Comment Number	EWMP Reference	MS4 Permit Provision	Summary of Comments and Necessary Revisions	NSMBCW Group Response (January 2016)	Regional Board Follow Up (February 18, 2016)	NSMBCW Response (March 2016)
1	NA		ASBS Comments 1. As part of the EWMP, provide specificity on the number of MS4 outfalls and their ownership within the ASBS 24 area. Ensure consistency with "Area of Special Biological Significance 24, Compliance Plan for the County of Los Angeles and City of Malibu, September 20, 2015" (ASBS 24 Compliance Plan). 2. Integrate the ASBS 24 Compliance Plan into the EWMP. (a) Particular attention should be paid to integrating the actions in sections 3 and sections 6 into the appropriate elements of the EWMP. (b) Ensure the actions in the EWMP are in alignment with the schedule (section 8) in the ASBS Compliance Plan. 3. Discuss in the EWMP any unique watershed control measures to address MS4 discharges of non-stormwater and stormwater that are being taken within the ASBS 24 that are not being taken in areas outside of the ASBS but still within the NSMB EWMP area.	The number of outfalls has been added to the EWMP, and consistency with the ASBS Compliance Plan has been verified. The ASBS 24 Compliance Plan has been integrated by way of reference, and BMPs/MCMs between the EWMP and Compliance Plan have been verified to be consistent. There are no unique watershed control measures that are specific to the ASBS. Rather, the NSMBCW EWMP Group has proactively chosen to implement these BMPs throughout the entire EWMP Area, as applicable. The ASBS 24 Compliance Plan has been appended to the EWMP as Appendix E.	Where in the document is the number of outfalls provided?	The number of outfalls is in Section 1.1.3, which says: "There are 26 identified outfalls owned, operated./maintained, or monitored by the NSMBCW Agencies that are located within the ASBS 24 drainage area; ten of these outfalls have been identified as major outfalls." A footnote has also been added to this section stating the following: "The ASBS 24 Compliance Plan identifies 21 outfalls owned, operated/maintained, or monitored by the NSMBCW Agencies that discharge directly to ASBS 24. The additional five outfalls identified in this EWMP discharge to other receiving water bodies upstream of ASBS 24." Please note that the number of identified outfalls has been increased since the draft submittal of the EWMP in June 2015. As a result, other sections of the EWMP have been updated for consistency, including the subwatershed descriptions in Section 1.3.5 and the dry weather RAA in Section 5.3.2 (Tables 31 and 32 and Figure 25).
2	Table 1		Include beaches and SMB Nearshore & Offshore beneficial uses in Table 1. NSMBCW Water Bodies and Beneficial Uses Designated in the Basin Plan.	Table 1 has been updated to include the requested beneficial uses.	However, check beneficial uses in attached table. This is the latest table and there are some discrepancies between the beneficial uses in Table 1 for Los Angeles County Coastal Beaches and this excel table.	Table 1 has been updated with the most recent (2015) beneficial use table information.
16	Table 23 D.8. Construction (page 87)		Regarding Construction, include the developed/modified checklist that focuses on water quality priorities.	The checklist for both the City and County will not be modified. This item has been removed from the table.	Please explain and provide a rationale how the Construction checklist will be modified to address water quality concerns.	The County and the City already have existing checklists, respectively. As stated, these checklists will not be modified, as they already meet the requirements set forth in the Permit. Language has been updated to show that this MCM is no longer being enhanced or modified. Note that Table 25 no longer includes this item. Since no modification is proposed, there is no modified checklist to show.
17	NSMBCW EWMP - Appendix D MCMs		Wherever modified is checked for a requirement,include details of the how the MCM was modified in the Comment section.	Appendix D has been updated to include a comment for all modifications/enhancements.	There was one modification that was not explained in the comment section: Develop/implement Standard Operating Procedure (SOP)/inspection Checklist (page D-3 under Construction).	This MCM is planned to be implemented "as-is," without modification or enhancement. Appendix D has been updated to reflect this.
19	pages 135 - 143	Part VI.C.1.g.ix, page 50	Provide estimated costs of the non-structural BMPs which includes Minimum Control Measures (MCMs). Also include a summary of existing/ past funding sources/amounts in the revised EWMP. These funding sources may include general or dedicated funds from the City, County & FCD, as well as grants/loans. General funds are mentioned, but the amount of generalfunds must be quantified for the last several years (FY13-14, 14-15) by Permittee.	Section 9.3/Table 39 has been added to include past expenditures on water management programs, as well as estimated FY2015-2016 budgets.	Please explain and provide a rationale why the footnote only appears to apply to the Industrial/Commercial program element in Table 39?	The footnote has been moved to the column heading and text has been added to attempt to clarify that all staf costs for the City of Malibu are included within the Program Management element.
20		Part VI.C.5.b. iv.(4)e	The plan does not clearly identify the responsibilities of each participating permittee. Ensure that the responsible entity for each watershed control measure (regional projects, distributed projects, public retrofit incentives, MCMs,etc.) is clearly identified in the revised EWMP.	Text has been added to the respective sections/tables identifying responsible parties. In the case of MCMs, it is stated that the MCMs are the responsibility of each agency unless otherwise noted. Table 27, which lists the various green street projects proposed in the EWMP, shows the responsible parties based on the percentage of land use within each project area.	Responsible Permittee(s) should be specified for the proposed distributed BMPs.	Table 28 (formerly Table 27) lists the responsible parties for the proposed distributed BMPs based on tributary land use. The following sentence has been added before the table: "As shown in the table, the percentage of each project within each NSMBCW Agency represents the proposed ownership responsibility for that project."
21	various	Part VI.A.2	Address any intermingling of discharges from privately owned stormwater infrastructure into the MS4 in the appropriate elements of the revised EWMP.	The RAA was conducted based on land uses and was inclusive of private property/drains within the EWMP Area. As a result, the EWMP inherently addresses runoff from private property that enters the NSMBCW MS4.	We understand that the RAA was conducted based on land uses and was inclusive of private property/drains within the EWMP Area. As a result, the EWMP inherently addresses runoff from private property that enters the NSMBCW MS4." Please put this statement in an appropriate place in the EWMP.	The following footnote has been added to Section 4.4.1 (Spatial Domain): "The RAA was conducted based on land uses, including private property within the NSMBCW EWMP Area. As a result, the EWMP inherently addresses runoff from private property that enters the NSMBCW MS4. "
25	Pages 98-105 and page 122		Ensure that all MS4 outfalls,as shown on Figure 23, are also included on all maps on pages 98-105 and page 122.	Identified MS4 outfalls have been added to requested figures. Figure 23 is now labeled as Figure 25.	Please check proper nomenclature for IDs for the monitoring stations in Figure 25.	No Monitoring Stations are shown in Figure 25, only analysis regions and outfalls (both major and minor). Per discussion with Deborah Brandes, we have verified that the analysis regions shown on the figure are accurate.
28	EWMP Work Plan, page 21	Part VI.C.5.a.iii.(1)(a)(i)-(iv), pages 59-60	The EWMP Work Plan states "The following data sources will be reviewed as part of the source assessment for the Category 1 and 2 water body- pollutant combinations (i.e. regarding known and suspected stormwater and non-stormwater pollutant sources in discharges to the MS4 and from the MS4 to receiving waters and any other stressors related to MS4 discharges causing or contributing to the water quality priorities): 1. Findings from the Permittees' Illicit Connections and Illicity Dischagre Elimination Programs (IC/ID); 2. Findings from the Permittees' Industrial/Commerical Facilities Programs; 3. Findings from the Permittees' Developments Construction Programs; 4. Findings from the Permittees' Public Agency Activities Programs 5. TMDL source investigations; 6. Watershed model results; 7. Findings from the Permittees' monitoring programs, including but not limited to TMDL compliance monitoring and receiving water monitoring; and 8. Any other pertinent data, information,or studies related to pollutant sources. However, no such findings are presented in the EWMP from these programs regarding known and suspected stormwater and non- stormwater pollutant sources in discharges to the MS4 and from the MS4 to receiving waters and any other stressors related to MS4 discharges causing or contributing to the water quality priorities. The revised EWMP must detail what the results of the Group's investigations are. Further ,it is not clear whether the Group considered the Topanga Creek Source ID Study, mentioned above, as it is not listed in the Reference section. Footnote a of Table 8 cites monitoring results from multiple MST (Microbial Source Tracking) studies in the EWMP area, but references a comment letter rather than the original sources. The revised EWMP must cite the original sources and include the references in the Reference section. The only additional discussion of MCMs focuses on the enhancements/modifications to the MCMs from the base line requirements in the 2012 permit (Part VI.D).	The EWMP Source Assessment (Section 2.3) has been bolstered based on information gathered as part of the EWMP Work Plan. The Topanga Creek Source ID Study was not originally included, since it had not been published at the time of submittal of the EWMP Work Plan. However, this study has been added to the EWMP. Footnote a of Table 9 (formerly Table 8) has been revised as requested.	Just adding the Topanga Creek Source ID Study as an Appendix and to the Reference section does not mean it was "considered". Please explain how the study considered and integrated?	Section 2.1.2, under "Indicator Bacteria," has a paragraph stating that bacteria has been added as a Category 3 WBPC in this subwatershed based on the Topanga Creek Source ID Study. In addition, the study results are summarized in detail in Section 2.3.1.

Comment Number	EWMP Reference	MS4 Permit Provision	Summary of Comments and Necessary Revisions	NSMBCW Group Response (January 2016)	Regional Board Follow Up (February 18, 2016)	NSMBCW Response (March 2016)
35	Page 10	Part VI.C.5.b	Include a detailed soils map indicating the infiltration rates for the various soil types in the EWMP area rather than the general description provided in Section 1.3.4 to support the group's conclusion that there is little opportunity for regional retention projects.	A soils map has been created based on available GIS data, which is not identical to the data provided in the referenced report. It should also be noted that additional geologic conditions were evaluated when determining if a regional retention project was feasible. Some of these conditions are also included in the figure. In addition, regional retention projects were only evaluated in subwatersheds that showed a need for structural BMPs based on the RAA results. The combination of these various factors has led to the overall conclusion that such large-scale projects are not efficient nor necessary at this point in time in the NSMBCW EWMP Area. Additional discussion on this is provided in the BMP section of the EWMP.	I don't see the soils map.	The soils map is Figure 2 of the EWMP.
37	Appendix D	Part\ VI.C.l.g.viii, page 50	While not explicitly stated it appears that the MCMs as required in Part VI.D of the permit, per Appendix D, are either going to be implemented as required by the permit,enhanced, or appropriately modified. Confirm that the MCMs will be required, enhanced or modified. Ensure that the modifications and enhancements described in Table 23 of the EWMP (pages 85-87) for the Development Construction Program match those in Appendix D of the EWMP for the same program.	The Group has confirmed that Table 23 of the Draft EWMP (now Table 24) and Appendix D are consistent. The Group plans to implement all MCMs as specified in Appendix D. The following sentence has been added to state this: "An overview of all MCMs to be implemented by the NSMBCW EWMP Group and the WBPCs which they target is provided in Appendix D."	There is not an exact match between Tables 23 and the table in Appendix D. Please explain why.	Table 25 (previously Table 24) is a summary of all modified or enhanced MCMs. As a result, the information contained in it is a subset of Appendix D (since Appendix D includes all MCMs). Text has been modified in each table such that everything affirmed in each table is consistent with the other.
40	Pages 81-82; Table 23; Appendix D	Part VI.C.5.b.ii.(1), page 62	Regarding preventing or eliminating non-stormwater discharges to the MS4 that are a source of pollutants from the MS4 to receiving waters ,the plan does not specify measurable milestones within the permit term (specific actions, outcomes and deadlines). To the extent that these are covered in the CIMP through the non- stormwater screening, source investigation and elimination, and monitoring program, include a description of these elements and corresponding measurable milestones in the EWMP.	Section 4.1 has been updated to include details from the CIMP and measurable milestones.	Additional material was incorporated into Section 4.2.1-3. However, Table 4-1. Non-Stormwater Outfall Screening and Monitoring Program Summary should be included.	The requested table has been added to Section 4.1.1. It is Table 11 in the EWMP. All subsequent tables have been re-numbered.
41	Table 23, pages 85-87 and Appendix D	Part VI.C.5.b. iv.(1)(a)(i)	Ensure that Table 23 (pages 85-87) and Appendix D are aligned. It appears that Table 23 should be a subset of the MCMs in Appendix D, i.e.,those that are identified as "enhanced" or "modified" in Appendix D. The Group also needs to ensure that for each MCM, the Permittee(s) responsible for implementing it are clearly identified. If all MCMs will be implemented by all three permittees in all areas, note this.	Table 23 of the Draft EWMP (now Table 24) and Appendix D have each been modified to be consistent with one another. It has been noted that all NSMBCW agencies will be responsible for all MCMs.	Table 24 and Appendix D still do not seem to match. How are they consistent with one another?	Table 25 (previously Table 24) is a summary of all modified or enhanced MCMs. As a result, the information contained in it is a subset of Appendix D (since Appendix D includes all MCMs). Text has been modified in each table such that everything affirmed in each table is consistent with the other.
44	pages 132-134	Part VI.C.8, pages 68-70	Part VI.C.8.a. i.(7) describes adaption of the EWMP to become more effective based on:"Recommendations for modifications to the Watershed Management Program solicited through a public participation process." A public participation process is not described in the NSMB EWMP description of the Adaptive Management Approach . Describe the group's intention regarding public participation in its adaptive management process. Include a commitment to address Part VI.C.8.a.iv.(1)-(7) of the LA County permit as part of the group's adaptive management process.	Section 8 of the EWMP has been updated to include the requested language.	Reference to VI.C.8.a.iv.(1)-(7) should be made	Reference to Permit Section VI.C.8.a.iv has been added to Section 8 of the EWMP.
45	Pages 106-123	Part VI.C.5.b.iv .(4)(d), page 64	The EWMP does not address compliance vis-a-vis interim limits. Tables 27 and 31 discuss compliance but only with the final limits. Attachment C-1 provides further detail in terms of target load reduction by blocks of years (2003-2015 and 2015-2021) but it does not correspond with the next interim deadline for bacteria, which is 2018 for Santa Monica Bay. Revise the EWMP to include analysis demonstrating a reasonable assurance that interim limits for Santa Monica Bay Beaches bacteria will be met.	As discussed with the Regional Board in our December 7 meeting, Section 7.2 sufficiently addresses interim compliance.	Please put in a table in Section 7.2 with Interim Limits. This comment was not addressed.	As outlined in Section 7 of the EWMP, the only applicable interim limits within the NSMBCW EWMP Area are percentage load reductions for bacteria in SMB and trash in SMB and Malibu Creek. These limits are included in Table 35 in Section 7.1.1. Interim compliance for bacteria is demonstrated in Section 7.2.1. This approach, which demonstrates interim compliance via historical monitoring data, was approved by Ms. Renee Purdy and Mr. Ivar Ridgeway in a meeting on December 7, 2015. A footnote has been added to the this section of the EWMP to state this. Attachment C-1 includes a load reduction block starting/ending in 2015 since this was the effective date of the Group's LID ordinances. Prior to 2015, SUSMP credits were taken. Starting in 2015, SUSMP was replaced by LID. The RAA attempts to account for this change in redevelopment standards. This process is described in Section 5.2.3.2 of the EWMP. This comment has been discussed with Ms. Deborah Brandes, and it was agreed upon that no further clarification is required.
55	Pages 89-90	Part VI.C.l.g, page 49	Consider relabeling the section Quantified Non-structural BMPs (5.2.3),which describes programmatic BMPs, but also redevelopment BMPs and public retrofit BMPs (page 89-91). The EWMP says that "Specific non-structural BMP model inputs are summarized in Table 25." However, media-filters, bioretention, biofiltration and bioswales are all structural BMPs. In addition, provide an explanation as to why these BMPs were selected for public retrofit and redevelopment and not others.	The Group would prefer to maintain the non-structural designation, since ultimately, these are programs/institutional BMPs that are being implemented (e.g., the LID ordinance or downspout disconnect program). However, since non-structural BMPs can't be modeled, assumptions were made in the RAA to account for these non-structural BMPs as structural BMPs. For example, since the LID ordinance requires LID BMPs such as bioretention and biofiltration to be implemented on new projects, it was assumed that a qualifying percentage of certain properties will incorporate these BMPs in the future. This section of the EWMP describes the assumptions related to the modeling of these structural BMPs to asses non-structural BMP effectiveness. Text has been added to attempt to clarify and expand this discussion.	I don't see where an explanation was provided as to why these BMPs were selected for public retrofit and redevelopment and not others. In the future you might consider submitting your revision in track changes.	The explanation of this decision is provided in Section 5.2.3.2. In short, SUSMP (from 2001-20015) allowed the implementation of flow-through BMPs. Because these allowed for a much smaller footprint, they were often selected for redevelopment projects. The LID Ordinances place a required emphasis on capture and retention via infiltration, bioretention, and/or harvest and use. Water that can't be captured and retained is required to treat more volume. As a result, a selection of BMPs was assumed for implementation for qualifying redevelopment projects in accordance with the design requirements set forth in the Permit (and LID Ordinances). This approach is consistent with other EWMPs to account for redevelopment BMPs.
62	table 29, page 111	Part VI.C.5.b. iv.(5)	Include in the EWMP a plan to reevaluate the dry weather RAA (analysis presented in Table 29,page 111) with updated data biennially per the adaptive management process where there are any MS4 outfalls (major and minor).	Since the dry weather RAA is presented for informational purposes only (due to the fact that relevant dry weather compliance deadlines have passed), the dry weather RAA will not be updated. However, compliance monitoring in the form of shoreline monitoring as well as outfall screenings will continue to occur, and will be reported annually in the Group's respective annual reports.	Is the main pollutant of concern in the EWMP, bacteria? If so, I agree, otherwise dry weather should be addressed. What about other category 1 constituents like nutrients, trash/debris, DDTs and PCBs?	The main pollutant of concern is bacteria. The other Category 1 WBPCs/TMDLs are focused on wet weather, with the exception of trash (which is being addressed via full capture devices and monitoring).
Additionally, please note that the NSMBCW EWMP Group has updated language related to Dan Blocker Beach. Previously, this beach was identified as being located within the Corral Subwatershed. However, based on field verifications, it is actually located within the Solstice Subwatershed. The text of the EWMP has been modified accordingly.						

April 1, 2016

Samuel Unger, Executive Officer
California Regional Water Quality Control Board
Los Angeles Region
320 W. 4th Street, Suite 200
Los Angeles, CA 90013

RE: Revised LA County MS4 Permit - North Santa Monica Bay Coastal Watersheds Enhanced Watershed Management Program Submittal

Dear Mr. Unger:

On behalf of the City of Malibu, the County of Los Angeles, and the Los Angeles County Flood Control District, collectively the North Santa Monica Bay Coastal Watersheds (NSMBCW) Enhanced Watershed Management Program (EWMP) Group, this letter is in response to your letter dated February 18, 2016, which provided comments on the Group's revised Enhanced Watershed Management Program. The draft EWMP was submitted to the Los Angeles Regional Water Quality Control Board (Regional Board) on January 19, 2016, pursuant to the provisions of NPDES Permit No. CAS004001 (Order No.R4-2012-0175).

The City has addressed the Regional Board's comments and is providing the revised NSMBCW EWMP for review and approval. Also attached is a table that summarizes all comments received from the Regional Board on February 18, 2016, as well as the Group's response to each of these comments.

If you have any questions, please contact Acting Public Works Director Rob DuBoux at rduboux@malibucity.org or (310) 456-2489, extension 339. Thank you.

Sincerely,

Jim Thorsen
City Manager

Enclosures

cc: Christi Hogin, City Attorney
Robert L. Brager, Public Works Director
Craig George, Acting Environmental Sustainability Director
Rob DuBoux, Acting Public Works Director
Jennifer Voccola Brown, Senior Environmental Programs Coordinator
Paul Alva, County of Los Angeles
Terri Grant, Los Angeles County Flood Control District
Rene Purdy, Los Angeles Regional Water Quality Control Board
Ivar Ridgeway, Los Angeles Regional Water Quality Control Board
Rebecca Christmann, Los Angeles Regional Water Quality Control Board

Enhanced Watershed Management Program (EWMP)

for

North Santa Monica Bay Coastal Watersheds

Submitted to:

Los Angeles Regional Water Quality Control Board

Submitted by:

North Santa Monica Bay Coastal Watersheds EWMP Group

March 2016

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LIST OF ACRONYMS

AED	Allowable Exceedance Days
ASBS	Area of Special Biological Significance
ASCE	American Society of Civil Engineers
BMP	Best Management Practice
CEDEN	California Environmental Data Exchange Network
CERCLA	Comprehensive Environmental Response, Compensation, & Liability Act
CIMP	Coordinated Integrated Monitoring Program
CML	Compliance Monitoring Location
CSMP	Coordinated Shoreline Monitoring Plan
CTR	California Toxic Rules
CWA	Clean Water Act
DDT	Dichloro-diphenyl-trichloroethane
ED	Exceedance Day
EMC	Event Mean Concentration
EWMP	Enhanced Watershed Management Program
FIB	Fecal Indicator Bacteria
GIS	Geographic Information System
GM	Geometric Mean
HSPF	Hydrological Simulation Program - Fortran
IBD	International BMP Database
IC/ID	Illicit Connection/Illicit Discharge
LACDBH	Los Angeles County Department of Beaches and Harbors
LACFCD	Los Angeles County Flood Control District
LID	Low Impact Development
LVMWD	Las Virgenes Municipal Water District
MCM	Minimum Control Measure
MPN	Most Probable Number
MST	Microbial Source Tracking
MS4	Municipal Separate Storm Sewer System
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System

LIST OF ACRONYMS (Continued)

NSMBCW	North Santa Monica Bay Coastal Watersheds
OWTS	Onsite Wastewater Treatment Systems
PCB	Polychlorinated Biphenyl
QA/QC	Quality Assurance/Quality Control
RAA	Reasonable Assurance Analysis
RWL	Receiving Water Limitation
SBPAT	Structural BMP Prioritization and Analysis Tool
SCCWRP	Southern California Coastal Watershed Research Project
SMB	Santa Monica Bay
SMBB	Santa Monica Bay Beaches
SWMM	Storm Water Management Model, originally developed by USEPA
SWRCB	State Water Resources Control Board
TAC	Technical Advisory Committee
TLR	Target Load Reduction
TMDL	Total Maximum Daily Load
TMRP	Trash Monitoring and Reporting Plan
TOC	Total Organic Carbon
TSS	Total Suspended Solids
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WBPC	Water Body-Pollutant Combination
WCM	Watershed Control Measure (analogous to BMP)
WERF	Water Environment Research Foundation
WLA	Waste Load Allocation
WMA	Watershed Management Area
WMMS	Watershed Management Modeling System
WQBEL	Water Quality-Based Effluent Limitation
WRF	Water Reclamation Facility

EXECUTIVE SUMMARY

PURPOSE AND OBJECTIVES

Following adoption of the 2012 Los Angeles Municipal Separate Storm Sewer System (MS4) National Pollutant Discharge Elimination System (NPDES) Permit[1] (Permit), the City of Malibu (Malibu), County of Los Angeles (County), and Los Angeles County Flood Control District (LACFCD) agreed to collaborate on the development of an Enhanced Watershed Management Plan (EWMP) for the North Santa Monica Bay Coastal Watersheds (NSMBCW).

This NSMBCW EWMP is intended to facilitate effective, watershed-specific Permit implementation strategies in accordance with Permit Part VI.C. This EWMP:

- Summarizes watershed-specific water quality priorities identified by the NSMBCW EWMP Group;
- Outlines the program plan, including specific strategies, control measures and best management practices (BMPs)[2] necessary to achieve water quality targets (Water Quality-Based Effluent Limitations [WQBELs] and Receiving Water Limitations [RWLs]); and
- Describes the quantitative analyses completed to support target achievement and Permit compliance.

In compliance with Section VI.C.4.b and Section VI.C.4.c.iv of the Permit, the NSMBCW EWMP Group submitted a Notice of Intent (NOI) to develop an EWMP on June 27, 2013, and a Work Plan for development of the EWMP on June 28, 2014, respectively, to the Los Angeles Regional Water Quality Control Board (Regional Board). The NOI is provided as **Appendix A** and the EWMP Work Plan is provided as **Appendix B**. As of the time of drafting of this EWMP, comments have not been received from the Regional Board on the submitted EWMP Work Plan. As the next step in EWMP development, the NSMBCW EWMP Group is required by Section VI.C.4.c.iv of the

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[1] 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.

[2] For simplification, the term "BMP" will be used to collectively refer to strategies, control measures, and/or best management practices. The Permit also refers to these measures as Watershed Control Measures.

Permit to submit this Draft EWMP no later than June 28, 2015. This Draft NSMBCW EWMP is consistent with the Work Plan previously submitted to the Regional Board.

Watershed Management Programs (WMPs) are a voluntary opportunity afforded by Section VI.C.1 of the Permit for Permittees to collaboratively or individually develop comprehensive watershed-specific control plans and are intended to facilitate Permit compliance and water quality target achievement. An EWMP is a WMP which comprehensively evaluates opportunities for collaboration on multi-benefit regional projects that retain all non-stormwater runoff and runoff from the 85th percentile, 24-hour storm event while also achieving benefits associated with issues such as flood protection and water supply. Where it is not feasible for regional projects to retain the 85th percentile, 24-hour storm, the EWMP must demonstrate through a Reasonable Assurance Analysis (RAA) that applicable water quality targets should be achieved. The EWMP allows Permittees to collaboratively or individually develop comprehensive watershed-specific control plans which:

a. Prioritize water quality issues;
b. Identify and implement focused strategies, control measures, and BMPs;
c. Execute an integrated monitoring and assessment program; and
d. Allow for modification over time.

In general, WMPs and EWMPs are intended to facilitate Permit compliance and water quality target achievement and must ensure: 1) that discharges from covered MS4s achieve applicable WQBELs and RWLs and do not include prohibited non-stormwater discharges; and 2) that control measures are implemented to reduce the discharge of pollutants to the maximum extent practicable (MEP). Per Permit Section VI.C.1.e, WMPs and EWMPs are to be developed based on the Regional Board's Watershed Management Areas (WMAs) or subwatersheds thereof.

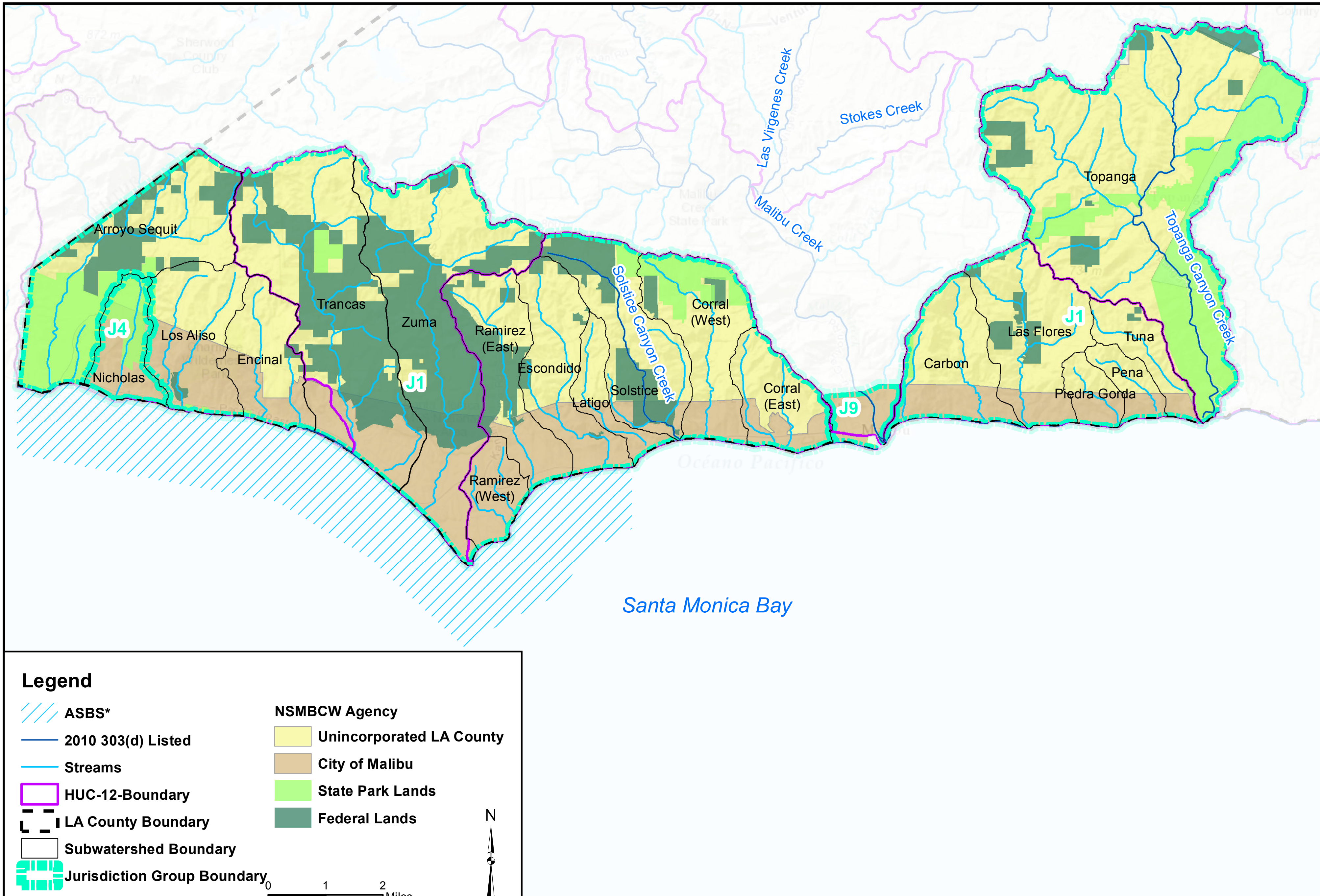
Consistent with Permit requirements, this EWMP is written to:

1. Be consistent with Permit provisions in Part VI.C.1.a.-f and Part VI.C.5-C.8;
2. Incorporate applicable State agency input on priorities and key implementation factors;
3. Provide for meeting water quality standards and other CWA obligations;
4. Include multi-benefit regional projects which retain stormwater from the 85th percentile, 24-hour storm;

5. Include watershed control measures to achieve compliance with all interim and final WQBELs in drainage areas where retention of the 85th percentile, 24-hour storm is infeasible;
6. Maximize the effectiveness of funding;
7. Incorporate effective innovative technologies;
8. Ensure existing requirements to comply with technology based effluent limitations and core requirements are not delayed; and
9. Ensure a financial strategy is in place.

This EWMP is applicable to the NSMBCW EWMP Area, which consists of the coastal subwatersheds within Santa Monica Bay Beaches Bacteria (SMBBB) TMDL Jurisdictional Groups 1 (J1) and 4 (J4) and the portion of Malibu Creek Watershed (SMBBB TMDL Jurisdictional Group 9 [J9]) within the City of Malibu's jurisdiction, as shown in **Figure ES-1**. It was developed through collaboration amongst the NSMBCW EWMP Group, all of whom maintain jurisdiction over a portion of the NSMBCW EWMP Area. The NSMBCW EWMP Area excludes lands owned by jurisdictions other than the NSMBCW EWMP Group, including the State of California and Federal lands.

The NSMBCW EWMP Area encompasses 55,121 acres, including 20 subwatersheds and 28 freshwater coastal streams as defined by the Basin Plan (Regional Board, 1995. Updated 2011). The 18 subwatersheds within J1 from east to west include: Topanga Canyon, Tuna Canyon, Pena Canyon, Piedra Gorda Canyon, Las Flores Canyon, Carbon Canyon, Corral Canyon, Solstice Canyon, Latigo Canyon, Escondido Canyon, Ramirez Canyon, Zuma Canyon, Trancas Canyon, Encinal Canyon, Los Alisos Canyon, and Arroyo Sequit. Nicholas Canyon, located between Los Alisos Canyon and Arroyo Sequit, is the only subwatershed within J4, and Malibu Creek is the only watershed within J9. The NSMBCW EWMP Area is shown in **Figure ES-1**. An additional, larger figure of the EWMP Area is provided in **Appendix G**.



*ASBS boundary is in the ocean up to the mean high tide line

Figure ES-1. NSMBCW EWMP Area.
NSMBCW EWMP

Januray 2016

Geosyntec consultants

RB-AR 4729

The EWMP approach, including model selection, data inputs, critical condition selection, calibration performance criteria, and output types is consistent with the Regional Board Reasonable Assurance Analysis Guidance Document (Regional Board, 2014) and also leverages previous efforts where relevant models have already been developed. The individual water quality targets, BMPs, Reasonable Assurance Analyses, schedules, and costs for each of the watersheds are summarized in watershed-specific sections that follow.

REASONABLE ASSURANCE ANALYSIS

Because the EWMP is a planning document intended to lay out a framework of activities that will achieve Water Quality objectives, it is necessary to demonstrate that selected BMPs are reasonably expected to meet defined goals. This evaluation of performance is described through a technically robust and rigorous Reasonable Assurance Analysis (RAA). The RAA evaluates the simulated existing load of prioritized pollutants for each modeled subwatershed, then compares this value to the allowable load for those same pollutants and subwatersheds. The difference between the simulated existing load and the calculated allowable load is the target load reduction (TLR), or the amount of load that needs to be reduced within the modeled subwatershed to reach compliance. The RAA then seeks to identify and evaluate BMP implementation scenarios within the NSMBCW EWMP Area for each priority pollutant identified below in order to meet the allowable load. The following is an overview of the types of BMPs contemplated in the NSMBCW EWMP Area.

> Programmatic BMPs: These source controls include a combination of BMPs such as new or enhanced pet waste controls (ordinance, signage, education/outreach, mutt mitts, etc.), Clean Bay Restaurant Program, enhanced street sweeping (e.g., 100% vacuum sweepers, increased frequency, posting of ‘No Parking’ signs for street sweeping, etc.), increased catch basin and storm drain cleaning, and other new or enhanced nonstructural BMPs that target the pollutants addressed in this EWMP.
>
> Public Retrofit Incentives: These BMPs include programs directed at incentivizing the public to decrease the amount of stormwater runoff from their property, specifically via downspout disconnection programs that redirect roof runoff to vegetated or otherwise pervious areas.
>
> Redevelopment: Beginning in 2001, redevelopment projects were required by the Permit (via the Standard Urban Stormwater Management Program [SUSMP]) to incorporate stormwater treatment BMPs into their projects if their project size exceeded specified thresholds. The 2001 MS4 Permit SUSMP redevelopment

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requirements were applied between 2003 (the point at which the Bacteria TMDL was implemented) and 2015 for the NSMBCW EWMP Area. Additionally, the 2012 MS4 Permit established new criteria for redevelopment projects, requiring certain sized projects to capture, retain, or infiltrate the 85th percentile design storm or the 0.75-inch design storm, whichever is greater, via the implementation of LID BMPs. These were taken into account as well.

Structural BMPs: Both existing and proposed regional and distributed structural BMPs are included in this EWMP to address water quality targets in the Santa Monica Bay Watershed.

The RAA process shows that implementation of EWMP-defined activities within the NSMBCW EWMP Area are expected to result in discharges that achieve applicable Permit-specified WQBELs and that do not cause or contribute to exceedances of applicable RWLs.

WATER QUALITY PRIORITIES

Receiving waters for stormwater runoff from the NSMBCW EWMP Area were screened for water quality priorities by reviewing Total Maximum Daily Loads (TMDLs), the State's 303(d) list, and additional water quality data. Each identified water quality priority for a given receiving water body was categorized as a water body-pollutant combination (WBPC). WBPCs were classified into one of three categories, in accordance with Section VI.C.5(a).ii of the Permit. **Table ES-1** presents the resulting classifications for the WBPCs within the NSMBCW EWMP Area. WBPCs categorized below are subject to change through the EWMP's adaptive management process (as described in Section 8) based on future data collected as part of the CIMP or other monitoring programs.

Table ES-1. Water Body Pollutant Prioritization for the NSMBCW EWMP Area

Category	Water Body	Pollutant	Basis
1	Malibu Creek and Lagoon	Nutrients	USEPA-established Nutrients TMDL and Benthic TMDL for the Malibu Creek Watershed
	SMB Beaches	Dry Weather Bacteria	SMB Beaches Bacteria TMDLs for both dry and wet weather
	SMB Beaches	Wet Weather Bacteria	
	Malibu Creek and Lagoon	Indicator Bacteria	Malibu Creek and Lagoon Indicator Bacteria TMDL
	Malibu Creek	Trash	Malibu Creek Trash TMDL
	SMB	Trash/Debris	TMDL for debris for Santa Monica Bay Offshore/Nearshore
	SMB	DDTs	USEPA TMDL for DDT and PCBs for Santa Monica Bay Offshore/Nearshore
	SMB	PCBs	
2	Topanga Canyon Creek	Lead	Topanga Canyons Creek 303(d) listing for lead.
	Malibu Creek	Sulfates & Selenium	Malibu Creek 303(d) listing for sulfates and selenium
	Malibu Lagoon	pH	Malibu Lagoon 303(d) listing for pH
3	None		There are currently no known available data demonstrating exceedances of receiving water limits within the NSMBCW Area, aside from those WBPCs already defined as Category 1 and 2.

The RAA was performed for bacteria in both the Santa Monica Bay Watershed and the Malibu Creek Watershed. In addition, the RAA was performed for nutrients (nitrates, total nitrogen, and total phosphorus) in the Malibu Creek Watershed and total lead in the Topanga Canyon Creek subwatershed.

The MS4 compliance targets for dichloro-diphenyl-trichloroethanes (DDTs) and polychlorinated biphenyls (PCBs) established in the Santa Monica Bay DDT & PCB TMDL were based on the assumption that the existing stormwater pollutant loads for DDT and PCBs were lower than what was needed to protect the Santa Monica Bay from these legacy pollutants (i.e., based on data used in the TMDL, no MS4 pollutant load reduction is expected to be required). Therefore, no reductions in DDT and PCB loading from the NSMBCW EWMP Group MS4s are required to meet the TMDL and therefore, no pollutant modeling is required.

Trash was not modeled as part of the RAA, instead the RAA describes how the NSMBCW EWMP Agencies will comply with the TMDL through their Trash Monitoring and Reporting Programs which are aimed at meeting the zero trash discharge definition in the TMDL.

SANTA MONICA BAY WATERSHED

In the NSMBCW EWMP Area, the wet weather RAA was performed for bacteria in all subwatersheds and total lead in the Topanga Creek subwatershed. After evaluating the TLR for each WBPC in the Santa Monica Bay Watershed, BMPs were identified where necessary to meet the allowable loads. The wet weather TLRs for bacteria in the tributary subwatersheds to Santa Monica Bay were calculated to range from 0 to 43.9 percent (as a percent of calculated baseline load), and the cumulative wet weather TLR for the entire NSMBCW EWMP Area in the Santa Monica Bay Watershed was calculated to be 7.3 percent of the baseline load. The wet weather TLR for total lead in the Topanga Creek subwatershed was estimated to be zero. Section 5.1 details the calculated TLRs for bacteria in Santa Monica Bay and total lead in Topanga Creek.

Where wet weather TLRs were calculated to be greater than zero, BMPs were identified in order to reduce the existing load to compliance levels. A summary of specific BMPs for Santa Monica Bay can be found in Section 1.1 and results from the RAA can be found in Section 1.1 for Santa Monica Bay.

For dry weather, the NSMBCW EWMP Group's compliance approach is consistent with the Permit requirement to eliminate 100 percent of non-exempt dry weather MS4 discharges. The Group's implementation approach for achieving this is to use a suite of non-structural source controls (e.g., water conservation incentives, enhanced illicit discharge detection and elimination (IDDE) efforts, and enhanced education/outreach and inspection/ enforcement to prevent non-exempt sources of non-stormwater flow) and source investigations. By eliminating flows, this is equivalent to 100 percent load reduction for all pollutants, thereby demonstrating reasonable assurance of meeting all applicable TMDL limits and water quality objectives in the Permit during dry weather. Elimination of discharges is a pathway for compliance with RWLs and WQBELs in the MS4 Permit (per Section VI.E.2.e.i.(3)); without discharges there can be no "cause or contribute" to receiving water issues.

MALIBU CREEK WATERSHED

The NSMBCW EWMP Group is responsible for the portion of the Malibu Creek Watershed within the City of Malibu. This area is approximately 618 acres in size, or 0.87 percent of the entire 70,651 acre Malibu Creek Watershed. Approximately 306 acres of the 618-acre watershed are tributary to Malibu Legacy Park. Legacy Park was designed to retain the 0.75-inch design storm for most of the 306-acre Civic Center drainage areas, as well as dry weather flows from the other two drains which are tributary to the project. Because the 85th percentile, 24-hour design storm over the entire Legacy Park tributary area is approximately 0.65 inch, the park currently qualifies as a regional EWMP project. The RAA was therefore not performed for the tributary area to Malibu Legacy Park, since it is considered a regional EWMP project capable of capturing and retaining the 85th percentile, 24-hour storm.

The remaining area, which is almost entirely on the eastern side of Malibu Creek, is a uniquely developed area requiring special consideration when modeling as part of the RAA. This area (identified as the "MCW" analysis region, as shown in **Figure ES-2**) contains approximately 312 acres of sparsely developed space, with a total impervious coverage of approximately 12 percent. The development in this analysis region contains mostly low density (rural) single family residential. There are no NSMBCW Agency-owned storm drains in this analysis region and streets do not have curbs or gutters. Besides the 85 acres of state- and federally-owned land, the developed neighborhood is privately owned property, including private roads. None of the developed area is directly connected to Malibu Creek. Instead, all impervious areas are disconnected via densely vegetated fields and flow paths. To represent this disconnected imperviousness, baseline conditions for the developed areas in this analysis region were modeled as being tributary to vegetated swales.

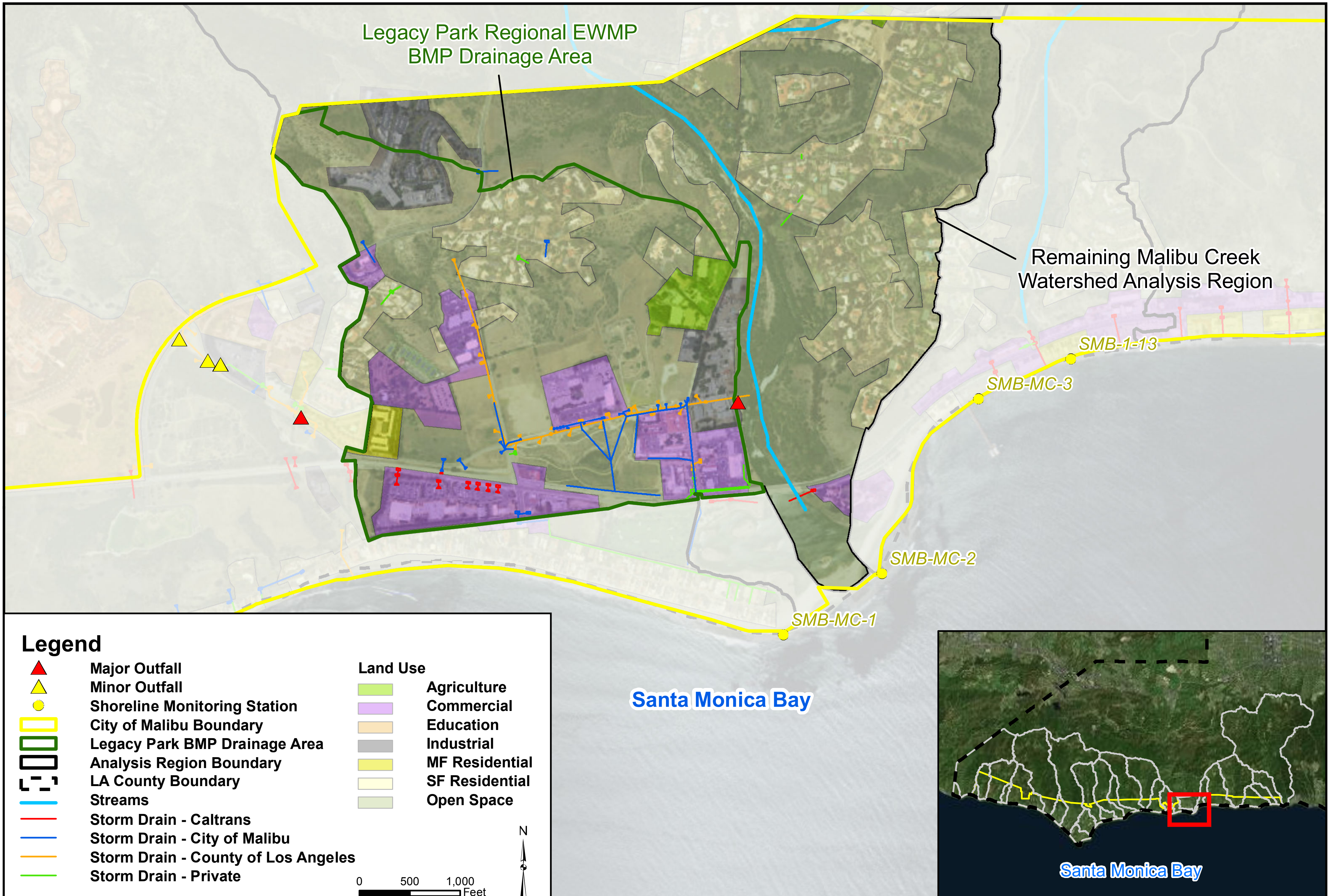

Figure ES-2. Malibu Creek Watershed NSMBCW EWMP

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For bacteria within the modeled area of the Malibu Creek Watershed, the absolute allowed load for fecal coliform was calculated to be 23.5 x 10^{12} MPN for Model Year 1995. However, the baseline load reaching Malibu Creek was calculated to be 19.9 x 10^{12} MPN fecal coliform due to the limited discharges occurring from the EWMP Area. Therefore, even during the critical year, since the existing load is less than the allowed load, no load reduction is required to meet the allowed load (TLR = 0), and reasonable assurance of compliance with the TMDL limit has been demonstrated.

For nitrate plus nitrite in the Malibu Creek Watershed per the Malibu Creek Nutrients TMDL, the allowed load, calculated based on total runoff in the 90th percentile critical year (1995) multiplied by the concentration-based waste load allocation (8 mg/L), was calculated to be 8,680 lbs. The baseline load, calculated based on total runoff in 1995 multiplied by the 90th percentile daily concentration in 1995 (1.6 mg/L), is 1,733 lbs. Therefore, even in a critical condition, no load reduction is required to meet the allowed load (TLR = 0), and reasonable assurance of compliance with the TMDL limit has been demonstrated.

For total nitrogen within the Malibu Creek Watershed per the USEPA Benthic TMDL, the TMDL establishes a final concentration-based waste load allocation for total nitrogen of 4.0 mg/L (average winter season load). Within the NSMBCW EWMP-portion of the Malibu Creek Watershed, the total nitrogen baseline load reaching the receiving water for Model Year 1995 (2,170 lbs) was calculated to be less than the allowed load (4,340 lbs); therefore, load reductions are not anticipated to be necessary to meet the TMDL winter total nitrogen WLA (i.e., the TLR is zero), and reasonable assurance of compliance has been demonstrated. Similarly for total phosphorus, the TMDL establishes a final concentration-based waste load allocation for total phosphorus of 0.2 mg/L (average winter season load). Within the NSMBCW EWMP-portion of the Malibu Creek Watershed, the total phosphorus baseline load reaching the receiving water for Model Year 1995 (211 lbs) was calculated to be less than the allowed load (217 lbs); therefore, load reductions are not anticipated to be necessary to meet the TMDL WLAs (i.e., the TLR is zero), and reasonable assurance of compliance has been demonstrated.

Therefore, within the Malibu Creek Watershed analysis region, reasonable assurance of compliance with all WBPC allowed loads was demonstrated since there is no required load reduction. As such, no new structural BMPs have been proposed for this watershed (Analysis Region MCW). Load reductions associated with the implementation of non-structural BMPs were quantified and range from 7 to 24 percent of baseline loads for the critical year for each modeled pollutant. These are summarized in Section 6.3.

For dry weather within the Malibu Creek Watershed, all flows tributary to Legacy Park are captured, treated, and retained by Legacy Park. Therefore, dry weather discharges from this area do not exist. In the remaining portion of the Malibu Creek Watershed, the only storm drain infrastructure is a small rectangular channel on the eastern side of Malibu Creek. This drain is privately owned, and is not directly connected to the Creek. Therefore, no dry weather discharges are known to occur from the NSMBCW EWMP Area within the Malibu Creek Watershed, and reasonable assurance of compliance with applicable dry weather bacteria TMDL WQBELs and nutrient TMDL WLAs is demonstrated on this basis. Future screening results will be considered through the EWMP adaptive management process, and this dry weather RAA conclusion may be reevaluated at that time.

ESTIMATED COSTS

Costs were estimated for the proposed structural BMPs identified in the EWMP. Total capital costs estimated for structural BMPs include “hard” costs, such as construction and materials, as well as “soft” costs, such as design, construction management, and permitting. Operation and maintenance costs were also estimated for structural BMPs, as discussed in Section 9.

1 INTRODUCTION

Following adoption of the 2012 Los Angeles Municipal Separate Storm Sewer System (MS4) National Pollutant Discharge Elimination System (NPDES) Permit[3] (Permit), the City of Malibu (Malibu), County of Los Angeles (County), and Los Angeles County Flood Control District (LACFCD) agreed to collaborate on the development of an Enhanced Watershed Management Plan (EWMP) for the North Santa Monica Bay Coastal Watersheds (NSMBCW). This NSMBCW EWMP is intended to facilitate effective, watershed-specific Permit implementation strategies in accordance with Permit Part VI.C. This document summarizes the NSMBCW-specific water quality priorities identified jointly by Malibu, the County, and LACFCD (collectively referred to as the NSMBCW EWMP Group), outlines the program plan, including specific strategies, control measures and best management practices (BMPs) necessary to achieve water quality targets (Water Quality-Based Effluent Limitations [WQBELs] and Receiving Water Limitations [RWLs]), and describes the quantitative analysis performed to support target achievement and Permit compliance.

In compliance with Section VI.C.4.b and Section VI.C.4.c.iv of the Permit, the NSMBCW EWMP Group submitted a Notice of Intent (NOI) to develop an EWMP on June 27, 2013, and a Work Plan for development of the EWMP on June 28, 2014 to the Los Angeles Regional Water Quality Control Board (Regional Board). The EWMP Notice of Intent and Work Plan are provided as **Appendix A** and **Appendix B**, respectively. As of the time of drafting of this EWMP, comments have not been received from the Regional Board on the submitted EWMP Work Plan. As the next step in EWMP development, the NSMBCW EWMP Group is required by Section VI.C.4.c.iv of the Permit to submit this Draft EWMP no later than June 28, 2015. This Draft NSMBCW EWMP is consistent with the Work Plan previously submitted to the Regional Board.

In compliance with Section VI.B and Attachment E of the Permit, the NSMBCW EWMP Group submitted a Coordinated Integrated Monitoring Plan (CIMP) to the Regional Board on June 28, 2014. The CIMP was finalized in accordance with comments received from the Regional Board and re-submitted for approval on September 4, 2015.

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[3] 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.

1.1 PURPOSE AND REGULATORY FRAMEWORK

Watershed Management Programs (WMPs) are a voluntary opportunity afforded by Section VI.C.1 of the Permit for Permittees to collaboratively or individually develop comprehensive watershed-specific control plans and are intended to facilitate Permit compliance and water quality target achievement. An EWMP is defined in the Permit as a WMP which comprehensively evaluates opportunities for collaboration amongst Permittees and other partners on multi-benefit regional projects that, wherever feasible, retain, 1) all non-stormwater runoff, and 2) all stormwater runoff from the 85th percentile, 24-hour storm event while also achieving benefits associated with issues such as flood control and water supply. Where regional projects cannot achieve these standards, the EWMP must demonstrate that applicable water quality targets are achieved through a Reasonable Assurance Analysis (RAA). Additional details on the regulatory background (NPDES Permit, Water Quality Standards, and California Ocean Plan) and the Permit specifics of EWMPs are provided below.

1.1.1 NPDES PERMIT

The 1972 Clean Water Act (CWA) established the NPDES Program to regulate the discharge of pollutants from point sources to waters of the United States. In 1990, the USEPA developed Phase I of the NPDES Storm Water Permitting Program, which established a framework for regulating municipal and industrial discharges of stormwater and non-stormwater that had the greatest potential to negatively impact water quality within waters of the United States. In particular, under Phase I, USEPA required NPDES Permit coverage for discharges from medium and large MS4 servicing populations greater than 100,000 persons. Operators of MS4s regulated under the Phase I NPDES Storm Water Program were required to obtain permit coverage for municipal discharges of stormwater and non-stormwater to waters of the United States.

The Regional Board designated the MS4s owned and/or operated by the incorporated cities and Los Angeles County unincorporated areas within the Coastal Watersheds of Los Angeles County as a large MS4 due to the total population of Los Angeles County. All MS4s within the Coastal Watersheds of Los Angeles County except for the City of Long Beach MS4 are subject to the waste discharge requirements set forth in Order No. R4 2012-0175 Permit No. CAS004001. General permit requirements, which are relevant to and must be met through EWMPs, include: (i) a requirement to effectively prohibit non-stormwater discharges through the MS4, (ii) requirements to implement controls to reduce the discharge of pollutants to the maximum extent practicable, and (iii) other provisions the Regional Board has determined appropriate for the control of such pollutants.

1.1.2 *WATER QUALITY STANDARDS AND TMDLS*

The CWA also required that Regional Water Quality Control Boards establish water quality standards for each water body in their region. Water quality standards include beneficial uses, water quality objectives and criteria that are established at levels sufficient to protect those beneficial uses, and an anti-degradation policy to prevent degrading waters. The Regional Board adopted a Water Quality Control Plan - Los Angeles Region (hereinafter Basin Plan) on June 13, 1994 addressing this portion of the CWA, which designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters in the Los Angeles Region. Pursuant to California Water Code section 13263(a), the requirements of the Permit implement the Basin Plan. Beneficial use designations for water bodies within the NSMBCW EWMP Area are summarized in **Table 1**.

Table 1. NSMBCW Water Bodies and Beneficial Uses Designated in the Basin Plan

Water Body	MUN	IND	GWR	NAV	REC1	REC2	COMM	SHELL	WARM	COLD	EST	MAR	WILD	BIOL[c]	RARE	MIGR	SPWN	WET[a]
Santa Monica Bay Nearshore and Offshore		E		E	E	E	E	E				E	E	E	E	E	E	
Los Angeles County Coastal Beaches[b]				E	E	E	E	E				E	E			E[d]	P	
Malibu Lagoon				E	E	E					E	E	E		E	E	E	E
Malibu Creek	P*				E	E			E	E			E		E	E	E	E
Arroyo Sequit	P*		I		E	E			E	E			E		E	E	E	E
Nicholas Canyon	P*				I	I			I				E					
Los Alisos Canyon	P*				I	I			I				E		E			
Lachusa Canyon	P*				I	I			I				E					
Encinal Canyon	P*				I	I			I				E		E			
Trancas Canyon Creek	E*				E	E			E				E		E			
Zuma Canyon Creek	E*				E	E			E	E			E		E	P	P	
Zuma Lagoon (a.k.a., Dume Lagoon				E	E	E	E				E		E		E	P	P	E
Ramirez Canyon Creek	I*				I	I			I				E				P	
Escondido Canyon Creek	I*				I	I			I				E		E			
Latigo Canyon	I*				I	I			I				E		E			
Puerco Canyon	I*				I	I			I				E					
Solstice Canyon Creek	E*				E	E			E				E			P	P	
Corral Canyon Creek	I*				I	I			I				E					
Carbon Canyon	P*				I	I			I				E					
Las Flores Canyon Creek	P*				I	I			I				E					
Piedra Gorda Canyon	P*				I	I			I				E					
Pena Canyon	P*				I	I			I	E			E					
Tuna Canyon	P*				I	I			I				E					
Topanga Canyon Creek	P*				I	I			E	E			E			P	I	
Topanga Lagoon				E	E	E	E				E		E		E	E	E	E

E = Existing beneficial use; I = Intermittent beneficial use; P = Potential beneficial use

*Asterisked MUN designations are designated under SB 88-63 and RB 89-03. Some designations may be considered for exemption at a later date.

[a] Water bodies designated as WET may have wetlands habitat associated with only a portion of the water body. Any regulatory action would require a detailed analysis of the area.

[b] Applicable beaches include Nicholas Canyon Beach, Trancas Beach, Zuma County (Westward) Beach, Dume State Beach, Escondido Beach, Dan Blocker Memorial (Corral) Beach, Corral Canyon Beach, Puerco Beach, Amarillo Beach, Malibu Beach, Carbon Beach, La Costa Beach, Las Flores Beach, Las Tunas Beach, and Topanga Beach.

[c] Only applicable to the Nearshore Zone of Santa Monica Bay.

[d] Only applicable to Malibu Beach.

CWA Section 303(d)(1) requires each state to identify the waters within its boundaries that do not meet water quality standards. Water bodies that do not meet water quality standards are considered impaired and are placed on the state's CWA Section 303(d) List. For each listed water body-pollutant combination, the state is required to establish a Total Maximum Daily Load (TMDL) to establish the allowable pollutant loadings for a water body and provide the basis upon which to establish water quality-based controls (required by NPDES Permits). Provisions regarding TMDLs are then incorporated into NPDES Permits once they have been developed and adopted. The 2010 CWA Integrated Report and updated 303(d) list were approved by the State Water Resources Control Board (SWRCB) on August 4, 2010 and by the United States Environmental Protection Agency (USEPA) on October 11, 2011. Specific TMDLs developed for the NSMBCW EWMP Area are discussed in more detail in Section 2.

1.1.3 OCEAN PLAN AREAS OF SPECIAL BIOLOGICAL SIGNIFICANCE

In 1972, the State of California adopted the Ocean Plan (SWRCB, 2012a), which regulates waste discharges to protect the quality of ocean waters for use and enjoyment by the general public. All receiving water bodies are ultimately tributary to the SMB, thus making the regulations set forth in the Ocean Plan applicable to the NSMBCW. In particular, the Ocean Plan designates Areas of Special Biological Significance (ASBS), which are areas requiring special protection of species or biological communities to the extent that maintenance of natural water quality is assured. One of these ASBS designations is within the NSMBCW EWMP Area and includes the minimally-developed area from Laguna Point to Latigo Point, known as ASBS 24 (see **Figure 1**). The Permit defines this area as:

"Ocean water within a line originating from Laguna Point at 34° 5' 40" north, 119° 6'30" west, thence southeasterly following the mean high tideline to a point at Latigo Point defined by the intersection of the mean high tide line and a line extending due south of Benchmark 24; thence due south to a distance of 1000 feet offshore or to the 100 foot isobath, whichever distance is greater; thence northwesterly following the 100 foot isobath or maintaining a 1,000-foot distance from shore, whichever maintains the greater distance from shore, to a point lying due south of Laguna Point, thence due north to Laguna Point."

There are 26 identified outfalls owned, operated/maintained, or monitored by the NSMBCW Agencies that are located within the ASBS 24 drainage area; ten of these outfalls have been identified as major outfalls.[4] As a result of this ASBS designation, the NSMBCW agencies were required by the SWRCB to either cease the discharge of stormwater and nonpoint sources of waste into ASBS 24 or request an exception to the California Ocean Plan. The NSMBCW agencies each submitted a request for an exception. In March of 2012, the SWRCB granted these exceptions, finding that such discharge exceptions will not compromise protection of ocean waters for beneficial uses. As a stipulation of the exceptions, discharges by the NSMBCW agencies are required to meet the following criteria:

- The discharges must be covered under an appropriate authorization to discharge waste to the ASBS, such as an NPDES permit and/or waste discharge requirements;
- The authorization must incorporate all of the Special Protections required by the SWRCB in Resolution No. 2012-0012 (SWRCB, 2012b); and
- The exception applies to stormwater and nonpoint source waste discharges only.

The details of the California Ocean Plan exceptions are provided in SWRCB Resolution No. 2012-0012 (SWRCB, 2012b).

In September 2014, the NSMBCW EWMP Group submitted a Draft Compliance Plan and Draft Pollution Prevention Plan to the SWRCB in order to provide a comprehensive approach to dealing with potential pollutant sources to ASBS 24 (NSMBCW EWMP Group, 2014b and NSMBCW EWMP Group, 2014c). After conducting an assessment of the potential pollutant load reductions that would protect the water quality of the ASBS, it was determined that structural BMPs would not be required to meet targets. Instead, non-structural source controls would be relied upon to ensure ongoing protection of ASBS 24 and to meet the requirements of the ASBS Special Protections.

As described in more detail herein, the NSMBCW EWMP includes similar findings; namely, that additional structural BMPs are not required within the NSMBCW EWMP Area tributary to ASBS 24. The non-structural BMPs described in the ASBS Compliance Plan are included in **Appendix D** and consistency with ASBS compliance actions is described in Section 5.2.2.3 of this NSMBCW EWMP.

[4] The ASBS 24 Compliance Plan identifies 21 outfalls owned, operated/maintained, or monitored by the NSMBCW Agencies that discharge directly to ASBS 24. The additional five outfalls identified in this EWMP discharge to other receiving water bodies upstream of ASBS 24.

The ASBS 24 Compliance Plan is included in the NSMBCW EWMP as **Appendix E**.

1.1.4 WMPs and Enhanced WMPs

The voluntary WMPs and EWMPs allow Permittees to collaboratively or individually develop comprehensive watershed-specific control plans which a) prioritize water quality issues, b) identify and implement focused strategies, control measures and BMPs, c) execute an integrated monitoring and assessment program, and d) allow for modification over time. In general, WMPs and EWMPs are intended to facilitate Permit compliance and water quality target achievement and must ensure: 1) that discharges from covered MS4s achieve applicable WQBELs and RWLs and do not include prohibited non-stormwater discharges; and 2) that control measures are implemented to reduce the discharge of pollutants to the maximum extent practicable (MEP). Per Permit Section VI.C.1.e, WMPs and EWMPs are to be developed based on the Regional Board's Watershed Management Areas (WMAs) or subwatersheds thereof.

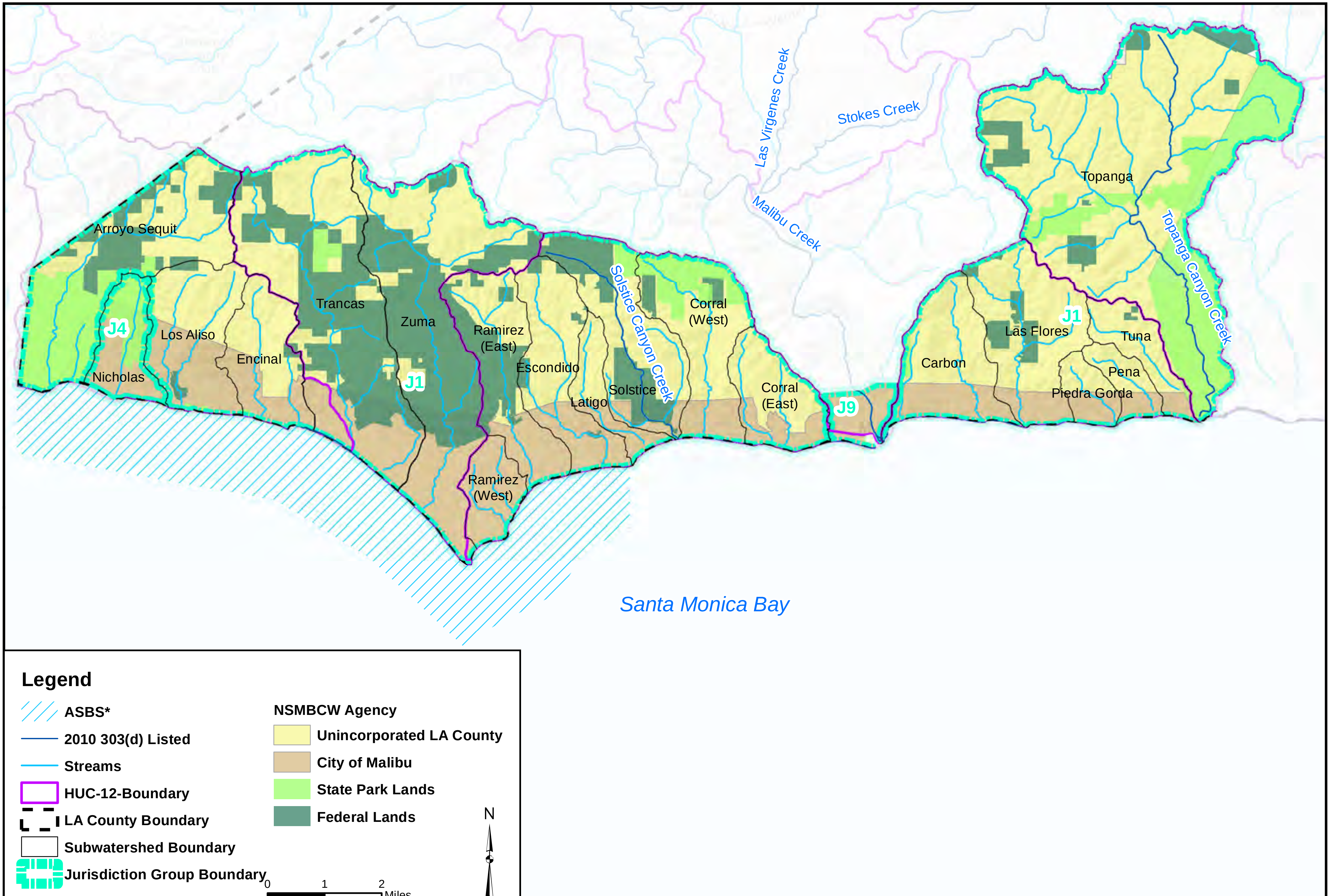
The Permit specifies that an EWMP shall:

1. Be consistent with Permit provisions in Part VI.C.1.a.-f and Part VI.C.5-C.8;
2. Incorporate applicable State agency input on priorities and key implementation factors;
3. Provide for meeting water quality standards and other CWA obligations;
4. Include multi-benefit regional projects which retain stormwater from the 85^{th} percentile, 24-hour storm;
5. Include watershed control measures to achieve compliance with all interim and final WQBELs in drainage areas where retention of the 85^{th} percentile, 24-hour storm is infeasible;
6. Maximize the effectiveness of funding;
7. Incorporate effective innovative technologies;
8. Ensure existing requirements to comply with technology based effluent limitations and core requirements are not delayed; and
9. Ensure a financial strategy is in place.

The EWMP must also include an adaptive management process that allows the EWMP to be modified based on consideration of items such as, but not limited to, water quality data, implementation progress, and Regional Board recommendations.

1.2 EWMP JURISDICTIONAL CHARACTERISTICS

This EWMP is applicable to the NSMBCW EWMP Area, which consists of the coastal watersheds within Santa Monica Bay Beaches Bacteria (SMBBB) TMDL Jurisdictional Groups 1 (J1) and 4 (J4) and the portion of Malibu Creek Watershed (SMBBB TMDL Jurisdictional Group 9 [J9]) within the City of Malibu's jurisdiction. It represents collaboration amongst the NSMBCW EWMP Group, all of whom maintain jurisdiction over a portion of the NSMBCW EWMP Area. The NSMBCW EWMP Area excludes lands owned by jurisdictions other than the NSMBCW EWMP Group, including the State of California and Federal lands. The NSMBCW EWMP Area is shown in **Figure 1**. An additional, larger figure of the EWMP Area is provided in **Appendix G**.



*ASBS boundary is in the ocean up
to the mean high tide line

Figure 1. NSMBCW EWMP Area.
NSMBCW EWMP

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Although the NSMBCW EWMP Group does not have responsibility over Federal or State agencies, including Caltrans and California State Parks, the Mountains Recreation and Conservation Authority (MRCA), Santa Monica Mountains Conservancy (SMMC) and the National Park Service (NPS), the Group will continue to pursue coordination with these agencies via interagency agreements and/or other means. Efforts will be made to coordinate and pursue cost sharing on projects with Caltrans and the park agencies, as well as to properly identify storm drain ownership and maintenance responsibilities.

1.3 GEOGRAPHICAL CONTEXT

The NSMBCW EWMP Area encompasses 55,121 acres, including 20 subwatersheds and 28 freshwater coastal streams as defined by the Basin Plan (Regional Board, 1995. Updated 2011). The subwatersheds within J1 from east to west include: Topanga Canyon, Tuna Canyon, Pena Canyon, Piedra Gorda Canyon, Las Flores Canyon, Carbon Canyon, Corral Canyon, Solstice Canyon, Latigo Canyon, Escondido Canyon, Ramirez Canyon, Zuma Canyon, Trancas Canyon, Encinal Canyon, Los Alisos Canyon, and Arroyo Sequit. Nicholas Canyon, located between Los Alisos Canyon and Arroyo Sequit, is the only subwatershed within J4 and Malibu Creek is the only watershed within J9.

1.3.1 TOPOGRAPHY

The topography of the NSMBCW EWMP Area is dominated by the Santa Monica Mountains, an east-west trending mountain range (also referred to as a transverse range) that rises steeply from the Pacific Ocean. Elevations range from sea level to 3,111 feet at Sandstone Peak in the northern portion of Arroyo Sequit subwatershed (United States Geological Survey Topographic-Bathymetric Map Los Angeles, CA 1975), which is approximately 5.5 miles inland from the Pacific Ocean. Drainage is thus is characterized by steep, narrow canyons which run out of the Santa Monica Mountains across a very narrow coastal plain.

1.3.2 CLIMATE

Annual rainfall within the Malibu coastal plain averages 12-13 inches, though annual rainfall can vary significantly from year-to-year as well as geographically throughout the EWMP Area, primarily due to the Santa Monica Mountains.

Although rainfall in the area is generally low and infrequent, passing storms (coinciding with the southern California rainy season from November to April) are generally intense, capable of releasing large rain amounts in relatively short periods of time (Malibu Bay Company, 2002).

1.3.3 GEOLOGY

The Santa Monica Mountains are relatively young, having formed approximately 20 million years ago as a result of repeated episodes of uplift and submergence. Considered part of the east-west trending Transverse Range, they are believed to be an extension of the Channel Islands. The Santa Monica Mountains can be characterized as an anticline ruptured by faulting and intrusions, the most dominant of which being the Malibu Fault. The Malibu Coast fault runs from offshore just west of Point Dume to offshore just east of Malibu and separates Catalina Schist basement rocks, offshore south of the coast, from granitic and meta-sedimentary rocks north of the fault. Due to the folding and faulting that has affected the Santa Monica Mountains, bedrock formations have fractures, joints, and tilted bedding planes at both steep and shallow angles.

The bedrock formations exposed in the Santa Monica Mountains north of the Malibu Coast fault consist of two main sequences (Yerkes and Campbell, 1980). The lower sequence consists of basement rocks of middle Mesozoic age, including slates, schists, and granitic rocks which are overlain by marine sedimentary series of late Cretaceous and early Tertiary age sandstone and siltstone formations. The upper sequence is a varied group of sedimentary and volcanic formations of middle Tertiary (Oligocene and Miocene) age that make up part of the south-central and western Santa Monica Mountains. These are the Sespe, Vaqueros, and Topanga Formations, Conejo Volcanics (intrusive volcanics into the Sespe and Vaqueros Formations), Monterey Formation, and Trancas Formation. A comprehensive water quality report by the Las Virgenes Municipal Water District (LVMWD) in 2011 (LVMWD, 2011) found that the Monterey Formation in particular is known to contain high levels of sulfur, selenium, and phosphate.

South of the Malibu Coast fault, the upper sequence bedrock formations found consist of Trancas Formation siltstone, sandstone and claystone (found at Trancas) and Monterey Formation shales (found at Point Dume). Trancas and Point Dume also have associated Pleistocene terrace deposits or Quaternary alluvium, beach, or estuarine deposits.

The shallowest surface geologic units consist of colluvium/soil, alluvium, estuarine deposits, landslide deposits, and terrace deposits. These range in age from very recent (historic) to early Quaternary (Pleistocene), and may be locally covered by artificial fill. All of the natural units was deposited by either water (streams, debris flows, long shore currents, and high tidal surges), gravity (slow creep or rapid slippage), or by in-place weathering (soil).

1.3.4 SOILS

The USDA Soil Conservation Service (now the Natural Resources Conservation Services) prepared a study in 1967 entitled "Soils of the Malibu Area, California with Farm and Non-farm Interpretations" that characterized soils in the Malibu area. Based on this study, the majority of soils in the NSMBCW EWMP Area are classified as clay loams or silty clay loams. Specific examples of soil types found in the area include Castaic silty clay loams, Gazos silty clay loams, Gilroy clay loams, and Linne silty clay loams. Due to their clay nature, soils within the NSMBCW EWMP Area tend to have low infiltration capacity and high runoff potential.

Based on the SBPAT geodatabase, **Figure 2** presents a general overview of soil conditions and geologic hazards that serve as an impedance to large-scale infiltration within the NSMBCW EWMP Area. When coupled with developed conditions near the ocean and lack of undeveloped, publicly owned parcels near storm drains, the opportunity for implementation of infiltration projects within the EWMP Area becomes severely limited. Additional discussion of this conclusion is provided in Section 5.2.1.

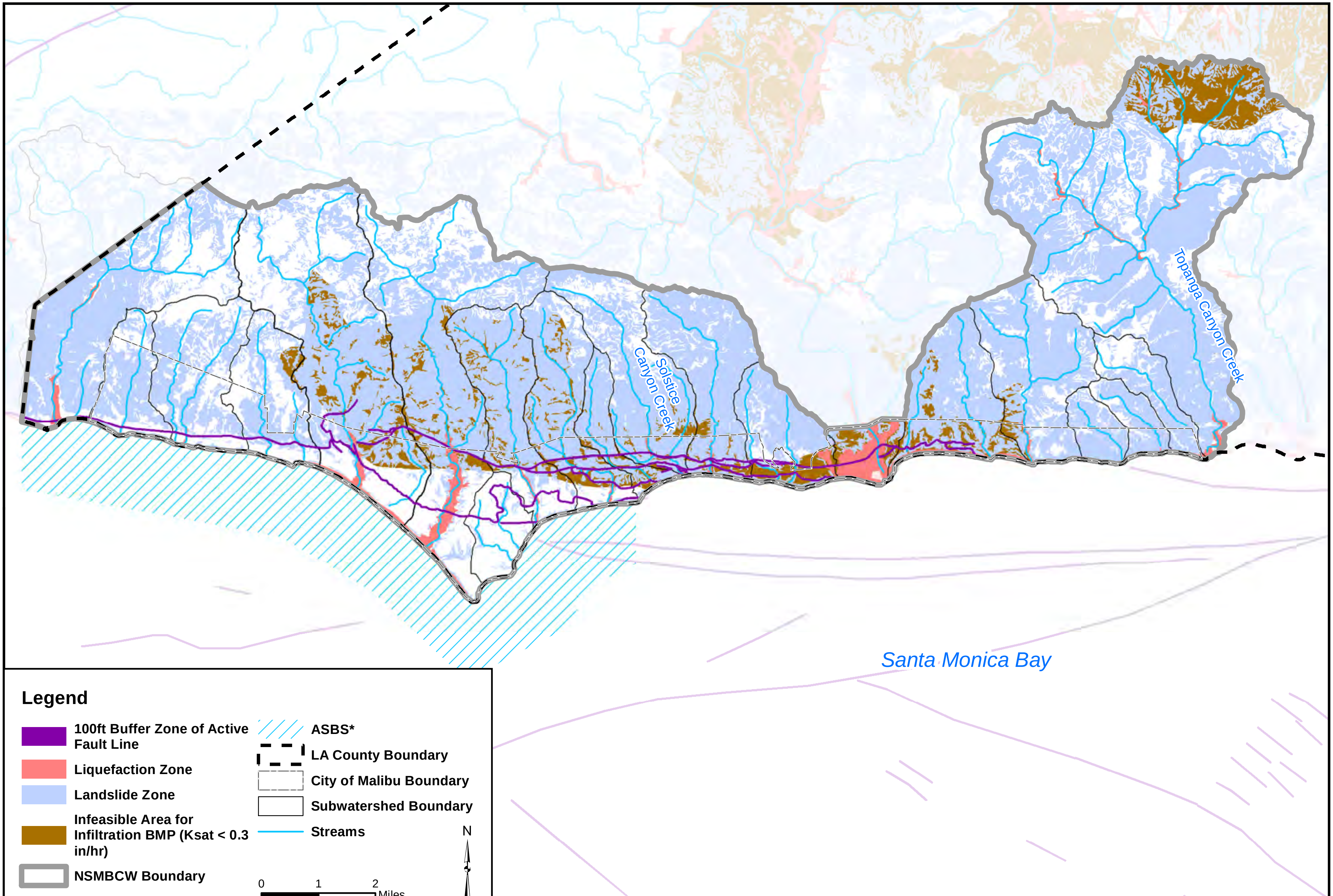
1.3.5 LAND USE

As summarized in **Table 2** and illustrated in **Figure 3**, the land within the NSMBCW EWMP Area is largely undeveloped (93% vacant land use), the majority of which is designated as natural open space presently owned by State Parks, SMMC, MRCA, the NPS, Los Angeles County, and the City of Malibu. These public parklands and beaches attract more than 20 million annual visitors who enjoy the natural resources. The entire coastal watershed is traversed by the popular Backbone Trail that crosses every subwatershed and attracts hikers, bikers and equestrians. All major coastal subwatersheds are crossed by Pacific Coast Highway; owned and operated by the California Department of Transportation (Caltrans). The transportation infrastructure needed to bridge the coastal streams generally includes either hard of soft bottom concrete box culverts. Where concrete culverts are located, scour ponds generally form either upstream or downstream of the box culvert and impede natural stream flows before reaching the ocean.

The majority of developed land is located along or adjacent to the narrow stretch of coastal plain, with a few exceptions where development is dispersed in the mid- to upper areas (e.g., in Topanga Canyon subwatershed). Low density and rural residential development are the most prevalent developed land uses. Commercial lands are sparse and there are currently no industrial uses, with the shoreline area of the Carbon subwatershed and the western side of Malibu Creek Watershed within the City of Malibu having the most concentrated areas of commercial development within the NSMBCW

EWMP Area. The largest non-residential development within the NSMBCW EWMP Area is Pepperdine University, which is found within the Corral Canyon Creek subwatershed and includes Puerco, Marie, and Winter Canyons. Developments within the unincorporated areas, as well as the incorporated areas of Malibu, are predominantly serviced by onsite wastewater treatment systems (OWTS), however some City and unincorporated areas are sewered.[5]

[5] Within the City of Malibu there are 5 sewered neighborhoods served by small wastewater treatment facilities: Malibu West, Point Dume Club (mobile homes), Paradise Cove Mobile Home Park, Tivoli Cove Condominiums, Malibu County Estates, and the three condominiums in the Civic Center area.



*ASBS boundary is in the ocean up to the mean high tide line

Figure 2. NSMBCW Geologic Conditions
NSMBCW EWMP

January 2016

Geosyntec consultants

RB-AR 4751

Table 2. Land Use Distributions within the NSMBCW EWMP Area

JG	HUC-12 Watershed[a]	Vacant (%)	Agriculture (%)	Commercial (%)	SFR[b] (%)	MFR[b] (%)	Industrial[c] (%)	Education (%)
1/4	Arroyo Sequit	96.5%	0.9%	0.2%	2.2%	0.1%	0.0%	0.0%
1	Zuma Canyon	89.0%	1.9%	0.5%	7.7%	0.5%	0.1%	0.3%
1	Solstice Canyon	87.7%	0.7%	0.6%	8.8%	0.7%	0.1%	1.4%
9	Cold Creek-Malibu Creek[d]	56.0%	1.6%	11.2%	24.9%	0.7%	5.7%	0.0%
1	Santa Monica Beach	91.7%	0.0%	0.8%	7.0%	0.4%	0.0%	0.0%
1	Garapito Creek	94.9%	0.6%	0.2%	4.1%	0.2%	0.0%	0.1%
	Total	93.1%	0.8%	0.4%	5.0%	0.3%	0.1%	0.3%

[a] A HUC-12 watershed is defined by a 12-digit hydrologic unit code (HUC) delineation by the United States Geological Survey (USGS), which identifies the watershed area based on six levels of classification: regional, sub-region, hydrologic basin, hydrologic sub-basin, watershed, and subwatershed. See **Figure 3**.
[b] SFR = Single Family Residential; MFR = Multi-Family Residential
[c] Minor areas within the NSMBCW EWMP Area are zoned for industrial use, although the actual land use is not associated with manufacturing or similar industrial activities.
[d] The land use distribution for this watershed only includes the 618 acres tributary to Malibu Creek within the NSMBCW EWMP Area.

Land use data for the NSMBCW EWMP Area was taken from Los Angeles County Department of Public Works (LACDPW) Modified Rational Method Hydrology Support Files, which contains 2005 land use data for the entire County of Los Angeles (County of Los Angeles, 2005). After reviewing the data, including aerial photo analyses of various parcels, it was determined that a select number of parcels in the City of Malibu that were designated as agricultural areas were in fact single family residential developments. Therefore, based on discussion with the City of Malibu and review of the City's Local Coastal Plan (LCP), some agricultural land uses were updated to reflect the land use designated in the LCP (City of Malibu, 2001). Parcels that were determined to contain equestrian facilities maintained a designation of agricultural to best reflect the pollutant loads expected from such facilities. In total, approximately 15 parcels were updated to reflect existing LCP land uses compared to the 2005 LACDPW data. While corrals, barns, or other features related to equestrian use may remain on properties, many are no longer actually in use. The west end of Malibu was historically horse country, but the trend is that new owners often do not keep horses. This may have an effect on the projected loads in some assessment areas as uses change over time.

The NSMBCW EWMP Area includes six HUC-12 units. Within four of these units, there are several distinct subwatersheds, each with unique environmental characteristics and management challenges. When the Santa Monica Bay Bacteria TMDL was established, general subwatersheds were delineated based most often on a primary drainage area or canyon, the outlet of which became the basis for establishing compliance monitoring locations. These delineated areas in many instances also include other separate prominent canyons, gullies, or other sub-drainages which may or may not be tributary to the main canyon or sample site. Descriptions of each of these historic subwatersheds in the NSMBCW EWMP Area, including their land use characteristics and other prominent features, are provided below. Appendix G includes a map of these subwatersheds and shoreline sample sites.

Arroyo Sequit Frontal Pacific Ocean – HUC 12 - 180701040202

Arroyo Sequit. Arroyo Sequit, at 12 square miles, is the most undeveloped subwatershed in the Santa Monica Bay watershed with 98% open space and little evidence of human impact (Regional Board, 2012d). Therefore, it is the reference subwatershed used by the Regional Board for setting allowable exceedance days for fecal indicator bacteria in the Santa Monica Bay Beaches Bacterial TMDL, as well as limits in other TMDLs in southern California. Much of the open space within the subwatershed belongs to State Parks. At the bottom of the subwatershed, State Parks operates a beach park and campground facilities including restrooms, parking lots, and a general store. There is a small remnant lagoon at the outlet of Arroyo Sequit, separated from the ocean by a sand berm barrier. Creek flow has been insufficient in recent years to breach this berm. State Parks commenced a fish passage barrier removal project and creek restoration project in the lower reaches in 2015.

Primary government and land management agencies within this subwatershed include Los Angeles County, State Parks, NPS, and Caltrans. The outlet of Arroyo Sequit is at Leo Carrillo State Beach, where sample site SMB 1-1 is located. There is a single non-major, NSMBCW-owned MS4 outfall known to exist in this subwatershed.

Nicholas (J4). Nicholas Canyon is a 1,220 acre subwatershed with approximately six percent (74 acres) residential development and 94 percent natural and managed open space. It is the sole subwatershed in the Jurisdiction 4 area. The subwatershed can generally be characterized as predominately undeveloped. Nicholas Canyon Beach operated by Los Angeles County is a moderately popular, fairly open beach that provides restroom facilities, and parking for approximately 150 vehicles. A small, low-flow, intermittent creek outlets to the east of a rocky point downcoast of the main open beach area.

Primary government and land management agencies within this subwatershed include Los Angeles County, City of Malibu, NPS, and Caltrans. Sample site SMB 4-1 is collected on the open beach part of the shore, upcoast of the outlet of the creek. There are no NSMBCW-owned MS4 outfalls known to exist in this subwatershed.

Los Alisos. Los Alisos is a 2,380-acre subwatershed with approximately 11 percent residential development (267 acres), and 89 percent natural and managed open space. Within this subwatershed are multiple small canyons, the most prominent of which are Aliso Canyon, Decker Canyon, Lachusa Canyon, and an unnamed canyon. The upper region of the subwatershed is generally open space with scattered rural residential development. Much of the upper subwatershed is under the jurisdiction of the NPS in the Santa Monica Mountains National Recreation Area, with locally known features Nicholas Flats parkland and Decker Lake. Lachusa Canyon is home to Charmlee Wilderness Park operated by the SMMC. The lower region of the subwatershed includes mostly low density residential with some medium to high density residential development. The coast of this subwatershed includes portions of Robert H. Meyer Memorial State Beach, which is made up of a number of cove or cliff-foot strands known as "pocket beaches" along the west end of the City of Malibu, including El Pescador State Beach - the westernmost of the three major pocket beaches. State Parks operates a parking lot and portable toilets on the bluff above this beach.

Primary government and land management agencies within these three subwatersheds include Los Angeles County, City of Malibu, NPS, and Caltrans. Sample site SMB 1-2 is located within this watershed at El Pescador State Beach. It is located just east of Lachusa Canyon below an unnamed canyon of less than 600 acres with approximately 99 percent open space. This is an open beach, with no direct drainage to the sample site. Due to safety concerns, sampling has not occurred at this site since early 2014. There are no NSMBCW-owned MS4 outfalls known to exist in these subwatersheds.

Encinal. Encinal Canyon is a 1,830-acre subwatershed with approximately 10 percent (179 acres) of residential development, and 90 percent natural and managed open space. Scattered rural residential development is found beyond the incorporated boundaries of the City of Malibu and is located primarily along streams. Medium to high density development dominates the shoreline with some intermingling of low density development. Two small agricultural parcels comprising a total of about 14 acres are located relatively close to the shoreline. This subwatershed includes portions of Robert H. Meyer Memorial State Beach, which is made up of a number of cove or cliff-foot strands known as "pocket beaches" along the west end of the City of Malibu, including, from west to east, La Piedra and El Matador State Beaches. State Parks operates parking lots and portable toilets on the bluffs above these beaches, and rustic trails to the beaches below.

Primary government and land management agencies within this subwatershed include Los Angeles County, City of Malibu, NPS, and Caltrans. Sample site SMB 1-3 is located just within the western edge of this subwatershed at El Matador State Beach. This is an open beach site, with no direct drainage to the sample site. There are three NSMBCW-owned MS4 outfalls known to exist in this subwatershed, one of which is classified as a major outfall.

Zuma Canyon Frontal Pacific Ocean – HUC 12 - 180701040203

Trancas. Trancas Canyon is a 6,580-acre subwatershed with approximately 10 percent (635 acres) residential development, one percent commercial/industrial development, and 89 percent natural and managed open space. A mixture of land uses, including medium-to-high and low density residential, educational, commercial, and rural residential, is found in the western portion of the subwatershed. The middle and upper regions of the subwatershed are mostly undeveloped, with a scattering of rural residential parcels, a private golf course, public parks, and agricultural land uses in the upper part of the subwatershed. Approximately 26 acres of land within the northeastern section of the subwatershed is classified as cropland and pasture. There are 3 mapped horse ranches within the subwatershed. A commercial center is located at the bottom of the subwatershed. Trancas Lagoon, a less than a half-acre lagoon at the outlet of Trancas Canyon Creek, is separated from the ocean by a sand berm barrier. Due to insufficient rain in recent years, this berm remains closed most of the time. Nearly half of the shoreline is comprised of Zuma Beach operated by Los Angeles County, with parking, restroom facilities, and a snack bar. It is one of the largest and most popular beaches in Los Angeles County, based on County Lifeguard attendance reports.

Primary government and land management agencies within this subwatershed include Los Angeles County, City of Malibu, NPS, and Caltrans. Trancas Canyon Creek outlets at sample site SMB 1-4 at the up coast extent of Zuma Beach downcoast of Broad Beach. There are eight NSMBCW-owned MS4 outfalls known to exist in this subwatershed, four of which are classified as major outfalls.

Zuma. Zuma Canyon is a 6,290-acre subwatershed with approximately 12 percent (796 acres) of residential development, one percent commercial development, and 87 percent natural and managed open space. Low density residential development scattered with commercial, agricultural, horse ranch, and medium to high density residential development comprises the western portion of the subwatershed. Development is also found in the far upper portion of the subwatershed and is mostly characterized by rural residential, agricultural, and public park land uses. There are seven mapped horse ranches in this subwatershed. A large proportion of the shoreline is comprised of Zuma County Beach operated by the County of Los Angeles. It is one of the largest and most popular beaches in Los Angeles County and is with parking, restroom facilities with separate advanced OWTS facilities, and a snack bar. Zuma Lagoon, an approximately 1.5 acre restored lagoon located at the outlet of Zuma Canyon, is separated from the ocean by a sand berm barrier. Due to insufficient rain in recent years, this berm remains closed most of the time. Some USGS maps refer to this subwatershed and lagoon as Dume Creek and Dume Lagoon, however, this name is not commonly used or known.

Primary government and land management agencies within this subwatershed include Los Angeles County, City of Malibu, NPS, and Caltrans. Zuma Canyon outlets at sample site SMB 1-5 on the downcoast end of Zuma Beach toward Westward Beach Road. There are six NSMBCW-owned MS4 outfalls known to exist in this subwatershed, four of which are classified as major outfalls.

<u>Solstice Canyon Frontal Santa Monica Bay – HUC 12 - 180701040204</u>

Ramirez. Ramirez is a 3,350-acre subwatershed with approximately 25 percent (854 acres) residential development, one percent industrial/commercial, and 74 percent natural and managed open space lands. The subwatershed includes Ramirez Canyon, Walnut Canyon, and some smaller canyons and gullies. The upper subwatershed includes a 22-acre park and conference center operated by the SMMC. Most of the development, representing various types of land uses, is in the lower portion of the subwatershed, with low density residential comprising the greatest proportion of the developed land. The middle area includes single-family residential, multifamily residential, and a church. The bottom of Ramirez Canyon includes privately-owned Paradise Cove comprised of an approximately 270-unit mobile home park and restaurant with separate advanced OWTS facilities, parking lot, pier, and beach. Ramirez Canyon Creek experiences intermittent dry areas and day-lighted flows throughout its reaches, and scour ponds form above and below the Pacific Coast Highway Bridge culvert. A cement open box channel was constructed by the private property owner to protect developed parts of the property in the last reach of the creek. There are dense, kelp forests and rich tide pools in the near-shore habitat.

Primary government and land management agencies within this subwatershed include

Los Angeles County, City of Malibu, NPS, SMMC, MRCA, and Caltrans. Walnut Canyon outlets at sample site SMB 1-6 on Point Dume in an area between Paradise Cove and Little Dume Beach at the end of Zumirez Drive. A 102-acre area is tributary to the unnamed gully that outlets in a scour pond at the beach at sample site SMB O-1, located upcoast beyond the extent of the Paradise Cove mobile home park. Ramirez Canyon Creek outlets at sample site SMB 1-7 on Paradise Cove Beach; the City of Malibu constructed a stormwater treatment facility in 2010 at the outfall to address uncontrollable natural sources of indicator bacteria in the creek prior to discharge. There are two NSMBCW-owned MS4 outfalls known to exist in this subwatershed, none of which are classified as major outfalls.

Escondido. Escondido is a 2,300-acre subwatershed with approximately 14 percent (318 acres) residential development, one percent commercial development, and 85 percent natural and managed open space. Low density rural residential development is found scattered throughout the subwatershed and includes 43 acres of property with equestrian facilities, or approximately 2 percent of the subwatershed. Medium to high density residential development is found along the shoreline and low density residential development is found just inland of the shoreline. Escondido Canyon Park is operated by the SMMC, covers about a third of this subwatershed, and includes a popular hiking trail. Escondido Canyon Creek is separated from the ocean by a sand berm barrier. Due to insufficient rain in recent years, this berm remains closed most of the time. Scour ponds form in the creek upstream and downstream of the Pacific Coast Highway Bridge concrete box culvert. A small pocket beach with an access gate is adjacent to the outlet of the creek.

Primary government and land management agencies within this subwatershed include Los Angeles County, City of Malibu, SMMC, MRCA, and Caltrans. Escondido Canyon Creek outlets at sample site SMB 1-8. There are six NSMBCW-owned MS4 outfalls known to exist in this subwatershed, one of which is classified as a major outfall.

Latigo. Latigo is a 824-acre subwatershed with approximately 10 percent (80 acres) residential development and 90 percent natural open space. It is one of the smallest subwatersheds in the NSMBCW EWMP Area. Developed land within the Latigo subwatershed is characterized by some high-density small lot subdivisions in the upper part of the subwatershed, but mostly by rural residential development in the central area of the subwatershed along the rim of Latigo Canyon, and low and medium to high density residential development near the shoreline. Managed lands of the SMMC are found along the eastern slopes of the subwatershed.

Primary government and land management agencies within this subwatershed include Los Angeles County, City of Malibu, SMMC, MRCA, and Caltrans. Latigo Canyon Creek flows through a concrete box culvert under the Tivoli Cove condominiums and outlets on Latigo Beach at sample site SMB 1-9. There are no NSMBCW-owned MS4 outfalls known to exist in this subwatershed.

Solstice. Solstice Canyon is a 2,840-acre subwatershed with approximately three percent (96 acres) residential development and 97 percent natural open space. It is the second least developed subwatershed in Santa Monica Bay. The minimal development includes rural residential and a couple commercial properties consisting of a gas station and restaurant near the coast. Solstice Canyon Park in the Santa Monica Mountains National Recreation is a prominent feature of this subwatershed. The park facilities managed by NPS include trails, very limited vehicle parking, restrooms, and picnic areas. Dan Blocker Beach, operated by Los Angeles County, has a public view area, 15-space parking lot, restrooms, and picnic tables, located just up coast of the intersection of Corral Canyon Road on PCH.

Primary government and land management agencies within this subwatershed include Los Angeles County, City of Malibu, NPS, and Caltrans. Sample site SMB 1-10 is located near the outlet of Solstice Creek at the western extent of Corral Beach. A scour pond formed in the creek downstream of the Pacific Coast Highway Bridge concrete box. There are no NSMBCW-owned MS4 outfalls known to exist in this subwatershed, with the exception of two 18-inch roadway drains preventing flooding on Solstice Creek Bridge.

Corral. Corral subwatershed is a 4,300-acre subwatershed bounded by the Malibu Creek Watershed to the north and east, with approximately 10 percent (425 acres) residential development, 2 percent commercial development, and 88 percent natural and managed open space. The subwatershed includes Corral Canyon, Puerco Canyon, Marie Canyon, and Winter Canyon. Developed features include two small lot subdivisions in the upper watershed, the Pepperdine University campus, limited commercial land uses near Pacific Coast Highway. Pepperdine University (approximately 180-acres total) is within unincorporated County. Except for a concentrated area of rural residential development in the east, most of the developed area in the subwatershed is surrounding the university or near the shoreline. The residential development near the shoreline is primarily medium to high density. Corral Canyon is largely undeveloped but features the 1,000-acre Corral Canyon Park with trails and facilities operated by SMMC/MRCA including a parking lot, picnic areas, and portable restrooms on the landside of Pacific Coast Highway near Corral Beach. Puerco Canyon is approximately 620 acres on the east of Corral Canyon with about 95 percent open space, limited medium to high-density residential, commercial, and institutional land uses near the shore. Marie Canyon is approximately 600 acres, about 34 percent of which is developed with areas of medium to high-density residential and institutional land uses. Winter Canyon is less than 500 acres with institutional and high-density residential land uses on the eastern extent of the Malibu Civic Center area.

Primary government and land management agencies within this subwatershed include Los Angeles County, City of Malibu, SMMC, MRCA, and Caltrans, as well as the private Pepperdine University. Sample site SMB 1-11 is located at the outlet of Corral Canyon at the eastern extent of Corral Beach. Sample station SMB O-2 is at the outlet of Puerco Canyon at Puerco Beach. Sample site SMB 1-12 is located at the outlet of Marie Canyon in the middle of Puerco Beach. The County constructed the Marie Canyon Water Quality Improvement Project on Malibu Road upstream of the outlet of Marie Canyon to address unknown sources of indicator bacteria in Marie Canyon Creek prior to discharge at the beach. Dense kelp forests are near shore in this coastal area. There are 18 NSMBCW-owned MS4 outfalls known to exist in this subwatershed, three of which are classified as major outfalls.

Cold Creek and Malibu Creek - HUC 12 180701040104

Malibu Creek (J9). The NSMBCW EWMP Group is responsible for the portion of the Malibu Creek Watershed within the City of Malibu. This area is approximately 618 acres in size, or 0.87 percent of the entire 70,651 acre Malibu Creek Watershed. Approximately 306 acres of the 618-acre watershed are tributary to Malibu Legacy Park, a regional EWMP project capable of retaining the 85th percentile, 24-hour storm over the entire tributary area. The western side of the creek is the Malibu Civic Center area, which is predominately commercial, municipal, and institutional land uses. In 2007, the City of Malibu installed the Malibu Civic Center Stormwater Treatment Facility that includes filtration and disinfection. The Legacy Park project made it possible to detain and treat more of each rain event due to the construction of the 8-acre foot detention pond that attenuates the flows from the storm drain system. A major outfall is present in this subwatershed, immediately downstream of Malibu Legacy Park. The remaining area, which is almost entirely on the eastern side of Malibu Creek, contains approximately 312 acres of sparsely developed space, with a total impervious coverage of approximately 12 percent. The development in this are contains mostly low density (rural) single family residential. There are no NSMBCW-owned storm drains in this analysis region and streets do not have curbs or gutters. Besides the 85 acres of state- and federally-owned land, the developed neighborhood is privately owned property, including private roads.

The lower reach also includes the Adamson House, a State Parks historical site hosting tours and public and private events. The last reach of the Malibu Creek watershed includes the 30-acre Malibu Lagoon, which was reconstructed by State Parks in 2010 to improve circulation and reduce entrapment of fine sediment. Malibu Lagoon is separated from Surfrider Beach and Malibu Lagoon State Beach by a sand berm barrier. Due to insufficient rain in recent years, this berm remains closed most of the time, but generally breaches when flow conditions in Malibu Creek increase the level of the Lagoon sufficiently. Higher tides and waves have been known to overtop the berm. Los Angeles County operates the middle section of this stretch of beach, and State Parks generally operates the area upcoast and seaward of Malibu Lagoon, and at the Malibu Pier.

Primary government and land management agencies with land use responsibility in this watershed are Los Angeles County, City of Malibu, State Parks, and Caltrans. There are four sample locations in this area. Sample site MCW-1 is located in Malibu Lagoon, seaward of the Pacific Coast Highway Bridge. Sample site SMB-MC-1 is collected at the most western extent of Surfrider Beach, just downcoast of the Malibu Colony. SMB-MC-2 is collected 5 days per week at the most recent location of the sand barrier breach. SMB-MC-3 is collected approximately 50 yards downcoast of Malibu Pier at the border of the Carbon subwatershed at the downcoast extent of Surfrider Beach between the Pier and Carbon Beach.

Santa Monica Beach Frontal Santa Monica Bay – HUC 12 - 180701040403

Carbon. Carbon is a 2,310-acre subwatershed with approximately 14 percent (315 acres) residential development, two percent commercial development, and 84 percent natural open space, bounded by the Malibu Creek Watershed to the west. Rural residential development is found scattered within the eastern and western portions of the subwatershed. Medium to high density residential and commercial development is located adjacent to Pacific Coast Highway. It includes Carbon Canyon and Sweetwater Canyon. The beach located within this subwatershed beyond the State-operated Malibu Pier and Surfrider Beach is considered Carbon Beach.

Primary government and land management agencies within this subwatershed are Los Angeles County, City of Malibu, State Parks, and Caltrans. Sample site SMB 1-13 is located at the bottom of Sweetwater Canyon on Carbon Beach. There are no NSMBCW-owned MS4 outfalls known to exist in this subwatershed.

Las Flores. Las Flores is a 2,921-acre subwatershed with approximately 10 percent (282 acres) residential development, one percent commercial development, and 89 percent natural open space in Las Flores Canyon. Within this subwatershed, medium to high density development flanks the shoreline along with commercial development. Scattered low density development is found within the lower subwatershed and rural residential development is found scattered within the central and eastern areas of the subwatershed. A large proportion of the land is comprised of SMMC lands. In 2008, the City of Malibu restored the lower reaches of Las Flores Creek and constructed a small neighborhood park just upstream of Pacific Coast Highway, including a small playground, 1/3 mile of walking trails, and picnic areas. As part of the park construction, measures were taken to preserve and naturalize the creek through the removal of non-native invasive vegetation and planting of over 45 varieties of native plant species and the installation of a vegetated swale to mitigate runoff from the roadway. Las Flores Canyon Creek has a small remnant lagoon with a sand berm barrier separating it from the ocean except when flow conditions in the creek increase the level of the lagoon sufficiently to breach.

Primary government and land management agencies in this subwatershed include Los Angeles County, City of Malibu, NPS, SMMC, MRCA, and Caltrans. Las Flores Creek outlets at sample site SMB 1-14 on Las Flores Beach. There is a single NSMBCW-owned MS4 outfall known to exist in this subwatershed. It is classified as a major outfall.

Piedra Gorda. Piedra Gorda is a 629-acre subwatershed with approximately 19 percent (121 acres) residential development, and 81 percent natural and managed open space. The developed area includes a mixture of single-family and multi-family residential, and limited commercial land use along the coast.

Primary government and land management agencies in this subwatershed include Los Angeles County, City of Malibu, SMMC, MRCA, and Caltrans. Sample site SMB 1-15 is an open beach site located on Big Rock Beach adjacent to a public access stairway. There is a single NSMBCW-owned MS4 outfall known to exist in this subwatershed. It is not classified as a major outfall.

Pena. Pena Canyon is a 625-acre subwatershed with approximately three percent (18 acres) residential development and 97 percent natural open space. Medium to high density residential development and a County beach park are the only other uses within the subwatershed, and both are along the shoreline.

Primary government and land management agencies in this subwatershed include Los Angeles County, City of Malibu, SMMC, MRCA, and Caltrans. Sample site SMB 1-16 is located at the outlet of Pena Canyon at the eastern extent of Las Tunas County Beach. There are no NSMBCW-owned MS4 outfalls known to exist in this subwatershed.

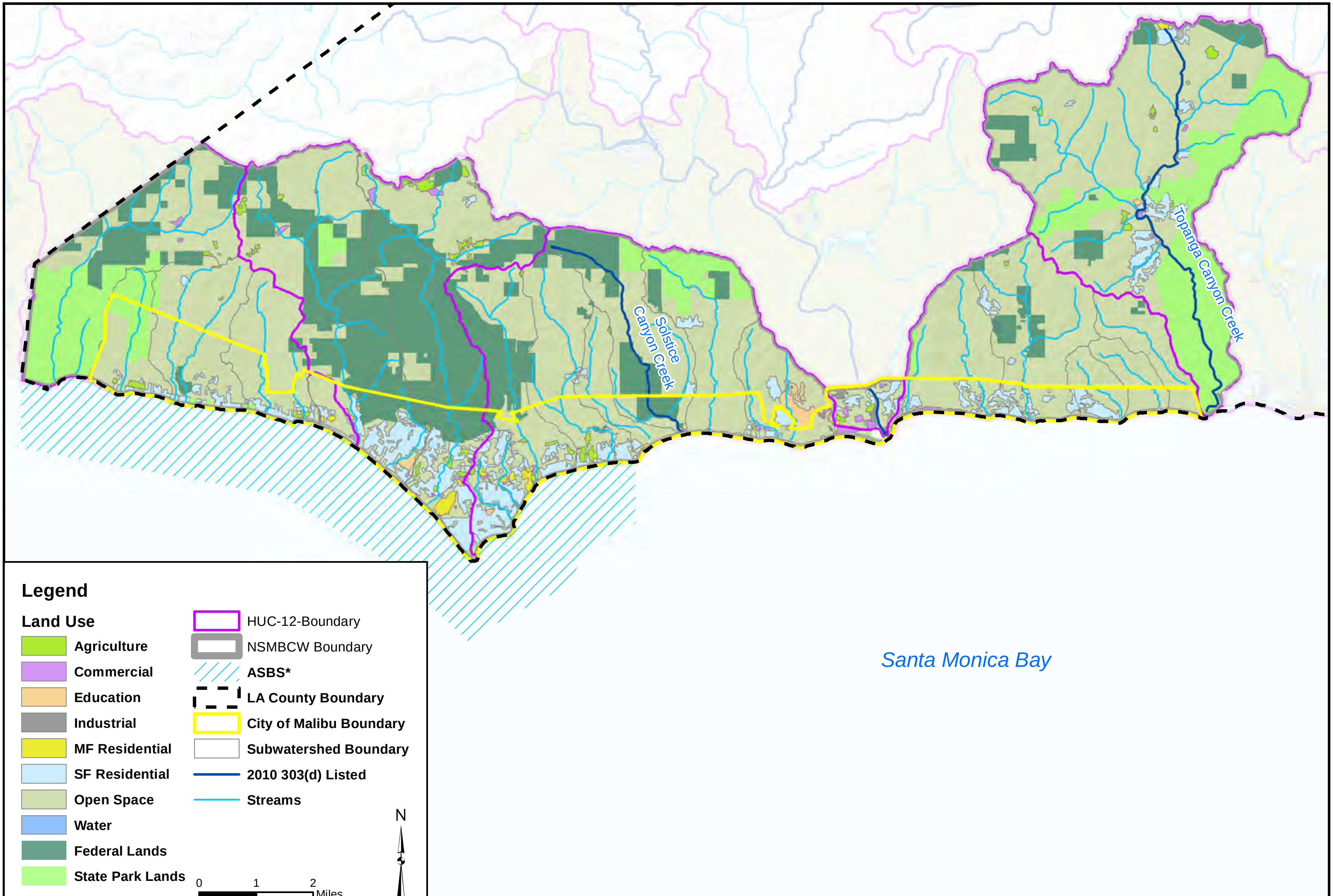
Tuna. Tuna Canyon is a 1,007-acre subwatershed with approximately four percent (39 acres) residential development and 96 percent natural open space. This subwatershed is virtually undeveloped with the exception of a few scattered areas of rural residential development in the east and medium to high density and commercial development along the shoreline. The SMMC/MRCA owns the majority of open space.

Primary government and land management agencies in this subwatershed include Malibu, Los Angeles County, SMMC, MRCA, and Caltrans. Sample site SMB 1-17 is located at the wave wash of Tuna Canyon. There are no NSMBCW-owned MS4 outfalls known to exist in this subwatershed.

Garapito Creek – HUC 12 – 180701040401

Topanga. Topanga Canyon is a 12,611-acre subwatershed with approximately 11 percent (1,407 acres) residential development, and 88 percent natural open space. There are only 34 acres designated as industrial/commercial. It is the largest subwatershed within the NSMBCW EWMP Area and has nearly every category of land use represented within its borders. Garapito Creek is a small tributary to Topanga Creek in the upper watershed. The central and eastern areas of the subwatershed are marked by rural and small lots residential subdivisions, commercial, public, horse ranch, educational, and mixed urban/construction land uses. This subwatershed has a relatively high concentration of horse ranches, the majority of which are in the upper subwatershed. State Parks has completed restoration projects that removed non-native vegetation and fill, helping return flows in Topanga Canyon Creek to a more natural meander. There is little development near the coast other than a small commercial area in the lower subwatershed, much of which is owned by State Parks, a small (2-acre) maintenance facility zoned as industrial land use, and County Beach facilities. Topanga Lagoon is a 1.8-acre lagoon at the outlet of Topanga Canyon Creek, separated from the ocean by a sand berm barrier that generally breaches when flow conditions in the creek increase the level of the lagoon sufficiently.

Primary government and land management agencies in this subwatershed include Los Angeles County, State Parks, and Caltrans. The City of Los Angeles received an exception by the Regional Board for the very small portion of its land in this subwatershed. Topanga Canyon Creek outlets at sample site SMB 1-18. There is only one NSMBCW-owned MS4 outfall known to exist in this subwatershed. It is not classified as a major outfall.



*ASBS boundary is in the ocean up to the mean high tide line

Figure 3. NSMBCW Land Uses.
NSMBCW EWMP

Januray 2016

Geosyntec consultants

1.4 OUTREACH AND STAKEHOLDER PROCESS

Section VI.C.1.f.v of the Permit requires a stakeholder process for collaboration on EWMP development. The development process must:

- Provide appropriate opportunity for stakeholder input;
- Include participation in the Permit-wide Technical Advisory Committee (TAC); and
- Incorporate applicable State agency input on priority setting and other key implementation issues.

The NSMBCW EWMP Group has conducted public outreach to engage the public and other interested parties to support EWMP development. Received input has been incorporated as appropriate. These efforts are described in more detail below.

Public Workshops. Public workshops were held jointly with the Malibu Creek Watershed Group in May 2014, November 2014, and May 2015 at King Gillette Ranch in Calabasas, California. For each workshop, an informational presentation was provided followed by a question and answer period. Comments were collected and concerns were noted and considered during EWMP development by the NSMBCW EWMP Group. The presentations were made available following each respective meeting, and can be found at the City of Malibu's EWMP webpage (www.malibucity.org/EWMP).

Website. As the lead agency in the EWMP development, the City of Malibu has maintained an EWMP webpage (www.malibucity.org/EWMP) where information regarding EWMP development, public workshops, and links to the Regional Board where relevant document submittals are posted. Additionally, contact information for NSMBCW EWMP Group leads from each agency is provided in case further information is desired.

Technical Advisory Committee: The NSMBCW EWMP Group has, and will continue to, actively participate in the Los Angeles Region EWMP TAC throughout the EWMP process.

Outreach to City and County Departments: Throughout the EWMP development process, the City and County have attended various division meetings, providing internal informational seminars and presenting relevant information for feedback from senior staff. Additionally, the City presented the EWMP to the City of Malibu Public Works Commission on May 27th to receive and incorporate feedback.

1.5 REPORT ORGANIZATION

Following the executive summary, background and introductory information on the NSMBCW EWMP is provided in Section 1 of this report. Section 2 describes the water body pollutant priorities that are addressed by the EWMP. Section 3 provides information on the BMPs implemented by the NSMBCW EWMP Group and how these BMPs were identified and analyzed through the Reasonable Assurance Analysis (RAA). The next two sections present the results of the RAA within the NSMBCW EWMP Area – Section 4 provides results for the Santa Monica Bay Watershed and Section 5 provides results for the Malibu Creek Watershed. A compliance schedule and interim compliance demonstration is provided in Section 6, followed by the adaptive management process for revising the EWMP in Section 7. Section 8 provides a cost estimate for EWMP implementation; Section 9 confirms that the NSMBCW EWMP Group possesses sufficient legal authority to implement the EWMP; Section 10 provides the references cited in the EWMP.

2 WATER QUALITY PRIORITIES

As part of the EWMP, the Permit requires the NSMBCW EWMP Group to identify water quality priorities within their WMA. To accomplish this per Permit Section VI.C.5.a, the NSMBCW EWMP Group conducted the following for the NSMBCW EWMP Area:

1. Characterized the water quality of stormwater and non-stormwater discharges from the MS4 as well as receiving water bodies based on available data;
2. Classified water body-pollutant combinations into one of three Permit-specified categories;
3. Prioritized water body-pollutant combinations; and
4. Assessed sources for high priority water body-pollutant combinations.

A summary of results is provided below.

2.1 WATER QUALITY CHARACTERIZATION

Stormwater and non-stormwater discharges from the MS4 and receiving water quality were characterized based on 303(d) listings as well as available monitoring data, including data derived from the following monitoring programs or agencies/ organizations: Santa Monica Bay Beaches Bacteria TMDL Coordinated Shoreline

Monitoring Plan (CSMP), Southern California Bight 2008 Regional Monitoring (Bight '08), Heal the Bay, the Las Virgenes Municipal Water District (LVMWD, 2011), and the Joint Powers Authority of the LVMWD/Triunfo Sanitation District. Applicable water quality objectives and criteria are presented below followed by a discussion of the water quality conditions within the NSMBCW EWMP Area.

2.1.1 303(D) LISTINGS AND TMDL WLAS

The 2010 Clean Water Act (CWA) Integrated Report and updated 303(d) list were approved by the State Water Resources Control Board on August 4, 2010 and by the United States Environmental Protection Agency (USEPA) on October 11, 2011. The 2010 303(d)-listed water bodies and associated pollutants within the NSMBCW EWMP Area are summarized in **Table 3** below.

Table 3. 2010 303(d)-Listed Water Bodies in NSMBCW

Water Body	Pollutant Class	Pollutant	Notes
Santa Monica Bay Beaches	Pathogens	Coliform Bacteria	Addressed by Bacteria TMDL
	Pesticides	DDT	Addressed by PCB/DDT TMDL
	Other Organics	PCBs	Addressed by PCB/DDT TMDL
Santa Monica Bay Offshore/Nearshore	Trash	Debris	Addressed by Debris TMDL
	Pesticides	DDT (tissue & sediment)	Addressed by PCB/DDT TMDL
	Other Organics	PCBs (tissue & sediment)	Addressed by PCB/DDT TMDL
	Toxicity	Sediment Toxicity	Addressed by PCB/DDT TMDL
	Miscellaneous	Fish Consumption Advisory	Addressed by PCB/DDT TMDL
Solstice Canyon Creek	Miscellaneous	Invasive species	Not a Stormwater Issue
Topanga Canyon Creek	Metals/Metalloids	Lead	TMDL Does Not Currently Exist
Malibu Creek	Pathogens	Coliform Bacteria	Addressed by Bacteria TMDL
	Nutrients	Nutrients (Algae)	Addressed by USEPA Nutrient TMDL and USEPA Benthic TMDL
	Hydromodification	Fish Barriers (Fish Passage)	Not a Stormwater Issue
	Sediment	Sedimentation/Siltation	Addressed by USEPA Benthic TMDL
	Nuisance	Scum/Foam- Unnatural	Addressed by Nutrient TMDL

Water Body	Pollutant Class	Pollutant	Notes
	Metals	Selenium	TMDL Does Not Currently Exist
	Trash	Trash	Addressed by Trash TMDL
	Other Inorganics	Sulfates	TMDL Does Not Currently Exist
	Miscellaneous	Invasive Species	Not a Stormwater Issue
		Benthic-Macroinvertebrate Bioassessments	Addressed by USEPA Benthic TMDL
Malibu Lagoon	Pathogens	Coliform Bacteria	Addressed by Bacteria TMDL
		Swimming Restrictions	Addressed by Bacteria TMDL
		Viruses (enteric)	Addressed by Bacteria TMDL
	Nutrients	Eutrophic Conditions	Addressed by Nutrient TMDL and USEPA Benthic TMDL
	Miscellaneous	Benthic Community Effects	Addressed by USEPA Benthic TMDL
		pH	TMDL Does Not Currently Exist

The water bodies listed in **Table 3** are subject to water quality objectives in the Ocean Plan, Basin Plan and Basin Plan Amendments, including Waste Load Allocations (WLAs) developed through TMDLs. The beneficial use designations for NSMBCW water bodies can be found in **Table 1**, and additional information on associated water quality objectives can be found in the Ocean Plan and Basin Plan. TMDLs developed for water bodies within the NSMBCW EWMP Area are discussed in more detail below.

There are currently ten TMDLs in effect for the water bodies within the NSMBCW EWMP Area; nine of which are incorporated into Attachment M of the MS4 Permit. These TMDLs are summarized in **Table 4** and delineated in more detail, including specific Water Quality Based Effluent Limitations (WQBELs) and/or Receiving Water Limitations (RWLs), in **Table 5** and **Table 6**.

Table 4. NSMBCW TMDLs

TMDL Name	Agency	Effective Date
SMB Beaches (SMBB) Bacteria TMDL, Reconsideration of Certain Technical Matters of the SMBB Bacteria TMDL, Resolution R12-007	Regional Board	July 2, 2014
Malibu Creek and Lagoon Bacteria TMDL, Resolution R12-009	Regional Board	July 2, 2014
Malibu Creek and Lagoon TMDL for Sedimentation and Nutrients to Address Benthic Community Impairments (Benthic TMDL)	USEPA	July 2, 2013
SMB TMDL for DDT and PCBs	USEPA	March 26, 2012
SMB Nearshore Debris TMDL, Resolution R10-010	Regional Board	March 20, 2012
Malibu Creek Watershed Trash TMDL, Resolution R4-2008-007	Regional Board	July 7, 2009
TMDL for Bacteria in the Malibu Creek Watershed, Resolution 2004-019R[a]	Regional Board	January 24, 2006
SMB Beaches (SMBB) Bacteria TMDL, Dry Weather, Resolution 2002-004[b]	Regional Board	July 15, 2003
SMB Beaches (SMBB) Bacteria TMDL, Wet Weather, Resolution 2002-022[b]	Regional Board	July 15, 2003
Malibu Creek Watershed Nutrients TMDL (Nutrient TMDL)	USEPA	March 21, 2003

[a] This TMDL was revised pursuant to Resolution R12-009.
[b] This TMDL was revised pursuant to Resolution R12-007.

Table 5. Final RWLs and WQBELs for NSMBCW TMDLs

TMDL	Parameter	Effluent Limitation/ Receiving Water Limitation
SMB Nearshore Debris TMDL	Trash	Zero[a]
	Plastic Pellets	Zero[a]
SMB PCBs/DDT TMDL	DDT[b]	27.08 g/yr (based on 3-year avg)
	PCBs[b]	140.25 g/yr (based on 3-year avg)
SMBB Bacteria TMDL	Total coliform (daily maximum)	10,000/100 mL
	Total coliform (daily maximum), if the ratio of fecal-to-total coliform exceeds 0.1	1,000/100 mL
	Fecal coliform (daily maximum)	400/100 mL
	Enterococcus (daily maximum)	104/100 mL
	Total coliform (geometric mean[c])	1,000/100 mL
	Fecal coliform (geometric mean[c])	200/100 mL
	Enterococcus (geometric mean[c])	35/100 mL
Malibu Creek and Lagoon Bacteria TMDL	Total coliform (daily maximum) –Malibu Lagoon	10,000/100 mL
	Total coliform (daily maximum), if the ratio of fecal-to-total coliform exceeds 0.1-Malibu Lagoon	1,000/100 mL
	Fecal coliform (daily maximum) –Malibu Lagoon	400/100 mL
	Enterococcus (daily maximum)-Malibu Lagoon	104/100 mL
	E. coli (daily maximum) – Malibu Creek	235/100 mL
	Total coliform (geometric mean[c]) –Malibu Lagoon	1,000/100 mL
	Fecal coliform (geometric mean[c]) –Malibu Lagoon	200/100 mL
	Enterococcus (geometric mean[c]) –Malibu Lagoon	35/100 mL
	E. coli (geometric mean[c]) – Malibu Creek	126/100 mL
Malibu Creek Watershed Trash TMDL	Trash	Zero[a]
Malibu Creek Watershed Nutrients TMDL	Nitrate + Nitrite as N (summer daily maximum) [b]	8 lbs/day (based on 1.0 mg/L numeric target)
	Total Phosphorus (summer daily maximum) [b]	0.8 lbs/day (based on 0.1 mg/L numeric target)
	Nitrate + Nitrite as N (winter daily maximum) [b]	8 mg/L
Malibu Creek and Lagoon Benthic TMDL	Total Nitrogen (summer)[d]	1.0 mg/L
	Total Phosphorus (summer)[d]	0.1 mg/L
	Total Nitrogen (winter)[d]	4.0 mg/L
	Total Phosphorus (winter)[d]	0.2 mg/L

[a] A WQBEL of zero for trash and debris means that no trash or debris can be discharged from the MS4 into water bodies within the Santa Monica Bay Watershed management area and then into Santa Monica Bay or along the shoreline of Santa Monica Bay. Within the NSMBCW EWMP Area, there are no facilities that work with or produce plastic pellets, such that the WQBEL for plastic pellets is already being achieved.
[b] These thresholds are grouped WLAs for the annual pollutant load discharged from the MS4s throughout the entire Santa Monica Bay Watershed Management Area. The individual load-based WLAs for each NSMBCW MS4 agency is the area-weighted fraction of each grouped WLA.
[c] The geometric mean is calculated based on the weekly calculation of a rolling six week geometric mean using five or more samples, starting all calculation weeks on Sunday.
[d] Values shown are TMDL WLAs, and are not yet incorporated into the Permit (e.g., as RWLs or WQBELs).

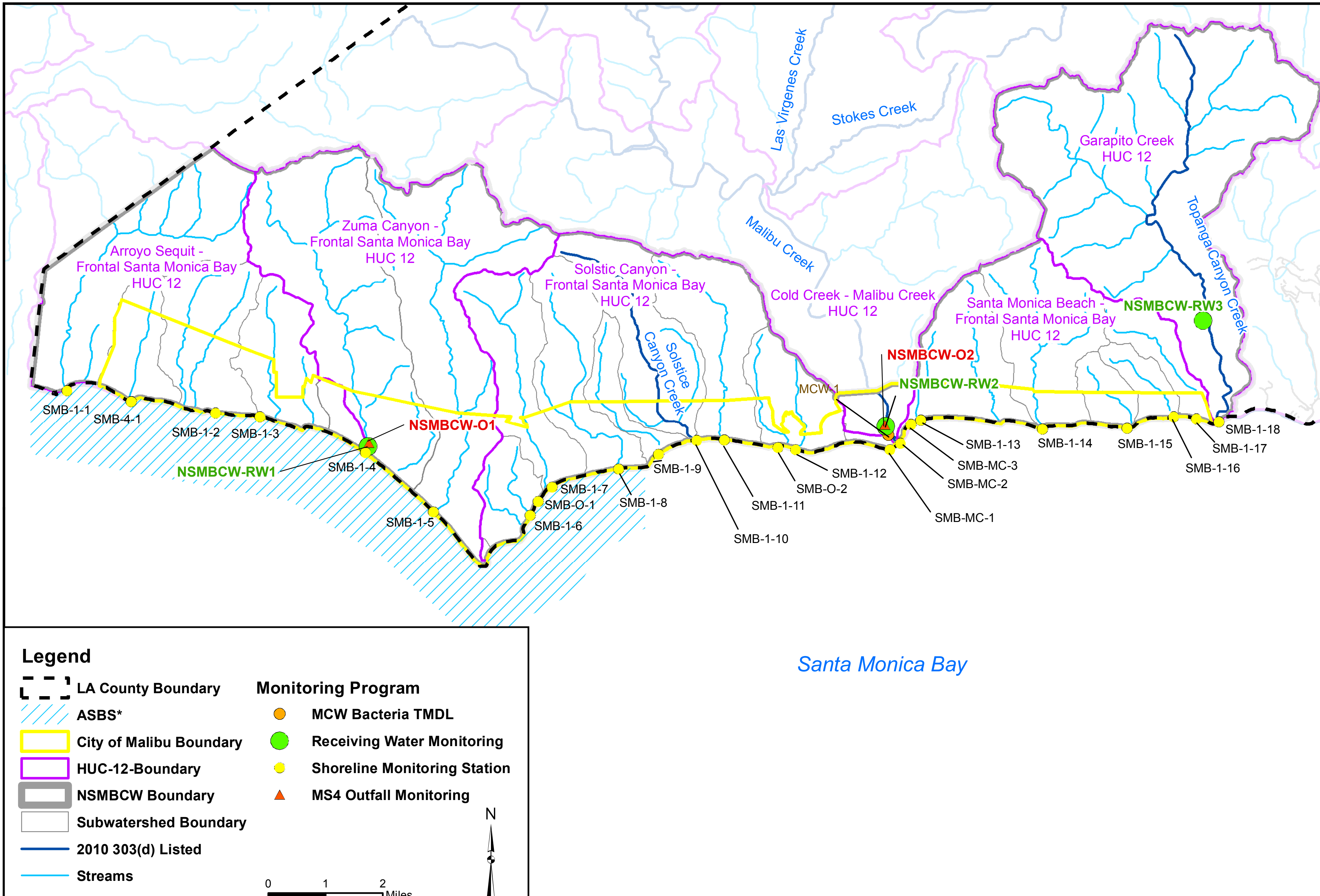
Grouped RWLs for the SMBB Bacteria TMDL and Malibu Creek and Lagoon Bacteria TMDL are also expressed in the Permit as allowable exceedance days (AEDs), which vary by season and by monitoring location. Compliance monitoring locations within the NSMBCW EWMP Area include 21 Santa Monica Bay Beaches Bacteria TMDL compliance monitoring locations (SMB 1-1 through SMB 1-18; SMB O-1 and SMB O-2; and SMB 4-1) and a single Malibu Creek Watershed compliance monitoring location (MCW-1). These AEDs are summarized in **Table 6** below. The final grouped RWLs for dry weather are currently effective, and the final wet weather RWLs will be effective on July 15, 2021. The monitoring locations are shown on **Figure 4**.

