs may be considered for retrofit projects when infiltration, bioretention or rainfall harvest and use is technically infeasible.

   e. The agency in which the project is located will develop a schedule for the completion of offsite projects, including milestone dates to identify, fund, design, and construct the projects. Offsite

projects will be completed as soon as possible, and at the latest, within 4 years of the certificate of occupancy for the first project that contributed funds toward the construction of the offsite project, unless a longer period is otherwise authorized by the Executive Officer of the Regional Water Board. For public offsite projects, the agency in which the project is located must provide in their annual reports a summary of total offsite project funds raised to date and a description (including location, general design concept, volume of water expected to be retained, and total estimated budget) of all pending public offsite projects. Funding sufficient to address the offsite volume must be transferred to the agency (for public offsite mitigation projects) or to an escrow account (for private offsite mitigation projects) within one year of the initiation of construction.

f. Offsite projects must be approved by the agency in which the project is located and may be subject to approval by the Regional Water Board Executive Officer, if a third-party petitions the Executive Officer to review the project. Offsite projects will be publicly noticed on the Regional Water Board's website for 30 days prior to approval.

g. The project applicant must perform the offsite projects as approved by either the agency or the Regional Water Board Executive Officer or provide sufficient funding for public or private offsite projects to achieve the equivalent mitigation stormwater volume.

6. Regional Stormwater Mitigation Program

An agency or agency group may apply to the Regional Water Board for approval of a regional or sub-regional stormwater mitigation program to substitute in part or wholly for New and Redevelopment requirements for the area covered by the regional or sub-regional stormwater mitigation program. Upon review and a determination by the Regional Water Board Executive Officer that the proposal is technically valid and appropriate, the Regional Water Board may consider for approval such a program if its implementation meets all of the following requirements:

a. Retains the runoff from the 85th percentile, 24-hour rain event or the 0.75 inch, 24-hour rain event, whichever is greater;

b. Results in improved stormwater quality;

c. Protects stream habitat;

d. Promotes cooperative problem solving by diverse interests;

e. Is fiscally sustainable and has secure funding; and

f. Is completed in five years including the construction and start-up of treatment facilities.

7. Water Quality Mitigation Criteria

All New Development and Redevelopment projects that have been approved for offsite mitigation or groundwater replenishment projects will also provide treatment of stormwater runoff from the project site. These projects will design and implement post-construction stormwater BMPs and control measures to reduce pollutant loading as necessary to:

a. Meet the pollutant specific benchmarks listed in Table PLD2 at the treatment systems outlet or prior to the discharge to the MS4, and

b. Ensure that the discharge does not cause or contribute to an exceedance of water quality standards at the agency's downstream MS4 outfall.

The project proponent may be allowed to install flow-through modular treatment systems including sand filters, or other proprietary BMP treatment systems with a demonstrated efficiency at least equivalent to a sand filter. The sizing of the flow through treatment device will be based on a rainfall intensity of 0.2 inches per hour, or the one year, one-hour rainfall intensity as determined from the most recent Los Angeles County isohyetal map, *whichever is greater*.

Table PLD- 2: Benchmarks Applicable to New Development Treatment BMPs.

Conventional Pollutants					
Pollutant	Suspended Solids mg/L	Total P mg/L	Total N mg/L	TKN mg/L	
Effluent Concentration	14	0.13	1.28	1.09	
Metals					
Pollutant	Total Cd µg/L	Total Cu µg/L	Total Cr µg/L	Total Pb µg/L	Total Zn µg/L
Effluent Concentration	0.3	6	2.8	2.5	23

New developments and redevelopments will not cause or contribute to an exceedance of applicable water quality-based effluent limitations established in the MS4 Permit pursuant to Total Maximum Daily Loads (TMDLs).

8. Hydromodification (Flow/ Volume/ Duration) Control Criteria

All New Development and Redevelopment projects located within natural drainage systems will implement hydrologic control measures, to prevent accelerated downstream erosion and to protect stream habitat in natural drainage systems. The purpose of the hydrologic controls is to minimize changes in post-development hydrologic stormwater runoff discharge rates, velocities, and duration. This will be achieved by maintaining the project's pre-project stormwater runoff flow rates and durations.

Description

Hydromodification control in natural drainage systems will be achieved by maintaining the Erosion Potential (Ep) in streams at a value of 1, unless an alternative value can be shown to be protective of the natural drainage systems from erosion, incision, and sedimentation that can occur as a result of flow increases from impervious surfaces and prevent damage to stream habitat in natural drainage system tributaries[5]. Hydromodification mitigation approaches should meet the criteria below:

a. Hydromodification control may include one, or a combination of on-site, regional or sub-regional hydromodification control BMPs, LID strategies, or stream and riparian buffer restoration measures. Any in-stream restoration measure shall not adversely affect the beneficial uses of the natural drainage systems.

b. Natural drainage systems that are subject to the hydromodification assessments and controls,

[5] See Attachment J of the MS4 Permit, "*Determination of Erosion Potential*"

as described in this section, include all drainages that have not been improved (e.g., channelized or armored with concrete, shotcrete, or rip-rap) or drainage systems that are tributary to a natural drainage system, except as provided in Exemptions to Hydromodification Controls, see below. The clearing or dredging of a natural drainage system does not constitute an "improvement."

c. Until the State Water Board or the Regional Water Board adopts a final Hydromodification Policy or criteria, the Hydromodification Control Criteria described in this section will be implemented to control the potential adverse impacts of changes in hydrology that may result from New Development and Redevelopment projects located within natural drainage systems.

Exemptions to Hydromodification Controls

New Development and Redevelopment projects may be exempt from implementation of hydromodification controls where assessments of downstream channel conditions and proposed discharge hydrology indicate that adverse hydromodification effects to beneficial uses of Natural Drainage Systems are unlikely. Conditions for exemptions include the following:

a. Projects involving replacement, maintenance or repair of an agency's existing flood control facility, storm drain, or transportation network.

b. Redevelopment Projects in the center of urban areas that do not increase the effective impervious area or decrease the infiltration capacity of pervious areas compared to the pre-project conditions.

c. Projects that have any increased discharge directly or via a storm drain to a sump, lake, area under tidal influence, into a waterway that has a 100-year peak flow (Q100) of 25,000 cfs or more, or other receiving water that is not susceptible to hydromodification impacts.

d. Projects that discharge directly or via a storm drain into concrete or otherwise engineered (not natural) channels (e.g., channelized or armored with rip rap, shotcrete, etc.), which, in turn, discharge into receiving water that is not susceptible to hydromodification impacts.

e. LID BMPs implemented on single family homes are sufficient to comply with hydromodification criteria.

Hydromodification Control Criteria

The Hydromodification Control Criteria to protect natural drainage systems are as follows:

a. Except for exemptions described above, projects disturbing an area greater than 1 acre but less than 50 acres within natural drainage systems will be presumed to meet pre-development hydrology if one of the following demonstrations is made:

    i. The project is designed to retain on-site, through infiltration, evapotranspiration, and/or harvest and use, the stormwater volume from the runoff of the 95th percentile, 24-hour storm, or

ii. The runoff flow rate, volume, and velocity for the post-development condition do not exceed the pre-development condition for the 2-year, 24-hour rainfall event and the duration for the post-development condition is not less than the pre-development condition for the 2-year, 24-hour rainfall event. This condition may be substantiated by simple screening models, including those described in Hydromodification Effects on Flow Peaks and Durations in Southern California Urbanizing Watersheds (Hawley et al., 2011) or other models acceptable to the Executive Officer of the Regional Water Board, or

The MS4 Permit states projects will meet Hydromodification Control Criteria if "*The...duration for the post-development condition **do[es] not exceed** the pre-development condition for the 2-year, 24-hour rainfall event*." The runoff duration (Tc) is generally associated with longer values resulting in lower concern for hydromodification impacts. Implementation of LID BMPs generally results in runoff not immediately (or not at all) discharging from the site, increasing the time of concentration. Thus, the interpretation presented herein is that Hydromodification Control Criteria would be met if the runoff duration for the post-development condition is **not less than** the pre-development condition for the 2-year, 24-hour rainfall event.

iii. The Erosion Potential (Ep) in the receiving water channel will approximate 1, as determined by a Hydromodification Analysis Study and the equation presented in Attachment J of the MS4 Permit. Alternatively, agencies can opt to use other work equations to calculate Erosion Potential with Executive Officer approval.

b. Projects disturbing 50 acres or more within natural drainage systems will be presumed to meet pre-development hydrology based on the successful demonstration of one of the following conditions:

i. The site infiltrates on-site at least the runoff from a 2-year, 24hour storm event, or

ii. The runoff flow rate, volume, and velocity for the post-development condition does not exceed the pre-development condition for the 2-year, 24-hour rainfall event and the duration for the post-development condition is not less than the pre-development condition for the 2-year, 24-hour rainfall event. These conditions must be substantiated by hydrologic modeling acceptable to the Regional Water Board Executive Officer, or

iii. The Erosion Potential (Ep) in the receiving water channel will approximate 1, as determined by a Hydromodification Analysis Study and the equation presented in Attachment J of the MS4 Permit.

Alternative Hydromodification Criteria

The requirement for Hydromodification Controls will be satisfied by implementing the hydromodification requirements in the County of Los Angeles Low Impact Development Manual (2009) for all projects disturbing an area greater than 1 acre within natural drainage systems.

3. Watershed Equivalence

Regardless of the methods through which applicants implement alternative compliance measures,

the subwatershed-wide (defined as draining to the same HUC-12 hydrologic area in the Basin Plan) result of all development must be at least the same level of water quality protection as would have been achieved if all projects utilizing these alternative compliance provisions had complied with the Integrated Water Quality/Flow Reduction/Resource Management Criteria, described herein.

4. Annual Report

   Annual Reports will be provided to the Regional Water Board to include a list of mitigation project descriptions and estimated pollutant and flow reduction analyses (compiled from design specifications submitted by project applicants, as approved. Within 4 years of the MS4 Permit adoption, the Annual Reports will include a comparison of the expected aggregate results of alternative compliance projects to the results that would otherwise have been achieved by retaining on site the SWQDv.

Implementation *Permit §VI.D.7.d (LA)/§VII.J.5 (LB)*

Local Ordinance Equivalence

Alternative requirements in the local ordinances for the agencies of this WMP will provide equal or greater reduction in stormwater discharge pollutant loading and volume as would have been obtained through strict conformance with the Integrated Water Quality/Flow Reduction Resources Management Criteria, Alternative Compliance Measures for Technical Infeasibility, or Opportunity for Regional Groundwater Replenishment sections herein and, if applicable, the Hydromodification (Flow/Volume Duration) Control Criteria section herein.

Project Coordination

A process for effective approval of post-construction stormwater control measures will be developed to include:

a. Detailed LID site design and BMP review including review of BMP sizing calculations, BMP pollutant removal performance, and municipal approval; and

b. An established structure for communication and delineated authority between and among municipal departments that have jurisdiction over project review, plan approval, and project construction through memoranda of understanding or an equivalent agreement.

Maintenance Agreement and Transfer

Prior to issuing approval for final occupancy, the Cities will require that all New Development and Redevelopment projects subject to post-construction BMP requirements, with the exception of simple LID BMPs implemented on single family residences, provide an operation and maintenance plan, monitoring plan, where required, and verification of ongoing maintenance provisions for LID practices, Treatment Control BMPs, and Hydromodification Control BMPs including but not limited to: final map conditions, legal agreements, covenants, conditions or restrictions, CEQA mitigation requirements, conditional use permits, and/ or other legally binding maintenance agreements (see Attachments PLD-A and PLD-B for MCA and MCA Termination sample templates, respectively). Agencies will require maintenance records be kept on site.

Verification at a minimum will include the developer's signed statement accepting responsibility for maintenance until the responsibility is legally transferred; and either:

a. A signed statement from the public entity assuming responsibility for BMP maintenance; or

b. Written conditions in the sales or lease agreement, which require the property owner or tenant to assume responsibility for BMP maintenance and conduct a maintenance inspection at least once a year; or

c. Written text in project covenants, conditions, and restrictions (CCRs) for residential properties assigning BMP maintenance responsibilities to the Home Owners Association; or

d. Any other legally enforceable agreement or mechanism that assigns responsibility for the maintenance of BMPs.

All development projects subject to post-construction BMP requirements will provide a plan for the operation and maintenance of all structural and treatment controls. The plan will be submitted for examination of relevance to keeping the BMPs in proper working order. Where BMPs are transferred to agency for ownership and maintenance, the plan will also include all relevant costs for upkeep of BMPs in the transfer. Operation and Maintenance plans for private BMPs will be kept on-site for periodic review by agency inspectors.

A tracking system and an inspection and enforcement program will be maintained for New Development and Redevelopment post-construction stormwater as shown in Table PLC-3. Enforcement action will be taken per the established Progressive Enforcement Policy as appropriate based on the results of the inspection. See Section for requirements for the development and implementation of a Progressive Enforcement Policy (Appendix A-3-1_PEP).

Table PLD-3: Tracking, Inspection, and Enforcement Program Components

Program	Description	Components	
GIS or other Electronic System	A GIS or other electronic system will be implemented for tracking projects that have been conditioned for post-construction BMPs.	– Municipal Project ID – State WDID No. – Project Acreage – BMP Type and Description – BMP Location (coordinates) – Date of Maintenance Agreement – Date of Acceptance	– Maintenance Records – Inspection Date and Summary – Corrective Action – Date Certificate of Occupancy Issued – Replacement or Repair Date
Inspections[6]	Inspect all development sites upon completion of construction and prior to the issuance of occupancy	Proper installation of: – LID measures, – Structural BMPs,	

[6] The inspection may be combined with other inspections provided it is conducted by trained personnel.

	certificates.	– Treatment control BMPs, and – Hydromodification control BMPs.
Operation and Maintenance[7]	Verify proper operation and maintenance of post-construction BMPs. Inspection at least once every 2 years after project completion.	– Follow a Post-construction BMP Maintenance Inspection checklist (See Attachment PLD-C) – Assess operation and maintenance conditions relating to post-construction BMPs, including BMP repair, replacement, or re-vegetation.

Plan Certification

Each SUSMP/LID Plan should contain proper certifications. The following approach is suggested for SUSMP/LID Plan submittals:

- Form signed by the property owner/applicant stating the category in which the project falls under to easily define the NPDES requirements (see Attachment PLD-D for Form PC sample template).
- Form signed by the property owner/applicant certifying that the BMPs will be implemented, monitored, and maintained per SUSMP/LID Plan requirements (see Attachment PLD-E for Form P1 sample template).
- Form signed and stamped by a California registered civil engineer stating the proposed structural BMPs and certifying the methods and requirements are in compliance with the MS4 Permit requirements (see Attachment PLD-F for Form P2 sample template).

[7] For post-construction BMPs operated and maintained by parties other than the agency in which the BMP(s) is located, the agency will require the other parties to document proper maintenance and operations.

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Development Construction Program

The Cities are required to develop, implement and enforce a construction program that includes the provisions listed in MS4 Permit §VI.D.8 (LB §VII.K). This document provides guidance to assist the Cities in implementing a construction program in compliance with the MS4 Permit.

Objectives

Permit §VI.D.8.a (LA)/§VII.K.1 (LB)

The objectives of the construction program are to:

- Prevent illicit construction-related discharges of pollutants into the MS4 and receiving waters.
- Implement and maintain structural and non-structural BMPs to reduce pollutants in stormwater runoff from construction sites.
- Reduce construction site discharges of pollutants to the MS4 to the MEP.
- Prevent construction site discharges to the MS4 from causing or contributing to a violation of water quality standards.

Erosion and Sediment Control Ordinance

Permit §VI.D.8.b (LA)/ §VII.K.1 (LB)

The construction program requires an established, enforceable erosion and sediment control ordinance for all construction sites that disturb soil.

Applicability

Permit §VI.D.8.c (LA)/ §VII.K.1.v (LB)

The construction program addresses construction activity as defined in Table DC-1.

Table DC-1: Definitions

Construction Activity	
Definition	Any construction or demolition activity, clearing, grading, grubbing, or excavation or any other activity that results in land disturbance.
Examples	Grading, vegetation clearing, soil compaction, paving, repaving and linear underground/overhead projects (LUPs) that result in land disturbance.
Exclusions	Emergency construction required to immediately protect public health and safety, *routine maintenance* as defined below and agricultural activities.
Routine Maintenance (construction program exclusion)	
Definition	Projects required to maintain the integrity of structures, including but not limited to the following:
Examples	Maintaining the original line and grade, hydraulic capacity, or original purpose of the facility.
	Performing restoration work to preserve the original design grade, integrity and hydraulic capacity of flood control facilities.
	Performing road shoulder work, regrading dirt/gravel roadways/shoulders and cleaning out ditches.
	Update existing lines (includes replacing with new materials or pipe) and facilities to comply with applicable codes, standards, and regulations regardless if such projects result in increased capacity.
	Repair leaks
Exclusion	New lines (i.e. not associated with existing facilities and not part of a project to update or replace existing lines) or facilities constructed to comply with applicable codes, standards and regulations.

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The greater part of the construction program is dedicated to construction sites that disturb one acre or more of soil (with the exception of agricultural activities). This coincides with the size threshold for coverage under the State Water Resources Control Board's NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities. The program provisions exclusive to sites less than one acre are addressed first.

Construction Sites Less than One Acre

Permit §VI.D.8.d (LA)/§VII.K.1.vi (LB)

BMPs (< 1 acre)

Through the use of the erosion and sediment control ordinance and/or building permit, construction sites are required have in place an effective combination of erosion and sediment control BMPs from Table DC-2 to prevent erosion and sediment loss and the discharge of construction wastes.

Table DC-2: Applicable Set of BMPs for All Construction Sites

BMP Type	BMP
Erosion Controls	Scheduling
	Preservation of Existing Vegetation
Sediment Controls	Silt Fence
	Sand Bag Barrier
	Stabilized Construction Site Entrance/Exit
Nonstormwater Management	Water Conservation Practices
	Dewatering Operations
Waste Management	Material Delivery and Storage
	Stockpile Management
	Spill Prevention and Control
	Solid Waste Management
	Concrete Waste Management
	Sanitary/Septic Waste Management

Inventory (< 1 acre)

All construction sites with soil disturbing activities that require a permit, regardless of size, are identified and stored in an inventory. Existing permit databases or other tracking systems may be used to file this information. The list of permitted sites is provided to the Regional Water Board upon request.

Inspections (< 1 acre)

Construction sites are inspected on as needed based on the evaluation of the factors that are a threat to water quality. In evaluating the threat to water quality, the following factors are considered: soil erosion potential, site slope, project size and type, sensitivity of receiving water bodies, proximity to receiving water bodies, nonstormwater discharges, past record of noncompliance by the operators of the construction site and any water quality issues relevant to the particular MS4.

Enforcement (< 1 acre)

The Progressive Enforcement Policy (MS4 Permit §VI.D.2) is implemented to ensure that construction sites are brought into compliance with the erosion and sediment control ordinance within a reasonable time period.

Construction Sites One Acre or Greater

Operators of public and private construction sites within a city's jurisdiction are required to select, install, implement, and maintain BMPs that comply with the erosion and sediment control ordinance.

Construction Site Inventory / Electronic Tracking System *Permit §VI.D.8.g (LA)/§VII.K.1.ix (LB)*

An electronic system is used to inventory all issued grading permits, encroachment permits, demolition permits, building permits, or construction permits (and any other municipal authorization to move soil and/ or construct or destruct that involves land disturbance). A database management system or GIS system is recommended. This inventory is continuously updated as new sites are permitted and sites are completed. The inventory / tracking system contains at a minimum the items listed in Table DC-3.

Table DC-3: Inventory Information for Constructions Sites

Information Type		Information
General	Name	Project Name
	Location	Site address and/or latitude and longitude coordinates
		Receiving water
	Contact	Names of owner and contractor
		Mailing addresses of owner and contractor
		Phone numbers of owner and contractor
		Emails (if available) of owner and contractor
Status		Start and end dates
		Permit approval date and anticipated completion date
		Erosion and Sediment Control Plan (ESCP) approval date
		Status of NOI submittal and CGP coverage
		Current construction phase (where feasible)
Size		Size of project and area of disturbance
Water quality		Proximity to waterbodies listed as impaired[1] by sediment related pollutants
		Proximity to waterbodies for which a sediment-related TMDL has been adopted and approved by USEPA
		Status as a significant threat to water quality (based on a consideration of factors listed in Appendix 1 to the CGP)
Inspection		Inspection frequency
Post construction		List of post-construction structural BMPs subject to O&M requirements

Construction Plan Review and Approval Procedures *Permit §VI.D.8.h (LA)/§VII.K.1.x (LB)*

Plan review procedures are developed and implemented such that the following minimum requirements are met:

- Prior to issuing a grading or building permit, each operator of a construction activity within the city's jurisdiction of which the project is located is required to prepare and submit an ESCP prior to the disturbance of land for review and written approval. The construction site operator is prohibited from commencing construction activity prior to receipt of written approval by the city of which the project is located. An ESCP is not approved unless it contains appropriate site-

[1] CWA §303(d) listed or subject to a TMDL

specific construction site BMPs that meet the minimum requirements of the erosion and sediment control ordinance.

- ESCPs must include the elements of a Storm Water Pollution Prevention Plan (SWPPP). SWPPPs prepared in accordance with the requirements of the Construction General Permit can be accepted as ESCPs.
- At a minimum, the ESCP must address the following elements:
    - Methods to minimize the footprint of the disturbed area and to prevent soil compaction outside of the disturbed area.
    - Methods used to protect native vegetation and trees.
    - Sediment/Erosion Control.
    - Controls to prevent tracking on and off the site.
    - Nonstormwater controls (e.g., vehicle washing, dewatering, etc.).
    - Materials Management (delivery and storage).
    - Spill Prevention and Control.
    - Waste Management (e.g., concrete washout/waste management; sanitary waste management).
    - Identification of site Risk Level as identified per the requirements in Appendix 1 of the Construction General Permit.
- The ESCP must include the rationale for the selection and design of the proposed BMPs, including quantifying the expected soil loss from different BMPs.
- The ESCP must be developed and certified by a Qualified SWPPP Developer (QSD).
- All structural BMPs must be designed by a licensed California Engineer.
- The landowner or the landowner's agent must sign a statement on the ESCP as follows (see Attachment DC-A for sample OC-1 template):

  "I certify that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that submitting false and/ or inaccurate information, failing to update the ESCP to reflect current conditions, or failing to properly and/ or adequately implement the ESCP may result in revocation of grading and/ or other permits or other sanctions provided by law."

- Prior to issuing a grading or building permit, the city of which the project is located verifies that the construction site operators have existing coverage under applicable permits, including, but not limited to the State Water Board's Construction General Permit, and State Water Board 401 Water Quality Certification.
- A checklist is used to conduct and document review of each ESCP (see Attachment DC-B for the ESCP Checklist sample template).

BMP Implementation Level *Permit §VI.D.8.i (LA)/§VII.K.1.xi (LB)*

The Cities will implement technical standards for the selection, installation and maintenance of construction BMPs for all construction sites within its jurisdiction.

The BMP technical standards require:

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- The use of BMPs that are tailored to the risks posed by the project. Sites are ranked from Low Risk (Risk 1) to High Risk (Risk 3). Project risks are calculated based on the potential for erosion from the site and the sensitivity of the receiving water body. Receiving water bodies that are listed on the Clean Water Act (CWA) Section 303(d) list for sediment or siltation are considered High Risk. Likewise, water bodies with designated beneficial uses of SPWN, COLD, and MIGR are also considered High Risk. The combined (sediment/receiving water) site risk is calculated using the methods provided in Appendix 1 of the Construction General Permit. At a minimum, the BMP technical standards include requirements for High Risk sites as defined in Table DC-7.
- The use of BMPs for all construction sites, sites equal or greater to 1 acre, and for paving projects per Table DC-6 and Table DC-8.
- Detailed installation designs and cut sheets for use within ESCPs.
- Maintenance expectations for each BMP, or category of BMPs, as appropriate.

Permittees are encouraged to adopt respective BMPs from latest versions of the California BMP Handbook, Construction or Caltrans Stormwater Quality Handbooks, Construction Site Best Management Practices (BMPs) Manual and addenda. Alternatively, Permittees are authorized to develop or adopt equivalent BMP standards consistent for Southern California and for the range of activities presented in Tables DC-5 through DC-8.

The local BMP technical standards are readily available to the development community and are clearly referenced within the Cities' stormwater or development services websites, ordinances, permit approval processes and/or ESCP review forms. The local BMP technical standards are also readily available to the Regional Water Board upon request.

Local BMP technical standards are available for the BMPs listed in Tables DC-5 through DC-8.

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Table DC-4: Minimum Set of BMPs for All Construction Sites

BMP Type	BMP
Erosion Controls	Scheduling
	Preservation of Existing Vegetation
Sediment Controls	Silt Fence
	Sand Bag Barrier
	Stabilized Construction Site Entrance/Exit
Nonstormwater Management	Water Conservation Practices
	Dewatering Operations
Waste Management	Material Delivery and Storage
	Stockpile Management
	Spill Prevention and Control
	Solid Waste Management
	Concrete Waste Management
	Sanitary/Septic Waste Management

Table DC-5: Additional BMPs Applicable to Construction Sites Disturbing 1 Acre or More

BMP Type	BMP
Erosion Controls	Hydraulic Mulch
	Hydroseeding
	Soil Binders
	Straw Mulch
	Geotextiles and Mats
	Wood Mulching
Sediment Controls	Fiber Rolls
	Gravel Bag Berm
	Street Sweeping and/ or Vacuum
	Storm Drain Inlet Protection
	Scheduling
	Check Dam
Additional Controls	Wind Erosion Controls
	Stabilized Construction Entrance/ Exit
	Stabilized Construction Roadway
	Entrance/ Exit Tire Wash
Non-Storm Management	Vehicle and Equipment Washing
	Vehicle and Equipment Fueling
	Vehicle and Equipment Maintenance
Waste Management	Material Delivery and Storage
	Spill Prevention and Control

Table DC-6: Additional Enhanced BMPs for High Risk Sites

BMP Type	BMP
Erosion Controls	Hydraulic Mulch
	Hydroseeding
	Soil Binders
	Straw Mulch
	Geotextiles and Mats
	Wood Mulching
	Slope Drains
Sediment Controls	Silt Fence
	Fiber Rolls
	Sediment Basin
	Check Dam
	Gravel Bag Berm
	Street Sweeping and/or Vacuum
	Sand Bag Barrier
	Storm Drain Inlet Protection
Additional Controls	Wind Erosion Controls
	Stabilized Construction Entrance/Exit
	Stabilized Construction Roadway
	Entrance/Exit Tire Wash
	Advanced Treatment Systems*
Nonstormwater Management	Water Conservation Practices
	Dewatering Operations (Ground water dewatering only under NPDES Permit No. CAG994004)
	Vehicle and Equipment Washing
	Vehicle and Equipment Fueling
	Vehicle and Equipment Maintenance
Waste Management	Material Delivery and Storage
	Stockpile Management
	Spill Prevention and Control
	Solid Waste Management

*Applies to public roadway projects.

Table DC-7: Minimum Required BMPs for Roadway Paving or Repair Operation (For Private or Public Projects)

#	BMP
1.	Restrict paving and repaving activity to exclude periods of rainfall or predicted rainfall unless required by emergency conditions.
2.	Install gravel bags and filter fabric or other equivalent inlet protection at all susceptible storm drain inlets and at manholes to prevent spills of paving products and tack coat.
3.	Prevent the discharge of release agents including soybean oil, other oils, or diesel to the stormwater drainage system or receiving waters.
4.	Minimize non stormwater runoff from water use for the roller and for evaporative cooling of the asphalt.
5.	Clean equipment over absorbent pads, drip pans, plastic sheeting or other material to capture all spillage and dispose of properly.
6.	Collect liquid waste in a container, with a secure lid, for transport to a maintenance facility to be reused, recycled or disposed of properly.
7.	Collect solid waste by vacuuming or sweeping and securing in an appropriate container for transport to a maintenance facility to be reused, recycled or disposed of properly.
8.	Cover the "cold-mix" asphalt (i.e., pre-mixed aggregate and asphalt binder) with protective sheeting during a rainstorm.
9.	Cover loads with tarp before haul-off to a storage site, and do not overload trucks.
10.	Minimize airborne dust by using water spray or other approved dust suppressant during grinding.
11.	Avoid stockpiling soil, sand, sediment, asphalt material and asphalt grindings materials or rubble in or near stormwater drainage system or receiving waters.
12.	Protect stockpiles with a cover or sediment barriers during a rain.

Construction Site Inspection *Permit §VI.D.8.j (LA)/§VII.K.1.xii (LB)*

The Cities' legal authority is used to implement procedures for inspecting public and private construction sites. The inspection procedures are implemented as follows:

Inspection Frequency

- Inspect the public and private construction sites as specified in Table DC-8.
- All phases of construction are inspected as follows:
    - Prior to Land Disturbance – Prior to allowing an operator to commence land disturbance, each Permittee shall perform an inspection to ensure all necessary erosion and sediment structural and non-structural BMP materials and procedures are available per the erosion and sediment control plan.
    - During Active Construction, including Land Development[2] and Vertical Construction[3] – In accordance with the frequencies specified in Table DC-8, inspections are performed to ensure all necessary erosion and sediment structural and non-structural BMP materials and procedures are available per the erosion and sediment control plan throughout the construction process.
    - Final Landscaping / Site Stabilization[4] – At the conclusion of the project and as a condition of approving and/or issuing a Certificate of Occupancy, the constructed site is inspected to ensure that all graded areas have reached final stabilization and that all

[2] Activities include cuts and fills, rough and finished grading; alluvium removals; canyon cleanouts; rock undercuts; keyway excavations; stockpiling of select material for capping operations; and excavation and street paving, lot grading, curbs, gutters and sidewalks, public utilities, public water facilities including fire hydrants, public sanitary sewer systems, storm sewer system and/or other drainage improvement.

[3] The build out of structures from foundations to roofing, including rough landscaping.

[4] All soil disturbing activities at each individual parcel within the site have been completed.

trash, debris, and construction materials, and temporary erosion and sediment BMPs are removed.

- Based on the required frequencies above, each construction project is inspected a minimum of three times.

Table DC-8: Inspection Frequencies for Sites One Acre or Greater

Site	Inspection Frequency Shall Occur
All sites 1 acre or larger that discharge to a tributary listed by the state as an impaired water for sediment or turbidity under the CWA §303(d)	(1) when two or more consecutive days with greater than 50% chance of rainfall are predicted by NOAA[5], (2) within 48 hours of a ½-inch rain event and at (3) least once every two weeks
Other sites 1 acre or more determined to be a significant threat to water quality[6]	
All other construction sites with 1 acre or more of soil disturbance not meeting the criteria above	At least monthly

Inspection Standard Operating Procedures

Standard operating procedures are implemented, and revised as necessary, that identify the inspection procedures followed by the Cities' inspectors (see Attachment DC-C for suggested standard operating procedures). Inspections of construction sites – and the standard operating procedures – include, but are not limited to:

1. Verification of active coverage under the Construction General Permit for sites disturbing 1 acre or more, or that are part of a planned development that will disturb 1 acre or more and a process for referring non-filers to the Regional Water Board.
2. Review of the applicable ESCP and inspection of the construction site to determine whether all BMPs have been selected, installed, implemented, and maintained according to the approved plan and subsequent approved revisions (see Attachment DC-B for the ESCP Checklist sample template).
3. Assessment of the appropriateness of the planned and installed BMPs and their effectiveness.
4. Visual observation and record keeping of nonstormwater discharges, potential illicit discharges and connections, and potential discharge of pollutants in stormwater runoff.
5. Development of a written or electronic inspection report generated from an inspection checklist used in the field (see Attachment DC-D and DC-E for the Large Site and Small Site[7] Inspection Forms, respectively).
6. Tracking of the number of inspections for the inventoried construction sites throughout the reporting period to verify that the sites are inspected at the minimum frequencies listed in Table DC-8.

Enforcement *Permit §VI.D.8.k (LA)/§VII.K.1.xiii (LB)*

The Progressive Enforcement Policy is implemented to ensure that construction sites are brought into compliance with all stormwater requirements within a reasonable time period.

[5] www.srh.noaa.gov/forecast

[6] In evaluating the threat to water quality, the following factors shall be considered: soil erosion potential; site slope; project size and type; sensitivity of receiving water bodies; proximity to receiving water bodies; nonstormwater discharges; past record of non-compliance by the operators of the construction site; and any water quality issues relevant to the particular MS4.

[7] A "large site" refers to a site greater than or equal to 1 acre while a "small site" refers to a site less than one acre.

Permittee Staff Training *Permit §VI.D.8.l(LA)/§VII.K.1.xiv(LB)*

Staff whose primary job duties are related to implementing the construction stormwater program are adequately trained.

The Cities may conduct in-house training or contract with consultants. Training is provided to the following staff positions of the MS4:

- Plan Reviewers and Permitting Staff – Staff and consultants are trained as qualified individuals, knowledgeable in the technical review of local erosion and sediment control ordinance, local BMP technical standards, ESCP requirements, and the key objectives of the State Water Board QSD program. The training is provided either internally to staff or staff is required to obtain QSD certification.
- Erosion Sediment Control/Stormwater Inspectors – Inspectors are either 1) knowledgeable in inspection procedures consistent with the State Water Board sponsored program QSD, 2) a Qualified SWPPP Practitioner (QSP) or 3) a designated person on staff trained in the key objectives of the QSD/QSP programs supervises inspection operations. The training is provided either provided internally to staff or staff is required to obtain QSD/QSP certification. Each inspector is knowledgeable of the local BMP technical standards and ESCP requirements.
- Third-Party Plan Reviewers, Permitting Staff, and Inspectors – If outside parties are utilized to conduct inspections and/or review plans, these staff are trained per the requirements listed above. Outside contractors can self-certify, providing they certify they have received all applicable training required in MS4 Permit §VI.D.8 and have documentation to that effect.

Public Agency Activities Program

Each participating city is required to develop and implement a program for public agency facilities and activities that includes the requirements listed in MS4 Permit §VI.D.9 (LB §VII.L). This document provides guidance to assist the Cities in implementing a public agency activities program in compliance with the MS4 Permit.

Objectives

Permit §VI.D.9.a (LA)/§VII.L.1 (LB)

The objectives of the Public Agency Activities program are to:

- Minimize stormwater pollution impacts from Permittee-owned or operated facilities.
- Minimize stormwater pollution impacts from public agency activities.
- Identify opportunities to reduce stormwater pollution impacts from areas of existing development.

MS4 Permit requirements for Public Agency Facilities and Activities consist of the following components which will be discussed in more detail in the sections below:

- Public Construction Activities Management
- Public Facility Inventory
- Inventory of Existing Development for Retrofitting Opportunities
- Public Facility and Activity Management
- Vehicle and Equipment Wash Areas
- Landscape, Park, and Recreational Facilities Management
- Storm Drain Operation and Maintenance
- Streets, Roads, and Parking Facilities Maintenance
- Emergency Procedures
- Municipal Employee and Contractor Training

1. Public Construction Activities Management

Permit §VI.D.9.b (LA)/§VII.L.2 (LB)

Each participating city is required to develop and implement a Development Construction Program that meets the requirements the Development Construction Section of this WMP, and Part VI.D.8 of the LA MS4 Permit at municipally owned or operated (i.e., public or Permittee sponsored) construction projects. In addition, each participating city is required to develop and implement a Planning and Land Development Program that meets the requirements in the Planning and Land Development Section of this WMP, and the MS4 Permit at municipally owned or operated (i.e., public or Permittee sponsored) construction projects.

2. Public Facility Inventory

Permit §VI.D.9.c (LA)/§VII.L.3 (LB)

The Public Agency Activities Program requires the maintenance of an inventory of all Permittee-owned or operated (i.e., public) facilities that are potential sources of stormwater pollution. The incorporation of facility information into a GIS is recommended. Sources that are tracked include but are not limited to the following:

- Animal control facilities
- Chemical storage facilities
- Composting facilities

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- Equipment storage and maintenance facilities (including landscape maintenance-related operations)
- Fueling or fuel storage facilities (including municipal airports)
- Hazardous waste disposal facilities
- Hazardous waste handling and transfer facilities
- Incinerators
- Landfills
- Materials storage yards
- Pesticide storage facilities
- Fire stations
- Public restrooms
- Public parking lots
- Public golf courses
- Public swimming pools
- Public parks
- Public works yards
- Public marinas
- Recycling facilities
- Solid waste handling and transfer facilities
- Vehicle storage and maintenance yards
- Stormwater management facilities (e.g., detention basins)
- All other Permittee-owned or operated facilities or activities that are determined to contribute a substantial pollutant load to the MS4.

The following minimum fields of information are included in the inventory for each Permittee-owned or operated facility:

- Name of facility
- Name of facility manager and contact information
- Address of facility (physical and mailing)
- A narrative description of activities performed and potential pollution sources.
- Coverage under the Industrial General Permit or other individual or general NPDES permits or any applicable waiver issued by the Regional or State Water Board pertaining to stormwater discharges.

The inventory is updated at least once during the 5-year MS4 Permit term. The update are accomplished through collection of new information obtained through field activities or through other readily available inter and intra-agency informational databases (e.g., property management, land-use approvals, accounting and depreciation ledger account, and similar information).

3. Inventory of Existing Development for Retrofit Opportunities

Permit §VI.D.9.d (LA)/§VII.L.4 (LB)

The Public Agency Activities Program requires the development of an inventory of retrofitting opportunities. Retrofit opportunities are identified within the public right-of-way or in coordination with a TMDL implementation plan(s). The goals of the existing development retrofitting inventory are to address the impacts of existing development through regional or sub-regional retrofit projects that

reduce the discharges of stormwater pollutants into the MS4 and prevent discharges from the MS4 from causing or contributing to a violation of water quality standards as defined in the MS4 Permit.

Existing areas of development are screened to identify candidate areas for retrofitting using watershed models or other screening level tools. The areas of existing development identified during the screening process are then evaluated and ranked to prioritize retrofitting candidates. Criteria for this evaluation may include, but is not limited to the following:

- Feasibility, including general private and public land availability;
- Cost effectiveness;
- Pollutant removal effectiveness;
- Tributary area potentially treated;
- Maintenance requirements;
- Landowner cooperation;
- Neighborhood acceptance;
- Aesthetic qualities;
- Efficacy at addressing concern; and
- Potential improvements to public health and safety.

The results of this evaluation are considered in the following programs:

- Highly feasible projects expected to benefit water quality are given a high priority to implement source control and treatment control BMPs in the WMP.
- High priority retrofit projects are considered as candidates for off-site mitigation projects per LA MS4 Permit §VI.D.7.c.iii(4)(d) (LB §VII.J.4.iii(4)).
- Where feasible, the existing development retrofit program is coordinated with flood control projects and other infrastructure improvement programs per LA MS4 Permit §VI.D.9.e.ii(2) (LB §VII.L.5.ii(2)).

Site specific retrofit projects are encouraged through cooperation with private landowners. The following practices are considered in cooperating with private landowners to retrofit existing development:

- Demonstration retrofit projects;
- Retrofits on public land and easements that treat runoff from private
- developments;
- Education and outreach;
- Subsidies for retrofit projects;
- Requiring retrofit projects as enforcement, mitigation or ordinance compliance;
- Public and private partnerships;
- Fees for existing discharges to the MS4 and reduction of fees for retrofit implementation.

4. Public Facility and Activity Management

Permit §VI.D.9.e (LA)/§VII.L.5 (LB)

4.1. Industrial General Permitted Facilities

Permit §VI.D.9.e.i & §VI.D.9.e.v (LA)/§VII.L.5.i (LB)

All Permittee owned or operated facilities where industrial activities are conducted that require coverage are required to obtain coverage under the Industrial General Permit by submitting a Notice of Intent (NOI) to the State Water Resources Control Board (State Board) and preparing a Stormwater

Pollution Prevention Plan (SWPPP). Facilities that may require coverage are listed by category in 40 Code of Federal Regulations (CFR) Section 122.26(b)(14), and include:

- Facilities subject to stormwater effluent limitations guidelines, new source performance standards, or toxic pollutant effluent standards (40 CFR Subchapter N)
- Manufacturing facilities
- Mining and oil and gas facilities
- Hazardous waste treatment, storage, or disposal facilities
- Landfills, land application sites, and open dumps that receive industrial waste
- Recycling facilities
- Steam electric generating facilities
- Transportation facilities
- Sewage treatment plants
- Certain facilities if materials are exposed to stormwater

Municipally owned or operated facilities that have obtained coverage under the IGP implement and maintain BMPs consistent with the associated SWPPP, and are therefore not required to implement and maintain the activity specific BMPs as described in the sections below.

4.2. Flood Management Projects *Permit §VI.D.9.e.ii (LA)/§VII.L.5.ii (LB)*

The following measures are implemented for municipally owned or operated flood management projects:

- Procedures are developed to assess the impacts of flood management projects on the water quality of receiving water bodies;
- Existing structural flood control facilities area evaluated to determine if retrofitting the facility to provide additional pollutant removal from stormwater is feasible.

4.3. Contracted Public Agency Activities *Permit §VI.D.9.e.iv (LA)/§VII.L.5.iv (LB)*

Any contractors hired to conduct Public Agency Activities, including, but not limited to the following must be contractually obligated to implement and maintain the activity specific BMPs outlined in the sections below:

- Storm and/or sanitary sewer system inspection and repair,
- Street sweeping,
- Trash pick-up and disposal, and
- Street and right-of-way construction and repair

It is the responsibility of each Permittee to ensure that these BMPs are being properly implemented and maintained through oversight of contracted activities. Example contractor/lessor contract language is provided in attachment PA-A.

4.4. BMPS for Municipal Activities

Permit §VI.D.9.e.iii & Permit §VI.D.9.e.vi (LA)/§VII.L.5.iii & VII.L.5.vi (LB)

Municipal maintenance and field staff are the ones responsible for implementing effective source control BMPs[1], such as those described in Table PA-1 (or an equivalent set of BMPs) when such activities occur at municipally owned or operated facilities and field operations (i.e. project sites). These sites include, but are not limited to the facility types identified in the Public Facility Inventory, and at any area that includes the activities described in Table PA-1, or that have the potential to discharge pollutants in stormwater. The Caltrans Stormwater Quality Handbook Maintenance Staff Guide (Caltrans Handbook)[2] is an additional resource that describes BMPs to prevent the stormwater-related pollutants most likely to come from common maintenance facility operations and field activities. It provides a straightforward working-level approach to implementing BMPs for common maintenance activities by categorizing these activities into Families, and associating each Family with certain types of BMPs in Activity Cut Sheets. The activities described in Sections 5-10 below are representative of typical municipal operations, and correspond to the activities and BMPs listed in Table PA-1. Where appropriate, each section will identify the appropriate Maintenance Activity Family and corresponding Caltrans Activity Cut Sheets from this table for ease of reference.

Although Table PA-1 and the CalTrans Handbook are excellent references for selecting BMPs for some of the most common municipal activities, they may not represent a comprehensive inventory of activities encountered by maintenance staff and field personnel. Likewise, for those BMPs that are not adequately protective of water quality standards, additional site-specific BMPS may be needed. For example, the implementation of additional BMPs is required where stormwater from the storm drain system discharges to a water body subject to a TMDL, a Clean Water Act §303(d) listed water body, or a significant ecological area (SEA). Attachment PA-B contains a map of SEAs in LA County and Attachment K of the LA MS4 Permit contains a matrix of Permittees and TMDLs.

[1] BMP is defined by the California Stormwater Quality Association as "*any program, technology, process, siting criteria, operating method, measure, or device which controls, prevents, removes, or reduces pollution*". Source Control BMPs are operational practices that prevent pollution by reducing potential pollutants at the source. They typically do not require maintenance or construction, and may consist of programmatic controls such as street sweeping. Treatment Control BMPs are methods of treatment to remove pollutants from stormwater, and can include constructed treatment devices such as an infiltration basin.

[2] The handbook is available at http://www.dot.ca.gov/hq/env/stormwater/special/newsetup/_pdfs/management_ar_rwp/CTSW-RT-02-057.pdf and may also be found by entering the words "Caltrans Stormwater Quality Handbook Maintenance Staff Guide" in a web search engine.

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Table PA-1: General and Activity Specific BMPs and Their Associated Caltrans Handbook Activity Cut Sheet

Maintenance Activity Family	BMP	Caltrans Activity Cut Sheet Number
General BMPs	Scheduling and Planning	B-4
	Spill Prevention and Control	
	Sanitary/Septic Waste Management	
	Material Use	
	Safer Alternative Products	
	Vehicle/Equipment Cleaning, Fueling and Maintenance	
	Illicit Connection Detection, Reporting and Removal	
	Illegal Spill Discharge Control	
	Maintenance Facility Housekeeping Practices	
Flexible Pavement	Asphalt Cement Crack and Joint Grinding/ Sealing	B-9
	Asphalt Paving	B-10
	Structural Pavement Failure (Digouts) Grinding and Paving	B-11
	Emergency Pothole Repairs	B-13
	Sealing Operations	B-14
Rigid Pavement	Portland Cement Crack and Joint Sealing	B-15
	Mudjacking and Drilling	B-16
	Concrete Slab and Spall Repair	B-17
Slope/ Drains/ Vegetation	Shoulder Grading	B-19
	Nonlandscaped Chemical Vegetation Control	B-21
	Nonlandscaped Mechanical Vegetation Control/Mowing	B-23
	Nonlandscaped Tree and Shrub Pruning, Removal	B-24
	Fence Repair	B-25
	Drainage Ditch and Channel Maintenance	B-26
	Drain and Culvert Maintenance	B-28
	Curb and Sidewalk Repair	B-30
Litter/ Debris/ Graffiti	Sweeping Operations	B-32
	Litter and Debris Removal	B-33
	Emergency Response and Cleanup Practices	B-34
	Graffiti Removal	B-36
Landscaping	Chemical Vegetation Control	B-37
	Manual Vegetation Control	B-39
	Landscaped Mechanical Vegetation Control/ Mowing	B-40
	Landscaped Tree and Shrub Pruning, Removal	B-41
	Irrigation Line Repairs	B-42
	Irrigation (Watering), Potable and Nonpotable	B-43
Environmental	Storm Drain Stenciling	B-44
	Roadside Slope Inspection	B-45
	Roadside Stabilization	B-46
	Stormwater Treatment Devices	B-48
	Traction Sand Trap Devices	B-49
Public Facilities	Public Facilities	B-50
Bridges	Welding and Grinding	B-52
	Sandblasting, Wet Blast with Sand Injection, Hydroblasting	B-54
	Painting	B-56
	Bridge Repairs	B-57
Other Structures	Pump Station Cleaning	B-59
	Tube and Tunnel Maintenance and Repair	B-61
	Tow Truck Operations	B-63
	Toll Booth Lane Scrubbing Operations	B-64
Electrical &	Sawcutting for Loop Installation	B-65
Traffic Guidance	Thermoplastic Striping and Marking	B-67
	Paint Striping and Marking	B-68
	Raised/ Recessed Pavement Marker Application/Removal	B-70

	Sign Repair and Maintenance	B-71
	Median Barrier and Guard Rail Repair	B-73
	Emergency Vehicle Energy Attenuation Repair	B-75
Storm Maintenance	Minor Slides and Slipouts Cleanup/ Repair	B-78
Management and Support	Building and Grounds Maintenance	B-80
	Storage of Hazardous Materials (Working Stock)	B-82
	Material Storage Control (Hazardous Waste)	B-84
	Outdoor Storage of Raw Materials	B-85
	Vehicle and Equipment Fueling	B-86
	Vehicle and Equipment Cleaning	B-87
	Vehicle and Equipment Maintenance and Repair	B-88
	Aboveground and Underground Tank Leak and Spill Control	B-90

5. Vehicle and Equipment Wash Areas

Permit §VI.D.9.f (LA)/§VII.L.6 (LB)

This section corresponds to Maintenance Activity Family Management and Support and corresponding Caltrans Activity Cut Sheet B-87.

Vehicle and equipment cleaning at a municipal facility may introduce a number of potential pollutants into the storm drain system. Municipal maintenance and field staff are responsible for implementing and maintaining the activity specific BMPs listed in Table PA-1 for all fixed vehicle and equipment washing; including fire fighting and emergency response vehicles. In addition, maintenance and field staff are responsible for preventing discharges of wash water from entering the storm drain system. Table PA-2 shows the potential pollutants associated with vehicle and equipment cleaning.

Table PA-2: Potential Pollutants Generated from Cleaning Activities

Activity	**Potential Pollutants**					
Vehicle and Equipment Cleaning	Sediment	Nutrients	Trash	Metals	Oil & Grease	Organics

Discharges of wash waters to the storm drain system are prevented by implementing the following measures at existing facilities with vehicle or equipment wash areas:

- Wash water is self-contained and hauled away for proper disposal offsite.
- Wash areas are equipped with a clarifier, or an alternative pre-treatment device, and water is plumbed to the sanitary sewer in accordance with applicable waste water provider regulations.
- Wastewater from all new vehicle and equipment wash facilities, or redeveloped or replaced existing facilities is prevented from discharging to the MS4 by equipping the facility with a clarifier, or an alternative pre-treatment device, and plumbing water to the sanitary sewer in accordance with applicable waste water provider regulations, or by self-containing all water water/wash water and hauling to a point of legal disposal.

6. Landscape, Park, and Recreational Facilities Management

Permit §VI.D.9.g (LA)/ §VII.L.7 (LB)

This section corresponds to multiple Activity Cut Sheets within the Slope/Drains/Vegetation, Landscape, Environmental, and Management and Support Families.

Maintenance practices at parks and recreational facilities generally include fertilizer and pesticide applications, vegetation maintenance and disposal, irrigation, swimming pool chemical maintenance and draining, and trash and debris management. All of these maintenance practices have the potential to contribute pollutants to the storm drain system. Municipal maintenance and field staff are responsible for implementing and maintaining the activity specific BMPs listed in Table PA-1for all public right-of-

ways, flood control facilities and open channels, lakes and reservoirs, and landscape, park, and recreational facilities and activites. Table PA-3 shows the potential pollutants associated with recreational facilities..

Table PA-3: Potential Pollutants Generated from Recreational Facilities

Activity	Potential Pollutants				
Vehicle and Equipment Cleaning	Sediment	Nutrients	Trash	Bacteria	Pesticides

6.1 Model Integrated Pest Management Program

Permit §VI.D.9.g.ii & VI.D.9.g.iii (LA)/§VII.L.7.ii & VII.L.7.iii (LB)

An IPM policy is in place to minimize pesticide and fertilizer use, and encourage the use of IPM techniques for Public Agency facilities and activities. The attached IPM Program template (Attachment PA-C), adapted from the Orange County Drainage Area Management Plan (DAMP) IPM Policy developed by the University of California, Division of Agriculture and Natural Resources, provides an example of an effective IPM program. This IPM Program template is based on regulations, management guidelines, and research-based recommendations established by federal, state and local agencies and universities with particular expertise in pest management.

As part of the IPM policy, a commitment and schedule to reduce the use of pesticides that cause impairment t of surface waters is implemented through the following procedures:

- An inventory of all pesticides used by municipal departments, divisions, and operational units is prepared and updated annually.
- Pesticides used by staff and hired contractors are quantified.
- The use of IPM alternatives is demonstrated, where feasible, to reduce pesticide use.

Municipal maintenance and field staff applying pesticides are certified in the appropriate category by the California Department of Pesticide Regulation, or are under the direct supervision of a pesticide applicator certified in the appropriate category.

7. Storm Drain Operation and Maintenance

Permit §VI.D.9.h (LA)/ §VII.L.8 (LB)

This section corresponds to the Litter/Debris/Graffiti Family: Litter and Debris Removal Cut Sheet, pg. B-33, and the Environmental Family: Storm Drain Stenciling Cut Sheet, pg. B-44

The storm drain system functions primarily to collect and convey surface runoff to receiving waters during storms in order to prevent flooding. It is a common municipal activity to maintain the storm drain system so that it functions hydraulically as intended during storms. Municipal maintenance and field staff are responsible for implementing and maintaining the activity specific BMPs listed in Table PA-1 for storm drain operation and maintenance, and ensuring that all material removed from the MS4 does not reenter the system by dewatering solid material in a contained area and disposing of liquid material in accordance with any of the following measures:

- Self-containing and hauling off for legal disposal; or
- Applying to the land without runoff; or
- Equipping with a clarifier or alternative pre-treatment device and plumbing to the sanitary sewer in accordance with applicable waste water provider regulations.

Table PA-4 shows potential pollutants generated during storm drain operation and maintenance.

Table PA-4: Potential Pollutants Generated from Storm Drain Operation and Maintenance

Activity	Potential Pollutants								
	Sediment	Nutrients	Trash	Metals	Bacteria	Oil & Grease	Organics	Pesticides	Oxygen Demanding Substances
Inspection and Cleaning of Conveyance Structures	×	×	×		×		×		×
Controlling Illicit Connections and Discharges	×	×	×	×	×	×	×	×	×
Controlling Illegal Dumping	×	×	×	×	×	×	×	×	×
Maintenance of Inlet and Outlet Structures	×		×		×	×			

7.1 Catch Basin Cleaning

Permit §VI.D.9.h.iii (LA)/ §VII.L.8.iii (LB)

There is no preferred method for cleaning catch basins as long as the method used is successful in removing accumulated sediment and debris. The methods used are determined in the field with the goal of minimizing the amount of escaped material, and preventing this material from entering the storm drain system. A template catch basin cleaning log is provided in Attachment PA-D.

7.1.1 Catch Basins Cleaning in Areas not Subject to a Trash TMDL

In areas that are not subject to a trash TMDL, catch basin inlets are prioritized based on the amount of trash generated, and inspected according to the schedule in Table PA-5.

Table PA-5: Inspection Frequencies for Catch Basin Inlets

Trash Generating Frequency	Priority	Inspection Frequency
Consistently generates the highest volumes of trash and/or debris	A	A minimum of three times during the wet season (October-April) and once during the dry season every year
Consistently generates moderate volumes of trash and/or debris	B	A minimum of once during the wet season and once during the dry season every year
Generates low volumes of trash and/or debris	C	A minimum of once per year

An inventory of catch basins is maintained and updated regularly. This inventory includes the following components:

- GPS coordinates of each catch basin
- Priorities for inspection
- Rationale or data to support catch basin priority designations
- Inspection and cleaning records

Catch basins are cleaned as necessary based on the inspections conducted. At a minimum, catch basins determined to be at least 25% full of trash are cleaned out.

7.1.2 Catch Basin Cleaning in Areas Subject to a Trash TMDL

In areas subject to a Trash TMDL, all applicable provisions of LA MS4 Permit Section VI.E (LB Part Part VIII) in conformance with the appropriate TMDL implementation schedule, are implemented. This includes an effective combination of full capture, partial capture, institutional controls, or minimum frequency of assessment and collection as described in LA MS4 Permit Section VI.E (LB Part Part VIII).

7.2 Catch Basin Labels and Open Channel Signage

Permit §VI.D.9.h.vi (LA)/ §VII.L.8.vi (LB)

All municipally owned storm drain inlets are labeled with a "No Dumping, Drains to Ocean" message, and inspected for legibility prior to the wet season (October-April) every year. Catch basins with illegible labels are recorded and re-stenciled or re-labeled within 180 days of inspection. In addition, signs referencing local code(s) that prohibit littering and illegal dumping are posted at designated public access points to open channels, creeks, urban lakes, and other relevant water bodies.

7.3 Trash Management

Permit §VI.D.9.h.iv-v & Permit §VI.D.9.h.vii (LA)/§VII.L.8.iv-v (LB)

The following Trash Management BMPs described below are employed to mitigate the impacts of anthropogenic trash on receiving waters.

7.3.1 Trash Management at Public Events

The following measures are implemented for any event in the public right of way or wherever it is foreseeable that substantial quantities of trash and litter may be generated, including events located in areas that are subject to a trash TMDL:

- Proper management of trash and litter generated; and
- Arrangement for temporary screens to be placed on catch basins; or
- Provide clean out of catch basins, trash receptacles, and grounds in the event area within one business day subsequent to the event.

7.3.2 Trash Receptacles

Covered trash receptacles are located in areas identified as high trash generation areas and maintained and cleaned out as necessary to prevent trash overflow. Examples of areas that may be considered high trash generating areas include:

- High vehicle or pedestrian traffic areas
- Commercial areas
- Industrial areas
- Construction areas
- High density residential areas
- Areas adjacent to vacant lots

7.3.3 Additional Trash Management Practices

In areas that are not subject to a trash TMDL, additional trash management practices will be employed no later than five years after the effective date of the LA MS4 Permit (4 years after the effective date of the LB MS4 Permit). Trash excluders or equivalent devices must be installed on or in catch basins or outfalls to prevent the discharge of trash to the MS4 or receiving waters, unless the installation of such BMP(s) alone will cause flooding (not due to lack of maintenance). Alternatively, additional trash BMPs

that provide substantially equivalent removal of trash may be implemented. Additional BMPs may include, but are not limited to:

- Increased street sweeping
- Adding trash cans near trash generation sites
- Prompt enforcement of trash accumulation
- Increased trash collection on public property
- Increased litter prevention messages or trash nets within the MS4

The BMPs chosen will provide equivalent trash removal performance as excluders, and will be demonstrated though the annual report. When outfall trash capture is provided, revision of the schedule for inspection and cleanout of catch basins will also be reported in the annual report.

The State Water Resources Control Board (State Water Board) is considering the adoption of amendments to the Water Quality Control Plans for Ocean Waters of California and for the Inland Surface Water, Enclosed Bays, and Estuaries of California for Trash (Trash Amendments) citing a strong need for statewide consistency in trash management. The proposed Trash Amendments will include five elements: (1) Water Quality Objective, (2) Prohibition of Discharge, (3) Implementation, (4) Compliance Schedule, and (5) Monitoring, which will outline NPDES Permittee requirements for trash management. The development of the Trash Amendments will continue to be monitored, and any additional required trash management practices in areas not subject to a trash TMDL will be implemented per the guidance provided by these amendments.

7.4 Storm Drain Maintenance

Permit §VI.D.9.h.viii (LA)/ §VII.L.8.viii (LB)

The following BMPs constitute the Storm Drain Maintenance Program:

- Municipally-owned open channels and drainage structures are visually inspected for debris at least annually.
- Trash and debris from is removed from open channel storm drains a minimum of once per year, before the storm season.
- The discharge of contaminants is minimized during MS4 maintenance and clean outs;
- Material removed is properly disposed of by containing and hauling away for legal disposal

7.5 Infiltration from Sanitary Sewer to MS4/Preventive Maintenance

Permit §VI.D.9.h.ix (LA)/§VII.L.8.ix (LB)

Thorough, routine, preventive surveys and maintenance of both municipally owned and operated Storm Drain Systems as well as Sanitary Sewer Systems infiltration and seepage of contaminants from the sanitary sewer system into the storm drain system is prevented. Sanitary Sewer System routine preventative maintenance is described in the Sewer System Management Plan (SSMP), which is a component of the Statewide General Waste Discharge Requirements (WDR) for Sanitary Sewer Systems.

Where necessary, controls implemented to limit infiltration of seepage from sanitary sewers to the MS4 include:

- Adequate plan checking for construction and new development;
- Incident response training for its municipal employees that identify sanitary sewer spills;
- Code enforcement inspections;
- MS4 maintenance and inspections;
- Interagency coordination with sewer agencies; and

- Proper education of its municipal staff and contractors conducting field operations on the MS4 or its municipal sanitary sewer (if applicable).

7.6 Permittee Owned Treatment Control BMPs *Permit §VI.D.9.h.x (LA)/§VII.L.8.x (LB)*

All municipally owned treatment control BMPs, including post-construction BMPs, are regularly inspected and maintained to ensure their proper operation.
Any residual water generated during BMP maintenance is disposed of using one of the following procedures:

- Hauled away and legally disposed of; or
- Applied to the land without runoff; or
- Discharged to the sanitary sewer system; or
- Treated or filtered to remove bacteria, sediments, nutrients, and meet the limitations set in Table PA-6 below prior to discharge to the storm drain system.

Table PA-6: Discharge Limitations for Dewatering Treatment BMPs

Parameter	Units	Limitation
Total Suspended Solids	Mg/L	100
Turbidity	NTU	50
Oil and Grease	Mg/L	10

8. Streets, Roads, and Parking Facilities Maintenance

Permit §VI.D.9.i(LA)/§VII.L.9 (LB)

This section corresponds to multiple Activity Cut Sheets within the Flexible Pavement, Rigid Pavement, Litter/Debris/Graffiti, Traffic Guidance, and Management and Support Families.

Streets and roads may collect litter and debris from nearby activities, as well as from vehicular traffic. They also require routine maintenance that may generate waste materials. Table PA-7 shows potential pollutants generated from street, road, and parking facilities maintenance.

Table PA-7: Potential Pollutants Generated from Street, Road, and Parking Facility Maintenance

Activity	Potential Pollutants						
	Sediment	Trash	Metals	Bacteria	Oil & Grease	Organics	Oxygen Demanding Substances
Street and Road Maintenance	×	×	×		×	×	
Parking Facility Maintenance	×	×	×	×	×	×	×

8.1 Street Sweeping *Permit §VI.D.9.i.i-ii(LA)/§VII.L.9.i-ii (LB)*

Streets and/or street segments are swept according to the following designations:

- Priority A: Streets and/or street segments that are designated as consistently generating the highest volumes of trash and/or debris should be swept at least two times per month.
- Priority B: Streets and/or street segments that are designated as consistently generating moderate volumes of trash and/or debris should be swept at least once per month.
- Priority C: Streets and/or street segments that are designated as generating low volumes of trash and/or debris shall be swept as necessary but in no case less than once per year.

8.2 Road Reconstruction *Permit §VI.D.9.iii (LA)/§VII.L.9.iii (LB)*

Projects that include roadbed or street paving, repaving, patching, digouts, or resurfacing roadbed surfaces implement the following BMPS:

- Restricting paving and repaving activities to exclude periods of rainfall or predicted rainfall unless required by emergency conditions.
- Installing sand bags or gravel bags and filter fabric at all susceptible storm drain inlets and at manholes to prevent spills of paving products and tack coat;
- Preventing the discharge of release agents including soybean oil, other oils, or diesel into the MS4 or receiving waters.
- Preventing non-stormwater runoff from water use for the roller and for evaporative cooling of the asphalt.
- Cleaning equipment over absorbent pads, drip pans, plastic sheeting or other material to capture all spillage and dispose of properly.
- Collecting liquid waste in a container, with a secure lid, for transport to a maintenance facility to be reused, recycled or disposed of properly.
- Collecting solid waste by vacuuming or sweeping and securing in an appropriate container for transport to a maintenance facility to be reused, recycled or disposed of properly.
- Covering the “cold-mix” asphalt (i.e., pre-mixed aggregate and asphalt binder) with protective sheeting during a rainstorm.
- Covering loads with tarp before haul-off to a storage site, and not overloading trucks.
- Minimizing airborne dust by using water spray during grinding.
- Avoiding the stockpiling of soil, sand, sediment, asphalt material and asphalt grindings materials or rubble in or near MS4 or receiving waters.
- Protecting stockpiles with a cover or sediment barriers during a rain.

8.3 Parking Facilities Maintenance *Permit §VI.D.9.iv (LA)/ §VII.L.9.iv (LB)*

Municipally owned parking lots that are uncovered and exposed to stormwater are kept clear of debris and excessive oil buildup by inspecting lots at least 2 times per month and cleaning at least once per month.

9. Emergency Procedures *Permit §VI.D.9.j (LA)/ §VII.L.10 (LB)*

Participating Agencies may conduct repairs of essential public service systems and infrastructure in emergency situations with a self-waiver of the provisions of the MS4 Permit as follows:

- Cities will abide by all other regulatory requirements, including notification to other agencies as appropriate.
- Where the self-waiver has been invoked, Cities will submit to the Regional Water Board Executive Officer a statement of the occurrence of the emergency, an explanation of the

circumstances, and the measures that were implemented to reduce the threat to water quality, no later than 30 business days after the situation of emergency has passed.

Minor repairs of essential public service systems and infrastructure in emergency situations (that can be completed in less than one week) are not subject to the notification provisions. Appropriate BMPs to reduce the threat to water quality will be implemented.

10. Municipal Employee and Contractor Training *Permit §VI.D.9.k (LA)/Permit §VII.L.11 (LB)*

An annual training program on the requirements of the overall stormwater management program is implemented for all municipal field staff whose interactions, jobs, and activities affect stormwater quality prior to June 30 every year. The Cities also ensure that contractors performing privatized/contracted municipal services have appropriate training in the stormwater management program. The goals of the annual training are to:

- Promote a clear understanding of the potential for municipal activities to pollute stormwater
- Identify opportunities to require, implement, and maintain appropriate BMPs in their line of work

In addition to the annual stormwater program training, the Cities implement an annual training program to train all of their employees and contractors who use or have the potential to use pesticides or fertilizers (whether or not they normally apply these as part of their work). Training programs address:

- The potential for pesticide-related surface water toxicity
- Proper use, handling, and disposal of pesticides
- Least toxic methods of pest prevention and control, including IPM
- Reduction of pesticide use

Outside contractors can self-certify, providing they certify they have received all applicable training required in the MS4 Permit and have documentation to that effect.