Receiving water compliance monitoring locations identified as MC-1, MC-2, and MC-3 in the Santa Monica Bay Beaches Bacteria TMDL CSMP are not included in Permit Attachment M. Compliance at these receiving water locations is also dependent upon the overall effectiveness of the plans developed to comply with the Malibu Creek Bacteria TMDL (e.g., Malibu Creek EWMP, Ventura County TMDL Implementation Plan), since these sites were selected to be representative of the entire Malibu Creek Watershed (Jurisdictional Group 9), and addresses a significantly larger contributory area than in the City of Malibu. The NSMBCW EWMP Group’s modeling and compliance efforts are therefore limited to MS4 discharges from the City -owned areas within the Malibu Creek Watershed. Since monitoring locations MC-1, MC-2, MC-3, and MCW-1 each represent contributions from the entire Malibu Creek Watershed, the NSMBCW EWMP Group has performed a RAA based on the fewest AEDs at any of these sites (15 wet weather AEDs at MCW-1). Separate modeling for MC-1, MC-2, and MC-3 was therefore not conducted, though compliance monitoring at these locations will continue under the NSMBCW CIMP.

Table 6. Single Sample Allowable Exceedance Days for NSMBCW Bacteria Monitoring Stations

Station	Station Name	Summer Dry Weather (Apr 1 – Oct 31)		Winter Dry Weather (Nov 1 – Mar 31)		Wet Weather (Year-Round)	
		Daily Sample[a]	Weekly Sample	Daily Sample[a]	Weekly Sample	Daily Sample[a]	Weekly Sample
SMB 1-1	Leo Carrillo Beach at Arroyo Sequit Crk	0	0	9	2	17	3
SMB 4-1	Nicholas Beach	0	0	4	1	14	2
SMB 1-2	El Pescador State Beach	0	0	1	1	5	1
SMB 1-3	El Matador State Beach[b]	0	0	1	1	3	1
SMB 1-4	Zuma Beach at Trancas Crk	0	0	9	2	17	3
SMB 1-5	Zuma Beach at Zuma Crk	0	0	9	2	17	3
SMB 1-6	Walnut Canyon on Point Dume at Zumirez Drive	0	0	9	2	17	3
SMB O-1	Unnamed gully between Point Dume and Paradise Cove	0	0	9	2	15	3
SMB 1-7	Paradise Cove Beach at Ramirez Crk	0	0	9	2	17	3
SMB 1-8	Escondido Beach at Escondido Crk	0	0	9	2	17	3
SMB 1-9	Latigo Beach at Tivoli Cove Condos	0	0	9	2	17	3
SMB 1-10	Corral Beach at Solstice Cayon Crk	0	0	5	1	17	3
SMB 1-11	Corral Beach at Corral Canyon Crk	0	0	9	2	17	3
SMB O-2	Puerco Beach at Puerco Cyn	0	0	0	0	6	1
SMB 1-12	Puerco Beach at Marie Cyn	0	0	9	2	17	3
SMB MC-1	Malibu Point at west end of Surfrider Beach	0	0	9	2	17	3
MCW-1[c]	Malibu Creek at PCH	5	1	-	-	15	2
SMB MC-2	Surfrider Beach at Malibu Lagoon breach	0	0	9	2	17	3
SMB MC-3	Malibu Pier at Surfrider Beach	0	0	9	2	17	3
SMB 1-13	Carbon Beach at Sweetwater Cyn	0	0	9	2	17	3
SMB 1-14	Las Flores Beach at Las Flores Crk	0	0	6	1	17	3
SMB 1-15	Big Rock Beach at Piedra Gorda Cyn[b]	0	0	9	2	17	3
SMB 1-16	Las Tunas Beach at Pena Cyn	0	0	3	1	14	2
SMB 1-17	Las Tunas Beach at Tuna Cyn	0	0	7	1	12	2
SMB 1-18	Topanga Beach at Topanga Cyn	0	0	9	2	17	3

[a] SMB 1-18 is the only monitoring site that is sampled daily; all others are sampled weekly (on average).
[b] SMB 1-3 and 1-15 are both open beach monitoring locations which are not associated with creeks or storm drain outfalls.
[c] MCW-1 is also titled LVMWD (R-4). The Malibu Creek and Bacteria TMDL does not distinguish between summer and winter seasons for dry weather AEDs. Instead, the AEDs represent the total AEDs for all dry weather for the entire monitoring year.



*ASBS boundary is in the ocean
up to the mean high tide line

Figure 4. Compliance Monitoring Locations.
NSMBCW EWMP

RB-AR 4772

January 2016

Geosyntec consultants

2.1.2 RECEIVING WATER QUALITY

Available monitoring data from previous studies and data collection efforts were reviewed with respect to applicable water quality objectives and criteria to characterize receiving water quality within the NSMBCW EWMP Area. Raw monitoring data analyzed were limited to data available at the time this report was drafted, including bacteria data analyzed as part of the CSMP, data available from Bight ’08, and data available from Heal the Bay. Previous reports and data were reviewed for the following pollutants: bacteria, DDT and PCBs, Trash, Nutrients, Lead, pH, and Selenium and Sulfates. The analysis conducted is summarized below but is described in detail in the NSMBCW EWMP Work Plan (**Appendix B**).

Indicator Bacteria: Shoreline monitoring data collected as part of the CSMP and as well as stream monitoring data collected by Heal the Bay were evaluated to characterize indicator bacteria conditions within the NSMBCW EWMP Area. Shoreline monitoring bacteria data were analyzed for the years 2005 - 2013 in terms of the number of exceedance days (EDs) at each location, as defined in the SMBB Bacteria TMDL. Although long-term trends have not been comprehensively evaluated for the CSMP bacteria data, the data indicate that: 1) attainment of wet weather AEDs is highly variable on an annual basis and is driven by hydrology as well as other natural/non-anthropogenic conditions (e.g., Imamura *et al* 2011, Izbicki *et al* 2012b); and 2) although the number of dry and wet weather EDs is highly variable from season-to-season, year-to-year, and site-to-site, there are some sites which appear to have consistently better or worse water quality than others. For example, if each site is ranked by exceedance percentage per season, with a higher ranking corresponding to a lower exceedance percentage, SMB 1-2, 1-3, 1-16, and 4-1 are all ranked in the top 5 sites for each season, while SMB 1-12, 1-18, and MC-2 are all ranked in the bottom 5 for each season.

Heal the Bay has been conducting sampling for *E. coli* at four different stream locations within the NSMBCW Area, including three reference streams (HtB-14 at Solstice Creek, HtB-18 at Lachusa Creek, and HtB-19 at Arroyo Sequit Creek) and one non-reference location in Malibu Creek (HtB-1). Compared to the REC1 single sample Basin Plan Objective, the *E. coli* data collected by Heal the Bay between 2001 and August 2013 shows a comprehensive dry weather exceedance rate of 0 to 7.7 percent and a comprehensive wet weather exceedance rate of 0 to 7.1 percent for the reference streams. In comparison, *E. coli* data collected over the same period of time from lower Malibu Creek at HtB-1 shows a comprehensive dry weather exceedance rate of 2.9 percent and a comprehensive wet weather exceedance rate of 17.6 percent. For reference, the Malibu Creek Bacteria TMDL sets an allowable exceedance rate for *E. coli* of 1.6 percent for dry weather and 19 percent for wet weather.

Because the Malibu Creek monitoring location at HtB-1 has a dry weather exceedance rate within the range of exceedance rates for the three reference creeks, anthropogenic effects with respect to indicator bacteria during dry weather are not easily distinguishable by this limited dataset. During wet weather, although the long-term average exceedance rate at HtB-1 exceeds those of the Heal the Bay reference streams, the average exceedance rate is still lower than the allowable exceedance rate established in the TMDL.

Based on the results of the Topanga Source ID Study (Dagit, et. al., 2014), conducted by the Resource Conservation District of the Santa Monica Mountains (RCDSMM) in collaboration with the University of California Los Angeles (UCLA), BioSolutions, and Topanga Underground, bacteria in Topanga Creek has been identified as a potential pollutant of concern. While Topanga Creek is not 303(d) listed for bacteria, it is designated a Category 3 WBPC due to the findings of this study.

DDT and PCBs: USEPA's Santa Monica Bay DDT and PCBs TMDL relies on a limited dataset to establish stormwater load allocations, relying on a single study (Curren *et al*., 2011) from a single creek (Ballona Creek, which is outside the NSMBCW watershed area) to establish MS4 WLAs throughout the entire SMB Watershed. It does not present sufficient data to assign MS4 contributions to the DDT and PCB concentrations observed in SMB. Therefore, to help characterize DDT and PCB conditions within the NSMBCW EWMP Area, data collected by the Southern California Coastal Watershed Research Project (SCCWRP) as part of the Bight Regional Monitoring Program were analyzed.

SCCWRP conducted PCB and DDT monitoring in SMB in 2008 at two sampling locations immediately off the coast of the NSMBCW EWMP area. These locations included B08-7522, located off the coast near the creek mouth of Arroyo Sequit Canyon; and B08-7517, located off the coast near the creek mouth of Topanga Canyon. Results from B08-7522 show a total PCB sediment concentration range of 14 – 20 ug/kg dry weight (11.7 – 16.7 ug/g OC) and a DDT concentration range of 0.002 – 1.000 ug/kg dry weight (0.002 – 0.8 ug/g OC). These results are higher than the final PCB target for sediment (0.7 ug/g OC), but below the final DDT target for sediment (2.3 ug/g OC). Results from B08-7517 show a total PCB sediment concentration range of 0 – 13 ug/kg dry weight (0 – 1.6 ug/g OC) and a DDT concentration range of 6.651 – 23.2 ug/kg dry weight (0.8 – 2.8 ug/g OC). Both of these concentration ranges span the TMDL-established targets for PCBs and DDT.

These ranges include estimated values that assume one half of the method detection limit for all non-detect results. There is no evidence supporting any linkage between MS4 discharges and the observed sediment concentrations. No other data or source information are available at this time.

Trash: Data for trash discharge from the MS4 to SMB are unavailable for the NSMBCW Area at this time and were not analyzed as part of this data analysis. A Trash Monitoring and Reporting Plan (TMRP) was submitted to the Regional Board by the County before the TMDL-specified deadline of September 20, 2012 (County of Los Angeles, 2012). The TMRP calls for installation of 62 Full Capture Systems (FCS). These systems are projected to be installed in accordance with the schedule shown in **Table 7**.

Table 7. General Timeline for FCS Installation[1]

Final Date	Number of FCSs Installed
March 20, 2016	13
March 20, 2017	25
March 20, 2018	38
March 20, 2019	50
March 20, 2020	62

[1] This timeline is applicable to the entire County area covered by the TMRP and is not necessarily specific to the NSMBCW EWMP Area.

Within the County area of jurisdictional groups J1 and J4, the County has identified 50 catch basins requiring installation of FCS and has completed the installation which accounts for 100% of catch basins in the unincorporated areas of jurisdictional groups J1 and J4. The percentage of catch basins presented does not include rural drainage inlets (RDIs), which in the past have been grouped into the category of catch basins. However, RDIs are distinct and have the following characteristics, which require that they be treated differently than normal catch basins to provide the desired trash reduction:

- Are situated in sparsely developed or totally undeveloped areas.
- Have no curb and gutter to direct street flows.
- Are not connected to a storm drain system.
- Convey flows from one side of the road to the other, similar to a road culvert.
- Catch leaves and rocks.
- Installation of standard trash devices is infeasible.

The County is in discussions with the Regional Board to determine the best course of action in dealing with RDIs. By way of the LADPW catch basin cleanout contract, the County inspects these RDI’s at least once a year and performs cleanouts as warranted by the inspections. Upon initiation of the NSMBCW CIMP, monitoring for trash and debris will begin in the SMB Watershed in accordance with the County's TMRP.

A TMRP for the Malibu Creek Watershed Trash TMDL was approved on May 30, 2014. Since Permit Attachment M specifies that a Permittee in compliance with the WQBELs for the Malibu Creek Watershed Trash TMDL will be deemed in compliance with the WQBEL for trash in Santa Monica Bay, the City will rely on their Malibu Creek Watershed TMRP to achieve compliance with the SMB Debris TMDL.

From December 2014 through December 2015, trash monitoring by the City in the Malibu Creek Watershed at Compliance Monitoring Site (CMS) "Malibu Lagoon" has resulted in the observance of approximately 1.9 bags of trash and debris on the bank of the creek, and approximately 1.9 bags of trash and debris within the stream itself. At General Assessment Site (GAS) "Malibu Lagoon," approximately 5.25 bags of trash and debris were observed on the streambank, while no trash or debris was observed within the stream. Monitoring to-date has concluded that the source of trash has not been the City's or County's MS4, which is equipped with multiple full capture devices covering the entire tributary watershed in the NSMBCW EWMP Area, but rather littering or illicit dumping by vagrants. Additional details of all trash and debris data collected to date can be found in the 1st Annual Progress Report for the Trash Monitoring and Reporting Plan, submitted to the Regional Board in December 2015 by the City of Agoura Hills (City of Agoura Hills, 2015).

Compliance schedules for the Santa Monica Bay Debris TMDL and Malibu Creek Watershed Trash TMDL can be found in **Table 35**. Compliance for each TMDL will be demonstrated by adherence to the respective TMRPs.

Nutrients: Malibu Creek Watershed currently has two USEPA TMDLs in place which set numeric targets for nutrients: the 2003 Malibu Creek Watershed Nutrients TMDL (Nutrients TMDL) and the 2013 Malibu Creek & Lagoon TMDL for Sedimentation and Nutrients to Address Benthic Community Impairments (Benthic TMDL). The Benthic TMDL, which was released after the Permit became effective, developed stricter WLAs than the Nutrients TMDL, although these WLAs are not incorporated into the Permit. As a result, nutrient concentration data in this section are compared with WLAs (or numeric targets, where WLAs were load-based) from both TMDLs, as shown in **Table 5**.

Historical nutrient data within the Malibu Creek Watershed were summarized in a report by the Las Virgenes Municipal Water District (LVMWD) in 2011 (LVMWD, 2011). Reviewing a wide variety of water quality data from numerous monitoring programs, the study summarized phosphate (as phosphorus)[6] and nitrate (as nitrogen) data at approximately 50 monitoring locations throughout the watershed. USEPA's 2013 Benthic TMDL also summarizes nutrient data within the Malibu Creek Watershed, relying heavily on the data summarized in the 2011 report by LVMWD.

Two of the monitoring locations summarized in the 2011 LVMWD report, both monitored by the Joint Powers Authority of the LVMWD/Triunfo Sanitation District, were located within the lower portion of Malibu Creek Watershed within the geographical scope of the NSMBCW EWMP: RSW_MC004D, in Malibu Creek near Cross Creek Road, and RSW_MC011D, in Malibu Lagoon. Although the 2011 study did not distinguish between summer and winter as defined by the USEPA Nutrients TMDL, it did distinguish between "wet season" and "dry season," which are approximately equivalent to the TMDL-defined seasons. Median nutrient concentrations in lower Malibu Creek and Malibu Lagoon meet the numeric targets for nitrogen established in the 2003 Nutrients TMDL, but do not meet the summer numeric target for phosphorus established therein. If these medians are compared to the lower numeric targets from the 2013 Benthic TMDL (shown in **Table 5**), median nitrate concentrations at each monitoring location would still meet the nitrogen numeric target, but the phosphorus numeric target would be exceeded at both monitoring locations during both the summer and winter periods. It is important to note that monitoring station RSW_MC004D is upstream of MS4 inputs from the NSMBCW EWMP Group, and therefore data at this station reflect the quality of water entering the NSMBCW EWMP Area.

In addition to the nutrient data collected by LVMWD/Triunfo Sanitation District, Heal the Bay has been conducting water quality sampling within Malibu Creek Watershed since 1998. Data from their sampling efforts are summarized in the LVMWD report, but up-to-date data through December 2013 are available via Heal the Bay's website (http://streamteam.healthebay.org/). In particular, Heal the Bay has collected nitrate and phosphate data in Malibu Creek at a monitoring location nearly identical to RSW_MC004D, also located near Cross Creek Road. This location is identified as "HtB-1." Like monitoring station RSW_MC004D, HtB-1 is upstream of MS4 inputs from the NSMBCW EWMP Group, and therefore data at this station reflect the quality of water

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[6] The majority of agencies which have monitored nutrients in the Malibu Creek Watershed have analyzed phosphate instead of total phosphorus. The USEPA's 2003 Nutrients TMDL and the USEPA's 2013 Benthic TMDL set numeric targets for total phosphorus. The LVMWD report states, "The use of phosphate – a subset of total phosphorus – for our analysis of exceedances is conservative for sites identified as exceeding the [Nutrient] TMDL target, especially since these sites constitute the bulk of the watershed by area" (LVWMD, 2011).

entering the NSMBCW EWMP Area. The data have been collected approximately monthly since November 1998. The data were compared with the nitrogen and phosphorus numeric targets established by both the 2003 Nutrients TMDL and the 2013 Benthic TMDL. As expected, the percentages of exceedances for both nitrate and phosphate increase when compared against the Benthic TMDL numeric targets. Also, the percentages of exceedances in the winter are significantly higher for both nitrate and phosphate than in the summer.

Lead: The basis for the 303(d) listing of total lead in Topanga Canyon relies on data that are not available through the SWRCB's 303(d) website. No other lead data are known to be available for the Topanga Canyon Creek subwatershed at this time.

pH: Raw data are not available on the SWRCB's 303(d) website. The listing of Malibu Lagoon for pH includes a statement that out of 138 water samples, 33 samples exceeded the Basin Plan's water quality objective. The data were collected at various monitoring stations within the lagoon during winter 1997, summer-winter 1998, and winter-fall 1999, prior to the recent lagoon restoration project.

The Joint Powers Authority of the LVMWD/Triunfo Sanitation District monitored pH within Malibu Lagoon between 1971 and 2010, prior to the 2012-2013 lagoon restoration project. The data were summarized in LVMWD's 2011 study, showing that a median pH value of 8.2 was found in the Lagoon based on 160 samples (LVMWD, 2011). This is within the Basin Plan Objective range of 6.5 to 8.5. However, the LVMWD study did not report the percent of these samples that were outside of the Basin Plan Objective range.

Following the extensive restoration of Malibu Lagoon in May 2013, which included physical changes in the Lagoon's ecosystem, rearranging the western channels to create an artificial peninsula, and removal of all vegetation canopy and bank vegetation, pH data were collected by the Santa Monica Bay Restoration Foundation (SMBRF) at two locations in the northwest portion of the Lagoon- ML1 and ML2 (SMBRF, 2013). Data were collected every 30 minutes at each location from May 3 (ML 2) and June 25 (ML 1) through November 15, 2013. At ML 1, 58 percent of the 6,847 samples were above the 8.5 threshold. The average pH at this location over the period of record was measured to be 8.65. At ML 2, 34 percent of the 9,323 samples were above the 8.5 threshold. The average pH at ML2 over the period of record was measured to be 8.35. The data show that pH levels in the lagoon remain outside of the Basin Plan Objective range despite the restoration effort.

Since the completion of Legacy Park in 2010, all NSMBCW Group-owned MS4 dry weather flows within the Malibu Creek Watershed have been diverted, and stormwater flows have been significantly reduced. Therefore, there is no known evidence supporting a linkage between MS4 discharges and the observed pH exceedances.

Selenium and Sulfates: Malibu Creek is 303(d)-listed for both selenium and sulfates; however, raw data are not available on the SWRCB's website. The samples that served as the basis for the 303(d)-listing for each of these constituents were collected upstream of the City of Malibu and outside the jurisdiction of the NSMBCW EWMP Group. There is currently no evidence supporting a linkage between MS4 discharges and exceedances of selenium and/or sulfates. Because both pollutants are reported to be a result of natural sources within the upper watershed (LVMWD, 2011), they are addressed collectively here.

The SWRCB's 303(d) website states that 5 of 20 samples (25 percent) taken between October 2000 and April 2003 exceeded the California Toxic Rules (CTR) criterion for total selenium (5.0 ug/L). As noted previously, this sampling was conducted upstream of the City of Malibu and outside the jurisdiction of the NSMBCW EWMP Group. No other information regarding this listing is available on the SWRCB's website.

The Joint Powers Authority of the LVMWD/Triunfo Sanitation District monitored selenium within Malibu Creek between 1971 and 2010. Analysis of data from monitoring location RSW_MC004D, located within Malibu, shows a median concentration of 3 ug/L for 28 water quality samples. This median concentration meets the CTR criterion. Additionally, the data show that the highest concentrations of selenium are in the upper portion of the watershed, and are reportedly due to the presence of the Monterey Geologic Formation, which is known to contain high levels of sulfur and selenium (LVMWD, 2011).

For sulfates, the SWRCB's 303(d) website states that 9 of 22 samples (40.9 percent) taken between October 2000 and March 2004 exceeded the Basin Plan Objective (500 mg/L). Similar to selenium, it is important to note that sampling was conducted upstream of the City of Malibu and outside the jurisdiction of the NSMBCW EWMP Group. No other information regarding this listing is available on the SWRCB's website.

The Joint Powers Authority of the LVMWD/Triunfo Sanitation District also monitored sulfate within Malibu Creek between 1971 and 2010. Data for monitoring location RSW_MC004D shows a median concentration of 530 mg/L for 29 water quality samples, which is above the Basin Plan Objective. However, like selenium, the data show that the highest concentrations of sulfate are in the upper portion of the watershed, and are reportedly due to the presence of the Monterey Geologic Formation, which is known to contain high levels of sulfur and selenium (LVMWD, 2011).

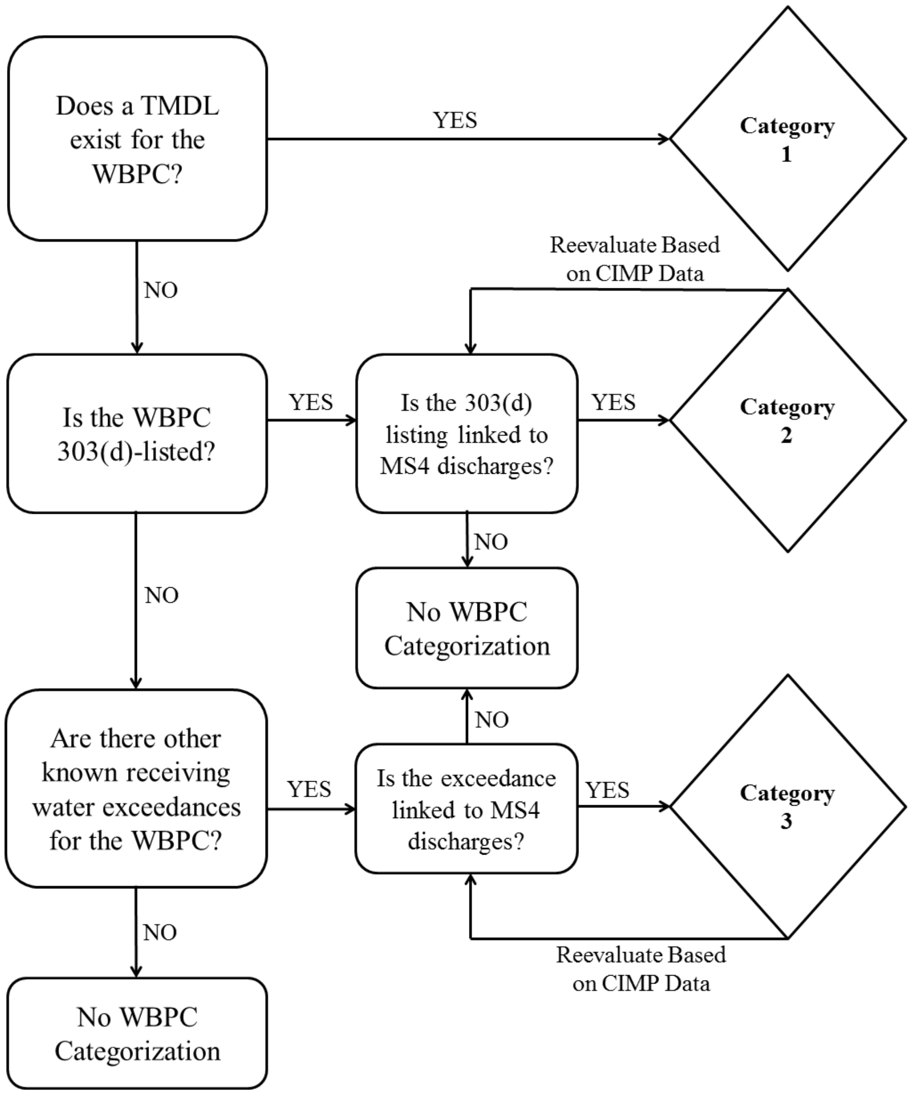
2.1.3 MS4 DISCHARGE QUALITY

Stormwater and non-stormwater discharges have not yet been characterized within the NSMBCW EWMP Area. No MS4 discharge monitoring data were available at the time of this assessment, but discharge characterization will occur as part of the implementation of the CIMP (NSMBCW EWMP Group, 2014d). Since outfall monitoring data from the CIMP were not available at the time of EWMP development, information from regional MS4 land use studies (e.g., Los Angeles County, 2000) and/or TMDL technical reports were used in Section 2.2 for the water body-pollutant prioritization.

2.2 WATER BODY-POLLUTANT PRIORITIZATION

Water body-pollutant combinations (WBPCs) were established and categorized based on Permit Section VI.C.5.b. **Figure 5** provides a brief conceptual overview of the process used to identify and categorize the WBPCs within the NSMBCW EWMP Area.

Figure 5. Process for Categorizing Water Body-Pollutant Combinations



As shown above, identified WBPCs were prioritized as Category 1, 2 or 3, in accordance with Section IV.C.5(a).ii of the Permit, to guide the implementation of structural and institutional BMPs. The three priority categories are defined as follows:

- Category 1 (Highest Priority): WBPCs for which WQBELs and/or RWLs have been established in an approved TMDL;
- Category 2 (High Priority): Pollutants for which data indicate water quality impairment in the receiving water according to the State's 303(d) list and for which MS4 discharges may be causing or contributing to the impairment; and

- Category 3 (Medium Priority): Pollutants which exceed applicable RWLs contained in the Permit and for which MS4 discharges may be causing or contributing to the exceedances, but which do not have an approved TMDL or are not listed on the 303(d) list.

Table 8 presents the resulting classifications for the WBPCs within the NSMBCW EWMP Area. WBPCs categorized below are subject to change through the EWMP's adaptive management process (as described in Section 8) based on future data collected as part of the CIMP or other monitoring programs. Additional details on the process of identifying these WBPCs can be found in the NSMBCW EWMP Work Plan (**Appendix B**).

Table 8. Water Body Pollutant Prioritization for the NSMBCW EWMP Area

Category	Water Body	Pollutant	Basis
1	Malibu Creek and Lagoon	Nutrients	USEPA-established Nutrients TMDL and Benthic TMDL for the Malibu Creek Watershed
	SMB Beaches	Dry Weather Bacteria	SMB Beaches Bacteria TMDLs for both dry and wet weather
	SMB Beaches	Wet Weather Bacteria	
	Malibu Creek and Lagoon	Indicator Bacteria	Malibu Creek and Lagoon Indicator Bacteria TMDL
	Malibu Creek	Trash	Malibu Creek Trash TMDL
	SMB	Trash/Debris	TMDL for debris for Santa Monica Bay Offshore/Nearshore
	SMB	DDTs	USEPA TMDL for DDT and PCBs for Santa Monica Bay Offshore/Nearshore
	SMB	PCBs	
2	Topanga Canyon Creek	Lead	Topanga Canyons Creek 303(d) listing for lead.
	Malibu Creek	Sulfates & Selenium	Malibu Creek 303(d) listing for sulfates and selenium
	Malibu Lagoon	pH	Malibu Lagoon 303(d) listing for pH
3	Topanga Canyon Creek	Bacteria (E. *coli*)	Based on findings from the Topanga Source ID Study (Dagit, et. al., 2014).

A few WBPCs within the NSMBCW EWMP Area are included on the SWRCB's 2010 303(d) list, but are not included in **Table 8** and are not directly addressed as part of this EWMP. These WBPCs, and the reasoning for excluding each, are as follows:

- Invasive species in Solstice Canyon and fish barrier in Malibu Creek: These WBPCs are not related to MS4 discharges.
- The fish consumption advisory in SMB, which is being addressed by the PCB and DDT TMDL; sediment and benthic-macroinvertebrate bioassessments in Malibu Creek, which are being addressed by the Benthic TMDL; scum and foam in Malibu Creek, which is being addressed by the Nutrients TMDL; swimming restrictions and viruses in Malibu Lagoon, which are being addressed by the Malibu Lagoon Indicator Bacteria TMDL; eutrophic conditions in Malibu Lagoon, which is being addressed by the Nutrients TMDL; and benthic community effects in Malibu Lagoon, which is being addressed by the Benthic TMDL. These WBPCs are already being addressed (directly or indirectly) by one of the TMDLs contained in this EWMP.
- Sediment toxicity in SMB Offshore/Nearshore: there is sufficient evidence in support of the WBPC being delisted from the 303(d) list, as determined by the USEPA. The USEPA PCB and DDT TMDL states the following regarding sediment toxicity: "There is little evidence of sediment toxicity in Santa Monica Bay…Our evaluation of the data showed only 3 out of 116 samples exhibited toxicity. Following the California listing policy, Santa Monica Bay is meeting the toxicity objective and there is sufficient evidence to delist sediment toxicity. We therefore make a finding that there is no significant toxicity in Santa Monica Bay and recommend that Santa Monica Bay not be identified as impaired by toxicity in California's next 303(d) list."

2.3 SOURCE ASSESSMENT

To complement the water quality prioritization process, the Permit requires that Permittees identify known and suspected stormwater and non-stormwater sources for WBPCs. The intent of the Source Assessment is to identify potential sources within the watershed for the WBPCs and to support prioritization and sequencing of management actions.

A detailed source assessment was carried out as part of the EWMP Work Plan. The following data sources were reviewed as part of the source assessment for the water body-pollutant combinations listed previously:

- Findings from the Permittees' Illicit Connections and Illicit Discharge Elimination Programs (IC/ID);
- Findings from the Permittees' Industrial/Commercial Facilities Programs;
- Findings from the Permittees' Development Construction Programs;

- Findings from the Permittees' Public Agency Activities Programs;
- TMDL source investigations;
- Watershed model results;
- Findings from the Permittees' monitoring programs, including but not limited to TMDL compliance monitoring and receiving water monitoring; and
- Any other pertinent data, information, or studies related to pollutant sources and conditions that contribute to the highest water quality priorities.

Since sources of pollutants for the various water bodies within the NSMBCW are essentially identical (e.g., sources of trash within SMB and Malibu Creek are believed to be the same), the following source assessment is broken down by pollutant.

2.3.1 INDICATOR BACTERIA

The SMBB Bacteria TMDL for both dry and wet weather was the first bacteria TMDL adopted by the Regional Board in the State of California. The SMBB Bacteria TMDL was recently opened for reconsideration, although the source assessment was not part of this update. As a result, the general findings from the original source assessment remain unchanged. These findings are summarized in the 2012 Basin Plan Amendment for the reopened SMBB Bacteria TMDL (Attachment A to Resolution No. R12-007):

> "With the exception of isolated sewage spills, dry weather urban runoff and stormwater runoff conveyed by storm drains and creeks is the primary source of elevated bacterial indicator densities to SMB beaches. Limited natural runoff and groundwater may also potentially contribute to elevated bacterial indicator densities during winter dry weather" (Regional Board, 2012b).

The SMBB Bacteria TMDL source assessment (Regional Board, 2002) maintains that dry weather urban runoff and stormwater runoff is the primary source of elevated bacteria concentrations at SMB beaches. Although definitive information regarding the specific sources of bacteria within the watershed is not presented, speculation provided in the dry weather staff report provides some insight into possible sources:

> "Urban runoff from the storm drain system may have elevated levels of bacterial indicators due to sanitary sewer leaks and spills, illicit connections of sanitary lines to the storm drain system, runoff from homeless encampments, illegal discharges from recreational vehicle holding tanks, and malfunctioning septic tanks among other things. Swimmers can also be a direct source of bacteria to recreational waters. The bacteria indicators used to assess water quality are not specific to human sewage; therefore, fecal matter from animals and birds can also be a source of elevated levels

of bacteria, and vegetation and food waste can be a source of elevated levels of total coliform bacteria, specifically" (Regional Board, 2002).

Following the TMDL, a study by the SCCWRP investigated bacteria runoff concentrations from various land uses in the Los Angeles region (Stein *et al*, 2007). Results showed that wet weather runoff event mean concentrations (EMCs) for fecal coliform bacteria were highest for agricultural land uses, followed by commercial and educational, single family residential, multi-family residential, open space, industrial, and transportation. In this 2007 SCCWRP study, results also showed that in some cases, the levels of fecal indicator bacteria at the recreational (horse) and agricultural land use sites were as high as those found in primary wastewater effluent in the United States. Tiefenthaler *et al* (2011) also found that horse stable sites contributed significantly higher wet weather EMCs than other land use types.

The 2010-2011 and 2011-2012 Los Angeles County Municipal Stormwater Permit Individual Reports for Malibu, the County, and LACFCD report that while eliminated shortly after being reported, leaks from onsite wastewater treatment systems (OWTSs) and IC/IDs do sometimes occur within their jurisdictions. However, while much of the NSMBCW area lacks a sewer system and instead relies on OWTSs, OWTSs have been studied extensively and no documentation currently exists to prove that they are a source of fecal indicator bacteria (FIB) to SMB, Malibu Lagoon, or MS4 discharges. This is supported by a recent USGS study (2011) conducted in the Malibu Lagoon area, which found that bacteria in groundwater wells were nearly absent even in wells that contained water with a wastewater history, likely due to a combination of microbial filtration, sorption, death, predation, and other factors within the soil. Therefore, since the only pathway from an OWTS to the receiving waters or the MS4 would be via groundwater, the USGS study suggested other more likely sources of bacteria including beach kelp, discharge from the Lagoon to the ocean, and movement of water through the berm separating the lagoon from the ocean.

Additionally, information on non-MS4 sources of surf zone bacteria were provided by Malibu, based on a comprehensive review of Southern California published literature, as part of comments on the reopened Bacteria TMDL (City of Malibu, 2012):

"A number of recent Santa Monica Bay studies have further identified and confirmed natural (non-anthropogenic) sources of fecal indicator bacteria including plants, algae, decaying organic matter, beach wrack and bird feces – implicating these as potentially significant contributors to exceedances (Imamura *et al* 2011, Izbicki 2012b). Beach sands, sediments and beach wrack have been shown to be capable of serving as reservoirs of bacteria, possibly by providing shelter from UV inactivation and predation by allowing for regrowth (Imamura *et al* 2011, Izbicki *et al* 2012b, Lee *et al* 2006, Ferguson *et al* 2005, Grant *et al* 2001, Griffith 2012, Litton *et al* 2010, Phillips *et al* 2011, Jiang *et al* 2004, Sabino *et al* 2011, and Weston Solutions 2010). In fact, enterococci include non-fecal or "natural" strains that live and grow in water, soil, plants and insects (Griffith, 2012). Thus, elevated levels of enterococci in water could be related to input from natural sources. The phenomenon of regrowth of bacteria from either anthropogenic or natural sources has been suggested by several studies as a possible source of beach bacteria exceedances (Griffith 2012, Litton *et al* 2010, Weston Solutions 2010, Izbicki *et al* 2012b, Weisberg *et al* 2009)."

Furthermore, monitoring results from microbial source tracking (MST) studies conducted in the NSMBCW area indicate that human fecal contributions are minor or non-existent (City of Malibu, 2012):

> "Several MST studies have been conducted within North Santa Monica Bay subwatersheds to assess the presence of human fecal contamination during dry weather. Noble et al (2005) sampled from Malibu Creek, Malibu Lagoon and from the discharge of the lagoon to the beach. Jay et al (2011) collected samples from the Malibu Creek, Malibu Lagoon, and Surfrider Beach, and Izbicki et al (2012b) tested Malibu Lagoon and near-shore ocean water. Two of the three studies (Noble et al 2005 and Izbicki et al 2012b) found no detection of human markers in any of the surface water samples tested, and Jay et al found no evidence of human fecal marker HF183 at Surfrider Beach, however, Jay et al did detect low levels of human marker HF183 in several samples (5 out of 80 samples, or 6 percent) that were collected from lower Malibu Creek and Malibu Lagoon[7]. It was noted that the detected lagoon levels correspond to 0.00005-0.0009 percent sewage or greater than 5-log (>100,000 times) dilution. Potential sources for human contributions were not identified, however the Izbicki study specifically investigated the potential for OWTS to serve as sources of human fecal contamination to Malibu Lagoon, and did not find evidence linking microbial

[7] It should be noted that while the HF183 assay is generally accepted as one of the most reliable markers of human fecal waste and has been recommended by SCCWRP and university collaborators based on testing performed for the ongoing State grant-funded Source Identification Pilot Project (SIPP), it is not 100% specific to human fecal contamination and therefore false positives may occur. For instance, assay testing for the SIPP has shown that specificity (or how specific the analysis results are to human sources as compared to sources from other species) is such that up to 18% error rates were observed for test samples based on four test studies.

communities (based on TRFLP [terminal restriction fragment length polymorphism] community analysis) found in these systems to those found in the lagoon or beach; furthermore all 25 groundwater samples were negative (non-detect) for HF183 (Izbicki, 2012a). Weisberg et al (2009) similarly studied Ramirez and Escondido Creeks and found little to no evidence of human sources in either creek and suggested regrowth[8] (grass clippings and high nutrients in Ramirez and presence of enclosed berm at Escondido) as a potential source of the minor levels measured at the very low end of the detection range. In fact, of 332 samples tested for both creeks, only one sample from Escondido Creek tested positive for optical brighteners (a correlate of human fecal contamination) (Barnett et al 2008 [Year 2 Progress Report on Weisberg study]). Weisberg et al also tested human *Bacteroides* markers in both creeks but results were inconclusive. Following the study period at Paradise Cove/Ramirez Creek, Malibu installed a stormwater treatment facility with City and State bond funds. This facility effectively disinfects all flows in dry weather and most flows in wet weather. Compliance and project monitoring show that the treated effluent is bacteria free but as soon as these flows reach the beach, bacteria levels rebound and shoreline samples exceed TMDL WLAs.

Malibu's final Project Certification to the SWRCB (Brown 2011) acknowledges that the project monitoring site PC-5 at the interface of the treated discharge and the sand was regularly above FIB standards. It was clear that once the treated water flowed across the sand and the accumulated kelp wrack, there was a dramatic decline in water quality and bacteria levels had increased. This is consistent with findings from other Southern California urban runoff disinfection projects, such as in Aliso Creek (Orange County) and Moonlight Beach (San Diego County), where FIB concentrations rebound immediately downstream of the treated discharges."[9]

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[8] "Regrowth" is a general term being used here to describe persistence and multiplication of bacteria within natural or engineered systems such as sediments or storm drains, where decomposing organic matter, nutrient supplies, and/or protection from UV light create favorable conditions for this to occur. Studies by SCCWRP have demonstrated the ability of Enterococcus to grow on sterile concrete surfaces under such conditions, and the speciation of these Enterococcus colonies showed them to be primarily of environmental origin (mostly from plants and decomposing organic matter) (Griffith 2012). Regrowth can serve as an internal source of bacteria to waterbodies, as opposed to external inputs such as urban runoff.

[9] These findings are also consistent with monitoring data from LACFCD's Marie Canyon Treatment Facility.

More recently, a bacteria source identification study was conducted in the Topanga Creek subwatershed. For the Topanga Source ID Study (Dagit, et. al., 2014), intensive sampling, long-term monitoring during wet and dry seasons, and measurement of quantitative polymerase chain reaction (qPCR) markers was conducted at 14 locations (5 locations within the subwatershed, 9 locations on the beach) to attempt to characterize bacteria levels and potential sources within the Topanga Creek subwatershed due to poor water quality ratings at Topanga State Beach. Based on this study, elevated bacteria levels were observed throughout the subwatershed in association with human, dog, and gull markers. Other conclusions from the study included:

- The finding that the upper subwatershed is not contributing to the exceedances observed at Topanga Beach;
- The finding that concentrations of FIB and nutrients decrease as the creek flows downstream from town through the Narrows;
- The finding that FIB and/or pathogens are generally not caused by leakage from faulty septic systems in the lower subwatershed;
- The finding that contributions from Topanga Lagoon are correlated with FIB levels in the ocean during rain events and when the lagoon is connected to the ocean directly. These elevated levels of bacteria appear to be the result of dog and gull inputs. Human marker, on the other hand, was detected infrequently in the creek, lagoon, and ocean.

Based on the results of this study, it appears that County inputs from the MS4 are not causing or contributing to bacteria exceedances at Topanga beach.

Other sources of bacteria during wet weather are anticipated to include other permitted and non-permitted stormwater discharges such as Construction General Permit sites, Phase II MS4 Sites (e.g., college campuses), State/Federal owned lands, recreational areas, private stormdrains, and Caltrans' MS4.

Additional data will be needed to quantify the contribution of MS4 discharges – particularly relative to the many other identified sources that have been documented within the NSMBCW – to the elevated bacteria concentrations measured at NSMBCW TMDL compliance monitoring locations. Additional data are also needed to identify the sources of bacteria within MS4 discharges as well as their potential to contribute to recreational illness risks, which has the potential to affect the TMDL WLAs through a future reopener. MS4 outfall monitoring (through the CIMP) and source identification (through special studies) will be essential to support future BMP planning and EWMP updates.

2.3.2 DDT AND PCBS

As stated previously, limited data are available characterizing DDT and PCBs within Santa Monica Bay, particularly since direct discharges of these pollutants from publically owned treatment works (POTWs) have ceased. The largest concentration of DDT and PCBs within Santa Monica Bay is contained within the Palos Verdes shelf, which is being addressed by the USEPA as a CERCLA site. Loadings from the shelf to the bay are large and have been well characterized (USEPA, 2012).

With respect to stormwater, the TMDL does not specifically characterize MS4 loadings, though it does recognize that “DDT and PCBs are no longer detected in routine stormwater sampling from Ballona Creek or Malibu Creek.” However, the TMDL also states that current detection limits used to analyze DDT and PCB concentrations are too high to appropriately assess the water quality. Stormwater inputs are assumed to come from urban areas, as the TMDL specifically states that rural areas in NSMBCW are not likely to be a major source of PCBs or DDT (USEPA, 2012).

No other data or source information is available at this time. Once three years of water quality data are collected under the CIMP and evaluated consistent with the recommendations by USEPA in the TMDL to utilize a three-year averaging period,[10] then further source assessment will be considered and the categorization and prioritization of PCB and DDTs as MS4-related pollutants of concern will be reevaluated.

2.3.3 TRASH

Source information for trash within Malibu Creek and Santa Monica Bay is provided by those water body’s respective TMDLs. A detailed source breakdown is not provided, but the following general summary from the Malibu Creek Watershed Trash TMDL is generally applicable to SMB as well:

> “Litter from adjacent land areas, roadways, and direct dumping and deposition are sources of trash to Malibu Creek Watershed. Point sources such as storm drains are also sources of trash discharged to Malibu Creek Watershed” (Regional Board, 2008).

[10] The three-year averaging period is recommended in the USEPA TMDL in Section 8.2, which reads, “We recommend that stormwater waste load allocations be evaluated based on a three year averaging period” (USEPA, 2012). Additionally, Permit Attachment M states that compliance with the PCB and DDT waste load allocations shall be determined based on a three-year averaging period.

The requirement in the SMB Debris TMDL to prepare and implement a Plastic Pellet Monitoring and Reporting Program (PMRP) is not applicable to the NSMBCW EWMP Group. The Regional Board provided a letter on October 20, 2014 finding that the City of Malibu submitted adequate documentation demonstrating that a PMRP is not necessary, and confirmed that a Plastic Pellet Spill Response Plan had been submitted as required.

2.3.4 NUTRIENTS

The USEPA Nutrients TMDL for the Malibu Creek Watershed cites a 2002 source analysis study (Tetra Tech, 2002) as the basis for the source assessment. The analysis compiled an inventory of sources of nutrients to the waterbody and used both "simple methods and computer modeling" (using HSPF) to estimate nutrient loads within the Malibu Creek Watershed. The analysis estimated both annual and summer (May 1 through October 31) loading contributions of nitrogen and phosphorus. Although the TMDL source assessment does not estimate loadings from Malibu in particular, it does estimate loadings by subwatershed, including "Lower Malibu Creek" and "Malibu Lagoon." For simplicity, these two subwatersheds are conservatively assumed to comprise the portion of the Malibu Creek Watershed covered by the NSMBCW EWMP Group's watershed management area.

The portion of the Malibu Creek Watershed within the NSMBCW EWMP Group's jurisdiction is estimated to be responsible for 9.2 percent of the annual nitrogen loads and 7.4 percent of the annual phosphorus loads within the entire watershed, according to the 2003 TMDL (USEPA, 2003). The specific sources of nitrogen and phosphorus within the NSMBCW EWMP Group's jurisdiction are estimated to be (in order of decreasing magnitude): natural sources, such as birds, tidal inflow, and sediment release[11]; septic systems; runoff from undeveloped land; runoff from developed land; runoff from agriculture/livestock areas; and runoff from local golf courses.

The USEPA's 2013 Benthic TMDL contains a robust data analysis and source assessment for nutrients within the Malibu Creek Watershed, though it relies significantly on the source assessment findings from the 2003 Nutrients TMDL. Like the Nutrients TMDL, the Benthic TMDL found that Tapia WRF was the largest contributor of nutrients to

[11] Sutula et al (2004) found that sediment enriched in particulate nitrogen and phosphorus was deposited in Malibu Lagoon during the wet season. These particulate nutrients were remobilized as dissolved inorganic nutrients to the surface waters during dry season. The study reported that sediment release approximately equals 18% of the total nitrogen source and 5% of the total phosphorus source from other nonpoint source inputs to the Lagoon during the dry season (Sutula et al, 2004).

Malibu Creek during the winter. Aside from Tapia WRF, major contributors in the winter were found to be undeveloped runoff, OWTS inputs, urban runoff, and golf course runoff. In the summer, when Tapia WRF is under a no-discharge prohibition, main contributors were estimated to be OWTS inputs and urban runoff.

Within the Malibu Creek Watershed, undeveloped areas with Monterey Formation geology are a significant nonpoint source of phosphate (LVMWD, 2011). The 2013 Benthic TMDL supports this claim in part, recognizing that the Monterey Formation geology may result in elevated levels of phosphorus at un-impacted sites. However, the TMDL also points out that "substantial elevated orthophosphate levels downstream of Tapia's discharge (more than twenty-fold)" suggests that phosphorus concentrations are consistently elevated in the Creek due to discharges from Tapia (USEPA, 2013). The Benthic TMDL also states that inorganic nitrogen concentrations are associated with development, rather than geology (USEPA, 2013). For purposes of this EWMP it is noted that monitoring locations within Malibu Creek (HtB-1 and RSW_MC004D) reflect nutrient loads that discharge into the NSMBCW EWMP Area, upstream of any potential MS4 inputs from the NSMBCW.[12] While this input is important, the determination of the causes and/or sources of these nutrient loads are outside the scope of the NSMBCW EWMP plan.

EMC data for various land uses within Los Angeles County (Los Angeles County, 2000) and agricultural land uses within Ventura County (Ventura County, 2003) show that the highest concentrations of nitrate are associated with runoff from (in descending order): agriculture, multi-family residential, vacant/open space, industrial, single family residential, educational, and commercial. Similarly, the highest concentrations of total phosphorus are associated with runoff from (in descending order): agriculture, transportation, single family residential and commercial, industrial, education, multi-family residential, and vacant/open space. Many of these land uses exist in the Malibu Creek Watershed above the City of Malibu. Within the City of Malibu area within the Malibu Creek Watershed, land uses with the highest nutrient EMCs based on the County's findings are (in descending order): agriculture, single family residential and vacant/open-space, commercial, industrial, and multi-family residential. Runoff from these areas is expected to be the most significant source of nutrients within the NSMBCW area in Malibu Creek Watershed.

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[12] NSMBCW MS4 contributions within Malibu Creek are regularly diverted, and only discharge to Malibu Creek during extreme conditions.

2.3.5 LEAD

The data used to establish the lead 303(d) listing for Topanga Canyon Creek are not available on the SWRCB's 303(d) website, as the listing decision was made prior to 2006. The website does state that the source of lead is a nonpoint source within the subwatershed, but no details are provided. There is no other data available for total lead in this water body at this time. A recent study in the adjacent Malibu Creek Watershed found that "lead no longer appears to present a significant threat to human health or aquatic life in the watershed" (LVMWD, 2011).

Wet weather EMCs for lead, based on the Los Angeles County EMC dataset, show that the highest concentrations are expected from agricultural land uses, followed in order by industrial, commercial, high density single family residential, transportation, multi-family residential, educational, and open space land uses (Geosyntec Consultants, 2012). Other Los Angeles region land use studies have found that high density single family residential has the highest EMCs, followed by industrial and commercial land uses (Stein *et al* 2007). These potential sources will be evaluated for BMP implementation as part of the RAA.

2.3.6 PH

The SWRCB's 303(d) website states that sources are unknown with respect to pH exceedances within Malibu Lagoon. Additional information regarding specific sources of pH in the lagoon is not known to be available at this time.

Los Angeles County estimated EMCs for pH for various land uses within the County based on monitoring data collected from 1994 through 2000 (LACDPW, 2000). For land uses relevant to the NSMBCW EWMP Area - including commercial, vacant, high density single family residential, transportation, educational, and multi-family residential - median pH values in stormwater runoff ranged from 6.5-8.1, which are within the Basin Plan objective range of 6.5 to 8.5. Therefore, pH exceedances in Malibu Lagoon are not believed to be caused by stormwater contributions from the NSMBCW EWMP Group.

2.3.7 SELENIUM AND SULFATES

The SWRCB's 303(d) website states that sources are unknown with respect to both selenium and sulfate exceedances within Malibu Creek. However, a comprehensive study conducted in 2011 reports that the northern tributaries of Malibu Creek are "clearly the major source" of both sulfates and selenium within the watershed. The northern tributaries drain the Monterey Formation, which is known to contain high levels of sulfur and selenium. With respect to sulfates, the report states that "no known human sources (aside from coal and shale mining, neither of which occur in the watershed) are capable of yielding sulfate levels equivalent to those recorded” (LVMWD, 2011). Anthropogenic sources of selenium and sulfates within the NSMBCW EWMP jurisdiction are not known at this time.

2.4 SOURCE ASSESSMENT SUMMARY

The preliminary source assessment and literature review conducted for the NSMBCW EWMP Area is summarized in **Table 9** below.

Table 9. Water Body Pollutant Source Assessment

Pollutant	Potential Sources
Indicator Bacteria	• Human sources[a] - sanitary sewer overflows and leaks, OWTS, illicit discharges and connections, homeless encampments, swimmers • Non-human anthropogenic sources – waste from dogs, horses and other domestic animals or livestock • Non-anthropogenic sources[b] - plants, algae, decaying organic matter, beach wrack, beach sands, creek and lagoon sediment, birds and other wildlife • Dry weather runoff and stormwater from all developed and undeveloped land uses, which include and convey pollutants from origin sources listed above; this category includes MS4 permitted discharges as well as discharges from other sites and areas not covered under the Phase I MS4 Permit (e.g., Construction General Permit sites, Phase II MS4 General Permit sites, Caltrans’ MS4s, State and Federal owned lands, other recreational areas, and private storm drains)
DDT and PCBs	• Palos Verdes Shelf[c] • Stormwater and dry weather runoff from developed and agricultural land uses
Trash	• Litter from adjacent land areas • Roadways • Direct dumping and deposition • Storm drains (Regional Board, 2008)
Nutrients	• Natural and legacy sources – decaying vegetation and organic litter, birds, tidal inflow, and release from lagoon sediments[d] • Human sources - sanitary sewer overflows and leaks, OWTS, illicit discharges and connections, homeless encampments, swimmers • Non-human anthropogenic sources – waste from dogs, horses and other domestic animals or livestock, and fertilizers and compost • Dry weather runoff and stormwater from undeveloped and developed land (including agriculture, livestock, equestrian, and golf course areas), which include and convey pollutants from origin sources listed above • Discharges from Tapia Water Reclamation Facility
Lead	• Natural background soils • Dry weather runoff and stormwater from all developed and undeveloped land uses, including MS4 permitted discharges as well as discharges from other sites and areas not covered under the Phase I MS4 Permit (e.g., Construction General Permit sites, Phase II MS4 General Permit sites, Caltrans’ MS4s, State and Federal owned lands, other recreational areas, and private storm drains
pH	• Unknown
Selenium/ Sulfates	• Groundwater exfiltration and dissolution of minerals from northern tributaries of Malibu Creek, particularly areas with Monterrey Formation type geology (LVMWD, 2011)[e]

[a] Monitoring results from multiple microbial source tracking studies conducted in surface waters in the NSMBCW EWMP Area indicate that human fecal contributions are minor or non-existent (e.g., Dagit, et. al., 2014; Noble, et. al., 2005; Jay, et. al., 2011; Izbicki, et. al., 2012b; findings summarized in City of Malibu, 2012).
[b] Imamura *et al* 2011, Izbicki *et al* 2012b, Lee *et al* 2006, Ferguson *et al* 2005, Grant *et al* 2001, Griffith 2012, Litton *et al* 2010, Phillips *et al* 2011, Jiang *et al* 2004, Sabino *et al* 2011, Weston Solutions 2010.
[c] The largest concentration of DDT and PCBs within Santa Monica Bay is contained within the Palos Verdes shelf, which is being addressed by the USEPA as a CERCLA site. Loadings from the shelf to the bay are large and have been well characterized (USEPA, 2012).
[d] Sutula et al (2004) found that sediment enriched in particulate nitrogen and phosphorus was deposited in Malibu Lagoon during the wet season. These particulate nutrients were remobilized as dissolved inorganic nutrients to the surface waters during dry season. The study reported that sediment release approximately equals 18% of the total nitrogen source and 5% of the total phosphorus source from other nonpoint source inputs to the Lagoon during the dry season (Sutula et al, 2004).
[e] Undeveloped areas with Monterey Formation geology are a significant nonpoint source of phosphate within a number of subwatersheds in the upper Malibu Creek Watershed (LVMWD, 2011).

Where source information specific to the watershed was unavailable, pertinent literature was utilized to provide direction for further assessment. Additional water quality data will be needed to quantify the contribution of MS4 discharges – particularly relative to the many other identified sources that have been documented within the NSMBCW. MS4 outfall monitoring (through the CIMP) and source identification (through the non-stormwater screening and monitoring program) will be essential to support future BMP planning and EWMP updates.

3 SELECTION OF APPROPRIATE BEST MANAGEMENT PRACTICES (BMPS)

This section summarizes the objectives set by the NSMBCW EWMP Group in identifying appropriate BMPs as well as the reasoning behind the general types of control measures (MCMs, structural controls, etc.) that were incorporated herein. Since the modeling conducted as part of the RAA serves as the basis not only for BMP evaluation but also BMP identification, details on how specific BMP projects were identified can be found in Section 4. Furthermore, Sections 5 and 6 contain specifics (concept, water quality performance) on the combination of BMP projects that were chosen for this program.

3.1 OBJECTIVES

The Permit requires the NSMBCW EWMP Group to identify strategies, control measures, and BMPs[13] to implement within their WMA. Specifically, the Permit specifies that BMPs be implemented to achieve effluent limits in the Permit applicable to MS4 discharges and to reduce impacts to receiving waters from stormwater and non-stormwater runoff. This expectation assumes the implementation of both types of BMPs – non-structural and structural – by the NSMBCW EWMP Group.

The objectives of selecting and incorporating BMPs into the NSMBCW EWMP include:

1. Preventing and/or eliminating non-stormwater discharges to the MS4 that are a source of pollutants from the MS4 to receiving waters;
2. Achieving all applicable interim and final WQBELs and/or RWLs pursuant to corresponding compliance schedules; and
3. Ensuring that discharges from the MS4 do not cause or contribute to exceedances of RWLs.

3.2 DEFINITION OF BEST MANAGEMENT PRACTICES

The Permit defines BMPs as “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.” These BMPs may include:

1. Structural and/or non-structural BMPs and operation and maintenance procedures that are designed to achieve applicable WQBELs and/or RWLs;
2. Retrofitting areas of existing development known or suspected to contribute to the highest water quality priorities with regional or sub-regional BMPs; and
3. Stream and/or habitat rehabilitation or restoration projects where stream and/or habitat rehabilitation or restoration are necessary for, or will contribute to demonstrable improvements in the physical, chemical, or biological receiving water conditions and restoration and/or protection of water quality standards in receiving waters.

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[13] For simplification, the term “BMP” will be used to collectively refer to strategies, control measures, and/or best management practices. The Permit also refers to these measures as Watershed Control Measures, or WCMs.

Non-structural BMPs are BMPs that prevent or reduce the release of pollutants or transport of pollutants within the MS4 area but do not involve construction of physical facilities. Non-structural BMPs are often implemented as programs or strategies which seek to reduce runoff and/or pollution close to the source. Examples include but are not limited to: street sweeping, downspout disconnect programs, pet waste cleanup stations, irrigation ordinances, or illicit discharge elimination. Minimum control measures (MCMs) as set forth in the Permit are a subset of non-structural BMPs even though some MCMs include measures that require the implementation of structural BMPs.

Structural BMPs are BMPs that involve the construction of a physical control measure to alter the hydrology or water quality of incoming stormwater or non-stormwater. There are two categories of structural BMPs, defined by the runoff area treated by the BMP: regional BMPs[14] and distributed BMPs. Regional BMPs are designed to treat runoff from a large drainage area and are expected to include multiple parcels and various land uses. These may include infiltration basins, treatment plants, and subsurface flow wetlands, among others. Distributed BMPs are designed to treat runoff from smaller drainage areas and are normally installed to collect runoff close to the source from a limited number of parcels. Distributed BMPs typically include swales, bioretention facilities, biofiltration facilities, and cisterns, among others. Relevant regional and distributed structural BMPs are described below.

Infiltration Basins

An infiltration basin typically consists of an earthen basin (i.e., pervious soft bottom, or without impervious barrier inhibiting loss of surface waters into subsurface soils) constructed in naturally pervious soils (Type A or B soils). A forebay settling basin or separate treatment control measure may be provided as pretreatment and to facilitate maintenance. An infiltration basin functions by retaining the stormwater quality design volume and allowing the retained runoff to percolate into the underlying native soils over a specified period of time, avoiding or mitigating potential adverse effects of standing water (e.g., vectors). This is a full-capture / zero discharge approach, meaning all influent up to the design storm is infiltrated at the BMP.

[14] The term “regional BMP” does not necessarily indicate that the project can capture and retain the 85th percentile storm, as described in the Permit. The term “regional EWMP project” is therefore used for those regional BMPs that are expected to be able to capture and retain the 85th percentile storm.

Subsurface Flow Wetlands

Subsurface flow wetlands have a history of highly-effective implementation for tertiary treatment of wastewater, and are considered a "natural treatment system" with particular effectiveness with bacteria and pathogen reduction. Subsurface flow wetlands have not been extensively studied for stormwater treatment effectiveness and, though applied research exists, the International BMP database currently does not contain data with regard to their performance. Subsurface flow treatment processes within sub-surface flow wetlands range from simple physical filtration mechanisms to complex chemical adsorption and microbial transformation. With the addition of a detention basin for settling of coarse materials, subsurface flow wetlands can be considered an advanced treatment system nearly comparable (though less reliable) than a conventional wastewater treatment plant and would be expected to remove pollutants (e.g., TSS) at least as effectively as constructed surface flow wetlands.

Constructed Surface Flow Wetlands

A constructed surface flow wetland is a system consisting of a sediment forebay and one or more permanent micro-pools with aquatic vegetation covering a significant portion of the basin. Constructed surface flow wetlands typically include components such as an inlet with energy dissipation, a sediment forebay for settling out coarse solids and to facilitate maintenance, a base with shallow sections (1 to 2 feet deep) planted with emergent vegetation, deeper areas or micro pools (3 to 5 feet deep), and a water quality outlet structure. The interactions between the incoming stormwater runoff, aquatic vegetation, wetland soils, and the associated physical, chemical, and biological unit processes are a fundamental part of constructed treatment wetlands. Constructed wetlands provide multiple biological and physiochemical treatment processes associated with aerobic and anaerobic soil zones, submerged and emergent vegetation, and associated microbial activities.

Treatment Facilities

This BMP type includes the complete or partial diversion of the water quality design storm to a treatment plant for disinfection. Conventional treatment practices, while more common for the treatment of dry weather runoff than stormwater runoff due in part to capacity and energy requirements, are considered to be the most effective at removing pollutants since they are highly engineered systems with designs driven by the constituents of concern.

Cisterns

Cisterns are a harvest-and-use BMP, typically designed to capture a water quality design storm. Captured water is infiltrated or reused for irrigation, thereby reducing runoff and associated pollutants. Because cisterns are typically a full-capture BMP, the pollutant removal effectiveness of cisterns is considered comparable to infiltration basins. Capture-and-use regulations currently in place in the NSMBCW EWMP Area effectively require captured water to be used for landscape irrigation only.

Bioretention/Biofiltration

Bioretention stormwater treatment facilities are landscaped shallow depressions that capture and filter stormwater runoff. These facilities function as a soil- and plant-based filtration device that removes pollutants through a variety of physical, biological, and chemical treatment processes. The facilities normally consist of a ponding area, mulch layer, planting soils, and plantings. As stormwater passes down through the planting soil, pollutants are filtered, adsorbed, and biodegraded by the soil and plants. An optional gravel layer can be added below the planting soil to provide additional storage volume for infiltration. Bioretention is typically designed without an underdrain to serve as a retention BMP in areas of high soil permeability, where infiltration can occur in addition to filtration. Bioretention with an underdrain (or "biofiltration") is a treatment control measure that can be used for areas with low permeability native soils or steep slopes, to allow for the treatment of runoff through filtration despite impermeable underlying soils. Bioretention (or "bioinfiltration") can also be designed with a raised underdrain to enhance the amount of retention, nitrate removal, and incidental infiltration achieved by the BMP.

Bioswales

Bioswales (also known as vegetated swales) are open, shallow channels with low-lying vegetation covering the side slopes and bottom topography that collect and slowly convey runoff to downstream discharge points. Bioswales provide pollutant removal through settling and filtration via the vegetation (usually grasses) lining the channels, thereby allowing for stormwater volume reduction through infiltration and evapotranspiration, reduction in the flow velocity, and conveyance of stormwater runoff. The vegetation in the bioswale can vary depending on its location.

Green Roofs

Green roofs (also known as eco-roofs and vegetated roof covers) are roofing systems that layer a soil/vegetative cover over a waterproof membrane. Green roofs rely on highly-porous media and moisture retention layers to treat runoff via biofiltration, store intercepted precipitation, and support vegetation that can reduce the volume of stormwater runoff via evapotranspiration. Cisterns can also be incorporated into green roof design to receive the filtered runoff and store it for on-site use.

Porous / Permeable Pavements

Permeable pavements are infiltration-type BMPs that contain significant voids to allow water to pass through to a stone base. These BMPs come in a variety of forms- they may be a modular paving system (concrete pavers, grass-pave, or gravel-pave) or a poured-in-place solution (porous concrete or permeable asphalt). All permeable pavements with a stone reservoir base treat stormwater and remove sediments and metals to some degree. While conventional non-permeable pavement results in increased rates and volumes of surface runoff, porous pavements (when properly constructed and maintained) allow some of the stormwater to percolate through the pavement and enter the soil below. This process facilitates groundwater recharge while providing the structural and functional features needed for roadways, parking lots, and sidewalks. The paving surface, subgrade, and installation requirements of permeable pavements are more complex than those for conventional asphalt or concrete surfaces. For porous pavements to function properly over an expected life span of 15 to 20 years, they must be properly sited, carefully designed and installed, as well as periodically maintained. Failure to protect permeable pavement areas from construction-related or other sediment loads can result in premature clogging and failure.

Media Filters

Media filters consist of sand filters, compost filters, cartridge filters, and any other BMP designed with filtration media that absorbs pollutants. The treatment pathway is vertical (downward through the sand or media) to a perforated underdrain system that is connected to the downstream storm drain system or to an infiltration facility. As stormwater or dry weather runoff passes through the sand, pollutants are trapped in the small pore spaces between sand grains or are adsorbed to the sand surface. Media filters can be used as stand-alone or pre-treatment measures to extend the life and effectiveness of downstream BMPs.

Hydrodynamic Separators

Hydrodynamic separation devices are devices that remove trash, debris, and coarse sediment from incoming flows using screening, gravity settling, and centrifugal forces generated by forcing the influent into a circular motion. By having the water move in a circular fashion, rather than a straight line, it is possible to obtain significant removal of suspended sediments and attached pollutants with less space as compared to wet vaults and other settling devices. Several types of hydrodynamic separation devices are also designed to remove floating oils and grease using sorbent media. Like media filters, hydrodynamic separators can be used as stand-alone or pre-treatment measures to extend the life and effectiveness of downstream BMPs.

3.3 DEMONSTRATION OF BMP PERFORMANCE – INTRODUCTION TO THE REASONABLE ASSURANCE ANALYSIS

Because the EWMP is a planning document intended to lay out a framework of activities that will achieve Water Quality Objectives, it is necessary to demonstrate that selected BMPs are reasonably expected to meet defined goals. This evaluation of performance is described through a technically robust and rigorous Reasonable Assurance Analysis (RAA). Through this analysis, the NSMBCW EWMP Group identified and evaluated BMP implementation scenarios within the NSMBCW EWMP Area for each WBPC identified in Section 2. The RAA process shows that implementation of EWMP-defined activities within the NSMBCW EWMP Area are expected to result in discharges that achieve applicable Permit-specified WQBELs and that do not cause or contribute to exceedances of applicable RWLs. Since the modeling conducted as part of the RAA serves as the basis not only for BMP evaluation but also BMP identification, Section 4 is devoted to providing details on the RAA process. Results from the RAA are presented in Section 5 (Santa Monica Bay Watershed) and Section 6 (Malibu Creek Watershed).

4 RAA MODELING TOOLS AND APPROACH

In 2014, the Regional Board released a guidance document intended to establish baseline expectations and promote consistency and objectivity in the development of the RAAs throughout the Los Angeles Region. RAA details described herein, including model selection, data inputs, critical condition selection (90th percentile wet year), calibration performance criteria, and output types are consistent with the resulting Regional Board RAA Guidance.

4.1 RAA APPROACH - DRY WEATHER

Demonstrating reasonable assurance of compliance with applicable dry weather Permit limits **(Table 10**) requires a methodology that accounts for many factors which cannot be accurately modeled based on dry weather runoff processes alone (Thoe et al, 2015), despite the existence of somewhat extensive dry weather beach-specific monitoring datasets that are available. Therefore, to perform the RAA for dry weather for the NSMBCW EWMP Area, a semi-quantitative conceptual model (methodology) has been developed following the Permit compliance structure. This approach applies independent lines of evidence for demonstrating that MS4 discharges are not causing or contributing to receiving water exceedances. The following series of criteria form the dry weather RAA methodology. If one criterion is met for each Coordinated Shoreline Monitoring Plan (CSMP) compliance monitoring location (CML), then "reasonable assurance" is considered to be demonstrated. This methodology was presented to Regional Board staff on April 9, 2014, and verbal feedback received at the time was supportive.

1. If a dry weather diversion, infiltration, or disinfection system is located at the downstream end of the analysis region, reasonable assurance is considered to be demonstrated. To meet this criterion, any such system must have records to show that it is consistently operational, well maintained, and effectively removing bacteria in the treated effluent (in the case of disinfection facilities). Diversion or infiltration systems must demonstrate consistent operation and maintenance so that all freshwater surface discharges to the receiving water are effectively eliminated during year-round dry weather days.
2. If there are no MS4 outfalls (major or minor) owned by the NSMBCW Agencies within the analysis region, MS4 discharges are considered to not be contributing to pollutant concentrations in the receiving water. Therefore, reasonable assurance is demonstrated.
3. For the Santa Monica Bay Beaches Bacteria TMDL compliance monitoring locations, if the allowed summer-dry and winter-dry single sample exceedance days have been achieved for four out of the past five years and the last two years, then the existing water quality conditions at this compliance monitoring location are acceptable, and reasonable assurance is demonstrated.
4. If non-stormwater MS4 outfall discharges have been eliminated within the analysis region, reasonable assurance is demonstrated. For this criterion to be met, supporting records from the non-stormwater outfall screening program should be supplied.

Table 10 summarizes the dry weather TMDL limits for each applicable WBPC in the NSMBCW EWMP Area.

Table 10. Dry Weather Permit Limits (Final Compliance Limits)

Waterbody	TMDL	Pollutant	RWL/WQBEL
SMB	SMB Beaches Bacteria TMDL for Dry Weather	Coliform	Exceedance Days (per season, per year)
Malibu Creek	Malibu Creek Watershed Nutrients TMDL	Coliform	
		Nitrate + Nitrite	8 lbs/day (summer daily maximum)
		Total Phosphorus	0.8 lbs/day (summer daily maximum)
	Malibu Creek and Lagoon Benthic TMDL	Total Nitrogen	1.0 mg/L (summer)[a]
		Total Phosphorus	0.1 mg/L (summer)[a]

[a] Values shown are TMDL WLAs, and are not yet formally incorporated into the Permit (e.g., as RWLs or WQBELs). These values are expressed in the TMDL as seasonal averages.

4.1.1 NON-STORMWATER DISCHARGE SCREENING

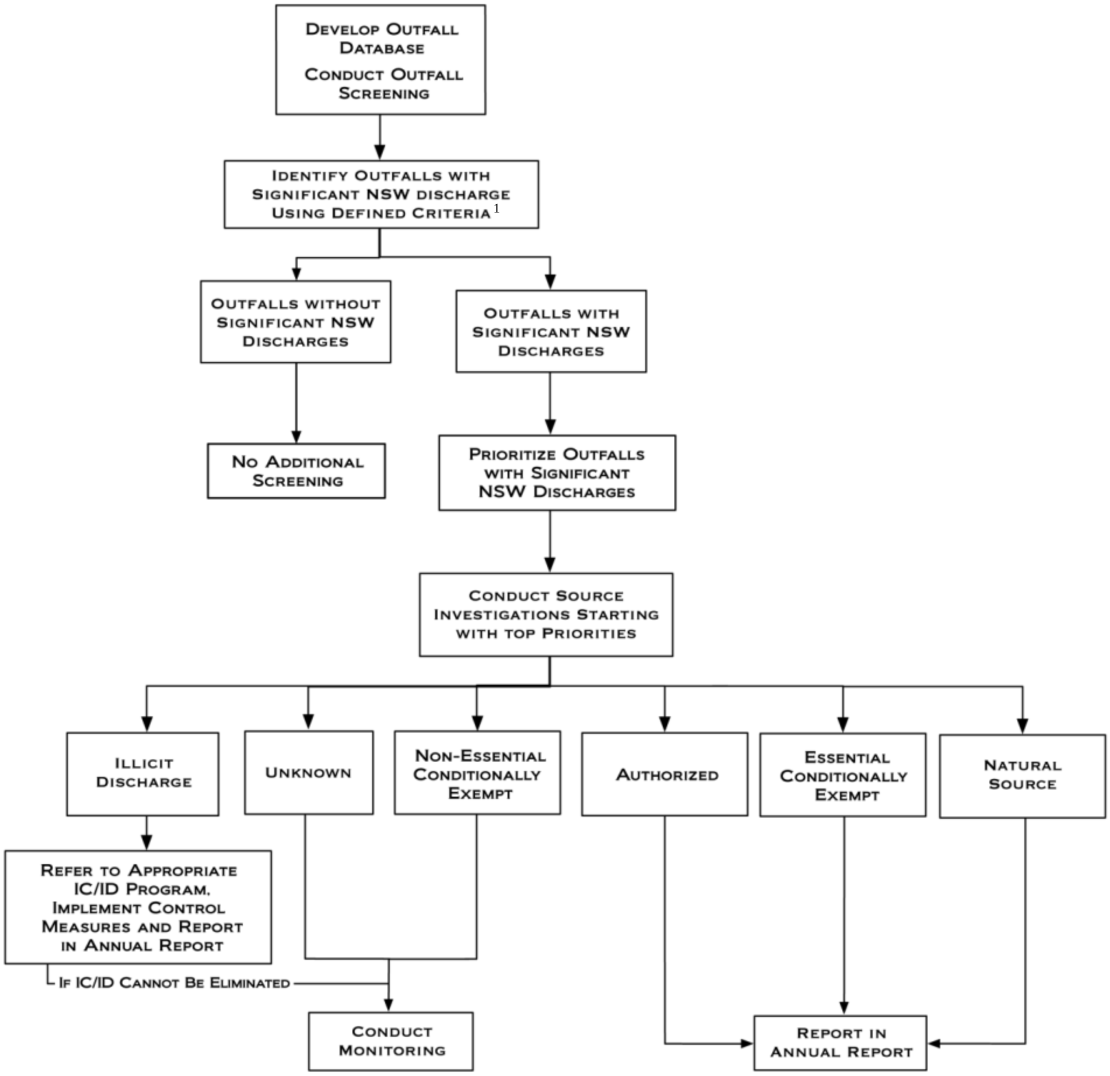
Since the NSMBCW EWMP Group's dry weather compliance approach is consistent with the Permit requirement to eliminate 100 percent of non-exempt dry weather MS4 discharges, the Group's non-stormwater screening process plays an important role in demonstrating reasonable assurance of compliance for dry weather.

The non-stormwater screening process, used to identify outfalls with significant non-stormwater discharge, consists of the steps outlined in Table 11 and shown in **Figure 6**. Further details on the NSMBCW EWMP Group's approach to meet this requirement are provided below and in Section 4 of the NSMBCW CIMP (NSMBCW EWMP Group, 2014d).

Table 11. Non-Stormwater Outfall Screening and Monitoring Program Summary

Element	Description
Develop MS4 outfall database	Develop a database of all major outfalls with descriptive information, linked to GIS.
Outfall screening	A screening process will be implemented to collect data for determining which outfalls exhibit significant NSW discharges.
Identification of outfalls with NSW discharge	Based on data collected during the Outfall Screening process, identify outfalls with NSW discharges.
Inventory of outfalls with significant NSW discharge	Develop an inventory of major MS4 outfalls with known significant NSW discharges and those requiring no further assessment.
Prioritize source investigation	Use the data collected during the screening process to prioritize significant outfalls for source investigations.
Identify sources of significant discharges	For outfalls exhibiting significant NSW discharges, perform source investigations per the prioritization schedule. If not exempt or unknown, determine abatement process.
Monitor discharges exceeding criteria	Monitor outfalls that have been determined to convey significant NSW discharges comprised of either unknown or non-essential conditionally exempt discharges, or continuing discharges attributed to illicit discharges must be monitored.

Figure 6. Non-Stormwater Outfall Screening Program



[1] Discharges are defined as "significant" based on a variety of factors, including, but not limited to: a) proximity of the outfall to receiving water bodies where TMDLs apply; b) presence of persistent flows at the outfall, meaning flow is observed on two or more of the three screenings at a rate "greater than a garden hose" (> 10 gpm); c) characteristics of the catchment area, including but not limited to, presence of permitted discharges in the area, land use characteristics, and previous IC/ID results.

4.1.2 *Inventory of MS4 Outfalls with Significant Non-Stormwater Discharges*

An inventory of MS4 outfalls will be developed identifying those outfalls with known significant non-stormwater discharges and those requiring no further assessment (Part

IX.D of the Permit MRP). If the MS4 outfall requires no further assessment, the inventory will include the rationale for the determination of no further action required. The inventory will be included in the outfall database. The inventory will be updated to incorporate the most recent characterization data for outfalls with significant non-stormwater discharges.

4.1.3 PRIORITIZED SOURCE IDENTIFICATION

Once the major outfalls exhibiting significant non-stormwater discharges have been identified through the screening process and incorporated in the inventory, the NSMBCW EWMP Group will prioritize the outfalls for further source investigations.

Once the prioritization is complete, a source identification schedule will be developed. The scheduling will focus on the outfalls with the highest priorities first. Based on the recent approval of the CIMP, the schedule will ensure that source investigations are completed on no fewer than 50 percent of the outfalls with significant non-stormwater discharges by December 28, 2016 and 100 percent by December 28, 2017.

4.1.4 SIGNIFICANT NON-STORMWATER DISCHARGE SOURCE IDENTIFICATION

Based on the prioritized list of major outfalls with significant non-stormwater discharges, investigations will be conducted to identify the source(s) or potential source(s) of non-stormwater flows. The source investigation results will then be classified into one of four endpoints outlined as follows:

A. <u>Illicit connections or illicit discharges (IC/IDs)</u>: If the source is determined to be an illicit discharge, the Permittee must implement procedures to eliminate the discharge consistent with IC/ID requirements (Permit Part VI.D.10) and document actions.
B. <u>Authorized or conditionally exempt NSW discharges</u>: If the source is determined to be an NPDES permitted discharge, a discharge subject to Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), or a conditionally exempt essential discharge, the Group Member must document the source. For non-essential conditionally exempt discharges, the Group Member must conduct monitoring consistent with Part IX.G of the MRP to determine whether the discharge should remain conditionally exempt or be prohibited.
C. <u>Natural flows</u>: If the source is determined to be natural flows, the Permittee must document the source.
D. <u>Unknown sources</u>: If the source is unknown, the Permittee must conduct monitoring consistent with Part IX.G of the MRP.

Based on the results of the source assessment, outfalls may be reclassified as requiring no further assessment and the inventory will be updated to reflect the information and justification for the reclassification.

Where investigations determine the non-stormwater source to be authorized, natural, or essential conditionally exempt flows, the EWMP Group will conclude the investigation, categorize the outfall as requiring no further assessment in the inventory, and move to the next highest priority outfall for investigation. Where investigations determine that the source of the discharge is non-essential conditionally exempt, an illicit discharge, or is unknown – further investigation may be conducted to eliminate the discharge or demonstrate that it is not causing or contributing to receiving water problems. In some cases, source investigations may ultimately lead to prioritized programmatic or structural BMPs. Where Permittees determine that they will address the non-stormwater discharge through modifications to programs or by structural BMP implementation, the EWMP Group will incorporate the approach into the implementation schedule developed for the EWMP Group and the outfall can be lowered in priority for investigation, such that the next highest priority outfall can be addressed.

4.1.5 NON-STORMWATER DISCHARGE MONITORING

Outfalls with significant NSW discharges that remain unaddressed after source investigation will be monitored for water quality in accordance with the CIMP. Monitoring will begin within 90 days of the completion of the respective source investigation.

4.1.6 SIGNIFICANT NON-STORMWATER DISCHARGE ELIMINATION

Within 180 days of the completion of the source identification, the Group will strive to eliminate, divert, or treat significant non-stormwater discharges that are unauthorized and determined to be causing or contributing to RWL/WQBEL exceedances.

4.2 RAA APPROACH – WET WEATHER

The Permit specifies the TMDL RWLs and WQBELs applicable to each Permittee. The NSMBCW RAA was conducted to demonstrate reasonable assurance of compliance with these limits. In instances where critical conditions were not clearly defined (e.g., a critical condition of “wet weather”) or the limit’s expression could not be directly modeled based on pollutant loads in stormwater (e.g., exceedance days as the expression for bacteria RWLs), steps were taken to establish a link between the expressed Permit limit and relevant modelable data (i.e., rainfall, runoff, and pollutant concentrations in the runoff). **Table 12** summarizes these steps for each modeled WBPC with a Permit-established limit.

Table 12. Wet Weather Permit Limits
(Final Compliance Limits for Quantitatively Modeled Pollutants)

Waterbody	Modeled Pollutant	RWL/WQBEL	How Limits Were Used to Establish Target Load Reductions for the RAA
SMB	Fecal Coliform[a]	Exceedance Days (per season, per year)	TLRs were set for each compliance monitoring location based on site-specific exceedance percentages based on historic exceedance rates and the number of modeled discharge days for the 90th percentile wet year, as detailed in Section 5.1.1 and Section 6.1.1.
Malibu Creek	Fecal Coliform[a]		
	Nitrate + Nitrite	8 mg/L (winter daily maximum)[b, c]	TLRs were set based on the difference between the 90th percentile daily concentration for nitrate and the WQBEL. Nitrite was assumed to be negligible in stormwater, as evidenced by monitoring data.
	Total Nitrogen	4.0 mg/L (winter)[c, d]	For each pollutant, TLRs were set based on the difference between the modeled average annual wet weather runoff load for the 90th percentile wet year and the allowed load, calculated as the WQBEL multiplied by the annual runoff volume for the 90th percentile wet year.
	Total Phosphorus	0.2 mg/L (winter)[c, d]	

[a] Fecal coliform was modeled as the representative indicator bacteria based on available data. Bacteria limits for SMB include total coliform, fecal coliform, and enterococcus, while bacteria limits for Malibu Creek include *E. coli*.

[b] The Permit identifies this concentration as a grouped WLA without explicitly identifying it as a RWL or WQBEL.

[c] Both the Malibu Creek Watershed Nutrients TMDL and the Malibu Creek and Lagoon Benthic TMDL define separate RWLs/WQBELs for summer (April 15 – November 15) and winter (November 16 – April 14). For purposes of wet weather modeling, only winter targets are considered here.

[d] Values shown are TMDL WLAs, and are not yet formally incorporated into the Permit (e.g., as RWLs or WQBELs).

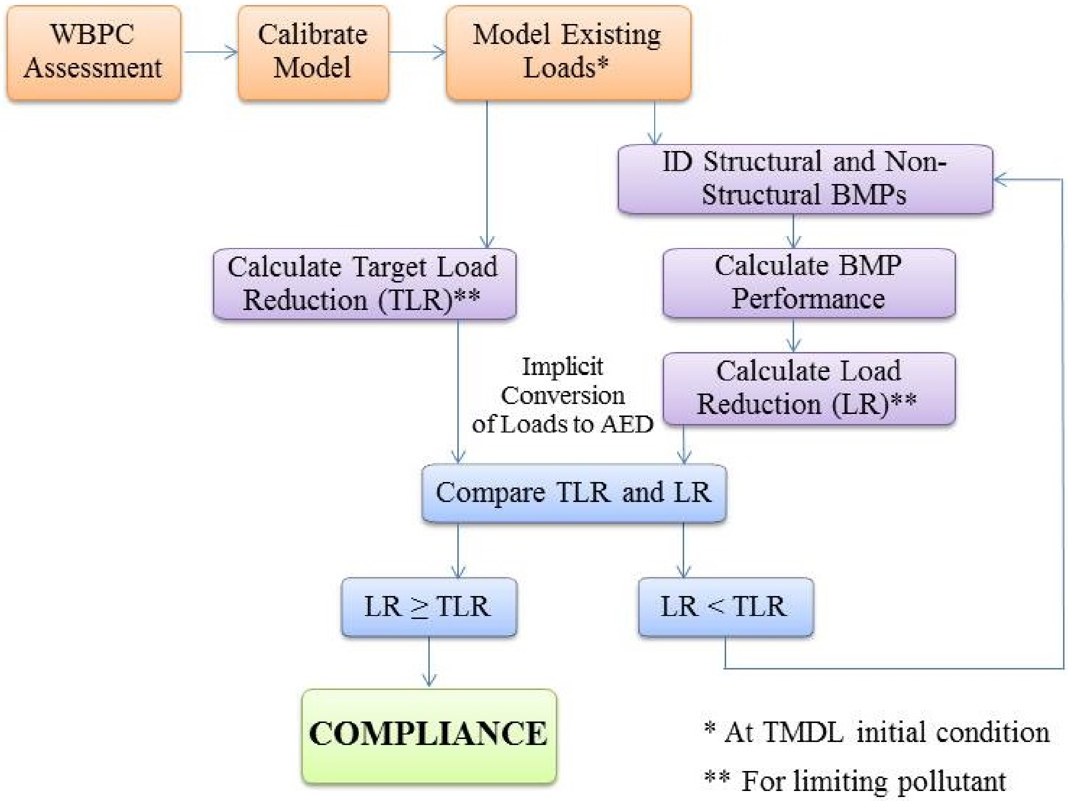
The critical condition for the Malibu Creek and Lagoon Benthic TMDL was defined simply as the "winter period," and compliance with this TMDL can be achieved by meeting the concentration-based discharge limits (calculated as a flow-weighted average seasonal concentration). To be consistent with the controlling pollutant, bacteria, the 90th percentile year was modeled as the critical condition for this TMDL.

The wet-weather RAA process consists generally of the following steps:

- Identify WBPCs for which the RAA will be performed, based on TMDLs, the 303(d) list, and additional (Category 3) criteria;
- Identify the MS4 service area (exclude lands of agencies not party to this EWMP such as Federal land and State land, as shown in **Figure 1**);
- Using a permit-approved model, for each analysis region, calculate target load reductions (TLRs) for 90th percentile year based on Permit limits and Regional Board RAA Guidance (Regional Board, 2014);
- Identify structural and non-structural BMPs that were either implemented after applicable TMDL effective dates or are planned for implementation in the future;
- Using a permit-approved model, quantify the performance of these BMPs in terms of annual pollutant load reductions;
- Compare these calculations with the TLRs; and
- Revise the BMP implementation scenario until TLRs are met.

This process is outlined in **Figure 7**.

Figure 7. RAA Process Overview



TLRs (discussed in Sections 5.1 and 6.1) represent a numerical expression of the Permit compliance metrics (e.g., bacteria allowable exceedance days (AEDs) for wet weather) that can be modeled and can serve as a basis for confirming that the EWMP is anticipated to achieve compliance with the Permit's TMDL-based limits and the water quality objectives. Thus, if the structural and non-structural BMPS by which the TLRs are achieved in the EWMP are appropriately implemented, compliance with the MS4 Permit's TMDL limits and water quality objectives will be reasonably demonstrated and assured.

4.3 SBPAT MODEL

The selected RAA approach leverages the strengths of a publicly available, Permit-approved, Geographical Information System (GIS)-based model that has already been developed for the region: SBPAT (Regional Board, 2014 and Regional Board, 2012).[15] The NSMBCW EWMP Work Plan provides the rationale for the selection of SBPAT as the primary water quality modeling program used to perform the NSMBCW RAA. It is included as **Appendix B** to this document.

The quantification analysis component of SBPAT includes a number of features. The model:

- Calculates and tracks inflows to BMPs, treated discharge, bypassed flows, evaporation, and infiltration at each 10 minute time step;
- Distinguishes between individual runoff events by defining six-hour minimum inter-event time spans in the rainfall record, and tracks inter-event antecedent conditions;
- Tracks stormwater volume through BMPs and summarizes and records these metrics by storm event; and
- Produces a table of each BMP's hydrologic performance, including concentration and load reduction metrics by storm event, and consolidates these outputs on an annual basis.

Each model simulation integrates Monte Carlo methods that rely on repeated random sampling to obtain numerical results. Model simulations are run 20,000 times to calculate a distribution of outcomes that can support the definition of confidence levels and quantify variability. Consistent with the SBPAT usage, Monte Carlo methods are used in physical and mathematical problems when it is difficult to obtain a closed-form expression, when a deterministic algorithm is not desired, and/or when expected output ranges (or quantified uncertainty) are desired. A schematic of SBPAT's Monte Carlo process is provided in **Figure 8**. Model documentation, as well as links to related technical articles and presentations, is provided at www.sbpat.net.

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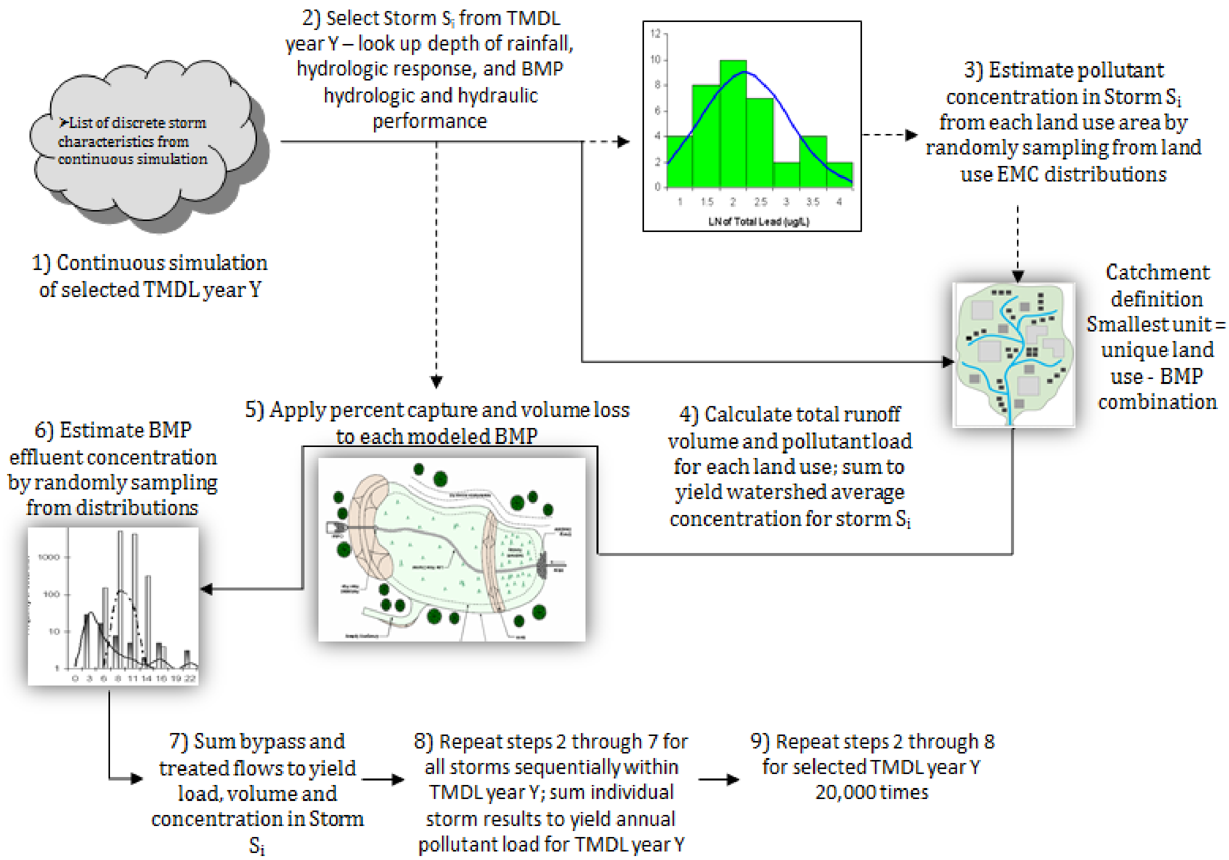
[15] SBPAT is specifically referenced in the MS4 Permit Part VI.C.5.b.iv and was presented at the first two Permit Group TAC RAA Subcommittee meetings. Furthermore, SBPAT has been used for reasonable assurance analysis purposes in the Los Angeles region for four TMDL Implementation Plans, two WMPs, four EWMPs, and, in the San Diego region, for two Combined Load Reduction Plans and two Water Quality Improvement Plans.

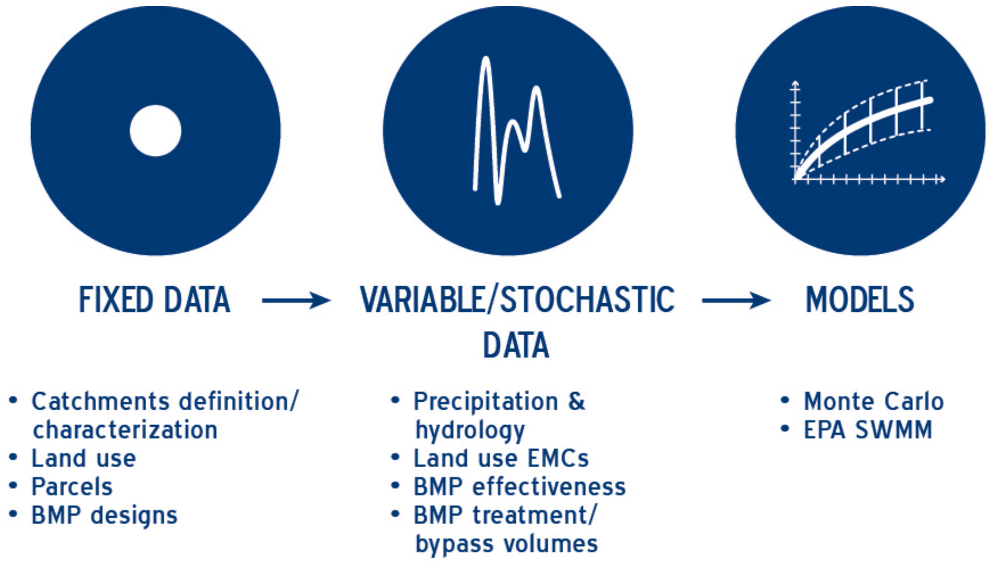
Figure 8. SBPAT Monte Carlo Method Components



4.4 MODELING DATA

Data used for the quantification/analysis module include both fixed and stochastic parameters. The model utilizes land use-based event mean concentrations (EMCs), USEPA SWMM, USEPA/American Society of Civil Engineers/Water Environment Research Foundation (USEPA/ASCE/WERF) International BMP Database (IBD) water quality concentrations, watershed/GIS data, and a Monte Carlo approach to quantify water quality benefits and uncertainties. Model data flow is provided below in **Figure 9**.

Figure 9. SBPAT Model Data Flow

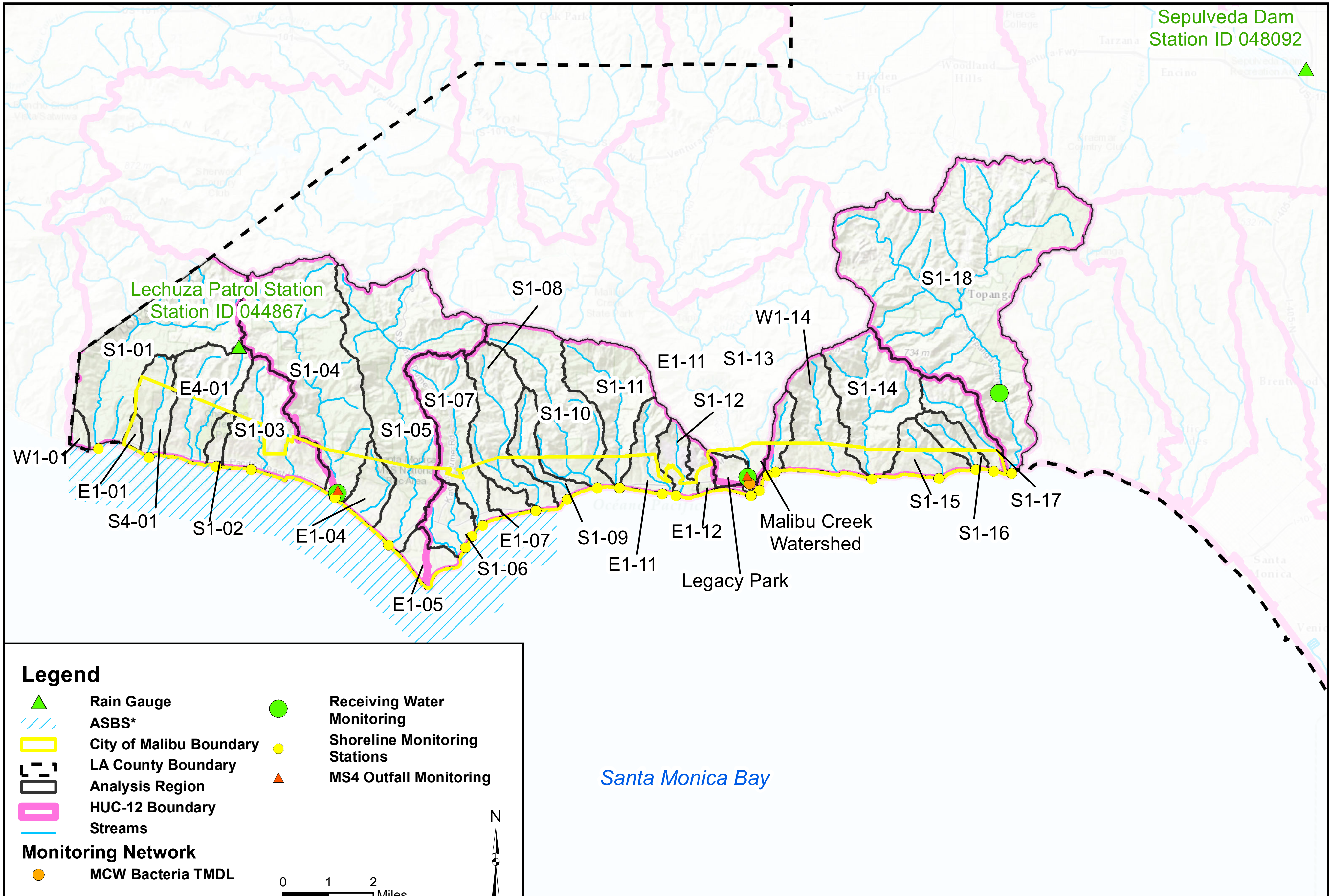


4.4.1 SPATIAL DOMAIN

The RAA was performed for the NSMBCW EWMP Area, as shown in **Figure 1**. The area consists of Santa Monica Bay Jurisdictional Groups 1 and 4 and the portion of the Malibu Creek Watershed within the City of Malibu's jurisdiction. In order to perform the RAA, analysis regions (areas for which compliance was evaluated individually) were defined based on areas tributary to compliance monitoring locations. These compliance monitoring locations include 19 Santa Monica Bay Beaches Bacteria TMDL compliance monitoring locations (SMB 1-1 through SMB 1-18 and SMB 4-1) and a single Malibu Creek Watershed compliance monitoring location (MCW-1). Additional analysis regions (i.e., that do not drain to a compliance monitoring location) were defined to account for the remaining drainage areas for each WBPC so that all areas within the NSMBCW EWMP Area were covered by an analysis region, including private property that drains to the NSMBCW MS4.[16] In total, 30 analysis regions were defined and analyzed. Analysis regions are shown on **Figure 10** and summarized in **Table 13**. RAA results are reported for each analysis region, with the exception of the area tributary to Malibu Legacy Park, a regional EWMP project capable of fully capturing and retaining the 85th percentile, 24-hour design storm. More information on Malibu Legacy Park can be found in Section 6.2.4.1.

[16] The RAA was conducted based on land uses, including private property within the NSMBCW EWMP Area. As a result, the EWMP inherently addresses runoff from private property that enters the NSMBCW MS4.

To account for contributions from agencies not party to this EWMP (i.e., State/Federal lands), existing loads from these agencies were calculated and subtracted out of the modeled subwatershed loads for the NSMBCW EWMP Area. Additional details on these adjustments can be found in the NSMBCW EWMP Work Plan (**Appendix B**).



*ASBS boundary is in the ocean up to the mean high tide line

Figure 10. NSMBCW Analysis Regions for RAA.
NSMBCW EWMP

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Table 13. Analysis Regions and Associated Compliance Monitoring Locations

Analysis Region	Compliance Station ID	Compliance Station Name
W1-01	N/A[1]	Not directly tributary to a CML
S1-01	SMB 1-1	Leo Carrillo Beach at Arroyo Sequit Creek
E1-01	N/A[1]	Not directly tributary to a CML
S4-01	SMB 4-1	Nicholas Beach
E4-01	N/A[1]	Not directly tributary to a CML
S1-02	SMB 1-2	El Pescador State Beach
S1-03	SMB 1-3	El Matador State Beach
S1-04	SMB 1-4	Zuma Beach at Trancas Creek
E1-04	N/A[1]	Not directly tributary to a CML
S1-05	SMB 1-5	Zuma Beach at Zuma Creek
E1-05	N/A[1]	Not directly tributary to a CML
S1-06	SMB 1-6	Walnut Canyon on Point Dume at Zumirez Drive
S1-07	SMB 1-7	Paradise Cove Beach at Ramirez Creek
E1-07	N/A[1]	Not directly tributary to a CML
S1-08	SMB 1-8	Escondido Beach at Escondido Creek
S1-09	SMB 1-9	Latigo Beach at Tivoli Cove Condos
S1-10	SMB 1-10	Corral Beach at Solstice Cayon Creek
S1-11	SMB 1-11	Corral Beach at Corral Canyon Creek
E1-11	N/A[1]	Not directly tributary to a CML
S1-12	SMB 1-12	Puerco Beach at Marie Cyn
E1-12	N/A[1]	Not directly tributary to a CML
MCW	MCW-1	Malibu Creek at Pacific Coast Highway
S1-13	SMB 1-13	Carbon Beach at Sweetwater Cyn
W1-14	N/A[1]	Not directly tributary to a CML
S1-14	SMB 1-14	Las Flores Beach at Las Flores Creek
S1-15	SMB 1-15	Big Rock Beach at Piedra Gorda Cyn
S1-16	SMB 1-16	Las Tunas Beach at Pena Cyn
S1-17	SMB 1-17	Las Tunas Beach at Tuna Cyn
S1-18	SMB 1-18	Topanga Beach at Topanga Cyn

[1] These analysis regions were created to represent subwatersheds not directly tributary to a CML.

GIS layers used in SBPAT included, but were not limited to, the following:

- Storm drains
- Receiving water bodies
- Soils
- Rain gage polygons
- Parcels
- Land use
- Catchments

4.4.2 HYDROLOGY

SBPAT utilizes a customized version of SWMM for continuously simulating study area hydrology and BMP hydraulics. Long-term, hourly rainfall data and average monthly evapotranspiration values are used along with land use-linked catchment imperviousness and soil properties to calculate runoff volumes. Revised and recalibrated SBPAT database values and EWMP-defined BMP information are used to calculate the volume of runoff generated from subwatershed areas and captured by BMPs. Storm events are individually tracked for the entire simulation so that the volumes of runoff infiltrated, evapotranspired, captured, and released (if applicable) by BMPs are calculated for every storm event.

4.4.2.1 90TH PERCENTILE YEAR DEFINITION

Consistent with the Permit-specified limits and the Regional Board RAA Guidance (Regional Board, 2014), the RAA was performed for all WBPCs for the 90th percentile critical year.[17] The critical year was determined by evaluating the total annual rainfall and the total number of wet weather days[18] at the various gauges in the NSMBCW EWMP Area. Rainfall analyses were performed for "Model Years" (i.e., November 1 – October 31) in order to provide consistency with the bacteria TMDLs and the CIMP. **Table 14** presents these results. The 90th percentile year was determined to be 1995 after analyzing the available rainfall data.[19] In all cases shown in **Table 14**, 1995 was found to be greater than or equal to the 90th percentile year, justifying its selection as the critical condition. The selection of 1995 as the critical condition is also consistent with other SMB EWMPs.

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[17] For the purposes of this RAA, 90th percentile daily average concentrations of nitrate as nitrogen (in Malibu Creek Watershed) and total lead (in Topanga Canyon Creek) were also used to represent critical conditions, and these critical concentrations were applied to annual volumes for the 90th percentile critical year (1995) to calculate baseline loads for the critical condition. Further details on this approach can be found in Section 4.

[18] Consistent with the SMB Beaches Bacteria TMDL, "wet weather" days are defined as days with at least 0.1-inch of rainfall and the three days immediately following.

[19] For Lachusa Patrol Station, data were analyzed from Model Years 1955 through 1997 (last full year on record). For Sepulveda Dam, data were analyzed from Model Years 1955 through 2012 (with 1980 and 1981 excluded due to a lack of data).

Table 14. Rainfall Summary at NSMBCW Precipitation Gauges (Model Year 1995)

	Model Year 1995 Percentile Ranking (Total Rainfall)		Model Year 1995 Percentile Ranking (Wet Days)	
	Percentile	Total Rainfall (in)	Percentile	Wet Days
Lachusa Patrol Station (Station ID 044867)	93.1%	39.5	90.9%	89
Sepulveda Dam (Station ID 048092)	91.2%	33.15	91.2%	72

A summary of annual rainfall data for each gauge above is provided in **Appendix C**.

4.4.3 WATER QUALITY

The priority WBPCs for the NSMBCW EWMP Area, combined with data availability, were used to determine the WBPCs addressed by the RAA. As previously described, SBPAT links the long-term hydrologic output from SWMM to a stochastic Monte Carlo water quality model to develop statistical descriptions of stormwater quantity and quality. Through this approach, the predicted runoff volumes for each storm were randomly sampled from the long-term storm event runoff volume record produced by SWMM. Land use-based wet weather pollutant EMC values (see **Table 15** for summary statistics) and BMP effluent concentrations (presented in Section 4.4.4) for each storm were then randomly sampled from their log-normal statistical distributions. The runoff volumes (including volumes treated and bypassed by BMPs), land use EMCs, and BMP effluent concentrations were combined to determine the total pollutant loads and load reductions (i.e., difference between existing and post-BMP load calculations) for each randomly sampled storm event. This procedure was then repeated thousands of times, each time recording the volume, pollutant concentrations, loads, and load reductions for each randomly selected storm event. The statistics of these recorded results were then used to characterize the average (mean) values for the annual volume, pollutant loads, and pollutant concentrations in stormwater runoff from the modeled area, with and without BMPs implemented.

Table 15. SBPAT EMCs for NSMBCW Watersheds – Arithmetic Estimates of the Log-normal Summary Statistics (means with standard deviations in parentheses)[a]

Land Use	TSS mg/L	TP mg/L	DP mg/L	NH3 mg/L	NO3 mg/L	TKN mg/L	Diss Cu ug/L	Tot Cu ug/L	Tot Pb ug/L	Diss Zn ug/L	Tot Zn ug/L	Fecal Col. #/100mL
Single Family Residential	124.2 (184.9)	0.40 (0.30)	0.32 (0.21)	0.49 (0.64)	0.78 (1.77)	2.96 (2.74)	9.4 (9.0)	18.7 (13.4)	11.3 (16.6)	27.5 (56.2)	71.9 (62.4)	31,100[b] (94,200)
Commercial	67.0 (47.1)	0.40 (0.33)	0.29 (0.25)	1.21 (4.18)	0.55 (0.55)	3.44 (4.78)	12.3 (10.2)	31.4 (25.7)	12.4 (34.2)	153.4 (96.1)	237.1 (150.3)	51,600 (1,490,000)[c]
Industrial	219.2 (206.9)	0.39 (0.41)	0.26 (0.25)	0.6 (0.95)	0.87 (0.96)	2.87 (2.33)	15.2 (14.8)	34.5 (36.7)	16.4 (47.1)	422.1 (534.0)	537.4 (487.8)	3,760 (4,860)
Education	99.6 (122.7)	0.30 (0.17)	0.26 (0.2)	0.4 (0.99)	0.61 (0.67)	1.71 (1.13)	12.2 (11.0)	19.9 (13.6)	3.6 (4.9)	75.4 (52.3)	117.6 (83.1)	11,800[d] (23,700)
Transportation	77.8 (83.8)	0.68 (0.94)	0.56 (0.82)	0.37 (0.68)	0.74 (1.05)	1.84 (1.44)	32.40 (25.5)	52.2 (37.5)	9.2 (14.5)	222.0 (201.7)	292.9 (215.8)	1,680 (456)
Multi-Family Residential	39.9 (51.3)	0.23 (0.21)	0.20 (0.19)	0.50 (0.74)	1.51 (3.06)	1.80 (1.24)	7.40 (5.70)	12.1 (5.60)	4.5 (7.80)	77.5 (84.1)	125.1 (101.1)	11,800[e] (23,700)
Agriculture (row crop)	999.2 (648.2)	3.34 (1.53)	1.41 (1.04)	1.65 (1.67)	34.40 (116.30)	7.32 (3.44)	22.50 (17.50)	100.1 (74.8)	30.2 (34.3)	40.1 (49.1)	274.8 (147.3)	60,300 (153,000)
Vacant / Open Space	216.6 (1482.8)	0.12 (0.31)	0.09 (0.27)	0.11 (0.25)	1.17 (0.79)	0.96 (0.9)	0.60 (1.90)	10.6 (24.4)	3.0 (13.1)	28.1 (12.9)	26.3 (69.5)	484[f] (806)

[a] EMC statistics are calculated based on 1996-2000 data for Los Angeles County land use sites (Los Angeles County, 2000), except for agriculture which are based on Ventura County MS4 EMCs (Ventura County, 2003) and fecal coliform which are based on 2000-2005 SCCWRP Los Angeles region land use data (SCCWRP, 2007b). These EMC datasets are summarized in the SBPAT User's Guide (Geosyntec, 2012).

[b] The fecal coliform EMC for the single-family residential land use is based on SCCWRP dataset for "low-density residential."

[c] The default log distribution best fit summary statistics for this land use-pollutant combination produced an unreasonably high deviation, therefore the arithmetic estimate of the log mean was held constant while the log summary statistics were recomputed based on the log CoV for SFR (SCCWRP's LDR EMC).

[d] Multi Family Residential EMC used since educational land use site not available in the SCCWRP fecal coliform dataset.

[e] The fecal coliform EMC for the multi-family residential land use is based on SCCWRP dataset for "high-density residential."

[f] Open space fecal coliform EMC statistics based on *E. coli* data (divided by 0.85 to adjust to fecal coliform) for Arroyo Sequit reference subwatershed, or 11 samples collected between December 2004 and April 2006. Data used by Regional Board for Santa Clara River Bacteria TMDL and taken from (SCCWRP, 2005) and (SCCWRP 2007a).

4.4.4 SUMMARY OF BMP PERFORMANCE DATA

The performances of existing and planned BMPs in the NSMBCW were evaluated both in terms of volume capture (based on BMP design criteria) and predicted effluent quality. Due to a lack of project-specific monitoring data quantifying the performance of an installed BMP, modeling of expected BMP performance was based on existing, peer-reviewed pollutant reduction data for similar types of pollutants and BMPs. Coupled with information on the capacity/volume of each BMP in question, modeling was used to predict the impact of each BMP on water quality.

Expected BMP performance was modeled using data from the International Stormwater BMP Database (IBD; www.bmpdatabase.org), which is comprised of data from a peer-reviewed collection of studies that have monitored the effectiveness of a variety of BMPs in treating water quality pollutants for a variety of land use types. Research on characterizing BMP performance suggests that effluent quality is more reliable in modeling stormwater treatment rather than percent removal, which assumes a linear influent-to-effluent relationship (Strecker et al. 2001). Schueler (1996) also found in his evaluation of detention basins and stormwater wetlands that BMP performance is often limited by an achievable effluent quality, or "irreducible pollutant concentration"; acknowledging that a practical lower limit exists at which stormwater pollutants can be removed by any given technology. While there is likely a relationship between influent and effluent water quality for some BMPs and some constituent concentrations, analyses conducted to date do not support fixed percent removal values relative to influent quality for the following reasons (WWE and Geosyntec, 2007):

1. Percent removal depends heavily on influent quality, and in the majority of cases, higher observed influent pollutant concentrations actually result in higher percent removals (i.e., observed effluent concentrations for most BMPs are relatively consistent, so the use of a pre-set percent removal would under-predict BMP performance when influent concentrations are high and over-predict BMP performance when influent concentrations are low);
2. The variability in percent removal is often more broad than the variability in effluent pollutant concentration;
3. A high percent removal may still result in a high pollutant concentration, thereby leading to a false determination that BMPs are performing well; and
4. Different percent removals can be calculated within the same dataset (i.e., when looking at individual pairs of influent/effluent samples).

For the reasons stated above, percent removal is not used to quantify BMP performance. Instead raw effluent data has been used to estimate the "irreducible pollutant concentration" attributable to each BMP analyzed as part of the RAA.

Future studies may support a refinement to the assumption of effluent concentration-based BMP performance modeling, such as the development of more complex influent-effluent relationships (WWE and Geosyntec, 2007). However, it should be noted that the stochastic modeling approach accounts for, at least in part, the uncertainty of not knowing the relationship between influent and effluent concentrations because the BMP effluent distributions are based on a variety of BMP studies with a wide range of influent concentrations, representing a variety of tributary drainage area land use characteristics.

A November 2011 interim release of the IBD was analyzed in early 2012 for the purpose of developing BMP effluent statistics (this analysis utilized the same dataset used to produce the summary statistics contained in Geosyntec and WWE, 2012). As with the estimation of land use EMCs, final effluent values used to predict BMP performance were determined from the data contained in the IBD using a combination of regression-on-order statistics and the “bootstrap” method.[20] Log-normality was also assumed for BMP effluent concentrations. This assumption has been confirmed previously through goodness-of-fit tests on the BMP effluent concentration data (Geosyntec, 2008). Statistics for effluent concentrations based on available water quality performance data were developed for the BMPs and constituents listed in **Table 16**.

[20] The bootstrap approach randomly samples the dataset several thousand times and computes the desired statistic from the subset of data.

Table 16. BMPs and Constituents Modeled[a]

BMPs	Constituents
Constructed Wetland / Retention Pond (with Extended Detention)	Total suspended solids (TSS)
Constructed Wetland / Retention Pond (without Extended Detention)	Total phosphorus (TP)
Dry Extended Detention Basin	Dissolved phosphorus as P (DP)[b]
Hydrodynamic Separator	Ammonia as N (NH3)
Media Filter	Nitrate as N (NO3)
Subsurface Flow Wetland	Total Kjeldahl nitrogen as N (TKN)
Treatment Plant	Dissolved copper (DCu)
Bioswale	Total copper (TCu)
Bioretention with underdrain	Total lead (TPb)
Bioretention (volume reduction only)	Dissolved zinc (DZn)
Cistern (volume reduction only)	Total zinc (TZn)
Green Roof (volume reduction only)	Fecal Coliform (FC)
Porous Pavement (volume reduction only)	
Low Flow Diversion (volume reduction only)	

[a] All constituents are addressed for all BMPs that provide treatment (i.e., excluding those identified as "volume reduction only").

[b] Dissolved phosphorus and orthophosphate datasets were combined to provide a larger dataset and because the majority of orthophosphate is typically dissolved and many datasets either report dissolved phosphorus or orthophosphate, but not both.

Table 17 summarizes the number of effluent data points (individual storm events) and percent non-detects for the pollutants and BMP types of interest for which sufficient data were available. A large percentage of non-detects can bias the effluent statistics derived from the dataset (e.g., total lead for bioretention shows a 60 percent non-detect ratio). **Table 18** summarizes arithmetic averages and **Table 19** summarizes the arithmetic standard deviations of the BMP effluent concentrations that were used in the RAA.

Consistent with IBD documentation (WWE and Geosyntec, 2007), BMP effluent concentrations are assumed to be limited by an "irreducible effluent concentration," or a minimum achievable concentration (Schuler, 1996). Lower limits are currently set at the 10th percentile effluent concentration of BMP data in the IBD for each modeled BMP type for which the BMP data show statistically significant reductions between influent and effluent means. If the differences are not statistically significant or there is a statistically significant increase, the 90th percentile is used as the minimum achievable effluent concentration, which essentially assumes no treatment except when influent to the BMP is very high. **Table 20** summarizes the irreducible effluent concentration estimates that are used in SBPAT to prevent treatment from occurring when influent concentrations are equal to or below these values (i.e., the table presents the minimum BMP effluent concentrations modeled in SBPAT, so that when influent concentrations in the model are at or below these values, the same BMP effluent value is produced and no concentration reduction occurs through the BMP).

Table 17. Summary of Number of Data Points and Percent Non-Detects for BMP Effluent Concentration Data from the IBD

BMP		TSS	TP	DP	NH3	NO3	TKN	DCu	TCu	TPb	DZn	TZn	FC
Bioretention	Count	193	249	164	184	259	201	NA	39	48	15	48	29
	%ND	10%	5%	4%	18%	3%	2%	NA	18%	60%	0%	35%	0%
Vegetated Swales (Bioswales)	Count	354	364	249	225	372	324	82	309	308	72	373	92
	%ND	1%	1%	0%	17%	1%	0%	4%	3%	39%	6%	23%	0%
Hydrodynamic Separators (not updated - original SBPAT analysis, 2008)	Count	199	170	58	69	59	77	89	99	95	99	174	31
	%ND	7%	3%	33%	28%	3%	5%	17%	0%	8%	18%	7%	3.2%
Media Filters	Count	409	403	244	215	391	374	186	361	341	221	433	185
	%ND	7%	6%	14%	24%	2%	6%	7%	12%	21%	19%	13%	0%
Detention Basins	Count	299	275	116	94	213	185	170	198	209	163	189	190
	%ND	1%	3%	16%	6%	7%	4%	32%	31%	50%	17%	15%	0%
Retention Ponds	Count	723	654	618	423	626	496	213	536	646	212	593	137
	%ND	4%	3%	6%	8%	6%	3%	26%	21%	30%	15%	7%	0%
Wetland Basins/Retention Ponds (combined)	Count	1028	932	862	681	872	680	228	684	767	227	770	158
	%ND	4%	3%	6%	7%	7%	2%	25%	20%	28%	14%	8%	0%

Table 18. IBD Arithmetic Mean Estimates of BMP Effluent Concentrations

BMP	**TSS mg/L**	**TP mg/L**	**DP mg/L**	**NH3 mg/L**	**NO3 mg/L**	**TKN mg/L**	**DCu ug/L**	**TCu ug/L**	**TPb ug/L**	**DZn ug/L**	**TZn ug/L**	**FC #/100 mL**
Constructed Wetland / Retention Pond (with Extended Detention)[1]	38.3	0.19	0.11	0.18	0.42	1.20	5.3	6.7	7.2	22.1	35.3	1.01E+04
Constructed Wetland / Retention Pond (without Extended Detention)[2]	32.9	0.17	0.09	0.17	0.38	1.20	5.3	6.2	12.0	22.6	38.0	9.89E+03
Dry Extended Detention Basin[3]	42.3	0.37	0.26	0.16	0.61	2.40	6.5	11.4	14.4	33.7	78.4	1.41E+04
Hydrodynamic Separator[4]	98.1	0.50	0.06	0.30	0.67	2.07	13.1	16.7	12.7	78.4	107.4	2.68E+04
Media Filter[5]	22.3	0.14	0.07	0.18	0.74	0.98	8.3	11.0	4.6	34.7	37.6	5.89E+03
Sub-surface Flow Wetland[6]	18.1	0.06	0.06	0.09	0.27	0.87	4.6	4.6	0.7	20.9	25.8	PR=90%
Treatment Plant[7]	2.0	0.00	0.00	0.00	0.27	0.01	1.0	1.0	4.4	5.0	5.0	2.00E+00
Vegetated Swale (Bioswale)[8]	27.1	0.28	0.17	0.09	0.43	0.87	9.6	10.1	6.4	33.3	33.3	8.00E+04
Bioretention[9]	18.1	0.14	0.07	0.18	0.37	0.98	8.3	8.8	4.2	34.7	37.6	5.89E+03
Bioretention w/o underdrain	Volume reductions only											
Cistern	Volume reductions only											
Green Roof	Volume reductions only											
Porous Pavement	Volume reductions only											
Infiltration Basin	Volume reductions only											

[1] Based on retention pond IBD category (basis per Geosyntec 2008)
[2] Based on combined wetland basin and retention pond IBD categories (basis per Geosyntec 2008)
[3] Strictly detention basin category from the IBD
[4] From Geosyntec, 2008
[5] Includes non-bio media filters (e.g., sand filters)
[6] Lowest of all IBD categories; except for Fecal Coliform where 90% removal is used. The 90% removal is based on USEPA, 1993, which states that SSF wetlands are generally capable of a 1 to 2 log reduction in fecal coliforms.
[7] Secondary Drinking Water Standards or Minimum of all BMP types, whichever is less
[8] Strictly from vegetated swale category from the IBD
[9] Effluent quality assigned to treated underdrain discharge is based on the better performing characteristics of the "media filter" and "bioretention" categories for each pollutant.

Table 19. IBD Arithmetic Standard Deviations of BMP Effluent Concentrations

BMP	TSS mg/L	TP mg/L	DP mg/L	NH3 mg/L	NO3 mg/L	TKN mg/L	DCu ug/L	TCu ug/L	TPb ug/L	DZn ug/L	TZn ug/L	FC #/100 mL
Constructed Wetland / Wetpond (with Extended Detention)	76.80	0.253	0.357	0.234	0.787	0.688	4.288	9.710	12.96	42.46	61.96	3.23E+04
Constructed Wetland / Wetpond (without Extended Detention)	71.14	0.228	0.313	0.375	0.750	0.848	4.196	8.849	123.0	41.88	85.57	3.08E+04
Dry Extended Detention Basin	87.36	0.673	0.439	0.183	1.173	5.029	6.656	19.96	56.01	64.68	137.9	4.15E+04
Hydrodynamic Separator	236.5	1.237	0.093	0.880	1.198	3.737	11.98	11.98	25.70	137.4	137.4	2.16E+05
Media Filter	40.73	0.168	0.099	0.382	0.852	1.213	13.75	17.20	10.02	142.2	100.3	1.27E+04
Sub-surface Flow Wetland	30.66	0.145	0.088	0.145	0.552	0.594	3.504	3.504	1.845	12.84	17.16	5.37E+02
Treatment Plant	2.00	0.003	0.003	0.006	0.552	0.030	3.000	3.000	10.97	15.00	15.00	1.00E+00
Vegetated Swale (Bioswale)	35.12	0.311	0.239	0.145	0.905	0.872	7.749	9.429	15.36	28.49	34.86	1.19E+06
Bioretention	30.66	0.168	0.099	0.382	0.552	1.213	13.75	11.12	4.84	100.3	100.3	1.27E+04
Bioretention w/o underdrain	Volume reductions only											
Cistern	Volume reductions only											
Green Roof	Volume reductions only											
Porous Pavement	Volume reductions only											
Infiltration Basin	Volume reductions only											

Table 20. IBD Arithmetic Irreducible of BMP Effluent Concentrations

BMP	TSS mg/L	TP mg/L	DP mg/L	NH3 mg/L	NO3 mg/L	TKN mg/L	DCu ug/L	TCu ug/L	TPb ug/L	DZn ug/L	TZn ug/L	FC #/100 mL
Constructed Wetland / Wetpond (with Extended Detention)	1.358	0.034	0.010	0.019	0.011	0.499	1.387	1.387	0.429	1.000	2.933	4
Constructed Wetland / Wetpond (without Extended Detention)	1.300	0.030	0.009	0.012	0.010	0.520	1.267	1.267	0.400	1.075	3.000	5.4
Dry Extended Detention Basin	5.460	0.089	0.523	0.336	0.026	3.650	1.153	1.274	0.435	8.396	8.396	19.6
Hydrodynamic Separator	5.543	0.023	0.172	0.014	1.299	3.576	3.340	3.340	1.351	17.793	17.793	3295
Media Filter	1.487	0.026	0.010	0.013	0.064	0.210	0.995	1.298	0.372	1.000	2.000	13.1
Sub-surface Flow Wetland	1.268	0.025	0.006	0.009	0.008	0.141	1.000	1.000	0.089	1.000	2.933	4
Treatment Plant	0.500	0.001	0.001	0.001	0.008	0.001	0.100	0.100	0.255	0.500	0.500	1
Vegetated Swale (Bioswale)	2.000	0.079	0.040	0.009	0.056	0.141	2.708	2.708	0.434	5.720	5.720	9.53E+04
Bioretention	1.605	0.026	0.010	0.013	0.050	0.210	0.995	1.524	0.836	1.000	2.000	13.1
Bioretention w/o underdrain	Volume reductions only											
Cistern	Volume reductions only											
Green Roof	Volume reductions only											
Porous Pavement	Volume reductions only											
Infiltration Basin	Volume reductions only											

In some cases, performance data were not available for all types of BMPs requiring a performance assessment as part of the RAA. If the unit treatment processes (e.g., filtration, sedimentation, etc.) for a BMP with data ("BMP 1") can be expected to be similar for a BMP without data ("BMP 2"), then equivalent performance for "BMP 2" is assumed based on the performance of "BMP 1". However if no data exist and unit treatment processes cannot be associated with a BMP with data, then no treatment is assumed except for load reductions associated with simulated volume loss. **Table 21** summarizes the performance assumptions for each of the BMPs that were modeled in the RAA. Additionally, bioretention with underdrains ("biofiltration") were assessed in the RAA using a vegetated swale BMP from the IBD, which represents some incidental volume reduction as well as a certain percent treated discharge and a certain percent bypass discharge. Effluent quality assigned to treated underdrain discharge was based on the characteristics of the "bioretention" BMP.

Table 21. Assumptions and Source Data for BMP Performance

BMP	Source Data and Assumptions
Vegetated Swale (Bioswale)	Strictly from vegetated swale category from the IBD
Cistern	No treated effluent; volume reductions only
Bioretention w/o underdrain	No treated effluent; volume reductions only
Porous Pavement	No treated effluent; volume reductions only
Green Roof	No treated effluent; volume reductions only
Low Flow Diversion	No treated effluent; volume reductions only
Media Filter	Strictly from media filter category from the IBD; includes non-bio media filters (e.g., sand filters)
Subsurface Flow Wetland	Lowest of all IBD categories; except for Fecal Coliform where 90% removal is used [a]
Constructed Wetland / Retention Pond (w/o Extended Detention)	Based on combined wetland basin and retention pond IBD categories (basis per Geosyntec 2008)
Treatment Plant	Secondary Drinking Water Standards or Minimum of all BMP types, whichever is less
Dry Extended Detention Basin	Strictly detention basin category from the IBD
Hydrodynamic Separator	From Geosyntec, 2008
Infiltration Basin	No treated effluent; volume reductions only
Constructed Wetland / Retention Pond (w/ Extended Detention)	Based on retention pond IBD category (basis per Geosyntec 2008)

[a] SSF (subsurface flow) wetlands provide multiple unit treatment processes provided by other BMPs (e.g., sedimentation, filtration, biochemical, etc.). The 90% removal is based on USEPA, 1993, which states that SSF wetlands are generally capable of a 1 to 2 log reduction in fecal coliforms.

4.5 MODEL CALIBRATION

4.5.1 HYDROLOGIC CALIBRATIONS

The hydrology component of SBPAT was calibrated for the only location in the SMB watershed where *all* data requirements (daily flow, hourly precipitation, and daily beach bacteria concentrations) were met - the Topanga Creek subwatershed. No other SMB subwatersheds met the calibration data requirements. The Topanga subwatershed is located on the eastern edge of the NSMBCW EWMP Area.

Since primary output for SBPAT includes annual volumes and pollutant loads, the calibration focused on accurate prediction of annual discharge volumes from the Topanga Creek subwatershed outlet, with estimated baseflow removed. Hourly rainfall data were used for the nearby Lachusa Patrol Station #72 gauge (gauge reference ID 352b) in Malibu, with these data adjusted upward based on an annual rain depth ratio between the higher elevation Topanga Fire Station #69 gauge (gauge reference ID 6) and the Lachusa gauge. Los Angeles County Flood Control District's Topanga Creek streamflow gauge (gauge reference ID F54C-R) was used to determine measured annual discharge volumes for comparison with modeled volumes. The effective impervious percentage for the open space land use category and the saturated hydraulic conductivity of all mapped soil types served as calibration parameters.

The hydrologic calibration reported in the NSMBCW EWMP Work Plan (**Appendix B**) was refined to include additional precipitation and streamflow data. The refined calibration used a vacant undifferentiated land use effective imperviousness value of 1 percent and required the evaluation of various saturated hydraulic conductivity multipliers that resulted in increased model runoff (i.e., each soil type's original hydraulic saturated conductivity was multiplied by the same value). The calibration was performed iteratively with adjustment multipliers ranging from 0.1 to 2.0 until the average annual modeled volume produced an acceptable error value when compared to the average annual observed volumes. A multiplier of 0.20 was selected as most appropriate. **Figure 11** presents the refined hydrologic calibration results, including the 0.20 saturated hydraulic conductivity multiplier. As described in the Work Plan and in the April 2014 presentation to Regional Board staff, the emphasis of the calibration effort focused on accurate, unbiased prediction of "non-extreme" annual conditions (annual volumes exceeding a 25-year frequency, 4 percent probability, were excluded from the calibration effort). Based on available data, the period of calibration was 12 years, between 2001 and 2012, with water years 2005 and 2008 excluded due to outlying streamflow measurement results.[21] These calibrated input parameter values were used throughout all SMB watersheds in the wet weather RAAs. Figure 12 presents these same results in a flow duration curve format, which compares the distribution of annual discharge volume magnitudes throughout the period analyzed between the modeled and observed data.

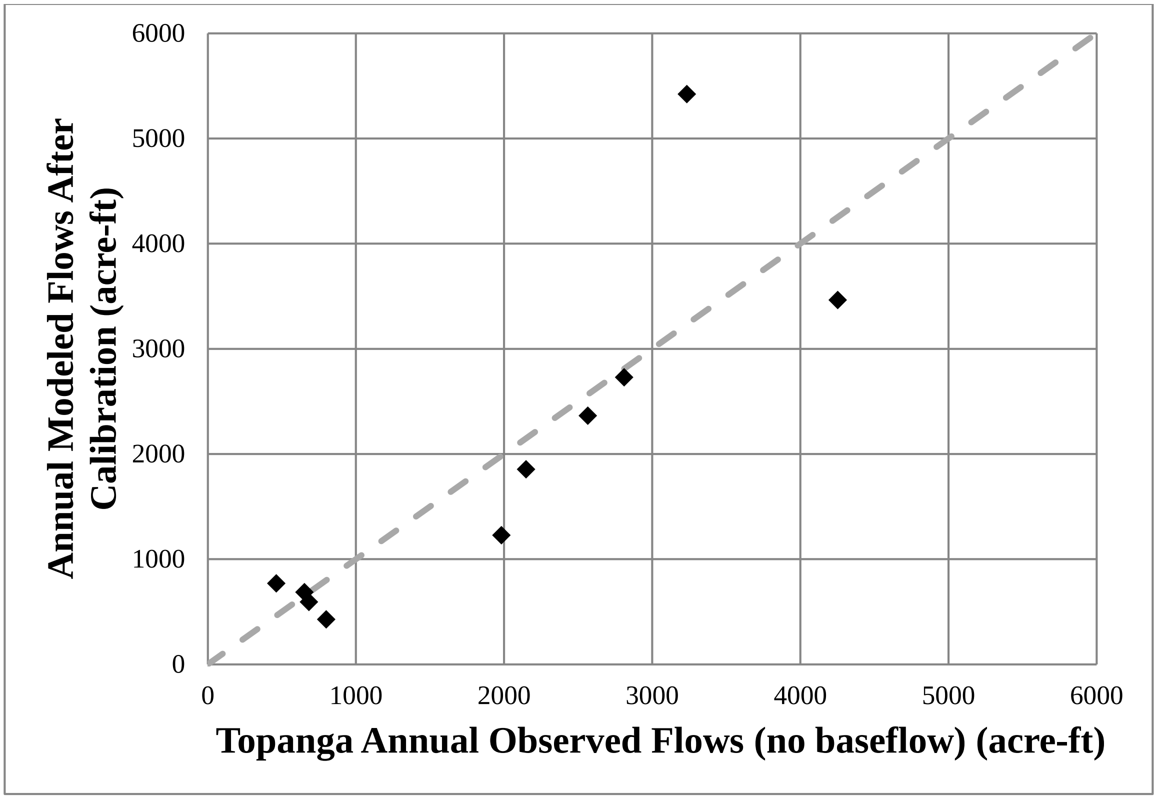

Figure 11. Annual Runoff Volumes for Topanga Subwatershed: Modeled vs. Observed, 2001-2012

[21] The stream gauge annual volume measurement in 2008 was unexplainably high (corresponding to a runoff coefficient greater than one), and the 2005 year included a 15-day period of near-record rainfall levels that were anomalously high (where the mean annual rainfall depth fell between December 27 and January 10, and major landslides were reported in nearby coastal Ventura County).

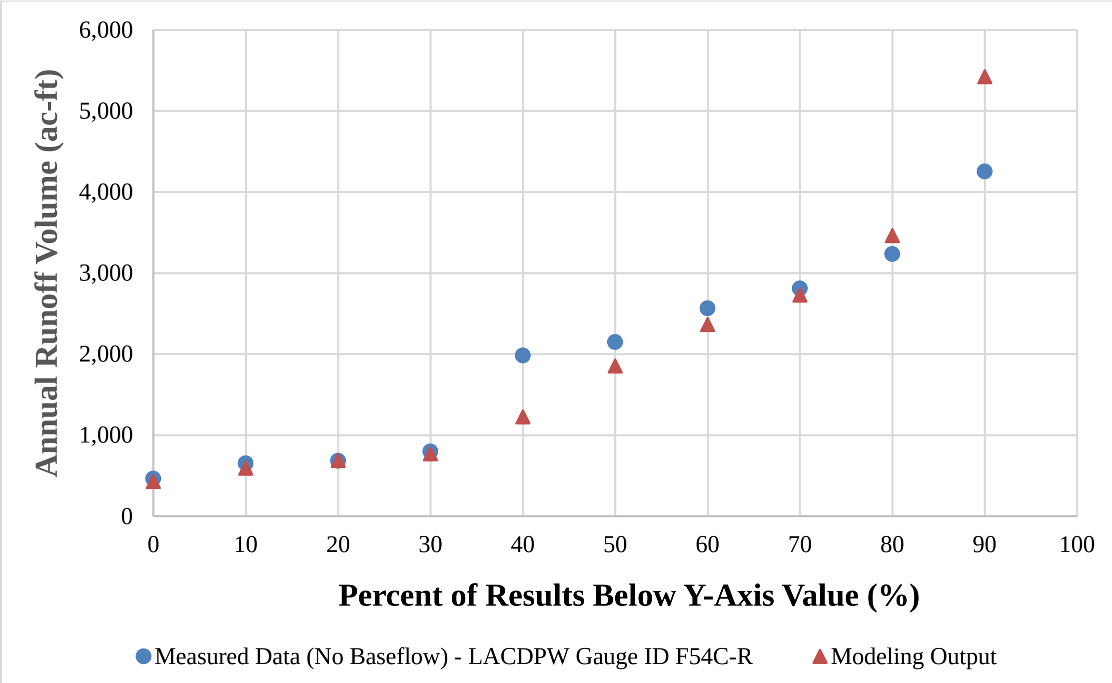

Figure 12. Annual Runoff Volumes for Topanga Subwatershed: Modeled vs. Observed (Flow Duration Curve Format)

Following calibration, average relative prediction error (or the percent differences between the averages annual observed and modeled annual runoff volume) was calculated to be -0.24 percent. According to the Regional Board's RAA Guidance (Regional Board, 2014, which is based on Donigian, 2000), SBPAT model performance with respect to hydrology as a result of this calibration is categorized as "very good."

4.5.2 WATER QUALITY CALIBRATION

SBPAT's land use EMC statistics were compared with the most current MS4 land use water quality monitoring data available. The land use EMCs used in SBPAT (**Table 18** and **Table 19**) were calculated from Los Angeles County land use-specific data collected between 1996 and 2000 and SCCWRP land use-specific data collected between 2001 and 2004 (SCCWRP data were used for fecal coliform only). An example comparison between the SBPAT-modeled pollutant concentrations (shown by non-parametric summary statistics drawn from SBPAT's lognormal distributions) for the single family residential land use, compared with the original SCCWRP sample results, is shown in **Figure 13** for fecal coliform bacteria. As shown, the comparison between these data sets is very good. The example is provided for single family residential land use since this is the dominant developed land use in the NSMBCW EWMP Area. Similar plots can be found for each modeled pollutant in **Appendix C**. Modeled EMC values are consistent with the recommended values for land use-specific loading in Table 3.3 of the RAA Guidelines.[22] In the future, as new local monitoring data become available, EMCs may be reevaluated as part of the EWMP adaptive management process.

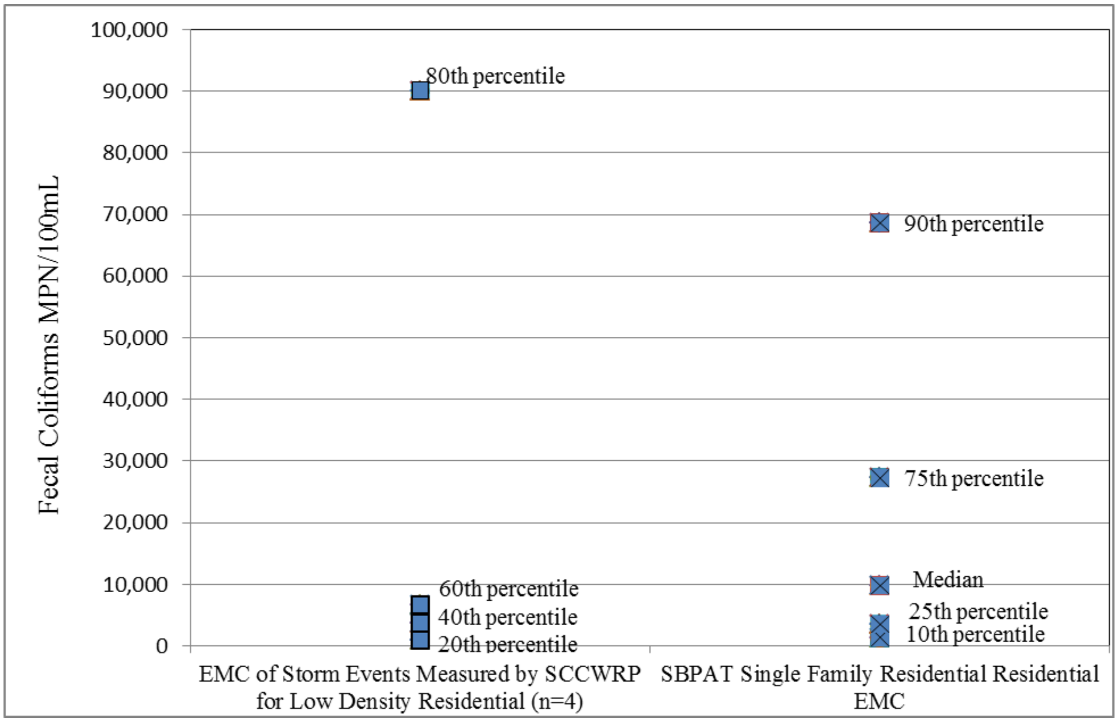

Figure 13. Comparison of Fecal Coliform Low Density Residential EMC Values Between SCCWRP Measurements (n=4) and SBPAT Modeled Values (a full log distribution is used by the model, but non-parametric summary statistics are shown for comparison)

4.6 MODEL VALIDATION

In addition to the above land use EMC verification, SBPAT's bacteria exceedance day calculation methodology was validated using the Santa Monica Bay reference watershed at Leo Carrillo Beach – Arroyo Sequit. Recent beach bacteria monitoring results were used. This validation is described in Section 4.6.1 below. Another validation of SBPAT's

[22] An exception to this was made for the open space/vacant fecal coliform EMC data. These values were instead based on *E. coli* data (divided by 0.85 to adjust to fecal coliform) for Arroyo Sequit reference watershed, or 11 samples collected between December 2004 and April 2006. Data were used by the Regional Board for every creek or river bacteria TMDL in the region and taken from (SCCWRP, 2005) and (SCCWRP 2007a).

annual bacteria loads is included in Section 4.6.2, demonstrating their correlation with measured annual wet weather beach exceedance days.

4.6.1 VALIDATION OF EXCEEDANCE DAY CALCULATION APPROACH

To be consistent with the SMB Beaches Bacteria TMDL for wet weather, which established allowed exceedance day WLAs based on monitoring results from the Leo Carrillo reference beach, the exceedance day calculation approach was tested on Leo Carrillo and its Arroyo Sequit subwatershed for the same critical year as the TMDL (Model Year 1993).[23] The goal of this analysis was to validate the modeling methodology by comparing its predicted exceedance days for Leo Carrillo with the 17 exceedance days from the TMDL, for Model Year 1993. This analysis occurred in three steps:

1. The calibrated SBPAT model, using the nearby Lachusa Patrol Station gauge for Model Year 1993 (consistent with the TMDL), resulted in 59 discharge days for Arroyo Sequit.
2. Based on 2003 to 2013 Leo Carrillo monitoring data, 27 percent of samples collected on days with >=0.10-inch of rainfall exceeded the single sample recreational Water Quality Objectives.[24] In other words, on 27 percent of days when runoff discharges due to a rain event might be expected, one or more fecal indicator bacteria concentrations at the beach exceeded the objectives.
3. Multiplying 59 discharge days by the 27 percent exceedance percentage resulted in 16 predicted wet weather exceedance days for Leo Carrillo for Model Year 1993. This result is within 6 percent of the 17 exceedance days that were determined through the original analysis in the SMBBB wet weather TMDL, therefore validating the proposed exceedance day calculation methodology.

[23] Note that in the SMB Beaches Bacteria TMDL, Model Year 1993 was defined as the critical year. However, based on more recent rainfall records, 1995 has been determined to be the 90th percentile year, and so is used for the RAA. See Section 4.4.2.1 and **Appendix C**.

[24] Single sample recreational Water Quality Objectives for bacteria include: 10,000 MPN/100 mL for total coliform; 400 MPN/100 mL for fecal coliform; 104 MPN/100 mL for Enterococcus (salt water); 235 MPN/100 mL for E. coli (freshwater); and the total coliform density shall not exceed a daily maximum of 1,000 MPN/100 mL if the ratio of fecal-to-total coliform exceeds 0.1.

4.6.2 VALIDATION OF USING ANNUAL FECAL COLIFORM LOADS TO PREDICT EXCEEDANCE DAY REDUCTIONS

A second methodology validation step was performed to demonstrate that modeled annual fecal coliform loads are indeed predictive of the compliance metric, or annual exceedance days for all fecal indicator bacteria. For bacteria modeling, verifying the linkage between modeled *fecal coliform loads* (i.e., discharged from the hypothetical subwatershed outlets) and total observed wet weather *exceedance days* (in the receiving water, based on REC1 daily maximum water quality objectives) is critical to establish reasonable assurance that compliance monitoring locations will be in compliance with the Permit limits. To establish this linkage, an analysis was conducted using shoreline monitoring data at Topanga Canyon[25] (SMB 1-18) between 2005 and 2013. **Figure 14** illustrates a reasonable correlation between total modeled annual fecal coliform loads and total annual observed wet weather exceedance days. Each point shown represents one single Model Year.

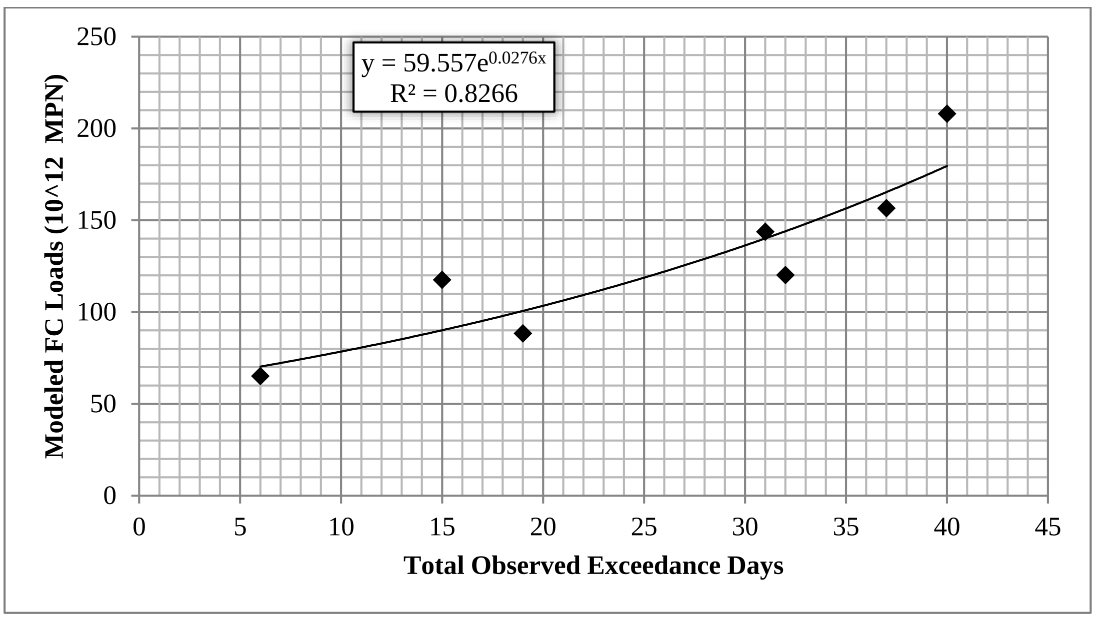

Figure 14. Correlation between Modeled Fecal Coliform Loads and Observed Exceedance Days, 2005-2013

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[25] This subwatershed is 88 percent open space and was selected for water quality validation due to it being the hydrologic calibration subwatershed and because it had *daily* shoreline monitoring data, which was necessary in order to have a sufficiently robust dataset of annual wet weather exceedance days. See additional explanation in Section 4.5.1.

5 SANTA MONICA BAY WATERSHED DEMONSTRATION OF COMPLIANCE

This section describes the proposed BMPs for the Santa Monica Bay areas (Jurisdictional Groups 1 and 4) and the demonstration that if implemented, there is reasonable assurance that the BMPs will meet the stated objectives. The results of the RAA for the Santa Monica Bay Watershed are presented below, including a summary of the target load reductions (TLRs), the BMPs selected for implementation in the NSMBCW EWMP Area, and a summary of load reductions achieved by the selected BMPs.

5.1 WET WEATHER TARGET LOAD REDUCTIONS

5.1.1 BACTERIA (SANTA MONICA BAY BEACHES)

In the NSMBCW EWMP Area, five SMB Beaches Bacteria TMDL CMLs have been assigned exceedance day allowances in the Permit based on an anti-degradation approach. As such, no load reductions are required (TLR = 0) for each subwatershed tributary to these compliance monitoring locations (SMB 1-2, SMB 1-3, SMB 1-16, SMB 1-17, and SMB 4-1), consistent with the TMDL's approach that acknowledges that historic average wet weather bacteria exceedance rates for each of these subwatersheds are lower than that of the reference beach. Historic wet weather monitoring data (2005 – 2014) at these five sampling locations confirm this understanding, as the long-term exceedance rate at all five sites varies between 5 and 15 percent, well below the long-term wet weather exceedance rate at the reference beach (26 percent).

Although the SMB Beaches Bacteria TMDL requires only that beach water quality at anti-degradation compliance locations be maintained, the NSMBCW EWMP Group will seek to implement non-structural and LID-based BMPs within these portions of the EWMP Area that will protect and potentially further improve water quality at these beaches. These measures, though not required for Permit compliance, are quantified in Section 5.3.1 below.

The methodology used to calculate TLRs for all other SMB analysis regions within the NSMBCW EWMP Area is described below.

5.1.1.1 TARGET LOAD REDUCTION CALCULATION METHODOLOGY (CONCEPTUAL MODEL) FOR BACTERIA

In order to establish the bacteria target load reduction (TLR) for each analysis region, a conceptual model methodology was developed to relate the annual number of modeled calendar days with rainfall-generated runoff (or "discharge days") to the expected annual bacteria exceedance days, which is the Permit's WQBEL expression for the SMB Beaches Bacteria TMDL and Malibu Creek Watershed Bacteria TMDL.

After validation of the modeling methodology using the reference watershed (see Section 4.6.1), the conceptual model approach was applied to all analysis regions within the NSMBCW EWMP Area in order to predict baseline exceedance days for the 90th percentile year, or Model Year 1995. Once baseline discharge days were calculated for each analysis region, the number of allowed discharge days was established using the exceedance percentage of samples collected during days with precipitation greater than 0.1 inches at each compliance monitoring location. The number of Permit-specified wet weather allowable exceedance days (17 for all non-anti-degradation sites) was divided by this site-specific exceedance percentage to calculate the number of discharge days that would result in the allowed number of exceedance days. **Table 22** summarizes the allowable discharge days calculated for each analysis region.

Table 22. Allowable Discharge Days for each Modeled Analysis Region (Model Year 1995)

Watershed	CML	Analysis Region	Historical Exceedance Rate (2002 – 20013) Wet Weather	Historical Exceedance Rate (2002 – 20013) Daily Rainfall > 0.1 inch	Allowable Exceedance Days	Allowable Discharge Days	Required Diversion Flow Rate (cfs)
Santa Monica Bay	-	W1-01	-	-	-	68	0.0
	S1-01[1]	S1-01	26%	25%	17	68	0.0
	-	E1-01	-	-	-	69	0.0
	S4-01[2]	S4-01	13%	20%	14	70	0.0
	-	E4-01	-	-	-	53	0.0
	S1-02[2]	S1-02	8%	14%	5	35	0.0
	S1-03[2]	S1-03	5%	9%	3	35	0.0
	S1-04	S1-04	36%	34%	17	49	0.0
	-	E1-04	-	-	-	51	0.0
	S1-05	S1-05	26%	32%	17	53	0.0
	-	E1-05	-	-	-	56	0.0
	S1-06	S1-06	25%	29%	17	58	0.0
	S1-07	S1-07	54%	66%	17	26	12.0
	-	E1-07	-	-	-	26	12.7
	S1-08	S1-08	43%	63%	17	27	6.9
	S1-09	S1-09	37%	61%	17	28	2.8
	S1-10	S1-10	35%	52%	17	33	4.5
	S1-11	S1-11	29%	42%	17	40	0.0
	-	E1-11	-	-	-	34	4.4
	S1-12	S1-12	49%	60%	17	28	17.8
	-	E1-12	-	-	-	28	6.8
	S1-13	S1-13	42%	46%	17	15	3.2
	-	W1-14	-		-	15	12.3
	S1-14	S1-14	31%	54%	17	37	8.4
	S1-15	S1-15	25%	33%	17	34	0.0
	S1-16[2]	S1-16	15%	31%	14	32	0.0
	S1-17[2]	S1-17	11%	14%	12	51	0.0
	S1-18	S1-18	58%	63%	17	46	38.6

[1] Compliance monitoring location at the reference subwatershed.

[2] Compliance monitoring locations with anti-degradation-based allowed exceedance days for wet weather.

To determine the TLR necessary for each analysis region to meet the allowed discharge days, a technical approach utilizing a virtual BMP was modeled at each outlet and/or CML.

For each analysis region's outlet retention BMP, an in-stream diversion system was iteratively sized (based on a diversion flow rate) to produce a bypass frequency (or number of discharge days) during Model Year 1995 that matched the allowed discharge days. Each virtual diversion system diverted runoff to an infinitely large retention BMP where the diverted water was fully captured. The load reduction resulting from this BMP scenario (i.e., baseline analysis region load minus analysis region load with the diversion system and retention BMP in place) became the TLR for each analysis region. "Reasonable assurance" of compliance with the allowed discharge days was then considered to have been met when actual and proposed BMPs combined to achieve the TLR for each analysis region. This approach was presented to Regional Board staff on June 6, 2014 and verbal feedback received during the meeting was supportive.

In summary, the following approach was implemented to calculate a bacteria TLR for each modeled analysis region (see **Appendix C** for an example calculation):

1. Each analysis region is modeled in SBPAT for the 90th percentile wet year (Model Year 1995).
2. The existing, baseline condition (i.e., without any outlet retention BMP) is modeled for each analysis region, resulting in a mean baseline fecal coliform (FC) load for the 90th percentile wet year (baseline load).
3. The exceedance percentage of samples collected during days with precipitation greater than 0.1 inches is determined for each CML.
4. The allowable number of discharge days for each analysis region is calculated.
   a. For analysis regions within the SMB Watershed tributary to a CML, allowable discharge days are calculated by dividing 17 TMDL allowable exceedance days by the exceedance percentage calculated in Step 3.
   b. For analysis regions within the SMB Watershed that lie between CMLs, allowable discharge days are calculated by averaging the allowable discharge days from the nearest adjacent analysis regions (e.g., the number of allowable discharge days for analysis region E1-07 is the average of the allowable discharge days calculated for S1-07 and S1-08).
5. An in-stream diversion to a large, theoretical retention BMP at the outlet of each analysis region is iteratively sized so that it only bypasses during the number of allowable discharge days determined in Step 4.
6. Each diversion and retention BMP is then modeled in SBPAT to produce a mean FC load for the 90th percentile wet year (allowed load).
7. For each analysis region, the difference between the baseline load (step 2) and the allowed load (step 6) results in a TLR for the 90th percentile wet year, which is the load reduction required to meet the allowable exceedance days for wet weather.

Within the NSMBCW EWMP Area, the TLR for bacteria for each analysis region was found to range between 0 and 44 percent. The cumulative TLR for the entire Santa Monica Bay Watershed, calculated as the total baseline bacteria load minus the total allowed bacteria load for the entire Santa Monica Bay Watershed, was calculated to be 7.3 percent. These TLRs are summarized in **Table 23** below.

5.1.2 TOTAL LEAD (TOPANGA CANYON CREEK)

Total lead is listed as a Category 2 WBPC in Topanga Canyon Creek (analysis region S1-18) due to the existing 303(d) listing. Currently there is no WQBEL established in the Permit because a TMDL has not been developed, so the California Toxics Rule (CTR) criteria maximum concentration (CMC) for total lead of 82 µg/L was used as the water quality objective for wet weather. This concentration was converted from the dissolved lead criteria concentration of 65 µg/L to a total lead criteria concentration by following CTR conversion procedures and assuming a hardness of 100 mg/L, a conversion factor of 0.791, and a Water Effects Ratio (WER) of 1.0. A TLR methodology was applied consistent with the conceptual model for nitrates plus nitrites, including the use of 90th percentile daily concentrations of total lead during Model Year 1995 to establish baseline loads during the critical period.

The baseline load, calculated based on total runoff volume from 1995 multiplied by the 90th percentile daily concentration in 1995 (14.3 µg/L), is 180 lbs. The allowed load, calculated based on total volume for the 90th percentile critical year (1995) multiplied by the water quality objective (82 µg/L), is 1,031 lbs. Therefore, even in a critical condition, no reduction of the baseline load is required by the NSMBCW EWMP Group to meet the allowed load (TLR = 0), and therefore it is determined that reasonable assurance of compliance with the water quality objective has been demonstrated.

5.1.3 PCBS AND DDT (SANTA MONICA BAY)

The Santa Monica Bay TMDL for DDTs and PCBs developed WLAs for stormwater throughout the Santa Monica Bay Watershed. Because the NSMBCW EWMP Area contribution is not distinctly defined in the TMDL, the WLAs assigned to the entire Santa Monica Bay Watershed management area as a whole are being used for this discussion. Table 6-3 in the TMDL lists the existing annual DDT and PCB loads as compared to the annual maximum allowable loads. The existing TMDL-estimated loads for all of Santa Monica Bay and most of the individual subwatersheds are lower than the maximum allowable loads. As such, the TMDL WLAs for the entire NSMBCW EWMP Area were set equal to the existing estimates of annual MS4 loads for DDTs and PCBs as 28 grams per year (g/yr) and 145 g/yr, respectively. Therefore, consistent with the TMDL, it is assumed that there is a zero required load reduction for PCBs and DDTs in MS4 discharges. These WBPCs are not analyzed further in this RAA, and based on this evaluation it is determined that reasonable assurance of compliance with the WLA has been demonstrated. In addition, the BMPs proposed in this EWMP are expected to reduce sediment and sediment-associated pollutants such as DDTs and PCBs within the NSMBCW EWMP Area, so the anticipated BMP load reductions for DDTs and PCBs will exceed the TMDL WLA.

5.1.4 SUMMARY OF SANTA MONICA BAY TLRS

Table 23 provides a summary of calculated TLRs for bacteria in Santa Monica Bay and total lead in Topanga Canyon Creek. In addition, the cumulative bacteria TLR for the entire NSMBCW EWMP Area in the Santa Monica Bay Watershed is summarized at the bottom of **Table 23**.

Table 23. Target Load Reductions for the Santa Monica Bay Watershed (Model Year 1995)

Analysis Region	Pollutant[a]	Baseline Condition for the Critical Year			Allowed Condition for the Critical Year[b]			Target Load Reduction[b]	
		Runoff Volume	Average Pollutant Concentration	Pollutant Load	Runoff Volume	Average Pollutant Concentration	Pollutant Load	Absolute Load Reduction	% of Baseline Load
W1-01	**FC**	0.3 af	191,956 MPN/100mL	0.8x10^{12} MPN	0.3 af	191,956 MPN/100mL	0.8 x10^{12} MPN	0.0x10^{12} MPN	0.0%
S1-01	**FC**	350.1 af	8,976 MPN/100mL	38.8x10^{12} MPN	350.1 af	8,976 MPN/100mL	38.8 x10^{12} MPN	0.0x10^{12} MPN	0.0%
E1-01	**FC**	109.7 af	522 MPN/100mL	0.7x10^{12} MPN	109.7 af	522 MPN/100mL	0.7 x10^{12} MPN	0.0x10^{12} MPN	0.0%
S4-01[c]	**FC**	305.1 af	7,986 MPN/100mL	30.1x10^{12} MPN	305.1 af	7,986 MPN/100mL	30.1 x10^{12} MPN	0.0x10^{12} MPN	0.0%
E4-01	**FC**	896.5 af	4,131 MPN/100mL	45.7x10^{12} MPN	896.5 af	4,131 MPN/100mL	45.7 x10^{12} MPN	0.0x10^{12} MPN	0.0%
S1-02[c]	**FC**	204.3 af	7,504 MPN/100mL	18.9x10^{12} MPN	204.3 af	6,195 MPN/100mL	15.6 x10^{12} MPN	0.0x10^{12} MPN	0.0%
S1-03[c]	**FC**	1703.5 af	6,217 MPN/100mL	130.6x10^{12} MPN	1703.5 af	5,013 MPN/100mL	105.3 x10^{12} MPN	0.0x10^{12} MPN	0.0%
S1-04	**FC**	934.1 af	8,739 MPN/100mL	100.7x10^{12} MPN	934.1 af	8,739 MPN/100mL	100.7 x10^{12} MPN	0.0x10^{12} MPN	0.0%
E1-04	**FC**	1162.9 af	18,632 MPN/100mL	267.3x10^{12} MPN	1162.9 af	18,632 MPN/100mL	267.3 x10^{12} MPN	0.0x10^{12} MPN	0.0%
S1-05	**FC**	2379.7 af	13,580 MPN/100mL	398.6x10^{12} MPN	2379.7 af	13,580 MPN/100mL	398.6 x10^{12} MPN	0.0x10^{12} MPN	0.0%
E1-05	**FC**	1271.8 af	21,986 MPN/100mL	344.9x10^{12} MPN	1271.8 af	21,986 MPN/100mL	344.9 x10^{12} MPN	0.0x10^{12} MPN	0.0%
S1-06	**FC**	1879.6 af	16,647 MPN/100mL	386.0x10^{12} MPN	1879.6 af	16,647 MPN/100mL	386.0 x10^{12} MPN	0.0x10^{12} MPN	0.0%
S1-07	**FC**	1748.7 af	3,657 MPN/100mL	78.9x10^{12} MPN	1748.7 af	3,308 MPN/100mL	71.4 x10^{12} MPN	7.5x10^{12} MPN	9.5%
E1-07	**FC**	666.9 af	14,771 MPN/100mL	121.5x10^{12} MPN	681.6 af	10,494 MPN/100mL	88.2 x10^{12} MPN	36.4x10^{12} MPN	29.9%
S1-08	**FC**	2065.1 af	3,394 MPN/100mL	86.4x10^{12} MPN	2100.5 af	3,183 MPN/100mL	82.5 x10^{12} MPN	7.8x10^{12} MPN	9.0%
S1-09	**FC**	749.7 af	3,125 MPN/100mL	28.9x10^{12} MPN	757.8 af	2,769 MPN/100mL	25.9 x10^{12} MPN	3.6x10^{12} MPN	12.5%
S1-10	**FC**	1125.5 af	1,716 MPN/100mL	23.8x10^{12} MPN	1153.8 af	1,699 MPN/100mL	24.2 x10^{12} MPN	1.5x10^{12} MPN	6.1%
S1-11	**FC**	755.5 af	2,088 MPN/100mL	19.5x10^{12} MPN	778.6 af	2,143 MPN/100mL	20.6 x10^{12} MPN	0.0x10^{12} MPN	0.0%
E1-11	**FC**	673.8 af	6,563 MPN/100mL	54.5x10^{12} MPN	684.0 af	5,306 MPN/100mL	44.8 x10^{12} MPN	11.2x10^{12} MPN	20.5%
S1-12	**FC**	579.8 af	12,084 MPN/100mL	86.4x10^{12} MPN	608.2 af	6,890 MPN/100mL	51.7 x10^{12} MPN	37.9x10^{12} MPN	43.9%
E1-12	**FC**	478.2 af	9,862 MPN/100mL	58.2x10^{12} MPN	493.4 af	7,194 MPN/100mL	43.8 x10^{12} MPN	16.2x10^{12} MPN	28.0%
S1-13	**FC**	646.8 af	7,213 MPN/100mL	57.5x10^{12} MPN	650.9 af	6,514 MPN/100mL	52.3 x10^{12} MPN	6.5x10^{12} MPN	11.3%
W1-14	**FC**	1814.2 af	6,363 MPN/100mL	142.4x10^{12} MPN	1832.3 af	5,023 MPN/100mL	113.5 x10^{12} MPN	29.5x10^{12} MPN	20.8%

Analysis Region	Pollutant[a]	Baseline Condition for the Critical Year				Allowed Condition for the Critical Year[b]				Target Load Reduction[b]	
		Runoff Volume	Average Pollutant Concentration		Pollutant Load	Runoff Volume	Average Pollutant Concentration		Pollutant Load	Absolute Load Reduction	% of Baseline Load
S1-14	**FC**	945.2 af	4,609	MPN/100mL	53.7×10^{12} MPN	983.7 af	4,257	MPN/100mL	51.7 $\times 10^{12}$ MPN	8.2×10^{12} MPN	15.3%
S1-15	**FC**	302.7 af	19,302	MPN/100mL	72.1×10^{12} MPN	302.7 af	19,302	MPN/100mL	72.1 $\times 10^{12}$ MPN	0.0×10^{12} MPN	0.0%
S1-16[c]	**FC**	210.0 af	1,767	MPN/100mL	4.6×10^{12} MPN	210.0 af	1,767	MPN/100mL	4.6 $\times 10^{12}$ MPN	0.0×10^{12} MPN	0.0%
S1-17[c]	**FC**	1056.6 af	1,112	MPN/100mL	14.5×10^{12} MPN	1056.6 af	1,112	MPN/100mL	14.5 $\times 10^{12}$ MPN	0.0×10^{12} MPN	0.0%
S1-18	**FC**	4623.5 af	5,461	MPN/100mL	311.4×10^{12} MPN	4623.5 af	4,551	MPN/100mL	259.6 $\times 10^{12}$ MPN	51.8×10^{12} MPN	16.6%
	Total Pb	4623.5 af	14	µg/L	180.1 lbs	4623.5 af	82	µg/L	1031 lbs	0.0 lbs	0.0%

[a] Pollutants in bold are the controlling pollutants in each analysis region.
[b] RAA demonstration is made based on the achievement of the TLR values in terms of absolute load removed by the proposed suite of BMPs in each analysis region. The allowed conditions in terms of runoff volume and concentration are shown for informational purposes only.
[c] These compliance monitoring locations have Permit limits based on an anti-degradation approach, and therefore have a TLR of zero.

5.2 BEST MANAGEMENT PRACTICES

5.2.1 *METHODS TO SELECT AND PRIORITIZE*

In order to demonstrate reasonable assurance, BMPs identified for incorporation were prioritized based on cost (low cost BMPs were prioritized); BMP effectiveness for the pollutants of concern (BMPs that had greater treatment efficiency for the pollutant of concern in a particular analysis region were prioritized over other BMPs); and implementation feasibility as determined by desktop screening and field reconnaissance (where necessary). In general, non-structural BMPs were prioritized over structural BMPs due to their lower relative cost, and then structural BMPs were identified that would result in the greatest load reduction per dollar. This was accomplished by targeting land uses with the greatest percent imperviousness and highest pollutant loads and by using BMPs with the greatest performance, particularly for the controlling pollutant.

The RAA was performed according to the following steps:

1. Calculate load reductions associated with existing BMPs;
2. Assume non-modeled, non-structural programmatic load reduction (5 percent of baseline pollutant load);
3. Calculate Low Impact Development (LID) incentives and redevelopment load reduction;
4. Calculate planned and proposed regional BMP load reductions after evaluating existing plans and parcel screening analyses;
5. Meet the TLR by backfilling the remaining load reduction with regional BMPs or distributed BMPs to treat a percentage of developed land uses.

New structural BMPs (including regional and distributed BMPs) were identified only in cases where the combination of load reductions from non-structural, programmatic, and existing, planned, or proposed structural BMPs were insufficient to meet the TLR. GIS desktop screening and field screening were used to determine what types of projects could reasonably be constructed in the identified analysis region. In all cases except one (Topanga Canyon), it was determined that distributed (green street-type) BMPs were the appropriate BMPs for the identified subwatersheds. This was due in large part to the following unique attributes of the NSMBCW EWMP Area:

- Development in the EWMP Area is mostly limited to the coast, with large canyons draining through these developed areas to Santa Monica Bay. As a result, full retention of the 85th percentile, 24-hour storm volume would require a very large BMP in most cases to treat large amounts of runoff from the upper watershed;

- Of the 7 percent of the EWMP Area that is developed, a majority is not served by a traditional storm drain system. Many roads do not have curbs and gutters. The majority of drains owned by the EWMP Group Agencies are limited to culverts that simply transport water from one side of a road to the other. As a result, effectively collecting and conveying runoff to a large-scale retention project is not feasible or efficient in all but a few cases; and
- The combination of geologic hazards (landslide potential, liquefaction potential, presence of faults), groundwater mounding effects on onsite wastewater treatment (septic) systems, and soils with low permeability throughout the EWMP Area (see **Figure 2**). These factors collectively limit the available locations for implementation of a large scale retention BMP.

When these three factors were combined with the results of the subwatershed prioritization analysis, the identification of potential large-scale retention projects was limited to the upper watershed of Topanga Canyon (see Section 5.2.4.3.1).

BMP load reductions were evaluated for the period between the effective date and final compliance deadline for the SMB Beaches Bacteria Wet Weather TMDL. These dates are summarized in **Table 24**.

Table 24. TMDL Effective Dates and Final Compliance Dates

TMDL	TMDL Effective Date	Final Compliance Deadline
SMB Beach Bacteria TMDL	May 20, 2003	July 15, 2021

5.2.2 *RECOMMENDED MINIMUM CONTROL MEASURES*

The Permit allows the opportunity in an EWMP to customize specified MCMs to focus resources on high priority issues within their watersheds. Customization may include replacement of a MCM with a more effective measure, reduced implementation of an MCM, augmented implementation of the MCM, focusing the MCM on the water quality priority, or elimination of an MCM. Modifications to the MCMs must be appropriately justified and still be consistent with 40 CFR § 122.26(d)(2)(iv)(A)-(D). A control measure may only be eliminated based on the justification that it is not applicable to a particular permittee (per Section IV.C.5.b.iv.1(c) of the Permit). Customized measures, once approved as part of the EWMP, will replace in part or in whole the prescribed MCMs in the Permit. The Planning & Land Development Program is not eligible for customization in that it may be no less stringent than the baseline requirements in the Permit. However, it can be enhanced over the baseline permit requirements such as LA County has done in its LID ordinance, thereby yielding additional pollutant and stormwater volume control for the watershed. The Permit-specified MCMs (baseline MCMs) build upon the MCMs in the previous MS4 Permit (Order 01-182). Although similar in many ways to the previously-required MCMs, in most cases the baseline MCMs contain more prescriptive record-keeping and/or implementation requirements.

Summary assessments of each MCM contained in the Permit are provided in **Appendix D**, including non-structural BMPs from the ASBS Compliance Plan, as well as a determination as to whether the NSMBCW EWMP Group will implement the MCM provisions as defined in the Permit, or whether modifications will be made. Additional (future) modifications may also be made through the Adaptive Management Process, outlined in Section 8.

5.2.2.1 GENERAL FRAMEWORK FOR MCM CUSTOMIZATION

An approach for evaluating existing institutional MCMs was developed as part of the NSMBCW EWMP Work Plan (**Appendix B)** and was used to evaluate existing MCMs and develop the customized MCMs. The following steps provide a general framework for MCM customization:

- Identify MCMs for potential customization. This may include identifying:
  - MCM requirements prescribed by the Permit which are not already being implemented by the permittee;
  - Currently implemented MCMs which have been enhanced over the previous Permit as part of TMDL implementation, e.g., Clean Bay Restaurant Certification Program;
  - Programmatic solutions/non-structural controls identified in TMDL implementation plans which may not yet have been implemented; and
  - MCMs which are currently being implemented but which may be excessive in scope. For example, commercial inspections being conducted of retail gasoline facilities which are already heavily regulated through other environmental programs in areas that have no receiving water impairments for the pollutants of concern may be carried out less frequently, or discontinued indefinitely.
- Identify MCMs which are not applicable. A control measure may be eliminated based on the justification that it is not applicable to a particular permittee. For example if it is the policy of a permittee not to use pesticides in public agency

activities, then there is no need for tracking of pesticide use and this MCM may be proposed for elimination.

- Assess the effectiveness of the incremental baseline MCM requirements with respect to water quality priorities. The data necessary to quantify this will vary greatly by MCM, but may include information such as: receiving water quality, inspection and reporting records, number of qualifying projects (e.g., number of construction projects greater than 1 acre), number of pet station bags used, amount of material picked up by street sweeping activities, number of employees trained, and maintenance records. Additionally, the California Stormwater Quality Association (CASQA) provides a tool to estimate the effectiveness of stormwater management programs. The tool recommends possible assessment metrics that can be used for various stormwater programs.
- Quantify the additional resources required to implement the incremental baseline MCMs. This may include estimating additional staff resources in terms of full-time employees, consulting resources, and contracted services.
- Assess the effectiveness and resources required to implement the customized MCM. The process to quantify these will be the same as the process used to quantify the baseline effectiveness of the existing MCM.
- Compare the assessed effectiveness and resources required to implement the incremental baseline MCMs and the customized MCMs. Customization can be justified in several ways:
    - If the customized MCM effectiveness is equal to or greater than the baseline MCM, customization can be justified.
    - If an MCM requirement is not applicable, then elimination is justified.
    - If the incremental MCM requires additional resources that are disproportionate to the increased effectiveness achieved, then retention of the existing MCM may be justified.
- Document the customized MCM justification.

MCMs were evaluated based on their effectiveness in addressing the WBPCs specific to the NSMBCW EWMP Area and based on the NSMBCW EWMP Group's knowledge and experience with existing MCMs. In many ways, the Group's practical experience with MCM implementation over time provides the best insight as to what MCM modifications/enhancements will be most helpful to target the WBPCs of concern in the NSMBCW EWMP Area. **Table 25** summarizes the proposed MCM modifications and enhancements for the NSMBCW EWMP Agencies. The NSMBCW EWMP Group will implement the remaining MCMs identified in Part VI.D of the Permit with no additional modifications. Per the Group's adaptive management approach, additional enhancements or modifications will be made on an as-needed and ongoing basis. An overview of all MCMs to be implemented by the NSMBCW EWMP Group and the WBPCs which they target is provided in **Appendix D**. Unless otherwise noted, implementation of each MCM is the responsibility of each NSMBW EWMP Agency, as applicable.

Table 25. Common MCM Modifications/Enhancements for City and County

2012 Permit Requirement	Modification/Enhancements	Justification for Modification
D.5 Public Information and Participation Program (PIPP)		
Develop and distribute public education materials on: vehicle fluids; household waste; construction waste; pesticides, fertilizers, and integrated pest management (IPM); green wastes; and animal wastes. Distribute public education materials at points of purchase including automotive parts stores, home improvement centers, landscaping/garden centers, and pet shops/feed stores.	PIPP enhancements including: - "Living Lightly in Our Watersheds – A Guide for Residents of the SMB Watershed." Copies of this guide are regularly distributed at public counters and events. A partnership project with the Resource Conservation District of the Santa Monica Mountains and other local agencies, this guide is currently being updated for print production, and a new website for presenting the information was launched in 2015. It can be found at www.livinglightlyguide.org. - Malibu is founding member and facilitator of the Malibu Area Conservation Coalition (MACC). MACC is a partnership of local government agencies, utilities, resource districts, and community stakeholders working within Malibu and the North Santa Monica Mountains that share the common goal of empowering local communities to conserve and protect natural and economic resources and habitat. Recognizing that watersheds, oceans, water and power generation and delivery systems do not stop at jurisdictional boundaries, the coalition is dedicated to providing effective programs, environmental education and outreach. The MACC does this by providing resources to the community to improve resource conservation, and eliminate non-point source pollution. Programs have included promoting the Surfrider Foundation's Ocean Friendly Gardens program, providing rebates and incentives for conservation devices and landscape retrofits, hosting workshops and training, and installing demonstration gardens. - Malibu actively participates in the Malibu Chamber of Commerce environmental Committee which provides education/outreach and recognition to local businesses and the community through events, awards, workshops, and outreach campaigns. - Special focused outreach directly to the equestrian community in neighborhoods known to have increased equestrian uses or facilities. Including direct contact with properties, offers to conduct site evaluations, education and outreach to property owner associations, and educational materials. A new equestrian facilities best management practices guidelines is currently in development.	This is an enhancement.

2012 Permit Requirement	Modification/Enhancements	Justification for Modification
	- The City of Malibu has conducted landscaper/gardener training and certification programs multiple times in both Spanish and English. - Malibu will assess the feasibility and effectiveness of additional program enhancements that are detailed in Appendix E Section 6.1 (ASBS 24 Compliance Plan). This includes an Enhanced Collaborative Environmentally Friendly Alternative Services Program and ASBS Signage at Beaches. Final implementation of programs determined to be feasible and effective will be subject to City Council approval.	
D.6. Industrial/Commercial		
Educate - notify each facility in inventory of BMP requirements once per permit cycle	Outreach material content and distribution will be focused on industrial/commercial facilities with the potential to contribute to pollutants identified as water quality priorities, specifically bacteria. For example, BMPs related to trash management will be highlighted in outreach material, and additional recommendations that exceed the minimum requirements for these BMPs will be encouraged.	Outreach to industrial/ commercial facilities will focus on water quality priorities to most effectively utilize resources.
Inspect critical commercial/industrial facilities twice during the 5 year permit term, including inspection of 25% of facilities with No Exposure Certification	The NSMBCW EWMP Group conducts inspections of commercial facilities within the NSMBCW EWMP Area on an annual basis rather than twice per five years as required in the Permit. This includes annual inspections of food service establishments including restaurants, grocery stores, and coffee shops to reduce this type of business' impact on water quality due to stormwater and dry weather runoff. Malibu is a partner in the Santa Monica Bay Restoration Foundation's Clean Bay Restaurant Certification program that far exceeds the minimum requirements of the previous MS4 Permit. Inspections include a comprehensive 30+ point stormwater inspection checklist requiring 100% compliance in order for the facility to be awarded a Clean Bay Restaurant Certification.	This is an enhancement.
D.7. Planning and Land Development		

2012 Permit Requirement	Modification/Enhancements	Justification for Modification
Update ordinance/design standards to conform with new requirements (LID and Hydromodification)	The City of Malibu exceeds the Permit's LID requirements by requiring LID implementation on more projects than otherwise required by the Permit. In addition, the City of Malibu implements a Local Coastal Program, which is certified by the California Coastal Commission, including a Land Use Plan (LUP) and Local Implementation Plan (LIP) that detail many environmental quality and protection standards, objectives, and implementation measures for new development and redevelopment projects. These include requirements for water conservation, protection of native vegetation, and landscaping with native vegetation. All landscape plans are reviewed by Malibu's contract biologist. A water quality mitigation plan is required for all planning priority projects along with additional projects, including: beachfront development that creates, adds, or replaces 2,500 sf or more of impervious area; projects that result in the creation, addition, or replacement of 2,500 sf that discharge directly to or adjacent to an ASBS or are tributary to an ASBS; and single family residential projects that create, add, or replace 5,000 sf of impervious surface area.	This is an enhancement.
D.9 Public Agency Activities		
Develop retrofit opportunity inventory (within public ROW or in coordination with TMDL implementation plan); evaluate and rank	EWMP regional and distributed project selection process will be utilized to meet these requirements for public projects rather than implementing separate evaluations for retrofit opportunities. The Group will continue to encourage private retrofit projects through the following: • Retrofit projects on public land that treat runoff from private property; • Education and outreach; • Development plan review process; • Ordinance enforcement.	Separate procedures are not needed as these considerations are incorporated into the EWMP control measure selection process.
Develop procedures to assess impact of flood management projects on water quality of receiving waters; evaluate to determine if retrofitting is feasible		
Evaluate existing structural flood control facilities to determine if retrofitting facility to provide additional pollutant removal is feasible		
Implement controls to limit infiltration of seepage from sanitary sewers to the storm drains	Implement controls to limit sewage discharges from OWTS to the MS4 by maintaining a Septic System Management Plan and Comprehensive Onsite Wastewater Treatment System Inspection and Operating Permit Program.	Due to lack of municipal sanitary sewer in the majority of the NSMBCW EWMP Area, the MCM will be implemented where applicable, otherwise, the modified MCM will apply where OWTS exists.
Implement routine preventative maintenance for both systems, survey sanitary sewer and MS4.		

2012 Permit Requirement	Modification/Enhancements	Justification for Modification
Street sweeping - Priority A: 2x/mo; B: 1x/mo; C: as needed, not less than 1x/yr	The current street sweeping program in the City of Malibu includes sweeping of all City streets monthly (even Priority C streets) and PCH weekly. Vacuum trucks will be used, where feasible. Malibu will assess the feasibility and effectiveness of additional program enhancements that are detailed in Appendix E Section 6.1 (ASBS 24 Compliance Plan). This includes Equipment Upgrades, Increased Sweeping Frequency, and an Infrastructure Priority Re-Evaluation Program to determine if increased cleaning may be appropriate. Final implementation of programs determined to be feasible and effective will be subject to City Council approval.	This is an enhanced program.
Inspect and/or clean Permittee-owned parking lots at least 2x/month	The County has implemented an aggressive street sweeping program at County Beach parking lots by sweeping three to four times per week with enhanced sweeping equipment.	This is an enhanced program.
D.10 Illicit Connections and Illicit Discharges Elimination		
Install signage adjacent to open channels to provide info regarding public reporting	Implement signage in prioritized areas only, only in areas where the NSMBCW EWMP Group has local jurisdiction or land control.	Modify to focus on water quality priorities, and to limit signage requirements to enforceable locations.

5.2.2.2 ADDITIONAL PROGRAMMATIC CONTROLS

In addition to these MCMs, Malibu originally enacted its water conservation ordinance in December 1991 (the City had recently incorporated in March 1991) to prevent waste or unreasonable use of water—a consequence of which is the reduction of incidental residential runoff. In December 2009, Malibu enacted Ordinance No. 343 – Landscape Water Conservation Ordinance, to comply with the requirements of the Water Conservation in Landscaping Bill (AB1881) of the State of California. The 2009 ordinance adopted by Malibu was deemed to be "at least as effective" as the "Model Water Efficient Landscape Ordinance" set forth by the California Department of Water Resources (DWR). The City went above the minimum requirements established by the DWR in this ordinance to capture more redevelopment projects and limit the amount of turf that could be installed, among other restrictions. On June 8, 2015, the City of Malibu adopted Ordinance No. 390, which enhances water conservation efforts by further restricting water of landscape and lawns; prohibiting residential car washing unless all wash water is retained on site; and requiring all mobile car washes within City limits to use recycled water. Similarly, the County adopted Ordinance No. 2008-00052U on October 7, 2008, establishing water conservation requirements for all unincorporated areas of the County. Among other requirements, the ordinance set forth a hose watering prohibition, established landscape watering requirements, and placed limits on vehicle washing procedures.

Consistent with Permit requirements, the NSMBCW EWMP Group has adopted laws to protect and improve water quality throughout the NSMBCW EWMP Area. The NSMBCW EWMP Group has banned smoking on public beaches, the use of expanded polystyrene food packaging, and the distribution of plastic shopping bags. The bans on smoking in public places, expanded polystyrene food packaging, and plastic shopping bags are TMDL implementation measures identified in the Santa Monica Bay Debris TMDL.

Malibu plants native and drought resistant vegetation and utilizes water efficient irrigation systems at City owned or operated facilities to reduce water consumption and the need for applying chemicals on landscaping, with the exception of limited fertilizer application to turf on ball fields. All municipal parks, except Legacy Park, are managed with an evapotranspiration (ET) based irrigation system that tracks rainfall, evaporation, and transpiration to determine irrigation requirements. The system also applies programmed "Crop Coefficients" (plant growth habits) that automatically adjust irrigation to specific seasonal needs, and other programming options to minimize runoff and water puddles. Malibu has also undertaken outreach programs and installed pet waste disposal bag dispensers at public parks within the NSMBCW and the Malibu Equestrian Center.

The NSMBCW EWMP Group recognizes that opportunities may arise for the implementation of additional programmatic controls. These opportunities may include:

- True source control, such as removal of metals from brake pads and pesticide bans;
- Landscaper/gardener training and certification program;
- Enhanced street sweeping;
- Enhanced illicit connection program;
- Enhanced inspection and enforcement programs;
- Enhanced enforcement of litter ordinances; and
- Installation of additional trash cans or increased trash collection services in high trash generating areas.

During implementation of the EWMP, the NSMBCW EWMP Group members will look for opportunities to maximize the use of institutional control measures.

5.2.2.3 CONSISTENCY WITH ASBS 24 COMPLIANCE ACTIONS

The baseline and enhanced MCMs and additional programmatic controls described herein are inclusive of all watershed control measures enumerated in the ASBS 24 Compliance Plan (**Appendix E**). While some ASBS 24 compliance actions are addressed directly by a MCM (i.e. street sweeping, IDDE), others may fall less explicitly under more general MCMs. For example, the ASBS 24 Compliance Plan describes various PIPPs in place to encourage public cooperation in waste management and water conservation. While the PIPPs described in the ASBS 24 Compliance Plan (i.e. Clean LA website, Malibu Green Room website, Landscape Irrigation Efficiency Program, Cash for Grass) are not individually called out as specific MCMs, they fall under the NSMBCW agencies implementation of MCMs in Section VI.D.5 Public Information and Participation Programs. There are no ASBS-specific watershed control measures called out in the ASBS 24 Compliance Plan that are not implemented elsewhere.

In addition, some of the non-structural controls in the ASBS 24 Compliance Plan are MCM enhancements. These include:

- An architectural copper and metal building material mitigation program;

- An architectural copper ban; and
- A zinc alternative building material ordinance.

5.2.3 QUANTIFIED NON-STRUCTURAL BMPS

Non-structural BMPs have been categorized as follows for inclusion in the RAA. Since techniques have not yet been developed to properly model non-structural BMPs, a selection of structural BMPs has been used to account for the effectiveness of some of the BMPs described below.

5.2.3.1 PROGRAMMATIC BMPS

These source controls include a combination of BMPs such as new or enhanced pet waste controls (ordinance, signage, education/outreach, mutt mitts, etc.), human waste source tracking and remediation (e.g., sanitary surveys and other investigations, etc.), new or enhanced equestrian facility outreach, increased catch basin and storm drain cleaning, and other new or enhanced non-structural BMPs that target the pollutants addressed in this EWMP. A combined credit of 5 percent load reduction was applied for all pollutants to represent the cumulative benefit from all programmatic BMPs in addition to MCM enhancements the NSMBCW EWMP Group will implement.

5.2.3.2 REDEVELOPMENT

Beginning in 2001, redevelopment projects were required by the Permit (via the Standard Urban Stormwater Management Program (SUSMP)) to incorporate stormwater treatment BMPs into their projects if their project size exceeded specified thresholds. The 2012 MS4 Permit established new criteria for redevelopment projects, requiring certain sized projects to capture, retain, or infiltrate the 85th percentile design storm or the 0.75-inch design storm, whichever is greater, via the implementation of LID BMPs. To account for these redevelopment requirements, BMPs were modeled in SBPAT assuming land use-specific annual redevelopment rates for projects that triggered former SUSMP requirements or will trigger the Permit's LID BMP requirements (**Table 26**). These assumed rates were based on redevelopment data collected in the Los Angeles region (City of Los Angeles Bureau of Sanitation, 2012).

Table 26. Assumed Annual Redevelopment Rates

Land Use	Annual Redevelopment Rate (% of total land use area)
Residential	0.18
Commercial	0.15
Industrial	0.34
Education	0.16
Transportation	2.7

As redevelopment data is collected and evaluated by the NSMBCW EWMP Group, these numbers will be updated, as necessary, per the Group's adaptive management process.

BMPs were assumed to be implemented and to continue be implemented in the future, at these rates across two distinct time periods:

- **TMDL Effective Date - 2015:** The 2001 MS4 Permit SUSMP requirements were assumed to be implemented over this period, which varied by watershed, as flow-through media filters at a 0.2 in/hr design event. Flow-through media filters were assumed since these BMPs were allowed to be implemented under SUSMP, and since these BMPs require the smallest physical footprint, they were often implemented to comply with SUSMP requirements.
- **2015 – 2021:** The 2012 MS4 Permit post-construction requirements were assumed to be (on average) implemented as 50 percent biofiltration and 50 percent bioretention. Biofiltration (bioretention with underdrains) were modeled using bioswale BMPs with effluent EMCs set to bioretention and sized to treat the 1-year, 1-hour design storm (approximately 0.36 – 0.50 in/hr, depending on location), while bioretention units were sized to retain 100 percent of the 85th percentile, 24-hour design storm depth, calculated as the mean for each analysis region (approximately 0.75 – 1.0 in, depending on location).

2015 is used as a transition date since the LID post-construction requirements from the 2012 MS4 Permit are required to be in full effect via local LID ordinances by this time.

In order to calculate load reductions associated with these redevelopment BMPs, the land use percentages shown in **Table 26** were multiplied by the respective land use areas in each analysis region, resulting in an assumed area treated by LID BMPs each year. This area was multiplied by the applicable number of years, since new BMPs are assumed to be implemented each year. The total land use area assumed to be redeveloped for each analysis region was then modeled as being treated by the BMPs described above and the total load reduction was quantified.

5.2.3.3 PUBLIC RETROFIT INCENTIVES

These BMPs include programs directed at incentivizing the public to decrease the amount of stormwater runoff from their property, specifically via downspout disconnection. Public incentives for retrofitting existing development were modeled in SBPAT between 2015, when the EWMP will begin to be implemented, and 2021. Public retrofit incentives were assumed to be a downspout disconnection program, modeled as bioswales sized to a design storm intensity of 0.2 in/hr. When downspouts are disconnected from impervious areas, the discharged water will either infiltrate or flow through low-lying vegetation before continuing downstream. Therefore, shallow bioswales were selected as the modeled BMP since this BMP type most closely represents the impact of stormwater being directed to a turf lawn or garden. Assumptions for the modeled bioswales included:

- 10 percent of all single family residential areas will be converted to disconnected downspout systems; and
- Based on GIS analysis, 38 percent of the single family residential area consists of rooftops that can be effectively disconnected.

Therefore, 3.8 percent of all single family residential neighborhoods were modeled as treated by bioswales in order to account for public retrofit incentives. An implementation schedule for the public retrofit program is included in Section 7.3. This program will be implemented by both the City of Malibu and County of Los Angeles.

Specific non-structural BMP model inputs for redevelopment and public retrofit incentives are summarized in **Table 27**.

Table 27. BMP Assumptions for Public Retrofit Incentives and Redevelopment

Non-Structural Program (assumed implementation period)	Modeled BMP Type	Design Storm	Longitudinal Slope (ft/ft)	Manning n	Hydraulic Residence Time (min)	Water Quality Flow Depth (in)	Effective Retention Depth (in)	Infiltration Rate (in/hr)
Redevelopment (TMDL effective Date - 2015)	Media Filter	0.2 (in/hr)	-	-	-	-	-	-
Redevelopment (2015-Final)	Bioretention	0.75 – 1.0 (in)	-	-	-	-	12	0.30
	Biofiltration[1]	0.36-0.50 (in/hr)	0.03	0.25	10	4	2	0.15
Public Retrofit (2015-Final)	Bioswale	0.2 (in/hr)	0.03	0.25	10	4	2	0.30

[1] Modeled as a bioswale using bioretention EMCs.

5.2.4 STRUCTURAL BMPS

Existing (constructed between 2003 and 2014) and proposed structural BMPs were modeled in SBPAT based on the most current design information. The following sections outline the structural BMPs that were modeled as well as their drainage areas, design details in SBPAT, and any relevant assumptions.

5.2.4.1 EXISTING REGIONAL EWMP PROJECTS

Within the Santa Monica Bay Watershed in the NSMBCW EWMP Area, there are no regional EMWP projects capable of capturing and retaining the 85^{th} percentile, 24-hour storm.

5.2.4.2 EXISTING REGIONAL BMPS

The following existing regional BMPs were modeled to quantify associated load reductions.

5.2.4.2.1 Paradise Cove Stormwater Treatment Facility (Analysis Region S1-07)

Completed in 2010 by the City of Malibu, the Paradise Cove SWTF treats flows from Ramirez Canyon Creek where it discharges at Paradise Cove. The system is designed as a 3-stage system which removes sediment prior to filtration and UV treatment of the creek water: Stage 1- sediment removal (Bay Saver Technologies type device); Stage 2- filtration; and Stage 3- ultraviolet disinfection. The treatment flow rate for sediment removal is 3600 gpm and the treatment flow rate for UV/filtration is 900 gpm. The SWTF treats flows from approximately 2230 acres. The BMP was modeled in SBPAT as a regional treatment facility with 100 ft^3 of storage and a treatment flow rate of 900 gpm (2.0 cfs). The project includes signage to help educate the public on how the SWTF operates.

5.2.4.2.2 Marie Canyon Water Quality Improvement Project (Analysis Region S1-12)

Opened in 2007 by the LACFCD with the support of the City of Malibu, the Marie Canyon Water Quality Improvement Project was designed to filter and treat up to 100 gpm of dry and wet weather runoff at the Marie Canyon drain. The Marie Canyon facility uses ultraviolet radiation to destroy bacteria and pathogens in stormwater and dry weather flows (including natural stream flows/seeps and runoff from residential neighborhoods) from Marie Canyon Creek and then returns the treated water to the creek, which then flows to the beach. The project treats flows from approximately 602 acres. The BMP was modeled in SBPAT as a regional treatment facility with 100 ft^3 of storage and a treatment flow rate of 100 gpm (0.22 cfs).

5.2.4.2.3 Broad Beach Biofiltration Project (Analysis Region S1-03)

The Broad Beach Biofiltration Project, completed in 2015 by the City of Malibu, consists of nine stormwater quality catch basins on Broad Beach Road in the City of Malibu. Stormwater runoff from 14 acres of single family residential property is treated via flow-through biofiltration BMPs. Since the project was modeled based on the SUSMP design requirements, the project was modeled in SBPAT as a media filter BMP with a treatment flow rate of 0.2 in/hr (Geosyntec, 2011). The project also improved public access and parking; included native plants and habitat improvement; and increased water conservation via water reuse.

5.2.4.2.4 Wildlife Road Storm Drain Improvements (Analysis Region S1-06)

In 2015, the City of Malibu completed installation of four Filterra (biofiltration) units and two bioswales along Wildlife Road and Whitesands Place in the residential neighborhood northeast of Point Dume State Beach. Stormwater runoff from 14 acres of single family residential property is treated via flow-through biofiltration BMPs. Since the project was modeled based on the SUSMP design requirements, the project was modeled in SBPAT as a media filter BMP with a treatment flow rate of 0.2 in/hr. The project also provides the benefits of water conservation, educational awareness, and habitat enhancement.

5.2.4.2.5 Trancas Canyon Park (Analysis Region S1-04)

The construction of Trancas Canyon Park in 2010 included bioretention BMPs to capture and treat runoff from approximately 13.5 acres of land. This project was modeled as a bioretention BMP designed to capture and treat runoff from the SUSMP design storm (0.75-inch storm), which is greater than the 85th percentile, 24-hour storm in this area (0.65-inch).

5.2.4.2.6 Las Flores Creek Restoration and Park (Analysis Region S1-14)

During the construction of the park and restoration of Las Flores Creek in 2008, bioretention BMPs were incorporated to treat runoff from 4 acres of single family residential land. These BMPs were modeled as a bioretention BMP designed to capture and treat runoff from the SUSMP design storm (0.75-inch storm), which is equivalent to the 85th percentile, 24-hour design storm in this area. The project also included educational aspects through interpretive signage; native plants and habitat improvement; increased water conservation through drought-tolerant landscaping; and public recreation and access benefits such as walking trails, picnic areas, and green space.

5.2.4.3 PROPOSED REGIONAL BMPS

Following the NSMB J1/4 Bacteria TMDL Implementation Plan, the SMBBB TMDL J1/4 Site Evaluations Technical Report presented concept reports for potential BMP retrofits within the NSMBCW EWMP Area. These concepts, along with other potential sites, were reviewed to identify potential regional BMPs, with particular attention given to Topanga Canyon watershed based on County input as described below.[26]

5.2.4.3.1 Analysis Region S1-18 (Topanga Canyon)

The BMPs originally identified in the SMBBB TMDL J1/4 Site Evaluations Technical Report as "Topanga-1/3" were collectively found to provide the best opportunity for a regional BMP to achieve Permit compliance, with some modifications.

The proposed regional BMP is a large-scale green street project along Viewridge Road in the upper portion of the Topanga Canyon watershed. In total, approximately 80.7 acres of single family residential property are tributary to this project. By rerouting two of the existing storm drains in this neighborhood, runoff that would otherwise discharge directly to the canyon will be treated via the green street project.

Although still in the conceptual design stages of project planning, the project will consist of a combination of bioretention BMPs and flow-through biofiltration BMPs, dependent on soil conditions and other constraints. The BMPs will be designed to capture and treat the 85th percentile, 24-hour storm (1.11 inches) and/or the 1-year, 1-hour design storm intensity (0.44 in/hr), to the maximum extent practicable. As feasible, the project will be constructed in the center median and/or along the curbside of Viewridge Road. The project will also provide additional benefits, as feasible, such as:

- **Neighborhood Greening and Recreation**. Project design will seek to incorporate green space along Viewridge Road, beautifying the neighborhood and providing recreational area for the public.
- **Public Education/Awareness**. Project design will seek to serve as a public education opportunity by including on-site educational materials, such as placards and interpretive signage posted at the project.

For modeling purposes, the project was modeled as half bioretention (design storm of 1 inch) and half biofiltration (design storm intensity of 0.4 in/hr). As previously described, biofiltration BMPs were modeled using bioswale BMP types with effluent EMCs set to bioretention. **Figure 15** shows the tributary area to the proposed green street regional BMP on Viewridge Road. Expected load reductions from the project for the 90th

[26] Projects identified in the TMDL Implementation Plan were not evaluated further as part of the EWMP if it was determined that the projects were not required to achieve the calculated TLR. Such projects included those identified in the Work Plan as "Trancas-2" and "Trancas-3."

percentile year are estimated to be 33.0 x 10^{12} MPN for fecal coliform (10.6 percent of the estimated baseline load) and 2.3 lbs for total lead (1.3 percent of the estimated baseline load).

The Topanga Canyon Regional Super Green Street EWMP Project is a Los Angeles County project. The County has initiated the planning phase for this project. The proposed project is estimated to be completed by 2021.

Figure 15. Topanga Canyon Subwatershed (Analysis Region S1-18)
Proposed Regional BMP
NSMBCW EWMP

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RB-AR 4861

5.2.4.4 PROPOSED DISTRIBUTED BMPS

Distributed Green Street BMPs include infrastructure such as bioswales, biofiltration, and bioretention, typically constructed in the public right-of-way, designed to treat stormwater before it enters the storm drain system. Based on iterative model results in the NSMBCW EWMP Area, it was determined that in nearly every analysis region where additional load reductions were required, distributed BMPs were the preferred option for meeting the target load reduction.

Green Street distributed BMPs were modeled as biofiltration BMPs in all cases (modeled using bioswale BMP types with effluent EMCs set to bioretention), since infiltration is generally not feasible in the NSMBCW EWMP Area because of site-specific constraints which include (but are not limited to) soil conditions, steep slopes, groundwater mounding effects on OWTS function and geologic instability. In all cases, biofiltration BMPs were modeled with a design storm intensity of 0.30 in/hr; all other design parameters were consistent with those shown in **Table 27**.

In each analysis region where additional structural BMPs were required, distributed BMPs were modeled as treating a percentage of developed land uses (including commercial, education, single family residential, multi-family residential, and industrial, where applicable) in selected subcatchments. **Table 28** summarizes the area required to be treated by proposed green street BMPs in the NSMBCW EWMP Area. As shown in the table, the percentage of each project within each NSMBCW Agency represents the proposed ownership responsibility for that project.

Table 28. Proposed Distributed BMPs in the NSMBCW EWMP Area

Analysis Region	Subwatershed	Developed Area in Analyzed Region (acres)	Percentage of Area to be Treated	Area to be Treated (acres)	Percent Within City of Malibu	Percent Within County
E1-07	Ramirez Canyon	93.7	35%	32.8	100%	0%
S1-09	Latigo Canyon	24.3	10%	2.4	100%	0%
E1-11	Corral Canyon	74.2	20%	14.8	100%	0%
S1-12	Marie Canyon	202.7	55%	111.5	23.3%	76.7%
E1-12	Winter Canyon	54.8	40%	21.9	54.7%	45.3%
S1-13	Sweetwater Canyon	51.8	5%	2.6	100%	0%
W1-14	Las Flores Canyon	211.4	15%	31.7	100%	0%
S1-14		28.0	5%	1.4	0%	100%

Figures 14 – 21 show the various analysis regions with proposed distributed BMPs, as well as the developed areas analyzed in each region. Progress toward full implementation of these distributed green street BMPs will be reported annually, based on the total area treated.

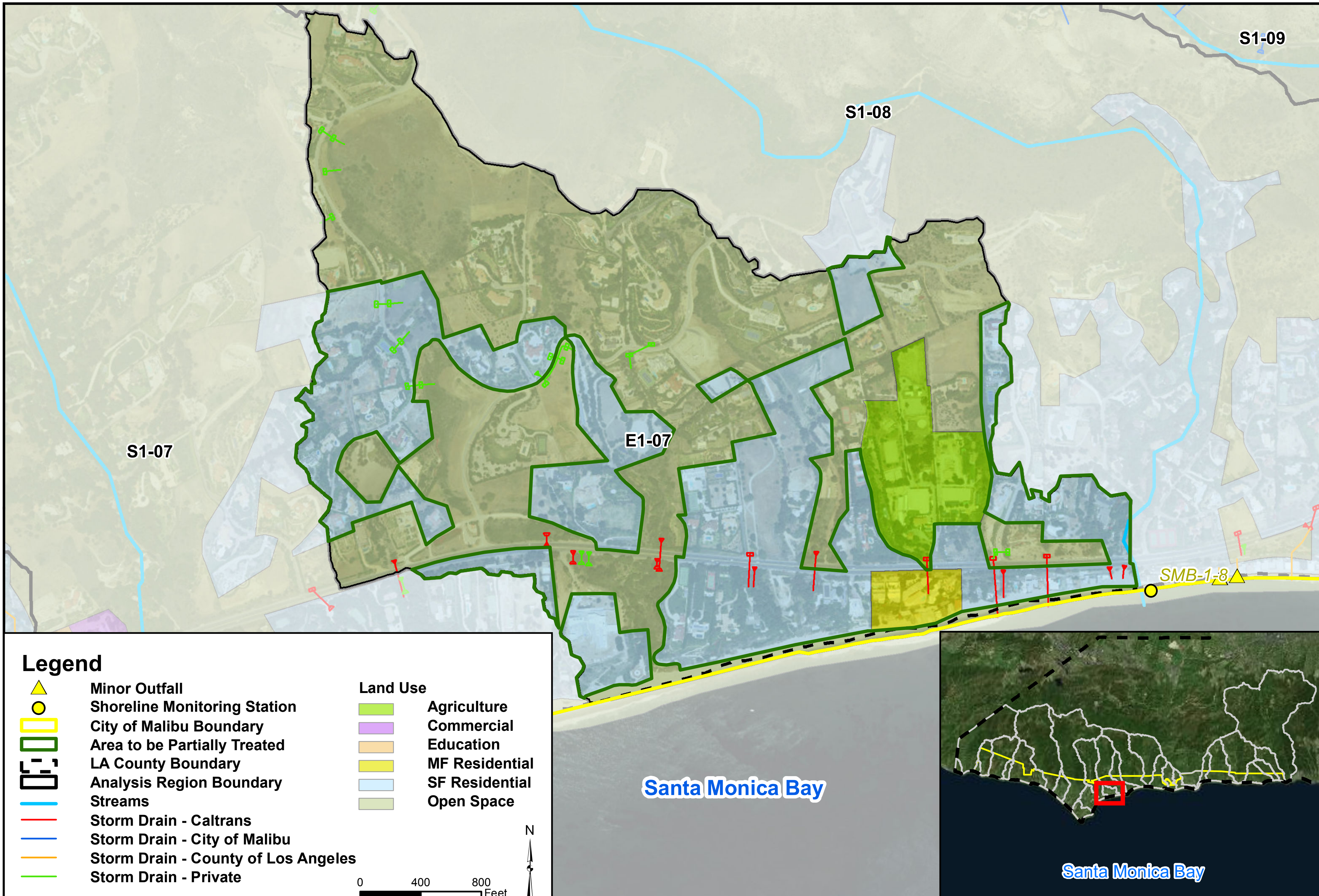

Figure 16. East of Ramirez Creek at Paradise Cove (Analysis Region E1-07)
Area to be Treated by Distributed BMPs (35% of Area Outlined in Green)
NSMBCW EWMP

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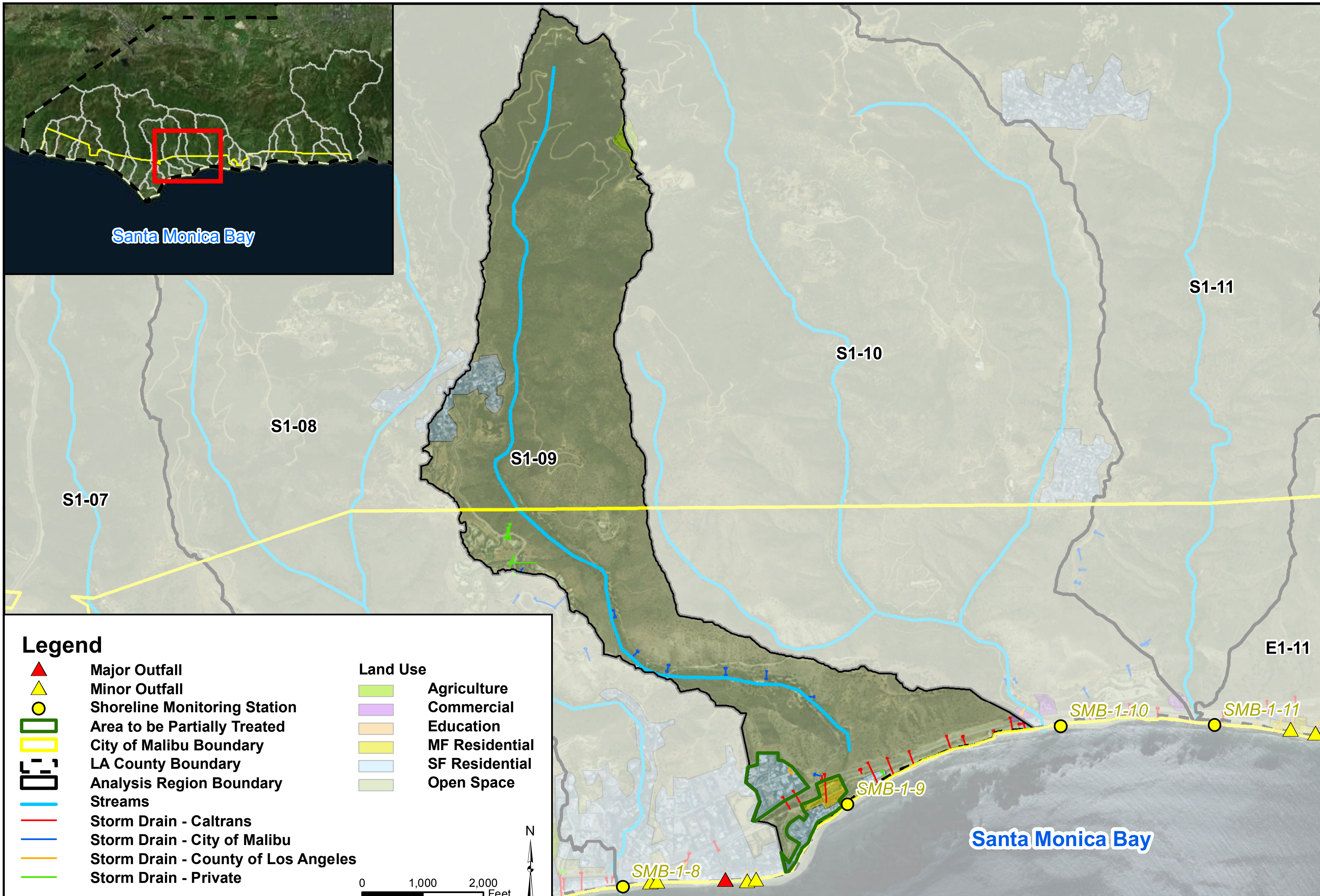

Figure 17. Latigo Canyon (Analysis Region S1-09)
Area to be Treated by Distributed BMPs (15% of Area Outlined in Green)
NSMBCW EWMP

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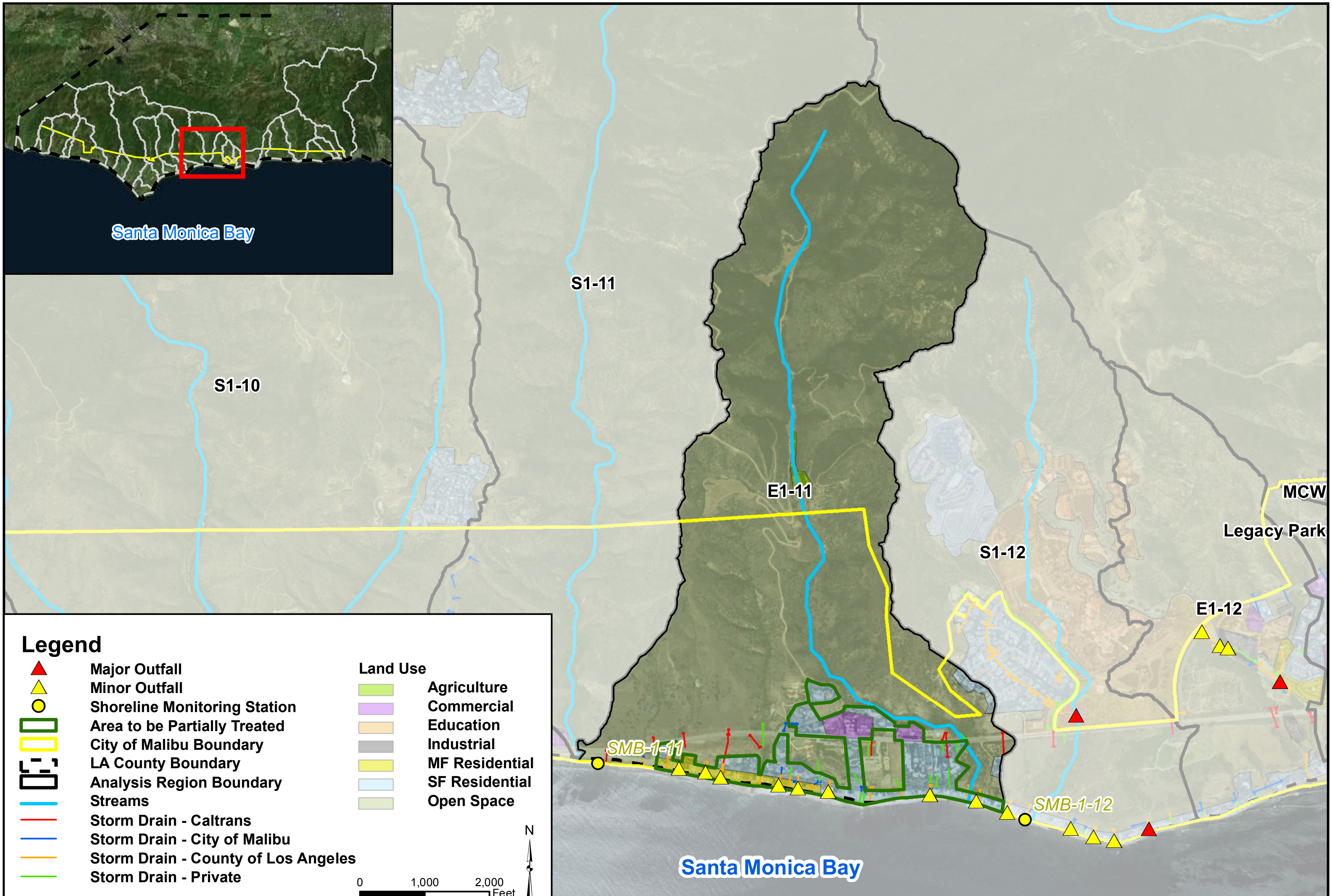

Figure 18. East of Corral Canyon Creek (Analysis Region E1-11)
Area to be Treated by Distributed BMPs (20% of Area Outlined in Green)
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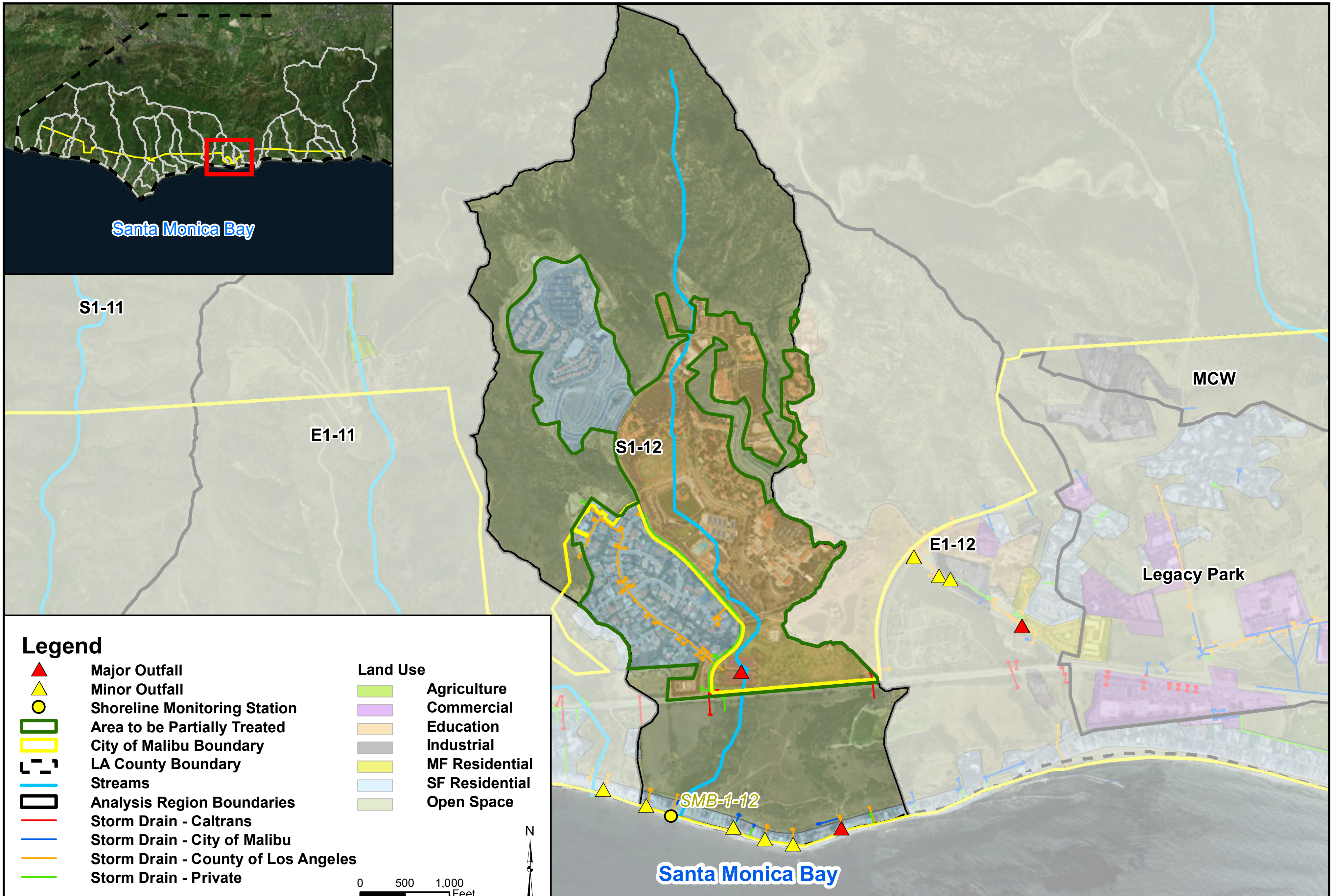

Figure 19. Marie Canyon at Puerco Beach (Analysis Region S1-12)
Area to be Treated by Distributed BMPs (55% of Area Outlined in Green)
NSMBCW EWMP

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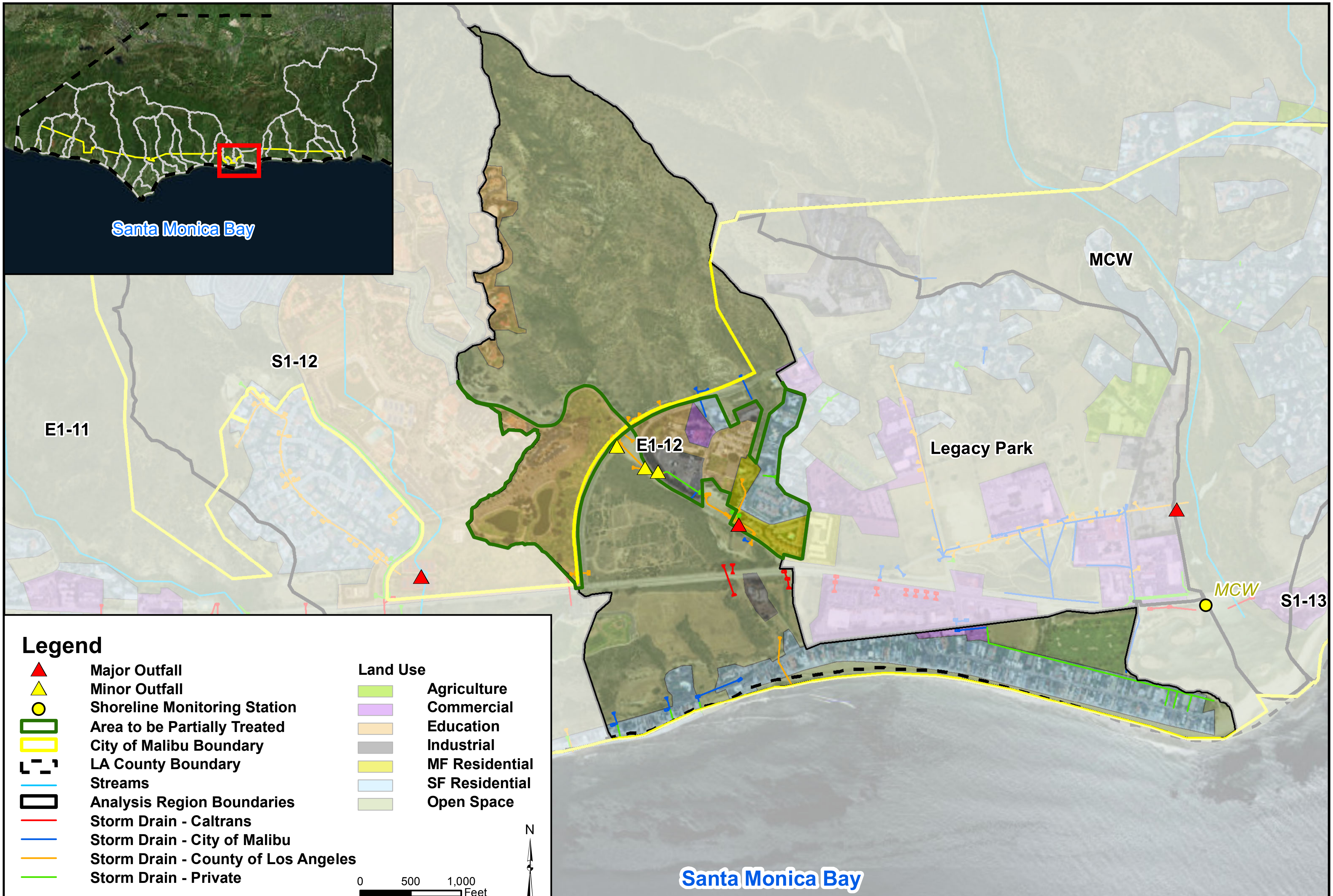

Figure 20. East of Marie Canyon (Analysis Region E1-12)
Area to be Treated by Distributed BMPs (40% of Area Outlined in Green)
NSMBCW EWMP

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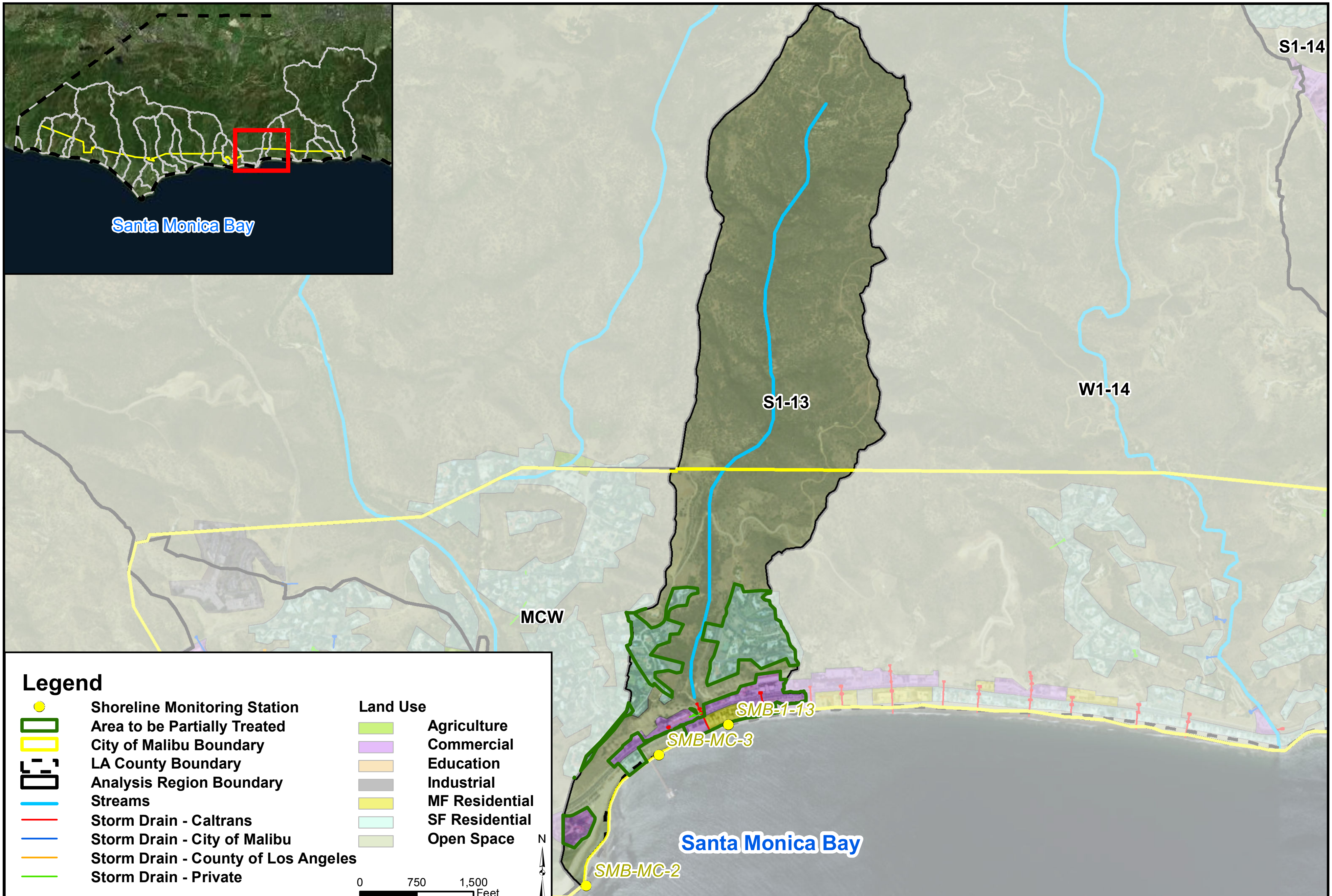

Figure 21. Sweetwater Creek at Carbon Beach (Analysis Region S1-13)
Area to be Treated by Distributed BMPs (10% of Area Outlined in Green)
NSMBCW EWMP

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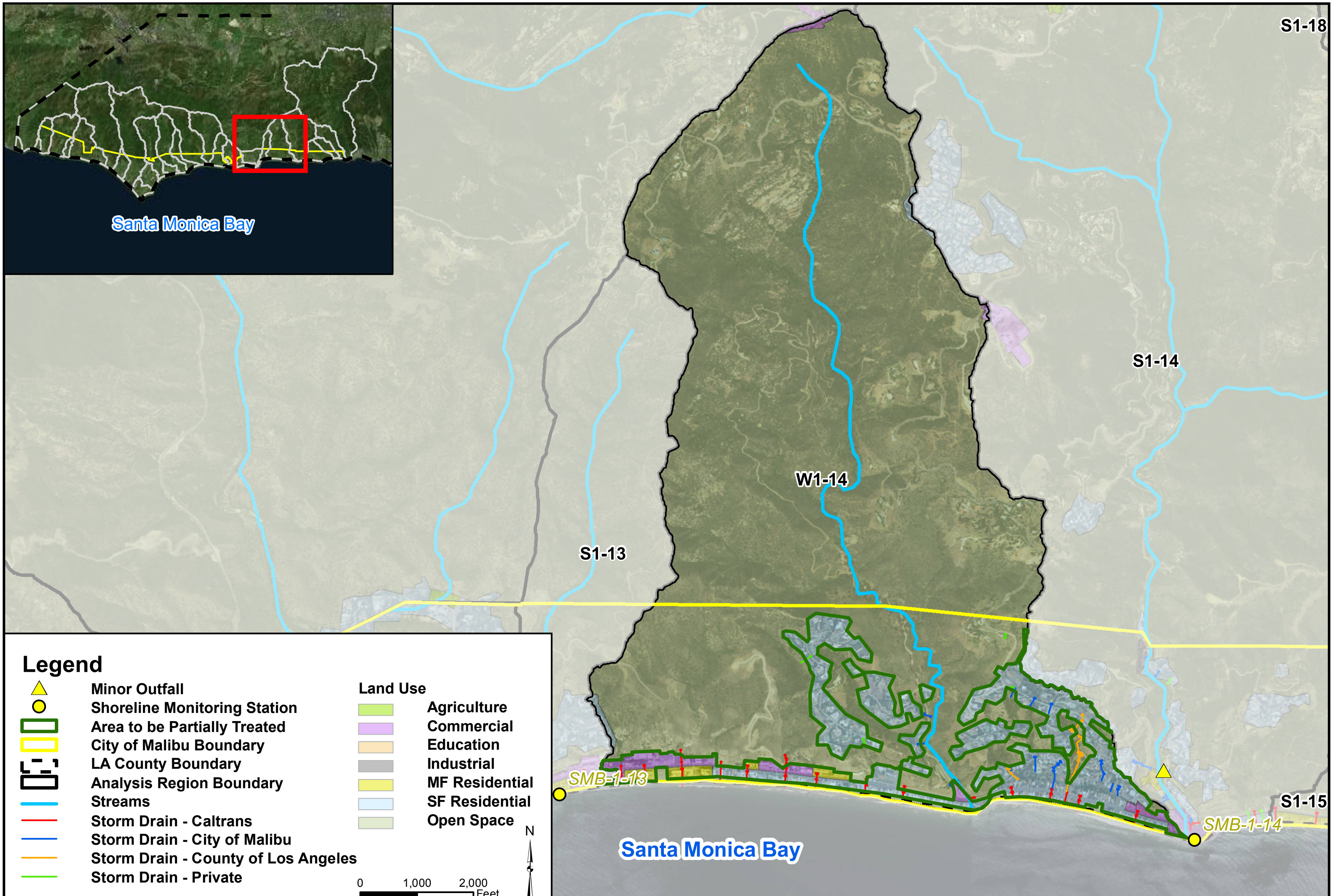

Figure 22. West of Las Flores Creek (Analysis Region W1-14)
Area to be Treated by Distributed BMPs (15% of Area Outlined in Green)
NSMBCW EWMP

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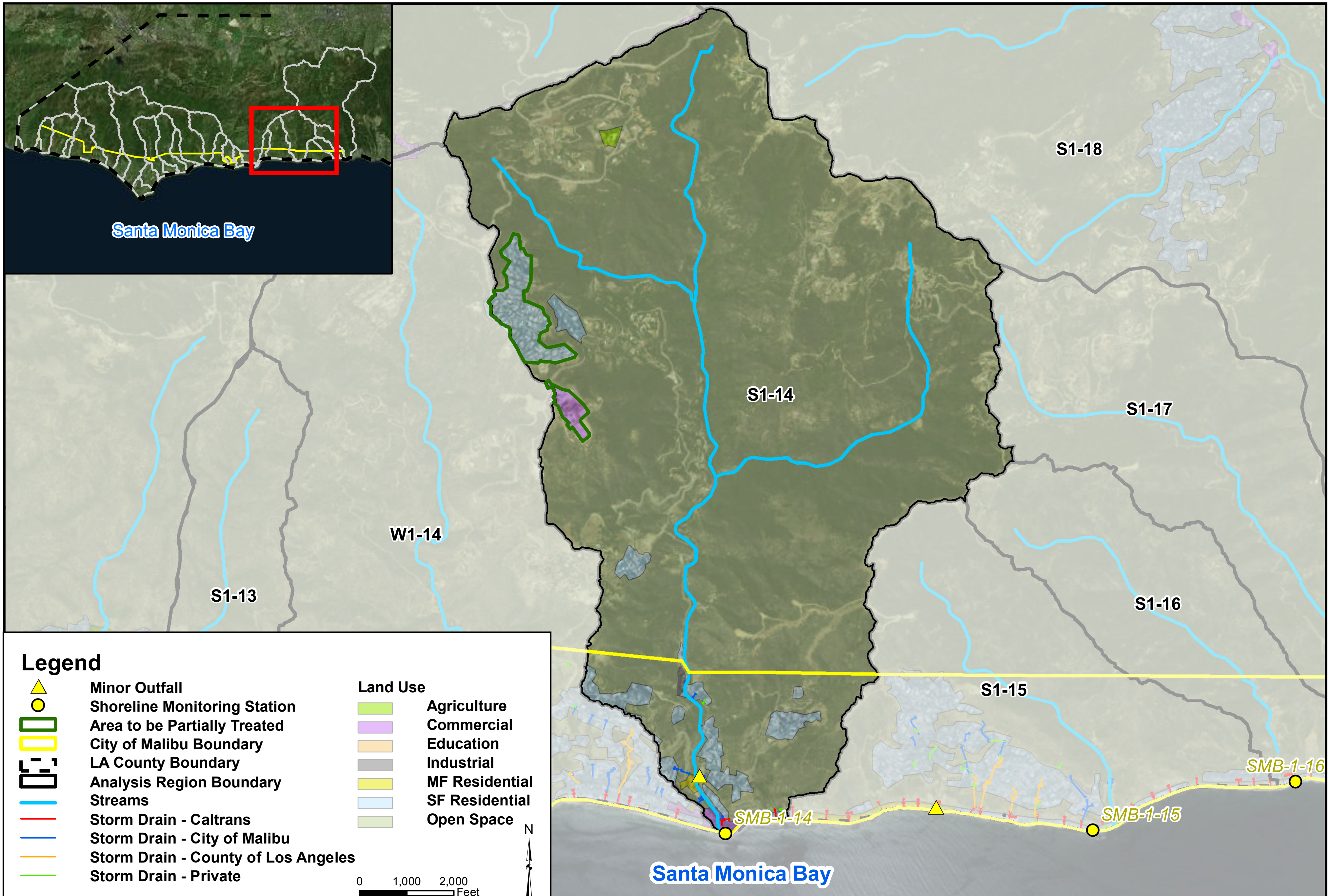

Figure 23. Las Flores Creek (Analysis Region S1-14)
Area to be Treated by Distributed BMPs (10% of Are Outlined in Green)
NSMBCW EWMP

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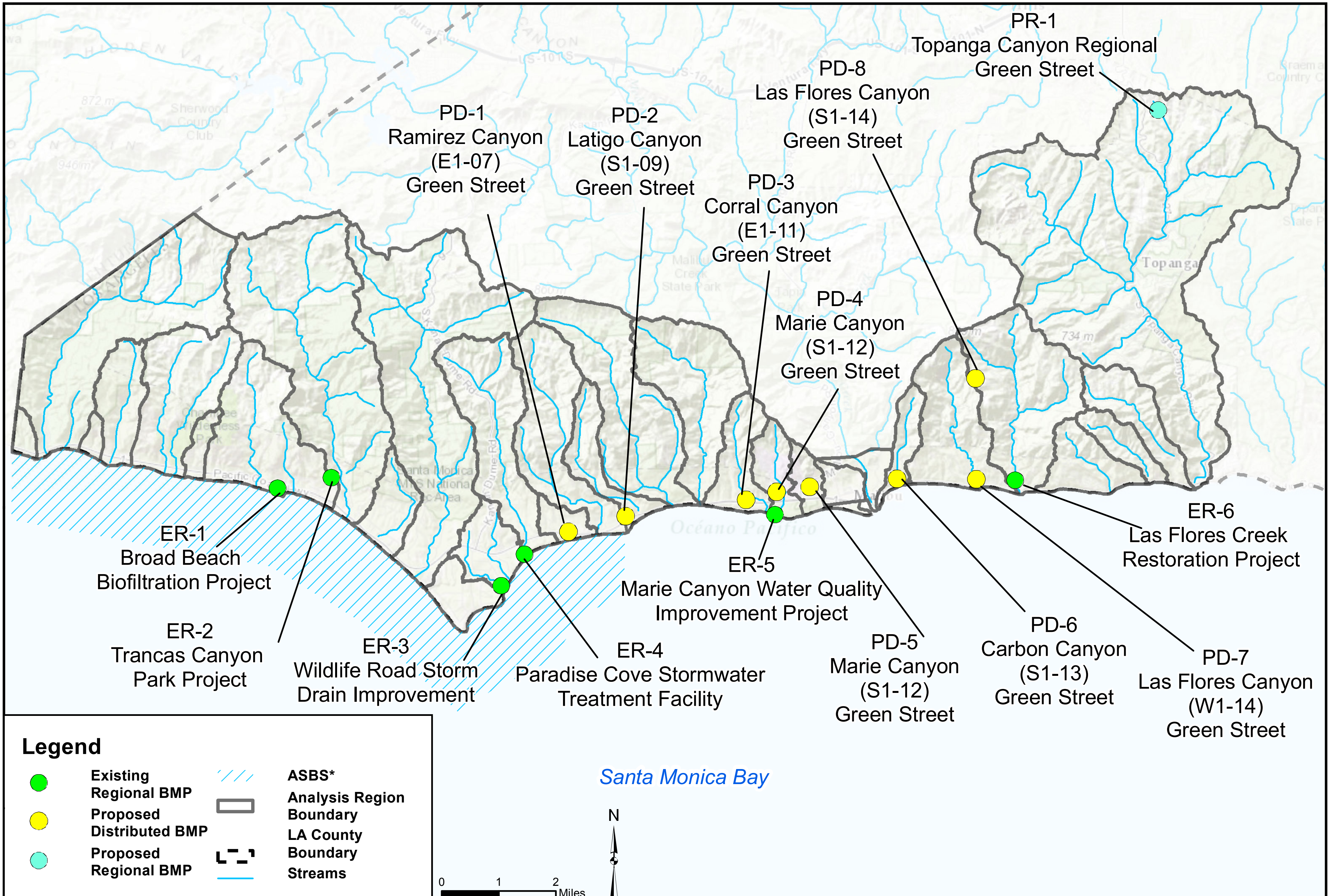
5.2.4.5 SUMMARY OF BMPS

Figure 24 shows an overview of all existing and proposed structural BMPs within the SMB portion of the NSMBCW EWMP Area.



*ASBS boundary is in the ocean up to the mean high tide line

Figure 24. BMP Locations in Santa Monica Bay Watershed.
NSMBCW EWMP
RB-AR 4873

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5.3 REASONABLE ASSURANCE ANALYSIS

5.3.1 REASONABLE ASSURANCE ANALYSIS – WET WEATHER

Although quantitative analyses were conducted for each analysis region separately, cumulative load reductions for the entire SMB watershed are also summarized below (**Table 30**). In all cases, expected cumulative load reductions exceed the cumulative target load reductions for each watershed WBPC.

In Santa Monica Bay, total bacteria load reductions for the various analysis regions were calculated to be between 5.0 and 45.9 percent (by 2021), based on expected load reductions from existing BMPs; implementation of various structural and non-structural BMPs; establishment of LID ordinances to incorporate LID BMPs into qualifying redevelopment projects; and implementation of a downspout disconnect program for single family residential homeowners. In each analysis region, the calculated load reduction is greater than the calculated TLR for bacteria, thereby demonstrating reasonable assurance of compliance with the TMDL limits.

Across the entire SMB watershed, a required bacteria TLR of 7.3 percent was established by summing the absolute TLR for each analysis region and dividing this value by the baseline load from all analysis regions. The modeled bacteria load reduction for the entire SMB watershed was 14.4 percent, based on the implementation of all previously described BMPs, and every calculated subwatershed analysis region BMP load reduction exceeded the subwatershed-specific TLR. Therefore, the expected bacteria load reduction for all of SMB is significantly higher than the required bacteria TLR. See **Table 30**.

As previously discussed, consistent with the Permit, it has been assumed that there is a zero required load reduction for PCBs and DDTs in MS4 discharges to Santa Monica Bay. Therefore, reasonable assurance is demonstrated for these pollutants. As part of the adaptive management process based on monitoring data collected through the approved CIMP, additional structural and/or non-structural BMPs may be proposed if needed.

Results of the RAA for each analysis region are presented in **Table 29** below. The values provided correspond to the load reductions, by BMP type, following the applicable final compliance deadline. As shown, the TLR is met in all analysis regions, with varying levels of non-structural and regional BMPs. More detailed results of the RAA, including daily volume, concentration, and load data for each BMP analyzed, can be found in **Appendix C**.

Table 29. Modeling Results – RAA Demonstration of Compliance with Final Limits (SMB Watershed)

Watershed	Analysis Region	Pollutant	Quantified Load Reductions as a Percentage of Baseline Loads for the 1995 Critical Year					Target Load Reduction
			Non-Modeled Programmatic BMPs	Public Incentives + Redevelopment	Existing/ Planned BMPs	Proposed BMPs	Cumulative Load Reduction	
Santa Monica Bay	W1-01	**Fecal Coliform**	**5.0%**	**0.0%**	**0.0%**	**0%**	**5.0%**	**0%**
	S1-01	**Fecal Coliform**	**5.0%**	**3.5%**	**0.0%**	**0%**	**8.5%**	**0%**
	E1-01	**Fecal Coliform**	**5.0%**	**0.1%**	**0.0%**	**0%**	**5.1%**	**0%**
	S4-01	**Fecal Coliform**	**5.0%**	**2.0%**	**0.0%**	**0%**	**7.0%**	**0%**
	E4-01	**Fecal Coliform**	**5.0%**	**3.5%**	**0.0%**	**0%**	**8.5%**	**0%**
	S1-02	**Fecal Coliform**	**5.0%**	**6.0%**	**0.0%**	**0%**	**11.0%**	**0%**
	S1-03	**Fecal Coliform**	**5.0%**	**4.5%**	**4.1%**	**0%**	**13.6%**	**0%**
	S1-04	**Fecal Coliform**	**5.0%**	**3.5%**	**0.9%**	**0%**	**9.4%**	**0%**
	E1-04	**Fecal Coliform**	**5.0%**	**4.3%**	**0.0%**	**0%**	**9.3%**	**0%**
	S1-05	**Fecal Coliform**	**5.0%**	**2.3%**	**0.0%**	**0%**	**7.3%**	**0%**
	E1-05	**Fecal Coliform**	**5.0%**	**5.3%**	**0.0%**	**0%**	**10.3%**	**0%**
	S1-06	**Fecal Coliform**	**5.0%**	**4.3%**	**2.7%**	**0%**	**11.9%**	**0%**
	S1-07	**Fecal Coliform**	**5.0%**	**3.3%**	**2.6%**	**0%**	**10.9%**	**9.5%**
	E1-07	**Fecal Coliform**	**5.0%**	**3.6%**	**0.0%**	**22.0%**	**30.6%**	**29.9%**
	S1-08	**Fecal Coliform**	**5.0%**	**4.4%**	**0.0%**	**0%**	**9.4%**	**9.0%**
	S1-09	**Fecal Coliform**	**5.0%**	**3.9%**	**0.0%**	**5.6%**	**14.5%**	**12.5%**
	S1-10	**Fecal Coliform**	**5.0%**	**4.0%**	**0.0%**	**0.0%**	**9.0%**	**6.1%**
	S1-11	**Fecal Coliform**	**5.0%**	**3.5%**	**0.0%**	**0.0%**	**8.5%**	**0%**
	E1-11	**Fecal Coliform**	**5.0%**	**3.1%**	**0.0%**	**14.3%**	**22.4%**	**20.5%**
	S1-12	**Fecal Coliform**	**5.0%**	**4.3%**	**1.1%**	**35.5%**	**45.9%**	**43.9%**
	E1-12	**Fecal Coliform**	**5.0%**	**8.2%**	**4.1%**	**10.6%**	**28.0%**	**28.0%**
	S1-13	**Fecal Coliform**	**5.0%**	**6.0%**	**0.0%**	**4.4%**	**15.4%**	**11.3%**
	W1-14	**Fecal Coliform**	**5.0%**	**5.4%**	**0.0%**	**14.4%**	**24.9%**	**20.8%**
	S1-14	**Fecal Coliform**	**5.0%**	**7.8%**	**0.6%**	**2.3%**	**15.7%**	**15.3%**
	S1-15	**Fecal Coliform**	**5.0%**	**5.2%**	**0.0%**	**0.0%**	**10.2%**	**0%**
	S1-16	**Fecal Coliform**	**5.0%**	**3.8%**	**0.0%**	**0.0%**	**8.8%**	**0%**
	S1-17	**Fecal Coliform**	**5.0%**	**2.9%**	**0.0%**	**0.0%**	**7.9%**	**0%**
	S1-18	**Fecal Coliform**	**5.0%**	**4.9%**	**0.0%**	**10.6%**	**20.5%**	**16.6%**
		Total Lead	**5.0%**	**0.6%**	**0.0%**	**1.3%**	**6.9%**	0%

Table 30. SMB Watershed-Wide Modeling Results – RAA Demonstration of Compliance with Final Limits

Analysis Region	Pollutant	Quantified Load Reductions as a Percentage of Baseline Loads for the 1995 Critical Year					Target Load Reduction
		Non-Modeled Programmatic BMPs	Public Incentives + Redevelopment	Existing/ Planned BMPs	Proposed BMPs	Cumulative Load Reduction	
Santa Monica Bay	**Fecal Coliform**	5.0%	4.3%	0.7%	4.4%	14.4%	7.3%

5.3.2 REASONABLE ASSURANCE ANALYSIS – DRY WEATHER

Table 31 summarizes the qualitative dry weather RAA conducted for each of the CMLs. If any evaluation criteria are met, this constitutes demonstration of reasonable assurance of compliance with the TMDL limits and water quality objectives for all WBPCs addressed in this EWMP.

As shown by the evaluation criteria in **Table 31**, reasonable assurance has been demonstrated for dry weather at the Santa Monica Bay compliance monitoring locations. The NSMBCW EWMP Group will work to remain in compliance, consistent with the Permit's requirement to eliminate 100 percent of non-exempt dry weather MS4 discharges. Compliance will continue to be evaluated biennially based on compliance monitoring data, which will be reported in the NSMBCW EWMP Agency's annual reports.

In order to support this approach, **Figure 25** shows all NSMBCW Agency-owned MS4 outfalls within the NSMBCW EWMP Area and **Table 32** summarizes the details of these outfalls.

Since the dry weather compliance deadlines for the SMB beaches bacteria TMDL have passed, this analysis is provided for informational purposes only, and is not intended to support or justify a new compliance schedule, additional non-structural or structural BMPs, or an evaluation of whether any newly proposed BMPs will provide a dry weather benefit.

Table 31. Dry Weather RAA Evaluation

CML	Effective Diversion/ Disinfection at Analysis Region Outlet?	WMG MS4 Outfall Absent?[1]	Monitoring Data Show Dry Weather Compliance Demonstrated?[2]	Non-Exempt Dry Weather MS4 Discharges Absent?[3,4]	Dry Weather Reasonable Assurance Demonstrated?
SMB 1-1[5]	N/A	N/A	No	N/A	N/A
SMB 4-1	No	Yes	No	Yes	Yes
SMB 1-2	No	Yes	No	Yes	Yes
SMB 1-3	No	No	No	Yes	Yes
SMB 1-4	No	No	No	Yes	Yes
SMB 1-5	No	No	No	Yes	Yes
SMB 1-6	No	No	No	Yes	Yes
SMB-O-1	No	No	No	Yes	Yes
SMB 1-7	Yes[6]	No	No	Yes	Yes
SMB 1-8	No	No	No	Yes	Yes
SMB 1-9	No	Yes	No	Yes	Yes
SMB 1-10	No	Yes	No	Yes	Yes
SMB 1-11	No	No	No	Yes	Yes
SMB-O-2	No	No	No	Yes	Yes
SMB 1-12	Yes[6]	No	No	Yes	Yes
SMB 1-13	No	Yes	No	Yes	Yes
SMB 1-14	No	No	No	Yes	Yes
SMB 1-15	No	No	No	Yes	Yes
SMB 1-16	No	Yes	Yes	Yes	Yes
SMB 1-17	No	Yes	No	Yes	Yes
SMB 1-18	No	No	No	Yes	Yes

[1] See **Figure 25**, which shows all NSMBCW Agency-owned MS4 outfalls within the NSMBCW EWMP Area, and **Table 32** which summarizes the details of these outfalls.

[2] If both the winter dry and summer dry allowable exceedance days have been met in four out of the past five years and the most recent two years.

[3] Observations were made on August 19, October 21, 29, 30, and November 12, 2014 at all major outfalls; and on April 13, 2014, May 19, 2015, and June 19, 2015 at all minor outfalls. A "yes" in this column indicates that non-stormwater flows were not present during any of these screenings. Detailed results from these screenings are provided in **Appendix F**.

[4] Exempt discharges include natural flows and conditionally exempt discharges such as runoff from landscape irrigation.

[5] SMB 1-1 is the reference beach. Monitoring data shows that winter dry weather samples have not achieved compliance in four of the past five years.

[6] Observations confirm that no bypass is occurring from these BMPs during dry weather, and that effluent concentrations are consistently less than the FIB water quality objectives.

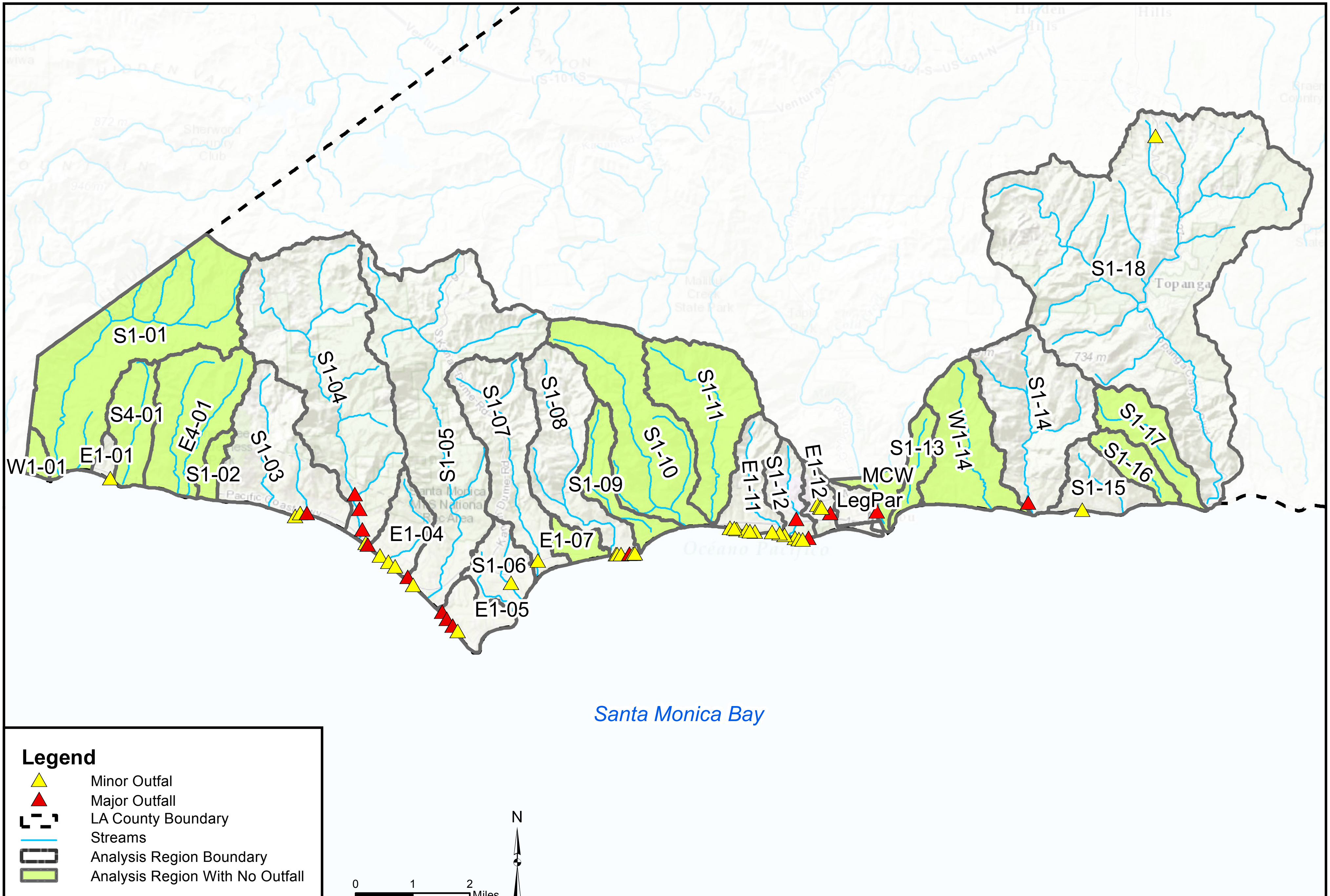

Figure 25. NSMBCW Outfall Locations
NSMBCW EWMP
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Table 32. Summary of NSMBCW-Owned Outfalls

Analysis Region[1]	Outfall ID	Outfall Name	Outfall Type	Latitude	Longitude	Diameter (in)
E1-01	ASBS-031	Unknown	Minor	34.043892	-118.91863	22
S1-03	ASBS-001	PD 363 Line A	Minor	34.034702	-118.861846	24
	ASBS-002	PD 363 Line B	Minor	34.035556	-118.860328	18
	ASBS-003	PD 2053	Major	34.035526	-118.858276	51
S1-04	ASBS-004	PD 291	Minor	34.028038	-118.840179	24
	ASBS-005	Zuma #U02	Major	34.027683	-118.839637	36
	TRANCC-004	PD 0306 - Line B - Trancas Cyn	Major	34.0314387	-118.8412861	54
	TRANCC-017	PD 0390 - Trancas Cyn	Major	34.0403901	-118.8437463	72
	TRANCC-012	PD 0392 - Line B - Trancas Cyn	Major	34.03670663	-118.8422889	48
E1-04	ASBS-008	PD 1174	Minor	34.024833	-118.835784	24
	ASBS-011	Zuma #U06	Minor	34.023258	-118.833213	24
	ASBS-013	Zuma #U08	Minor	34.022087	-118.83123	18
S1-05	ASBS-016	Zuma Open Channel	Major	34.019493	-118.827316	60
	ASBS-018	Zuma #U11	Minor	34.01749	-118.825668	24
E1-05	ASBS-021	PD 1184 Line B	Major	34.010665	-118.816688	48
	ASBS-022	Westward #001	Major	34.00893	-118.815261	36
	ASBS-023	Westward #U15	Major	34.007139	-118.81343	42
	ASBS-024	Westward #U16	Minor	34.005847	-118.811958	24
S1-06	WC-027	CDR 436.003	Minor	34.0181582	-118.7957389	24
S1-07	RAMC-091	PD 1153 - Ramirez Cyn	Minor	34.0239355	-118.7875944	24
S1-08	ASBS-025	MTD 622 Line 1	Minor	34.025646	-118.763717	18
	ASBS-026	MTD 622 Line 2	Minor	34.025653	-118.763336	24
	ASBS-027	MTD 622 Line 3	Minor	34.025726	-118.762153	24
	ASBS-028	MTD 622 Line 4	Major	34.025772	-118.75962	36

Analysis Region[1]	Outfall ID	Outfall Name	Outfall Type	Latitude	Longitude	Diameter (in)
	ASBS-029	MTD 622 Line 5	Minor	34.025856	-118.758468	18
	ASBS-030	MTD 622 Line 6	Minor	34.025897	-118.757987	18
E1-11	CSTL-008D	MTD 0622 - U1 Line 12 - Pacific Ocean	Minor	34.03198804	-118.7238016	24
	CSTL-009C	MTD 0622 - U2 Line 20 - Pacific Ocean	Minor	34.03137056	-118.7137248	24
	CSTL-009B	MTD 0622 - U2 Line 18 - Pacific Ocean	Minor	34.0316192	-118.7160745	18
	CSTL-008B	MTD 0622 - U2 Line 9 - Pacific Ocean	Minor	34.03250762	-118.7275501	16
	CSTL-008A	MTD 0622 - U2 Line 8 - Pacific Ocean	Minor	34.03265982	-118.7288932	18
	CSTL-008C	MTD 0622 - U1 Line 10 - Pacific Ocean	Minor	34.03230542	-118.7267733	18
	CSTL-009A	MTD 0622 - U1 Line 15 - Pacific Ocean	Minor	34.03172256	-118.7212699	24
	CSTL-008E	MTD 0622 - U2 Line 14 - Pacific Ocean	Minor	34.03186111	-118.7228208	16
S1-12	MARIC-001	PD 1098 - Line A - Pacific Ocean	Major	34.03503173	-118.7086464	42
	CSTL-009K	MTD 0622 - U2 Line 26 - Pacific Ocean	Major	34.03023354	-118.704898	48
	CSTL-009F	MTD 0622 - U2 Line 23 - Pacific Ocean	Minor	34.03022506	-118.708897	24
	CSTL-009D	MTD 0622 - U2 Line 21 - Pacific Ocean	Minor	34.03089197	-118.7121348	18
	CSTL-009G	MTD 0622 - U2 Line 24 - Pacific Ocean	Minor	34.02987207	-118.7077387	24
	CSTL-009H	MTD 0622 - U2 Line 25 - Pacific Ocean	Minor	34.02971938	-118.7066805	18
E1-12	WNTRC-001	PD 0342 - Winter Drain	Major	34.03651271	-118.6982689	36
	WNTRC-004	CDR 436.005	Minor	34.03861832	-118.7022817	18
	WNTRC-003	CDR 436.005	Minor	34.03803492	-118.7013467	18
	WNTRC-002	CDR 436.005	Minor	34.03793737	-118.7009276	18
LegPar	MALBUC-004	BI 9302 - Malibu	Major	34.0370064	-118.6839597	60
S1-14	Unknown	Las Flores #2	Major	34.03959075	-118.6378114	36
S1-15	CSTL-012	BIG ROCK MESA DRAIN	Minor	34.03783269	-118.6211883	18
S1-18	TOPC-097	Unknown	Minor	34.13309571	-118.5994274	24

[1] Only analysis regions containing at least one identified NSMBCW-owned outfall have been included in the table. All other analysis regions have no such outfalls.