Illicit Connections & Illicit Discharges Elimination Program

Each participating city is required to develop and implement an Illicit Connections & Illicit Discharge Elimination (IC/ID) Program that includes the requirements listed in Permit §VI.D.10.a (LB §VII.M). This document provides guidance to assist the Cities in implementing an IC/ID program in compliance with the Permit.

Introduction *Permit §VI.D.10.a (LA)/§VII.M.1 (LB)*

Illicit connections and illicit discharges (IC/IDs) as defined in Table ICID-1 are potential significant sources of pollutants into and from the MS4. The Illicit Connection and Illicit Discharge (IC/ID) Program provides a comprehensive process for detecting, investigating and eliminating IC/IDs in an efficient and timely manner. The program consists of the following components:

- Procedures for conducting source investigations for IC/IDs
- Procedures for eliminating the source of IC/IDs
- Procedures for public reporting of illicit discharges
- Spill response plan and
- IC/ID education and training for City staff.

The purpose of this program is to effectively prohibit illicit discharges into the MS4.

Table ICID-1: IC/IDs Defined

Prohibition	Definition	Examples
Illicit Connections	Any man-made conveyance that is connected to the MS4 without a permit, excluding roof drains and other similar type connections.	Unpermitted channels, pipelines, conduits, inlets or outlets that are connected directly to the MS4.
Illicit Discharges	Any discharge into the MS4 or from the MS4 into a receiving water that is prohibited under local, state, or federal statutes, ordinances, codes or regulations. This includes any non-stormwater discharge, except those authorized in MS4 Permit §III.A.10.2.	Sanitary wastewater, Vehicle wash water, wash-down from grease traps, motor oil, antifreeze and fuel spills into or from the MS4.

Legal Authority

Adequate Legal Authority is required to prohibit IC/IDs to the MS4 and enable enforcement capabilities to eliminate the sources of IC/IDs.

Illicit Discharge Source Investigation and Elimination *Permit §VI.D.10.b (LA)/ §VII.M.2 (LB)*

The purpose of the IC/ID Program is accomplished in part by developing clear, step-by-step written procedures for conducting investigations of illicit discharges.

Investigation

Standardized procedures for conducting investigations to identify the source of all suspected illicit discharges are included in as an attachment (Illicit Discharge Investigation and Elimination Guidance). Procedures include the following:

- **Initiation** – Investigate the source of all observed discharges. After becoming aware of an illicit discharge, conduct an investigation to identify and locate the source within 72 hours.
- **Prioritization** – Investigate illicit discharges suspected of being sanitary sewage and/or significantly contaminated first.
- **Tracking** – Track all investigations and document the information listed in Table ICID-2.

Table ICID-2: Recorded Information for Illicit Discharge Investigations

Item	Information
1	Date(s) the illicit discharge was observed
2	Results of the investigation
3	Follow-up of the investigation
4	Date the investigation was closed

Elimination

Standardized procedures to eliminate illicit discharges once the sources are located are included as an attachment. Procedures include the following:

- **Notification** – Immediately notify the responsible party (RP)/parties of the problem and require the responsible party to initiate all necessary corrective actions to eliminate the illicit discharge.
    - If it is determined that an illicit discharge originates within an upstream jurisdiction, notify the upstream jurisdiction and the Regional Board. The Notification is conducted within 30 days of determination and information is collected regarding combined efforts to identify the source.
- **Spill response** – The Spill Response Plan is implemented when the source for illicit discharges cannot be traced to a suspected RP. Permanent solutions to such discharges are described in the following section (Flow Diversion).
- **Follow-up** – Conduct and document follow-up investigations upon notification that an illicit discharge has been eliminated to verify that it has been satisfactorily eliminated and cleaned-up.
- **Enforcement** – Enforcement procedures are included in the Progressive Enforcement Policy. The Progressive Enforcement Policy includes a list of enforcement actions.

Progressive Enforcement Policy

The Progressive Enforcement Policy is implemented to ensure that illicit discharges/ illicit connections are eliminated within a reasonable time period. The procedures are followed when the source of the nature of the discharges is known. Procedures typically include:

- Written warnings for minor violations
- Formal notice of violation with specific actions and time frames for compliance
- Compensation from the RP for any costs related to remediation, inspection, investigation, clean-up and oversight activities
- Cease and desist orders

- Civil penalties (infractions), or referral for criminal penalties or further legal action.

Flow Diversion

In the event that an ongoing illicit discharge cannot be eliminated (following the full execution of legal authority and in accordance with the Progressive Enforcement Policy) or the RPs cannot be identified, the discharge is either treated or diverted to the sanitary sewer. In either instance, the Regional Board is notified within 30 days of such determination. Notification includes the following information:

- Written plan that describes the efforts that have been undertaken to eliminate the discharge.
- Description of actions to be undertaken.
- Anticipated cost and
- Schedule for completion.

Identification and Response to Illicit Connections *Permit §VI.D.10.c (LA)/§VII.M.3 (LB)*

Illicit connections can be concentrated sources of pollutants either through direct discharge or infiltration of sewage or other prohibited discharges into the MS4. To reduce this source of pollutants, the following program is implemented for the identification of illicit connections. Key components of this program include investigating and responding in order to actively prevent and eliminate illicit connections.

Investigation

Standardized procedures for identifying illicit connections are included as an attachment (Illicit Connection Investigation Guidance). Procedures include the following:

- **Initiation** – Investigate within 21 days from the discovery or upon receiving a report of a suspected illicit connection. The elements of the investigation are listed in Table ICID-3.
- **Tracking** – Track all investigations and document the information listed in Table ICID-3.

Response

If the source investigation concludes that a connection to the MS4 is both 1) permitted or documented and 2) discharging only stormwater or nonstormwater allowed under WMP NSWD SECTION or other individual or general NPDES Permits/WDRs, then the investigation is closed and no further action is taken. Upon confirmation of a connection to the MS4 is illicit, one of two options is taken:

1. **Permit or document the connection.** The permitted or documented connection may only discharge stormwater and nonstormwater allowed under WMP NSWD SECTION or other individual or general NPDES Permits/WDRs. Retaining a record of the connection and its investigation qualifies as documentation.
2. **Eliminate the connection.** The connection is eliminated within 180 days of completion of the investigation, using formal enforcement authority if necessary.

Table ICID-3: Recorded Information for Illicit Connection Investigations

Item	Information
1	Any relevant illicit discharge information from Table ICID-2
2	Source of the connection
3	Nature and volume of the discharge through the connection
4	RP for the connection (if identified)
5	Response including any formal enforcement taken

Public Reporting of Non-Stormwater Discharges and Spills *Permit §VI.D.10.d (LA)/§VII.M.4 (LB)*

Central Point of Contact

Public reporting of illicit discharges or water quality impacts associated with discharges into or from MS4s through a central contact point are promoted, publicized, and facilitated. This includes phone numbers and an internet site for complaints and spill reporting. The reporting hotline is provided to staff to leverage the field staff that has direct contact with the MS4 in detecting and eliminating illicit discharges.

The LACFCD, in collaboration with the County, provides the central point of contact and through the 888-CLEAN-LA reporting hotline and internet site.

Open Channels

Signage is posted adjacent to open channels (see MS4 Permit IV.D.9.h.vi.(4)). The signage includes information regarding dumping prohibitions and public reporting of illicit discharges.

Complaints

Written procedures are maintained that document how complaint calls are received, and tracked to ensure that all complaints are adequately addressed in the attached form (Record Keeping & Documentation). Following the adaptive management process outlined in the MS4 Permit, the procedures are periodically evaluated to determine whether changes or updates are needed to ensure that the procedures accurately document the employed methods. After the evaluation, any identified changes will be made to the procedures.

Documentation is maintained for all complaint calls. This includes recording the location of the reported spill or IC/ ID and the actions undertaken in response the complaint, including referrals to other agencies.

Spill Response Plan *Permit §VI.D.10.e (LA)/§VII.M.5 (LB)*

A spill response plan (Attachment ICID-E) is implemented for all sewage and other spills that may discharge into its MS4. The spill response plan identifies agencies responsible for spill response and cleanup, telephone numbers and e-mail address for contacts, and contains the following:

- **Agency Coordination** – Coordinate with spill response teams throughout all appropriate departments, programs and agencies so that maximum water quality protection is provided.
- **Spill Response** – Respond to spills for containment within 4 hours of becoming aware of the

spill, except where such spills occur on private property, in which case respond within 2 hours of gaining legal access to the property. Initiate investigation of all public and employee spill complaints within one business day of receiving the complaint to assess validity.

- **Reporting** – Spills that may endanger health or the environment are reported to appropriate public health agencies and the California Emergency Management Agency (Cal EMA).

Illicit Connection and Illicit Discharge Education and Training *Permit §VI.D.10.f (LA)/§VII.M.6 (LB)*

A training program regarding the identification of IC/IDs is implemented for all municipal field staff, who, as part of their normal job responsibilities (e.g., street sweeping, storm drain maintenance, collection system maintenance, road maintenance), may come into contact with or otherwise observe an illicit discharge or illicit connection to the MS4. Contact information, including the procedure for reporting an illicit discharge, is readily available to field staff.

Applicable Staff

Table ICID-4 is a list of field programs where program staff may come into contact with or otherwise observe an illicit discharge or illicit connection to the MS4. Appropriate field staff, supervising staff and contractors involved in these programs require training in IC/ID identification and reporting following the schedule provided in Table ICID-5.

Contracted Staff

Contractors that provide these municipal services may attend city training or certify to the participating city and retain documentation that staff has received applicable training. Otherwise this provision is accomplished through a contractual requirement for contracted staff to receive the training.

Table ICID-4: Municipal Field Programs

Main Field Program Types	Sub-Category Types/Activities
Lake Management	Fertilizer & Pesticide Management
	Mowing, Trimming/Weeding, Planting
	Managing Landscape Waste
	Controlling Litter
	Erosion Control
	Controlling Illegal Dumping
	Bacteria Control
	Monitoring
Landscape Maintenance	Mowing, Trimming/Weeding, Planting
	Irrigation
	Fertilizer & Pesticide
	Managing Landscape Waste
	Erosion Control
Roads, Streets, and Highways Operations and Maintenance	Sweeping & Cleaning
	Street Repair & Maintenance
	Bridge & Structure Maintenance
Fountains, Plazas, and Sidewalk Maintenance and Cleaning	Surface Cleaning
	Graffiti Cleaning
	Sidewalk Repair
	Controlling Litter
	Fountain Maintenance
Solid Waste Handling	Solid Waste Collection
	Waste Reduction & Recycling
	Hazardous Waste Collection
	Litter Control
Water and Sewer Utility O&M	Water Line Maintenance
	Sanitary Sewer Maintenance
	Spill/Leak/Overflow Control
Fire Department Activities	Emergency/Post-Emergency Fire Fighting Activities
	Fire Fighting Training
	Fire Station Activities

Training Schedule

The training schedule for all applicable staff is listed in Table ICID-5.

Table ICID-5: IC/ID Program Training Schedule

Category	Schedule
Current Staff	Twice during the term of the MS4 Permit
New Staff	Within 180 days of starting employment

Training Elements

The IC/ID elements addressed by the training program are listed in Table ICID-6.

Table ICID-6: Minimum IC/ID Training Program Elements

Item	Information
1	IC/ID identification, including definitions and examples
2	Investigation
3	Elimination
4	Clean-up
5	Reporting
6	Documentation

Documentation

Documentation of training program activities and training modules are retained and made available for review by the Regional Board.

PROGRESSIVE ENFORCEMENT POLICY

2014 Stormwater Enforcement Guide

Insert City Seal

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PROGRESSIVE ENFORCEMENT POLICY

STORMWATER ENFORCEMENT GUIDE

INTRODUCTION

This Stormwater Progressive Enforcement Policy (PEP) provides procedures to enforce provisions of the Waste Discharge Requirements for Municipal Separate Storm Sewer System (MS4) Discharges within the Coastal Watersheds of Los Angeles County, except those Discharges Originating from the City of Long Beach MS4 Order No. R4-2012-0175. Pursuant to Section VI.D.2.a of the Order, Permittees are required to develop and implement a PEP to ensure that (1) regulated Industrial/ Commercial facilities, (2) construction sites, (3) development and redevelopment sites with post-construction controls, and (4) illicit discharges are each brought into compliance with all storm water and non-storm water requirements. The PEP provides the City with a guidance for enforcing the MS4 Permit Provisions and identifies enforcement procedures designed to encourage a timely response.

PROGRESSIVE ENFORCEMENT

Progressive enforcement is an escalating series of actions that allows for the efficient and effective use of enforcement. In some situations, an informal response (written warning/inspection report) is sufficient to inform the responsible party that there is a deficiency and to require the responsible party to return to compliance. If violations continue, the enforcement response should be quickly escalated to increasingly more formal and serious actions until compliance is achieved. Progressive enforcement is not appropriate in all circumstances. For example, where there is a situation needing immediate response, immediate issuance of a cleanup and abatement order may be appropriate.

COMPLIANCE CRITERIA

The City conducts on-site compliance inspections and conducts investigations, in response to complaints, under their authority provided in their municipal code and ordinances to verify compliance. Typical noncompliance issues related to stormwater may include:

- Prohibited discharges to the storm drain system.
- Site's existing condition is likely to result in exposure of pollutants to stormwater contact and possible pollutant discharge to the storm drain system such as:
    - Poor housekeeping activities that results in pollutant exposure.
    - Unattended spills and leaks.
    - Uncovered or improperly stored wastes, materials, or other items of concern.
    - Open waste receptacles such as tallow bins, compactors, and trash bins.
    - Leaky or contaminated equipment stored or used outdoors.
    - Track-out of dirt and sediment or other materials to street or outdoor areas.
- Illicit connections to the storm drain system.
- Best Management Practices (BMPs) are not in place to address pollutant generating activities, which may include erosion and sediment controls and post construction controls.

Complaint Response

The City may receive complaints regarding stormwater ordinance from their staff members, public, local agencies, or the Regional Water Board. The City initiates, within one business day,[1] investigation of complaints from facilities within its jurisdiction. The initial investigation includes, at minimum, a limited inspection of the facility to confirm validity of the complaint and to determine if the facility is in compliance with municipal storm water ordinance and, if necessary, to oversee corrective action. Emergency complaints are investigated immediately.

PROGRESSIVE ENFORCEMENT GUIDELINES

Informal Enforcement

The City implements professional judgment regarding the circumstances surrounding an enforcement action and chooses to resolve routine noncompliance quickly and efficiently through informal means that are not accompanied by sanctions (e.g., civil charges or penalties). When deemed appropriate, the City employs the procedures described below to correct noncompliance informally.

Written Warning/ Inspection Report

Under circumstances where an inspection reveals routine noncompliance that can be corrected within a reasonably short time, staff may choose to issue a written warning/inspection report that describes the minor deficiencies/violations and includes a schedule for correcting the noncompliance[2]. The purpose of the written warning is to give the responsible party an opportunity to comply voluntarily and thus avoid sanctions that might be imposed by an escalated enforcement response.

For residential zones, the City employs an informal enforcement process and escalates to formal enforcement actions for those residents that do not comply with stormwater regulations.

Formal Enforcement / Administrative Enforcement

In the event that the City determines, based on an inspection or illicit discharge investigation conducted, that a responsible party has failed to adequately comply with the informal enforcement process within the required timeframe, the City may initiate administrative enforcement actions or will implement enforcement actions as established through authority in its municipal code. The City's goal is to achieve compliance through an extensive inspection program, educational outreach efforts and, if necessary, the initiation of appropriate enforcement action(s). The goal of any enforcement action is to: (1) return the facility to compliance in a timely manner; (2) eliminate economic benefit realized by the noncompliant facility; and (3) punish violators and prevent future noncompliance.

Notice of Violations

Under circumstances where the responsible party has failed to comply with the informal enforcement process or where the violations are significant, the City may choose to issue a Notice of Violation (NOV). The purpose of an NOV is to inform the responsible party of the observed violations, the applicable stormwater municipal codes that the responsible party has failed to comply with and the

[1] The City may comply with the Permit by taking initial steps (such as logging, prioritizing, and tasking) to "initiate" the ingestigation within that one business day. However, the Regional Water Board would expect that the initial investigation, including a site visit, to occur within four business days (per MS4 Order No.R4-2012-0175 Section VI.D.2.b)
[2] The City may choose to issue/write inspection report on site or provide to the responsible party at a later time.

potential consequences of failing to correct the violations. The NOV also gives the responsible party an opportunity to correct the violations described in the NOV within a specified time. Under circumstances where the responsible party fails to adequately respond to the NOV by failing to address or correct the violations noted in the NOV, the severity of the enforcement response will continue to escalate as described below.

Failure to Return to Compliance/ Second Notice of Violation

The City's municipal code stormwater ordinance authorizes assessment of administrative penalties which can be carried out by issuing a Failure to Return to Compliance Notice or second NOV . The second NOV is a stronger enforcement option which may be used in circumstances where the responsible party has failed to comply with the requirements as indicated on the first NOV.

Cease and Desist Order

In the event the City's municipal code stormwater ordinance authorizes a Cease and Desist Order (CDO), the City may issue a CDO, as an alternative to the second NOV, when immediate action by the responsible party is necessary to eliminate a continuing or threatened serious violation of the stormwater ordinance.

Misdemeanors

The City's may escalate enforcement when evidence of noncompliance indicates that the violator of the stormwater ordinance has acted intentionally with intent to cause, allow to continue or conceal a discharge in violation of the ordinance.

Issuance of Citation/Infractions

At the discretion of the City's, and as established through authority in its municipal code, the City may issue citations and/or infractions.

Cost Recovery

In the event that a complaint response or violation requires clean-up and or extensive investigation, the City has the authority, as established in the municipal code, to require the responsible party to reimburse the city or County for all costs incurred by the related violation. Cost recovery fees that may be collected include, but are not limited to, investigation, enforcement, compliance assistance, damage, control, and clean-up.

Abatement

When a responsible party fails to cease or control a nuisance condition that results in or is likely to result in further or continuing violations, the City's may request abatement of conditions on private property if necessary, or in the event of imminent danger to public safely or the environment, the City itself may abate the nuisance condition.

Permit Revocation

Sites violating the stormwater permit may be subject to permit revocation procedures as authorized in the City's municipal code.

City's/District Attorney

Severe or continuing violations should be referred to the City's or District Attorney for consideration of criminal charges.

TIMEFRAMES FOR CORRECTING DEFICIENCIES/VIOLATIONS

Depending upon the nature of the deficiencies/violations observed, City's may specify compliance deadlines for the responsible party in the inspection report or NOV.

- Prohibited discharges: discharges are to be stopped immediately and up to two weeks. The City may require the responsible party to provide a written description of correction, long-term compliance plan.
- Illicit connection: discharge via the illicit connection are to be stopped immediately and up to two weeks. The City may require the responsible party to provide proof that connection was permanently terminated. Re-inspection typically is required.
- Pollutant exposure/prohibited conditions violations: Up to two weeks to correct violations. The City may require the responsible party to provide proof of compliance for the observed violations.

EXTENSIONS OF COMPLIANCE DEADLINES

There are instances when a responsible party is not able to comply with requirements within the time frame specified. The City may grant a reasonable extension to the responsible party if the City determines that an extension is warranted, as follows:

- A request for extension must be received in writing (mail, e-mail, fax, hand delivered, etc.) by the City no later than the last day of the initial specified compliance deadline date.
- The extension request must explain why the extension is needed and warranted, as well as include a summary of actions taken to date by the responsible party to comply with requirements of the NOV.
- No more time is provided than should reasonably be needed for the responsible party to competently correct the noted deficiencies/violations. The City grants shorter extensions during the wet season.

Appropriate reasons to grant an extension may include, but are not limited to:

- Confirmed delays due to contractor or other service provider outside of responsible party's control.
- Extensive corrections involving work that would conceivably take longer than the time frame provided.
- In general, extensions should not be granted to allow the continuation of unauthorized non-storwater discharges.

The City may require an action plan or statement to be submitted by the responsible party within the initial compliance time frame, as a condition of granting an extension. The action plan or statement should specify the corrections that are to be made and specify an anticipated time frame for completion. The action plan or statement should be signed and dated by the responsible party.

REFERRALS TO THE REGIONAL BOARD

The City may refer violations of its municipal storm water ordinance and/or California Water Code section 13260 by industrial and commercial facilities and construction site operators to the Regional Water Board provided that the City has made a good faith effort of applying enforcement procedures to achieve compliance with its own ordinance. At a minimum, the City's good faith effort must be documented with:

- Two follow-up inspections, and
- Two warning letters or notices of violation.

Referral of Violations of the General Industrial/Construction Permits

For those facilities or site operators in violation of municipal stormwater ordinances and subject to the Industrial and/or Construction General Permits (IGP/CGP), the City may escalate referral of such violations to the Regional Water Board (promptly via telephone or electronically) after one inspection and one written notice of violation (copied to the Regional Water Board) to the facility or site operator regarding the violation. In making such referrals, the City shall include, at a minimum, the following documentation:[3]

- Name of the facility or site,
- Operator of the facility or site,
- Owner of the facility or site,
- WDID Number (if applicable),
- Records of communication with the facility/site operator regarding the violation, which shall include at least one inspection report,
- The written notice of violation (copied to the Regional Water Board),
- For industrial sites, the industrial activity being conducted at the facility that is subject to the Industrial General Permit, and
- For construction sites, site acreage and Risk Factor rating.

RECORDS RETENTION

City shall maintain records, per their existing record retention policies, and make them available on request to the Regional Water Board, including inspection reports, warning letters, notices of violations, and other enforcement records, demonstrating a good faith effort to bring facilities into compliance.[4]

[3] Pursuant to Order No. R4-2012-0175 Section VI.D.2.a.v
[4] Pursuant to Order No. R4-2012-0175 Section VI.D.2.a.iii

RB-AR9819

Sources

Los Angeles County Stormwater Quality Management Program (2001)

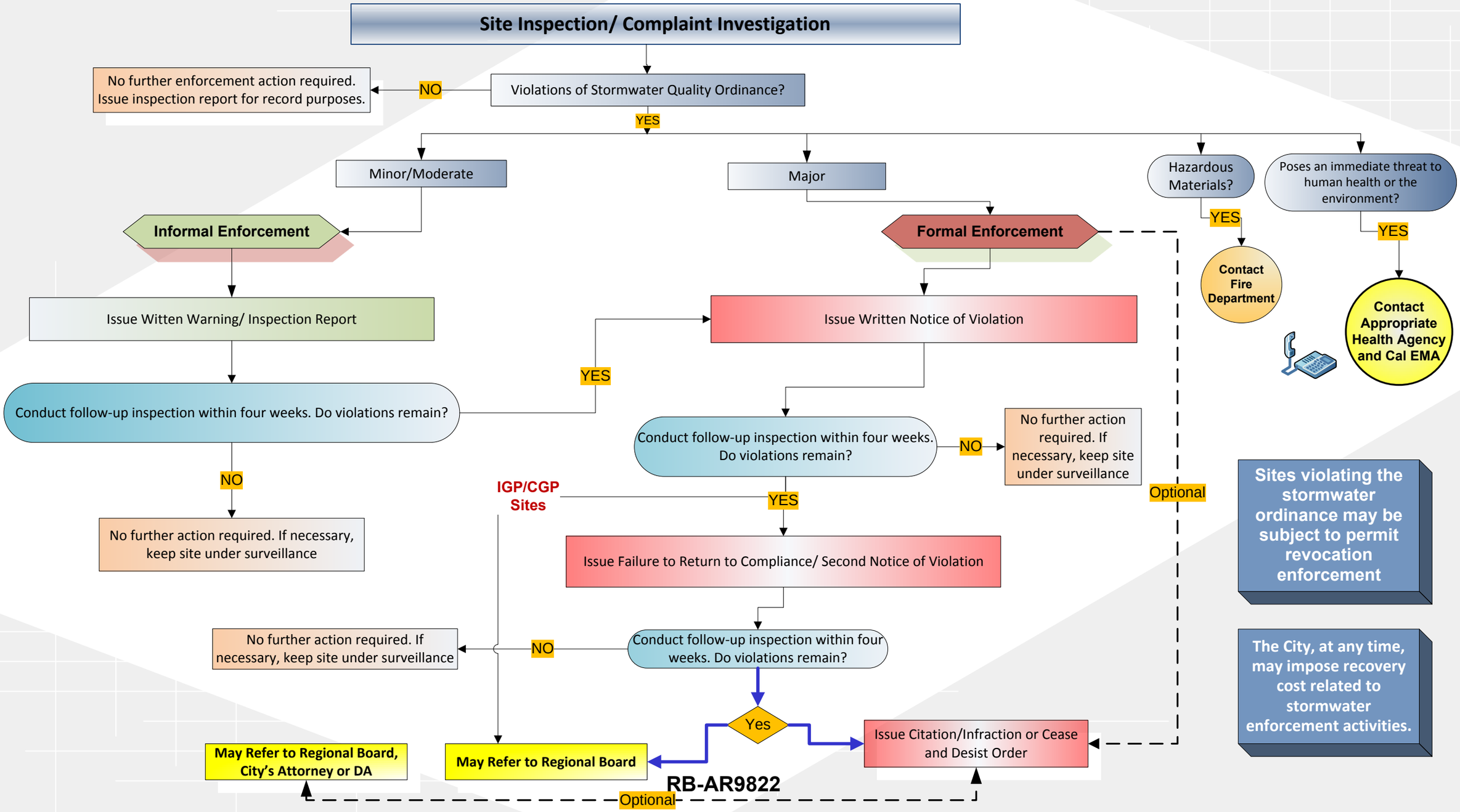
Orange County Municipal Storm Water Drainage Area Management Plan (2003)

Sacramento County Environmental Management Department. Inspection & Enforcement Policy - Commercial/Industrial Stormwater Compliance Program (2012).

Deficiencies/ Violation Degrees

Minor	Moderate	Major
Typically involves conditions that threaten to result in pollutant discharge to the storm system and/or waterways, if not corrected. The immediate threat to human health or the environment is low. **Examples:** **1.** Unattended automotive fluid drips and spills likely to result in moderate discharges to the storm drain system. **2.** Discharge of a moderate amount of car body wet sanding effluent from a single vehicle to outdoor pavement that has not yet impacted the storm drain system. **3.** Unattended spilled restaurant grease on outdoor pavement. Spill appears to be recent, is less than a quart, has not yet impacted the storm drain system and poor housekeeping do not appear to be habitual. **4.** Oily, uncovered engines, or other oily, possibly leaky items stored outside. **5.** Open and missing dumpster and tallow bin lids.	Typically involves less significant pollutant discharges to the storm system and/or receiving waters or conditions that threaten to result in minor to moderate pollutant discharges to the storm system and/or receiving waters. May include small or incidental discharges of hazardous or toxic substances. The violation does not present a major threat to human health and safety, but is likely to result in degradation of receiving water quality. **Examples:** **1.** Discharge of moderate amounts of automotive fluids to storm drain system results from neglected spills and poor housekeeping. **2.** Discharge of moderate amount (less than 20 gallons of diluted effluent) of auto body wet sanding effluent to storm drain system. **3.** More than a quart of spilled restaurant grease on outdoor pavement is neglected, possibly getting tracked out of trash enclosure. Neglect appears to be habitual but so far, impact to storm drain is moderate. **4.** Moderate amount of Oil/fluids leaking from improperly stored engines and parts discharge to storm drain system. **5.** Repeat minor violations may be considered moderate.	Includes significant pollutant discharges to the storm system and/or receiving waters as well as creation of conditions that threaten imminent discharge of significant pollutants to the storm system and/or receiving waters. This also includes, but is not limited to, significant discharges of hazardous or toxic substances. Major violations have the potential to present a major threat to human health or safety and/or the environment. The intent of the violator should be considered: Patterns of willful disregard for safety and the environment, recalcitrance, and repeat violations should contribute to designation of a violation as major, but are not necessary. **Examples:** **1.** Intentional discharge of waste oil to the storm drain. **2.** Discharge of significant volumes of auto body wet sanding effluent to storm drain from work on multiple vehicles, as practice. Especially where repeat violations or evidence of habitual discharge is evident. **3.** Significant amount of spilled restaurant grease is intentionally washed into storm drain, especially if hazardous degreasing agent is used. **4.** Significant amount of Oil/fluids leaking from improperly stored engines and parts discharge to storm drain system, especially if repeat violation. **5.** Repeat moderate violations may be considered major.

PROGRESSIVE ENFORCEMENT FLOW CHART



Watershed Management Program

Attachments to MCM Guidance

Insert City Seal

CITY STORMWATER PROGRAM INDUSTRIAL/COMMERCIAL FACILITY INSPECTION REPORT

Facility:	Address:
Contact:	Title:
Email:	Phone:
Inspector:	Date:
Inspection Type: ☐ Routine ☐ Follow-up ☐ Response to Complaint	BMP materials provided and explained: ☐ Yes ☐ No
SIC/NAICS code and/or business type:	

Industrial Facilities Only

(1) Covered under IGP (WDID is current) or other NPDES Permit: ☐ Yes ☐ No	(2) NEC filed: ☐ Yes ☐ No	SWPPP on-site: ☐ Yes ☐ No
If (1) and (2) above are "No", notified contact of need for IGP coverage and will refer facility to Regional Board: ☐ Yes ☐ No		

CHECKLIST FOR STORMWATER BMP (BEST MANAGEMENT PRACTICE) COMPLIANCE

	BMP	Yes	No	N/A
Vehicle & Equipment Maintenance	**Fueling** - Effective fueling source control devices & practices	☐	☐	☐
	Cleaning – Effective cleaning practices & wash water management practices	☐	☐	☐
	Repair – Effective repair practices & source control devices	☐	☐	☐
Equipment Operations	**Outdoor equipment operations** – Effective source control devices & practices	☐	☐	☐
Storage & Handling	**Outdoor liquids** – Effective source controls & practices	☐	☐	☐
	Outdoor raw materials – Effective source control practices & structural devices	☐	☐	☐
	Solid waste – Effective storage & handling practices & appropriate control measures	☐	☐	☐
Facility Maintenance	**Building & grounds maintenance** – Effective maintenance practices	☐	☐	☐
	Parking & storage area maintenance – Effective designs & housekeeping/maintenance practices	☐	☐	☐
	Stormwater conveyance system maintenance – Proper operation & maintenance protocols	☐	☐	☐
	Sidewalk washing – Remove debris & free standing oil/grease. Use high pressure/low volume spray washing with potable water, no cleaning agents & average rate of 0.006 gal/ft^2.	☐	☐	☐
Spills, Leaks & Discharges	**Accidental spills/leaks** – Effective spill/leak prevention & response procedures	☐	☐	☐
	Unauthorized nonstormwater discharges – Effective elimination	☐	☐	☐

COMMENTS AND CORRECTIVE ACTIONS (IF REQUIRED)
Include description of activities performed and/or principal products produced

ENFORCEMENT: ☐ **None required** ☐ **Corrective Action Notice (complete section below)** ☐ **Other (see comments)**

CORRECTIVE ACTION NOTICE (IF REQUIRED)

If corrective actions have been noted above, then the responsible party (facility owner, occupant or person responsible) is in noncompliance with the City's Stormwater Quality Ordinance. The responsible party may be subject to enforcement actions under this ordinance if the corrective actions are not implemented by:

_____
Corrective Action Due Date

ACKNOWLEDGEMENT OF RECEIPT OF CORRECTIVE ACTION NOTICE

_____	_____	_____
Site Representative Signature	Printed Name	Date

Recording requested by and mail to:

Name: City of [Insert City]
Department of Public Works
ATTN: Director of Public Works

Address: [Insert City Address Line1]
[Insert City Address Line2]

Insert City Seal

********** Space Above This Line For Recorder's Use **********

MASTER COVENANT AND AGREEMENT

REGARDING ON-SITE BMP MAINTENANCE

The undersigned hereby certifies I am (we are) the owner(s) of the hereinafter legally described real property located in the City of [Insert City], County of Los Angeles, State of California (please give legal description: assessor's ID, tract no., lot no., etc.):

_____

Site Address _____

Owner(s) do hereby covenant and agree to and with the City of [Insert City]to maintain all on-site structural Best Management Practices (BMPs) in accordance with the Site Map and the Operations & Maintenance (O&M) Plan set forth in Attachment 1 hereto and incorporated herein by this reference. The specific structural BMPs are listed as follows:

_____

_____

Owner(s) shall maintain the listed drainage devices above on the property indicated and as shown on plans permitted by the City of [Insert City]in a good and functional condition to safeguard the property owners and adjoining properties from damage and pollution.

Owner(s) hereby consent to inspection of the Property by an inspector authorized by the City Manager, or his or her designee, for the purpose for verifying compliance with the provisions of this Agreement.

Owner(s) shall provide printed educational materials with any sale of the property which provide information on what stormwater management facilities are present, the type(s) and location(s) of maintenance signs that are required, and how the necessary maintenance can be performed.

Owner(s) shall provide actual notice of this Agreement and its terms to any respective successor(s) in interest to the Property prior to transfer of said interest to such successor(s) in interest. This covenant and agreement shall run with the land and shall be binding upon any future owners, encumbrances, their successors, heirs or assigns and shall continue in effect until the City of [Insert City] approves its termination.

_____ _____
(Print Name of Property Owner) (Print Name of Property Owner)

_____ _____
(Signature of Property Owner) (Signature of Property Owner)

Dated this _____ day of _____ 20 _____.

********** Space Below This Line For Notary's Use **********

ALL PURPOSE ACKNOWLEDGEMENT

State of _____ }
}
County of _____ }

On _____ before me, _____ personally appeared
(Insert Name of Notary Public and Title)
_____, who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf on which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature _____ (Seal)

Recording requested by and mail to:

Name: City of [Insert City]
Public Works Department
ATTN: Director of Public Works

Address: [Insert City Address Line1]
[Insert City Address Line2]

Insert City Seal

********** Space Above This Line For Recorder's Use **********

MASTER TERMINATION OF COVENANT AND AGREEMENT

REGARDING ON-SITE BMP MAINTENANCE

The undersigned hereby certifies I am (we are) the owner(s) of the hereinafter legally described real property located in the City of [Insert City], County of Los Angeles, State of California (please give legal description: assessor's ID, tract no, lot not, etc.):

_____

Site Address _____

We do hereby, with approval of the City of [Insert City], Engineering Division, terminate the covenant and agreement entered into with the City of [Insert City]as recorded on the _____ day of _____20_____, as Document No.

_____

_____

This covenant and agreement is terminated for the reason that:

_____

_____

_____ _____
(Print Name of Property Owner) (Print Name of Property Owner)

_____ _____
(Signature of Property Owner) (Signature of Property Owner)

Dated this _____ day of _____ 20 _____.

Termination approved by: _____ Date: _____
(Authorized City Representative)

********** Space Below This Line For Notary's Use **********

ALL PURPOSE ACKNOWLEDGEMENT

State of _____ }
}
County of _____ }

On _____ before me, _____ personally appeared
(Insert Name of Notary Public and Title)
_____, who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf on which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature _____ (Seal)

Insert City Seal

City of [Insert City]NPDES Program

POST-CONSTRUCTION BMP VERIFICATION & INSPECTION FORM

PROJECT INFORMATION	
Facility/Project Name:	Inspection Date:
Address:	Inspector:
Contact Name:	Contact Phone:

Project Category

☐ Priority Project ☐ Small Site LID Project ☐ Single Family Residence ☐ Green Street
☐ Public Project ☐ Private Project

Project Type:

☐ Commercial ☐ Industrial ☐ Residential ☐ Multi-Use
☐ Road/Street ☐ Parking Lot ☐ Automotive repair ☐ Restaurant ☐ Other:

Operation/Maintenance:

☐ Reviewed ☐ Not Reviewed ☐ Not Available
Preparer's Name: Preparer's Title:
Address: City: Zip: Phone:

Inspection Type

☐ Prior to Certificate of Occupancy ☐ Special Investigation ☐ Response to Complaint
☐ Routine Inspection (Annual) ☐ Follow-up Inspection

CHECKLIST FOR ROUTINE SOURCE CONTROL BMPs

Requirement	No. of BMPs (if Applicable)	BMP in place per approved LID Plan/SUSMP?	Corrective Action Required
Storm Drain System Stenciling/Signage		☐ Yes ☐ No	☐ Yes ☐ No
Outdoor Material Storage Areas		☐ Yes ☐ No	☐ Yes ☐ No
Trash Storage Areas		☐ Yes ☐ No	☐ Yes ☐ No
Efficient Irrigation Systems & Landscape Design		☐ Yes ☐ No	☐ Yes ☐ No
Protect Slopes & Channels		☐ Yes ☐ No	☐ Yes ☐ No
Loading Dock Areas		☐ Yes ☐ No	☐ Yes ☐ No
Maintenance Bays		☐ Yes ☐ No	☐ Yes ☐ No
Vehicle Wash Areas		☐ Yes ☐ No	☐ Yes ☐ No
Outdoor Process Areas		☐ Yes ☐ No	☐ Yes ☐ No
Equipment Wash Areas		☐ Yes ☐ No	☐ Yes ☐ No
Fueling Areas		☐ Yes ☐ No	☐ Yes ☐ No
Hillside Landscaping		☐ Yes ☐ No	☐ Yes ☐ No
Wash-water Controls for Food Prep Areas		☐ Yes ☐ No	☐ Yes ☐ No
Community Car Wash Racks		☐ Yes ☐ No	☐ Yes ☐ No

CHECKLIST FOR STRUCTURAL BMPs

Requirement	No. of BMPs (if Applicable)	BMP in place per approved LID Plan/SUSMP?	Corrective Action Required
Infiltration Trench/Basin		☐ Yes ☐ No	☐ Yes ☐ No
Infiltration Well/Dry Well		☐ Yes ☐ No	☐ Yes ☐ No
Detention Basin		☐ Yes ☐ No	☐ Yes ☐ No
Porous Pavement		☐ Yes ☐ No	☐ Yes ☐ No
Bio-infiltration		☐ Yes ☐ No	☐ Yes ☐ No
Vegetated Swale		☐ Yes ☐ No	☐ Yes ☐ No
Bio-filtration		☐ Yes ☐ No	☐ Yes ☐ No
Proprietary Control Measure (describe):		☐ Yes ☐ No	☐ Yes ☐ No
Media Filtration		☐ Yes ☐ No	☐ Yes ☐ No
Filter Insert		☐ Yes ☐ No	☐ Yes ☐ No
Regional or Watershed BMPs		☐ Yes ☐ No	☐ Yes ☐ No
Other (describe):		☐ Yes ☐ No	☐ Yes ☐ No

INSPECTION RESULTS:

- ☐ Visible / No Apparent Problems
- ☐ BMP Failure
- ☐ Significant Engineering / Design Flaws
- ☐ Unauthorized Modifications
- ☐ BMP Missing / Removed / Not Located
- ☐ Trash / Debris Exceeding Cap. (bypass)
- ☐ Evidence of Pollution / Dumping
- ☐ Vector Control Issues (Mosquitoes)
- ☐ Inadequate Maintenance

DESCRIPTION OF CORRECTIVE ACTION(S) REQUIRED:

CORRECTIVE ACTION NOTICE (IF REQUIRED)

If any corrective actions have been noted above, then based on this verification inspection, you are in noncompliance with Municipal Code Chapter [-]. You must implement the required corrective action(s) by:

_____
Corrective Action Due Date

After this date, your facility will be re-inspected to verify that all necessary corrective measures have been taken. FAILURE TO IMPLEMENT THE CORRECTIVE ACTION(S) WILL SUBJECT YOU TO ELEVATED ENCORCEMENT, WHICH CAN INCLUDE INFRACTION OR MISDEMEANOR PENALTIES.

ACKNOWLEDGEMENT OF RECEIPT OF CORRECTIVE ACTION NOTICE

_____	_____	_____
Contact Signature	Printed Name	Date

Insert City Seal

STORMWATER PLANNING PROGRAM PRIORITY PROJECT CHECKLIST

FORM PC

Project Name	Owner Name	Developer Name
Project Address	Owner Address	Developer Address
Plan Check #	Owner Phone	Developer Phone

TYPE OF PROJECT

Does the proposed project fall into one of the following categories? Please check Yes/No	YES	NO
PRIORITY PROJECTS		
1. A new project equal to 1 acre or greater of disturbed area and adding more than 10,000 square feet of impervious* surface area		
2. A new industrial park with 10,000 square feet or more of surface area		
3. A new commercial mall with 10,000 square feet or more surface area		
4. A new retail gasoline outlet with 5,000 square feet or more of surface area		
5. A new restaurant (SIC 5812) with 5,000 square feet or more of surface area		
6. A new parking lot with either 5,000 ft^2 or more of impervious* surface or with 25 or more parking spaces		
7. A new automotive service facility (SIC 5013, 5014, 5511, 5541, 7532-7534 and 7536-7539) with 5,000 square feet or more of surface area		
8. Projects located in or directly adjacent to, or discharging directly to a Significant Ecological Area (SEA)*, where the development will: a. Discharge stormwater runoff that is likely to impact a sensitive biological species or habitat; and b. Create 2,500 square feet or more of impervious surface area		
9. Redevelopment*		
SPECIAL PROVISION PROJECTS		
10. Green street* project		
11. Single family hillside* home		

If checked YES, numerical criteria will apply to items 1,2,6-9 and items 3-5 (for project areas of 5,000 ft^2 or more of surface area.) If any of the boxes are checked YES, this project will require the preparation of a Low Impact Development (LID) Plan and a Maintenance Agreement Transfer*

* Defined on back.

Applicant Name

Applicant Signature

Applicant Title

Date

DEFINITIONS:

Impervious are those surfaces that do not allow stormwater runoff to percolate into the ground. Typical impervious surfaces include: concrete, asphalt, roofing materials, etc. However, some specially designed concrete/asphalt do allow water to percolate (pervious).

Hillside means property where the slope is 25% or greater and where grading contemplates cut or fill slopes. Single family hillside homes will require a less extensive plan. During the construction of a single-family hillside home, the following measures are implemented:

a. Conserve natural areas

b. Protect slopes and channels

c. Provide storm drain system stenciling and signage

d. Divert roof runoff to vegetated areas before discharge unless the diversion would result in slope instability

e. Direct surface flow to vegetated areas before discharge unless the diversion would result in slope instability.

Green Streets means any street and road construction of 10,000 square feet or more of impervious surface area

a. These projects will follow an approved green streets manual to the maximum extent practicable. Street and road construction applies to standalone streets, roads, highways, and freeway projects, and also applies to streets within larger projects. Stormwater mitigation measures must be in compliance with the approved green streets manual requirements.

Redevelopment means land-disturbing activities that result in the creation, addition, or replacement of 5,000 ft^2 or more of impervious surface area on an already developed site.

Redevelopment does not include routine maintenance activities that are conducted to maintain the original line and grade, hydraulic capacity, or original purpose of facility, nor does it include modifications to existing single family structures, or emergency construction activities required to immediately protect public health and safety.

Significant Ecological Area means an area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and would be disturbed or degraded by human activities and developments. Also, an area designated by the City as approved by the Regional Water Quality Control Board.

Maintenance Agreement and Transfer: All developments subject to LID and site specific plan requirements provide verification of maintenance provisions for Structural and Treatment Control BMPs, including but not limited to legal agreements, covenants, CEQA mitigation requirements, and/or conditional use permits. Verification at a minimum shall include:

- The developer's and/or owner's signed statement accepting responsibility for maintenance until the responsibility is legally transferred; and
- A signed statement from the public entity assuming responsibility for Structural or Treatment Control BMP maintenance and conduct a maintenance inspection at least once a year; or
- Written conditions in the sales or lease agreement, which requires the recipient to assume responsibility for maintenance and conduct a maintenance inspection at least once a year; or
- Written text in project conditions, covenants and restrictions (CCRs) for residential properties assigning maintenance responsibilities to the Home Owners Association for maintenance of the Structural and Treatment Control BMPs; or
- Any other legally enforceable agreement that assigns responsibility for the maintenance of post-construction Structural or Treatment Control BMPs.

Insert City Seal

STORMWATER PLANNING PROGRAM
PRIORITY DEVELOPMENT & REDEVELOPMENT PROJECTS
PLAN CHECK # _____

FORM P1

Project Name _____ Project Location _____	**GENERAL PROJECT CERTIFICATION** A completed original of this form must accompany all LID Plan submittals.
Company Name _____ Address _____ Contact Name / Title _____ Phone / FAX / Email _____	

Best Management Practices (BMPs) have been incorporated into the design/maintenance/construction of this project to accomplish the following:

1. Minimize impacts from stormwater runoff on the biological integrity of Natural Drainage Systems and water bodies in accordance with requirements under CEQA (Cal. Pub. Resources Code § 21100), CWC § 13369, CWA § 319, CWA § 402(p), CWA § 404, CZARA § 6217(g), ESA § 7, and local government ordinances.
2. Maximize the percentage of pervious surfaces to allow more percolation of stormwater into the ground.
3. Minimize the amount of stormwater directed to impermeable surfaces and to the MS4.
4. Minimize pollution emanating from parking lots through the use of appropriate Treatment Control BMPs and good housekeeping practices.
5. Minimize breeding of Vectors
6. Reduce pollutant loads in stormwater from the development site.

I certify that this Low Impact Development Plan and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gathered/evaluated the information submitted.

Post Construction / Maintenance Certification

As the responsible party, I certify that the proposed BMPs will be implemented, monitored and maintained to ensure their continued effectiveness. In the event of a property transfer, the new owner/lessee will be notified of the BMPs in use at this site and I will include written conditions in the sales or lease agreement, which requires the new owner (or lessee) to assume responsibility for maintenance and conduct a maintenance inspection at least once a year. The information contained herein is, to the best of my knowledge and belief, true, accurate, and complete.

In consideration of the execution of City of [Insert City] approval of the proposed Low Impact Development (LID) Plan including any proposed treatment system, the applicant hereby agrees to indemnify, save and keep the City of [Insert City], its officers, agents and employees free and harmless from and against any and all claims for injury, damage, loss, liability, cost and expense of any nature whatsoever, which the City of [Insert City], its officers, agents, or employees may suffer, sustain, incur, pay out as a result of any and all actions, suits, proceedings, claims and demands which may be brought, made, or filed against the City of [Insert City], its officers, agents or employees by reason of or arising out of, or in any manner connected with any and all operations permitted by this approval. This indemnification extends to further agree that the City of [Insert City]is not responsible for any additional requirements or restrictions due to changes in regulations, policies or enforcement practices of the California Regional Water Quality Control Board, or any other applicable regulatory agencies.

Property Owner Name	Property Owner Signature
Applicant Title	Date

PLANNING BEST MANAGEMENT PRACTICES

BMP Name	BMP Identification Number and Name	✓ if to be used
Car Wash Facility	SC-21: Vehicle and Equipment Cleaning	
Constructed Wetlands	MP-20: Wetlands	
Control of Impervious Runoff	-N/A-	
Efficient Irrigation	-N/A-	
Energy Dissipaters	EC-10: Velocity Dissipation Devices	
Extended Detention Basins	TC-22: Extended Detention Basin	
Infiltration Basins	TC-11: Infiltration Basins	
Infiltration Trenches	TC-10: Infiltration Trenches	
Inlet Trash Racks	-N/A-	
Landscape Design	EC-2: Preservation of Existing Vegetation EC-4: Hydro seeding EC-6 & EC-8: Straw & Wood Mulching	
Linings for Urban Runoff Conveyance Channels	-N/A-	
Materials Management	SC-30: Outdoor Loading/Unloading	
Media Filtration	TC-40: Media Filter	
Motor Fuel Concrete Dispensing Areas	SC-20: Vehicle and Equipment Fueling	
Motor Fuel Dispensing Area Canopy	SC-20: Vehicle and Equipment Fueling	
Water Quality Inlets	TC-50: Water Quality Inlet	
Outdoor Storage	SC-31: Outdoor Liquid Container Storage SC-33: Outdoor Storage of Raw Materials	
Porous Pavement and/or Alternative Surfaces	-N/A-	
Protect Slopes and Channels	EC-11: Slope Drains EC-12: Streambank Stabilization	
Self-Contained Areas for Vehicle or Equipment Washing, Steam Cleaning, Maintenance, Repair, or Material Processing	SC-21: Vehicle and Equipment Cleaning SC-22: Vehicle and Equipment Repair SC-32: Outdoor Equipment Operations	
Storm Drain System Stenciling and Signage	SC-34: Waste Handling and Disposal (Signage Section)	
Trash Container Areas	SC-34: Waste Handling and Disposal	
Vegetated Swales and Strips	TC-32: Bioretention	
Wet Ponds	TC-20: Wet Ponds	
Other:	• • • • •	

Please refer to the California Storm Water Best Management Practice Handbooks for more information.

Insert City Seal

STORMWATER TREATMENT CERTIFICATION

FORM P2

SITE NAME and ADDRESS

_____

_____

_____

_____

_____

Plan Check #_____

Planning #_____

APPROXIMATE PROJECT CHARACTERISTICS

Roofed Area	_____	ft^2
Roadway/Parking Area (exposed)	_____	ft^2
Landscaped/Vegetation	_____	ft^2
Other Ground Level Impervious Areas (Ex: Outdoor work or storage areas)	_____	ft^2
Other: _____	_____	ft^2
TOTAL	_____	ft^2

STRUCTURAL/TREATMENT BMPs

(attach additional sheets as necessary) or see back

Area Designation (must correspond with plans)	**Tributary Area** (ft^2)	**Average Impervious Factor**	**Estimated Flow Rate or Volume***	**Anticipated Potential Pollutants**	**Type of BMP** (include size, make, and model, if any)	**BMP Location** (briefly describe)	**Design Treatment Flow Rate or Volume Capacity**

By stamping this form, I acknowledge that each treatment BMP is provided with adequate bypass or overflow so as not to contribute to localized flooding or soil instability.

*Flow rates and volumes based on the 0.75 inch, 24-hour rain event or the 85th percentile, 24-hour rain event, whichever is greater.

I certify that I am a Professional Civil Engineer registered in the State of California, and that the treatment methods and capacities herein comply with the requirements established by the California Regional Water Quality Control Board, Los Angeles Region, and the State Water Resources Control Board for Low Impact Development (LID) Plans.

Affix Registered Engineer Wet Ink Stamp Here:

Print Name _____ **Signature** _____ **Date** _____

STRUCTURAL/TREATMENT BMPs

(attach additional sheets as necessary)

Area Designation (must correspond with plans)	**Tributary Area** (ft^2)	**Average Impervious Factor**	**Estimated Flow Rate or Volume***	**Anticipated Potential Pollutants**	**Type of BMP** (include size, make, and model, if any)	**BMP Location** (briefly describe)	**Design Treatment Flow Rate or Volume Capacity**

Insert City Seal

OWNER'S CERTIFICATION
MINIMUM BMPS FOR ALL CONSTRUCTION SITES

FORM OC1

PLAN CHECK #_____

Project Name	_____	BUILDING/GRADING PERMIT NUMBER	
Project Location	_____		
Owner Name	_____	Contractor Name	_____
Address	_____	Address	_____
Phone	_____	Phone	_____
FAX/Email	_____	FAX/Email	_____

The National Pollutant Discharge Elimination System (NPDES) is the portion of the Clean Water Act that applies to the protection of receiving waters. Under permits from the Los Angeles Regional Water Quality Control Board (RWQCB), certain activities are subject to RWQCB enforcement. To meet the requirements of the Los Angeles County Municipal Stormwater Permit (CAS004001), minimum requirements for sediment control, erosion control and construction activities must be implemented on each project site. Minimum requirements include:

- **EROSION CONTROL:** Erosion from slopes and channels shall be controlled by implementing an effective combination of BMPs, such as the limiting of grading activities during the wet season; inspecting graded areas during rain events; planting and maintenance of vegetation on slopes; and covering erosion susceptible slopes.
- **SEDIMENT CONTROL:** Eroded sediments from areas disturbed by construction and from stockpiles of soil shall be retained on site to minimize sediment transport from the site to streets, drainage facilities and/or adjacent properties via runoff, vehicle tracking or wind.
- **NON-STORMWATER MANAGEMENT:** Non-stormwater runoff from equipment and vehicle washing and any other activity shall be contained at the project site.
- **WASTE MANAGEMENT:** Construction related materials, wastes, spills or residues shall be retained on site to minimize transport from the site to streets, drainage facilities or adjoining properties by wind or runoff. Runoff from equipment and vehicle washing shall be contained at construction sites unless treated to remove sediment and pollutants.

Examples of Minimum BMPs include: (1) Soil piles must be covered with tarps or plastic, (2) leaking equipment must be repaired immediately, (3) refueling must be conducted away from catch basins, (4) catch basins must be protected when working nearby, (5) vacuum all concrete saw cutting, (6) never wash concrete waste into the street, (7) keep the site clean, sweep the gutters at the end of each working day and keep a trash receptacle on site.

As the architect/engineer of record, I have selected appropriate BMPs to effectively minimize the negative impacts of this project's construction activities on stormwater quality. The project owner and contractor are aware that the selected BMPs shall be installed, monitored, and maintained to ensure their effectiveness. The BMPs not selected for implementation are redundant or deemed not applicable to the proposed construction activity.

Architect/Engineer of Record Name	Architect/Engineer of Record Signature
Title	Date

I certify that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that submitting false and/ or inaccurate information, failing to update the ESCP to reflect current conditions, or failing to properly and/ or adequately implement the ESCP may result in revocation of grading and/ or other permits or other sanctions provided by law.

Landowner or Landowner's Agent Name	Landowner or Landowner's Agent Signature
Title	Date

Insert City Seal

EROSION AND SEDIMENT CONTROL PLAN (ESCP) REVIEW CHECKLIST

These requirements apply to all activities involving soil disturbance with the exception of agricultural activities. Applicable activities include but are not limited to grading, vegetation clearing, soil compaction, paving, re-paving and linear underground/overhead projects (LUPs).

Prior to issuing a grading or building permit, each operator of a construction activity within its jurisdiction must prepare and submit an ESCP prior to the disturbance of land.

Contact Name:	Tracking #:
Contact Title:	Site Name:
Company Name:	Site Address:
Mailing Address:	Type of Facility:
City, State, Zip:	Submittal Date:
Phone Number:	Plan Return Date:
Fax Number:	Disturbed Area:

First Review
ESCP Received on:

Review Completed on:

Second Review
ESCP Received on:

Review Completed on:

Third Review
ESCP Received on:

Review Completed on:

Fourth Review
ESCP Received on:

Review Completed on:

Fifth Review
ESCP Received on:

Review Completed on:

Sixth Review
ESCP Received on:

Review Completed on:

ESCP REQUIREMENT	SATISFACTION			COMMENTS
	YES	NO	N/A	
General Information				
Contact information (e.g., name, address, phone, email, etc.) provided for the owner and contractor.	☐	☐	☐	
Basic site information including location, status, size of the project and area of disturbance is provided.	☐	☐	☐	
Proof of existing coverage under applicable permits, including, but not limited to the State Water Board's Construction General Permit, and State Water Board 401 Water Quality Certification.	☐	☐	☐	
Meets the minimum requirements of the jurisdictional erosion and sediment control ordinance.	☐	☐	☐	
Includes the elements of a Storm Water Pollution Prevention Plan (SWPPP) prepared in accordance with the requirements of the Construction General Permit.	☐	☐	☐	
Developed and certified by a Qualified SWPPP Developer (QSD).	☐	☐	☐	
Identifies the proximity all water bodies, water bodies listed as impaired by sediment-related pollutants, and water bodies for which a sediment-related TMDL has been adopted and approved by the USEPA.	☐	☐	☐	
Identifies any significant threat to water quality status, based on consideration of factors listed in Appendix 1 to the Construction General Permit.	☐	☐	☐	
The project start date and anticipated completion date is provided.	☐	☐	☐	
Includes Identification of site Risk Level as identified per the requirements in Appendix 1 of the Construction General Permit.	☐	☐	☐	
Contains a language signed by the landowner or the landowner's agent stating as follows: *"I certify that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that submitting false and/ or inaccurate information, failing to update the ESCP to reflect current conditions, or failing to properly and/ or adequately implement the ESCP may result in revocation of grading and/ or other permits or other sanctions provided by law."*	☐	☐	☐	

ESCP REQUIREMENT	SATISFACTION			COMMENTS
	YES	NO	N/A	
Best Management Practices				
All structural BMPs are designed by a licensed California Engineer.	☐	☐	☐	
Includes Sediment/Erosion Control.	☐	☐	☐	
Includes controls to prevent tracking on and off the site.	☐	☐	☐	
Includes non-stormwater controls (e.g., vehicle washing, dewatering, etc.).	☐	☐	☐	
Includes Materials Management (delivery and storage).	☐	☐	☐	
Includes Spill Prevention and Control.	☐	☐	☐	
Includes Waste Management (e.g., concrete washout/waste management; sanitary waste management).	☐	☐	☐	
Includes methods to minimize the footprint of the disturbed area and to prevent soil compaction outside of the disturbed area.	☐	☐	☐	
Includes methods used to protect native vegetation and trees.	☐	☐	☐	
Includes the rationale for the selection and design of the proposed BMPs, including quantifying the expected soil loss from different BMPs.	☐	☐	☐	
Post-Construction Structural BMPs subject to Operation and Maintenance Requirements are identified.	☐	☐	☐	
Site Plan				
Full sized plans showing the site with all proposed BMPs and water quality notes have been signed and stamped with wet ink application by the appropriate individual.	☐	☐	☐	
Plan includes a title block containing at least the project name, address, and owner.	☐	☐	☐	
All figures, maps, plot plans, etc. have a legend, including a North arrow and scale.	☐	☐	☐	
All facilities are labeled for the intended function.	☐	☐	☐	
All areas of outdoor activity are labeled.	☐	☐	☐	
All structural BMPs are indicated.	☐	☐	☐	
Drainage flow information depicted.	☐	☐	☐	
Project location shown.	☐	☐	☐	
Site boundary indicated.	☐	☐	☐	

Agency Standard Operating Procedures

Each agency will use the suggested language below to develop, implement, and revise as necessary agency-specific Standard Operating Procedures (SOPs) that identify the procedures each agency will follow.

CGP Coverage Verification

- Verification of active coverage under the Construction General Permit for sites disturbing 1 acre or more, or that are part of a planned development that will disturb 1 acre or more and a process for referring non-filers to the Regional Water Board.

Prior to releasing any permits relating to and/or allowing for construction activities on a site resulting in one (1) acre or more of soil disturbance, a Notice of Intent (NOI), a Storm Water Pollution Prevention Plan (SWPPP), and all other Permit Registration Documents (PRDs) must be filed with the Regional Water Resources Control Board (Regional Board) through the State Water Board's Storm water Multi-Application and Report Tracking System (SMARTS) website and a Waste Discharge ID (WDID) number must be obtained from the Regional Board. This requirement will be included as a condition of approval. In cases where construction activities have commenced on a qualifying site and the project has not yet filed all PRDs (along with an explanation for filing late) with the Regional Board, a Notice of Violation (NOV) will be sent to the responsible person. Any work orders released will be stopped and fines may be enforced. The Regional Board will be notified of the discharger's non-compliance. Work will not be allowed to commence until the NOI has been accepted by the Regional Board and WDID number issued.

ESCP Review

- Review of the applicable ESCP and inspection of the construction site to determine whether all BMPs have been selected, installed, implemented, and maintained according to the approved plan and subsequent approved revisions.

Prior to issuing a grading or building permit, each operator of a construction activity within its jurisdiction must prepare and submit an Erosion and Sediment Control Plan (ESCP) prior to the disturbance of land. The ESCP Requirement Checklist will be used to ensure required information is submitted by the responsible person. These requirements apply to all activities involving soil disturbance with the exception of agricultural activities. Applicable activities include but are not limited to grading, vegetation clearing, soil compaction, paving, re-paving and linear underground/overhead projects (LUPs).

BMP Assessment

- Assessment of the appropriateness of the planned and installed BMPs and their effectiveness.

Prior to releasing any permits relating to and/or allowing for construction activities on a site resulting in one (1) acre or more of soil disturbance a Qualified SWPPP Practitioner (QSP) must be identified by the developer. Prior to beginning any construction activities, the QSP must review the ESCP and determine if the following requirements are being met:

1. Erosion and sediment controls are incorporated to provide effective reduction or elimination of sediment related pollutants in stormwater discharges and authorized non-stormwater discharges from the site.

2. Sediment controls are designed to intercept and settle out soil particles that have been detached and transported by the force of water.
3. Non-stormwater control BMPs are selected to control sediment on the construction site.
4. Materials and waste management pollution control BMPs are incorporated to minimize stormwater contact with construction materials, wastes and service areas; and to prevent materials and wastes from being discharged off-site.

If the QSP identifies potential problematic areas of the ESCP, a revision to the ESCP must be submitted for review and approval.

Once the BMPs are installed, inspections must be conducted at the frequency identified in the Watershed Management Program (WMP). All BMPs not functioning as intended must be repaired, replaced, or changed to a more effective BMP. Inspection and maintenance procedures must be in accordance with the CASQA handbook.

Discharge Reporting

- Visual observation and record keeping of non-stormwater discharges, potential illicit discharges and connections, and potential discharge of pollutants in stormwater runoff.

Any non-stormwater discharges, potential illicit discharges and connections, and potential discharge of pollutants in stormwater runoff will be tracked and kept on record.

Public reporting of illicit discharges or water quality impacts associated with discharges into or from MS4s within this jurisdiction will be conducted. Multiple modes of communication are in place to allow for complaints and spill reporting. When a complaint is received it will be documented and tracked to ensure that all complaints are adequately addressed.

A Spill Response Plan will be implemented for all sewage and other spills that may discharge into the MS4 within this jurisdiction. Coordination with spill response teams will be observed throughout all appropriate departments, programs, and agencies so that maximum water quality protection is provided. All spill complaints will be investigated within one business day of receiving the complaint and a response to spills for containment will be conducted within 4 hours of becoming aware of the spill, except where such spills occur on private property, in which case the response should be within 2 hours of gaining legal access to the property. Spills that may endanger health or the environment will be reported to appropriate public health agencies and the Office of Emergency Services (OES).

A training program regarding the identification of illicit connections/illicit discharges (IC/IDs) for all municipal field staff, who, as part of their normal job responsibilities (e.g., street sweeping, storm drain maintenance, collection system maintenance, road maintenance), may come into contact with or otherwise observe an illicit discharge or illicit connection to the MS4 will be provided.

Construction Inspection Reporting and Tracking

- Development of a written or electronic inspection report generated from an inspection checklist used in the field.
- Tracking of the number of inspections for the inventoried construction sites throughout the reporting period to verify that the sites are inspected at the minimum frequencies required.

Inspections will be conducted at a frequency listed in the Watershed Management Program (WMP). Inspection checklists and/or reports will be utilized to determine and keep record of whether or not all

BMPs have been selected, installed, implemented, and maintained according to the approved plan and subsequent approved revisions. These checklists/reports will be retained for at least three (3) years following NOT approval.

Insert City Seal

(CITY NAME) STORMWATER INSPECTION REPORT FOR CONSTRUCTION SITES

SITES ONE ACRE OR GREATER

Project Name:		Address:	
Area disturbed:		WDID:	SWPPP on-site: ☐ Yes ☐ No
Risk level: ☐ Low (Risk 1) ☐ Medium (Risk 2) ☐ High (Risk 3)		Erosion & Sediment Control Plan (ESCP) on-site: ☐ Yes ☐ No	
Phase: ☐ Prior to Land Disturbance ☐ Active construction ☐ Site stabilization			
Developer/Contractor:		Phone number:	
Contact:		Title:	
Inspector:		Date:	
Inspection: ☐ Routine (monthly and for each phase of construction) ☐ Follow-up ☐ Response to complaint		*For sites discharging to a waterbody impaired for sediment/turbidity*[i] ☐ *Routine biweekly* ☐ *Predicted rainfall* ☐ *Recent rainfall*	

CHECKLIST FOR STORMWATER BMP (BEST MANAGEMENT PRACTICE) COMPLIANCE

PHASE 1 AND 2: PRIOR TO LAND DISTURBANCE AND DURING ACTIVE CONSTRUCTION

	Comment	Yes	No	N/A
Erosion Control	1. Erosion controls are implemented in accordance with the ESCP	☐	☐	☐
	2. Erosion observed	☐	☐	☐
Sediment Control	3. Sediment controls are implemented in accordance with the ESCP	☐	☐	☐
	4. Sediment discharge observed	☐	☐	☐
Additional Controls	5. Tracking controls (tire washout, stabilized entrances, exits and roadways) are implemented in accordance with the ESCP	☐	☐	☐
	6. Sediment in roads observed	☐	☐	☐
	7. Wind erosion controls are implemented in accordance with the ESCP	☐	☐	☐
	8. Wind erosion observed	☐	☐	☐
Waste Management	9. Effective material delivery and storage practices are implemented	☐	☐	☐
	10. Spill prevention and control practices are implemented	☐	☐	☐
	11. Stockpile controls are implemented in accordance with the ESCP	☐	☐	☐
	12. Solid waste controls are implemented in accordance with the ESCP	☐	☐	☐
Nonstormwater Management	13. Vehicle and equipment washing, fueling and maintenance controls are implemented in accordance with the ESCP	☐	☐	☐
	14. Nonstormwater discharges observed	☐	☐	☐
	15. Dewatering operations covered under NPDES Permit CAG994004	☐	☐	☐
	16. Water conservation practices are implemented	☐	☐	☐

PHASE 3: FINAL LANDSCAPING/SITE STABILIZATION

Comment	Yes	No	N/A	Comment	Yes	No	N/A
1. Graded areas have reached final stabilization	☐	☐	☐	3. Temporary erosion and sediment BMPs are removed	☐	☐	☐
2. Trash, debris and construction materials are removed	☐	☐	☐	4. Post-construction BMPs are installed	☐	☐	☐

COMMENTS AND CORRECTIVE ACTIONS (IF REQUIRED):

ENFORCEMENT: ☐ **None required** ☐ **Corrective Action Notice (complete section below)** ☐ **Other (see comments)**

CORRECTIVE ACTION NOTICE (IF REQUIRED)

If corrective actions have been noted above, then the responsible party (facility owner, occupant or person responsible) is in noncompliance with the City's Stormwater Quality Ordinance. The responsible party may be subject to enforcement actions under this program if the corrective actions are not implemented by:

_____
Corrective Action Due Date

ACKNOWLEDGEMENT OF RECEIPT OF CORRECTIVE ACTION NOTICE

_____ Site Representative Signature

_____ Printed Name

_____ Date

[i] For sites discharging to a tributary listed by the state as an impaired waterbody for sediment or turbidity under CWA § 303(d), or determined to be a threat to water quality, inspections must be conducted (1) when two or more consecutive days with greater than 50% chance of rainfall are predicted by NOAA and (2) within 48 hours of a ½-inch rain event and (3) at least once every two weeks.