5.4 MULTIPLE BENEFITS

Not only is reasonable assurance demonstrated for the WQBEL and RWLs in the Permit, but some of the proposed projects also provide multiple benefits beyond pollutant load reduction. Such benefits may include:

- **Beneficial Use Protection**. The reduction of MS4-generated bacteria loads throughout the NSMBCW EWMP Area will help to protect recreational beneficial uses and support public health at Santa Monica Bay Beaches.
- **Neighborhood Greening**. Increased green space can positively impact the aesthetics, as well as property values, of developed areas. Property value tends to increase when a neighborhood has green space or trees in sight (CNT, 2010). Green infrastructure and green space can also alleviate urban heat-island effects by reducing temperatures by about 5^{o}F through shade and evaporation (CNT, 2010), and may provide traffic calming measures, which increases public safety.
- **Water Conservation/Supply**. Stormwater retained in capture-and-use BMPs can be reused for irrigation and other on-site, non-potable uses, thus promoting water conservation and offsetting reliance on the potable water supply (SWRCB, 2012a). Landscaping retrofits and upgrades to irrigation systems also help to eliminate runoff and reduce the use of potable water.
- **Public Education/Awareness**. Public education and outreach engages the public's interest in preventing stormwater pollution and is achieved most effectively through an understanding of the varying levels of public background knowledge about stormwater management and pollution prevention (EPA, 2014). Public outreach is a major facet of the public retrofit incentives element of the RAA approach, which is directed at incentivizing the decrease of stormwater runoff from private properties, specifically via downspout disconnects. Outreach for this incentive may occur in the form of direct conversations, a variety of media, and/or short training courses. Structural BMPs proposed in the EWMP will also serve as public education opportunities in the form of on-site educational materials, such as placards and interpretive signage posted at construction and completed sites.

6 MALIBU CREEK WATERSHED DEMONSTRATION OF COMPLIANCE

The results of the RAA for the Malibu Creek Watershed are presented below, including a summary of the TLRs, the BMPs selected for implementation in the NSMBCW EWMP Area, and a summary of load reductions achieved by the selected BMPs. As stated previously, the NSMBCW EWMP Group is responsible for the portion of the Malibu Creek Watershed within the City of Malibu. This area is approximately 618 acres in size, or 0.87 percent of the entire 70,651 acre Malibu Creek Watershed. Approximately 306 acres of the 618-acre watershed are tributary to Malibu Legacy Park.

Malibu Legacy Park, located between Civic Center Way and Pacific Coast Highway adjacent to Malibu Lagoon, officially opened on October 2, 2010. Legacy Park is an integrated multi-benefit regional EWMP project that 1) improves water quality to Malibu Creek, Malibu Lagoon, and nearby beaches by capturing, detaining, screening, filtering, and treating dry and wet weather runoff from the 306 acre Civic Center drainage area to remove pathogens, nutrients, and other pollutants; 2) integrates and beneficially uses captured and treated runoff to offset potable water usage; and 3) creates a public amenity that provides valuable habitat, education, and passive recreation opportunities in conjunction with water quality improvement opportunities.

The project, which diverts runoff flows to an 8 acre-foot (85^{th} percentile volume) pretreatment and transient storage vegetated detention pond located at the Legacy Park site, is the only existing regional EWMP project within the NSMBCW EWMP Area. The pond at Legacy Park stores captured runoff from Civic Center Way, Cross Creek Road, and Malibu Road, regulating flow into the Civic Center Storm Water Treatment Facility (SWTF), which feeds potable water resources uses such as irrigation at the park or other Civic Center area landscaping. The Civic Center SWTF is able to treat and disinfect up to 1,400 gallons per minute (gpm) of non-stormwater and stormwater runoff. The Civic Center SWTF is also used to recirculate and maintain the quality of flows within Legacy Park during periods of storage for water resources use.

Legacy Park was designed to retain the 0.75-inch design storm for most of the 306-acre Civic Center drainage areas, as well as dry weather flows from the other two drains which are tributary to the project. Because the 85^{th} percentile, 24-hour design storm over the entire Legacy Park tributary area is approximately 0.65 inch, the park currently qualifies as a regional EWMP project.

Modeling results are not presented for the tributary area to Malibu Legacy Park, since it is considered a regional EWMP project capable of capturing and retaining the 85th percentile, 24-hour storm.

6.1 WET WEATHER TARGET LOAD REDUCTIONS

The processes for establishing TLRs for the modeled WBPCs within the NSMBCW EWMP-portion of the Malibu Creek Watershed are described in the following section. Flows in Malibu Creek originating from upstream of the City boundary were excluded from this analysis, such that only discharges from the NSMBCW EWMP Agency-owned lands immediately adjacent to both sides of Malibu Creek were considered. A separate EWMP has been drafted for the portion of the Malibu Creek Watershed outside of the NSMBCW EWMP Area that will be submitted by the MCW EWMP Group.

Of the 618 acres of land within the NSMBCW EWMP Area tributary to Malibu Creek, approximately 306 acres is tributary to Malibu Legacy Park, a regional EWMP project on the western side of Malibu Creek (see Section 6.2.4.1). The remaining area, which is almost entirely on the eastern side of Malibu Creek, is a uniquely developed area requiring special consideration when modeling as part of the RAA. This area (identified as the "MCW" analysis region, as shown in **Figure 26**) contains approximately 312 acres of sparsely developed space, with a total impervious coverage of approximately 12 percent. The development in this analysis region contains mostly low density (rural) single family residential. There are no NSMBCW Agency-owned storm drains in this analysis region and streets do not have curbs or gutters. Besides the 85 acres of state- and federally-owned land, the developed neighborhood is privately owned property, including private roads. None of the developed area is directly connected to Malibu Creek. Instead, all impervious areas are disconnected via densely vegetated fields and flow paths. **Figure 27** photos show a few of the streets in this analysis region.

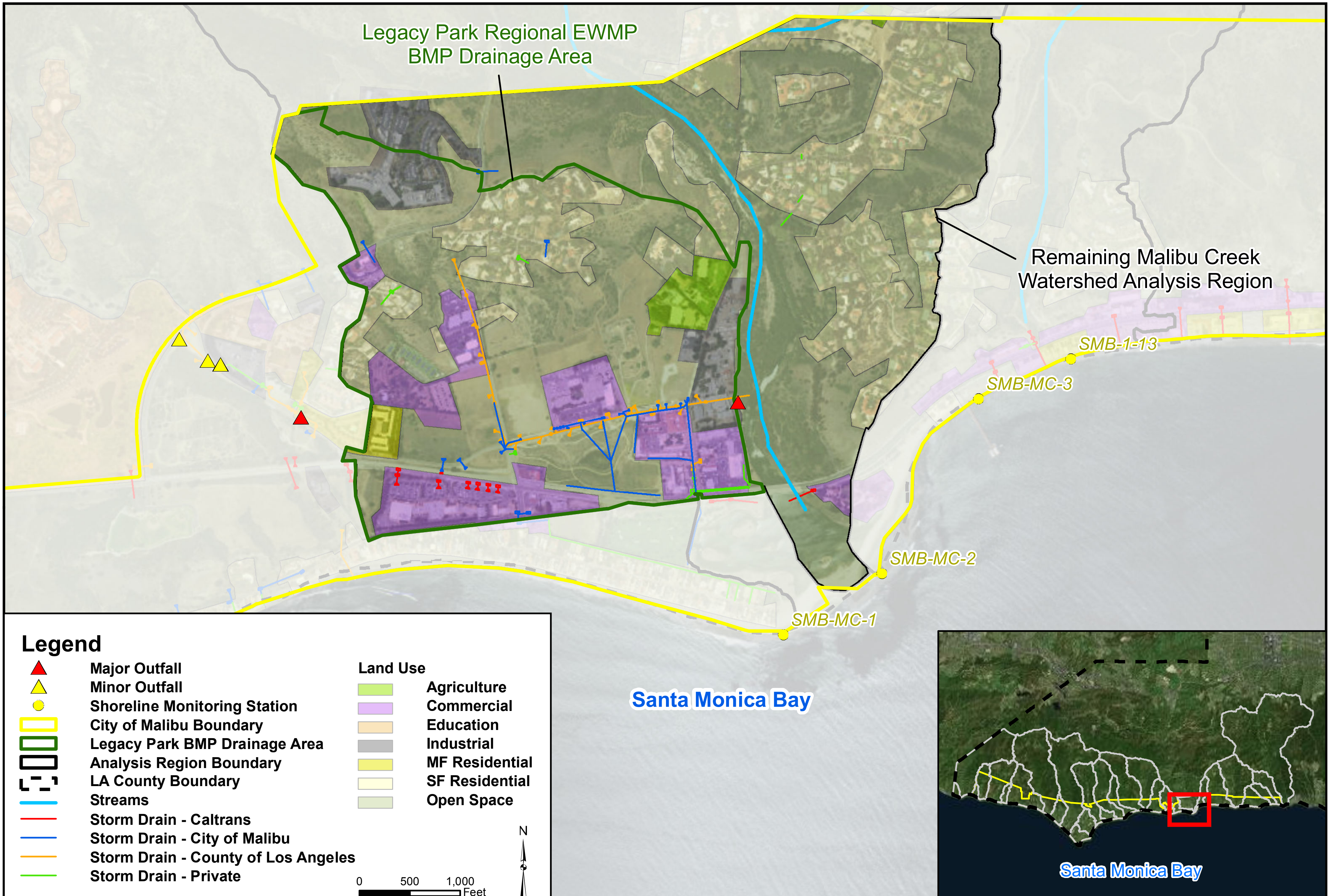

Figure 26. Malibu Creek Watershed NSMBCW EWMP

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Figure 27. Photographs showing the private Serra Canyon Neighborhood on the eastern side of Malibu Creek within the City of Malibu.

To represent this disconnected imperviousness, baseline conditions for the developed areas in this analysis region were modeled as being tributary to vegetated swales. This modeling procedure is similar to the downspout disconnect modeling procedure described in Section 5.2.3.3.

6.1.1 BACTERIA (MALIBU CREEK)

The process for calculating the bacteria TLR within the Malibu Creek Watershed mirrors the Santa Monica Bay process (See Section 5.1.1), with the exception of Step 4. For this step, allowable discharge days were assumed to be equivalent to the TMDL allowable exceedance days (15 days) at the MCW-1 compliance monitoring location. This is due to the assumption that no dilution is taking place in the creek or lagoon (e.g., all discharge days result in an exceedance day), and that upstream dischargers from the NSMBCW EWMP Area are exactly achieving their allowed exceedance days (i.e., no assimilative capacity exists).

The absolute allowed load for fecal coliform[27] within the Malibu Creek Watershed was calculated to be 23.5 x 10^{12} MPN for Model Year 1995, based on a total runoff volume

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[27] While the REC1 fecal coliform objective was removed from the Los Angeles Basin Plan through Order R10-005, fecal coliform is used in this EWMP as the modeling surrogate for *E. coli* due to its more robust modeling input datasets. Therefore, the old REC1 objective for fecal coliform (400 mpn/100mL) is used in this EWMP for setting target load reductions, and this objective is considered equally protective of public health to the 235 mpn/100mL REC1 objective for *E. coli* based on illness relationships reported in the 1986 USEPA recreational water quality criteria documents.

of 396.2 acre-ft. This results in an average concentration for fecal coliform of 4,810 MPN/100ml. However, the baseline load reaching Malibu Creek was calculated to be 19.9 x 10^{12} MPN fecal coliform (resulting in an average concentration of 4,070 MPN/100 ml). Therefore, even during the critical year, since the existing load is less than the allowed load, no load reduction is required to meet the allowed load (TLR = 0), and reasonable assurance of compliance with the TMDL limit has been demonstrated.

6.1.2 *NITRATE + NITRITE (MALIBU CREEK)*

The combination of nitrate as nitrogen plus nitrite is listed as a Category 1 WBPC in Malibu Creek Watershed due to the Malibu Creek Watershed Nutrients TMDL. The Permit expresses the grouped winter waste load allocation for this WBPC as a daily maximum concentration of 8 mg/L. With the underlying assumption that nitrite as nitrogen is negligible in stormwater,[28] a TLR methodology was established based on 90th percentile daily concentrations of nitrate as nitrogen during the winter season of Model Year 1995.

The allowed load, calculated based on total runoff in the winter season of the 90th percentile critical year (360.2 acre-ft) multiplied by the concentration-based waste load allocation (8 mg/L), was calculated to be 7,840 lbs. The baseline load, calculated based on total runoff in the winter season of 1995 multiplied by the 90th percentile daily concentration in the winter season of 1995 (1.6 mg/L), is 1,570 lbs. Therefore, even in a critical condition, no load reduction is required to meet the allowed load (TLR = 0), and reasonable assurance of compliance with the TMDL limit has been demonstrated.

6.1.3 *TOTAL NITROGEN AND TOTAL PHOSPHORUS (MALIBU CREEK)*

Nutrients (total nitrogen and total phosphorus) are listed as Category 1 WBPCs in Malibu Creek Watershed due to the Malibu Creek and Lagoon Benthic TMDL. The EPA TMDL WLAs are not yet incorporated into the Permit, since the TMDL became effective after the Permit term had begun. Therefore, the wet weather TLR was established using the TMDL's concentration-based WLAs for total nitrogen and total phosphorus for the winter period, which for the most part is when wet weather occurs.

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[28] For example, The Los Angeles County cumulative event mean concentrations by land use show that nitrite as nitrogen accounts for 2.2 – 3.4 percent of total nitrogen (County of Los Angeles, 2000). In addition, annual nutrient reporting for the Machado Lake Nutrient TMDL by the Peninsula Cities found nitrite above the detection limit in less than 3 percent of their total samples (Northgate Environmental Management, Inc., 2014).

The TMDL concentration-based WLAs are expressed as seasonal average concentrations that include both dry and wet weather winter days. The TMDL states that, “the total nutrient in-stream loading capacities are to be measured as seasonal summer and winter averages since total nutrient discharges vary substantially within seasons, and short term pulses of high nutrient loading have not been shown to be specifically responsible for short term benthic algal growth increases or benthic community index decreases. This TMDL focuses on reducing loads on a seasonal basis” (USEPA, 2013). Therefore, wet weather nutrient TLRs were calculated based on annual wet weather concentrations and volumes of total nitrogen and total phosphorus from SBPAT for the 90th percentile year. Since nutrient concentrations are typically higher during wet weather (which is the only weather condition modeled by SBPAT), this approach is considered conservative. Actual baseline winter seasonal average concentrations (i.e., a blend of concentrations measured on dry and wet days) are expected to be lower than those modeled by SBPAT.

The following approach, or conceptual model, was implemented to calculate TLRs for both total nitrogen and total phosphorus in the NSMBCW EWMP Area tributary to Malibu Creek:

1. The analysis region was modeled in SBPAT for the 90th percentile wet year (Model Year 1995).
2. The existing, baseline condition (i.e., without any BMPs) was modeled in SBPAT, resulting in a mean baseline pollutant load for the 90th percentile wet year.
3. The allowed load was calculated by multiplying the concentration-based WLA of each pollutant by the baseline runoff volume for the 90th percentile wet year.
4. The difference between the baseline load (step 2) and the allowed load (step 3) was used to set the TLR for the 90th percentile year, which is the load reduction required to meet the TMDL WLA during a critical year. The TLR is expressed in this report as a percent of the baseline annual load (step 2).

Appendix C provides an example TLR calculation for nutrients.

6.1.3.1 TOTAL NITROGEN

The TMDL establishes a final concentration-based waste load allocation for total nitrogen of 4.0 mg/L (average winter season load). Within the NSMBCW EWMP-portion of the Malibu Creek Watershed, the total nitrogen baseline load reaching the receiving water for Model Year 1995 was estimated to be 2,170 lbs, based on a runoff volume of 396.2 acre-ft (and resulting average nitrogen concentration of 2 mg/L). This load was calculated to be less than the allowed load of 4,310 lbs. Therefore, load reductions are not anticipated

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to be necessary to meet the TMDL winter total nitrogen WLA (i.e., the TLR is zero), and reasonable assurance of compliance has been demonstrated.

6.1.3.2 TOTAL PHOSPHORUS

The TMDL establishes a final concentration-based waste load allocation for total phosphorus of 0.2 mg/L (average winter season load). Within the NSMBCW EWMP-portion of the Malibu Creek Watershed, the total phosphorus baseline load reaching the receiving water for Model Year 1995 was estimated to be 211 lbs, based on a runoff volume of 396.2 acre-ft (and resulting average phosphorus concentration of 0.19 mg/L). This load was calculated to be less than the allowed load (215 lbs). Therefore, load reductions are not anticipated to be necessary to meet the TMDL WLAs (i.e., the TLR is zero), and reasonable assurance of compliance has been demonstrated.

6.2 BEST MANAGEMENT PRACTICES

6.2.1 METHODS TO SELECT AND PRIORITIZE

BMPs were selected and prioritized in the Malibu Creek Watershed in the same manner in which they were in the Santa Monica Bay Watershed. See Section 5.2.1 for a description of this process.

BMP load reductions were evaluated for the period between the effective dates and final compliance deadlines for the Malibu Creek Bacteria TMDL. These dates are summarized in **Table 33**.

Table 33. TMDL Effective Dates and Final Compliance Dates

TMDL	TMDL Effective Date	Final Compliance Deadline
Malibu Creek Bacteria TMDL	January 10, 2006	July 15, 2021

These dates were used in the Malibu Creek Watershed since bacteria was generally found to be the controlling pollutant throughout Santa Monica Bay; and since TLRs of zero were calculated for bacteria, nitrate, total nitrogen, and total phosphorus within the portion of the Malibu Creek Watershed covered by this EWMP.

6.2.2 RECOMMENDED MINIMUM CONTROL MEASURES

Minimum control measures for the Malibu Creek Watershed portion of the NSMBCW EWMP Area are the same as those described in Section 5.2.2.

6.2.3 QUANTIFIED NON-STRUCTURAL BMPS

Non-structural BMPs within the Malibu Creek Watershed were modeled consistent with those in the SMB Watershed (see Section 5.2.3). However, public retrofit incentives in the form of downspout disconnection programs were not modeled, since all impervious areas within this watershed are disconnected (i.e., no direct connections to Malibu Creek exist in the watershed within the NSMBCW EWMP Area).

6.2.4 STRUCTURAL BMPS

6.2.4.1 EXISTING REGIONAL EWMP PROJECT – MALIBU LEGACY PARK

Legacy Park, which consists of an 8 acre-foot pretreatment and transient storage vegetated detention pond, was designed to retain the 0.75-inch design storm for most of the 306-acre Civic Center drainage areas, as well as dry weather flows from the other two drains which are tributary to the project. Because the 85th percentile, 24-hour design storm over the entire Legacy Park tributary area is approximately 0.65 inch, the park currently qualifies as a regional EWMP project. Future modifications will lead to an increased capacity of Legacy Park, including: 1) the implementation of distributed low impact development (LID) BMPs throughout portions of the tributary watershed, which may lower the runoff volume tributary to Legacy Park; and 2) pump upgrades which will increase the pump stations capacity from 200 gpm to 300 gpm, increasing the project's overall capture efficiency. The tributary area to Malibu Legacy Park is shown in **Figure 28**.

Per Section VI.E.2.e.i(4) of the Permit, the NSMBCW EWMP Group is deemed in compliance with all applicable final WQBELs and RWLs for the WBPCs in this tributary area, since the project fully retains all non-stormwater runoff and stormwater runoff up to and including the volume equivalent to the 85th percentile, 24-hour event. Therefore, modeling and quantification of benefits in this project tributary area is not included as part of this RAA.

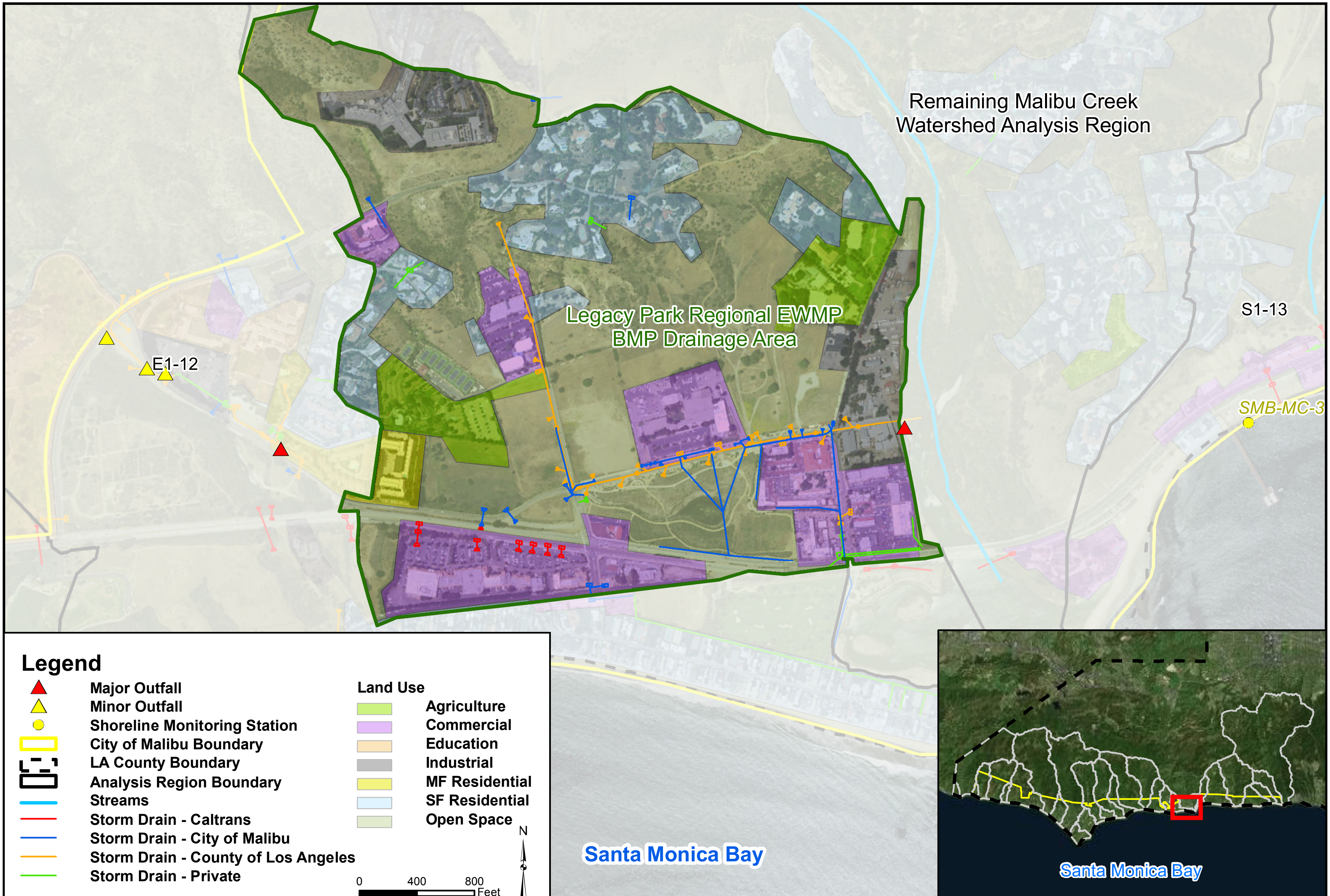

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Figure 28. Legacy Park Regional EWMP BMP Drainage Area
NSMBCW EWMP

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6.3 REASONABLE ASSURANCE ANALYSIS

6.3.1 *REASONABLE ASSURANCE ANALYSIS – WET WEATHER*

Within the Malibu Creek Watershed analysis region, reasonable assurance of compliance with all WBPC allowed loads was demonstrated since there is no required load reduction. As such, no new structural BMPs have been proposed for this watershed (Analysis Region MCW). Load reductions associated with the implementation of non-structural BMPs were quantified and range from 7 to 24 percent of baseline loads for the critical year for each modeled pollutant. These are summarized in **Table 34** below. Details of the RAA model results can be found in **Appendix C**, including daily volume, concentration, and load data for each BMP analyzed.

Table 34. Malibu Creek Watershed Modeling Results – RAA Demonstration of Compliance with Final Limits

Pollutant	Quantified Load Reductions as a Percentage of Baseline Loads for the 1995 Critical Condition					Target Load Reduction
	Non-Modeled Programmatic BMPs	Public Incentives + Redevelopment	Existing/ Planned BMPs	Proposed BMPs	Cumulative Load Reduction	
Fecal Coliform	5.0%	8.2%	0.0%	0.0%	13.2%	0.0%
Nitrate + Nitrite	5.0%	18.8%	0.0%	0.0%	23.8%	0.0%
Total Nitrogen	5.0%	2.0%	0.0%	0.0%	7.0%	0.0%
Total Phosphorus	5.0%	2.2%	0.0%	0.0%	7.2%	0.0%

6.3.2 *REASONABLE ASSURANCE ANALYSIS – DRY WEATHER*

Within the Malibu Creek Watershed, all dry weather flows tributary to Legacy Park are captured, treated, and retained and reused by Legacy Park. Therefore, dry weather discharges from this area do not exist. In the remaining portion of the Malibu Creek Watershed, the only storm drain infrastructure is a small rectangular channel on the eastern side of Malibu Creek. This drain is privately owned, and is not directly connected to the Creek. In addition, dry weather screenings have shown that dry weather flows do not occur here. Therefore, no dry weather discharges are known to occur from the NSMBCW EWMP Area within the Malibu Creek Watershed, and reasonable assurance of compliance with applicable dry weather bacteria TMDL WQBELs and nutrient TMDL WLAs is demonstrated on this basis.

6.4 MULTIPLE BENEFITS

Not only is reasonable assurance demonstrated for the WQBEL and RWLs in the Permit, Malibu Legacy Park provides multiple benefits beyond pollutant load reduction. Included photos (**Figure 29** and **Figure 30)** below highlight a few of these benefits, which include:

- **Beneficial Use Protection.** The reduction of MS4-generated bacteria and nutrient loads within the Legacy Park drainage area may help to protect recreation public health at Malibu Lagoon, while also reducing eutrophication.
- **Neighborhood Greening and Recreation.** The Legacy Park project transformed 15 acres in the heart of Malibu into a central park that includes the restoration/creation of riparian habitats and the establishment of an open space area for passive recreation and environmental education. Walking trails meander through natural landscape planted with California native plants. The park itself showcases six regionally significant habitats, including the coastal prairie, woodlands, coastal bluffs, riparian corridor, wetland meadows, and vernal pools.

Figure 29. Photographs of Malibu Legacy Park, highlighting some of the multiple benefits of the Project including public education/awareness and neighborhood greening and recreation

- **Water Conservation/Supply**. Runoff retained at Legacy Park is used (and potable water offset) for irrigation at the park and surrounding areas, thus offsetting reliance on the potable water supply (SWRCB, 2012a).

- **Groundwater Recharge (Where Feasible).** Although infiltration at Legacy Park is small, it does still occur in the pond at Legacy Park, thereby reducing runoff volumes, lowering peak flood elevations, and lessening the erosive potential of surface water flow. In addition, the increased pervious area created as a result of the park leads to increased infiltration and evapotranspiration.
- **Public Education/Awareness.** Not only did Legacy Park create a public amenity that provides valuable habitat and passive recreation opportunities in conjunction with water quality improvement opportunities, it also incorporates educational material throughout the park, thereby improving the public's knowledge about stormwater management and pollution prevention. It offers a living learning center, informational kiosks, an outdoor classroom, a cultural interpretive center, and numerous other features to provide information and education about flora and fauna along the Southern California coast.

Figure 30. Additional photographs of Malibu Legacy Park and some of the benefits provided to the Public

7 EWMP COMPLIANCE SCHEDULE

7.1 COMPLIANCE SCHEDULE

Compliance schedules for the WBPCs in the NSMBCW EWMP Area are discussed below. For some WBPCs, compliance schedules are set forth in respective TMDLs; for others, compliance schedules are established in the sections below.

7.1.1 TMDL-ESTABLISHED COMPLIANCE SCHEDULES

Table 35 summarizes the compliance schedules for WBPCs within the NSMBCW EWMP Area that have been established in a TMDL. These include bacteria and trash/debris in Santa Monica Bay and Malibu Creek.

Table 35. TMDL Compliance Dates and Load Reduction Requirements for WBPCs Within the NSMBCW EWMP Area

Water Body	Pollutant	Compliance Deadline
SMB Beaches	Dry Weather Bacteria	July 15, 2006: Final summer RWLs (AEDs)
		November 1, 2009: Final winter RWLs (AEDs)
	Wet Weather Bacteria	July 15, 2009: 10% cumulative percentage reduction from total exceedance day reductions
		July 15, 2013: 25% cumulative percentage reduction from total exceedance day reductions
		July 15, 2018: 50% cumulative percentage reduction from total exceedance day reductions
		July 15, 2021: Final RWLs (AEDs & Geometric Mean)
SMB	Trash/Debris	March 20, 2016: 20% reduction of baseline load
		March 20, 2017: 40% reduction of baseline load
		March 20, 2018: 60% reduction of baseline load
		March 20, 2019: 80% reduction of baseline load
		March 20, 2020: 100% reduction of baseline load
Malibu Creek and Lagoon	Dry Weather Bacteria	January 24, 2012: Final single sample AED RWLs met
	Wet Weather Bacteria	July 15, 2021: Final single sample AED and Geometric Mean RWLs
Malibu Creek	Trash	July 7, 2013: 20% reduction of baseline load
		July 7, 2014: 40% reduction of baseline load
		July 7, 2015: 60% reduction of baseline load
		July 7, 2016: 80% reduction of baseline load
		July 7, 2017: 100% reduction of baseline load

7.1.2 ADDITIONAL WBPC COMPLIANCE SCHEDULES

Compliance schedules for other WBPCs are described below. In general, no additional compliance schedules are established herein, given the results of the RAA and the lack of known NSMBCW Agency contributions at this time. In all cases, future water quality data collected under the CIMP may inform the NSMBCW EWMP Group that compliance schedules may need to be revised. This process is discussed in more detail in the Adaptive Management section below (Section 8).

7.1.2.1 NUTRIENTS (MALIBU CREEK)

Since both nutrient-related TMDLs in the Malibu Creek Watershed were developed by the USEPA, no compliance schedules are contained therein. However, Permit Section VI.E.3.c.iv. references the Malibu Creek Nutrient TMDL, stating that "in no case shall the time schedule to achieve the final numeric WLAs exceed five years from the effective date of this Order." The schedule must therefore have a final date not exceeding December 28, 2017. This date is only specified for the WLAs in the Nutrient TMDL, not the Benthic TMDL. The Benthic TMDL recommends interim targets, but states that it is expected to take up to between one to two Permit cycles to meet the interim targets, and another one to two Permit cycles to meet the final targets (USEPA, 2013).

Based on the RAA results, and considering the fact that the area tributary to Legacy Park is fully captured, treated, and retained for all storms up to the 85th percentile, 24-hour depth, there is reasonable assurance that the NSMBCW EWMP Group is in compliance with all applicable nutrient WLAs. Therefore, no compliance schedule for these WBPCs is proposed, and the effective date of each TMDL (March 21, 2003 for the Malibu Creek Nutrient TMDL and July 2, 2013 for the Malibu Creek and Lagoon Benthic TMDL) is the compliance date for the respective WBPCs.

Final compliance with the TMDL-established WLAs may be demonstrated by the NSMBCW Agencies by any one of the following:

1. No violations of the seasonal average concentration-based WLA is found in the discharge at the Permittee's MS4 outfall(s) within the Malibu Creek Watershed, including outfalls that collect discharges from multiple Permittee's jurisdictions;
2. No exceedances of the seasonal average concentration-based WLA is found in the receiving waters at, or downstream of, the Permittee's outfall(s);
3. The calculated seasonal nutrient load from the entire MS4 group is less than or equal to the load-based WLA;
4. The calculated seasonal nutrient load from an individual MS4 agency is less than or equal to the area-weighted fractional load-based WLA;
5. No direct or indirect discharge from the Permittee's MS4 to the receiving water has occurred during the time period subject to the WLA; or
6. All non-stormwater and all stormwater runoff up to and including the volume equivalent to the 85th percentile, 24-hour event is retained for the Permittee's drainage area tributary to the Malibu Creek Watershed.

7.1.2.2 DDT AND PCBS (SMB OFFSHORE/NEARSHORE)

Load-based WQBELs for DDTs and PCBs established by the TMDL were set equivalent to the estimated existing stormwater loads (i.e., based on data used in the TMDL, no MS4 load reduction is expected to be required). As a result, since the TMDL effectively implements an antidegradation approach, and the NSMBCW Agencies are presumed to be achieving the waste load allocations, no compliance schedule is proposed.

7.1.2.3 TOTAL LEAD (TOPANGA CANYON CREEK)

As discussed in Section 5.1.2, discharges from the NSMBCW EWMP Group are currently expected to be in compliance with proposed (CTR-based) numeric targets during the critical condition. As a result, no compliance schedule for this WBPC is proposed, and the compliance date is the pending effectiveness date of the EWMP.

Compliance with the proposed numeric targets can be demonstrated in any one of the following ways:

1. No exceedances of the concentration-based numeric target for either total or dissolved lead is found in the discharge at the Permittee's MS4 outfall within the Topanga Creek subwatershed, including outfalls that collect discharges from multiple Permittee's jurisdictions;
2. No exceedances of the concentration-based numeric target for either total or dissolved lead is found in the receiving waters at the Permittee's receiving water monitoring station;
3. No direct or indirect discharge from the Permittee's MS4 to the receiving water has occurred during the time period subject to the targets; or
4. All non-stormwater and all stormwater runoff up to and including the volume equivalent to the 85^{th} percentile, 24-hour event is retained for the Permittee's drainage area tributary to the Topanga Creek Watershed.

No NSMBCW Agency-owned major (>/= 36") outfalls are known to exist in the Topanga Creek subwatershed. Since "cause or contribute" based non-compliance cannot be demonstrated solely based on receiving water monitoring data, outfall monitoring may be found to be needed at a later time. Therefore, if receiving water monitoring data collected under the CIMP show exceedances of the lead numeric targets in Topanga Creek, outfall sampling at non-major outfalls may be added at that time.

7.1.2.4 SULFATES AND SELENIUM (MALIBU CREEK)

Due to the fact that there is currently no evidence supporting a linkage between MS4 discharges and exceedances of water quality objectives for selenium and sulfates, and due to the treatment ability of Malibu Legacy Park (which captures and retains all dry weather runoff and stormwater runoff above and beyond the 85th percentile design storm), the NSMBCW EWMP Group is not believed to be causing or contributing to exceedances of applicable water quality objectives in Malibu Creek. As a result, no compliance schedule for these WBPCs is proposed.

7.1.2.5 PH (MALIBU LAGOON)

Due to the fact that there is currently no evidence supporting a linkage between MS4 discharges and exceedances of the pH objective, and due to the treatment ability of Malibu Legacy Park (which captures and retains all dry weather runoff and stormwater runoff above and beyond the 85th percentile design storm), the NSMBCW EWMP Group is not believed to be causing or contributing to exceedances of the applicable numeric target in Malibu Lagoon. As a result, no compliance schedule for this WBPC is proposed.

7.2 DEMONSTRATION OF INTERIM COMPLIANCE

Based on the existing compliance schedules outlined in Section 7.1, interim compliance is only demonstrated for bacteria in Santa Monica Bay and trash/debris in Santa Monica Bay and Malibu Creek. All other WBPCs are believed to be achieving final compliance.

7.2.1 BACTERIA

Scheduling of BMP implementation is based on the feasibility of completing projects and milestones of the SMB Beaches Wet Weather Bacteria TMDL.[29] The final wet weather compliance deadline for the TMDL (July 15, 2021) is proposed to be met through a combination of non-structural BMPs, distributed green streets BMPs, and regional BMPs. The structural BMPs (distributed and regional) are planned to be implemented no later than July 15, 2021.

The only remaining interim compliance deadline for the TMDL requires a 50 percent reduction in total wet weather exceedance days by July 15, 2018. Permit Attachment M presents these interim receiving water limits as combined exceedance days per Jurisdictional Group that can occur beyond those allowed during wet weather.

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[29] This chapter only refers to interim targets. Therefore, any TMDL for which final compliance deadlines have passed are not discussed in this section.

- For the Jurisdictional Group 1 sites, 218 exceedance days can occur beyond those allowed during wet weather. Since a total of 293 wet weather exceedance days are allowed for these compliance monitoring locations per the final receiving water limitations, a total of 511 wet weather exceedance days must be met to achieve the 50 percent reduction milestone by July 15, 2018.
- For Jurisdictional Group 4 sites (SMB 4-1), 8 exceedance days can occur beyond those allowed during wet weather. Since a total of 14 wet weather exceedance days are allowed for this compliance monitoring location per the final receiving water limitations, a total of 22 wet weather exceedance days must be met to achieve the 50 percent reduction milestone by July 15, 2018.

Based on historical monitoring data, Jurisdictional Group 1 compliance monitoring locations have had fewer than 511 exceedance days every year beginning in 2007. Similarly, the single compliance monitoring location in Jurisdictional Group 4 (SMB 4-1) has had fewer than 22 exceedance days ever year beginning in 2005.[30] These results are presented in **Table 36** below. In addition, for compliance monitoring locations subject to the antidegradation implementation provision in the TMDL, there has been no increase in exceedance days during the implementation period above those estimated for each location during the critical year. Therefore, based on historical monitoring data, compliance with the 50 percent interim compliance milestone is currently being achieved.[31]

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[30] When analyzing the historical monitoring data, results from sites for which weekly sampling was conducted were conservatively multiplied by 7 to estimate the total daily exceedances.

[31] This approach was agreed upon by Regional Board staff in a meeting with the NSMBCW EWMP Group on December 7, 2015.

Table 36. Historical SMBBB TMDL Exceedance Days, Compared to Interim Single Sample Bacteria Receiving Water Limitations, 2005 - 2013

CML	AEDs	Interim AEDs	2005	2006	2007	2008	2009	2010	2011	2012	2013
SMB 1-1	17	-	28	7	0	7	14	21	35	28	0
SMB 1-2	5		21	0	0	0	0	0	14	-	-
SMB 1-3	3		14	0	0	0	0	0	7	0	7
SMB 1-4	17		21	35	7	35	21	21	49	0	0
SMB 1-5	17		28	7	0	28	21	7	42	7	0
SMB 1-6	17		21	49	7	0	14	7	7	7	28
SMB O-1	15		-	-	-	-	-	2	5	2	1
SMB 1-7	17		56	35	28	42	28	28	56	28	7
SMB 1-8	17		42	84	0	7	21	49	21	35	0
SMB 1-9	17		28	35	7	28	28	28	21	21	7
SMB 1-10	17		35	35	7	7	21	21	42	21	14
SMB 1-11	17		14	21	0	35	21	28	21	14	0
SMB O-2	6		-	-	-	-	-	1	2	2	1
SMB 1-12	17		63	63	7	28	35	35	35	7	35
SMB 1-13	17		42	49	21	14	7	28	42	14	21
SMB 1-14	17		49	49	0	0	21	28	14	14	7
SMB 1-15	17		21	28	7	21	14	7	35	7	0
SMB 1-16	14		42	14	0	0	7	7	14	0	0
SMB 1-17	12		14	0	0	7	0	0	0	0	0
SMB 1-18	17		40	37	6	15	19	32	31	20	6
JG 1 Total	**293**	**511**	**579**[1]	**548**[1]	**97**	**274**	**292**	**350**	**493**	**227**	**134**
SMB 4-1	14	22	14	7	0	14	7	0	14	7	0
JG 4 Total	**14**	**22**	**14**	**7**	**0**	**14**	**7**	**0**	**14**	**7**	**0**

[1] Years that exceed the interim single sample bacteria receiving water limitations.

7.2.2 TRASH/DEBRIS

In Santa Monica Bay, compliance with the Trash/Debris TMDLs will be met through a phased retrofit of all catch basins throughout the NSMBCW EWMP Area to meet each interim compliance deadline (20 percent load reduction per year between 2016 and 2019) as well as the final compliance deadline (100 percent load reduction) in 2020.

In Malibu Creek, all storm drains and outfalls owned by the NSMBCW Agencies are tributary to Malibu Legacy Park, and are therefore achieving compliance with the trash TMDL. One other drainage structure exists outside of the Legacy Park drainage area, but this is a private drain on the eastern side of Malibu Creek, in the Serra Canyon Community.

7.3 BMP IMPLEMENTATION MILESTONES

Based on the compliance milestones described above, proposed structural BMPs and public retrofit incentives are proposed to be implemented in accordance with the schedule outlined in **Table 37** below. However, since the July 2021 final compliance deadline for the SMB Beaches Bacteria TMDL is the controlling compliance deadline for the NSMBCW EWMP Group (with the exception of trash and debris in Santa Monica Bay and Malibu Creek), the proposed schedule below may be altered as long as the July 2021 deadline is achieved for all proposed projects.

Table 37. Proposed Implementation Schedule for NSMBCW EWMP BMPs

KEY	Planning Phase	Design Phase	Construction Phase

	BMP Location/Name	**Timeline**						
		2015	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
Santa Monica Bay Watershed	Full Capture System Installation							
	Public Retrofit Incentives							
	Topanga Canyon (S1-18) Regional Project							
	Ramirez Canyon (E1-07) Distributed							
	Latigo Canyon (S1-09) Distributed							
	Corral Canyon (E1-11) Distributed							
	Marie Canyon (S1-12) Distributed							
	Winter Canyon (E1-12) Distributed							
	Sweetwater Canyon (S1-13) Distributed							
	Las Flores Canyon (W1-14) Distributed							
	Las Flores Canyon (S1-14) Distributed							

Full capture system installation is proposed to occur according to the SMB Debris TMDL compliance schedule (i.e., 20 percent installation by March 2016, 40 percent installation by March 2017, etc.).

The public retrofit program will seek to incentivize homeowners to disconnect impervious surfaces from their residences. The goal will be to disconnect a total of 3.8 percent of single family residential impervious areas within the NSMBCW EWMP Area by July 2021.[32] The program will seek to incentivize the public through outreach and education as well as free training workshops. The program will also seek to create a reporting and tracking element in order to track progress toward the 3.8 percent goal.

8 ASSESSMENT AND ADAPTIVE MANAGEMENT FRAMEWORK

Adaptive management is a critical component of the EWMP implementation process, and EWMP updates are required at two-year cycles by the Permit. The NSMBCW EWMP Group is committed to an adaptive management process that considers the following, in accordance with Permit Section VI.C.8.a.i:

- Progress toward achieving applicable interim and/or final WQBELs and/or RWLs, according to established compliance schedules;
- Progress toward achieving improved water quality in MS4 discharges and achieving RWLs through implementation of the watershed control measures based on an evaluation of outfall-based monitoring data and receiving water monitoring data;
- Achievement of interim milestones;
- Re-evaluation of the water quality priorities identified in the EWMP 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;
- Availability of new information and data from sources other than the NSMBCW CIMP that informs the effectiveness of the actions implemented by the Group;
- Regional Water Board recommendations; and
- Recommendations for modifications submitted through a public participation process.

The CIMP will gather additional data on receiving water conditions and stormwater/non-stormwater quality. These data will support adaptive management at multiple levels, including: (1) tracking improvements in water quality over the course of EWMP implementation and (2) generating data not previously available to support model

[32] For compliance purposes, only those analysis regions that rely on the downspout disconnection program to demonstrate reasonable assurance are required to reach the 3.8 percent target by July 2021.

updates. Furthermore, over time the experience gained through intensive BMP implementation will provide lessons learned to support modifications to the control measures identified in the EWMP.

The NSMBCW EWMP Group will continue to encourage public participation in the implementation of the EWMP through educational outreach and events as well as maintenance of relevant websites, phone numbers, and social media sites. Additionally, when projects are being implemented, there are several milestones which require City Council approval. This allows public participation through availability of project information presented in the staff report, and provides opportunity for the public to comment. Further, direct outreach to impacted neighborhoods or properties occurs when necessary, such as for CEQA compliance.

The adaptive management process also includes a schedule for developing and reporting on the EWMP updates, the approach to conducting the updates, and the process for implementing any modifications to the RAA and EWMP to reflect the updates. Reporting for the adaptive management process will be conducted in accordance with Section VI.C.8.a.iv of the Permit.

The adaptive management approach for the NSMBW EWMP area is designed to address the EWMP planning process and the relationship between monitoring, scheduling, and BMP planning. The adaptive management process outlines how the EWMP will be modified in response to monitoring results, updated modeling results, and lessons learned from BMP implementation. It is designed to accomplish three goals:

1. Clarify the short-term and long-term commitments of the NSMBW EWMP group within the EWMP.
2. Provide a structured decision-making process for modifications to the EWMP based on the results of monitoring data.
3. Propose a structure for evaluating compliance with water-quality based permit requirements within an adaptive structure.

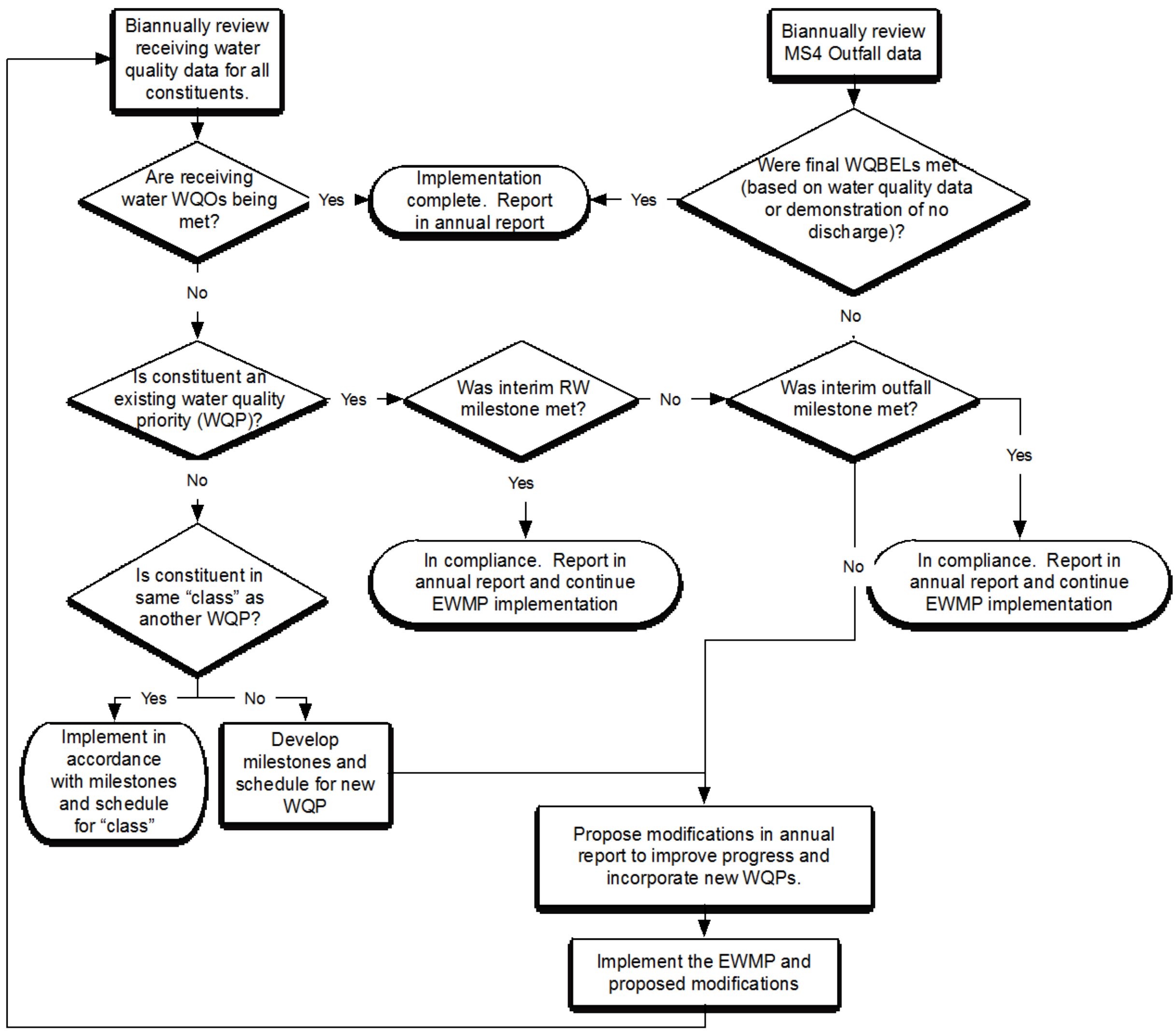
As outlined in Section 7, the schedule and milestones for the EWMP have been designed around meeting the interim and final TMDL requirements for bacteria. While the EWMP identifies actions that will lead to compliance with the final TMDL limitations, the specific actions taken will be informed by monitoring data collected under the CIMP, special studies that may be conducted during implementation, and any applicable regulatory changes that could influence the remaining interim and final milestones and schedule. For example, bacteria is prevalent throughout the watershed including numerous natural, non-anthropogenic, non-MS4 sources. Therefore, during the remaining compliance period, the NSMBCW EWMP Group may consider options to perform special studies to evaluate the SMB Beaches Bacteria TMDL's dry and wet weather WLAs. Various pathways are available to reopen the TMDL and modify the WLAs, including use of microbial source tracking to support a natural source exclusion, and quantitative microbial risk assessment to develop site specific objectives. Furthermore, TMDL WLA changes are anticipated if the pending statewide bacteria objectives are adopted. The proposed marine water changes include removal of the total coliform, fecal coliform, and fecal-to-total coliform ratio objectives, changing the enterococcus single sample maximum of 104 MPN/100ML to a statistical threshold value (10 percent allowed exceedances in a 30 day period) of 110 MPN/100mL, and other clarification and implementation guidance. Through the adaptive management process, the RAA may be reevaluated after any changes to the statewide objectives, TMDL WLAs, and/or Permit limits.

Monitoring data will be utilized to measure progress towards achieving RWLs and WQBELs. An evaluation of monitoring data will be carried out on a biennial basis in accordance with **Figure 31** to determine if modifications to the EWMP are necessary. Modifications that are warranted because final milestones are achieved *more quickly* than anticipated can be made at any time (i.e. no more actions are needed if fewer control measures result in meeting RWLs and/or WQBELs). Modifications that are warranted because insufficient progress is being made will be noted every two years in the annual report and a schedule for implementation will be provided. A full update to the EWMP and the RAA is not anticipated as the schedule for bacteria compliance is only six years long. Updating the EWMP and RAA is a significant and costly undertaking that is not necessary unless conditions change significantly and additional modeling is needed to inform implementation decisions, or if otherwise required by the Regional Board or State Board. However, at any point, the NSMBCW Agencies could choose to update the EWMP and the associated RAA, particularly if deemed appropriate based on monitoring data.

If at any point during the implementation period any of the permit conditions are modified in response to a regulatory action, TMDL modification, or local studies, the receiving water and outfall monitoring data will be compared to the new RWLs and WQBELs. The same procedure will be followed for evaluating the data and adapting the EWMP, but the new RWLs and WQBELs will be used for the analysis.

The process outlined in **Figure 31** applies during the implementation period for the EWMP. At the end of the implementation period for the TMDLs, if the final RWL and/or WQBELs are not being met, either the TMDL must be modified to adjust the schedule or the permittees will need to apply for a Time Schedule Order or other mechanism to get an extension of the compliance deadlines.

Figure 31. Adaptive Management Approach



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9 FINANCIAL ANALYSIS

9.1 METHODOLOGY TO ESTIMATE BMP COSTS

Total capital costs estimated for structural BMPs include "hard" costs, such as construction and materials, as well as "soft" costs, such as design, construction management, and permitting. Operation and maintenance costs were also estimated for structural BMPs, as discussed below.

9.1.1 HARD COST ASSUMPTIONS

Hard costs were determined using a line item unit cost approach, which separately accounts for each material cost element required for the construction and installation of a given BMP. Quantities for each line item were calculated based on BMP storage/treatment volumes and typical design configurations. A safety factor was applied to the BMP footprints for calculation of design parameters, for both the low and high cost estimates. Unit costs were taken from RS Means,[33] past projects based in Southern California, recent cost/bid information for construction projects, and vendors. Since the majority of proposed BMPs were located on publicly-owned land to reduce land acquisition costs to the extent possible, land acquisition costs were not considered as part of this analysis.

9.1.2 SOFT COST ASSUMPTIONS

Soft costs are project costs that cannot be calculated on a unit cost basis. For conceptual cost estimating, these costs are generally calculated as a percentage of total capital costs. The soft costs considered for each BMP were:

- **Utility Realignment** - Costs associated with the relocation of utilities that are located within the proposed BMP footprint or inhibit construction activities.
- **Mobilization and Demobilization** – The costs associated with activation/deactivation of equipment and manpower resources for transfer to/from a construction site until completion of the contract.
- **Planning, Permitting, Bond, and Insurance** – Cost, including planning and permit fees and personnel hours, of obtaining required permits for BMP

[33] RS Means is a unit cost database that is updated annually (http://www.rsmeansonline.com/). When costs from literature were not available, a project's design criteria and unit costs from the database were used to estimate the project's cost.

installation. Examples of permits needed may include grading, building, stormwater, construction, environmental (e.g., CEQA), and access permits. Potential bond and insurance costs are also included.

- **Engineering and Planning –** Costs associated with BMP and site design, as well as access for maintenance, environmental mitigation, safety/security, traffic control, and site restoration.
- **Construction Management** – The costs associated with management and oversight of the construction of the BMP, from project initiation until completion of the contract.

Estimated soft costs as percent of total project capital costs are presented in **Table 38**. These percentages were based on literature, client input, best professional judgment, and data from past projects (Brown and Schueler, 1997; International Cost Engineering Council, 2014).

Table 38. Assumed Soft Costs for Distributed and Regional Projects as a Percent of Capital

Cost Item	Percent of Capital Cost
Utility Realignment	3%
Mobilization/Demobilization[1]	10%
Planning, Permitting, Bond, and Insurance[2]	10%
Engineering and Planning[2]	40%
Construction Management	15%

[1] $2,000 minimum fee

[2] Cost percentages provided by the County of Los Angeles

9.1.3 *OPERATIONS AND MAINTENANCE*

Annual operations and maintenance (O&M) costs were assumed to be six percent of the capital cost for green streets (USEPA, 2005; Weiss et al., 2007). O&M for green streets includes repairs to eroded areas, incremental landscape maintenance, minimal media and gravel replacement once clogged and surface scarification is no longer effective, removal of trash and debris, and removal of aged mulch with installation of a new layer. O&M costs have been summarized as 20-year lifecycle costs, with no discounting applied. O&M costs also include post-construction monitoring.

Additional maintenance will be necessary after the 20-year lifecycle. Green streets BMPs are estimated to have a useful life of approximately 25 years (USEPA, 2005). After 25 years, they should be excavated, disposing of existing soil media, and backfilled with new soil media. It is estimated that the cost associated with this reconstruction is approximately 90 percent of capital costs. This additional cost is not included in the 20-year lifecycle costs estimated below.

9.1.4 *ADDITIONAL DESIGN ASSUMPTIONS*

Additional design-related assumptions were made to support development of the cost opinion presented herein, including, but not limited to:

- The percentage of excavated material requiring hauling;
- The type and length of BMP inflow and outflow conveyance structures;
- The type and quantity of vegetation required for the post-BMP condition;
- The percentage of the parcel area requiring hydroseeding for the post-BMP condition;
- The type of pre-treatment used for each BMP.

It is assumed that a project may benefit multiple agencies, and therefore the cost burden for each individual agency is not defined herein.

9.2 STRUCTURAL BMP COSTS

Table 39 summarizes the total estimated capital cost to construct or implement each structural BMP and associated 20-year O&M costs. In order to account for possible variations in BMP design, BMP configurations, and site-specific constraints, as well as for uncertainties in available BMP unit costs from literature or estimated BMP unit costs, inherent factors of safety are included.

Table 39. Estimated Capital and O&M Costs for Proposed Structural BMPs

Analysis Region	Subwatershed	Capital Cost	20 Year O&M	20 Year Life Cycle
E1-07	Ramirez Cyn	$3,200,000	$2,200,000	$5,400,000
S1-09	Latigo Cyn	$240,000	$160,000	$400,000
E1-11	Corral Cyn	$1,500,000	$980,000	$2,500,000
S1-12	Marie Cyn	$11,000,000	$7,400,000	$18,400,000
E1-12	Winter Cyn	$2,100,000	$1,400,000	$3,500,000
S1-13	Carbon Cyn	$250,000	$170,000	$420,000
W1-14	Las Flores Cyn	$3,100,000	$2,100,000	$5,200,000
S1-14	Las Flores Cyn	$140,000	$93,000	$230,000
S1-18	Topanga Cyn	$11,000,000	$7,200,000	$18,200,000
Total		**$32,500,000**	**$21,700,000**	**$54,200,000**
Total Cost (County)		**$20,500,000**	**$13,600,000**	**$34,100,00**
Total Cost (City)		**$12,000,000**	**$8,100,000**	**$20,100,000**

9.3 WATERSHED MANAGEMENT PROGRAM BUDGETS

Table 40 provides watershed management program budget information for the City of Malibu and County of Los Angeles as presented in each agency's Stormwater Annual Reports. A projected expenses for Fiscal Year 2015-2016 is also included, though these figures are subject to change before the end of the fiscal year. Budget line items are determined and defined slightly differently by each agency, so variances and overlap between different program elements may exist.

Table 40. Watershed Management Program Budgets for the NSMBCW EWMP Group

	City of Malibu Program Budget				Los Angeles County Program Budget			
Program Element	**Fiscal Year 2012-2013**	**Fiscal Year 2013-2014**	**Fiscal Year 2014-2015[a]**	**Fiscal Year 2015-2016[b]**	**Fiscal Year 2012-2013**	**Fiscal Year 2013-2014**	**Fiscal Year 2014-2015**	**Fiscal Year 2015-2016[a]**
1. Program Management	$323,522	$330,419	$333,428	$342,255	1,902,555	2,171,000	2,038,000	2,000,000
2. Public Information and Participation	$16,061	$31,922	$5,000	$80,000	339,191	357,000	1,219,000	1,160,000
3. Industrial/Commercial[b]	$8,000	$10,694	$0	-	321,431	592,000	355,000	400,000
4. Development Planning	$207,992	$8,501	$7,707	$7,919	221,555	306,000	281,000	300,000
5. Development Construction	$29,833	$48,541	$57,482	$58,738	621,337	635,000	599,000	620,000
6. Public Agency Activities	$363,611	$453,295	$925,394	$986,521	57,899,230	63,742,000	59,339,000	52,310,000
7. IC/ID Program	$48,631	$51,453	$32,591	$33,282	598,944	811,000	815,000	850,000
8. Monitoring and TMDL Compliance	$127,393	$87,817	$95,345	$119,521[c]	0[d]	6,000[d]	0[d]	0[d]
9. Other	$519,654	$190,778	$2,215,005	$335,421	8,882,681[e]	8,552,000[e]	10,966,000[e]	23,050,000[e]
Total	**$1,644,698**	**$1,213,420**	**$3,671,952**	**$1,963,658**	**70,786,924**	**77,172,000**	**75,612,000**	**80,690,000**

[a] The City of Malibu integrates environmental programs staff costs for MCM implementation into "Program Management." This explains why there is no cost shown for the Industrial/Commercial Program, since all associated costs are staff costs. Please see the City's Annual Reports for further details on this budget breakdown.

[b] Subject to change once new allocations are added due to pending contracts.

[c] Does not yet include CIMP monitoring, since this cost has not yet been established.

[d] Does not include TMDL monitoring.

[e] The amount spent on "Other" Program Elements includes costs for Watershed Management Program, Enhanced Watershed Management Program, and Coordinated Integrated Monitoring Program development and implementation; TMDL and ASBS monitoring and projects; and other projects with water quality benefits

9.4 FINANCIAL COMMITMENT

The purpose of this section is to present the financial strategy for addressing the additional costs of compliance with the 2012 MS4 permit to implement the extensive set of BMPs or "recipe for compliance", identified in Section 6.0.

The financial strategy for implementing the EWMP consists of the identification of existing funding sources and a process for identifying future funding sources for the estimated costs that are not covered by existing funding sources.

9.4.1 CURRENTLY AVAILABLE REVENUE

The agencies within this group historically utilized general funds to support their stormwater programs and will continue to do so. However, the cost estimates exceed expected available general fund revenue for stormwater programs. Therefore, the cities will be pursuing funds from multiple, additional sources.

9.4.2 FUNDING SOURCES

This region has historically shown an early and proactive approach to implementing projects that protect, improve, or restore water quality and environmental resources. These agencies have been diligent and successful in obtaining funding from alternative sources as well as allocations from the General Fund, and will continue to pursue such opportunities. Since 2001 funding sources for the NSMBCW EWMP Group have included:

- Civic Center Stormwater Treatment Facility - $5,800,000 of total funding from various funding sources including California Integrated Waste Management Board ($500,000), Santa Monica Bay Restoration Commission ($1 million), SWRCB Clean Beaches Initiative ($4 million), and General Fund ($300,000);
- Cross Creek Road Improvements- $2,441,215 of total funding from various funding sources including developer contributions ($20,000), Caltrans ($40,000), Traffic Safety Funds ($367,000), Proposition C local return ($798,700), Transportation Enhancement Act STPL Funds ($180,000), Transportation Enhancement Act 21 Funds ($563,000), and General Fund ($472,515);
- Solstice Creek Bridge Replacement- Grants from State agencies including Department of Fish and Game ($637,815), State Coastal Conservancy ($145,000), Wildlife Conservation Board ($145,000), and City match ($239,308) for a total amount of $1,167,123;

- Las Flores Park and Creek Restoration – Grants from State agencies including Wildlife Conservation Board ($600,000), Resources Agency ($925,000), Department of Water Resources ($835,000), and City match ($610,075);
- Paradise Cove Stormwater Treatment - Proposition 40 and American Recovery and Reinvestment Act funding in the amount of $816,276 and City match of $342,160;
- Malibu Legacy Park Project - $35,561,174 from various state, county, and private grants; proposition funding; private donations; bonds; and general funds ($4,000,000);
- Trancas Canyon Park – $3,209,461 of total funding including Quimby Funds ($18,000), Proposition 40 Grant ($170,000), Trancas Canyon Park Designated Reserve ($2,989,461), and General Fund ($22,000);
- Broad Beach Road Biofiltration Project - Proposition 84 funding in the amount of $2.25 million and City match of $250,000;
- Marie Canyon Water Quality Improvement Project - $950,000 from a SWRCB Proposition 13 Grant and $350,000 from the Los Angeles County Flood Control District; and
- Wildlife Road Treatment Project- Proposition 84 funding in the amount of $540,000 and City match of $60,000.

The City has allocated from the general fund on CIP, sensitive, and priority projects such as Malibu Road and Las Flores biofiltration projects and Civic Center pump upgrades as a result of a third party lawsuit.

The County has an ongoing collective budget of $10.1 million for 140 unincorporated areas. Additional funds for projects are allocated on an annual basis from the General Fund and other sources. In Fiscal Year 2015-16, the total allocation from the General Fund for stormwater management was $23 million. Additional funds from other sources, including the Gasoline Tax, Solid Waste Fund, Prop C, Prop A Local Return Funds, and Measure R, provide for ongoing MCM compliance activities.

The LACFCD allocated a budget of $33 million from the Flood Fund for all LACFCD territories within Los Angeles County MS4 in Fiscal Year 2015-16.

A number of potential funding sources have been identified that will be considered by the NSMBCW EWMP Group to supply the remaining funding estimated to be necessary to meet the final cost estimates for the EWMP. Currently, the NSMBCW EWMP Group is pursuing Proposition 1 implementation grant funding for the Winter Canyon Project and the County is pursuing Proposition 1 and Proposition 84 grant funding for the Topanga Canyon Regional (Viewridge Road) Super Green Street EWMP Project.

The potential funding strategies, potential uses, and constraints on the use of the strategy are included in **Table 41**.

Table 41. Potential Funding Strategies

Type	Background	Potential	Process	Conditions	Challenges
Enhanced Infrastructure Financing Districts (EIFDs)	Government entity created by City or County to construct or improve infrastructure, governed by a public financing authority (PFA) to use a portion of property taxes from the participating jurisdictions or other fees or investments to fund regional infrastructure projects	Signed into law in Fall 2014, will allow cross jurisdictional projects to collaboratively fund improvements affecting water problems which don't follow jurisdictional boundaries	• Determine if the prerequisites are met • ID projects, stakeholders, district members • Establish PFA • Formalize EIFD • Develop Infrastructure Financing Plan (IFP) • Review with public • Adopt IFP and begin work	• Receive Finding of Completion (FOC) • Certify no SA assets under litigation will benefit • Comply with State Controller's asset transfer review	New concept which will need time to become standard practice will require educating local decision makers of the benefits of EIFDs
State Revolving Fund (SRF) Loans and SRF Prinicipal Forgiveness grants	Funding source for any city county or district to fund projects including stormwater treatment, water reclamation and wastewater treatment systems; principal forgiveness for projects in the Santa Monica Bay National Estuary program.	Continuously available for application	Application available online on SWRCB site,	Limitations apply to types of projects eligible	Limited supply of funds
Bonds	Traditional infrastructure bonds	Vary by project funding needs and jurisdiction	Traditional bond development and approval processes	Vary by type of bond and details	• Lack of public support from lack knowledge of infrastructure funding shortcomings • Timelines of bond issuance process don't always match project timelines

Type	Background	Potential	Process	Conditions	Challenges
Prop 1. Grants	The bond measure approved by voters in fall of 2014 will enact the Water Quality, Supply, and Infrastructure Improvement Act of 2014	$7.5 billion law to be enacted, funds generated by the act will become available under a variety of programs and through various agencies and timelines	Prop 1 Water Bond contained: • $520 million to improve water quality for "beneficial use," for reducing and preventing drinking water contaminants • $1.495 billion for competitive grants for multi-benefit ecosystem and watershed protection and restoration projects • $810 million for expenditures on, and competitive grants and loans to, integrated regional water management projects • $2.7 billion for water storage projects, dams and reservoirs • $725 million for water recycling and advanced water treatment technology • $900 million for competitive grants and loans for groundwater contamination cleanup • $395 million for flood management projects	Will vary by program, information about availability will be arriving from different agencies administering funds in 2015. Governor's budget calls for spending $532 million in 2015 of Prop 1 funds	Will vary by program

Type	Background	Potential	Process	Conditions	Challenges
IRWM Grants	Grant funding program for projects related to all aspects of water resources, including multi-jurisdiction projects	Stormwater management projects are eligible for funding	• Application process overseen by DWR. • Applications for the current round of Prop 84 funding will be due in fall of 2015, draft program guidelines to be released in spring 2015 • $1.1 billion in spending from the 2006 flood bond Prop 1E proposed in Governor's 2015 budget	To be outlined in guidelines	Limited supply of funds
Climate Change/Greenhouse Gas Emission Funding	AB32 established a comprehensive emission reduction program, including a "cap and trade" program that will auction emission credits creating up to $3billion annually, investment of these funds will be potential funding source	Emission trading funds investment plan does include "water use and supply" projects that reduce GHG as eligible	Emission trading market still developing	Still to be determined	Role of stormwater projects in the cap and trade program and quantification of associated emission reduction is still to be determined
Local Stormwater Fees or Assessments	Standard utility type fee assessed on a parcel basis included as part of property tax or sewer service bill, varies in percent.		Varies by jurisdiction, ordinance development and approval process typically included	Various exemptions and exceptions related to sizing and type of surface/storm water management systems and requirements	Lack of public support from lack knowledge of infrastructure funding shortcomings

Type	Background	Potential	Process	Conditions	Challenges
Collaborative opportunities with Other Agencies	Mutually beneficial program partnerships to share resources and meet regulatory requirements; water suppliers to meet conservation goals through rainwater harvesting	Will be well suited to be developed via the EIFD process above; support water agency applications for grant funding	Varies on type of jurisdictions or entities included	Varies on type of jurisdictions or entities included	Case by case management can be resource intensive
Public/Private Partnerships	Synergistic partnerships to develop funding opportunities	Vary by jurisdictions, smaller scale projects may be more attainable or allow proof of concept	Vary by project type and scale	Vary by project	May not be repeatable or of sufficient scale to justify public resource expenditure

9.4.3 NEXT STEPS

The Group as a whole, as well as individual members, will prioritize and select the specific financing strategies that best fit their needs.

10 LEGAL AUTHORITY

The NSMBCW EWMP Agencies, including the City of Malibu, County of Los Angeles, and Los Angeles County Flood Control District, have adequate legal authority to implement and enforce the requirements in the Permit, consistent with the requirements set forth in the regulations implementing the Clean Water Act, 40 CFR § 122.26(d)(2)(i)(A-F), and to the extent permitted by state and federal law and subject to the limitations on municipal action under the California and United States Constitutions.

As required by the Permit, each Agency has submitted and will continue to submit as part of its Annual Report a statement certified by its chief legal counsel that verifies their legal authority. What follows is a summary of each Agency's legal authority.

10.1 CITY OF MALIBU

The primary source of the City's authority is Article 11, § 7 of the California Constitution. The City also has authority under § 13002 of the California Water code to adopt and enforce ordinances conditioning, restricting, and limiting activities which might degrade the quality of waters of the State. Pursuant to Article 11, § 7 of the California Constitution and § 13002 of the California Water Code, the City adopted Chapter 13.04 of the Malibu Municipal Code, which contains the City's regulations enabling it to impose the legal requirements of the Permit. The City's Local Coastal Program as certified by the California Coastal Commission includes a Land Use Plan and Local Implementation Plan. The LCP details many environmentally protective standards for new development and redevelopment projects, some of which are equally or more stringent than those in the Permit. Thus, the City has the legal authority as required under Part VI.A.2 of the Permit.

Article 11, § 7 also provides the City the authority to require the use of control measures to prevent or reduce the discharge of pollutants and ensure that such control measures are properly operated and maintained. The City's environmental requirements are also implemented in part through the application of the California Environmental Quality Act (CEQA) process to proposed projects, as enforceable mitigation measures. The City, as a municipal corporation, has authority to enter into contracts that enable it to carry out its necessary functions, including the power to enter into interagency agreements to control the contribution of pollutants from one portion of the shared MS4 to another.

Pursuant to Malibu Municipal Code Chapters 1.10 – Administrative Citation and Penalties, 1.16 – General Penalty, and 13.04 – Storm Water Management and Discharge Control, the City's regulations may be enforced administratively, civilly, and criminally. The Malibu Municipal Code also provides various procedures to modify and/or revoke city-issued permits for unlawful and/or environmentally disruptive activity.

10.2 COUNTY OF LOS ANGELES

Although many portions of State law, the Charter of the County of Los Angeles, and the Los Angeles County Code are potentially applicable to the implementation and enforcement of the Permit requirements, the primary applicable laws and ordinances are:

- Los Angeles County code, Title 12, Chapter 12.80 – Stormwater and Runoff Pollution Control;
- Los Angeles County Code, Title 12, Chapter 12.84 – Low Impact Development Standards;
- Los Angeles County Code, Title 22 – Planning and Zoning, Part 6 – Enforcement Procedures;
- Los Angeles County Code, Title 26 – Building Code;
- California Government Code §6502;
- California Government Code §23004.

10.3 LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

Although many portions of State law, the Charter of the County of Los Angeles, the Los Angeles County Code, and the Los Angeles County Flood Control District Code are potentially applicable to the implementation and enforcement of the Permit requirements, the primary applicable laws and ordinances are:

- Los Angeles County code, Title 12, Chapter 12.80 – Stormwater and Runoff Pollution Control;
- Los Angeles County Code, Title 12, Chapter 12.84 – Low Impact Development Standards;
- Los Angeles County Code, Title 22 – Planning and Zoning, Part 6 – Enforcement Procedures;
- Los Angeles County Code, Title 26 – Building Code;

- LACFCD Code Chapter 21 – Stormwater and Runoff Pollution Control;
- California Government Code §6502;
- California Government Code §23004;
- California Water Code §8100 et. seq.

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APPENDIX A

Notice of Intent

April 7, 2014

Mr. Jim Thorsen, City Manager
City of Malibu
Public Works Department
23825 Stuart Ranch Road
Malibu, CA 90265

Ms. Gail Farber, Director
County of Los Angeles
Department of Public Works
Watershed Management Division, 11th Floor
900 South Fremont Avenue
Alhambra, CA 91803

Ms. Gail Farber, Chief Engineer
Los Angeles County Flood Control District
Department of Public Works
Watershed Management Division, 11th Floor
900 South Fremont Avenue
Alhambra, CA 91803

APPROVAL OF REVISED NOTIFICATION OF INTENT TO DEVELOP AN ENHANCED WATERSHED MANAGEMENT PROGRAM FOR THE NORTH SANTA MONICA BAY COASTAL WATERSHED, PURSUANT TO THE LOS ANGELES COUNTY MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) PERMIT (NPDES PERMIT NO. CAS004001; ORDER NO. R4-2012-0175)

Dear Permittees participating in the North Santa Monica Bay Coastal Watershed:

In a letter dated November 26, 2013, the California Regional Water Quality Control Board, Los Angeles Region (Regional Water Board or Board) provided its review of the North Santa Monica Bay (SMB) Coastal Watershed agencies' notification of intent (NOI) to develop an enhanced watershed management program (EWMP). As part of their NOI, Permittees pursuing an EWMP are required to identify, and commit to fully implement by June 28, 2015, a structural best management practice (BMP) or suite of BMPs at a scale that provides meaningful water quality improvement within each watershed covered by the EWMP. The structural BMP(s) must be in addition to BMPs that are required to meet interim or final trash TMDL effluent limitations or other final effluent limitations applicable in the watershed with deadlines prior to April 28, 2016. The structural BMP(s) identified in the NOI are subject to Executive Officer approval. The NOI identified the Broad Beach Biofiltration project, Wildlife Road Storm Drain Improvement project, and the Malibu Legacy Park Pump Station Improvement project in the Santa Monica Bay Watershed Management Area as the structural BMPs to meet the above mentioned requirement.

In its letter, the Board requested additional information about each of the projects and the water quality improvements to be achieved by these three projects. Specifically, for the Board to fully evaluate the three projects, Permittees needed to provide the size of drainage area; the volume of storm water to be treated; the additional volume to be treated at Legacy Park; and an estimate of pollutant load reductions.

On December 17, 2013, the Regional Water Board received an amended NOI for the North SMB Coastal Watershed EWMP. Board staff has reviewed the revised NOI for compliance with all notification requirements of Part VI.C of Order No. R4-2012-0175 and has determined that all the notification requirements, of Part VI.C of Order No. R4-2012-0175, have been met.

Pursuant to section VI.C.4.b.iii.(5) of the Order, the proposed structural best management practices (BMPs) are subject to approval by the Regional Water Board Executive Officer. The City of Malibu proposes to implement the Broad Beach Biofiltration project; the Wildlife Road Storm Drain Improvement project; and the Malibu Legacy Park Pump Station Improvement project. During Board staff review of the BMPs, discrepancies were found with the calculation of the design volumes for the Broad Beach Biofiltration project and the Wildlife Road Storm Drain Improvement project. In addition, the completion date for the Malibu Legacy Park Pump Station Improvement project was past the 30 month implementation deadline of June 28, 2015. On March 11, 2014, the Board received a second revised NOI, which addressed these concerns.

The Broad Beach Biofiltration project consists of the installation of biofilters within eight catch basins along Broad Beach Road to treat storm water and urban runoff prior to discharge into the Pacific Ocean adjacent to the Eastern Section of the Laguna Point to Latigo Point Area of Special Biological Significance (ASBS). The eight catch basins will capture runoff from a drainage area of 12.4 acres and will be designed to treat the runoff from a 0.75 inch 24-hour storm event. The biofilters have an estimated removal efficiency of 95% to 99% for fecal coliform, E. coli and enterococcus; and a total suspended solids (TSS) removal efficiency of approximately 85%.

The Wildlife Road Storm Drain Improvement project consists of the installation of bioretention swales along Wildlife Road and Whitesands Place and installation of biofilters within two catch basins to treat storm water and urban runoff prior to discharge into the Pacific Ocean adjacent to the ASBS. The two catch basins will capture runoff from a drainage area of 8.8 acres and will be designed to treat the runoff from a 0.75 inch 24-hour storm event. The biofilters have an estimated removal efficiency of 95% to 99% for fecal coliform, E. coli and enterococcus; and a TSS removal efficiency of approximately 85%.

The Malibu Legacy Park Pump Station Improvement project will upgrade the existing storm drain pumps at the Cross Creek Pump Station and the Malibu Road Pump Station. The objective of the pump station upgrades is to increase the pumping capacity at Cross Creek and Malibu Road to capture and convey the 85^{th} percentile 24-hour storm event to Malibu Legacy Park for treatment. The Cross Creek Pump Station and the Malibu Road Pump Station currently have a maximum pumping capacity of 200 gallons per minute. These two pump stations will be upgraded with new pumps and other improvements to increase the volume of water pumped to Legacy Park for treatment.

The Board has concluded that these three projects will result in meaningful improvements in water quality by preventing and removing bacteria and other pollutants from storm water before discharging into the Pacific Ocean. Therefore, the proposed Broad Beach Biofiltration project; the Wildlife Road Storm Drain Improvement project; and the Malibu Legacy Park Pump Station Improvement project are approved.

The work plan for development of the North SMB Coastal Watershed EWMP is due by June 28, 2014. Please submit the work plan to losangeles@waterboards.ca.gov with the subject line “LA County MS4 Permit – Enhanced Watershed Management Program Work Plan” with copies to Ivar.Ridgeway@waterboards.ca.gov and Rebecca.Christmann@waterboards.ca.gov.

If you have any questions, please contact Mr. Ivar Ridgeway, Storm Water Permitting, at (213) 620-2150 or Ms. Rebecca Christmann at (213) 576-6786.

Sincerely,

Samuel Unger

Samuel Unger, P.E.
Executive Officer

cc: Jennifer Brown, City of Malibu
Rob DuBoux, City of Malibu
Angela George, County of Los Angeles, Department of Public Works
Gary Hildebrand, Los Angeles County Flood Control District
David Smith, NPDES Program, USEPA Region IX
Jennifer Fordyce, Office of Chief Counsel, State Water Board

NOTICE OF INTENT
North Santa Monica Bay Coastal Watersheds Enhanced Watershed Management Program and Coordinated Integrated Monitoring Program

Submitted to:
Los Angeles Regional Water Quality Control Board
320 West 4th Street, Suite 200
Los Angeles, CA 90013
losangeles@waterboards.ca.gov

Submitted by:
City of Malibu
County of Los Angeles
Los Angeles County Flood Control District

March 11, 2014

SECTION 1. PROGRAM TYPE AND PERMITTEES

MS4 Permit Section VI.C.4.b.i and Attachment E Section IV.C.1.

This Notice of Intent (NOI) is being submitted in accordance with Part VI.C.4.b.i of Order R4-2012-0175. The Permittees (listed in **Table 1**) that are party to this NOI hereby notify the Los Angeles Regional Water Quality Control Board (Regional Water Board) of their intent to develop an Enhanced Watershed Management Program (EWMP) for the portions of the Santa Monica Bay (SMB) Watershed Management Area located within SMB Jurisdictional Group (JG) 1, SMB JG 4, and the portion of the Malibu Creek Watershed (SMB JG 9) located within the City of Malibu's boundaries, hereafter collectively referred to as the North Santa Monica Bay Coastal Watersheds (NSMB) EWMP Area. The geographic scope of the EWMP addressed in this NOI is further discussed in Section 5 of this document. The Permittees meet the Low Impact Development (LID) and green streets conditions, will submit an EWMP Work Plan within 18 months of the effective date of the Order R4-2012-0175 (June 28, 2014), and will submit the Draft EWMP within 30 months of the effective date (June 28, 2015).

Additionally, the Permittees (listed in **Table 1**) that are party to this NOI 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 program elements and will submit the CIMP within 18 months of the effective date of Order R4-2012-0175 (June 28, 2014).

Table 1. Enhanced Watershed Management Program Permittees
City of Malibu
County of Los Angeles
Los Angeles County Flood Control District

SECTION 2. TOTAL MAXIMUM DAILY LOADS ESTABLISHED WATER QUALITY BASED EFFLUENT LIMITATIONS

MS4 Permit Section VI.C.4.b.ii

Table 2 lists the Total Maximum Daily Loads (TMDLs) that have specifically been developed for areas that are included in the NSMB EWMP Area. **Table 3** lists applicable interim and final trash Water Quality Based Effluent Limitations (WQBELs) and all other final WQBELs and receiving water limitations (RWLs) established by TMDLs with compliance deadlines occurring prior to the anticipated approval date of the

EWMP (April 28, 2016). The watershed control measures that will be implemented to meet the requirements of the interim and final trash WQBELs and all other final WQBELs are described in Section 3 of this NOI.

Table 2. Total Maximum Daily Loads Applicable to the North Santa Monica Bay Enhanced Watershed Management Program Area

TMDL	Regional Board Resolution	Effective Date and/or EPA Approval Date
Santa Monica Bay Beaches Dry Weather TMDL	2002-004	07/15/2003
Santa Monica Bay Beaches Wet Weather TMDL	2002-022	07/15/2003
Malibu Creek Watershed Bacteria TMDL	2004-019R	01/24/2006
Malibu Creek Watershed Trash TMDL	2008-007	07/07/2009
Malibu Creek Nutrient TMDL	Not Assigned	03/21/2003
Santa Monica Bay Nearshore and Offshore Debris TMDL	R10-010	03/20/2012
Santa Monica Bay DDTs and PCBs TMDL	Not Assigned	03/26/2012

Table 3. Applicable Interim and Final Trash WQBELs and all other Final WQBELs and Receiving Water Limitations[1] Occurring Before Enhanced Watershed Management Program Approval

TMDL Order	WQBEL/RWL	Interim/ Final	Compliance Date [2]
Santa Monica Bay Beaches Dry Weather Bacteria 2002-004	*Total Coliform* [3] Daily Maximum: 10,000 MPN/100 mL *(WQBEL)* Geometric Mean: 1,000 MPN/100 mL *(WQBEL and RWL)*	Final	12/28/2012
	Fecal Coliform Daily Maximum: 400 MPN/100 mL *(WQBEL)* Geometric Mean: 200 MPN/100 mL *(WQBEL and RWL)*	Final	12/28/2012
	Enterococcus Daily Maximum: 104 MPN/100 mL *(WQBEL)* Geometric Mean: 35 MPN/100 mL *(WQBEL and RWL)*	Final	12/28/2012
	Compliance with allowable exceedance days for summer and winter dry weather single sample maximum *(RWL)*	Final	12/28/2012

(Table continued on the next page)

Table 3. Applicable Interim and Final Trash WQBELs and all other Final WQBELs and Receiving Water Limitations[1] Occurring Before Enhanced Watershed Management Program Approval

TMDL Order	WQBEL/RWL	Interim/ Final	Compliance Date [2]
Malibu Creek and Lagoon Dry Weather Bacteria 2004-019R	*Total Coliform [3] (Malibu Lagoon)* Daily Maximum: 10,000 MPN/100 mL *(WQBEL)* Geometric Mean: 1,000 MPN/100 mL *(WQBEL and RWL)*	Final	12/28/2012
	Fecal Coliform (Malibu Lagoon) Daily Maximum: 400 MPN/100 mL *(WQBEL)* Geometric Mean: 200 MPN/100 mL *(WQBEL and RWL)*	Final	12/28/2012
	Enterococcus (Malibu Lagoon) Daily Maximum: 104 MPN/100 mL *(WQBEL)* Geometric Mean: 35 MPN/100 mL *(WQBEL and RWL)*	Final	12/28/2012
	E. coli (Malibu Creek) Daily Maximum: 235 MPN/100 mL *(WQBEL)* Geometric Mean: 126 MPN/100 mL *(WQBEL and RWL)*	Final	12/28/2012
	Compliance with allowable exceedance days for summer and winter dry weather single sample maximum *(RWL)*	Final	12/28/2012
Malibu Creek Trash R4-2008-007	80% of baseline (i.e., 20% reduction)	Interim	7/7/2013
	60% of baseline (i.e., 40% reduction)	Interim	7/7/2014
	40% of baseline (i.e., 60% reduction)	Interim	7/7/2015
Santa Monica Bay Nearshore and Offshore Debris R10-010	80% of baseline (i.e., 20% reduction)	Interim	3/20/2016

1 Per Order R4-2012-0175, interim and final WQBELs are listed for trash TMDL and final WQBELs are listed for other pollutants.

2 Per Order R4-2012-0175, WQBELs and RWLs are required to be met at the effective date of the Order. TMDL implementation plans required responsible parties to meet Santa Monica Bay Bacteria TMDL allowable exceedance days during summer dry weather on 7/15/2006 and winter dry weather on 7/15/2009 and Malibu Creek Bacteria TMDL allowable exceedance days during summer dry weather on 1/24/09 and winter dry weather on 1/24/2012.

3 Total coliform density shall not exceed a daily maximum of 1,000 MPN/ 100 mL, if the ratio of fecal-total coliform exceeds 0.1.

SECTION 3. IDENTIFY TMDL CONTROL MEASURES

MS4 Permit Sections VI.C.4.b.ii and VI.C.4.d

The Permittees that are participating in this EWMP are responsible for four TMDLs with interim (trash only) and final WQBELs deadlines that occur prior to the anticipated approval of the EWMP (April 28, 2016). **Table 4** identifies the structural control measures that have been or will be implemented by the Permittees for each TMDL. The Permittees will continue to implement these measures during the development of the EWMP.

In addition to the structural control measures listed in Table 4, the City of Malibu has implemented a number of non-structural source control measures that go beyond the minimum control measures in the permit to support implementation of the TMDLs. These measures include a proactive illicit connection/illicit discharge program that places elimination of all runoff as a priority including irrigation runoff, the City of Malibu Local Coastal Program (discussed in more detail below), annual or more frequent commercial inspections through the Clean Bay Restaurant Certification program (the permit requires 2 inspections during the 5-year permit term), annual inspections of automotive service/retail gasoline outlets (the permit requires 2 inspections during the 5-year permit term), and marine debris reducing ordinances such as plastic bag and polystyrene packaging bans and banning smoking on beaches.

The Los Angeles County Flood Control District submitted a revised Time Schedule Order request to address compliance with the Malibu Creek and Lagoon Dry Weather Bacteria TMDL.

Table 4. Structural Control Measures Implemented to Address Total Maximum Daily Loads[1]

TMDL	Permittees	Implementation Plan and Control Measures	Status of Implementation
Santa Monica Bay Beaches Dry Weather Bacteria 2002-004	City of Malibu	Paradise Cover Stormwater Treatment Facility[2]	Completed (June 2010)
	County of Los Angeles	Advanced treatment septic systems for beach restrooms at Malibu/Surfrider, Point Dume, Topanga, and Zuma Beaches	In progress (12 out of 18 completed as of June 2013)
	County of Los Angeles, Los Angeles County Flood Control District, and City of Malibu	Marie Canyon Water Quality Improvement Project[1,2]	Completed (October 2007)
Malibu Creek and Lagoon Dry Weather Bacteria 2004-019R [4]	City of Malibu and Los Angeles Flood Control District	Civic Center Stormwater Treatment Facility [3]	Completed (February 2007)
		Malibu Legacy Park Project [3]	Completed (October 2010)
Malibu Creek Trash R4-2008-007 [4]	City of Malibu	Malibu Legacy Park Project achieves full capture of 100% of City's drainage area to the Creek.	Completed (October 2010)
		Civic Center Stormwater Treatment Facility screens and filters all runoff to Legacy Park.	Completed (February 2007)
Santa Monica Bay Nearshore and Offshore Debris R10-010	City of Malibu	Distributed Best Management Practices (BMPs) to reduce baseline by 20%	Will complete by March 2016
	County of Los Angeles	Trash Monitoring & Reporting Plan's (TMRP) Minimum Frequency of Assessment and Collection (MFAC)	County will implement the subject MFAC once the Regional Water Board approves the TMRP.
		Plastic Pellets Monitoring and Reporting Plan	County will submit the subject plan by the September 20, 2013 deadline.
		Full capture trash inserts in catch basins to reduce baseline by 20%	Will complete by March 2016

1 These control measures are complete and/or are being implemented concurrently with EWMP Development.

2 From existing Santa Monica Bay Beaches Wet-Weather Bacteria Total Maximum Daily Load Implementation Plan Jurisdictional Groups 1 and 4.

3 These control measures also reduce the bacteria loading to the Santa Monica Bay beaches near the outlet of Malibu Creek and thereby support compliance with the Santa Monica Bay Beaches Dry Weather Total Maximum Daily Load as well.

4 The measures the County has been implementing or will implement to address the TMDLs that are specific to the Malibu Creek Watershed are not discussed in this NOI because the areas within the Malibu Creek Watershed that the County is responsible for will be addressed in a separate NOI and EWMP, specifically, the Malibu Creek Watershed Group EWMP.

SECTION 4. DEMONSTRATION OF MEETING LID ORDINANCE AND GREEN STREET POLICY REQUIREMENTS

MS4 Permit Sections VI.C.4.b.iii.(6), VI.C.4.c.iv.(1), and VI.C.4.c.iv.(2)

The Permittees that are party to this NOI have draft LID ordinances and Green Streets policies. **Table 5** and **Table 6** summarize the status of the Permittees' LID ordinances and Green Streets policies, respectively, for the EWMP area covered by this NOI. As a member of the Los Angeles Permit Group, the City of Malibu will be utilizing the draft LID ordinance and the green streets policy developed by the subject group to meet the requirements to complete a draft LID ordinance and Green Streets policy prior to NOI submittal. The County of Los Angeles has drafted its own LID ordinance and Green Streets policy. More than 50 percent of the area that will be addressed by the EWMP is covered by the City of Malibu's and County's LID ordinances and Green Streets policies.

In addition to utilizing the aforementioned draft ordinance, the City of Malibu has been implementing LID and proactive environment protection requirements for years. The City of Malibu implements a certified Local Coastal Program (LCP) with adopted Local Implementation Plan (LIP), which is considered to be one of the most stringent in regard to development standards in the State. It contains standards addressing a wide range of coastal development issues, many of which serve to reduce water runoff and improve water quality. The standards include:

- limitations on development size and area such as:
  - limiting the interior square footage of commercial projects to 15 percent of the parcel size,
  - allowing for up to 20 percent of the parcel size to be used for commercial projects in the Civic Center Area if the project contains public benefits and amenities, including public open space and habitat restoration or enhancement,
  - requiring that 65 percent of a commercial parcel be retained as landscaping and open space;
- basing residential structure size for non-beachfront lots on lot area, less slopes of 1:1 and steeper (for steep lots, this means the calculation is based on the area of the lot flatter than 1:1, resulting in smaller structures on steep lots);
- encouraging the use of permeable surfaces, especially for driveways;
- requiring that development be planned to fit the topography, soils, geology, hydrology, and other conditions existing on the site so that grading is kept to an absolute minimum while placing an actual limit on the quantity of grading;

- prohibiting new agricultural uses and confined animal uses in environmentally sensitive habitat areas and associated buffer zones, as well as on slopes greater than 3:1;
- requiring setbacks from parklands, streams, wetlands, and coastal bluffs;
- requiring that disturbed areas be protected from erosion; minimize irrigation requirements through the use of native and drought-tolerant plants (which includes a restriction on the amount of turf) and protect existing native areas by the minimization of clearing and the prohibition of invasive, non-native species;
- requiring parking areas to have landscaping; and
- encouraging the use of graywater for irrigation where feasible.

Table 5. Status of Low Impact Development Ordinance Coverage

Permittee	Jurisdictional Area	LID Ordinance Status	MS4 EWMP Area for which Permittee is Responsible [acres]	MS4 EWMP Area Covered by Permittee's LID Ordinance [acres]	Percentage of EWMP Area
City of Malibu	JG1	Draft Ordinance	11,062	11,062	20.1%
	JG4	Draft Ordinance	998	998	1.8%
	JG9	Draft Ordinance	599	599	1.1%
County of Los Angeles	JG1	Draft Ordinance	42,217	42,217	76.6%
	JG4	Draft Ordinance	245	245	0.4%
LACFCD	N/A	N/A	N/A	N/A	N/A
	Total EWMP Area		55,121		
	Total EWMP Area Covered by LID Ordinances			55,121	
	% of EWMP Area Covered by LID Ordinance				100%

Status Description:

- Draft Ordinance – Permittee has completed, or will complete by June 28, 2013, the development of a draft LID Ordinance that is in compliance with the requirements of Order R4-2012-0175 for its portion of the MS4 watershed.

Table 6. Status of Green Street Policy Coverage

Permittee	Jurisdictional Area	Green Street Policy Status	MS4 EWMP Area for which Permittee is Responsible [acres]	MS4 EWMP Area Covered by Permittee's Green Street Policy [acres]	Percentage of EWMP Area
City of Malibu	JG1	Draft Policy	11,062	11,062	20.1%
	JG4	Draft Policy	998	998	1.8%
	JG9	Draft Policy	599	599	1.1%
County of Los Angeles	JG1	Draft Policy	42,217	42,217	76.6%
	JG4	Draft Policy	245	245	0.4%
LACFCD		N/A	N/A	N/A	N/A
	Total EWMP Area		55,121		
	Total EWMP Area Covered by Green Street Policies			55,121	
	% of EWMP Area Covered by Green Street Policies				100%

Status Descriptions:

- Draft Policy – Permittee has completed, or will complete by June 28, 2013, the development of a draft Green Street Policy that is in compliance with the requirements of Order R4-2012-0175 for its portion of the MS4 watershed.

SECTION 5. GEOGRAPHIC SCOPE OF ENHANCED WATERSHED MANAGEMENT PROGRAM

MS4 Permit Section VI.C.4.b.iii.(1)

The EWMP and CIMP will address MS4 areas within the North Santa Monica Bay Coastal Watersheds (that is, SMB JG 1, SMB JG 4, and the portion of SMB JG 9 located within the City of Malibu's boundaries) that are under the jurisdiction of the City of Malibu and the County of Los Angeles and the Los Angeles County Flood Control District's facilities within those areas, as shown in **Figure 1**. The EWMP and CIMP will not address State of California (State) and Federal lands within SMB JG 1, SMB JG4, and the portion of SMB JG 9 located within the City of Malibu's boundaries. The area covered by the EWMP is 55,121 acres and includes portions of 18 subwatersheds. **Table 7** provides a breakdown of each jurisdictional group within the EWMP area. Geographic descriptions of each of the jurisdictional groups are discussed in the following sections.

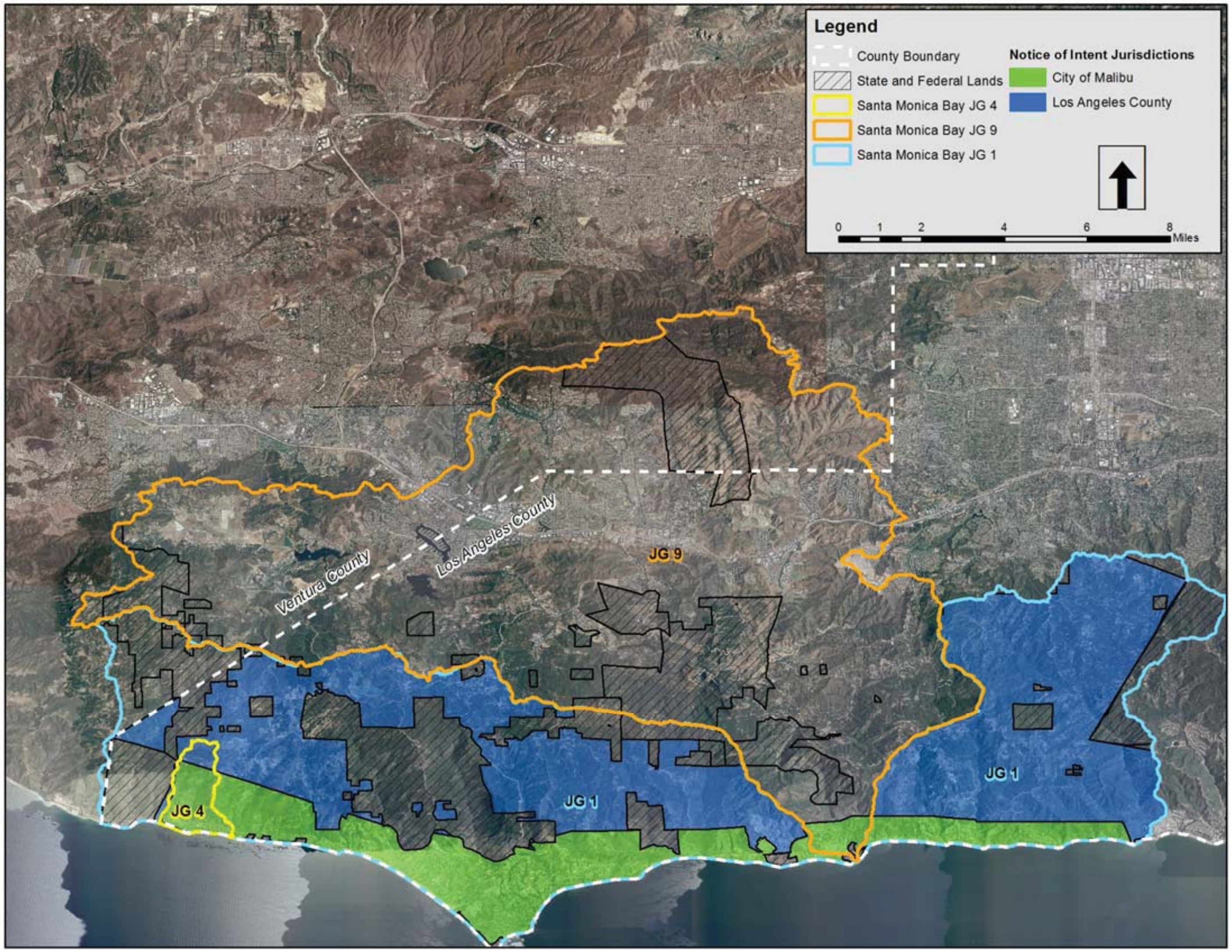

Figure 1. Geographic Scope of the Portions of Santa Monica Bay Jurisdictional Groups 1, 4, and 9 to be covered by the Enhanced Watershed Management Program and Coordinated Integrated Monitoring Program (areas that are not highlighted constitute areas that are not within the geographic scope of the NSMB EWMP)

Table 7. North Santa Monica Bay Coastal Watersheds Land Area Distribution and Enhanced Watershed Management Program and Coordinated Integrated Monitoring Plan Participation

Jurisdictional Group	Responsible Party	EWMP Party	Land Area (Acres)	Percent of JG Area
Jurisdictional Group 1	City of Malibu	Yes	11,062	19.0%
	County of Los Angeles	Yes	42,217	72.5%
	Total JG 1 Area Covered by this EWMP and CIMP		**53,279**	
	Cities of Calabasas and Los Angeles, Caltrans, and State and Federal parks, Santa Monica Mountains Conservancy, and the Mountains Recreation and Conservation Authority	No	4,935	8.5%
	Total Area of Jurisdictional Group 1		**58,214**	
Jurisdictional Group 4	City of Malibu	Yes	998	80.2%
	County of Los Angeles	Yes	245	19.7%
	Total JG 4 Area Covered by this EWMP and CIMP		**1,243**	
	Caltrans	No	1	0.1%
	Total Area of Jurisdictional Group 4		**1244**	
Jurisdictional Group 9	City of Malibu	Yes	599	0.9%
	Total JG 9 Area Covered by this EWMP and CIMP		**599**	
	Cities of Calabasas, Westlake Village, Agoura Hills, Hidden Hills, Simi Valley and Thousand Oaks, unincorporated areas of the Counties of Los Angeles and Ventura, Caltrans, State and Federal parks, Santa Monica Mountains Conservancy, and the Mountains Recreation and Conservation Authority	No	69,831	99.1%
	Total Area of Jurisdictional Group 9		**70,430**	
Total Area Covered by this EWMP and CIMP			***55,121***	
Total Area of Jurisdictional Groups 1, 4, and 9			***129,888***	

Jurisdictional Group 1 Geographic Description

The entire SMB JG 1 area encompasses approximately 58,214 acres and is comprised of portions of the Cities of Malibu, Calabasas, and Los Angeles, unincorporated areas of the County of Los Angeles, Caltrans, State and Federal parks, Santa Monica Mountains Conservancy, and the Mountains Recreation and Conservation Authority. The watershed is comprised of 16 subwatersheds:

Arroyo Sequit	Los Aliso	Encinal	Trancas
Zuma	Ramirez	Escondido	Latigo
Solstice	Corral	Carbon	Las Flores
Piedra Gorda	Pena	Tuna	Topanga

The portion of the SMB JG 1 area covered by this NOI encompasses approximately 53,279 acres and only consists of portions of the City of Malibu and unincorporated areas of the County of Los Angeles. Permittees do not have jurisdiction over lands within the Cities of Calabasas and Los Angeles, Caltrans, and lands owned by the State of California and the Federal government, but will seek collaboration with these agencies during the development of the EWMP. Of the total watershed area, the Permittees have jurisdiction over 91.5% of the land area in SMB JG1. **Figure 2** provides a map of SMB JG1 watershed boundaries and highlights the geographic areas covered by this NOI.

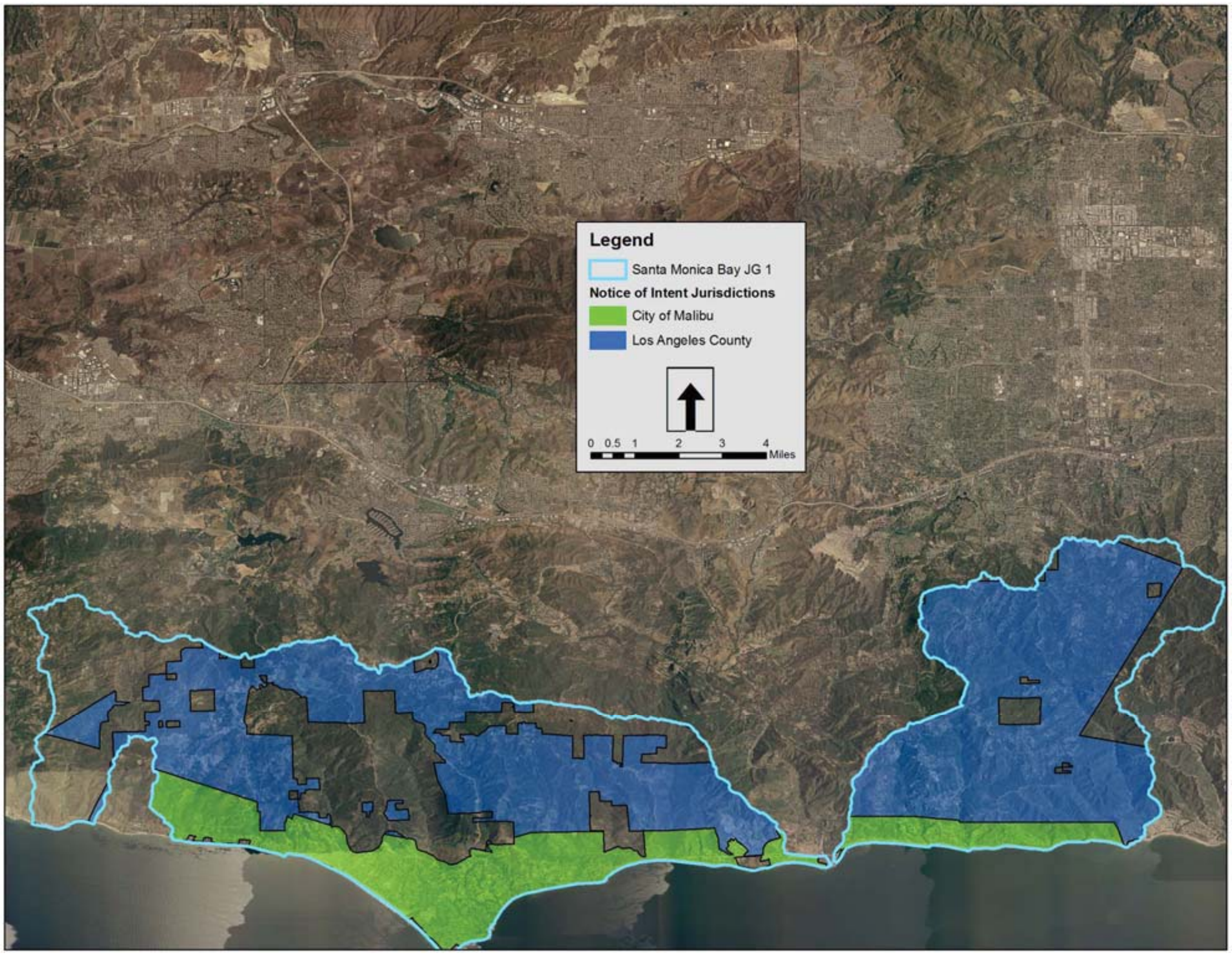

Figure 2. Geographic Scope of the Portion of Santa Monica Bay Jurisdictional Group 1 to be covered by the Enhanced Watershed Management Program and Coordinated Integrated Monitoring Program (areas that are not highlighted constitute areas that are not within the geographic scope of the NSMB EWMP)

Jurisdictional Group 4 (Nicolas Canyon Subwatershed) Geographic Description

The SMB JG 4 area encompasses approximately 1,244 acres and is only comprised of portions of the City of Malibu, unincorporated areas of the County of Los Angeles, and Caltrans. The Permittees have jurisdiction over 99.9% of the total watershed area. Permittees do not have jurisdiction over the lands owned by Caltrans, but will seek collaboration with Caltrans during the development of the EWMP. The entire watershed consists only of the Nicholas Canyon subwatershed. **Figure 3** provides a map of the watershed boundaries and highlights the geographic areas covered by this NOI.

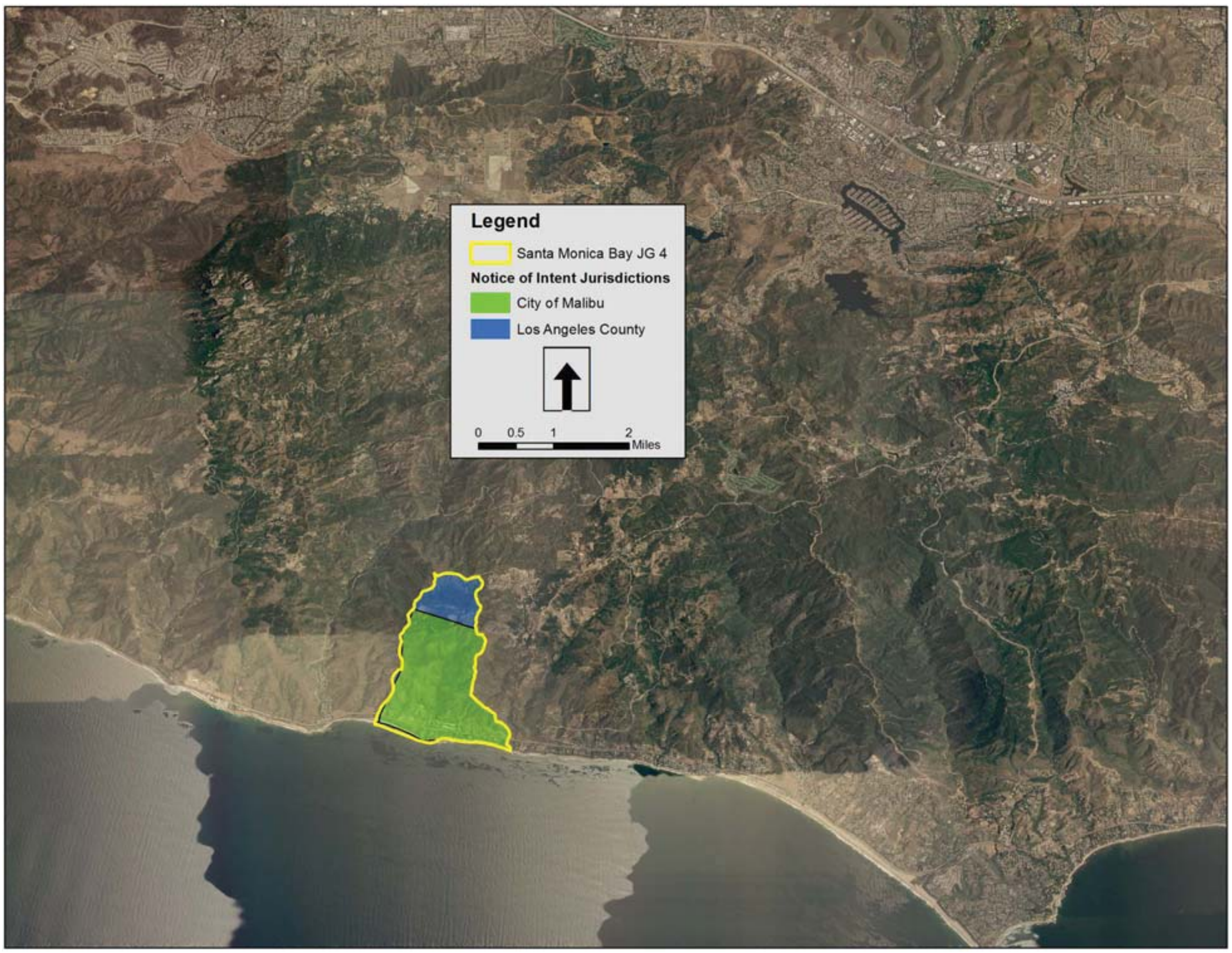

Figure 3. Geographic Scope of the Portion of the Santa Monica Bay Jurisdictional Group 4 area to be covered by the Enhanced Watershed Management Program and Coordinated Integrated Monitoring Program (areas that are not highlighted constitute areas that are not within the geographic scope of the NSMB EWMP)

Jurisdictional Group 9 (Malibu Creek Watershed) Geographic Description

SMB JG9 area encompasses approximately 70,430 acres and is known as the Malibu Creek watershed. It is comprised of portions of the Cities of Agoura Hills, Calabasas, Hidden Hills, Malibu, Simi Valley, and Thousand Oaks, and Westlake Village; (unincorporated areas of) the Counties of Los Angeles and Ventura; Caltrans; State and Federal parks; Santa Monica Mountains Conservancy; and the Mountains Recreation and Conservation Authority.

As previously mentioned, the EWMP and CIMP identified in this NOI will only address the portion of SMB JG 9 within the jurisdictional limits of the City of Malibu, which encompasses approximately 599 acres and only consists of a portion of the City of Malibu. Of the total watershed area, the City of Malibu has jurisdiction over 0.9% of the area in SMB JG 9. The City of Malibu does not have jurisdiction over lands within the rest of the watershed, but will seek collaboration with the other agencies in the watershed during development of the EWMP. **Figure 4** provides a map of the watershed boundaries and highlights the geographic areas covered by this NOI.

The County of Los Angeles and Los Angeles County Flood Control District are partnering with agencies in the Malibu Creek Watershed (other than the City of Malibu) in the development of a Malibu Creek Watershed Group EWMP and a CIMP, which will address the portions of JG9 that are under the responsibility of the agencies that are participating in the development of that EWMP.

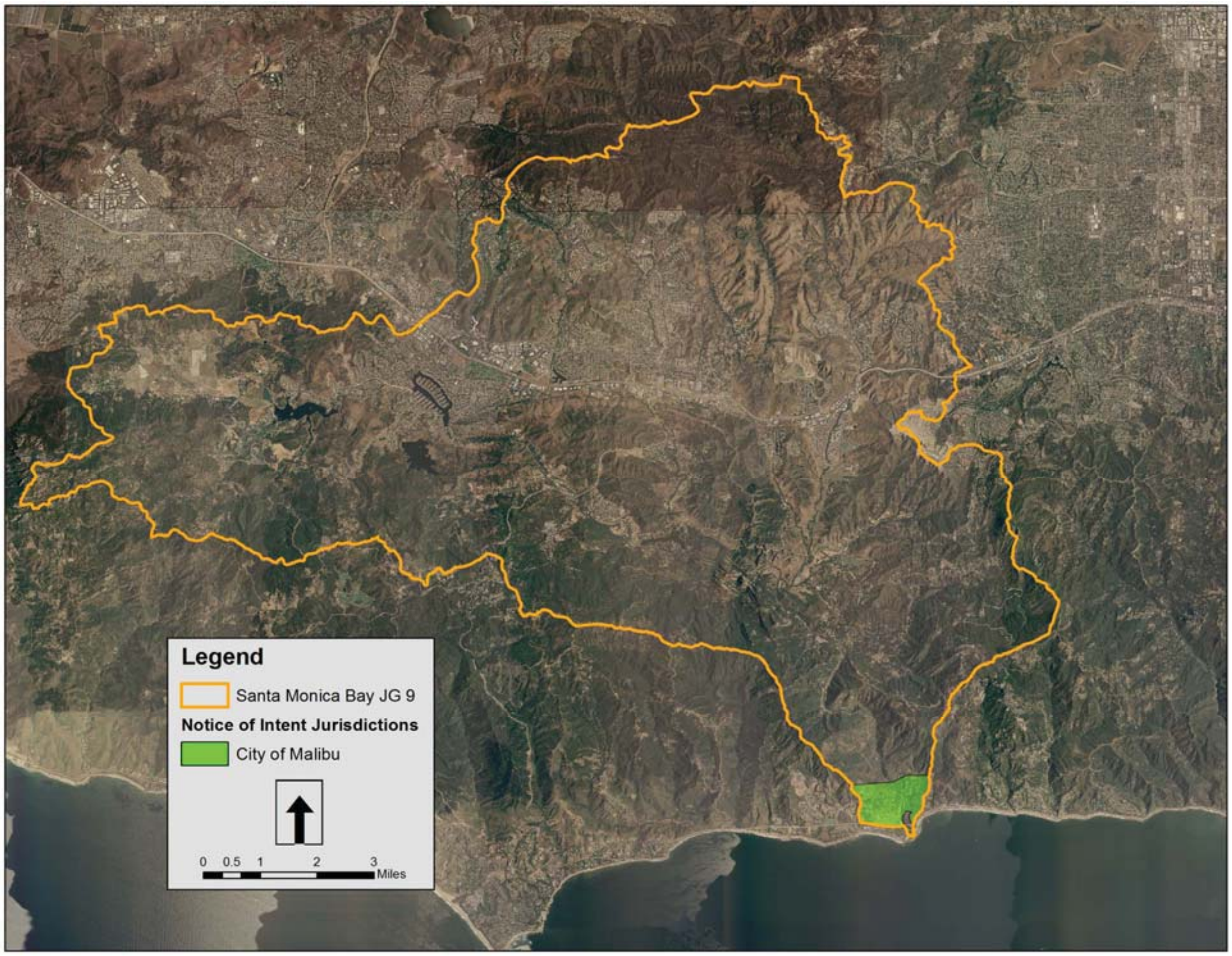

Figure 4. Geographic Scope of the Portion of Santa Monica Bay Jurisdictional Group 9 to be covered by the Enhanced Watershed Management Program and Coordinated Integrated Monitoring Program (areas that are not highlighted constitute areas that are not within the geographic scope of the NSMB EWMP)

SECTION 6. PLAN CONCEPT AND INTERIM MILESTONES AND DEADLINES

MS4 Permit Sections VI.C.4.b.iii.(1) and VI.C.4.b.iii.(4)

The Permittees were directly involved in the development of implementation plans with strategies for compliance with the Malibu Creek and Lagoon Bacteria TMDL and Santa Monica Bay Beaches TMDL and have a track record of successfully and proactively implementing multi-benefit projects in the subwatersheds covered by the NOI to address other TMDL requirements. The Permittees' EWMP will build on the implementation plans and completed control measures to ensure proposed actions consider multiple pollutants and meet the permit requirements. The Permittees' EWMP will re-evaluate watershed control measures that have been proposed, but have not yet been implemented, and will identify improvements that can be made to these control measures to provide the maximum benefit to all stakeholders. Finally, the EWMP will evaluate opportunities for regional projects that could retain all non-stormwater runoff and stormwater from the 85^{th} percentile, 24-hour storm event and identify additional watershed control measures for those areas in the watershed that cannot be addressed by a regional project.

Based on the available information, the Permittees believe that opportunities exist, within the Permittees' collective jurisdictional areas, for collaboration on multi-benefit projects that will meet the intent of the EWMP approach. The Permittees have shown the ability to identify and implement large, regional projects that retain the 85^{th} percentile, 24-hour storm event and provide opportunities for multiple benefits. One example of such a project that has been implemented by the Permittees is the Malibu Legacy Park Project. The Malibu Legacy Park Project encompasses an area of approximately 17 acres. The total cost of the project was in excess of $50 million. The multiple benefits of the project include:

- Elimination of all non-stormwater discharges and stormwater discharges resulting from the 85^{th} percentile, 24-hour storm event.
- Improving the water quality of Malibu Creek, Malibu Lagoon, and nearby beaches by screening, filtering, and disinfecting stormwater and incidental runoff from the local watershed to remove pathogens and other pollutants.
- Developing the Legacy Park site into a public amenity that provides valuable habitat, education, and passive recreation opportunities in conjunction with water quality improvement opportunities.
- Conserving water by using the retained and treated runoff for irrigation in the Park.

Building on the lessons learned from implementing the Malibu Legacy Park Project, the Permittees will continue to seek opportunities for regional projects that retain all non-stormwater and stormwater runoff from the 85^{th} percentile, 24-hour storm event. Where such regional projects cannot be identified, the Permittees will identify smaller-scale watershed control measures.

To ensure adequate progress is being made to achieve the permit deadlines, interim milestones and deadlines were identified and are summarized in **Table 9**. Interim milestones in **Table 9** are the expected due dates of draft Technical Memoranda that will summarize the information and approaches for development of the specified components of the final Work Plan, CIMP, and EWMP. It is expected that the draft technical memos will not be finalized; instead the information presented in the memos will be revised based on comments and presented in the Work Plan, CIMP, and EWMP Plan.

Table 9. Enhanced Watershed Management Program Interim Milestones and Deadlines

Milestone	Deadline
Develop draft technical memorandum of water quality priorities	March 2014
Complete internal draft of EWMP Work Plan	April 2014
Complete internal draft of CIMP	April 2014
Submit final EWMP Work Plan to the Regional Water Board	June 2014
Submit CIMP to the Regional Water Board	June 2014
Develop draft technical memorandum describing approach to US EPA TMDLs	March 2015
Complete internal draft of EWMP	May 2015
Submit draft EWMP to Regional Water Board	June 2015
Submit Final EWMP to Regional Water Board (revised based on to Regional Water Board comments)	January 2016

SECTION 7. COST ESTIMATE

MS4 Permit Section VI.C.4.b.iii.(2)

The cost estimate for the development of the EWMP and CIMP is $400,000. Additionally, it is expected that the Permittees will contribute several hundred thousand dollars of in-kind services toward the development of the EWMP and CIMP and attendance at EWMP and Technical Advisory Committee meetings, and will have additional implementation costs.

SECTION 8. PERMITTEE MEMORANDUM OF AGREEMENT

MS4 Permit Section VI.C.4.b.iii.(2)

Attachment A includes a draft of the Memorandum of Understanding between the Permittees that are participating in the development of the EWMP and CIMP addressed in this NOI. Attachment B includes the Permittees' letters of intent with regard to execution of the MOU.

SECTION 9. COMMITMENT TO IMPLEMENT A STRUCTURAL BMP OR SUITE OF BMPS

MS4 Permit Section VI.C.4.b.iii.(5)

The Permittees listed in **Table 10** will implement the identified structural BMPs to fulfill the obligations under Part VI.C.b.iii.(5). The structural BMPs listed in Table 10 are further described in Attachment C.

Table 10. Structural BMP or Suite of Best Management Practices to be Implemented in the Enhanced Watershed Management Program Area

Jurisdictional Group	Permittee	Structural BMP or Suite of BMPs to be Implemented	Planned Implementation Date
SMB JG 1	City of Malibu	**Broad Beach Biofiltration Project –** installation of biofilters at 9 catch basins on Broad Beach Road.	September 2013 (Commencement of Construction) April 2014 (Completion)
		Wildlife Road Storm Drain Improvements – installation of biofilters along Wildlife Road and Whitesands Place, and catch basin filters at 2 existing catch basins.	September 2013 (Commencement of Construction) April 2014 (Completion)
SMB JG 9	City of Malibu	**Malibu Legacy Park Pump Station Improvements –** upgrade the existing storm drain pumps so that the system can treat an increased volume of runoff.	June 2015 (Completion)

ATTACHMENT A
MEMORANDUM OF UNDERSTANDING

MEMORANDUM OF UNDERSTANDING
BETWEEN
THE CITY OF MALIBU AND PARTICIPATING AGENCIES
(LOS ANGELES COUNTY FLOOD CONTROL DISTRICT AND COUNTY OF LOS ANGELES)

REGARDING THE ADMINISTRATION AND COST SHARING FOR THE DEVELOPMENT OF THE
NORTH SANTA MONICA BAY COASTAL WATERSHEDS
ENHANCED WATERSHED MANAGEMENT PROGRAM
AND COORDINATED INTEGRATED MONITORING PROGRAM

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 City of Malibu (CITY), a municipal corporation, and PARTICIPATING AGENCIES (Los Angeles County Flood Control District (LACFCD) and County of Los Angeles). Collectively, these entities shall be known herein as "PARTIES" or individually as "PARTY."

WITNESSETH

WHEREAS, the Los Angeles Regional Water Quality Control Board (Regional Board) adopted the National Pollutant Discharge Elimination System Municipal Separate Storm Sewer System Permit Order No. R4-2012-0175 (MS4 Permit); and

WHEREAS, the MS4 Permit became effective on December 28, 2012, and requires that the LACFCD, County of Los Angeles, and 84 of the 88 cities (excluding Avalon, Long Beach, Palmdale, and Lancaster) within the County of Los Angeles comply with the prescribed elements of the MS4 Permit; and

WHEREAS, the PARTIES have agreed to collaborate in the development of an Enhanced Watershed Management Program (EWMP) and Coordinated Integrated Program (CIMP) for the areas and facilities in the North Santa Monica Bay Coastal Watersheds controlled by the LACFCD, County of Los Angeles, and CITY to comply with of certain elements of the MS4 Permit; and

WHEREAS, the PARTIES agree that each shall assume full and independent responsibility for ensuring its own compliance with the MS4 Permit despite the collaborative approach of this MOU; and

WHEREAS, the PARTIES collaboratively prepared a final Scope of Work and Request for Proposal to obtain a Consultant to assist the PARTIES with compliance with certain elements of the MS4 Permit, as specified in the Scope of Work, which is incorporated into this MOU by reference; and

WHEREAS, the PARTIES have determined that hiring a Consultant, as set forth in paragraph (5)b, to prepare and deliver a Final Work Plan, an EWMP, and a CIMP (collectively, PLANS) in compliance with certain elements of the MS4 Permit will be beneficial to the PARTIES; and

WHEREAS, the PARTIES have agreed that the total cost for developing the PLANS shall not exceed $521,218, which includes the cost of the Consultant contract, contract administration fee, and a ten percent (10%) contingency, as detailed on Exhibit A; and

WHEREAS, the PARTIES have agreed to contribute funds to the CITY, which will contract with the Consultant for the preparation of the PLANS, in accordance with the cost allocation and timeline shown in Exhibit A.

NOW, THEREFORE, in consideration of the mutual benefits to be derived by the PARTIES, and of the promises contained in this MOU, the PARTIES agree as follows:

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

(2) Purpose: The purpose of this MOU is to cooperatively fund the preparation and submittal of the PLANS to the Regional Board.

(3) Voluntary: This MOU is voluntarily entered into for the purpose of preparing and submitting the PLANS to the Regional Board.

(4) Terms: This MOU shall become effective on the latest date of execution by a PARTY and shall remain in effect until (i) the Regional Board's final approval date of the last outstanding portion of the PLANS, (ii) the CITY has provided the PARTIES with an accounting as set forth in paragraph (5)g, and (iii) the PARTIES have paid all outstanding invoices.