Insert City Seal

CITY STORMWATER QUALITY PROGRAM
CONSTRUCTION SITE INSPECTION REPORT

FOR SITES LESS THAN ONE ACRE

Project:	Address:
Contact:	Title:
Contractor:	Phone:
Inspector:	Date:

CHECKLIST FOR STORMWATER BMP (BEST MANAGEMENT PRACTICE) COMPLIANCE

	Question	Yes	No	N/A
Erosion Control	1. Effective erosion controls implemented.	☐	☐	☐
	2. Erosion observed.	☐	☐	☐
Sediment Control	3. Effective sediment controls implemented.	☐	☐	☐
	4. Sediment discharge observed.	☐	☐	☐
Non-Stormwater Management	5. Water conservation practices are implemented.	☐	☐	☐
	6. Dewatering operations covered under NPDES Permit CAG994004	☐	☐	☐
Waste Management	7. Effective material delivery/storage practices and spill prevention/control practices are implemented.	☐	☐	☐
	8. Effective waste management controls are implemented.	☐	☐	☐

COMMENTS AND CORRECTIVE ACTIONS (IF REQUIRED):

ENFORCEMENT: ☐ **None required** ☐ **Corrective Action Notice (complete section below)** ☐ **Other (see comments)**

CORRECTIVE ACTION NOTICE (IF REQUIRED)

If corrective actions have been noted above, then the responsible party (facility owner, occupant or person responsible) is in noncompliance with the City's Stormwater Quality Ordinance. The responsible party may be subject to enforcement actions under this program if the corrective actions are not implemented by:

_____
Corrective Action Due Date

ACKNOWLEDGEMENT OF RECEIPT OF CORRECTIVE ACTION NOTICE

_____ Site Representative Signature

_____ Printed Name

_____ Date

Example Lease Language for Fixed Facilities

The following is example language that can be inserted into municipal leases:

The Los Angeles Regional Water Quality Control Board (RWQCB) has issued permits which govern stormwater and non-stormwater discharges resulting from municipal activities performed by or for the Coastal Watersheds of Los Angeles County, including the Los Angeles County Flood Control District, the County of Los Angeles, and 84 incorporated cities within the coastal watersheds of Los Angeles County with the exception of Long Beach (collectively referred to as Permittees). The RWQCB Permit is a National Pollutant Discharge Elimination System (NPDES) Permit No. R4-2023-0175. A Copy of the RWQCB Permit is available for review.

In order to comply with the Permit requirements, the Permittees have developed a Watershed Management Program (WMP) which contains Public Agency Facilities and Activities Maintenance Procedures (Maintenance Procedures) with Best Management Practices (BMPs) adopted from the Caltrans Storm Water Quality Handbook Maintenance Staff Guide (Caltrans Handbook) that parties leasing municipally owned properties must adhere to. These Maintenance Procedures contain pollution prevention and source control techniques to minimize the impact of those activities upon dry-weather urban runoff, stormwater runoff, and receiving water quality.

Activities performed at the facility leased under this agreement shall conform to the RWQCB NPDES Permit, the WMP, and the CalTrans Handbook, and must be performed as described within all applicable Maintenance Procedures. The holder of this agreement shall fully understand the Maintenance Procedures applicable to activities conducted at the facility leased under this agreement prior to conducting them and maintain copies of the Maintenance Procedures at the leased facility throughout the agreement duration. The applicable Maintenance Procedures are included as Exhibit ___ of this agreement.

Evaluation of activities subject to WMP requirements performed at the facility leased under this agreement will be conducted by the city to verify compliance with Maintenance Procedures, and may be required through lessor self-evaluation as determined by the city.

Example Contract Language for Field Programs

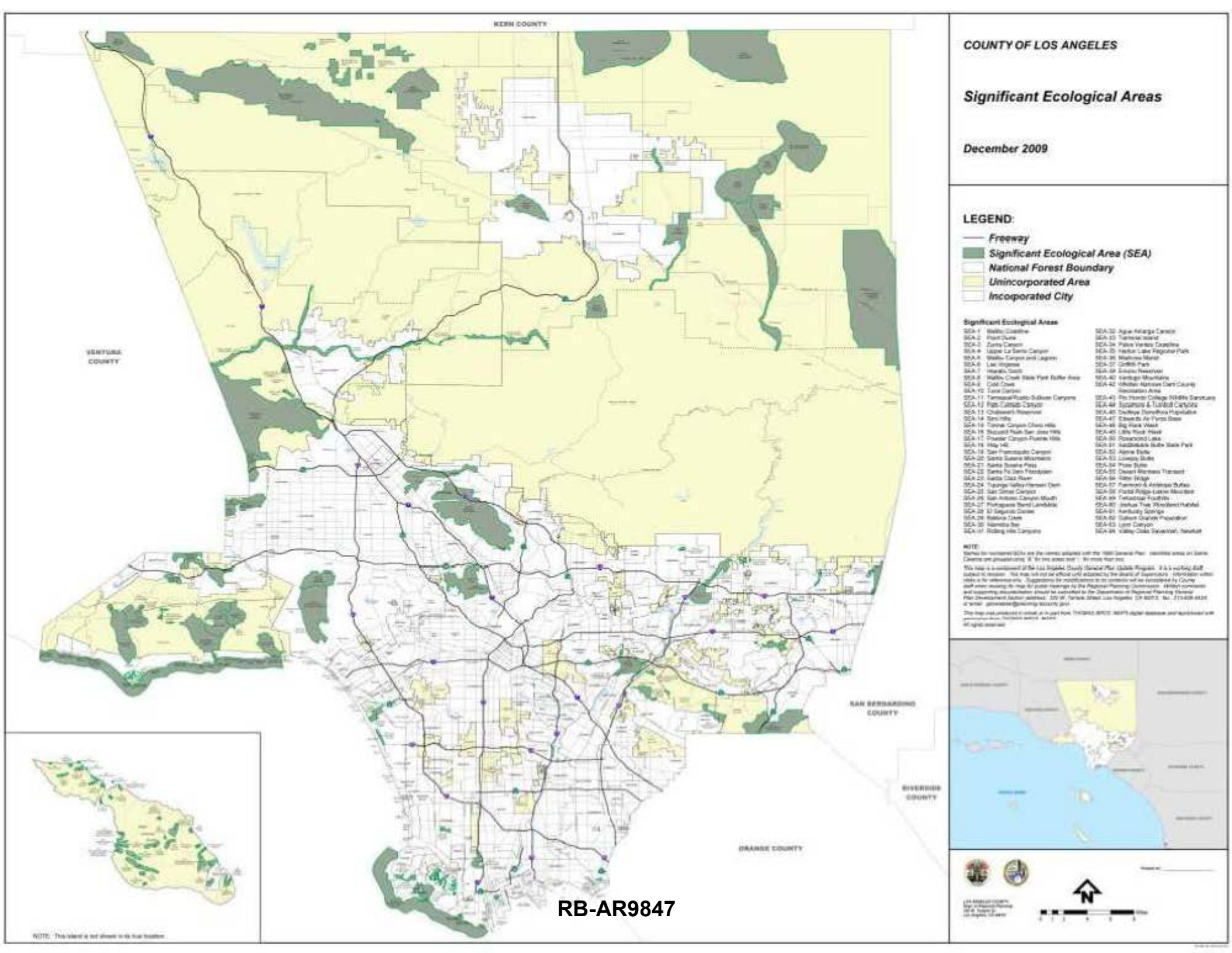
The following is example language that can be inserted into municipal field program contracts:

The Los Angeles Regional Water Quality Control Board (RWQCB) has issued permits which govern stormwater and non-stormwater discharges resulting from municipal activities performed by or for the Coastal Watersheds of Los Angeles County, including the Los Angeles County Flood Control District, the County of Los Angeles, and 84 incorporated cities within the coastal watersheds of Los Angeles County with the exception of Long Beach (collectively referred to as Permittees). The RWQCB Permit is a National Pollutant Discharge Elimination System (NPDES) Permit No. R4-2023-0175. A Copy of the RWQCB Permit is available for review.

In order to comply with the Permit requirements, the Permittees have developed a Watershed Management Program (WMP) which contains Public Agency Facilities and Activities Maintenance Procedures (Maintenance Procedures) with Best Management Practices (BMPs) adopted from the Caltrans Storm Water Quality Handbook Maintenance Staff Guide (Caltrans Handbook) that parties leasing municipally owned properties must adhere to. These Maintenance Procedures contain pollution prevention and source control techniques to minimize the impact of those activities upon dry-weather urban runoff, stormwater runoff, and receiving water quality.

Work performed under this CONTRACT shall conform to the RWQCB NPDES Permit, the WMP, and the CalTrans Handbook, and must be performed as described within all applicable Maintenance Procedures. The CONTRACTOR shall fully understand the Maintenance Procedures applicable to activities that are being conducted under this CONTRACT prior to conducting them and maintain copies of the Maintenance Procedures throughout the CONTRACT duration. The applicable Model Maintenance Procedures are included as Exhibit ___ of this CONTRACT.

Evaluation of activities subject to WMP requirements performed under this CONTRACT will be conducted to verify compliance with the Maintenance Procedures, and may be required through CONTRACTOR self-evaluation as determined by the city.


KERN COUNTY
VENTURA COUNTY
SAN BERNARDINO COUNTY
RIVERSIDE COUNTY
ORANGE COUNTY
NOTE: This island is not shown in its true location.
COUNTY OF LOS ANGELES
Significant Ecological Areas
December 2009
LEGEND:
Freeway
Significant Ecological Area (SEA)
National Forest Boundary
Unincorporated Area
Incoporated City
Significant Ecological Areas
SEA-1 Malibu Coastline
SEA-2 Point Dume
SEA-3 Zuma Canyon
SEA-4 Upper La Sierra Canyon
SEA-5 Malibu Canyon and Lagoon
SEA-6 Las Virgenes
SEA-7 Hidden Valley
SEA-8 Malibu Creek State Park Buffer Area
SEA-9 Cold Creek
SEA-10 Liano Canyon
SEA-11 Tarmaquel/Pacific Sullivan Canyons
SEA-12 Palo Comado Canyon
SEA-13 Chatsworth Reservoir
SEA-14 Simi Hills
SEA-15 Towsley Canyon-Oliveo Hills
SEA-16 Recreation Peak-San Jose Hills
SEA-17 Powder Canyon-Puente Hills
SEA-18 Hillary Hill
SEA-19 San Francisquito Canyon
SEA-20 Santa Susana Mountains
SEA-21 Agoura Sycamore Area
SEA-22 Santa Fe Dam Floodplain
SEA-23 Santa Clara River
SEA-24 Tujunga Valley-Hansen Dam
SEA-25 San Gabriel Canyon
SEA-26 San Antonio Canyon Mouth
SEA-27 Portuguese Bend/Landslide
SEA-28 El Segundo Dunes
SEA-29 Ballona Creek
SEA-30 Marvista Bar
SEA-31 Rolling Hills Canyons
SEA-32 Agua Amarga Canyon
SEA-33 Torrance Island
SEA-34 Palos Verdes Coastline
SEA-35 Harbor Lake Regional Park
SEA-36 Madrona Marsh
SEA-37 Griffith Park
SEA-38 Encino Reservoir
SEA-40 Verdugo Mountains
SEA-42 Whittier Narrows Dam/County Recreation Area
SEA-43 Rio Hondo College Wildlife Sanctuary
SEA-44 Sycamore & Turnbull Canyons
SEA-45 Dalliege Dorothea Hugetation
SEA-47 Edwards Air Force Base
SEA-48 Big Rock Wash
SEA-49 Little Rock Wash
SEA-50 Rosamond Lake
SEA-51 Saddleback Butte State Park
SEA-52 Alpine Butte
SEA-53 Lovejoy Buttes
SEA-54 Piute Buttes
SEA-55 Desert Wilderness Transect
SEA-56 Kiler Ridge
SEA-57 Fremont & Antelope Buttes
SEA-58 Portal Ridge-Liebre Mountain
SEA-59 Tehachapi Foothills
SEA-60 Joshua Tree Woodland Habitat
SEA-61 Kentucky Springs
SEA-62 Sullivan Grantite Precipitron
SEA-63 Lyon Canyon
SEA-64 Valley-Oaks Savannah, Newhall
NOTE:
Names for numbered SEAs are the names adopted with the 1980 General Plan. Identified areas on Santa Catalina and adjacent islands (8, 9) are areas over 1 sq. mile in size.
This map is a component of the Los Angeles County General Plan Update Program. It is a working draft subject to revision. The map will not be official until adopted by the Board of Supervisors. Information within inset is for reference only. Suggestions for modifications to its contents will be considered by County staff when reviewing the maps for public hearings by the Regional Planning Commission. Written comments and supporting documentation should be submitted to the Department of Regional Planning Revenue Plan Development Section addressed: 320 W. Temple Street Los Angeles, CA 90012, fax: 213-626-0434, or e-mail: generalplan@planning.lacounty.gov.
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RB-AR9847

2014

Integrated Pest Management Program

Developed for the City of

_____

RB AR9848

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DRAFT

RB-AR9849

INTEGRATED PEST MANAGEMENT (IPM) PROGRAM IMPLEMENTATION GUIDELINES[1] FOR THE CITY OF _____

General IPM Policy

For the past few decades, the trend in pest management has been to increasingly rely on synthetic chemical pesticides. This management strategy results in the increased use of dangerous chemicals, an increase in the number of pests that can become resistant to the pesticides, as well as lead to new organisms becoming pests. Additionally, some pesticides used for terrestrial pest management have been found in waterways causing problems in the aquatic environment.

Pest control managers are now moving away from their reliance on pesticides and toward an integrated approach that combines limited pesticide use with more environmentally friendly pest control techniques. This system is known as integrated pest management (IPM), a strategy that focuses on the long-term prevention of pests through a combination of techniques, including preventative, cultural, mechanical, environmental, biological, and chemical control tactics (**Figure 1**). Multiple IPM techniques can be utilized simultaneously to control pest populations in the most effective manner possible.

A comprehensive IPM Program and Approach allows for primary focus on pollution prevention by monitoring and preventing pests as well as minimizing heavy pest infestations, which reduces the need for chemicals and/or multiple applications. The goal of the IPM Program is not to eliminate all pests, but to keep their populations at tolerable levels. In an IPM program, pesticides should be applied only when it is determined that pests are approaching damaging levels. Because this requires early detection of the pests, IPM programs utilize monitoring techniques and economic thresholds to determine when to implement control strategies. If possible, a person should be trained and assigned to scout the sites on a regular basis. Pesticides may be part of an IPM program, but they should preferably be used only after pests exceed established thresholds and applied only to the affected area (in the case of disease prevention, some modifications may be allowed). In general, all pest control strategies should be those that are least disruptive to biological control organisms (natural enemies), least hazardous to humans and the environment (including non-target organisms), and have the best likelihood of long-term effectiveness.

[1]Adapted from the Orange County Drainage Area Management Plan Integrated Pest Management Policy Developed by the University of California, Division of Agriculture and Natural Resources

DRAFT

RB-AR9850

IPM practices are encouraged over the sole use of pesticides as the primary means of pest management (**Table 1**). As a part of their Municipal Activities Program, public agencies and their contractors evaluate the ability to use non-chemical IPM techniques before intensive use of pesticides. This IPM Program template outlines baseline IPM procedures that are required by the Los Angeles County Municipal Separate Storm System Permit (MS4 Permit)[2] along with additional optional IPM techniques that can be employed to implement an effective IPM program.

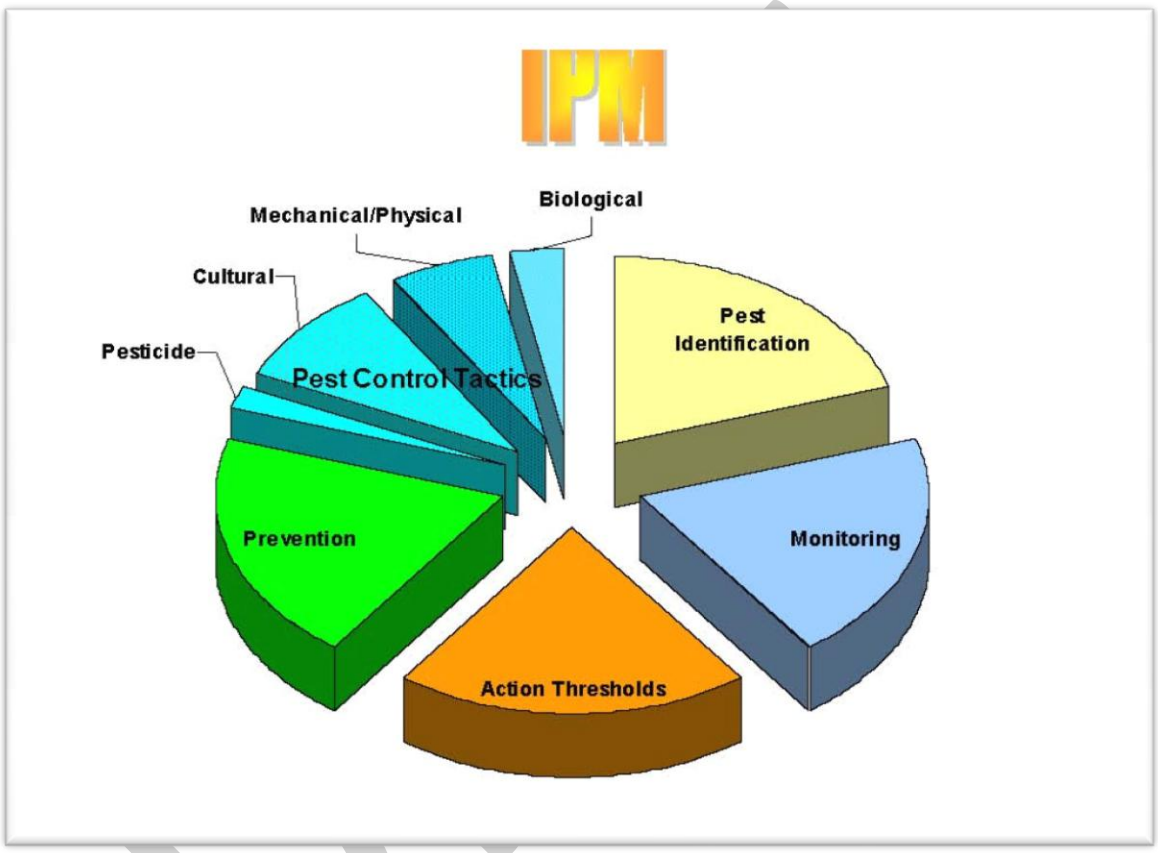

Figure 1 Components of an Integrated Pest Management Program

[2]California Regional Water Quality Control Board Los Angeles Region. 2012. Order No. R4-2012-0175 NPDES Permit No. CAS004001 Waste Discharge Requirements for Municipal Separate Storm Sewer System (MS4) Discharges within the Coastal Watersheds of Los Angeles County, except those Discharges Originating from the City of Long Beach MS4.

RB-AR9851

Table 1 Advantages and Disadvantages of a Pesticide-Based Program Versus An IPM-Based Pest Control Program

Pesticide Based Pest Control		IPM Based Pest Control	
Advantages	**Disadvantages**	**Advantages**	**Disadvantages**
Quick suppression of pests	Not long-term	Long-term control	It may take longer to see results
	Pest control is reactive	Can be proactive in pest control actions.	Must establish thresholds
	Loss of natural controls. Often get outbreaks of other pests	Reduces disruption of natural enemies	
		Pesticides can be used (only used as a last resort)	Must have knowledge of pesticides and their effects on other organisms.
Labor is only for spraying	Extra work in cleanup	Staff becomes more knowledgeable of pests and injury symptoms	Labor is required for monitoring and regular scouting Training is required to identify pests and natural enemies
Not much preparation or follow-up needed	Need a PCA recommendation	Pest management is more organized	Must maintain a record-keeping system.
	Pesticide safety issues for applicators, public, animals More pesticides in environment Contamination of water bodies from runoff	Less exposure to pesticides Safer to the environment Reduces contamination from runoff	

RB-AR9852

Implementation Guidelines

Enter Designated IPM Coordinator or IPM Contact Information in Box Below:

IPM Coordinator: Contact Info:

Personnel responsible for the care and maintenance of facilities under the City of _____ agree to implement a suite of basic integrated pest management procedures to meet MS4 Permit requirements[3]. The fundamental basis for the IPM program must include the following as outlined in Permit Part VI.D.9.g:

1. **Pesticides are to be used if monitoring indicates they are needed, and pesticides are applied according to applicable permits and established guidelines.**
2. **Treatments are made with the goal of removing only the target organism.**
3. **Pest controls are selected and applied in a manner that minimizes risks to human health, beneficial non-target organisms, and the environment.**
4. **The use of pesticides, including Organophosphates and Pyrethroids, does not threaten water quality.**
5. **Partnerships with other agencies and organizations are established to encourage the use of IPM.**
6. **A standardized protocol is to be used for the routine and non-routine application of pesticides (including pre-emergents), and fertilizers.**
7. **There is to be no application of pesticides or fertilizers (1) when two or more consecutive days with greater than 50% chance of rainfall are predicted by NOAA34, (2) within 48 hours of a ½-inch rain event, or (3) when water is flowing off the area where the application is to occur. This requirement does not apply to the application of aquatic pesticides or pesticides which require water for activation.**
8. **No banned or unregistered pesticides are stored or applied.**
9. **All staff applying pesticides are certified in the appropriate category by the California Department of Pesticide Regulation, or are under the direct supervision of a pesticide applicator certified in the appropriate category.**
10. **Procedures to encourage the retention and planting of native vegetation to**

[3] In addition to MS4 Permit compliance, there are extensive federal and state laws and regulations that all public agencies must be in compliance with at all times, including the California Food and Agricultural Code (FAC) and the California Code of Regulations, Title 3 (3CCR).

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reduce water, pesticide and fertilizer needs are implemented; and

11. **Pesticides and fertilizers are stored indoors or under cover on paved surfaces, or use secondary containment.**
    a. **The use, storage, and handling of hazardous materials are reduced to decrease the potential for spills.**
    b. **Storage areas are regularly inspected.**

In order to implement the above required minimum practices, the following section describes components of an effective IPM Program that can be employed:

- Pest and Symptom Identification
- Prevention
- Monitoring
- Injury Levels and Action Thresholds
- Pest Control Tactics

A number of useful IPM techniques are outlined under each component and further described in Appendix A. These techniques are known to be effective and methods can be selected from each component as necessary to achieve the IPM goals and meet MS4 Permit requirements.

Additional information on the latest IPM techniques including management of new pests in the landscape can be obtained from local UC Cooperative Extension Advisors, UC IPM Regional Advisor, or the Statewide UC IPM Web Site at www.ipm.ucdavis.edu.

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Components of an Effective IPM Program

An IPM program is a long-term, multi-faceted system to manage pests (**Figure 1**). Use of pesticides is a short-term solution to pest problems, and should be used only when the other components fail to maintain the pests or their damage below an acceptable level. Successful IPM practitioners are knowledgeable about the biology of the plants and pests, and successful IPM programs primarily use combinations of cultural practices as well as a combination of physical, mechanical and biological controls.

Pest Identification

It is important to learn to identify all stages of common pests at each site. For example, if you can identify weed seedlings, you can control them before they become larger and more difficult to control and before they flower, disseminating seeds throughout the site. It is also important to be sure that a pest is actually causing the problem. Often damage such as wilting is attributed to root disease but may actually be caused by under watering or wind damage. Appendix A lists specific techniques that can be employed to identify pests.

Prevention

Good pest prevention practices are critical to any IPM program, and can be very effective in reducing pest incidence. Numerous practices can be used to prevent pest incidence and reduce pest population buildup such as the use of resistant varieties, good sanitary practices and proper plant culture. Examples of prevention include choosing an appropriate location for planting, making sure the root system is able to grow adequately and selecting plants that are compatible with the site's environment. Appendix A lists specific techniques that can be employed to achieve pest prevention.

Monitoring

The basis of an effective IPM Program is the development and use of a regular monitoring or scouting program. Monitoring involves examining plants and surrounding areas for pests, examining tools such as sticky traps for insect pests and quantitatively or qualitatively measuring the pest population size or injury. This information can be used to determine if pest populations are increasing, decreasing, or staying the same and to determine when to use a control tactic. Weather and other environmental conditions may also play a factor in whether a pest outbreak may occur so it is important to monitor temperature and soil moisture as well.

It is important to use a systematic approach when monitoring, for example you should examine leaves of a similar age each time you check for pests, rather than looking at the older leaves on some plants and younger ones on others. Randomly looking at a plant and its leaves does not allow you to track changes in pest population or damage over time.

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It is important to establish and maintain a record-keeping system to evaluate and improve your IPM program. Records should include information such as date of examination, pests found, size and extent of the infestation, location of the infestation, control options utilized, effectiveness of the control options, labor and material costs. Appendix A lists specific techniques that can be employed to in the monitoring of pests.

Injury Levels and Action Thresholds

In order to have a way to determine when a control measure should be taken, injury levels and action thresholds must be set for each pest. An injury level is the level of unacceptable damage. For example, the injury level for a leaf-feeding beetle may be set at 30% of the leaves being damaged. Action thresholds are the set of conditions required to trigger a control action. An example of this would be finding an average of 5 or more beetles on 10 shrubs in a location. Action thresholds are set from previous experience or published recommendations and based on expected injury levels. Injury levels are often set by the public's comments. Appendix A lists specific techniques that can be employed to determine injury levels and action thresholds.

Pest Control Tactics

Integrated pest management programs use a variety of pest control tactics in a compatible manner that minimizes adverse effects to the environment. A combination of several control tactics is usually more effective in minimizing pest damage than any single control method. The type of control that an agency selects will likely vary on a case-by-case basis due to the varying site conditions.

The primary pest control tactics to choose from include:

- Cultural
- Mechanical/Physical
- Biological
- Pesticide

Appendix A lists specific pest control techniques that can be employed.

Cultural Controls

Cultural controls are modifications of normal plant care activities that reduce or prevent pests. In addition to those methods used in the pest preventions, other cultural control methods include adjusting the frequency and amount of irrigation, fertilization, and mowing height. For example, spider mite infestations are worse on water-stressed plants, over-fertilization may cause succulent growth which then encourages aphids, too low of a mowing height may thin turf and allow weeds to become established.

Mechanical/Physical Controls

Mechanical control tactics involve the use of manual labor and machinery to reduce or

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eliminate pest problems using methods such as handpicking, physical barriers, or machinery to reduce pest abundance indirectly. Examples include hand-pulling or hoeing and applying mulch to control weeds, using trap boards for snails and slugs, and use of traps for gophers.

The use of physical manipulations that indirectly control or prevent pests by altering temperature, light, and humidity can be effective in controlling pests. Although in outdoor situations these tactics are difficult to use for most pests, they can be effective in controlling birds and mammals if their habitat can be modified such that they do not choose to live or roost in the area. Examples include removing garbage in a timely manner and using netting or wire to prevent bird from roosting.

Biological Controls

Biological control practices use living organisms to reduce pest populations. These organisms are often also referred to as beneficials, natural enemies or biocontrols. They act to keep pest populations low enough to prevent significant economic damage. Biocontrols include pathogens, parasites, predators, competitive species, and antagonistic organisms. Beneficial organisms can occur naturally or can be purchased and released.

The most common organisms used for biological control in landscapes are predators, parasites, pathogens and herbivores.

- Predators are organisms that eat their prey (e.g. Ladybugs).
- Parasites spend part or all of their life cycle associated with their host. Common parasites lay their eggs in or on their host and then the eggs hatch, the larvae feed on the host, killing it (e.g. Tiny stingless wasps for aphids and whiteflies).
- Pathogens are microscopic organisms, such as bacteria, viruses, and fungi that cause diseases in pest insects, mites, nematodes, or weeds (e.g. Bacillus thuringiensis or BT).
- Herbivores are insects or animals that feed on plants. These are effective for weed control. Biocontrols for weeds eat seeds, leaves, or tunnel into plant stems (e.g. goats and some seed and stem borers).

In order to conserve naturally occurring beneficials, broad-spectrum pesticides should be avoided since the use of these types of pesticides may result in secondary pest outbreak due to the mortality of natural enemies that may be keeping other pests under control (Figure 2).

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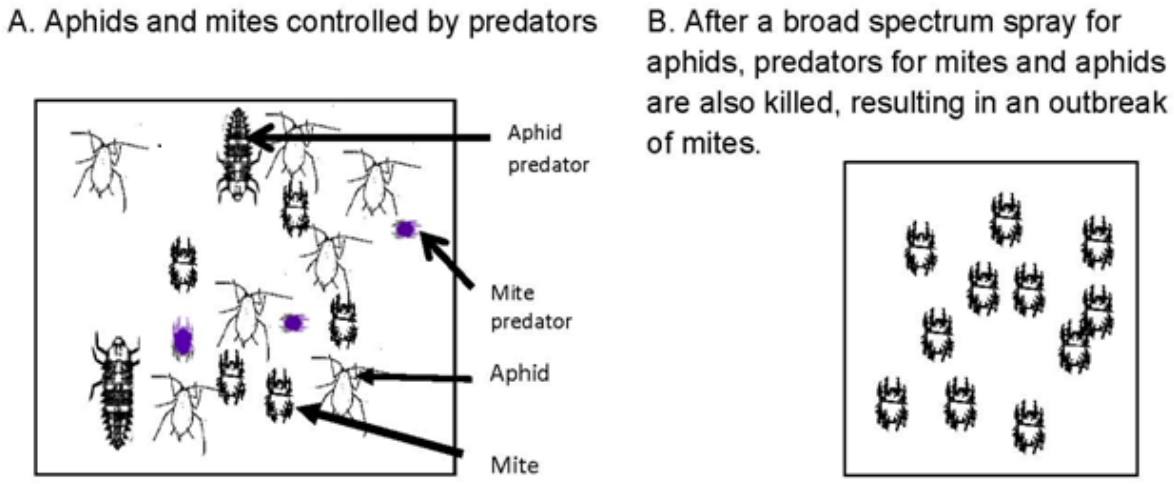

Figure 2 Example of Secondary Pest Outbreak Caused By Use of a Broad Spectrum Insecticide

Pesticide Controls

Any substance used for defoliating plants, regulating plant growth or preventing, destroying, repelling or mitigating any pest, is a pesticide. Insecticides, miticides, herbicides, fungicides, rodenticides and molluscides are all pesticides. Anything with an EPA or DPR registration number on the label is a non-exempt pesticide.

Pesticides should only be used when other methods fail to provide adequate control of pests and just before pest populations cause unacceptable damage. The overuse of pesticides can cause beneficial organisms to be killed and pest resistance to develop. When pesticides must be used, considerations should be made for how to use them most successfully. Avoid pesticides that are broad-spectrum and relatively persistent since these are the ones that can cause the most environmental damage and increase the likelihood of pesticide resistance. Always choose the most specific but least toxic to non-target organisms method.

In addition, considerations should be given to the proximity to water bodies, irrigation schedules, weather (rain or wind), etc. that are secondary factors that may result in the pesticide being moved off-site into the environment. Consideration should be made of the temporary loss of use of an area (application in a park may result in the area being sectioned off).

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Appendix A: Optional IPM Techniques to Integrate into IPM Program

The following practices are generally accepted to be effective IPM techniques. These procedures increase the long-term prevention and suppression of pest problems (insects, weeds, diseases, and vertebrates) with the minimum impact on human health, the environment, and non-target organisms. Emphasis is placed on improving cultural practices to prevent problems and utilize alternative control measures instead of broad spectrum pesticides. The following IPM techniques are divided into the following categories:

- General Pesticide Management Practices
- Pest and Symptom Identification
- Prevention
- Monitoring
- Injury Levels and Action Thresholds
- Pest Control Tactics

GENERAL PESTICIDE MANAGEMENT PRACTICES

- Maintain a complete inventory of all pesticides used and the use sites. This inventory should be updated annually.
- If pesticides are necessary, CAUTION-labeled pesticides should be considered before more toxic alternatives.
- Ensure that no banned or unregulated pesticides are stored or applied.
- Restricted use pesticides should only be used when no other alternatives are practical.
- Only small quantities of pesticides should be purchased eliminating the need for stockpiling.
- MSDSs should be regularly updated to reflect new pesticides or label changes to pesticides in storage.
- Pesticides should be used only according to label instructions.
- Weather conditions that could affect application should be considered. For example, wind conditions affect spray drift; rain may wash pesticide off of leaves.
- Pesticides should not be applied where there is a high chance of movement into water bodies; for example, they should not be applied near wetlands, streams, lakes, ponds or storm drains unless it is for an approved maintenance activity.
- In most cases, empty pesticide containers should be triple-rinsed before disposal. Particular information on the proper disposal of the pesticide and its container can be found on the label.

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- Pesticide equipment and containers should not be cleaned or rinsed in the vicinity of storm drains or other open water areas.
- Pesticides should be stored in covered areas with cement floors and in areas insulated from temperature extremes.
- Chemicals and equipment should be secured during transportation to prevent tipping or excess jarring.
- Pesticides should be transported completely isolated from people, food and clothing, for example, in the bed of the truck rather than in the passenger compartment.
- Pesticide equipment, storage containers and transportation vehicles should be inspected frequently.
- A plan for dealing with pesticide spills and accidents should be developed.
- Unless their safety is compromised, workers should immediately clean up any chemical spills according to label instructions and notify the appropriate supervisors and agencies.
- Pesticide applications on public property, which take place on school grounds, parks, or other public rights-of-way where public exposure is possible, should be posted with warning signs. The specific criteria for the signage can be found in FAC, section 12978. Pesticide applications by the Department of Transportation on public highway rights-of-way are exempt.

PEST AND SYMPTOM IDENTIFICATION

Insects, Mites, and Snails and Slugs

- Field personnel should be trained to recognize basic pests found in the landscape in the following groups: insects, mites, and mollusks.
- A licensed Pest Control Adviser can be on staff or hired to properly identify a pest and the symptoms caused by the pest.
- Field personnel can be trained to utilize disease life cycles to apply treatments when the organism can be controlled most effectively.
- Field personnel can be trained to distinguish between beneficial insects and actual pests found in the landscape (e.g. parasitizing wasps).
- Unknown samples can be submitted to the Orange County Agricultural Commissioner for identification by the county entomologist or plant pathologist.
- Abiotic or nonliving factors (wind, sunburn, air pollution, etc…) should be considered as possible causes of observed symptoms as well as biotic (living) factors.

Weeds

- Field personnel can be trained to identify common weeds in the landscape.
- Field personnel can be trained to utilize weed life cycles to properly control

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weeds such as controlling crabgrass utilizing a pre-emergent herbicide applied in mid-January.
- A licensed Pest Control Adviser can be on staff or contracted to properly identify the pest.

Diseases

- Field personnel can be trained to recognize common diseases or their signs/symptoms in the landscape.
- Field personnel can be trained to utilize disease life cycles to apply treatments when the organism can be controlled most effectively.
- Field personnel can be trained to recognize the difference between biotic and abiotic problems.
- Field personnel can be trained to understand how common diseases are spread throughout the landscape.
- Disease signs and symptoms can be sampled and submitted to the Orange County Agricultural Commissioner for identification by the county plant pathologist.
- A licensed Pest Control Adviser can be on staff or contracted to properly identify the pest.
- Photographs of disease signs and symptoms can be taken and compared to reference guides such as UC IPM's *Pests of Landscape Trees and Shrubs*.

Vertebrates

- Field personnel can be trained to recognize vertebrate pests and the damage they cause in the landscape.
- Field personnel can be trained to utilize vertebrate behavior to properly control the pest most effectively.
- Field personnel can be trained in vertebrate baiting and trapping.
- A licensed Pest Control Adviser can be on staff or contracted to properly identify vertebrate pest.

PREVENTION

Landscape Design Procedures

- Drainage, soil characteristics, water quality and availability should be considered during plant selection.
- Sun exposure, heat, and high temperature conditions should be considered during plant selection.
- Plant material should be selected based on adaptability to local climate conditions, such as those conditions common to a Mediterranean climate.
- Adequate space should be allowed for root growth, especially trees.

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- Nursery stock should be inspected and rejected if not healthy (injuries, diseased, circling roots/potbound, poor staking and/or pruning).
- Pest resistant species and cultivars should be selected.
- Plants with similar growth characteristics and irrigation requirements should be grouped together.
- Landscape design should match available irrigation technology to avoid excess water use and to minimize surface runoff.

Site Preparation and Planting Procedures

- Soil drainage properties can be assessed and compacted soils improved prior to planting.
- A soil analysis can be conducted to determine the chemical and physical properties of the existing soil and then appropriate amendments such as organic matter can be added.
- Irrigation should be installed as designed in order to avoid poor uniformity once plants are in place.
- Proper planting procedures should be followed for particular plant species to avoid planting too deeply or too shallow.
- Nursery tree stakes can be removed at planting and replaced with staking that allows trunk to flex; removing these stakes after 1 to 1.5 years.
- A soil probe or other soil moisture measurement device can be utilized to monitor soil moisture levels in existing root ball and surrounding soil during establishment period.

Water Management

- Plants should be examined weekly for symptoms of water stress and to assist in determining irrigation scheduling.
- Soil moisture can be monitored with a soil probe or soil moisture sensors to assist in scheduling irrigation.
- Evapotranspiration (ET) data or 'smart' clock technology can be utilized to schedule irrigation.
- Cyclic irrigation (short-multiple run times) can be employed to minimize surface runoff.
- Low precipitation sprinklers or low-volume systems can be utilized to reduce surface runoff.
- Systems should be inspected monthly to check for leaks, broken pipes, and clogged or broken sprinkler heads.
- Adjust sprinklers to avoid application of water directly to the trunk of trees (can promote disease) or on to concrete surfaces where it can enter storm drains.
- A hotline, email, or other dedicated method can be established for citizens to

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report leaks and broken sprinkler heads

Fertilizing Procedures

- To avoid nutrient losses below the root zone, fertilize only when plants are actively growing.
- Fertilizer should not be applied within 48 hours of a rain event to avoid losses below the root zone and in surface runoff.
- Soil analyses can be conducted in order to determine existing nutrient levels in the soil prior to fertilizing.
- Turf grass fertilizer maintenance schedules can be based on UC recommendations found online at UC Guide for Healthy Lawns: http://www.ipm.ucdavis.edu/TOOLS/TURF/MAINTAIN/fertilize.html
- Sports turf grass fertilizer maintenance guidelines can be based on UC recommendations found in *Establishing and Maintaining the Natural Turf Athletic Field (UCR ANR Publication Number: 21617)*.
- Overfertilization, especially of trees and shrubs, should be avoided to ensure plant growth is not excessively succulent making it more susceptible to pest infestations.
- Off-target fertilizer applications or spills should be cleaned up immediately by sweeping up and applying to landscape or turf or replacing in spreader or bag to ensure material does not enter storm drains.

Pruning Procedures

- Damaged or diseased wood should be regularly pruned from landscape plants.
- Trees should be pruned according to standards set forth by a professional tree care organization such as the International Society of Arboriculture.
- Plants too large for a space should be replaced instead of pruning them severely.
- Unnecessary pruning should be avoided as wounds are entry sites for decay and disease organisms.
- The age and species of the plant should be taken into account when determining the time of year to prune. For example, eucalyptus should be pruned in December and January when long-horned beetles are not active.
- Tree height reduction should be discouraged. When deemed necessary by a licensed arborist, the crown reduction method approved by a professional tree care organization should be utilized. Topping should not be done to reduce tree size.

MONITORING FOR PESTS AND PROBLEMS

Insect/Mollusk Monitoring Procedures

- Monthly visual inspections of plants for insects, mites, snail and slug damage,

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and recording results is an effective method for tracking changes and easy recall of data.

- Yellow sticky traps can be utilized to assess populations of insects.
- Insects can be dislodged from plants by shaking over a collection surface usually consisting of a clipboard with a white sheet of paper.
- If available for a particular insect, pheromone-baited traps can be utilized.
- Soil-dwelling turf insects can be brought to the surface for monitoring by flushing a specific area of soil (i.e. 2' x 2' grid) with plain water or a soapy water mixture.
- The amount of honeydew (aphids) and frass (caterpillars) present can be utilized as an indicator of population levels.

Weed Monitoring Procedures

- Landscapes can be inspected at least 4 times a year (early winter, early spring, summer and early fall) for weeds in order to determine if and when a weed problem exists.
- Site surveys can be utilized to record the location, date, and severity of weed problem for an effective method of tracking changes and easy recall of data.
    - The number of weeds encountered at periodic intervals (e.g. every 1 to 2 feet) can be counted and recorded along a straight line transecting a landscaped, area or within a selected area, for example 4 sq. ft. samples done in random places in a bed or turf area.

Disease Monitoring Procedures

- Landscapes should be regularly checked for conditions, such as overwatering and injuries, which promote disease.
- Landscapes should checked monthly for disease symptoms and signs. Disease prone plants should be checked more frequently.
- Landscape inspections should note date when disease signs and symptoms were first noticed and the current environmental conditions and soil moisture levels as an effective method of tracking changes and easy recall of data.

Vertebrate Monitoring Procedures

- Landscapes can be regularly inspected for vertebrate presence either by damage caused by animal, actual animal sightings, and/or droppings.
- Records can be kept of the absence or presence of actual vertebrates, the damage caused, and/or the presence or absence of droppings.
- Maps can be created and updated at least twice a year, recording areas of high vertebrate damage or signs (such as gopher mounds).

INJURY LEVELS AND ACTION THRESHOLDS

Insect/Mollusk Thresholds and Guidelines

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- Insect tolerance levels can be established based on the public's acceptance of damage to the landscape or a certain level of nuisance pests (i.e. ants), the actual plant species in the landscape, and long-term monitoring and knowledge of pests causing the damage.
- Thresholds can be based on levels where reasonable control of the pest can be achieved with minimum impact on the environment.
- Insect monitoring records can be utilized to establish threshold levels for the implementation of control strategies. For example, the threshold for the presence of aphids on a rose garden at City Hall is low, while in a native shrub border it might be considerably higher.

Weed Thresholds and Guidelines

- Weed tolerance levels can be established based on public safety or the public's acceptance and the resources available to manage the landscape at that level.
- Weed monitoring records can be utilized to rank the percentage of the landscape area infested (none, light, moderate, heavy, or very heavy) with weeds.
- Public areas can be ranked according to high, medium, or low level of weed control and management conducted according to levels set for each rank (see Appendix B)

Disease Thresholds and Guidelines

- Disease tolerance levels can be established based on the public's acceptance and the resources available to manage the landscape at the level required.
- Disease monitoring records can be utilized to establish threshold levels for the implementation of control strategies. For example, the threshold for the presence of powdery mildew on roses at City Hall is much lower than the threshold for its presence on Euonymus in a parking lot at a city sports park.

Vertebrate Thresholds and Guidelines

- Vertebrate tolerance levels can be established based on public safety, the public's acceptance and the resources available to manage the landscape at the level required.
- Vertebrate monitoring records can be utilized to establish threshold levels for the implementation of control strategies. For example, the threshold for the presence of gopher mounds in a sport field is zero, while in a native shrub border it might be two before a trapping strategy is implemented.

PEST CONTROL TACTICS

Insect/Mollusk Management Methods

Cultural/Mechanical/Physical Control Methods

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- Sticky barriers can be applied to trunks of trees and large shrubs to prevent ants and other wingless invertebrates from plant canopies.
- Small insect infestations can be removed by pruning infested plant parts.
- Copper bands can be installed around base of trees or planting areas where snail and slug infestations are prevalent.
- Plant canopies can be thinned to increase light penetration to expose certain soft-bodied insects (soft-scale) as well as snails and slugs to heat.
- Strong streams of water can be used to dislodge insects such as aphids and whiteflies, from leaves.
- The use of plants that snails and slugs use for shelter should be avoided.
- Avoid irrigating between 5pm and 5am when moisture remains on plant material for several hours.

Biological Control Methods

- Persistent broad-spectrum pesticides should be avoided, especially if biological control of an insect has been established by UC researchers. Examples include parasitoid wasps controlling Eugenia Psyllids, Giant Whitefly, and Ash Whitefly.
- Natural predators (beneficial insects) can be augmented with purchases of additional predators from commercially available resources.

Pesticide Control Methods

- The most selective, rather than broad-spectrum, pesticide should be used.
- If available for controlling a particular insect, biological and botanical pesticides should be selected.
- Insecticidal soaps can be utilized to control infestations of soft-bodied insects such as aphids, thrips, and immature scales.
- Horticultural oils (neem oil and narrow-range refined oils) can be utilized to control infestations of soft-bodied immature and adult insects such as aphids, scales, and whiteflies.
- Pesticides should only utilized when the potential for impacts to the environment, especially water quality, are minimized.
- Equipment should be calibrated prior to the application of the insecticide to avoid excess material being applied to the landscape environment.
- Applicators should be trained to not apply pesticides to hard surfaces and to not allow any pesticide to enter the storm drain system.
- Spot treatments should be utilized rather than broadcast methods.
- Insecticide/fertilizer combinations should only used if it is appropriate timing for BOTH the insecticide application and the fertilizer application.

Weed Management Methods

Cultural, Mechanical, and Physical Control Methods

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- Timers can be set to avoid overwatering as weeds establish in areas where soil moisture is excessive.
- Drainage can be managed to avoid wet areas.
- Weeds can be removed from a site prior to planting.
- Mower height can be adjusted to turf species and time of year.
- Mower should be washed after mowing a weedy site.
- Hand-pulling, mowing, trimmers/brushcutters, flaming, hoeing, and rototilling around landscape plants should be the main methods utilized to control annual weeds and young perennial weeds.
- Soil solarization can be utilized to control some annual and perennial weed species.
- Bare soil areas can be covered with a thick layer of mulch to suppress weeds and conserve soil moisture.
- Soil, mulch, and plant material should be weed-free before it is introduced into the landscape.

Pesticide Control Methods

- Spot treatments can be utilized rather than broadcast methods.
- Herbicide/fertilizer combinations should only used if it is appropriate timing for BOTH the herbicide application and the fertilizer application.
- Herbicides should be utilized according to established thresholds (see Appendix B).
- Organically acceptable herbicides (shown to be effective through science-based research) should be used where appropriate.
- Herbicides can be applied to the stage of weed growth most susceptible to the chemical.
- Equipment should be calibrated prior to the application of the herbicide to avoid excess material being applied to the landscape environment.

Disease Management Methods

Cultural, Mechanical, and Physical Control Methods

- Localized areas of diseased plants should be pruned out and disposed of.
- Pathogen-infested plant parts can be removed from the soil surface area to reduce certain pathogens (e.g. Camellia Petal Blight).
- Pruning tools can be sterilized (e.g. a diluted bleach solution) between plants to prevent the spread of pathogen to other plants.
- Proper irrigation and fertilization can be maintained to prevent plant stress, waterlogging, and subsequent susceptibility to disease.
- Soil solarization can be utilized to control soil pathogens in annual beds where it

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is most effective.

- Mulch can be kept at least 6" from base of plants to avoid excessive moisture around crown possibly resulting in crown rots and is no deeper than 4"
- Disease-prone plants can be replaced with non-susceptible species.

Pesticide Control Methods

- Preventative fungicides and bactericides should only used where diseases can be predicted from environmental conditions and applied prior to infection or the appearance of symptoms.
- Synthetic fungicides should be used sparingly in the landscape and only in high visibility areas in order to minimize development of resistance.
- Organic fungicides and bactericides should be utilized in combination with cultural, mechanical, and physical control methods in order to improve their effectiveness.
- Copper-based fungicides should only be utilized in situations where its entry into surface runoff and storm drains is virtually impossible and after consultation with PCA and IPM coordinator.
- Mycopesticides, commercially available beneficial microorganisms, should be used where appropriate.
- Fungicides classes can be rotated to avoid resistance.

Vertebrate Management Methods

Cultural and Physical Control Methods

- Groundcovers can be maintained such that they do not harbor rats.
    - Shrubs pruned at least 1 foot from the ground (rats).
    - Sources of drinking water removed (leaky faucets, puddles).
    - Trash cans have lids and are emptied daily (rats).
    - Screens or other barriers installed under structures that have a space between soil and floor (rabbits).
- Habitat modification, based on pest biology can be used to reduce shelter. Trapping can be used for gophers when safe and practical.
- Kill traps used for ground squirrels and rabbits, should be checked daily, and put in places not accessible by children or non-target animals.
- Gas cartridges can be used for ground squirrels according to UC recommendations.

Pesticide Control Methods

- Anti-coagulant baits can be used and applied according to label and UC recommendations.
- Bait should be applied in a manner that non-target animals do not have access to

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it.

- Restricted use pesticides should only be applied by or under the direct supervision of an individual with a qualified applicators certificate (QAC). To receive a QAC, a person must take a test administered by Department of Pesticide Regulation (DPR). To obtain test materials, test schedules, and an application, see http://www.cdpr.ca.gov/docs/license/liccert.htm.

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Appendix B

Ranking public areas for weeds (or other pest) management:

Areas ranked as **HIGH** may include areas that the public sees and expects to be well-maintained. Examples are entrances to public buildings such as city hall and libraries.

These areas are allowed to use pesticides based on established thresholds.

Areas ranked as **MEDIUM** may include areas the public sees but does not expect a high level of maintenance. Examples are landscaped areas away from the entrance, recreational and picnic areas. These areas can tolerate a higher lever of weeds.

*These areas are allowed to use pesticides but the threshold is much higher and pesticides are used infrequently and only after consultation with IPM coordinato*r.

Areas ranked as **LOW** may include areas the public rarely sees or does not expect a high level of maintenance. Examples are medians, landscaped areas in parking lots, wildlands. These areas can tolerate a higher lever of weeds.

These areas are not allowed to use pesticides except in extreme cases and only after consultation with IPM coordinator.

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Insert City Seal

Example Catch Basin Cleaning Log

Catch Basin Cleaning Log			
Date	Location	Number of Catch Basins Cleaned	Total Amount Removed
Notes:			

Example of Completed Catch Basin Cleaning Log

Catch Basin Cleaning Log			
Date	Location	Number of Catch Basins Cleaned	Total Amount Removed
7/1/13	Street #1	20	55 cu. ft.
	Intersection #1	10	
	Street #2	5	
Notes:			

Drainage Inlet/Catch Basin Information		
Location		
Street:	Cross Street:	Side (N,S,E,W)
Distance:	Direction (N,S,E,W):	Inlet #:
Map #:	Grid:	
Condition		
Length of Opening:	Height of Opening:	Stencil Legible (Y/N):
Bicycle Bars (Y/N):	Grate Size:	Inlet Protection Bar (Y/N):
Treatment Control BMP (Y/N):	Type of BMP:	
Repairs Required:		

Illicit Connection Investigations Guidance

Field Screening Techniques

If evidence of an illicit discharge is detected, as described in Section 2, and the source does not appear to be evident or above ground, investigations will be conducted to determine if the discharge is being conveyed through an illicit connection. A good source of information includes *Investigation of Inappropriate Pollutant Entries into Storm Drainage Systems* (EPA/600/R-92/238.1993, Pitt et al). General guidance follows below. These techniques can also be used if a Permittee elects to survey sections of their system for illicit connections.

Document Research

Maps of drainage facilities can be reviewed to locate upstream connections and drainage basins as an initial step to locate potential illicit connections. Other records, such as connection permits and discharge permits, can also be reviewed to determine if legal connections may be the source.

Physical Inspections

Catch basins, manholes and other facilities that can be safely investigated from the surface should be physically checked for evidence of connections. This may be a hard pipe connection, or could be a hose or other conveyance that directs a discharge into the storm drain facility. Identification of connections that exhibit evidence of suspected illicit discharges during routine site inspection (e.g., industrial, commercial or construction). Investigation is conducted to determine if the discharge is being conveyed through an illicit connection when evidence of illicit discharge is detected, and the source does not appear to be evident or above ground.

Facilities that are large enough for personnel to enter can also be physically inspected, however, entry into facilities requires strict adherence to health and safety procedures, including confined space entry procedures. In general, a space is “confined” if it is not intended for human occupancy, has limited openings for entry or exit, and has insufficient natural or mechanical ventilation. Information on safety procedures can be found in many documents, including the *Occupational Safety and Health Guidance Manual*, National Institute for Occupational Safety and Health; *OSHA Safety and Health Standards 29 CFR 1910 (General Industry)*, US Department of Labor, and *Title 8 of the California Code of Regulations, General Industry Safety Order*.

Dye Tests

Dye tests can reveal illicit connections in areas where storm drain flows are unexplained and the Permittee has access to suspect facilities. Typical dye tests consist of the addition of fluorescent dye to a floor drain or waste line from a domestic, commercial or industrial process, followed by monitoring for the dye in downstream storm drains. Permittees should conduct dye testing facility by facility (in each area where unexplained flow exists) until all facilities in the area are tested.

Smoke Tests

Smoke tests can reveal if illicit connections exist, and can reveal their source. Storm drains are sealed via sandbags or other sealing devices (plugs, etc.) and smoking incendiary devices are ignited upstream of the seal. Simultaneous inspections inside area facilities should reveal illicit connections even in the

absence of flow. As illicit discharges are intermittent, smoke tests offer real advantages over other types of illicit discharge source identification methods. However, as many legitimate connections to a storm drain may exist (roof drains, street drains, etc.) smoke may be observed extensively. This may cause some illicit connections to be missed, and create a problem with area businesses and residents as excessive smoke begins to enter private property.

T.V. Inspections

T.V. inspections can reveal if illicit connections exist, but cannot be used to view up the connection to determine the source. Robotized or otherwise mobile television cameras allow visual inspection of storm drains (pipes) too small or dangerous for personnel to enter. Although an excellent method of identifying and documenting illicit connections, T.V. inspections have high costs unless the equipment is already owned or can be borrowed from neighboring agencies.

Guidance Source

Los Angeles County Model Stormwater Quality Management Program, 2003.

Illicit Discharge Investigation and Elimination Guidance

Introduction

Once illicit discharges/disposal are detected and identified, they must be eliminated. Sometimes the source of the spill or discharge/disposal is apparent. The incident can be removed through voluntary cleanup/termination or enforcement procedures, and steps can be taken to prevent its recurrence. These prevention methods can include education and outreach materials for residents and businesses, preventive maintenance practices for infrastructure, vehicles and equipment or additional enforcement.

When the source of the discharge is not apparent, further investigation will be necessary to eliminate it and prevent it from recurring. The following discusses methods that can be used to document the incident, determine the nature of the material, and investigate the source.

Advance Planning

An effective investigation program requires good advance planning. Sufficient staff should be trained to conduct investigations so that qualified staff are available whenever investigations are necessary. Staff should become familiar with illicit discharge investigation and sampling procedures. General guidance follows below to assist with overall planning, but should not be considered complete for proper sampling quality assurance purposes.

Equipment

Appropriate equipment for field investigations may include:

Table 1: Typical Equipment for Investigations

Equipment Type	Equipment
General	Inspection checklist
	Field data log book
	Camera
	Tape measure
	Storm drain system map
	Flashlight
Flow measurement	Ping pong ball or other light floatable
	Stopwatch
Laboratory	Graduated container
	Temperature/pH/conductivity (EC) probe
	Field test kits (e.g., Lamotte test kit)
	12 1-liter amber glass sample bottles
	12 1-liter HDPE sample bottles
	Cooler with ice for sample preservation
	Gloves
	Splash goggles/safety glasses
	Deionized water in wash bottle
First Aid	First aid kit

Data Collection

Before entering the field, the inspection crew should locate information such as the following on a storm drain/street map for areas that will be investigated:

- All known or suspected pollutant generating activities
- Locations of NPDES dischargers
- All locations where storm drains enter open channels
- Catch basins and storm drain manholes

Visual Observation

Visual observation of the storm drain system and/or of activities on the surface can provide information on the source of illicit discharges. It is the simplest method to begin with and the least costly. Evidence of illicit discharges may only consist of visual observations because most illicit discharges are intermittent and will probably not be flowing when inspected. A field inspection crew should investigate the surface drainage system in the vicinity of suspected illicit discharges. This may include accessible areas in the public right-of-way adjacent to residences and businesses, catch basins, open channels near known points of discharge, and upstream manholes.

Photos of visual observations should be taken to aid subsequent data analysis and follow up planning. The following types of visual observations should be recorded on an investigation checklist, such as the one attached:

- Location
- General site description
- Amount, appearance of discharge/disposal
- Stains
- Structural cracking and corrosion
- Vegetative growth
- Nearby facilities with poor outside housekeeping practices
- Pipes/hoses connected to/directed toward drainage system

If the source of the discharge is determined, appropriate methods should be used to eliminate it through voluntary cleanup/termination or enforcement procedures, and steps should be taken to prevent its recurrence.

Sampling and Testing

If flow is observed, and the source of the discharge is not apparent, the crew should collect a sample and measure flow. Several tests should be conducted to determine the nature of the material. This can be compared to records of local facilities and possible pollutant generating activities as an aid in determining the possible sources of the flow.

The sample should be measured for pH, temperature and conductivity (EC). If any of these parameters are abnormal, or strong odors or flow discoloration are detected, the sample should be analyzed. This can be done with a field test kit, which will detect the presence of copper, phenols, detergents, and chlorine. Findings should be recorded on the inspection checklist.

If visual observations are abnormal and/or the field tests detect high concentrations of any constituent, the crew should consider collecting samples for laboratory analysis. The laboratory can usually supply properly cleaned sample bottles and specify either amber glass or plastic (HDPE) bottles depending on the analyses required. If there is enough flow, the field crew should fill several of each type of bottle to obtain enough sample volume for a range of analyses. If there is a limited quantity or sampling is difficult, the field crew should collect as much sample as possible so that the laboratory can run a limited set of analyses. The samples should be placed in a cooler filled with ice and transported to the lab(s) on the same day. Arrangements should be made prior to the field inspection with an analytical laboratory capable of performing the required analyses.

The laboratory analyses run on each sample should be carefully considered. Given the potential high cost for laboratory work, it is prudent to limit the number of analytical parameters (or analytes) tested for each sample. Tests may be selected based on the findings of indicator analyses, visual observations, field tests, and information collected about the types of materials processed, stored and/or spilled within each drainage area.

Guidance Source

Los Angeles County Model Stormwater Quality Management Program, 2003.

Insert City Seal

ILLICIT CONNECTION/ ILLICIT DISCHARGE INVESTIGATION REPORT

Response Time:
☐ 1-6 hrs. ☐ 13 hrs. ☐ 24 hrs. ☐ 48 hrs.

RESPONSE

Date:	Time:	Inspector:

INVESTIGATION

Location/ Address:

Reason for Investigation: ☐ Complaint ☐ Discharge/Spill Response ☐ Visual Monitoring
☐ Other: _____

Type of Material: ☐ Hazardous ☐ Wastewater ☐ Oil/Grease ☐ Soil/ Sediment ☐ Trash ☐ Sewage
☐ Fuel (Gas/Diesel) ☐ Chemicals ☐ Other _____

Estimated Quantity: ☐ Gallons ☐ Lbs.

Entered Storm Drain System: ☐ Yes ☐ No Storm Drain Location: _____	Entered Receiving Waters: ☐ Yes ☐ No Name of Receiving Water: _____

Observations

Field Testing: ☐ Yes ☐ No Details:	Sample Collected: ☐ Yes ☐ No Details:

Direct/ Constructed Connections Found: ☐ Yes ☐ No
Details:

RESPONSIBLE PARTY

Name:

Address:	Phone/ email:

Repeat Violation? ☐ Yes ☐ No

OUTREACH MATERIAL

Outreach Material Distributed: ☐ None ☐ General Information ☐ BMP Brochure ☐ Other _____

ENFORCEMENT

Enforcement: ☐ None ☐ Written Warning ☐ Notice of Violation ☐ Citation/Infraction ☐ Cease and Desist Order

Other Actions

FOLLOW-UP VISIT

Date:	Time:	Inspector:
Discharge Stopped? ☐ Yes ☐ No		Proper Clean-Up Action Taken: ☐ Yes ☐ No

Further Action Required: ☐ Yes ☐ No
Details:

Insert City Seal

ILLICIT CONNECTION/ ILLICIT DISCHARGE REPORTING & RESPONSE

Received by:	
Date:	Time Received:

REPORTING PARTY	
Name:	Anonymous: ☐ Yes ☐ No
Address:	Phone/email:

INCIDENT	
Date:	Time:
Location/ Address:	
Land Use: ☐ Residential ☐ Commercial ☐ Industrial ☐ Public	
Type of Material: ☐ Hazardous ☐ Wastewater ☐ Oil/Grease ☐ Sediment ☐ Trash ☐ Other _____ ☐ Unknown	
Estimated Quantity: ☐ Gallons ☐ Lbs.	
Entered Storm Drain System/ Receiving Waters? ☐ Yes ☐ No	
Description / Details	
Agencies Contacted: ☐ Office of Emergency Services ☐ HazMat Team ☐ LA County ☐ Regional Board ☐ Other	
Source Investigation Conducted? ☐ Yes ☐ No	Source Identified? ☐ Yes ☐ No
Direct/ Constructed Connections Found? ☐ Yes ☐ No	

ALLEGED RESPONSIBLE PARTY	
Name:	
Address:	Phone/ email:
Vehicle License No:	

ACTION & CLOSURE	
Referred to:	Date:
Department:	Phone/ email:
Actions Taken/ Details	

Date Closed:

Spill Prevention Coordination

Procedures

This attachment discusses spill prevention coordination procedures that identify:

- Divisions or sections responsible for responding to reports of spills
- General and specific spill response procedures including responsible division or section
- Spill response training activities
- Activities conducted to improve spill response procedures and equipment

Divisions or Sections Responsible for Responding to Reports of Spills

Identify the divisions or sections responsible for responding to reports of spills and note divisions or sections that respond to specific types of spills such as hazardous materials spills or sewage spills. Also indicate the specific field staff who respond to spills and the level of support they provide to lead emergency response agencies and source of spill investigations.

General and Specific Spill Response Procedures

Describe or reference general spill response procedures involved in responding to complaints and identifying spills through inspections. Include the spill response process from the spill identification stage through clean up and report preparation. Copies of the forms and reports prepared to document spills should also be included. Specific procedures for hazardous materials spills, floods, and sewage spills should be referenced. Contractor support for spill events, if applicable, should also be noted.

Spill Response Training Activities

Provide an overview of all spill response training that is conducted within the various divisions and sections of the agencies.

Activities to Improve Spill Response Procedures and Equipment

List all activities conducted within the implementing agency to improve spill response procedures and update equipment. Explain how improvements are identified, prioritized, and implemented. Include a schedule of how often spill response procedures and equipment are evaluate.

Spill Investigation, Containment and Cleanup

Investigation

Depending on the location of the spill and the type of material, the appropriate department/ agency should be notified. This may include:

- Storm drain maintenance, if the spill reaches the storm drain system
- Street and road maintenance, if the spill is in the public right-of-ways
- Sewer system maintenance, if the material is from the sewage system
- Industrial waste inspection, if the material is from industrial facilities
- Fire Departments/"first responders," if the material may be hazardous
- Contractors for hazardous materials, if the material is hazardous

These departments/agencies should determine the nature of the material and the extent of the spill. If any agency determines there is a chance that the spill involves hazardous materials, then the local Administering Agency will be notified. An example of spill investigation procedures is depicted in Figure D-1. Reporting procedures for hazardous substances are discussed further in Section 5 of this Illicit Connection/Illicit Discharge Elimination model program.

Containment and Cleanup

Once the nature and extent of the spill is determined, the appropriate departments and field superintendents will be notified to contain and clean up the spill. The three types of cleanup scenarios are (1) hazardous, (2) wastewater, and (3) other non-hazardous materials.

Hazardous

Handling procedures regarding releases of hazardous or potentially hazardous substances into the environment are covered in a number of federal and state regulations, including: Comprehensive Environmental Response, Compensation and Liability Act (CERCLA); Superfund Amendments and Reauthorization Act (SARA); Resource Conservation and Recovery Act (RCRA); and multiple bills codified under Division 20 of the California Health and Safety Code. These procedures are well established and are practiced by local hazardous materials response teams - generally a local Fire Department.

Material determined to be hazardous will be contained by the appropriate hazardous material response team. The team will contact an approved contractor for cleanup. Details are contained in the local *Emergency Response Procedures* manual.

Wastewater

Field crews responding to a sewage spill or overflow should contain the spill to prevent entry of the sewage into the storm drain system or natural watercourse. This will involve a coordinated effort between the sewer, street, and storm drain maintenance crews.

To the maximum extent possible, sewage should be prevented from entering the storm drain system by covering or blocking storm drain inlets and catch basins or by containing or diverting the overflow away from open channels and other storm drain fixtures (using sandbags, inflatable dams, etc.).

In the event that raw sewage enters a storm drain catch basin, where possible the sewage should be vacuumed or pumped out of the catch basin. If a sewage overflow enters a storm drain channel, where possible the downstream channel area should be blocked, flushed with potable water and the captured water pumped to a nearby sewer manhole. Any time a sewage spill enters the storm drain system and has the potential to reach coastal waterways, the local agency and L.A. County Dept. of Health Services, Bureau of Environmental Protection must be notified (323) 881-4147.

Once the spill is contained, it should be removed and the area disinfected. Every effort should be made to ensure that the disinfectant is not discharged to the storm drain system, using methods such as those described above.

Other Non-hazardous Materials

Non-hazardous materials should generally be removed by appropriate crews with knowledge of or jurisdiction over the location of the spill, as indicated in Section D.1. Because the situations and materials will vary widely, procedures will vary as well.

All materials should be prevented from entering waterways to the maximum extent possible. Many materials in sufficient quantities can deplete the oxygen level in receiving waters, or smother benthic communities. Typical examples of these materials include landscape waste, milk, flour, and many other organic liquids and solids or fine powders. These materials should generally be removed by first collecting and/or sweeping up all solids and disposing them in a landfill or other approved location. Liquids should be diverted to an area away from waterways where they may be removed with a vacuum truck or can soak into the ground.

Guidance Source

Los Angeles County Model Stormwater Quality Management Program, 2003.

ATTACHMENT F:
LEGAL CERTIFICATIONS

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December 6, 2013

Sam Unger, Executive Officer
California Regional Water Quality Control Board
Los Angeles Region
320 W. 4th Street, Suite 200
Los Angeles, California 90013-1105

Re: Statement of Legal Authority

Dear Mr. Unger:

This letter is provided to serve as the Statement of Legal Authority for the City of Bellflower (the "City") that must be submitted with its Annual Report pursuant to Part VI.A.2.b. of Order No. R4-2012-0175 for NPDES Permit No. CAS004001. As legal counsel for the City, it is my considered legal opinion the City has all the necessary legal authority to implement and enforce the requirements contained in 40 CFR § 122.26(d)(2)(i)(A-F) and this Order during the reporting period of July 1, 2012 through June 30, 2013, to the extent permitted by State and Federal law, subject to the limitations on municipal action under the California and United States Constitutions.

Per the requirement in Part VI.A.2.b.i., here are citations to the Bellflower Municipal Code ("BMC") for each of the following requirements found in Part VI.A.2.a:

i. *Control the contribution of pollutants to its MS4 from storm water discharges associated with industrial and construction activity and control the quality of storm water discharged from industrial and construction sites. This requirement applies both to industrial and construction sites with coverage under an NPDES permit, as well as to those sites that do not have coverage under an NPDES permit.*

BMC Sections: 13.20.090 Control of Pollutants from Industrial and Commercial Facilities, 13.20.100 Control of Pollutants from Industrial Activities, 13.20.110 Control of Pollutants from Construction Activities Requiring General Construction Activity Stormwater Permit, and 13.20.120 Control of Pollutants from Other Construction Activities

ii. *Prohibit all non-storm water discharges through the MS4 to receiving waters not otherwise authorized or conditionally exempt pursuant to Part III.A.*

BMC Sections: 13.20.050 Illicit Discharges and Nonstormwater Discharges and 13.20.080 Reduction of Pollutants in Runoff

iii. *Prohibit and eliminate illicit discharges and illicit connections to the MS4.*

BMC Sections: 13.20.050 Illicit Discharges and Nonstormwater Discharges and 13.20.070 Illicit Connections

iv. *Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4.*

BMC Section: 13.20.060 Illegal Disposal/Dumping

v. *Require compliance with conditions in Permittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows);*

BMC Section: 13.20.140 Violation, Inspection, Enforcement

vi. *Utilize enforcement mechanisms to require compliance with applicable ordinances, permits, contracts, or orders.*

BMC Section: 13.20.140 Violation, Inspection, Enforcement

vii. *Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Co-permittees;*

BMC Sections: 13.20.050 Illicit Discharges and Nonstormwater Discharges and 13.20.080 Reduction of Pollutants in Runoff

viii. *Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation;*

BMC Sections: 13.20.050 Illicit Discharges and Nonstormwater Discharges and 13.20.080 Reduction of Pollutants in Runoff

ix. *Carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with applicable municipal ordinances, permits, contracts and orders, and with the provisions of this Order, including the prohibition of non-storm water discharges into the MS4 and receiving waters.*

This means the Permittee must have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from entities discharging into its MS4;

BMC Section: 13.20.140 Violation, Inspection, Enforcement

x. *Require the use of control measures to prevent or reduce the discharge of pollutants to achieve water quality standards/receiving water limitations;*

BMC Sections: 13.20.090 Control of Pollutants from Industrial and Commercial Facilities and 13.20.130 Control of Pollutants from New Development/Redevelopment Projects

xi. *Require that structural BMPs are properly operated and maintained;*

BMC Section: 13.20.130 Control of Pollutants from New Development/Redevelopment Projects

xii. *Require documentation on the operation and maintenance of structural BMPs and their effectiveness in reducing the discharge of pollutants to the MS4.*

BMC Section: 13.20.130 Control of Pollutants from New Development/Redevelopment Projects

Per the requirement in Part VI.A.2.b.ii., the City's legal procedures available to mandate compliance with applicable municipal ordinances identified in the above section, and therefore with the conditions of the Order, can be found in BMC Section 13.20.140 Violation, Inspection, Enforcement. Here is the relevant text of that provision:

13.20.140 Violation, Inspection, Enforcement.

A. Violation of any provision of this chapter, any stormwater pollution prevention plan or any permit issued pursuant to this chapter shall be a violation per Chapter 1.08.

B. The Director of Community Development, or the Director's designees, may issue notices of violation and administrative orders to achieve compliance with the provisions of this chapter. Failure to comply with the terms and conditions of such a notice of violation or an administrative order shall constitute a violation of this chapter.

C. The violation of any provision of this chapter is hereby declared to be a nuisance, and may be abated by the City in accordance with its authority to abate nuisances.

D. The remedies listed in this chapter are not exclusive of any other remedies available to the City under any applicable Federal, State or local law and it is within the discretion of the City to seek cumulative remedies.

[...]

F. The Director of Community Development, or the Director's designees, may issue notice of violation and administrative orders to any other person who has failed to comply with either a notice of violation or other administrative order an invoice for costs (invoice of cost) for reimbursement of the City's actual costs incurred in issuing and enforcement of any provision of this chapter.

G. The Director of Community Development, or the Director's designees, may require that any person engaged in any activity and/or owning or operating any facility which may cause or contribute to stormwater pollution or contamination, illicit discharges and/or discharge of nonstormwater to the stormwater system, undertake such monitoring activities and/or analysis and furnish such reports as the officer may specify. The burden, including costs, of these activities, analysis and reports shall bear a reasonable relationship to the need for the monitoring, analysis and the benefits to be obtained.

Thus, enforcement actions can be completed administratively or judicially if necessary.

Please contact the undersigned if you have any questions.

Sincerely,

ALESHIRE & WYNDER, LLP

Joseph W. Pannone
City Attorney for the City of Bellflower

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December 3, 2013

Mr. Sam Unger, Executive Officer
California Regional Water Quality Control Board
Los Angeles Region
320 W. 4th Street, Suite 200
Los Angeles, California 90013-1105

Re: Statement of Legal Authority

Dear Mr. Unger:

This letter is provided to serve as the Statement of Legal Authority for the City of Cerritos (the "City") that must be submitted with its Annual Report pursuant to Part VI.A.2.b. of Order No. R4-2012-0175 for NPDES Permit No. CAS004001. As legal counsel for the City, I have determined that it has all the necessary legal authority to implement and enforce the requirements contained in 40 CFR § 122.26(d)(2)(i)(A-F) and this Order during the reporting period of July 1, 2012 through June 30, 2013, to the extent permitted by State and Federal law, subject to the limitations on municipal action under the California and United States Constitutions.

Per the requirement in Part VI.A.2.b.i., here are citations to the City's Municipal Code for each of the following requirements found in Part VI.A.2.a:

i. *Control the contribution of pollutants to its MS4 from storm water discharges associated with industrial and construction activity and control the quality of storm water discharged from industrial and construction sites. This requirement applies both to industrial and construction sites with coverage under an NPDES permit, as well as to those sites that do not have coverage under an NPDES permit.*

   Municipal Code Sections: 6.32.050 Construction sites requiring building permit and/or grading plan and 6.32.060 Industrial activity sites

ii. *Prohibit all non-storm water discharges through the MS4 to receiving waters not otherwise authorized or conditionally exempt pursuant to Part III.A.*

   Municipal Code Section: 6.32.030 Illicit discharges and connections

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iii. *Prohibit and eliminate illicit discharges and illicit connections to the MS4.*

Municipal Code Section: 6.32.030 Illicit discharges and connections

iv. *Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4.*

Municipal Code Sections: 6.32.030 Illicit discharges and connections and 6.32.040 Illicit disposal

v. *Require compliance with conditions in Permittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows);*

Municipal Code Sections: 6.32.010 Purpose and 6.32.080 Violation—Penalty

vi. *Utilize enforcement mechanisms to require compliance with applicable ordinances, permits, contracts, or orders.*

Municipal Code Section: 6.32.080 Violation—Penalty

vii. *Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Co-permittees;*

Municipal Code Section: 6.32.030 Illicit discharges and connections

viii. *Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation;*

Municipal Code Section: 6.32.030 Illicit discharges and connections

ix. *Carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with applicable municipal ordinances, permits, contracts and orders, and with the provisions of this Order, including the prohibition of non-storm water discharges into the MS4 and receiving waters. This means the Permittee must have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from entities discharging into its MS4;*

Municipal Code Section: 6.32.080 Violation—Penalty, subsection (D)

x. *Require the use of control measures to prevent or reduce the discharge of pollutants to achieve water quality standards/receiving water limitations;*

Municipal Code Section: 6.32.030 Illicit discharges and connections

RB-AR9888

xi. *Require that structural BMPs are properly operated and maintained;*

Municipal Code Section: 6.32.055 Urban runoff mitigation plan for new development

xii. *Require documentation on the operation and maintenance of structural BMPs and their effectiveness in reducing the discharge of pollutants to the MS4.*

Municipal Code Section: 6.32.055 Urban runoff mitigation plan for new development

Per the requirement in Part VI.A.2.b.ii., the City's legal procedures available to mandate compliance with applicable municipal ordinances identified in the above section, and therefore with the conditions of the Order, can be found in Municipal Code Section 6.32.080 Violation—Penalty. Here is the relevant text of that provision:

6.32.080 Violation—Penalty.

(A) The violation of any provision of this chapter, or failure to comply with any of the requirements of this chapter, shall constitute a misdemeanor; except that notwithstanding any other provision of this chapter, any such violation constituting a misdemeanor under this chapter may, at the sole discretion of the authorized enforcement officer, by charged and prosecuted as an infraction.

(B) In addition to the penalties provided, any condition caused or permitted to exist in violation of any of the provisions of this chapter is a threat to the public health, safety and welfare, is declared and deemed a nuisance, may be summarily abated and/or restored by the authorized enforcement officer, and/or civil action to abate, enjoin or otherwise compel the cessation of such nuisance.

(1) The cost of such abatement and restoration shall be borne by the owner of the property and the cost thereof shall be invoiced to the owner of the property. If the invoice is not paid with sixty days, a lien shall be placed upon and against the property. If the lien is not satisfied within three months, the property may be sold in satisfaction thereof in a like manner as other real property is sold under execution.

(2) If any violation of this chapter constitutes a seasonal recurrent nuisance, the authorized enforcement officer shall so declare. Thereafter such seasonal and recurrent nuisance shall be abated every year without the necessity of any further hearing.

(3) In any administrative or civil proceeding under this chapter in which the city prevails, the city shall be awarded all costs of investigation, administrative overhead, out-of-pocket expenses, costs of suit and reasonable attorney fees.

(C) Penalties for Failure to Comply with BMPs. The authorized enforcement officer shall enforce this chapter as follows:

(1) For the first failure to comply with any provision of this chapter, the authorized enforcement officer shall issue to the affected person or business a written notice which includes the following information:

(a) A statement specifying the violation committed;

(b) A specified time period within which the affected person or business must correct the failure or file a written notice disputing the notice of failure to comply;

(c) A statement of the penalty for continued noncompliance.

(2) For each subsequent failure to comply with any provision of this chapter, following written notice issued pursuant to subsection (C)(1) of this section, the authorized enforcement officer may levy a penalty of one hundred dollars each day during which a person or business fails to comply with the provisions of this chapter. Each day following written notice shall constitute a separate offense. Said penalty shall be set by the city council resolution.

[…]

Thus, enforcement actions can be completed administratively or judicially if necessary.

Please contact the undersigned if you have any questions.

Sincerely,

ALESHIRE & WYNDER, LLP

Mark W. Steres
City Attorney for the City of Cerritos

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City of Downey

FUTURE UNLIMITED

YVETTE M. ABICH GARCIA
City Attorney

December 12, 2013

Mr. Sam Unger, Executive Officer
California Regional Water Quality Control Board
Los Angeles Region
320 W. 4th Street, Suite 200
Los Angeles, CA 90013-1105

RE: Legal Authority Certification for the City of Downey

Dear Mr. Unger:

As the City Attorney for the City of Downey, I have reviewed the City's existing ordinances, applicable statutes, and/or applicable contracts and have determined that as of the date of this letter, the City can operate pursuant to the legal authority required in 40 CFR 122.26(d)(2)(i)(A)-(F) and Part VI.A.2 of Order No. R4-2012-0175, issued by the Regional Water Quality Control Board – Los Angeles Region ("RWQCB"), adopted on December 28, 2012 and entitled "Waste Discharge Requirements for Municipal Separate Storm Sewer System (MS4) Discharges within the Coastal Watersheds of Los Angeles County, except those Discharges Originating from the City of Long Beach (MS4)" [NPDES No. CAS004001] (the "2012 NPDES Permit"). Enforcement of the City's storm water ordinances can be completed administratively or, if necessary, through the judicial system.

This letter is limited to the matters contained herein, and should not be read as expressing any opinion on any other matter except on the matters expressly set forth herein.

Please call the undersigned if you have any questions.

Sincerely,

CITY OF DOWNEY

Yvette M. Abich Garcia
City Attorney

cc: John L. Hunter & Associates

RB-AR9891

STEVEN N. SKOLNIK

Attorney at Law
15332 Antioch Street, #436
Pacific Palisades, California 90272
Telephone: (310) 459-3418 Facsimile: (310) 606-2775
E-Mail: sskolniklaw@gmail.com

December 9, 2013

Lisa Rapp, Director of Public Works
City of Lakewood
5050 Clark Avenue
Lakewood, CA 90712

Re: Order No. R4-2012-0175
NPDES No. CAS004001

Dear Ms. Rapp:

In my capacity as City Attorney for the City of Lakewood (the "City"), I hereby confirm that the City has the legal authority within its jurisdiction to implement and enforce each of the requirements contained in 40 CFR @ 122.26(d)(2)(i)(A-F) and the Order referenced above. Such legal authority is derived from Article 11, Section 7 of the California Constitution, Section 13002 of the California Water Code, and Section 5801 of the Lakewood Municipal Code, which incorporates by reference the pertinent provisions of the Los Angeles County Code.

The City is authorized to take enforcement action by administrative proceedings or in the judicial system.

Very truly yours,

Steven N. Skolnik

OFFICE OF THE CITY ATTORNEY
Long Beach, California

CHARLES PARKIN
City Attorney

MICHAEL J. MAIS
Assistant City Attorney

MONTE H. MACHIT
Assistant City Attorney

PRINCIPAL DEPUTIES
Dominic Holzhaus
Anne C. Lattime

DEPUTIES
C. Geoffrey Allred
Gary J. Anderson
Richard F. Anthony
William R. Baerg
Kendra L. Carney
LaTasha N. Corry
Charles M. Gale
Haleh R. Jenkins
Michele L. Levinson
Barbara J. McTigue
Howard D. Russell
Arturo D. Sanchez
Tiffani L. Shin
Linda T. Vu
Amy R. Webber
Theodore B. Zinger

February 26, 2015

VIA CERTIFIED MAIL AND EMAIL

RETURN RECEIPT REQUESTED

Mr. Samuel Unger, P.E., Executive Officer
California Regional Water Quality Control Board
Los Angeles Region
320 West 4th Street, Suite 200
Los Angeles, CA 90013-2343

Attention: Mr. Ivar Ridgeway

RE: City of Long Beach Order No. R4-2014-0024/NPDES Permit No. CAS004003: City of Long Beach Statement of Legal Authority (2014-2015)

Dear Mr. Unger:

This office serves as City Attorney to the City of Long Beach. Pursuant to the requirements of Part VII.A (2)(b) of Order No. R4-2014-0024 ("Order") and NPDES Permit No. CAS004003 ("Permit"), the Long Beach City Attorney's Office submits this statement of legal authority.

The City of Long Beach ("City") has the legal authority to implement and enforce a majority of the requirements contained in 40 CFR § 122.26(d)(2)(i)(A-F) and the Order during the reporting period. In addition, insofar as certain legal requirements are not yet in place, the City is actively working to approve additional ordinances that will permit the City to meet all of the requirements of the Order and the Permit, resulting in a comprehensive and updated NPDES ordinance which contains provisions and remedies specifically tailored to the Order. It is anticipated that the remaining ordinances will be approved and in place prior to December 31, 2015.

The City's legal authority to implement and enforce these requirements is derived from the City's general police powers under Article XI, Section 7 of the California Constitution, and more particularly, the provisions of the Long Beach Municipal Code ("LBMC"), including Chapter 18.61 (NPDES and SUSMP Regulations) and the NPDES and SUSMP Regulations Manual, which details technical information and implementation parameters, alternative compliance for technical infeasibility, as well as other rules, requirements and procedures for implementation.

The City's legal procedures available to mandate compliance with the provisions of Chapter 18.61 include LBMC section 1.32 which deems any violation of the LBMC to be enforceable criminally as an infraction or misdemeanor, or as a public nuisance that can be abated and remedied administratively or judicially, in accordance with the enforcement procedures set forth in LBMC section 1.32.

If you have questions regarding this matter, please do not hesitate to contact this Office.

Very truly yours,

CHARLES PARKIN, City Attorney

By: AMY R. WEBBER
Deputy City Attorney

ARW:arw A15-00019
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cc: Charles Parkin, City Attorney
Patrick H. West, City Manager
John L. Hunter, Stormwater Consultant (jhunter@jlha.net)

STATEMENT OF LEGAL AUTHORITY

Pursuant to Part VI.A.2.b. of Order No. R4-2012-0175, the City of Paramount has all the necessary legal authority to implement and enforce the requirements contained in 40 CFR § 122.26(d)(2)(i)(A-F) and this Order during the reporting period of July 1, 2012 through June 30, 2013. This is made evident by municipal code citation to each of the following requirements found in Part VI.A.2.a:

1. Control the contribution of pollutants to its MS4 from storm water discharges associated with industrial or commercial activity and control the quality of storm water discharged from industrial and commercial sites. This requirement applies both to industrial and commercial sites with coverage under an NPDES permit, as well as to those sites that do not have coverage under an NPDES permit.
   Municipal Code Section: Sec. 48-3.5. Prohibited discharges from industrial or commercial activity
2. Prohibit all non-storm water discharges through the MS4 to receiving waters not otherwise authorized or conditionally exempt pursuant to Part III.A.
   Municipal Code Section: Sec. 48-3.3. Littering and other discharge of polluting or damaging substances prohibited
3. Prohibit and eliminate illicit discharges and illicit connections to the MS4.
   Municipal Code Section: Sec. 48-3. Illicit discharges prohibited and Sec. 48-3.1. Installation or use of illicit connections prohibited
4. Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4.
   Municipal Code Section: Sec. 48-3.3. Littering and other discharge of polluting or damaging substances prohibited
5. Require compliance with applicable Permittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows);
   Municipal Code Section: Sec. 48-3.8. Notification of uncontrolled discharges required.
6. Utilize enforcement mechanisms to require compliance with applicable ordinances, permits, contracts, or orders.
   Municipal Code Section: Sec. 48-5. Enforcement - Director's powers and duties
7. Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Co-permittees;
   Municipal Code Section: Sec. 48-3.3. Littering and other discharge of polluting or damaging substances prohibited and Sec. 48-2.1. Purpose and Intent.
8. Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation;
   Municipal Code Section: Sec. 48-3.3. Littering and other discharge of polluting or damaging substances prohibited and Sec. 48-2.1. Purpose and Intent.

RB-AR9895

9. Carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with applicable municipal ordinances, permits, contracts and orders, and with the provisions of this Order, including the prohibition of non-storm water discharges into the MS4 and receiving waters. This means the Permittee must have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from entities discharging into its MS4;
   Municipal Code Section: Sec. 48-5.3. Inspection to ascertain compliance - Access
10. Require the use of control measures to prevent or reduce the discharge of pollutants to achieve water quality standards/receiving water limitations;
    Municipal Code Section: Sec. 48-5.4. Notice to correct violations - Director may take action
11. Require that structural BMPs are properly operated and maintained.
    Municipal Code Section: Sec. 48-4.1. Best management practices for construction activity, 48-42, best managerial practices for industrial and commercial facilities.
12. Require documentation on the operation and maintenance of structural BMPs and their effectiveness in reducing the discharge of pollutants to the MS4.
    Municipal Code Section: Sec. 48-4.3. Installation of structural BMPs

The City of Paramount legal procedures available to mandate compliance with applicable municipal ordinances identified in the above section, and therefore with the conditions of the Order, can be found in Section *Sec. 48-5. Enforcement - Director's powers and duties*. Violations of this section are deemed a "Public Nuisance" in section 48-5.5, where any discharge in violation of this chapter, any illicit connection, and/or any violation of runoff management requirements shall constitute a threat to public health and safety.

Signature: John E Cavanaugh.
John E. Cavanaugh, City Attorney

Date: 12-3-13

RB-AR9896

ALESHIRE & WYNDER LLP
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December 3, 2013

Mr. Sam Unger, Executive Officer
California Regional Water Quality Control Board
Los Angeles Region
320 W. 4th Street, Suite 200
Los Angeles, California 90013-1105

Re: Legal Authority Statement

Dear Mr. Unger:

This letter is provided to serve as the Statement of Legal Authority for the City of Signal Hill (the "City") that must be submitted with its Annual Report pursuant to Part VI.A.2.b. of Order No. R4-2012-0175 for NPDES Permit No. CAS004001. As legal counsel for the City, I have determined that it has all the necessary legal authority to implement and enforce the requirements contained in 40 CFR § 122.26(d)(2)(i)(A-F) and this Order during the reporting period of July 1, 2012 through June 30, 2013, to the extent permitted by State and Federal law, subject to the limitations on municipal action under the California and United States Constitutions.

Per the requirement in Part VI.A.2.b.i., here are citations to the City's Municipal Code for each of the following requirements found in Part VI.A.2.a:

i. *Control the contribution of pollutants to its MS4 from storm water discharges associated with industrial and construction activity and control the quality of storm water discharged from industrial and construction sites. This requirement applies both to industrial and construction sites with coverage under an NPDES permit, as well as to those sites that do not have coverage under an NPDES permit.*

   Municipal Code Sections: 12.16.060 Illicit discharges, 12.16.100 Compliance with state and federal discharge requirements, and 12.16.112 Construction pollutant reduction

ii. *Prohibit all non-storm water discharges through the MS4 to receiving waters not otherwise authorized or conditionally exempt pursuant to Part III.A.*

Municipal Code Section: 12.16.060 Illicit discharges

iii. *Prohibit and eliminate illicit discharges and illicit connections to the MS4.*

Municipal Code Sections: 12.16.050 Illicit connections prohibited and 12.16.060 Illicit discharges

iv. *Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4.*

Municipal Code Sections: 12.16.060 Illicit discharges and 12.16.080 Littering

v. *Require compliance with conditions in Permittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows);*

Municipal Code Section: 12.16.120 Inspection and enforcement

vi. *Utilize enforcement mechanisms to require compliance with applicable ordinances, permits, contracts, or orders.*

Municipal Code Section: 12.16.120 Inspection and enforcement

vii. *Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Co-permittees;*

Municipal Code Sections: 12.16.020 Purpose and intent and 12.16.120 Inspection and enforcement

viii. *Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation;*

Municipal Code Sections: 12.16.020 Purpose and intent and 12.16.120 Inspection and enforcement

ix. *Carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with applicable municipal ordinances, permits, contracts and orders, and with the provisions of this Order, including the prohibition of non-storm water discharges into the MS4 and receiving waters. This means the Permittee must have authority to enter, monitor, inspect, take*

measurements, review and copy records, and require regular reports from entities discharging into its MS4;

Municipal Code Section: 12.16.120 Inspection and enforcement

x. *Require the use of control measures to prevent or reduce the discharge of pollutants to achieve water quality standards/receiving water limitations;*

Municipal Code Sections: 12.16.060 Illicit discharges, 12.16.114 New development/redevelopment pollutant reduction, and 12.16.116 Small site new development/ redevelopment pollutant reduction

xi. *Require that structural BMPs are properly operated and maintained;*

Municipal Code Sections: 12.16.114 New development/redevelopment pollutant reduction and 12.16.116 Small site new development/ redevelopment pollutant reduction

xii. *Require documentation on the operation and maintenance of structural BMPs and their effectiveness in reducing the discharge of pollutants to the MS4.*

Municipal Code Section: 12.16.114 New development/redevelopment pollutant reduction and 12.16.116 Small site new development/ redevelopment pollutant reduction

Per the requirement in Part VI.A.2.b.ii., the City's legal procedures available to mandate compliance with applicable municipal ordinances identified in the above section, and therefore with the conditions of the Order, can be found in Municipal Code Section 12.16.120 Inspection and enforcement. Here is the relevant text of that provision:

"12.16.120 Inspection and enforcement.

[...]

B. Enforcement.

1. Any violation of this chapter is a misdemeanor and shall be punishable by either a fine of up to one thousand dollars or six months in the county jail, or both.

2. Any person who may otherwise be charged with a misdemeanor as a result of a violation of this chapter may be charged, at the discretion of the prosecuting attorney, with an infraction punishable by a fine of not more than one

hundred dollars for the first violation, two hundred dollars for the second violation, and two hundred fifty dollars for each additional violation thereafter.

3. As a part of any sentence or other penalty imposed or the award of any damage, the court may also order that restitution be paid to the City or any injured person, or, in the case of a violator who is a minor, by the minor's parent or lawfully designated guardian or custodian. Restitution may include the amount of any reward.

4. Any person violating the provisions of this chapter shall reimburse the City for any and all costs incurred by the City in responding to, investigating, assessing, monitoring, treating, cleaning, removing, or remediating any Illicit Discharge or Pollutant from the municipal storm drain system; rectifying any Illicit Connection; or remediating any violation of this chapter.

Such costs to be paid to the City include all administrative expenses and all legal expenses, including costs and attorneys' fees, in obtaining compliance, and in litigation including all costs and attorneys' fees on any appeal. The costs to be recovered in this Section 12.16.120 shall be recoverable from any and all persons violating this chapter.

5. In the event any violation of this chapter constitutes an imminent danger to public health, safety, or the environment, the City Manager or Director, or any authorized agent thereof, may enter upon the premises from which the violation emanates, abate the violation and danger created to the public safety or the environment, and restore any premises affected by the alleged violation, without notice to or consent from the owner or occupant of the premises. An imminent danger shall include but is not limited to exigent circumstances created by the Discharge of Pollutants, where such Discharge presents a significant and immediate threat to the public health or safety, or the environment.

6. Violations of this chapter may further be deemed to be a public nuisance which may be abated by administrative or civil or criminal action in accordance with the terms and provisions of this code and state law.

7. All costs and fees incurred by the City as a result of any violation of this chapter which constitute a nuisance, including all administrative fees and expenses and legal fees and expenses, shall become a lien against the subject premises from which the nuisance emanated and a personal obligation against the owner, in accordance with Government Code Sections 38773.1 and 38773.5. The owner of record of the premises subject to any lien shall receive notice of the lien prior to recording, as required by Government Code Section 38773.1. The City Attorney is authorized to collect nuisance abatement costs or enforce a nuisance lien in an action brought for money judgment, or by delivery to the county

assessor of a special assessment against the premises in accordance with the conditions and requirements of Government Code Section 38773.5.

8. Any person acting in violation of this chapter may also be acting in violation of the Clean Water Act or the California Porter-Cologne Act (California Water Code Section 13000 et seq.) and the regulations thereunder, and other laws and regulations, and may be subject to damages, fines and penalties, including civil liability under such other laws. The City Attorney is authorized to file a citizen's suit pursuant to the Clean Water Act, seeking penalties, damages and orders compelling compliance and appropriate relief.

9. The City Attorney is authorized to file in a court of competent jurisdiction a civil action seeking an injunction against any violation or threatened or continuing violation of this chapter. Any temporary, preliminary or permanent injunction issued pursuant hereto may include an order for reimbursement to the City for all costs incurred in enforcing this chapter, including costs of inspection, investigation, monitoring, treatment, abatement, removal or remediation undertaken by or at the expense of the city, and may include all legal expenses and fees and any and all costs incurred relating to the restoration or remediation of the environment.

10. Each separate Discharge in violation of this chapter and each day a violation of this chapter exists, without correction, shall constitute a new and separate violation punishable as a separate infraction, misdemeanor and/or civil violation.

11. Whenever necessary, interagency coordination will be employed to enforce the provisions of this chapter.

12. The City may utilize any and all other remedies as otherwise provided by law."

Thus, enforcement actions can be completed administratively or judicially if necessary.

Please contact the undersigned if you have any questions.

Sincerely,

ALESHIRE & WYNDER, LLP

David J. Aleshire
City Attorney for the City of Signal Hill

COUNTY OF LOS ANGELES
OFFICE OF THE COUNTY COUNSEL
648 KENNETH HAHN HALL OF ADMINISTRATION
500 WEST TEMPLE STREET
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JOHN F. KRATTLI
County Counsel

December 16, 2013

Mr. Samuel Unger, P.E., Executive Officer
California Regional Water Quality Control Board – Los Angeles Region
320 West 4th Street, Suite 200
Los Angeles, CA 90013-2343

Attention: Mr. Ivar Ridgeway

Re: Certification By Legal Counsel For Los Angeles County Flood Control District's Annual Report

Dear Mr. Unger:

Pursuant to the requirements of Part VI(A)(2)(b) of Order No. R4-2012-0175 (the "Order"), the Office of the County Counsel of the County of Los Angeles makes the following certification in support of the Annual Report of the Los Angeles County Flood Control District ("LACFCD"):

Certification Pursuant To Order Part VI(A)(2)(b)

"*Each Permittee must submit a statement certified by its chief legal counsel that the Permittee has the legal authority within its jurisdiction to implement and enforce the requirements contained in 40 CFR §122.26(d)(2)(i)(A-F) and this Order.*"

LACFCD has the legal authority within its jurisdiction to implement and enforce each of the requirements contained in 40 CFR §122.26(d)(2)(i)(A-F) and the Order.

Order Part VI(A)(2)(b)(i)

"*Citation of applicable municipal ordinances or other appropriate legal authorities and their relationship to the requirements of 40 CFR §122.26(d)(2)(i)(A-F) and this Order*"

Citations Of Applicable Ordinances Or Other Legal Authorities

Although many portions of State law, the Charter of the County of Los Angeles, the Los Angeles County Code and LACFCD's Flood Control District Code ("Code") are potentially applicable to the implementation and enforcement of these requirements, the primary applicable laws and ordinances are as follows:

Los Angeles County Code, Title 12, Chapter 12.80 STORMWATER AND RUNOFF POLLUTION CONTROL, including:

§12.80.010 - §12.80.360 Definitions

§12.80.370 Short title.

§12.80.380 Purpose and intent.

§12.80.390 Applicability of this chapter.

§12.80.400 Standards, guidelines and criteria.

§12.80.410 Illicit discharges prohibited.

§12.80.420 Installation or use of illicit connections prohibited.

§12.80.430 Removal of illicit connection from the storm drain system.

§12.80.440 Littering and other discharge of polluting or damaging substances prohibited.

§12.80.450 Stormwater and runoff pollution mitigation for construction activity.

§12.80.460 Prohibited discharges from industrial or commercial activity.

§12.80.470 Industrial/commercial facility sources required to obtain a NPDES permit.

§12.80.480 Public facility sources required to obtain a NPDES permit.

§12.80.490 Notification of uncontrolled discharges required.

§12.80.500 Good housekeeping provisions.

§12.80.510 Best management practices for construction activity.

§12.80.520 Best management practices for industrial and commercial facilities.

§12.80.530 Installation of structural BMPs.

§12.80.540 BMPs to be consistent with environmental goals.

§12.80.550 Enforcement—Director's powers and duties.

§12.80.560 Identification for inspectors and maintenance personnel.

§12.80.570 Obstructing access to facilities prohibited.

§12.80.580 Inspection to ascertain compliance—Access required.

§12.80.590 Interference with inspector prohibited.

§12.80.600 Notice to correct violations—Director may take action.

§12.80.610 Violation a public nuisance.

§12.80.620 Nuisance abatement—Director to perform work when—Costs.

§12.80.630 Violation—Penalty.

§12.80.635 Administrative fines.

§12.80.640 Penalties not exclusive.

§12.80.650 Conflicts with other code sections.

§12.80.660 Severability.

§12.80.700 Purpose.

§12.80.710 Applicability.

§12.80.720 Registration required.

§12.80.730 Exempt facilities.

§12.80.740 Certificate of inspection—Issuance by the director.

§12.80.750 Certificate of inspection—Suspension or revocation.

§12.80.760 Certificate of inspection—Termination.

§12.80.770 Service fees.

§12.80.780 Fee schedule.

§12.80.790 Credit for overlapping inspection programs.

§12.80.800 Annual review of fees.

Los Angeles County Code, Title 12, Chapter 12.84 LOW IMPACT DEVELOPMENT STANDARDS, including:

§12.84.410 Purpose.

§12.84.420 Definitions.

§12.84.430 Applicability.

§12.84.440 Low Impact Development Standards.

§12.84.445 Hydromodification Control.

§12.84.450 LID Plan Review.

§12.84.460 Additional Requirements.

Los Angeles County Code, Title 22 PLANNING AND ZONING, Part 6 ENFORCEMENT PROCEDURES, including:

§22.60.330 General prohibitions.

§22.60.340 Violations.

§22.60.350 Public nuisance.

§22.60.360 Infractions.

§22.60.370 Injunction.

§22.60.380 Enforcement.

§22.60.390 Zoning enforcement order and noncompliance fee.

Los Angeles County Code, Title 26 BUILDING CODE, including:

§26.103 Violations And Penalties

§26.104 Organization And Enforcement

§26.105 Appeals Boards

§26.106 Permits

§26.107 Fees

§26.108 Inspections

LACFCD Code Chapter 21 - STORMWATER AND RUNOFF POLLUTION CONTROL including:

§21.01 Purpose and Intent

§21.03 Definitions

§21.05 Standards, Guidelines, and Criteria

§21.07 Prohibited Discharges

§21.09 Installation or Use of Illicit Connections Prohibited

§21.11 Littering Prohibited

§21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity

§21.15 Notification of Uncontrolled Discharges Required

§21.17 Requirement to Monitor and Analyze

§21.19 Conflicts With Other Code Sections

§21.21 Severability

§21.23 Violation a Public Nuisance

California Government Code §6502

California Government Code §23004

California Water Code §8100 *et. seq.*

Relationship Of Applicable Ordinances Or Other Legal Authorities To The Requirements of 40 CFR §122.26(d)(2)(i)(A-F) And The Order

Although, depending upon the particular issue, there may be multiple ways in which particular sections of the County of Los Angeles' ordinances, LACFCD's ordinances, and statutes relate to the requirements contained in 40 CFR §122.26(d)(2)(i)(A-F) and the Order, the table below indicates the basic relationship with Part VI(A)(2)(a) of the Order:

Order Part VI(A)(2)(a) Items	**Primary Applicable Ordinance/Statute**
i. Control the contribution of pollutants to its MS4 from storm water discharges associated with industrial and construction activity and control the quality of storm water discharged from industrial and construction sites. This requirement applies both to industrial and construction sites with coverage under an NPDES permit, as well as to those sites that do not have coverage under an NPDES permit.	Los Angeles County Code: §12.80.410 [illicit discharge prohibited]; §12.80.450 [construction] §12.80.460 [industrial and commercial] §12.80.470 and .480 [industrial and commercial NPDES requirements] §12.84.440 [LID standards] §12.84.445 [hydromodification control] §12.84.450 [LID Plan Review] §22.60.330 [general prohibitions] §22.60.340 [violations] §22.60.350 [public nuisance] §22.60.360 [infractions] §22.60.370 [injunction] §22.60.380 [enforcement.] §22.60.390 [zoning enforcement order] §26.103 [violations and penalties]

Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
	§26.104 [enforcement] §26.106 [permits] §26.108 [inspections] LACFCD Code: §21.05 Standards, Guidelines, and Criteria §21.07 Prohibited Discharges §21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity §21.15 Notification of Uncontrolled Discharges Required §21.17 Requirement to Monitor and Analyze §21.23 Violation a Public Nuisance
ii. Prohibit all non-storm water discharges through the MS4 to receiving waters not otherwise authorized or conditionally exempt pursuant to Part III.A.	Los Angeles County Code: §12.80.410 [illicit discharge prohibited] LACFCD Code: §21.07 Prohibited Discharges
iii. Prohibit and eliminate illicit discharges and illicit connections to the MS4.	Los Angeles County Code: §12.80.410 [illicit discharge prohibited]; §12.80.420 [illicit connections prohibited] LACFCD Code: §21.05 Standards, Guidelines, and Criteria §21.07 Prohibited Discharges §21.09 Installation or Use of Illicit Connections Prohibited §21.23 Violation a Public Nuisance

Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
iv. Control the discharge of spills, dumping, or disposal of materials other than storm water to its MS4.	Los Angeles County Code: §12.80.410 [illicit discharge prohibited]; §12.80.440 [littering and other polluting prohibited] LACFCD Code: §19.07 Interference With or Placing Obstructions, Refuse, Contaminating Substances, or Invasive Species in Facilities Prohibited §21.05 Standards, Guidelines, and Criteria §21.07 Prohibited Discharges §21.09 Installation or Use of Illicit Connections Prohibited §21.11 Littering Prohibited §21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity §21.15 Notification of Uncontrolled Discharges Required §21.17 Requirement to Monitor and Analyze §21.23 Violation a Public Nuisance
v. Require compliance with conditions in Permittee ordinances, permits, contracts or orders (i.e., hold dischargers to its MS4 accountable for their contributions of pollutants and flows).	Los Angeles County Code: §12.80.490 [notification of uncontrolled discharge] §12.80.570 [obstructing access to facilities] §12.80.580 [compliance inspection] §12.80.610 [violation a nuisance] §12.620 [nuisance abatement] §12.80.635 [violation penalty]

Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
	§12.80.640 [penalties not exclusive] §12.84.440 [LID standards] §12.84.445 [hydromodification control] §12.84.450 [LID Plan Review] §22.60.330 [general prohibitions] §22.60.340 [violations] §22.60.350 [public nuisance] §22.60.360 [infractions] §22.60.370 [injunction] §22.60.380 [enforcement.] §22.60.390 [zoning enforcement order] §26.103 [violations and penalties] §26.104 [enforcement] §26.106 [permits] §26.108 [inspections] LACFCD Code: §19.11 Violation a Public Nuisance §21.05 Standards, Guidelines, and Criteria §21.07 Prohibited Discharges §21.09 Installation or Use of Illicit Connections Prohibited §21.11 Littering Prohibited §21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity §21.15 Notification of Uncontrolled Discharges Required §21.17 Requirement to Monitor and Analyze

Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
	§21.19 Conflicts With Other Code Sections §21.23 Violation a Public Nuisance
vi. Utilize enforcement mechanisms to require compliance with applicable ordinances, permits, contracts, or orders.	Same as item v., above
vii. Control the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements among Copermittees.	California Government Code §6502 California Government Code §23004
viii. Control of the contribution of pollutants from one portion of the shared MS4 to another portion of the MS4 through interagency agreements with other owners of the MS4 such as the State of California Department of Transportation.	California Government Code §6502 California Government Code §23004
ix. Carry out all inspections, surveillance, and monitoring procedures necessary to determine compliance and noncompliance with applicable municipal ordinances, permits, contracts and orders, and with the provisions of this Order, including the prohibition of non-storm water discharges into the MS4 and receiving waters. This means the Permittee must have authority to enter, monitor, inspect, take measurements, review and copy records, and require regular reports from entities discharging into its MS4.	Los Angeles County Code: §12.80.490 [notification of uncontrolled discharge] §12.80.570 [obstructing access to facilities] §12.80.580 [compliance inspection] §12.80.610 [violation a nuisance] §12.80.620 [nuisance abatement] §12.80.635 [violation penalty] §12.80.640 [penalties not exclusive] §22.60.380 [enforcement.] §26.106 [permits] §26.108 [inspections]

Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
	LACFCD Code: §21.05 Standards, Guidelines, and Criteria §21.07 Prohibited Discharges §21.09 Installation or Use of Illicit Connections Prohibited §21.11 Littering Prohibited §21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity §21.15 Notification of Uncontrolled Discharges Required §21.17 Requirement to Monitor and Analyze §21.23 Violation a Public Nuisance
x. Require the use of control measures to prevent or reduce the discharge of pollutants to achieve water quality standards/receiving water limitations.	Los Angeles County Code: §12.80.450 [construction mitigation] §12.80.500 [good housekeeping practices] §12.80.510 [construction BMPs] §12.80.520 [industrial/commercial BMPs] §12.84.440 [LID standards] §12.84.450 [LID Plan Review] §22.60.330 [general prohibitions] §22.60.380 [enforcement.] §22.60.390 [zoning enforcement order] §26.106 [permits] §26.108 [inspections] LACFCD Code: §21.05 Standards, Guidelines, and Criteria

Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
	§21.07 Prohibited Discharges §21.09 Installation or Use of Illicit Connections Prohibited §21.11 Littering Prohibited §21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity §21.15 Notification of Uncontrolled Discharges Required §21.17 Requirement to Monitor and Analyze §21.23 Violation a Public Nuisance
xi. Require that structural BMPs are properly operated and maintained.	Los Angeles County Code: §12.80.530 [installation of structural BMPs] §22.60.380 [enforcement.] §22.60.390 [zoning enforcement order] §26.106 [permits] §26.108 [inspections] LACFCD Code: §21.05 Standards, Guidelines, and Criteria §21.07 Prohibited Discharges §21.09 Installation or Use of Illicit Connections Prohibited §21.11 Littering Prohibited §21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity §21.15 Notification of Uncontrolled Discharges Required §21.17 Requirement to Monitor and Analyze

Order Part VI(A)(2)(a) Items	Primary Applicable Ordinance/Statute
	§21.23 Violation a Public Nuisance
xii. Require documentation on the operation and maintenance of structural BMPs and their effectiveness in reducing the discharge of pollutants to the MS4.	Los Angeles County Code: §12.80.530 [installation of structural BMPs] §22.60.380 [enforcement.] §22.60.390 [zoning enforcement order] §26.106 [permits] §26.108 [inspections] LACFCD Code: §21.05 Standards, Guidelines, and Criteria §21.07 Prohibited Discharges §21.09 Installation or Use of Illicit Connections Prohibited §21.11 Littering Prohibited §21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity §21.15 Notification of Uncontrolled Discharges Required §21.17 Requirement to Monitor and Analyze §21.23 Violation a Public Nuisance

Order Part VI(A)(2)(b)(ii)

"*Identification of the local administrative and legal procedures available to mandate compliance with applicable municipal ordinances identified in subsection (i) above and therefore with the conditions of this Order, and a statement as to whether enforcement actions can be completed administratively or whether they must be commenced and completed in the judicial system.*"

The local administrative and legal procedures available to mandate compliance with the above ordinances are specified in those ordinances, particularly in:

Los Angeles County Code:

§12.80.550 Enforcement—Director's powers and duties.

§12.80.600 Notice to correct violations—Director may take action.

§12.80.610 Violation a public nuisance.

§12.80.620 Nuisance abatement—Director to perform work when—Costs.

§12.80.630 Violation—Penalty.

§12.80.635 Administrative fines.

§12.80.640 Penalties not exclusive.

§12.84.450 LID Plan Review.

§12.84.460 Additional Requirements.

Title 26, §103 Violations And Penalties

Title 26, §104 Organization And Enforcement

Title 26, §105 Appeals Boards

Title 26, §106 Permits

§22.60.330 General prohibitions.

§22.60.340 Violations.

§22.60.350 Public nuisance.

§22.60.360 Infractions.

§22.60.370 Injunction.

§22.60.380 Enforcement.

§22.60.390 Zoning enforcement order and noncompliance fee.

LACFCD Code:

§21.05 Standards, Guidelines, and Criteria

§21.07 Prohibited Discharges

§21.09 Installation or Use of Illicit Connections Prohibited

§21.11 Littering Prohibited

§21.13 Evidence of Compliance With Permit Requirements for Industrial or Commercial Activity

§21.15 Notification of Uncontrolled Discharges Required

§21.17 Requirement to Monitor and Analyze

§21.23 Violation a Public Nuisance

LACFCD attempts to first resolve each enforcement action administratively. However, the above cited ordinances also provide LACFCD with the authority to pursue such actions in the judicial system as necessary.

Very truly yours,

JOHN F. KRATTLI
County Counsel

By
JUDITH A. FRIES
Principal Deputy County Counsel
Public Works Division

JAF:jyj

LOS CERRITOS CHANNEL WATERSHED

Los Cerritos Channel

Coordinated Integrated Monitoring Program

Participants

Bellflower
Cerritos
Downey
Lakewood
Long Beach
Paramount
Signal Hill
Los Angeles County Flood Control District

Prepared by:

KINNETIC LABORATORIES INCORPORATED

Revised
June 29, 2015

RB-AR9917

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ACRONYMS

ALERT	Automatic Local Evaluation in Real Time
AMEL	Average Monthly Effluent Limitation
Basin Plan	*Water Quality Control Plan for the Coastal Watersheds of Los Angeles and Ventura Counties*
BMP	Best Management Practices
BPJ	Best Professional Judgment
BOD	Biochemical Oxygen Demand 5-day @ 20 °C
CASQA	California Stormwater Quality Association
CCR	California Code of Regulations
CD	Compact Disc
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CIMP	Coordinated Integrated Monitoring Program
CL	Control Limit
COD	Chemical Oxygen Demand
CTR	California Toxics Rule
CV	Coefficient of Variation
CWA	Clean Water Act
CWC	California Water Code
CWP	Center for Watershed Protection
Discharger	Los Angeles County MS4 Permittees
DNQ	Detected But Not Quantified
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethylene
DDT	Dichlorodiphenyltrichloroethane
EFA	Effective Filtration Area
EIA	Effective Impervious Area
ELAP	California Department of Public Health Environmental Laboratory Accreditation Program
Facility	Los Angeles County MS4s
FEB	Fluorinated Ethylene Propylene
FIB	Fecal Indicator Bacteria
GIS	Geographical Information System
gpd	gallons per day
HUC	Hydrologic Unit Code
IC50	Concentration at which the organism is 50% inhibited
IC/ID	Illicit Connection and Illicit Discharge Elimination
IWC	In-Stream Waste Concentration
LA	Load Allocations
LACFCD	Los Angeles County Flood Control District
LARWQCB	Regional Water Quality Control Board, Los Angeles
LCC	Los Cerritos Channel
LID	Low Impact Development

LOEC	Lowest Observed Effect Concentration
MAL	Municipal Action Limits
MBAS	Methylene Blue Active Substances
MCM	Minimum Control Measure
mg/L	milligrams per Liter
MDEL	Maximum Daily Effluent Limitation
ME	Mass Emission
µg/L	micrograms per Liter
MDL	Method Detection Limit
MEC	Maximum Effluent Concentration
MGD	Million Gallons Per Day
ML	Minimum Level
MRP	Monitoring and Reporting Program
MS4	Municipal Separate Storm Sewer System
MTBE	Methyl tertiary-butyl ether
ND	Not Detected
NOEC	No Observable Effect Concentration
NPDES	National Pollutant Discharge Elimination System
NSW	Non-Stormwater
NTR	National Toxics Rule
Ocean Plan	Water Quality Control Plan for Ocean Waters of California
ORI	Outfall Reconnaissance Inventory
PCB	Polychlorinated Biphenyls
PWS	Primary Watershed Segment
PES	Polyester-reinforced polysulfone
QA	Quality Assurance
QA/QC	Quality Assurance/Quality Control
QPF	Quantified Precipitation Forecast
RAP	Reasonable Assurance Program
Regional Water Board	California Regional Water Quality Control Board, Los Angeles Region
RL	Reporting Limit
RPA	Reasonable Potential Analysis
RWL	Receiving Water Limitations
SIP	State Implementation Policy (Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California)
SMC	Stormwater Monitoring Coalition
SMR	Self-Monitoring Reports
SQO	Sediment Quality Objective
SSC	Suspended Sediment Concentration
State Water Board	California State Water Resources Control Board
SVOC	Semi-Volatile Organic Compound
SWAMP	State's Water Ambient Monitoring Program
SWS	Secondary Watershed Segment

TAC	Test Acceptability Criteria
TIE	Toxicity Identification Evaluation
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TOC	Total Organic Carbon
TRE	Toxicity Reduction Evaluation
TSD	Technical Support Document
TSS	Total Suspended Solid
TST	Test of Significant Toxicity
TU_c	Chronic Toxicity Unit
USEPA	United States Environmental Protection Agency
USGS	U.S. Geological Survey
WDR	Waste Discharge Requirements
WET	Whole Effluent Toxicity
WLA	Waste Load Allocations
WMA	Watershed Management Area
WMG	Waste Management Group
WMMS	Watershed Management Modeling System
WMP	Watershed Management Program
WQBELs	Water Quality-Based Effluent Limitations
WQS	Water Quality Standards
%	Percent

COORDINATED INTEGRATED MONITORING PROGRAM FOR THE LOS CERRITOS CHANNEL WATERSHED GROUP

1 Introduction

A Coordinated Integrated Monitoring Program (CIMP) is required to be submitted either separately or as part of a Watershed Management Plan (WMP). The CIMP is required to integrate requirements of the current Los Angeles County MS4 Permit, the City of Long Beach MS4 permit and TMDL monitoring requirements. This plan was developed to address five primary objectives which include:

- Assess the chemical, physical, and biological impacts of discharges from the MS4s on receiving waters.
- Assess compliance with receiving water limitations and water quality-based effluent limitations (WQBELs) established to implement TMDL wet and dry weather load allocations
- Characterize pollutant loads in MS4 discharges.
- Identify sources of pollutants in MS4 discharges.
- Measure and improve the effectiveness of pollutant controls implemented under the new MS4 permits.

Figure 1-1 provides a summary of all jurisdictions that are participating in both the WMP and the CIMP. The Los Angeles County Flood Control District includes the entire area addressed by the Los Cerritos Channel WMP and CIMP.

1.1 Monitoring Objectives

The Permit Monitoring and Reporting Program (MRP) for Los Angeles County[1] and the City of Long Beach[2] have equivalent requirements. The Los Cerritos Channel watershed is located in areas covered by both permits but the requirements differ only in terms of schedules. The City of Long Beach opted to participate in the WMP and CIMP being developed under the Los Angeles County Permit schedule but the major elements and primary objectives listed below are identical. The CIMP is required to incorporate the following elements and address the established objectives under each element:

- Receiving Water Monitoring (Wet and Dry Weather) (Part II.E.1 of the MRP)
    - Are receiving water limitations being met?
    - Are there trends in pollutant concentrations over time or during specified conditions?

[1] Order No. R4-2012-0175, NPDES Permit No. CAS004001

[2] Order No. R4-2014-0024, NPDES Permit No. CAS004003

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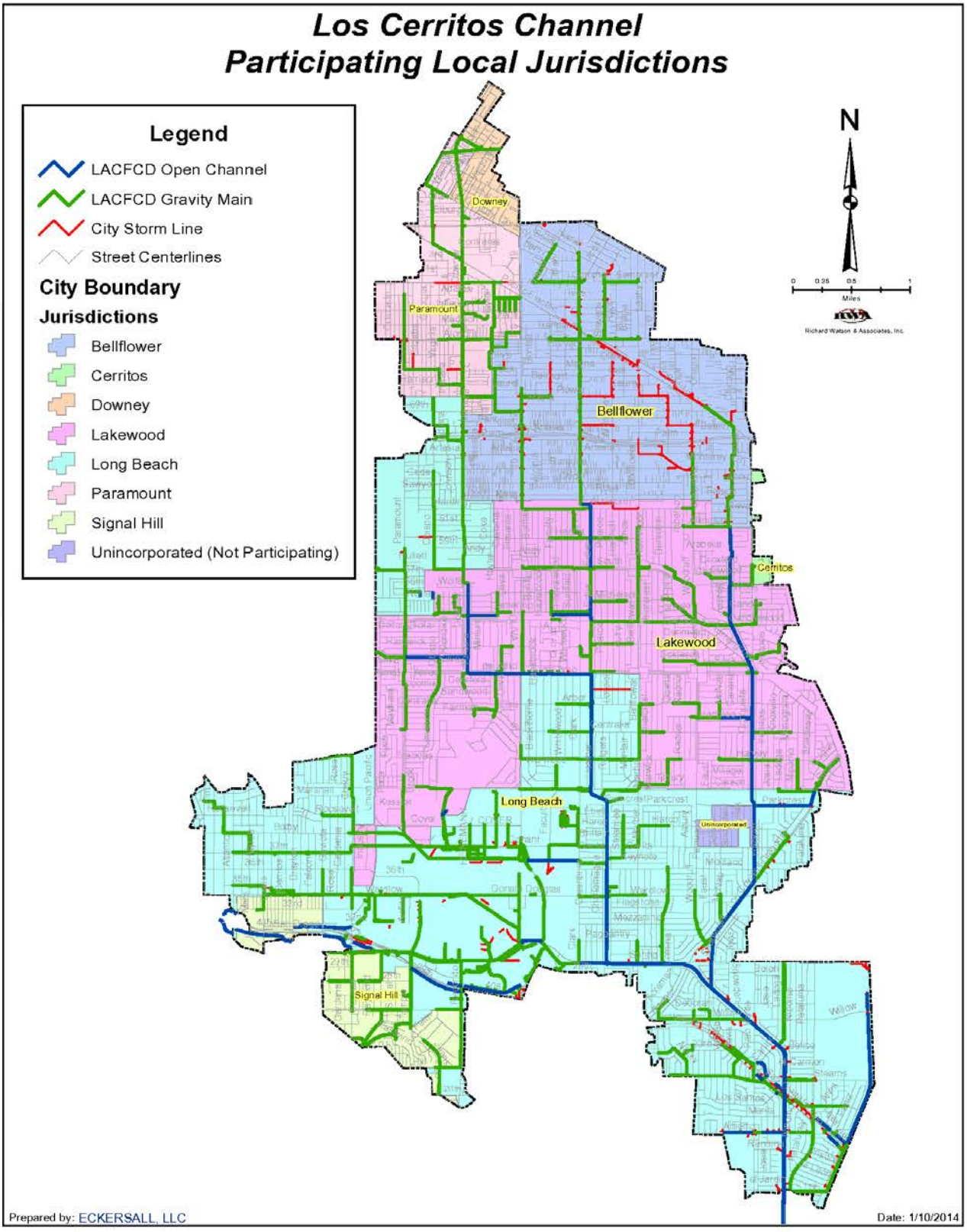

Figure 1-1. Jurisdictions Participating in the WMP and CIMP.

    - Are designated beneficial uses fully supported as determined by water chemistry, aquatic toxicity, and bioassessment monitoring?
- Stormwater Outfall Monitoring (Part II.E. 2 of the MRP)
    - How does the quality of the permittees' discharges compare to Municipal Action Limits (MALs)?
    - Are the permittees' discharges in compliance with applicable stormwater WQBELs derived from TMDL Waste Load Allocations (WLAs)?
    - Do the permittees' discharges cause or contribute to an exceedance of the receiving water limitations?
- Non-Stormwater Outfall Based Monitoring (Part II.E.3 of the MRP)
    - Are the permittees' discharges in compliance with non-stormwater WQBELs derived from TMDL WLAs.
    - How does the quality of the permittees' discharges compare to Non-Stormwater Action Levels?
    - Do the permittees' discharges cause or contribute to an exceedance of the receiving water limitations?
    - Do the permittees comply with the requirements of the Illicit Connection and Illegal Discharge Program?
- New Development/Re-Development Effectiveness Tracking (Part II.E.4 of the MRP)
    - Are the conditions established in building permits issued by the Permittees being met?
    - Are stormwater volumes associated with the design storm effectively retained on-site?
- Regional Studies
    - How do the permittees plan to participate in efforts to characterize the impact of the MS4 on receiving waters? Include participation in regional studies with the Southern California Stormwater Monitoring Coalition (SMC) and any special studies specified in TMDLs.

1.2 Monitoring Sites and Approach

The approach presented in this CIMP incorporates all objectives of the MRP but provides a customized approach to address the objectives identified in the MRP for Stormwater Outfall Monitoring based upon the unique characteristics of the LCC watershed. Unlike other WMGs in Los Angeles County, the LCC watershed does not receive flow from other WMGs. External contributions of contaminants are limited to atmospheric deposition originating predominantly from major transportation corridors and facilities. Proposed monitoring sites are shown in Figure 1-2 along with subwatershed boundaries. The Los Cerritos Watershed HUC Equivalent map is shown in Figure 1-3 and land use in the Los Cerritos Watershed is shown in Figure 1-4. From EPA TMDL modeling, estimated concentrations of metals in the Sub-Basins are shown in Figure 1-5.

1.2.1 Receiving Water

Receiving water quality monitoring will be conducted at the historic Los Cerritos Channel site at Stearns Street (LCC1). Originally, this location was considered a mass emission monitoring site for the City's stormwater program since it captures runoff stormwater originating from a large segment of the City. This site is also the compliance monitoring site for TMDL monitoring. This site is located about 100 feet

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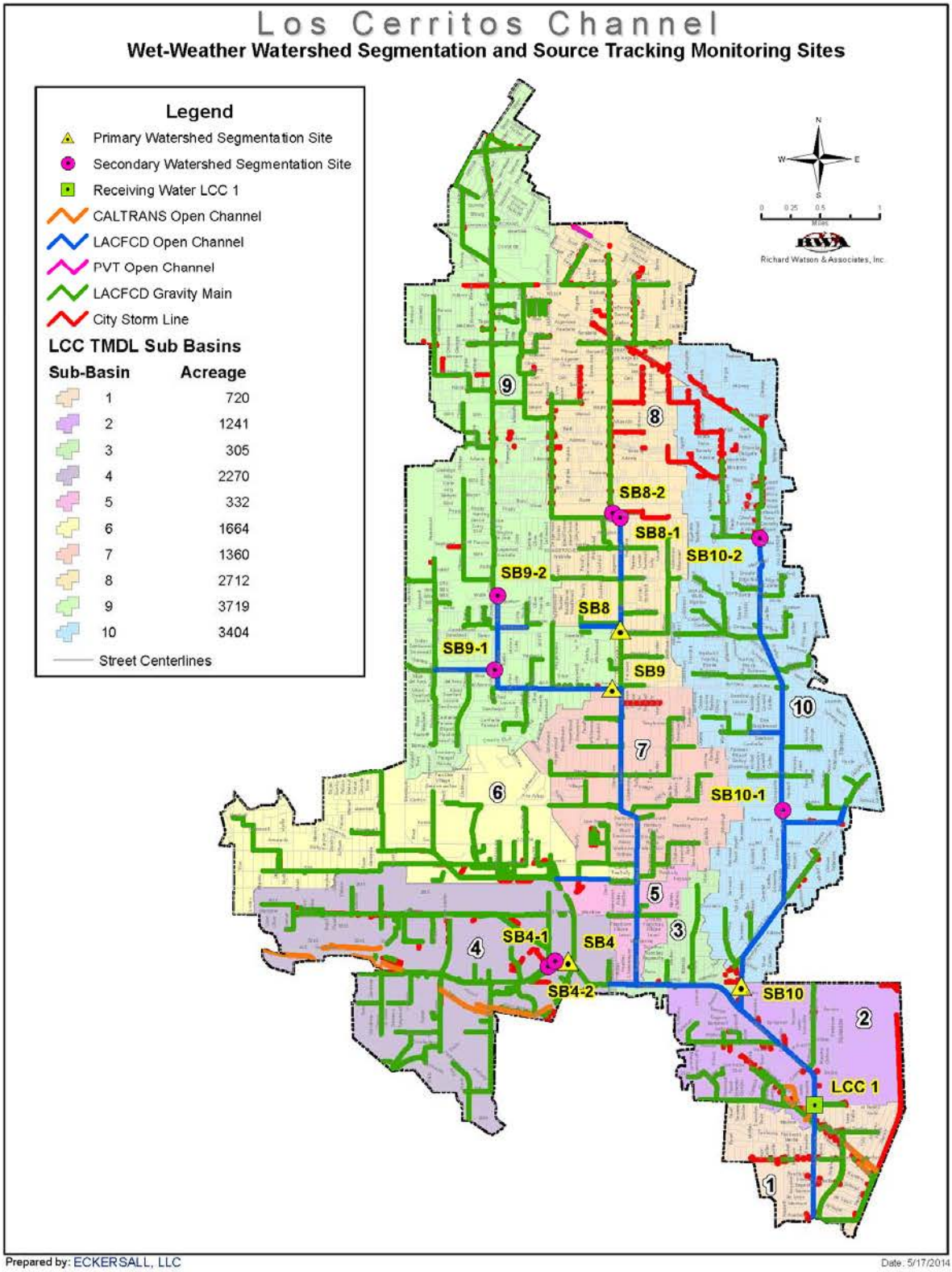


Figure 1-2. Locations of Potential Wet Weather Monitoring Sites in the Los Cerritos Channel Watershed.

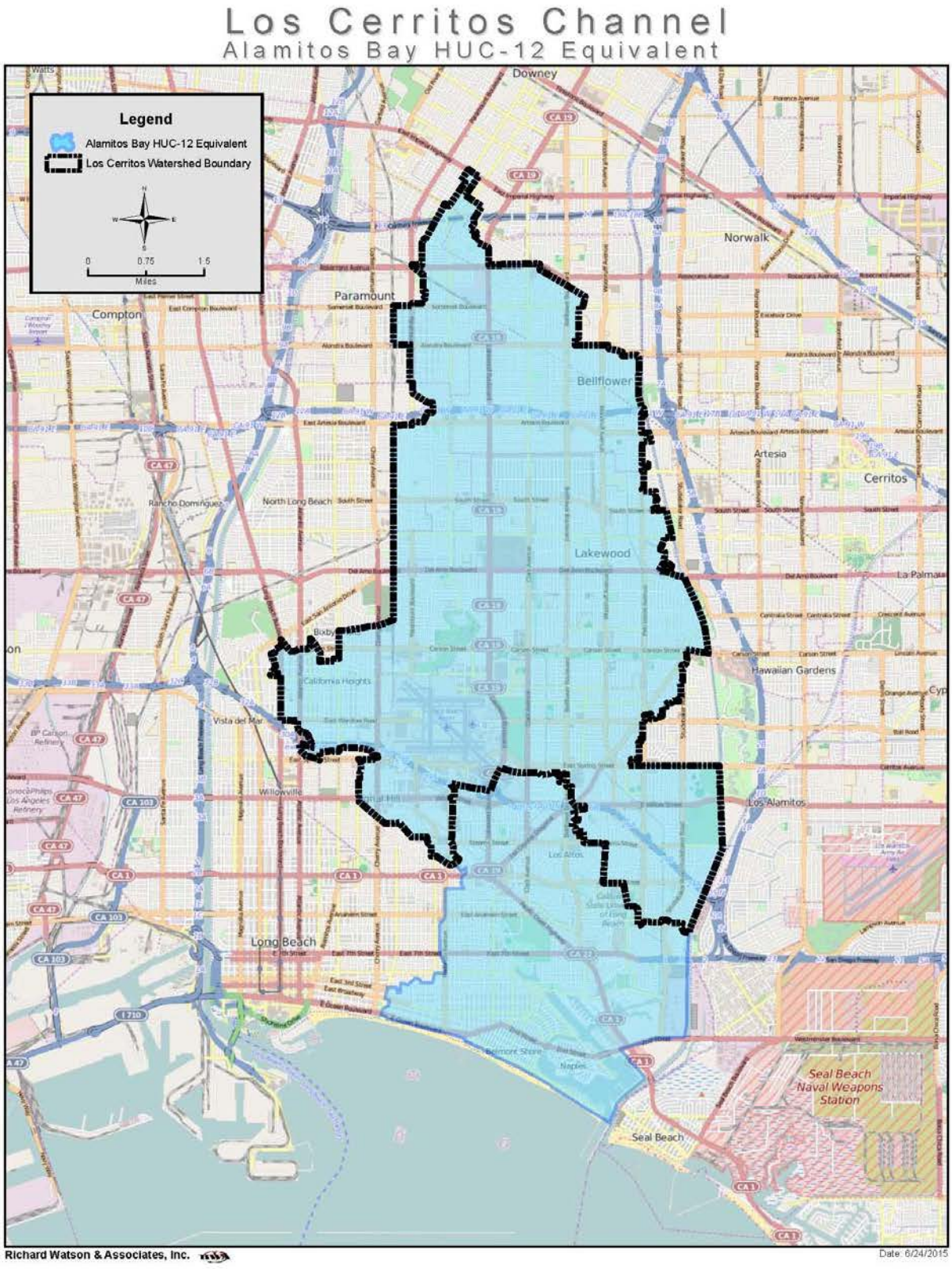


Figure 1-3. HUC-12 Equivalent Boundaries, Los Cerritos Watershed.