(5) The CITY shall provide the services and performance as follows:

a. CITY shall solicit proposals for, award, and administer a Consultant contract for the preparation and delivery of the PLANS.

b. CITY shall invoice the PARTIES for their share of the cost for the preparation and delivery of the PLANS as described in Exhibit A.

c. CITY will administer the Consultant contract. For this service, LACFCD and County of Los Angeles will pay CITY a contract administration fee equivalent to ten percent (10%) of the respective PARTY's contribution toward the Consultant contract.

d. Contingency: CITY will notify the PARTIES if actual expenditures are anticipated to require use of the contingency funds specified in Exhibit A and will obtain written approval of such expenditures from all PARTIES prior to expenditures. Expenditures that exceed the ten percent (10%) contingency will require an amendment of this MOU.

e. CITY shall utilize the funds deposited by the PARTIES only for the preparation and completion of the PLANS and the administration of the Consultant contract.

f. CITY shall provide the PARTIES with an electronic copy of the technical memos, draft PLANS, and completed PLANS within seven (7) business days after receipt from the Consultant.

g. CITY shall provide an accounting upon the early termination of this MOU pursuant to paragraph (6)p 60 days after the date the Regional Board gives final approval for the last outstanding portion of the PLANS, or three (3) years after the execution of this MOU, whichever comes first. At the completion of the accounting, CITY shall return the unused portion of all funds deposited with the CITY in accordance with the cost allocation formula set forth in Exhibit A.

h. CITY shall instruct the Consultant to not submit any PLANS to the Regional Board unless and until the PLANS have been approved, in writing, for submittal by all PARTIES to this MOU, which approval will not be unreasonably withheld. If the PARTIES cannot agree on the final language of the PLANS to be submitted to the Regional Board, then this MOU shall terminate and each PARTY shall be entitled to copies of the Consultant's materials prepared to date for use by each individual PARTY.

(6) THE PARTIES FURTHER AGREE:

a. To make a full faith effort to cooperate with one another to achieve the purposes of this MOU by providing information about project opportunities, reviewing deliverables, and informing their respective administrators, agency heads, and/or governing bodies of matters associated with this MOU in a timely manner.

b. To fund the cost of the preparation and delivery of the PLANS and to pay the CITY for the preparation and delivery of the PLANS within 60 days of receiving an invoice. Funding shall be as specified in Exhibit A.

c. To grant reasonable access rights and entry to the CITY and the Consultant during the terms of this MOU to the PARTY's facilities (i.e. storm drains, channels, catch basins, properties, etc.) (collectively, THE FACILITIES) to achieve the purposes of this MOU, provided, however, that prior to entering any PARTY's FACILITIES, the CITY or its Consultant shall secure written authorization to enter from the applicable PARTY.

d. The CITY shall require the Consultant retained pursuant to this MOU to agree to indemnify, defend, and hold harmless each PARTY, its special districts, elected and appointed officers, employees, and agents, from and against any and all liability, including but not limited to demands, claims, actions, fees, costs, and expenses (including attorney and expert fees), arising from or connected with the Consultant's performance of its agreement with CITY. In addition, the CITY shall require the Consultant to carry, maintain, and keep in full force and effect an insurance policy or policies, and each PARTY, its officers, employees, attorneys, and designated volunteers shall be named as additional insured on the policy(ies) with respect to liabilities arising out of the Consultant's work.

e. Each PARTY shall indemnify, defend, and hold harmless each other PARTY, including its special districts, elected and appointed officers, employees, and agents, from and against any and all liability, including but not limited to demands, claims, actions, fees, costs, and expenses (including attorney and expert witness fees), arising from or connected with the respective acts of each PARTY arising from or related to this MOU; provided, however, that no PARTY shall indemnify another PARTY for that PARTY's own negligence or willful misconduct.

f. In light of the provisions of Section 895.2 of the Government Code of the State of California imposing certain tort liability jointly upon public entities solely by reason of such entities being parties to an agreement (as defined in Section 895 of said Code), each of the PARTIES hereto, pursuant to the authorization contained in Section 895.4 and 895.6 of said Code, shall assume the full liability imposed upon it or any of its officers, agents, or employees, by law for injury caused by any act or omission occurring in the performance of this MOU to the same extent that such liability would be imposed in the absence of Section 895.2 of said Code. To achieve the above stated purpose, each PARTY indemnifies, defends, and holds harmless each other PARTY for any liability, cost, or expense that may be imposed upon such other PARTY solely by virtue of said Section 895.2. The provisions of Section 2778 of the California Civil Code are made a part hereof as if incorporated herein.

g. The PARTIES are, and shall at all times remain as to each other, wholly independent entities. No PARTY to this MOU shall have power to incur any debt, obligation, or liability on behalf of any other PARTY unless expressly provided to the contrary by this MOU. No employee, agent, or officer of a PARTY shall be deemed for any purpose whatsoever to be an agent, employee, or officer of another PARTY.

h. Any notices, bills, invoices, or reports relating to this MOU, and any request, demand, statement, or other communication required or permitted hereunder shall be in writing and shall be delivered to the representatives of the PARTIES at the addresses set forth in Exhibit B.

i. This MOU shall be binding upon, and shall be to the benefit of the respective successors, heirs, and assigns of each PARTY; provided, however, neither PARTY may assign its respective rights or obligations under this MOU without the prior written consent of the other PARTIES.

j. This MOU is governed by, interpreted under, and construed and enforced in accordance with the laws of the State of California.

k. If any provision of this MOU shall be determined by any court to be invalid, illegal, or unenforceable to any extent, the remainder of this MOU shall not be affected, and this MOU shall be construed as if the invalid, illegal, or unenforceable provision had never been contained in this MOU.

l. 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. Any ambiguities shall be resolved in a collaborative manner by the PARTIES and shall be rectified by amending this MOU as described in paragraph (6)o.

m. Each of the persons signing below on behalf of a PARTY represents and warrants that he or she is authorized to sign this MOU on behalf of such PARTY.

n. Each PARTY shall have no financial obligation to the other PARTIES of this MOU, except as herein expressly provided.

o. The terms and provisions of this MOU may not be amended, modified, or waived, except by an instrument in writing signed by all PARTIES.

p. Early Termination or Withdrawal

    1. This MOU may be terminated upon the express written agreement of all PARTIES. If this MOU is terminated, all PARTIES must agree on the equitable redistribution of remaining funds deposited, if there are any, or payment of invoices due at the time of termination. Completed work shall be owned by all PARTIES. Rights to uncompleted work by the Consultant still under contract will be held by the PARTY or PARTIES who fund the completion of such work.

    2. A PARTY may withdraw from this MOU upon 60 days written notice to the other PARTIES, subject to payment of any invoice received from CITY prior to or during the 60-day notice period for its share of the cost of the work completed as of the date of its notice of withdrawal, calculated in accordance with the cost-sharing percentages set forth in Exhibit A. The effective withdrawal date shall be the sixtieth (60^{th}) day after CITY receives the withdrawing PARTY's notice to withdraw from this MOU. CITY shall refund to the withdrawing PARTY any unused funds paid by the withdrawing PARTY's effective withdrawal date. All PARTIES understand, acknowledge, and agree that withdrawal from this MOU will terminate any responsibility, liability, or obligation of the withdrawing PARTY

under this MOU commencing on the effective withdrawal date and that the withdrawing PARTY shall remain liable for its share of any loss, debt, or liability incurred prior to the withdrawal date, and for any work which could not be suspended. Work completed prior to the effective withdrawal date shall be owned by all PARTIES. Rights to the remaining work will be held by the PARTY or PARTIES who fund the completion of such work. Withdrawal from this MOU does not release any PARTY from the obligations set forth in the MS4 Permit.

3. If a PARTY fails to comply with any of the terms or conditions of this MOU, that PARTY shall forfeit its rights to work completed through this MOU, but no such forfeiture shall occur unless and until the defaulting PARTY has first been given notice of its default and a reasonable opportunity to cure the alleged default.

IN WITNESS WHEREOF, the PARTIES hereto have caused this MOU to be executed by their duly authorized representatives and affixed as of the date of signature of the PARTIES:

CITY OF MALIBU

By ______________________________ 10/15/13

JIM THORSEN
CITY MANAGER

Date

ATTEST:

By ______________________________ 10.15.13

LISA POPE
CITY CLERK

Date

APPROVED AS TO FORM:

By ______________________________

CHRISTI HOGIN
CITY ATTORNEY

COUNTY OF LOS ANGELES

By Christopher Stone 9-19-13

for GAIL FARBER
Director of Public Works

Date

APPROVED AS TO FORM:

John F. Krattli
County Counsel

By [signature] 9/17/2013

Associate

Date

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

By Christopher Stone 9-19-13

for GAIL FARBER Date

Chief Engineer

APPROVED AS TO FORM:

John F. Krattli
County Counsel

By 9/17/2013

Associate Date

EXHIBIT A

North Santa Monica Bay Coastal Watersheds EWMP and CIMP
Funding Contributions

Consultant Contract Cost = $446,200

Funding Contributions

The LACFCD will contribute 10 percent of the total project cost. Ten (10) percent of the remaining 90 percent of the total project cost will be distributed equally between the other PARTIES (i.e., the City of Malibu and the County of Los Angeles); this shall be known as the Base Fee. The remaining balance will be distributed based on the percent of the combined land area for which each PARTY is responsible.

Table 1: Agency Contributions

Party	Base Fee	Land Area (Acres)	Percent of Land Area	Contribution Based on Land Area	Total Contribution toward Consultant Contract	Contract Administration Fee	Total
LACFCD	N/A	N/A	N/A	N/A	$44,620	$4,462	$49,082
City of Malibu	$20,079	12,659	22.9658%	$83,004	$103,083	N/A	$103,083
County of Los Angeles	$20,079	42,462	77.0342%	$278,418	$298,497	$29,850	$328,347
Total	$40,158	55,121	100%	$361,422	$446,200	$34,312	$480,512

Table 2: Invoicing Timeline

Party	1st Invoice (50%) [See note 1]	2nd Invoice (50%) July 1, 2014	Total Invoice Amount	Contingency (10%) [See note 2]	Total Including Contingency
LACFCD	$24,541	$24,541	$49,082	$4,908	$53,900
City of Malibu	$51,541	$51,541	$103,083	$10,308	$113,391
County of Los Angeles	$164,174	$164,174	$328,347	$32,835	$361,182
Total	$240,256	$240,256	$480,512	$48,051	$528,563

Notes:

1. The first invoice shall be sent once the MOU becomes effective, as set for in Section 4, or on October 1, 2013, whichever comes first
2. The ten percent (10%) contingency includes a 10 percent contingency on the cost of the consultant contract plus the corresponding contract administration fee.

North Santa Monica Bay Coastal Watersheds EWMP
Responsible Agencies Representatives

1. City of Malibu
   Public Works Department
   23825 Stuart Ranch Road
   Malibu, CA 92065
   Rob DuBoux
   E-mail: rduboux@malibucity.org
   Phone: (310) 456-2489 x339
   Fax: (310) 317-0950

2. County of Los Angeles
   Department of Public Works
   Watershed Management Division, 11th Floor
   900 South Fremont Avenue
   Alhambra, CA 91803-1331
   Angela George
   E-mail: ageorge@dpw.lacounty.gov
   Phone: (626) 458-4300
   Fax: (626) 457-1526

3. Los Angeles County Flood Control District
   Department of Public Works
   Watershed Management Division, 11th Floor
   900 South Fremont Avenue
   Alhambra, CA 91803-1331
   Gary Hildebrand
   E-mail: ghildeb@dpw.lacounty.gov
   Phone: (626) 458-4300
   Fax: (626) 457-1526

ATTACHMENT B
LETTERS OF INTENT

COUNTY OF LOS ANGELES

DEPARTMENT OF PUBLIC WORKS

"To Enrich Lives Through Effective and Caring Service"

900 SOUTH FREMONT AVENUE
ALHAMBRA, CALIFORNIA 91803-1331
Telephone: (626) 458-5100
http://dpw.lacounty.gov

GAIL FARBER, Director

ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1460
ALHAMBRA, CALIFORNIA 91802-1460

June 24, 2013

IN REPLY PLEASE
REFER TO FILE: WM-7

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 – COUNTY OF LOS ANGELES
NORTH SANTA MONICA BAY COASTAL WATERSHEDS
ENHANCED WATERSHED MANAGEMENT PROGRAM
AND COORDINATED INTEGRATED MONITORING PROGRAM**

The County of Los Angeles (County) submits this Letter of Intent to participate in and share the cost of the development of an Enhanced Watershed Management Program (EWMP) and a Coordinated Integrated Monitoring Program (CIMP) with the North Santa Monica Bay Coastal Watersheds Group. This Letter of Intent serves to satisfy the EWMP notification requirements of Section VI.C.4.b.iii(3) 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 North Santa Monica Bay Coastal Watersheds Group consists of the following agencies: City of Malibu as coordinating agency for EWMP and CIMP development, County, and Los Angeles County Flood Control District. The North Santa Monica Bay Coastal Watersheds Group has included a final draft Memorandum of Understanding as Attachment A of the Notice of Intent. The County intends to submit a final Memorandum of Understanding to its Board of Supervisors for approval prior to December 28, 2013.

If you have any questions, please contact Ms. Angela George at (626) 458-4325 or ageorge@dpw.lacounty.gov.

Very truly yours,

GAIL FARBER
Director of Public Works

MB:jht
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cc: City of Malibu (Jennifer Brown, Rob DuBoux)

COUNTY OF LOS ANGELES

DEPARTMENT OF PUBLIC WORKS

"To Enrich Lives Through Effective and Caring Service"

900 SOUTH FREMONT AVENUE
ALHAMBRA, CALIFORNIA 91803-1331
Telephone: (626) 458-5100
http://dpw.lacounty.gov

GAIL FARBER, Director

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 NORTH SANTA MONICA BAY COASTAL WATERSHEDS ENHANCED 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 an Enhanced Watershed Management Program (EWMP) and a Coordinated Integrated Monitoring Program (CIMP) with the North Santa Monica Bay Coastal Watersheds Group. This Letter of Intent serves to satisfy the EWMP notification requirements of Section VI.C.4.b.iii(3) 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 North Santa Monica Bay Coastal Watersheds Group consists of the following agencies: City of Malibu as coordinating agency for EWMP and CIMP development, County of Los Angeles, and LACFCD. The North Santa Monica Bay Coastal Watersheds Group has included a final draft Memorandum of Understanding as Attachment A of the Notice of Intent. 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

MB:jht
P:\wmpub\Secretarial\2013 Documents\Letter\LOI NSMBCW LACFCD.doc\C13182

cc: City of Malibu (Jennifer Brown, Rob DuBoux)

City of Malibu

23825 Stuart Ranch Road · Malibu, California · 90265-4861
Phone (310) 456-2489 · Fax (310) 456-3356 · www.malibucity.org

June 26, 2013

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

RE: Participation in the North Santa Monica Bay Coastal Watersheds Enhanced Watershed Management Program and Coordinated Integrated Monitoring Program

Dear Mr. Unger:

The City of Malibu is confirming its intent to participate in the development of and share the cost of the North Santa Monica Bay Coastal Watersheds Enhanced Watershed Management Program (EWMP) and Coordinated Integrated Monitoring Program (CIMP). This Letter of Intent serves to satisfy the notification requirements of Section VI.C.4.b.iii (3) and Section IV.C.1 of Attachment E of Order No. R4-2012-0175 (Permit). The final Memorandum of Understanding between the City and other participating agencies is scheduled for approval by Malibu City Council prior to December 28, 2013.

The North Santa Monica Bay Coastal Watersheds agencies subject to the Permit and participating in this EWMP and CIMP include the City of Malibu, County of Los Angeles, and the Los Angeles County Flood Control District. The City is taking an active role as the coordinating agency in this effort. There are additional agencies which have land draining to the North Santa Monica Bay Coastal Watersheds that are not currently participating in this EWMP and CIMP. Some are agencies which are already participating in other local EWMPs. Others are Caltrans, National Parks Service, California Department of Parks and Recreation, the Santa Monica Mountains Conservancy, and Mountains Recreation Conservation Authority. Therefore, lands owned by those agencies are not included in the subject EWMP coverage area. However, the participants are making efforts to collaborate and/or include other agencies in the process where feasible.

Should you have any questions, please contact Jennifer Brown, Senior Environmental Programs Coordinator at (310) 456-2489 extension 275 or jbrown@malibucity.org, or Rob DuBoux, Senior Civil Engineer, on extension 339 or rduboux@malibucity.org.

Sincerely,

Jim Thorsen
City Manager

cc: County of Los Angeles

ATTACHMENT C

BROAD BEACH PROJECT

Jurisdictional Group	Permittee	Structural BMP or Suite of BMPs to be Implemented	Planned Implementation Date
SMB JG 1	City of Malibu	**Broad Beach Biofiltration Project –** installation of biofilters at 8 catch basins on Broad Beach Road.	January 2014 (Commencement of Construction) June 2014 (Completion)

BACKGROUND/DESCRIPTION

The Broad Beach Biofiltration Project is located in JG1 in Northern Malibu on Broad Beach, near the intersection of Pacific Coast Highway (PCH) and Trancas Canyon Road, adjacent to ASBS areas. Broad Beach Road parallels and is located at the toe of the PCH embankment slope. Single family residential homes separate Broad Beach Road from the Pacific Ocean. The Project consists of the installation of different types of biofilters at nine catch basins within the City Right of Way, treating stormwater and urban runoff prior to the entering of flows into City-owned catch basins, which discharge to privately owned storm drain systems. The project location is shown below in Figure 1.

Figure 1. Broad Beach Project Locations

Design constraints include proximity to septic systems, slope stability of adjacent Caltrans embankments and slopes, parking restrictions, local geotechnical concerns, and other constraints. An example of a typical Broad Beach Road biofilter (small footprint) is shown below in Figure 2.

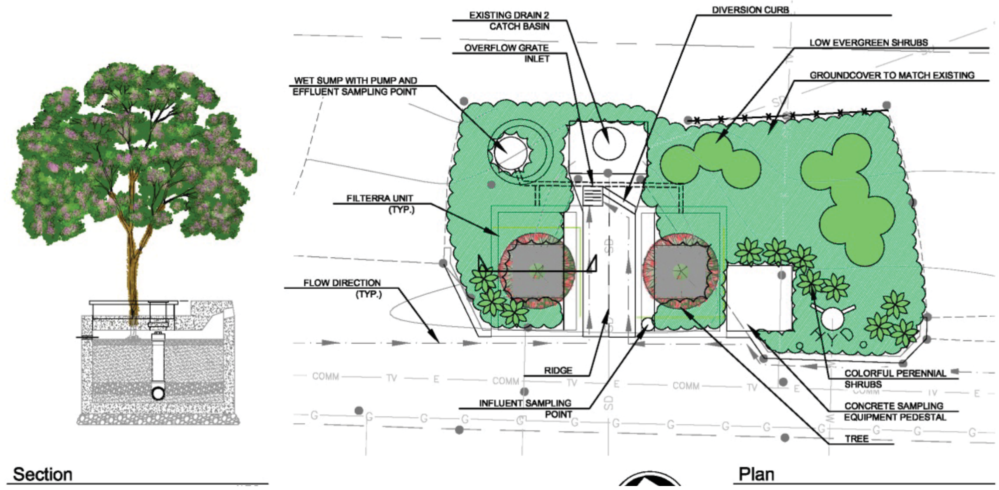

Figure 2. Typical Small Footprint Biofilter

Project includes a combination of biofilters, and flow control, with potential to incorporate harvest and use systems for Malibu drains. In general terms, three types of biofilters are contemplated.

- Small footprint biofilters such as the Filterra™ or Bacterra™ systems, which incorporate flow-based design, smaller right of way requirements, and higher treatment capacity. A schematic of the Filterra system is provided as Figure 3.
- Biofilters with volume control that provide not only biofiltration, but control discharges into the storm drain system though integrated storage and pumping. This is a volume-based design approach. The extended hydraulic residence time in vegetated soil media matrix are design to partially mimic subsurface flow wetland performance and eliminate dry weather flows into the MS4 (catch basin).
- Harvest and use systems incorporated with biofilters are not currently planned but could be contemplated as a future retrofit. This approach seeks to incorporate integrated water resource and potable water offset concepts with water quality. Given local site limitations including steep slopes and onsite wastewater treatment systems, the objective is to store captured water for application to safely apply to landscaping. This design element if incorporated, could examine usage of Opti-RTC (real time controller) technologies for stormwater management, though it is not currently planned.

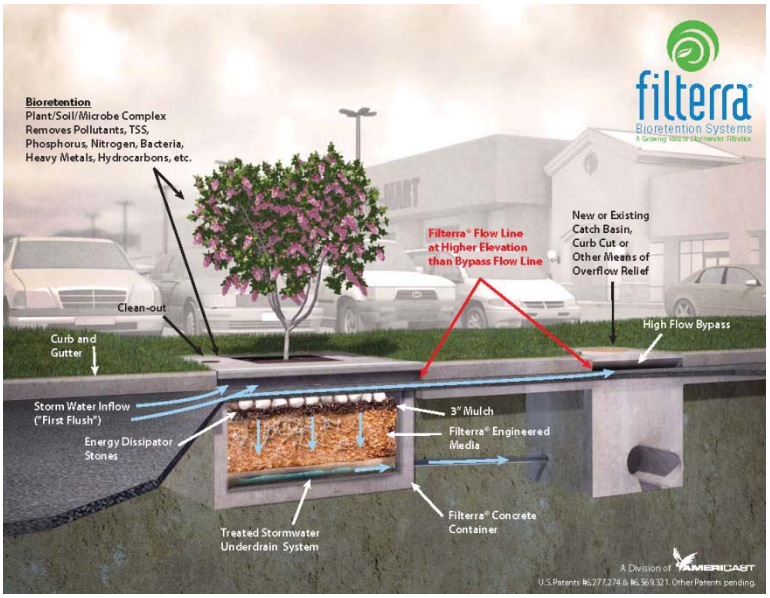

Figure 3. Filterra (TM) Concept

DRAINAGE AREA AND EQUIVALENT WATER QUALITY VOLUMES

Catch basin locations are shown above in Figure 1. The following table (Table 1) lists drainage areas and approximate equivalent design volumes and flow rates for the catch basin locations. Drainage areas are primarily single family residential, roadway, and slope runoff. The basis for design is the Standard Urban Stormwater Mitigation Plan (0.75 in storm).

Table 1.
Approximate Drainage Areas and Equivalent Design Volumes for Project Catchments.

Catchment No.	Drainage Area (Acres)	Runoff Coef. (Cd)	WQ Volume (ft3)[1]	WQ Flow Rate (cfs)
1	2.3	0.29	1794	0.13
2W	0.6	0.17	283	0.02
2E	1.6	0.17	754	0.06
3	0.8	0.20	427	0.03
4	1.5	0.16	651	0.05
5AW	0.9	0.17	422	0.03
5AE	1.7	0.17	797	0.06
6	1.1	0.18	546	0.04
7W	0.8	0.19	413	0.03
7E	0.3	0.19	155	0.01
8	0.8	0.23	494	0.04
Total	12.4		6,736	

POLLUTANT LOAD REDUCTIONS

- For biofilters (flow-through systems) estimates for pollutant loading are provided by the manufacturer for reference. Lab analyses report removal efficiencies ranging from 77% - 99%. Field investigations report removal efficiencies of 95% - 99% for fecal coliform, E.coli,

[1] Note that where flow based BMPs are implemented, the basis for design would be flow based.

and enterococcus; TSS removal efficiencies of 85%. Influent and effluent concentrations are not reported, but given anticipated influent loading, pollutant reduction, particularly for the Bacterra media, is expected to be significant (see Figure 4).
(http://www.filterra.com/index.php/product/bacterra/)

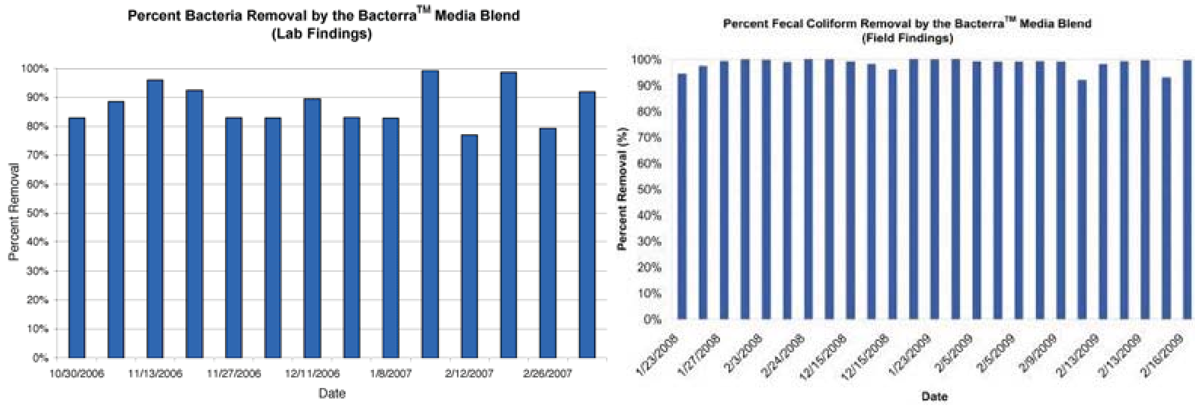

Figure 4. Filterra (TM)/Bacterra reported pollutant removal efficiencies.

- For biofilters with flow control. Water quality is expected to be similar to the quality of subsurface flow wetlands, which have proven to be highly effective for pollutant removal (in many cases 2-log to 3-log removal). Full bacteria treatment is expected for any discharges from biofilters. Furthermore, flow control systems will minimize discharge occurrences, enhancing compliance with the TMDL and ASBS exception provisions.
- For harvest and use systems, though not currently planned, there would be no discharge and therefore captured water would receive 100% pollutant reduction of all stormwater and urban runoff pollutants.

WILDLIFE ROAD

Jurisdictional Group	Permittee	Structural BMP or Suite of BMPs to be Implemented	Planned Implementation Date
SMB JG 1	City of Malibu	**Wildlife Road Storm Drain Improvements –** installation of biofilters along Wildlife Road and Whitesands Place, and catch basin filters at 2 existing catch basins.	September 2013 (Commencement of Construction) April 2014 (Completion)

BACKGROUND/DESCRIPTION

The Wildlife Road Storm Drain Improvements Project is located in JG1 in Northern Malibu on Wildlife Road and Whitesands Place, adjacent to ASBS areas. This project is located within a developed residential neighborhood. Two existing storm drain inlets, SD-1 and SD-2 are located on Whitesands Place and Wildlife Road. The project site map is shown on Figure 5. The Project consists of the installation of bioretention swales and biofilters within the City Right of Way, treating stormwater and urban runoff prior to the entering of flows into City-owned catch basins.

Figure 5. Wildlife Road Storm Drain Improvements Locations

Due to the limited about of space within the City's Right of Way, the project will include a combination of bioretention swales and biofilters.

- Small foot print biofilters such as the Filterra™ or Bacterra™ systems, which incorporate flow-based design, smaller right of way requirements, and higher treatment capacity. A schematic of the Filterra system is provided as Figure 3.
- Bioretention swales will be constructed adjacent to the existing roadway without significant impact to the existing intrastructure (driveways, hardscape and landscaping). The bioretention swales are vegetated shallow depressions that prove above ground storage, evapotranspiration, infiltration, and hydro-modification of stormwater runoff. Runoff from the road way will enter into the bioretention swales where the proposed vegetation will assist in removing the pollutants through plant uptake. The remaining stormwater runoff is infiltrated through the bottom of swale into the native soils

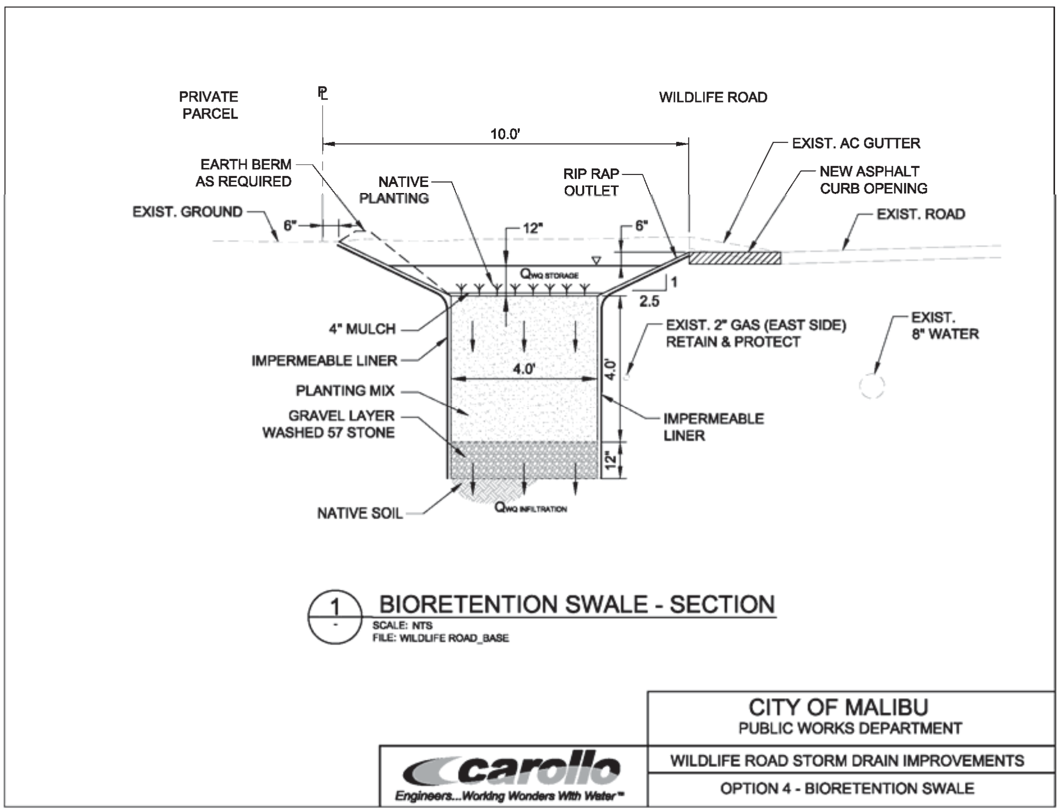

Figure 6. Typical Bioretention Swale

Drainage Area

Catch basin locations are shown above in 5. The following table (2) lists drainage areas and approximate equivalent design volumes and flow rates for the catch basin locations. Drainage areas are primarily single family residential, and roadway runoff. The basis for design is the Standard Urban Stormwater Mitigation Plan (0.75 in storm).

Table 2.
Approximate Drainage Areas and Equivalent Design Volumes for Project Catchments.

Catchment No.	Drainage Area (acres)	Runoff Coef. (Cd)	WQ Volume (ft3)[2]	WQ Flow Rate (cfs)
SD1	4.91	0.32	4,792	0.35
SD2	3.90	0.47	5,663	0.40
Total	8.81		10,455	

POLLUTANT LOAD REDUCTIONS

- For the Filtera biofilters (flow-through systems) estimates for pollutant loading are provided by the manufacturer for reference. Lab analyses report removal efficiencies ranging from 77% - 99%. Field investigations report removal efficiencies of 95% - 99% for fecal coliform, E.coli, and enterococcus; TSS removal efficiencies of 85%. Influent and effluent concentrations are not reported, but given anticipated influent loading, pollutant reduction, particularly for the Bacterra media, is expected to be significant (see Figure 4).
- For the bioretention swales the water quality is expected to be similar to the quality of subsurface flow wetlands, which have proven to be highly effective for pollutant removal (in many cases 2-log to 3-log removal). Full bacteria treatment is expected since all storm flows captured will be infiltrated. It is expected that these bioretention swales will provide full compliance with the TMDL and ASBS exception provisions.

LEGACY PARK

Jurisdictional Group	Permittee	Structural BMP or Suite of BMPs to be Implemented	Planned Implementation Date
SMB JG 9	City of Malibu	**Malibu Legacy Park Pump Station Improvements –** upgrade the existing storm drain pump stations so that the system can treat an increased volume of runoff.	June 2015 (Completion)

BACKGROUND/DESCRIPTION

Malibu Legacy Park is a Regional Project that provides water quality and water resources benefits. The project exceeds requirements to put over 300 acres of Malibu (including City Hall) into full compliance with Malibu Creek Bacteria TMDL requirements, providing a capture volume consistent with Los Angeles Standard Urban Stormwater Mitigation Plan requirements (assuming no upstream LID or source control measures). Captured water is managed, disinfected, and utilized to offset potable water uses for park irrigation. A schematic of the design flow processes is provided in the schematic below (Figure 7).

[2] Note that where flow based BMPs are implemented, the basis for design would be flow based.

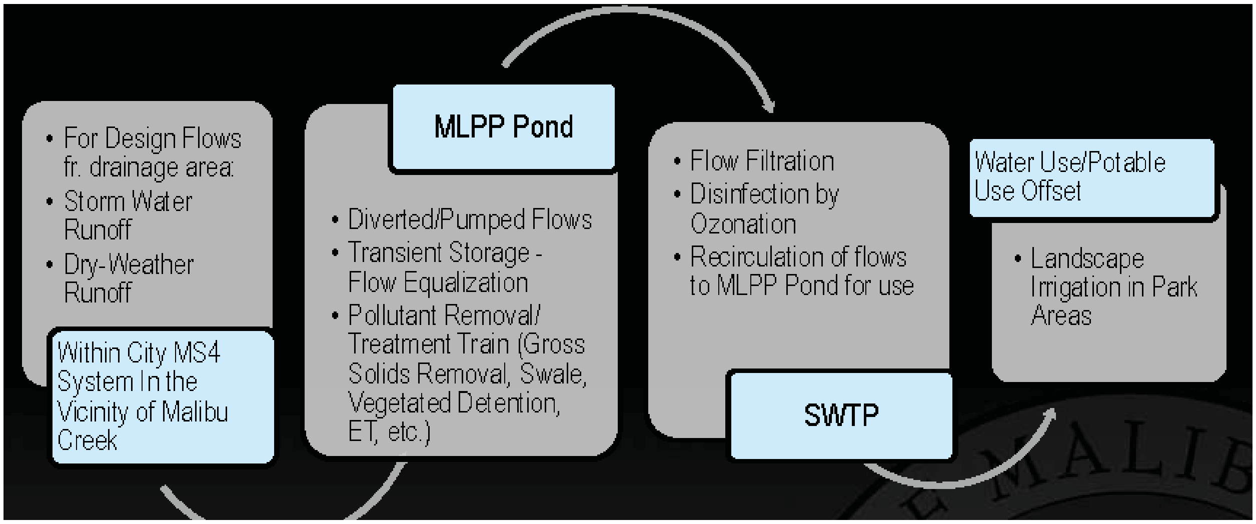

Figure 7. Legacy Park Flow Process

Drainage Area

There are three primary tributary areas associated with the (pre-project) hydrology as shown below in Figure 8. The majority of water originates from the Civic Center Drainage Area and drains directly to Legacy Park. Two smaller drainage areas originate from the Cross Creek (AKA Texaco Drain) drainage area and Malibu Road drainage area. Currently, water from Cross Creek and Malibu Road are pumped through a force main to Legacy Park. The proposed project contemplates an upgrade to the pumping system (Figure 9).

A summary of drainage areas are tabulated below.

- Malibu Road Outfall ~ 55 acres
- Cross Creek (Texaco Drain) ~15 acres
- Civic Center~270 acres
- Total Drainage Area ~ 340 acres

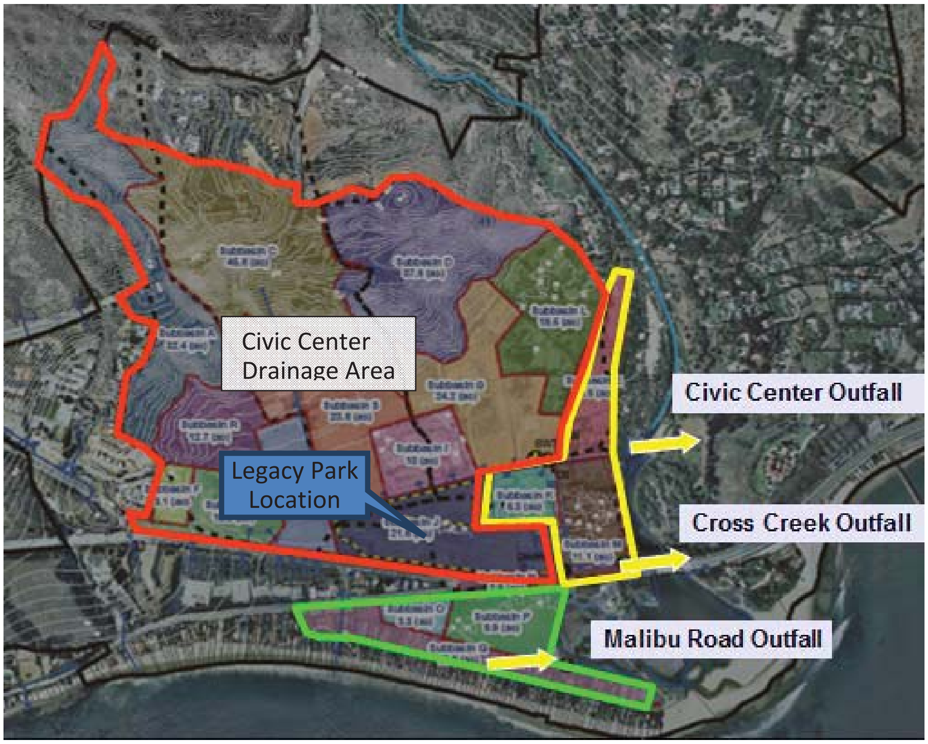

Figure 8. Legacy Park Drainage Areas

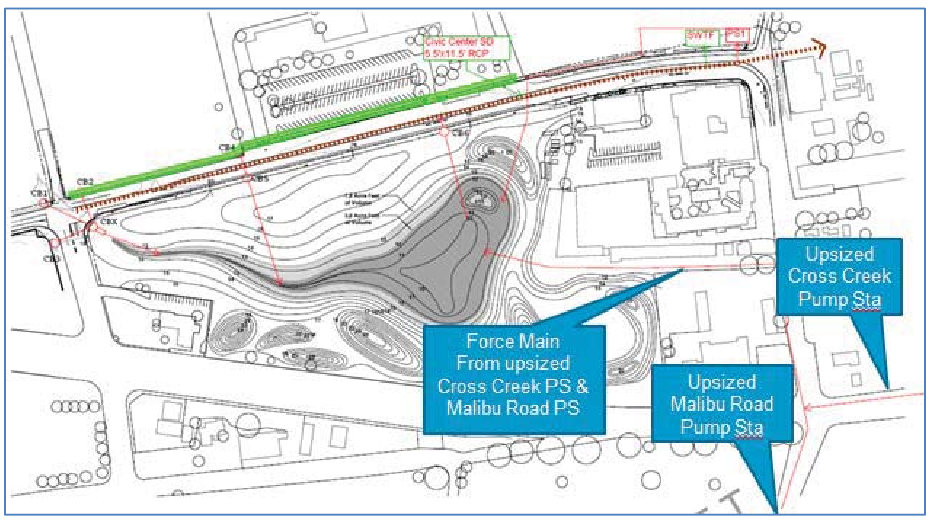

Figure 9. Legacy Park Project Upgrades

VOLUME OF WATER TREATED

The hydraulics of the Civic Center Drain system were analyzed through a continuous 50-year simulation to model compliance with the Bacteria TMDL. The results of this simulation are provided below in Figure 10. Prior to the project, it was estimated that the Cross Creek and Malibu Road may have exceeded Bacteria TMDL criteria 15-35% of the time. Studies have shown that increasing pumping capacity could increase compliance to 90-98% of the time (Susilo et. al 2007).

The objective of the pump station upgrades is to increase the pumping capacity to capture and convey the 85th Percentile 24-hour storm event to Malibu Legacy Park. The Cross Creek Pump

Station and Malibu Road Pump Station currently have a maximum pumping capacity of 200 gallons per minute. These pump stations will be upgraded with new pumps and other improvements to increase the capacity at these locations.

Currently the park has a storage capacity (utilized for both extended detention and transient water storage) of 8 acre feet, or 348,480 cubic feet. Since the 85th Percentile 24-hour storm event volume for the pond is 240,000 cubic feet, the existing Malibu Legacy Park configuration has sufficient capacity once the pump stations are upgraded.

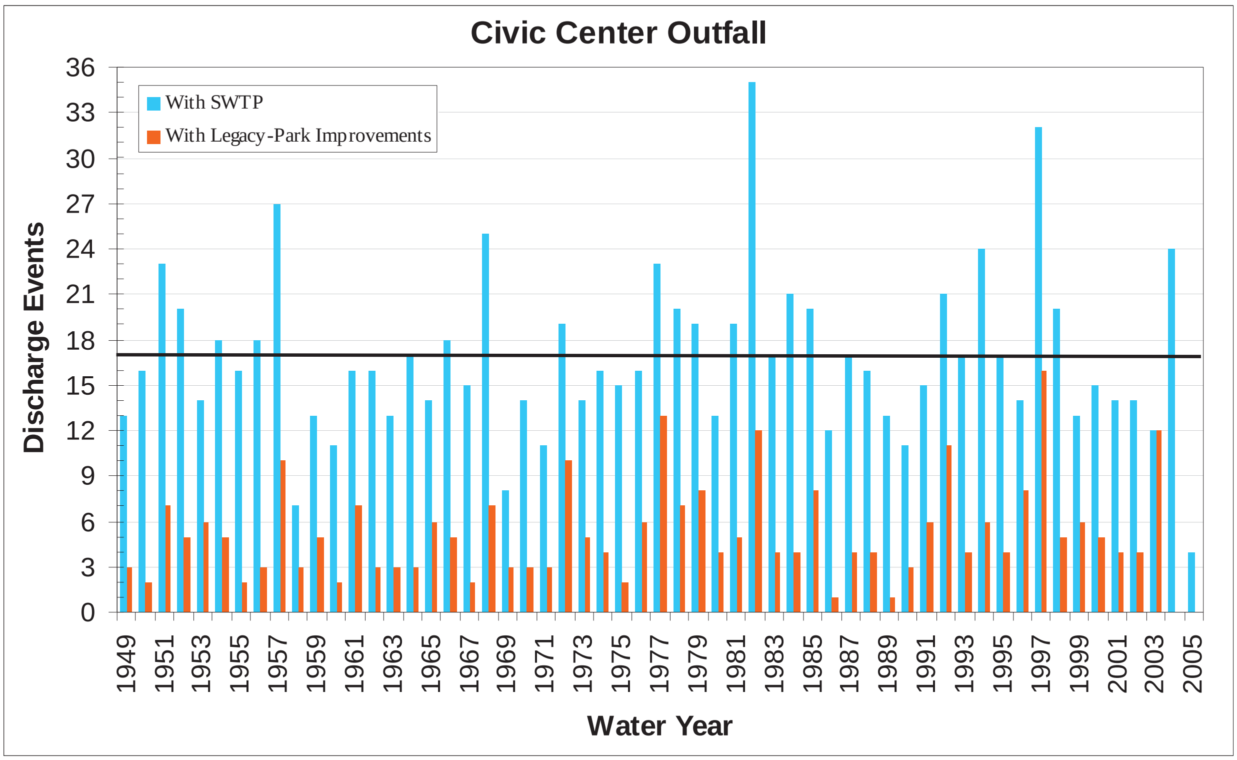

Figure 10. Civic Center Drain TMDL Compliance

POLLUTANT LOAD REDUCTIONS

As previously stated the capacity of Legacy Park is 8 acre-feet, significantly more than the 85th Percentile 24-hour storm volume. Because this is an actively managed, disinfection, and harvest and use system, it is expected that all pollutant loading associated with this design storm will be fully mitigated.

REFERENCES

Susilo, Brager, Cameron, West. 2007. Multi-Benefit Stormwater Concept Implementation: Malibu's Legacy Park Project. CASQA Conference. Costa Mesa, CA

APPENDIX B

DRAFT EWMP WORK PLAN

Enhanced Watershed Management Program (EWMP) Work Plan

For the North Santa Monica Bay Coastal Watersheds EWMP Group

Prepared for:

The Los Angeles Regional Water Quality Control Board

June 2014

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LIST OF ACRONYMS

AED	Allowable Exceedance Days
ASBS	Area of Special Biological Significance
ASCE	American Society of Civil Engineers
BMP	Best Management Practice
CEDEN	California Environmental Data Exchange Network
CERCLA	Comprehensive Environmental Response, Compensation, & Liability Act
CIMP	Coordinated Integrated Monitoring Program
CML	Compliance Monitoring Location
CSMP	Coordinated Shoreline Monitoring Plan
CTR	California Toxic Rules
CWA	Clean Water Act
DDT	Dichloro-diphenyl-trichloroethane
ED	Exceedance Day
EMC	Event Mean Concentration
EWMP	Enhanced Watershed Management Program
FIB	Fecal Indicator Bacteria
GIS	Geographic Information System
GM	Geometric Mean
HSPF	Hydrological Simulation Program - Fortran
IBD	International BMP Database
IC/ID	Illicit Connection/Illicit Discharge
LACDBH	Los Angeles County Department of Beaches and Harbors
LACFCD	Los Angeles County Flood Control District
LID	Low Impact Development
LVMWD	Las Virgenes Municipal Water District
MCM	Minimum Control Measure
MPN	Most Probable Number
MST	Microbial Source Tracking
MS4	Municipal Separate Storm Sewer System

NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NSMBCW	North Santa Monica Bay Coastal Watersheds
OWTS	Onsite Wastewater Treatment Systems
PCB	Polychlorinated Biphenyl
QA/QC	Quality Assurance/Quality Control
RAA	Reasonable Assurance Analysis
RWL	Receiving Water Limitation
SBPAT	Structural BMP Prioritization and Analysis Tool
SCCWRP	Southern California Coastal Watershed Research Project
SMB	Santa Monica Bay
SMBB	Santa Monica Bay Beaches
SWMM	Storm Water Management Model
SWRCB	State Water Resources Control Board
TAC	Technical Advisory Committee
TMDL	Total Maximum Daily Load
TMRP	Trash Monitoring and Reporting Plan
TOC	Total Organic Carbon
TSS	Total Suspended Solids
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WBPC	Water Body-Pollutant Combination
WERF	Water Environment Research Foundation
WLA	Waste Load Allocation
WMA	Watershed Management Area
WMMS	Watershed Management Modeling System
WQBEL	Water Quality-Based Effluent Limitation
WRF	Water Reclamation Facility

1 INTRODUCTION

The 2012 Municipal Separate Storm Sewer System (MS4) Permit[1] (Permit) was adopted on November 8, 2012 by the Los Angeles Regional Water Quality Control Board (Regional Board) and became effective December 28, 2012. The Permit was created for the purpose of protecting the beneficial uses in the receiving waters in the Los Angeles region by ensuring that MS4s in the County of Los Angeles are not causing or contributing to exceedances of applicable water quality objectives. The Permit allows the permittees to customize their stormwater programs through the development and implementation of an Enhanced Watershed Management Program (EWMP) to achieve compliance with certain receiving water limitations (RWLs) and water quality based effluent limits (WQBELs). Following the adoption of the Permit, the City of Malibu (Malibu), County of Los Angeles (County), and Los Angeles County Flood Control District (LACFCD) agreed to collaborate on the development of an EWMP for the North Santa Monica Bay Coastal Watersheds (NSMBCW, consisting of Santa Monica Bay Jurisdictional Groups 1 and 4 and the portion of Malibu Creek within Malibu's jurisdiction). This group of permittees is referred to as the NSMBCW EWMP Group.

In compliance with Section VI.C.4.b of the Permit, the NSMBCW EWMP Group submitted a Notice of Intent (NOI) to develop an EWMP on June 27, 2013. As a next step in EWMP development, the NSMBCW EWMP Group is required by Section VI.C.4.c.iv of the Permit to submit a work plan for development of the EWMP no later than June 30, 2014. This document has been drafted to serve as the NSMBCW EWMP Work Plan.

The purpose of the Work Plan is to present the basis for, and define the elements of, the methodology that will be utilized by the NSMBCW EWMP Group, specifically by:

- Soliciting meaningful community and stakeholder input (Section VI.C.1.f.v);
- Identifying water quality priorities within the NSMBCW EWMP Area (Section VI.C.5.a);
- Identifying, selecting, and quantifying best management practices (BMPs) to achieve Permit compliance (Section VI.C.5.b); and
- Developing an approach to perform a Reasonable Assurance Analysis (RAA) for the water quality priorities within the watershed (Section VI.C.5.b.iv(5)).

A schedule is included herein which details the timeframe for completion of the EWMP as well as a funding strategy and interim compliance milestones. Furthermore, the EWMP is a dynamic

[1] 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.

and evolving process, and it will include adaptive management principles to adapt to changes in the watershed.

The NSMBCW EWMP Group is also in the process of developing a Coordinated Integrated Monitoring Program (CIMP) to meet the monitoring requirements set forth in Attachment E of the Permit. The CIMP is not part of this EWMP Work Plan, but will be submitted to the Regional Board as a separate document.

2 STAKEHOLDER PROCESS

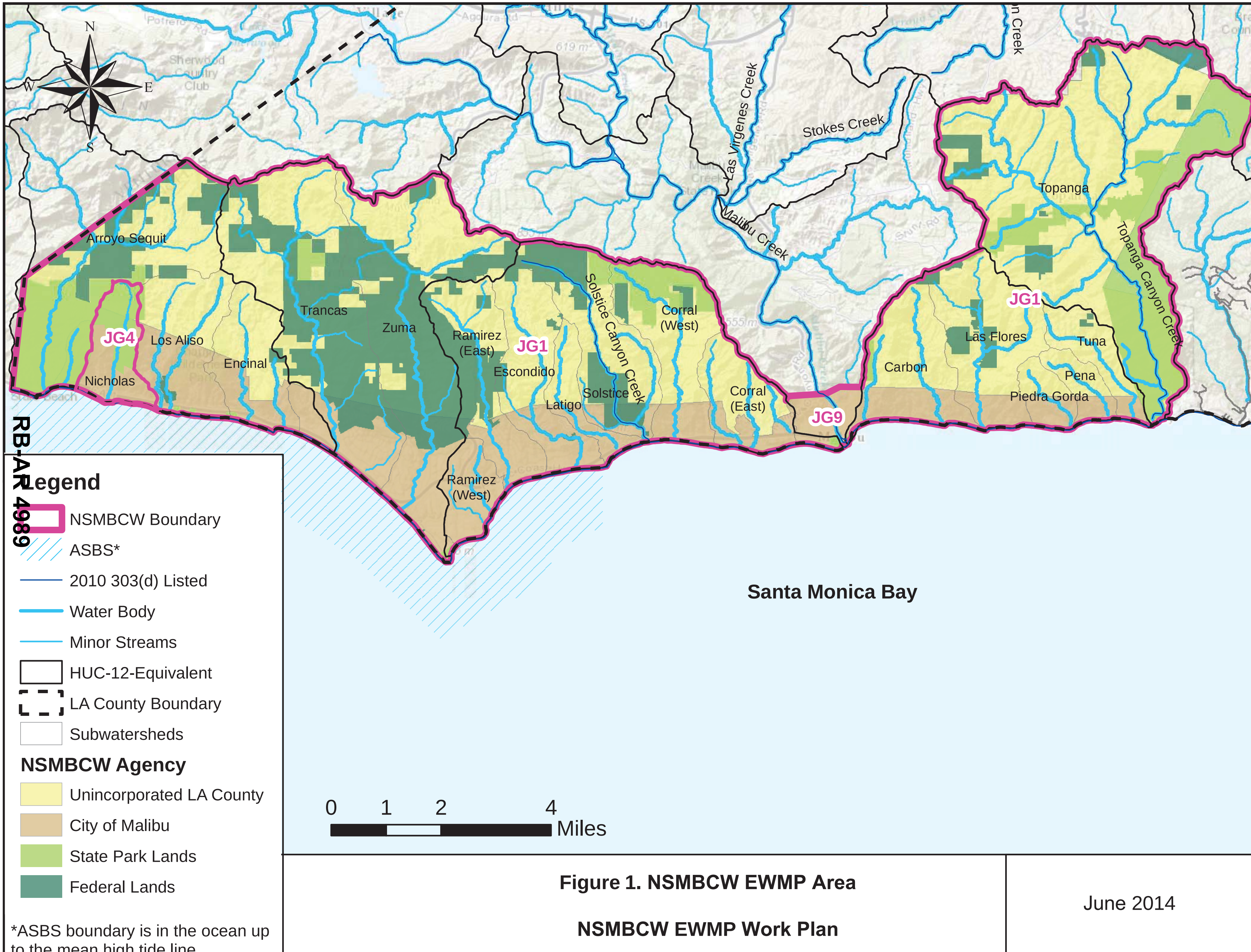
Section VI.C.1.f.v of the Permit requires that an opportunity be provided for meaningful stakeholder input to the EWMP. The EWMP Group has initiated both public and focused outreach efforts to support EWMP development. Recently, a public workshop was jointly held with the Malibu Creek Watershed Group on May 22, 2014 at King Gillette Ranch in Calabasas, California. Information presented at this meeting, along with other current and regularly updated EWMP information, is available at the City of Malibu's EWMP web page (www.malibucity.org/EWMP). The Permit also requires participation in the Permit-wide technical advisory committee (TAC), and the NSMBCW EWMP Group has, and will continue to, actively participate in the TAC throughout the EWMP process.

The NSMBCW EWMP Group is planning to conduct additional EWMP-related outreach meetings with community groups, non-government organizations (NGOs), the general public, and/or other potential project partners and stakeholders to solicit input on the content of the EWMP. Feedback received will be considered and incorporated as appropriate.

3 BACKGROUND AND NSMBCW EWMP AREA DESCRIPTION

3.1 GEOGRAPHICAL SCOPE AND CHARACTERISTICS

The EWMP Group's geographical area includes the jurisdictional areas for the participating agencies within Santa Monica Bay (SMB) Jurisdictional Group (JG) 1, SMB JG 4, and the portion of SMB JG 9 within the City of Malibu's borders. This area is known as the NSMBCW EWMP Area and is shown in Figure 1. It does not include land owned by other jurisdictions, including the State of California and Federal lands.



RB-AR 4989

Figure 1. NSMBCW EWMP Area

NSMBCW EWMP Work Plan

June 2014

The NSMBCW EWMP Area encompasses 55,121 acres, including portions of six HUC-12 watersheds, 18 subwatersheds, and 28 freshwater coastal streams as defined by the Los Angeles Basin Plan (Regional Board, 1995. Updated 2011). Each coastal stream is directly tributary to SMB. The EWMP Area is over 93% vacant land, with minimal EWMP Group-owned storm drains serving the undeveloped areas. Of the 7% of the watershed that is developed, a majority is not served by a traditional storm drain system. Many roads do not have curbs and gutters. The majority of drains owned by the EWMP Group Agencies are limited to culverts that simply transport water from one side of a road to the other. The EWMP Group land use breakdowns by JG and HUC-12 watershed are shown in Table 3-1. Land use is also shown in Figure 2.

Table 3-1. Land Use Distributions within the NSMBCW EWMP Area

JG	HUC-12 Watershed	Vacant (%)	Agriculture (%)	Commercial (%)	SFR[a] (%)	MFR[a] (%)	Industrial[b] (%)	Education (%)
1	Zuma Canyon	89.0%	1.9%	0.5%	7.7%	0.5%	0.1%	0.3%
1	Solstice Canyon	87.7%	0.7%	0.6%	8.8%	0.7%	0.1%	1.4%
1	Santa Monica Beach	91.7%	0.0%	0.8%	7.0%	0.4%	0.0%	0.0%
1	Garapito Creek	94.9%	0.6%	0.2%	4.1%	0.2%	0.0%	0.1%
1/4	Arroyo Sequit	96.5%	0.9%	0.2%	2.2%	0.1%	0.0%	0.0%
9	Cold Creek-Malibu Creek	95.8%	0.7%	0.2%	3.0%	0.2%	0.2%	0.0%
	Total	93.1%	0.8%	0.4%	5.0%	0.3%	0.1%	0.3%

[a] SFR = Single Family Residential; MFR = Multi-Family Residential

[b] Minor areas within the NSMBCW CIMP Area are zoned for industrial use, although the actual land use is not associated with manufacturing or similar industrial activities.

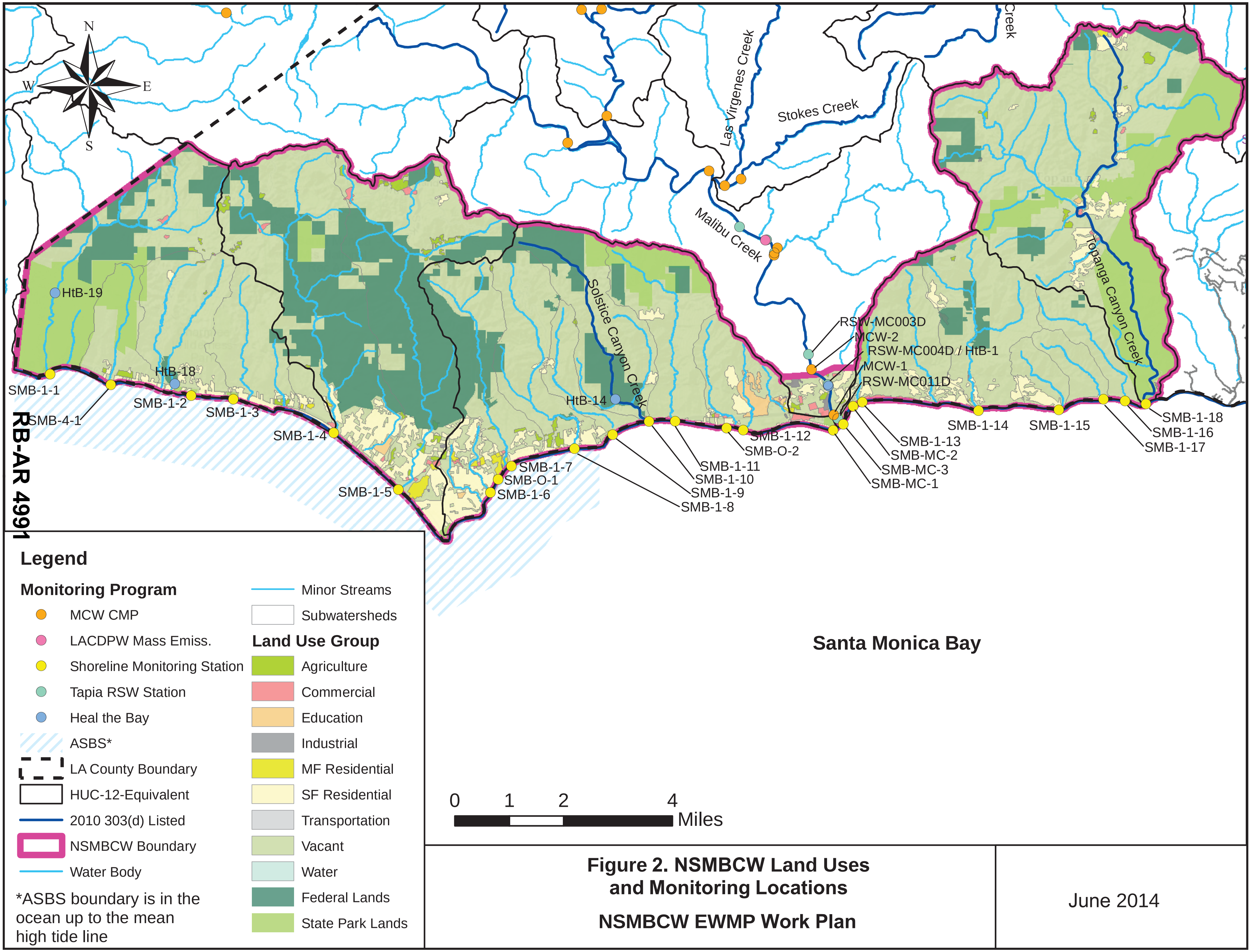


Figure 2. NSMBCW Land Uses and Monitoring Locations

NSMBCW EWMP Work Plan

June 2014

3.2 Receiving Water Bodies

The NSMBCW subwatersheds are tributary to Santa Monica Bay. Figure 1 identifies the receiving waters in these jurisdictions, as depicted in the Water Quality Control Plan, Los Angeles Region (Basin Plan) (Regional Board, 1995, Updated 2011). All receiving water bodies are ultimately tributary to the SMB, thus making the regulations set forth in the California Ocean Plan (SWRCB, 2012a) applicable to the NSMBCW. The Ocean Plan regulates waste discharges to protect the quality of ocean waters for use and enjoyment by the general public. In particular, the Ocean Plan designates Areas of Special Biological Significance (ASBS), which are areas requiring special protection of species or biological communities to the extent that maintenance of natural water quality is assured. One of these ASBS designations within the NSMBCW area includes the area from Laguna Point to Latigo Point, known as ASBS 24. The Permit defines this area as:

"Ocean water within a line originating from Laguna Point at 34° 5' 40" north, 119° 6'30" west, thence southeasterly following the mean high tideline to a point at Latigo Point defined by the intersection of the mean high tide line and a line extending due south of Benchmark 24; thence due south to a distance of 1000 feet offshore or to the 100 foot isobath, whichever distance is greater; thence northwesterly following the 100 foot isobath or maintaining a 1,000-foot distance from shore, whichever maintains the greater distance from shore, to a point lying due south of Laguna Point, thence due north to Laguna Point."

As a result of this ASBS designation, the NSMBCW agencies were required by the State Water Resources Control Board (SWRCB) to either cease the discharge of stormwater and nonpoint sources of waste into ASBS 24 or request an exception to the Ocean Plan. The NSMBCW agencies each submitted a request for an exception. In March of 2012, the SWRCB granted these exceptions, finding that such discharge exceptions will not compromise protection of ocean waters for beneficial uses. As a stipulation of the exceptions, discharges by the NSMBCW agencies are required to meet the following criteria:

- The discharges must be covered under an appropriate authorization to discharge waste to the ASBS, such as an NPDES permit and/or waste discharge requirements;
- The authorization must incorporate all of the Special Protections required by the SWRCB in Resolution No. 2012-0012 (SWRCB, 2012b); and
- The exception applies to stormwater and nonpoint source waste discharges only.

The details of the Ocean Plan exceptions are provided in SWRCB Resolution No. 2012-0012 (SWRCB, 2012b).

In addition to the Ocean Plan, the Basin Plan also sets forth water quality regulations which are applicable to the NSMBCW agencies. These regulations are based on assigned beneficial uses to receiving water bodies. Beneficial use designations for these water bodies within the NSMBCW include the following:

- Municipal and Domestic Supply (MUN),
- Ground Water Recharge (GWR),
- Navigation (NAV),
- Water Contact Recreation (REC-1),
- Non-Contact Water Recreation (REC-2),
- Warm Freshwater Habitat (WARM),
- Cold Freshwater Habitat (COLD),
- Estuarine Habitat (EST),
- Marine Habitat (MAR),
- Wildlife Habitat (WILD),
- Rare, Threatened, or Endangered Species (RARE),
- Migration of Aquatic Organisms (MIGR),
- Spawning, Reproduction, and/or Early Development (SPWN), and
- Wetland Habitat (WET).

Table 3-2 summarizes the beneficial uses for each water body in the NSMBCW geographical area, as designated in the Basin Plan.

Table 3-2. NSMBCW Water Bodies and Beneficial Uses Designated in the Basin Plan

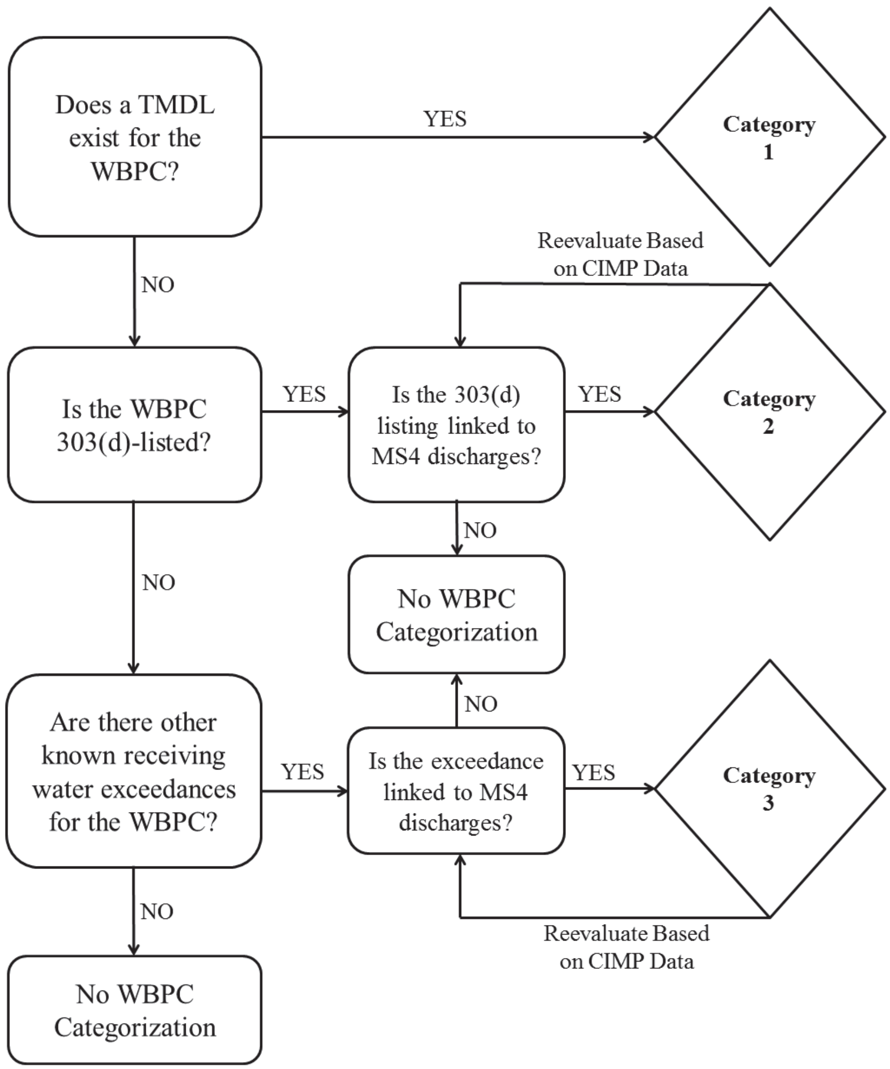
Water Body	MUN	GWR	NAV	REC1	REC2	WARM	COLD	EST	MAR	WILD	RARE	MIGR	SPWN	WET[a]
Malibu Lagoon			E	E	E			E	E	E	E	E	E	E
Malibu Creek	P*			E	E	E	E			E	E	E	E	E
Arroyo Sequit	P*	I		E	E	E	E			E	E	E	E	E
Nicholas Canyon Creek	P*			I	I	I				E				
Los Alisos Canyon Creek	P*			I	I	I				E	E			
Lechuza Canyon Creek	P*			I	I	I				E				
Encinal Canyon Creek	P*			I	I	I				E	E			
Trancas Canyon Creek	E*			E	E	E				E	E			
Zuma Canyon Creek	E*			E	E	E	E			E	E	P	P	
Ramirez Canyon Creek	I*			I	I	I				E			P	
Escondido Canyon Creek	I*			I	I	I				E	E			
Latigo Canyon Creek	I*			I	I	I				E	E			
Puerco Canyon Creek	I*			I	I	I				E				
Solstice Canyon Creek	E*			E	E	E				E		P	P	
Corral Canyon Creek	I*			I	I	I				E				
Carbon Canyon Creek	P*			I	I	I				E				
Las Flores Canyon Creek	P*			I	I	I				E				
Piedra Gorda Canyon Creek	P*			I	I	I				E				
Pena Canyon Creek	P*			I	I	I	E			E				
Tuna Canyon Creek	P*			I	I	I				E				
Topanga Canyon Creek	P*			I	I	E	E			E		P	I	

E = Existing beneficial use
I = Intermittent beneficial use
P = Potential beneficial use
*Asterisked MUN designations are designated under SB 88-63 and RB 89-03. Some designations may be considered for exemption at a later date.
[a] Water bodies designated as WET may have wetlands habitat associated with only a portion of the water body. Any regulatory action would require a detailed analysis of the area.

4 WATER BODY-POLLUTANT PRIORITIZATION

As part of the Work Plan, the Permit requires the NSMBCW EWMP Group to identify water quality priorities within their watershed management area (WMA). To accomplish this, receiving waters within the NSMBCW EWMP Area were screened for water quality priorities by reviewing Total Maximum Daily Loads (TMDLs), the State's 303(d) list, and additional water quality data. Each identified water quality priority for a given receiving water body was categorized as a water body-pollutant combination (WBPC). Figure 3 provides a brief conceptual overview of the process used to identify and categorize the WBPCs within the NSMBCW EWMP Area.

Figure 3. Process for Categorizing Water Body-Pollutant Combinations



This section of the EWMP Work Plan presents the evaluation of the water quality conditions within the geographical scope of the NSMBCW EWMP, identifies water quality priorities, determines water body-pollutant classifications, and assesses pollutant sources.

4.1 Water Quality Objectives/Criteria

The 2010 Clean Water Act (CWA) Integrated Report and updated 303(d) list were approved by the State Water Resources Control Board on August 4, 2010 and by the United States Environmental Protection Agency (USEPA) on October 11, 2011. The 2010 303(d)-listed water bodies and associated pollutants within the NSMBCW are summarized in Table 4-1 below.

Table 4-1. 2010 303(d)-Listed Water Bodies in NSMBCW

Water Body	Pollutant Class	Pollutant	Notes
Santa Monica Bay Beaches	Pathogens	Coliform Bacteria	Addressed by Bacteria TMDL
	Pesticides	DDT	Addressed by PCB/DDT TMDL
	Other Organics	PCBs	Addressed by PCB/DDT TMDL
Santa Monica Bay Offshore/Nearshore	Trash	Debris	Addressed by Trash TMDL
	Pesticides	DDT (tissue & sediment)	Addressed by PCB/DDT TMDL
	Other Organics	PCBs (tissue & sediment)	Addressed by PCB/DDT TMDL
	Toxicity	Sediment Toxicity	Addressed by PCB/DDT TMDL
	Miscellaneous	Fish Consumption Advisory	Addressed by PCB/DDT TMDL
Solstice Canyon Creek	Miscellaneous	Invasive species	Not a Stormwater Issue
Topanga Canyon Creek	Metals/Metalloids	Lead	TMDL Does Not Currently Exist
Malibu Creek	Pathogens	Coliform Bacteria	Addressed by Bacteria TMDL
	Nutrients	Nutrients (Algae)	Addressed by USEPA Nutrient TMDL and USEPA Benthic TMDL
	Hydromodification	Fish Barriers (Fish Passage)	Not a Stormwater Issue
	Sediment	Sedimentation/Siltation	Addressed by USEPA Benthic TMDL
	Nuisance	Scum/Foam- Unnatural	Addressed by Nutrient TMDL
	Metals	Selenium	TMDL Does Not Currently Exist
	Trash	Trash	Addressed by Trash TMDL
	Other Inorganics	Sulfates	TMDL Does Not Currently Exist
	Miscellaneous	Invasive Species	Not a Stormwater Issue
		Benthic-Macroinvertebrate Bioassessments	Addressed by USEPA Benthic TMDL
Malibu Lagoon	Pathogens	Coliform Bacteria	Addressed by Bacteria TMDL
		Swimming Restrictions	Addressed by Bacteria TMDL
		Viruses (enteric)	Addressed by Bacteria TMDL
	Nutrients	Eutrophic	Addressed by Nutrient TMDL and USEPA Benthic TMDL
	Miscellaneous	Benthic Community Effects	Addressed by USEPA Benthic TMDL
		pH	TMDL Does Not Currently Exist

The water bodies listed in Table 4-1 are subject to water quality objectives in the Basin Plan, or Basin Plan Amendments, such as those to implement TMDLs. There are currently eight TMDLs in effect for the water bodies within the NSMBCW geographical scope as listed in Attachment M of the MS4 Permit, plus two TMDLs which have not yet been approved by the USEPA and are therefore not yet effective. These TMDLs are summarized in Table 4-2.

Table 4-2. NSMBCW TMDLs

TMDL Name	Agency	Effective Date
SMB Beaches (SMBB) Bacteria TMDL, Reconsideration of Certain Technical Matters of the SMBB Bacteria TMDL, Resolution R12-007[a]	Regional Board	Not yet effective
Malibu Creek and Lagoon Bacteria TMDL, Resolution R12-009[a]	Regional Board	Not yet effective
Malibu Creek and Lagoon TMDL for Sedimentation and Nutrients to Address Benthic Community Impairments (Benthic TMDL)	USEPA	July 2, 2013
SMB TMDL for DDT and PCBs	USEPA	March 26, 2012
SMB Nearshore Debris TMDL, Resolution R10-010	Regional Board	March 20, 2012
Malibu Creek Watershed Trash TMDL, Resolution R4-2008-007	Regional Board	July 7, 2009
TMDL for Bacteria in the Malibu Creek Watershed, Resolution 2004-019R	Regional Board	January 24, 2006
SMB Beaches (SMBB) Bacteria TMDL, Dry Weather, Resolution 2002-004[b]	Regional Board	July 15, 2003
SMB Beaches (SMBB) Bacteria TMDL, Wet Weather, Resolution 2002-022[b]	Regional Board	July 15, 2003
Malibu Creek Watershed Nutrients TMDL (Nutrient TMDL)	USEPA	March 21, 2003

[a] This TMDL revision is not yet approved by USEPA.
[b] This TMDL was revised pursuant to Resolution R12-2007.

Table 4-3 identifies the applicable Water Quality Based Effluent Limitations (WQBELs) and/or Receiving Water Limitations (RWLs) established pursuant to TMDLs included in Attachment M of the Permit. The water quality objectives as listed in the Basin Plan are also applicable to water bodies based on the designated beneficial uses. Pollutant-specific compliance deadlines are discussed in Section 4.4 below.

Table 4-3. Final Permit RWLs and WQBELs for NSMBCW TMDLs

TMDL	Parameter	Effluent Limitation/ Receiving Water Limitation
SMB Nearshore Debris TMDL	Trash	Zero
	Plastic Pellets	Zero
SMB PCBs/DDT TMDL	DDT[a]	27.08 g/yr (based on 3-year avg)
	PCBs[a]	140.25 g/yr (based on 3-year avg)
SMBB Bacteria TMDL	Total coliform (daily maximum)	10,000/100 mL
	Total coliform (daily maximum), if the ratio of fecal-to-total coliform exceeds 0.1	1,000/100 mL
	Fecal coliform (daily maximum)	400/100 mL
	Enterococcus (daily maximum)	104/100 mL
	Total coliform (geometric mean[b])	1,000/100 mL
	Fecal coliform (geometric mean[b])	200/100 mL
	Enterococcus (geometric mean[b])	35/100 mL
Malibu Creek and Lagoon Bacteria TMDL	Total coliform (daily maximum) –Malibu Lagoon	10,000/100 mL
	Total coliform (daily maximum), if the ratio of fecal-to-total coliform exceeds 0.1-Malibu Lagoon	1,000/100 mL
	Fecal coliform (daily maximum) –Malibu Lagoon	400/100 mL
	Enterococcus (daily maximum)-Malibu Lagoon	104/100 mL
	E. coli (daily maximum) – Malibu Creek	235/100 mL
	Total coliform (geometric mean[b]) –Malibu Lagoon	1,000/100 mL
	Fecal coliform (geometric mean[b]) –Malibu Lagoon	200/100 mL
	Enterococcus (geometric mean[b]) –Malibu Lagoon	35/100 mL
	E. coli (geometric mean[b]) – Malibu Creek	126/100 mL
Malibu Creek Watershed Trash TMDL	Trash	Zero
Malibu Creek Watershed Nutrients TMDL	Nitrate + Nitrite (summer daily maximum) [a]	8 lbs/day (based on 1.0 mg/L numeric target)
	Total Phosphorus (summer daily maximum) [a]	0.8 lbs/day (based on 0.1 mg/L numeric target)
	Nitrate + Nitrite (winter daily maximum) [a]	8 mg/L
Malibu Creek and Lagoon Benthic TMDL	Total Nitrogen (summer)[c]	0.65 mg/L
	Total Phosphorus (summer)[c]	0.1 mg/L
	Total Nitrogen (winter)[c]	4.0 mg/L
	Total Phosphorus (winter)[c]	0.2 mg/L

[a] The Permit identifies these thresholds as grouped WLAs without identifying them as RWLs or WQBELs, which imply where the point of compliance is located (i.e., receiving water or MS4 outfall). Group load-based WLAs are for the applicable MS4 discharger group; the individual load-based WLAs for each NSMBCW MS4 agency would be area-weighted fractions of these.

[b] The rolling 30-day geometric mean is calculated based on the previous 30 days. If weekly sampling is conducted, the weekly sampling result will be assigned to the remaining days of the week. The reopened 2012 TMDL, which has not yet been approved by USEPA, modified this to weekly calculation of a rolling six week geometric mean using five or more samples, starting all calculation weeks on Sunday.

[c] Values shown are TMDL WLAs, and are not yet explicitly included in the Permit (e.g., as RWLs or WQBELs).

Grouped RWLs for the SMBB Bacteria TMDL are also expressed in the Permit in terms of allowable exceedance days (AEDs), which vary by season and by Coordinated Shoreline Monitoring Plan (CSMP) monitoring station. These AEDs are summarized in Table 4-4 below. The CSMP monitoring stations are shown in Figure 2. These final grouped RWLs are currently effective for dry weather and will be effective for wet weather on July 15, 2021.

Table 4-4. Allowable Number of Exceedance Days for NSMBCW Shoreline Monitoring Stations

Station	Station Name	Summer Dry Weather (Apr 1 – Oct 31)		Winter Dry Weather (Nov 1 – Mar 31)		Wet Weather (Year-Round)	
		Daily Sample[a]	Weekly Sample	Daily Sample[a]	Weekly Sample	Daily Sample[a]	Weekly Sample
SMB 1-1	Leo Carillo Beach (REFERENCE BEACH)	0	0	9	2	17	3
SMB 1-2	El Pescador State Beach	0	0	1	1	5	1
SMB 1-3	El Matador State Beach[b]	0	0	1	1	3	1
SMB 1-4	Trancas Creek	0	0	9	2	17	3
SMB 1-5	Zuma Creek	0	0	9	2	17	3
SMB 1-6	Walnut Creek	0	0	9	2	17	3
SMB 1-7	Ramirez Creek	0	0	9	2	17	3
SMB 1-8	Escondido Creek	0	0	9	2	17	3
SMB 1-9	Latigo Canyon Creek	0	0	9	2	17	3
SMB 1-10	Solstice Creek	0	0	5	1	17	3
SMB 1-11	Wave wash of unnamed creek on Puerco Beach	0	0	9	2	17	3
SMB 1-12	Marie Canyon Storm Drain on Puerco Beach	0	0	9	2	17	3
SMB 1-13	Sweetwater Creek on Carbon Beach	0	0	9	2	17	3
SMB 1-14	Las Flores Creek	0	0	6	1	17	3
SMB 1-15	Big Rock Beach at 19948 Pacific Coast Hwy[b]	0	0	9	2	17	3
SMB 1-16	Pena Creek	0	0	3	1	14	2
SMB 1-17	Tuna Canyon Creek	0	0	7	1	12	2
SMB 1-18	Topanga Creek	0	0	9	2	17	3
SMB 4-1	San Nicholas Canyon Creek	0	0	4	1	14	2
SMB MC-1	Malibu Point, Malibu Colony Dr.	0	0	9	2	17	3
SMB MC-2	Surfrider Beach (breach point of Malibu Lagoon)	0	0	9	2	17	3
SMB MC-3	Malibu Pier on Carbon Beach	0	0	9	2	17	3

[a] SMB 1-18 and MC-2 are the only monitoring sites that are sampled daily; all others are sampled weekly (on average).

[b] SMB 1-3 and 1-15 are both open beach monitoring locations which are not associated with creeks or storm drain outfalls.

4.2 Characterization of Receiving Water Quality

Water-quality conditions were characterized based on available data. A review of previous studies was conducted to characterize the receiving water bodies within the NSMBCW subwatersheds. The characterization process consisted of the following steps:

1. Gathering relevant data and information from numerous sources including, but not limited to, 303(d) listings, WQBELs, RWLs, established TMDLs, bacteria data analyzed as part of the CSMP, Bight ’08, Heal the Bay, nutrient data from Las Virgenes Municipal Water District (LVMWD, 2011), and Joint Powers Authority of the LVMWD/Triunfo Sanitation District; and
2. Conducting a data analysis to identify constituents with exceedances of water quality objectives.

The receiving water quality analysis resulted in the list of prioritized pollutants summarized in Section 4.4 below.

4.3 Characterization of Discharge Quality

Stormwater and non-stormwater discharges have not been well characterized within the NSMBCW EWMP Area. No data were available for this assessment, but discharge characterization will occur as part of the implementation of the CIMP. It is unlikely that data from the CIMP will be available for EWMP development. As a result, if needed to support the source assessment or sequencing, information from regional studies and/or TMDL technical reports may be used to characterize the discharge.

4.4 Water Body-Pollutant Prioritization

Based on the water quality characterization performed by the NSMBCW EWMP Group, the water body-pollutant combinations were classified into one of three categories, in accordance with Section IV.C.5(a).ii of the Permit. This categorization is intended to prioritize water body-pollutant combinations in order to guide the implementation of structural and institutional BMPs. The three categories include:

- Category 1 (Highest Priority): WBPCs for which WQBELs and/or RWLs have been established in an approved TMDL.
- Category 2 (High Priority): Pollutants for which data indicate water quality impairment in the receiving water according to the State’s 303(d) list and for which MS4 discharges may be causing or contributing to the impairment.
- Category 3 (Medium Priority): Pollutants which exceed applicable RWLs contained in the Permit and for which MS4 discharges may be causing or contributing to the exceedances, but which do not have an approved TMDL or are not listed on the 303(d) list.

Table 4-5 presents the prioritized water body-pollutant combinations within the NSMBCW area. These water body-pollutant combinations will be used in the EWMP to prioritize BMP implementation. Water body pollutant combinations categorized below are subject to change based on future data collected as part of the CIMP or other monitoring program.

Table 4-5. Water Body Pollutant Prioritization for the NSMBCW EWMP Area (First and Last Applicable Deadlines Included)

Category	Water Body	Pollutant	Compliance Deadline	
1	Malibu Creek and Lagoon	Nutrients	Compliance schedule will be determined in the EWMP, with the final compliance deadline not exceeding December 28, 2017	
	SMB Beaches	Dry Weather Bacteria	7/15/2006 (Final: Single sample summer AEDs met)	11/1/2009 (Final: Single sample winter AEDs met)[a]
	SMB Beaches	Wet Weather Bacteria	7/15/2009 (Interim: 10% Single sample ED reduction)	7/15/2021 (Final: Single sample AED and GM targets met)
	Malibu Creek and Lagoon	Indicator Bacteria	1/24/2012 (Final: Dry weather single sample AED targets met)	7/15/2021 (Final: Wet weather single sample AED targets met)
	Malibu Creek	Trash	7/7/2013 (20% reduction)	7/7/2017 (100% reduction)
	SMB	Trash/Debris	3/20/2016 (20% reduction)	3/20/2020 (100% reduction)
	SMB	DDTs	Compliance schedule may be developed through the EWMP [b]	
	SMB	PCBs	Compliance schedule may be developed through the EWMP [b]	
2	Topanga Canyon Creek	Lead	NA	
	Malibu Creek	Sulfates & Selenium	NA	
	Malibu Lagoon	pH	NA	
3	None			

[a] Compliance date per 2013 reopened TMDL, which is not yet effective (i.e., USEPA and Office of Administrative Law approval is pending)

[b] Although the TMDL lacks a formal compliance schedule for the WQBEL, the TMDL Executive Summary does state, "The time frame for attainment of the TMDL targets for the rest of Santa Monica Bay (other than the Palos Verdes shelf) is 11 years for DDT and 22 years for PCBs."

4.4.1 *Category 1 – Highest Priority*

Water body-pollutant combinations under Category 1 (highest priority) are defined in the Permit as "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 Permit]." These water body-pollutant combinations include:

- SMB beaches for bacteria (wet and dry weather). These are considered Category 1 due to the SMB Beaches Bacteria TMDL.
- Malibu Creek and Lagoon for bacteria. These are considered Category 1 due to the Malibu Creek and Lagoon Indicator Bacteria TMDL.
- Malibu Creek for nutrients. This is considered Category 1 due to the USEPA-established Nutrients TMDL and Benthic TMDL in the Malibu Creek Watershed.[2]
- SMB Offshore/Nearshore for DDT and PCBs.[3] These are considered Category 1 due to the USEPA TMDL for DDT and PCBs for Santa Monica Bay Offshore/Nearshore. However, it is important to note that the load-based WQBELs for DDTs and PCBs established by the TMDL were set equivalent to the estimated existing stormwater loads (i.e., based on data used in the TMDL, no MS4 load reduction is expected to be required). As a result, it is anticipated that for the EWMP RAA, no reductions in DDT and PCB loading from the NSMBCW MS4s are required to meet the TMDL WQBELs. And while DDTs and PCBs cannot be modeled as a stormwater pollutant for the RAA (due to the lack of land use EMCs and BMP performance data), they will be qualitatively evaluated. It will also be noted that the implementation of any future BMPs throughout the NSMBCW will lead to a reduction in runoff volume and suspended sediment loading from the MS4s, thereby further reducing the existing mass load of any sediment-bound DDT and/or PCBs to SMB. For these reasons, while DDT and PCBs will be included as Category 1 pollutants, they will be evaluated further through the efforts of the CIMP to determine whether pollutant-specific measures are necessary.
- SMB Offshore/Nearshore for debris. These are considered Category 1 due to the TMDL for debris for Santa Monica Bay Offshore/Nearshore. Section VI.E.5.b(i) of the Permit states, "Pursuant to California Water Code section 13360(a), Permittees may comply with the trash [debris] effluent limitations using any lawful means. Such compliance options are broadly classified as full capture, partial capture, institutional controls, or minimum frequency of assessment and collection… and any combination of these may be employed to achieve compliance." While trash will not be modeled as part of the RAA, the RAA will address how the NSMBCW agencies will comply with the TMDL WQBELs by providing details on the planned implementation of the methods listed above, primarily through their Trash Monitoring and Reporting Programs.
- Malibu Creek for trash. This is considered Category 1 due to the Malibu Creek Trash TMDL.

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[2] The Regional Board is currently developing a new Malibu Creek Nutrient TMDL. Until this TMDL is approved, the USEPA TMDL will be adhered to.

[3] SMB Offshore/Nearshore is 303(d)-listed for fish consumption advisory due to DDT and PCBs. Therefore, the fish consumption advisory will be assumed to be addressed by the DDT and PCB categorization.

It is important to note that these "Highest Priority" water body-pollutant combinations have been assigned based strictly on the Permit definition. At this time, not all of these pollutants (e.g., DDT and PCBs as exceptions) have been definitively linked to MS4 sources. As a result, this categorization and subsequent prioritization within this Category will be reevaluated based on results from the future water quality monitoring efforts conducted under the CIMP.

4.4.2 Category 2 – High Priority

Category 2 (high priority) water body-pollutant combinations are defined 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." As summarized in Table 4-1, a number of water body-pollutant combinations within the NSMBCW jurisdiction have been listed on the SWRCB's 2010 303(d) list. Aside from those water body-pollutant combinations already listed as Category 1, the remaining water body-pollutant combination list can be condensed by excluding pollutants which are not stormwater related[4] as well as pollutants which are already being addressed (directly or indirectly) by one of the TMDLs.[5]Therefore, the condensed list of Category 2 water body-pollutant combinations includes[6]:

- Topanga Canyon Creek for lead. This qualifies as a Category 2 water body-based pollutant on the 303(d) listing for lead.
- Malibu Creek for sulfates and selenium. This qualifies as a Category 2 water body-based pollutant on the 303(d) listing for sulfates and selenium. However, due to the fact that there is currently no evidence supporting a linkage between MS4 discharges and exceedances of selenium and sulfates, these pollutants will not be modeled as part of the

[4] These include invasive species in Solstice Canyon and Malibu Creek, as well as fish barriers in Malibu Creek.

[5] These include: the fish consumption advisory in SMB, which is being addressed by the PCB and DDT TMDL; sediment in Malibu Creek, which is being addressed by the Benthic TMDL; scum and foam in Malibu Creek, which is being addressed by the Nutrients TMDL; benthic-macroinvertebrate bioassessments in Malibu Creek, which is being addressed by the Benthic TMDL; swimming restrictions and viruses in Malibu Lagoon, which is being addressed by the Malibu Lagoon Indicator Bacteria TMDL; eutrophy in Malibu Lagoon, which is being addressed by the Nutrients TMDL; and benthic community effects in Malibu Lagoon, which is being addressed by the Benthic TMDL.

[6] SMB Offshore/Nearshore is also 303(d)-listed for sediment toxicity. However, the USEPA PCB and DDT TMDL states the following regarding sediment toxicity: "There is little evidence of sediment toxicity in Santa Monica Bay…Our evaluation of the data showed only 3 out of 116 samples exhibited toxicity. Following the California listing policy, Santa Monica Bay is meeting the toxicity objective and there is sufficient evidence to delist sediment toxicity. We therefore make a finding that there is no significant toxicity in Santa Monica Bay and recommend that Santa Monica Bay not be identified as impaired by toxicity in the California's next 303(d) list." For this reason, sediment toxicity will be excluded as a Category 2 pollutant, and excluded from the EWMP and RAA.

NSMBCW RAA, but will be qualitatively evaluated as part of the EWMP. Monitoring for these pollutants will occur under the CIMP. If monitoring data suggest that the NSMBCW Agencies' MS4s may cause or contribute to exceedances of these pollutants in the receiving water, the EWMP will be revised accordingly.

- Malibu Lagoon for pH. This qualifies as a Category 2 water body-based pollutant on the 303(d) listing for pH. However, due to the fact that there is currently no evidence supporting a linkage between MS4 discharges and exceedances of pH, pH will not be modeled as part of the NSMBCW RAA, but will be qualitatively evaluated as part of the EWMP. Monitoring for pH will occur under the CIMP. If monitoring data suggest that the NSMBCW Agencies' MS4s may cause or contribute to pH exceedances in the receiving water, the EWMP will be revised accordingly.

4.4.3 Category 3 – Medium Priority

Category 3 (Medium Priority) designations are to be applied to water body-pollutant combinations which are not 303(d)-listed but which exceed applicable receiving water limitations contained in the Permit and for which MS4 discharges may be causing or contributing to the exceedance.

Based on information received from the NSMBCW EWMP Agencies, there are currently no known available data demonstrating exceedances of receiving water limits within the NSMBCW area, aside from those water body-pollutant combinations described previously as Category 1 and 2. As a result, no Category 3 combinations are designated at this time.

The agencies understand that data collected as part of their approved CIMP may result in future Category 3 designations in instances when receiving water limits are exceeded and MS4 discharges are identified as contributing to such exceedances. Under these conditions, the (appropriate) Agencies will adhere to Section VI.C.2.a.iii of the Permit.

4.5 Source Assessment

To complement the water quality prioritization process, permittees must identify known and suspected stormwater and non-stormwater sources influencing MS4 discharges by utilizing existing information for the water body-pollutant combinations in Categories 1 and 2. The intent of the Source Assessment is to identify potential sources within the watershed for the water body-pollutant combinations and to support prioritization and sequencing of management actions.

A preliminary source assessment and literature review has been conducted. Since sources of pollutants for the various water bodies within the NSMBCW are essentially identical (e.g., sources of trash within SMB and Malibu Creek are believed to be the same), the source assessment is presented by pollutant in Table 4-6.

Table 4-6. Water Body Pollutant Source Assessment

Pollutant	Potential Sources
Indicator Bacteria	• Human sources[a] - sanitary sewer overflows and leaks, onsite wastewater treatment systems, homeless encampments, swimmers • Land uses[b] – agricultural, commercial, educational, residential, open space, industrial, transportation, recreational • Non-anthropogenic sources[c] - plants, algae, decaying organic matter, beach wrack, beach sands, sediment, bird feces, dogs • Urban runoff and stormwater • Illicit discharges and connections • Other sites not covered under the Phase I MS4 Permit including Construction General Permit sites, Phase II MS4 Sites, State/Federal owned lands, recreational areas, private storm drains, and Caltrans' MS4
DDT and PCBs	• Palos Verdes Shelf[d] • Stormwater and dry weather runoff from urban land uses
Trash	• Litter from adjacent land areas • Roadways • Direct dumping and deposition • Storm drains (Regional Board, 2008)
Nutrients	• Natural sources - birds, tidal inflow, and sediment release[e] • Septic systems • Undeveloped and developed land • Agriculture/livestock areas • Golf courses • Tapia Water Reclamation Facility • Land uses - agriculture, residential, vacant/open space, industrial, educational, commercial, transportation.
Lead	• Non-point sources • Land uses - agricultural industrial, commercial, high density single family residential, transportation, multi-family residential, educational, open space (Geosyntec Consultants, 2012, Stein *et al* 2007)
pH	• Unknown
Selenium/ Sulfates	• Northern tributaries of Malibu Creek with Monterrey Formation type geology (LVMWD, 2011)[f]

[a] Monitoring results from microbial source tracking studies conducted in the NSMBCW area indicate that human fecal contributions are minor or non-existent (City of Malibu, 2012). This is supported by a recent USGS study (2011) conducted in the Malibu Lagoon area, which found that bacteria in groundwater wells were nearly absent even in wells that contained water with a wastewater history, likely due to a combination of microbial filtration, sorption, death, predation, and other factors within the soil.

[b] A study by SCCWRP investigated bacteria runoff concentrations from various land uses in the Los Angeles region (Stein *et al*, 2007).

[c] Imamura *et al* 2011, Izbicki *et al* 2012b, Lee *et al* 2006, Ferguson *et al* 2005, Grant *et al* 2001, Griffith 2012, Litton *et al* 2010, Phillips *et al* 2011, Jiang *et al* 2004, Sabino *et al* 2011, Weston Solutions 2010.

[d] The largest concentration of DDT and PCBs within Santa Monica Bay is contained within the Palos Verdes shelf, which is being addressed by the USEPA as a CERCLA site. Loadings from the shelf to the bay are large and have been well characterized (USEPA, 2012).

[e] Sutula et al (2004) found that sediment enriched in particulate nitrogen and phosphorus was deposited in Malibu Lagoon during the wet season. These particulate nutrients were remobilized as dissolved inorganic nutrients to the

surface waters during dry season. The study reported that sediment release approximately equals 18% of the total nitrogen source and 5% of the total phosphorus source from other nonpoint source inputs to the Lagoon during the dry season (Sutula et al, 2004).

[f] Undeveloped areas with Monterey Formation geology are a significant nonpoint source of phosphate within a number of subwatersheds in the upper Malibu Creek Watershed (LVMWD, 2011).

The final source assessment will be conducted using available data and information from annual reports, established TMDLs, and information received from the EWMP agencies. The following data sources will be reviewed as part of the source assessment for the Category 1 and 2 water body-pollutant combinations:

- Findings from the Permittees' Illicit Connections and Illicit Discharge Elimination Programs (IC/ID);
- Findings from the Permittees' Industrial/Commercial Facilities Programs;
- Findings from the Permittees' Development Construction Programs;
- Findings from the Permittees' Public Agency Activities Programs;
- TMDL source investigations;
- Watershed model results;
- Findings from the Permittees' monitoring programs, including but not limited to TMDL compliance monitoring and receiving water monitoring; and
- Any other pertinent data, information, or studies related to pollutant sources and conditions that contribute to the highest water quality priorities.

Where source information specific to the watershed is unavailable, pertinent literature will be utilized to provide direction for further assessment. Additional water quality data will be needed to quantify the contribution of MS4 discharges – particularly relative to the many other identified sources that have been documented within the NSMBCW. MS4 outfall monitoring (through the CIMP) and source identification (through the non-stormwater screening and monitoring program) will be essential to support future BMP planning and EWMP updates.

5 Watershed Control Measures

The Permit requires the NSMBCW EWMP Group to identify strategies, control measures, and BMPs[7] to implement within their WMA. Specifically, the Permit specifies that BMPs are expected to be implemented so that MS4 discharges meet effluent limits as established in the

[7] For simplification, the term "BMP" will be used throughout this Work Plan to collectively refer to strategies, control measures, and/or best management practices.

Permit and to reduce impacts to receiving waters from stormwater and non-stormwater runoff. This expectation assumes the implementation of both types of BMPs – non-structural and structural – by the EWMP permittees.

5.1 Structural BMP Categories and Design Characteristics

Structural BMPs are BMPs that involve the construction of a physical control measure to alter the hydrology or water quality of incoming stormwater or non-stormwater. There are two categories of structural BMPs, defined by the runoff area treated by the BMP: regional BMPs[8] and distributed BMPs. Regional BMPs are designed to treat runoff from a large drainage area expected to include multiple parcels and various land uses. Distributed BMPs are designed to treat runoff from smaller drainage areas and are normally installed to collect runoff close to the source from a limited number of parcels. Relevant regional and distributed structural BMPs are described below.

Infiltration Basins

An infiltration basin typically consists of an earthen basin (i.e., pervious soft bottom, or without impervious barrier inhibiting loss of surface waters into subsurface soils) constructed in naturally pervious soils (Type A or B soils). A forebay settling basin or separate treatment control measure may be provided as pretreatment and to facilitate maintenance. An infiltration basin functions by retaining the stormwater quality design volume and allowing the retained runoff to percolate into the underlying native soils over a specified period of time, avoiding or mitigating potential adverse effects of standing water (e.g., vectors). This is a full-capture / zero discharge approach, meaning all influent up to the design storm is infiltrated at the BMP.

Dry Extended Detention Basins

Dry extended detention basins are basins whose outlets have been designed to detain the stormwater quality design volume for 36 to 48 hours to provide treatment through sedimentation with some volume loss due to infiltration and soil soaking (and evaporation/evapotranspiration). Dry extended detention basins do not have a permanent pool and are designed to drain completely between storm events. Limited biological and physiochemical treatment processes are typically provided due to lack of vegetation or constant presence of water necessary to support microbes, but detention basin performance is expected to increase with vegetation due to the breakdown of some pollutants by microbes growing on the vegetated substrate (e.g., stems and leaves). These basins can also be used to provide hydromodification and/or flood control by modifying the outlet control structure and providing additional detention storage. The slopes,

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[8] The term "regional BMP" does not necessarily indicate that the project can capture and retain the 85th percentile storm, as described in the Permit. A nomenclature for regional BMPs that can capture and retain the 85th percentile storm will be useful to the EWMP process. The term "regional EWMP project" is recommended for those regional BMPs that are expected to be able to capture and retain the 85th percentile storm.

bottom, and forebay of dry extended detention basins are typically vegetated. Without the addition of a sand filter beneath the basin, considerable stormwater volume reduction can still occur, depending on the infiltration capacity of the subsoil.

Subsurface Flow Wetlands

Subsurface flow wetlands have a history of highly-effective implementation for tertiary treatment of wastewater, and are considered a “natural treatment system” with particular effectiveness with bacteria and pathogen reduction. Subsurface flow wetlands have not been extensively studied for stormwater treatment effectiveness and, though applied research exists, the International BMP database currently does not contain data with regard to their performance. Subsurface flow treatment processes within sub-surface flow wetlands range from simple physical filtration mechanisms to complex chemical adsorption and microbial transformation. With the addition of a detention basin for settling of coarse materials, subsurface flow wetlands can be considered an advanced treatment system nearly comparable (though less reliable) than a conventional wastewater treatment plant and would be expected to remove pollutants (e.g., TSS) at least as effectively as constructed surface flow wetlands.

Constructed Surface Flow Wetlands

A constructed surface flow wetland is a system consisting of a sediment forebay and one or more permanent micro-pools with aquatic vegetation covering a significant portion of the basin. Constructed surface flow wetlands typically include components such as an inlet with energy dissipation, a sediment forebay for settling out coarse solids and to facilitate maintenance, a base with shallow sections (1 to 2 feet deep) planted with emergent vegetation, deeper areas or micro pools (3 to 5 feet deep), and a water quality outlet structure. The interactions between the incoming stormwater runoff, aquatic vegetation, wetland soils, and the associated physical, chemical, and biological unit processes are a fundamental part of constructed treatment wetlands. Constructed wetlands provide multiple biological and physiochemical treatment processes associated with aerobic and anaerobic soil zones, submerged and emergent vegetation, and associated microbial activities.

Sanitary Diversions

Sanitary (or low-flow) diversions are structural BMPs that divert and redirect urban stormwater runoff away from the MS4 and to the sanitary sewer system, primarily during dry weather. In some cases low flow diversions also function during wet weather, thereby reducing a portion of the wet weather runoff volume (and associated pollutant load) transported downstream. Because Malibu is not sewered, sanitary diversions may not be applicable within Malibu.

Treatment Facilities

This BMP type includes the complete or partial diversion of the water quality design storm to a treatment plant for disinfection. Conventional treatment practices, while more common for the treatment of dry weather urban runoff than stormwater runoff due in part to capacity and energy requirements, are considered to be the most effective at removing pollutants since they are highly engineered systems with designs driven by the constituents of concern.

Cisterns

Cisterns are a harvest-and-use BMP, typically designed to capture a water quality design storm. Captured water is infiltrated or reused for irrigation, thereby reducing runoff and associated pollutants. Because cisterns are typically a full-capture BMP, the pollutant removal effectiveness of cisterns is considered comparable to infiltration basins. Capture-and-use regulations currently in place in the NSMBCW EWMP Group effectively require captured water to be used for landscape irrigation only.

Bioretention/Biofiltration

Bioretention stormwater treatment facilities are landscaped shallow depressions that capture and filter stormwater runoff. These facilities function as a soil- and plant-based filtration device that removes pollutants through a variety of physical, biological, and chemical treatment processes. The facilities normally consist of a ponding area, mulch layer, planting soils, and plantings. As stormwater passes down through the planting soil, pollutants are filtered, adsorbed, and biodegraded by the soil and plants. An optional gravel layer can be added below the planting soil to provide additional storage volume for infiltration. Bioretention is typically designed without an underdrain to serve as a retention BMP in areas of high soil permeability, where infiltration can occur in addition to filtration. Bioretention with an underdrain (or "biofiltration") is a treatment control measure that can be used for areas with low permeability native soils or steep slopes, to allow for the treatment of runoff through filtration despite impermeable underlying soils. Bioretention can also be designed with a raised underdrain (or "bioinfiltration") to enhance the amount of retention and incidental infiltration achieved by the BMP.

Bioswales

Bioswales (also known as vegetated swales) are open, shallow channels with low-lying vegetation covering the side slopes and bottom topography that collect and slowly convey runoff to downstream discharge points. Bioswales provide pollutant removal through settling and filtration via the vegetation (usually grasses) lining the channels, thereby allowing for stormwater volume reduction through infiltration and evapotranspiration, reduction in the flow velocity, and conveyance of stormwater runoff. The vegetation in the bioswale can vary depending on its location and design criteria.

Green Roofs

Green roofs (also known as eco-roofs and vegetated roof covers) are roofing systems that layer a soil/vegetative cover over a waterproof membrane. Green roofs rely on highly-porous media and moisture retention layers to treat runoff via biofiltration, store intercepted precipitation, and support vegetation that can reduce the volume of stormwater runoff via evapotranspiration.

Cisterns can also be incorporated into green roof design to receive the filtered runoff and store it for on-site use.

Porous / Permeable Pavements

Permeable pavements are infiltration-type BMPs that contain significant voids to allow water to pass through to a stone base. These BMPs come in a variety of forms- they may be a modular paving system (concrete pavers, grass-pave, or gravel-pave) or a poured-in-place solution (porous concrete or permeable asphalt). All permeable pavements with a stone reservoir base treat stormwater and remove sediments and metals to some degree. While conventional non-permeable pavement results in increased rates and volumes of surface runoff, porous pavements (when properly constructed and maintained) allow some of the stormwater to percolate through the pavement and enter the soil below. This process facilitates groundwater recharge while providing the structural and functional features needed for roadways, parking lots, and sidewalks. The paving surface, subgrade, and installation requirements of permeable pavements are more complex than those for conventional asphalt or concrete surfaces. For porous pavements to function properly over an expected life span of 15 to 20 years, they must be properly sited, carefully designed and installed, as well as periodically maintained. Failure to protect permeable pavement areas from construction-related or other sediment loads can result in premature clogging and failure.

Media Filters

Media filters consist of sand filters, compost filters, cartridge filters, and any other BMP designed with filtration media that absorbs pollutants. The treatment pathway is vertical (downward through the sand or media) to a perforated underdrain system that is connected to the downstream storm drain system or to an infiltration facility. As stormwater or dry weather urban runoff passes through the sand, pollutants are trapped in the small pore spaces between sand grains or are adsorbed to the sand surface. Media filters can be used as stand-alone or pre-treatment measures to extend the life and effectiveness of downstream BMPs.

Hydrodynamic Separators

Hydrodynamic separation devices are devices that remove trash, debris, and coarse sediment from incoming flows using screening, gravity settling, and centrifugal forces generated by forcing the influent into a circular motion. By having the water move in a circular fashion, rather than a straight line, it is possible to obtain significant removal of suspended sediments and attached pollutants with less space as compared to wet vaults and other settling devices. Several types of hydrodynamic separation devices are also designed to remove floating oils and grease using sorbent media. Like media filters, hydrodynamic separators can be used as stand-alone or pre-treatment measures to extend the life and effectiveness of downstream BMPs.

5.2 Summary of Existing and Planned BMPs

This section provides a summary of existing, planned, and potential BMPs within the NSMBCW EWMP Area. Existing BMPs are those BMPs that have been constructed and are functional at the time of drafting the EWMP Work Plan (and were constructed after adoption of TMDLs). Planned BMPs are those BMPs which have been identified for implementation and conceptual designs have been initiated. These BMPs are not necessarily funded at this time and their future construction depends on a number of factors which have not necessarily been evaluated at this stage of the EWMP development. Such factors include technical feasibility, constructability, cost, and modeled performance during the reasonable assurance analysis, among others. Potential BMPs are those BMPs which have been identified for possible implementation, but no design plans have been initiated at this time.

5.2.1 Existing Regional BMPs

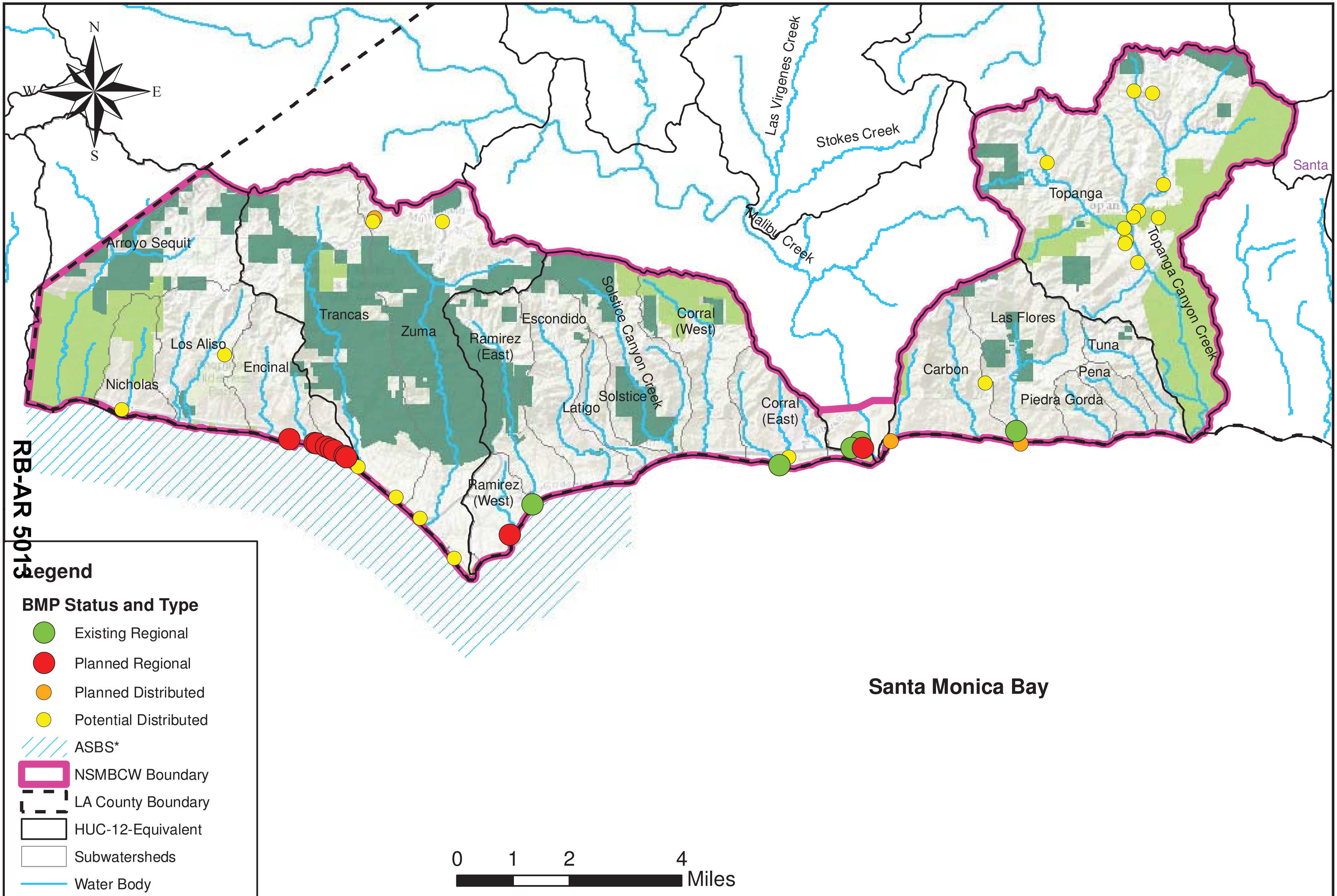
Aside from Malibu Legacy Park and the Civic Center Stormwater Treatment Facility (SWTF), which is collectively considered a regional EWMP project (see Section 5.3), Paradise Cove Stormwater Treatment Facility and Marie Canyon Water Quality Improvement Project are summarized below due to their significance with respect to stormwater quality within the NSMBCW EWMP Area. Although these BMPs do not necessarily meet the Permit's design criterion for a regional EWMP project, they do capture and/or treat runoff from large tributary areas which include multiple parcels. Locations of these BMPs are shown on Figure 4. Details for each BMP are provided in Appendix B.

Paradise Cove Stormwater Treatment Facility

On June 28, 2010, Malibu completed and held its grand opening of the Paradise Cove SWTF. In 2006, Malibu applied for funding through the Clean Beaches Initiative Grant program and was awarded $920,000 for the construction of a treatment facility to treat flows from Ramirez Canyon Creek where it discharges at Paradise Cove. The system is designed as a 3-stage system which removes sediment prior to filtration and UV treatment of the creek water: Stage 1- sediment removal (Bay Saver Technologies type device); Stage 2- filtration; and Stage 3- ultraviolet disinfection. The treatment flow rate for sediment removal is 3600 gpm and the treatment flow rate for UV/filtration is 900 gpm.

Marie Canyon Water Quality Improvement Project

Opened in 2007 by the LACFCD with the support of Malibu, the Marie Canyon Water Quality Improvement Project was designed to filter and treat up to 100 gallons per minute of dry and wet weather runoff at Marie Canyon drain. The Marie Canyon facility uses ultraviolet radiation to kill bacteria in stormwater and urban runoff and then returns the clean water to the creek, which empties into the ocean.



RB-AR 5013

Figure 4. Existing Regional BMPs, Planned and Potential Distributed BMPs, and Planned Regional BMPs NSMBCW EWMP Work Plan

June 2014

5.2.2 *Existing Distributed BMPs*

The appendices of the 2011-2012 Unified Annual Stormwater Report compiled by the Los Angeles County Department of Public Works (LACDPW, 2012) summarizes installed (Appendix B) and maintained (Appendix C) structural BMPs within the area referred to as "Malibu Creek and Rural Santa Monica Bay." Table 5-1 provides a compilation of installed and maintained BMPs from the 2011-2012 Unified Annual Stormwater Report for the NSMBCW EWMP Group. The table reflects a combination of two distinct tables in the Unified Annual Stormwater Report – the installed BMP summary table and the maintained BMP summary table.

Table 5-1. Summary of Installed and Maintained BMPs by Jurisdiction and BMP Type

		Existing BMPs (Installed and Maintained)			
BMP Category	**BMP Type**	**County**	**LACFCD**	**Malibu**	**Total**
Biofiltration/ Bioretention	Biofiltration	0	0	17	17
	Bioswale	0	0	24	24
Infiltration	Infiltration Trenches	0	0	13	13
	Drywell	0	0	2	2
Permeable Pavement	Geo Block Porous Pavement	0	0	15	15
Rainfall Harvesting	Cistern	0	0	4	4
Source Control	Catch Basin	0	0	139	139
	Catch Basin Insert	0	0	23	23
	CDS Gross Pollutant Separators	3	0	0	3
	Clean Screen Catch Basin Inserts	39	0	0	39
	Downspout Filter	0	0	2	2
	Fossil Filter Catch Basin Inserts	14	0	1	15
	Restaurant Vent Traps	1	0	0	1
	Debris Boom/Net	0	1	0	1
Treatment Facility	Treatment Facility/Low Flow Diversion	0	1	2	3
	TOTAL	**57**	**2**	**242**	**301**

5.2.3 *Planned/Potential Regional BMPs*

Regional BMPs which have been planned within the NSMBCW EWMP Area include those detailed in the NSMB J1/J4 Bacteria TMDL Implementation Plan, the County J1/J4 Implementation Report, and previous work conducted on behalf of the City of Malibu. There are five planned/potential regional BMPs within the NSMBCW EWMP Area. These BMPs are not necessarily funded at this time and their future construction depends on a number of factors which have not necessarily been evaluated at this stage of the EWMP development. Such factors include technical feasibility, constructability, cost, and modeled performance during the RAA, among others. The BMPs included in the NSMBCW EWMP Group's Notice of Intent are explained below.

Broad Beach Biofiltration Project – Malibu is currently preparing to construct a project to install biofilters at nine catch basins on Broad Beach Road. Construction is planned to commence in summer of 2014 and be completed mid-2015.

Wildlife Road Storm Drain Improvements – Malibu has begun construction of a project to install biofilters along Wildlife Road and Whitesands Place, as well as catch basin filters at two existing catch basins. The project is expected to be complete in summer of 2014.

Malibu Legacy Park Pump Station Improvements – Malibu plans on investigating the feasibility of upgrading the existing storm drain pumps at Malibu Legacy Park so that the system can treat an increased volume of runoff. If feasible, Malibu hopes to implement these upgrades by April 2016.

In addition to these three BMPs, two other BMPs, currently known as "Trancas-2" and "Trancas-3," have been identified as potential BMPs but have not reached a conceptual design stage at this point in time. They will be evaluated further as part of the EWMP RAA. Locations of these five BMPs are shown on Figure 4. Details for each BMP are provided in Appendix B.

5.2.4 Planned/Potential Distributed BMPs

Table 5-2 summarizes the planned/potential distributed BMPs within the NSMBCW EWMP Area. These BMPs are not necessarily funded at this time and their future construction depends on a number of factors which have not necessarily been evaluated at this stage of the EWMP development. Such factors include technical feasibility, constructability, cost, and modeled performance during the RAA, among others. Locations of these BMPs are shown on Figure 4 where location information was available. Details for each BMP are provided in Appendix B.

Table 5-2. Summary of Planned/Potential Distributed BMPs by Jurisdiction and Type

Permittee	Number of Planned/Potential Distributed BMPs				
	Bioretention	Cistern	Permeable Pavement	Infiltration	Treatment Facility
Malibu	2	-	-	2	-
County[a]	6	1	2	24	1
Total	8	1	2	26	1

[a] County includes the Los Angeles County Department of Beaches and Harbors, which have 18 planned infiltration BMPs at beaches per the 2005 J1/J4 Implementation Plan.

5.3 Regional EWMP Projects

Participation in an EWMP requires collaboration among permittees on multi-benefit regional projects that, wherever feasible, retain (i) all non-stormwater runoff and (ii) all stormwater runoff from the 85th percentile, 24-hour storm event for the drainage areas tributary to the projects, while also achieving other benefits including flood control and water supply, among others.

The 85th percentile, 24-hour storm within the NSMBCW EWMP Group area ranges from approximately 0.6-inches along some of the coastal beaches to 1.1-inch in some of the mountainous areas. At this time, Malibu Legacy Park (Legacy Park) is the only known regional EWMP project within the NSMBCW EWMP Group area, as detailed in the NSMBCW EWMP Group's Notice of Intent.

5.3.1 Malibu Legacy Park

Legacy Park, located between Civic Center Way and Pacific Coast Highway adjacent to Malibu Lagoon, officially opened on October 2, 2010. Legacy Park is an integrated multi-benefit project that 1) improves water quality to Malibu Creek, Malibu Lagoon, and nearby beaches by capturing, detaining, screening, filtering, and treating dry and wet weather runoff from the local watershed to remove pathogens, nutrients, and other pollutants, 2) integrates and beneficially uses captured and treated runoff to offset potable water usage, and 3) creates a public amenity that provides valuable habitat, education, and passive recreation opportunities in conjunction with water quality improvement opportunities.

The project, which diverts runoff flows to an 8 acre-foot pretreatment vegetated detention pond located at the Legacy Park site, is the only known regional EWMP project within the NSMBCW EWMP Area. The pond at Legacy Park temporarily stores captured runoff prior to conveyance to the Civic Center SWTF, and also stores water for water resources uses, such as irrigation at the park or other Civic Center area landscaping. The Civic Center SWTF is able to treat and disinfect up to 1,400 gallons per minute (gpm) of urban and stormwater runoff. The runoff is pumped from Civic Center Way, Cross Creek Road, and the Malibu Road storm drains to Legacy Park, and then the Civic Center SWTF. The Civic Center SWTF is also used to recirculate and maintain the quality of flows within Legacy Park during periods of storage for water resources use.

Legacy Park was originally designed to capture the 0.75" design storm for most of the 330-acre Civic Center drainage areas, as well as dry weather flows from the other two drains which are tributary to the project. Because the 85th percentile, 24-hour design storm over the entire Legacy Park tributary area is approximately 0.65", the park currently qualifies as a regional EWMP project. Future modifications may lead to an increased capacity of Legacy Park, including: 1) the implementation of low impact development (LID) BMPs throughout portions of the tributary watershed, which may lower the runoff volume tributary to Legacy Park; and 2) pump upgrades which would increase the project's overall capacity.

5.3.2 *Additional Regional EWMP Projects*

Additional regional BMPs that do exist may not currently be designed to fully capture the stormwater runoff from the 85th percentile, 24-hour storm event. However, potential upgrades to existing regional BMPs may provide sufficient capacity to capture the 85th percentile storm. Potential regional EWMP projects within the NSMBCW EWMP Area may therefore include:

- Existing regional BMPs which may be redesigned and upgraded to capture and retain the runoff from the 85th percentile, 24-hour storm event within the BMP's tributary area, as well as existing regional BMPs which can increase their design capture efficiency by adding distributed BMPs throughout the tributary watershed;
- Planned regional BMPs which can be designed and constructed to capture and retain the runoff from the 85th percentile, 24-hour storm event within the BMPs tributary area; and
- Additional regional EWMP projects that are identified as part of the EWMP planning process.

The following planned regional BMPs require further analysis to determine if potential exists for these BMPs to meet the design requirements to qualify as a regional EWMP project.

Broad Beach Biofiltration Project

As stated previously, this biofiltration project is still in the design stages, but based on the final drainage area and sizing characteristics of the biofilters as well as potential to implement upstream distributed BMPs, the Broad Beach Biofiltration Project will be evaluated to determine if it can qualify as a regional EWMP project.

Wildlife Road Storm Drain Improvements

Because this project is currently in construction, there is likely little that can be done at this time to immediately increase its capacity. However, upon completion, the project design capacity will be evaluated to determine if it meets the Permit criteria of a regional EWMP project. Additionally, opportunities for the implementation of upstream distributed BMPs will be evaluated to determine if these can increase the design capacity of the regional BMP so it can capture the 85th percentile, 24-hour storm event.

Each of these BMPs will be analyzed in greater detail to determine which have the greatest potential of meeting the Permit requirements for regional EWMP projects.

5.4 Process for Identifying and Evaluating Additional Structural BMPs

Additional structural BMPs, including regional EWMP projects, will be identified during the EWMP planning process. These projects will be identified using a combination of stakeholder input, computer modeling with the Structural BMP Prioritization and Analysis Tool (SBPAT), and desktop-level screening to identify areas that are suitable for BMPs. SBPAT will also be used to quantitatively evaluate the identified BMPs. A more detailed description of the modeling process implemented by SBPAT is provided in Section 6 - RAA Approach. In particular, Section 6.2.3 describes the process used to identify and evaluate additional structural BMPs.

5.5 Minimum Control Measures

Non-structural BMPs are BMPs that prevent or reduce the release of pollutants or transport of pollutants within the MS4 area but do not involve construction of physical facilities. Non-structural BMPs are often implemented as programs or strategies which seek to reduce runoff and/or pollution close to the source. Examples include but are not limited to: street sweeping, downspout disconnect programs, pet waste cleanup stations, or illicit discharge elimination. Minimum control measures (MCMs) as set forth in the Permit are a subset of non-structural BMPs even though some MCMs include measures that require the implementation of structural BMPs by private parties.

Participating agencies are continuing to implement the MCMs required under the 2001 MS4 Permit. Applicable new MCMs will be implemented by the time the EWMP is approved by the Regional Board.

5.5.1 Identification of Additional or Modified Non-Structural BMPs

The Permit allows permittees developing an EWMP the opportunity to customize the MCMs specified in the Permit to focus resources on high priority issues within their watersheds. Modifications to the MCMs must be appropriately justified and still be consistent with 40 CFR § 122.26(d)(2)(iv)(A)-(D). A control measure may only be eliminated based on the justification that it is not applicable to a particular permittee (per Section IV.C.5.b.iv.1(c) of the Permit. Customized measures, once approved as part of the EWMP, will replace in part or in whole the prescribed MCMs in the Permit. The Planning & Land Development Program is not eligible for customization in that it may be no less stringent than the baseline requirements in the Permit. However, it can be enhanced over the baseline permit requirements such as LA County has done in its LID ordinance, thereby yielding additional pollutant and stormwater volume control for the watershed. The Permit-specified MCMs (baseline MCMs) build upon the MCMs in the previous MS4 Permit (Order 01-182). Although similar in many ways to the previously-required MCMs, in most cases the baseline MCMs contain more prescriptive record-keeping and/or implementation requirements.

General Framework for MCM Customization

As previously stated, permittees are implementing the existing MCMs under Order 01-182 and in some cases MCM program enhancements have been implemented to address watershed priorities for TMDL implementation which may be more stringent or more targeted than the baseline MCMs. The task of MCM customization is to identify which MCMs should be customized in order to address the identified water quality priorities.

The Regional Board has stated that a permittee must show an "equivalent effectiveness" to justify customization of an MCM.[9] In order to accomplish this, a permittee must compare the effectiveness of proposed customized MCMs with the corresponding effectiveness of the baseline MCMs in the context of the identified water quality priorities.

An approach for evaluating existing institutional MCMs has been developed and will be used to develop the customized MCMs, if any, proposed in the EWMP. The following steps provide a general framework for MCM customization:

- **Identify MCMs for potential customization**. This may include identifying:
    - MCM requirements prescribed by the Permit which are not already being implemented by the permittee;
    - Currently implemented MCMs which have been enhanced over the previous Permit as part of TMDL implementation, e.g., Clean Bay Restaurant Program;
    - Programmatic solutions/non-structural controls identified in TMDL implementation plans which may not yet have been implemented; and
    - MCMs which are currently being implemented but which may be excessive in scope. For example, commercial inspections being conducted of retail gasoline facilities which are already heavily regulated through other environmental programs in areas that have no receiving water impairments for the pollutants of concern may be carried out less frequently, or discontinued indefinitely.
- **Identify MCMs which are not applicable**. A control measure may be eliminated based on the justification that it is not applicable to a particular permittee. For example if it is the policy of a permittee not to use pesticides in public agency activities, then there is no need for tracking of pesticide use and this MCM may be proposed for elimination.
- **Assess the effectiveness of the incremental baseline MCM requirements with respect to water quality priorities**. The data necessary to quantify this will vary greatly by MCM, but may include information such as: receiving water quality, inspection and reporting records, number of qualifying projects (e.g., number of construction projects greater than 1 acre), number of pet station bags used, amount of material picked up by street sweeping activities, number of employees trained, and maintenance records. Additionally, the California Stormwater Quality Association (CASQA) provides a tool to

[9] Stated on page E-2 of response to comments on the Tentative Order Minimum Control Measures, found here: http://www.waterboards.ca.gov/losangeles/water_issues/programs/stormwater/municipal/StormSewer/CommentLetters/E_MCM%20Matrix%2010-26-12%20Final.pdf

estimate the effectiveness of stormwater management programs. The tool recommends possible assessment metrics that can be used for various stormwater programs.

- **Quantify the additional resources required to implement the incremental baseline MCMs.** This may include estimating additional staff resources in terms of full-time employees, consulting resources, and contracted services.
- **Assess the effectiveness and resources required to implement the customized MCM**. The process to quantify these will be the same as the process used to quantify the baseline effectiveness of the existing MCM.
- **Compare the assessed effectiveness and resources required to implement the incremental baseline MCMs and the customized MCMs**. Customization can be justified in several ways:
  - If the customized MCM effectiveness is equal to or greater than the baseline MCM, customization can be justified.
  - If an MCM requirement is not applicable, then elimination is justified.
  - If the incremental MCM requires additional resources that are disproportionate to the increased effectiveness achieved, then retention of the existing MCM may be justified.
- **Document the customized MCM justification**.

This customization framework provides a general process to justify customization of MCMs. The NSMBCW EWMP Group will conduct the customization, develop justification, and provide the materials for documentation in the EWMP. These materials may include any of the information outlined in the above framework to modify or eliminate a MCM. The customization of MCMs will be evaluated separately by each Agency and included in the EWMP, although coordination among the NSMBCW EWMP Agencies will occur where feasible.

6 Reasonable Assurance Analysis Approach

The Permit-required RAA identifies and evaluates potential BMP implementation scenarios within the NSMBCW EWMP Area. Specifically, the Permit requires that the RAA be conducted for the prioritized WBPCs identified in the EWMP. The RAA must demonstrate that the proposed BMP implementation scenario(s) will reasonably achieve compliance with applicable water quality standards.

The Regional Board has developed a guidance document titled, "Guidelines for Conducting Reasonable Assurance Analysis in a Watershed Management Program, Including an Enhanced Watershed Management Program (March 25, 2014)." Although the guidance document presents guidelines and not necessarily requirements, the RAA approach presented in this document has been developed to conform to the Regional Board guidance document where appropriate. The approach outlined herein was presented to the Regional Board on April 9, 2014 (Geosyntec, 2014) and June 6, 2014 and was found to be consistent with their guidelines.

6.1 MODEL SELECTION FOR RAA ANALYSIS

The recommended RAA approach leverages the strengths of the publicly available, Permit-approved, Geographical Information System (GIS)-based model that has been developed for the region: the SBPAT.[10] The following describes the rationale for utilization of this model for the wet weather RAA. A non-modeling based methodology is recommended for the dry weather RAA. This methodology is described in Section 6.3.8.[11]

SBPAT is a public domain, "open source," GIS-based water quality analysis tool intended to: 1) facilitate the prioritization and selection of BMP project opportunities and technologies in urbanized watersheds; and 2) quantify benefits, costs, variability, and potential compliance risk associated with stormwater quality projects. The decision to use SBPAT for the NSMBCW RAA in the manner described below is based on the model capabilities and the unique characteristics of the NSMBCW, specifically:

1. **Modeling of SMB hydrologic and watershed processes** – SBPAT utilizes EPA's Stormwater Management Model (SWMM) as the hydrologic engine, and SBPAT has been calibrated to local rainfall and Santa Monica Bay (SMB) stream flow gauges, confirming the ability to predict stormwater runoff volumes on an annual basis;
2. **SMB pollutants of concern and their compliance metric expression** – SBPAT has been utilized for planning applications related to Bacteria TMDL compliance (and specifically exceedance-day predictions, based on SMB criteria), including a demonstrated linkage of load reduction to exceedance days;
3. **Availability of new open space water quality loading data** – Recently developed Event Mean Concentration (EMC) data are consistent with SBPAT and were developed in SMB as part of this RAA-development effort;
4. **Capability to conduct opportunity and constraints investigations** – SBPAT is capable of supporting structural BMP placement, prioritization, and cost-benefit quantification,

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[10] SBPAT is specifically referenced in the MS4 Permit Part VI.C.5.b.iv and was presented at the first two Permit Group TAC RAA Subcommittee meetings.

[11] A similar methodology will also be adhered to for open beach compliance monitoring locations, where drainage areas are not defined and MS4 discharges are not immediately present.

and has been applied for such purposes previously in the NSMBCW and other nearby SMB subwatersheds;

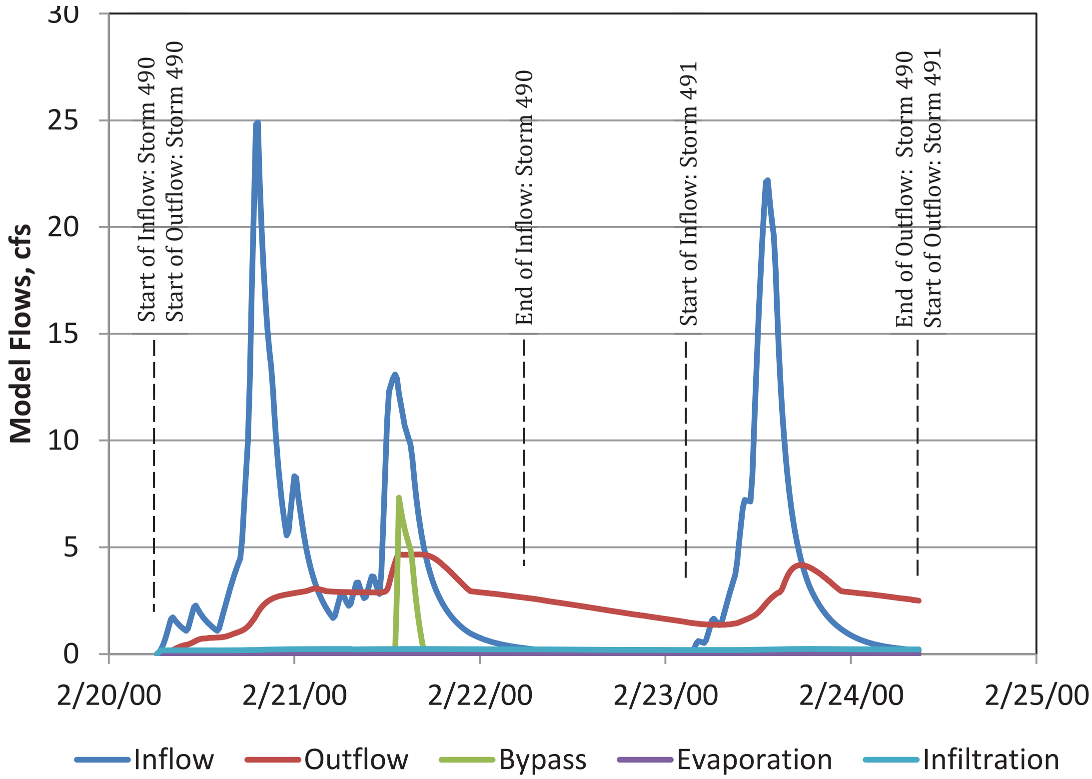
5. **Characterization of water quality variability** – SBPAT is capable of quantifying model output variability and confidence levels, which is a component of the Regional Board's recent RAA guidance; and
6. **Supports quantification of interim milestones, consistent with methods addressing both structural and non-structural BMPs** – SBPAT is a wet weather tool, but implementation is easily compatible with methods for addressing dry weather and non-structural BMPs.

The quantification analysis component of SBPAT includes a number of features. The model:

- Calculates and tracks inflows to BMPs, treated discharge, bypassed flows, evaporation, and infiltration at each 10 minute time step;
- Distinguishes between individual runoff events by defining six-hour minimum inter-event time in the rainfall record, yet tracks inter-event antecedent conditions;
- Tracks volume through BMPs and summarizes and records these metrics by storm event; and
- Produces a table of each BMP's hydrologic performance, including concentration and load metrics by storm event, and consolidates these outputs on an annual basis.

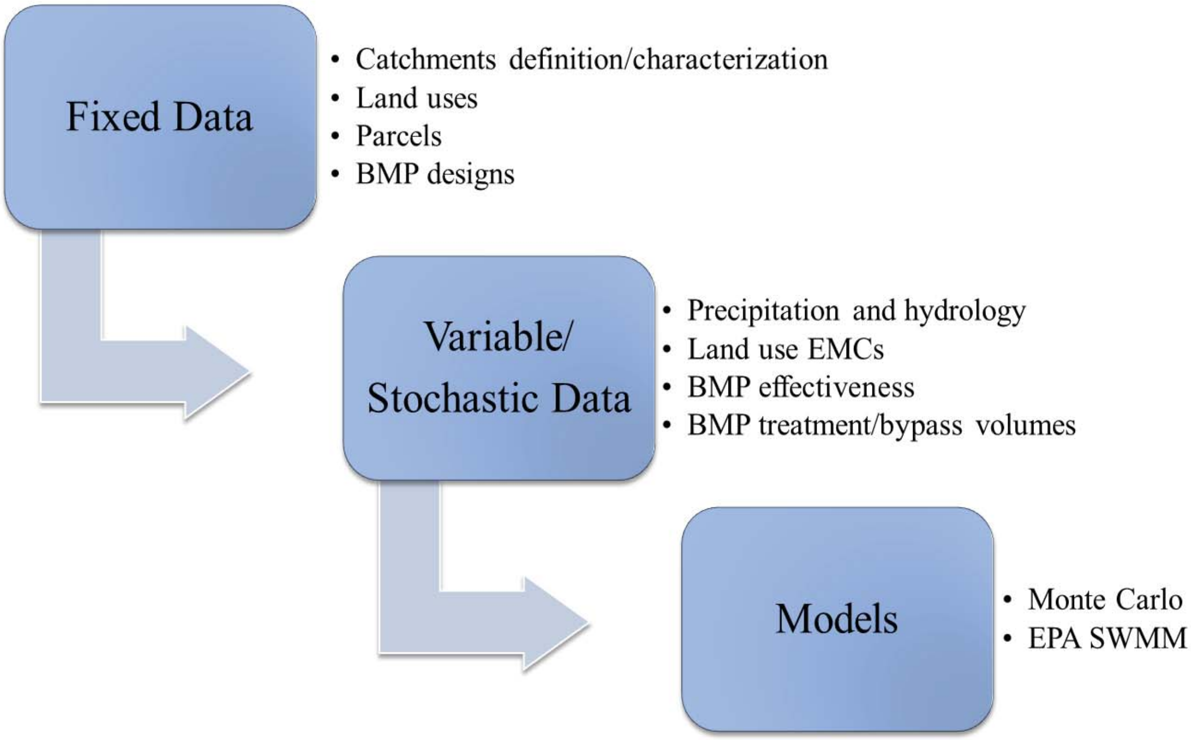
An example of the SBPAT (and EPA SWMM) hydrologic and watershed modeling approach is illustrated below in Figure 5.

Figure 5. Example of SBPAT/SWMM Hydrologic Modeling Consideration of Storms in Long Term Record



Data used for the quantification/analysis module include both fixed and stochastic parameters. The model utilizes land use based EMCs, USEPA SWMM, USEPA/American Society of Civil Engineers/Water Environment Research Foundation (USEPA/ASCE/WERF) International BMP Database (IBD) water quality concentrations, watershed/GIS data, and a Monte Carlo approach to quantify water quality benefits and uncertainties. Model data flow is provided below in Figure 6.

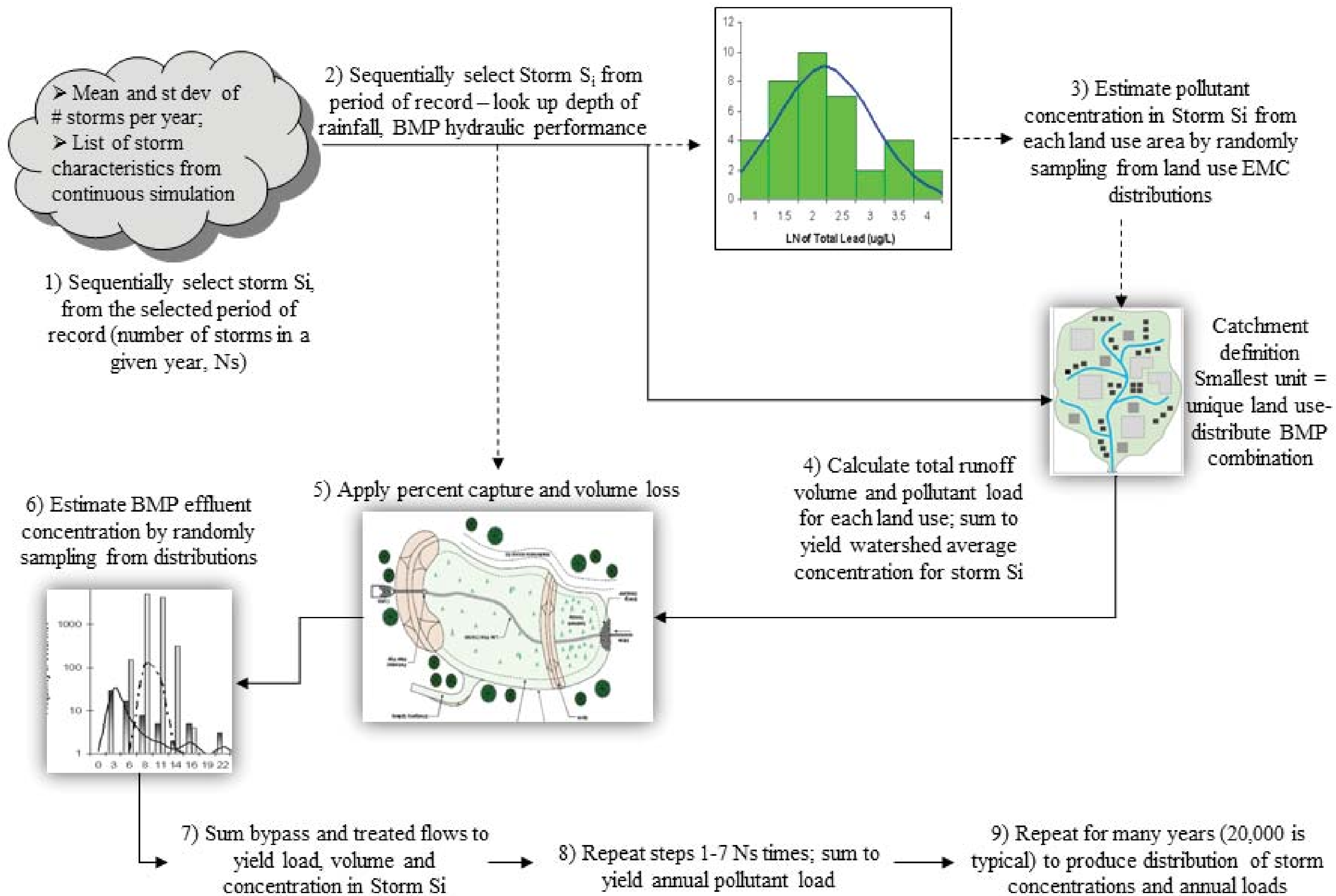
Figure 6. SBPAT Model Data Flow



Each model simulation integrates Monte Carlo methods that rely on repeated random sampling to obtain numerical results. Model simulations are run 20,000 times to calculate a distribution of outcomes that can support the definition of confidence levels and quantify variability. Consistent with the SBPAT usage, Monte Carlo methods are typically used in physical and mathematical problems and are most suited to be applied when it is difficult to obtain a closed-form expression or when a deterministic algorithm is not desired. A schematic of SBPAT's Monte Carlo process is provided in Figure 7.

Model documentation, as well as links to related technical articles and presentations, is provided at www.sbpat.net.

Figure 7. SBPAT Monte Carlo Method Components



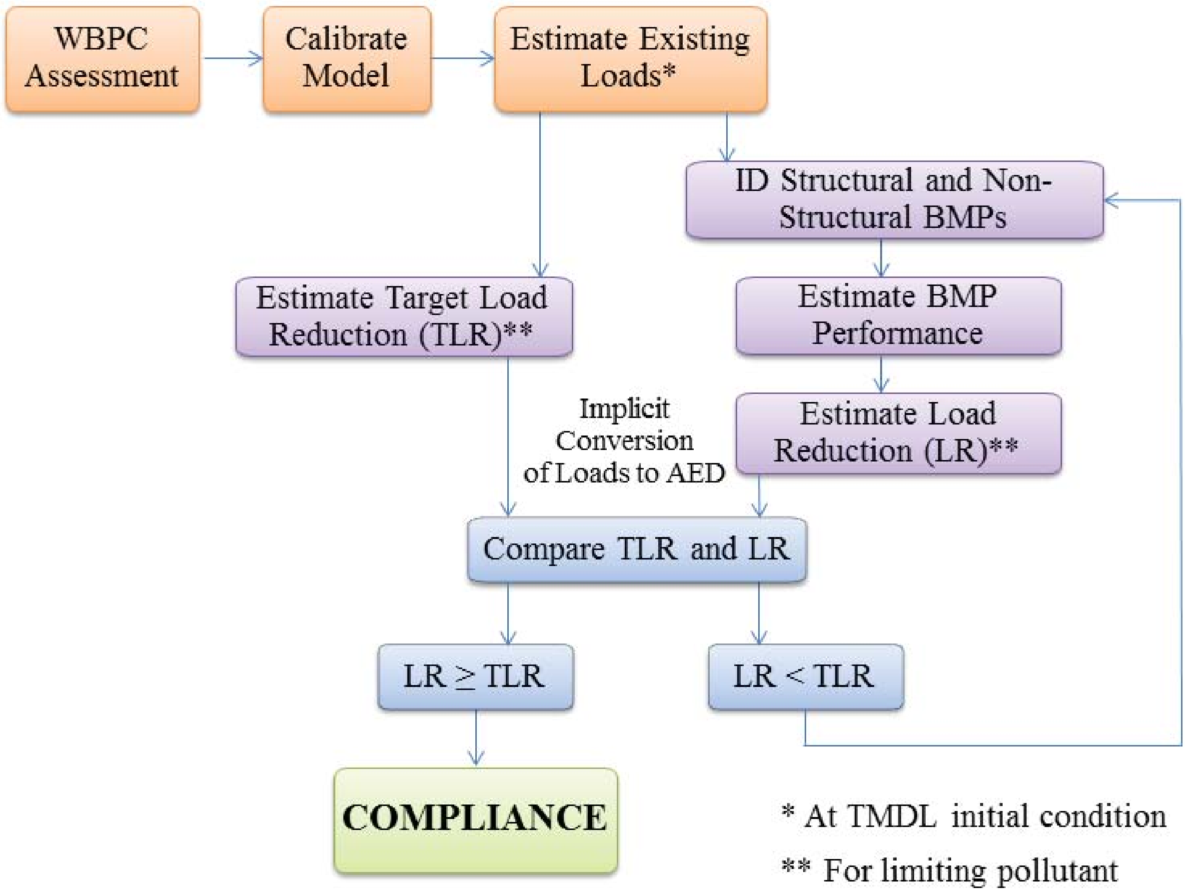
6.2 Overview of RAA and BMP Selection Process

6.2.1 RAA Process

The RAA process, depicted in Figure 8, consists generally of the following steps:

- Identify WBPCs for which the RAA will be performed;
- Identify the MS4 service area (exclude lands of agencies not party to this EWMP such as Federal land, State land, etc.);
- Develop target load reductions for average and 90^{th} percentile years based on Permit and Regional Board guidance;
- Identify structural and non-structural BMPs that were either implemented after applicable TMDL effective dates or are planned for implementation in the future;
- Evaluate the performance of these BMPs in terms of annual pollutant load reductions;
- Compare these estimates with the targets; and
- Revise the BMP implementation scenario by identifying additional BMP's until targets are met.

Figure 8. RAA Process Overview



Target load reductions represent a numerical expression of the Permit compliance metrics (e.g., bacteria allowable exceedance days (AEDs) for dry and wet weather) that can be modeled and can serve as a basis for confirming that the EWMP is in compliance with the Permit and that the efforts described therein, if appropriately implemented, will reasonably demonstrate and assure Permit compliance. For bacteria, an additional step will be taken to establish that, for a representative NSMBCW subwatershed, modeled annual fecal coliform loads (from the subwatershed) are predictive of measured annual wet weather exceedance days (based on surf zone sampling data for all bacteria indicators). Target load reductions for bacteria will then be established through the following steps:

- Calculate each subwatershed's baseline (natural condition) loading, assuming the land use distribution of the Arroyo Sequit subwatershed (approximately 95% open space) to represent an "allowable" annual load[12] that reflects the reference condition;
- Calculate "existing" (pre-EWMP implementation) loading using existing land uses and BMPs to represent the current load; and
- Subtract the two load estimates to determine the target load reduction needed to achieve reference watershed conditions.

This approach requires a new open space land use event mean concentration (EMC) dataset for fecal coliform that reflects wet weather freshwater samples collected from the NSMBCW reference watershed, Arroyo Sequit. This new open space EMC dataset is shown in Table 6-1.

Table 6-1. Default and Revised Fecal Coliform EMC Statistics for Open Space/Vacant Land Use Category
(Arithmetic Estimates of Log Mean And Log Standard Deviation Values Shown)

	Mean (MPN/100 mL)	Standard Deviation (MPN/100 mL)
SBPAT Default based on Southern California Coastal Watershed Research Project (SCCWRP) 2007b (n=2)	6310	1310
Revised based on Arroyo Sequit samples (n=11)	484	806

For subwatersheds with SMB Beaches Bacteria TMDL compliance monitoring locations that have anti-degradation-based allowable exceedance days, a target load reduction of zero will be assumed, consistent with the TMDL's approach which acknowledges that historic bacteria exceedance rates for each of these subwatersheds are lower than that of the reference beach, on average.

Target load reductions for lead, a 303(d)-listed pollutant for Topanga Canyon, will be estimated based on the load required to meet the California Toxics Rule (CTR) objective in MS4 discharges to this water body. This will be done by subtracting the "allowable" annual load (or existing annual runoff volume multiplied by the CTR objective) from the existing annual load. Nutrients in lower Malibu Creek will be addressed similarly, with the nutrient and benthic TMDL waste load allocations (WLAs) used to set the allowable annual loads. Zero target load reductions will be set for PCBs and DDT (with Total Suspended Solids [TSS] as a surrogate for

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[12] The 50th and 90th percentile years will be selected based on direction from the Regional Board.

these particulate-associated pollutants), consistent with the USEPA TMDL which sets MS4 WLAs based on existing loads.

6.2.2 Alternative Approaches

The above approach describes one method for demonstrating reasonable assurance. Alternatively, fecal coliform target load reductions can also be estimated using an SBPAT modeling approach where a hypothetical infiltration basin at each subwatershed outlet is sized so that discharge frequency meets the AEDs, with the target load reduction values then set equivalent to the load reduction achieved by the hypothetical outlet infiltration basin. On June 6, 2014, this alternative approach for estimating TLRs for bacteria was presented to the Regional Board, who expressed support of the approach.

6.2.3 BMP Selection Process

The RAA modeling process will begin with the evaluation of new or enhanced, quantifiable non-structural BMPs and existing structural BMPs to assess water quality improvements (load reductions) which have occurred to date since the effective dates of applicable TMDLs. Next, if compliance is not met based on non-structural and existing BMPs, planned/potential non-structural and structural BMPs will be modeled with consideration of scheduled completion in the context of the prioritized WBPCs and compliance deadlines (including interim milestone dates). If compliance is still not achieved by the combination of both built and planned BMPs, additional BMPs will be identified, evaluated to assess water quality improvements, and discussed with the NSMBCW Agencies in order to achieve compliance.

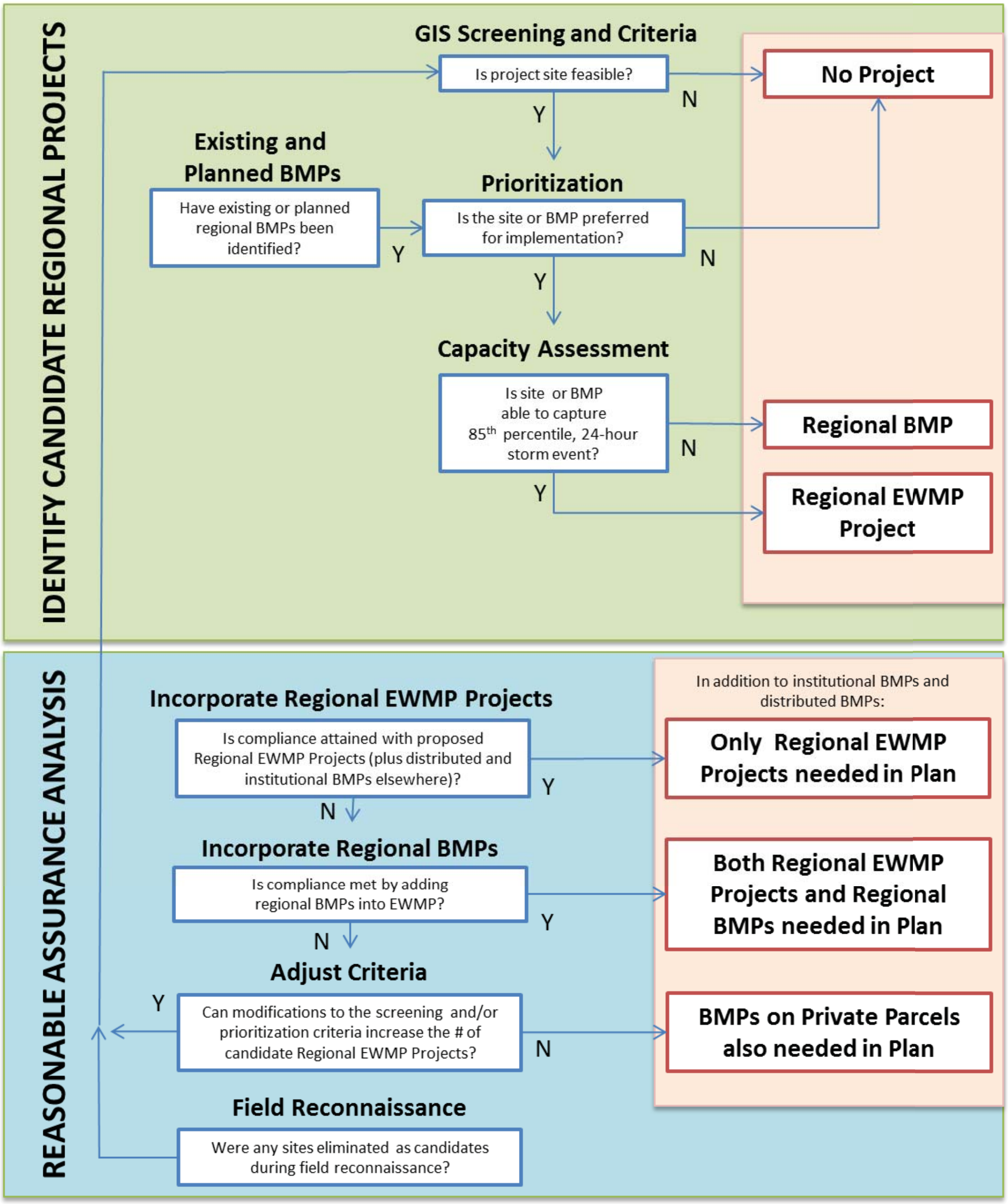
Additional potential regional BMPs, including regional EWMP projects, will first be identified using SBPAT's catchment prioritization process. SBPAT prioritizes catchments based on water quality needs and identifies parcels which provide opportunities for structural BMP implementation. After first evaluating and prioritizing catchments within a watershed with the highest water quality improvement need, SBPAT identifies potential BMP opportunities by calculating a BMP opportunity score for every catchment within a watershed. The BMP score is determined by examining parcel ownership, size, land use, and distance from major storm drains and then an area-weighted parcel score is calculated for every catchment. These BMP scores are then compared with the calculated catchment prioritization results, resulting in a prioritized list of BMP opportunity sites based on parcel characteristics as well as water quality considerations. A desktop-level GIS screening will also take place in order to evaluate potential BMP sites based on additional factors, such as infiltration capacity and proximity to environmentally sensitive areas. Identified potential BMPs that are estimated to have sufficient capacity to capture runoff from the 85th percentile storm even will be categorized as potential regional EWMP projects. Identified potential BMPs that cannot retain at least this storm event will be categorized as potential regional BMPs.

After categorization, the identified potential BMPs will be prioritized based on feedback from the NSMBCW EWMP Agencies. Field reconnaissance will then be conducted on these prioritized projects. Each field reconnaissance will include a preliminary soils analysis and will be followed by an initial environmental study to support a feasibility analysis.

Identified/prioritized regional BMPs will be evaluated (i.e., quantification of costs and water quality benefits) using SBPAT. The prioritization module of SBPAT supports BMP selection by identifying those BMPs best suited to mitigate the specific pollutants of concern that drive water quality needs in each catchment area. Included in this evaluation is a relative cost comparison.

The water quality priorities defined in Section 4.4 will be the emphasis of the RAA analysis, which will focus on quantifiable MS4-derived pollutants. An overview of the proposed process to evaluate existing regional BMPs and identify new candidate sites for regional EWMP projects is portrayed in Figure 9.

Figure 9. Regional EWMP Project Screening, Prioritization, and Selection Framework



6.2.4 *SCHEDULING*

There is a need for linking RAA outcomes to interim and final TMDL compliance dates. The steps described above in Sections 6.2.1 through 6.2.3 are developed for final TMDL compliance.

Once the BMP implementation approach is developed for final compliance, specific activities and the potential scheduling of said activities will be established within the context of local opportunities and constraints. It is expected that to assess compliance with interim milestones, the RAA analysis will need to be implemented for interim BMP implementation scenarios. These are expected to include different levels of non-structural BMPs, implemented over time (e.g., LID ordinance implementation). It is also recognized that in some cases there will be overlapping implementation efforts (e.g., non-structural outreach BMPs in areas where there are also structural BMPs). These instances will be evaluated on a case-by-case basis so that double-counting of water quality benefits is avoided.

Quantifiable non-TMDL (and non-303(d)) pollutants can also be addressed using SBPAT, but these pollutants may not include a reference to a target load reduction; i.e., their quantification would only serve to express the additional water quality benefits of the existing, planned, and proposed BMPs.

6.2.5 Uncertainty and Variability

The proposed RAA approach, which directly utilizes monitoring data to characterize natural variability, as well as Monte Carlo methods to develop stochastic relationships, is conducive to the production of metrics that quantify variability and confidence limits (which reflect the uncertainty of predicted output, such as average annual loads). These relationships are important in determining the level of BMP implementation and assessing reasonableness. The SBPAT methods can provide statistics annualized over a longer period of record (e.g., 10-years) or can be conducted for numerous individual years. The structural BMP methodologies described herein are also easily paired with non-structural BMP quantification methods.

6.3 Modeling Approach

6.3.1 Spatial Domain

The spatial domain of the RAA will include the priority catchments within the NSMBCW EWMP Area, excluding drainage areas already addressed by regional EWMP projects (as defined herein). Adjustments may be made to account for contributions from agencies not party to this EWMP (e.g., State/Caltrans, Federal, etc.).

GIS layers to be used in SBPAT will include, but not be limited to, the following:

- Storm drains
- Soils
- Rain gage polygons
- Parcels
- Land use

- Catchments

6.3.2 *Hydrology*

SBPAT utilizes a customized version of SWMM for continuously simulating study area hydrology and BMP hydraulics. Long-term, hourly rainfall data and average monthly evapotranspiration values are used along with land use-linked catchment imperviousness and soil properties to estimate runoff volumes. Revised and recalibrated SBPAT database values and EWMP-defined BMP information are used to estimate the volume of runoff generated from watershed areas and captured by BMPs. Storm events are individually tracked for the entire simulation so that the volumes of runoff infiltrated, evapotranspired, captured, and released (if applicable) by BMPs are estimated for every storm event. Hourly rainfall data from Lechuza Gauge (County Gauge No. 454) within the NSMBCW area will be used for the RAA.

Calibration

The hydrology component of SBPAT will be calibrated for Topanga Creek, a HUC-12 subwatershed located within the eastern portion of the NSMBCW EWMP Area. Since primary output for SBPAT includes annual volumes and pollutant loads, the calibration focused on accurate prediction of annual discharge volumes from the Topanga subwatershed outlet, with estimated (dry weather) baseflow removed. Hourly rainfall data will be used from the nearby Lechuza Patrol Station #72 gauge (gauge reference ID 352b) in Malibu, with these data adjusted upward based on an annual rain depth ratio between the higher elevation Topanga Fire Station #69 gauge (gauge reference ID 6) and the coastal Lechuza gauge. Los Angeles County's Topanga Creek streamflow gauge (ID No. F54C-R) will be used to estimate measured annual discharge volumes for comparison with modeled volumes. The effective impervious percentage for the open space land use category and the saturated hydraulic conductivity of all mapped soil types will serve as calibration parameters. The calibrated input parameter values will be used for the NSMBCW RAA.

6.3.3 *Water Quality*

The priority WBPCs for the NSMBCW EWMP Area, combined with data availability, will dictate which WBPCs the RAA will address. As previously described, SBPAT links the long-term hydrologic output from SWMM to a stochastic Monte Carlo water quality model to develop statistical descriptions of stormwater quantity and quality. Through this approach, the predicted runoff volumes for each storm are randomly sampled from the long-term storm event runoff volume record produced by SWMM. Land use-based wet weather pollutant EMC values (see Table 6-2 for summary statistics and Appendix C for a data summary) and BMP effluent concentrations (presented in Section 6.3.4) for each storm are then randomly sampled from their log-normal statistical distributions. The runoff volumes (including volumes treated and bypassed by BMPs), land use EMCs, and BMP effluent concentrations are combined to determine the total pollutant loads and load reductions (i.e., difference between existing and post-BMP load estimates) for each randomly sampled storm event. This procedure is then repeated thousands of times, each time recording the volume, pollutant concentrations, loads, and load reductions for each randomly selected storm event. The statistics of these recorded results are then used to characterize the low (25th percentile), average (mean), and high (75th percentile) values for the annual volume, pollutant loads, and pollutant concentrations in stormwater runoff from the modeled area, with and without BMPs implemented.

Table 6-2. Proposed SBPAT EMCs for NSMBCW Watersheds – Arithmetic Estimates of the Log-normal Summary Statistics (means with standard deviations in parentheses)[a]

Land Use	TSS mg/L	TP mg/L	DP mg/L	NH3 mg/L	NO3 mg/L	TKN mg/L	Diss Cu ug/L	Tot Cu ug/L	Tot Pb ug/L	Diss Zn ug/L	Tot Zn ug/L	Fecal Col. #/100mL
Single Family Residential	124.2 (184.9)	0.40 (0.30)	0.32 (0.21)	0.49 (0.64)	0.78 (1.77)	2.96 (2.74)	9.4 (9.0)	18.7 (13.4)	11.3 (16.6)	27.5 (56.2)	71.9 (62.4)	31,100[b] (94,200)
Commercial	67.0 (47.1)	0.40 (0.33)	0.29 (0.25)	1.21 (4.18)	0.55 (0.55)	3.44 (4.78)	12.3 (10.2)	31.4 (25.7)	12.4 (34.2)	153.4 (96.1)	237.1 (150.3)	51,600 (1,490,000)
Industrial	219.2 (206.9)	0.39 (0.41)	0.26 (0.25)	0.6 (0.95)	0.87 (0.96)	2.87 (2.33)	15.2 (14.8)	34.5 (36.7)	16.4 (47.1)	422.1 (534.0)	537.4 (487.8)	3,760 (4,860)
Education (Municipal)	99.6 (122.7)	0.30 (0.17)	0.26 (0.2)	0.4 (0.99)	0.61 (0.67)	1.71 (1.13)	12.2 (11.0)	19.9 (13.6)	3.6 (4.9)	75.4 (52.3)	117.6 (83.1)	11,800[c] (23,700)
Transportation	77.8 (83.8)	0.68 (0.94)	0.56 (0.82)	0.37 (0.68)	0.74 (1.05)	1.84 (1.44)	32.40 (25.5)	52.2 (37.5)	9.2 (14.5)	222.0 (201.7)	292.9 (215.8)	1,680 (456)
Multi-Family Residential	39.9 (51.3)	0.23 (0.21)	0.20 (0.19)	0.50 (0.74)	1.51 (3.06)	1.80 (1.24)	7.40 (5.70)	12.1 (5.60)	4.5 (7.80)	77.5 (84.1)	125.1 (101.1)	11,800[d] (23,700)
Agriculture (row crop)	999.2 (648.2)	3.34 (1.53)	1.41 (1.04)	1.65 (1.67)	34.40 (116.30)	7.32 (3.44)	22.50 (17.50)	100.1 (74.8)	30.2 (34.3)	40.1 (49.1)	274.8 (147.3)	60,300 (153,000)
Vacant / Open Space	216.6 (1482.8)	0.12 (0.31)	0.09 (0.27)	0.11 (0.25)	1.17 (0.79)	0.96 (0.9)	0.60 (1.90)	10.6 (24.4)	3.0 (13.1)	28.1 (12.9)	26.3 (69.5)	484[e] (806)

[a] EMC statistics are calculated based on 1996-2000 data for Los Angeles County land use sites (Los Angeles County, 2000), except for agriculture which are based on Ventura County MS4 EMCs (Ventura County, 2003) and fecal coliform which are based on 2000-2005 SCCWRP Los Angeles region land use data (SCCWRP, 2007b). These EMC datasets are summarized in the SBPAT User's Guide (Geosyntec, 2012).

[b] The fecal coliform EMC for the single-family residential land use is based on SCCWRP dataset for "low-density residential."

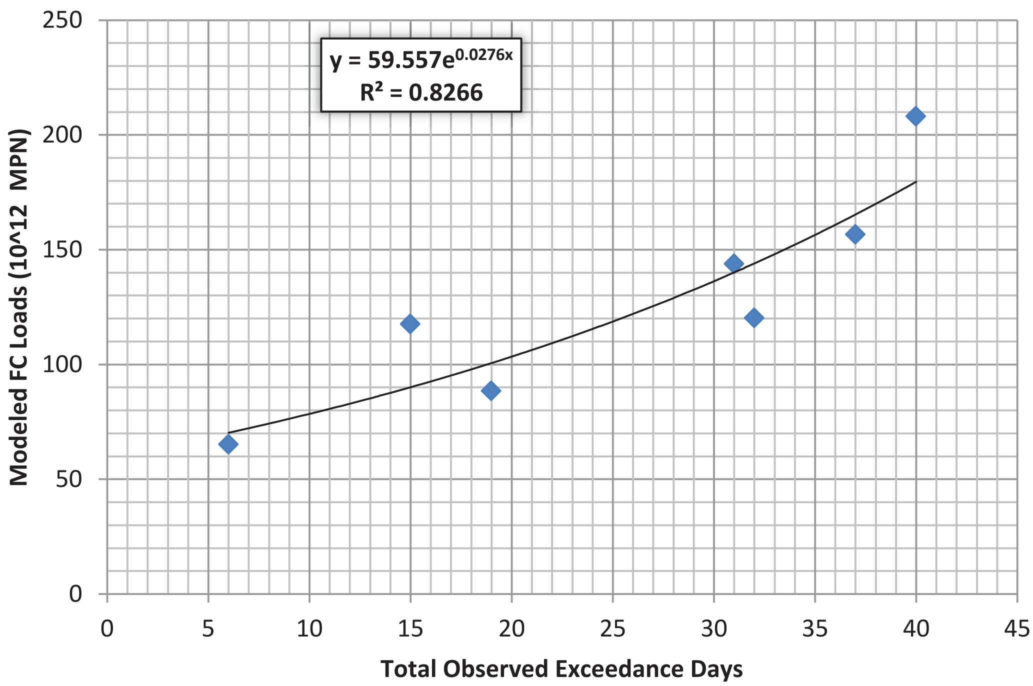
[c] Multi Family Residential EMC used since educational land use site not available in the SCCWRP fecal coliform dataset.

[d] The fecal coliform EMC for the multi-family residential land use is based on SCCWRP dataset for "high-density residential."

[e] Open space fecal coliform EMC statistics based on *E. coli* data (divided by 0.85 to adjust to fecal coliform) for Arroyo Sequit reference watershed, or 11 samples collected between December 2004 and April 2006. Data used by Regional Board for Santa Clara River Bacteria TMDL and taken from (SCCWRP, 2005) and (SCCWRP 2007a).

For bacteria modeling, verifying the linkage between modeled *fecal coliform loads* (i.e., discharged from the watershed outlets) and total observed wet weather *exceedance days* (in the ocean, based on REC1 daily maximum water quality objectives) is critical to establish reasonable assurance that the ocean monitoring locations will be in compliance with the Permit limits for the SMB Beaches Bacteria TMDL and the Malibu Creek and Lagoon Bacteria TMDL. To establish this linkage, an analysis was conducted using shoreline monitoring data from Topanga Canyon[13] (SMB 1-18) between 2005 and 2013. Figure 10 illustrates a reasonable correlation between modeled annual fecal coliform loads and observed annual exceedance days.

Figure 10. Correlation between Modeled Fecal Coliform Loads and Observed Exceedance Days



6.3.4 *Summary of BMP Performance Data*

The performance of existing and planned BMPs in the NSMBCW will be evaluated through the RAA as described in Section VI.C.5.b.iv(5) of the Permit, both in terms of volume capture (based on BMP design criteria) and predicted effluent quality. Due to a lack of project-specific monitoring data quantifying the performance of an installed BMP, modeling of expected BMP performance will be based on existing, peer-reviewed pollutant reduction data for similar types

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[13] This watershed is 88% open space. This is a daily sampled compliance shoreline monitoring site.

of pollutants and BMPs. Coupled with information on the capacity/volume of each BMP in question, modeling will predict the impact of each BMP on water quality.

Expected BMP performance will be modeled using data from the International Stormwater BMP Database (IBD; www.bmpdatabase.org), which is comprised of data from a peer-reviewed collection of studies that have monitored the effectiveness of a variety of BMPs in treating water quality pollutants for a variety of land use types. Research on characterizing BMP performance suggests that effluent quality is more reliable in modeling stormwater treatment rather than percent removal, which assumes a linear influent-to-effluent relationship (Strecker et al. 2001). Schueler (1996) also found in his evaluation of detention basins and stormwater wetlands that BMP performance is often limited by an achievable effluent quality, or "irreducible pollutant concentration"; acknowledging that a practical lower limit exists at which stormwater pollutants can be removed by any given technology. While there is likely a relationship between influent and effluent water quality for some BMPs and some constituent concentrations, analyses conducted to date do not support fixed percent removal values relative to influent quality for the following reasons (WWE and Geosyntec, 2007):

1. Percent removal depends heavily on influent quality, and in the majority of cases, higher observed influent pollutant concentrations actually result in higher percent removals (i.e., observed effluent concentrations for most BMPs are relatively consistent, so the use of a pre-set percent removal would under-predict BMP performance when influent concentrations are high and over-predict BMP performance when influent concentrations are low);
2. The variability in percent removal is often more broad than the variability in effluent pollutant concentration;
3. A high percent removal may still result in a high pollutant concentration, thereby leading to a false determination that BMPs are performing well; and
4. Different percent removals can be calculated within the same dataset (i.e., when looking at individual pairs of influent/effluent samples).

For the reasons stated above, percent removal is not used to quantify BMP performance. Instead raw effluent data has been used to estimate the "irreducible pollutant concentration" attributable to each BMP that will be analyzed as part of the RAA.

Future studies may support a refinement to the assumption of effluent concentration-based BMP performance modeling, such as the development of more complex influent-effluent relationships (WWE and Geosyntec, 2007). However, it should be noted that the stochastic modeling approach accounts for, at least in part, the uncertainty of not knowing the relationship between influent and effluent concentrations because the BMP effluent distributions are based on a variety of BMP studies with a wide range of influent concentrations, representing a variety of tributary drainage area land use characteristics.

A November 2011 interim release of the IBD was analyzed in early 2012 for the purpose of developing BMP effluent statistics (this analysis utilized the same dataset used to produce the summary statistics contained in Geosyntec and WWE, 2012). As with the estimation of land use event mean concentrations (EMCs), final effluent values used to predict BMP performance were determined from the data contained in the IBD using a combination of regression-on-order statistics and the "bootstrap" method.[14] Log-normality was also assumed for BMP effluent concentrations. This assumption has been confirmed previously through goodness-of-fit tests on the BMP effluent concentration data (Geosyntec, 2008). Statistics for effluent concentrations based on available water quality performance data were developed for the BMPs and constituents listed in Table 6-3.

Table 6-3. BMPs and Constituents Modeled[a]

BMPs	Constituents
Constructed Wetland / Retention Pond (with Extended Detention) Constructed Wetland / Retention Pond (without Extended Detention) Dry Extended Detention Basin Hydrodynamic Separator Media Filter Subsurface Flow Wetland Treatment Plant Bioswale Bioretention with underdrain Bioretention (volume reduction only) Cistern (volume reduction only) Green Roof (volume reduction only) Porous Pavement (volume reduction only) Low Flow Diversion (volume reduction only)	Total suspended solids (TSS) Total phosphorus (TP) Dissolved phosphorus as P (DP)[b] Ammonia as N (NH3) Nitrate as N (NO3) Total Kjeldahl nitrogen as N (TKN) Dissolved copper (DCu) Total copper (TCu) Total lead (TPb) Dissolved zinc (DZn) Total zinc (TZn) Fecal Coliform (FC)

[a] All constituents are addressed for all BMPs that provide treatment (i.e., excluding those identified as "volume reduction only").

[b] Dissolved phosphorus and orthophosphate datasets were combined to provide a larger dataset and because the majority of orthophosphate is typically dissolved and many datasets either report dissolved phosphorus or orthophosphate, but not both.

[14] The bootstrap approach randomly samples the dataset several thousand times and computes the desired statistic from the subset of data.

Table 6-4 summarizes the number of effluent data points (individual storm events) and percent non-detects for the pollutants and BMP types of interest for which sufficient data were available. A large percentage of non-detects can bias the effluent statistics derived from the dataset (e.g., total lead for bioretention shows a 60% non-detect ratio). Table 6-5 summarizes arithmetic averages and Table 6-6 summarizes the arithmetic standard deviations of the BMP effluent concentrations that will be used in the RAA.

Consistent with IBD documentation (WWE and Geosyntec, 2007), BMP effluent concentrations are assumed to be limited by an "irreducible effluent concentration," or a minimum achievable concentration (Schuler, 1996). Lower limits are currently set at the 10th percentile effluent concentration of BMP data in the IBD for each modeled BMP type for which the BMP data show statistically significant reductions between influent and effluent means. If the differences are not statistically significant or there is a statistically significant increase, the 90th percentile is used as the minimum achievable effluent concentration, which essentially assumes no treatment except when influent to the BMP is very high. Table 6-7 summarizes the irreducible effluent concentration estimates that are used in SBPAT to prevent treatment from occurring when influent concentrations are equal to or below these values.

Table 6-4. Summary of Number of Data Points and Percent Non-Detects for BMP Effluent Concentration Data from the IBD

BMP		TSS	TP	DP	NH3	NO3	TKN	DCu	TCu	TPb	DZn	TZn	FC
Bioretention	Count	193	249	164	184	259	201	NA	39	48	15	48	29
	%ND	10%	5%	4%	18%	3%	2%	NA	18%	60%	0%	35%	0%
Vegetated Swales (Bioswales)	Count	354	364	249	225	372	324	82	309	308	72	373	92
	%ND	1%	1%	0%	17%	1%	0%	4%	3%	39%	6%	23%	0%
Hydrodynamic Separators (not updated - original SBPAT analysis, 2008)	Count	199	170	58	69	59	77	89	99	95	99	174	31
	%ND	7%	3%	33%	28%	3%	5%	17%	0%	8%	18%	7%	3.2%
Media Filters	Count	409	403	244	215	391	374	186	361	341	221	433	185
	%ND	7%	6%	14%	24%	2%	6%	7%	12%	21%	19%	13%	0%
Detention Basins	Count	299	275	116	94	213	185	170	198	209	163	189	190
	%ND	1%	3%	16%	6%	7%	4%	32%	31%	50%	17%	15%	0%
Retention Ponds	Count	723	654	618	423	626	496	213	536	646	212	593	137
	%ND	4%	3%	6%	8%	6%	3%	26%	21%	30%	15%	7%	0%
Wetland Basins/Retention Ponds (combined)	Count	1028	932	862	681	872	680	228	684	767	227	770	158
	%ND	4%	3%	6%	7%	7%	2%	25%	20%	28%	14%	8%	0%

Table 6-5. IBD Arithmetic Mean Estimates of BMP Effluent Concentrations

BMP	TSS mg/L	TP mg/L	DP mg/L	NH3 mg/L	NO3 mg/L	TKN mg/L	DCu ug/L	TCu ug/L	TPb ug/L	DZn ug/L	TZn ug/L	FC #/100 mL
Constructed Wetland / Retention Pond (with Extended Detention)[1]	38.3	0.19	0.11	0.18	0.42	1.20	5.3	6.7	7.2	22.1	35.3	1.01E+04
Constructed Wetland / Retention Pond (without Extended Detention)[2]	32.9	0.17	0.09	0.17	0.38	1.20	5.3	6.2	12.0	22.6	38.0	9.89E+03
Dry Extended Detention Basin[3]	42.3	0.37	0.26	0.16	0.61	2.40	6.5	11.4	14.4	33.7	78.4	1.41E+04
Hydrodynamic Separator[4]	98.1	0.50	0.06	0.30	0.67	2.07	13.1	16.7	12.7	78.4	107.4	2.68E+04
Media Filter[5]	22.3	0.14	0.07	0.18	0.74	0.98	8.3	11.0	4.6	34.7	37.6	5.89E+03
Sub-surface Flow Wetland[6]	18.1	0.06	0.06	0.09	0.27	0.87	4.6	4.6	0.7	20.9	25.8	PR=90%
Treatment Plant[7]	2.0	0.00	0.00	0.00	0.27	0.01	1.0	1.0	4.4	5.0	5.0	2.00E+00
Vegetated Swale (Bioswale)[8]	27.1	0.28	0.17	0.09	0.43	0.87	9.6	10.1	6.4	33.3	33.3	8.00E+04
Bioretention[9]	18.1	0.14	0.07	0.18	0.37	0.98	8.3	8.8	4.2	34.7	37.6	5.89E+03
Bioretention w/o underdrain	Volume reductions only											
Cistern	Volume reductions only											
Green Roof	Volume reductions only											
Porous Pavement	Volume reductions only											
Infiltration Basin	Volume reductions only											

[1] Based on retention pond IBD category (basis per Geosyntec 2008)
[2] Based on combined wetland basin and retention pond IBD categories (basis per Geosyntec 2008)
[3] Strictly detention basin category from the IBD
[4] From Geosyntec, 2008
[5] Includes non-bio media filters (e.g., sand filters)
[6] Lowest of all IBD categories; except for Fecal Coliform where 90% removal is used. The 90% removal is based on USEPA, 1993, which states that SSF wetlands are generally capable of a 1 to 2 log reduction in fecal coliforms.
[7] Secondary Drinking Water Standards or Minimum of all BMP types, whichever is less
[8] Strictly from vegetated swale category from the IBD
[9] Effluent quality assigned to treated underdrain discharge is based on the better performing characteristics of the “media filter” and “bioretention” categories for each pollutant.

Table 6-6. IBD Arithmetic Standard Deviations of BMP Effluent Concentrations

BMP	TSS mg/L	TP mg/L	DP mg/L	NH3 mg/L	NO3 mg/L	TKN mg/L	DCu ug/L	TCu ug/L	TPb ug/L	DZn ug/L	TZn ug/L	FC #/100 mL
Constructed Wetland / Wetpond (with Extended Detention)	76.80	0.253	0.357	0.234	0.787	0.688	4.288	9.710	12.96	42.46	61.96	3.23E+04
Constructed Wetland / Wetpond (without Extended Detention)	71.14	0.228	0.313	0.375	0.750	0.848	4.196	8.849	123.0	41.88	85.57	3.08E+04
Dry Extended Detention Basin	87.36	0.673	0.439	0.183	1.173	5.029	6.656	19.96	56.01	64.68	137.9	4.15E+04
Hydrodynamic Separator	236.5	1.237	0.093	0.880	1.198	3.737	11.98	11.98	25.70	137.4	137.4	2.16E+05
Media Filter	40.73	0.168	0.099	0.382	0.852	1.213	13.75	17.20	10.02	142.2	100.3	1.27E+04
Sub-surface Flow Wetland	30.66	0.145	0.088	0.145	0.552	0.594	3.504	3.504	1.845	12.84	17.16	5.37E+02
Treatment Plant	2.00	0.003	0.003	0.006	0.552	0.030	3.000	3.000	10.97	15.00	15.00	1.00E+00
Vegetated Swale (Bioswale)	35.12	0.311	0.239	0.145	0.905	0.872	7.749	9.429	15.36	28.49	34.86	1.19E+06
Bioretention	30.66	0.168	0.099	0.382	0.552	1.213	13.75	11.12	4.84	100.3	100.3	1.27E+04
Bioretention w/o underdrain	Volume reductions only											
Cistern	Volume reductions only											
Green Roof	Volume reductions only											
Porous Pavement	Volume reductions only											
Infiltration Basin	Volume reductions only											

Table 6-7. IBD Arithmetic Irreducible of BMP Effluent Concentrations

BMP	TSS mg/L	TP mg/L	DP mg/L	NH3 mg/L	NO3 mg/L	TKN mg/L	DCu ug/L	TCu ug/L	TPb ug/L	DZn ug/L	TZn ug/L	FC #/100 mL
Constructed Wetland / Wetpond (with Extended Detention)	1.358	0.034	0.010	0.019	0.011	0.499	1.387	1.387	0.429	1.000	2.933	4
Constructed Wetland / Wetpond (without Extended Detention)	1.300	0.030	0.009	0.012	0.010	0.520	1.267	1.267	0.400	1.075	3.000	5.4
Dry Extended Detention Basin	5.460	0.089	0.523	0.336	0.026	3.650	1.153	1.274	0.435	8.396	8.396	19.6
Hydrodynamic Separator	5.543	0.023	0.172	0.014	1.299	3.576	3.340	3.340	1.351	17.793	17.793	3295
Media Filter	1.487	0.026	0.010	0.013	0.064	0.210	0.995	1.298	0.372	1.000	2.000	13.1
Sub-surface Flow Wetland	1.268	0.025	0.006	0.009	0.008	0.141	1.000	1.000	0.089	1.000	2.933	4
Treatment Plant	0.500	0.001	0.001	0.001	0.008	0.001	0.100	0.100	0.255	0.500	0.500	1
Vegetated Swale (Bioswale)	2.000	0.079	0.040	0.009	0.056	0.141	2.708	2.708	0.434	5.720	5.720	9.53E+04
Bioretention	1.605	0.026	0.010	0.013	0.050	0.210	0.995	1.524	0.836	1.000	2.000	13.1
Bioretention w/o underdrain	Volume reductions only											
Cistern	Volume reductions only											
Green Roof	Volume reductions only											
Porous Pavement	Volume reductions only											
Infiltration Basin	Volume reductions only											

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In some cases, performance data are not available for all types of BMPs requiring a performance assessment as part of the RAA. If the unit treatment processes (e.g., filtration, sedimentation, etc.) for a BMP with data ("BMP 1") can be expected to be similar for a BMP without data ("BMP 2"), then equivalent performance for "BMP 2" is assumed based on the performance of "BMP 1". However if no data exist and unit treatment processes cannot be associated with a BMP with data, then no treatment is assumed except for load reductions associated with simulated volume loss. Table 6-8 summarizes the performance assumptions for each of the BMPs that will be modeled in the RAA. Additionally, bioretention with underdrains will be assessed in the RAA using a vegetated swale BMP from the IBD, which represents some incidental volume reduction as well as a certain percent treated discharge and a certain percent bypass discharge. These inputs will be modified to match the proposed implementation. Effluent quality assigned to treated underdrain discharge will be based on the better performing characteristics of the "media filter" and "bioretention" categories for each pollutant.

Table 6-8. Assumptions and Source Data for BMP Performance

BMP	Source Data and Assumptions
Vegetated Swale (Bioswale)	Strictly from vegetated swale category from the IBD
Cistern	No treated effluent; volume reductions only
Bioretention w/o underdrain	No treated effluent; volume reductions only
Porous Pavement	No treated effluent; volume reductions only
Green Roof	No treated effluent; volume reductions only
Low Flow Diversion	No treated effluent; volume reductions only
Media Filter	Strictly from media filter category from the IBD; includes non-bio media filters (e.g., sand filters)
Subsurface Flow Wetland	Lowest of all IBD categories; except for Fecal Coliform where 90% removal is used [a]
Constructed Wetland / Retention Pond (w/o Extended Detention)	Based on combined wetland basin and retention pond IBD categories (basis per Geosyntec 2008)
Treatment Plant	Secondary Drinking Water Standards or Minimum of all BMP types, whichever is less
Dry Extended Detention Basin	Strictly detention basin category from the IBD
Hydrodynamic Separator	From Geosyntec, 2008
Infiltration Basin	No treated effluent; volume reductions only
Constructed Wetland / Retention Pond (w/ Extended Detention)	Based on retention pond IBD category (basis per Geosyntec 2008)

[a] SSF (subsurface flow) wetlands provide multiple unit treatment processes provided by other BMPs (e.g., sedimentation, filtration, biochemical, etc.). The 90% removal is based on USEPA, 1993, which states that SSF wetlands are generally capable of a 1 to 2 log reduction in fecal coliforms.

6.3.5 *Representation of Individual BMPs*

MCMs and Other Non-structural BMPs

Existing, recently-initiated non-structural BMPs (i.e., those not modeled in the initial establishment of the TMDLs and compliance requirements) and planned non-structural BMPs will be evaluated in terms of ability to reduce loads at each of the compliance modeling locations within the NSMBCW area. Both wet and dry weather water quality benefits of these BMPs will be evaluated for all TMDL and 303(d) pollutants (excluding trash) where data are available to support such estimates.

Non-structural BMPs will be quantified with assumptions and references documented. For example, bacteria and dry weather runoff reduction BMPs will be quantified consistent with methodologies utilized in recent San Diego Combined Load Reduction Plans (examples available at http://www.sbpat.net/example.html).

Structural BMPs

The goal of this step will be to achieve the remaining target load reductions by utilizing structural BMPs in combination with the benefits of non-structural BMPs. The RAA will consider existing jurisdictional, sub watershed, and conveyance facility characteristics to delineate pollutant source, runoff control, and outfall monitoring strategies. This will involve a detailed review of existing conditions and datasets. This step will include the following components:

- Existing (i.e., implemented post-TMDL) and planned structural BMPs will be described by the Agencies with sufficient conceptual design detail to support quantitative analysis. Based on agency input on BMP preferences, additional "proposed" structural BMP opportunities will be identified and prioritized using SBPAT's structural retrofit planning methodology, and these potential projects will be reviewed by the agencies prior to RAA modeling. The final TMDL compliance scenario will reflect the dates in which the final TMDL limits become effective.
- The water quality benefits (in terms of expected pollutant load reductions) associated with existing, planned, and proposed structural BMPs will be evaluated for wet weather using SBPAT, as described previously in this document.

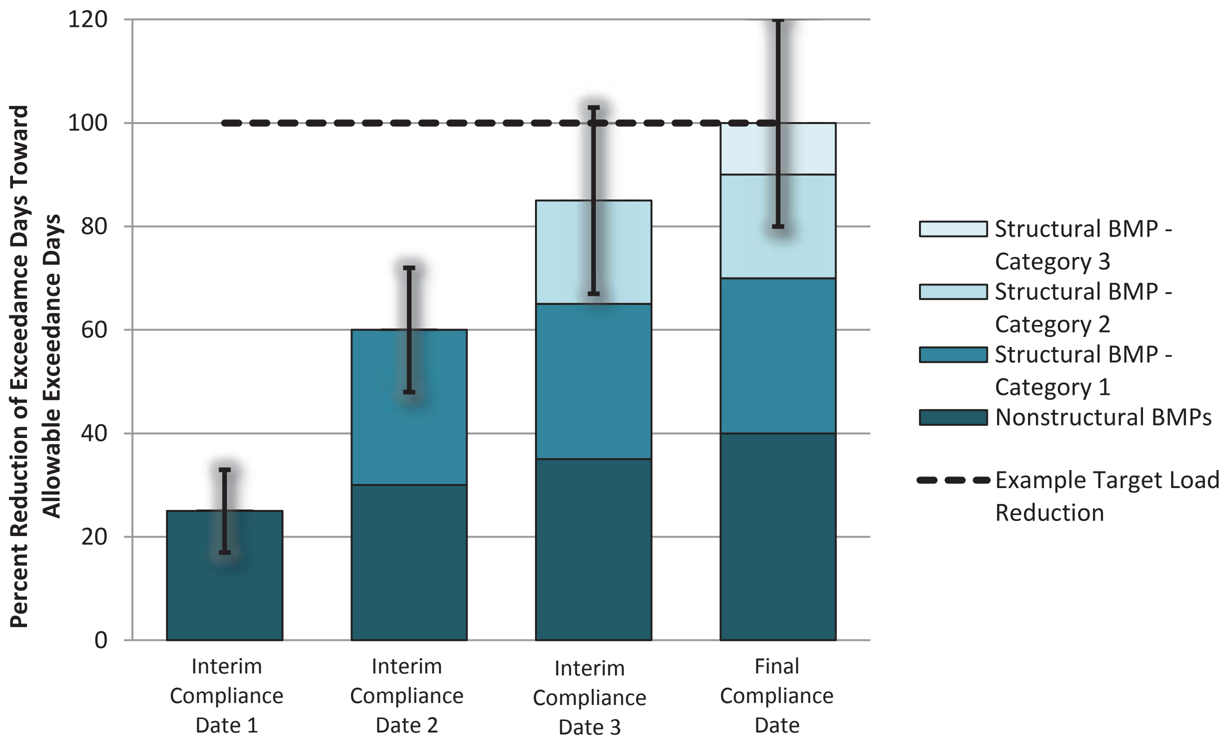
6.3.6 *Representation of Cumulative Effect of all BMPs and New BMP Selection Support*

Following evaluation of the water quality benefits associated with non-structural and structural BMPs, additional pollutant load reductions necessary to achieve the target load reductions will be calculated to determine whether additional BMPs are needed to demonstrate reasonable assurance (see **Error! Reference source not found.**8). To avoid double-counting of load reductions when non-structural and structural BMPs overlap (e.g., for a catchment where irrigation overspray reduction programs will be targeted and a downstream diversion to a regional BMP exists), the greater load reduction of each BMP will be applied; but load reductions will not be additive.

Estimated load reductions will be compared with the target pollutant load reductions and, for bacteria, will represent exceedance day-based compliance demonstration. Expected pollutant reduction ranges will be provided, thereby capturing the variability inherent to precipitation patterns, land use runoff concentrations, and BMP performance. The NSMBCW Agencies may then use discretion, based on their specific compliance risk tolerance, to interpret "reasonable assurance" based on a number of statistical options, such as whether the target annual load reductions (which may correspond to a TMDL critical condition, such as a 90th percentile wet year) are met by the predicted average or 75th percentile annual load reductions (i.e., there is a 25% probability of compliance based on the modeling analysis). It is recognized that the Technical Advisory Committee and/or its RAA subcommittee may also express preferences or guidance for how such model output are reported.

Figure 11 depicts an example of a phased implementation approach to reach the desired target load reduction. In the case that BMPs address several pollutants simultaneously, this process will be evaluated for the limiting pollutant.

Figure 11. Conceptual Approach to Phased Implementation



6.3.7 *Regional Project (85th Percentile Design) Definition*

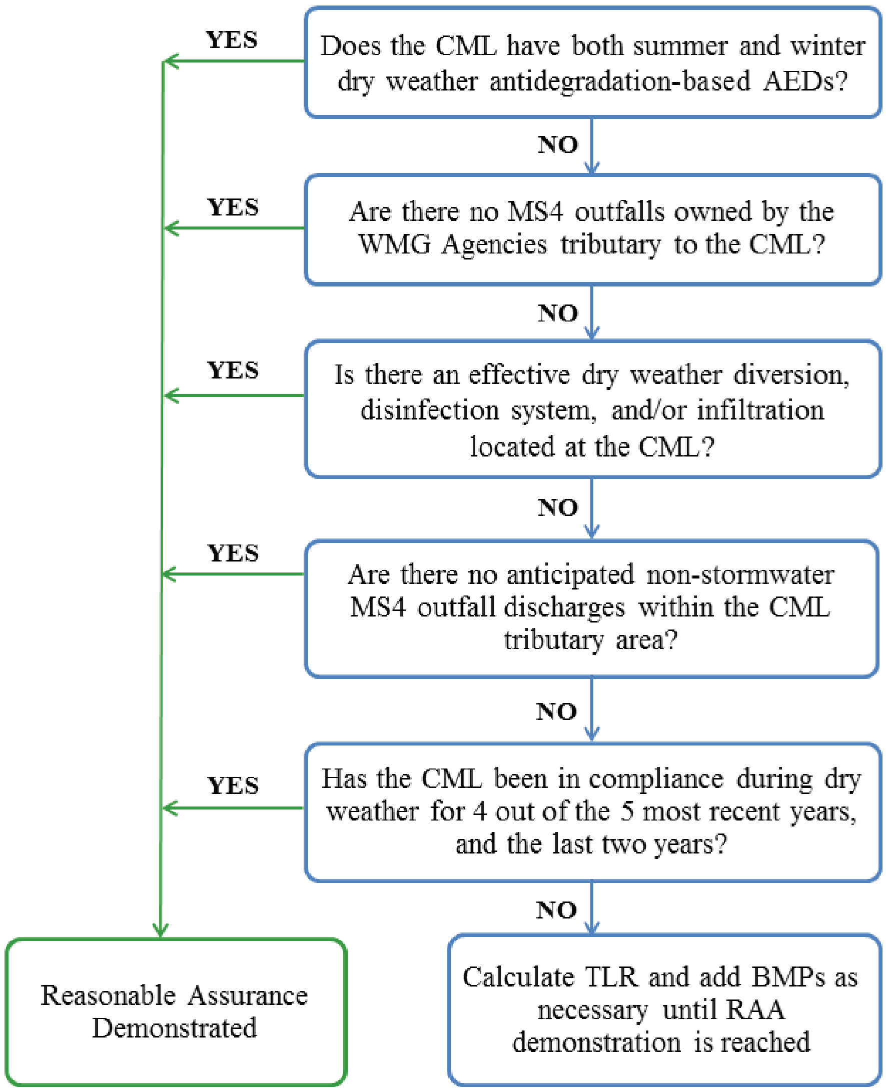
Regional EWMP projects meeting the 85th percentile design basis negate the need for RAA on their drainage areas. This design criterion can be met in a variety of ways. The simplest approach would be to design a single structural BMP to retain the 85th percentile, 24-hour design volume, which may be computed using the County's Modified Rational Method and design hydrology processes. This approach is the easiest to design, but the most difficult to construct due to the required facility capacity, land availability, and operations and maintenance constraints, among numerous other factors. An alternate approach to retain the 85th percentile storm would be to incorporate and account for the impacts of a combination of distributed BMPs upstream of the regional BMP. This would result in the effective design capacity of the regional BMP increasing over time as distributed BMPs are progressively implemented. Lastly, it may also be possible to meet the 85th percentile design criteria at a smaller regional BMP by incorporating a real-time controller in combination with infiltration and/or capture and use systems. This more innovative approach may require assumptions of different disposal options as future non-structural BMPs.

6.3.8 *DRY WEATHER RAA APPROACH*

Demonstrating "reasonable assurance" of compliance with dry weather limits for the SMB Beaches Bacteria TMDL requires a methodology that accounts for many factors which cannot be modeled. Therefore, to perform the RAA for dry weather for the NSMBCW EWMP Area, a semi-quantitative methodology has been developed to follow a permit compliance structure. Because fecal indicator bacteria are considered the "controlling" pollutants of concern during dry weather in the NSMBCW (i.e., if MS4 discharges are compliant for bacteria during dry weather, they will be compliant for all TMDL and 303(d) pollutants during dry weather), the methodology was developed based on bacteria. The following series of questions form the proposed dry weather RAA methodology. Each question is to be answered for each Coordinated Shoreline Monitoring Plan (CSMP) compliance monitoring location (CML). If one question is affirmative then "reasonable assurance" is considered to be demonstrated. This methodology is illustrated in Figure 12.

1. Are the allowed dry weather (summer and winter) single sample exceedance days based on an anti-degradation approach at the CML?
2. Are there no MS4 outfalls owned by the NSMBCW Agencies within the CML's drainage area, and therefore MS4 discharges could not be contributing to pollutant concentrations at the CML?
3. Is a dry weather diversion, infiltration, or disinfection system located at the CML? To meet this criterion, any such system should have records to show that it is consistently operational, well maintained, properly sized, and effectively removing bacteria in the treated effluent (in the case of disinfection facilities) so that it is effectively eliminating freshwater surface discharges to the surf zone during year-round dry weather days. If all dry weather creek flows tributary to the CML are known to be captured, infiltrated, diverted, or disinfected prior to discharging at the beach, reasonable assurance is assumed to be demonstrated.
4. Are there no non-stormwater MS4 outfall discharges within the CML's drainage area? For this criterion to be met, supporting records from the non-stormwater outfall screening program should be supplied.
5. Have the allowed dry weather (summer and winter) single sample exceedance days been met in four of the past five years and during the last two years, based on recent monitoring data?

Figure 12. Dry Weather RAA Methodology Outline



For all CMLs which have not demonstrated reasonable assurance by the steps above, the total load reduction required to meet the applicable receiving water limit will be calculated based on historic monitoring data. This is accomplished by iteratively applying a reduction fraction to the historic bacteria concentration dataset until the receiving water limit (in allowable exceedance days) is met during all years. This reduction fraction will then be compared with expected dry weather BMP load (or volume) reductions within the tributary watershed. If the calculated BMP load reduction exceeds the total required load reduction, then reasonable assurance has been demonstrated.

If the calculated BMP load reduction is less than the necessary load reduction, additional BMPs (non-structural and/or structural) will be iteratively implemented in the tributary watershed until reasonable assurance can be demonstrated (i.e., until the calculated BMP load reduction exceeds the total load reduction required). Where necessary and feasible, it may be assumed that structural BMPs (such as permeable street gutters and catch basin dry wells) will be implemented to a level to eliminate existing significant non-stormwater MS4 discharges (as defined in the NSMBCW CIMP).

In the ASBS-portion of the NSMBCW EWMP Area and in accordance with the General Exception, non-authorized dry weather discharges have effectively been stopped and responsible agencies will continue to take necessary actions to prevent dry weather discharges.

6.4 Proposed Approach for RAA Output

6.4.1 Jurisdictional Responsibilities

This RAA approach was developed with an emphasis on encouraging collaborative, watershed-based planning within the jurisdictional planning departments of the NSMBCW EWMP Group members. Pollutant load reduction opportunities will be determined irrespective of jurisdictional boundaries. Once high priority areas and sources are identified, the NSMBCW EWMP Agencies will identify the most feasible and effective BMPs to maximize pollutant removal and meet target load reduction requirements.

6.4.2 Example Output/Format

Table 6-9 and Table 6-10 illustrate example SBPAT output for the parameters modeled. This list will be limited to the identified Category/Priority 1 and 2 WBPCs identified in Section 4.4 for the actual RAA. This output will include non-structural and phased structural BMPs so that target load reductions can be expected to be met for the scheduled compliance dates. Ranges of results will also be reported (e.g., load +/- confidence interval).

Table 6-9. Example SBPAT Output for Each Compliance Assessment Site

Constituent	Units	Average Annual MS4 Loads and Volumes			% of MS4 Load Removed	
		Pre-BMP	w/ Dist. BMPs	w/ Dist. + Reg. BMPs	w/ Dist. BMPs	w/ Dist. + Reg. BMPs
Total runoff volume	Acre-ft	220	172	172	22%	22%
DCu	lbs	8.8	6.9	6.8	22%	23%
DP	lbs	170	125	118	27%	30%
DZn	lbs	163	73	63	55%	62%
FC	10^12 MPN	52.8	35.4	24.3	33%	54%
NH3	lbs	435	276	190	37%	56%
NO3	lbs	500	384	378	23%	25%
TCu	lbs	18.9	10.7	8.1	43%	57%
TKN	lbs	1645	1257	1194	24%	27%
TPb	lbs	7.63	4.18	3.54	45%	54%
TP	lbs	235	140	98	41%	58%
TSS	Tons	42	19	12	54%	71%
TZn	lbs	218	101	66	54%	70%

Table 6-10. Example Bacteria Output for Different TLRs Including Non-Structural BMPs

Subwatershed	Pollutant	Target Load Reduction	Sum of NS Load Reductions (low-high range)	Sum of Structural Load Reductions (low-high range)	Total Estimated Load Reductions (low-high range)
1	Fecal coliform	100	17 (12-20)	60 (40-85)	77 (52-105)
2	Fecal coliform	75	15 (11-19)	60 (40-85)	75 (51-104)

7 EWMP DEVELOPMENT

7.1 SCHEDULE

The following schedule sets forth the planned timeline that will be met by the NSMBCW EWMP Group to complete their EWMP Plan. The schedule adheres to deliverable dates dictated by the Permit while also setting interim milestones. Dates in bold represent the Permit-specified deliverable dates for submittal to the Regional Board. Interim milestones are not Permit-specified. Therefore, interim milestones may be subject to change. The compliance schedule required per Section VI.C.5.c of the Permit will be included in the EWMP.

Table 7-1. NSMBCW EWMP Compliance Schedule

Item	Date
Final EWMP Work Plan to Regional Board	**June 30, 2014**
Finalize Approach to Addressing Exceedances of Receiving Water Limits	August 2014
Identify and Screen Regional Project(s) (including field screening and feasibility assessment)	September 2014
Identify Selected BMPs and Conduct RAA	December 2014
Develop Project Schedules and Cost Estimates	February 2015
Complete First Draft of EWMP Plan for Internal Review	April 2015
Submit Draft EWMP Plan to Regional Board	**June 30, 2015**
Comments on Draft EWMP Plan Provided by Regional Board	October 31, 2015[a]
Submit Final EWMP Plan to Regional Board	**January 31, 2016[b]**
Approval or Denial of Final EWMP Plan by Regional Board	April 30, 2016[c]

[a] The date specified in the Permit is 4 months after submittal of the Draft EWMP Plan.
[b] The date specified in the Permit is 3 months after receipt of Regional Water Board comments on the draft Plan. Therefore, this date is subject to change based on receipt of comments from the Regional Board.
[c] The date specified in the Permit is 3 months after submittal of the final EWMP Plan.

The schedule above does not include deliverable dates related to the CIMP. It is understood that the CIMP will be submitted to the Regional Board by June 30, 2014, and that initiation of monitoring under the CIMP will commence as specified in the CIMP.

7.2 Costs

Section VI.C.1.g of the Permit requires that a financial strategy is in place for EWMP implementation and that the effectiveness of EWMP funds is maximized through the analysis of various implementation scenarios.

Based on the RAA, preliminary planning level cost opinions will be developed for implementation of the proposed watershed control measures. The cost analysis will include consideration of planning, design, permits, construction, operation and maintenance, land acquisition, and other factors as appropriate. Potential funding mechanisms will be discussed in the EWMP. BMP phasing will then be based on both interim target compliance (based on the RAA) and the projected availability of funds.

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APPENDIX A

Approach to Addressing Receiving Water Exceedances

Appendix A

Approach to Addressing Receiving Water Exceedances Within the North Santa Monica Bay Coastal Watersheds

APPROACH TO ADDRESSING RECEIVING WATER EXCEEDANCES

Sections VI.C.2 and VI.C.3 of the Permit describe how compliance with receiving water limits is attained for the various water body-pollutant combinations identified in a permittee's EWMP. Different actions are required for different types of receiving water limits. Specifically, the following classifications are addressed by the Permit:

- Water Body-Pollutant Combinations Addressed by a TMDL.
- 303(d)-listed Water Body-Pollutant Combinations: Pollutants in the same class as those identified in a TMDL and for which the water body is 303(d)-listed (Section VI.C.2.a.i), and pollutants not in the same class as those identified in a TMDL, but for which the water body is 303(d)-listed (Section VI.C.2.a.ii).
- Non 303(d)-listed Water Body-Pollutant Combinations: Pollutants for which there are exceedances of receiving water limitations, but for which the water body is not 303(d)-listed (Section VI.C.2.a.iii).

Figure A-1 illustrates this process.

Water Body-Pollutant Combinations Addressed by a TMDL
For water body-pollutant combinations addressed by a TMDL, adherence to all requirements and compliance dates as set forth in the approved EWMP will constitute compliance with applicable interim TMDL-based water quality based effluent limits and interim receiving water limits.

303(d)-listed Water Body-Pollutant Combinations
303(d)-listed water body-pollutant combinations are equivalent to the identified Category 2 combinations. Category 2 pollutants that will be addressed by the EWMP are limited to lead in Topanga Canyon Creek.[1] However, with the understanding that water body-pollutant combinations may be added to the Category 2 list based on future monitoring data, an approach to address both types of 303(d)-listed water body-pollutant combinations is provided below.

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[1] As detailed in this document, pollutants which have not been definitively tied to MS4 discharges are not included in the EWMP at this time, but will be evaluated as part of future monitoring under the CIMP.

Pollutants in the same class as those identified in a TMDL

If in the future a water body within the NSMBCW EWMP WMA is added to the State's 303(d) list and a direct linkage to MS4 discharges is shown, the requirements of Permit Section VI.C.2.a.i will apply to this water body-pollutant combination, and the following actions will be completed as part of the EWMP:

- Demonstrate that the BMPs selected to achieve the applicable TMDL provisions will also adequately address MS4 contributions of the pollutant(s) within the same class. Assumptions and requirements of the corresponding TMDL provisions must be applied to the additional pollutant(s), including interim and final requirements and deadlines for their achievement, such that the MS4 discharges of the pollutant(s) will not cause or contribute to exceedances of receiving water limitations.
- Perform a RAA for this water body-pollutant combination.
- Identify milestones and dates for their achievement consistent with those in the applicable TMDL.

If outfall and receiving water monitoring under the CIMP indicate that such a listing is not linked to MS4 discharges, the Category 2 designation will be removed and further action for this water-body pollutant combination under the EWMP will cease.

Pollutants not in the same class as those identified in a TMDL

If in the future a water body within the NSMBCW EWMP area is added to the State's 303(d) list and a direct linkage to MS4 discharges is shown, the requirements of Permit Section VI.C.2.a.ii will apply to this water body-pollutant combination. Currently, lead (a 2006 303(d) listing for Topanga Canyon Creek) is the only pollutant that is not in the same class as any existing TMDL within the NSMBCW EWMP area. The source assessment conducted as part of the EWMP Work Plan indicated that, while a definitive linkage was not demonstrated, the MS4 system *may* cause or contribute to the lead impairment. Therefore, the following actions will be completed as part of the EWMP for lead in Topanga Canyon Creek, as well as in the future for any future applicable 303(d) listings:

- This water body-pollutant combination will be included in the RAA.
- If necessary, BMPs will be identified to address contributions of lead from MS4 discharges to the receiving water, such that the MS4 discharges of lead will not cause or contribute to the exceedance of the receiving water limits.
- Enforceable milestones and dates for their achievement will be identified to control MS4 discharges such that they do not cause or contribute to exceedances

of receiving water limitations within a timeframe that is as short as practicable, taking into account the technological, operational, and economic factors that affect the design, development, and implementation of the BMPs that are necessary. The time between dates will not exceed one year. Milestones will relate to a specific water quality endpoint (e.g., percent load reduction) and dates will relate either to taking a specific action or meeting a numeric water quality endpoint. If the identified dates are beyond the term of the Order, then Permit Section VI.C.2.a.ii(5) will apply.

If outfall and receiving water monitoring under the CIMP indicate that lead is not an MS4-related pollutant, the Category 2 designation will be removed and further action for this water-body pollutant combination under the EWMP will cease.

Non 303(d)-listed Water Body-Pollutant Combinations

Permit Section C.2.a.iii discusses the requirements for pollutants for which there are exceedances of receiving water limitations, but for which the water body is *not* 303(d)-listed. Existing data do not indicate the existence of any such water body-pollutant combinations at this time. As a result, these combinations will ultimately be identified based on data collected pursuant to the approved CIMP. If and when sufficient CIMP monitoring data demonstrate that MS4 discharges may[2] have caused or contributed, or have reasonable potential to cause or contribute, to the exceedance of receiving water limitations, then the EWMP will be modified as follows:

- BMPs will be identified to address contributions of the pollutant(s) from MS4 discharges to the receiving water(s), such that the MS4 discharges of the pollutant(s) will not cause or contribute to the exceedance of the receiving water limits.
- A RAA will be conducted for the water body-pollutant combination(s). In some instances this will require modeling of the identified pollutant.
- Enforceable milestones and dates for their achievement will be identified to control MS4 discharges such that they do not cause or contribute to exceedances of receiving water limitations within a timeframe(s) that is as short as practicable, taking into account the technological, operational, and economic

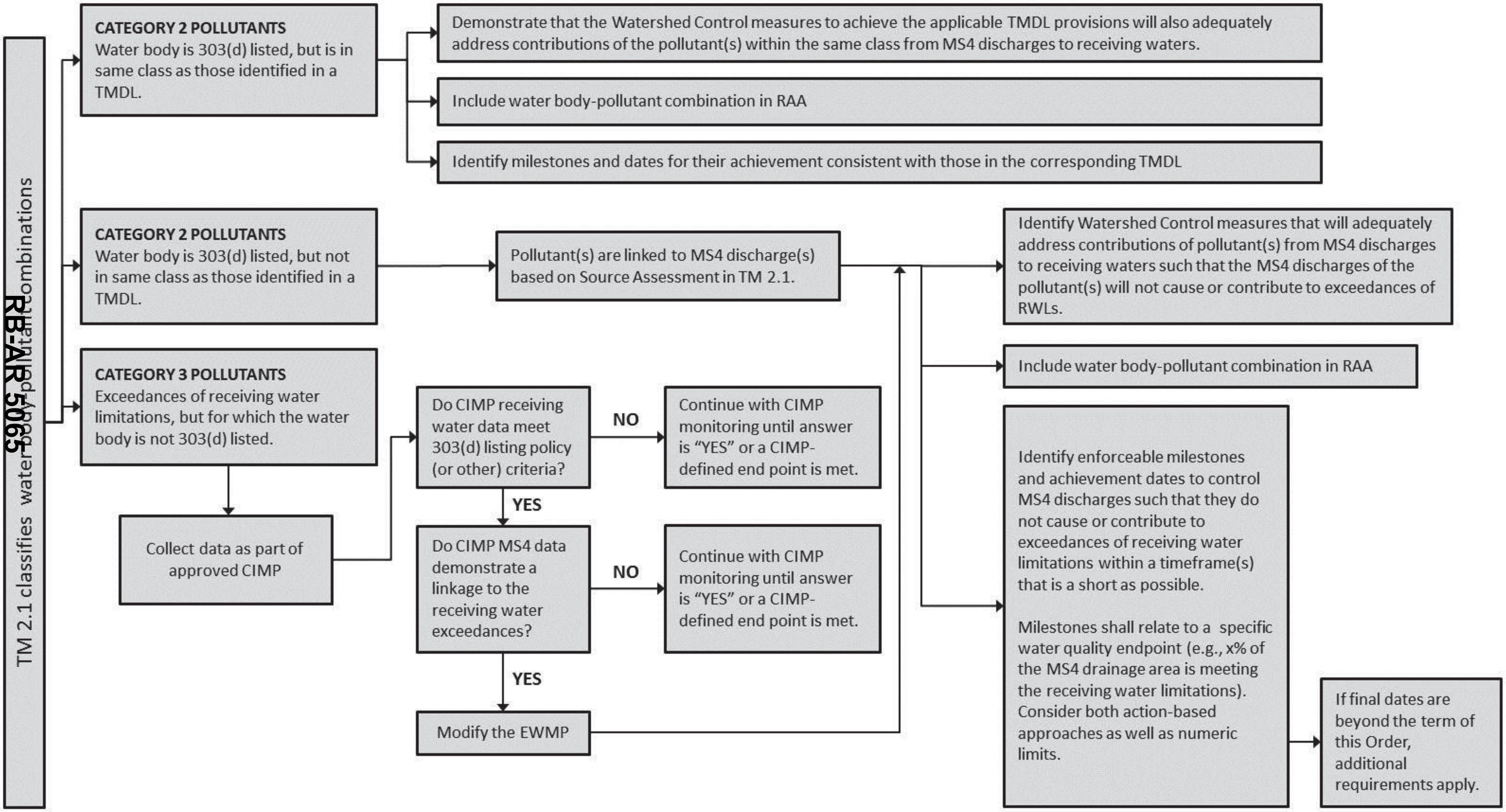
[2] Where CIMP monitoring data demonstrate that MS4 discharges may have caused or contributed to the exceedance of receiving water limitations, it should be noted that this does not constitute any admission of known contributions, but reflects uncertainty in linking datasets.

factors that affect the design, development, and implementation of the BMPs that are necessary. The time between dates will not exceed one year. Milestones will relate to a specific water quality endpoint (e.g., percent load reduction) and dates will relate either to taking a specific action or meeting a milestone. If the identified dates are beyond the term of the Order, then Permit Section VI.C.2.a.iii(2)(d) will apply.

To evaluate if MS4 discharges may have caused or contributed to the exceedance of receiving water limitations, all of the following criteria will be applied:

- Receiving water samples exceed the applicable receiving water limitations at such frequency that they meet the listing criteria in Tables 3.1 and 3.2 in California's Water Control Policy (State Water Board, 2004);
- MS4 outfall samples (taken per the CIMP) exceed the applicable WQBELs or receiving water limits; and
- Data do not exist to demonstrate that the outfall exceedances were a result of other permitted discharges to the MS4 (e.g., permitted dewatering or groundwater treatment projects)

Figure A-1. Compliance with Receiving Water Limitations Not Otherwise Addressed by a TMDL



RB-AR 5065

Appendix B

Summary of NSMBCW BMPs

Appendix B

Summary of Existing and Potential Control Measures Within the North Santa Monica Bay Coastal Watersheds

Existing Regional BMPs

Existing Regional BMPs in the NSMBCW EWMP Area

ID	Subwatershed	Jurisdiction	Project Name	Address	BMP Category	Treatment Volume	Date Active
R1	Ramirez	Malibu	Paradise Cove Dry Weather Treatment Facility		Treatment Facility	1M gal/day	6/28/2010
R2	Marie	LACFCD	Marie Canyon Dry Weather Treatment Facility	Malibu Rd at Marie Canyon	Treatment Facility	100 gpm	10/11/2007
R3	Malibu Creek	Malibu	Civic Center SW Treatment Facility	Civic Center Way and Cross Creek Road, Malibu	Treatment Facility	1200 gpm	2/2/2007
R4			Malibu Legacy Park Detention	23500 Civic Center Way, Malibu	Detention/Treatment Facility	1400 gpm, 8 ac-ft	10/2/2010
R5	Las Flores	Malibu	Las Flores Canyon Restoration	3805 Las Flores Canyon Rd	Biofiltration and infiltration		4/1/2008

Planned & Potential Regional BMPs

Planned & Potential Regional BMPs in the NSMBCW EWMP Area

ID	Subwatershed	Jurisdiction	Data Source	Project Name	Address	BMP Category	Scheduled Completion
D6	Encinal/Trancas	Malibu	NSMBCW EWMP NOI	Broad Beach Biofiltration Project	Broad Beach Road, Malibu	Biofiltration	Apr-14
D7	Trancas	County	J1/J4 IP Implementation, 2009	Trancas-2		Infiltration Trench	Potential
D8			J1/J4 IP Implementation, 2009	Trancas-3		Infiltration Trench	Potential
D9	Ramirez West	Malibu	NSMBCW EWMP NOI	Wildlife Road Storm Drain Improvements	6950 and 6982 Wildlife Road, Malibu	Biofiltration	Apr-14
D10	Malibu Creek	Malibu	NSMBCW EWMP NOI	Malibu Legacy Park Pump Station Improvements	Civic Center Area, Malibu	Treatment Plant	Apr-16

Planned & Potential Distributed BMPs

Planned and Potential Distributed BMPs in the NSMBCW EWMP Area

ID	Subwatershed	Jurisdiction	Data Source	Project Name	Address	BMP Category	Tributary Area Treated (ac)	Existing	Planned	Potential
D1	Nicholas	LACDBH	Table 5.1, J1/4 IP, 2005	Nicholas Canyon County Beach Parking Lot	33850 PCH, Malibu	Infiltration	1.18			X
D2	Los Aliso	Malibu	Table 5.1, J1/4 IP, 2005	Charmlee Nature Center Public Rec Area	2577 South Encinal Canyon Road, Malibu	Infiltration	547			X
D3	Trancas	County	J1/J4 IP Implementation, 2009	Trancas-2/Trancas-3		Infiltration	5			X
D4		LACDBH	Table 5.1, J1/4 IP, 2005	Zuma County Beach (Parking Lot #7)	30050 PCH, Malibu	Infiltration	1.37			X
D5			Table 5.1, J1/4 IP, 2005	Zuma County Beach (Parking Lot #8)	30050 PCH, Malibu	Infiltration	2.19			X
D6			Table 5.1, J1/4 IP, 2005	Zuma County Beach (Parking Lot #9)	30050 PCH, Malibu	Infiltration	0.64			X
D7			Table 5.1, J1/4 IP, 2005	Zuma County Beach (Parking Lot #10)	30050 PCH, Malibu	Infiltration	0.29			X
D8			Table 5.1, J1/4 IP, 2005	Zuma County Beach (Parking Lot #11)	30050 PCH, Malibu	Infiltration	0.56			X
D9			Table 5.1, J1/4 IP, 2005	Zuma County Beach (Parking Lot #12)	30050 PCH, Malibu	Infiltration	2.04			X
D10		Malibu	Table 5.1, J1/4 IP, 2005	Trancas Canyon Park Public Rec Area	between 6120 & 5942 Trancas Canyon Road, Malibu	Infiltration	15	X		
D11	Zuma	County	J1/J4 IP Implementation, 2009	Zuma-1		Porous Pavement	4.5			X
D12			J1/J4 IP Implementation, 2009	Zuma-3		Bioretention	195			X
D13				Camp Kilpatrick LID	427 South Encinal Canyon Road, Malibu	Treatment Facility	10.8		X	
D14		LACDBH	Table 5.1, J1/4 IP, 2005	Zuma County Beach (Parking Lot #1)	30050 PCH, Malibu	Infiltration	2.21			X
D15			Table 5.1, J1/4 IP, 2005	Zuma County Beach (Parking Lot #2)	30050 PCH, Malibu	Infiltration	1.72			X
D16			Table 5.1, J1/4 IP, 2005	Zuma County Beach (Parking Lot #3)	30050 PCH, Malibu	Infiltration	0.61			X
D17			Table 5.1, J1/4 IP, 2005	Zuma County Beach (Parking Lot #4)	30050 PCH, Malibu	Infiltration	0.67			X
D18			Table 5.1, J1/4 IP, 2005	Zuma County Beach (Parking Lot #5)	30050 PCH, Malibu	Infiltration	1.15			X
D19			Table 5.1, J1/4 IP, 2005	Zuma County Beach (Parking Lot #6)	30050 PCH, Malibu	Infiltration	0.91			X
D20			Table 5.1, J1/4 IP, 2005	Zuma Beach Maintenance Yard	30100 PCH, Malibu	Infiltration	0.53			X
D21			Table 5.1, J1/4 IP, 2005	Point Dume County Beach Parking Lot	7103 Westward Beach Road, Malibu	Infiltration	2.45			X
D22	Corral West	County	J1/J4 IP Implementation, 2009	Corral West-1		Infiltration	7.6			X
D23	Marie Canyon	Malibu		Malibu Road Biofiltration		Bioretention			X	
D24	Carbon	LACDBH	Table 5.1, J1/4 IP, 2005	Malibu Lagoon County Beach (Surfrider) Parking Lot	23000 PCH, Malibu	Infiltration	0.68			X
D25		County	J1/J4 IP Implementation, 2009	Carbon-1		Bioretention	31			X
D26	Las Flores	Malibu	Table 5.1, J1/4 IP, 2005	Las Flores Creek Park Public Rec Area	3755 Las Flores Canyon Road, Malibu	Infiltration	4		X	
D27				Las flores Biofilter at PCH		Bioretention			X	
D28	Topanga	LACDBH	Table 5.1, J1/4 IP, 2005	Topanga County Beach (East Lot)	18700 PCH, Malibu	Infiltration	0.97			X
D29			Table 5.1, J1/4 IP, 2005	Topanga County Beach (West Lot, unpaved)	18700 PCH, Malibu	Infiltration	0.96			X
D30		County	J1/J4 IP Implementation, 2009	Topanga-1/3		Infiltration	116			X
D31			J1/J4 IP Implementation, 2009	Topanaga-2		Infiltration	13			X
D32			J1/J4 IP Implementation, 2009	Topanga-4		Infiltration	2			X
D33			J1/J4 IP Implementation, 2009	Topanga-5		Bioretention	15			X
D34			J1/J4 IP Implementation, 2009	Topanga-7		Bioretention	9.4			X
D35			J1/J4 IP Implementation, 2009	Topanga-8		Bioretention	9.6			X
D36			J1/J4 IP Implementation, 2009	Topanga-9		Bioretention	4.2			X
D37			J1/J4 IP Implementation, 2009	Topanga-10		Infiltration	0.27			X
D38			J1/J4 IP Implementation, 2009	Topanga-11		Cistern	0.15			X
D39			J1/J4 IP Implementation, 2009	Topanga-12		Porous Pavement	0.88			X

Existing Non-Structural BMPs

Non-Structural BMPs in the NSMBCW EWMP Area

Program Element	ID	Activity	Existing County BMP?	Existing Flood Control BMP?	Existing City BMP?
Public Information and Participation Program	1	Maintain storm water website(s)	Yes	Yes	Yes
	2	Reporting hotline for the public (e.g., 888-CLEAN-LA)	Yes	Yes	Yes
	3	Make reporting info available to public	Yes	Yes	Yes
	4	Public service announcements, advertising, and media relations	Yes	Yes	Yes
	5	Educational activities and countywide events	Yes	Yes	Yes
	6	Educate and involve ethnic communities and businesses	Yes	Yes	Yes
	7	Pet Owner Outreach	Yes	Yes	Yes
	8	Outreach to property owners with corralled animals	No	No	Yes
	9	Horse owner outreach/Pilot program	No	No	Yes
	10	Equestrian waste/cleanout signage		No	No
	11	Hiking trailhead signage	Yes	No	No
	12	Septic system guides	Yes	Yes	Yes
	13	Outreach coordination with Pepperdine University	Yes	Yes	Yes
	14	Inter-agency coordination	Yes	Yes	Yes
	15	Irrigation Management Outreach and Retrofits	Yes	Yes	Yes
	16	Ocean Friendly Garden Project	No	No	Yes
	17	Pesticide, Herbicide, Fertilizer Management	No	N/A	Yes
	18	Downspout disconnect program	No	N/A	No
Industrial/Commercial	27	Tracking of critical sources	Yes	N/A	Yes
	28	BMP material available for industrial/commercial owners	Yes	N/A	Yes
	29	Maintained inventory of critical sources annually	Yes	N/A	Yes
	30	Inspections of industrial/commercial facilities	Yes	N/A	Yes
	31	Progressive enforcement of compliance with stormwater requirements	No - Pending	N/A	Yes
	32	Regular restaurant inspections	Yes	N/A	Yes
	33	Restaurant reward and recognition program	No	N/A	Yes
	34	Industry-specific workshops	No	N/A	Yes
	35	Sustainable/Green Business Program	No	N/A	Yes
Planning and Land Development Program	44	Lid Ordinance/Planning and Land Development Program implementation	Yes	N/A	Yes
	45	Green Streets Policy	Yes	N/A	Yes
	46	Plan check process in place for qualifying projects	Yes	N/A	Yes
	47	LID guidance documents available for development community	Yes	N/A	Yes
	48	Tracking database	Yes	N/A	Yes
	49	Post-project inspections	Yes	N/A	No
	50	Require verification of maintenance provisions for BMPs	No	N/A	Yes
	51	Targeted Employee training of Development planning employees	Yes	N/A	Yes
	52	Annual reporting of mitigation project descriptions	No	N/A	No
Development Construction Program	62	Electronic tracking system (database and/or GIS)	Yes	N/A	Yes
	63	Required documents prior to issuance of building/grading permit	Yes	N/A	Yes
	64	Implement technical BMP standards	Yes	N/A	Yes
	65	Progressive enforcement	Yes	N/A	Yes
	66	Require preparation of a Local SWPPP for approval of permitted sites	Yes	N/A	Yes
	67	Inspect construction sites as-necessary	Yes	N/A	Yes
	68	Permittee staff training	Yes	N/A	Yes
Public Agency Activities Program	77	Public construction activities management	Yes	Yes	Yes
	78	Public facility inventory	No - In Progress	No - In Progress	No - In Progress
	79	Inventory of existing development for retrofitting opportunities	No - In Progress	No - In Progress	No - In Progress
	80	Public facility and activity management	Yes	Yes	Yes
	81	Vehicle maintenance, material storage facilities, corporation yard management	Yes	Yes	N/A
	82	Landscape, park, and recreational facilities management	Yes	Yes	Yes
	83	Storm drain operation and maintenance	Yes	Yes	Yes
	84	Streets, roads, and parking facilities maintenance	Yes	Yes	Yes
	85	Parking Facilities Management	Yes	Yes	N/A
	86	Municipal employee and contractor training	Yes - Employees Only	Yes - Employees Only	Yes - Employees Only
	87	Sewage system maintenance, overflow, and spill prevention	Yes	No	N/A
	88	Street Sweeping	Yes	No	Yes
IC/ID Elimination Program	97	Implementation program	Yes	Yes	Yes
	98	MS4 Tracking (mapping) of permitted connections and IC/ID	Yes	Yes	Yes
	99	Procedures for conducting source investigations for IC/IDs	Yes	Yes	Yes
	100	Procedures for eliminating IC/IDs	Yes	Yes	Yes
	101	Procedures for public reporting of ID	Yes	Yes	Yes
	102	Spill response plan	Yes	Yes	Yes
	103	IC/ID response plan	Yes	Yes	Yes
	104	IC/IDs education and training for staff	Yes	Yes	Yes

APPENDIX C

SBPAT Land Use EMC Dataset

Appendix C
SBPAT Default LA County Land Use EMC Datasets

Data Summary for SBPAT Default LA County Land Use EMC Datasets[a]

Land Use		TSS	TP	DP	NH3	NO3	TKN	Diss Cu	Tot Cu	Tot Pb	Diss Zn	Tot Zn	Fecal Col.
Commercial	Count	31	32	33	33	33	36	40	40	40	40	40	5
	% ND	0%	3%	3%	21%	21%	3%	15%	0%	45%	10%	0%	20%
Industrial	Count	53	55	56	57	56	57	61	61	61	61	61	6
	% ND	0%	5%	9%	19%	5%	0%	15%	0%	43%	7%	0%	0%
Transportation	Count	75	71	71	74	75	75	77	77	77	77	77	2
	% ND	0%	1%	4%	27%	20%	0%	1%	0%	52%	6%	0%	0%
Education	Count	51	49	49	52	51	51	54	54	54	54	54	NA
	% ND	0%	0%	2%	35%	24%	0%	19%	0%	76%	39%	9%	NA
Multi-Family Residential	Count	45	38	38	46	46	50	54	54	54	54	54	7
	% ND	2%	3%	3%	24%	26%	0%	37%	7%	72%	41%	9%	0%
Single Family Residential	Count	41	42	42	44	43	46	48	48	48	48	48	4
	% ND	0%	0%	0%	16%	30%	0%	40%	4%	52%	81%	44%	0%
Agriculture (row crop)	Count	20	18	18	21	19	17	18	21	21	21	21	5
	% ND	0%	0%	0%	0%	5%	0%	0%	0%	0%	10%	0%	0%
Vacant / Open Space	Count	48	46	44	48	50	50	52	52	57	52	52	11
	% ND	2%	41%	57%	67%	2%	0%	90%	38%	88%	96%	77%	0%

[a] EMC data are based on 1996-2000 data for Los Angeles County land use sites (Los Angeles County, 2000), except for agriculture which are based on Ventura County MS4 EMCs (Ventura County, 2003) and fecal coliform which are based on 2000-2005 SCCWRP Los Angeles region land use data (SCCWRP, 2007b). These EMC datasets are summarized in the SBPAT User's Guide (Geosyntec, 2012). Open space fecal coliform EMC based on 2004-2006 SCCWRP data for Arroyo Sequit reference watershed, taken from (SCCWRP, 2005) and (SCCWRP 2007a).

Appendix D

Los Angeles County Flood Control District Background Information

Appendix D

Los Angeles County Flood Control District Background Information

LACFCD Background Information

In 1915, the Los Angeles County Flood Control Act established the LACFCD and empowered it to manage flood risk and conserve stormwater for groundwater recharge. In coordination with the United States Army Corps of Engineers the LACFCD developed and constructed a comprehensive system that provides for the regulation and control of flood waters through the use of reservoirs and flood channels. The system also controls debris, collects surface storm water from streets, and replenishes groundwater with storm water and imported and recycled waters. The LACFCD covers the 2,753 square-mile portion of Los Angeles County south of the east-west projection of Avenue S, excluding Catalina Island. It is a special district governed by the County of Los Angeles Board of Supervisors, and its functions are carried out by the Los Angeles County Department of Public Works. The LACFCD service area is shown in Figure D-1.

Unlike cities and counties, the LACFCD does not own or operate any municipal sanitary sewer systems, public streets, roads, or highways. The LACFCD operates and maintains storm drains and other appurtenant drainage infrastructure within its service area. The LACFCD has no planning, zoning, development permitting, or other land use authority within its service area. The permittees that have such land use authority are responsible under the Permit for inspecting and controlling pollutants from industrial and commercial facilities, development projects, and development construction sites. (Permit, Part II.E, p. 17.)

The MS4 Permit language clarifies the unique role of the LACFCD in storm water management programs: "[g]iven the LACFCD's limited land use authority, it is appropriate for the LACFCD to have a separate and uniquely-tailored storm water management program. Accordingly, the storm water management program minimum control measures imposed on the LACFCD in Part VI.D of this Order differ in some ways from the minimum control measures imposed on other Permittees. Namely, aside from its own properties and facilities, the LACFCD is not subject to the Industrial/Commercial Facilities Program, the Planning and Land Development Program, and the Development Construction Program. However, as a discharger of storm and non-storm water, the LACFCD remains subject to the Public Information and Participation Program and the Illicit Connections and Illicit Discharges Elimination Program. Further, as the owner and operator of certain properties, facilities and infrastructure, the LACFCD remains subject to requirements of a Public Agency Activities Program." (Permit, Part II.F, p. 18.)

Consistent with the role and responsibilities of the LACFCD under the Permit, the [E]WMPs and CIMPs reflect the opportunities that are available for the LACFCD to collaborate with permittees having land use authority over the subject watershed area. In some instances, the opportunities are minimal, however the LACFCD remains responsible for compliance with certain aspects of the MS4 permit as discussed above.

In some instances, in recognition of the increased efficiency of implementing certain programs regionally, the LACFCD has committed to responsibilities above and beyond its obligations under the 2012 Permit. For example, although under the 2012 Permit the Public Information and Participation Program is a responsibility of each Permittee, the LACFCD is committed to implementing certain regional elements of the PIPP on behalf of all Permittees at no cost to the Permittees. These regional elements include:

- Maintaining a countywide hotline (888-CLEAN-LA) and website (www.888cleanla.com) for public reporting and general stormwater management information at an estimated annual cost of $250,000. Each Permittee can utilize this hotline and website for public reporting within its jurisdiction.
- Broadcasting public service announcements and conducting regional advertising campaigns at an estimated annual cost of $750000.
- Facilitating the dissemination of public education and activity specific stormwater pollution prevention materials at an estimated annual cost of $100,000.
- Maintaining a stormwater website at an estimated annual cost of $10,000.

The LACFCD will implement these elements on behalf of all Permittees starting July 2015 and through the Permit term. With the LACFCD handling these elements regionally, Permittees can better focus on implementing local or watershed-specific programs, including student education and community events, to fully satisfy the PIPP requirements of the 2012 Permit.

Similarly, although water quality monitoring is a responsibility of each Permittee under the 2012 Permit, the LACFCD is committed to implement certain regional elements of the monitoring program. Specifically, the LACFCD will continue to conduct monitoring at the seven existing mass emissions stations required under the previous Permit. The LACFCD will also participate in the Southern California Stormwater Monitoring Coalition's Regional Bioassessment Program on behalf of all Permittees. By taking on these additional responsibilities, the LACFCD wishes to increase the efficiency and effectiveness of these programs.

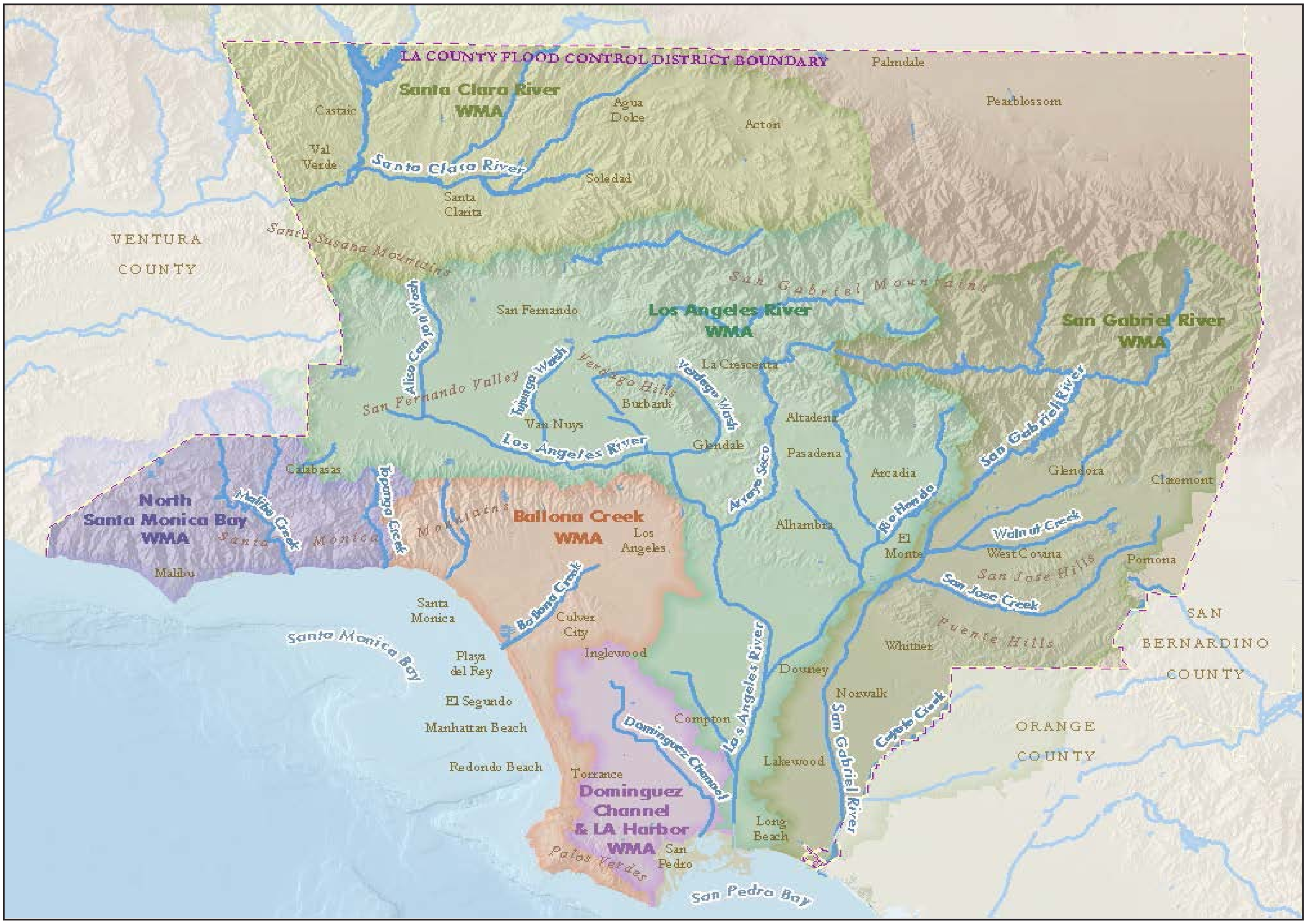


Figure D-1 Los Angeles County Flood Control District Service Area

APPENDIX C

RAA Summary Data

Data files associated with the Reasonable Assurance Analysis (RAA) have been submitted electronically to the Regional Board. These files include the following:

- Excel workbooks containing post-processed RAA results, including daily runoff, concentration, and load data for each BMP scenario and each analysis region.
- Excel workbooks containing the TLR and RAA summary sheets.
- SBPAT files for all used RAA runs, including both input and output files and the Scenario Managers used.
- GIS files, including all shapefiles used in the RAA and development of figures in the EWMP.

Included in this Appendix is the following:

- A printout of the RAA summary sheet (Attachment C-1).
- Example TLR calculations for a variety of pollutants addressed in the RAA (Attachment C-2).
- Annual rainfall data within the NSMBCW watershed, used to estimate the 90th percentile year (Attachment C-3).
- Charts comparing single family residential monitoring data and corresponding EMC data used in SBPAT (Attachment C-4).

ATTACHMENT C-1

RAA Summary Calculations

Compliance Monitoring Location	Analysis Region (For V lookup)	Analysis Region	Pollutant	Historical Monitoring Exceedances (2002-2013)		Target Load Reduction			2003 - 2015						2015-2021										2003-2021		Additional LR Needed		Target Load Reduction	
									SUSMP Redevelopment		Existing BMPs		Total LR (2003 - 2015)		LID Incentives		LID Redevelopment		Non-Structural Non-Modeled		Proposed BMPs		Total LR (2015 - 2021)		Total LR (2003 - 2021)					
				All Events	Daily rainfall > 0.10"	Baseline Load	Absolute TLR	%	Absolute	%	Absolute	%	Absolute	%	Absolute	%	Absolute	%	Absolute	%	Absolute	%	Absolute	%	Absolute	%	Absolute	%	Absolute	%
	W1-01	W1-01	FC	-	-	0.8	0.0	0.0%	0.00	0.0%	0.0	0.0%	0.00	0%	0.00	0.0%	0.00	0.0%	0.04	5.0%	0.0	0%	0.04	5%	0.04	5.0%	0.00	0.0%	0.0	0%
S1-01	S1-01	S1-01	FC	26%	25%	38.8	0.0	0.0%	0.93	2.4%	0.0	0.0%	0.93	2%	0.00	0.0%	0.42	1.1%	1.94	5.0%	0.0	0%	2.36	6%	3.29	8.5%	0.00	0.0%	0.0	0%
	E1-01	E1-01	FC	-	-	0.7	0.0	0.0%	0.00	0.0%	0.0	0.0%	0.00	0%	0.00	0.1%	0.00	0.0%	0.04	5.0%	0.0	0%	0.04	5%	0.04	5.1%	0.00	0.0%	0.0	0%
S4-01	S4-01	S4-01	FC	13%	20%	30.1	0.0	0.0%	0.20	0.6%	0.0	0.0%	0.20	1%	0.31	1.0%	0.08	0.3%	1.51	5.0%	0.0	0%	1.90	6%	2.09	7.0%	0.00	0.0%	0.0	0%
	E4-01	E4-01	FC	-	-	45.7	0.0	0.0%	0.62	1.4%	0.0	0.0%	0.62	1%	0.71	1.5%	0.28	0.6%	2.29	5.0%	0.0	0%	3.28	7%	3.89	8.5%	0.00	0.0%	0.0	0%
S1-02	S1-02	S1-02	FC	8%	14%	18.9	0.0	0.0%	0.41	2.2%	0.0	0.0%	0.41	2%	0.57	3.0%	0.17	0.9%	0.95	5.0%	0.0	0%	1.68	9%	2.09	11.0%	0.00	0.0%	0.0	0%
S1-03	S1-03	S1-03	FC	5%	9%	130.6	0.0	0.0%	1.83	1.4%	5.4	4.1%	7.22	6%	3.21	2.5%	0.78	0.6%	6.53	5.0%	0.0	0%	10.52	8%	17.74	13.6%	0.00	0.0%	0.0	0%
S1-04	S1-04	S1-04	FC	36%	34%	100.7	0.0	0.0%	1.32	1.3%	0.9	0.9%	2.20	2%	1.66	1.6%	0.58	0.6%	5.04	5.0%	0.0	0%	7.28	7%	9.48	9.4%	0.00	0.0%	0.0	0%
	E1-04	E1-04	FC	-	-	267.3	0.0	0.0%	4.14	1.6%	0.0	0.0%	4.14	2%	6.13	2.3%	1.32	0.5%	13.37	5.0%	0.0	0%	20.81	8%	24.96	9.3%	0.00	0.0%	0.0	0%
S1-05	S1-05	S1-05	FC	26%	32%	398.6	0.0	0.0%	3.59	0.9%	0.0	0.0%	3.59	1%	4.10	1.0%	1.60	0.4%	19.93	5.0%	0.0	0%	25.63	6%	29.22	7.3%	0.00	0.0%	0.0	0%
	E1-05	E1-05	FC	-	-	344.9	0.0	0.0%	6.95	2.0%	0.0	0.0%	6.95	2%	8.85	2.6%	2.38	0.7%	17.25	5.0%	0.0	0%	28.47	8%	35.43	10.3%	0.00	0.0%	0.0	0%
S1-06	S1-06	S1-06	FC	25%	29%	386.0	0.0	0.0%	5.46	1.4%	10.3	2.7%	15.75	4%	8.94	2.3%	2.13	0.6%	19.30	5.0%	0.0	0%	30.37	8%	46.12	11.9%	0.00	0.0%	0.0	0%
S1-07	S1-07	S1-07	FC	54%	66%	78.9	7.5	9.5%	0.89	1.1%	2.0	2.6%	2.93	4%	1.34	1.7%	0.34	0.4%	3.95	5.0%	0.0	0%	5.63	7%	8.57	10.9%	0.00	0.0%	7.5	9.5%
	E1-07	E1-07	FC	-	-	121.5	36.4	29.9%	1.43	1.2%	0.0	0.0%	1.43	1%	2.48	2.0%	0.51	0.4%	6.07	5.0%	26.7	22.0%	35.77	29%	37.20	30.6%	0.00	0.0%	36.4	29.9%
S1-08	S1-08	S1-08	FC	43%	63%	86.5	7.8	9.0%	1.39	1.6%	0.0	0.0%	1.39	2%	1.84	2.1%	0.54	0.6%	4.32	5.0%	0.0	0%	6.71	8%	8.09	9.4%	0.00	0.0%	7.8	9.0%
S1-09	S1-09	S1-09	FC	37%	61%	28.9	3.6	12.5%	0.43	1.5%	0.0	0.0%	0.43	1%	0.49	1.7%	0.20	0.7%	1.45	5.0%	1.6	5.6%	3.76	13%	4.19	14.5%	0.00	0.0%	3.6	12.5%
S1-10	S1-10	S1-10	FC	35%	52%	23.9	1.5	6.1%	0.50	2.1%	0.0	0.0%	0.50	2%	0.22	0.9%	0.23	1.0%	1.19	5.0%	0.0	0.0%	1.65	7%	2.15	9.0%	0.00	0.0%	1.5	6.1%
S1-11	S1-11	S1-11	FC	29%	42%	19.5	0.0	0.0%	0.26	1.4%	0.0	0.0%	0.26	1%	0.30	1.5%	0.11	0.6%	0.97	5.0%	0.0	0.0%	1.38	7%	1.65	8.5%	0.00	0.0%	0.0	0%
	E1-11	E1-11	FC	-	-	54.6	11.2	20.5%	0.67	1.2%	0.0	0.0%	0.67	1%	0.71	1.3%	0.31	0.6%	2.73	5.0%	7.8	14.3%	11.54	21%	12.22	22.4%	0.00	0.0%	11.2	20.5%
S1-12	S1-12	S1-12	FC	49%	60%	86.4	37.9	43.9%	1.57	1.8%	0.9	1.1%	2.50	3%	1.48	1.7%	0.67	0.8%	4.32	5.0%	30.7	35.5%	37.16	43%	39.66	45.9%	0.00	0.0%	37.9	43.9%
	E1-12	E1-12	FC	-	-	58.2	16.3	28.0%	2.64	4.5%	2.4	4.1%	5.00	9%	0.89	1.5%	1.27	2.2%	2.91	5.0%	6.2	10.6%	11.26	19%	16.26	28.0%	0.00	0.0%	16.3	28.0%
MCW - Serra	MCW	MCW	FC	-	-	19.9	0.0	0.0%	1.14	5.7%	0.0	0.0%	1.14	6%	-	-	0.49	2.5%	0.99	5.0%	0.0	0.0%	1.48	7%	2.62	13.2%	0.00	0.0%	0.0	0%
	MCW		NO3	-	-	43.5	0.0	0.0%	5.51	12.7%	0.0	0.0%	5.51	13%	-	-	2.68	6.2%	2.17	5.0%	0.0	0.0%	4.85	11%	10.36	23.8%	0.00	0.0%	0.0	0%
	MCW		TN	-	-	2173.3	0.0	0.0%	30.31	1.4%	0.0	0.0%	30.31	1%	-	-	13.25	0.6%	108.67	5.0%	0.0	0.0%	121.92	6%	152.22	7.0%	0.00	0.0%	0.0	0%
	MCW		TP	-	-	211.2	0.0	0.0%	3.19	1.5%	0.0	0.0%	3.19	2%	-	-	1.39	0.7%	10.56	5.0%	0.0	0.0%	11.95	6%	15.14	7.2%	0.00	0.0%	0.0	0%
S1-13	S1-13	S1-13	FC	42%	46%	57.5	6.5	11.3%	1.91	3.3%	0.0	0.0%	1.91	3%	0.70	1.2%	0.84	1.5%	2.88	5.0%	2.5	4.4%	6.93	12%	8.84	15.4%	0.00	0.0%	6.5	11.3%
	W1-14	W1-14	FC	-	-	142.3	29.5	20.8%	3.70	2.6%	0.0	0.0%	3.70	3%	2.40	1.7%	1.64	1.2%	7.12	5.0%	20.5	14.4%	31.68	22%	35.38	24.9%	0.00	0.0%	29.5	20.8%
S1-14	S1-14	S1-14	FC	31%	54%	53.7	8.2	15.3%	2.08	3.9%	0.3	0.6%	2.39	4%	1.11	2.1%	0.99	1.8%	2.69	5.0%	1.2	2.3%	6.02	11%	8.41	15.7%	0.00	0.0%	8.2	15.3%
S1-15	S1-15	S1-15	FC	25%	33%	72.1	0.0	0.0%	1.38	1.9%	0.0	0.0%	1.38	2%	1.69	2.3%	0.71	1.0%	3.61	5.0%	0.0	0.0%	6.01	8%	7.39	10.2%	0.00	0.0%	0.0	0%
S1-16	S1-16	S1-16	FC	15%	31%	4.6	0.0	0.0%	0.06	1.4%	0.0	0.0%	0.06	1%	0.08	1.7%	0.03	0.7%	0.23	5.0%	0.0	0.0%	0.34	7%	0.40	8.8%	0.00	0.0%	0.0	0%
S1-17	S1-17	S1-17	FC	11%	14%	14.5	0.0	0.0%	0.20	1.3%	0.0	0.0%	0.20	1%	0.13	0.9%	0.10	0.7%	0.73	5.0%	0.0	0.0%	0.95	7%	1.15	7.9%	0.00	0.0%	0.0	0%
S1-18	S1-18	S1-18	FC	58%	63%	311.4	51.8	16.6%	6.46	2.1%	0.0	0.0%	6.46	2%	5.54	1.8%	3.21	1.0%	15.57	5.0%	33.0	10.6%	57.29	18%	63.75	20.5%	0.00	0.0%	51.8	16.6%
	S1-18		TPb	-	-	180.0	0.0	0.0%	0.44	0.2%	0.0	0.0%	0.44	0%	0.40	0.2%	0.23	0.1%	9.00	5.0%	2.3	1.3%	11.90	7%	12.34	6.9%	0.00	0.0%	0.0	0%

ATTACHMENT C-2

EXAMPLE TLR CALCULATIONS

Bacteria

To better illustrate the TLR calculation process, the following example scenario was developed for compliance monitoring location (CML) 1-12 for TMDL year 1995.

Steps 1-2: Calculate the exceedance frequency and allowable discharge days

The monitoring data in the receiving water of the subwatershed draining to CML 1-12 (Analysis Region S1-12) was evaluated for exceedances of the TMDL FIB limits over all samples and only samples taken during days with precipitation greater than 0.1 inches. To determine the allowable discharge days for 1-12, the 17 TMDL allowable exceedance days was divided by the exceedance frequency of samples taken during days with precipitation greater than 0.1 inches. The results of this analysis are shown in the table below.

Historical Exceedance Frequency (All events)	Historical Exceedance Frequency (Daily rainfall > 0.10")	Allowable Discharge Days (Based on exceedance frequency with daily rainfall > 0.10")
49%	60%	28

Steps 3-4: Model the subwatershed in SWMM5 and size a retention BMP to only bypass during the allowable discharge days

The analysis region was modeled in SWMM5 and resulted in 40 discharge days (i.e., midnight – midnight 24-hour periods where discharge occurred). To reduce the baseline 40 discharge days to the allowable 28 discharge days, the diversion flowrate to a virtual retention BMP was iteratively sized until these two numbers were equal. This process resulted in a retention BMP with a diversion flowrate of 17.7 cubic feet per second (cfs).

Steps 5-8: Model the virtual retention BMP and the baseline condition in SBPAT and compare the FC loads to determine the TLR

The baseline condition for the S1-12 analysis region and the virtual retention BMP with a diversion flowrate of 17.2 cfs were modeled in SBPAT for TMDL year 1995. The table below shows the results of this modeling.

Average MS4 Baseline FC Load (10^12 MPN)	Average FC Load assuming virtual retention BMP (10^12 MPN)	MS4 Baseline FC Load Reduced (10^12 MPN)	% MS4 Baseline FC Load Reduced
92.1	48.5	43.6	47%

Nutrients - Total Phosphorus

To better illustrate the nutrient TLR calculation process, the following example scenario was developed for the MCW analysis region for TMDL year 1995 for Total Phosphorus (TP).

Steps 1-2: Model the analysis region in SBPAT to estimate the baseline load

The analysis region was modeled in SBPAT to obtain baseline runoff volume and phosphorus loading. Modeling included impervious areas as tributary to small bioswales to represent actual conditions in the MCW analysis region. The results are shown in the table below:

Baseline Phosphorus Load (lbs)	Average Runoff (ac-ft)
211	396.2

Steps 3: Compute the allowed loading based on MS4 TMDL limit.

The TMDL concentration-based WLA for total phosphorus is 0.2 mg/L for the winter season. The allowed load was computed by multiplying the concentration with the runoff volume obtained from Step 2. The result was 215 lbs.

Step 4: Compute TLR based on baseline and allowed loading.

The table below shows the computation results:

Baseline Load (lbs)	Allowed Load (lbs)	Target Load Reduction (lbs)	Target Load Reduction (%)
211	215	< 0	0%

Metals - Lead

To better illustrate the total lead TLR calculation process, the following example scenario was developed for the Topanga Canyon Creek (S1-18) analysis region for TMDL year 1995.

Steps 1-2: Model the analysis region in SBPAT to estimate the baseline load

The analysis region was modeled in SBPAT to obtain baseline runoff volume for TMDL year 1995. Daily storm loads for TMDL year 1995 were ranked, and the 90th percentile lead concentration was estimated. This concentration was multiplied by the annual runoff volume to estimate the baseline lead load. The results are shown in the table below:

Average Runoff (ac-ft)	90th Percentile Daily Lead Concentration (ug/L)	Baseline Lead Load (lbs)
4,623.5	14.3	180.1

Steps 3: Compute the allowed loading based on MS4 TMDL limit.

The CTR criteria for total lead is 82 ug/L, assuming hardness of 100 mg/L, a conversion factor of 0.791, and a Water Effects Ratio (WER) of 1.0. The allowed load was computed by multiplying the concentration with the runoff volume obtained from Step 2. The result was 1,031 lbs.

Step 4: Compute TLR based on baseline and allowed loading.