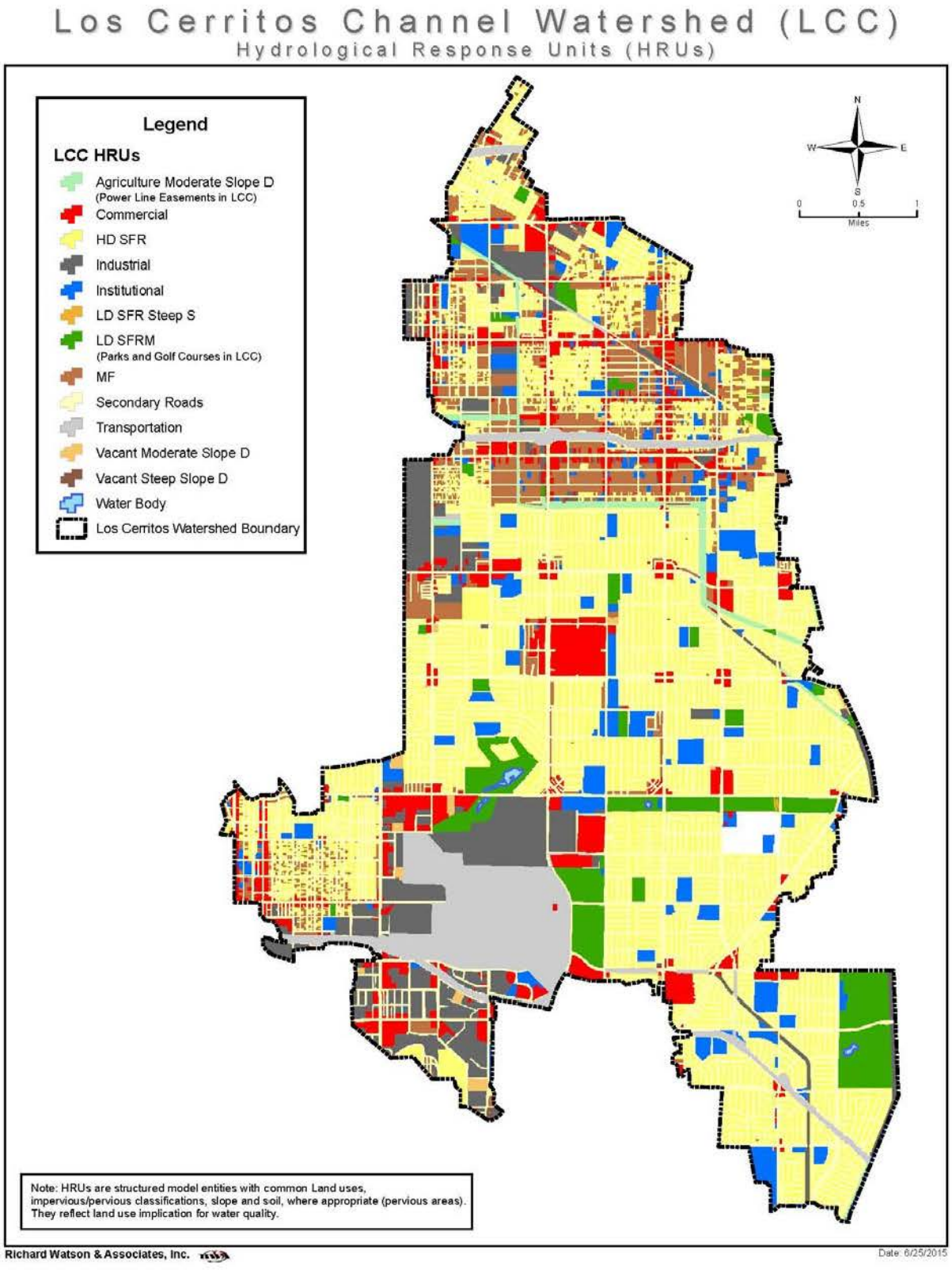
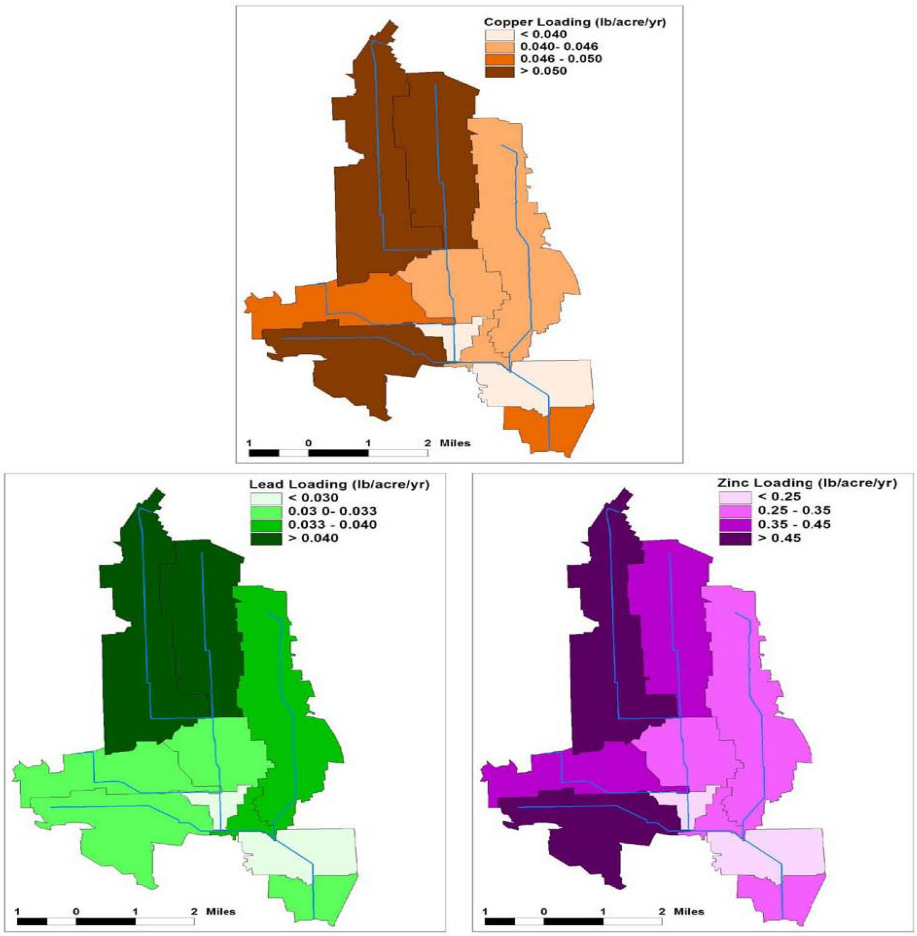


Figure 1-4. Los Cerritos Watershed Land Uses.

Figure 6. Estimated metals loadings by sub-basin



Los Cerritos Channel Metals TMDLs 31

Source: EPA 2010. Los Cerritos Channel Metals TMDL.

Figure 1-5. Estimated Concentrations of Metals from each Sub-Basin of the Los Cerritos Channel Watershed.

downstream of a former U.S. Geological Survey (USGS) gaging station (Figure 1-2) and effectively marks the downstream extent of freshwater influences within the Channel. During low tides, freshwater extends down to the end of the concrete-lined channel below Atherton St. LCC1 marks the upper extent of tidal influence for all but the most extreme high tides. The portion of the Los Cerritos Channel listed as impaired for metals was identified as the 2.1 mile freshwater portion above the tidal prism. EPA (2010) used data from 10 years of both wet and dry weather monitoring at the LCC1 to establish the freshwater metals TMDL for the Los Cerritos Channel. This site now has a record of stormwater and dry weather water quality measurements that extend back for 13 years using consistent methods and, in most cases, consistent detection limits applicable to current receiving water limitations (RWLs).

1.2.2 Primary Watershed Segmentation (PWS) Monitoring

Stormwater outfall monitoring in the LCC watershed will be addressed by partitioning the watershed into segments that correspond to those used in the Los Cerritos Metals TMDLs to develop a model for estimating flow and pollutant loads. This allows the modeling information to be used to assist in directing sampling efforts to target areas of the watershed believed to contribute greater loads and verify the accuracy of the model. If the monitoring program identifies a segment of the watershed as contributing significantly higher pollutants loads than the segments, then further monitoring will be conducted to further identify and isolate the source. This "forensic" monitoring would further partition the watershed by monitoring of Secondary Watershed Segmentation (SWS) using more portable sampling stations.

PWS sampling is intended to assist in determining whether the permittees' discharges are causing or contributing to exceedance of receiving water limitations, assess whether the permittees' discharges are in compliance with applicable WQBELs derived from TMDL WLAs and with applicable action limits. The Los Cerritos Channel watershed is highly divided with a number of separate channels contributing flow. In practice, no clear distinction exists between the end of the storm drain system and the start of tributaries or receiving waters. Restricting monitoring sites to locations considered to be "outfall" sites would limit sampling to much smaller catchments that are intended to be representative of land use throughout the LCC watershed. This monitoring approach was not considered to be an effective strategy for identification of the major sources of contaminants and would provide limited assistance in directing effective implementation of control measures in this watershed.

Primary Watershed Segment (PWS) sites (Figure 1-2) were selected based upon:

- LSPC modeling results from the LCC Metals TMDL (U.S. EPA 2010);
- land use characteristics within the watershed; and
- the ability to isolate major portions of the watershed.

The LSPC model was used to simulate flows and metals concentrations in Los Cerritos Channel during development of the LCC Metals TMDLs. An updated version of the LSPC serves as the basis for the Los Angeles County Watershed Management Modeling System (WMMS). The model divided the watershed into 10 sub-basins (Figure 1-2) and developed loading estimates (Figure 1-5) for each of the sub-basins. The LSPC model results provided the primary guidance for selection of appropriate watershed monitoring sites. Site selection first considered sub-basins that the model identified as the most

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significant sources of metals. Potential sites were considered at locations near the downstream edge of each sub-basin and where runoff from each sub-basin could be effectively isolated. Land use information for within each sub-basin was then examined to determine dominant land uses within each segment and assure that all major land uses would be effectively sampled. Lastly, sites were selected to effectively represent a large proportion of the watershed and yet avoid large disparities in the sizes of each segment such that pollutant or sediment delivery ratios[3] would not vary substantially among monitoring sites.

Sites selected as PWS sites include SB4, SB10, SB8 and SB9 (Figure 1-2; Table 1-2). Each of these sites isolates significant proportions of their respective sub-basins (4, 10, 8 and 9). Together, these monitoring locations allow 68% of the entire watershed to be monitored. Once implemented, pollutant loading rates for each of the PWS sites can be compared to loads measured at the downstream receiving water site (LCC1) in order to assess potential discrepancy in load contributions and determine if further implementation of control measures is warranted

SB4 is located in the Los Cerritos Channel just west of Lakewood Blvd. and adjacent to the Long Beach Daugherty Airport. This site will effectively sample runoff from sub-basin 4. LSPC modeling indicated that this segment may be a significant source of both copper and zinc (Figure 1-5). Land use in this segment of the watershed (Table 1-1) is dominated equally by the Airport (classified as mixed urban in the model) and industrial land use. This segment represents approximately 13% of the entire LCC watershed.

SB10 is located in the Palo Verde Channel and will collect runoff from the Sub-Basin 10. This segment of the watershed is comprised largely of low-density residential neighborhoods (Table 1-1) and represents 19% of the entire LCC watershed. The LSPC model predicted that this portion of the watershed would produce moderate loads of copper, lead and zinc. This watershed is somewhat unique in its relatively large size (3403 acres) and having more than 77 percent residential land use (71% low density and 6.3% high density residential land use). Monitoring of this sub-basin is considered to be useful in validating the modeling results and providing improved estimates of trace metal loads from residential areas.

Sub-basins 8 and 9 are located in northern portion of the watershed (Figure 1-2) draining portions of Bellflower, Downey, Lakewood, Long Beach, and Paramount. LSPC modeling indicated that these two sub-basins would likely yield some of the highest loads of metals (Figure 1-5). Initial modeling indicated that sub-basin 9 was expected to have higher loads of copper, lead and zinc than most other areas. The model projected that copper and lead loading would be elevated in sub-basin 8 but this region was expected to produce slightly lower levels of zinc. Land uses in both sub-basins are predominantly residential with substantial amounts of commercial activities (Table 1-1). Together, these two sub-basins comprise over a third of the LCC watershed. Monitoring sites are located near the bottom of each of these sub-basins. SB8 is located in the Clark Channel just north of the Lakewood Civic Center and SB9 is located in the Del Amo Channel near Clark Avenue.

[3] The delivery ratio of pollutant loads can be defined as the ratio of the discharged pollutant load delivered to the point of interest divided by the mass of pollutants generated at the source.

Monitoring at these four PWS sites will form the backbone of the program. This program allows for an adaptive process that enables resources to be focused on confirming modeling results and portions of the watershed that are significant sources of contaminants and flow. Wet weather monitoring at the LCC1 receiving water monitoring site and the four PWS sites will be used to evaluate if one or more of these segments is contributing excessive loads of key pollutants.

Potential Secondary Watershed Segment (SWS) sites for forensic monitoring have been identified within each of the four sub-basins (Figure 1-2). SWS sites are identified by the name of the sub-basin monitoring site followed by a hyphen and a sequential number for each added site. For example, potential SWS sites in sub-basin 4 are identified as SB4-1 and SB4-2.

Where possible, these sites are positioned at locations that further dissect the sub-basins. In sub-basin 4, tentative SWS sites effectively divide the sub-basin into two areas of comparable size. SWS sites isolate major, but unequal branches of the drainages within both sub-basins 8 and 9. Sub-basin 10 has a more linear configuration that required locating potential SWS sites at two locations along the length of the sub-basin. These are sites where further monitoring would be conducted if one of more of the sub-basins is identified as having high pollutant loading rates. It is not anticipated that all secondary sampling locations will require sampling and it is possible that none will require further sampling.

Any sampling initiated at these SWS sites would be conducted with temporary installations designed to allow for installation within one day. Monitoring at these sites would utilize 24-hour, time-based sampling triggered by flow. Sampling would be conducted concurrently with sampling of the long-term sub-basin watershed sites (PWS sites) and the receiving water monitoring site (LCC1).

SWS sites will utilize time-based monitoring methods to aid in isolating areas that may be contributing excessive concentrations of contaminants. If monitoring data indicate that one of the two SWS sites has elevated concentrations of any contaminant of concern, additional upstream monitoring sites will be selected based upon the configuration of the upstream storm drains and land use. Monitoring equipment used for the paired secondary stations would then be relocated upstream in the targeted segment to better isolate potential sources.

1.2.3 Non-Stormwater Outfall Monitoring

Non-Stormwater Outfall Based Monitoring will be conducted throughout the major open channels of the Los Cerritos Channel Watershed. Initially, all pipes exceeding 12 inches in diameter and discharging either directly into the Los Cerritos Channel receiving water or into any of the open channels will be identified in the first screening survey. By the end of 2014, the database will be refined to determine which of the 12-inch to 36-inch pipes include discharges from areas with industrial land uses. Discharge pipes less than 36 inches and determined not to incorporate runoff from industrial land use areas will be excluded from further surveys. After completing an inventory of the outfalls, two more screening surveys will be conducted by the end of 2014 to document sites with persistent and significant non-stormwater flows. Subsequently, the source ID program will utilize an array of different methods to assist in determining whether flows are the result of illicit connections/illicit discharges (IC/IDs), authorized or conditionally exempt non-stormwater flows, natural flows or unknown. These may

include available drainage maps, information on existing dewatering permits or industrial discharges, and a combination of field tests and limited laboratory testing.

1.2.4 New Development/Re-Development Effectiveness Tracking

Participating agencies have developed mechanisms for tracking information related to new and re-development projects that are subject to post-construction best management practice requirements in Part VI.D.7 of the MS4 Permit.

1.2.5 Regional Studies

On behalf of the participating agencies, the Los Angeles County Flood Control District (LACFCD) will continue to provide financial and/or monitoring resources to the Southern California SMC Regional Watershed Monitoring Program, also known as the Regionally Consistent and Integrated Freshwater Stream Bioassessment Monitoring Program (Bioassessment Program). The Bioassessment Program was initiated in 2009 and is structured to occur in cycles of five years. Sampling under the first cycle concluded in 2013. The next five-year cycle is scheduled to begin in 2015, with additional special study monitoring scheduled to occur in 2014.

Permittee representatives will also participate in the SMC meetings and assist in development and implementation of selected and appropriate regional studies designed to improve stormwater characterization and impact assessment.

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Table 1-1. Summary of Land Use Associated with Monitored Segments of the Los Cerritos Channel Watershed.

	SUB-BASIN NUMBER/ACREAGE				
Land Use	4	8	9	10	TOTAL[1]
Agriculture	0.0	37.3	42.4	50.0	130
Commercial	353	507	710	372	1941
Industrial	706	125	500	59.0	1390
HD Residential	40.0	371	491	213	1115
LD Residential	276	1,598	1,783	2,416	6072
Mixed Urban	753	13.6	120	142	1029
Open	144	60.4	63.9	152	419
Total Acres	2,271	2,712	3,710	3,403	12,096
		Total Watershed Acres			**17,716**
	SUB-BASIN NUMBER/%				
Land Cover	4	8	9	10	-
Agriculture	0.0	1.4	1.1	1.5	0.7
Commercial	15.5	18.7	19.1	10.9	11.0
Industrial	31.1	4.6	13.5	1.7	7.8
HD Residential	1.8	13.7	13.2	6.3	6.3
LD Residential	12.2	58.9	48.1	71.0	34.3
Mixed Urban	33.2	0.5	3.2	4.2	5.8
Open	6.3	2.2	1.7	4.5	2.4
Total %	13	15	21	19	68

HD= High Density, LD= Low Density

[1]Land use composition for all 10 sub-basins can be accessed in the Los Cerritos Channel Metals TMDLs (EPA 2010)

Table 1-2. Monitoring Site Designation and Monitoring Function.

Site Name	Site Description	Datum NAD83		Type of Site			
				Receiving Water	TMDL	WATERSHED	
		Latitude (N)	Longitude (W)			Primary	Secondary[1]
LCC1	Stearns Street	33.79538	118.10361	X	X	X	
SB4	Sub-basin 4 – Spring St. Drain	33.81306	118.13953		X	X	
SB8	Sub-basin 8 – Clark Drain	33.85384	118.13226		X	X	
SB9	Sub-basin 9 – Del Amo/Downey	33.84682	118.13370		X	X	
SB10	Sub-basin 10 – Palo Verde	33.81044	118.11430		X	X	
SB4-1	Northern Sub-basin[1]	33.81316	118.14235				X
SB4-2	Southern Sub-basin[1]	33.81288	118.14249				X
SB8-1	North Clark Channel[1]	33.86848	118.13355				X
SB8-2	West Clark Channel[1]	33.86783	118.13225				X
SB9-1	West Downey Channel[1]	33.84908	118.15978				X
SB9-2	North Downey Channel[1]	33.85844	118.15046				X
SB10-1	North Palo Verde Channel[1]	33.86546	118.11160				X
SB10-2	Mid Palo Verde Channel	33.83210	118.10836				X

[1] These locations are ***tentative*** sites and will be further evaluated as part of the adaptive management of the CIMP. Monitoring at secondary sites will be dependent upon the monitoring results at each of the Primary Watershed Sites.

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2 Overview of the Schedule and Sampling Frequencies for each CIMP Element

The CIMP will be implemented in a phased process (Table 2-1). Existing monitoring at LCC1 continues to be conducted, and the dry weather screening of major outfalls has commenced. Implementation of new monitoring programs and modifications to the existing monitoring program at LCC1 will be implemented beginning July 1, 2015 or 90 days after the approval of the CIMP, whichever is later.

Receiving Water Quality Monitoring

- Monitoring will occur at one Receiving Water Quality Monitoring Site, LCC1, which will also serve as the LCC Metals TMDL compliance site.
- Monitoring will be conducted during two dry weather and four wet weather events per year. This allows alignment of monitoring the Receiving Water and Stormwater Outfall Monitoring requirements of the Permit with TMDL Monitoring. Alignment of these monitoring requirements allows for a more efficient and cost effective program. The Watershed Group will use wet-weather monitoring results from the first year to consider requesting a reduction in frequency to three wet-weather events in the future. The fourth storm event is only for the purpose of fulfilling the TMDL requirements. Only copper, lead, zinc, total suspended solids (TSS), suspended sediment concentration (SSC), and hardness will be analyzed.
- Monitoring of the two dry weather flows will start in July 1, 2015 or 90 days after approval of the CIMP, whichever is later. Wet season monitoring will follow for four storm events during the 2015/16 wet season.
- Water quality testing during the critical dry weather flows (July) and during the first significant storm event of the year will incorporate the entire list of water quality parameters listed in Table E-2 of the MRP. Water quality testing during the remaining two wet weather events and one dry weather event will incorporate all constituents identified in Table 3.2 (See Section 3) for the Los Cerritos Channel receiving waters.
- If Table E-2 constituents are not detected at the specified Method Detection Limit (MDL) for their respective test method or if the results are below the lowest applicable water quality objective, and is not otherwise identified as being 303(d)-listed or part of an ongoing TMDL, the analyte will not be further analyzed. In accordance with the minimum requirements established in the Permit MRP (page E-16) parameters exceeding the lowest applicable water quality objective will continue to be analyzed for the remainder of the Order at the receiving water monitoring station.
- The Aquatic Toxicity Testing program will be initiated during the 2015 dry weather season at LCC1. Aquatic Toxicity Testing will be conducted during one dry weather monitoring event when critical low flow conditions are expected and during two storm events including the first major storm of the year.

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Primary Watershed Segmentation (PWS) Stormwater Monitoring

- Due to water conservation in response to drought and greatly reduced dry-weather discharges, the drainage area is already in compliance with dry-weather copper WLA at Stearns Street. The watershed segment monitoring program is designed to help demonstrate compliance with wet-weather WLAs. A phased-in approach will be employed for monitoring sites.
- Two PWS sites, SB4 and SB10, will be installed and ready for monitoring during the 2015/16 wet season. SB8 and SB9 will be installed and prepared to monitor storm events during the 2016/17 wet season, and will complete the planned array of four PWS sites.
- Two portable monitoring units, SBX-1 and SBX-2, will be installed in 2017-2018 to monitor secondary watershed segments based on results of primary watershed segment monitoring.
- When possible, PWS sampling will be conducted concurrently with stormwater monitoring at LCC1. This will result in three monitored stormwater events for each PWS site as they are installed and ready for collection of flow-rated composite samples.
- Water quality testing at PWS sites will initially incorporate a list of general and conventional pollutants, *E. coli*, nutrients, and metals. A detailed list of analytes to be initially tested at PWS sites is addressed in Section 3.1.
- Additional water quality parameters listed in Table E-2 of the MRP may be incorporated based upon results of stormwater monitoring at the receiving water station, LCC1. These constituents will be added to monitoring requirements at PWS sites once an analyte is detected in stormwater runoff at LCC1 during two consecutive stormwater monitoring events. Similarly, if analytes added the PWS monitoring are not detected at PWS sites during two consecutive stormwater monitoring events, they will be removed from the required analytical list.
- Once a minimum of two seasons of wet weather monitoring data (six events) are available from a PWS site, data will be evaluated to determine if forensic monitoring is necessary to assist in source tracking and identifying upstream sources of key pollutants. Forensic monitoring would be conducted by further dividing the watershed with Secondary Watershed Segmentation (SWS) sites. Potential SWS sites have been identified for each of the four PWS sites but these sites will only be used if water quality constituents measured at the PWS sites are sufficiently elevated to warrant implementation of forensic monitoring.
- Sampling at SWS sites would be performed with temporary, mobile stormwater sampling stations used to take time-based composite samples and would focus on the specific analytes of concern as well as any appropriate ancillary analytes. Source tracking would be triggered if running averages measured at a PWS site exceeds Municipal Action Limits (MALs; Attachment G of the MRP) by more than 20% any analytes that have limits and that are required to be sampled at the PWS sites. Similarly, forensic sampling would also be conducted if the running average pollutant loading rates for Category 1 or 2 pollutants are found to exceed those measured at LCC1 (the Los Cerritos Channel receiving water/TMDL monitoring site) by more than 25%.

Non-Stormwater Outfall Monitoring Program

- Three initial surveys will be completed. The first will focus upon verification of outfalls as identified based upon available City and County GIS records, providing baseline photographic records, assessing flow, recording observations, and field water quality measurements. An inventory of outfalls above 12 inches in diameter will be created. The second and third screening surveys will expand field water quality testing to assist in the identification and classification of the discharge.
- Information from the three initial surveys will be used to determine which outfalls have significant discharges and classify these outfalls for further investigation. Information from the three surveys such as flow rates of the discharge, flow rates in the channel, the nature of the channel-earthen or concrete, and land uses in the drainage area will be used collectively to determine significance.
- Outfalls with significant flow will be classified for further investigation. Flow measurements, observations, field water quality tests and limited laboratory tests may be used to classify the remaining outfalls as either **Suspect Discharges**, **Potential Discharges** or **Unlikely** discharges of concern. Clean outfalls with no evidence of discharges or odors during the initial surveys will be classified as **Unlikely** sources of non-stormwater discharges and will not require further investigation.
- Outfalls considered having the highest risk for illicit discharges or illegal flows will be classified as **Suspect Discharges.** This will require multiple lines of evidence indicative of potential illicit discharges or persistent high flows that represent significant receiving waters contributions.
- Outfalls considered to be **Suspect Discharges** will be further classified and ranked for further investigations designed to identify the sources of these discharges and to determine whether discharges are illicit, exempt, conditionally exempt, conditionally exempt but non-essential flows or unknown.
- Suspect outfalls determined to have exempt or conditionally exempt discharges will be identified in annual reports along with the measures taken to identify the sources.
- Suspect outfalls identified with conditionally exempt but non-essential flows or flows from unknown sources will be first be subject to review to determine if suitable control measures can be implemented to eliminate the discharges.
- If discharges cannot be eliminated, they will be subjected to a periodic monitoring to document that sufficient measures are taken to control potential discharges of pollutants in the discharge.
- Source investigations for discharges from outfalls classified as suspect will be ongoing in order to meet the requirement that investigations are conducted for no less than 25% of the outfalls in the inventory by December 2015 and 100% of the outfalls in the inventory by December 2017.
- Outfalls classified as **Potential Discharges** will be reassessed during the permit.
- Outfalls with obvious illicit discharges will be immediately classified as such and investigated immediately.

Table 2-1. Schedule for Implementation of Monitoring Activities in the Los Cerritos Channel Watershed[7].

Task	Dry 2014	Dry 2015	Wet 2015-16	Dry 2016	Wet 2016-17	Dry 2017	Wet 2017-18	Dry 2018
Receiving Water/TMDL								
LCC1 Stearns St.	Note 6							
Chemistry[1]		2	4	2	4	2	4	2
Aquatic Toxicity		1	2	1	2	1	2	1
Primary Watershed Segments								
SB10			3		3		3	
SB4			3		3		3	
SB8					3		3	
SB9					3		3	
Secondary Watershed Segments[2]								
SBX-1							3	
SBX-2							3	
Non-Stormwater Outfall								
Inventory & Screen[3]	3							
Source ID[4]		Ongoing		Ongoing		Ongoing		Ongoing
Monitoring[5]				2		2		2

1. Table E-2 chemical analyses will be performed once during the first wet weather event and once during the first critical dry weather monitoring event. Constituents that exceed MDLs and available water quality objectives will continue to be monitored along with all constituents included as Category 1, 2 or 3 water body/pollutant classifications for the subject water body. Wet and dry weather chemical constituents will be separately assessed for purposes of continued monitoring. All constituents classified as category 1, 2, and 3 water body/pollutant in the water body will continue to be monitored during the permit cycle unless the constituents (primarily category 3 constituents) are shown to not be present at levels of concern on a consistent basis.
2. Initial locations of Secondary Watershed Segmentation (SWS) sites have been selected for each Primary Watershed Segment (PWS). Implementation of monitoring at SWS site will be dependent upon results of monitoring at PWS sites (e.g. exceedance of action limits).
3. Initial Inventory and Screening will be completed in three surveys before the end of 2014. One re-assessment of the Non-Stormwater Outfall Monitoring Program will be conducted prior to December 2017.
4. Investigations designed to track and classify discharges will start during the 2015 dry season. Source tracking and classification work depend upon the number of sites categorized as Suspect outfalls with evidence of significant flow.
5. Monitoring will be implemented if significant dry weather flows are identified at discharge points that are cannot be identified, are non-essential exempt flows, or identified as illicit flows that are not yet controlled. These sites will be initially monitored twice a year in conjunction with dry weather monitoring of the receiving water site.
6. Monitoring at LCC1 will continue to be conducted in accordance with the existing permit until the CIMP is approved.
7. The fourth storm event is only for the purpose of fulfilling the TMDL requirements. Only metals, TSS, SSC, and hardness will be analyzed.

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3 Chemical/Physical Parameters

Section 2 of the WMP provides a detailed analysis of water quality priorities within the Los Cerritos Channel Watershed. Water quality priorities were established in accordance with Section C.5.a.ii of the Permit. The three Permit categories are defined as:

- **Category 1 (Highest Priority):** Water body-pollutant combinations for which water quality-based effluent limitations and/or receiving water limitations are established in Part VI.E and Attachments L through R of the Order.
- **Category 2 (High Priority):** Pollutants for which data indicate water quality impairment in the receiving water according to the State's Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List (State Listing Policy) and for which MS4 discharges may be causing or contributing to the impairment.
- **Category 3 (Medium Priority):** Pollutants for which there are insufficient data to indicate water quality impairment in the receiving water according to the State's Listing Policy, but which exceed applicable receiving water limitations contained in this Order and for which MS4 discharges may be causing or contributing to the exceedance.

These Permit categories were intended to be specific to water bodies within the watershed but, in the case of the Los Cerritos Channel, data are limited to a single point in the watershed. Table 3-1 summarizes pollutants within each category.

Table 3-1. Waterbody-Pollutant Categories for the Los Cerritos Channel Watershed.

Category	Constituents
1	copper, lead, zinc, DDT, chlordane, PCBs, PAHs
2	ammonia, bis(2)ethylhexylphthalate, *E. coli*, pH
3	MBAS, enterococcus

The primary constituents of concern in the watershed are copper, lead and zinc which are part of the Los Cerritos Channel Metals TMDLs. Chlordane, DDTs, PCBs and PAHs are incorporated due to a 303(d) listing for chlordane in sediments downstream in the tidal portion of the channel and the Harbor Toxics TMDL for which the Los Cerritos Channel is considered part of the nearshore watershed[4]. Permittees in

[4] As recognized by the footnote in Attachment K-4 of the Permit, the Cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, Signal Hill, and the LACFCD have entered into an Amended Consent Decree with the United States and the State of California, including the Regional Board, pursuant to which the Regional Board has released the aforementioned entities from responsibility for toxic pollutants in the Dominguez Channel and the Greater Los Angeles and Long Beach Harbors. Accordingly, no inference should be drawn from the submission of this CIMP or from any action or implementation taken pursuant to it that the aforementioned entities are obligated to implement the Dominguez Channel and Greater Los Angeles and Long Beach Harbor Waters Toxic Pollutants TMDL, including this CIMP or any of the TMDL's other obligations or plans, or that the aforementioned entities have waived any rights under the Amended Consent Decree.

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the nearshore watershed are separately contributing to monitoring requirements in the Harbor waters and the Los Angeles River Estuary. Therefore DDTs, PCBs and PAHs are not currently incorporated into the sampling requirements for the ME and PWS monitoring sites. Two other constituents, ammonia and pH, are 303(d) listed due to dry weather flows where extremely shallow flows cause a daily cycle of pH and result in calculated ammonia water quality criteria to be exceeded despite extremely low concentrations. Additional listings exist for minor exceedances of methylene blue active substances (MBAS) criteria and exceedance of coliform and enterococcus bacteria. Enterococcus bacteria are limited to LCC1 since this site discharges to an estuarine environment.

Table 3-2 summarizes the constituents that will be monitoring at the ME and PWS sites. These constituents will serve as the core of the monitoring program. In addition, sections VI.C.1.e and VI.D.1.d of the MRP require that a comprehensive list of constituents is screened once during the first major storm event of the year and once during a period of critical low flow. Results of this analytical screening process will determine which constituents need to be analyzed at the mass emission site for the remainder of the five-year cycle of the permit.

If a parameter is not detected above the Method Detection Limit (MDL) for its respective test method *or* the result is below the lowest applicable water quality objective, and is not otherwise identified as a basic monitoring requirement, a TMDL analyte or a 303(d) listing, it need not be further analyzed. If a parameter is detected exceeding the lowest applicable water quality objective during either the wet or dry weather screening then the parameter shall be analyzed for the remainder of the Order (2017) at the receiving water monitoring station where it was detected during the respective conditions (wet or dry).

Analytical tests will be reconsidered at least once during each permit cycle in order to assess the appropriateness of maintaining the analyte or suite of analyses in the testing requirements. Water quality criteria, analytical methods, analytical results consistently near detection limits, updated information with respect to sources or many other additional factors may contribute to factors may warrant reconsideration of the analyte. If an analyte listed in Table E-2 (Attachment E of the Permit) is not detected at levels of concern during two consecutive monitoring events representing the same seasonal conditions, the Watershed Group will submit a request to the Regional Board to remove the analyte from future sampling. This does not include constituents which are basic monitoring requirements. In order to avoid bias due to seasonal build-up/wash off, this evaluation would be limited to the comparisons of the first major storm of the season rather than data consecutive events from the same season.

Constituents requiring screening are listed in Table E-2 of the Monitoring and Reporting Program. These constituents are further broken out by major analytical groups in Table 3-3 through Table 3-9 below.

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Table 3-2. Summary of Constituents to be Monitored on a Regular Basis at the Mass Emission Site (LCC1) and the Primary Watershed Segmentation (PWS) Sites.

CLASS OF MEASUREMENTS	MASS EMISSION SITE (LCC1)		PRIMARY WATERSHED SEGMENTATION (PWS) SITES
	Wet	Dry	Wet
Flow	4	2	3
Field Measurements (dissolved oxygen, pH, temperature, and specific conductivity)	4	2	3
MRP Table E-2 Constituents[1] (other than those specifically listed below)	1	1	
Aquatic Toxicity[5]	2	1	
General and Conventional Pollutants[6] (Table 3-3) (All except total phenols, turbidity, BOD_5, MTBE, and chloride and fluoride)	3	2	3
Microbiological Constituents (Table 3-4) *E.coli,* Total & Fecal Coliform, enterococcus[2]	3	2	
E.coli			3
Nutrients (Table 3-5) – Ammonia as Nitrogen (NH_3-N)	3	2	3
Organochlorine Pesticides and PCBs (Table 3-7) Chlordane[3]	3	2	
Metals[6] **(Table 3-6**) Cu, Pb, & Zn	4	2	3
Organophosphate Pesticides[4] (Table 3-8) - none required			
Semivolatile Organic Compounds (Table 3-9**)** bis(2)ethylhexylphthalate	3	2	

1. All Table E-2 constituents will be measured during the first major storm event of the season and the critical, low flow dry weather event (July) during the first year of the CIMP. Constituents that are detected above the lowest applicable WQOs during the first year of monitoring, will be analyzed for the remainder of the Order at the receiving water monitoring station where it was detected.
2. Analysis of all Fecal Indicator Bacteria (FIBs) will only be included for LCC1 that discharges directly to the Los Cerritos Channel Estuary. Enterococcus will not be analyzed at PWS sites since they do not discharge to marine or estuarine waters.
3. Chlordane components are based upon sum of chlordane-alpha, chlordane-gamma, nonachlor-alpha, nonachlor-gamma, and oxychlordane consistent with the Harbor Toxics TMDL.
4. No organophosphate pesticides are required as part of the baseline program.
5. Aquatic toxicity may be triggered at PWS sites by results from LCC1.
6. The fourth storm event is only for the purpose of fulfilling the TMDL requirements. Only copper, lead, zinc, TSS, SSC, and hardness will be analyzed.

Analytical requirements for the program are broken out by analytical test requirements since many are associated with an analytical test suite. This is most evident with the semivolatile organic compounds analyzed by EPA Method 625. Although this section identifies recommended methods for each analyte, many of the target constituents can be addressed by alternative methods. Use of alternative analytical methods may be preferable in cases where a larger suite of target analytes can be tested and still enable meeting minimum levels (MLs) established for each analyte. Selection of analytical methods is intended to be performance-based to allow laboratories flexibility to utilize methods that meet or exceed MLs listed in the MRP. As an example, the following tables (Table 3-7 and Table 3-8) list separate EPA methods for organochlorine pesticides and aroclors, organophosphate pesticides and semivolatile organic compounds. Some laboratories choose to use EPA Method 625 for all of these test requirements. This approach is acceptable as long as the method meets the MLs listed in Table E-2 of the MRP and meet data quality objectives consistent with the State's Surface Water Ambient Monitoring Program (SWAMP), but other laboratories will use separate test protocol for organophosphate pesticides.

The critical dry weather event is defined as the period when historical in-stream flow records are the lowest or during the historically driest month. Point measurements of dry weather flows taken in Los Cerritos Channel between 2000 and 2014 have been relatively uniform between May and September of each year, but base flows have decreased to approximately 0.5 cfs in recent years. Rainfall during the summer dry season is minimal and only briefly impacts flows in the channel. As a result, it is expected that critical dry weather flow testing could be performed anytime between May and September. Nevertheless, regional data suggest that rainfall and flows in major watersheds (Los Angeles River and San Gabriel River watersheds) are least in July. As such, critical low flow monitoring will be conducted in July.

A more accurate assessment of critical dry weather flow conditions will be completed and available by the end of the 2014 dry season. Flumes equipped with stilling wells, pressure sensors and data loggers will be constructed and installed throughout the watershed for a period of 6-8 weeks. The work is part of a State-funded Proposition 84 study[5] intended to provide detailed, continuous records of water level, flow and temperature at each site for the duration of the deployment. Four of the flumes will be located at sites selected as PWS sites for this CIMP. These data will be used to determine if flow diminishes over the course of a few weeks or exhibits diurnal fluctuations as expected. Concurrent water samples will also be collected over three 24-hour time periods to analyze trace metals (especially copper, lead, and zinc) and nutrient loading. If differences are noted, forensic work will be conducted to identify and mitigate the source of the discharges. Although this work is not part of the CIMP, the results of this program will be utilized to refine the "critical dry weather flow period" and to help provide guidance with respect to segments most likely to contribute higher loads of metals during dry weather conditions.

[5] Gateway Water Management Authority Agreement No. 12-423-550. Los Cerritos Channel Watershed Segmentation and Low Impact Development (LID) Project

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3.1 General and Conventional Pollutants

Most of the general and conventional pollutants listed in Table 3-3 will continue to be analyzed as part of the base monitoring requirements for both receiving water and PWS/SWS sampling. These constituents are common contaminants in stormwater from urban environments. Some, such as turbidity, are redundant and best used as surrogates under special studies. Turbidity is often used as a surrogate for suspended solids but requires calibration to the source material. Turbidity measurements are recognized to lack comparability due to differences in equipment as well as the differences between static and dynamic measurements (Anderson 2005 - USGS National Field Manual for Collection of Water Quality Data, Chapter 6.7). Total suspended solids (TSS) and suspended sediment concentrations (SSC) directly examine particles associated with water samples and do not suffer from the problems associated with measuring turbidity. An integral part of the pollutant reduction strategy involves the reduction of discharged solids from the MS4, therefore both TSS and SSC will be monitored. Since SSC sampling protocols are not met by the automatic stormwater samplers designed to measure pollutants, SSC analysis will be done on a subsample of the composite sample. Rigorous subsampling protocols will be utilized in order to assure representative samples that can be related directly to the chemical results. The SSC sample analyses will add information to the current TSS analyses being run.

Other pollutants in this group have been tested in samples from LCC1 since 2000 and have not been detected. As an example, total phenols have never exceeded the ML of 0.1 mg/L in this watershed. MTBE and cyanide were analyzed during the first three years of the City of Long Beach Stormwater Monitoring Program. MTBE has only detected in 1 out of 11 samples and cyanide was never detected. Although perchlorate has not been analyzed in stormwater in the LCC watershed, industrial activities likely to result in perchlorate discharges do not exist in the watershed. Perchlorate will be screened at the receiving water site (LCC1) during the initial surveys but this contaminant is not expected to require continued analysis at any monitoring site.

In summary, sufficient evidence exists to eliminate total recoverable phenolic compounds, cyanide, turbidity and MTBE from further analysis. Perchlorate will be incorporated in the initial screening since it has not been tested but it is not expected that continued testing will be required. Most other constituents included in this list are common contaminants in stormwater runoff and will continue to be analyzed. Analysis of chloride and fluoride may be analyzed as needed to assist in differentiating potable water and groundwater sources during source tracking programs for the non-stormwater outfall monitoring program but will not be included in monitoring conducted for wet/dry weather receiving water monitoring or for monitoring of the PWS/SWS monitoring sites.

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Table 3-3. Conventional Constituents, Analytical Methods and Quantitation Limits.

CONSTITUENTS CONVENTIONAL POLLUTANTS	METHOD	Target Reporting Limits mg/L
Oil and Grease	EPA1664	5
Total Petroleum Hydrocarbon	EPA 418.1	5
Total Suspended Solids	EPA 160.2	1
Suspended Sediment Concentration	ASTM D3977-97 (Method C)	0.5
Total Dissolved Solids	EPA 160.1	1
Volatile Suspended Solids	EPA 160.4	1
Total Organic Carbon	EPA 415.1	1
Biochemical Oxygen Demand	SM 5210B EPA 405.1	3
Chemical Oxygen Demand	EPA 410.1	4
Alkalinity	EPA 310.1	5
Specific Conductance	EPA 120.1	1 umho
Total Hardness	EPA 130.2	1
MBAS	EPA 425.1	0.02
Chloride	EPA300.0	2
Fluoride	EPA300.0	0.1
Perchlorate	EPA314.0	4 ug/L
Field Measurements	**METHOD**	**mg/L**
pH-field instrumentation	EPA 150.1	0 – 14
Temperature-field	In-situ	N/A
Dissolved Oxygen- field [1]	In-situ	Sensitivity to 5 mg/L

[1]Dissolved Oxygen will only be measured during dry weather surveys.

3.2 Microbiological Constituents

All four microbiological constituents used as fecal indicator bacteria (FIB) will continue to be monitored at the LCC1 Receiving Water monitoring site. Bacteria used as fecal indicators in marine waters will continue to be analyzed during wet and dry weather surveys due to being situated just above the Los Cerritos Channel Estuary. Only *E. coli* will be monitored at the four primary watershed segment sites since these are each located in freshwater portion of the watershed. Table 3-4 provides both upper and lower quantification limits for each FIB which was established to assure that quantifiable results are obtained. Upper quantitation limits are provided to assure that FIBs are quantified.

Table 3-4. Microbiological Constituents, Analytical Methods and Quantitation Limits.

BACTERIA[1]	Method	Lower Limits MPN/100ml	Upper Limits MPN/100ml
Total coliform (marine waters)	SM 9221B	<20	>2,400,000
Fecal coliform (marine waters)	SM 9221E	<20	>2,400,000
Enterococcus (marine waters)	SM 9230B/C	<20	>2,400,000
E. coli (fresh waters)	SM 9221E/ Colilert-QT	<10	>2,400,000

[1]Microbiological constituents will vary based upon sampling point. Total and fecal coliform and enterococcus will be measured only in marine waters or at locations where either the discharge point or receiving water body will impact marine waters. *E. coli* will be analyzed at sites within the freshwater portion of the watershed.

3.3 Nutrients

Nutrients (Table 3-5) are also considered as part of the base requirements for the monitoring program. These will be analyzed as part of the Table E-2 screening requirements during the first major storm event of the year and a critical dry weather sampling event at the receiving water site (LCC1). Nutrients have not been identified as exceeding any applicable RWL to date and are therefore not scheduled to be sampled as part of the ongoing program unless required based upon the initial screening. The current monitoring plan calls for separate analysis of nitrate-N and nitrite-N. Concentrations of nitrite-N have typically been low. If data indicates that concentrations of nitrite-N remain minimal, these analytes will be combined into one analytical procedure that quantifies both nitrate-N and nitrite-N at the same time.

Table 3-5. Nutrients, analytical methods, and quantitation limits

CONSTITUENT	METHOD	REPORTING LIMIT (mg/L)
Total Kjeldahl Nitrogen (TKN)[1]	EPA 351.1	0.50
Nitrate as Nitrogen (NO_3-N)[1,2]	EPA 300.0	0.10
Nitrite as Nitrogen (NO_2-N)[1,2]	EPA 300.0	0.05
Total Nitrogen[1]	calculation	NA
Ammonia as Nitrogen (NH_3-N)	EPA 350.1	0.10
Total Phosphorus	SM 4500-P E or F	0.1
Dissolved Phosphorus	SM 4500-P E or F	0.1

1. Total Nitrogen is the sum of TKN, nitrate, and nitrite.
2. Nitrate –N and Nitrite-N may be analyzed together using EPA 300

3.4 Total and Dissolved Trace Metals

A total of 16 trace metals are listed in Table E-2 of the MRP. Analytical methods and reporting limits for these elements are summarized in Table 3-6. Most metals will be analyzed by EPA Method 200.8 using ICP-MS to provide appropriate detection limits. Hexavalent chromium and mercury both require alternative methods. Neither hexavalent chromium nor mercury is commonly analyzed as part of stormwater programs. Hexavalent chromium has been analyzed at LACFCD's mass emission monitoring sites in both the Los Angeles River (S10) and the San Gabriel River (S14) for the past eight to ten years and has not been detected. Mercury has been detected at some mass emission monitoring sites but detections are not common at any. Analytical methods and detection limits used for the monitoring have been consistent with those required in Table E-2 of the MRP.

Measurement of mercury is generally not considered to be appropriate in flow-weighted composite samples taken with autosamplers due to its volatility. This becomes more of an issue when sampling is conducted near the limits of a peristaltic pump. Automatic stormwater samplers are not suitable for sampling stormwater at low detection limits (0.5 to 5 nanograms/liter). Grab samples will be taken for analysis of mercury in order to augment composite samples, which will be analyzed by EPA method 245.1. These grab samples will be analyzed by Method 1631E since this method is less subject to interferences and will be collected at the same time that monitoring crews pull other grab samples required by the monitoring program. Additional QAQC will be employed to support the extremely low detection limits required by the program.

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Table 3-6. Metals Analytical Methods, and Quantitation Limits.

METALS (Dissolved & Total)	METHOD	Reporting Limit *ug/L*
Aluminum	EPA200.8	100
Antimony	EPA200.8	0.5
Arsenic	EPA200.8	0.5
Beryllium	EPA200.8	0.5
Cadmium	EPA200.8	0.25
Chromium (total)	EPA200.8	0.5
Chromium (Hexavalent)	EPA218.6	5
Copper	EPA200.8	0.5
Iron	EPA200.8	25
Lead	EPA200.8	0.5
Mercury	EPA245.1	0.2
Mercury (Low level)	EPA1631E	0.0005
Nickel	EPA200.8	1
Selenium	EPA200.8	1
Silver	EPA200.8	0.25
Thallium	EPA200.8	0.5
Zinc	EPA200.8	1

3.5 Organochlorine Pesticides and PCBs

Although organochlorine pesticides (OC pesticides) and PCBs are not commonly present in stormwater sampled at LCC1, they have periodically been detected at low concentrations. The analytical methods and detection limits for these compounds are summarized in Table 3-7. These compounds are specified in Table E-2 of the MRP. The MRP suggests that detection of any of these analytes in excess of the ML and/or applicable criteria will require continuation of the analysis through the period of the permit. Since this could be attributable to analytical issues, we have recommended more frequent reevaluation (refer to Section 3).

Since the OC pesticides are part of an analytical suite, detection of one compound would necessitate continuation of the entire suite. However, this would not require continuation of analysis of PCBs analyses if they are not detected in the early storm event and critical dry weather monitoring event. Monitoring for PCBs will be reported as the summation of aroclors and a minimum of 50 congeners, using EPA Method 8270 without the use of High Resolution Mass Spectrometry for routine monitoring.

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Table 3-7. Chlorinated Pesticides and PCB Analytical Methods, and Quantitation Limits

CHLORINATED PESTICIDES	METHOD	Reporting Limit µg/L
Aldrin	EPA 608, 8081A	0.005
alpha-BHC	EPA 608, 8081A	0.01
beta-BHC	EPA 608, 8081A	0.005
delta-BHC	EPA 608, 8081A	0.005
gamma-BHC (lindane)	EPA 608, 8081A	0.02
alpha-chlordane	EPA 608, 8081A	0.1
gamma-chlordane	EPA 608, 8081A	0.1
Nonachlor-alpha	EPA 608, 8081A	0.1
Nonachlor-gamma	EPA 608, 8081A	0.1
Oxychlordane	EPA 608, 8081A	0.1
4,4'-DDD	EPA 608, 8081A	0.05
4,4'-DDE	EPA 608, 8081A	0.05
4,4'-DDT	EPA 608, 8081A	0.01
Dieldrin	EPA 608, 8081A	0.01
alpha-Endosulfan	EPA 608, 8081A	0.02
beta-Endosulfan	EPA 608, 8081A	0.01
Endosulfan sulfate	EPA 608, 8081A	0.05
Endrin	EPA 608, 8081A	0.01
Endrin aldehyde	EPA 608, 8081A	0.01
Heptachlor	EPA 608, 8081A	0.01
Heptachlor Epoxide	EPA 608, 8081A	0.01
Toxaphene	EPA 608, 8081A	0.5
POLYCHLORINATED BIPHENYLS[1]		
PCB 5	EPA Method 8270	0.005
PCB 8	EPA Method 8270	0.005
PCB 15	EPA Method 8270	0.005
PCB 18	EPA Method 8270	0.005
PCB 27	EPA Method 8270	0.005
PCB 28	EPA Method 8270	0.005
PCB 29	EPA Method 8270	0.005
PCB 31	EPA Method 8270	0.005
PCB 33	EPA Method 8270	0.005
PCB 44	EPA Method 8270	0.005
PCB 49	EPA Method 8270	0.005
PCB 52	EPA Method 8270	0.005
PCB 56	EPA Method 8270	0.005
PCB 60	EPA Method 8270	0.005
PCB 66	EPA Method 8270	0.005
PCB 70	EPA Method 8270	0.005
PCB 74	EPA Method 8270	0.005
PCB 87	EPA Method 8270	0.005
PCB 95	EPA Method 8270	0.005

PCB 97	EPA Method 8270	0.005
PCB 99	EPA Method 8270	0.005
PCB 101	EPA Method 8270	0.005
PCB 105	EPA Method 8270	0.005
PCB 110	EPA Method 8270	0.005
PCB 114	EPA Method 8270	0.005
PCB 118	EPA Method 8270	0.005
PCB 128	EPA Method 8270	0.005
PCB 137	EPA Method 8270	0.005
PCB 138	EPA Method 8270	0.005
PCB 141	EPA Method 8270	0.005
PCB 149	EPA Method 8270	0.005
PCB 151	EPA Method 8270	0.005
PCB 153	EPA Method 8270	0.005
PCB 156	EPA Method 8270	0.005
PCB 157	EPA Method 8270	0.005
PCB 158	EPA Method 8270	0.005
PCB 170	EPA Method 8270	0.005
PCB 174	EPA Method 8270	0.005
PCB 177	EPA Method 8270	0.005
PCB 180	EPA Method 8270	0.005
PCB 183	EPA Method 8270	0.005
PCB 187	EPA Method 8270	0.005
PCB 189	EPA Method 8270	0.005
PCB 194	EPA Method 8270	0.005
PCB 195	EPA Method 8270	0.005
PCB 200	EPA Method 8270	0.005
PCB 201	EPA Method 8270	0.005
PCB 203	EPA Method 8270	0.005
PCB 206	EPA Method 8270	0.005
PCB 209	EPA Method 8270	0.005
Aroclor-1248	EPA 608,EPA 8082	0.5
Aroclor-1254	EPA 608,EPA 8082	0.5
Aroclor-1260	EPA 608,EPA 8082	0.5

1. Monitoring for PCBs will be reported as the summation of aroclors and a minimum of at least 50 congeners. List of aroclors and congeners were obtained from Table C8 in the State's Surface Water Ambient Monitoring Program's Quality Assurance Program Plan.

3.6 Organophosphate Pesticides and Herbicides

Organophosphate pesticides, triamine pesticides and herbicides list in Table E-2 of the MRP are summarized in Table 3-8. Due to the fact that diazinon and chlorpyrifos are no longer available for residential use, these constituents are now rarely detected. When detected, concentrations rarely exceed available ambient water quality criteria for protection of aquatic life. Malathion, however,

remains a common constituent in stormwater runoff but this pesticide is not as toxic as other organophosphate pesticides.

Two compounds in this list, atrazine and simazine, are not organophosphate pesticides but can be analyzed by EPA Method 8141a. Both are triazine herbicides which are used for control of broadleaf weeds. Based upon historical data, herbicides such as these and the three additional separately listed compounds are unlikely to require continued analysis after completion of initial screening of Table E-2 constituents. Alternative analytical methods may be considered and used as long as the established reporting limits can be met.

Table 3-8. Organophosphate Pesticides and Herbicides Analytical Methods, and Quantitation Limits

ORGANOPHOSPHATE PESTICIDES	METHOD	Reporting Limit µg/L
Atrazine	EPA507, 8141A	1
Chlorpyrifos	EPA8141A	0.05
Cyanazine	EPA8141A	1
Diazinon	EPA8141A	0.01
Malathion	EPA8141A	1
Prometryn	EPA8141A	1
Simazine	EPA8141A	1
HERBICIDES		
Glyphosate	EPA547	5
2,4-D	EPA515.3	0.02
2,4,5-TP-SILVEX	EPA515.3	0.2

3.7 Semivolatile Organic Compounds (Acid, Base/Neutral)

Semivolatile organic compounds (SVOCs) from Table E-2 of the MRP are listed in Table 3-9 below. Acids consist mostly of phenolic compounds which are uncommon in stormwater samples. Base/neutrals include polynuclear aromatic hydrocarbons (PAHs) and phthalates. SVOCa were only measured during the first two years of the City of Long Beach Stormwater Monitoring Program. Very few analytes were detected and those that were detected were typically less than 10 times the reporting limit. Phthalates were among the most common SVOCs detected and are 303(d) listed based upon measurements taken over ten years ago. Phthalates have been historically a common laboratory contaminant due to the significant use of plastic in laboratories but they are also a common environmental contaminant for the same reason.

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Table 3-9. Semivolatile Organic Compounds, Analytical Methods, and Quantification Limits.,

SEMIVOLATILE ORGANIC COMPOUNDS	METHOD	Reporting Limit
ACIDS		**µg/L**
2-Chlorophenol	EPA625	2
4-Chloro-3-methylphenol	EPA625	1
2,4-Dichlorophenol	EPA625	1
2,4-Dimethylphenol	EPA625	2
2,4-Dinitrophenol	EPA625	5
2-Nitrophenol	EPA625	10
4-Nitrophenol	EPA625	5
Pentachlorophenol	EPA625	2
Phenol	EPA625	1
2,4,6-Trichlorophenol	EPA625	10
BASE/NEUTRAL		µg/L
Acenaphthene	EPA625	1
Acenaphthylene	EPA625	2
Anthracene	EPA625	2
Benzidine	EPA625	5
1,2 Benzanthracene	EPA625	5
Benzo(a)pyrene	EPA625	2
Benzo(g,h,i)perylene	EPA625	5
3,4 Benzofluoranthene	EPA625	10
Benzo(k)fluoranthene	EPA625	2
Bis(2-Chloroethoxy) methane	EPA625	5
Bis(2-Chloroisopropyl) ether	EPA625	2
Bis(2-Chloroethyl) ether	EPA625	1
Bis(2-Ethylhexl) phthalate	EPA625	5
4-Bromophenyl phenyl ether	EPA625	5
Butyl benzyl phthalate	EPA625	10
2-Chloroethyl vinyl ether	EPA625	1
2-Chloronaphthalene	EPA625	10
4-Chlorophenyl phenyl ether	EPA625	5
Chrysene	EPA625	5
Dibenzo(a,h)anthracene	EPA625	0.1
1,3-Dichlorobenzene	EPA625	1
1,4-Dichlorobenzene	EPA625	1
1,2-Dichlorobenzene	EPA625	1
3,3-Dichlorobenzidine	EPA625	5
Diethyl phthalate	EPA625	2
Dimethyl phthalate	EPA625	2
di-n-Butyl phthalate	EPA625	10
2,4-Dinitrotoluene	EPA625	5
2,6-Dinitrotoluene	EPA625	5
4,6 Dinitro-2-methylphenol	EPA625	5

SEMIVOLATILE ORGANIC COMPOUNDS	METHOD	Reporting Limit
1,2-Diphenylhydrazine	EPA625	1
di-n-Octyl phthalate	EPA625	10
Fluoranthene	EPA625	0.05
Fluorene	EPA625	0.1
Hexachlorobenzene	EPA625	1
Hexachlorobutadiene	EPA625	1
Hexachloro-cyclopentadiene	EPA625	5
Hexachloroethane	EPA625	1
Indeno(1,2,3-cd)pyrene	EPA625	0.05
Isophorone	EPA625	1
Naphthalene	EPA625	0.2
Nitrobenzene	EPA625	1
N-Nitroso-dimethyl amine	EPA625	5
N-Nitroso-diphenyl amine	EPA625	1
N-Nitroso-di-n-propyl amine	EPA625	5
Phenanthrene	EPA625	0.05
Pyrene	EPA625	0.05
1,2,4-Trichlorobenzene	EPA625	1

4 Aquatic Toxicity Testing and Toxicity Identification Evaluations

Aquatic toxicity testing supports the identification of best management practices (BMPs) to address sources of toxicity in urban runoff. Monitoring begins in the receiving water and the information gained is used to identify constituents for monitoring at outfalls to support the identification of pollutants that need to be addressed in the WMP. The sub-sections below describe the detailed process for conducting aquatic toxicity monitoring, evaluating results, and the technical and logistical rationale. Control measures and management actions to address confirmed toxicity caused by urban runoff are addressed by the WMP, either via currently identified management actions or those that are identified via adaptive management of the WMP.

4.1 Sensitive Species Selection

The Permit MRP (page E-32) states that sensitivity screening to select the most sensitive test species should be conducted unless "a sensitive test species has already been determined, or if there is prior knowledge of potential toxicant(s) and a test species is sensitive to such toxicant(s), then monitoring shall be conducted using only that test species." Previous relevant studies conducted in the watershed should be considered. Such studies may have been completed via previous MS4 sampling, wastewater NPDES sampling, or special studies conducted within the watershed.

As described in the MRP (page E-31), if samples are collected in receiving waters with salinity less than 1 part per thousand (ppt), or from outfalls discharging to receiving waters with salinity less than 1 ppt, toxicity tests should be conducted on the most sensitive test species in accordance with species and short-term test methods in *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms* (EPA/821/R-02/013, 2002; Table IA, 40 CFR Part 136). Salinities of both dry and wet weather discharges from the Los Cerritos Channel are considered to meet the freshwater criterion. During extreme high tides, salinity at the LCC1 receiving water monitoring site can exceed 1 ppt but dry weather sampling is always scheduled to avoid these extremes. The freshwater test species identified in the MRP are:

- A static renewal toxicity test with the fathead minnow, *Pimephales promelas* (Larval Survival and Growth Test Method 1000.04).
- A static renewal toxicity test with the daphnid, *Ceriodaphnia dubia* (Survival and Reproduction Test Method 1002.05).
- A static renewal toxicity test with the green alga, *Selenastrum capricornutum* (also named *Raphidocelis subcapitata*) (Growth Test Method 1003.0).

The three test species were evaluated to determine if either a sensitive test species had already been determined, or if there is prior knowledge of potential toxicant(s) and a test species is sensitive to such toxicant(s). In reviewing the available data in the Los Angeles River, Los Cerritos Channel, and the San Gabriel River watersheds, organophosphate pesticides and/or metals have been identified as problematic and are generally considered the primary aquatic life toxicants of concern found in urban runoff. Pyrethroid pesticides are known to be present in urban runoff and potentially contribute to toxicity in these waters. Tests specific to pyrethroid pesticides are simply less common. Given the

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knowledge of the presence of these potential toxicants in the watershed, the sensitivities of each of the three species were considered to evaluate which is the most sensitive to the potential toxicants in the watersheds.

Ceriodaphnia dubia has been reported as a sensitive test species for historical and current use pesticides and metals, and studies indicate that it is more sensitive to the toxicants of concern than *P. promelas* or *S. capricornutum*. In its aquatic life copper criteria document, the USEPA reports greater sensitivity of *C. dubia* to copper (species mean acute value of 5.93 µg/L) compared to *Pimephales promelas* (species mean acute value of 69.93 µg/L; EPA, 2007). *C. dubia's* relatively higher sensitive to metals is common across multiple metals. Researchers at the University of California, Davis also reviewed available species sensitivity values in developing pesticide criteria for the Central Valley Regional Water Quality Control Board. The UC Davis researchers reported higher sensitivity of *C. dubia* to diazinon and bifenthrin (species mean acute value of 0.34 µg/l and 0.105 µg/L) compared to *P. promelas* (species mean acute value of 7804 µg/L and 0.405 µg/L; Palumbo et al., 2010a, b). Additionally, a study of the City of Stockton urban stormwater runoff found acute and chronic toxicity to *C. dubia*, with no toxicity to *S. capricornutum* or *P. promelas* (Lee and Lee, 2001). The toxicity was attributed to organophosphate pesticides, indicating a higher sensitivity of *C. dubia* compared to *S. capricornutum* or *P. promelas*. *P. promelas* is generally less sensitive to metals and pesticides but has been found to be more sensitive to ammonia than *C. dubia*. However, as ammonia is not typically a constituent of concern for urban runoff and ammonia is not consistently observed above the toxic thresholds in the watershed, *P. promelas* is not considered a particularly sensitive species for evaluating the impacts of urban runoff in receiving waters in the watershed.

Selenastrum capricornutum is a species that is sensitive to herbicides; however, while sometimes present in urban runoff, measured concentrations are typically very low. Herbicides have not been identified as a potential toxicant in the watershed. *S. capricornutum* is also not considered the most sensitive species as it is not sensitive to either pyrethroids or organophosphate pesticides and is not as sensitive to metals as *C. dubia*. The *S. capricornutum* growth test can also be affected by high concentrations of suspended and dissolved solids, color and pH extremes, which can interfere with the determination of sample toxicity. As a result, it is common to manipulate the sample by centrifugation and filtration to remove solids in order to conduct the test. This process may affect the toxicity of the sample. In a study of urban highway stormwater runoff (Kayhanian et. al, 2008), the green alga response to the stormwater samples was more variable than both the *C. dubia* and the *P. promelas* and in some cases the alga growth was considered to be potentially enhanced due to the presence of stimulatory nutrients.

As *C. dubia* is identified as the most sensitive to known potential toxicant(s) typically found in receiving waters and urban runoff in the freshwater potions of the watershed and has demonstrated toxicity in programs within the watershed (CWH and ABC Laboratories, 2013), *C. dubia* is selected as the most sensitive species. The species also has the advantage of being easily maintained in in-house mass cultures. The simplicity of the test, the ease of interpreting results, and the smaller volume necessary to run the test, make the test a valuable screening tool. The ease of sample collection and higher

sensitivity will support assessing the presence of ambient receiving water toxicity or long term effects of toxic stormwater over time. As such, toxicity testing will be conducted using *C. dubia*.