The table below shows the computation results:

Baseline Load (lbs)	Allowed Load (lbs)	Target Load Reduction (lbs)	Target Load Reduction (%)
180	1,031	< 0	0%

ATTACHMENT C-3

ANNUAL RAINFALL RECORDS USED IN THE NSMBCW RAA

Percentile	Lechuza Patrol Gauge (ID 044867)			
	Precipitation Total		Number of Wet Days	
	Year	Precip. (in)	Year	Days
2.2%	1961	8.17	1959	30
4.5%	1959	8.23	1961	36
6.8%	1990	9.4	1970	37
9.0%	1976	9.8	1966	42
11.3%	1985	9.8	1960	48
13.6%	1964	9.86	1972	49
15.9%	1972	11	1964	52
18.1%	1984	12	1977	52
20.4%	1994	12.3	1990	52
22.7%	1977	12.4	1985	53
25.0%	1987	12.7	1975	55
27.2%	1965	13.26	1988	56
29.5%	1989	13.4	1965	58
31.8%	1975	13.4	1976	58
34.0%	1960	13.8	1956	59
36.3%	1982	14.6	1962	59
38.6%	1981	14.9	1958	60
40.9%	1988	15.3	1981	60
43.1%	1957	15.38	1967	62
45.4%	1970	15.38	1997	62
47.7%	1963	15.91	1989	63
50.0%	1968	16.02	1968	64
52.2%	1991	17.2	1991	64
54.5%	1955	17.25	1987	65
56.8%	1967	17.89	1963	68
59.0%	1971	19.13	1984	70
61.3%	1997	19.8	1980	74
63.6%	1996	20.5	1982	74
65.9%	1956	22.23	1955	76
68.1%	1974	22.4	1957	76
70.4%	1958	25.19	1971	76
72.7%	1979	25.6	1974	81
75.0%	1966	27.03	1992	82
77.2%	1973	27.1	1969	84
79.5%	1992	31.2	1986	84
81.8%	1962	31.32	1993	84
84.0%	1986	31.5	1996	84
86.3%	1993	32.9	1994	85
88.6%	1980	33.3	1973	86
90.9%	1969	38.29	1995	89
93.1%	1995	39.5	1978	95
95.4%	1978	42	1979	98
97.7%	1983	50.8	1983	130

Percentile	Sepulveda Dam Gauge (ID 048092)			
	Precipitation Total		Number of Wet Days	
	Year	Precip. (in)	Year	Days
1.7%	1982	0.72	1982	11
3.5%	2002	4.21	1997	22
5.2%	2007	4.65	1959	26
7.0%	1961	6.61	1961	32
8.7%	1984	6.65	1970	32
10.5%	1990	6.85	1984	32
12.2%	1997	7.76	1972	34
14.0%	1985	8.05	2008	35
15.7%	1964	8.32	1990	38
17.5%	1976	8.38	1960	39
19.2%	1989	8.45	1964	39
21.0%	1960	8.72	1991	39
22.8%	1972	8.78	2002	39
24.5%	1999	8.9	2007	41
26.3%	1959	9.13	1966	43
28.0%	1963	9.29	1976	43
29.8%	1996	9.39	1987	43
31.5%	1994	10.04	2012	43
33.3%	1970	10.27	1963	45
35.0%	2012	10.49	1977	48
36.8%	1987	10.6	2001	51
38.5%	1957	12	2003	51
40.3%	2009	12.75	2004	52
42.1%	1988	13.17	1957	53
43.8%	1991	13.23	2009	53
45.6%	1965	13.35	1956	54
47.3%	1968	13.45	1962	54
49.1%	2004	13.46	1988	54
50.8%	1955	13.67	2000	55
52.6%	1956	13.84	1975	56
54.3%	2008	14.06	1994	57
56.1%	1977	14.1	1971	58
57.8%	2006	14.74	1989	58
59.6%	1975	15.25	1996	58
61.4%	2000	15.51	1992	59
63.1%	1974	16.08	1999	59
64.9%	1971	16.37	1968	60
66.6%	2003	17.59	2006	60
68.4%	1986	18.32	1973	62
70.1%	2001	19.38	1974	62
71.9%	1967	19.52	2005	62
73.6%	1973	19.81	1979	64
75.4%	1979	20.51	1986	66
77.1%	2010	20.76	1955	67
78.9%	1966	22.48	1985	68
80.7%	1962	22.58	2011	68

Percentile	Sepulveda Dam Gauge (ID 048092)			
	Precipitation Total		Number of Wet Days	
	Year	Precip. (in)	Year	Days
82.4%	2011	22.62	1965	69
84.2%	1958	22.87	1958	70
85.9%	1969	28.63	1969	70
87.7%	1992	28.97	1967	71
89.4%	1978	29.87	2010	71
91.2%	1995	33.15	1995	72
92.9%	1983	34.03	1993	77
94.7%	2005	34.13	1978	82
96.4%	1993	34.81	1983	93
98.2%	1998	39.04	1998	108

ATTACHMENT C-4

COMPARISON OF SINGLE FAMILY RESIDENTIAL MONITORING DATA AND CORRESPONDING EMC DATA USED IN SBPAT

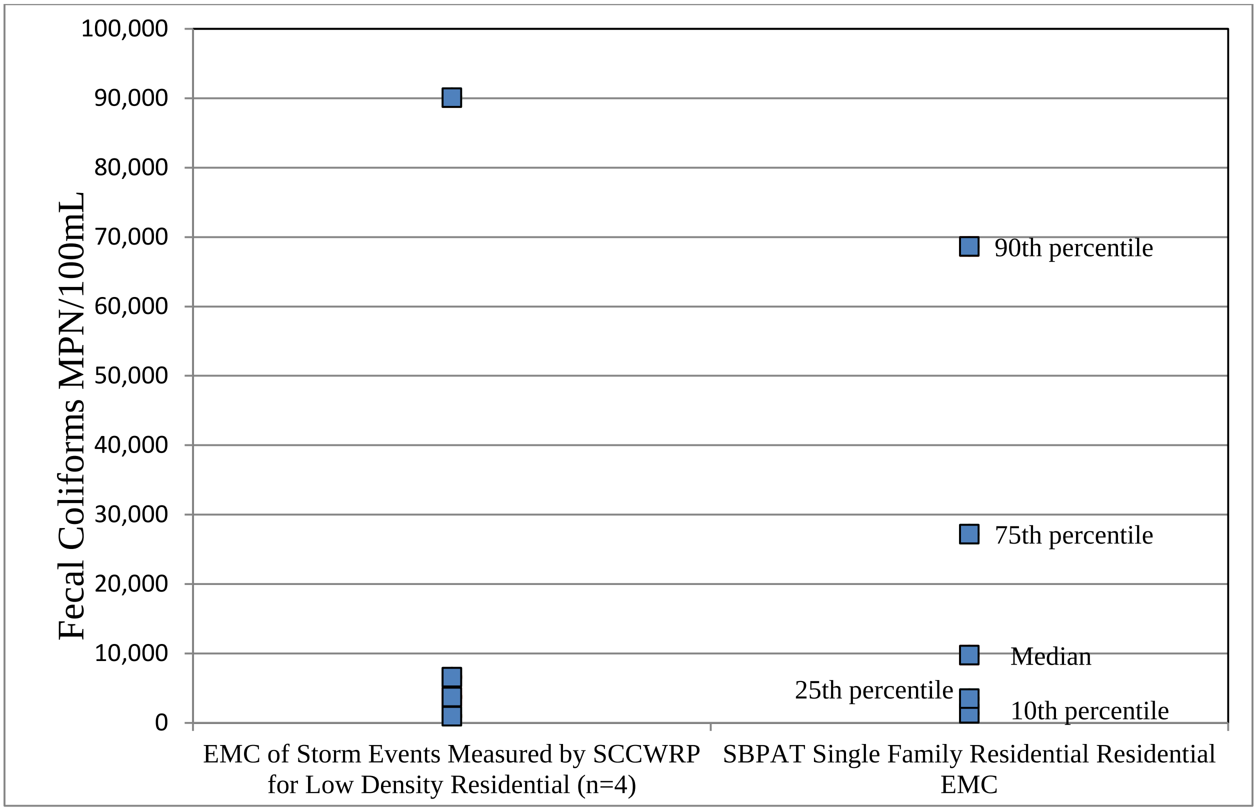


Figure E-1: Comparison of SFR monitoring data and SBPAT modeling data for fecal coliform

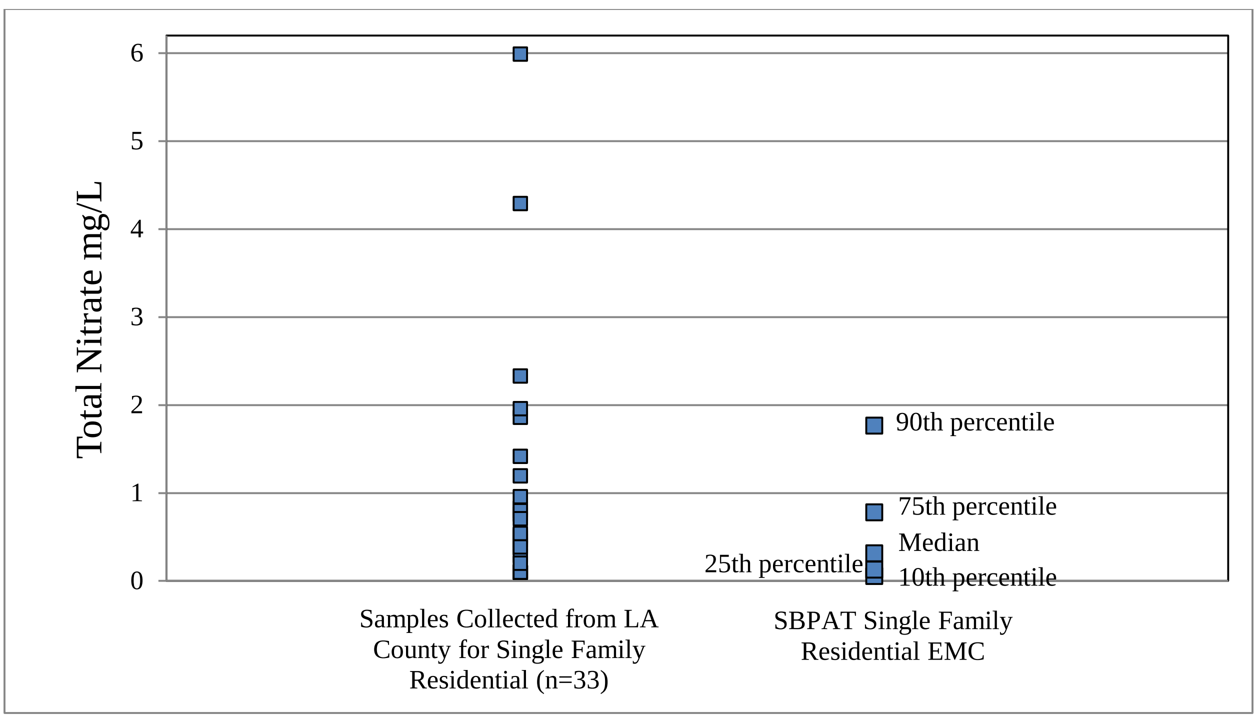


Figure E-2: Comparison of SFR monitoring data and SBPAT modeling data for total nitrate

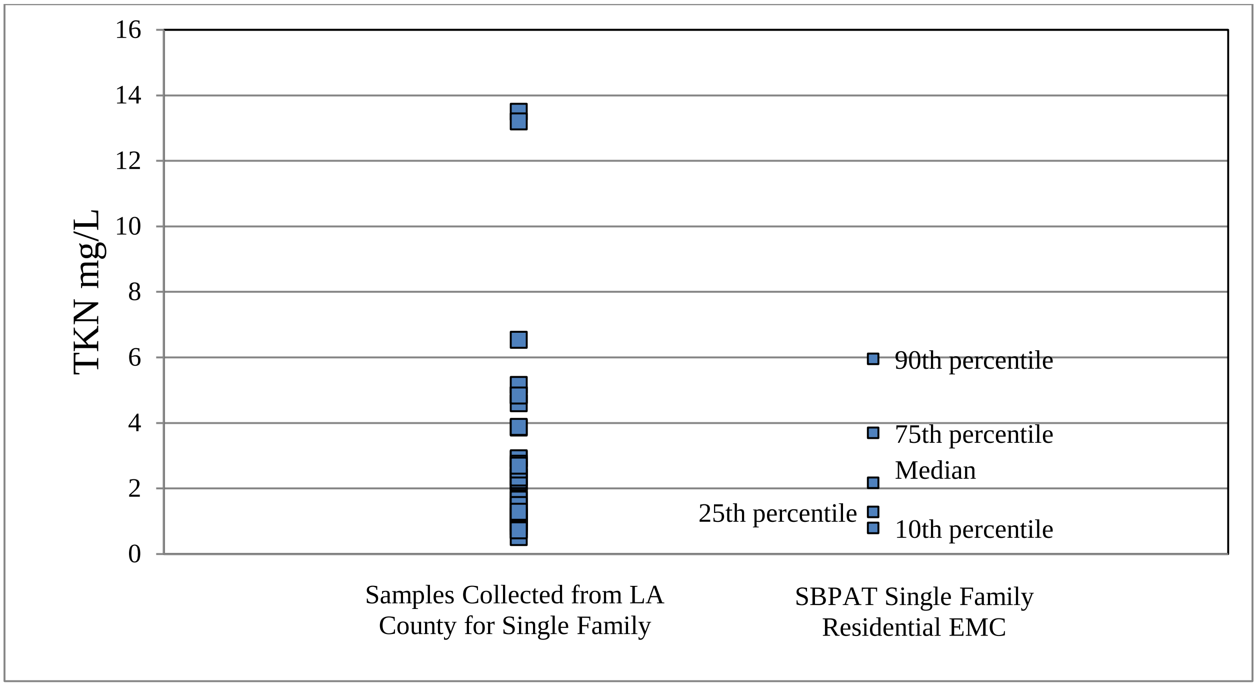


Figure E-3: Comparison of SFR monitoring data and SBPAT modeling data for TKN

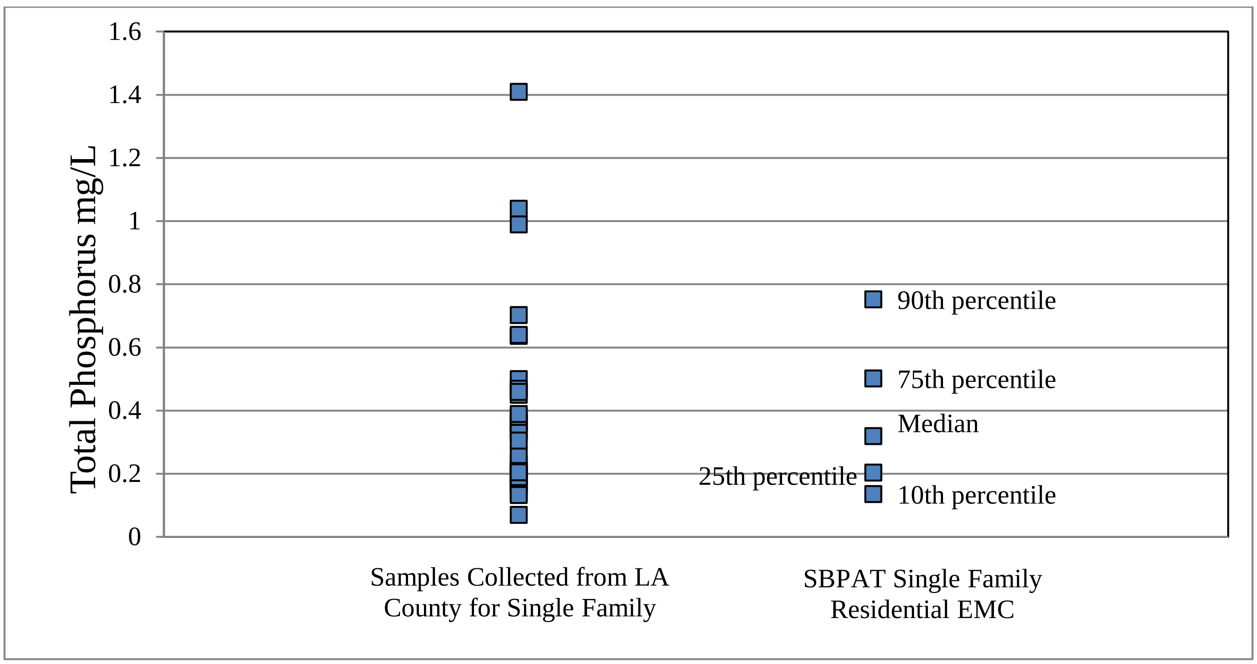


Figure E-4: Comparison of SFR monitoring data and SBPAT modeling data for total phosphorus

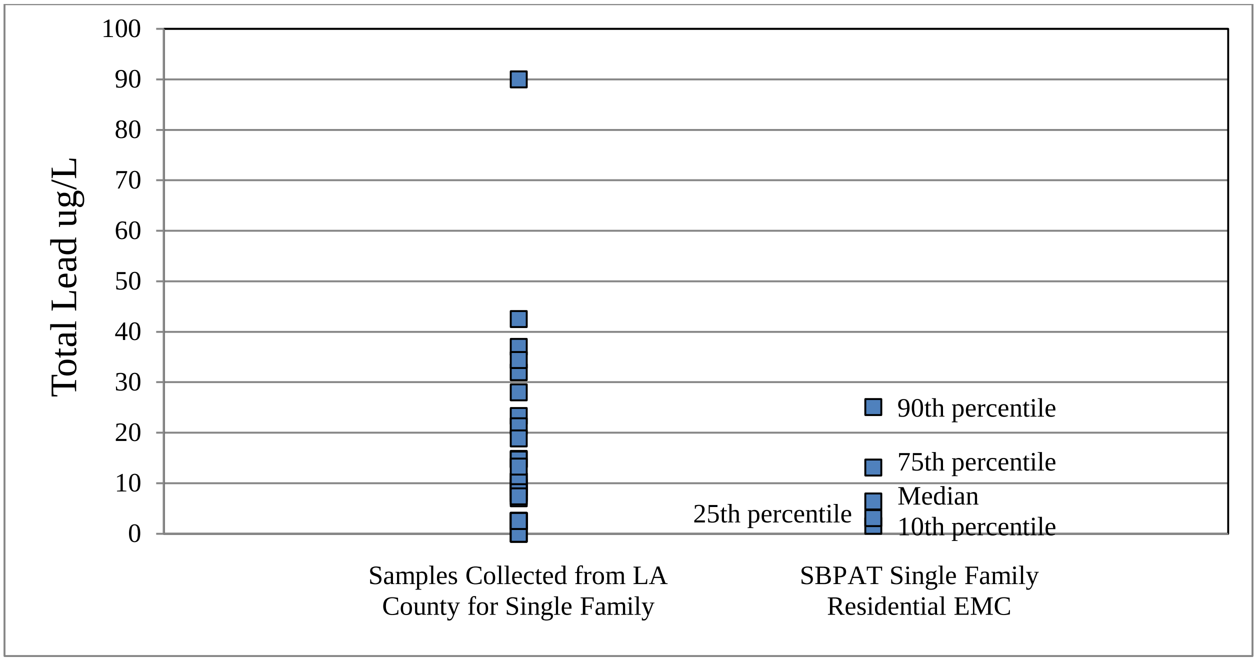


Figure E-5: Comparison of SFR monitoring data and SBPAT modeling data for total lead

APPENDIX D

Summary of Non-Structural BMPs

MCM	2012 Permit Requirement	Implementation			Water Quality Priority Pollutants				Comments
		As-is	Enhanced	Modified	Trash	Nutrients	Lead	Bacteria	
VI.D.2 Progressive Enforcement (Applies D.6, D.7, D.8, and D.10)									
	Develop and maintain a Progressive Enforcement Policy	X			X	X	X	X	
	Conduct follow-up inspection within 4 weeks of date of initial inspection	X			X	X	X	X	
	Take progressive enforcement actions, as necessary and appropriate	X			X	X	X	X	
	Retain records	X			X	X	X	X	
	Refer violations to Regional Board	X			X	X	X	X	
	Investigate complaints from Regional Board (RB)	X			X	X	X	X	
	Assist RB with Enforcement Actions	X			X	X	X	X	
VI.D.5 Public Information and Participation Program (PIPP)									
	Participate in a Countywide PIPP, WMP PIPP, or individual PIPP that measurably increases knowledge and changes behavior, and involves a diversity of socio economic and ethnic communities	X			X	X	X	X	
	Maintain reporting hotline, with hotline information published and point-of-contact identified	X			X	X	X	X	
	Organize events (e.g., clean ups)	X			X	X		X	
	Residential Outreach (Individually or with group)	X							
	Public Service Announcements	X			X	X	X	X	
	Develop and distribute public education materials on: vehicle fluids; household waste; construction waste; pesticides, fertilizers, and integrated pest management (IPM); green wastes; and animal wastes		X		X	X	X	X	PIPP enhancements including: - "Living Lightly in Our Watersheds – A Guide for Residents of the SMB Watershed." Copies of this guide are regularly distributed at public counters and events. A partnership project with the Resource Conservation District of the Santa Monica Mountains and other local agencies, this guide is currently being updated for print production, and a new website for presenting the information was launched in 2015. It can be found at www.livinglightlyguide.org. - Malibu is founding member and facilitator of the Malibu Area Conservation Coalition (MACC). MACC is a partnership of local government agencies, utilities, resource districts, and community stakeholders working within Malibu and the North Santa Monica Mountains that share the common goal of empowering local communities to conserve and protect natural and economic resources and habitat. Recognizing that watersheds, oceans, water and power generation and delivery systems do not stop at jurisdictional boundaries, the coalition is dedicated to providing effective programs, environmental education and outreach. The MACC does this by providing resources to the community to improve resource conservation, and eliminate non-point source pollution. Programs have included promoting the Surfrider Foundation's Ocean Friendly Gardens program, providing rebates and incentives for conservation devices and landscape retrofits, hosting workshops and training, and installing demonstration gardens. - Malibu actively participates in the Malibu Chamber of Commerce environmental Committee which provides education/outreach and recognition to local businesses and the community through events, awards, workshops, and outreach campaigns. - Special focused outreach directly to the equestrian community in neighborhoods known to have increased equestrian uses or facilities. Including direct contact with properties, offers to conduct site evaluations, education and outreach to property owner associations, and educational materials. A new equestrian facilities best management practices guidelines is currently in development. - The City of Malibu has conducted landscaper/gardener training and certification programs multiple times in both Spanish and English. - Malibu will assess the feasibility and effectiveness of additional program enhancements that are detailed in Appendix E Section 6.1 (ASBS 24 Compliance Plan). This includes an Enhanced Collaborative Environmentally Friendly Alternative Services Program and ASBS Signage at Beaches. Final implementation of programs determined to be feasible and effective will be subject to City Council approval.
	Distribute public education materials at points of purchase including automotive parts stores, home improvement centers, landscaping/garden centers, and pet shops/feed stores.		X		X	X	X	X	
	Maintain stormwater website	X			X	X	X	X	
	Provide schools with materials to educate children (K-12); using state-produced materials is allowed.	X			X	X	X	X	

MCM	2012 Permit Requirement	Implementation			Water Quality Priority Pollutants				Comments
		As-is	Enhanced	Modified	Trash	Nutrients	Lead	Bacteria	
VI.D.6 Industrial/ Commercial									
	Track Critical Sources - maintain inventory (watershed based or lat/long recorded)	X			X	X	X	X	
	Educate - notify critical sources of BMP requirements		X		X	X	X	X	Outreach material content and distribution will be focused on industrial/commercial facilities with the potential to contribute to pollutants identified as water quality priorities, specifically bacteria. For example, BMPs related to trash management will be highlighted in outreach material, and additional recommendations that exceed the minimum requirements for these BMPs will be encouraged.
	Implement a Business Assistance Program for select sectors or small businesses - technical assistance, and distribute materials to specific sectors	X			X	X	X	X	
	Inspect critical commercial/industrial facilities twice during the 5 year permit term. For facilities with a No Exposure Certification, evaluate and conduct 2nd inspection at 25% of facilities to verify the continuity of the no exposure status		X		X	X	X	X	The NSMBCW EWMP Group conducts inspections of commercial facilities within the NSMBCW EWMP Area on an annual basis rather than twice per five years as required in the Permit. This includes annual inspections of all food service establishments including restaurants, grocery stores, and coffee shops to reduce this type of business' impact on water quality due to stormwater and dry weather runoff. Malibu is a partner in the Santa Monica Bay Restoration Foundation's Clean Bay Restaurant Certification program that far exceeds the minimum requirements of the previous MS4 Permit. Inspections include a comprehensive 30+ point stormwater inspection checklist requiring 100% compliance in order for the facility to be awarded a Clean Bay Restaurant Certification.
	Conduct Progressive Enforcement follow-up inspections (see D.2), as needed.	X			X	X	X	X	
VI.D.7 Planning and Land Development									
	Update ordinance/design standards to conform with new requirements (LID and Hydromod)		X			X	X	X	The City of Malibu exceeds the Permit's LID requirements by requiring LID implementation on more projects than otherwise required by the Permit. In addition, the City of Malibu implements a Local Coastal Program, which is certified by the California Coastal Commission, including a Land Use Plan (LUP) and Local Implementation Plan (LIP) that detail many environmental quality and protection standards, objectives, and implementation measures for new development and redevelopment projects. These include requirements for water conservation, protection of native vegetation, and landscaping with native vegetation. All landscape plans are reviewed by Malibu's contract biologist. A water quality mitigation plan is required for all planning priority projects along with additional projects, including: beachfront development that creates, adds, or replaces 2,500 sf or more of impervious area; projects that result in the creation, addition, or replacement of 2,500 sf that discharge directly to or adjacent to an ASBS or are tributary to an ASBS; and single family residential projects that create, add, or replace 5,000 sf of impervious surface area.
	Optional: Establish alternative compliance for technical infeasibility, e.g., allow onsite biofiltration or offsite infiltration or gw replenishment or retrofit	X				X	X	X	
	Optional if allowing offsite mitigation: Develop a prioritized list of offsite mitigation projects	X				X	X	X	
	Optional if allowing offsite mitigation: Develop a schedule for completion of offsite projects (must be with 4 yrs of the Certificate of Occupancy of the first project that contributed funds)	X				X	X	X	
	Optional if allowing offsite mitigation: Notice offsite projects to RB website	X				X	X	X	
	Optional if allowing offsite mitigation: Develop a list of mitigation projects descriptions, and estimated pollutant and flow reductions	X				X	X	X	
	Optional if allowing offsite mitigation: Provide aggregated comparison of alternative compliance to results that would have been expected with on site retention of the SWQDv	X				X	X	X	
	Plan Review process - check LID and BMP sizing, etc.,	X				X	X	X	
	Establish internal agreements with structure for communication and authority for departments overseeing plan approval and project construction	X				X	X	X	
	Require project proponents to prepare Operation & Maintenance plan for LID, treatment, and hydromod BMPs	X				X	X	X	
	Implement tracking and enforcement program for LID, treatment, and hydromod BMPs	X				X	X	X	
	Inspect all development sites upon completion and prior to occupancy certificates	X				X	X	X	
	Verify Operation & Maintenance program is implemented on Permittee-operated BMPs through inspection	X				X	X	X	
	Develop maintenance inspection checklist for Permittee-operated BMPs	X				X	X	X	
	Require private parties that operate BMPs, except for simple LID BMPs implemented on single family residences, to document proper Operation & Maintenance; enforce as needed	X				X	X	X	
	Conduct Progressive Enforcement follow-up inspections (see D.2), as needed.	X				X	X	X	

MCM	2012 Permit Requirement	Implementation			Water Quality Priority Pollutants				Comments
		As-is	Enhanced	Modified	Trash	Nutrients	Lead	Bacteria	
VI.D.8 Construction									
	Update erosion and sediment control ordinance/procedures to conform with new requirements	X					X	X	
	Sites < 1 acre; inspect based upon water quality threat	X			X		X	X	
	Establish priority inspection process	X					X	X	
	Site < 1 acre; Require sites with soil disturbing activities to implement minimum BMPs	X			X		X	X	
	Sites >= 1 acre: Require construction sites to prepare erosion sediment control plan(ESCP); review and approve	X			X		X	X	
	Verify construction sites coverage under the CGP and 401 cert	X			X		X	X	
	Develop/implement ESCP review checklist	X			X		X	X	
	Implement technical standards for the selection, installation, and maintenance of construction BMPs for all construction sites within the Permittee's jurisdiction	X			X		X	X	
	Conduct inspections at public and private sites >= 1 acre in size in accordance with Table 17 of the MS4 Permit.	X			X		X	X	
	Develop/implement Standard Operating Procedure (SOP)/inspection checklist	X			X		X	X	
	Track number of inspections for inventoried sites and verify minimum inspections are completed	X			X		X	X	
	Conduct Progressive Enforcement follow-up inspections (see D.2), as needed.	X			X		X	X	
	Train plan review staff and inspectors	X			X		X	X	
	Staff must be knowledgeable in QSD/P key objectives, local BMPs standards	X			X		X	X	
VI.D.9 Public Agency Activities									
	Require public construction sites to implement Planning and Land Development requirements, implement Erosion and Sediment Control BMPs, and obtain Construction General Permit coverage	X			X		X	X	
	Maintain inventory of Permittee owned facilities (including parks and recreation faclities); Update inventory as required	X			X	X	X	X	
	Develop retrofit opportunity inventory (within public ROW or in coordination with TMDL implementation plan); evaluate and rank			X	X	X	X	X	EWMP regional and distributed project selection process was utilized to meet these requirements for public projects rather than implementing separate evaluations for retrofit opportunities. The Group will continue to encourage private retrofit projects through the following: • Retrofit projects on public land that treat runoff from private property; • Education and outreach; • Development plan review process; • Ordinance enforcement.
	Cooperate with private land owners to encourage site specific retrofitting; includes pilot projects and outreach	X			X	X	X	X	
	Obtain IGP coverage for public facilities where appropriate	X							
	Develop procedures to assess impact of flood management projects on water quality of receiving waters; evaluate to determine if retrofitting is feasible			X	X	X	X	X	EWMP regional and distributed project selection process was utilized to meet these requirements for public projects rather than implementing separate evaluations for retrofit opportunities. The Group will continue to encourage private retrofit projects through the following: • Retrofit projects on public land that treat runoff from private property; • Education and outreach; • Development plan review process; • Ordinance enforcement.
	Evaluate existing structural flood control facilities to determine if retrofitting facility to provide additional pollutant removal is feasible			X	X	X	X	X	EWMP regional and distributed project selection process was utilized to meet these requirements for public projects rather than implementing separate evaluations for retrofit opportunities. The Group will continue to encourage private retrofit projects through the following: • Retrofit projects on public land that treat runoff from private property; • Education and outreach; • Development plan review process; • Ordinance enforcement.
	Implement source control BMPs at Permittee owned facilities/activities	X			X	X	X	X	
	Require city-hired contractors to implement source control BMPs	X			X	X	X	X	
	Prevent vehicle/equipment washing discharges to the MS4, including fire fighting and emergency response vehicles	X				X	X	X	
	Ensure new/redeveloped/replaced wash facilities are plumbed to the sanitary sewer or self contained.	X							

MCM	2012 Permit Requirement	Implementation			Water Quality Priority Pollutants				Comments
		As-is	Enhanced	Modified	Trash	Nutrients	Lead	Bacteria	
	Implement Integrated Pest Management (IPM) program	X							
	Ordinances, policies, and procedures reflect IPM techniques and include commitments and schedules to reduce the use of pesticides that cause impairments	X							
	Update an inventory of pesticides used by agency annually; quantify pesticides used by staff and contractors; demonstrate IPM alternatives to reduce pesticide use	X							
	Use SOPs for pesticide application	X							
	Ensure no application of pesticides or fertilizers when two or more days with a 50% chance of rain is predicted by NOAA; within 48 hrs of 1/2 inch of rain; or when water is flowing off the site	X							
	Ensure staff applying pesticides are certified or working under supervision of a certified applicator in the appropriate category	X							
	Update catch basin map add GPS locations and update priority	X			X	X	X	X	
	Inspect/Clean catch basin in areas not subject to Trash TMDL- Priority A: 3x during wet season, 1x during dry 1x; PriorityB:1x during wet 1x and 1x during dry; Priority C: 1x per yr. Maintain records.	X			X			X	Malibu will assess the feasibility and effectiveness of additional program enhancements that are detailed in Appendix E Section 6.1 (ASBS 24 Compliance Plan). This includes an Infrastructure Priority Re-Evaluation Program to determine if increased cleaning may be appropriate to meet the requirements of the ASBS Special Protections and General Exception or to provide a streamlined, efficient and effective implementation program for ASBS 24. Final implementation of programs determined to be feasible and effective will be subject to City Council approval.
	Require trash management at public events	X			X			X	
	Place and maintain trash receptacles/capture devices at newly identified high trash generating areas	X			X			X	
	Label storm drains	X			X				
	Inspect storm drain labels prior to each wet season	X			X				
	Record and re-label illegible storm drain labels within 180 days of inspection	X			X				
	Post signs at access points to water bodies (open channels, creeks; lakes)	X			X	X	X	X	
	Install trash excluders on catch basins or outfalls in areas defined as Priority A, or implement substantially equivalent BMPs in areas not otherwise subject to the SMB/MCW Trash TMDL.	X			X				
	Inspect and Remove trash and debris from open channels and other drainage structures 1x/yr before rainy season.	X			X			X	
	Eliminate discharge of contaminants during MS4 maintenance	X			X	X	X	X	
	Implement controls to limit infiltration of seepage from sanitary sewers to the storm drains			X					Due to lack of municipal sanitary sewer in the majority of the NSMBCW EWMP Area, the MCM will be implemented where applicable; otherwise, controls will be implemented to limit sewage discharges from OWTS to the MS4 by maintaining a Septic System Management Plan and Comprehensive Onsite Wastewater Treatment System Inspection and Operating Permit Program.
	Implement routine preventative maintenance for both systems, survey sanitary sewer and MS4. May use SSO General WDR to fulfill this requirement.			X	X	X	X	X	Due to lack of municipal sanitary sewer in the majority of the NSMBCW EWMP Area, the MCM will be implemented where applicable; otherwise, controls will be implemented to limit sewage discharges from OWTS to the MS4 by maintaining a Septic System Management Plan and Comprehensive Onsite Wastewater Treatment System Inspection and Operating Permit Program.
	Implement inspection and maintenance program for Permittee owned BMPs	X			X	X	X	X	
	Manage residual water in treatment control BMPs removed during maintenance	X				X	X	X	
	Street sweeping - Priority A: 2x/mo; B: 1x/mo; C: as needed, not less than 1x/yr		X		X	X	X	X	The current street sweeping program in the City of Malibu includes sweeping of all City streets monthly (even Priority C streets) and PCH weekly. Vacuum trucks will be used, where feasible. Malibu will assess the feasibility and effectiveness of additional program enhancements that are detailed in Appendix E Section 6.1 (ASBS 24 Compliance Plan). This includes Equipment Upgrades, Increased Sweeping Frequency, and an Infrastructure Priority Re-Evaluation Program to determine if increased cleaning may be appropriate. Final implementation of programs determined to be feasible and effective will be subject to City Council approval.

MCM	2012 Permit Requirement	Implementation			Water Quality Priority Pollutants				Comments
		As-is	Enhanced	Modified	Trash	Nutrients	Lead	Bacteria	
	Implement road construction maintenance BMPs (e.g., restrict paving activity to exclude periods of rain)	X				X	X	X	
	Inspect and/or clean Permittee owned parking lots 2x/mo		X		X			X	The County has implemented an aggressive street sweeping program at County Beach parking lots by sweeping three to four times per week with enhanced sweeping equipment.
	Train employees and contractors on stormwater requirements	X			X	X		X	
	Train employees and contractors on pesticide use	X							
VI.D.10 Illicit Connections and Illicit Discharges (IC/ID) Elimination									
	Continue to implement IC/ID program	X			X	X	X	X	
	Devcelop written procedures for conducting investigations and eliminations	X			X	X	X	X	
	Initiate investigations within 72 hours from becoming aware of the discharge	X			X	X	X	X	
	Implement solutions to eliminate discharge; conduct follow-up investigation to verify elimination; follow Progressive Enforcement Plan (see D.2)	X			X	X	X	X	
	When discharge originates upstream of jurisdiction, notify the upstream jurisdiction and Regional Board within 30 days	X			X	X	X	X	
	Initiate investigations within 21 days of reported or discovered illicit connections	X			X	X	X	X	
	Eliminate illicit connections within 180 days of completion of source investigation. If an illicit connection is determined to only discharge allowed stormwater or non-stormwater discharges, document the connection.	X			X	X	X	X	
	Establish a hotline to facilitate public reporting of IC/ID	X			X	X	X	X	
	Install signage adjacent to open channels providing public information on how to report IC/ID			X	X	X	X	X	Signage will be implemented in prioritized areas where the NSMBCW EWMP Group has local jurisdiction or land control. This will allow the program to be focused on water quality priorities, and to limit signage requirements to enforceable locations.
	Document calls and actions associated with hotline	X			X	X	X	X	
	Implement procedures for responding to complaints; evaluate and update procedures, as needed	X			X	X	X	X	
	Implement a spill response plan	X			X	X	X	X	
	Train staff and contractors on IC/ID	X			X	X	X	X	
	Create a list of positions and contractors that require ID/IC training	X			X	X	X	X	
	ASBS Compliance - Potential Nonstructural Programs								
	Architectural Copper and Metal Building Material Mitigation Program		X				X		Malibu will assess the feasibility and effectiveness of additional program enhancements that are detailed in Appendix E Section 6.1 (ASBS 24 Compliance Plan). These enhancements include the Architectural Copper and Metal Building Material Mitigation Program which would offer rebates for architectural copper and zinc mitigation measures. Potential mitigation measures may include: application of sacrificial paint, downspout diversions, rain barrels and cisterns. Final implementation of programs determined to be feasible and effective will be subject to City Council approval.
	Architectural Copper Ban		X						Malibu will assess the feasibility and effectiveness of additional program enhancements that are detailed in Appendix E Section 6.1 (ASBS 24 Compliance Plan). These enhancements include the Architectural Copper Ban which would prohibit use of architectural copper for all new developments and re-development projects, especially for buildings and facilities along the ASBS and PCH. Final implementation of programs determined to be feasible and effective will be subject to City Council approval.
	Zinc Alternative Building Material Ordinance		X						Malibu will assess the feasibility and effectiveness of additional program enhancements that are detailed in Appendix E Section 6.1 (ASBS 24 Compliance Plan). These enhancements include the Zinc Alternative Building Material Ordinance which would eliminate, reduce, mitigate or control the use of zinc building materials, based upon the findings of a feasibility analysis and stakeholder engagement process. Final implementation of programs determined to be feasible and effective will be subject to City Council approval.

APPENDIX E

ASBS 24 Compliance Plan

Area of Special Biological Significance 24
Draft Compliance Plan For
The County of Los Angeles and City of Malibu

Submitted to:

State Water Resources Control Board
Division of Water Quality
P.O. Box 100
Sacramento, California 95812-0100

Submitted by:

County of Los Angeles
Chief Executive Office
Kenneth Hahn Hall of Administration
500 W. Temple Street
Los Angeles, California 90012

City of Malibu
23825 Stuart Ranch Road
Malibu, California 90265-4861

September 20, 2014

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EXECUTIVE SUMMARY

Background

The Laguna Point to Latigo Point Area of Special Biological Significance (ASBS), also referred to as ASBS 24, was established in 1974 by the State Board to preserve sensitive marine habitat (SWRCB, 1979). It stretches 24 miles, contains 11,842 marine acres, and is the largest ASBS along the mainland of Southern California. A wide range of sandy substrate, rocky reef, and coastal pelagic species can be found within ASBS 24. Figure ES-1 shows a small portion of ASBS 24 east of Point Dume.

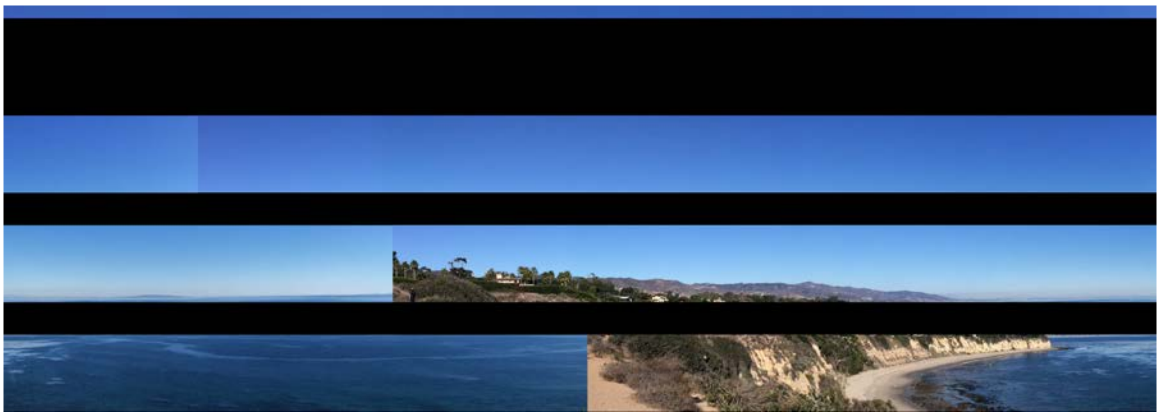

Figure ES-1. ASBS 24 Looking East Across Dume Cove

Since 1983, the California Ocean Plan (Ocean Plan) has prohibited the discharge of waste into ASBS along the California Coast, unless the State Water Resources Control Board (State Board) grants an exception to dischargers. The southern and central portions of ASBS 24 that are located in Los Angeles County (County) are subject to direct discharges from roads, landscape runoff, homes, and small businesses. In general, the near-coast storm water runoff along ASBS 24 within the County is conveyed through storm drain systems and / or natural drainage courses before it is discharged at multiple locations along the beach. In 2004, the City of Malibu (City), County of Los Angeles, and the Los Angeles County Flood Control District (District) requested exceptions for storm water discharges to ASBS 24 from the State Board. The State Board received requests from numerous other applicants for an exception to the Ocean Plan. In 2012, the State Board adopted a General Exception.

The General Exception includes Special Protections which specify prohibited discharges and other requirements that dischargers covered under the General Exception must comply with. The County, the District, and the City were included in the list of responsible entities required to prepare a Draft and Final ASBS Compliance Plan for point source discharges of storm water in ASBS 24. This Compliance Plan has been prepared by the County, District, and City (collectively the Parties) in accordance with the General Exception

Point Source Discharge Locations (Outfalls Equal to and Greater Than 18 Inches)

Los Angeles County Department of Public Works (LACDPW) has identified 12 storm drain outfalls having a diameter equal to or greater than 18 inches that drain to ASBS 24 and are owned and maintained by the County. Nine storm drain outfalls that have a diameter greater than or equal to 18 inches and drain to ASBS 24 are owned and maintained by the District. These nine outfalls occur along Broad Beach and Escondido Beach and convey runoff from upstream neighborhoods. The City identified eight storm drain outfalls that are privately owned and maintained and have diameters equal to or greater than 18 inches. These storm drains convey runoff from City owned and maintained inlets on Broad Beach Road and Wildlife Road to the storm drain outfalls located along Broad Beach and the seaside cliffs of Point Dume. An additional 10 storm drain outfalls are currently of undetermined ownership. These storm drains with undetermined ownership convey flow from the Pacific Coast Highway, and upstream neighborhoods. These 39 storm drain outfalls are considered point source discharges of storm water to ASBS 24. Figure ES-2 shows the locations of point source discharges along the County shoreline of ASBS-24. The Compliance Plan Map is included in the Appendix A.

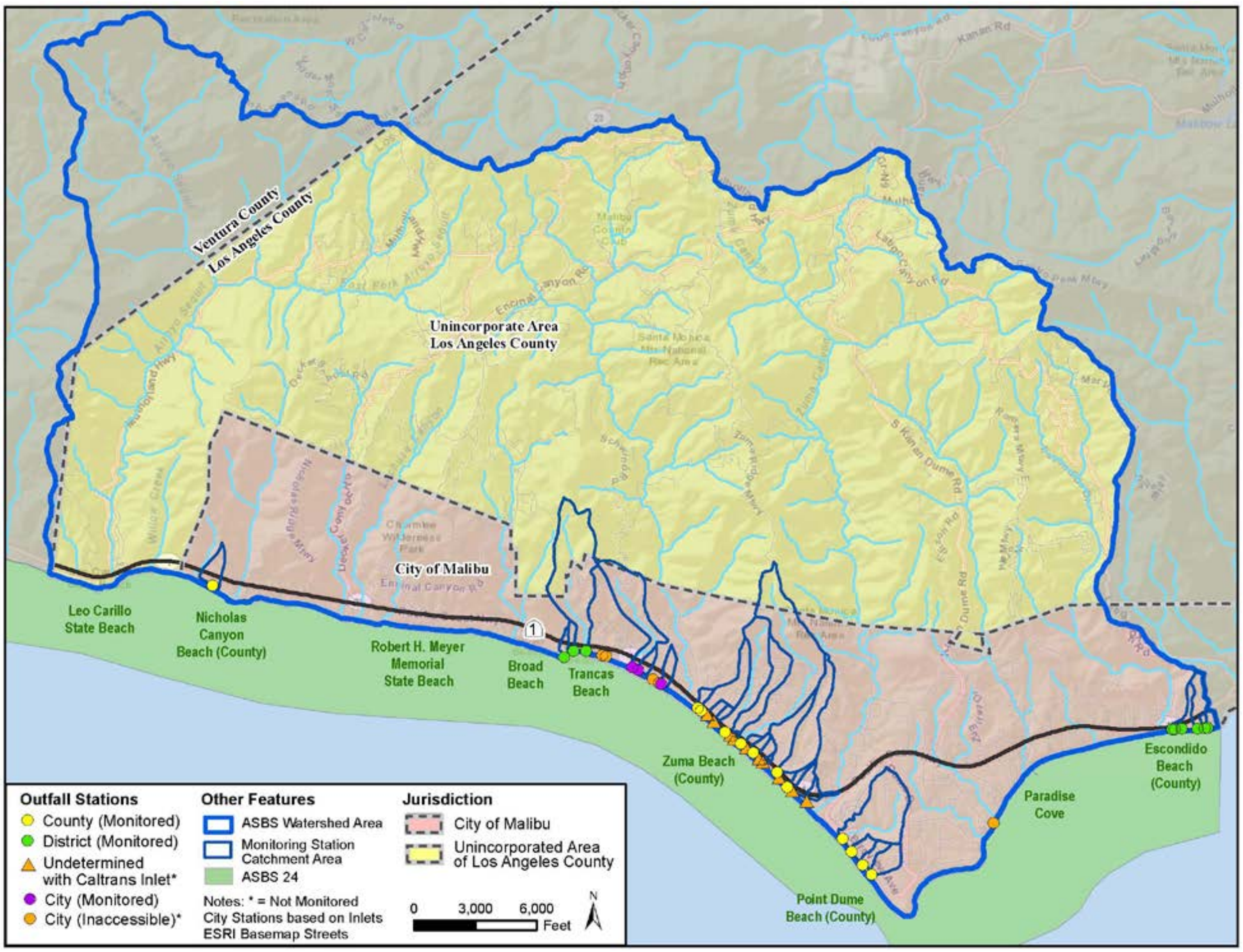

Figure ES-2. ASBS-24 Point Source Discharge Locations

Compliance Plan Map

A Compliance Plan Map for the ASBS 24 watershed area has been created and can be updated using Environmental Systems Research Institute (ESRI) ArcMap 10 and is provided in Appendix A. This map shows storm water conveyances and other storm drain features associated with surface drainage of storm water runoff, including catch basins, inlets/outlets, outfalls, storm drain lines, channels, and creeks. The map identifies core monitoring stations and shows the location of other outfalls equal to or greater than 18 inches that are private, state, or federal and not monitored by the Parties. Drainage areas for the core monitoring stations, watershed sub-basins and flow directions within these sub-basins are depicted, as well as the overall ASBS 24 watershed area. The map includes the locations of waste and hazardous material storage areas, sewage conveyances and treatment facilities, landslide zones, and roads. Jurisdictional boundaries for the unincorporated area of the County, the City, and state and federal lands within these areas are shown. This Plan provides information regarding the Compliance Plan Map datasets and the procedures for updating applicable GIS files and the map.

Dry Weather Requirement

The General Exception prohibits all non-authorized non-storm water (dry weather) discharges into the ASBS. Dry weather runoff is any runoff that is not the result of a precipitation event. This is also referred to as “non-storm water discharges” (SWRCB, 2012a). The Parties have implemented nonstructural measures that are designed to eliminate non-authorized, non-storm water runoff. These measures include public information and participation programs (PIPPs), operations and maintenance (O&M) programs, and enforcement programs. A list of existing programs with brief descriptions is provided in Appendix B.

Dry weather monitoring of outfalls has been performed to ensure compliance with the requirements of the General Exception. A summary of these outfall inspections for 2012 and 2013 is provided within the main body of the Plan on Table 3-3 and Table 3-4, respectively. Of the inspected outfalls, only ASBS-002 had flow reaching the surf, and this occurred only once out of the 13 times in 2012 and once out of the three times in 2013. Subsequent inspections performed in March and May, 2013, at ASBS-002 indicated that flow was not present. Some other outfalls were observed with flows or ponded water; however, due to the distances between the outfalls and the surf zones, these flows did not reach the surf zones. Inspections will continue to ensure that discharges of non-storm, non-authorized runoff do not occur.

Receiving Water Assessment

In 2008, a study was conducted as part of Bight 2008 to assess water quality in southern California ASBS (Schiff et al., 2011). The study was designed to evaluate the range of natural water quality near reference drainage locations and to compare water quality near ASBS discharges to these natural water quality conditions. The 2008 study provided initial estimates of reference thresholds, set at 85th percentile, based on data collected at reference sites. As part of the Bight 2013 Regional Monitoring Program, additional reference monitoring was performed under the Regional Monitoring Program, and the 85th percentile reference thresholds were revised.

Wet weather monitoring was performed by LACDPW at two receiving water locations: 1) S01, located off Zuma Beach directly out from ASBS-016, a 60-inch storm drain; and 2) S02, located off Escondido Beach directly out from ASBS-028, a 36-inch storm drain. The City performed monitoring at receiving water Site 24-BB-03R. For safety reasons this site was only sampled once. Therefore, the assessment of compliance with natural water quality was primarily performed for receiving water station S02, which had samples collected during three wet weather events. Receiving water station S02 is associated with ASBS-028, which is a 36-inch outfall that drains a mixture of developed and vacant land. Receiving water station S02 is considered to be representative of the typical to worst case scenario of the potential impact that storm water runoff may have on the water quality within the ASBS. The receiving water quality assessment is presented in Section 4.0, and a summary of the assessment is presented below.

In samples collected in the receiving water (Site S02), selenium, mercury, and total polynuclear aromatic hydrocarbons (PAHs) concentrations were above the 85^{th} percentile reference threshold and had post-storm concentrations that exceeded those of the pre-storm samples collected during two consecutive monitored storm events. Based on the guidance found in Attachment 1 of the General Exception, this indicates an exceedance of natural water quality in the ASBS for these constituents.

Receiving water samples collected (Site S02) during one event, but not in subsequent events, that had concentrations above both the 85^{th} percentile threshold and pre-storm concentrations include pyrethroids, nitrate as N, copper, lead, and zinc. These constituents do not meet the guidance criteria and are not considered an exceedance of the natural water quality in the ASBS.

During the three monitored events flow from ASBS-016 only reach the receiving water once at Site S01 and thus, receiving water chemistry data was only obtained once at S01 as part of the General Exception monitoring. Mercury, silver, zinc, and total PAHs concentrations in the receiving water were greater than both the 85^{th} percentile threshold and pre-storm concentrations for Site S01. Receiving water concentrations above both the 85^{th} percentile thresholds and pre-storm concentrations occurring during only one event is not considered to be an exceedance of natural water quality.

Pre-storm and post-storm samples were collected and analyzed at Site 24-BB-03R for only one event. The selenium concentration in the receiving water was greater than both the 85^{th} percentile threshold and pre-storm concentrations (see Table 4-3). The concentration of selenium being above the 85^{th} percentile threshold and pre-storm concentrations in one event is not considered an exceedance of natural water quality at Site 24-BB-03R. However, the selenium result at Site 24-BB-03R is consistent with the results at Site S02 where selenium is considered to be an exceedance of natural water quality based on first and second event results.

Pollution Loading Reduction Assessment

The General Exception states that the ASBS Compliance Plan shall describe how the necessary pollutant reductions in storm water runoff will be achieved through prioritization of outfalls and implementation of BMPs to achieve end-of-pipe pollutant concentrations targets during a design storm to below either the Table 1 Instantaneous Maximum Water Quality Objectives (WQOs) in Chapter II of the Ocean Plan or a 90% reduction in pollutant loading during storm events for the applicant's total discharge. Constituents that are currently in exceedance of the natural water quality threshold of the ASBS, and that also have an associated Ocean Plan Table 1 Instantaneous Maximum WQO value (mercury and selenium), were compared with the Table 1 Instantaneous Maximum WQOs in order to determine the appropriate pollutant load reduction in accordance with the General Exception.

Monitoring Results

Chemistry results obtained from monitoring outfall discharges to ASBS 24 are presented in the main body of the Plan in Table 5-1 through Table 5-3, respectively. The Ocean Plan Table 1 Instantaneous Maximum WQOs for mercury and selenium are 0.4 µg/L and 150 µg/L, respectively. The Ocean Plan Table 1 does not list Instantaneous Maximum WQOs for PAHs. During the three monitored events the sampling results were all below these Ocean Plan Table 1 Instantaneous Maximum values. A summary of the highest measured values in comparison with the Ocean Plan Table 1 Instantaneous Maximum values as well as other Ocean Plan Table 1 WQOs is provided on Table ES-1.

Table ES-1. Summary of Ocean Plan WQOs Comparison to Maximum Outfall Results

	Ocean Plan Table 1 Values (Receiving Water Mixing Zone)			Maximum Measured Value (in Outfall Prior to Mixing Zone)		
Parameter	**6-Month Median**	**Daily Maximum**	**Instantaneous Maximum**	**February 2013, Event 1**	**March 2013, Event 2**	**February 2014, Event 3**
Mercury	0.04	0.16	0.4	0.16	0.06	<0.0012
Selenium	15	60	150	0.79	1.0	5.1

Outfall Assessment Conclusions

Following the guidance found in the Special Protections an assessment of outfalls was performed to determine where structural controls may be required to achieve the specified pollutant loading limitations on point source discharges into ASBS 24. The outfall assessment included comparing the mercury and selenium monitoring data results obtained to Ocean Plan Table 1 Instantaneous Maximum WQOs. The Ocean Plan Table 1 does list Instantaneous Maximum values for the protection of marine aquatic life for total PAHs. (The Ocean Plan Table 1 only lists a 30-day Average PAHs WQO for the protection of human health.) As shown in Table ES-1 the results of the comparison indicated the discharges to the ASBS from point sources (outfalls) are currently achieving, and significantly below, the target levels. Therefore, based on available data, the outfalls being evaluated in this Plan under the Regional Monitoring Program are currently not considered priority outfalls, and in accordance with the Special Protections of the General Exception, additional controls (e.g., BMPs) to achieve pollutant load reductions are not required in the tributary drainage areas to the Parties' outfalls.

Anthropogenic Sedimentation Assessment

In accordance with the requirements of the General Exception, the natural habitat conditions in the ASBS shall not be altered as a result of anthropogenic sedimentation (SWRCB, 2012a). An assessment of the potential areas prone to anthropogenic sedimentation was performed as part of this Compliance Plan for the purpose of identifying areas where sediment control BMPs may be required. The general assessment process included first performing a desktop analysis of geological conditions, topography, land use, and aerial imagery for the applicable area. Next, a reconnaissance of the area was performed to verify desktop findings and further analyze the drainage areas. Finally, the desktop and reconnaissance data collected were then complied into this Plan.

Geologic processes, beginning as far back as 80 million years, created the sedimentary formations predominantly found along the coast shoreline and Point Dume upland mesa area, which include siltstone and sandstone. Approximately 16 million years ago, seismic actively began and continued for 3 million years to form the Santa Monica Mountains, which are composed of a combination of sedimentary and igneous rock formations (City, 1995). Land use zoning and development have occurred predominantly along the coast within the flatter areas at lower elevations. Some development has occurred inland within the Santa Monica Mountains, but for the most part, development in the mountainous areas of the ASBS 24 watershed has been restricted due to the conservation of the area at the federal, state, and local levels.

The desktop analysis included determining the general sediment risk for the area based on the procedures outlined in the Construction General Permit. These procedures included determining the rainfall erosivity (R factor), which is based on data collected over several years to determine the annual storm kinetic energy, on average, for the area. That factor, combined with properties of common soils and various slopes (up to 50%) and heights (up to 50 ft.), were used to determine the potential annual disturbed loose soil areas within the watershed. Calculation results indicated that the potential for soil loss within disturbed areas increases rapidly for areas having slopes greater than 10% and heights greater than a few feet. These results were used during the field reconnaissance to aid in determining if areas have the potential to contribute anthropogenic sedimentation to ASBS 24.

Field reconnaissance was performed with a focus on the areas that drain to the identified outfalls that discharge to ASBS 24. In general, the drainage areas primarily consisted of larger lots (0.25 to approximately 1 acre) with existing residential structures, hardscape improvements, and landscaping. Landscape vegetation of sloped areas within developed areas, including residential properties and roadway rights-of-way, were observed to have fairly good cover. No signs of erosion as a result of manmade improvements (e.g., rills, gullies caused by runoff from impervious surfaces) were observed in sloped areas, alongside secondary roads, or the PCH.

The sedimentation assessment indicates that currently there are no areas prone to anthropogenic sedimentation within the drainage areas to the identified outfalls that discharge to ASBS 24. Land use in the drainage areas consists predominantly of residential and vacant (open space) designations with associated roadway connections. The sloped areas associated with residential properties were observed to have good vegetation cover and appeared to be regularly maintained by landscaping professionals (see Figure 7-9). Areas where cuts (excavation) were made during the construction of roadways were observed to have either good vegetation cover that has been maintained by responsible property owners or consist of hard coastal bluff materials resistant to erosive forces (e.g., large bluff along the southeast portion of Zuma County Beach, as shown on Figure 7-11). Therefore, at this time, no additional sediment BMPs are required by this plan.

Conclusions

The assessments performed in the preparation of this Compliance Plan indicate that no additional structural controls (BMPs) are required based on the guidance presented within the Special

Protections. However, the Parties recognize that the ABSB 24 is one of most valued resources in the region and that wherever possible and feasible additional reductions in pollutant loading should be achieved. Accordingly, various existing nonstructural programs will continue to be implemented in order to maintain compliance with the requirements of the Special Protections and possibly achieve further reductions in pollutant loading. The Parties are considering implementing additional nonstructural controls and enhancements to existing controls for the purpose of further reducing pollutant loading to the ASBS. Additionally, proposed structural BMPs are currently in the construction phase for the areas of Broad Beach Road and Wildlife Road.

Cost Estimate

The Parties have implemented numerous nonstructural controls and related programs in order to eliminate non-storm water, non-authorized discharges to ASBS 24. The Parties continue to maintain these measures, and the annual estimated costs associated with the key programs, which are detailed in Section 3.0, are provided on Table ES-2. Appendix B contains a list along with brief descriptions of various existing nonstructural measures implemented by the Parties.

Structural controls are being proposed and currently in the planning and permitting phase for the areas of Broad Bead Road and Wildlife Road. These structural controls will provide additional pollutant loading into the ASBS but are not directly connected the Compliance Plan (i.e., not a result of the assessments performed for this document and not a requirement of this document). The costs for these structural controls are not included on Table ES-2. More information on these structural controls, included estimated costs, is included in Appendix C.

Table ES-2. Annual Nonstructural Programs Costs

Program Type	Approximate Cost ($/year)
PIPP Subtotal	$228,407
O&M Subtotal	$1,182,500
Enforcement Subtotal	$106,057
Total	$1,516,964

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Ag	Silver
AMSL	above mean sea level
As	arsenic
ASBS	Areas of Special Biological Significance
Bight	Southern California Bight Regional Monitoring Program
Bight 2008	Southern California Bight 2008 Regional Monitoring Program
Bight 2013	Southern California Bight 2013 Regional Monitoring Program
BMP	best management practice
CA	California
Caltrans	California Department of Transportation
Cd	cadmium
City	City of Malibu
Committee	Bight 2013 ASBS Planning Committee
County	County of Los Angeles
CPS	Coastal Preservation Specialist
Cr	chromium
Cu	copper
District	Los Angeles County Flood Control District
EI	Erosivity Index
EMAP	Monitoring & Assessment Program
EPPP	Environmentally Preferable Purchases and Practices Policy
ESRI	Environmental Systems Research Institute
ft.	feet
GIS	Geographic Information System
Hg	mercury
HSPF	Hydrologic Simulation Program–FORTRAN
Hydrology Manual	Los Angeles County Hydrology Manual
IC/ID	Illicit Connection/Illicit Discharge
in.	inches
LACDPW	Los Angeles County Department of Public Works
LACoMAX	Los Angeles County Materials Exchange
LAWQCB	Los Angeles Regional Water Quality Control Board
LIEP	Landscape Irrigation Efficiency Program
LSPC	Loading Simulation Program C++
LSWPPP	Local Storm Water Pollution Prevention Plan
LUP	Land Use Plan
m	meter
MACC	Malibu Area Conservation Coalition
mg/L	milligram per liter
MS4	municipal separate storm sewer system
N	nitrogen
Ni	nickel
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
O&M	Operations and Maintenance

Ocean Plan	California Ocean Plan
OFG	Ocean Friendly Garden
P	phosphorus
PAH	polynuclear aromatic hydrocarbons
Parties	LACDPW, District, and City
Pb	lead
PCH	Pacific Coast Highway
PIPP	public information and participation program
Plan	Compliance Plan
POTFW	wash-off potency factor
RCPP	Recycled Products Purchasing Policy
RGO	retail gasoline outlets
RMD	Road Maintenance Division
ROW	Right-of-way
SCAG	Southern California Association of Governments
SCCWRP	Southern California Coastal Water Research Project
Se	selenium
State Board	State Water Resources Control Board
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	California State Water Resources Control Board
T.H.	townhouse
Tc	time of concentration
TMDL	total maximum daily load
TN	total nitrogen
TP	total phosphorus
TSS	total suspended solids
USEPA	United States Environmental Protection Agency
USLE	Universal Soil Loss Equation
WDID	Waste Discharge Identification Number
Weston	Weston Solutions, Inc.
WMMS	Watershed Management Modeling System
WQOs	water quality objectives
WWECP	Wet Weather Erosion Control Plan
Zn	zinc
μg/L	microgram per liter

1.0 INTRODUCTION

In 1974 and 1975, the California State Water Resources Control Board (SWRCB) designated 34 coastal areas in California as Areas of Biological Significance (ASBS). The ASBSs are ocean areas requiring protection of species or biological communities to the extent that alteration of natural water quality is undesirable. One of these ASBS, known as ASBS 24, is located along 24 miles of the Ventura and Los Angeles County coastline, from Laguna Point to Latigo Point (SWRCB, 1979).

The California Ocean Plan (Ocean Plan) prohibition on discharges of waste to ASBS has been in place since 1983. The SWRCB may grant exceptions to this prohibition if the exception will not compromise the protection of ocean waters for beneficial uses and the public interest will be served (SWRCB, 2012a). On March 20, 2012, the SWRCB adopted a General Exception to the Ocean Plan ASBS waste discharge prohibition. The General Exception was amended and adopted as Resolution 2012-0031 on June 19, 2012 (SWRCB, 2012b).

The General Exception includes Special Protections that dischargers covered under the General Exception must comply with. For ASBS 24, the County of Los Angeles (County), the Los Angeles County Flood Control District (District), and the City of Malibu (City) were included in the list of responsible entities required to prepare an ASBS Compliance Plan for point source discharges of storm water and a Pollution Prevention Plan for non-point source waste discharges by September 30, 2013. An extension of one year was granted due to the lack of rainfall and water quality monitoring opportunities. This Compliance Plan has been prepared by the County, District, and City (the Parties) as specified in the General Exception. The Pollution Prevention Plan has been prepared under a separate cover.

1.1 Compliance Plan Objective and Scope

This Compliance Plan (Plan) documents the existing ASBS and ASBS watershed conditions and policies within the Parties' jurisdiction for the purpose of demonstrating either compliance with the point source discharges of storm water requirements specified in the General Exception Attachment B – *Special Protection for Areas of Special Biological Significance, Governing Point Source Discharges of Storm Water and Nonpoint Source Waste Discharge* (Special Protections), or describing the steps necessary to achieve compliance within the time frame allotted. This Plan focuses on point source discharges, which by this document are defined as outfalls that have associated storm networks that drain significant areas and that are entirely or partially maintained by an agency. Using this definition, point sources identified in this document coincide with conveyances that are equal to or greater than 18 inches in size (diameter or width) that discharge directly to the ASBS shoreline and the Parties maintain the outfall and/or inlets. Potential discharges from smaller pipes and conveyances (not defined as point sources) are defined in the Special Protections as nonpoint sources, and discussed in the Pollution Prevention Plan.

The following tasks associated with point source discharge locations and drainage areas were performed as part of the process to prepare this Plan:

- Preparing a map of the ASBS watershed showing surface drainage of storm water runoff and outfall locations (18 inches or greater in size).
- Preparing procedures to allow for future updates to the Compliance Plan map.
- Evaluations of compliance with the permitted point source discharges of storm water, which includes the prohibition of non-storm water discharges (i.e., discharges not composed entirely of storm water and not specifically allowed in accordance with Special Protections Section I.A.1.e).
- Assessment of the Parties' inspection policies.
- Collection and analysis of water quality samples in accordance with Section IV of the Special Protections.
- Assessment, using water quality sample results, of whether the storm water discharges are altering the natural water quality of the ASBS.
- Assessment of pollutant load reduction targets and outfall prioritization.
- Assessment of potential sources of anthropogenic sedimentation.
- Compilation of assessment and data into this Compliance Plan.
- Description of the nonstructural controls currently employed and planned in the future and implementation schedule

1.2 ASBS 24 Watershed Responsible Agencies

The Laguna Point to Latigo Point ASBS, also referred to as ASBS 24, stretches 24 miles, contains 11,842 marine acres, and is the largest ASBS along the mainland of Southern California. The boundary of ASBS 24 extends out from the mean high tide line at Laguna Point in Ventura County to either 1,000 ft. from shore or to the 100-ft isobath (whichever is greater) in a southwesterly direction to Latigo Point in Malibu, Los Angeles County.

This Plan includes the applicable drainage areas and point discharges that are the Parties' purview. These include the areas of the unincorporated County and City of Malibu along the coast south the Los Angeles County boundary and west of Latigo Point. Figure 1-1 shows the overall ASBS watershed within Los Angeles County, along with jurisdictional boundaries. Properties within the ASBS watershed in which the Parties do not have jurisdictional authority and thus are excluded from this Plan include, but are not limited to, federal lands, state parks, and state rights-of-way (see Section 2.1.2 for more information on these excluded properties).

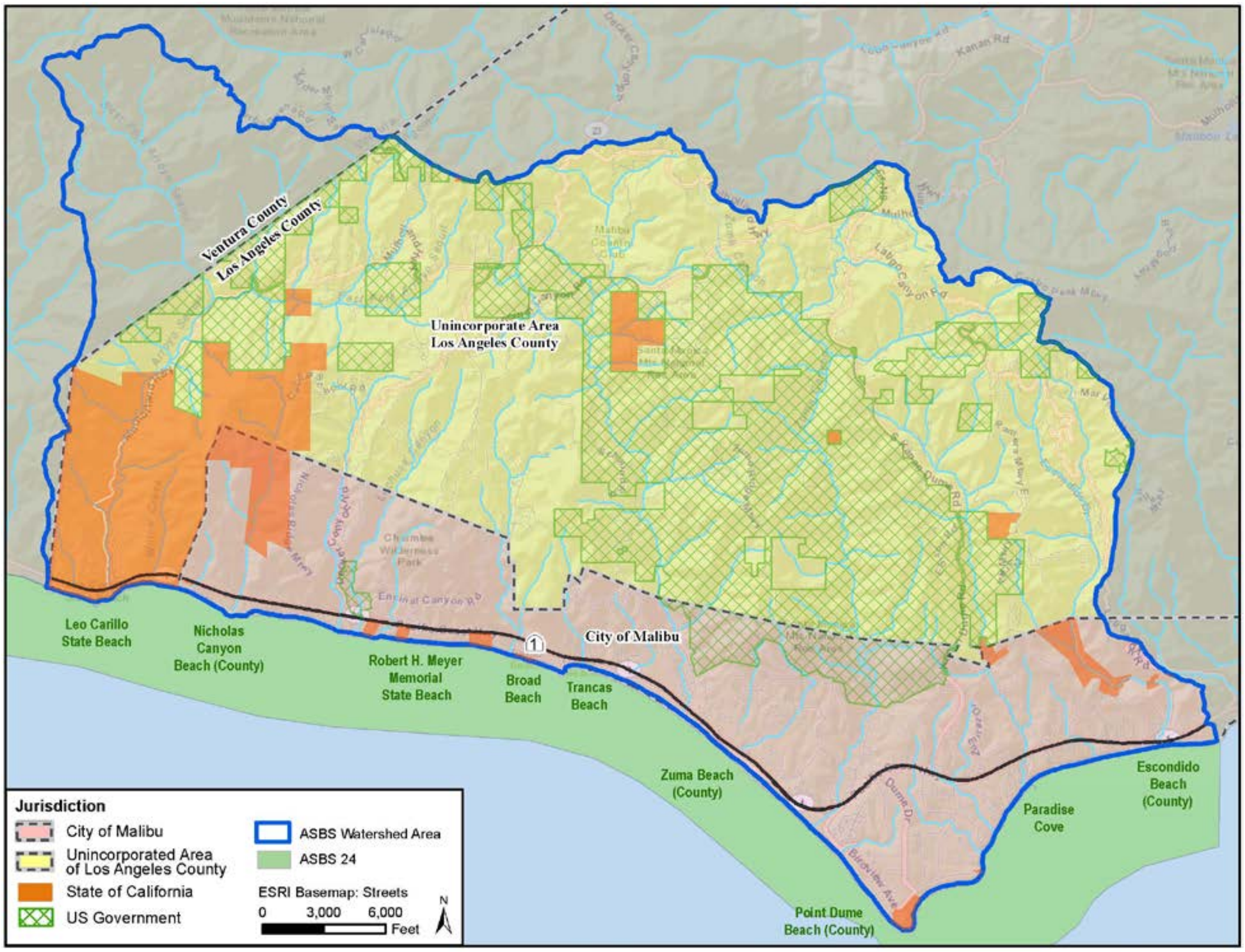

Figure 1-1. ASBS 24 Watershed and Jurisdictional Boundaries

2.0 ASBS 24 WATERSHED

2.1 General Site Conditions and Land Use

2.1.1 Topography

In general, the elevations within the ASBS 24 drainage area vary from sea level to 1,700 ft. above mean sea level (AMSL). Areas within the Santa Monica Mountains, typically north of the Pacific Coast Highway (PCH), contain steep hills, canyons, and valleys that drain to ASBS 24. These mountains consist of steep slopes with a 20% or greater gradient (SWRCB, 1979). Most of the developed areas along the coast lie below 100 ft., with the exception of the Point Dume and Malibu Park areas, which reach an elevation of approximately 500 ft. The hillsides and coastal mesas, such as Big Rock and Las Flores (both on the eastern end of town well outside of the ASBS), have elevations ranging from 300 to 400 ft. AMSL (City, 1995).

North of Broad Beach, extending to the County jurisdictional boundary, the coastal topography consists of narrow beaches adjacent to near-vertical natural bluffs that extend between 50 ft. to 200 ft. above mean sea level (alms). The mesas above the bluffs slope towards the coast at approximately 2% to 10%. The mesas extend inland and merge with the Santa Monica Mountains, which as previously stated are characterized by steep and rugged hillsides and valleys and canyons. The mesas have various valleys and canyons that coincide with the mountain valleys and canyons that provide the area with natural drainage to the ocean.

The area of Broad Beach south to Zuma County Beach is characterized, in general, by gentle seaward sloping natural topography (approximately 2 to 4%) with some near-vertical bluffs located further inland at varying distances from the ocean between approximately 1,000 ft. to 3,500 ft. and similar to those bluffs previously described.

The Point Dume area consists of narrow beaches followed by near vertical bluffs that extend from approximately 200 ft. northwest of the point to approximately 500 ft. northeast of the point. The mesa area above the beach is large and consists of sloping terrain which has formed high and low areas as well as valley and canyons that drain the area to the ocean. This topography continues northeast to approximately Escondido Beach, where the area has an approximately 10% gradient towards Escondido Creek.

South of Escondido Creek, the topography is similar to that of Broad Beach, with an area of gentle seaward sloping terrain along the ocean followed by relatively small inland bluffs and upland sloped areas.

2.1.2 Current Land Use

Land use data within the drainage area to the portion of ASBS 24 located south of the LA-Ventura County jurisdictional boundary were compiled and analyzed using GIS software and available land use data sources, including data provided by the City (2010 data for the City portion) and LACDPW (2008 data for the County portion). Both of these sources use Southern California Association of Governments (SCAG) land use codes. The SCAG classifications were generalized for inclusion into this document and for mapping purposes. Roads were not included in the land use; however, data were filled in with the mapping and analysis software.

Along the coast, the location of the County jurisdictional boundary coincides with a natural high point in the topography, and thus, the drainage area boundary follows the County jurisdiction boundary fairly well for a couple of miles inland. The land use analysis indicated that the overall drainage area to ASBS 24 includes approximately 31,400 acres, of which approximately 28,480 acres are located within the County jurisdictional boundary, and 2,900 acres are located in Ventura County.

The portion of the drainage area located within Ventura County is composed primarily of natural open space, mountainous terrain. The drainage area within the LA County portion is under the jurisdiction of multiple entities, including national parks, state parks, Unincorporated County, City of Malibu and Caltrans. The properties located south of the jurisdictional boundary are within the Unincorporated County and City's jurisdiction. However, several parcels have federal, state, or conservation authority ownership and are designated as National or State Parks. Table 2-1 summarizes land areas associated with the County and City and includes information on federal- and state-owned properties.

Table 2-1. Property Ownership Summary

Ownership	Unincorporated County Area (acres)	City of Malibu Area (acres)	Total (acres)
Federal	7,490	740	8,230
State	2,330	520	2,850
Conservation Authority/Conservancy	300	10	310
Remainder (Non-specified)	10,140	6,950	17,090
Total	**20,260**	**8,220**	**28,480**

The general land use within the drainage area is approximately 86.1% open space public lands; 4.9% low-density residential; 4.8% very-low-density residential; 2.6% medium-density residential; and about 1.6% either low-density commercial, industrial, high-density residential, planned development, high-density commercial, water, urban reserve, and mixed use (SWRCB, 2012c).

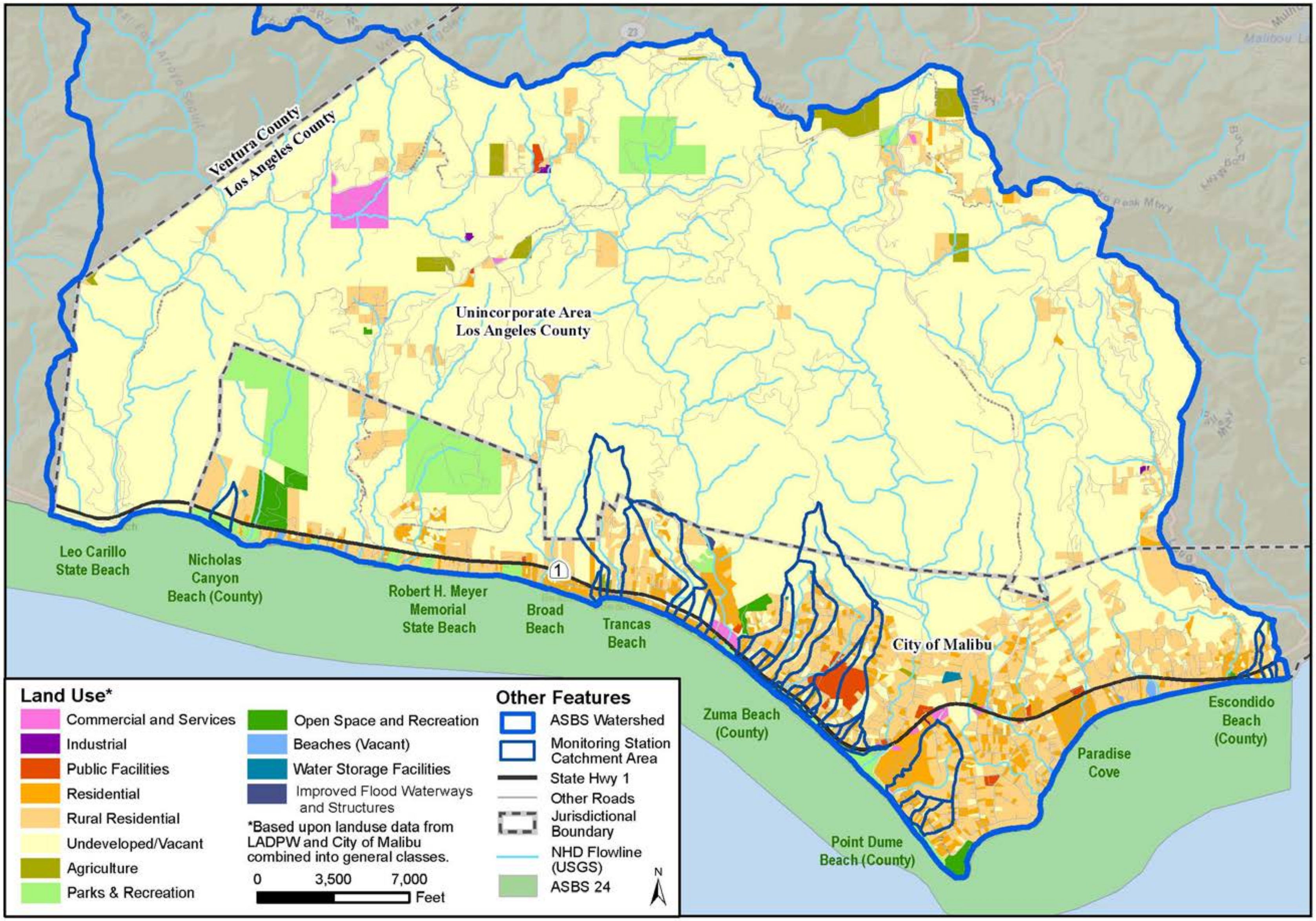

Figure 2-1. ASBS 24 Drainage Area Land Use Map

2.2 Geological Setting

2.2.1 Regional Geology

The ASBS 24 coastal drainage area is composed of an extremely complex geology that has resulted from the geologic uplift which formed the Santa Monica Mountains. The area is located within the northwestern corner of the Los Angeles basin, which lies at the boundary or juncture between two major geomorphic or structural provinces of southern California: 1) the Peninsular Ranges province, consisting primarily of a northwest-oriented structural grain; and 2) the Transverse Ranges structural province, which features a predominantly east-west-oriented structural grain. The Los Angeles structural basin originated roughly 16 million years ago in what is designated the Miocene geologic epoch. However, the Los Angeles basin area, in general, has been a site of continuous sedimentary deposition for at least the past 80 million years. The sedimentary rocks underlying the Santa Monica Mountains in the ASBS 24 drainage area are generally highly folded and complexly faulted (City, 1995).

2.2.2 ASBS 24 Geology

The Malibu Coast fault runs in an east-west alignment within the ASBS 24 drainage area. The fault is a boundary between two very different geologic terranes: to the south, Catalina Schist is overlain by Miocene and younger deposits; and to the north, Santa Monica Slate and plutonic granodiorite is overlain by Upper Cretaceous through upper Miocene deposits (i.e., Santa Monica Mountains) (Yerkes and Campbell, 1979). The fault is aligned in a near east-west direction following the coast line from the County's north jurisdictional boundary east to Lechuza Point. East of Lechuza Point the fault continues in a near east-west alignment to Corral Beach (east of ASBS 24). The fault continues east along the coastline (NPS, 2007). North of the Malibu Coast fault, the local bedrock structure of the Santa Monica Mountains can be modeled as an asymmetric, south-vergent, westward-plunging anticline, including sandstone and siltstone bedrock (e.g., Tuna Canyon Formation, Sespe Formation, Vaqueros Formation, and Topanga Group). South of the Malibu Coast fault, the ductile bedrock units, Trancas and Monterey Formations, contain a high percentage of shales, mudstones, and diatomaceous rocks that exhibit complex folding and pervasive shearing (City, 1995).

The majority of the area along the Malibu coast comprises the Santa Monica Mountains. The portion of the ASBS 24 and uplands areas between Point Mugu, which is north of the County's jurisdictional boundary and La Piedra State Beach, comprise the Santa Monica Mountains formations. North of Point Mugu, the coastal area consists of low-lying land that comprises the Ventura-Oxnard Alluvial Plain. The Malibu Coast fault separates the Santa Monica Mountains from the coastal formations between La Piedra State Beach and Corral Beach. The portion of ASBS 24 between La Piedra State Beach area and the south extents of Broad Beach, south of the Malibu Coast Fault, consists of Malibu Bluff Coast Trancas Formation. The Trancas Formation consists chiefly of sandstone, mudstone, silty shale, and claystone. This formation extends north (upland from the ocean), varying distances between a few hundred feet to a few thousand feet. Southeast of Broad Beach, the ASBS and entire upland coastal area, bound to the north by the Malibu Coast Fault, comprise the Malibu Bluff Coast Monterey/Modelo Formation (SWRCB, 1979). The Monterey Formation consists of marine clay shale and laminated to platy siltstone that are variably diatomaceous, bituminous, phosphatic, siliceous, or cherty, and interbedded altered vitric tuffs and fine- to medium-grained sandstone that locally is schist bearing.

The Malibu bluff coast is triangular with its widest point at Point Dume. This region is structurally the most complex within the ASBS. The rocks are highly folded and steeply dipping so that very different rock types lie next to each other. The western part of this bluff coast from little Sycamore Canyon to Trancas Beach is made up of older Tertiary (Miocene) erosion-resistant rocks of the Trancas Formation. The white cliffs of Paradise Cove are outcrops of the Miocene age Modelo Formation which forms steep inclined bids from Zuma Beach eastward to Corral Beach. This formation is predominantly siliceous shale and was probably formed in the deep sea. The headland at Point Dume is highly resistant igneous breccia which has protected the softer sedimentary shale behind it from erosion. In addition to the Miocene deposits, there is an irregular veneer of Pleistocene marine terrace deposits on the bluff between the ocean and the mountains adjacent to the eastern section of the ASBS. This is a reddish, poorly stratified, and sorted material, which is soft and easily dissected. It tends to form steep-sided stream gullies and sea cliffs (SWRCB, 2008).

The geologic features within the ASBS 24 drainage area are shown in Figure 2-2. Map symbols used along the coastal area were defined using the National Geologic Map Database. Pleistocene marine terrace deposits along the shoreline include the Trancas and Monterey Formations. The symbols used to depict general costal geologic features in Figure 2-2 include the following:

- Qa – Alluvial gravel, sand, and clay of flood plains.
- Qaf – Artificial cut and fill.
- Qao – Older dissected alluvial gravel, sand and clay; on coastal area deposited in part on a wave-cut platform, forms several terraces.
- Qg – Gravel and sand of major stream channels.
- Qls – Landslide debris.
- Qos – Old dune sand at Point Dume.
- Qs – Beach Sand.
- Tr – Trancas Formation composed of marine sandstone, mudstone, silty shale, and claystone.
- Tmt – Modelo/Monterey Formation composed of marine clay shale and laminated to platy siltstone with sandstone.

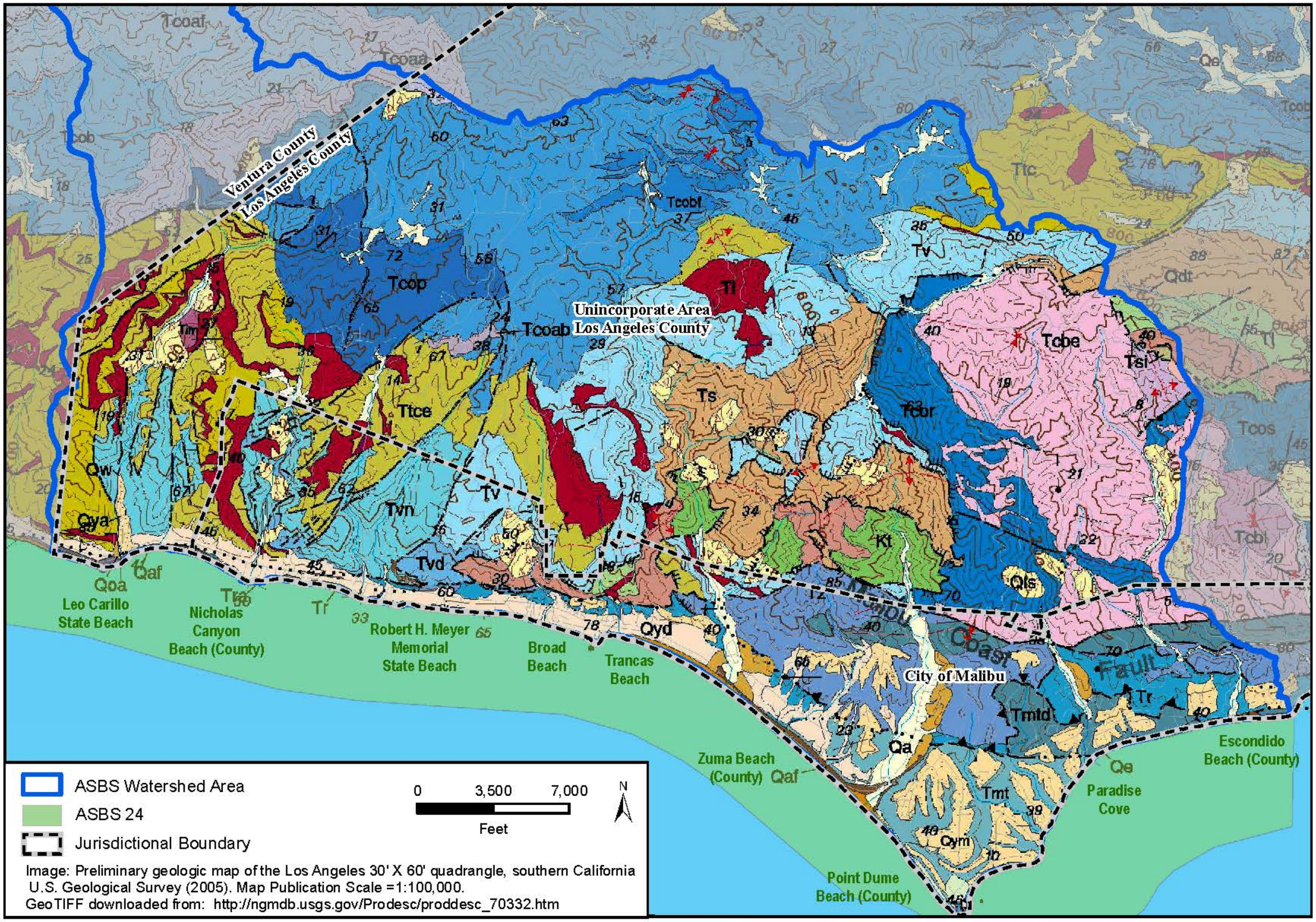

Figure 2-2. Geology Map of Overall ASBS 24 Drainage Area

2.3 Site Hydrology

The Santa Monica Mountains within the ASBS watershed generally slope towards the south to southwest. Except for the lower laying and relatively flat portion of the coast north of Point Dume extending to Broad Beach, the coast is lined with a steep bluff area that varies in height. Slopes along the coast above the bluff are gentle to moderate, with gradients typically between 2% and 20%. Inland, the watershed consists of much steeper terrain (typically 3:1 or steeper) covered with native coastal vegetation.

The Santa Monica Mountains have formed various peaks and valleys that collect runoff into 21 natural streams and gullies that drain to ASBS 24. Outside of this network of natural streams, 39 storm drain outfalls 18 inches in diameter or larger fall under the Parties' responsibility. Typically, the drainage areas to these outfalls consist of open space and/or development. The areas of development primarily include residential properties occupied by single-family dwellings surrounded by maintained landscaping along with associated roadways. The state-maintained PCH with various associated storm drain inlets extends across the length of the watershed near the coastline.

2.4 Monitoring Activities

2.4.1 2013 Regional Monitoring Program

As part of the exception process, LACDPW and the City participated in the Bight 2008 and Bight 2013 ASBS Planning Committee (Committee) with the State Board, the Southern California Coastal Water Research Project (SCCWRP), and other ASBS dischargers in Southern California. Together, the Committee developed a Regional ASBS Work Plan that is based on the Special Protections document. The Regional ASBS Work Plan is intended to provide compliance guidance to applicants of the General Exception in Southern California that wish to participants in the Southern California Bight 2013 Regional Monitoring Program (Bight 2013).

All outfalls that are equal to or greater than 18 inches in diameter are required to be monitored for oil and grease, total suspended solids (TSS), and toxicity, while outfalls that are equal to or greater than 36 inches in diameter are required to be monitored for metals, polynuclear aromatic hydrocarbons (PAHs), pyrethroids, organophosphorus pesticides, and nutrients (ammonia, nitrate, and phosphates) in addition to oil and grease, TSS, and toxicity. Furthermore, each discharger participating in the Regional Monitoring Program is required to monitor one ocean receiving water station which is representative of worst-case discharge conditions (i.e., co-located at a large drain greater than 36 inches, if possible).

As participants in the Bight 2013, LACDPW monitored 21 storm drains along ASBS 24, nine of which are operated by LACFCD, and 12 of which are operated by the County. Additionally, the City of Malibu, which owns storm drain inlets that drain to ASBS 24 via outfalls that are privately owned, monitor three outfalls located along Broad Beach; other private outfalls with City maintained inlets were not proposed to be monitored due to being inaccessible.

The ASBS Special Protections monitoring data used in this document were collected and analyzed during the 2012-2013 and 2013-2014 wet seasons. The monitoring performed complies with the monitoring requirements of the Regional Monitoring Program through the identification of water quality impacts to ASBS 24 during storm events. The Special Protections document describes the following two types of monitoring programs:

1. **Core Discharge Monitoring –** collecting and analyzing wet weather runoff from the discharge of outfalls during a storm event.
2. **Ocean Receiving Water Monitoring –** collecting and analyzing samples from the ocean before and after a storm event at two locations (i.e., directly in front of the discharge and at a reference site removed from the discharge). For the monitoring performed during the 2012-2014 wet weather season, ocean receiving water monitoring at the discharge site was the responsibility of the discharger, while reference station monitoring was performed by SCCWRP.

2.5 ASBS 24 OUTFALL DESCRIPTIONS

A description of the point source outfalls is provided that includes the location, size, ownership, and tributary general land use. LACDPW identified 11 storm drain outfalls having a diameter equal to or greater than 18 inches that drain to ASBS 24 and are owned and maintained by the County. Nine storm drain outfalls that have a diameter greater than or equal to 18 inches and drain to ASBS 24 are owned and maintained by the District. These nine outfalls occur along Broad Beach and Escondido Beach and convey runoff from upstream neighborhoods and PCH. The City identified eight privately owned storm drain outfalls with City maintained inlets that have diameters equal to or greater than 18 inches. These storm drains convey runoff from Broad Beach Road and Wildlife Road to the storm drain outfalls located along Broad Beach and the seaside cliffs of Little Dume Cove. An additional 10 storm drain outfalls are currently of undetermined ownership. These storm drains with undetermined ownership convey flow from PCH and upstream neighborhoods. These 39 storm drain outfalls are considered point source discharges of storm water to ASBS 24 and are described in the following section. Figure 2-3 shows the outfall locations.

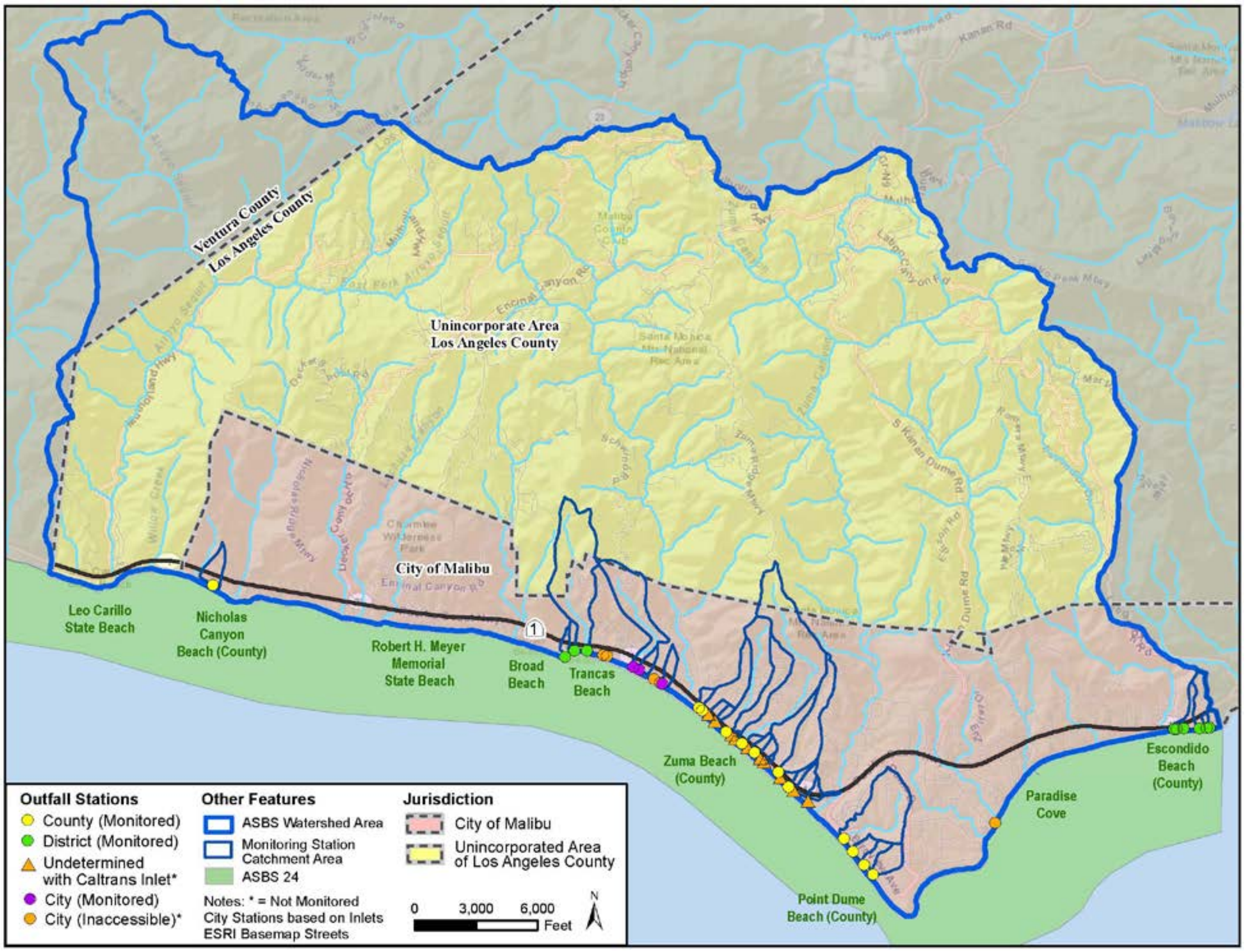

Figure 2-3. ASBS Outfall Location Map

2.5.1 County Outfalls

The 11 outfalls that fall under the jurisdiction of the County are located along Zuma Beach (six outfalls), Westward Beach (four outfalls) and Nicholas Beach (one outfall). The location of each County outfall is provided on Table 2-2 and show in Figure 2-4. A summary, including the diameter, monitoring data collected at each outfall pipe, and the observed flow connection (or absence), is provided on Table 2-3. A description of each outfall is provided in the text following Figure 2-4.

Table 2-2. County Outfall Locations and Diameters

Beach Location	Site Name	Latitude	Longitude	Pipe Diameter (inches)
Zuma Beach	ASBS-004	34.028038	-118.840179	24
	ASBS-005	34.027683	-118.839637	36
	ASBS-008	34.024833	-118.835784	24
	ASBS-011	34.023258	-118.833213	24
	ASBS-013	34.022087	-118.83123	18
	ASBS-016	34.019493	-118.827316	60
	ASBS-018	34.01749	-118.825668	24
Westward Beach	ASBS-021	34.010665	-118.816688	48
	ASBS-022	34.00893	-118.815261	36
	ASBS-023	34.007139	-118.81343	42
	ASBS-024	34.005847	-118.811958	24
Nicholas Beach	ASBS-031	34.043883	-118.918621	22

Table 2-3. County Outfall Diameters, Collected Monitoring Data, and Flow Summary

Beach Location	Site Name	Pipe Diameter (in)	Analyses Performed	Storm Events Analyzed			Did flow reach receiving water?		
				2/19/2013	3/8/2013	2/28/2014	2/19/2013	3/8/2013	2/28/2014
Zuma Beach	ASBS-004	24	TSS, O&G, Bivalve Toxicity	x	x	x	Yes	No	Yes
	ASBS-005	36	Full Chem. List*; Bivalve Toxicity	x	x	x	No	No	Yes
	ASBS-008	24	TSS, O&G, Bivalve Toxicity	Not Monitored	x	Not Monitored	Unknown	No	Unknown
	ASBS-011	24	TSS, O&G, Bivalve Toxicity	x	x	x	No	No	No
	ASBS-013	18	TSS, O&G, Bivalve Toxicity	No Flow	x	x	No	No	No
	ASBS-016**	60	Full Chem. List*; Bivalve Toxicity	No Flow	x	x	No	No	Yes
	ASBS-018	24	TSS, O&G, Bivalve Toxicity	**x**	**x**	**x**	No	No	No
Westward Beach	ASBS-021	48	Full Chem. List*; Bivalve Toxicity	**x**	**x**	**x**	No	Yes	Yes
	ASBS-022	36	Full Chem. List*; Bivalve Toxicity	**x**	**x**	**x**	No	No	Yes
	ASBS-023	42	Full Chem. List*; Bivalve Toxicity	**x**	**x**	**x**	No	No	No
	ASBS-024	24	TSS, O&G, Bivalve Toxicity	**x**	**x**	**x**	No	No	Yes
Nicholas Beach	ASBS-031	22	TSS, O&G, Bivalve Toxicity	**No Flow**	**No Flow**	**No Flow**	No	No	No
Ocean Receiving Water	S01	n/a	Full Chem. List*; Kelp, Bivalve, and Echinoderm Toxicity	No Flow to ocean from ASBS-016	No Flow to ocean from ASBS-016		Not Applicable		

*Full chemistry list= TSS, oil and grease, metals, PAHs, pyrethroids, OP pesticides, ammonia, nitrate and total phosphorus.

* *Flow monitoring equipment installed in this outfall pipe.

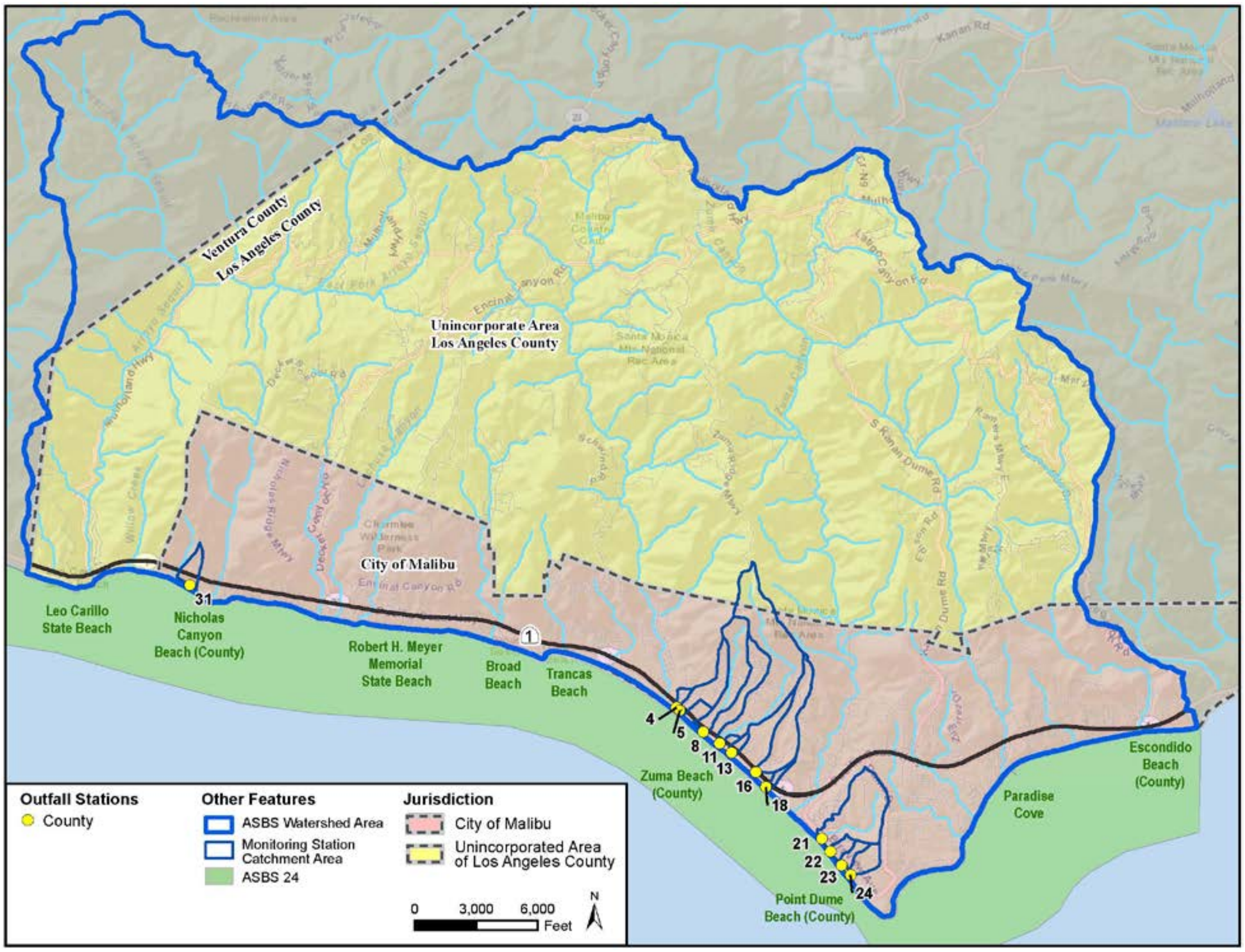

Figure 2-4. County ASBS Outfall Location Map

Zuma Beach Outfalls

ASBS-004 is a 24-inch outfall located at the northern end of Zuma Beach, adjacent to the northernmost parking lot along Zuma Beach Access Road (Figure 2-5). This outfall is accessible during all tides and was sampled during three monitored storm events (February 19 and March 8, 2013 and February 28, 2014). The watershed draining to ASBS-004 is 9.8 acres in size and the surrounding landscape at ASBS-004 consists of a gradually sloping, broad sandy beach.

Figure 2-5. ASBS-004 Outfall

ASBS-005 is a 36-inch outfall located at the northern end of Zuma Beach, adjacent to the northernmost parking lot along Zuma Beach Access Road, and directly across from the intersection of Guernsey Avenue with PCH (Figure 2-6). This outfall is accessible during all tides and was sampled during the February 19, March 8, 2013, and February 28, 2014, storm events. The watershed draining to ASBS-005 is 65.8 acres in size and the surrounding landscape at ASBS-005 consists of a gradually sloping, broad sandy beach.

Figure 2-6. ASBS-005 Outfall

ASBS-008 is a 24-inch outfall located at the northern end of Zuma Beach, near a parking lot along Zuma Beach Access Road (Figure 2-7). This outfall is accessible during all tides and was sampled during the March 8, 2013, storm event (it was added to the list of monitored sites following the February 19, 2013, storm event). The watershed draining to ASBS-008 is 114.8 acres in size and the surrounding landscape at ASBS-008 consists of a gradually sloping, broad sandy beach.

Figure 2-7. ASBS-008 Outfall

ASBS-011 is a 24-inch outfall located in middle portion of Zuma Beach, adjacent to a parking lot along Zuma Beach Access Road (Figure 2-8). This outfall is accessible during all tides and was sampled during three monitored storm events (February 19 and March 8, 2013, and February 28, 2014). The watershed draining to ASBS-011 is 7.0 acres in size and the surrounding landscape at ASBS-011 consists of a gradually sloping, broad sandy beach.

Figure 2-8. ASBS-011 Outfall

ASBS-013 is an 18-inch outfall located in middle portion of Zuma Beach, adjacent to a parking lot along Zuma Beach Access Road (Figure 2-9). This outfall is accessible during all tides and was sampled during only the March 8, 2013, and February 28, 2014, storm events, as it did not flow during the February 19, 2013, storm event. The watershed draining to ASBS-013 is 10.4 acres in size and the surrounding landscape at ASBS-013 consists of a gradually sloping, broad sandy beach.

Figure 2-9. ASBS-013 Outfall

ASBS-016 is a 60-inch outfall located in middle portion of Zuma Beach, adjacent to a parking lot along Zuma Beach Access Road (Figure 2-10). This box culvert outfall is accessible during all tides and was sampled during only the March 8, 2013, and February 28, 2014, storm events, as it did not flow during the February 19, 2013, storm event. Flow monitoring equipment was installed in this outfall. The watershed draining to ASBS-016 is 115.1 acres in size and the surrounding landscape at ASBS-016 consists of a gradually sloping, broad sandy beach.

Figure 2-10. ASBS-016 Outfall

ASBS-018 is a 24-inch outfall located at the southern end of Zuma Beach, adjacent to a lifeguard station in the middle of the beach off Zuma Beach Access Road (Figure 2-11). This outfall is accessible during all tides and was sampled during three monitored storm events (February 19 and March 8, 2013, and February 28, 2014). The watershed draining to ASBS-018 is 10.0 acres in size and the surrounding landscape consists of a gradually sloping, broad sandy beach.

Figure 2-11. ASBS-018 Outfall

Westward Beach Outfalls

ASBS-021 is a 48-inch outfall located at the northern end of Westward Beach, adjacent to an entrance gate near the intersection of Birdview Ave. and Westward Beach Road (Figure 2-12). This outfall is accessible during all tides and was sampled during three monitored storm events (February 19 and March 8, 2013, and February 28, 2014).The watershed draining to ASBS-021 is 170 acres in size and the surrounding landscape at ASBS-021 consists of a gradually sloping, broad sandy beach.

Figure 2-12. ASBS-021 Outfall

ASBS-022 is a 36-inch outfall located at the northern end of Westward Beach, midway between the entrance gate and the edge of the parking lot on Westward Beach Road (Figure 2-13). This outfall is accessible during all tides and was sampled during three monitored storm events (February 19 and March 8, 2013, and February 28, 2014).. The watershed draining to ASBS-022 is 18.4 acres in size and the surrounding landscape at ASBS-022 consists of a gradually sloping, broad sandy beach.

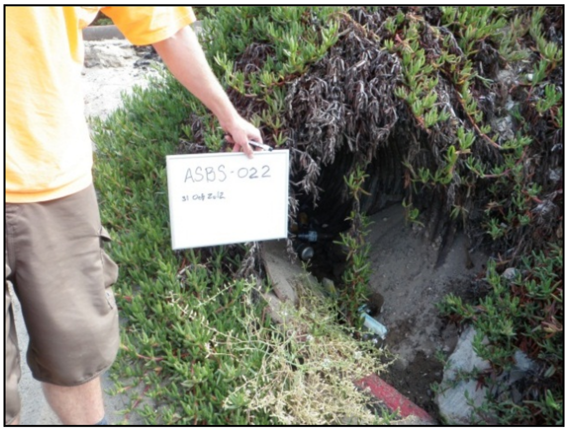

Figure 2-13. ASBS-022 Outfall

ASBS-023 is a 42-inch outfall located in the middle portion of Westward Beach, approximately 100 meters (m) north of the parking lot on Westward Beach Road (Figure 2-14). This outfall is difficult to find since it is hidden by ice plant. ASBS-023 is accessible during all tides and was sampled during three monitored storm events (February 19 and March 8, 2013, and February 28, 2014). The watershed draining to ASBS-023 is 18.4 acres in size and the surrounding landscape at ASBS-023 consists of a gradually sloping, broad sandy beach.

Figure 2-14. ASBS-023 Outfall

ASBS-024 is a 24-inch outfall located in the middle portion of Westward Beach, approximately 100 m south of the edge of the parking lot on Westward Beach Road (Figure 2-15). This outfall is accessible during all tides and was sampled during three monitored storm events (February 19 and March 8, 2013, and February 28, 2014). The watershed draining to ASBS-024 is 34.9 acres in size and the surrounding landscape at ASBS-024 consists of a gradually sloping, broad sandy beach.

Figure 2-15. ASBS-024 Outfall

Nicholas Beach Outfall

ASBS-031 is a 22-inch outfall located in the middle portion of Nicholas Beach, at the base of Nicholas Beach Road (Figure 2-16). This outfall is accessible during all tides; however, no flow was observed during either of the monitored storm events. The watershed draining to ASBS-031 is 30.1 acres in size and the surrounding landscape at ASBS-031 consists of a gradually sloping, broad sandy beach.

Figure 2-16. ASBS-031 Outfall

2.5.2 Outfalls Whose Ownership is Undetermined [With Inlets Owned by Caltrans]

Along Zuma Beach, 10 outfalls drain to ASBS 24 and are equal to or greater than 18 inches in diameter; however, ownership has not been determined. These outfalls have inlets maintained by Caltrans. A brief summary of the location and diameter of each of these outfalls with undetermined ownership is provided on Table 2-4, and Figure 2-17 shows the outfall locations. A description of each outfall is provided in the text that follows Figure 2-17.

Table 2-4. Locations and Diameters of Outfalls with Undetermined Ownership

Beach Location	Site Name	Latitude	Longitude	Pipe diameter (inches)
Zuma Beach	ASBS-006	34.027069	-118.838623	24
	ASBS-007	34.026184	-118.837539	24
	ASBS-009	34.024349	-118.834899	24
	ASBS-010	34.023872	-118.834304	18
	ASBS-012	34.022735	-118.832267	24
	ASBS-014	34.021247	-118.830307	24
	ASBS-015	34.02082	-118.829696	18
	ASBS-017	34.018711	-118.827049	30
	ASBS-019	34.016979	-118.824882	24
	ASBS-020	34.015602	-118.822525	36

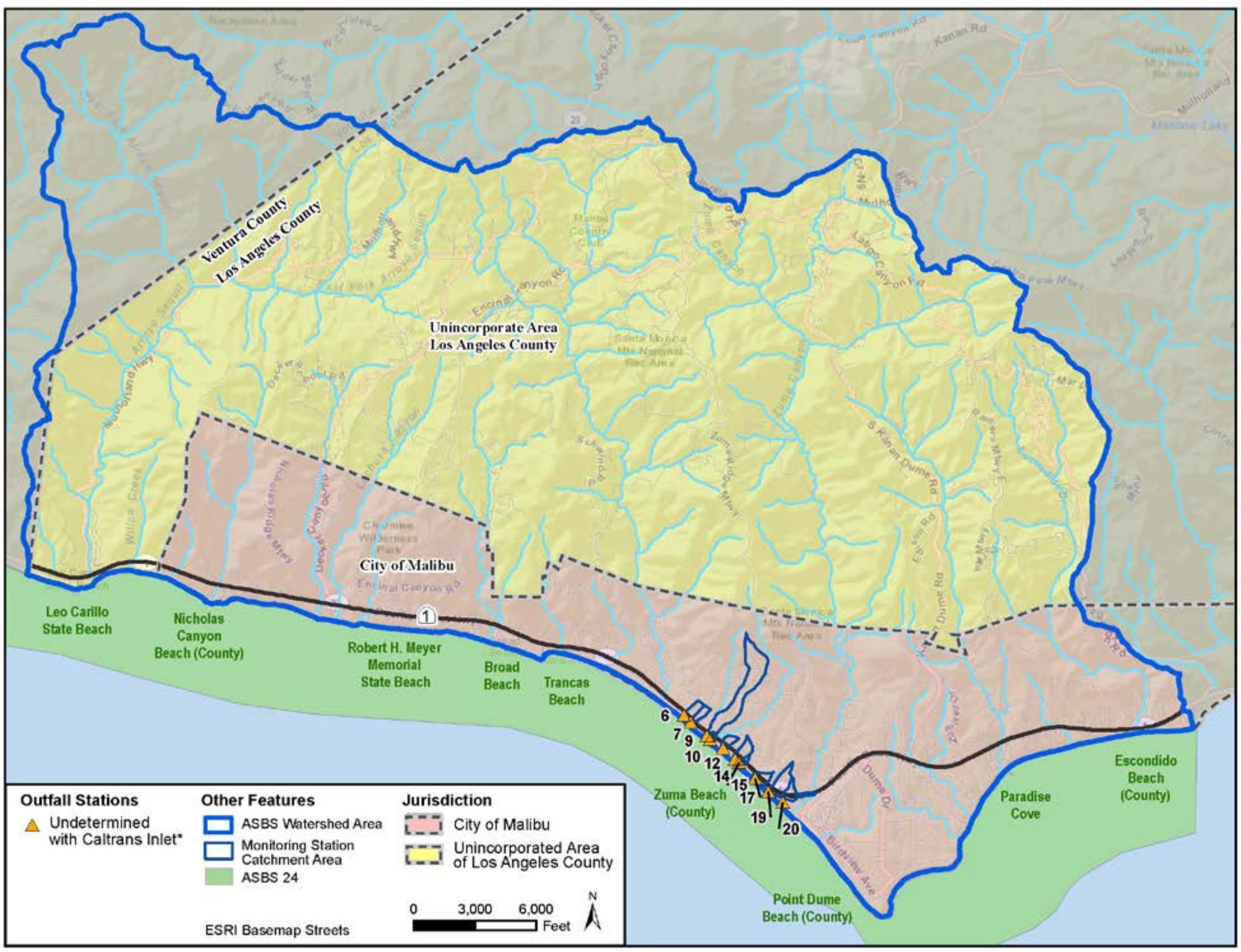

Figure 2-17. Undetermined Ownership (with Caltrans Inlets) ASBS Outfall Location Map

Zuma Beach Outfalls

ASBS-006 is a 24-inch outfall located in the northern portion of Zuma Beach, adjacent to a parking lot along Zuma Beach Access Road (Figure 2-18). The watershed draining to ASBS-006 is 10.2 acres in size and the surrounding landscape at ASBS-006 consists of a gradually sloping, broad sandy beach.

Figure 2-18. ASBS-006 Outfall

ASBS-007 is a 24-inch outfall located in the northern portion of Zuma Beach, adjacent to a parking lot along Zuma Beach Access Road (Figure 2-19). The watershed draining to ASBS-007 is 7.8 acres in size and the surrounding landscape at the outfall consists of a gradually sloping, broad sandy beach.

Figure 2-19. ASBS-007 Outfall

ASBS-009 is a 24-inch outfall located in the middle portion of Zuma Beach, adjacent to a parking lot along Zuma Beach Access Road, approximately 90 m south of Seadrift Cove (Figure 2-20). The watershed draining to ASBS-009 is 78.6 acres in size and the surrounding landscape at ASBS-009 consists of a gradually sloping, broad sandy beach.

Figure 2-20. ASBS-009 Outfall

ASBS-010 is an 18-inch outfall located in the middle portion of Zuma Beach, adjacent to a parking lot along Zuma Beach Access Road, approximately 170 m south of Seadrift Cove (Figure 2-21). The watershed draining to ASBS-010 is 2.4 acres in size and the surrounding landscape at ASBS-010 consists of a gradually sloping, broad sandy beach.

Figure 2-21. ASBS-010 Outfall

ASBS-012 is a 24-inch outfall located in the middle portion of Zuma Beach, adjacent to a parking lot along Zuma Beach Access Road, approximately 400 m south of Seadrift Cove (Figure 2-22). The watershed draining to ASBS-012 is 7.0 acres in size and the surrounding landscape at ASBS-012 consists of a gradually sloping, broad sandy beach.

Figure 2-22. ASBS-012 Outfall

ASBS-014 is a 24-inch outfall located in the middle portion of Zuma Beach, adjacent to a parking lot along Zuma Beach Access Road, directly in front of the Beaches and Harbors maintenance yard (Figure 2-23). The watershed draining to ASBS-014 is 12.1 acres in size and the surrounding landscape at ASBS-014 consists of a gradually sloping, broad sandy beach.

Figure 2-23. ASBS-014 Outfall

ASBS-015 is an 18-inch outfall located in the middle portion of Zuma Beach, adjacent to a parking lot along Zuma Beach Access Road, approximately 65 m south of the Beaches and Harbors maintenance yard (Figure 2-24). The watershed draining to ASBS-015 is 3.0 acres in size and the surrounding landscape at ASBS-015 consists of a gradually sloping, broad sandy beach.

Figure 2-24. ASBS-015 Outfall

ASBS-017 is an 18-inch outfall located in the southern portion of Zuma Beach, adjacent to a parking lot along Zuma Beach Access Road, directly in front of a helicopter landing pad (Figure 2-25). The watershed draining to ASBS-017 is 8.8 acres in size and the surrounding landscape at ASBS-017 consists of a gradually sloping, broad sandy beach.

Figure 2-25. ASBS-017 Outfall

ASBS-019 is a 24-inch outfall located in the southern portion of Zuma Beach, adjacent to a parking lot along Zuma Beach Access Road, approximately 420 m north of the Zuma Beach entrance gate (Figure 2-26). The watershed draining to ASBS-019 is 20.8 acres in size and the surrounding landscape at the outfall consists of a gradually sloping, broad sandy beach.

Figure 2-26. ASBS-019 Outfall

ASBS-020 is a 36-inch outfall located in the southern portion of Zuma Beach, adjacent to a parking lot along Zuma Beach Access Road, approximately 200 m north of the Zuma Beach entrance gate, in the center of the beach (Figure 2-27). The watershed draining to ASBS-020 is 12.3 acres in size and the surrounding landscape at ASBS-020 consists of a gradually sloping, broad sandy beach.

Figure 2-27. ASBS-020 Outfall

2.5.3 District Outfalls

The nine outfalls that fall under the jurisdiction of the District are located along Broad Beach (three outfalls) and Escondido Beach (six outfalls). The location of each County Outfall is provided on Table 2-5 and shown on Figure 2-28. A summary, including the diameter, monitoring data collected at each outfall pipe, and the observed flow connection (or absence), is provided on Table 2-6. A description of each outfall is provided in the text following Figure 2-28.

Table 2-5. District Outfall Locations and Diameters

Beach Location	Site Name	Latitude	Longitude	Pipe Diameter (inches)
Broad Beach	ASBS-001	34.034702	-118.861846	24
	ASBS-002	34.035556	-118.860328	18
	ASBS-003	34.035526	-118.858276	51
Escondido Beach	ASBS-025	34.025646	-118.763717	18
	ASBS-026	34.025653	-118.763336	24
	ASBS-027	34.025726	-118.762153	24
	ASBS-028	34.025772	-118.75962	36
	ASBS-029	34.025856	-118.758468	18
	ASBS-030	34.025897	-118.757987	18

Table 2-6. District Outfall Locations, Diameters, and Monitoring Information

Beach Location	Site Name	Pipe Diameter (in)	Analyses Performed	Storm Events Analyzed			Did flow reach receiving water?		
				2/19/2013	3/8/2013	2/28/2014	2/19/2013	3/8/2013	2/28/2014
Broad Beach	ASBS-001	24	TSS, O&G, Bivalve Toxicity	x	x	x	Yes	Yes	Yes
	ASBS-002	18	TSS, O&G, Bivalve Toxicity	x	x	x	Yes	Yes	Yes
	ASBS-003	51	Full Chem. List*; Bivalve Toxicity	x	x	x	Yes	Yes	Yes
Escondido Beach	ASBS-025	18	TSS, O&G, Bivalve Toxicity	x	x	x	Yes	Yes	Yes
	ASBS-026	24	TSS, O&G, Bivalve Toxicity	x	x	x	Yes	Yes	Yes
	ASBS-027	24	TSS, O&G, Bivalve Toxicity	x	x	x	Yes	No	Yes
	ASBS-028**	36	Full Chem. List*; Bivalve Toxicity	x	x	x	Yes	Yes	Yes
	ASBS-029	18	TSS, O&G, Bivalve Toxicity	x	x	x	Yes	No	Yes
	ASBS-030	18	TSS, O&G, Bivalve Toxicity	x	x	x	No	No	Yes
Ocean Receiving Water	S02	N/A	Full Chem. List*; Kelp, Bivalve, and Echinoderm Toxicity	x	x	x	Not applicable		

*Full chemistry list= TSS, oil and grease, metals, PAHs, pyrethroids, OP pesticides, ammonia, nitrate and total phosphorus.

* *Flow monitoring equipment installed in this outfall pipe.

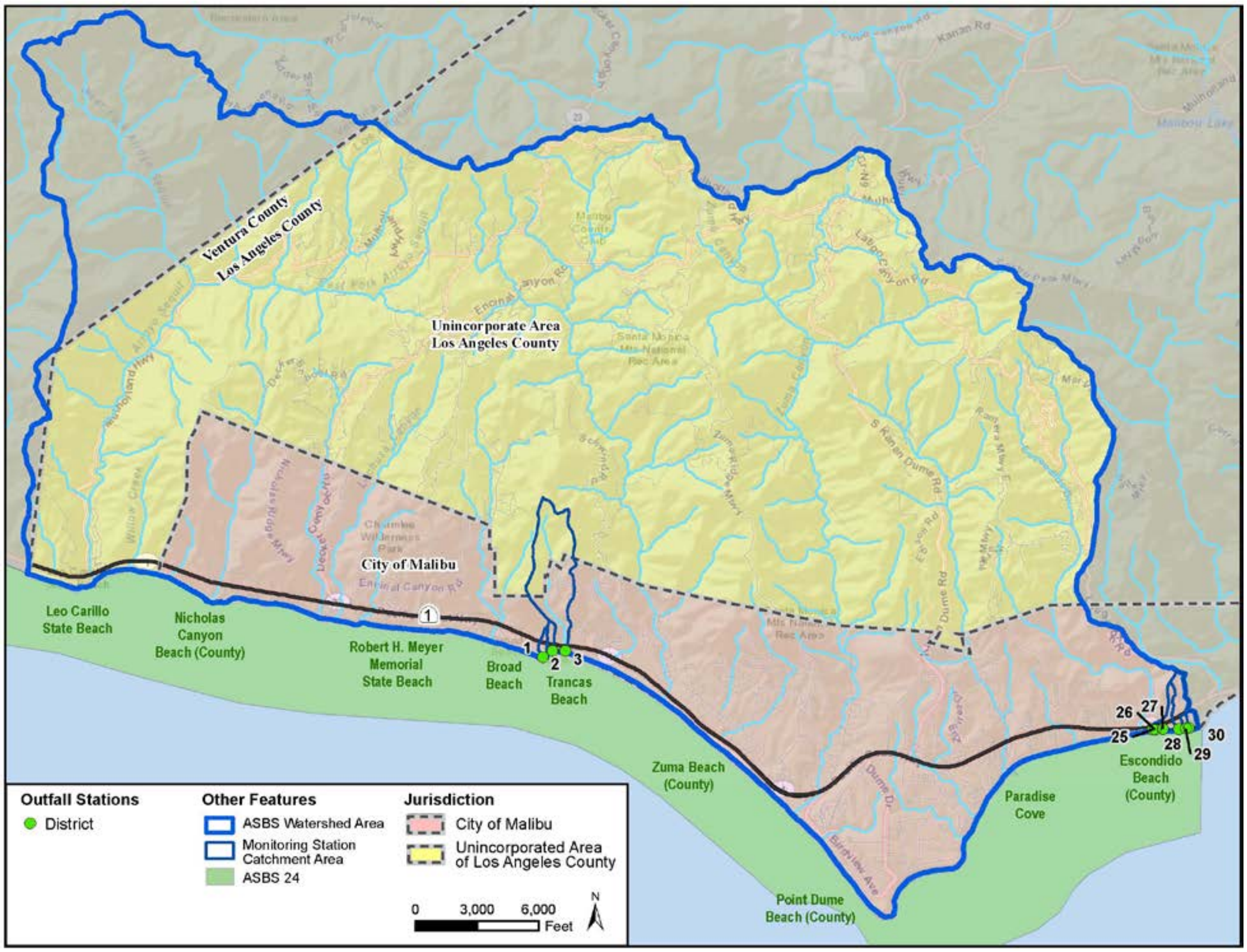

Figure 2-28. District ASBS Outfall Location Map

Broad Beach Outfalls

ASBS-001 is a 24-inch outfall located at the northern end of Broad Beach, along Point Lechuza, beneath a large residence (Figure 2-29). This outfall is inaccessible during high tide and was sampled during three monitored storm events (February 19 and March 8, 2013, and February 28, 2014)from a manhole located approximately 140 ft. from the beach on Point Lechuza Drive. The watershed draining to ASBS-001 is 9.4 acres in size and the area surrounding the outfall consists of a rocky intertidal area interspersed along a narrow, sandy beach.

Figure 2-29. ASBS-001 Outfall

ASBS-002 is an 18-inch outfall located at the northern end of Broad Beach, south of Point Lechuza, adjacent to a residence that has been undergoing construction (Figure 2-30). This outfall is inaccessible during high tide but was successfully sampled during three monitored storm events (February 19 and March 8, 2013, and February 28, 2014).The watershed draining to ASBS-002 is 11.0 acres in size and the area surrounding the outfall consists of a narrow, sandy beach with intermittent rocky reef.

Figure 2-30. ASBS-002 Outfall

ASBS-003 is a 51-inch outfall located at the northern end of Broad Beach, south of Point Lechuza, between two residences (Figure 2-31). This outfall is inaccessible during high tide but was successfully sampled during three monitored storm events (February 19 and March 8, 2013 and February 28, 2014). The watershed draining to ASBS-003 is 253.5 acres in size and a rocky intertidal area is located directly west of the outfall.

Figure 2-31. ASBS-003 Outfall

Escondido Beach Outfalls

ASBS-025 is an 18-inch outfall located at the southern end of Escondido Beach, south of the Malibu Cove Colony Drive entrance off PCH (Figure 2-32). The outfall is integrated with the foundation of a residence and discharges directly onto the sand between two residences. This outfall is inaccessible during high tide but was successfully sampled during three monitored storm events (February 19 and March 8, 2013, and February 28, 2014). The watershed draining to ASBS-025 is 0.8 acres in size and the landscape surrounding the outfall is composed of a steep, sandy beach.

Figure 2-32. ASBS-025 Outfall

ASBS-026 is a 24-inch outfall located at the southern end of Escondido Beach, south of the Malibu Cove Colony Drive entrance off PCH (approximately 30 m southeast of ASBS-025). The outfall is integrated with the foundation of a residence and discharges directly onto the sand beneath the residence (Figure 2-33). This outfall is inaccessible during high tide but was successfully sampled during three monitored storm events (February 19 and March 8, 2013, and February 28, 2014). The watershed draining to ASBS-026 is 2.5 acres in size and the landscape surrounding the outfall is composed of a steep, sandy beach.