An alternative species of water fleas, *Daphnia magna*, may be used if the water being tested has elevated hardness. *C. dubia* test organisms are typically cultured in moderately hard waters (80-100 mg/L CaCO3) and can have increased sensitivity to elevated water hardness greater than 400 mg/L CaCO3), which is beyond their typical habitat range. Because of this, *Daphnia magna* may be substituted in instances where hardness in site waters exceeds 400 mg/L ($CaCO_3$). *Daphnia magna* is more tolerant to high hardness levels and is a suitable substitution for *C. dubia* in these instances (Cowgill and Milazzo, 1990).

4.2 Testing Period

The following describes the testing periods to assess toxicity in samples collected in the LCC WMP area during dry and wet weather conditions. Short-term chronic tests will be used to assess both survival and reproductive/growth endpoints for *C. dubia* for both wet and dry weather sampling efforts. Although wet weather conditions in the region generally persist for less than the chronic testing periods (7 days), the *C. dubia* chronic test will be used for wet weather toxicity testing in accordance with *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms* (EPA, 2002a). Utilization of standard chronic tests on wet weather samples are not expected to generate results representative of the typical conditions found in the receiving water intended to be simulated by toxicity testing.

4.3 Toxicity Endpoint Assessment and Toxicity Identification Evaluation Triggers

Per the MRP, toxicity test endpoints will be analyzed, using the Test of Significant Toxicity (TST) t-test approach specified by the USEPA (USEPA, 2010). The Permit specifies that the chronic in-stream waste concentration (IWC) is set at 100% receiving water for receiving water samples and 100% effluent for outfall samples. Using the TST approach, a t-value is calculated for a test result and compared with a critical t-value from USEPA's TST Implementation Document (USEPA, 2010). Follow-up triggers are generally based on the Permit specified statistical assessment as described below.

For chronic *C. dubia* toxicity testing, if a ≥50% reduction in survival or reproduction is observed between the sample and laboratory control that is statistically significant, a toxicity identification evaluation (TIE) will be performed.

TIE procedures will be initiated as soon as possible after the toxicity trigger threshold is observed to reduce the potential for loss of toxicity due to extended sample storage. If the cause of toxicity is readily apparent or is caused by pathogen related mortality or epibiont interference with the test, the result will be rejected, if necessary, a modified testing procedure will be developed for future testing.

In cases where significant endpoint toxicity effects greater than 50% are observed in the original sample, but the follow-up TIE positive control "signal" is found to not be statistically significant, the cause of toxicity will be considered non-persistent. No immediate follow-up testing is required on the sample.

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However, future test results will be evaluated to determine if implementation of concurrent TIE treatments are needed to provide an opportunity to identify the cause of toxicity.

4.4 Toxicity Identification Evaluation Approach

The results of toxicity testing will be used to trigger further investigations to determine the cause of observed laboratory toxicity. The primary purpose of conducting TIEs is to support the identification of management actions that will result in the removal of pollutants causing toxicity in receiving waters. Successful TIEs will direct monitoring at outfall sampling sites to inform management actions. As such, the goal of conducting TIEs is to identify pollutant(s) that should be sampled during outfall monitoring so that management actions can be identified to address the pollutant(s).

The TIE approach as described in USEPA's 1991 Methods for Aquatic Toxicity Identification is divided into three phases although some elements of the first two phases are often combined. Each of the three phases is briefly summarized below:

- Phase I utilizes methods to characterize the physical/chemical nature of the constituents, which cause toxicity. Such characteristics as solubility, volatility and filterability are determined without specifically identifying the toxicants. Phase I results are intended as a first step in specifically identifying the toxicants but the data generated can also be used to develop treatment methods to remove toxicity without specific identification of the toxicants.
- Phase II utilizes methods to specifically identify toxicants.
- Phase III utilizes methods to confirm the suspected toxicants.

A Phase I TIE will be conducted on samples that exceed a TIE trigger described in Section 4.4. Water quality data will be reviewed to future support evaluation of potential toxicants. A range of sample manipulations may be conducted as part of the TIE process. The most common manipulations are described in Table 4-1. Information from previous chemical testing and/or TIE efforts will be used to determine which of these (or other) sample manipulations are most likely to provide useful information for identification of primary toxicants. TIE methods will generally adhere to USEPA procedures documented in conducting TIEs (USEPA, 1991, 1992, 1993a-b).

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Table 4-1. Phase I and II Toxicity Identification Evaluation Sample Manipulations

TIE Sample Manipulation	Expected Response
pH Adjustment (pH 7 and 8.5)	Alters toxicity in pH sensitive compounds (i.e., ammonia and some trace metals)
Filtration or centrifugation*	Removes particulates and associated toxicants
Ethylenediamine-Tetraacetic Acid (EDTA) or Cation Exchange Column*	Chelates trace metals, particularly divalent cationic metals
Sodium thiosulfate (STS) addition	Reduces toxicants attributable to oxidants (i.e., chlorine) and some trace metals
Piperonyl Butoxide (PBO)*	Reduces toxicity from organophosphate pesticides such as diazinon, chlorpyrifos and malathion, and enhances pyrethroid toxicity
Carboxylesterase addition(1)	Hydrolyzes pyrethroids
Temperature adjustments(2)	Pyrethroids become more toxic when test temperatures are decreased
Solid Phase Extraction (SPE) with C18 column*	Removes non-polar organics (including pesticides) and some relatively non-polar metal chelates
Sequential Solvent Extraction of C18 column	Further resolution of SPE-extracted compounds for chemical analyses
No Manipulation*	Baseline test for comparing the relative effectiveness of other manipulations

***** Denotes treatments that will be conducted during the initiation of toxicity monitoring, but may be revised as the program is implemented. These treatments were recommended for initial stormwater testing in Appendix E (Toxicity Testing Tool for Stormwater Discharges) of the State Water Resources Control Board's June 2012 Public Review Draft "Policy for Toxicity Assessment and Control".

1 Carboxylesterase addition has been used in recent studies to help identify pyrethroid-associated toxicity (Wheelock et al., 2004; Weston and Amweg, 2007). However, this treatment is experimental in nature and should be used along with other pyrethroid-targeted TIE treatments (e.g., PBO addition).

2 Temperature adjustments are another recent manipulation used to evaluate pyrethroid-associated toxicity. Lower temperatures increase the lethality of pyrethroid pesticides. (Harwood, You and Lydy, 2009)

The Watershed Group will identify the cause(s) of toxicity using a selection of treatments in Table 4-1 and, if possible, using the results of water column chemistry analyses. After any initial assessments of the cause of toxicity, the information may be used during future events to modify the targeted treatments to more closely target the expected toxicant or class of toxicants. Moreover, if the toxicant or toxicant class is not initially identified, toxicity monitoring during subsequent events will confirm if the toxicant is persistent or a short-term episodic occurrence.

As the primary goals of conducting TIEs is to identify pollutants for incorporation into outfall monitoring, narrowing the list of toxicants following Phase I TIEs via Phase II/III TIEs is not necessary if the toxicant class determined during the Phase I TIE is sufficient for 1) identifying additional pollutants for outfall monitoring and/or 2) identifying control measures. Thus, if the specific pollutant(s) or classes of pollutants (e.g., metals that are analyzed via EPA Method 200.8) are identified then sufficient information is available to incorporate the additional pollutants into outfall monitoring and to start implementation of control measures to target the additional pollutants.

Phase II TIEs may be utilized to identify specific constituents causing toxicity in a given sample if the results of Phase I TIE testing and a review of available chemistry data fails to provide information

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necessary to identify constituents that warrant additional monitoring activities or management actions to identify likely sources of the toxicants and lead to elimination of the sources of these contaminants. Phase III TIEs will be conducted following any Phase II TIEs.

For the purposes of determining whether a TIE is inconclusive, TIEs will be considered inconclusive if:

- The toxicity is persistent (i.e., observed in the baseline), and
- The cause of toxicity cannot be attributed to a class of constituents (e.g., insecticides, metals, etc.) that can be targeted for monitoring.

If (1) a combination of causes that act in a synergistic or additive manner are identified; (2) the toxicity can be removed with a treatment or via a combination of the TIE treatments; or (3) the analysis of water quality data collected during the same event identify the pollutant or analytical class of pollutants, the result of a TIE is considered conclusive.

Note that the MRP (page E-33) allows a TIE Prioritization Metric (as described in Appendix E of the Stormwater Monitoring Coalition's Model Monitoring Program) for use in ranking sites for TIEs. However, as the extent to which TIEs will be conducted is unknown, prioritization cannot be conducted at this time. However, prioritization may be utilized in the future based on the results of toxicity monitoring and an approach to prioritization will be developed through the CIMP adaptive management process and will be described in future versions of the CIMP.

4.5 Follow Up on Toxicity Testing Results

Our suggested approach is that If the results of two TIEs on separate receiving samples collected during the same conditions (i.e., wet or dry weather) are inconclusive, a toxicity test conducted during the same conditions (i.e., wet or dry weather), using the same test species, will be conducted at applicable upstream outfalls as soon as feasible (i.e., the next monitoring event that is at least 45 days following the toxicity laboratory's report transmitting the results of an inconclusive TIE). The same TIE evaluation triggers and TIE approach presented in Section 4.3 and 4.4, respectively will be followed based on the results of the outfall sample.

The MRP (page E-33) indicates the following actions should be taken when a toxicant or class of toxicants is identified through a TIE:

1. Group Members shall analyze for the toxicant(s) during the next scheduled sampling event in the discharge from the outfall(s) upstream of the receiving water location.
2. If the toxicant is present in the discharge from the outfall at levels above the applicable receiving water limitation, a toxicity reduction evaluation (TRE) will be performed for that toxicant.

The list of constituents monitored at outfalls identified in the CIMP will be modified based on the results of the TIEs. Similarly, upon completion of a successful dry weather TIE, additional constituents identified in the TIE will be added to monitoring requirements at outfalls with significant non-stormwater flows. Monitoring for those constituents will occur as soon as feasible following the completion of a successful

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TIE (i.e., the next monitoring event that is at least 45 days following the toxicity laboratory's report transmitting the results of a successful TIE).

The requirements of the TREs will be met as part of the adaptive management process in the WMPs rather than the CIMP. The identification and implementation of control measures to address the causes of toxicity are tied to management of the stormwater program, not the CIMP. It is expected that the requirements of TREs will only be conducted for toxicants that are not already addressed by an existing Permit requirement (i.e., TMDLs) or existing or planned management actions.

The Water Boards' TMDL Roundtable is currently evaluating options to streamline and consistently respond to urban-use pesticide impairment listings throughout the State including a statewide urban-use pesticide TMDL modeled after the San Francisco Bay Area Urban Creeks Pesticides TMDL. In Addition to toxicity testing, statewide efforts will be monitored to study these pesticides being discussed by the California Stormwater Quality Association (CASQA) Pesticides sub-committee and other Regional Water Boards. The toxicity approach is subject to modifications based on discussions with the Regional Board.

4.6 Summary of Aquatic Toxicity Monitoring

The approach to conducting aquatic toxicity monitoring as described in the previous sections is summarized in detail in Figure 4.1. The intent of the approach is to identify the cause of toxicity observed in receiving water to the extent possible with the toxicity testing tools available, thereby directing outfall monitoring for the pollutants causing toxicity with the ultimate goal of supporting the development and implementation of management actions.

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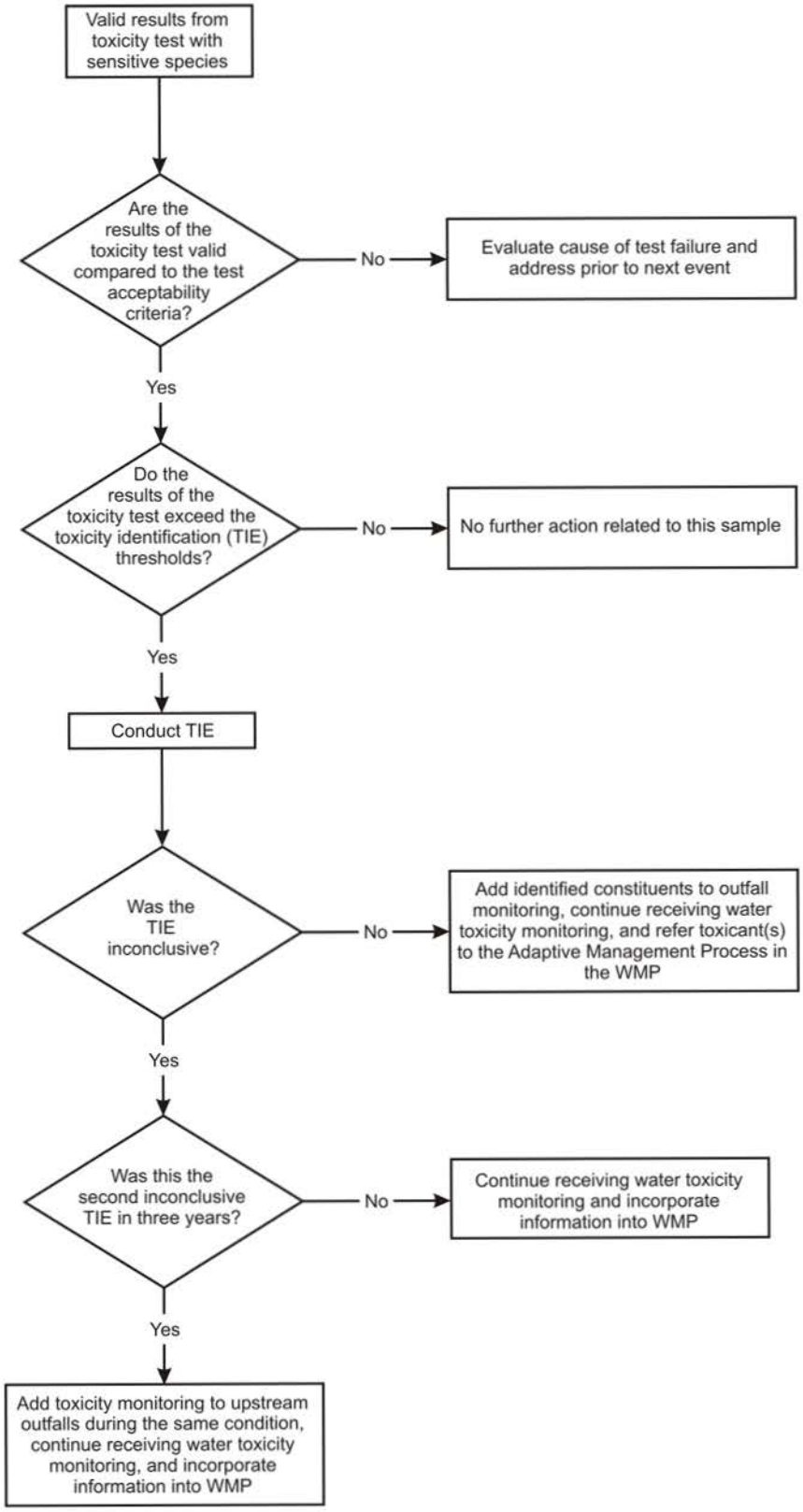

Figure 4.1. Detailed Aquatic Toxicity Assessment Process.

5 Receiving Water Quality Monitoring (Wet and Dry Weather)

Receiving water quality monitoring will primarily be conducted with automated stormwater monitoring equipment detailed in Appendix A. Water samples for bacteria, oil and grease, petroleum hydrocarbons, low level mercury, and volatile organic compounds must be collected separately as grab samples. Appendix A also discussed manual collection of water samples when required. This section addresses both the equipment and protocol used for collection of flow-weighted and time-weighted composite samples. The monitoring site LCC1 as shown in Figure 1-2 will serve as the Receiving Water and TMDL compliance monitoring location for the Los Cerritos Channel. The monitoring equipment provides continuous records of rainfall at this site as well as flow during storm events. This site monitors and records all flows exceeding 18 cfs. Flow estimates are based upon a rating curve established for a former gaging station located approximately 100 feet upstream.

During dry weather monitoring, manual flow measurements are required to obtain instantaneous estimates of flow rates. Measurements are taken at a position where flow is relative uniform over a distance of 10 to 20 feet. Measurements are taken to determine to average width of the flowing water and the depth of water at the center of the flow. Water velocities are recorded by the time required for particles to travel a measured distance along the channel. The velocity of water flow is multiplied by the cross-sectional area of the channel to estimate flow. Since the channel approximates a triangular form, the cross-sectional area of the flowing water is calculated as ½ of the depth at the center of the channel multiplied by the width of flowing water. Dry weather flows have averaged approximately 0.5 cfs during the past five years.

5.1 Sampling Frequency and Mobilization Requirements

Monitoring of receiving water quality will be performed four times a year during the wet season and two times a year during dry weather conditions. Screening for Table E-2 constituents listed in the MRP will be conducted during the first significant storm of the year and during a critically dry weather period. Large sampling volumes are required to incorporate all analytical tests and associated QA/QC needed for Table E-2 constituents, bioassay tests and to provide sufficient volumes should TIEs be required. Due to these requirements, mobilization criteria for the initial wet weather events will differ from subsequent events.

Mobilization of field crews will typically start when there is both a 70% probability of rainfall within 24 hours of the arrival of a predicted storm event and Quantitative Precipitation Forecasts (QPFs) indicate that a minimum of 0.25 inches will occur within a 24-hour time period. Due to the importance of the first storm event of the year, crews will be mobilized to prepare the site (or sites) for monitoring 24 hours in advance of any events with at least a 50% probability of rainfall and QPFs of at least 0.20 inches within a 24-hour time period. If weather forecasts for the first storm of the season indicate development of a condition known as a "cut-off low"[6], partial field teams may initially be deployed to

[6] A closed upper-level low which has become completely displaced (cut off) from basic westerly current, and moves independently of that current. Cutoff lows may remain nearly stationary for days, or on occasion may move westward opposite to the prevailing flow aloft (i.e., retrogression).

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prepare stations since such conditions create highly unpredictable situations that have the potential to suddenly move onshore with higher than expected rainfall. Full mobilization will require an upgrade in the local forecast to a predicted rainfall of at least 0.25 inches with a minimum probability of 70% within 12 hours of the event. For the purposes of this CIMP, weather forecasts and Quantitative Precipitation Forecasts (QPFs) provided by the Los Angeles/Oxnard National Weather Service and the California Nevada River Forecast Center will be used to assess whether mobilization criteria are met.

Once the screening phase has been completed for Table E-2 constituents, storm events will be considered suitable for monitoring given a minimum of 72 hours (3 days) with cumulative rainfall of less than 0.1 inches of rainfall within the watershed. Evaluation of antecedent rainfall conditions will initially be based upon Los Angeles County ALERT (Automatic Local Evaluation in Real Time) stations and rain gauges within or near the Los Cerritos Channel Watershed and rainfall measured at LCC1. The rain gauge located at Signal Hill City Hall (#335) will serve as the primary site for evaluation of antecedent conditions. The rain gauge installed at LCC1 will serve as the secondary site if the primary site is inoperable or unavailable. As the Primary Watershed Segmentation (PWS) sites come on line, these sites will also be used to evaluate antecedent conditions. Assessment of antecedent conditions will be based upon average rainfall measured at sites located within the watershed boundaries and that are known to be fully operable. Due to anticipated reductions in required stormwater volumes, monitoring of subsequent storm events will be based upon weather forecasts predicting rainfall of 0.25 inches at probability of at least 70% within 24 hours of the predicted event. Once crews are mobilized for a storm event, rainfall must exceed a minimum of 0.25 inches and provide sufficient rainfall to project objectives. One of the three storm events to be sampled at the LCC1 Receiving Water Monitoring Site is only intended to address the requirements of the metals TMDL. At this site, a minimum rainfall event of 0.15 to 0.25 inches would be expected fulfill sampling requirements for the TMDL constituents and provide a representative flow-composite sample due to the fact that the watershed is highly impervious.

Two monitoring events are required during dry weather conditions. There has been no indication that seasonal trends exist with respect to dry weather flows in the Los Cerritos Channel Watershed but data from the ongoing Proposition 84 study will provide information to evaluate if seasonality in flow exists in different areas of the watershed. Based upon existing information, dry weather monitoring at the LCC1 Receiving Water Monitoring Site will be conducted once in late spring/early summer (May to June) and again towards the end of the dry season in September/October. This will be consistent with historical dry weather sampling conducted under the City of Long Beach NPDES Permit. During the dry season, the only restriction on sampling will be that total rainfall over the 72 hour time period preceding the sampling event does not exceed 0.1 inches. In practice, rainfall is very rare during the summer months. With the exception of unusual periods when hurricanes developing off of Baja California cause some precipitation to spin north, rainfall events are very infrequent. When practical, dry weather monitoring will be conducted during periods with less than 0.1 inches of rain occur over the previous week.

5.2 Sampling Constituents

With minor exceptions, chemical analyses are scheduled to be conducted for all analytes listed in Table 3-3 through Table 3-9 during the first significant rainfall of the season and again during a period of critical low flow. Chemical constituents not detected in excess of their respective Method Detection

Limits (MDLs) or that do not exceed available water quality standards will be considered for removal during subsequent surveys. Adjustments to the list of analytical tests will be assessed separately for wet and dry weather sampling requirements. Since the initial screening event may be followed too quickly for the data to be received and fully evaluated, the field team must be prepared to collect water samples for the testing the full set of Table E-2 constituents during the second sampling event.

Most of the general and conventional pollutants listed in Table 3-3 will continue to be analyzed as part of the base monitoring requirements for continued monitoring for both receiving waters and for the metals TMDL. The only pollutants considered for elimination will be cyanide, total phenols, perchlorate, and MTBE. Analysis of chloride and fluoride will continue to be used to assist in the interpretation of potential potable water sources during in association with the non-stormwater screening program. In addition, microbiological constituents (Table 3-4), nutrients (Table 3-5), chlordane compounds listed in Table 3-7 and TMDL metals (Table 3-6) will continue to be part of the ongoing monitoring at LLC1.

As noted in the previous section, it has been determined that adequate data exist to determine which of the three freshwater species are considered to be most sensitive during both storm events and dry weather periods. Available literature and local data indicate that the most sensitive bioassay test species is *Ceriodaphnia dubia*. The prior section on Aquatic Toxicity Testing and TIEs goes into detail as to species selection and the overall approach recommended for measuring toxicity in the receiving waters and strategies to eliminate any sources of toxicity. During wet weather conditions, bioassay tests will be performed based upon exposure to 100 percent test waters over a 48-hour time period since this time exposure is deemed to be more consistent with the duration of typical storm events. Since exposure times during the dry season are much longer, dry weather testing will utilize 7-day chronic toxicity tests that assess both survival and reproductive endpoints for *C. dubia*. Chronic testing will also be conducted on 100 percent undiluted samples. Table 5-1 provides sample volumes necessary for toxicity tests (both wet and dry weather) as well as minimum volumes necessary to fulfill Phase I TIE testing if necessary. As detailed in the previous section, the sublethal endpoints will be assessed using EPA's TST procedure to determine if there is a statistically significant 50% difference between sample controls and the test waters and ultimately determine if further testing should be is necessary.

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Table 5-1. Toxicity Test Volume Requirements for Aquatic Toxicity Testing as part of the Los Cerritos Channel Coordinated Integrated Monitoring Program.

Test Organism	Toxicity Test Type	Test Concentration	Volume Required for Initial Screen (L)	Minimum Volume Required for TIE (L)[1]
Freshwater Tests for Samples with Salinity < 1.0 ppt				
Daphnid Water Flea (*Ceriodaphnia dubia*)	48-Hour Acute Survival 7-day Chronic Survival and Reproduction	100% only	1.5	10
Sample Receipt Water Quality	--	--	1.0	--
Total volume required per event for samples with salinity < 1.0 ppt			2.5	a

[1] Minimum volume for the TIE is for Phase 1 characterization testing only. The additional volume collected for potential TIE testing can be held in refrigeration (4°C in the dark, no head space) and shipped to the laboratory at a later date if needed.

Note: The NPDES permit targets a 36-hr holding time for initiation of testing but allows a maximum holding time of 72-hr if necessary.

6 Primary Watershed Segmentation (PWS) Sites

6.1 Sampling Frequency and Mobilization Requirements

The sampling frequency and mobilization requirements for the PWS sites will be consistent with monitoring conducted at the LCC1. A total of three storm events will be monitored at each PWS site once they are installed. Monitoring will be concurrent with LCC1 monitoring in order to allow for comparison of pollutant loading rates associated with each segment relative to ultimate pollutant loads measured at the LCC1 site.

6.2 PWS Sampling Constituents

Constituents monitored at each PWS site will include all TMDL constituents as well as general and conventional constituents necessary to assist in evaluation of the data (Table 6-1). Constituents included in the MAL list and monitored at the outfall sites will be included in an annual MAL Assessment Report reported as part of the Annual Report. The MAL Assessment Report will summarize the monitoring data in comparison to the applicable MALs, and identify those subwatersheds where the running average concentrations of these constituents exceed the MALs by twenty percent or more.

Table 6-1. Constituents Monitored at Primary Watershed Segment (PWS) Sites.

CONSTITUENTS CONVENTIONAL POLLUTANTS	METHOD	TARGET REPORTING LIMITS mg/L
Total Suspended Solids	EPA 160.2	1
Total Dissolved Solids	EPA 160.1	1
Volatile Suspended Solids	EPA 160.4	1
Total Organic Carbon	EPA 415.1	1
Chemical Oxygen Demand	EPA 410.1	4
Alkalinity	EPA 310.1	5
Specific Conductance	EPA 120.1	1
Total Hardness	EPA 130.2	1
MBAS	EPA 425.1	0.02
Chloride	EPA300.0	2
Fluoride	EPA300.0	0.1
METALS (Dissolved & Total)	**METHOD**	**ug/L**
Copper	EPA200.8	0.5
Lead	EPA200.8	0.5
Zinc	EPA200.8	1

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7 Secondary Watershed Segmentation (SWS) Sites (Wet Weather)

Secondary Watershed Segmentation (SWS) sites will be monitored with portable equipment that will be used to assist in tracking sources of constituents found to be elevated at one of the Primary Watershed Segmentation sites. The portable monitoring stations will consist of a battery powered autosamplers triggered by sensors installed in the channel to detect the start of flow. Once triggered, the samplers will take time-weighted samples for a 24-hour period. The autosamplers will be set to take 200 mL samples every 15 minutes while is present in the channel. All sample composite bottles and materials contacting the water will be identical to those used for each of the "permanent" or fixed monitoring sites.

SWS sites are expected to be deployed upstream of PWS sites where specific contaminants are found to be elevated. Tentative locations (Figure 1-2) have been established at sites in each subwatershed should PWS monitoring data indicate that forensic monitoring is necessary to further isolate areas contributing excessive pollutant loads. The selected sites further segment the subwatersheds into two areas and are designed to be monitored concurrently with the SWS site. Pre-selection of candidate SWS sites was intended to facilitate implementation of forensic monitoring by clearly identifying the next step if conditions are met that trigger further testing.

SWS monitoring will be triggered if the running average of any MAL constituent is exceeded by 20 percent or if the running average of MAL or TMDL constituents at a PWS site exceeds the running average at other PWS sites by more than 20 percent. SWS sites would focus on monitoring the specific constituent of concern and any additional data necessary to help interpret the results. For example, if the constituent of concern is a trace metal, monitoring at SWS sites would include both TSS and hardness.

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8 Non-Stormwater (NSW) Outfall Monitoring

Detailed objectives of the screening and monitoring process (Section IX.A, page E-23 of the MRP) include the following:

1. Develop criteria or other means to ensure that all outfalls with significant non-stormwater discharges are identified and assessed during the term of this Order.

2. For outfalls determined to have significant non-stormwater flow, determine whether flows are the result of illicit connections/illicit discharges (IC/IDs), authorized or conditionally exempt non-stormwater flows, natural flows, or from unknown sources.

3. Refer information related to identified IC/IDs to the IC/ID Elimination Program (Part VI.D.10 of the Order) for appropriate action.

4. Based on existing screening or monitoring data or other institutional knowledge, assess the impact of non-stormwater discharges (other than identified IC/IDs) on the receiving water.

5. Prioritize monitoring of outfalls considering the potential threat to the receiving water and applicable TMDL compliance schedules.

6. Conduct monitoring or assess existing monitoring data to determine the impact of non-stormwater discharges on the receiving water.

7. Conduct monitoring or other investigations to identify the source of pollutants in non-stormwater discharges.

8. Use results of the screening process to evaluate the conditionally exempt non-stormwater discharges identified in Parts III.A.2 and III.A.3 of the Order and take appropriate actions pursuant to Part III.A.4.d of the Order for those discharges that have been found to be a source of pollutants. Any future reclassification will occur per the conditions in Parts III.A.2 or III.A.6 of the Order.

9. Maximize the use of Permittee resources by integrating the screening and monitoring process into existing or planned CIMP efforts.

Ultimately, the NSW program is intended to establish a process for identifying outfalls that serve as potential sources of contaminants. Sites where initial screening indicates the potential for discharges of a magnitude considered to have the potential to cause or contribute to exceedances of receiving water limitations will require further efforts to classify the discharges and determine appropriate actions, if any.

In cases where flow or other factors show evidence of potential discharges of concern, the program will take further action to determine if the flows are illicit, exempt, conditionally exempt, conditionally exempt but non-essential, or if the source(s) of the discharge cannot be identified (unknown). Illicit discharges require immediate action and, if they cannot be eliminated, monitoring will be implemented

until such time that the illicit discharge can be eliminated. Discharges classified as conditionally exempt but non-essential or unknown also require ongoing monitoring.

The following sections summarize the elements of the program and processes to ultimately eliminate major sources of non-stormwater discharges.

8.1 Non-Stormwater Outfall Screening and Monitoring Program

The NSW Outfall Screening and Monitoring Program will consist of a screening phase designed to initially classify outfalls into one of three categories. Three screening surveys will be conducted starting in the summer of 2014 to identify outfalls or other discharges that are considered to be significant and persistent sources of non-stormwater flow to either the open channels or receiving waters.

The initial survey will focus on completing an inventory of all outfalls (refer to Appendix E) to receiving waters. Outfalls greater than 12-inches in diameter (or equivalent) will be photographed and documented. All minor outfalls[7] (outfalls less than 36-inches in diameter or equivalent) without evidence of the presence of industrial activities will be maintained in the database but will be considered as not requiring any further action.

If while in the process of conducting any of the site inspections, the inspection team encounters a transitory discharge, such as a liquid or oil spill, the problem will be immediately referred to the appropriate local jurisdiction for clean-up or response. If it is not readily apparent which jurisdictional authority has responsibility; the discharge will be reported to the WMG technical committee chair.

Information from all three screening surveys will be consolidated to assist in the identification and ranking of outfalls considered to have significant NSW discharges. Multiple lines of evidence will be considered when assessing the significance of a discharge. Data from the field screening program such as flow measurements, general observations and *in-situ* water quality information will be given primary consideration but land uses within the drainage area will also be considered.

A combination of field observations, flow measurements and field water quality measurements collected during the screening surveys will be used to classify outfalls into one of the following three categories that will determine further actions (Figure 8-1):

1. **Suspect Discharge** – Outfalls with persistent high flows during at least two out of three visits and with high severity on one or more physical indicators (odors, oil deposits, etc.). Outfalls in this category require prioritization and further investigation.

[7] Minor municipal separate storm sewer outfall (or ''minor outfall'') means a municipal separate storm sewer outfall that discharges from a single pipe with an inside diameter of less than 36 inches or its equivalent (discharge from a single conveyance other than circular pipe which is associated with a drainage area of less than 50 acres); or for MS4s that receive stormwater from lands zoned for industrial activity (based on comprehensive zoning plans or the equivalent), an outfall that discharges from a single pipe with an inside diameter of less than 12 inches or from its equivalent (discharge from other than a circular pipe associated with a drainage area of 2 acres or less)

2. **Potential Discharge** - Flowing or non-flowing outfalls with presence of two or more physical indicators. Outfalls in this category are considered to be low priority but will be continue to be monitored periodically to determine if the sites are subject to less frequent, discharges or determine if actions can be taken to reduce or eliminate the factors that lead to the site being considered a potential source of contaminants.

3**. Unlikely Discharge** - Non-flowing outfalls with no physical indicators of an illicit discharge. Outfalls within this classification would be not be subject to any further screening.

Initial screening activities will emphasize use of field water quality instrumentation and/or simple field test kits to assist in classifying discharges. Collection of water samples for limited laboratory testing may be incorporated into the program as requirements for more complex, accurate and scientifically supportable data become necessary to characterize NSW discharges and provide scientifically supportable data to track the source of these discharges. The Center for Watershed Protection (CWP) and Pitt (2004) provide an evaluation of twelve analytes for assistance in determining the source of NSW discharges (Table 8-2). Three of the analytes can be measured with *in-situ* instrumentation. Others can be analyzed relatively inexpensively by use of field test kits or can be analyzed in an ELAP-certified laboratory. In addition, three to five of the listed tests are often considered sufficient to screen for illicit discharges. Ammonia, MBAS, fluoride (assuming tap water is fluorinated), and potassium are considered to confidently differentiate between sewage, wash water, tap water and industrial wastes. Incorporation of *in-situ* measurement of temperature, pH, TDS/salinity, turbidity and dissolved oxygen can further assist in characterizing and tracking the source(s) of an NSW discharge.

8.1.1 Identification of Outfalls with Significant Non-Stormwater Discharges

Existing monitoring data or institutional knowledge (Objective 4) are not available to allow identification of outfalls with significant NSW discharges. The screening program is necessary to collect information necessary to identify outfalls with potentially significant NSW discharges. The outfall screening includes collection of information necessary to provide an accurate inventory of the major outfalls, assess flow from each outfall and in the receiving waters, determine the general characteristics of the receiving waters (e.g. is flow present, does the flow from the outfall represent a large proportion of the flow, is it an earthen or lined channel), and record general observations indicative of possible illicit discharges. The initial screening survey(s) will also be used to refine the inventory information required in Section 8.1.2.

Table 8-1. Outline of the NSW Outfall Screening and Monitoring Program.

Element	Description	Timing of Completion
1. Outfall Screening	Because data required to implement the NSW Outfall Program are not available, the Permittees will implement a screening process to determine which outfalls exhibit significant NSW discharges and those that do not require further investigation. Data will be recorded on Outfall Reconnaissance Investigation (ORI) forms and in the associated database.	The Outfall Screening process is currently being implemented. Identification of obvious illicit discharges will be immediately addressed. Otherwise, the Outfall Screening process will be completed prior to starting source investigations.
2. Identification of outfalls with significant NSW discharge (Part IX.C of the MRP)	Data from the Outfall Screening process will be used to categorize MS4 outfalls on the basis of discharge flow rates, field water quality and physical observations.	Concurrent with Outfall Screening December 28, 2014 with Annual CIMP Report
3. Inventory of Outfalls with NSW discharge (Part IX.D of the MRP)	Develop an inventory of all major MS4 outfalls, identify outfalls with known NSW discharges and identify outfalls with no flow requiring no further assessment.	Concurrent with Outfall Screening December 28, 2014 with Annual CIMP Report
4. Prioritized source investigation (Part IX.E of the MRP)	Use the data collected during the Outfall Screening process to further prioritize outfalls for source investigations.	Prioritization for Source Investigation will be occur after completion of Outfall Screening
5. Identify sources of significant NSW discharges (Part IX.F of the MRP)	For outfalls exhibiting significant NSW discharges, Permittees will perform source investigations per the established prioritization.	Complete source investigations for 25% of the outfalls with significant NSW discharges by December 28, 2015 and 100% by December 28, 2017
6. Monitoring NSW discharges exceeding criteria (Part IX.G of the MRP)	Monitor outfalls determined to convey significant NSW discharges comprised of either unknown or conditionally exempt non-essential discharges, or illicit discharges that cannot be abated.	Monitoring will commence within 90 days of completing the source investigations

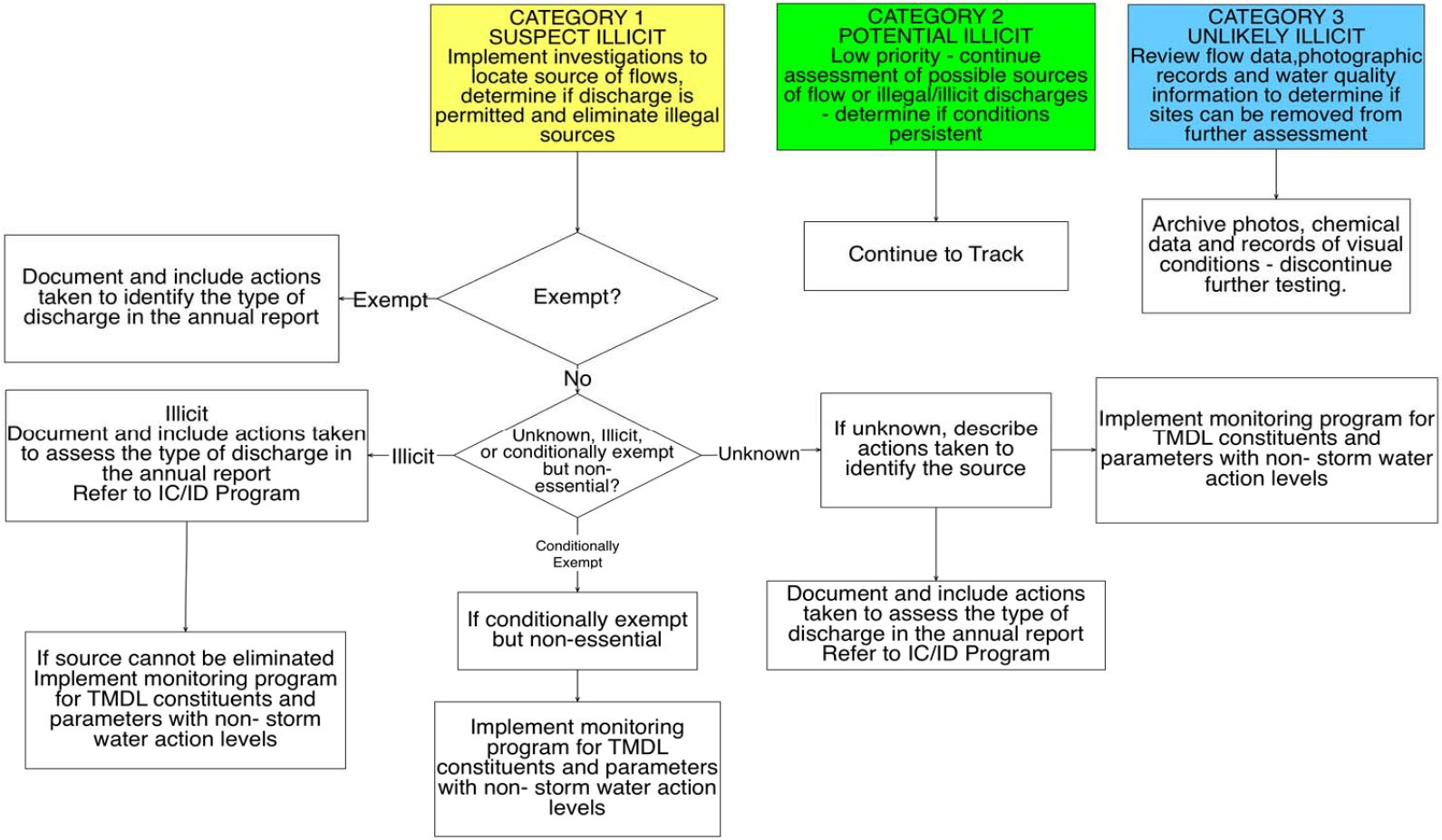

Figure 8-1. Flow Diagram of NSW Outfall Program after Classifying Outfalls during Initial Screening.

Table 8-2. Potential Indicator Parameters for Identification of Sources of NSW Discharges.

Indicator Parameters	
Ammonia	E. coli
Boron	Fluoride
Chlorine	Hardness
Color	pH - Field
Conductivity-Field	Potassium
Detergents – Surfactants (MBAS or fluorescence)	Turbidity

Based upon CWP and Pitt 2004. Illicit Discharge Detection and Elimination A Guidance Manual for Program Development and Technical Assessments

The outfall screening process has already been initiated in order to meet the established schedule for completion of 25% of the source identification work. Once the screening process is completed Permittees are required to identify MS4 outfalls with "significant" NSW discharges. The MRP (Section IX.C.1) indicates that significant NSW discharges may be determined based upon one or more of the following characteristics:

a. Discharges from major outfalls subject to dry weather TMDLs.

b. Discharges for which existing monitoring data exceeds Non-Stormwater Action Levels (NALs) identified in Attachment G of the Order.

c. Non-stormwater discharges that have caused or have the potential to cause overtopping of downstream diversions.

d. Discharges exceeding a proposed threshold discharge rate as determined by the Permittee.

Most of these characteristics are either unlikely to differentiate significant NSW discharges or the information will not be available when the screening process is completed. Multiple lines of evidence derived from flow measurements, observations and *in-situ* water quality information recorded on the Outfall Reconnaissance Investigation (ORI) forms used during the screening process will be used to determine "significant" NSW discharges and appropriately rank sites for source investigations. The relative magnitude of the discharges, persistence of the flow, visual and physical characteristics recorded at each site, and land uses associated with the drainage may also be considered. Characteristics of the receiving waters (flow, channel characteristics –hard or soft-bottom, etc.) at the discharge location will also be considered when determining the relative significance of NSW discharges. The most important consideration is whether the discharge has the potential to cause or contribute to exceedance of receiving water quality limitations. Factors that provide the best insight with respect to these impacts will receive the greatest weight when establishing the list of "significant" NSW discharges.

8.1.2 Inventory of MS4 Outfalls with Non-Stormwater Discharges

Part VII.A of the MRP requires that the CIMP plan(s) include a map(s) and/or database of the MS4 that includes the elements listed in Table 8-3. Most required elements are complete and included with this CIMP. Elements requiring further development include the Effective Impervious Area, information on the length of open channels and underground pipes equal to or greater than 18 inches, and the drainage areas associated with each outfall. Sub-basins used for the WMMS model are currently associated with each outfall within that sub-basin. If an outfall is identified as a significant source of NSW discharges, drainage areas for each targeted outfall will be refined and updated in the database. Additional information such as documenting presence of significant NSW discharges, links to a database documenting water quality measurements at sites with significant NSW discharges will be updated annually and submitted with the CIMP annual report.

As a component of the inventory and screening process, Permittees are required to document the physical attributes of MS4 outfalls determined to have significant non-stormwater discharges. Table 8-4 summarizes the minimum physical attributes required to be recorded and linked to the outfall database.

These data will be maintained using the Outfall Reconnaissance Inventory (ORI) field form and associated database (Appendix C) developed by CWP and Pitt (2004). Data entry can be accomplished by completing the ORI form while conducting the screening survey. Current forms are shown in the Appendix D but may be modified as the parameters and database are modified to provide different information more relevant to the NSW program.

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Table 8-3. Basic Database and Mapping Information for the Watershed.

Database Element	Status	
	Complete	Schedule
1. Surface water bodies within the Permittee(s) jurisdiction	X	
2. Sub-watershed (HUC 12) boundaries	X	
3. Land use overlay	X	
4. Effective Impervious Area (EIA) overlay (if available)		Will provide if available
5. Jurisdictional boundaries	X	
6. The location and length of all open channel and underground pipes 18 inches in diameter or greater (with the exception of catch basin connector pipes)	X[1]	
7. The location of all dry weather diversions	X	
8. The location of all major MS4 outfalls within the Permittee's jurisdictional boundary. Each major outfall shall be assigned an alphanumeric identifier, which must be noted on the map	X[2]	
9. Notation of outfalls with significant non-stormwater discharges (to be updated annually)	X	ongoing
10. Storm drain outfall catchment areas for each major outfall within the Permittee(s) jurisdiction	X[3]	ongoing
11. Each mapped MS4 outfall shall be linked to a database containing descriptive and monitoring data associated with the outfall. The data shall include:[4]		
a. Ownership	X	
b. Coordinates	X	
c. Physical description	X	
d. Photographs of the outfall, where possible to provide baseline information to track operation and maintenance needs over time	X	
e. Determination of whether the outfall conveys significant non-stormwater discharges		ongoing
f. Stormwater and non-stormwater monitoring data		ongoing

1. Locations are identified but the length of all open channel and underground pipes are not fully documented.
2. Attributes in the shapefile contain a Unique ID for all outfalls greater than 12" in diameter.
3. Catchments for each outfall are included as the area of the sub-basins associated with each outfall. Several outfalls may drain these sub-basins. Data will be developed as needed to resolve the drainage areas specific to each outfall.
4. Efforts are ongoing to define ownership and maintenance responsibility. As data become available, information regarding the conveyance of NSW and associated water quality data will be added to the database. Information will be updated based upon the three screening surveys.

Table 8-4. Minimum Physical Attributes Recorded during the Outfall Screening Process.

Database Element
a. Date and time of last visual observation or inspection
b. Outfall alpha-numeric identifier
c. Description of outfall structure including size (e.g., diameter and shape)
d. Description of receiving water at the point of discharge (e.g., natural, soft-bottom with armored sides, trapezoidal, concrete channel)
e. Latitude/longitude coordinates
f. Nearest street address
g. Parking, access, and safety considerations
h. Photographs of outfall condition
i. Photographs of significant non-stormwater discharge (or indicators of discharge) unless safety considerations preclude obtaining photographs
j. Estimation of discharge rate
k. All diversions either upstream or downstream of the outfall
l. Observations regarding discharge characteristics such as turbidity, odor, color, presence of debris, floatables, or characteristics that could aid in pollutant source identification
m. Observations regarding the receiving water such as flow, channel type, hard/soft bottom (added minimum attribute.)

8.1.3 Prioritized Source Identification

After completion of the initial reconnaissance survey and the two additional screening surveys, sites will be ranked based upon both initial flow observations from the reconnaissance inventory and the classifications assigned during each of the screening surveys. Source investigations will be scheduled to be conducted at sites categorized as Potential Illicit discharges.

The MRP (IX.E.1) states that prioritization of source investigations should be based upon the following items in order of importance.

a. Outfalls discharging directly to receiving waters with WQBELs or receiving water limitations in the TMDL provisions for which final compliance deadlines have passed.

b. All major outfalls and other outfalls that discharge to a receiving water subject to a TMDL shall be prioritized according to TMDL compliance schedules.

c. Outfalls for which monitoring data exist and indicate recurring exceedances of one or more of the Action Levels identified in Attachment G of this Order.

d. All other major outfalls identified to have significant non-stormwater discharges.

Additional information from the screening process will be used to refine priorities. Sites with evidence of higher, more frequent flow, presence of odors or stains will be assigned higher priorities for source investigations.

8.1.4 Identify Source(s) of Significant Non-Stormwater Discharges

The screening and source identification component of the program is intended to identify the source or sources of contaminants contributing to an NSW discharge. The prioritized list of major outfalls with significant NSW discharges will be used to direct investigations starting with outfalls deemed to present the greatest risk to the receiving water body.

The Order requires the WMG to develop a source identification schedule based on the prioritized list of outfalls exhibiting significant NSW discharges. Source investigations will be conducted for no less than 25% of the outfalls in the inventory by December 2015 and 100% of the outfalls in the inventory by December 2017.

Part IX.A.2 of the MRP requires Permittees to classify the source investigation results into one of four endpoints: illicit connections/illicit discharges (IC/IDs), authorized or conditionally exempt non-stormwater flows, natural flows, or from unknown sources. If source investigations indicate the source is illicit or unknown, the Permittee will document actions to eliminate the discharge and implement monitoring if the discharge cannot be eliminated.

If the source of a discharge is found to be attributable to natural flows or authorized conditionally exempt NSW discharge, the Permittee must identify the basis for the determination (natural flows) and identify the NPDES permitted discharger. If the source is found to be a conditionally exempt but non-essential discharge, monitoring is required to determine whether the discharge should remain conditionally exempt or be prohibited.

Source investigations will be conducted using a variety of different approaches depending upon the initial screening results, land use within the area drained by the discharge point, and the availability of drainage maps. Any additional water quality sampling will emphasize analysis of simple indicators, most of which can be either taken to a laboratory or analyzed in the field using field test kits. Such testing would only be conducted as needed to differentiate major sources of flows or to assist in assessing mixed sources rather than detailed characterization of the discharge. Investigations may include:

- Tracking of dry weather flows from the location where they are first observed in an upstream direction along the conveyance system.
- Collection of additional water samples for analysis of NWS indicators for assistance in differentiating major categories of discharges such as tap water, groundwater, wash waters and industrial wastewaters.
- Compiling and reviewing available resources including past monitoring and investigation data, land use/MS4 maps, aerial photography, existing NPDES discharge permits and property ownership information.

If source tracking efforts indicate that the discharge originates from a jurisdiction upstream of the boundaries of the LCC WMP, the appropriate jurisdiction and the Regional Board will be notified in writing of the discharge within 30 days of the determination. All existing information regarding documentation and characterization of the data, contribution determination efforts, and efforts taken to identify its source will be included.

Investigations will be concluded if authorized, natural, or essential conditionally exempt flows are found to be the source of the discharge. If the discharge is determined to be due to non-essential conditionally exempt, illicit, or unknown discharges, further investigations will be considered to assess whether the discharge can be eliminated. Alternatively, if the discharges are either non-essential conditionally exempt or of an unknown source, additional investigations may be conducted to demonstrate that it is not causing or contributing to receiving water impairments.

8.1.5 Monitor Non-Stormwater Discharges Exceeding Criteria

As required in the MRP (Part II.3.3), outfalls with significant NSW discharges that remain unaddressed after source identification will be monitored. The objectives of the non-stormwater outfall based monitoring program include the following:

a. Determine whether a Permittee's discharge is in compliance with applicable NSW WQBELs derived from TMDL WLAs;

b. Determine whether a Permittee's discharge exceeds NSW action levels, as described in Attachment G of the Order;

c. Determine whether a Permittee's discharge contributes to or causes an exceedance of receiving water limitations; and

d. Assist a Permittee in identifying illicit discharges as described in Part VI.D.10 of the Order.

After completion of source investigations, outfalls found to convey NSW discharges that could not be abated and were identified as illicit, conditionally exempt but non-essential or unknown will be monitored. Monitoring will be initiated within 90 days of completing the source investigations or as soon as the first scheduled dry weather survey. Conducting NSW monitoring at the same time as receiving water dry weather monitoring will be more cost effective and allow evaluation of whether the NSW discharges are causing or contributing to any observed exceedances of water quality objectives in the receiving water.

Monitoring of NSW discharges is expected to undergo substantial changes from year to year as the result of ongoing actions taken to control or eliminate these discharges. As NSW discharges are addressed, monitoring of the discharges will no longer be required. In addition, if monitoring demonstrates that discharges do not exceed any WQBELs, non-stormwater action levels, or water quality standards for pollutants identified on the 303(d) list after the first year, monitoring of the pollutants meeting all receiving water limitations will be no longer be necessary. Due to potential frequent adjustments in the number and location of outfalls requiring monitoring and pollutants

requiring monitoring, the annual CIMP report is expected to communicate adjustments in the number and locations of monitored discharges, pollutants being monitored and justifications for any adjustments.

8.1.5.1 Monitoring Parameters and Frequency

The MRP (Section IX.G.1) specifies the minimum parameters for monitoring of NSW discharges. Determination of monitoring parameters at each site requires consideration of a number of factors applicable to each site. Monitoring parameters will include:

a. Flow;

b. Pollutants assigned a WQBEL or receiving water limitation to implement TMDL Provisions for the respective receiving water, as identified in Attachments L - R of the Order;

c. Other pollutants identified on the CWA section 303(d) List for the receiving water or downstream receiving waters;

d. Pollutants identified in a TIE conducted in response to observed aquatic toxicity during dry weather at the nearest downstream receiving water monitoring station (LCC1) during the last sample event or, where the TIE conducted on the receiving water sample was inconclusive, aquatic toxicity (if the discharge exhibits aquatic toxicity, then a TIE shall be conducted); and

e. Other parameters in Table E-2 identified as exceeding the lowest applicable water quality objective at LCC1 (the nearest downstream receiving water station) per Part VI.D.1.d.

The MRP (Part IX.G.2-4) specifies the following monitoring frequency for NSW outfall monitoring:

- For outfalls subject to a dry weather TMDL, the monitoring frequency shall be per the approved TMDL monitoring plan or as otherwise specified in the TMDL or as specified in an approved CIMP.
- For outfalls not subject to dry weather TMDLs, approximately quarterly for first year.
- Monitoring can be eliminated or reduced to twice per year, beginning in the second year of monitoring if pollutant concentrations measured during the first year do not exceed WQBELs, MALs or water quality standards for pollutants identified on the 303(d) List.

While a monitoring frequency of four times per year is specified in the Permit, it is inconsistent with the dry weather receiving water monitoring requirements. The receiving water monitoring requires two dry weather monitoring events per year. Additionally, during the term of the current Permit, outfalls are required to be screened at least once and those with significant NSW discharges will be subject to a source investigation. As a result, the LCC WMG recommends that NSW outfall monitoring events be conducted twice per year. The NSW outfall monitoring events will be coordinated with the dry weather receiving water monitoring events to provide better opportunities to determine if the NSW discharges are causing or contributing to any observed exceedances of water quality objectives in the receiving water.

Any monitoring required will be performed using grab samples (refer to Appendix A for field sampling procedures) rather than automated samplers. Bacteria, which are expected to be the limiting factor at many sites during dry weather, require collection by grab methods and delivery to the laboratory within 6 hours. Based upon the much reduced variability experienced in measurements of dry weather flows associated with ongoing monitoring programs, measured concentrations of other analytes are not expected to vary significantly over a 24-hour period.

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9 New Development/Re-Development Effectiveness Tracking

Each of the cities in the watershed will maintain an electronic database to track qualifying new development and re-development projects that are subject to the Planning and Land Development Programs of Part VI.D.7 of Order No. R4 2012- 0175 and Part VII.J of Order No. R4 2014-0024. The electronic databases contain the information listed in Table 9-1 that includes details about the project and the design of onsite and offsite best management practices, as well as descriptions of the required information.

To promote consistency across the watershed and facilitate future planning and research within the watershed, all of the cities within the watershed are subscribing to MS4Front, a web-based software system designed to streamline record keeping for MS4 permits and assists with annual reporting. The cities concluded that although it is a sophisticated management tool, it is flexible and relatively easy to use. The existing tracking programs will be converted to MS4Front.

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Table 9-1. Information Required in the New Development/Re-Development Tracking Database.

	Required Information	Description
General Site Information	Project Name and Developer Name	Brief name of project and developer information (e.g. name, address, and phone number).
	Project Location and Map	Coordinates and map of the project location. The map should be linked to the GIS storm-drain map required in part VII.A of the Permit.
	Documentation of issuance of requirements to the developer	Date that the project developer was issued the Permit requirements for the project (e.g. conditions of approval).
	Date of Certificate of Occupancy	Date that the Certificate of Occupancy was issued.
On-site BMP Sizing Information	85th percentile storm event (inches per 24 hours)	85th percentile storm depth for the project location calculated using the Analysis of 85th Percentile 24-hour Rainfall Depths Within the County of Los Angeles.
	95th percentile storm event (inches per 24 hours)	95th percentile storm depth for the project location calculated using the *Analysis of 85th Percentile 24-hour Rainfall Depths Within the County of Los Angeles*. Only applies if the project drains directly to a natural drainage system[8] and is subject to hydromodification control measures.
	Project design storm (inches per 24 hours)	The design storm for each BMP as calculated using the Analysis of 85th Percentile 24-hour Rainfall Depths Within the County of Los Angeles.
	Projects design volume (gallons or MGD)	The design storm volume (design storm multiplied by tributary area and runoff coefficient) for each BMP.
	Percent of design storm volume to be retained on site	The percentage of the design volume which on-site BMPs will retain.
	Other design criteria required to meet hydromodification requirements for projects that directly drain to natural water bodies	Information relevant to determine if the project meets hydromodification requirements as described in the Permit e.g., peak flow and velocity in natural water body, peak flow from project area in mitigated and unmitigated condition, etc.). Only applies if the project drains directly to a natural drainage system.
	One -year, one-hour storm intensity as depicted on the most recently issued isohyetal map published by the Los Angeles County Hydrologist for flow-through BMPs	If flow-through BMPs (e.g., sand filters, media filters) for water quality are used at the project, provide the one-year, one-hour storm intensity at the project site from the most recent isohyetal map issued by LA County.
Off-site BMP Information	Location and maps of off-site mitigation, groundwater replenishment, or retrofit sites	If any off-site mitigation is used, provide locations and maps linked to the GIS storm-drain map required in part VII.A of the Permit.
	Design volume for water quality mitigation treatment BMPs	The calculated design volume, If water quality mitigation is required.
	Percent of design storm volume to be infiltrated at an off-site mitigation or groundwater replenishment project site	The percentage of the design volume which off-site mitigation or groundwater replenishment will retain.
	Percent of design storm volume to be retained or treated with biofiltration at an off-site retrofit project	The percentage of the design volume which off-site biofiltration will retain or treat.

[8] A natural drainage system is defined as a drainage system that has not been improved (e.g., channelized or armored). The clearing or dredging of a natural drainage system does not cause the system to be classified as an improved drainage system.

10 Reporting

Reporting will normally consist of Annual CIMP Reports and semi-annual data reports. Discharge Assessment Plans will only be submitted if TIEs are found to produce inconsistent results during two consecutive tests. These include the following reports:

Annual CIMP Reports

Annual CIMP monitoring reports are required to be submitted to the Regional Water Board Executive Officer by December 15th of each year in the form of three compact disks (CDs). The reporting period will cover July 1 through June 30. The annual reporting process is intended to meet the following objectives.

Summary information allowing the Regional Board to assess:

a. Each Permittee's participation in one or more Watershed Management Programs.
b. The impact of each Permittee(s) stormwater and non-stormwater discharges on the receiving water.
c. Each Permittee's compliance with receiving water limitations, numeric water quality-based effluent limitations, and non-stormwater action levels.
d. The effectiveness of each Permittee(s) control measures in reducing discharges of pollutants from the MS4 to receiving waters.
e. Whether the quality of MS4 discharges and the health of receiving waters is improving, staying the same, or declining as a result watershed management program efforts, and/or TMDL implementation measures, or other Minimum Control Measures.
f. Whether changes in water quality can be attributed to pollutant controls imposed on new development, re-development, or retrofit projects.

Data Submittals

Analytical data reports are required to be submitted to the Regional Board on a semi-annual basis in accordance with the Southern California Municipal Storm Water Monitoring Coalition's Standardized Data Transfer Formats. These reports are required to be subject to verification and validation prior to submittal. They are to cover monitoring periods of July 1 through December 31 for the mid-year report and January 1- June 30 for the end of year report. These data reports should summarize:

- Exceedances of applicable WQBELs, receiving water limitations, or any available interim action levels or other aquatic toxicity thresholds.
- Basic information regarding sampling dates, locations, or other pertinent documentation.

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APPENDIX A

AUTOMATED STORMWATER MONITORING EQUIPMENT

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1 Automated Stormwater Monitoring Equipment

Monitoring of stormwater runoff at the receiving water/TMDL site and Watershed Segmentation monitoring sites will require use of automated stormwater sampling equipment. This section addresses equipment and sampling procedures that will be used for LCC1, PWS and SWS sites.

Flow-weighted and time-weighted sampling will generally require similar equipment. Similar equipment will be necessary regardless of the selected sampling approach. Time-weighted composite samples simply allow for more mobile installations that do not require flow meters, rain gauges, solar panels, or communication equipment. In lieu of communications equipment, such sites require added field personnel to monitor and track performance of the equipment along with added sensors to trigger the equipment to initiate the sampling.

For purposes of this CIMP, it is assumed that all sites requiring collection of flow-weighted composite samples will be established as "permanent" or "long-term" sites with appropriate security to protect the equipment and intake structures from debris coming down the stream or vandalism. As noted, collection of time-weighted samples will be utilize the same types of autosamplers and composite containers but will not include flow meters, rain gauges and telecommunication packages. Monitoring stations designed to take time-weighted composite samples will require sensors to detect initial flows and trigger the sampler. This will allow for use of smaller security enclosures that can temporally be secured at a site or, if necessary, equipment can be deployed in a manhole.

Fixed monitoring sites will utilize automated stormwater sampling stations that incorporate an autosampler (American Sigma or Isco), a datalogger/flow module to monitor flow and pace the autosampler, a rain gauge to monitor and record local rainfall, and telecommunications to allow for remote monitoring and control of each site. Sites without access to AC power will be powered by deep-cycle marine batteries. Sites without direct access to AC power will utilize solar panels to provide the energy needed to maintain the charge on two deep cycle batteries used to power the autosampler, flow meter and datalogger. Providing reliable telecommunications for real-time access to data and to provide command and control functionality has greatly improved efficiency and contributed to improved stormwater data.

Both types of automated stormwater monitoring systems considered for this monitoring program use peristaltic pumping systems. When appropriate measures are taken, it has been demonstrated that these types of systems are capable of collecting blanks that are uncontaminated and high quality, reproducible data using detection limits appropriate to water quality criteria. In order to accomplish this, extreme care must be taken to avoid introduction of contaminants.

Requirements include:

- Assuring that all materials coming into contact with the samples are intrinsically low in trace metals and do not adsorb/absorb metals or other target.

- Materials coming into contact with the sample water are subjected to intensive cleaning using standardized protocol and subjected to systematic blanking to demonstrate and document that blanking standards are met.
- All cleaned sampling equipment and bottles are appropriately tracked so that blanking data can be associated with all component deployed in the field.
- Samples are collected, processed and transported taking care to avoid contamination from field personnel or their gear, and
- Laboratory analysis is conducted in a filtered air environment using ultrapure reagents.

Table 2-1 of the USGS National Field Manual (http://pubs.water.usgs.gov/twri9A/) provides a summary of acceptable materials for use sampling organic and inorganic constituents. The stormwater monitoring stations will primarily utilize 20-L borosilicate glass media bottles for the composite samples, FEP tubing for the sample hose and either 316 SS or Teflon-coated intake strainers. Ten (10) liter borosilicate glass media bottles will be considered for sites where required sample volumes are low and lower sample volumes are acceptable. The peristaltic hose is a silicone-base material that is necessary for operation of the autosamplers. The peristaltic hose can be as source of silica which is not a target compound.

Although the technical limitations of autosamplers are often cited, they still provide the most practical method for collecting representative samples of stormwater runoff for characterization of water quality and have been heavily utilized for this purpose for the past 20 years. The alternative, manual sampling, is generally not practical for collection of flow-weighted composite samples from a large number of sites or for sampling events that occur over an extended period of time. Despite the known drawbacks, autosamplers combined with accurate flow metering remain the most common and appropriate tool for monitoring stormwater runoff.

1.1 Sampler Intake Strainer, Intake Tubing and Flexible Pump Tubing

Intake strainers will be used to prevent small rocks and debris from being drawn into the intake tubing and causing blockages or damage to the pump and peristaltic pump tubing. Strainers will be constructed of a combination of Teflon and 316 stainless or simply stainless steel. The low profile version is typically preferred to provide greater ability to sample shallow flows. Although high grade stainless steel intake strainers are not likely to impact trace metal measurements, it is preferable to use strainers coated with a fluoropolymer coating. If the stainless steel intake is not coated, the strainer will not be subjected to cleaning with acids. Cleaning will be limited to warm tap water, laboratory detergents and MilliQ water rinses.

Tubing comprised of 100% FEP (Fluorinated Ethylene Propylene) will be used for the intake tubing. Several alternative fluoropolymer products are available but 3/8" ID solid FEP tubing has the chemical characteristics suitable for sampling metals and organics at low levels and appropriate physical characteristics. The rigidity of FEP tubing provides resistance to collapse at high head differentials but still is manageable for tight configurations.

The peristaltic hose used in autosamplers is a medical-grade silicon product. The specifications for the peristaltic pump hoses used in these samplers are unique to the samplers. It is very important that hose specified and provided by the manufacturers of the autosamplers be used. Minor

differences in the peristaltic hose can cause major deterioration in performance of the samplers. Use of generic peristaltic pump hose from other sources can lead to problems with the ability to calibrate the samplers and maintain intake velocities of greater than 2.5 feet per second with higher lift requirements.

The peristaltic hose is connected to the FEP tubing and fed through the pump head leaving the minimum amount necessary to feed the peristaltic pump hose into the top of the composite bottle. The composite container will always have a lid to prevent dust from settling in the container.

1.2 Composite Containers

The composite containers used for monitoring must be demonstrated to be free of contaminants of interest at the desired levels (USEPA 1996). Containers constructed of fluoropolymers (FEP, PTFE), conventional or linear polyethylene, polycarbonate, polysulfone, polypropylene, or ultrapure quartz are considered optimal for metals but borosilicate glass has been shown to be suitable for both trace metals and organics at limits appropriate to EPA water quality criteria. High capacity borosilicate media bottles (20-liters or ~5-gallons) are preferred for storm monitoring since they can be cleaned and suitably blanked for analysis of both metals and organic compounds. The transparency of the bottles is also a useful feature when subsampling and cleaning the containers for reuse.

Figure 1. Composite Bottle with Label and installed Tubing inside Brute® Container.

These large media bottles are designed for stoppers and thus do not come with lids. Suitable closure mechanisms must be fabricated for use during sampling, transport and storage of clean bottles. The preferred closure mechanism is a Teflon® stopper fitted with a Viton® O-ring (2 3/8" - I.D. x 23/4"-O.D.) that seals the lid against the media bottle. A polypropylene clamp (Figure 2) is used to seal the Teflon® stopper and O-ring to the rim of the composite sample bottle. Two polypropylene bolts with wing-nuts are used to maintain pressure on the seal or to assist in removal of the lid.

Every composite bottle requires one solid lid for use in protecting the bottle during storage and transport. A minimum of one Teflon® stopper should be available for each monitoring site during storm events. Each field sampling crew should have additional stoppers with holes ("sampling stopper") that would be available if a sampling stopper is accidentally contaminated during bottle changes or original installations.

Figure 2. Composite bottle showing bottle bag used for transport and lifting.

The holes in the sampling stoppers should be minimally larger than the external diameter of the peristaltic hose. If a tight fit exists, the pressure created when water is pumped into the bottle will cause the hose to be ejected and the sampling event will to be abandoned.

Transporting composite bottles is best accomplished by use of 10-gallon Brute® containers to both protect them from breakage and simplify handling. They also provide additional capacity for ice while transporting full bottles to the laboratory or subsampling site.

Bottle bags (Figure 2) are also useful in allowing full bottles to be handled easier and reduce the need to contact the bottles near the neck. They are important for both minimizing the need to handle the neck of the bottle and are also an important Health and Safety issue. The empty bottles weigh 15 pounds and they hold another 40 pounds of water when full. These can be very slippery and difficult to handle when removing them from the autosamplers. Bags can be easily fabricated out of square-mesh nylon netting with nylon straps for handles. Use of bottle bags allows two people to lift a full bottle out of the ice in the autosampler and place it in a Brute® container. Whether empty or full, suitable restraints should be provided whenever the 20-L composite bottles and Brute® containers are being transported.

1.3 Flow Monitoring

Retrieval of flow-weighted stormwater samplers requires the ability to accurately measure flow over the full range of conditions that occur at the monitoring site. The ability to accurately measure flow at an outfall site should be carefully considered during the initial site selection process. Hydraulic characteristics necessary to allow for accurate flow measurement include a relatively straight and uniform length of pipe or channel without major confluences or other features that would disrupt establishment of uniform flow conditions. The actual measurement site should be located sufficiently downstream from inflows to the drainage system to achieve well-mixed conditions across the channel. Ideally, the flow sensor and sample collection inlet should be placed a minimum of five pipe diameters upstream and ten pipe diameters downstream of any confluence to minimize turbulence and ensure well-mixed flow. The latest edition of the *Isco Open Channel Flow Measurement Handbook* (Walkowiak 2008) is an invaluable resource to assist in selection of the most appropriate approach for flow measurements and information on the constraints of each method.

The existing mass emission site has an established flow rating curve (Stage-Flow relationships) that only requires measurement of water level to estimate flow. Additional sites requiring flow monitoring are expected to utilize area-velocity sensors that use Doppler-based sensors to measure

the velocity of water in the conveyance, a pressure sensor to measure water depth, and information regarding channel dimensions to allow for real-time flow measurements to pace the autosamplers.

1.4 Rainfall Gauges

Electronic tipping bucket rain gauges will be installed at each fixed monitoring location to provide improved assessment of rainfall in the smaller drainages. Use of a localized rain gauge provides better representation of conditions at the site. A variety of quality instruments are available but all require substantial maintenance to ensure maintenance of high data quality.

Tipping bucket rain gauges with standard 8-inch diameter cones will be used at each site. These provide 1 tip per 0.01" of rain and have an accuracy of ± 2% up to 2"/hr. The accuracy of tipping bucket rain gauges can be impacted by very intense rainfall events but errors are more commonly due to poor installation.

Continuous data records will be maintained throughout the wet season with data being output and recorded for each tip of the bucket. The rainfall data is downloaded at the same rate as the flow and stormwater monitoring events.

1.5 Power

Stormwater monitoring equipment can generally be powered by battery or standard 120VAC. If 120VAC power is unavailable, external, sealed deep-cycle marine batteries will be used to power the monitoring site. Even systems with access to 120VAC will be equipped with batteries that can provide backup power in case of power outages during an event. All batteries will be placed in plastic marine battery cases to isolate the terminals and wiring. A second battery will be provided at each site to support the telecommunication packages. Sites relying on battery power will also be equipped with a solar panel to assure that a full charge is available when needed for a storm event.

1.6 Telecommunication for System Command/Control and Data Access

The ability to remotely communicate with the monitoring equipment has been shown to provide efficient and representative sampling of stormwater runoff. Remote communication facilitates preparation of stations for storm events and making last minute adjustments to sampling criteria based upon the most recent forecasts. Communication with the sites also reduces the number of field visits by monitoring personnel. Remote two-way communication with monitoring sites allows the project manager (storm control) to make informed decisions during the storm as to the best allocations of human resources among sampling sites. By remotely monitoring the status of each monitoring site, the manager can more accurately estimate when composite bottles will fill and direct field crews to the site to avoid disruptions in the sampling. Real time access to flow, sampling and rainfall data also provides important information for determining when sampling should be terminated and crews directed to collect and process the samples. Increases in both efficiency and sample quality make two-way communication with monitoring stations a necessity for most monitoring programs.

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APPENDIX B

CLEANING AND BLANKING PROTOCOL

FOR

EQUIPMENT AND SUPPLIES USED IN COLLECTION OF FLOW OR TIME-WEIGHTED COMPOSITES

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CLEANING PROTOCOL FOR:

20-L Borosilicate Glass Composite Bottles (Media Bottles) and Closures

1.0 SCOPE

This Standard Operating Procedure (SOP) describes the procedures for the cleaning of 20-liter composite sample bottles and the related equipment necessary to complete the task. The purpose of these procedures is to ensure that the sample bottles are contaminant-free and to ensure the safety of the personnel performing this procedure.

2.0 APPLICATION

This SOP applies to all laboratory activities that comprise the cleaning of 20-liter composite sample bottles and stoppers.

3.0 HEALTH AND SAFETY CONSIDERATIONS

The cleaning of 20-liter composite-sample bottles and associated equipment involves hazardous materials. Skin contact with all materials and solutions should be minimized by wearing appropriate personal protective equipment (PPE) including: chemical-resistant gloves, laboratory coats, chemical-resistant aprons, and goggles. To ensure that you are aware of the hazards involved, the material safety data sheets (MSDSs) for nitric acid and laboratory detergents should be reviewed before beginning any of these procedures.

Note: Preparations should be made to contain and neutralize any spillage of acid. Be aware of the location of absorbent, neutralizing, and containment materials in the bottle cleaning area.

4.0 DEFINITIONS

4.1 **Composite sample bottle** - 20 liter borosilicate glass bottle that is used with autosamplers to collect a stormwater composite sample.

4.2 **Stopper** - a Teflon® cap used to seal the composite sample bottle (either solid, or drilled with holes for the silicon inlet tubing).

4.3 **O-Ring** - Viton O-ring 23/8"- I.D. x 23/4"- O.D. that is located around the base of stopper.

4.4 **Clamp** - Polypropylene clamp, 2 bolts, and wing nuts specifically designed to fasten the stopper and the O-ring to the rim of the composite sample bottle.

4.5 **De-ionized (DI) water** - commercial de-ionized water (12-13 Megohm/cm)

4.6 **Laboratory Detergent** - 2% solution of Contrad 70® or Micro-90® detergent

5.0 EQUIPMENT

5.1 Instrumentation:

1) Peristaltic pump with a protocol-cleaned sub-sampling hose setup

5.2 Reagents:

1) ACS Reagent Grade nitric acid in a 2 Normal solution (2N HNO_3)

2) Contrad 70® non-phosphate laboratory detergent

3) Contrad 70® anti-foaming agent

4) Micro-90® non-phosphate laboratory detergent

5) Baking soda or equivalent to neutralize acid

6) pH paper

5.3 Apparatus:

1) Bottle Rolling Rack

2) DI Rinse Rack

3) Yellow Neutralization Drip Bucket

4) Neutralization Tank

5.4 Documentation:

The status of each composite sample bottle must be tracked. Bottles should be washed in batches of 10, 20, or 30 and the status of each batch must be made apparent to all personnel by posting a large status label (including the start date) with each batch. This will ensure that all required soak times have been attained and that each bottle was subjected to the proper cleaning procedures. Information on each batch of bottles cleaned (including bottle number, QA batch, date cleaning started, date finished, date blanked, and cleaning technicians) should be entered in the **Bottle Cleaning Log Sheet**.

6.0 CLEANING PROCEDURES

Care must be taken to ensure that no contaminants are introduced at any point during this procedure. If the wash is not performed with this in mind, the possibility for the introduction of contaminants (i.e., from dust, dirty sub-sampling tubing tips, dirty fingers/gloves, automobile emissions, etc.) is increased significantly.

6.1 Teflon® Bottle Stoppers with Holes and Field Extras:

To be performed whenever required for field use.

1) Wash with laboratory detergent using a clean all-plastic brush.

2) Rinse thoroughly (minimum of three times) with tap water.

3) Rinse thoroughly (minimum of three times) with DI water.

4) Wash three times with 2N nitric acid squirt bottle.

5) Rinse thoroughly (minimum of three times) with DI water.

6) Allow to dry in a dust-free environment.

7) Store in two sealed clean Ziploc® bags.

6.2 NPS 20 liter composite sample bottle Cleaning:

6.2.1 Preliminary Bottle Cleaning:

Bottles should undergo a preliminary rinse with tap water as soon as possible after they are available. This includes dumping any remaining stormwater into a sanitary drain and rinsing the bottles and stoppers. This prevents material from adhering to the interior surface of the bottle.

6.2.2 **48 Hour Soak:** Place the bottle to be cleaned into a secondary containment bucket. Prepare a 2% solution of laboratory detergent with tap water directly in the bottle. Note: Since laboratory detergent is a foaming solution, add 3/4 of the tap water first, add the detergent, then add the rest of the water. Should excessive foam be generated, a few drops of Contrad 70® anti-foaming agent may be added. **Make sure that the bottle is filled to the rim and scrub the rim with an all-plastic scrub brush.** Scrub a Teflon® stopper with 2% solution of laboratory detergent and place stopper over the full bottle so overflowing happens. This will allow both the stopper and the bottle to soak for 48 hours. After the 48 hour soak, this solution may be may be retained for reuse (i.e., siphoned into other dirty bottles) or it can be poured off into a sanitary drain.

6.2.3 Teflon® Bottle Stopper and O-ring Cleaning:

This procedure should be performed prior to the bottle washing process so that the stopper can follow the bottle through the acid wash.

1) Rinse thoroughly (minimum of three times) with tap water.

2) Rinse thoroughly (minimum of three times) with DI water.

3) Store temporarily in a similarly cleaned

6.2.4 **Tap Water Rinse:** Tap water rinses detergent better than DI water. Flush upside down bottle with tap water for 20 sec. Rinse each bottle 3 times with tap water being careful not to contaminate the clean surfaces.

6.2.5 **DI Rinse:** Rinse the top and neck of the bottles with DI water using a squirt bottle and then rinse upside down for three minutes on the DI rinse rack for bottles. Make sure to tip bottles from side to side for a more thorough rinsing. Allow 1-2 minutes for the bottles to

drain as much as possible. Rinse each stopper with DI water squirt bottle 3 times (being careful not to touch the clean surfaces).

6.2.6 **Acid Wash:** Note that it is important to Wash the bottle with 2N nitric acid according to the following procedure:

1) Place the empty bottle near the 2N nitric acid carboy and peristaltic pump. The location should be able to safely contain a spill if the 20L bottle breaks.

2) Pump acid into the bottle using the peristaltic pump fitted with a protocol-cleaned sub-sampling hose setup

3) Fill the bottle slightly more than half full.

4) Place a protocol-cleaned solid Teflon® stopper (with a properly seated O-ring) (Refer to Section 6.2.3 above) on the bottle and clamp it securely.

5) **Carefully** lift and place the bottle on the roller rack and check for leakage from the stopper. Neutralize any spillage. Often small leaks can be corrected by a slight tightening of the clamp. Roll the bottles for twenty minutes.

6) Pump the acid into another bottle for rolling or back into the 2N nitric acid carboy.

6.2.7 **DI Rinse for Sub-sampling Hose**: After use, the sub-sampling hose setup should be rinsed by pumping 1-2 gallons of DI water through the hoses and into a neutralization tank. Carefully rinse the outside of the hose to remove any acid that may be on the exterior of the hose. pH paper should be used to insure that the fluid in and on the hose is 6.8 or higher. Continue rinsing until your reach neutral pH. Store hose in a clean, large plastic bag between uses. Dispose of rinsate in accordance with all federal, state, and local regulations

6.2.8 **DI Rinse for Bottles**: Allow the bottles to drain into a yellow neutralization bucket for at least 1 minute. Place four bottles at a time on the DI rinse rack and rinse for 5 minutes. Move bottles around to ensure complete and thorough rinsing. Rinse the outside of the bottle with tap water. Allow bottles to drain for 2 minutes.

6.2.9 **DI Rinse for Stoppers**: Rinse caps thoroughly 3 times over neutralization tank. Place on a clean surface where the clean side of the stopper will not be contaminated.

6.3 **Storage:** Clamp a stopper (one that went through the entire cleaning procedure) on the bottle. Properly label the bottle as to the date cleaned and by whom and place on the bottle storage rack or in a secondary containment bucket in a safe area. Also, fill out the **Bottle Cleaning Log Sheet**.

7.0 QUALITY ASSURANCE REQUIREMENTS

7.1 The NPS 20 liter sample bottles must be evaluated ("blanked") for contaminants after they have completed the decontamination procedure. The analytical laboratory performing the evaluation should supply Milli-Q® water that is used as a blanking rinsate, and sample

bottles for the appropriate constituents of concern. This evaluation will be accomplished by randomly blanking 10% of the washed bottles, or 1 bottle per batch (whichever is greater) and having the blanking rinsate analyzed by the laboratory for the appropriate constituents.

7.2 If any of the bottles fail the analyses (concentration of any analytes are at or above the limit of detection), all of the bottles from that batch must be decontaminated. Again, 10% of these bottles must be subjected to the blanking process as described-above.

7.3 If results of the evaluation process show that the bottles are not contaminant-free, the cleaning procedure must be re-evaluated. Consult with the Quality Assurance/Quality Control Officer to determine the source of contamination.

CLEANING PROTOCOL FOR:

Miscellaneous Laboratory Equipment used for Cleaning and Blanking

1.0 SCOPE

This Standard Operating Procedure describes the procedures for cleaning the miscellaneous items necessary to complete the tasks of cleaning 20- liter composite sample bottles and hoses. The purpose of these procedures is to ensure that the items are contaminant-free and to ensure the safety of the personnel performing this procedure.

2.0 APPLICATION

This SOP applies to all laboratory activities that comprise the cleaning of ancillary items necessary to complete the tasks of cleaning 20 liter composite sample bottles and NPS hoses.

3.0 HEALTH AND SAFETY CONSIDERATIONS

The cleaning of the following items may involve contact with hazardous materials. Skin contact with all materials and solutions should be minimized by wearing appropriate personal protective equipment (PPE) including: chemically-resistant protective gloves, laboratory coats, chemically-resistant aprons, and goggles. In addition, to ensure that you are aware of the hazards involved and of any new revisions to the procedure, the material safety data sheets (MSDSs) for nitric acid and the laboratory detergent should be reviewed before beginning any of these procedures.

4.0 DEFINITIONS

4.1 Polyethylene Squirt Bottles - ½ and 1 liter squirt bottles for washing and/or rinsing with DI water or nitric acid.

4.2 Polycarbonate and Polyethylene De-ionized Water Jugs - For holding DI water.

4.3 Polyethylene Bucket - For holding tap water, DI water or detergent solutions during hose washing procedures.

4.4 Four-inch Teflon® Connector - For connecting two lengths of silicon peristaltic tubing together.

4.5 Four-inch Silicon Connector - For connecting two lengths of Teflon® hose together.

4.6 Orange Polypropylene Hose Caps - For placing over the ends of clean Teflon® hose to prevent contamination.

4.7 De-ionized (DI) water - Commercial de-ionized water

4.8 Laboratory Detergent - 2% solution of Contrad 70® or Micro-90® detergent.

5.0 EQUIPMENT

5.1 Instrumentation: Not applicable.

5.2 Reagents:

1) ACS Reagent Grade nitric acid as a 2 Normal solution (2N HNO_3)

2) Micro-90® non-phosphate laboratory detergent

3) Contrad 70® non-phosphate laboratory detergent

4) Contrad 70® anti-foaming agent.

5) pH paper or pH meter

6) Baking soda ($NaHCO_3$) or equivalent to neutralize acid

5.3 Apparatus:

1) Clean polyethylene squirt bottles.

2) Clean polyethylene trays or 2000 ml glass beakers.

3) Neutralization Tank

5.4 Documentation:

Label each squirt bottle, DI jug, storage container holding clean items, etc. as to the date each was cleaned and the initials of the cleaning technician.

6.0 CLEANING PROCEDURES

Care must be taken to ensure that no contaminants are introduced at any point during these procedures. If the wash is not performed with this in mind, the possibility for the introduction of contaminants (i.e., from dirty sinks, dirty counter tops, dirty fingers/gloves, dirty hose ends, etc.) is increased significantly.

Rinsing properly is essential to ensure proper cleaning. This is done by squirting the liquid over the item to be cleaned in a top-down fashion, letting the water flow off completely **before** applying the next rinse. Rinse the item in this fashion **a minimum** of three times. **Numerous rinses of relatively small volumes are much better than one or two rinses of higher volume.** Be aware of handling: use clean gloves (it is best if they have gone through the same prior wash as the item to be rinsed) and rinse off the fingers prior to grasping the item to be cleaned. Try to grasp the item in a slightly different place between rinses so ones fingers do not cover a portion of the item throughout the rinses.

6.1 Polyethylene Squirt Bottles:

1) Soak in a 2% solution of laboratory detergent in a protocol-cleaned bucket for 48 hours.

2) Rinse thoroughly (minimum of three times) with tap water.

3) Rinse thoroughly (minimum of three times) with DI water.

4) Wash three times with 2N (10%) nitric acid.

5) Rinse thoroughly (minimum of three times) with DI water. Neutralize and dispose of rinsate in accordance with all federal, state, and local regulations.

6.2 Polycarbonate and Polyethylene DI Water Jugs:

1) Fill to the rim with a 2% solution of laboratory detergent, cap the jug, and let soak for 48 hours. Wash cap with an all-plastic scrub brush after soak.

2) Rinse thoroughly (minimum of three times) with tap water.

3) Rinse thoroughly (minimum of three times) with DI water.

4) Wash three times with 2N (10%) nitric acid.

5) Rinse thoroughly (minimum of three times) with DI water. Neutralize and dispose of rinsate in accordance with all federal, state, and local regulations.

6.3 Polyethylene Bucket:

1) Fill to the rim with a 2% solution of laboratory detergent and let soak for 48 hours.

2) Rinse thoroughly (minimum of three times) with tap water.

3) Rinse thoroughly (minimum of three times) with DI water.

4) Wash three times with 2N (10%) nitric acid squirt bottle.

5) Rinse thoroughly (minimum of three times) with DI water. Neutralize and dispose of rinsate in accordance with all federal, state, and local regulations. **Label as to the date cleaned and initial**.

6.4 Four-inch Teflon® and Silicon Hose Connectors and Orange Polypropylene Hose Caps. The purpose of the four-inch sections of Teflon® and silicon hose is to connect longer lengths of each type of hose together during the hose cleaning procedures. The orange polypropylene hose caps are for the ends of cleaned FEP hoses to prevent contamination prior to use in the field or laboratory.

1) Using a 2% solution of laboratory detergent, soak the four-inch sections of FEP hose, silicon tubing, and orange caps for 48 hours.

2) Rinse thoroughly with tap water (minimum of three rinses).

3) Rinse thoroughly with DI water (minimum of three rinses).

4) Using a squirt bottle filled with 2N (10%) HNO_3, thoroughly rinse the interior and exterior of the connectors and caps thoroughly OR, roll/agitate them in a shallow layer of 2N (10%) HNO_3 in a laboratory detergent cleaned glass beaker or other appropriate, clean container for a more thorough washing.

5) Thoroughly rinse connectors and caps with DI water (minimum of three rinses). Neutralize and dispose of rinsate in accordance with all federal, state, and local regulations. Keep clean connectors and caps in a similarly cleaned (or certified clean) widemouth glass jar or detergent-cleaned resealable bag and **label as clean, date cleaned, and initial**.

NPS 20-Liter Bottle Subsampling Procedure

1.0 Scope

This Standard Operating Procedure (SOP) describes the procedures for the compositing and sub-sampling of non-point source (NPS) 20 liter sample bottles. The purpose of these procedures is to ensure that the sub-samples taken are representative of the entire water sample in the 20-L bottle (or bottles). In order to prevent confusion, it should be noted that in other KLI SOPs relating to 20-L bottles they are referred to as "composite" bottles because they are a composite of many small samples taken over the course of a storm; in this SOP the use of "compositing" generally refers to the calculated combining of more than one of these 20-L "composite" bottles.

2.0 Application

This SOP applies to all laboratory activities that comprise the compositing and sub-sampling of NPS 20 liter sample bottles.

3.0 Health and Safety Considerations

The compositing and sub-sampling of NPS 20 liter sample bottles may involve contact with contaminated water. Skin contact with sampled water should be minimized by wearing appropriate protective gloves, clothing, and safety glasses. Avoid hand-face contact during the compositing and sub-sampling procedures. Wash hands with soap and warm water after work is completed.

4.0 Definitions

4.1 **20 liter sample bottle:** 20 liter borosilicate glass bottle that is used to collect multiple samples over the course of a storm (a composite sample).

4.2 **Large-capacity stirrer**: Electric motorized "plate" that supports a 20 liter bottle and facilitates the mixing of sample water within the bottle by means of spinning a pre-cleaned magnetic stir-bar which is introduced into the bottle.

4.3 **Stir-bar**: Teflon-coated magnetic "bar" approximately 2-3 inches in length which is introduced into a 20 liter bottle and is spun by the stirrer, thereby creating a vortex in the bottle and mixing the sample. Pre-cleaned using cleaning protocols provided in KLI SOP for *Cleaning Procedures for Miscellaneous Items Related to NPS Sampling*.

4.4 **Sub-sampling hose**: Two ~3-foot lengths of Teflon tubing connected by a ~2-foot length of silicon tubing. Pre-cleaned using cleaning protocols provided in SOP for *Teflon Sample Hose and Silicon Peristaltic Tubing Cleaning Procedures*. Used with a peristaltic pump to transfer sample water from the 20-L sample bottle to sample analyte containers.

4.6 **Volume-to-Sample Ratio (VSR):** A number that represents the volume of water that will flow past the flow-meter before a sample is taken (usually in liters but can also be in kilo-cubic feet for river deployments). For example, if the VSR is 1000 it means that every time 1000 liters passes

the flow-meter the sampler collects a sample (1000 liters of flow per 1 sample taken). Note: The VSR indicates when a sample should be taken and is NOT an indication of the sample size.

5.0 EQUIPMENT

5.1 Instrumentation: Not applicable

5.2 Reagents: Not applicable.

5.3 Apparatus

1) Large capacity stirrer.

2) Stir bar.

3) Sub-sampling hose.

4) Peristaltic pump.

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APPENDIX C

QUALITY ASSURANCE/QUALITY CONTROL

1. Quality Assurance/Quality Control

Elements of a Quality Assurance and Quality Control (QA/QC) Plan have been incorporated into the CIMP in order to detail critical activities conducted to assure that both chemical and physical measurements meet the standard of quality needed to evaluate measurements at levels relevant to applicable water quality criteria. With many different monitoring programs being implemented within the region, comparability should remain of the primary goals of the QA/QC monitoring program. The Intergovernmental Task Force on Monitoring Water Quality (ITFM, 1995) defines comparability as the "characteristics that allow information from many sources to be of definable or equivalent quality so that it can be used to address program objectives not necessarily related to those for which the data were collected."

One important aspect of comparability is the use of analytical laboratories that are accredited under a program such as the National Environmental Laboratory Accreditation Program (NELAP), California's Environmental Laboratory Accreditation Program (ELAP) or a well-qualified research laboratory. In addition, the laboratory should be a participant in a laboratory proficiency and intercalibration program. Laboratories have not been selected for this program but participation in the Stormwater Monitoring Coalition's (SMC) intercalibration program will be a primary consideration. Unfortunately, the SMC has not fully completed implementation of a program the full range of analyses included in the MRP Table E-2 list.

Evaluation of data quality will be based upon protocols provided in the *National Functional Guidelines for Inorganic Superfund Data Review (USEPA540-R-10-011)* (USEPA 2010), *National Functional Guidelines for Superfund Organic Methods Data Review (EPA540/R-08-01),* and the *Guidance on the Documentation and Evaluation of Trace Metals Data Collected for Clean Water Act Compliance Monitoring (EPA/821/B/95/002)* (USEPA 1996).

The sections that follow address activities associated with both field sampling and laboratory analyses. Quality assurance activities start with procedures designed to assure that errors introduced in the field sampling and subsampling processes are minimized. Field QA/QC samples are collected and used to evaluate potential contamination and sampling error introduced into a sample prior to its submittal to the analytical laboratory. Laboratory QA/QC activities are used to provide information needed to assess potential laboratory contamination, analytical precision and accuracy, and representativeness.

1.1.1 Sample Handling, Containers and Holding Times.

Table **1** provides a summary of the types of sample volumes, container types, preservation and holding times for each analytical method. Analytical methods requiring the same preservation and container types may be transferred to the laboratory in one container in order to minimize handling prior to transfer to the laboratory.

Table 1. Constituents, Sample Container, Preservation and Holding Times.

Analyte	EPA Method Number	Holding Time	Container Size	Container Type	Preservation	Minimum Level/ Resolution	Units
Conventionals							
pH	150.1	15 minutes		glass or PE	none	+/- 0.1	std. units
Oil and Grease	1664A	28 days	1 L	Glass	HCl	5	mg/L
TPH	418.1	28 days	1 L	Glass	HCl	5	mg/L
Total Phenols	420.1	28 days	500mL-1 L	Glass	H_sSO_4	5	mg/L
Cyanide	SM4500-CN-E	14 days	500 mL	HDPE	NaOH	0.003	mg/L
Turbidity	SM2130B	48 hours	100-250mL	Glass	4-6°C	1	NTU
TSS	160.2	7 days	1 L	HDPE	4-6°C	4	mg/L
SSC[1]	ASTMD3977B	7 days	1 L	HDPE	4-6°C	4	mg/L
TDS	160.1	7 days	1 L	HDPE	4-6°C	1	mg/L
VSS	160.4	7 days	1 L	HDPE	4-6°C	1	mg/L
TOC; DOC	415.1	28 days	250 mL	glass	4°C and HCl or H_2SO_4 to pH<2	1	mg/L
BOD_5	SM5210B	48 hours	600mL-1L	HDPE	4-6°C	3	mg/L
COD	410.1	28 days	20-250 mL	Glass	H_sSO_4	4	mg/L
Alkalinity	SM 2320B	Filter ASAP, 14 days	100-250 mL	HDPE	4-6°C	1	mg/L
Conductivity	SM 2510	28 days	100-250 mL	HDPE	4°C; filter if hold time >24 hours	1	µmho/cm
Hardness	130.2	6 months	100-250 mL	HDPE	and HNO_3 or H_2SO_4 to pH<2	1	mg/L
MBAS	425.1	48 hours	250-500 mL	HDPE	4-6°C	0.02	mg/L
Chloride	300	28 days	250-500 mL	HDPE	4-6°C	2	mg/L
Fluoride	300	28 days	250-500 mL	HDPE	4-6°C	0.1	mg/L
Perchlorate	314.0	28 days	100-250 mL	HDPE	4-6°C	4	µg/L
Volatile Organics							
MTBE	624	14 days	3 40mL VOA	Glass	HCl	1	µg/L

Analyte	EPA Method Number	Holding Time	Container Size	Container Type	Preservation	Minimum Level/ Resolution	Units
Bacteria							
Total Coliform	SM9221B	6 hr-8 hr	100 mL	Sterile HDPE	4-6°C	20-2,400,000	MPN/100mL
Fecal Coliform	SM9221B	6 hr-8 hr	100 mL	Sterile HDPE	4-6°C	20-2,400,000	MPN/100mL
Enterococcus	SM9230B or C	6 hr-8 hr	100 mL	Sterile HDPE	4-6°C	20-2,400,000	MPN/100mL
E. coli	SM 9223 COLt	6 hr-8 hr	100 mL	Sterile HDPE	4-6°C	20-2,400,000	MPN/100mL
Nutrients							
TKN	351.1	28 days	500mL-1L	Amber glass	H_sSO_4	0.5	mg/L
Nitrate-N	300	48 hours	50-125mL	HDPE	4-6°C	0.1	mg/L
Nitrite-N	300	48 hours	50-125mL	HDPE	4-6°C	0.05	mg/L
Total Nitrogen	Calculation					NA	mg/L
Ammonia-N	350.1	28 days	500mL-1L	Amber glass	H_sSO_4	0.1	mg/L
Total Phosphorus	SM4500-P,EorF	28 days	100-250 mL	glass	H_sSO_4	0.1	mg/L
Dissolved Phosphorus	SM4500-P,EorF	28 days	100-250 mL	glass	4-6°C	0.1	mg/L
Organic Compounds (pesticides and herbicides)							
Organochlorine Pesticides & PCBs[1]	608 & 8270	7days:40days	1L	Amber glass	4-6°C	0.005-0.5	µg/L
Organophosphate Pesticides	507	14days	1L	Amber glass	$Na_sS_2O_3$ 4-6°C	0.01-1	µg/L
Glyphosate	547	14days	250mL	Amber glass	$Na_sS_2O_3$ 4-6°C	5	µg/L
Chlorinated Acids	515.3	14days	250mL	Amber glass	$Na_sS_2O_3$ 4-6°C		
2,4-D						0.02	µg/L
2,4,5-TP-Silvex						0.2	µg/L
Semivolatile Organic Compounds	625;8270D	7days;40days	1L	Amber glass	4-6°C	0.05-10	µg/L

Metals (Total and Dissolved)

Analyte	EPA Method Number	Holding Time	Container Size	Container Type	Preservation	Minimum Level/ Resolution	Units
Aluminum	200.8	If practical, filter immediately after subsampling. Otherwise filter in laboratory for dissolved fraction and preserve not more than 24 hours after subsampling; 6 months to analysis	250 to500 mL	HDPE	4°C and HNO_3 to pH<2	100	µg/L
Antimony	200.8					0.5	µg/L
Arsenic	200.8					0.5	µg/L
Beryllium	200.8					0.5	µg/L
Cadmium	200.8					0.25	µg/L
Chromium (Total)	200.8					0.5	µg/L
Copper	200.8					0.5	µg/L
Iron	200.8					25	µg/L
Lead	200.8					0.5	µg/L
Nickel	200.8					1	µg/L
Selenium	200.8					1	µg/L
Silver	200.8					0.25	µg/L
Thallium	200.8					0.5	µg/L
Zinc	200.8					1	µg/L
Chromium (Hexavalent)	218.6	Filter as above 24 hours	250 ml	HDPE	4°C	5	µg/L
Mercury	245.1	Filter as above 28 days	250 ml	Glass or Teflon	4°C and HNO3 to pH<2	0.2	µg/L
Mercury	1631E	Filter as above 28 days	250 ml	Glass or Teflon	4°C and HNO3 to pH<2	0.0005	µg/L

Abbreviations

TSS=Total Suspended Solids
SSC=Suspended Sediment Concentration
TDS=Total Dissolved Solids
TPH=Total Petroleum Hydrocarbons
VSS=Volatile Suspended Solids
TOC=Total Organic Carbon
BOD_5=Five-day Biochemical Oxygen Demand
COD=Chemical Oxygen Demand
MBAS=Methylene Blue Active Substances
MTBE= Methyl Tertiary Butyl Ether
TKN=Total Kjeldahl Nitrogen
PCBs=Polychlorinated Biphenyls

1. Monitoring for PCBs will be reported as the summation of aroclors and a minimum of 50 congeners. 54 PCB congeners include: 8, 18, 28, 31, 33, 37, 44, 49, 52, 56, 60, 66, 70, 74, 77, 81, 87, 95, 97, 99, 101, 105, 110, 114, 118, 119, 123, 126, 128, 132, 138, 141, 149, 151, 153, 156, 157, 158, 167, 168, 169, 170, 174, 177, 180, 183, 187, 189, 194, 195, 201, 203, 206, and 209. These include all 41 congeners analyzed in the SCCWRP Bight Program and dominant congeners used to identify the aroclor

1.1.2 Precision, Bias, Accuracy, Representativeness, Completeness, and Comparability

The overall quality of analytical measurements is assessed through evaluation of precision, accuracy/bias, representativeness, comparability and completeness. Precision and accuracy/bias are measured quantitatively. Representativeness and comparability are both assessed qualitatively. Completeness is assessed in both quantitative and qualitative terms. The following sections examine how these measures are typically applied.

1.1.2.1 Precision

Precision provides an assessment of mutual agreement between repeated measurements. These measurements apply to field duplicates, laboratory duplicates, matrix spike duplicates, and laboratory control sample duplicates. Monitoring of precision through the process allows for the evaluation of the consistency of field sampling and laboratory analyses.

The Relative Percent Difference (RPD) will be used to evaluate precision based upon duplicate samples. The RPD is calculated for each pair of data is calculated as:

$$RPD=[(x_1-x_2)*100]/[(x_1+x_2)/2)$$

Where:

x_1=concentration or value of sample 1 of the pair

x_2=concentration or value of sample 2 of the pair

In the case of matrix spike/spike duplicate, RPDs are compared with measurement quality objectives (MQOs) established for the program. MQOs will be established to be consistent with the most current SWAMP objectives in the SWAMP Quality Assurance Project Plan (2008) including the most recent updates as well as consultations with the laboratories performing the analyses. In the case of laboratory or field duplicates, values can often be near or below the established reporting limits. The most current SWAMP guidelines rely upon matrix spike/spike duplicate analyses for organic compounds instead of using laboratory duplicates since one or both values are often below detection limits or are near the detection limits. In such cases, RPDs do not provide useful information.

1.1.2.2 Bias

Bias is the systematic inherent in a method or caused by some artifact or idiosyncrasy of the measurement system. Bias may be either positive or negative and can emanate from a number of different points in the process. Although both positive and negative biases may exist concurrently in the same sample, the net bias is all that can be reasonably addressed in this project. Bias is preferably measured through analysis of spiked samples so that matrix effects are incorporated.

1.1.2.3 Accuracy

Accuracy is a measure of the closeness of a measurement or the average of a number of measurements to the true value. Accuracy includes of a combination of random error as measured by precision and systematic error as measured by bias. An assessment of the accuracy of measurements is based on determining the percent difference between measured values and known or "true" values applied to surrogates, Matrix Spikes (MS), Laboratory Control Samples (LCS) and Standard Reference Materials (SRM). Surrogates and matrix spikes evaluate matrix interferences on analytical performance, while laboratory control samples, standard reference materials and blank spikes (BS) evaluate analytical performance in the absence of matrix effects.

Assessment of the accuracy of measurements is based upon determining the difference between measured values and the true value. This is assessed primarily through analysis of spike recoveries or certified value ranges for SRMs. Spike recoveries are calculated as Percent Recovery according to the following formula:

$$\text{Percent Recovery} = [(t-x)/\alpha]*100\%$$

Where:

t=total concentration found in the spiked sample

x=original concentration in sample prior to spiking, and

α=actual spike concentration added to the sample

1.1.2.4 Representativeness, Comparability and Completeness

Representativeness is the degree to which data accurately and precisely represents the natural environment. For stormwater runoff, representativeness is first evaluated based upon the automated flow-composite sample and the associated hydrograph. To be considered as representative, the autosampler must have effectively triggered to capture initial runoff from the pavement and the composite sample should:

- be comprised of a minimum number of aliquots over the course of the storm event,
- effectively represent the period of peak flow,
- contain flow-weighted aliquots from over 80% of the total runoff volume, and
- demonstrate little or no evidence of "stacking".

Stacking occurs when the sampling volume is set too low and commands back up in the memory of an autosampler causing it to continuously cycle until it catches up with the accumulation of total flow measured by the stormwater monitoring station.

Representativeness is also assessed through the process of splitting or subsampling 20 L composite bottles into individual sample containers being sent to the laboratory. The first subsamples removed from the composite bottle should have the same composition as the last. Subsampling should be conducted in accordance with guidance in the subsampling SOP. This SOP is based upon use of large laboratory magnetic stir plate, an autosampler, and precleaned subsampling hoses to minimize

variability. Sample splitting can introduce a substantial amount of error especially if significant quantities of coarse sediments (greater than 250 µm) represent as significant fraction of the suspended sediments. Use of a USGS Teflon churns or Decaport cone splitter may also be used but would require development of a separate SOP.

Comparability is the measure of confidence with which one dataset can be compared to another. The use of standardized methods of chemical analysis and field sampling and processing are ways of insuring comparability. Application of consistent sampling and processing procedures is necessary for assuring comparability among data sets. Thorough documentation of these procedures, quality assurance activities and a written assessment of data validation and quality are necessary to provide others with the basic elements to evaluate comparability.

Completeness is a measure of the percentage of the data judged valid after comparison with specific validation criteria. This includes data lost through accidental breakage of sample containers or other activities that result in irreparable loss of samples. Implementation of standardized Chain-of-Custody procedures which track samples as they are transferred between custodians is one method of maintaining a high level of completeness.

A high level of completeness is essential to all phases of this study due to the limited number of samples. Of course, the overall goal is to obtain completeness of 100%, however, a realistic data quality indicator of 95% insures an adequate level of data return.

1.1.3 Laboratory Quality Assurance/Quality Control

The quality of analytical data is dependent on the ways in which samples are collected, handled and analyzed. Data Quality Objectives provide the standards against which the data are compared to determine if they meet the quality necessary to be used to address program objectives. Data will be subjected to a thorough verification and validation process designed to evaluate project data quality and determine whether data require qualification.

The three major categories of QA/QC checks are accuracy, precision, and contamination were discussed in the previous section. As a minimum, the laboratory will incorporate analysis of method blanks, and matrix spike/spike duplicates with each analytical batch. Laboratory duplicates will be analyzed for analytical tests where matrix spike/spike duplicate are not analyzed. Use of Certified Reference Materials (CRM) or Standard Reference Materials (SRM) is also recommended as these allow assessment of long term performance of the analytical methods so that representativeness can be assessed. Laboratories often use an internal CRM that is analyzed with each batch to evaluate any potential long-term shift in performance of the analytical procedures. Recommended minimum quality control samples will be based upon SWAMP QAPP (2008) and the associated 2013 Quality Control and Sample Handling Tables for water (http://www.swrcb.ca.gov/water_issues/programs/swamp/mqo.shtml).

1.1.4 Field QA/QC

1.1.4.1 Blanks

A thorough system of blanking is an essential element of monitoring. Much of the blanking processes are performed well in advance of the actual monitoring in order to demonstrate that all equipment expected to contact water is free of contaminants at the detection limits established for the program. Equipment components are cleaned in batches. Subsamples from each cleaning batch are rinsed with Type 1 laboratory blank water and submitted to the laboratory for analysis. If hits are encountered in any cleaning batch, the entire batch is put back through the cleaning and blanking process until satisfactory results are obtained. If contaminants are measured in the blanks, it is often prudent to reexamine the cleaning processes and equipment or materials used in the cleaning process. Equipment requiring blanks and the frequency of blanks is summarized below and in Table 2.

Table 2. Summary of Blanking Requirements for Field Equipment.

System Component	Blanking Frequency
Intake Hose	One per batch
Peristaltic Pump Hose	One per batch[1] or 10% for batches greater than 10
Composite Bottles	One per batch or 10% for batches greater than 10
Subsampling Pump Hose	One per batch or 10% for batches greater than 10
Laboratory Sample Containers	2% of the lot[2] or batch, minimum of one
Capsule Filter Blank[3]	One per batch or 10% for batches greater than 10
Churn/Cone Splitter[4]	When field cleaning is performed, process one blank per session

[1] A batch is a group of samples that are cleaned at the same time and in the same manner.

[2] If decontaminated bottles are sent directly from the manufacturer, the batch would be the lot designated by the manufacturer in their testing of the bottles.

[3] If filtration is performed in the laboratory, the capsule filter blanks would be considered part of laboratory QA/QC.

[4] This is applicable to use of a churn or cone splitter to subsample flow-weighted composite samples into individual containers. Splitting may be performed by the sampling team in a protected, clean area or by the laboratory.

1.1.4.2 Field Duplicates

Composite subsampling duplicates associated with flow-weighted composite samples are often referred to as field duplicates but, in fact, they are subsampling replicates. These replicates help assess combined variability associated with subsampling from the composite container and variability associated with the analytical process. They are evaluated against the same criteria as used for laboratory duplicates.

1.1.5 Equipment Cleaning, Blanking and Tracking

Sample collection, handling, and processing materials can contribute and/or sorb trace elements within the time scales typical for collection, processing and analysis of runoff samples. Sampling artifacts are especially important when measured concentrations that are at or near analytical detection limits (Horowitz 1997). Therefore, great care is required to collect and process samples in a manner that will minimize potential contamination and variability in the sampling process (Breault and Granato 2000).

Sampling conducted to measure dissolved metals and other trace contaminants at levels relevant to EPA water quality criteria requires documentation that all sampling equipment is free of contamination and that the processes used to obtain and handle samples do not introduce contamination. This requires documentation that methods used to collect, process and analyze the samples do not introduce contamination. Documentation for the CIMP includes written procedures provided in Appendix B for cleaning all components of the sampling system, blanking processes necessary to verify that system components and sample handling are not introducing contamination, and a system of tracking deployment of protocol-cleaned equipment in the field as described in this section.

All composite containers and equipment used for sample collection in the field and/or sample storage in the laboratory will be decontaminated and cleaned prior to use. These include the FEP tubing, Teflon® lids, strainers and hoses/fittings that are used in the subsampling process (USGS 1993). Personnel assigned to clean and handle the equipment are thoroughly trained and familiar with the cleaning, blanking, and tracking procedures. In addition, all field sampling staff will be trained to be familiar with these processes so that they have a better understanding of the importance of using clean sampling procedures and the effort required to eliminate sources of contamination.

Sample contamination has long been considered one of the most significant problems associated with measurement of dissolved metals and may be accentuated with use of High Resolution Mass Spectroscopy (HRMS) methods for trace levels of organic constituents at levels three orders of magnitude lower than conventional GCMS methods. One of the major elements of QA/QC documentation is establishing that clean sampling procedures are used throughout the process and that all equipment used to collect and process the water samples are free of contamination.

Cleaning protocols are consistent with ASTM (2008) standard D5088 – 02 that covers cleaning of sampling equipment and sample bottles. The generalized cleaning process is based upon a series of washings that typically start with tap water with a phosphate-free detergent, a tap water rinse, soaking in a 10% solution of reagent grade nitric acid, and a final series of rinses with ASTM Type 1 water. Detailed procedures for decontamination of sampling equipment are provided in Appendix A. In addition, Appendix G of the most recent Caltrans Stormwater Monitoring Guidance Manual (Caltrans, 2013) provides alternative cleaning procedure that incorporate use of methylene chloride to remove potential organic contaminants. Experience indicates that this step can be eliminated and still result in blanking data suitable for most target organic contaminants. Addition of this cleaning step or a comparable step to address organic contaminants may be necessary if satisfactory equipment blanks cannot be attained. Significant issues exist with respect to use of methylene

chloride. This chemical is highly toxic, must be handled and disposed as a hazardous waste and is difficult to fully remove from the 20-L media bottles used as composite containers.

In order to account for any contamination introduced by sampling containers, blanks must be collected for composite bottles and laboratory bottles used for sample storage for trace contaminants. A sampling container blank is prepared by filling a clean container with blank water and measuring the concentrations of selected constituents (typically metals and other trace contaminants for composite bottles and metals analysis only for metals storage bottles). Blanking of the 20-L composite bottles will be performed by using the minimum amount of blank water necessary for the selected analytical tests. This is typically requires one to two liters. The bottle is capped and then manipulated to assure that all surfaces up to the neck of the bottle are rinsed. The water is then be allowed to sit for a minimum of one hour before decanting the rinse water into sample containers. In order to provide adequate control, media bottles are labelled and tracked. All media bottles cleaned and blanked in one batch are tracked to allow for recall if laboratory analyses reveal any contamination. Further tracking is required in the field to document where bottles from each cleaning batch are used and to assist in tracking of any contamination that might be detected after bottles have been deployed since laboratory turnaround in the middle of the storm season may require use of decontaminated bottles prior to receiving the results of the blank analyses.

Selected constituents for blanking will be dependent upon the list of contaminants with reasonable potential to be present at levels that could impact sample results. Minimum parameters used for blank analyses will include total recoverable trace metals, TDS, TOC and nutrients. Analysis of total metals will allow for detection of any residual metal contamination which will be of concern for all sampling. Nutrients, particularly nitrogen compounds, will assure that residual nitrogen from acid cleaning has been fully removed. TDS and TOC are useful for accessing presence of any residual contaminants. Additional blanking may be added when sampling other constituents with ultra-low analytical methods. These blanks may be submitted "blind" to the laboratory by field personnel or prepared internally by the laboratory.

Certified pre-cleaned QC-grade laboratory containers can be used. These bottles are cleaned using acceptable protocol for the intended analysis and tracked by lots. They come with standard certification forms that document the concentration to which the bottles are considered "contaminant-free" but these concentrations are not typically suitable for program reporting limits required for measurement of dissolved metals. Manufacturers may provide an option of certification to specific limits required by a project but it is preferable to purchase the QC bottles that are tracked by lot and conduct internal blanking studies. Lots not meeting project requirements should be returned to the manufacturer and exchanged for containers from another lot. At least 2% of the bottles in any "lot" or "batch" should be blanked at the program detection limits with a minimum frequency of one bottle per batch. A batch is considered to be a group of samples that are cleaned at the same time and in the same manner; or, if decontaminated bottles are sent directly from the manufacturer, the batch would be the lot designated by the manufacturer in their testing of the bottles. Cleaned bottles are stored in a clean area with lids properly secured.

Subsampling hoses consist of a length of peristaltic hose with short lengths of FEP tubing attached to each end. These are required to be cleaned inside and out since the FEP tubing is immersed in the

composite bottle during the subsampling process. Once cleaned, the ends of the subsampling hoses are bagged. All hoses associated with the batch are then stored in large zip-lock containers labeled to identify the cleaning batch. Blanking of subsampling hoses is conducted as part of the composite bottle blanking process. A clean subsampling hose is used to decant blank water from the 20-L composite bottles into clean laboratory containers. Detection of any contaminants in the bottle blanks therefore requires that the subsampling hoses also are subjected another decontamination process. After cleaning, the subsampling hoses should only be handled while wearing clean, powder-free nitrile gloves.

APPENDIX D

NON-STORMWATER IC/ID AND OUTFALL TRACKING

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Operation Procedures	
Illicit Discharge Detection & Elimination: Initial Outfall Screening	
Purpose:	This provides a basic checklist for field crews conducting initial survey of storm drainage system outfalls for use in identification of illicit discharges

Reference: Brown et al., *Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments,* Center for Watershed Protection, Ellicott City, 2004.

Planning Considerations:

- ❑ Employees should have reviewed and understand the information presented in Chapter 11 of the reference manual
- ❑ Inspections are to occur during dry weather (no runoff producing precipitation in last 72 hours)
- ❑ Conduct inspections with at least two staff per crew
- ❑ Conduct inspections during low groundwater (if appropriate).
- ❑ Complete ***Site Info section on Outfall Reconnaissance Inventory Form*** before leaving the office. Additional forms should be available for undocumented outfalls

Field Methods:

- ❑ Ensure outfall is accessible.
- ❑ Inspect outfall only if safe to do so.
- ❑ Characterize the outfall by recording information on the ***LCC Outfall Reconnaissance Inventory Form.***
- ❑ Photograph the outfall with a digital camera (use dry erase board to identify outfall).
- ❑ Enter flow information on form if dry weather flow is present and ***easily*** obtained. If not, provide rough estimate of flow.
- ❑ Document clean, dry outfalls for potential elimination during future screening programs.
- ❑ Water samples will not be collected during the initial survey. In-situ measurements of temperature, conductivity, and pH should be taken if significant flow is present.
- ❑ Do not enter private property without permission.
- ❑ Photograph each site with the site identification written on the dry erase board.

Equipment List:

1. System map
2. Outfall Reconnaissance Inventory Forms
3. City identification or business cards
4. Digital camera (spare batteries)
5. Cell phone
6. GPS unit
7. Clip board and pencils
8. Dry erase board and pens
9. Hand Mirror
10. Flashlight (spare batteries)
11. Disposable gloves
12. Folding wood ruler or comparable
13. Temperature, Conductivity probe
14. pH probe/strips
15. ***Ammonia test strips***
16. ***Ten1-liter (polyethylene) sample bottles***
17. Watch with second hand
18. Calculator
19. Hand sanitizer
20. Safety vests
21. First aid kit
22. ***Cooler***
23. Permanent marker

Bolded, italicized items will only be needed for later surveys. No water quality samples will be taken for laboratory analysis during the first survey.

LOS CERRITOS CHANNEL OUTFALL RECONNAISSANCE INVENTORY/ SAMPLE COLLECTION FIELD SHEET

Section 1: Background Data

Subbasin:		Outfall ID:	
Today's date:		Time (Military):	
Investigators:		Form completed by:	
Temperature (°F):	Rainfall (in.): Last 24 hours: Last 48 hours:		
Latitude:	Longitude:	GPS Unit:	GPS LMK #:
Camera:		Photo #s:	

Land Use in Drainage Area (Check all that apply):

☐ Industrial ☐ Open Space

☐ Ultra-Urban Residential ☐ Institutional

☐ Suburban Residential Other: _____

☐ Commercial Known Industries: _____

Notes (e.g.., origin of outfall, if known):

Section 2: Outfall Description

LOCATION	MATERIAL	SHAPE		DIMENSIONS (IN.)	SUBMERGED
☐ **Closed Pipe**	☐ RCP ☐ CMP ☐ PVC ☐ HDPE ☐ Steel ☐ Other: _____	☐ Circular ☐ Elliptical ☐ Box ☐ Other: _____	☐ Single ☐ Double ☐ Triple ☐ Other: _____	Diameter/Dimensions: _____	In Water: ☐ No ☐ Partially ☐ Fully With Sediment: ☐ No ☐ Partially ☐ Fully
☐ **Open drainage**	☐ Concrete ☐ Earthen ☐ rip-rap ☐ Other: _____	☐ Trapezoid ☐ Parabolic ☐ Other: _____		Depth: _____ Top Width: _____ Bottom Width: _____	
☐ **In-Stream**	**(applicable when collecting samples)**				
Flow Present?	☐ Yes ☐ No	***If No, Skip to Section 5***			
Flow Description (If present)	☐ Trickle ☐ Moderate ☐ Substantial				

Section 3: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS				
PARAMETER		**RESULT**	**UNIT**	**EQUIPMENT**
☐Flow #1	Volume		Liter	Bottle
	Time to fill		Sec	
☐Flow #2	Flow depth		In	Tape measure
	Flow width	____' ____"	Ft, In	Tape measure
	Measured length	____' ____"	Ft, In	Tape measure
	Time of travel		S	Stop watch
Temperature			°F	Meter
pH			pH Units	Meter
Ammonia			mg/L	Test strip

Los Cerritos Channel Outfall Reconnaissance Inventory Field Sheet

Section 4: Physical Indicators for Flowing Outfalls Only

Are Any Physical Indicators Present in the flow? ☐ Yes ☐ No *(If No, Skip to Section 5)*

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (1-3)		
Odor	☐	☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas ☐ Sulfide ☐ Other:	☐ 1 – Faint	☐ 2 – Easily detected	☐ 3 – Noticeable from a distance
Color	☐	☐ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other:	☐ 1 – Faint colors in sample bottle	☐ 2 – Clearly visible in sample bottle	☐ 3 – Clearly visible in outfall flow
Turbidity	☐	See severity	☐ 1 – Slight cloudiness	☐ 2 – Cloudy	☐ 3 – Opaque
Floatables -Does Not Include Trash!!	☐	☐ Sewage (Toilet Paper, etc.) ☐ Suds ☐ Petroleum (oil sheen) ☐ Other:	☐ 1 – Few/slight; origin not obvious	☐ 2 – Some; indications of origin (e.g., possible suds or oil sheen)	☐ 3 - Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls

Are physical indicators that are not related to flow present? ☐ Yes ☐ No *(If No, Skip to Section 6)*

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
Outfall Damage	☐	☐ Spalling, Cracking or Chipping ☐ Peeling Paint ☐ Corrosion	
Deposits/Stains	☐	☐ Oily ☐ Flow Line ☐ Paint ☐ Other:	
Abnormal Vegetation	☐	☐ Excessive ☐ Inhibited	
Poor pool quality	☐	☐ Odors ☐ Colors ☐ Floatables ☐ Oil Sheen ☐ Suds ☐ Excessive Algae ☐ Other:	
Pipe benthic growth	☐	☐ Brown ☐ Orange ☐ Green ☐ Other:	

Section 6: Overall Outfall Characterization

☐ Unlikely ☐ Potential (presence of two or more indicators) ☐ Suspect (one or more indicators with a severity of 3) ☐ Obvious

Section 7: Data Collection

1. Sample for the lab?	☐ Yes	☐ No	
2. If yes, collected from:	☐ Flow	☐ Pool	
3. Intermittent flow trap set?	☐ Yes	☐ No	If Yes, type: ☐ OBM ☐ Caulk dam

Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)?

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APPENDIX E

MAJOR AND MINOR OUTFALLS TO THE LOS CERRITOS CHANNEL WATERSHED

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Major Outfalls (=>36 inches) in the Los Cerritos Channel Watershed

LDISCHARGE POINT	DESCRIPTION	DISCHARGE POINT LATITUDE	DISCHARGE POINT LONGITUDE	OWNER	SIDE (R/L)	DISTANCE FROM CHANNEL STARTING POINT (km)	JURISDICTION	MODEL SUB WATERSHED	UNIQUE ID	PHOTO UNIQUE ID	CHANNEL UNIQUE ID
CLARK CHANNEL											
N. Charlemagne Ave/E. Pageantry St	36" Discharge	33.81315	-118.12997	Long Beach	R	1.925	Long Beach	BI9A-5	BI9A-5-001		CC-0.273
N. Rutgers Ave/E. Pageantry St	36" Discharge	33.81317	-118.12970	Long Beach	L	1.927	Long Beach	BI9A-5	BI9A-5-002		CC-0.275
N Charlemagne Ave/E. Mezzanine Way	72" Discharge	33.81519	-118.12998	Long Beach	R	2.141	Long Beach	BI9A-5	BI9A-5-003		CC-0.494
N Rutgers Ave/E. Mezzanine Way	54" Discharge	33.81519	-118.12971	Long Beach	L	2.152	Long Beach	BI9A-5	BI9A-5-004		CC-0.507
3343 Rutgers Ave/E. Wardlow Rd	36" Discharge	33.81791	-118.12970	UNK	L	2.449	Long Beach	BI9A-5	BI9A-5-005		CC-0.793
N. Charlemagne Ave/E. Wardlow Rd	42" Discharge	33.81870	-118.12997	LACFCD	R	2.528	Long Beach	BI9A-5	BI9A-5-006		CC-0.877B
N. Rutgers Ave/E. Wardlow Rd	42" Discharge	33.81869	-118.12971	LACFCD	L	2.528	Long Beach	BI9A-5	BI9A-5-007		CC-0.877A
N. Charlemagne/E. Monlaco Rd	150" Discharge	33.82273	-118.12977	LACFCD	R	2.993	Long Beach	BI9A-5	BI9A-5-015		CC-1.342
N. Rutgers Ave/E. Keynote St	63" Discharge	33.82355	-118.12967	LACFCD	L	3.070	Long Beach	BI9A-4	BI9A-4-001		CC-1.419
E. Conant St/N. Charlemagne Ave	39" Discharge	33.82505	-118.12990	LACFCD	R	3.238	Long Beach	BI9A-4	BI9A-4-002		CC-1.586
Carson St/N. Bellflower Blvd	63" Discharge	33.83124	-118.13056	LACFCD	L	3.960	Long Beach	BI9A-4	BI9A-4-007		CC-2.309

Carson St/N. Greenbrier Rd	48" Discharge	33.83215	-118.13235	LACFCD	R	4.164	Long Beach	BI9A-4	BI9A-4-008		CC-2.512
Carson St/N. Greenbrier Rd	45" Discharge	33.83233	-118.13233	LACFCD	R	4.206	Long Beach	BI9A-4	BI9A-4-011		CC-2.555
Harvey Way/N. Greenbrier Rd	51" Discharge	33.83612	-118.13233	LACFCD	R	4.599	Long Beach	BI9A-4	BI9A-4-016		CC-2.948
Harvey Way/Heather Rd	81" Discharge	33.83613	-118.13205	LACFCD	L	4.602	Long Beach	BI9A-4	BI9A-4-017		CC-2.950
E. Centralia St/N. Greenbrier Rd	42" Discharge	33.83954	-118.13225	LACFCD	R	4.976	Long Beach	BI9A-3	BI9A-3-001		CC-3.324A
E. Centralia St/Heather Rd	42" Discharge	33.83951	-118.13206	LACFCD	L	4.976	Long Beach	BI9A-3	BI9A-3-002		CC-3.324B
E. Arbor Rd/Clark Ave	36" Discharge	33.84300	-118.13226	LACFCD	R	5.348	Long Beach	BI9A-3	BI9A-3-007		CC-3.696
E. Arbor Rd/Clark Ave	39" Discharge	33.84297	-118.13225	LACFCD	R	5.357	Long Beach	BI9A-3	BI9A-3-008		CC-3.705
4763 Fidler Ave/Del Amo Blvd	36" Discharge	33.84500	-118.13203	Long Beach	L	5.586	Long Beach	BI9A-3	BI9A-3-011		CC-3.934
Del Amo Blvd/Fidler Ave	138" Discharge	33.84697	-118.13223	LACFCD	C	5.807	Lakewood	BI9A-3	BI9A-3-014		CC-4.155
Civic Center/Clark Ave	36" Discharge	33.84922	-118.13228	LACFCD	R	6.052	Lakewood	BI9A-2	BI9A-2-002		CC-4.413
Candlewood St/Fidler Ave	57" Discharge	33.85360	-118.13219	LACFCD	L	6.521	Lakewood	BI9A-2	BI9A-2-009		CC-4.882
Candlewood St/Fidler Ave	126" Discharge	33.85379	-118.13221	LACFCD		6.586	Lakewood	BI9A-1	BI9A-1-002		CC-4.916
Candlewood St/Clark Ave	72" Discharge	33.85442	-118.13226	LACFCD	R	6.625	Lakewood	BI9A-1	BI9A-1-003		CC-4.986
5443 Fidler Ave/Michelson St	36" Discharge	33.85618	-118.13213	LACFCD	L	6.818	Lakewood	BI9A-1	BI9A-1-008	BI9A-1-007	CC-5.179
Clark Ave/Michelson St	126" Discharge	33.85684	-118.13225	LACFCD		6.889	Lakewood	BI9A-1	BI9A-1-010		CC-5.250
South St/Fidler Ave	39" Discharge	33.86017	-118.13219	LACFCD	L	7.255	Lakewood	BI9A-1	BI9A-1-013		CC-5.616A

South St/Dagwood Ave	57" Discharge	33.86017	-118.13232	LACFCD	R	7.255	Lakewood	BI9A-1	BI9A-1-014		CC-5.616B
											CC-5.652
South St/Dagwood Ave	132" Discharge	33.86046	-118.13225	LACFCD	C	7.290	Lakewood	BI9A-1	BI9A-1-017		CC-5.651
Hedda St/Fidler Ave	39" Discharge	33.86411	-118.13232	LACFCD	L	7.696	Lakewood	BI9A-1	BI9A-1-018		CC-6.057B
Hedda St/Fidler Ave	39" Discharge	33.86409	-118.13234	LACFCD	R	7.696	Lakewood	BI9A-1	BI9A-1-019		CC-6.057A
Ashworth St/Fidler Ave	75" Discharge	33.86780	-118.13235	LACFCD	R	8.109	Lakewood	BI9A-1	BI9A-1-022		CC-6.469
Ashworth St/Fidler Ave	132" Discharge	33.86836	-118.13233	Lakewood	L	8.162	Lakewood	BI9A-1	BI9A-1-025		CC-6.522
Clark Ave/Ashworth St	87" Discharge	33.86848	-118.13355	LACFCD		8.282	Lakewood	BI9A-1	BI9A-1-026		CC-6.643
DEL AMO CHANNEL											
Del Amo Blvd/Whitewood Ave	36" Discharge	33.84696	-118.13552	UNK	L	0.286	Lakewood	BI9B-2	BI9B-2-003	BI9B-2-003	DAC-0.331
Del Amo Blvd/Faculty Ave	36" Discharge	33.84696	-118.13695	LACFCD	L	0.421	Lakewood	BI9B-2	BI9B-2-004	BI9B-2-004	DAC-0.466
Del Amo Blvd/Graywood Ave	42" Discharge	33.84698	-118.13783	LACFCD	L	0.508	Lakewood	BI9B-2	BI9B-2-005	BI9B-2-005	DAC-0.554
Del Amo Blvd/Graywood Ave	36" Discharge	33.84699	-118.13797	LACFCD	L	0.516	Lakewood	BI9B-2	BI9B-2-006	BI9B-2-005	DAC-0.561
Del Amo Blvd/Hazelbrook Ave	36" Discharge	33.84694	-118.19539	LACFCD	L	0.664	Lakewood	BI9B-2	BI9B-2-010	BI9B-2-010	DAC-0.709
Del Amo Blvd/Blackthorne Ave	36" Discharge	33.84697	-118.14041	LACFCD	R	0.737	Lakewood	BI9B-2	BI9B-2-011	BI9B-2-011	DAC-0.782

Del Amo Blvd/N. Blackthorne Ave	18" Discharge	33.84698	-118.14024	LACFCD	L	0.7388	Lakewood	BI9B-2	BI9B-2-012		DAC-0.784
Del Amo Blvd/N. Pepperwood Ave	36" Discharge	33.84699	-118.14126	LACFCD	L	0.820	Lakewood	BI9B-2	BI9B-2-014	BI9B-2-014	DAC-0.865
Del Amo Blvd/Lakewood Blvd	36" Discharge	33.84701	-118.14200	LACFCD	L	0.902	Lakewood	BI9B-2	BI9B-2-016	BI9B-2-016	DAC-0.947
Del Amo Blvd/Lakewood Blvd	45" Discharge	33.84699	-118.14226	LACFCD	L	0.917	Lakewood	BI9B-2	BI9B-2-018	BI9B-2-018	DAC-0.963
Del Amo Blvd/Lakewood Blvd	36" Discharge	33.84700	-118.14255	UNK	L	1.960	Lakewood	BI9B-2	BI9B-2-020	BI9B-2-020	DAC-1.004
Del Amo Blvd/Hayter Ave	48" Discharge	33.84702	-118.14598	LACFCD	L	1.253	Lakewood	BI9B-2	BI9B-2-024	BI9B-2-024	DAC-1.253
Del Amo Blvd/Hayter Ave	45" Discharge	33.84684	-118.14629	LACFCD	R	1.289	Lakewood	BI9B-2	BI9B-2-027	BI9B-2-027	DAC-1.334B
Del Amo Blvd/Downey Ave	48" Discharge	33.84703	-118.15051	LACFCD	R	1.666	Lakewood	BI9B-2	BI9B-2-029	BI9B-2-029	DAC-1.711
Downey Ave/Eckleson St	114" Discharge	33.84884	-118.15047	LACFCD		1.911	Lakewood	BI9B-2	BI9B-2-032		DAC-1.911
DOWNEY CHANNEL											
Candlewood St/Downey Ave	42" Discharge	33.853717	-118.150524	UNK	R	0.551	Lakewood	BI447A	BI447A-003	BI447A-003	DNC-0.5514
Candlewood St/Downey Ave	42" Discharge	33.854243	-118.150513	UNK	R	0.609	Lakewood	BI447A	BI447A-005	BI447-005	DNC-0.6093
Candlewood St/Downey Ave	42" Discharge	33.854297	-118.150527	Lakewood	R	0.618	Lakewood	BI447A	BI447A-006	BI447A-006	DNC-0.618
Candlewood St/Downey Ave	72" Discharge	33.854368	-118.150421	Lakewood	L	0.624	Lakewood	BI447A	BI447A-007	BI447A-007	DNC-0.624
Saint Pancratius Pl/Verdura Ave	117" Discharge	33.858402	-118.150459	Lakewood	L	1.072	Lakewood	BI447A	BI447A-008		DNC-1.072B

Saint Pancratius Pl/Verdura Ave	117" Discharge	33.858405	-118.15051	Lakewood	R	1.072	Lakewood	BI447A	BI447A-009		DNC-1.072A
Candlewood St/Downey Ave	72" Discharge	33.854382	-118.15029	Lakewood		0.633	Lakewood	BI447A	BI447A-010		DNC-0.796
Obispo Ave/Eckleson St	36" Discharge	33.849078	-118.154687	LACFCD	R	2.332	Lakewood	BI9B-1	BI9B-1-004		DNC-2.332
Obispo Ave/Eckleson St	60" Discharge	33.849074	-118.154747	LACFCD	R	2.336	Lakewood	BI9B-1	BI9B-1-005		DNC-2.336
Obispo Ave/Eckleson St	36" Discharge	33.849083	-118.154825	UNK	R	2.347	Lakewood	BI9B-1	BI9B-1-006		DNC-2.347
Obispo Ave/Eckleson St	48" Discharge	33.849183	-118.154825	UNK	L	2.347	Lakewood	BI9B-1	BI9B-1-007		DNC-2.347
Paramount Blvd/Eckleson St	66" Discharge	33.849146	-118.159614	LACFCD	L	2.804	Lakewood	BI9B-1	BI9B-1-008	BI9B-1-008	DNC-2.804A
Paramount Blvd/Eckleson St	66" Discharge	33.849096	-118.159614	LACFCD	R	2.804	Lakewood	BI9B-1	BI9B-1-009	BI9B-1-008	DNC-2.804B
LOS CERRITOS CHANNEL											
Knoxville Ave/E. Atherton St	36" Discharge (1 of 3)	33.78867	-118.10368	Long Beach	R	7.386	Long Beach	LCERR-5	LCERR-5-003		LCC-0.030
Knoxville Ave/E. Atherton St	36" Discharge (2 of 3)	33.78884	-118.10370	Long Beach	R	7.386	Long Beach	LCERR-5	LCERR-5-004		LCC-0.031
Knoxville Ave/E. Atherton St	36" Discharge (3 of 3)	33.78902	-118.10369	Long Beach	R	7.387	Long Beach	LCERR-5	LCERR-5-005		LCC-0.032
Vuelta Grande Ave/E. Atherton St	42" Discharge	33.78917	-118.10331	Long Beach	L	7.417	Long Beach	LCERR-5	LCERR-5-006		LCC-0.062
2040 Knoxville Ave	48" Discharge (1 of 3)	33.79319	-118.10369	LACFCD	R	7.876	Long Beach	LCERR-5	LCERR-5-007		LCC-0.521
2040 Knoxville Ave	48" Discharge (2 of 3)	33.79336	-118.10368	LACFCD	R	7.877	Long Beach	LCERR-5	LCERR-5-008		LCC-0.522

2040 Knoxville Ave	48" Discharge (3 of 3)	33.79356	-118.10369	LACFCD	R	7.878	Long Beach	LCERR-5	LCERR-5-009		LCC-0.523
Vuelta Grande Ave/N. Hidden Ln	42" Discharge	33.79304	-118.10333	LACFCD	L	7.899	Long Beach	LCERR-5	LCERR-5-010		LCC-0.544
Vuelta Grande Ave/E. Stearns St	48" Discharge	33.79565	-118.10330	LACFCD	L	8.135	Long Beach	LCERR-4	LCERR-4-001		LCC-0.780
Vuelta Grande Ave/E. la Marimba St	36" Discharge	33.79793	-118.10332	Long Beach	L	8.387	Long Beach	LCERR-4	LCERR-4-004		LCC-1.032
2372 Knoxville Ave/E. Cantel St	36" Discharge	33.80000	-118.10472	Long Beach	R	8.682	Long Beach	LCERR-4	LCERR-4-007		LCC-1.327
6400 Willow St/Palo Verde Ave	42" Discharge	33.80262	-118.10779	Long Beach	L	9.071	Long Beach	LCERR-4	LCERR-4-008		LCC-1.716
6220 Willow St/Palo Verde Ave	48" Discharge	33.80304	-118.10890	PVRT	R	9.181	Long Beach	LCERR-4	LCERR-4-009		LCC-1.826
Spring St/San Anseline Ave	66" Discharge	33.81035	-118.12130	LACFCD	L	0.725	Long Beach	LCERR-3	LCERR-3-002		LCC-3.388
Spring St/Bellflower Blvd	36" Discharge	33.81043	-118.12552	LACFCD	L	1.115	Long Beach	LCERR-3	LCERR-3-006		LCC-3.778
Spring St/Montair Ave	45" Discharge	33.81014	-118.12680	Long Beach	R	1.230	Long Beach	LCERR-3	LCERR-3-009		LCC-3.892
Heather Rd/Spring St	45" Discharge	33.81026	-118.13101	UNK	R	0.135	Long Beach	LCERR-2	LCERR-2-002		LCC-4.301A
Clark Ave/Spring St	96" Discharge	33.81034	-118.13376	LACFCD	C	0.392	Long Beach	LCERR-2	LCERR-2-004		LCC-4.558

N. Lakewood Blvd/E. Spring St	96" Discharge	33.81303	-118.13950	LACFCD		1.077	Long Beach	LCERR-2	LCERR-2-007		LCC-5.221
Lakewood Blvd/Spring St	36" Discharge	33.81306	-118.13949	LACFCD	L	1.045	Long Beach	LCERR-2	LCERR-2-005		LCC-5.229
Spring St/Lakewood Blvd	54" Discharge	33.81313	-118.14033	LACFCD	R	1.135	Long Beach	LCERR-2	LCERR-2-006		LCC-5.319
Spring St/Lakewood Blvd	108" Discharge	33.81316	-118.14235	LACFCD	L	1.322	Long Beach	LCERR-1	LCERR-1-001		LCC-5.506
Spring St/Lakewood Blvd	120" Discharge	33.81288	-118.14249	LACFCD	R	1.341	Long Beach	LCERR-1	LCERR-1-002		LCC-5.525
WARDLOW CHANNEL											
Clark Ave/Keynote St	228" Discharge	33.82331	-118.13408	LACFCD		5.885	Long Beach	BI9C	BI9C-001		WC-5.883
Lakewood Blvd	36" Discharge	33.82333	-118.13822	LACFCD	L	6.194	Long Beach	BI9C	BI9C-004		WC-6.264
Lakewood Blvd	42" Discharge	33.82332	-118.14130	LACFCD	L	6.482	Long Beach	BI9C	BI9C-005		WC-6.555
Lakewood Blvd	228" Discharge	33.82332	-118.14165	LACFCD		6.520	Long Beach	BI9A-5	BI9A-5-017		WC-6.586
PALO VERDE CHANNEL											
WOODRUFF AVE / SPRING ST	54" Discharge	33.81090	-118.11427	Long Beach	R	0.430	Long Beach	BI9E-2	BI9E-2-006		PVC-0.430
3055 SHADYPARK DR/McNab Ave	36" Discharge	33.81224	-118.11410	Long Beach	L	0.584	Long Beach	BI9E-2	BI9E-2-007		PVC-0.584

LOS CERRITOS DRAIN LINE E / LOS COYOTES DIA/E.Pagentry St	36" Discharge (1 of 2)	33.81329	-118.11409	LACFCD	R	0.723	Long Beach	BI9E-2	BI9E-2-009		PVC-0.723
LOS CERRITOS DRAIN LINE E / LOS COYOTES DIA/E.Pagentry St	36" Discharge (2 of 2)	33.81359	-118.11407	LACFCD	R	0.727	Long Beach	BI9E-2	BI9E-2-010		PVC-0.727
LOS COYOTES DIA / GONDAR AVE	48" Discharge	33.81550	-118.11258	LACFCD	R	0.987	Long Beach	BI9E-2	BI9E-2-014		PVC-0.987
6228 WARDLOW RD/Los Coyotes Dia W	36" Discharge	33.81864	-118.10980	Long Beach	R	1.426	Long Beach	BI9E-2	BI9E-2-016		PVC-1.426
Los Coyotes Dia/Conquista Ave	42" Discharge	33.82054	-118.10802	Long Beach	L	1.684	Long Beach	BI9E-2	BI9E-2-019		PVC-1.684
PALO VERDE AVE / LOS COYOTES DIA	36" Discharge (1 of 2)	33.82110	-118.10793	LACFCD	L	1.748	Long Beach	BI9E-2	BI9E-2-021		PVC-1.747
PALO VERDE AVE / LOS COYOTES DIA	36" Discharge (2 of 2)	33.82110	-118.10793	LACFCD	L	1.748	Long Beach	BI9E-2	BI9E-2-022		PVC-1.748
3778 PALO VERDE AVE/Harco St	36" Discharge	33.82715	-118.10795	LACFCD	L	2.434	Long Beach	BI9E-2	BI9E-2-026		PVC-2.434
3788 CONQUISTA AVE/Harco St	48" Discharge	33.82758	-118.10811	LACFCD	R	2.470	LA County(LBC-254)	BI9E-2	BI9E-2-027		PVC-2.470
Palo Verde Ave/E. Parkcrest St	72" Discharge	33.83025	-118.10793	LACFCD	L	2.778	Los Angeles County	BI9E-2	BI9E-2-028		PVC-2.778A
	72" Discharge	33.83026	-118.10793	LACFCD	L	2.7779	Los Angeles County	BI9E-2	BI9E-2-029		PVC-2.778B
Carson St/Palo Verde Ave	48" Discharge	33.83232	-118.10832	Long Beach	L	3.008	Long Beach	BI9E-1	BI9E-1-034		PVC-3.008
Harvey Way/Palo Verde Ave	36" Discharge	33.83585	-118.10829	LACFCD	L	3.418	Lakewood	BI9E-1	BI9E-1-006	BI9E-1-006	PVC-3.417
Harvey Way/Palo Verde Ave	36" Discharge	33.83592	-118.10840	LACFCD	R	3.418	Lakewood	BI9E-1	BI9E-1-007	BI9E-1-007	PVC-3.418

Harvey Way/Palo Verde Ave	36" Discharge	33.83613	-118.10839	LACFCD	R	3.438	Lakewood	BI9E-1	BI9E-1-008	BI9E-1-008	PVC-3.437
Centralia St/Palo Verde Ave	48" Discharge	33.83948	-118.10822	LACFCD	L	3.827	Lakewood	BI9E-1	BI9E-1-013	BI9E-1-013	PVC-3.827
Henrilee Lateral/Conquista Ave	6'x7' Trap Channel Discharge	33.84132	-118.10834	LACFCD	R	4.017	Lakewood	BI9E-1	BI9E-1-032	BI9E-1-032	PVC-4.017
Turnergrove Dr/Silva St	48" Discharge (1 of 2)	33.84822	-118.10873	LACFCD	R	4.793	Lakewood	BI9E-1	BI9E-1-025	BI9E-1-025	PVC-4.793
Turnergrove Dr/Silva St	48" Discharge (2 of 2)	33.84824	-118.10873	LACFCD	R	4.795	Lakewood	BI9E-1	BI9E-1-026	BI9E-1-025	PVC-4.795
Palo Verde Ave/Carfax Ave	48" Discharge	33.84925	-118.10918	LACFCD	L	4.905	Lakewood	BI9E-1	BI9E-1-027	BI9E-1-027	PVC-4.905
Candlewood St/Carfax Ave	51" Discharge	33.85309	-118.11127	LACFCD	L	5.368	Lakewood	BI9E-1	BI9E-1-030	BI9E-1-030	PVC-5.368
Candlewood St/Carfax Ave	54" Discharge	33.85313	-118.11142	LACFCD	R	5.374	Lakewood	BI9E-1	BI9E-1-031	BI9E-1-031	PVC-5.374
South St/Canehill Ave	63" Discharge	33.85820	-118.11151	LACFCD	L	5.960	Lakewood	BI446B	BI446B-004	BI446B-004	PVC-5.960
South St/Canehill Ave	42" Discharge	33.85854	-118.11148	LACFCD	L	6.004	Lakewood	BI446B	BI446B-007	BI446B-007	PVC-6.004
Snowden Ave/Charlwood St	36" Discharge	33.85921	-118.11171	LACFCD	R	6.080	Lakewood	BI446B	BI446B-008	BI446B-000	PVC-6.080
Allington St/Canehill Ave	72" Discharge	33.86546	-118.11160	LACFCD	L	6.792	Lakewood	BI446B	BI446B-011	BI446B-011	PVC-6.793B
Allington St/Canehill Ave	75" Discharge	33.86546	-118.11161	LACFCD	R	6.792	Lakewood	BI446B	BI446B-012	BI446B-011	PVC-6.793A

Minor Outfalls (12-36 inches) in the Los Cerritos Channel Watershed

DISCHARGE POINT	EFFLUENT DESCRIPTION	DISCHARGE POINT LATITUDE	DISCHARGE POINT LONGITUDE	OWNER	SIDE (L/R)	DISTANCE FROM CHANNEL STARTING POINT (km)	JURISDICTION	MODEL SUB WATERSHED	UNIQUE ID	PHOTO UNIQUE ID	CHANNEL UNIQUE ID
CLARK CHANNEL											
Charlemagne Ave/Spring St	24" Discharge	33.81081	-118.13000	LACFCD	R	1.662	Long Beach	LCERR-3	LCERR-3-011		CC-0.009A
Rutgers Ave/Spring St	18" Discharge	33.81079	-118.12973	LACFCD	L	1.662	Long Beach	LCERR-3	LCERR-3-012		CC-0.009B
N. Charlemagne Ave/E. Wardlow Rd	18" Discharge	33.81895	-118.12994	Long Beach	R	2.565	Long Beach	BI9A-5	BI9A-5-008		CC-0.914B
E. Wardlow Rd/N. Rutgers Ave	18" Discharge	33.81897	-118.12970	Long Beach	L	2.565	Long Beach	BI9A-5	BI9A-5-009		CC-0.914A
Stanbridge Ave/E. Wardlow Rd	24" Discharge	33.81936	-118.12971	LACFCD	L	2.612	Long Beach	BI9A-5	BI9A-5-010		CC-0.961
E. Monlaco Rd/N. Rutgers Ave	18" Discharge	33.82216	-118.12968	Long Beach	L	2.924	Long Beach	BI9A-5	BI9A-5-012		CC-1.273
E. Monlaco Rd/N. Rutgers Ave	18" Discharge	33.82236	-118.12967	Long Beach	L	2.941	Long Beach	BI9A-5	BI9A-5-013		CC-1.290A
E. Monlaco Rd/N. Charlemagne Ave	18" Discharge	33.82233	-118.12995	Long Beach	R	2.941	Long Beach	BI9A-5	BI9A-5-014		CC-1.290B
E. Conant St/N. Charlemagne Ave	15" Discharge	33.82498	-118.12992	Long Beach	R	3.239	Long Beach	BI9A-4	BI9A-4-003		CC-1.587
E. Conant St/N. Charlemagne Ave	15" Discharge	33.82517	-118.12992	Long Beach	R	3.256	Long Beach	BI9A-4	BI9A-4-004		CC-1.605
N. Charlemagne Ave/E. Brittain St	24" Discharge	33.82604	-118.12991	Long Beach	R	3.354	Long Beach	BI9A-4	BI9A-4-005		CC-1.703
Carson St/N. Bellflower Blvd	12" Discharge	33.83070	-118.12970	LACFCD	L	3.865	Long Beach	BI9A-4	BI9A-4-006		CC-2.214
Carson St/N. Greenbrier Rd	24" Discharge	33.83223	-118.13231	Long Beach	R	4.168	Long Beach	BI9A-4	BI9A-4-009		CC-2.517A
Carson St/Heather Rd	24" Discharge	33.83223	-118.13210	Long Beach	L	4.168	Long Beach	BI9A-4	BI9A-4-010		CC-2.517B
Carson St/N. Greenbrier Rd	24" Discharge	33.83246	-118.13231	Long Beach	R	4.211	Long Beach	BI9A-4	BI9A-4-012		CC-2.560A
Carson St/Heather Rd	24" Discharge	33.83246	-118.13209	Long Beach	L	4.211	Long Beach	BI9A-4	BI9A-4-013		CC-2.560B
Harvey Way/Heather Rd	18" Discharge	33.83606	-118.13204	Long Beach	L	4.598	Long Beach	BI9A-4	BI9A-4-014		CC-2.947A

Harvey Way/Heather Rd	18" Discharge	33.83606	-118.13232	Long Beach	R	4.598	Long Beach	BI9A-4	BI9A-4-015		CC-2.947B
Harvey Way/N. Greenbrier Rd	18" Discharge	33.83620	-118.13231	Long Beach	R	4.610	Long Beach	BI9A-4	BI9A-4-018		CC-2.958A
Harvey Way/Heather Rd	18" Discharge	33.83620	-118.13205	Long Beach	L	4.610	Long Beach	BI9A-4	BI9A-4-019		CC-2.958B
E. Centralia St/N. Greenbrier Rd	18" Discharge	33.83969	-118.13227	Long Beach	R	4.994	Long Beach	BI9A-3	BI9A-3-003		CC-3.342A
E. Centralia St/Heather Rd	18" Discharge	33.83967	-118.13203	Long Beach	L	4.994	Long Beach	BI9A-3	BI9A-3-004		CC-3.342B
E. Centralia St/Pan American Park	15" Discharge	33.84087	-118.13202	Long Beach	L	5.129	Long Beach	BI9A-3	BI9A-3-005		CC-3.477
E. Arbor Rd/Pan American Park	15" Discharge	33.84154	-118.13203	Long Beach	L	5.205	Long Beach	BI9A-3	BI9A-3-006		CC-3.554
E. Arbor Rd/N. Charlemagne	24" Discharge	33.84312	-118.13202	Long Beach	L	5.379	Long Beach	BI9A-3	BI9A-3-009		CC-3.728
E. Arbor Rd./Fidler Ave	30" Discharge	33.84351	-118.13202	Long Beach	L	5.416	Long Beach	BI9A-3	BI9A-3-010		CC-3.764
Del Amo Blvd/Fidler Ave	33" Discharge	33.84693	-118.13217	LACFCD	L	5.801	Lakewood	BI9A-3	BI9A-3-012	BI9A-3-012	CC-4.149
Del Amo Blvd/Fidler Ave	18" Discharge	33.84701	-118.13216	UNK	L	5.802	Lakewood	BI9A-3	BI9A-3-013	BI9A-3-013	CC-4.150
Del Amo Blvd/Civic Center Way	30" Discharge	33.84721	-118.13220	UNK	L	5.834	Lakewood	BI9A-2	BI9A-2-001		CC-4.182
Civic Center/Del Amo Blvd	24" Discharge	33.84984	-118.13231	UNK	R	6.123	Lakewood	BI9A-2	BI9A-2-003		CC-4.484
Civic Center Way/Hardwick St	30" Discharge	33.85077	-118.13222	LACFCD	L	6.215	Lakewood	BI9A-2	BI9A-2-004		CC-4.575
Civic Center Way/Candlewood St	12" Discharge	33.85243	-118.13229	UNK	R	6.401	Lakewood	BI9A-2	BI9A-2-007		CC-4.762
Civic Center Way/Candlewood St	18" Discharge	33.85268	-118.13229	Lakewood	R	6.422	Lakewood	BI9A-2	BI9A-2-008		CC-4.783
Candlewood St/Clark Ave	18" Discharge	33.85382	-118.13222	LACFCD	R	6.545	Lakewood	BI9A-1	BI9A-1-001		CC-4.906
Candlewood St/Clark Ave	12" Discharge	33.85493	-118.13235	UNK	R	6.674	Lakewood	BI9A-1	BI9A-1-004		CC-5.035
Clark Ave/Michelson St	12" Discharge	33.85577	-118.13230	UNK	R	6.774	Lakewood	BI9A-1	BI9A-1-005		CC-5.135
Clark Ave/Michelson St	12" Discharge	33.85594	-118.13231	UNK	R	6.791	Lakewood	BI9A-1	BI9A-1-006		CC-5.151
Clark Ave/Michelson St	12" Discharge	33.85612	-118.13231	UNK	R	6.807	Lakewood	BI9A-1	BI9A-1-007		CC-5.168
Clark Ave/Michelson St	12" Discharge	33.85631	-118.13231	UNK	R	6.834	Lakewood	BI9A-1	BI9A-1-009		CC-5.194
Fidler Ave/Bigelow St	12" Discharge	33.85765	-118.13232	UNK	R	6.981	Lakewood	BI9A-1	BI9A-1-011		CC-5.342
Clark Ave/South St	24" Discharge	33.85968	-118.13228	Lakewood	R	7.192	Lakewood	BI9A-1	BI9A-1-012		CC-5.553
South St/Dagwood Ave	20" Discharge	33.86046	-118.13233	UNK	R	7.289	Lakewood	BI9A-1	BI9A-1-015		CC-5.649
South St/Fidler Ave	30" Discharge	33.86045	-118.13219	UNK	L	7.291	Lakewood	BI9A-1	BI9A-1-016		CC-5.652
Hedda St/Fidler Ave	15" Discharge	33.86417	-118.13221	UNK	L	7.697	Lakewood	BI9A-1	BI9A-1-020		CC-6.058

Hedda St/Fidler Ave	15" Discharge	33.86427	-118.13221	UNK	L	7.708	Lakewood	BI9A-1	BI9A-1-021		CC-6.089
Ashworth St/Fidler Ave	15" Discharge	33.86783	-118.13225	Lakewood	L	8.112	Lakewood	BI9A-1	BI9A-1-023		CC-6.472
Ashworth St/Fidler Ave	15" Discharge	33.86799	-118.13227	Lakewood	L	7.708	Lakewood	BI9A-1	BI9A-1-024		CC-6.485
DEL AMO CHANNEL											
Del Amo Blvd/Fidler Ave	24" Discharge	33.84697	-118.13290	UNK	L	0.079	Lakewood	BI9B-2	BI9B-2-001	BI9B-2-001	DAC-0.079
Del Amo Blvd/Whitewood Ave	24" Discharge	33.84697	-118.13540	Lakewood	L	0.283	Lakewood	BI9B-2	BI9B-2-002	BI9B-2-002	DAC-0.328
Del Amo Blvd/Graywood Ave	18" Discharge	33.84680	-118.13791	Long Beach	R	0.517	Lakewood	BI9B-2	BI9B-2-007	BI9B-2-007	DAC-0.562
Del Amo Blvd/Graywood Ave	15" Discharge	33.84680	-118.13827	Long Beach	R	0.538	Lakewood	BI9B-2	BI9B-2-008	BI9B-2-008	DAC-0.583
Del Amo Blvd/Graywood Ave	15" Discharge	33.84680	-118.13930	Long Beach	R	0.554	Lakewood	BI9B-2	BI9B-2-009	BI9B-2-009	DAC-0.599
Del Amo Blvd/Hazelbrook Ave	36" Discharge	33.84694	-118.13953		L	0.6642	Lakewood	BI9B-2	BI9B-2-010		DAC-0.709
Del Amo Blvd/Blackthorne Ave	18" Discharge	33.84680	-118.14030	Long Beach	R	0.742	Lakewood	BI9B-2	BI9B-2-013	BI9B-2-013	DAC-0.784
Del Amo Blvd/N. Blackthorne Ave	18" Discharge	33.84698	-118.14024	LACFCD	L	0.739	Lakewood	BI9B-2	BI9B-2-012	BI9B-2-012	DAC-0.787
Del Amo Blvd/N. Pepperwood Ave	15" Discharge	33.84681	-118.14139	Long Beach	R	0.836	Lakewood	BI9B-2	BI9B-2-015	BI9B-2-015	DAC-0.881
Del Amo Blvd/Lakewood Blvd	15" Discharge	33.84682	-118.14225	Long Beach	R	0.908	Lakewood	BI9B-2	BI9B-2-017	BI9B-2-017	DAC-0.953
Del Amo Blvd/Lakewood Blvd	18" Discharge	33.84700	-118.14241	Long Beach	L	0.924	Lakewood	BI9B-2	BI9B-2-019	BI9B-2-019	DAC-0.970
Del Amo Blvd/Lakewood Blvd	12" Discharge	33.84689	-118.14267	Lakewood	L	1.005	Lakewood	BI9B-2	BI9B-2-021	BI9B-2-021	DAC-1.005
Del Amo Blvd/Lakewood Blvd	18" Discharge	33.84681	-118.14264	Long Beach	R	1.961	Lakewood	BI9B-2	BI9B-2-022	BI9B-2-021	DAC-1.006
Del Amo Blvd/Oliva Ave	30" Discharge	33.84683	-118.14493	UNK	R	1.207	Lakewood	BI9B-2	BI9B-2-023	BI9B-2-023	DAC-1.252
Del Amo Blvd/Hayter Ave	30" Discharge	33.84686	-118.14618	UNK	R	1.289	Lakewood	BI9B-2	BI9B-2-026	BI9B-2-026	DAC-1.324
Del Amo Blvd/Hayter Ave	30" Discharge	33.84701	-118.14623	UNK	L	1.279	Lakewood	BI9B-2	BI9B-2-025	BI9B-2-025	DAC-1.334A
Del Amo Blvd/Verdura Ave	24" Discharge	33.84705	-118.14970	UNK	L	1.614	Lakewood	BI9B-2	BI9B-2-028	BI9B-2-028	DAC-1.659
Del Amo Blvd/Downey Ave	18" Discharge	33.84723	-118.15061	UNK	R	1.693	Lakewood	BI9B-2	BI9B-2-030	BI9B-2-030	DAC-1.738
DOWNEY CHANNEL											
Hardwick St/Downey Ave	30" Discharge	33.85025	-118.15041	UNK	L	0.165	Lakewood	BI447A	BI447A-001		DNC-0.165
Hardwick St/Downey Ave	30" Discharge	33.85031	-118.15054	UNK	R	0.173	Lakewood	BI447A	BI447A-002	BI447A-002	DNC-0.173
Candlewood St/Downey Ave	24" Discharge	33.85372	-118.15039	UNK	L	0.554	Lakewood	BI447A	BI447A-004	BI447A-004	DNC-0.554

Downey Ave/Eckleson St	18" Discharge	33.84919	-118.15089	Lakewood	L	1.985	Lakewood	BI9B-1	BI9B-1-001		DNC-1.985
Downey Ave/Eckleson St	21" Discharge	33.84920	-118.15121	UNK	L	2.019	Lakewood	BI9B-1	BI9B-1-002		DNC-2.019
Downey Ave/Eckleson St	18" Discharge	33.84908	-118.15121	UNK	R	2.022	Lakewood	BI9B-1	BI9B-1-003		DNC-2.022
LOS CERRITOS CHANNEL											
Knoxville Ave/E. el Progreso St	24" Discharge	33.79599	-118.10369	Long Beach	R	8.172	Long Beach	LCERR-4	LCERR-4-002		LCC-0.817
Vuelta Grande Ave/Stearns St	24" Discharge	33.79599	-118.10328	Long Beach	L	8.173	Long Beach	LCERR-4	LCERR-4-003		LCC-0.818
Vuelta Grande Ave/Los Arcos St	33" Discharge	33.79944	-118.10356	Long Beach	L	8.555	Long Beach	LCERR-4	LCERR-4-005		LCC-1.199
Vuelta Grande Ave/Ladoga Ave	21" Discharge	33.80006	-118.10427	LACFCD	L	8.649	Long Beach	LCERR-4	LCERR-4-006		LCC-1.294
Vuelta Grande Ave/Snowden Ave	24" Discharge	33.80557	-118.11188	Long Beach	L	9.678	Long Beach	LCERR-4	LCERR-4-010		LCC-2.323
Spring St/Lomina Ave	21" Discharge	33.81012	-118.12110	LACFCD	R	0.721	Long Beach	LCERR-3	LCERR-3-001		LCC-3.384
Spring St/San Anseline Ave	18" Discharge	33.81036	-118.12163	LACFCD	L	0.759	Long Beach	LCERR-3	LCERR-3-003		LCC-3.422
Spring St/Bellflower Blvd	21" Discharge	33.81013	-118.12411	LACFCD	R	1.000	Long Beach	LCERR-3	LCERR-3-004		LCC-3.663
Spring St/Bellflower Blvd	15" Discharge	33.81041	-118.12514	LACFCD	L	1.085	Long Beach	LCERR-3	LCERR-3-005		LCC-3.748
Spring St/Montair Ave	15" Discharge	33.81042	-118.12562	LACFCD	L	1.135	Long Beach	LCERR-3	LCERR-3-007		LCC-3.798
Spring St/Montair Ave	18" Discharge	33.81041	-118.12674	Long Beach	L	1.222	Long Beach	LCERR-3	LCERR-3-008		LCC-3.885
Charlemagne Ave/Spring St	15" Discharge	33.81051	-118.13042	Long Beach	L	0.078	Long Beach	LCERR-2	LCERR-2-001		LCC-4.245
Heather Rd/Spring St	24" Discharge	33.81023	-118.13107	Long Beach	R	0.135	Long Beach	LCERR-2	LCERR-2-003		LCC-4.301B
WARDLOW CHANNEL											
Clark Ave/Keynote St	18" Discharge	33.82335	-118.13495	Long Beach	L	5.885	Long Beach	BI9C	BI9C-002		WC-5.964
Clark Ave/Keynote St	18" Discharge	33.82337	-118.13574	Long Beach	L	5.918	Long Beach	BI9C	BI9C-003		WC-6.038
Lakewood Blvd	18" Discharge	33.82331	-118.14151	Long Beach	L	6.519	Lakewood	BI9A-5	BI9A-5-016		WC-6.571
SOUTH OF ATHERTON											
Vuelta Grande Ave/Espanita St	30" Discharge	33.78581	-118.10343	Long Beach	L	7.049	Long Beach	LCERR-5	LCERR-5-001		LCC-7049.1
Vuelta Grande Ave/E. Driscoll St	30" Discharge	33.78644	-118.10384	Long Beach	R	7.116	Long Beach	LCERR-5	LCERR-5-002		LCC-7116.2
PALO VERDE CHANNEL											
WOODRUFF AVE / VUELTA GRANDE AVE	24" Discharge	33.80836	-118.11435	Long Beach	R	0.156	Long Beach	BI9E-2	BI9E-2-001		PVC-0.156

6036 SPRING ST/Woodruff Ave	15" Discharge	33.81039	-118.11423	Long Beach	L	0.377	Long Beach	BI9E-2	BI9E-2-002		PVC-0.377
WOODRUFF AVE / SPRING ST	18" Discharge	33.81039	-118.11432	Long Beach	R	0.378	Long Beach	BI9E-2	BI9E-2-003		PVC-0.378
SPRING ST / WOODRUFF AVE	18" Discharge	33.81064	-118.11431	LACFCD	R	0.408	Long Beach	BI9E-2	BI9E-2-004		PVC-0.408
SPRING ST / WOODRUFF AVE	15" Discharge	33.81065	-118.11431	Long Beach	R	0.408	Long Beach	BI9E-2	BI9E-2-005		PVC-0.408
3128 LOS COYOTES DIA/E. Pageantry St	24" Discharge	33.81311	-118.11411	LACFCD	R	0.705	Long Beach	BI9E-2	BI9E-2-008		PVC-0.705
3143 LOS COYOTES DIA/E. Pagentry St	30" Discharge	33.81394	-118.11397	Long Beach	R	0.775	Long Beach	BI9E-2	BI9E-2-011		PVC-0.775
3142 LOS COYOTES DIA/E. Pagentry St	21" Discharge	33.81406	-118.11376	Long Beach	L	0.792	Long Beach	BI9E-2	BI9E-2-012		PVC-0.792
3169 LOS COYOTES DIA/N. Hayfield Dr	15" Discharge	33.81449	-118.11347	Long Beach	R	0.848	Long Beach	BI9E-2	BI9E-2-013		PVC-0.848
3302 LOS COYOTES DIA/Metz St	21" Discharge	33.81666	-118.11144	Long Beach	L	1.154	Long Beach	BI9E-2	BI9E-2-015		PVC-1.154
3425 LOS COYOTES DIA/Canehill Ave	21" Discharge	33.81940	-118.10913	Long Beach	R	1.527	Long Beach	BI9E-2	BI9E-2-017		PVC-1.527
LOS COYOTES DIA / PALO VERDE AVE	21" Discharge	33.82048	-118.10807	Long Beach	L	1.676	Long Beach	BI9E-2	BI9E-2-018		PVC-1.676
LOS COYOTES DIA / PALO VERDE AVE	18" Discharge	33.82081	-118.10792	LACFCD	L	1.721	Long Beach	BI9E-2	BI9E-2-020		PVC-1.721
PALO VERDE AVE/E. Monlaco Rd	24" Discharge	33.82224	-118.10796	Long Beach	R	1.878	Long Beach	BI9E-2	BI9E-2-023		PVC-1.878
Palo Verde Ave/E. Keynote St	27" Discharge	33.82280	-118.10793	Long Beach	L	1.937	Long Beach	BI9E-2	BI9E-2-024		PVC-1.937
3702 CONQUISTA AVE/Palo Verde Ave	27" Discharge	33.82505	-118.10798	Long Beach	R	2.201	Long Beach	BI9E-2	BI9E-2-025		PVC-2.201
Carson St/Palo Verde Ave	12" Discharge	33.83210	-118.10836	Long Beach		2.985	Long Beach	BI9E-1	BI9E-1-001		PVC-2.985
Carson St/Palo Verde Ave	18" Discharge	33.83235	-118.10832	Long Beach	L	3.009	Long Beach	BI9E-1	BI9E-1-002		PVC-3.009
Carson St/Palo Verde Ave	18" Discharge	33.83241	-118.10833	UNK	L	3.030	Lakewood	BI9E-1	BI9E-1-033	BI9E-1-033	PVC-3.030
Carson St/Palo Verde Ave	30" Discharge	33.83240	-118.10843	UNK	R	3.031	Lakewood	BI9E-1	BI9E-1-003	BI9E-1-003	PVC-3.031
4139 Palo Verde Ave/Harvey Way	18" Discharge	33.83433	-118.10831	UNK	L	3.228	Lakewood	BI9E-1	BI9E-1-004	BI9E-1-004	PVC-3.228
4222 Conquista Ave/Harvey Way	18" Discharge	33.83500	-118.10841	UNK	R	3.300	Lakewood	BI9E-1	BI9E-1-005	BI9E-1-005	PVC-3.300
Harvey Way/Palo Verde Ave	18" Discharge	33.83611	-118.10829	Lakewod	L	3.438	Lakewood	BI9E-1	BI9E-1-009	BI9E-1-009	PVC-3.438
Harvey Way/Palo Verde Ave	18" Discharge	33.83615	-118.10828	UNK	L	3.444	Lakewood	BI9E-1	BI9E-1-010	BI9E-1-010	PVC-3.444
Centralia St/Palo Verde Ave	15" Discharge	33.83775	-118.10824	UNK	L	3.622	Lakewood	BI9E-1	BI9E-1-011	BI9E-1-011	PVC-3.622

Centralia St/Palo Verde Ave	15" Discharge	33.83936	-118.10822	UNK	R	3.804	Lakewood	BI9E-1	BI9E-1-012	BI9E-1-012	PVC-3.804
Centralia St/Palo Verde Ave	24" Discharge	33.83947	-118.10842	UNK	R	3.824	Lakewood	BI9E-1	BI9E-1-014	BI9E-1-014	PVC-3.824
Centralia St/Palo Verde Ave	15" Discharge	33.83958	-118.10822	UNK	L	3.829	Lakewood	BI9E-1	BI9E-1-015	BI9E-1-015	PVC-3.829
Conquista Ave/Arbor Rd	15" Discharge	33.84135	-118.10821	UNK	L	4.020	Lakewood	BI9E-1	BI9E-1-016	BI9E-1-016	PVC-4.020
Arbor Rd/Palo Verde Ave	15" Discharge	33.84306	-118.10820	UNK	L	4.208	Lakewood	BI9E-1	BI9E-1-017	BI9E-1-017	PVC-4.208
Arbor Rd/Palo Verde Ave	24" Discharge	33.84326	-118.10841	UNK	R	4.228	Lakewood	BI9E-1	BI9E-1-018	BI9E-1-018	PVC-4.228
Arbor Rd/Palo Verde Ave	30" Discharge	33.84327	-118.10841	UNK	L	4.229	Lakewood	BI9E-1	BI9E-1-019	BI9E-1-019	PVC-4.229
Arbor Rd/Palo Verde Ave	18" Discharge	33.84332	-118.10820	UNK	L	4.235	Lakewood	BI9E-1	BI9E-1-020	BI9E-1-020	PVC-4.235
Arbor Rd/Palo Verde Ave	15" Discharge	33.84507	-118.10822	UNK	L	4.434	Lakewood	BI9E-1	BI9E-1-021	BI9E-1-021	PVC-4.434
Del Amo Blvd/Palo Verde Ave	15" Discharge	33.84685	-118.10819	UNK	L	4.628	Lakewood	BI9E-1	BI9E-1-022	BI9E-1-022	PVC-4.628
Del Amo Blvd/Palo Verde Ave	18" Discharge	33.84713	-118.10821	LACFCD	L	4.659	Lakewood	BI9E-1	BI9E-1-023	BI9E-1-023	PVC-4.659
Del Amo Blvd/Palo Verde Ave	24" Discharge	33.84714	-118.10836	LACFCD	R	4.659	Lakewood	BI9E-1	BI9E-1-024	BI9E-1-024	PVC-4.660
5023Carfax Ave/E. Hardwick St	18" Discharge	33.85007	-118.10960	UNK	L	4.962	Lakewood	BI9E-1	BI9E-1-028	BI9E-1-028	PVC-4.962
6251 McKnight Dr/Chesteroark Dr	24" Discharge	33.85057	-118.11001	UNK	R	5.075	Lakewood	BI9E-1	BI9E-1-029	BI9E-1-029	PVC-5.075
Candlewood St/Carfax Ave	24" Discharge	33.85321	-118.11132	UNK	L	5.403	Lakewood	BI446B	BI446B-001		PVC-5.403
Candlewood St/Cardale St	30" Discharge	33.85389	-118.11155	Lakewood	L	5.489	Lakewood	BI446B	BI446B-002		PVC-5.489
Candlewood St/Capetown St	27" Discharge	33.85441	-118.11167	Lakewood	R	5.543	Lakewood	BI446B	BI446B-003	BI446B-003	PVC-5.543
South St/Canehill Ave	18" Discharge	33.85822	-118.11172	UNK	R	5.970	Lakewood	BI446B	BI446B-005		PVC-5.970
South St/Canehill Ave	12" Discharge	33.85827	-118.11172	Lakewod	R	5.980	Lakewood	BI446B	BI446B-006		PVC-5.980

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APPENDIX F

GENERAL FIELD SAMPLING PROCEDURES

FOR

COMPOSITE AND GRAB SAMPLES

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GENERAL FIELD SAMPLING PROCEDURE FOR:

Composite Samples

1.0 SCOPE

This Standard Operating Procedure (SOP) describes the procedures for the compositing and sub-sampling of non-point source (NPS) "composite" sample bottles. The purpose of these procedures is to ensure that the sub-samples taken are representative of the entire water sample in the "composite" bottle (or bottles). In order to prevent confusion, it should be noted that the bottles are referred to as "composite" bottles because they are a composite of many small samples taken over the course of a storm; in this SOP the use of "compositing" generally refers to the calculated combining of more than one of these "composite" bottles.

2.0 APPLICATION

This SOP applies to all laboratory activities that comprise the compositing and sub-sampling of NPS composite sample bottles.

3.0 HEALTH AND SAFETY CONSIDERATIONS

The compositing and sub-sampling of composite sample bottles may involve contact with contaminated water. Skin contact with sampled water should be minimized by wearing appropriate protective gloves, clothing, and safety glasses. Avoid hand-face contact during the compositing and sub-sampling procedures. Wash hands with soap and warm water after work is completed.

4.0 DEFINITIONS

4.1 "Composite" sample bottle: A borosilicate glass bottle that is used to collect multiple samples over the course of a storm (a composite sample).

4.2 Large-capacity stirrer: Electric motorized "plate" that supports composite bottle and facilitates the mixing of sample water within the bottle by means of spinning a pre-cleaned magnetic stir-bar which is introduced into the bottle.

4.3 Stir-bar: Pre-cleaned teflon-coated magnetic "bar" approximately 2-3 inches in length which is introduced into a composite bottle and is spun by the stirrer, thereby creating a vortex in the bottle and mixing the sample.

4.4 Sub-sampling hose: Two pre-cleaned ~3-foot lengths of Teflon tubing connected by a ~2-foot length of silicon tubing. Used with a peristaltic pump to transfer sample water from the composite sample bottle to sample analyte containers.

4.5 Volume-to-Sample Ratio (VSR): A number that represents the volume of water that will flow past the flow-meter before a sample is taken (usually in liters but can also be in kilo-cubic feet for river deployments). For example, if the VSR is 1000 it means that every time 1000 liters passes the flow-meter the sampler collects a

sample (1000 liters of flow per 1 sample taken). Note: The VSR indicates when a sample should be taken and is NOT an indication of the sample size.

5.0 EQUIPMENT

5.1 Instrumentation: Not applicable

5.2 Reagents: Not applicable.

5.3 Apparatus:

1) Large capacity stirrer.

2) Stir bar.

3) Sub-sampling hose.

4) Peristaltic pump.

5.4 Documentation: Information from the field logbook should include the volume-to-sample ratio for each composite sample bottle, each bottle's ID number, and the time of the last sample taken at a particular sampling site (for purposes of holding times). Previous documentation should exist for the cleaning batch numbers for the 20-L bottles and the sub-sampling hoses.

6.0 COMPOSITING AND SUB-SAMPLING PROCEDURES

Compositing sample water prior to sub-sampling may be necessary if more than one composite sample bottle was filled (or partially filled) during the course of a storm at a particular sampling site. Care must be taken to ensure that no contaminants are introduced at any point during this procedure. If the compositing is not performed with this in mind, the possibility for the introduction of contaminants (i.e., from dust, dirty sub-sampling hose tips, dirty fingers/gloves, engine emissions, etc.) is increased significantly.

6.1 Determining the Fraction of Each Sample Bottle to be Composited: This is essential to producing a composite that is representative of the entire storm sampled and is not biased/weighted toward the first part of the storm (Bottle 1) or the last part of the storm (last bottle). In general, either the bottles have been sampled using the same volume-to-sample ratio (VSR), OR the VSR has been increased for the Bottle 2 in order to prevent over-filling of another bottle; this happens when the amount of rainfall and resulting runoff volume was underestimated.

6.1.1 Consult the field logbook and confirm that the bottles are from the same sampling station. Inspect the bottles' "ID" tags and confirm that the volume-to-sample ratio (VSR) numbers are the same as in the logbook.

6.1.2 If both bottles have the same VSR then equal parts of each sample should be mixed.

6.1.3 If the VSR of Bottle 2 is double that of Bottle 1 then 2-parts from Bottle 2 should be mixed with 1-part from Bottle 1. This is because Bottle 1 is, in a sense, twice as concentrated as Bottle 2, having sampled half as much flow per sample aliquot.

6.1.4 If there are more than two bottles to composite simply follow the rules above but apply it to all three bottles. For example, if Bottles 1, 2, and 3 had VSRs of 100, 200, and 400, respectively, then the composite would be composed of 4-parts from Bottle 3, 2-parts from Bottle 2, and 1-part from Bottle 1.

6.1.5 Volume-to-Sample Ratios are typically multiples of each other and are rarely fractions of each other. This is simply to make compositing bottles with different VSRs easier.

6.1.6 Rarely does an instance occur in which the VSR of Bottle 1 is HIGHER than that of Bottle 2. The only reason for this would be if the runoff was grossly overestimated and "Sample Control" instructed a field crew to pull Bottle 1 early and lower the VSR for Bottle 2.

6.2 Determining Water Volume Needed and the Fate of Any Excess Water: Compositing multiple composite bottles can often be done using only those bottles, or may require "dirtying" or "sacrificing" a clean composite bottle. The different reasons are described below.

6.2.1 Determine sample volume needed: The minimum volume of sample water needed for filling the numerous sample analyte containers must be known, or calculated on the spot. This is done by simply adding up the volumes of all sample containers to be filled. If there is not enough sample water (after compositing) to fill all the containers then consult with the project manager to determine what the order of priority is for the analyses (i.e., in what order to fill the containers). It is also useful to know the absolute minimum sample volumes needed by the laboratory to perform each analysis; some sample containers may not need to be filled completely.

6.2.2 Determine if excess water is to be saved: If the composite bottles are mostly full then it is likely that much of the sample water will be left over from the sub-sampling process. In this case it is sometimes prudent to save the left over sample water (on ice) for several days in case problems occur with the laboratory and more water is needed. Always check with the project manager on this point because it <u>may</u> require dirtying (sacrificing) a clean composite bottle to make the composite in. If any excess water is not to be saved then compositing can always be done in the existing composite

sample bottles: while being homogenized on a stir plate the excess sample water is simply discarded (pumped out in a calculated fashion), making room for the final composite.

6.2.3 **Plan on making as large a composite as possible:** If, for example, only 8 liters of sample water are needed but there is enough water to make a higher volume composite then it is prudent to do so. This is to account for any accidental spills and, if required, to the save enough excess water for possible re-analysis. There generally will never be a need to make a composite greater than a single 20-L composite bottle.

6.2.4 **If only one composite bottle exists from a station:** Simply follow the procedures for sub-sampling into numerous sample containers described in Section 6.5.

6.3 **Compositing Without Saving Excess Water:** This procedure also applies to instances in which there may not be excess water. For the sake of clarity an example will be used to explain the following steps. In this example three 20-L composite bottles are involved in creating a composite: Bottle 1 has 20 liters of sample water and was filled at a Volume to Sample Ratio (VSR) of 100; Bottle 2 has 20 liters and a VSR of 200; Bottle 3 has 20 liters and a VSR of 400. Sample water will be composited in Bottle 3. Most bottles have 1 liter graduations; if some don't then sample depth must be used to figure the fraction of water to be transferred.

6.3.1 Carefully place Bottle 3 on a large spin plate and gently drop a pre-cleaned stir-bar into the bottle and adjust the speed of the spin plate to optimize the mixing of the sample water throughout the bottle. The speed at which the stir-bar is spun should be adjusted so that even mixing is achieved. Speeds that are too fast will create a large vortex within the composite bottle that can actually concentrate heavier particles and should be avoided. Settling on a particular speed is based on a subjective visual assessment of what speed produces the most even, random mixing throughout the composite bottle.

6.3.2 Install a pre-cleaned sub-sampling hose into a peristaltic pump. Carefully remove the plastic cover which protects the approximately 18 inches of its exterior surface which has been cleaned. Insert this end into Bottle 3. Uncap the other end of the sub-sampling hose and ready it over a waste bucket.

6.3.3 While being mixed on the stir plate pump 10 liters into the waste bucket, leaving 10 liters in Bottle 3. This is best performed by two people. One person is responsible for filling the waste bucket and one person is responsible for moving the intake tubing up and down in the water column of the composite sample and controlling the pump. Based on experimental

evidence, this up and down movement of the intake helps obtain (or, in this case discard) a more representative sample. This is because there can still be some stratification of heavier particles in the sample bottle despite the mixing created by the stirrer. The up and down movement of the intake tubing should be limited to 80-90 percent of the water depth and should never touch the bottom of the sample bottle.

6.3.4 Remove Bottle 3 from the stir plate and replace with Bottle 2 and insert a new stir-bar and mix as described in Section 6.3.1. Keeping the sub-sampling hose clean (avoid setting it down or bumping it into objects), insert the intake end into Bottle 2. Using the methods described in Section 6.3.3 pump only 5 liters from Bottle 2 into Bottle 3, making a total of 15 liters. **NEVER INSERT THE "DIRTY" EFFLUENT END OF THE HOSE INTO ANY BOTTLE.**

6.3.5 Repeat the actions in Section 6.3.4 with Bottle 1, pumping only 2.5 liters of Bottle 1 into Bottle 3, making a total of 17.5 liters of composited water.

6.3.6 Note that this process cannot generate any excess composite water because there is none left from Bottle 3 that has not been contaminated in the waste bucket.

6.4 Compositing While Also Saving Excess Water: This is identical to the procedures described in Section 6.3 with one difference: the first 10 liters of Bottle 3 is pumped into a clean 20-L bottle instead of into a waste bucket. This "dirties" a fourth bottle but ensures that excess sample water can be kept and composited again, if desired.

6.5 Sub-sampling Composited Water into Sample Containers: This is the final stage in successfully filling a suite of sample analyte containers with composited water that is representative of an entire sampling event.

6.5.1 Place the composite bottle containing the composited water on the stir plate and achieve proper mixing.

6.5.2 Uncap and arrange all the sample containers to be filled in such a way that they can be easily filled. Due to the vibration of the peristaltic pump on the sub-sampling hose it takes a very steady hand to efficiently guide the stream of sample water into the containers. **NEVER INSERT THE "DIRTY" EFFLUENT END OF THE HOSE INTO THE SAMPLE CONTAINERS.** It is often necessary to steady the sample containers with a second hand so they do not fall over.

7.0 PERSONNEL

Only personnel that have been trained in the use of the proper safety equipment, as per the are allowed to complete this task. . The Laboratory Supervisor is responsible for training

personnel in the proper procedures in composite sample bottle, teflon sample hose and silicon peristaltic tubing, and stir bar cleaning.

8.0 QUALITY ASSURANCE REQUIREMENTS

The composite sample bottles and sub-sampling hoses must have been evaluated ("blanked") for contaminants after their initial decontamination procedure.

GENERAL FIELD SAMPLING PROCEDURE FOR:

Grab Samples

1.0 SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) describes the procedures involved in the discrete manual sampling (grab sampling) of storm water for a nonpoint source (NPS) monitoring program. The purpose of these procedures is to ensure contaminant free samples, and to ensure the safety of the personnel involved.

2.0 DEFINITIONS

2.1 Sample Containers – any EPA or laboratory specified clean container that is used to collect sample water.

2.2 Grab Pole – used to obtain grabs from locations where it is impossible or too dangerous (fast current, storm drain pipe, etc.) to manually obtain a sample.

3.0 PERSONNEL

Only personnel that have been trained in the use of the proper safety equipment are allowed to complete this task. Training needs to include the proper sampling techniques and station hazards that will be encountered while performing this task. The Project Manager is responsible for training personnel in these procedures.

4.0 EQUIPMENT

4.1 Instrumentation – see section 12.0 Physical Parameters

4.2 Reagents – preservatives will be supplied by the laboratory that supplies the sample bottles. Usually, the preservative is a concentrated acid (HNO_3, H_2SO_4, HCl or other).

4.3 Apparatus – a telescoping grab pole with a bottle holding device secured to one end. The bottle holding device is made of plastic and Velcro. It is designed to hold in place sample bottles of various sizes and types.

4.4 Documentation – time, date, location, number of containers and type of grab (whether for chemical analysis or physical parameters) must be noted in the station log book for that station.

5.0 PROCEDURES

Grab sampling methods will be discussed for the following analytes:

Metals and Total Cyanide

Oil and Grease

Fecal Coliform and Fecal Streptococci

Volatile Organic and Aromatic Compounds (VOA's)

Organic Compounds (Pesticides, PAHs, PCBs, SVOCs, etc.)

Physical Parameters

6.0 GRAB SAMPLING TECHNIQUES

6.1 Grab sampling may be conducted at any time during the storm event, depending upon the specific project requirements. The type of grab study might vary as the storm season progresses and the scope requirements deem necessary. These might include:

6.1.1 **Discrete Grabs** – Taken once during the storm event at a predetermined time, usually at peak flow.

6.1.2 **Persistent Grabs** – A schedule of discrete grabs which continue through the end of the storm to show a rate of change over time.

6.1.3 **First Flush** – A type of discrete grab to be taken within the first thirty minutes of the storm event.

For the majority of grab sample studies, discrete grabs will be required. Grabs will be taken on the rising hydrocurve of the storm event and as close to peak stage as is feasible. The times of these grabs will be decided by the Storm Control and/or Shift Leader and will be relayed to the field crews.

6.2 Depending upon then type of analyte being sampled, the technique may vary but all sampling **MUST** follow these general rules to minimize contamination:

6.2.1 Grab bottles are to be filled as near to the intake as is safely possible.

6.2.2 When unable to obtain a sample near the intake, take one as near to the center of flow as possible or in an area of sufficient velocity to ensure good mixing

6.2.3 The field personnel taking grab samples must be standing downstream from the sample bottle when filling.

6.2.4 The mouth of the bottle must be facing into the current.

6.2.5 Raise and lower the bottle through the water column so the sample is not biased with only one level sampled.

6.2.6 Manhole sites and inaccessible stream sites are best sampled with a grab pole.

7.0 METALS AND TOTAL CYANIDE

Samples to be analyzed for metals and cyanide are grabbed in a plastic or Teflon® container. Metals and total cyanide will require a preservative in the container (see Section 4.2). These grabs require extra care so as to not overfill the container and spill out any of the preservative, or allow the preservative to come into contact with the skin.

Metals sample bottles contain an acid preservative (HNO_3) and total cyanide sample bottles contain a base (NaOH) for a preservative. When the grab container is being filled manually, the level of water can be watched so the container is not overfilled. When the sample cannot be taken by hand and must be taken with a grab pole, the filling becomes a bit more difficult. Lower the container with the grab pole and watch for escaping air bubbles when submerged. Pull the sample bottle out frequently to check the water level accumulated and quit filling when that level has reached the "shoulder" of the bottle. Be sure **NOT TO OVERFILL THE SAMPLE BOTTLE**; this would spill the preservative compromising the sample and possibly endangering the person sampling.

8.0 OIL AND GREASE

Oil and grease samples are very similar to metals in that the bottles contain preservative and **MUST NOT BE OVERFILLED**. Oil and grease analysis requires that the sample be taken in glass containers, usually amber and usually in duplicate (in case of breakage). Fill these containers in the same exact way as mentioned above for metals analysis.

9.0 FECAL COLIFORM AND FECAL STREPTOCOCCI

Fecal coliform and fecal streptococci are usually grabbed in bacteria bottles or urine analysis cups. They contain a residual chlorine removal preservative tablet and should be filled to the sample container fill line when sampling. Wear protective gloves so that there is no skin contact with the interior of the container. The main precaution is not to contaminate the sample when opening the cup. Fill each cup completely and secure the cap.

10.0 VOLATILE ORGANIC AND AROMATIC COMPOUNDS (VOA'S)

Collecting water for Volatile Organic Compounds (VOA) requires extreme care. VOA's volatilize (enter the gaseous phase very quickly), thus, sample vials are designed to prevent this. These vials will leave no headspace (air bubbles) in a properly filled container because they have a septa cap , thereby minimizing loss of analyte to the atmosphere.

To fill a VOA vial, lower it into the water column and allow it to **FILL UP COMPLETELY** (until a water dome is formed over the top of the vial). VOA's must be preserved with HCl so take extra care not to spill any of this preservative. Very carefully place the septa cap onto the vial so no air is introduced, start with the cap tilted to one side and gently lower it until it is seated onto the threads of the vial and secure. Make sure there is no air in the vial by inverting the sample. If air bubbles show, a new sample must be taken using a new vial and the bad container and sample must be returned to the lab for proper disposal. **See Section 13.0 for additional precautions to be taken with VOA vials.**

11.0 ORGANIC COMPOUNDS (PESTICIDES, PAHs, PCBs, SVOCS, etc.)

Organic compound samples are collected in glass containers, usually amber. These samples generally do not require preservatives but should be filled in the same way as those collected for metals, and oil and grease analyses.

12.0 PHYSICAL PARAMETERS

Each time a station is visited during a storm event, certain physical parameters must be measured. Generally, at a minimum, pH and temperature are measured. Follow the instructions that are included with the field instrumentation used for the best results. There are many different brands of meters that require different techniques.

Take the measurements as close to the grab sampling point as possible while keeping safety a priority. A grab sample may be taken and analyzed somewhere more convenient and safe than the stream edge. Remember that the analysis on a grab sample should be performed "as soon as possible" to ensure as accurate measurements (pH, temperature, etc.) as possible. Record all results in the log book for that station and be sure to write in the units of measurement.

13.0 QUALITY CONTROL LIMITS

Grab sample containers must come from a reputable distributor and be certified clean for the analyte to be sampled. They must also be properly preserved and labeled prior to sampling. Transport the bottles in clean coolers accompanied with any required paperwork or instructions.

Immediately upon completion of sampling, return the sample bottles to a clean cooler and ice them down to 4°C. Recheck to be certain that all the information on the label is correct (date, time, location, analysis, preservative, etc.). Fill out the required paperwork and station log book sheets and transfer the samples to a predetermined pick-up location for the Analytical Laboratory.

13.1 For some storm sampling events, different Quality Assurance and Quality Controls (QA/QC) will be implemented. These will include:

13.1.1 Field Duplicates – Additional set of sample bottles grabbed at the same location and time as the actual sample. This sample may be given its own mock station identification and be submitted to the Analytical Laboratory blind.

13.1.2 Field Blanks – This is a full set of sample bottles (usually minus TSS and turbidity) containing reagent grade analyte free water provided by the Analytical Laboratory that will be doing the analysis. These samples are poured by hand from clean bottles containing the blank water into a labeled sample container. These sample bottles may be given a mock station identification and submitted blind as well.

13.1.3 Trip Blanks – Usually required for very sensitive samples (VOA's). The Analytical Laboratory will provide sample bottles already filled with reagent

grade analyte free water that will make the full "trip" from the lab, out into the field and back into the lab. **THESE CONTAINERS ARE NOT TO BE OPENED**.

Trip blanks are only analyzed if contamination is suspected. If analyzed and contamination is found, they usually warrant further investigation and subsequent sampling.

13.1.4 Matrix Spiking and Lab Replicates – These analyses can usually be taken from a sample bottle already sent into the field and do not require extra bottles, however, extra volume may be required at these stations.

13.2 While performing or preparing for grab sampling, be sure that no "outside" contamination will occur:

13.2.1 No engines are running in the general vicinity of sampling.

13.2.2 Sample containers are clean and intact.

13.2.3 Sample containers are properly labeled and meet bottle requirements for that analyte (size, type, preservative, type of cap liners, etc.).

13.2.4 Sample techniques are proper and safe.

13.3 Volatile Organic and Aromatic Compounds (VOA's) – require very special handling.

13.3.1 VOA vials are very fragile. Protect with adequate foam packing material.

13.3.2 VOA bottles should have no headspace (see Section 10.0). This means that they are subject to freezing. **Prevent direct contact of VOA vial with ice by using additional packaging.**

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APPENDIX G

Stormwater Outfall Inspections

Los Cerritos Channel Watershed*

* Due to size, file type and associated additional materials including KMZ files, photos, and log book scans, this appendix will be submitted separately

July 21, 2015

Permittees of the Los Cerritos Channel Watershed Management Group[1]

FINAL APPROVED LOS CERRITOS CHANNEL WATERSHED MANAGEMENT PROGRAM (WMP), PURSUANT TO THE LOS ANGELES COUNTY MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) PERMIT (NPDES PERMIT NO. CAS004001; ORDER NO. R4-2012-0175) AND THE CITY OF LONG BEACH MS4 PERMIT (NPDES PERMIT NO. CAS004003; ORDER NO. R4-2014-0024)

Dear Permittees of the Los Cerritos Channel Watershed Management Group:

On November 8, 2012, the California Regional Water Quality Control Board, Los Angeles Region (Los Angeles Water Board) adopted Order No. R4-2012-0175, *Waste Discharge Requirements for Municipal Separate Storm Sewer System (MS4) Discharges within the Coastal Watersheds of Los Angeles County, except those Discharges Originating from the City of Long Beach MS4* (hereafter, LA County MS4 Permit). On February 6, 2014, the Board adopted Order No. R4-2014-0024, *Waste Discharge Requirements for Municipal Separate Storm Sewer System Discharges from the City of Long Beach* (hereafter, Long Beach MS4 Permit). The LA County MS4 Permit and the Long Beach MS4 Permit allow Permittees the option to develop either a Watershed Management Program (WMP) or an Enhanced Watershed Management Program (EWMP) to implement permit requirements on a watershed scale through customized strategies, control measures, and best management practices (BMPs). Development of a WMP or EWMP is voluntary and allows a Permittee to address the highest watershed priorities, including complying with the requirements of Part V.A (Receiving Water Limitations), Part VI.E and Attachments L through R (Total Maximum Daily Load Provisions), by customizing the control measures in Parts III.A (Prohibitions – Non-Storm Water Discharges) and VI.D (Minimum Control Measures), except the Planning and Land Development Program[2].

On April 28, 2015, on behalf of the Los Angeles Water Board, I approved, with conditions, the Los Cerritos Channel (LCC) Group's WMP. My approval letter directed the LCC Group to submit a final WMP that satisfies all the conditions listed in the letter no later than June 12, 2015. On June 9, 2015 the LCC Group submitted its final WMP (dated June 8, 2015), as directed.

[1] Permittees of the Los Cerritos Channel Watershed Management Group include the Los Angeles County Flood Control District; and the cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill.

[2] The cited permit sections are from the LA County MS4 Permit. Equivalent requirements in the Long Beach MS4 Permit are as follows: Part VI.A (Receiving Water Limitations), Part VIII (Total Maximum Daily Load Provisions), Part IV.B (Prohibitions – Non-Storm Water Discharges), and Part VII.D-VII.M (Minimum Control Measures).

RB-AR10068

After review of the LCC Group's final WMP dated June 8, 2015, I have determined that the LCC Group's WMP satisfies all of the conditions identified in my April 28, 2015 approval letter. The WMP dated June 8, 2015 hereby constitutes the final approved WMP for the LCC Group.

The Los Angeles Water Board appreciates the participation and cooperation of the LCC Group in the implementation of the LA County MS4 Permit and the Long Beach MS4 Permit. If you have any questions, please contact Ivar Ridgeway, Storm Water Permitting, at Ivar.Ridgeway@waterboards.ca.gov or by phone at (213) 620-2150.

Sincerely,

Samuel Unger

Samuel Unger, P.E.
Executive Officer

July 28, 2015

Permittees of the Los Cerritos Channel Watershed Management Group[1]
(See Distribution List)

FINAL APPROVED LOS CERRITOS CHANNEL WATERSHED MANAGEMENT GROUP COORDINATED INTEGRATED MONITORING PROGRAM, PURSUANT TO ATTACHMENT E, PART IV.B OF THE LOS ANGELES COUNTY MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) PERMIT (NPDES PERMIT NO. CAS004001; ORDER NO. R4-2012-0175) AND ATTACHMENT E, PART IV.B OF THE CITY OF LONG BEACH MS4 PERMIT (NPDES PERMIT NO. CAS004003; ORDER NO. R4-2014-0024)

Dear Permittees of the Los Cerritos Channel Watershed Management Group:

The Los Angeles Regional Water Quality Control Board (Los Angeles Water Board or Board) has reviewed the final monitoring program submitted on July 2, 2015 by the Los Cerritos Channel Watershed Management Group (Group). This monitoring program was submitted pursuant to the provisions of NPDES Permit No. CAS004001 (Order No. R4-2012-0175), which authorizes discharges from the municipal separate storm sewer system (MS4) operated by 86 municipal Permittees within Los Angeles County (hereafter, LA County MS4 Permit), and NPDES Permit No. CAS004003 (Order No. R4-2014-0024), which authorizes MS4 discharges from the MS4 operated by the City of Long Beach (hereafter, Long Beach MS4 Permit). Both MS4 permits allow Permittees the option to develop and implement a coordinated integrated monitoring program (CIMP) that achieves the five Primary Objectives set forth in Part II.A of Attachment E and includes the elements set forth in Part II.E of Attachment E[2]. These programs must be approved by the Executive Officer of the Los Angeles Water Board.

On June 18, 2015, on behalf of the Los Angeles Water Board, I approved, with conditions, the Group's CIMP. My approval letter directed the Group to submit a final CIMP that satisfies all the conditions listed in the letter no later than July 3, 2015. On July 2, 2015 the Group submitted its final CIMP, as directed.

[1] Permittees of the Los Cerritos Channel Watershed Management Group CIMP include the Los Angeles County Flood Control District; and the cities of Bellflower, Cerritos, Downey, Lakewood, Long Beach, Paramount, and Signal Hill.

[2] Equivalent sections in the Long Beach MS4 Permit are Attachment E, Parts II.A and II.D, respectively.

After review of the Group's final CIMP submitted on July 2, 2015, I have determined that the Group's CIMP satisfies all of the conditions identified in my June 18, 2015 approval letter. The CIMP submitted on July 2, 2015 hereby constitutes the final approved CIMP for the Group. Additional direction on requirements for follow-up monitoring when aquatic toxicity is present in downstream receiving waters will be provided in separate correspondence, and must be followed as part of the Group's final approved CIMP.

The Los Angeles Water Board appreciates the participation and cooperation of the Group in the implementation of the LA County MS4 Permit. If you have any questions, please contact Mr. Chris Lopez of the Storm Water Permitting Unit by electronic mail at Chris.Lopez@waterboards.ca.gov or by phone at (213) 576-6674. Alternatively, you may also contact Mr. Ivar Ridgeway, Storm Water Permitting, at Ivar.Ridgeway@waterboards.ca.gov or by phone at (213) 620-2150.

Sincerely,

Samuel Unger

Samuel Unger, P.E.
Executive Officer

Enclosures: Los Cerritos Channel Watershed Management Group Distribution List

Los Cerritos Channel Watershed Management Group Distribution List

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