Figure 2-33. ASBS-026 Outfall

ASBS-027 is a 24-inch outfall located at the southern end of Escondido Beach, approximately 300 m east of the Malibu Cove Colony Drive entrance off PCH (Figure 2-34). The outfall is integrated with the foundation of a residence and discharges directly onto the sand beneath the residence. This outfall is inaccessible during high tide but was successfully sampled during three monitored storm events (February 19 and March 8, 2013, and February 28, 2014). The watershed draining to ASBS-027 is 18.9 acres in size and the landscape surrounding the outfall is composed of a steep, sandy beach.

Figure 2-34. ASBS-027 Outfall

ASBS-028 is a 36-inch outfall located at the southern end of Escondido Beach, approximately 500 m east of the Malibu Cove Colony Drive entrance off PCH (Figure 2-35). The outfall is integrated with the foundation of a residence and discharges directly onto the sand beneath the residence. Flow monitoring equipment was installed in this outfall near the inlet on Malibu Cove Colony Drive. This outfall is inaccessible during high tide but was successfully sampled during three monitored storm events (February 19 and March 8, 2013, and February 28, 2014). The watershed draining to ASBS-028 is 36.0 acres in size and the landscape surrounding the outfall is composed of a steep, sandy beach.

Figure 2-35. ASBS-028 Outfall

ASBS-029 is an 18-inch outfall located at the southern end of Escondido Beach, near the end of Malibu Cove Colony Drive (Figure 2-36). The outfall lies between two residences and discharges directly onto the sand. This outfall is inaccessible during high tide but was successfully sampled three monitored storm events (February 19 and March 8, 2013, and February 28, 2014). The watershed draining to ASBS-029 is 3.8 acres in size and the landscape surrounding the outfall is composed of a steep, sandy beach.

Figure 2-36. ASBS-029 Outfall

ASBS-030 is an 18-inch outfall located at the southern end of Escondido Beach, near the end of Malibu Cove Colony Drive (approximately 45 m east of ASBS-029). The outfall is integrated with the foundation of a residence and discharges directly onto the sand beneath the residence (Figure 2-37). This outfall is inaccessible during high tide but was successfully sampled during three monitored storm events (February 19 and March 8, 2013, and February 28, 2014). The watershed draining to ASBS-030 is 8.9 acres in size and the landscape surrounding the outfall is composed of a steep, sandy beach.

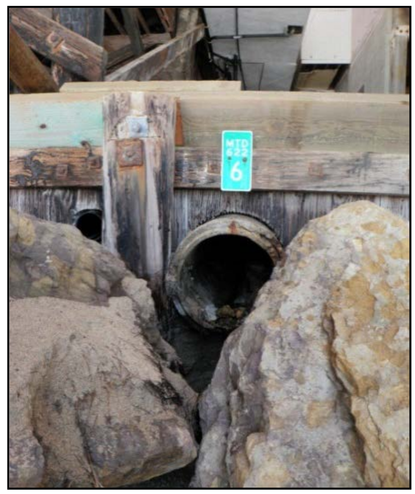

Figure 2-37. ASBS-030 Outfall

2.5.4 Private Outfalls with Inlets Owned by the City

Eight outfalls that are greater than, or equal to, 18 inches in diameter and located along Broad Beach and Little Dume Beach are privately owned with inlets maintained by the City. Currently, three of the outfalls along Broad Beach are being monitored as part of Bight 2013 and the compliance requirements of the General Exception. Although the City maintains ownership of the inlets for each of these storm drains, the ownership status of the outfalls is privately owned. The other five private outfalls with City maintained inlets along Broad Beach and Little Dume Cove that are greater than, or equal to, 18 inches in diameter are not being monitored due to inaccessibility during storm events or due to locations high on Bluffs. A brief summary of the location and diameter for each of these outfall pipes is provided on Table 2-7. Figure 2-38 shows the locations of these private outfalls with City maintained inlets, and a description of each outfall is provided in the text following Figure 2-38.

Table 2-7. City Outfall Locations, Diameters, and Monitoring Information

Beach Location	Site Name	City Outfall ID	City Inlet ID	Latitude	Longitude	Pipe diameter (inches)
Broad Beach	24-BB-01*	24-BB-01Z	24-BB-01A	34.03118	-118.84615	24
	24-BB-02*	24-BB-02Z	24-BB-02B	34.03302	-118.84988	18
	24-BB-03*	24-BB-03Z	24-BB-03A	34.0334	-118.85082	30
	ASBS-B	ASBS-B-Z**	ASBS-B-A	34.03499	-118.85567	18
	ASBS-C	ASBS-C-Z	ASBS-C-A	34.03485	-118.85502	30
	ASBS-F	ASBS-F-Z**	ASBS-F-A	34.03186	-118.84748	24
	ASBS-G	ASBS-G-Z	ASBS-G-A	34.03134	-118.84649	24
Little Dume Beach	ASBS-I	ASBS-I-Z	ASBS-I-A	34.01292	-118.79237	18

*Site currently undergoing monitoring in accordance with the General Exception.
**Site with no visible outfall.

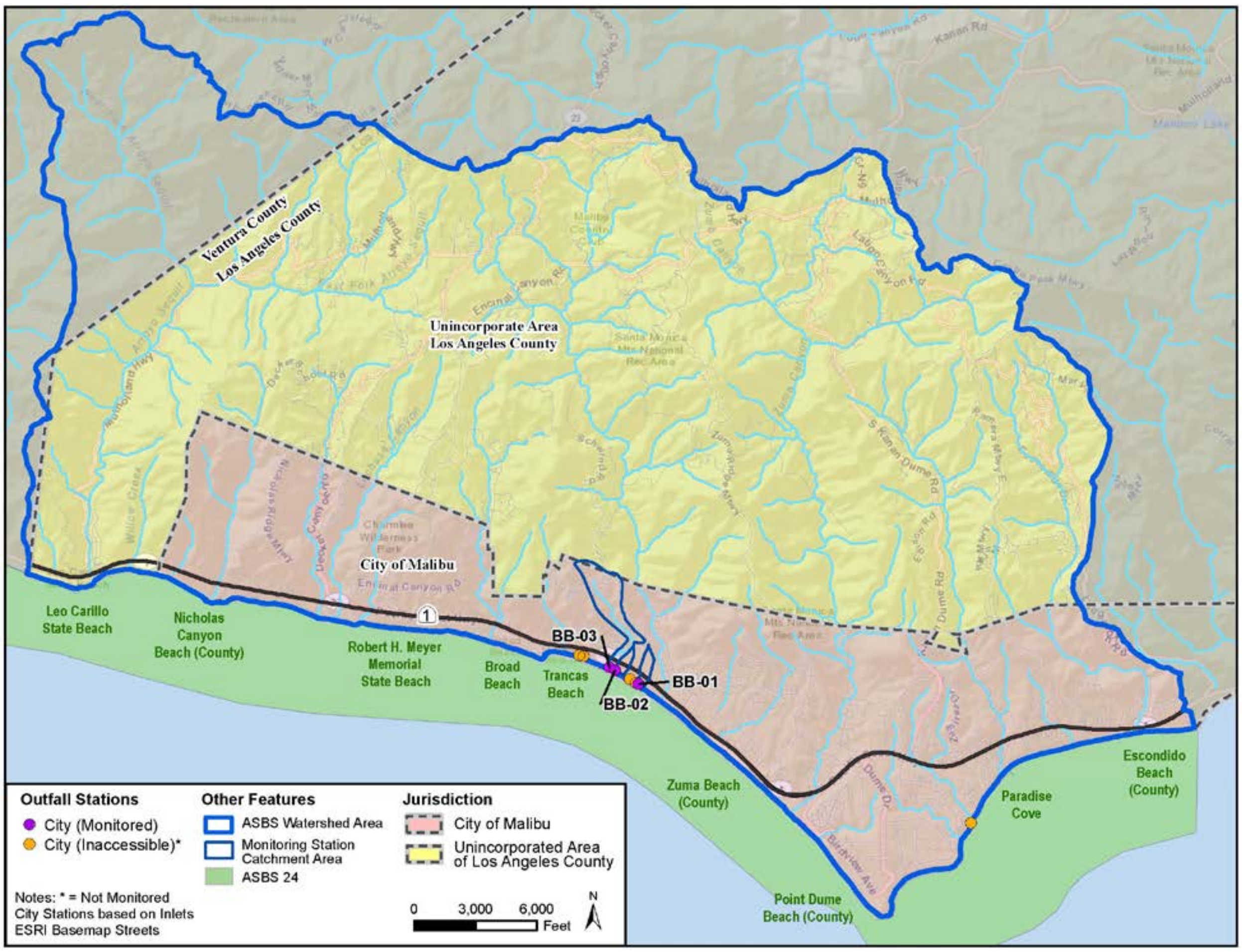

Figure 2-38. City ASBS Outfall Location Map

Broad Beach Outfalls

Site 24-BB-01Z is a 24-inch outfall located at the southern end of Broad Beach, near the intersection of Trancas Canyon Road and PCH (Figure 2-39). The outfall is located behind rock revetment and is inaccessible during high tide or dangerous surf conditions. This outfall was successfully sampled during the February 28, 2014, storm event. The monitoring program will continue into the 2014-2015 wet season and thus, sampling may be performed prior to the submittal of the final Plan. The watershed draining to 24-BB-01Z is 19.9 acres in size and consists primarily of single family residences, commercial, transportation right-of-way (ROW), and PCH ROW land uses. The landscape surrounding the outfall is composed of a rock revetment and narrow, sandy beach with near-shore reef and kelp.

Figure 2-39. 24-BB-01Z Outfall

Site 24-BB-02Z is an 18-inch outfall located at the southern end of Broad Beach, approximately 200 m south of the intersection of Lunita Road and PCH (Figure 2-40). This outfall was successfully sampled during the February 28, 2014, storm event. The monitoring program will continue into the 2014-2015 wet season and thus, sampling may be performed prior to the submittal of the final Plan. The outfall is located among the shoreline rock revetment and is inaccessible during high tide or dangerous surf conditions. The watershed draining to 24-BB-02Z is 13.9 acres in size and consists primarily of single family residences, vacant, transportation ROW, and PCH ROW land uses. The landscape surrounding the outfall is composed of rock revetment a narrow, sandy beach.

Figure 2-40. 24-BB-02Z Outfall

Site 24-BB-03Z is a 30-inch outfall located at the southern end of Broad Beach, approximately 100 m south of the intersection of Lunita Road and PCH (Figure 2-41). This outfall was successfully sampled during the February 28, 2014, storm event. The monitoring program continues into the 2013-2014 wet season and thus, sampling may be performed prior to the submittal of the Final Plan. The outfall is located among the shoreline rock revetment and is inaccessible during high tide or dangerous surf conditions. The watershed draining to 24-BB-03Z is 127.6 acres in size and consists primarily of rural residential, vacant, single family residences, transportation ROW, and PCH ROW land uses. the landscape surrounding the outfall is composed of rock revetment and a narrow, sandy beach.

Figure 2-41. 24-BB-03Z Outfall

Site ASBS-B-Z (outfall has a potential correlation to the SWQCB list as SAD790, although not confirmed) is an 18-inch outfall located at the northern end of Broad Beach, directly across from the intersection of La Herran Road and PCH. The City owns the inlet to this site, but existence and ownership of the outfall has not been determined, as the outlet may have been reconfigured during installation of the private rock revetment. The outfall may be located among shoreline riprap; however, the outfall is currently not visible and thus, considered inaccessible. No sampling has been performed at this site. The landscape surrounding the outfall is composed of rock revetment and a narrow, sandy beach with some near-shore reef.

Site ASBS-C-Z is a 30-inch outfall located at the northern end of Broad Beach, approximately 30 m south of the intersection of La Herran Road and PCH (Figure 2-42). While the City owns the inlet to this outfall, the outfall is considered private. The outfall is located behind and partially buried by the rock revetment and is inaccessible at all times due to the steep rock revetment that surrounds the outfall. No sampling has been performed at this site. The watershed draining to ASBS-C is 66.8 acres in size and consists primarily of single family residences, vacant, transportation ROW, and PCH ROW land uses.   The landscape surrounding the outfall is composed of rock revetment and a narrow, sandy beach with some near-shore reef.

Figure 2-42. ASBS-C Outfall

Site ASBS-F is a 24-inch outfall located at the southern end of Broad Beach, approximately 350 m northeast of the intersection of Trancas Canyon Road and PCH. The outfall is located among shoreline riprap; however, the outfall is currently not visible and thus, considered inaccessible.

No sampling has been performed at this site, and the landscape surrounding the outfall is composed of a rock revetment and narrow, sandy beach.

Site ASBS-G (outfall has a potential correlation to SWQCB list as MUG232 or SAD900, although not confirmed) has a 24-inch outfall located at the southern end of Broad Beach, approximately 200 m northeast of the intersection of Trancas Canyon Road and PCH. The outfall is located among shoreline riprap; however, the outfall is currently not visible and thus, considered inaccessible. No sampling has been performed at this site. The landscape surrounding the outfall is composed of a narrow, sandy beach.

Little Dume Beach Outfalls

Site ASBS-I (also referred to as PC02 in other documents) is an 18-inch outfall located on Little Dume Beach, approximately 100 m east of the end of Wildlife Drive (Figure 2-43). The outfall is located on a cliff-side bluff and is inaccessible. No sampling has been performed at this site. The watershed draining to ASBS-I is 6.7 acres in size and the landscape surrounding the outfall is composed of a narrow, sandy beach with near-shore reef and kelp.

Figure 2-43. ASBS-I Outfall

2.6 ASBS 24 Compliance Plan Map

A Compliance Plan Map for the ASBS 24 watershed area has been created and can be updated using ESRI ArcMap 10. This map shows storm water conveyances and other storm drain features associated with surface drainage of storm water runoff, including catch basins, inlets/outlets, outfalls, storm drain lines, channels, and creeks. The map identifies core monitoring stations and shows the location of other outfalls equal to or greater than 18 inches that are private, state, or federal and not monitored by the Parties. Drainage areas for the core monitoring stations, areas of potential sheet flow, the planned Broad Beach Road biofiltration best management practices (BMPs), watershed sub-basins and flow directions within these sub-basins are depicted, as well as the overall ASBS 24 watershed area. The map includes the locations of waste and hazardous material storage areas (located on private commercial properties), sewage conveyances and treatment facilities, landslide zones, and roads. Jurisdictional boundaries for the unincorporated area of the County, the City, and state and federal lands within these areas are shown. This subsection of the Compliance Plan provides information regarding the Compliance Plan Map datasets and the procedures for updating applicable GIS files and the map.

2.6.1 Compliance Plan Map Files

The Compliance Plan Map includes several types of files, organized by file type, in the following folders:

- MXD – MXD files are the map documents produced in ESRI ArcMap. An MXD contains the map template (e.g., size, layout) and calls upon ESRI GIS shapefiles that are stored in the Shapefiles folder. The MXD contains a table of contents, text, and graphic elements, and specifies how data will be displayed. The MXD establishes relative file paths to the shapefiles. Currently, the MXD folder contains only one file: Compliance_Plan_Map.MXD. Additional versions of the map can be saved in this folder, as needed.

- Shapefiles – Shapefiles are GIS format data files that are called upon by the map. Changes to shapefiles will be reflected in the map if the map calls upon the data stored in the shapefile. A spreadsheet listing all of the shapefiles, contents, and sources is provided as Table 2-8.

- Data Files – Data files contain MS Excel spreadsheets, including those added as tables to the MXD. Changes to MS Excel files do not update the map. New or revised tables must be added to the MXD, and can be used to create XY events (based on latitude and longitude data in the table), or joined to existing shapefiles through a common field ID to append additional data fields to the GIS features.

Table 2-8 lists the GIS shapefiles used in the Compliance Plan Map by filename, and provides GIS feature types (e.g., points, lines, polygons), descriptions of the contents of the GIS file, information regarding the original source, and how to update the data in the Compliance Plan Map as needed. The file order in this table is based on the order of the items in the map legend (Figure 2-44).

2.6.2 Compliance Plan Map Update Procedures

Update procedures are provided by GIS shape file on Table 2-8 and are dependent upon original source and other considerations. Many of the original source GIS files were provided by LACDPW, some files by the City, and were received in GIS shapefile format; therefore, files have been maintained in shapefile format (i.e., not converted to geodatabase format). The County possesses a complete set of the files used to prepare the map (Compliance Plan Map dataset). As these base data layers are updated by the Parties in their primary GIS database, the revised GIS files can be provided to the County and copied in the local Compliance Plan Map dataset, processed, and used to replace the older file versions. The City and County/District Outfall Stations (and Other Outfalls) locations are maintained in separate shapefiles such that this information can be updated independently by each party and then reinserted into the GIS database without overwriting another parties' information. If the new filename is the same as the previous version, the new data should display within ArcMap when the file is replaced in the

Shapefile folder. However, if the data attribute options have been updated, the symbology for the data layer should be checked in the table of contents to ensure that all values have a symbol and will be drawn. If the map layer does not display (i.e., a red exclamation point will appear in the table of contents next to the filename), check the data source file path and update as needed. GIS shapefiles should be clipped to the overall ASBS watershed area (GIS file), and geometry recalculated to update line lengths and polygon areas. All GIS data should be maintained in the following projected coordinate system: CA State Plane, Datum NAD83, Zone V, units Survey Feet for consistency.

In addition, GIS files can be edited within ESRI ArcMap to update map features and attribute data, such as a change in monitoring stations, a revision to the monitoring station catchment areas, the inclusion of monitoring data results to outfall locations, or the addition of new BMPs to the BMP shapefile. This process can be performed in an edit session using the Editing toolbar. Note that map labels on the map are currently static (i.e., have been converted to annotation stored in the map) to better control their placement. Therefore, text labels will need to be created for new features that are added to existing shapefiles or for new shapefile features for which map labeling is appropriate.

Facilities with hazardous material storage areas should be updated on an annual basis by requesting the Active Facility Inventory List from LA County Fire for Zip Code 90265. The address information can be formatted in an MS Excel spreadsheet for the geocoding process. After adding the table to ArcMap, run the geocoder tool, and clip the resulting shapefile to the ASBS 24 watershed area.

Updates can also be made to the MXD, such as adding new features layers, revising the layout, or other map template items to change the look of the map. New GIS files can also be easily added to the map as additional data become available related to compliance activities. Note that the map legend is static and will not automatically update when new GIS files are added to the MXD. The legend can be manually updated using the drawing and text tools or a new legend inserted. An MXD can be saved as a new file to maintain previous versions in the database.

Table 2-8. GIS Shapefiles Used in Compliance Plan Map

Filename	Type	Description	Original Source	To Update
LAC_ASBS24_Outfalls	Point	County and District Monitoring Stations in ASBS 24 Monitoring Program, including Core MS4 Outfalls, Outfalls that have Caltrans Inlets but undetermined ownership of Outfalls (not monitored) and Ocean Receiving Water Stations, and creek reference station. Includes ownership information.	Core Monitoring Stations provided by LADPW in table format and imported into GIS from an MS Excel spreadsheet using latitude and longitude data provided in file to map locations.	Station locations and attribute data can be edited in GIS to update file (i.e., add, remove, or change location or attribute data associated with monitoring stations).
City_Outfalls	Point	Outfalls identified for the City's ASBS 24 Monitoring Program. City has jurisdiction of inlets but outfalls were determined by City to be privately owned. Three of these eight Outfalls are monitored, and five are considered inaccessible. Includes the City's Ocean Receiving Water station.	Field notes in an MS PowerPoint file provided by the City. GIS file created using latitude and longitude data. Other outfalls ≥ 18 inches that were listed in the field notes but not included in monitoring program are provided in file called "Other_Outfalls_City_Recon".	Edit or replace GIS file as needed to add, remove, or change location or attribute data associated with monitoring stations.
Other_Outfalls_County_Recon	Point	This file contains outfalls that were identified in field reconnaissance activities by the County for which ownership is private or undetermined. These outfalls are not in the monitoring program. Not all outfalls were visible or could be verified.	Provided by LADPW in table format and imported into GIS from an MS Excel spreadsheet using latitude and longitude data fields provided in file.	Station locations and attribute data can be edited in GIS to update file. This file complements the LAC_ASBS24_Outfalls file as the outfalls ≥ 18 inches but not in County monitoring program as ownership is private or undetermined.
Other_Outfalls_City_Recon	Point	This file contains outfalls that were identified in field reconnaissance activities by the City of Malibu and were determined to be privately owned and were not included in the monitoring program. Not all outfalls were visible or could be verified.	Field notes in an MS PowerPoint file provided by the City. Tabular data imported into GIS using latitude and longitude data from field notes.	Station locations and attribute data can be edited in GIS to update file. This file complements the City_Outfalls that were also identified in the City recon activities, found to be privately owned but chosen for compliance monitoring.
Catchbasins_ws	Point	Catch basin locations within the ASBS 24 watershed area. Ownership or maintenance of catch basins given in file as: LACFCD for District, City, Road Maintenance Division or not listed (blank).	Based on integrating data from two different catch basin files and removing duplicates. One file provided by LADPW (used as primary data source), the other found on LA County GIS data portal (supplementary).	Replace GIS file with updated one (LADPW source) as available and clip to the ASBS 24 watershed boundary. Record catch basin cleaning frequency attribute data.
Inlet_Outlet_from_LADPW_ws	Point	Inlet and outlet locations clipped to ASBS 24 watershed.	Provided by LADPW. Feature type (inlet or outlet) attribute data was blank, so features could not be symbolized differently.	Replace GIS file with updated one (LADPW source) as available and clip to the ASBS 24 watershed boundary. Improve data by completing data fields.
City_inlets_ASBS_Drainage	Point	Point locations for inlets identified by the City as owned by the City.	Table provided by the City.	Locations and attribute information can be edited in GIS or a new table imported into GIS.
Lateral_Lines_SD_from_LADPW_ws	Line	Lateral line storm drains clipped to ASBS 24 watershed.	Provided by LADPW.	Replace GIS file with updated one (LADPW source) as available and clip to the ASBS 24 watershed boundary.
Gravity_Main_SD_from_LADPW_ws	Line	Storm drain mains clipped to ASBS 24 watershed.	Provided by LADPW.	Replace GIS file with updated one (LADPW source) as available and clip to ASBS 24 watershed boundary.
Storm_Drains_LADPW_clip_ws	Line	Includes pipes, channels, and creeks that convey stormwater runoff clipped to the watershed boundary.	LA County GIS data portal.	Replace GIS file with updated one (LADPW source) as available and clip to the ASBS 24 watershed boundary.
Prelimin_drain_areas_core_mon_outfalls	Polygon	Catchment areas delineated for the Core Monitoring Stations.	Delineated by Weston based on desktop data review using 2-ft contour data, sub-basins, and storm drain data. Not field-verified and should be considered preliminary.	Catchment areas and attribute data can be edited in GIS to update file. New drainage areas will need to be delineated as stations are added.
BMP_Areas	Polygon	Shows structural BMPs that can be mapped, and currently displays the Planned Biofiltration BMP at Broad Beach Rd. Does not include non-structure BMPS or Operations and Maintenance Activities (See compliance plan for details).	Based upon project boundary shown in Biofiltration Project report.	Edit or replace GIS file as needed to add, remove, or change location or attribute data associated with these features.
ASBS_24_Watershed	Polygon	An overall boundary watershed based on the eight watersheds that drain to the ASBS 24 area.	Based on sub-basins GIS file from LADPW with internal boundaries dissolved for the eight watersheds.	Edit boundary in GIS as needed.

Table 2-8. GIS Shapefiles Used in Compliance Plan Map

Filename	Type	Description	Original Source	To Update
Subbasins_ws	Polygon	Watershed sub-basins clipped to the ASBS 24 watershed boundary	Provided by LADPW.	Replace GIS file with updated one (LADPW source) as available and clip to the ASBS 24 watershed boundary.
Subbasins_flow_dir_ws	Line	Watershed sub-basins clipped to the ASBS 24 watershed boundary.	Provided by LADPW.	Replace GIS file with updated one (LADPW source) as available and clip to the ASBS 24 watershed boundary.
Sewer_Treatment_Plant_ws	Point	Sewer treatment plant locations within the ASBS 24 watershed area.	Provided by LADPW.	Replace GIS file with updated one (LADPW source) as available and clip to the ASBS 24 watershed boundary.
Sewer_Pump_Station_ws	Point	Sewer pump station locations within the ASBS 24 watershed area.	Provided by LADPW.	Replace GIS file with updated one (LADPW source) as available and clip to the ASBS 24 watershed boundary.
Areas_potential_sheet_flow	Polygon	Areas identified as having potential sheet flow are the parking lots at Nicholas Canyon, Zuma, and Westward Beaches.	Parking lot areas were digitized from aerial imagery to create the polygon file.	Edit or replace GIS file as needed to add, remove, or change location or attribute data associated with these features.
Sewer_Pipe_ws	Line	Sewer pump station locations within the ASBS 24 watershed area.	Provided by LADPW.	Replace GIS file with updated one (LADPW source) as available and clip to the ASBS 24 watershed boundary.
Sewer_Maintenance_Service_Area_ws	Polygon	Sewer maintenance service area within the ASBS 24 watershed area.	Provided by LADPW.	Replace GIS file with updated one (LADPW source) as available and clip to the ASBS 24 watershed boundary.
Pacific_Coast_Highway_ws	Line	Centerline feature of PCH (State Hwy 1) extracted from CAMS 2011 GIS file and clipped to the ASBS 24 watershed boundary.	LA County GIS data portal: http://egis3.lacounty.gov/dataportal/2011/12/09/2011-la-county-street-centerline-street-address-file/.	As updated versions of file become available, extract PCH lines from the new shapefile and clip to the ASBS 24 watershed.
Roads_ws	Line	Non-private road centerline features extracted from the CAMS 2011 GIS file and clipped to the ASBS 24 watershed boundary.	LA County GIS data portal: http://egis3.lacounty.gov/dataportal/2011/12/09/2011-la-county-street-centerline-street-address-file/.	Replace road file with updated versions as available and clip to the ASBS 24 watershed.
Facilities_with_haz_materials	Point	Geocoded addressed for facilities that generate or store hazardous materials within the ASBS 24 watershed.	Facility addresses provided by LA County Fire Dept in excel spreadsheet.	Request the annual update of Facility (Active) Inventory List from LA County Fire for Zip Code 90265. Format address data in Excel spreadsheet for geocoder. Geocode in ArcMap and clip the shapefile to the ASBS24 watershed.
County_Bndry	Polygon	Boundary of the County.	Los Angeles County GIS Data Portal.	No update expected.
Jurisdictional_Boundary_ws	Polygon	Jurisdictional boundaries for the unincorporated portion of the County and the City clipped to the ASBS 24 watershed.	Los Angeles County GIS Data Portal.	Replace GIS file with updated one (LADPW source) as available and clip to the ASBS 24 watershed boundary.
State_and_Federal_Lands_ws	Polygon	Land areas identified as in state or rederal ownership clipped to the ASBS watershed area.	Based on parcels in state or federal ownership extracted from Parcel GIS data file provided by LADPW.	Process updated parcel file (LADPW source) to extract parcels with state or federal ownership; dissolve boundaries by owner type/code; clip to the ASBS 24 watershed boundary.
ASBS_24_Boundary	Polygon	ASBS 24 watershed boundary.	CA State Water Resources Control Board.	To be updated only if boundary is changed. Replace GIS file if new one is published by agency.
USGS_Landslides_zone_clipped_ws	Polygon	Landslide zones for 1:24k USGS sheets of Point Dume and Trifuno Pass merged into a single GIS file.	Provided by the City, available from USGS.	Update GIS file as new data are published by USGS or if County revises data based on landslide activity.

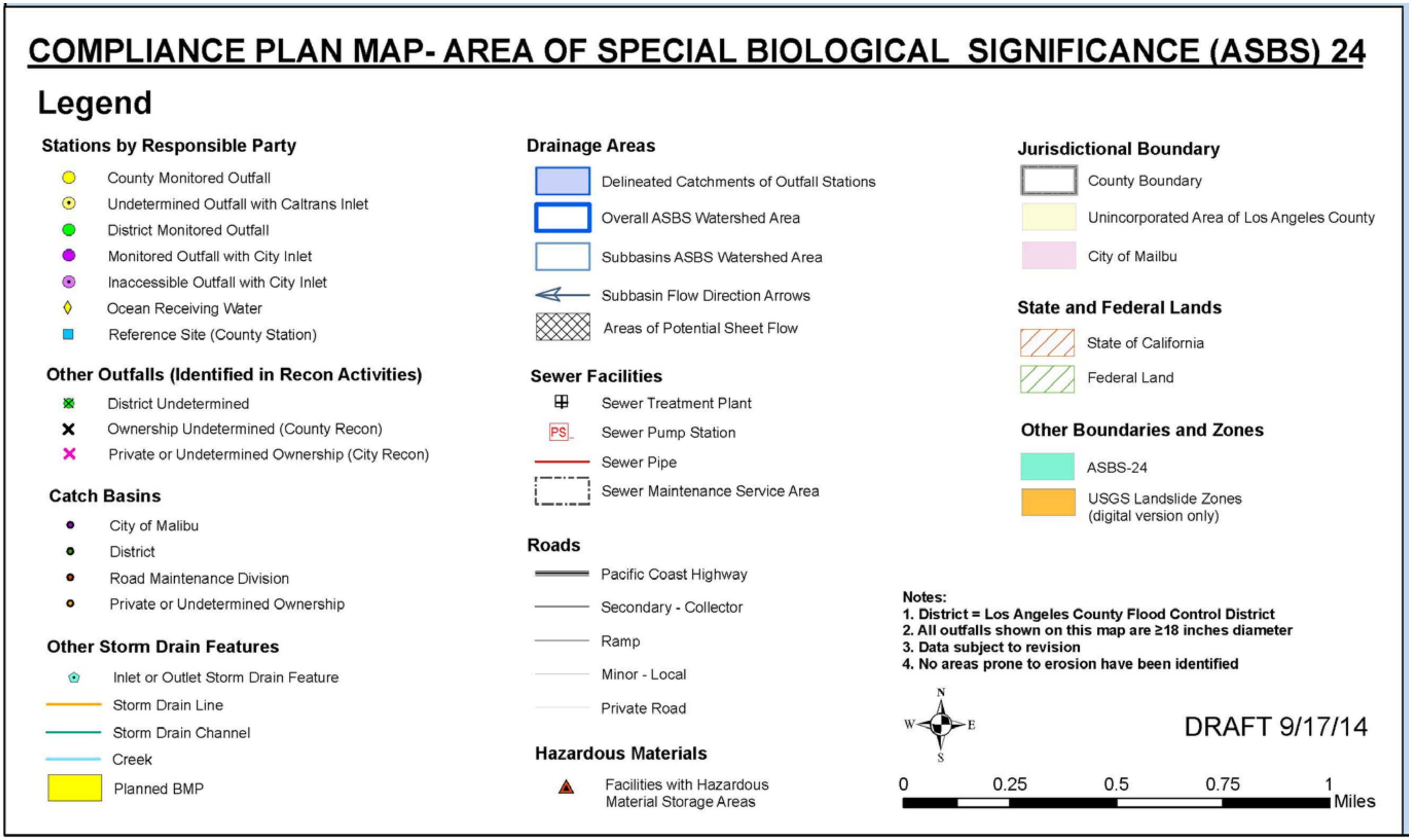

Figure 2-44. Compliance Plan Map Legend

3.0 DRY WEATHER COMPLIANCE

Section I.A.2.b of the General Exception states that the ASBS Compliance Plan will describe measures taken by the Parties to eliminate non-authorized, non-storm water runoff (e.g., dry weather flows), how these measures will be maintained over time, and how these measures are monitored and documented (SWRCB, 2012b).

The Parties have implemented nonstructural measures that are designed to eliminate non-authorized, non-storm water runoff, including public information and participation programs (PIPPs), operations and maintenance (O&M) programs, and enforcement programs. A list of existing programs is provided in Appendix B. When used in combination, nonstructural controls have been proven to provide improved effectiveness in load and flow reduction, at a lower cost, than many structural solutions (Brown et al., 2010; Pohl, 2010; Cac and Ogawa, 2010; Krieger et al., 2010). A discussion of the Parties' use of each of these types of nonstructural BMPs follows.

Dry weather monitoring of outfalls has been performed to ensure compliance with the requirements of the General Exception. This document summarizes those monitoring activities and results.

3.1 Nonstructural Controls

Nonstructural controls are designed to prevent dry weather runoff and pollution generation, control sources of dry weather runoff and pollution once generated, and eliminate the true source of pollutants, if appropriate. This document identifies nonstructural controls used by the Parties in order to meet the requirements of the General Exception and Special Protections of the California Ocean Plan (SWRCB, 2012a).

3.1.1 Nonstructural Program Terms and Definitions

Nonstructural programs are designed to prevent pollution generation, control sources of pollution once generated, and eliminate the true source of pollutants. The following common terms and definitions are related to nonstructural controls, which are used throughout the document, including:

- <u>Pollution Prevention Measures</u> target pollutants and wastes before they are generated. These measures typically emphasize conserving or reusing resources to prevent pollution.
- <u>Source Controls</u> target specific sources of pollution to reduce or eliminate pollutants from entering the municipal separate storm sewer system (MS4) and / or ultimately the receiving water. Source controls may include institutional controls (e.g., codes, ordinances, and regulations), outreach, education, incentive programs, and enforcement measures.
- <u>True Source Controls</u> recognize that the source pollutant may be the physical design of a product, such as copper-based pesticides or copper break-pads. In this instance, product regulation and true source control can only be achieved at the state or national level. True source controls support regulatory change outside the local jurisdiction.

Nonstructural programs have been classified in this document using a "three-legged stool" approach where the three legs of the stool consist of PIPPs, Enforcement Programs, and O&M Programs (see Figure 3-1). When used in combination, nonstructural controls have been proven to provide improved effectiveness in load and flow reduction, at a lower cost, than many structural solutions (Brown et al., 2010; Pohl, 2010; Cac and Ogawa, 2010; Krieger et al., 2010).

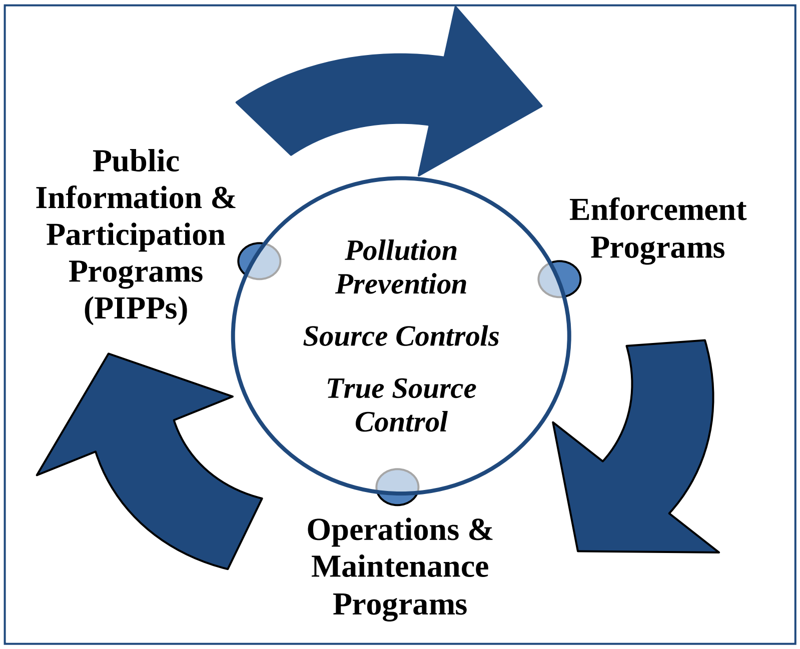

Figure 3-1. ASBS 24 Nonstructural Programs

3.1.2 Nonstructural Program Adaptive Management Process

The ASBS 24 PIPPs, enforcement, and O&M nonstructural programs have been implemented using adaptive management (Figure 3-2) to plan, implement, assess, and refine individual nonstructural controls. Nonstructural programs implemented to date have ensured compliance with the zero dry weather discharge criteria of the Special Protections. Receiving water data collected under the 2013 Regional Monitoring Program represent the initial assessment of wet weather loading to ASBS 24. Some nonstructural programs implemented to date, identified in this document, also have the potential to help reduce wet weather pollutant loads. Effectiveness assessments will play a key role in ongoing implementation of the nonstructural program by identifying the optimal enhanced programs and establishing a process for planning subsequent phases of nonstructural implementation.

Figure 3-2. Adaptive Management Process

3.2 Existing Nonstructural Programs

The Parties proactively participate in regional nonstructural planning efforts and implement nonstructural controls to protect the receiving water quality of ASBS 24. A detailed list of existing PIPPs, enforcement programs, and O&M programs is provided in Appendix B. This section contains a description of key nonstructural programs related to compliance with the prohibited discharges listed in the General Exception.

3.2.1 Public Information and Participation Programs

PIPPs encompass the education, outreach efforts, and rebate / incentive programs implemented by the Parties which encourage positive behavior changes that eliminate or reduce potential polluting behaviors, encourage reporting and cleanup of discharges, and reduce water consumption. Waste management and water conservation PIPPs have been implemented by the County and the City and are described in the following sub-sections.

3.2.1.1 Waste Management PIPPs – Outreach Programs

Clean LA is the County's main PIPP. Clean LA offers online and hotline resources to residents, businesses, and local governments to answer questions related to household hazardous and electronic waste collection, composting, recycling, illegal dumping prevention, and water quality impacts of proper waste management. The Clean LA hotline, which is shared with the District, fielded 34,064 calls throughout Los Angeles County during the fiscal year covered under the 2011-2012 Annual Report (LACDPW, 2012). Within the Clean LA tool box, the Rethink LA program encourages "rethinking" about opportunities to implement reduction, recycling, and reuse, and offers the Los Angeles County Materials Exchange (LACoMAX) as a unique Web platform for buying recycled products, exchanging materials, and advertising garage sales. These online educational resources are interlinked and represent the types of programmatic tiering possible within a PIPP.

Similarly, the Malibu Green Room Web page, a one-stop resource for all things "green" in the City, is one of the City's key PIPP resources. The Web page includes information related to environmental protection ordinances, the City's 24-Hour Pollution Prevention Hotline (initiated in June 2012), special waste collection events, the ocean friendly gardens (OFG) and California (CA) Friendly Landscapes programs and examples of properties where such gardens are installed, design and implementation of structural BMPs, and environmental events, as well as examples of what actions the City has taken to become more sustainable. This Web page is linked with other City-managed Web pages, such as the ASBS Web page, the *Keep it Clean, Malibu* campaign and projects and programs offered by partner agencies.

3.2.1.2 Water Conservation PIPPs – Incentive Programs

Three incentive programs are managed regionally by the Los Angeles County Waterworks and West Basin Municipal Water Districts and are advertised within the ASBS 24 watershed by the County and City. The programs are used to encourage water conservation for outdoor landscaping, thereby preventing dry weather runoff to ASBS 24 from over-irrigation. These programs vary based on available funding, but have included incentives such as the Landscape Irrigation Efficiency Program (LIEP) (completed in 2013), which offered installation of free, efficient sprinkler heads and an irrigation efficiency evaluation at qualified properties; the Water Saving Devices Rebate Program, a residential rebate program for water saving devices such as rotary sprinkler nozzles and irrigation controllers; and Cash for Grass, a residential rebate program for replacing grass with water-efficient landscaping.

3.2.1.3 Water Conservation PIPP – Surfrider Ocean Friendly Garden (OFG) Program

The Surfrider OFG Program is a regional effort to promote water conservation and eliminate dry weather runoff from over-irrigation and other anthropogenic sources. The County and City manage webpages identifying OFG "case studies" within their jurisdiction and frequently host educational and outreach events at OFGs located at public facilities. Recently, the City has also been promoting the Metropolitan Water District-funded CA Friendly Landscapes program, which is a reimagining of the OFG program intended to engage a broader audience who might not otherwise resonate with the concept of "ocean friendly".

3.2.1.4 Water Conservation PIPP – CA Friendly Landscaping Program

The CA Friendly Landscaping Program targets residences and businesses to promote water conservation and eliminate non-point source pollution from landscaping. It is a reimagining of the OFG Program by the Metropolitan Water District in an attempt to engage a broader audience statewide. Similarly to the OFG Program, it is promoted by its local water Districts and agencies. The program includes educational workshops, training events, and incentives such as landscape water efficiency rebates. The City hosted two CA Friendly Landscaping Workshops from 2013-2014.

3.2.1.5 Water Conservation PIPP – City of Malibu ASBS Focused Outreach Program

The City of Malibu Focused ASBS Outreach Program included a Coastal Preservation Specialist (CPS) position that was created by the City under a State Proposition 84 grant to perform direct and focused outreach to residents and to develop an outreach campaign to reach the community at large raising awareness of ASBS 24. One of the roles of the CPS was to develop and implement PIPPs that prevent dry weather flows. The CPS mailed a general ASBS education letter to every parcel within the ASBS and regularly gave public educational and school presentations on ASBS topics (e.g., OFGs, water conservation) that may be implemented by residents and are being implemented by the City. Additionally, the CPS attended public events to educate about protecting the ASBS. As the City's representative, the CPS interfaced with schools for environmental education programs with Pepperdine University, Point Dume Marine Science School, and Malibu High School. The CPS also developed new ASBS content and maintained pages on the City's web page, interfaced with the media, and expanded the City's outreach of ASBS topics using social media platforms including Facebook, Twitter, and Instagram. The *Keep it Clean, Malibu* website further enhanced the City's ASBS content and encourages residents to prevent pollution by providing guidance on the proper use of common products and best practices relating to other sources (e.g., pet waste).

As part of the Proposition 84 State funding, the CPS was tasked with developing an outreach campaign to educate people about the issue and the result was *Keep it Clean, Malibu* – a multi-platform educational campaign designed to positively, proactively make people think about storm drains and what goes into them. The campaign contains five main elements:

1. A series of four Public Service Announcements starring a beautiful urban mermaid coming into contact with the pollutants we create on land.
2. A series of four storm drains painted by a local artist to draw attention to the drains and their connection to the ocean. A video highlighting the making of this artwork was also created.
3. An active social media campaign on Instagram primarily, but also Facebook and Twitter. Citizens are encouraged to get involved in celebrating the ASBS by posting pictures of the gorgeous marine life in the area.
4. Two special events designed to kick off the campaign and draw attention to the issue – a ribbon cutting ceremony for the storm drain art project and a red carpet premier for the video series, which was held on Earth Day.
5. Distribution of wearable collateral materials (bright blue hats and temporary tattoos) which prominently feature the "Keep it Clean, Malibu" slogan, in effect creating walking billboards of the message.

In addition to these five main elements, the City partnered with local organizations to promote the ASBS campaign messages at their special events and through their websites and social media. These partnerships range from water and energy utilities to schools to business and community groups. The special events included:

1. Pepperdine University Earth Day Fair
2. Earth Day Celebration hosted by Malibu Chamber of Commerce and Malibu Country Mart
3. Rhyming in the Universe Earth Day Celebration hosted by Team United and Malibu Ballet Performing Arts Society
4. Fiesta Malibu hosted by Juan Cabrillo Elementary School

The bright blue hats and temporary tattoos used to promote the *Keep It Clean, Malibu* message were received with enthusiasm. In order to receive a hat, citizens sign an ASBS Pledge to prevent polluted runoff and protect ocean water quality with their daily activities.

In addition, ASBS 24 coastline and inland areas that could be tributary to it were regularly patrolled by the CPS, who looked for dry-weather runoff and other pollution threats in the coastal and inland areas. County staff routinely coordinated with the CPS on reports of over-irrigation. When individual properties were identified as non-compliant with ASBS regulations, such as due to over-irrigation, they were mailed educational materials and a cease-and-desist letter. Each of these property owners were personally engaged to correct the issue by providing education on the potential impacts to the ASBS and tailoring solutions to the property.

Even though the grant-funded outreach project that included the CPS is complete, the City recently added a new position which will assume the outreach and inspections duties of the CPS. The *Keep It Clean, Malibu* campaign and relevant videos may be found at www.keepitcleanmalibu.com and ASBS education in general at www.malibucity.org/ASBS.

3.2.2 Operations and Maintenance Programs

O&M programs are in place to maintain infrastructure within the area draining to ASBS 24. O&M programs, including street and parking lot sweeping, catch basin cleaning, and trash management and recycling programs, have been implemented by the LACDPW and the City and are described in the following sections. A map of the different programs and their implementation areas is presented in Figure 3-3.

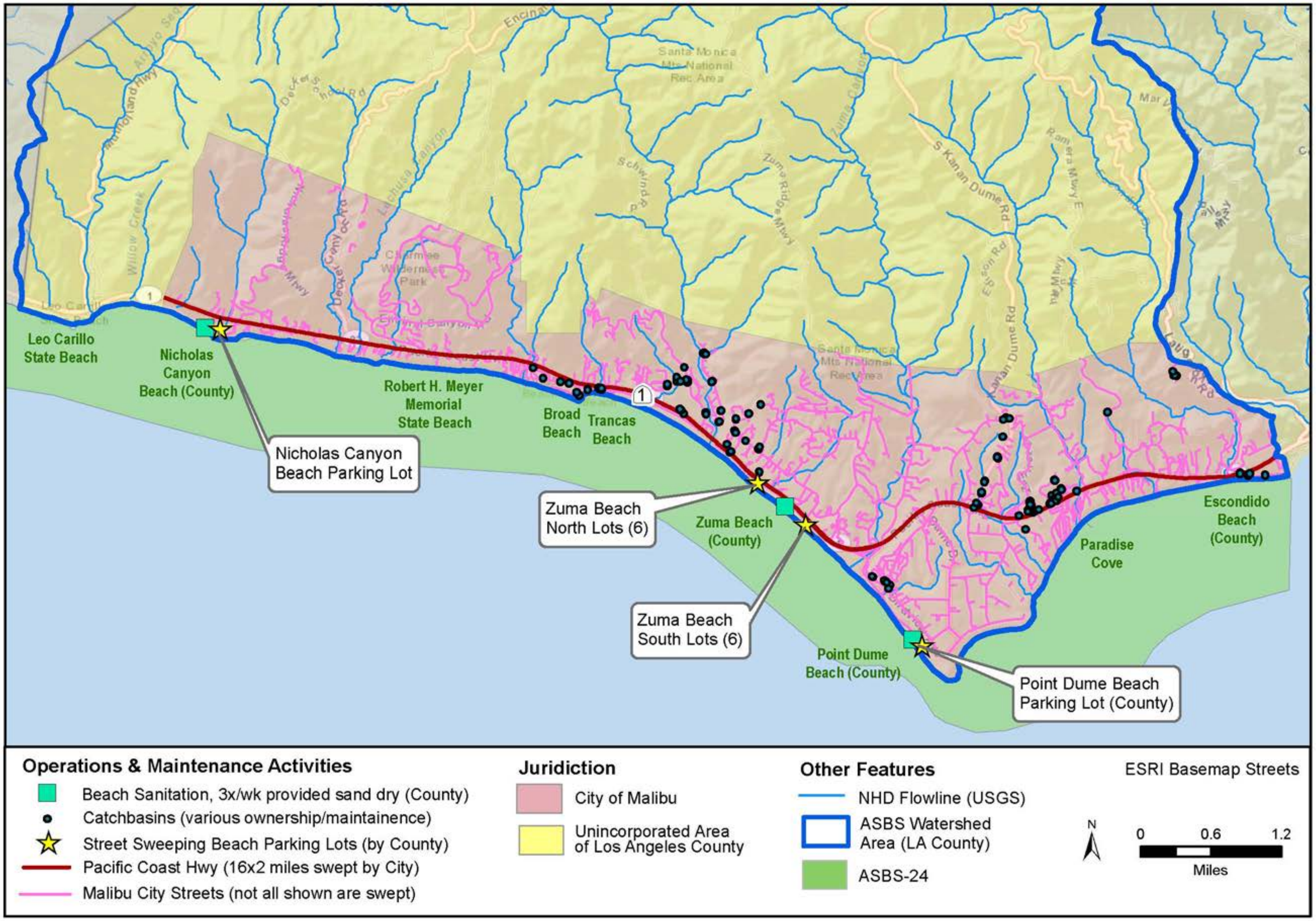

Figure 3-3. Locations of O&M Operations

3.2.2.1 Street and Parking Lot Sweeping

Studies have demonstrated that street sweeping is effective in reducing sediment, metals, and pesticide loading and, to a lesser extent, bacteria loading to the receiving water through physical removal of pollutants from paved surfaces (City of San Diego, 2010a, City of Portland, 2006). The County and City regularly maintain the roads, streets, and parking lots within the area draining to ASBS 24. The existing sweeping programs are presented on Table 3-1. Within the ASBS 24 drainage area, the County has jurisdiction over three beaches with County-maintained parking lots. All parking lots are swept on Saturday, Sunday, and Monday by a vacuum or regenerative air sweeper. The City shares a contract with California Department of Transportation (Caltrans) for sweeping PCH. The City's sweeping program was modified in 2013 to agree with Caltrans' statewide street sweeping policy, which requires use of mechanical sweeping equipment no more than once per week. The PCH is scheduled to be swept on Friday mornings (from 2:00 a.m. to 7:00 a.m.) to optimize sweeper access to the curb and gutter. City-maintained streets are swept monthly with a mechanical sweeper. The City maintains four regular sweeping schedules that are completed on the first, second, or third Monday or the third Wednesday of each month.

Table 3-1. Existing Street and Parking Lot Sweeping Programs within ASBS 24

Agency	Location	Technology	Frequency
Los Angeles County Dept. of Beaches & Harbors	Nicholas Canyon County Beach Parking Lot	Vacuum/ Regenerative Air	3 times/week
	Zuma Beach County Beach (12 Parking Lots)	Vacuum/ Regenerative Air	3 times/week
	Point Dume County Beach Parking Lot	Vacuum/ Regenerative Air	3 times/week
City of Malibu	Pacific Coast Highway	Mechanical	Once/week
	City-Maintained Streets	Mechanical	Once/month

3.2.2.2 Catch Basin Cleaning

The LACDPW and City implemented catch basin inspection and cleaning programs are designed to ensure that catch basins are: 1) properly marked with a "no dumping" message, most commonly applied with paint and stencil2) free of debris, and 3) in good condition. Catch basins are visually inspected by staff in the field and problem systems are flagged for maintenance. The routine inspection and cleaning/repair program is implemented in accordance with the priority assigned by each permittee to each system (i.e., catch basins consistently generating the highest volumes of trash and debris are Priority A; moderate volumes are Priority B; low volumes are Priority C). Priority A catch basins are cleaned four times a year, Priority B catch basins are cleaned twice a year, and Priority C catch basins are cleaned once a year. There are 121 catch basins within the ASBS 24 drainage area under the Parties' jurisdiction. A reported in the City of Malibu's 2011-2012 Annual Report, the material removed from the catch basins within the drainage areas to ASBS 24 mostly consists of "green waste that grows and thrives in the Southern California climate." There are 14 catch basins under the City's jurisdiction, which are classified as Priority B. There are 69 Priority B catch basins under the District's jurisdiction. The remaining 38 are under the County's jurisdiction (Road Maintenance Division) and are located in the upper portion of the watershed. These 38 catch basins are not part of the MS4 that drains to the ASBS and are classified as Priority C catch basins.

3.2.2.3 Waste Management & Recycling Programs

The County's and City's waste management programs include collection of waste and recyclables in public places such as bus stops, safe disposal of household hazardous waste; used oil collection/recycling events; waste management education; solid waste hauler permitting; Christmas tree recycling; brush clearance/green waste recycling events; bulky item collection; construction and demolition debris recycling; electronic and universal waste disposal; and an expanded polystyrene foam recycling program (i.e., Waste to Waves program). Education about recycling opportunities is provided through the PIPP discussed in Section 3.2.1.

The County's waste management program includes a regional beach sand "sanitation" program that is implemented at the three County Beaches located within ASBS 24. The beach sanitation program involves collecting beach debris in a screened hopper pulled by a tractor and properly disposing of the material. A rake system attached to the back of the tractor turns over the sand and allows solar radiation to "sanitize" the beach sand. Beach sand sanitation activities are implemented three times per week, provided that the beach sand is not wet. The implementation is scheduled during the morning hours to allow for maximal day-light exposure.

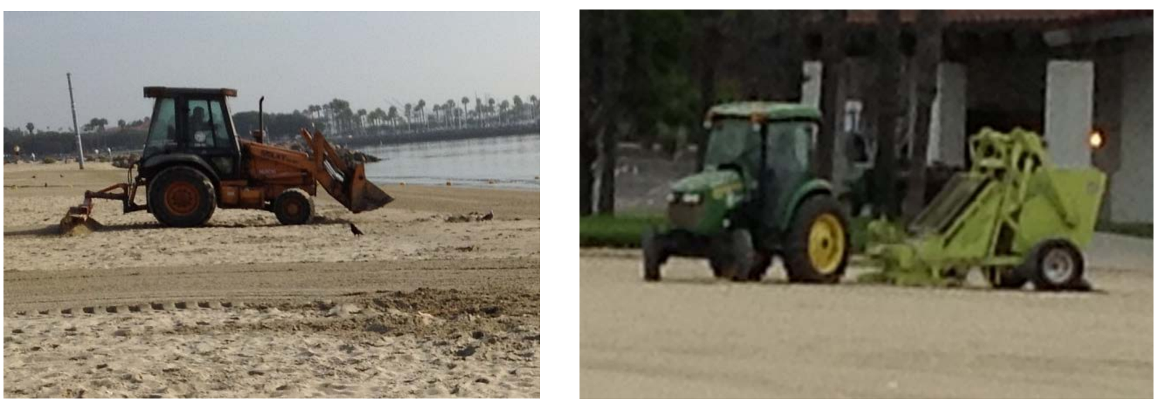

Figure 3-4. County Beach Sand Sanitation Program Equipment at Work

3.2.3 Enforcement Programs

Enforcement programs supporting environmental ordinances passed by the County and City are intended to eliminate non-authorized flows as defined in the General Exception; control illicit discharges; provide sediment and erosion control for construction sites'; verify National Pollutant Discharge Elimination System (NPDES) and ASBS compliance; and implement appropriate education and enforcement in response to runoff, trash, and other greening efforts. Existing enforcement programs within the area draining to ASBS 24 include the LACDPW and City illicit connection/illicit discharge (IC/ID) elimination programs, LACDPW and City construction programs, the City's commercial and industrial business inspection program (should an industrial facility begin operating; there are currently no industrial facilities in the City), and City enforcement of violations observed while implementing the Clean Bay Restaurant certificate program (discussed in further detail later in this document). IC/ID elimination programs are discussed in the following section, and construction programs, commercial and industrial business inspection programs, and the Clean Bay Restaurant certificate program are discussed as part of the Inspection Program Assessment in Section 3.3.1.

3.2.3.1 Illicit Connection/Illicit Discharge Elimination Programs

The IC/ID Programs implemented by the Parties are designed to eliminate pollution by illicit connections and discharges to the MS4 and ultimately the ocean receiving waters. The regional IC/ID Programs start with detection. The LACDPW staffs a 24-hour Pollution Prevention Hotline, which is shared with the District and available in English and Spanish. A Chinese hotline is also offered, which is available in Mandarin. Any IC/IDs reported to the hotlines are routed to the appropriate personnel for response, which may include ceasing, cleaning up, or diverting IC/ID flows before they reach the ocean receiving water. The City utilized the LACDPW's hotlines for public reporting of IC/IDs through June 2012, and then the City launched its own 24-hour Pollution Prevention Hotline. IC/IDs may also be detected by the Parties during desktop screening of the MS4. Permitted and suspected IC/IDs are stored in the Maintenance Management System database for the LACDPW and District and in an Access database for the City. Regional IC/ID investigation data collected by the Parties and reported in for the last 11 fiscal years, which run from July 1st of the previous calendar year through June 30th of the corresponding calendar year, are presented on Table 3-2.

The need for enforcement actions within the area draining to ASBS 24 is infrequent, with an overall decreasing pattern in the past 5 years. Recent dry weather monitoring of LACDPW outfalls has determined that no dry weather flows from these outfalls reach the ocean receiving water. Annually, there are relatively few IC/IDs within the City's jurisdiction and most of the IC/IDs tracked have been related to irrigation runoff. When individual properties are identified as non-compliant with ASBS regulations due to irrigation runoff, they are mailed a letter to "cease and desist" the observed discharge. The CPS then works with the property owners to help correct the runoff problem. The property owner must submit a report within 1 month detailing how the problem was fixed. The CPS may conduct additional site visits and continue monitoring the site, or other additional actions depending on the specific case. General letters, including Notices to Comply, are sent to high-priority neighborhoods and individuals identified, based on the CPS' field reconnaissance and historic data. Areas where discharges, if they were to occur, are more likely to impact the ASBS are deemed a high priority. The purpose is to inform and educate the public about ASBS discharge restrictions. A database with information on every case, including all communication and photos is maintained.

Table 3-2. 2011-2012 IC/ID Program Regional Data

Fiscal Year[1]	Total Reported/ Identified		Cleaned Up/ Terminated/ Discontinued		No Evidence Discharge		Conditionally Exempt/In Compliance		Enforcement or Other Action	
	IDs	ICs	IDs	ICs	IDs	ICs	IDs	ICs	IDs	ICs
County of Los Angeles (Source LACDPW, 2012)										
2002	18	2	18	2	0	-	0	0	0	0
2003	73	4	73	4	0	-	0	0	0	0
2004	11	0	11	0	0	-	0	0	0	0
2005	77	0	77	0	0	-	0	0	0	0
2006	65	0	65	0	0	-	0	0	0	0
2007	39	0	39	0	0	-	0	0	0	0
2008	219	1	219	1	7	-	0	0	0	1
2009	72	2	66	1	28	-	4	0	5	2
2010	34	2	34	1	3	-	0	0	0	2
2011	6	0	6	0	1	-	0	0	0	0
2012	2	0	1	0	1	-	0	0	0	0
Fiscal Year[1]	**Total Reported/ Identified**		**Cleaned Up/ Terminated/ Discontinued**		**No Evidence Discharge**		**Conditionally Exempt/In Compliance**		**Enforcement or Other Action**	
	IDs	**ICs**	**IDs**	**ICs**	**IDs**	**ICs**	**IDs**	**ICs**	**IDs**	**ICs**
Los Angeles County Flood Control District (Source: District, 2012)										
2002	495	494	154	48	5	-	3	398	1	0
2003	631	1,563	268	123	0	-	1	85	1	154
2004	265	1,375	166	145	44	-	4	89	0	68
2005	203	1,352	170	138	59	-	2	523	6	33
2006	204	1,079	184	84	37	-	0	819	11	31
2007	221	479	204	41	16	-	0	226	9	36
2008	223	775	216	33	7	-	0	426	11	218
2009	151	534	138	40	12	-	0	262	0	46
2010	88	409	59	67	29	-	0	219	0	68
2011	51	99	51	17	0	-	0	68	0	12
2012	87	170	87	50	14	-	0	95	0	9
Fiscal Year[1, 2]	**Total Reported/ Identified**		**Cleaned Up/ Terminated/ Discontinued**		**No Evidence Discharge**		**Conditionally Exempt/In Compliance**		**Enforcement or Other Action**	
	IDs	**ICs**	**IDs**	**ICs**	**IDs**	**ICs**	**IDs**	**ICs**	**IDs**	**ICs**
City of Malibu (Source: City, 2012)										
2002	6	0	5	0	1	-	0	0	0	0
2003	9	0	7	0	2	-	0	0	0	0
2004	5	0	5	0	0	-	0	0	0	0
2005	9	0	6	0	3	-	0	0	1	0
2006	25	0	11	0	13	-	1	0	11	0
2007	11	0	6	0	5	-	0	0	7	0
2008	41	3	25	1	6	-	5	0	20	3
2009	36	2	26	2	4	-	0	0	28	2
2010	36	1	16	1	13	-	3	0	18	1
2011	27	0	15	0	7	-	3	0	8	0
2012	17	0	8	0	2	-	6	0	5	0

Note 1: IC/ID data covers the entire jurisdictional areas of the County, District, and City.
Note 2: Due to the ASBS restrictions on non-storm water discharges, the City considers any discharge inland of ASBS to not be conditionally exempt regardless of the nature of the discharge (with the exception of the exemptions in the Special Protections for seeps and other such natural flows including footing drains).

3.2.4 Dry Weather Monitoring

3.2.4.1 City of Malibu ASBS Focused Outreach Program

As part of the City of Malibu ASBS Focused Outreach Program the ASBS 24 was regularly patrolled by the CPS who looked for dry-weather runoff and other pollution threats in the coastal and inland areas. The CPS was funded by a Proposition 84 grant that continued through July 2014. Even though the grant-funded outreach project that included the CPS is complete, the City recently added a new position which will assume the outreach and inspections duties previously performed by the CPS. When individual properties are identified as being out of compliance with the Special Provisions and City policies, such as through over-irrigation, they are mailed educational materials and a cease-and-desist letter (see Section 3.2.3.1). Each of these property owners were personally engaged to correct the issue by providing education on the potential impact to the ASBS and tailoring solutions (e.g., water conservation techniques, available rebate programs) to the property. There were eighty-three illicit discharge cases over the study period covered by the grant (November 2011 – March 2014) with a 96% success rate abating the runoff with “cease and desist discharge” letters followed by additional outreach, assistance, and sometimes site visits. Site visits were conducted at twenty-five properties to understand and mitigate runoff. Of the eighty-three cases over the project period, only three remain open. Two of the illicit discharge cases (2%) required assistance from code enforcement to gain compliance. Seventeen of the eighty-three properties were beachfront properties (20%), and only one illicit discharge from a low priority nonpoint source over the two and a half year project period actually reached the receiving water (1%). The patrol program coupled with outreach efforts to correct the observed issues is successful, but labor intensive.

3.2.4.2 County Dry Weather Outfall Inspections

County staff has been regularly performing inspections of outfalls along the ASBS to document the presence or absence of flow and where needed, take action to eliminate prohibited discharges. A summary of these outfall inspections for 2012 and 2013 is provided on Table 3-3 and Table 3-4, respectively. Of the inspected outfalls, only ASBS-002 had flows reaching the surf. Flow from this outfall was noted reaching the surf once out of the 13 times visited in 2012 and once out of the three times visited in 2013. In both cases these flows reaching the surf were observed in the first month that inspections occurred (January and February for 2012 and 2013, respectively). The suspected source of the flow was over-irrigation in 2012; outreach to residents has been performed as detailed Section 3.2.1. It is anticipated that this outreach effort has addressed the potential source of the non-storm water flows. In 2013 the suspected source of the flow was from a nearby construction site, and City staff visited that construction site to ensure that appropriated BMPs were in place to prevent future discharges. Inspections performed March and May of 2013 at ASBS-002 indicated that flow was not present. Several other outfalls were observed with flows or ponded water; however, due to the distance between the outfall and the surf zone, these minor flows did not reach the receiving water. Inspections will continue to ensure that discharges of non-storm, non-authorized runoff do not occur.

Table 3-3. 2012 Outfall Dry Weather Inspections Summary

Outfall	Beach	January, 2012			February, 2012			March, 2012			April, 2012			Source / Notes
		No. of Visits	No. of Flow	No. Flow to Surf	No. of Visits	No. of Flow	No. Flow to Surf	No. of Visits	No. of Flow	No. Flow to Surf	No. of Visits	No. of Flow	No. Flow to Surf	
ASBS-001	Broad Beach	1	1		4	2		4	2		3	1		Undetermined
ASBS-002	Broad Beach				6	3	1	4	2		3	1		Over irrigation
ASBS-003	Broad Beach	1			6			4			3			
ASBS-004	Zuma Beach	1			5	4		4	4		2	1		Over irrigation
ASBS-005	Zuma Beach	1			5			4			2			
ASBS-006	Zuma Beach				5	1		4			2			Undetermined low flow
ASBS-007	Zuma Beach				5	4		4	4		2	2		Hillside dewatering
ASBS-008	Zuma Beach													
ASBS-009	Zuma Beach				5			4			2			
ASBS-010	Zuma Beach													
ASBS-011	Zuma Beach				5	2		4	4		2	1		Hillside dewatering
ASBS-012	Zuma Beach													
ASBS-013	Zuma Beach													
ASBS-014	Zuma Beach													
ASBS-015	Zuma Beach													
ASBS-016	Zuma Beach													
ASBS-017	Zuma Beach													
ASBS-018	Zuma Beach													
ASBS-019	Zuma Beach													
ASBS-020	Zuma Beach													
ASBS-021	Westward Beach													
ASBS-022	Westward Beach													
ASBS-023	Westward Beach				2	1		3			2	1		Undetermined low flow
ASBS-024	Westward Beach													
ASBS-025	Escondido Beach													
ASBS-026	Escondido Beach													
ASBS-027	Escondido Beach	1	1		3	3		5	4		1	1		Hillside dewatering
ASBS-028	Escondido Beach													
ASBS-029	Escondido Beach				3	3		5	4		1	1		Hillside dewatering
ASBS-030	Escondido Beach				3	1		5			1			Sudsy water
ASBS-031	Nicholas Beach													

Table 3-4. 2013 Outfall Dry Weather Inspections Summary

Outfall	Beach	February, 2013			March, 2013			May, 2013			July, 2013			Source / Notes
		No. of Visits	No. of Flow	No. Flow to Surf	No. of Visits	No. of Flow	No. Flow to Surf	No. of Visits	No. of Flow	No. Flow to Surf	No. of Visits	No. of Flow	No. Flow to Surf	
ASBS-001	Broad Beach	1			1			1						
ASBS-002	Broad Beach	1	1	1	1			1						Construction site. Corrected.
ASBS-003	Broad Beach	1			1			1						
ASBS-004	Zuma Beach	1	1		1	1		1	1		1			Over irrigation
ASBS-005	Zuma Beach	1			1			1			1			
ASBS-006	Zuma Beach	1			1			1			1			
ASBS-007	Zuma Beach	1	1		1	1		1	1		1			Hillside dewatering
ASBS-008	Zuma Beach	1			1			1			1			
ASBS-009	Zuma Beach	1			1			1			1			
ASBS-010	Zuma Beach	1			1			1			1			
ASBS-011	Zuma Beach	1	1		1	1		1	1		1	1		Natural stream north of PCH
ASBS-012	Zuma Beach	1			1			1			1			
ASBS-013	Zuma Beach	1			1			1			1			
ASBS-014	Zuma Beach	1			1			1			1			
ASBS-015	Zuma Beach	1			1			1			1			
ASBS-016	Zuma Beach	1			1			1			1			
ASBS-017	Zuma Beach	1			1			1			1			
ASBS-018	Zuma Beach	1			1			1			1			
ASBS-019	Zuma Beach	1			1			1			1			
ASBS-020	Zuma Beach	1			1			1			1			
ASBS-021	Westward Beach	1			1			1			1			
ASBS-022	Westward Beach	1			1			1			1	1		Trickle of water drops observed
ASBS-023	Westward Beach	1			1			1			1			
ASBS-024	Westward Beach	1			1			1			1			
ASBS-025	Escondido Beach	1			1									
ASBS-026	Escondido Beach	1			1									
ASBS-027	Escondido Beach	1			1									
ASBS-028	Escondido Beach	1			1									
ASBS-029	Escondido Beach	1	1		1	1								Hillside dewatering
ASBS-030	Escondido Beach	1			1									
ASBS-031	Nicholas Beach	1			1			1			1			

3.3 Inspection Program Assessment

Section I.A.2.c of the General Exception states that for MS4s, the ASBS Compliance Plan requires the following minimum inspection frequencies:

1. Weekly during the rainy season for construction sites.
2. Monthly during rainy season for industrial facilities.
3. Twice during the rainy season for commercial facilities.

In addition, the General Exception states that storm water drain outfalls equal to or greater than 18 inches in diameter or width will be inspected once prior to the beginning of the rainy season and once during the rainy season, and maintained to remove trash and other anthropogenic debris (SWRCB, 2012b).

Section 3.3.1 outlines the Parties' existing inspection programs and Section 3.3.2 outlines the recommended inspection program enhancements that would meet the requirements of the General Exception.

3.3.1 Existing Inspection Programs

The following sections outline the Parties' inspection programs that are currently in place. Discussions of specific LACDPW, District, and City inspections, where available, are limited to those areas draining to ASBS 24.

3.3.1.1 Commercial and Industrial Inspection Programs

Existing inspection programs for commercial and industrial facilities (e.g., restaurants, retail gasoline outlets (RGOs), automotive service facilities, United States Environmental Protection Agency (EPA) Phase I facilities, landfills) were conducted in accordance with the requirements of the 2001 NPDES permit (Order No. 01-182) (LARWQCB, 2001). The Permit included requirements for tracking, inspecting, and ensuring compliance for those facilities that are critical sources of storm water pollutants. The 2012 NPDES permit (Order No. R4-2012-0175) inspection frequencies are unchanged from the 2001 Permit requirements, although the minimum interval between inspections is reduced from 12 months to 6 months. The 2012 Permit also includes the requirement that commercial and industrial facility operators be notified of BMP requirements applicable to their site at least once during the 5-year permit cycle.

Commercial facility inspections are required by the NPDES Permit at a minimum of twice during the 5-year permit cycle. In 2008, the City began inspecting food-service related commercial businesses annually, exceeding the permit requirements. For industrial facilities, one industrial facility inspection is required within the first 2 years of the 2012 Permit and a second inspection is only required if an industrial facility has not filed a No Exposure Certification with the SWRCB. The City inspects RGOs and auto service facilities at least every other year, exceeding the permit requirement. The 2012 Permit requires follow-up inspections to be completed within 4 weeks of an infraction, and a minimum of two follow-up inspections and two enforcement letters must be issued to demonstrate a permittee's good faith effort to encourage a business to comply with the NPDES requirements.

Overall, the General Exception requires more frequent inspections than the NPDES permits. Commercial facility inspections are required at a minimum of twice per year during the rainy season. Industrial facility inspections are required a minimum of monthly, also during the rainy season. A summary of the seasonal minimum inspection frequencies required by the two NPDES permits and the General Exception for commercial and industrial facilities are presented on Table 3-5.

Table 3-5. Minimum Inspection Frequencies for Commercial and Industrial Facilities

Inspection Program	Inspection Frequency Required in ASBS 24	Historic Inspection Frequency, NPDES Permit Order R4-2012-0175	Historic Inspection Frequency, NPDES Permit Order No. 01-182
Commercial	Twice/year (rainy season)	Twice/5-year permit cycle, with at least 6 months between inspections	Twice/5-year Permit cycle, with at least one year between inspections[3]
Industrial[1]	Monthly (rainy season)	Twice/5-year permit cycle, with at least 6 months between inspections[2]	

[1]Industrial inspections frequencies will be implemented, if applicable to the ASBS 24 watershed.
[2] First inspection is required within 2 years of permit effective date. Second inspection (with at least 6 months between) is required before permit expiration if a No Exposure Certification has not been filed. Second inspections will also be performed at a minimum of 25% of facilities with No Exposure Certifications.
[3] No second inspection required at Phase I Tier II facilities determined to have no risk of exposure of industrial activities to storm water.

3.3.1.2 County Industrial and Commercial Inspection Program

The land use under the LACDPW's jurisdiction within the area draining to ASBS 24 is primarily undeveloped open space. There are no industrial facilities or commercial facilities within the area draining to ASBS 24 that must comply with the inspection frequencies outlined in the General Exception.

3.3.1.3 District Industrial and Commercial Inspection Program

Aside from its own properties and facilities, the District has no planning, zoning, development, permitting, or other land use authority over industrial or commercial facilities within its service area. As such, the District has no qualifying industrial or commercial facilities within the area draining to ASBS 24 that must comply with the inspection frequencies outlined in the General Exception.

3.3.1.4 City Industrial/Commercial Facilities Inspection Program

The goals of the City's commercial and industrial (should an industrial facility begin operating; there are currently no industrial facilities in the City) inspection program include compliance verification, enforcement as needed, and education regarding storm water and runoff issues, recycling, and City environmental quality ordinances.

The City's commercial and industrial inspection program is overseen by Environmental Programs staff. During an inspection, educational materials that may be provided include surface cleaning techniques, waste management, waste minimization, and recycling options; storm water pollution prevention tips; and potential BMPs tailored to the inspected business. Businesses may call City staff with any storm water- or inspection-related questions. City Environmental Programs staff also coordinates interdepartmentally with other City staff including the code enforcement officer ,Public Works and the Building Safety inspectors, who have been trained to watch for storm water BMP infractions and are authorized to issue correction notices in the field. Code Enforcement and the Environmental Programs staff work together to issue cease-and-desist letters if violations have not been corrected. Repeat offenses are subject to increased enforcement procedures and may be subject to Malibu's administrative citation ordinance, exposing the violator to civil penalties as well as traditional enforcement remedies.

The City conducts annual inspections of food-service commercial facilities and at least every other year on automotive related service facilities, going above and beyond the historic requirements of the NPDES Permit. There is not an extensive base of commercial businesses operating within the City. As reported in the 2011-2012 Annual Report (City, 2012), the City inspected 60 restaurants/food service-related businesses, three grocers,[1] six RGOs, and three automotive services[2] during the reporting year. Only a subset of these commercial businesses is located within the ASBS 24 watershed. Based on a review of available data, the area draining to ASBS 24 contains approximately 15 businesses that sell or serve food, three inns/motels/hotels, a couple of other stores, and one service station.

In conjunction with the annual commercial inspection program, the City implements the Clean Bay Restaurant Certification program of the Bay Foundation in partnership with several other agencies in the south Santa Monica Bay area specifically for food-service related businesses. Through the program, restaurants and other food management businesses are inspected and certified for proper handling of waste, managing wash water, and implementing environmental policies that protect the storm drain system and ultimately the ocean receiving waters. The program certifies businesses as either 100% compliant with all program criteria or as non-compliant and therefore not certified under the Clean Bay Restaurant program. The program's primary success stems from brand recognition. It is a benefit to the partner agencies to work together in a larger regional and more recognized certification program so they may share resources such as promotional items and marketing materials, the advantage of Bay Foundation staff helping to promote the program at special events, and a standardized protocol; in essence, taking advantage of strength in numbers. As popularity and name recognition increases, there is a greater incentive to be certified in the program and more businesses will want to participate and take the extra steps to ensure they maintain certification. If a participant is found to not meet criteria or have a violation during the year that they are certified, they are subject to a strict rescinding policy and may have the certification revoked until the next period. The City's 2011-2012 Annual Report indicated that 93% of relevant businesses under the City's jurisdiction were currently certified under the program (City, 2012).

The City has complied with requirements to conduct inspections of industrial facilities when applicable. Industrial land use is very limited within the City's jurisdiction; in the 2011-2012 Annual Report, only one facility had active coverage under the State Industrial Activities Storm

[1] During the 2012-2013 annual reporting year, the Hughes Market grocery closed for business. The business will be replaced with a new organic grocer.
[2] All four RGOs that formerly housed automotive bays no longer offer these services. Two of the automotive service facilities are primarily RGOs.

Water General Permit and was in the process of terminating coverage. This business is under new ownership and is now a hardware store. Additionally, this industrial facility was in the Malibu Creek Watershed, not in a watershed draining to ASBS 24.

The City is exploring protocols to more readily identify any new commercial and industrial facilities located within the area draining to ASBS 24 and ensure that inspections are implemented in accordance with the General Exception requirements. All current commercial facilities have been identified. There are no industrial facilities.

3.3.1.5 Construction Site Inspection Programs

In accordance with the Los Angeles County Municipal NPDES Permit, permittees are required to develop, implement, and enforce a construction program that prevents illicit construction-related discharges of pollutants into the MS4 and receiving waters; implements and maintains structural and nonstructural BMPs to reduce pollutants in storm water runoff from construction sites; reduces construction site discharges of pollutants to the MS4 to the maximum extent practicable; and prevents construction site discharges to the MS4 from causing or contributing to a violation of water quality standards.

Existing construction site inspection programs were implemented in accordance with the requirements of the 2001 NPDES permit. The Permit requires permittees to inspect all construction sites (1 acre and greater) a minimum of once during the wet season and requires implementation of BMPs such as inspection of graded areas during rain events to control erosion from slopes and channels. For all construction sites where a Storm Water Pollution Prevention Plan (SWPPP) is not adequately implemented, permittees are required to conduct a follow-up inspection within 2 weeks of the initial inspection. In addition, proof of a Waste Discharger Identification (WDID) number for filing a Notice of Intent (NOI) for coverage under the General Construction Storm Water Permit and certification that a SWPPP has been prepared is required prior to issuance of a grading permit. Permittees are also required to use a database or other effective system to track grading permits for construction sites totaling 5 acres or greater. In the case of violations, two follow-up inspections within 3 months and two enforcement letters must be issued to demonstrate a permittee’s good faith effort to encourage a business to comply with the NPDES requirements.

The 2012 NPDES Permit outlines the new, more stringent requirements for construction site frequency that became effective on December 28, 2012. According to the 2012 NPDES Permit, construction sites with a minimum of 1 acre of soil disturbance must be inspected by permittees a minimum of three times (e.g., prior to land disturbance, during active construction, and at the conclusion of the project) and at least monthly during the rainy season. Additionally, sites that discharge to a water body listed on the Section 303(d) List as impaired for sediment or turbidity, or determined to be a “significant threat to water quality,” will be inspected by permittees at least once every 2 weeks during the rainy season. All sites will be inspected prior to a forecasted storm event[3] and within 48 hours after a recorded storm event.[4] The 2012 NPDES Permit

[3] A forecast storm event is defined by the NPDES permit as two or more consecutive days with a greater than 50% chance of rainfall that has been predicted by the National Oceanic and Atmospheric Administration (NOAA). This definition is in agreement with the definition of a storm event in the Construction General Permit.

requires construction sites consisting of less than 1 acre of soil disturbance to be managed through the permittees' erosion and sediment control ordinances and building permit requirements. These smaller construction sites shall be inspected on an as-needed basis. The inspection requirements of the 2012 NPDES Permit are in addition to the visual inspection programs implemented by the construction contractor's Qualified SWPPP Practitioner in accordance with the requirements of the Construction General Permit.[5] Under the 2012 NPDES Permit, permittees are required to use an electronic system to inventory permits for all construction sites.

The General Exception requires more frequent inspections than the 2012 NPDES Permit in areas draining to ASBS 24. Construction sites, defined as sites with 1 acre or more of disturbance (SWRCB, 2010), must be inspected weekly during the rainy season. A summary of the seasonal minimum inspection frequencies required by the two NPDES permits and the General Exception are presented on Table 3-6.

Table 3-6. Minimum Inspection Frequencies for Construction Sites (1 Acre or Greater)

Inspection Program	Inspection Frequency Required in ASBS 24	Historic Inspection Frequency, NPDES Permit Order R4-2012-0175	Historic Inspection Frequency, NPDES Permit Order No. 01-182
Construction	Weekly (rainy season)	Three times (before, during, and following construction) and: Monthly (rainy season) or Once every two weeks (rainy season)*	Once/year, following rain event

*For construction sites tributary to a water body on the Section 303(d) List due to sediment or turbidity.

3.3.1.6 County Construction Site Inspection Program

The LACDPW Architectural Engineering, Construction, and Building and Safety Divisions, along with applicable County departments, are responsible for County construction inspections. The LACDPW's construction program requires all construction projects to develop and implement erosion and sediment control BMP plans prior to the start of construction (i.e., Wet Weather Erosion Control Plan [WWECP] for sites less than one acre of disturbed land, Local Storm Water Pollution Prevention Plan [LSWPPP] and a WWECP for sites greater than 1 acre of disturbed land). The LSWPPP must include year-round BMPs to control pollutants that originate from the construction site due to construction activities.

[4] A recorded storm event is defined in the NPDES permit as a ½-inch rain event. This definition is in agreement with the definition of a storm event in the Construction General Permit.

[5] In accordance with the Construction General Permit, non-storm water visual inspections are required weekly for Risk Level 1, 2, and 3 projects. These inspections are recorded quarterly and performed daily for LUP Type 1, 2, and 3 projects. Inspections are also required before forecasted storm events and within 48 hours of a recorded storm event.

In addition to filing an LSWPPP, for projects greater than 1 acre, the applicant must file a NOI per the State General Construction Storm Water Permit and obtain a WDID number from the State Water Resources Control Board (SWRCB, 2010). Prior to grading plan approvals, the LACDPW requires the applicant to submit copies of the NOI, WDID, and SWPPP. Projects are notified of any required changes to the SWPPP and BMPs prior to the start of the rainy season. Inspections occur thereafter, and also after each significant rainfall event. Post-construction structural BMPs are inspected annually as part of the permit renewal process. In the event that enforcement actions are taken, they occur in the order listed: warnings, stop-work notices, office meetings, notices of violation, referrals to the Regional Board, and fines or non-payment of general contractor's invoices until the violation is corrected.

The LACDPW has begun implementing new protocols to identify and track active construction sites located within the area draining to outfalls that discharge to the ASBS 24 in order to ensure that inspections are implemented in accordance with the General Exception schedule requirements, where applicable.

3.3.1.7 District Construction Site Inspection Program

Aside from its own properties and facilities, the District has no planning, zoning, development, permitting, or other land use authority over new developments or redevelopment projects, or development construction sites within its service area. Under the 2012 NPDES Permit, the District is subject to the minimum control measures of a Public Agency Activities Program, which differ from the minimum control measures imposed on other permittees. Only the Public Construction Activities Management Program, a component of the Public Agency Activities Program, could potentially be applicable to District facilities within the area draining to ASBS 24. When active construction sites under the jurisdiction of District are located within the area draining to ASBS 24, internal construction site inspections would be implemented in accordance with the existing inspection criteria defined by the LACDPW, as discussed in Section 3.3.1.6.

3.3.1.8 City Construction Site Inspection Program

Grading within the City is limited to single-lot development. The area of disturbance is restricted due to development constraints implemented by the City of Malibu Local Coastal Plan and the Municipal Code. The Development Construction Inspection Program is implemented by the Environmental Sustainability Department and the Public Works Department. Applicants are notified if an NOI for coverage under the State General Construction Storm Water Permit is required, and plans are not approved until proof of a WDID has been submitted.

The City's construction inspection program for all sediment-disturbing projects begins with a pre-grading meeting with the general contractor, deputy building official, and building safety inspector (occasionally the LACDPW inspector). At the pre-grading meeting, the SWPPP is reviewed and appropriate BMPs, including sediment and erosion controls, are discussed, and the implementation schedule is developed by construction phase. During the meeting, it is stressed to all contractors that the job site will be shut down until the required measures are in place if the contractor fails to comply. The SWPPP is discussed with the general contractor at commencement of building construction activities, with a reminder of the repercussions (i.e., tiered enforcement actions, up to and including site closure) of failing to comply. Project sites are visited regularly during the grading phase. During the construction phase, the building inspector routinely conducts on-site inspections. The implementation and maintenance of the appropriate BMPs are checked at each inspection.

Violations are addressed immediately. All issues receive an Initial Notice of Violation/Warning and corrective actions are required with strict compliance deadlines (24 hours during rainy weather and up to 72 hours during non-critical times). Sites are then re-inspected to verify compliance and a stop-work order may be issued until compliance is verified (City, 2012).

In accordance the General Construction Permit construction projects of 1 acre or greater are inspected at least twice during the rainy season The City currently inspects all construction sites monthly, and higher risk construction sites before/during rain events as of the 2013-2014 winter. The City has begun implementing new protocols to identify and track active single-lot construction sites located within the area draining to outfalls that discharge to the ASBS 24 to ensure that construction site inspections are implemented weekly during the rainy season, in accordance with the General Exception requirements (summarized on Table 3-6).

3.3.1.9 Storm Drain Outfall Inspection and Cleaning Programs

Existing storm drain inspection programs were implemented in accordance with the requirements of the 2001 NPDES Permit . Each permittee was required to implement a Public Agency Activities Program to minimize storm water pollution impacts and to identify opportunities to reduce these impacts from areas of existing development. One of the activities covered under the Public Agency Activities Program is storm drain operation and maintenance, which includes visual monitoring of open-channels and other drainage structures for trash and debris at least annually; removal of trash and debris from open channels at least once annually prior to the wet season; elimination of the discharge of contaminants during MS4 maintenance; and proper disposal of debris and trash removed during storm drain maintenance. The storm drain inspection frequency was not modified in the 2012 NPDES Permit .

In addition to the annual inspection required by the NPDES Permits, the General Exception requires an additional inspection during the rainy season. A summary of the minimum inspection frequencies required by the two NPDES Permits and the General Exception is presented on Table 3-7.

Table 3-7. Minimum Inspection Frequencies for Storm Drain Outfalls

Inspection Program	Inspection Frequency Required in ASBS 24	Historic Inspection Frequency, NPDES Permit Order R4-2012-0175	Historic Inspection Frequency, NPDES Permit Order No. 01-182
MS4 outfalls	Once prior to rainy season; once during rainy season	Once/year, before the rainy season	Once/year, before the rainy season

3.3.1.10 County MS4 Outfall Inspection Program

Systems within the area draining to ASBS 24 that are at least 18 inches in diameter are generally located in the parking lots along County beaches. Beach sand frequently piles up in the outlet of these systems. These outfalls are cleared by DBH prior to the rainy season and catch basin systems are cleaned out in late summer or early fall, prior to the rainy season and again during the rainy season, as part of the LACDPW's Road Maintenance Division annual drainage inspection program.

The LACDPW has begun implementing new protocols to identify applicable outfalls that discharge to ASBS 24 to ensure that inspections are implemented in accordance with the General Exception schedule requirements (i.e., in addition to prior to the rainy season, second inspection to be performed during the rainy season).

3.3.1.11 City MS4 Outfall Inspection and Cleaning Program

The City's Storm Drain/Culvert Facilities Maintenance program is in place for annual and post-storm inspection and cleaning of storm drain facilities. All storm drain inlets are cleaned annually, and priority storm drains are cleaned at a minimum of twice annually. This program ensures that litter, debris, and pollutants are removed to prevent them from getting into the local waterways and impacting beneficial uses. In collaboration with LACDPW, the City will be conducting similar protocols to identify outfalls that discharge to ASBS 24. In general, citywide outlets are inspected when accessible. No applicable ASBS outlets are owned by the City. A contract service provider conducts the culvert cleaning and maintenance work on behalf of the City.

3.3.2 Inspection Program Enhancements to Comply with ASBS Special Protection Requirements

As the Parties modify their inspection programs to comply with the requirements of the current 2012 NPDES Permit, the Parties will need to include enhanced protocols for inspection programs implemented for sites within the area draining to outfalls that discharge to the ASBS 24. The inspection program requirements of the 2012 NPDES Permit and the General Exception are presented in Section 3.3.1 and the details of the required program enhancements are discussed in the following sections.

3.3.2.1 County Inspection Program Enhancements

The recommended enhancements to the LACDPW's existing inspection program are presented on Table 3-8 and include:

- During the rainy season, increase the inspection frequency to once per week for construction sites (at least 1 acre) under the LACDPW's jurisdiction that are located within the applicable area draining to ASBS 24.
- Conduct inspection and cleaning of storm drain outfalls measuring at least 18 inches in diameter or width catch basins that are located within the area draining to ASBS 24 once prior to the rainy season and once during the rainy season, at a minimum.

Table 3-8. County Inspection Program Enhancements

Program	Enhancement	Frequency
Commercial	Not applicable	-
Industrial	Not applicable	-
Construction (at least 1 acre)	Increase inspection frequency	Once/week (rainy season)
Storm Drain Outfalls	Coordinate inspections with	Once/dry season (prior to rainy season)

	ASBS criteria	and once/rainy season/year

3.3.2.2 District Inspection Program Enhancements

The recommendations for the DPW's inspection program are presented on Table 3-9 and include the following:

- When the District's active construction sites (at least 1 acre) are located within the applicable area draining to ASBS 24, District will implement inspections once per week during the rainy season in accordance with Special Protections and during the dry season in accordance with the requirements of the 2012 NPDES Permit.
- Conduct inspection and cleaning of storm drain outfalls measuring at least 18 inches in diameter or width catch basins which are located within the area draining to ASBS 24 once prior to the rainy season and once during the rainy season, at a minimum.

Table 3-9. District Inspection Program Enhancements

Program	Enhancement	Frequency
Commercial	Not applicable	-
Industrial	Not applicable	-
Construction (at least 1 acre)	Increase inspection frequency	Once/week (rainy season)
Storm Drain Outfalls	Coordinate inspections with ASBS criteria	Once/dry season (prior to rainy season) and once/rainy season/year

3.3.2.3 City Inspection Program Enhancements

The recommended enhancements to the City's existing inspection program are presented on Table 3-10 and include the following:

- During the wet season, increase the inspection frequency for construction sites (at least 1 acre) within the City's jurisdiction that are located within the applicable area draining to ASBS 24 to once per week.
- The outfalls associated with City maintained inlets are located on private properties and considered private. The City does not own or maintain outfalls that discharge to ASBS 24. As such, no enhancements are currently proposed for the City to inspect and clean outfalls.

Table 3-10. City Inspection Program Enhancements

Program	Enhancement	Frequency
Commercial	Increase inspection frequency	Twice/year (rainy season)
Industrial	Currently not applicable based on existing land uses	-
Construction (at least 1 acre)	Increase inspection frequency	Once/week (rainy season)

4.0 RECEIVING WATER ASSESSMENT

A determination of whether there is currently an exceedance of the natural water quality of the ASBS is the first step in the process of assessing the potential pollutant load reductions targets required to enhance the water quality of the ASBS. Wet weather receiving water quality monitoring data results were evaluated in comparison to data for reference monitoring sites, in accordance with the flowchart provided as Attachment 1 to the General Exception, to determine if an exceedance of the natural water quality currently exists.

4.1 Determination of Compliance with Natural Water Quality

In 2008, a study was conducted as part of Bight 2008 to assess water quality in southern California ASBS (Schiff et al., 2011). The study was designed to evaluate the range of natural water quality near reference drainage locations and to compare water quality near ASBS discharges to these natural water quality conditions. Additional reference monitoring was performed under the Regional Monitoring Program. During the development of this draft Compliance Plan, compliance with natural water quality was determined by comparing receiving water data from wet weather monitoring recently conducted for ASBS 24 to the 85th percentile threshold of reference sample concentrations measured during Bight 2008 and Bight 2013.

Concentrations of pollutants in post-storm receiving water were compared to those in pre-storm receiving water and to the 85th percentile threshold of reference sample concentrations. When post-storm receiving water concentrations are greater than the 85th percentile threshold and are greater than pre-storm concentrations for two or more storm events, results from the next storm are analyzed. If post-storm receiving water concentrations are again greater than the 85th percentile threshold and pre-storm concentrations, the constituent(s) are classified as exceedances of natural water quality. Concentrations of TSS, ammonia, nitrate, total orthophosphate, and total metals were compared to the 85th percentile thresholds.

Wet weather monitoring was performed by LACDPW at two receiving water locations: 1) S01, located off Zuma Beach directly out from ASBS-016, a 60-inch storm drain; and 2) S02, located off Escondido Beach, directly out from ASBS-028, a 36-inch storm drain. Monitoring was conducted during storm events occurring on February 19 and March 8, 2013, and February 28, 2014. Wet weather flows from ASBS-016 only reached the ocean receiving water at S01 during the February 28, 2014, monitored event. The City performed monitoring at receiving water Site 24-BB-03R. For safety reasons, this site was only sampled during the February 28, 2014, event. Therefore, the assessment of compliance with natural water quality was primarily performed for receiving water station S02, which had samples collected during three wet weather events. Receiving water station S02 is associated with ASBS-028, which is a 36-inch outfall that drains a mixture of developed and vacant land. There are additional identified point source clustered west and east of this site with three (ASBS-025, ASBS-026, and ASBS-027) located to the west (within 0.25 miles) and two (ASBS-029 and ASBS-030) located to the east (within 0.1 miles). Therefore, receiving water station S02 is considered to be representative of the typical to worst case scenario of the potential impact that storm water runoff may have on the water quality within the ASBS. Figure 4-1 shows the locations of the receiving water stations monitored in support of the preparation of this Plan.

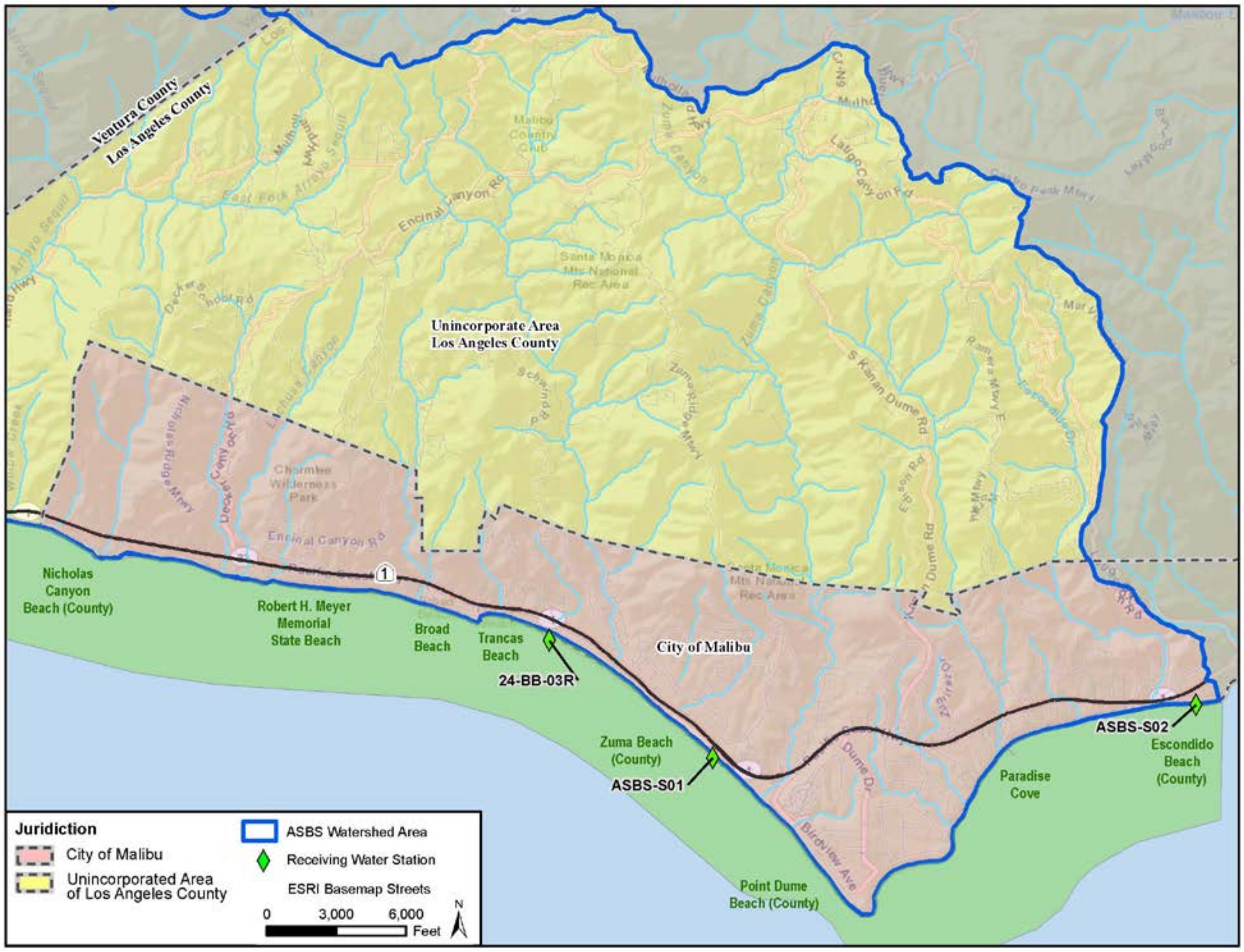

Figure 4-1. ASBS 24 Receiving Water Monitoring Locations

4.1.1 February 19, 2013, Storm Event Receiving Water Monitoring

The February 2013 storm event resulted in approximately 0.12 inches of rainfall based on rain gauge data obtained from County Fire Station 70 located at 3970 Carbon Canyon Road in Malibu, CA. Receiving water results were compared to the available list of constituents of reference site 85th percentile values. Post-storm concentrations of nitrate as nitrogen (N), selenium, total PAHs, and total pyrethroids were greater than the 85th percentile threshold (see Table 4-1). However, the nitrate as N post-storm concentration was less than the pre-storm concentration; therefore, the nitrate as N concentration is considered to be similar to background concentrations and is not classified as an exceedance. Since the selenium, total PAHs, and total pyrethroids concentrations were greater than the 85th percentile threshold and were greater than pre-storm concentrations, results from the proceeding storm event were analyzed to determine whether the natural water quality has been exceeded.

For constituents that are summed to get total values for comparison to 85th percentile total values (e.g., all OP pesticides, total PAHs, total pyrethroids), half of the method detection limits (MDL) were used for non-detect values. In the case of total pyrethroids for example, the reference sampling resulted in all non-detect values, and therefore the summation of the MDLs for the 10 selected pyrethroids is 6.75 µg/L. Following this process to determine total pyrethroids for the ASBS 24 receiving water stations results in an exceedance of 85th percentile threshold value anytime a pyrethroid included in the assessment has a measurable result (i.e., 85th percentile threshold in reality is zero). In actuality, the individual pyrethroid values may be less than half the MDL values (undetermined currently based on laboratory limitations) resulting in the possibility that the total pyrethroid value is less than the 85th percentile threshold. The same is true for both all OP pesticides and total PAHs assessments.

Table 4-1. February 2013 Receiving Water Results

Parameter	Units	85th Percentile of Reference Data	S01-PRE	S02-PRE	S02-POST
			2/18/2013	2/18/2013	2/19/2013
General Chemistry					
Ammonia as N	mg/L	0.015	0.09	0.04J	<0.02
Nitrate as N	mg/L	0.374	0.51	0.38	0.25
Oil & Grease	mg/L	0.5	14.1	<1	<1
Total Orthophosphate as P	mg/L	0.114	0.02	0.02	0.03
Total Suspended Solids	mg/L	55.4	5.2	7.9	40.5
Total Metals					
Arsenic (As)	µg/L	`	1.718	1.471	1.393
Cadmium (Cd)	µg/L	0.16	0.0229	0.0601	0.058
Chromium (Cr)	µg/L	2.6	0.3192	0.5437	0.6366
Copper (Cu)	µg/L	1.9	0.149	0.321	0.454
Lead (Pb)	µg/L	0.72	0.0513	0.102	0.1867
Mercury (Hg)	µg/L	0.0006	<0.0012	<0.0012	<0.0012
Nickel (Ni)	µg/L	2.2	0.2724	0.509	0.7661
Selenium (Se)	µg/L	0.017	0.007J	0.015	0.031
Silver (Ag)	µg/L	0.08	0.03	0.01J	<0.01
Zinc (Zn)	µg/L	19	1.0376	1.2033	12.2809
Organophosphorus Pesticides					
*All OP Pesticides	ng/L	6	6	6	6
Polynuclear Aromatic Hydrocarbons					
*Total PAHs	ng/L	12.5	12.5	12.5	41.1
Pyrethroids					
Bifenthrin	ng/L		<0.5	<0.5	<0.5
Deltamethrin/Tralomethrin	ng/L		<0.5	<0.5	<0.5
Esfenvalerate	ng/L		1.1J	<0.5	0.8J
All Other Pyrethroids	ng/L		ND	ND	ND
*Total Pyrethroids	ng/L	6.75	8.6	6.75	7.3

< - result less than the MDL.
ND - results less than the MDLs (multiple MDL values)
J - Analyte was detected at a concentration below the reporting limit and above the method detection limit. Reported value is estimated.

Red outline – Post-storm receiving water concentration is greater than 85th percentile of Reference Data AND greater than pre-storm concentration.

*Totals calculated using result values when if detected and half the MDL when results were <MDL.

4.1.2 March 8, 2013, Storm Event Receiving Water Monitoring

The March 2013 storm event resulted in approximately 0.74 inches of rainfall based on rain gauge data obtained from County Fire Station 70. The selenium and total PAHs concentrations in the receiving water were again greater than both the 85th percentile threshold and pre-storm concentrations (see Table 4-2). As a result, the concentrations of both constituents are considered to be exceedances of natural water quality and may be contributing to alterations in natural ocean water quality within ASBS 24. In addition, concentrations of nitrate as N, copper, lead, mercury, zinc, and total PAHs were greater than both the 85th percentile threshold and pre-storm concentrations. Results from the subsequent monitored wet weather event (February 2014) were used to evaluate whether the listed constituents in storm water runoff were considered to be contributing to an exceedance of natural water quality.

The receiving water Site S02 results for the first monitored event (February 2013 event) included a concentration total pyrethroid that was greater than both the 85th percentile threshold and pre-storm concentrations (see Table 4-1). The February 2014 receiving water Site S02 concentration for total pyrethroid was not greater than both the 85th percentile threshold and pre-storm concentrations (see Table 4-2).

Table 4-2. March 2013 Receiving Water Results

Parameter	Units	85th Percentile of Reference Data	S01-PRE 3/6/2013	S02-PRE 3/6/2013	S02-POST 3/8/2013
General Chemistry					
Ammonia as N	mg/L	0.015	0.04J	0.03J	<0.02
Nitrate as N	mg/L	0.374	0.48	0.49	0.54
Oil & Grease	mg/L	0.5	<1	<1	<1
Total Orthophosphate as P	mg/L	0.114	0.03	0.03	0.06
Total Suspended Solids	mg/L	55.4	3.8	14.9	33.3
Total Metals					
Arsenic (As)	µg/L	1.72	1.558	1.563	1.577
Cadmium (Cd)	µg/L	0.16	0.0281	0.0587	0.1396
Chromium (Cr)	µg/L	2.6	0.2422	0.6549	2.5224
Copper (Cu)	µg/L	1.9	0.157	0.378	2.924
Lead (Pb)	µg/L	0.72	0.0288	0.1558	1.0434
Mercury (Hg)	µg/L	0.0006	<0.0012	<0.0012	0.0046J
Nickel (Ni)	µg/L	2.2	0.2849	0.625	1.8595
Selenium (Se)	µg/L	0.017	0.008J	0.017	0.052
Silver (Ag)	µg/L	0.08	<0.01	0.01J	<0.01
Zinc (Zn)	µg/L	19	2.6986	37.8762	54.1039
Organophosphorus Pesticides					
*All OP Pesticides	ng/L	6	6	6	6
Polynuclear Aromatic Hydrocarbons					
*Total PAHs	ng/L	12.5	12.5	12.5	25.5
Pyrethroids					
Bifenthrin	ng/L		<0.5	<0.5	8.4
Deltamethrin/Tralomethrin	ng/L		10.6	26.6	<0.5
Esfenvalerate	ng/L		<0.5	<0.5	<0.5
All Other Pyrethroids	ng/L		ND	ND	ND
*Total Pyrethroids	ng/L	6.75	19.85	35.85	17.65

< - result less than the MDL.
ND - results less than the MDLs (multiple MDL values)
J - Analyte was detected at a concentration below the reporting limit and above the method detection limit. Reported value is estimated.
Red outline – Post-storm receiving water concentration is greater than 85th percentile of Reference Data AND greater than pre-storm concentration.
Orange fill – Analyte concentration has exceeded 85th percentile of Reference Data during 1st and 2nd monitoring event.
*Totals calculated using result values if above the MDL and half the MDL when results were less than the MDL.

4.1.3 February 28, 2014, Storm Event Receiving Water Monitoring

The February 2014 storm event resulted in a total event rainfall of approximately 2.26 inches of rainfall based on rain gauge data obtained from County Fire Station 70. Pre- and post-storm samples were collected at Sites S01, S02, and 24-BB-03R.

The concentrations of total orthophosphate as P, TSS, mercury, selenium, silver, total PAHs, and total pyrethroids in receiving water at Site S02 were greater than both the 85th percentile threshold and pre-storm concentrations (see Table 4-3). Based on the results from the first and second monitored events in accordance with the General Exception, selenium and total PAHs are considered to be exceedances of natural water quality. The selenium and total PAHs results at Site S02 from the February 2014 event are consistent with those previous data. The mercury result being higher than both the 85th percentile threshold and pre-storm concentration for the second consecutive monitored event is considered to be exceedance of the natural water quality and may be contributing to alterations in natural ocean water quality within ASBS 24. Of the three storms monitored, the February 2014 events results for Site S02 are the only one where orthophosphate as P, TSS, or silver were above both the 85th percentile threshold and pre-storm concentrations. Therefore, the receiving water Site S02 measured concentrations of total orthophosphate as P, TSS, and silver being above both the 85th percentile threshold and pre-storm concentrations during one event are not considered to be exceedances of natural water quality.

The receiving water Site S02 results for the second monitored event (March 2013 event) included concentrations of nitrate as N, copper, lead and zinc that were greater than both the 85th percentile threshold and pre-storm concentrations (see Table 4-2). The February 2014 receiving water Site S02 concentrations for nitrate as N, copper, lead, and zinc were not greater than both the 85th percentile threshold and pre-storm concentrations (see Table 4-3), and therefore these constituents are not considered to be exceedances of the natural water quality.

Mercury, silver, zinc, and total PAHs concentrations in receiving water were greater than both the 85th percentile threshold and pre-storm concentrations for Site S01 (see Table 4-3). This monitored event was the only one of three in which flow from ASBS-016 reached the receiving water at Site S01, and thus, was the only time receiving water chemistry data were obtained at S01 as part of the General Exception monitoring. Based on first and second event results for Site S02, total PAHs is considered to be an exceedances of natural water quality. Based on second and third event results for Site S02, mercury is considered to be an exceedance of natural water quality. The receiving water Site S01 measured concentrations of silver and zinc being above both the 85th percentile threshold and pre-storm concentrations during one event is not considered to be an exceedance of natural water quality.

Pre-storm and post-storm samples were collected and analyzed at Site 24-BB-03R. For safety reasons, this site was not sampled previous to this event. The selenium concentration in the receiving water was greater than both the 85th percentile threshold and pre-storm concentrations for Site 24-BB-03R (see Table 4-3). The concentration of selenium being above the 85th percentile threshold and pre-storm concentrations is not considered an exceedance of natural water quality at Site 24-BB-03R. The selenium result at Site 24-BB-03R above the 85th percentile threshold and pre-storm concentrations are consist with the results for Site S02 where selenium is considered to be an exceedance of natural water quality based on the first and second event results.

Table 4-3. February 2014 Receiving Water Results

Parameter	Units	85th Percentile of Reference Data	S01-PRE 2/25/2014	S01-POST 2/28/2014	S02-PRE 2/25/2014	S02-POST 2/28/2014	24-BB-03R-PRE 2/25/2014	24-BB-03R-POST 2/28/2014
General Chemistry								
Ammonia as N	mg/L	0.015	<0.02	<0.02	<0.02	<0.02	ND	ND
Nitrate as N	mg/L	0.374	0.03J	0.02J	0.02J	<0.01	0.04	ND
Oil & Grease	mg/L	0.5	<1	<1	<1	<1	ND	ND
Total Orthophosphate as P	mg/L	0.114	0.02	0.02	0.02	0.18	0.02	0.02
Total Suspended Solids	mg/L	55.4	19.5	25.2	87.7	150	10.8	7.1
Total Metals								
Arsenic (As)	µg/L	1.72	1.472	1.283	6.604	4.122	1.388	1.322
Cadmium (Cd)	µg/L	0.16	0.0249	0.0228	0.5099	0.2623	0.0152	0.022
Chromium (Cr)	µg/L	2.6	1.1131	0.3893	26.0119	4.9578	1.4705	0.6962
Copper (Cu)	µg/L	1.9	0.676	0.221	6.001	2.289	0.167	0.646
Lead (Pb)	µg/L	0.72	0.2367	0.0584	7.265	1.5477	ND	0.2159
Mercury (Hg)	µg/L	0.0006	<0.0012J	0.014	<0.0012	0.0261	ND	ND
Nickel (Ni)	µg/L	2.2	0.8679	0.3565	21.5664	4.2441	0.2951	0.4901
Selenium (Se)	µg/L	0.017	0.016	0.011J	0.083	0.155	0.012	0.026
Silver (Ag)	µg/L	0.08	0.09	0.18	0.03	0.14	0.14	0.12
Zinc (Zn)	µg/L	19	5.3515	21.0509	41.7076	12.0229	2.9144	17.3532
Organophosphorus Pesticides								
*All OP Pesticides	ng/L	6	6	6	6	6	6	6
Polynuclear Aromatic Hydrocarbons								
*Total PAHs	ng/L	12.5	17.4	18.5	29.6	84.1	19.2	18.8
Pyrethroids								
Bifenthrin	ng/L		<0.5	<0.5	<0.5	2.5	<0.5	<0.5
Deltamethrin/Tralomethrin	ng/L		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Esfenvalerate	ng/L		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
All Other Pyrethroids	ng/L		ND	ND	ND	ND	ND	ND
*Total Pyrethroids	ng/L	6.75	6.75	6.75	6.75	9	6.75	6.75

< - result less than the MDL.
ND - results less than the MDLs (multiple MDL values)
J - Analyte was detected at a concentration below the reporting limit and above the method detection limit. Reported value is estimated.
Red outline – Post-storm receiving water concentration is greater than 85th percentile of Reference Data AND greater than pre-storm concentration.
Orange fill – Analyte concentration has exceeded 85th percentile of Reference Data during 1st and 2nd monitoring event.
*Totals calculated using result values if above the MDL and half the MDL when results were less than the MDL.

4.1.4 Receiving Water Monitoring Conclusions

In post-storm samples collected in the receiving water (Site S02), selenium and total PAHs concentrations were above the 85th percentile reference threshold and had post-storm concentrations that exceeded those of the pre-storm samples collected during three consecutive monitored storm events (February and March 2013 and February 2014)Mercury results at Site S02 were above 85th percentile reference threshold and pre-storm concentrations for two consecutive events (March 2013 and February 2014). Based on the guidance found in

Attachment 1 of the General Exception, this indicates an exceedance of natural water of the ASBS for these constituents.

Receiving water samples (Site S02) collected during the second monitored event had concentrations of nitrate as N, copper, lead, and zinc above the 85th percentile reference thresholds and were above the pre-storm concentrations. Based on Attachment 1 of the General Exception, if these constituents are above the 85th percentile reference thresholds in post-storm receiving water samples collected during the next monitoring event, then there would be an exceedance in the natural water quality of the ASBS for these additional constituents. February 2014 receiving water (Site S02) concentrations for nitrate as N, copper, lead, and nickel were not greater than both the 85th percentile threshold and pre-storm concentrations, and these constituents are not considered an exceedance of natural water quality.

Of the three storms monitored, the only event in which flow from ASBS-016 reached the receiving water at Site S01 was during the February 28, 2014, storm (third monitored event), and thus, was the only time receiving water chemistry data were obtained at S01 as part of the General Exception monitoring. Mercury, silver, zinc and total PAHs concentrations in receiving water were greater than both the 85th percentile threshold and pre-storm concentrations for Site S01. Based on the Site S02 results from the first and second events total PAHs is considered to be exceedance of natural water quality. Based on the Site S02 results from the second and third events mercury is considered to be exceedance of natural water quality. The receiving water Site S01 measured concentrations of silver and zinc being above both the 85th percentile thresholds and pre-storm concentrations during one event is not considered to be exceedances of natural water quality.

Pre-storm and post-storm samples were collected and analyzed at Site 24-BB-03R. For safety reasons, this site was not sampled previous to this event. The selenium concentration in receiving water was greater than both the 85th percentile threshold and pre-storm concentration for Site 24-BB-03R (see Table 4-3). The concentration of selenium being above the 85th percentile threshold and pre-storm concentrations is not considered an exceedance of natural water quality at Site 24-BB-03R. The selenium results at Site 24-BB-03R above the 85th percentile threshold and pre-storm concentrations are consistent with the results for Site S02 where selenium is considered to be an exceedance of natural water quality based on the first and second event results

4.2 Bight 2008 Data for ASBS 24

A review of Bight 2008 ASBS 24 data was conducted, and a summary of the review is provided for reference and for comparison to the determination made in this Compliance Plan. Bight 2008 constituent concentrations values were obtained from a series of graphs provided as an appendix to the Bight 2008 report and are approximate (tabular data not currently available). The Bight 2008 effort included collecting and analyzing both reference and discharge receiving water samples. The Bight 2008 report showed the comparison between the reference 85th percentile threshold values and discharge samples (Schiff et al., 2011).

4.2.1 Metals

For total chromium, the Bight 2008 85th percentile threshold of reference conditions was 1.6 µg/L (revised by Bight 2013 data to 2.6 µg/L). Of the five ASBS 24 post-storm samples assessed for total chromium during Bight 2008, four had concentrations below the threshold (ranging from approximately 0.5 to 1.0 µg/L) and one was above the threshold (approximately 3.4 µg/L)(Schiff et al., 2011).

For total copper, the Bight 2008 85th percentile threshold was 2.2 µg/L (revised by Bight 2013 data to 1.9 µg/L). Of the three ASBS 24 post-storm samples assessed for total copper during Bight 2008, two had concentrations below the threshold (approximately 0.4 and 0.5 µg/L) and one was slightly above the threshold (approximately 2.3 µg/L)(Schiff et al., 2011).

For total nickel, the Bight 2008 85th percentile threshold was 1.5 µg/L (revised by Bight 2013 data to 2.2 µg/L). For the three ASBS 24 post-storm samples assessed during Bight 2008, two had concentrations below the threshold (approximately 0.5 and 0.7 µg/L) and one was above the threshold (approximately 4.2 µg/L)(Schiff et al., 2011).

For total zinc, the Bight 2008 85th percentile threshold was 8.6 µg/L (revised by Bight 2013 data to 19 µg/L). Of the five ASBS 24 post-storm samples assessed for total zinc during Bight 2008, three had concentrations below the threshold (ranging from 0 to approximately 2.1 µg/L) and two were above the threshold (approximately 10.5 and 11.0 µg/L)(Schiff et al., 2011).

Samples collected as part of the Bight 2008 efforts were not analyzed for mercury or selenium, and thus no Bight 85th percentile thresholds were established for these constituents.

4.2.2 Total Suspended Solids

For TSS, the Bight 2008 85th percentile threshold was 16.5 mg/L(revised by Bight 2013 data to 55.4 µg/). Of the five ASBS 24 post-storm samples assessed for TSS during the Bight 2008, two had concentrations below the threshold (approximately 8.0 and 10.0 µg/L) and three were above the threshold (ranging from approximately 50 to 130 µg/L)(Schiff et al., 2011).

4.2.3 Total PAHs

For total PAHs, the Bight 2008 85th percentile threshold was 19.6 ng/L (revised by Bight 2013 data to 12.5 ng/L). Of the four ASBS 24 post-storm samples assessed for total PAHs during the Bight 2008, all four samples had concentrations below the threshold (approximately 0, 5, 8, and 11 ng/L)(Schiff et al., 2011).

4.2.4 Organophosphorus Pesticides and Pyrethroids

Samples collected as part of the Bight 2008 efforts were not analyzed for organophosphorus pesticides or pyrethroids, and thus no Bight 85th percentile thresholds were established for these constituents.

5.0 OUTFALL ASSESSMENT OF POLLUTANT LOAD REDUCTION TARGETS

An assessment of the potential pollutant load reductions targets was performed to determine the magnitude of controls required to be implemented in order to enhance the water quality of the ASBS. The first step in the assessment process was to evaluate wet weather receiving water quality monitoring data in comparison to data for reference monitoring sites, in accordance with the flowchart provided as Attachment 1 to the General Exception, to determine if an exceedance of the natural water quality currently exists (see Section 4.0). This evaluation determined that an exceedance of natural water exists for three constituents at receiving water Site S02 and discussed in more detail in Section 4.0. Water quality results from outfall monitoring were evaluated for the applicable constituent to identify discharge locations that have a potential to be contributing to the exceedance of natural water quality. More specifically, the assessment evaluated where BMPs may be required to achieve outfall design storm discharge concentrations, on average, by either: 1) end-of-pipe concentrations below the Table B Instantaneous Maximum Water Quality Objectives (WQOs) in Chapter II of the Ocean Plan, or 2) achieving a 90% reduction in pollutant loading during storm events for the responsible applicant's total discharge. The Ocean Plan was updated subsequent to the General Exception adoption. The updated Ocean Plan now refers to Table B as Table 1 (formerly Table B), and this Plan utilized the updated table title.

5.1 Outfall Wet Weather Monitoring Results

The General Exception states that the ASBS Compliance Plan shall describe how the necessary pollutant reductions in storm water runoff will be achieved through prioritization of outfalls and implementation of BMPs to reduce end-of-pipe pollutant concentrations during a design storm to below either the Table 1 Instantaneous Maximum WQOs in Chapter II of the Ocean Plan or a 90% reduction in pollutant loading during storm events for the applicant's total discharge. For the constituents that are currently in exceedance of the natural water quality of the ASBS (mercury, selenium, and total PAHs), this draft ASBS Compliance Plan evaluates outfall discharges in comparison to the Table 1 Instantaneous Maximum WQOs as the pollutant load targets in order to be in compliance with the General Exception.

Chemistry results obtained from outfalls to ASBS 24 during the February 2013, March 2013, and February 2014 storm events are presented on Table 5-1 through Table 5-3, respectively. Site ASBS-008 was not added to the monitoring list until after the February 19, 2013, storm event, so no data were collected during the first monitoring event. Site ASBS-008 was inadvertently not monitored during the third storm event. Sites ASBS-013, ASBS-016, and ASBS-031 did not flow during the February 19, 2013, storm event, and Sites ASBS-013 and ASBS-031 did not flow during the March 8, 2013, storm event. Site ASBS-031 did not flow during the February 2014 storm event. Outfalls that were less than 36 inches in diameter were evaluated for oil and grease and TSS only, while outfalls that were 36 inches or greater in diameter were evaluated for ammonia, nitrate, oil and grease, TSS, total orthophosphate, total metals, PAHs, organophosphorus pesticides, and pyrethroids. Table 5-1 through Table 5-3

Table 5-3 include both PAHs (based on 13 constituents listed in the Ocean Plan) and total PAHs (based on the 25 constituents analyzed by the laboratory based on guidance from the Bight 2013 Committee). These tables also list the more commonly detected individual pyrethroids as well as the total pyrethroids.

Table 5-1. February 2013 Outfall Chemistry Results

Parameter	Units	CA Ocean Plan Instantaneous Maximum	001	002	003	004	005	008	011	013	016[1]	018	021	022	023	024	025	026	027	028[2]	029	030	031
			2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013	2/19/2013
General Chemistry																							
Ammonia as N	mg/L	6			1.47		1.12	Not sampled		Not sampled	Not sampled		0.78	1	0.68					0.64			Not sampled
Nitrate as N	mg/L				10.15		5.57						4.48	8.24	12.45					7.02			
Oil & Grease	mg/L		1.3	1.4	1.6	4	1.6		<1			<1	<1	1.9	2.3	6	3.7	7	3.1	<1	<1	30.9	
Total Orthophosphate as P	mg/L				0.53		0.6						0.22	0.35	0.63					0.28			
Total Suspended Solids	mg/L		270.7	53.8	584	284	186.5		1.8			75.5	22.5	38.7	63.2	453	90.5	870	218	16.3	133	61.3	
Total Metals																							
Arsenic (As)	µg/L	80			2.129		1.664	Not sampled		Not sampled	Not sampled		1.15	0.949	2.231					0.876			Not sampled
Cadmium (Cd)	µg/L	10			0.3074		0.3482						0.0953	0.1168	0.201					0.269			
Chromium (Cr)	µg/L	20			10.1209		7.9002						1.393	3.1286	3.2046					1.8548			
Copper (Cu)	µg/L	30			63.557		30.469						11.434	84.928	266.162					13.136			
Lead (Pb)	µg/L	20			13.9921		5.8034						1.317	4.3272	4.8762					2.0076			
Mercury (Hg)	µg/L	0.4			0.1611		0.0505						<0.0012	<0.0012	<0.0012					<0.0012			
Nickel (Ni)	µg/L	50			11.5741		10.4739						2.7542	3.1307	7.007					5.2478			
Selenium (Se)	µg/L	150			0.794		0.102						0.138	0.151	0.355					0.435			
Silver (Ag)	µg/L	7			<0.01		<0.01						<0.01	<0.01	<0.01					<0.01			
Zinc (Zn)	µg/L	200			141.3834		128.8537						60.3801	135.3146	269.0515					38.9739			
Organophosphorus Pesticides																							
*All OP Pesticides	ng/L				ND		ND	N.S.		N.S.	N.S.		ND	ND	2868.9					ND			N.S.
Polynuclear Aromatic Hydrocarbons																							
Fluoranthene	ng/L				59.2		122	Not Sampled		Not Sampled	Not Sampled		26.9	70.9	101.2					<1			Not Sampled
PAHs[3]	ng/L				102		208.4						42	103.7	255.6					<1			
Total PAHs[4]	ng/L				161.2		341.4						68.9	174.6	380.2					6.1			
Pyrethroids																							
Bifenthrin	ng/L				700.8		<0.5	Not Sampled		Not Sampled	Not Sampled		<0.5	320.9	1184.5					<0.5			Not Sampled
Deltamethrin/Tralomethrin	ng/L				<0.5		<0.5						<0.5	<0.5	<0.5					<0.5			
Esfenvalerate	ng/L				152.4		<0.5						<0.5	<0.5	<0.5					<0.5			
All Other Pyrethroids	ng/L				29.3		ND						ND	ND	344.4					ND			
*Total Pyethroids	ng/L				882.5		ND						ND	320.9	1528.9					ND			

< - results less than the method detection limit (MDL).

ND - results less than the MDLs (multiple results)

Green fill- concentration is greater than California Ocean Plan Imax criteria

Note 1 - Site associated with Receiving Water Station S01

Note 2 - Site associated with Receiving Water Station S02

Note 3 - PAHs based on constituents listed in Ocean Plan

Note 4 - Total PAHs based on constituents listed in Bight 2013 Work Plan.

Table 5-2. March 2013 Outfall Chemistry Results

Parameter	Units	CA Ocean Plan	001	002	003	004	005	008	011	013	016[1]	018	021	022	023	024	025	026	027	028[2]	029	030	031
		Instantaneous Maximum	3/8/2013	3/8/2013	3/8/2013	3/7/2013	3/7/2013	3/8/2013	3/7/2013	3/7/2013	3/8/2013	3/8/2013	3/8/2013	3/7/2013	3/8/2013	3/8/2013	3/8/2013	3/7/2013	3/7/2013	3/8/2013	3/7/2013	3/7/2013	3/7/2013
General Chemistry																							
Ammonia as N	mg/L	6			2.1		4.75			Not Sampled	4.8		0.57	1.32	0.66					7.8			Not Sampled
Nitrate as N	mg/L				3.78		3.51				10.2		3.24	4.84	5.15					5.29			
Oil & Grease	mg/L		221.1	<1	1.1	83.4	<1	<1	<1		<1	<1	<1	<1	1.3	1.2	1.5	4.8	1.7	6.7	<1	1.2	
Total Orthophosphate as P	mg/L				0.5		0.34				0.79		0.51	0.16	0.51					0.75			
Total Suspended Solids	mg/L		531	52.7	315.7	17.5	37.1	115.4	<0.5		782	58.1	64.1	10.7	33	63.6	64.3	660	17.9	616	29.7	32.4	
Total Metals																							
Arsenic (As)	µg/L	80			2.505		1.43			Not Sampled	3.738		2.13	2.257	2.158					7.287			Not Sampled
Cadmium (Cd)	µg/L	10			0.6881		0.0848				1.2527		0.5355	0.0901	0.0767					10.9524			
Chromium (Cr)	µg/L	20			23.8781		2.5783				39.2081		7.1327	1.9708	1.8344					32.3596			
Copper (Cu)	µg/L	30			41.556		27.149				33.872		20.484	35.044	116.98					198.495			
Lead (Pb)	µg/L	20			19.8277		1.7097				10.1402		3.9416	1.0592	3.6519					46.2982			
Mercury (Hg)	µg/L	0.4			0.0238		0.0158				0.0236		0.0148	0.007J	<0.0012					0.0596			
Nickel (Ni)	µg/L	50			22.3039		4.5323				47.8272		10.479	2.0729	3.4917					77.0818			
Selenium (Se)	µg/L	150			0.363		0.115				0.176		0.076J	0.521	0.151					1.004			
Silver (Ag)	µg/L	7			<0.01		0.06				<0.01		0.08	0.06	0.04					0.06			
Zinc (Zn)	µg/L	200			142.7101		104.6536				125.2092		88.1959	41.841	157.6642					800.687			
Organophosphorus Pesticides																							
*All OP Pesticides	ng/L				ND		ND			N.S.	ND		ND	ND	4128.6					ND			N.S.
Polynuclear Aromatic Hydrocarbons																							
Fluoranthene	ng/L				199.3		29.4			Not Sampled	70		51.8	9.8	83.8					476			Not Sampled
PAHs[3]	ng/L				665.2		53				231.3		131.8	18.5	251.4					1145.6			
Total PAHs[4]	ng/L				1036.2		101.4				340.2		205.2	31.3	473.9					1754.2			
Pyrethroids																							
Bifenthrin	ng/L				214		<0.5			Not Sampled	<0.5		<0.5	74.6	167.5					203.9			Not Sampled
Deltamethrin/Tralomethrin	ng/L				<0.5		50.3				<0.5		<0.5	<0.5	<0.5					<0.5			
Esfenvalerate	ng/L				<0.5		<0.5				<0.5		<0.5	<0.5	<0.5					<0.5			
All Other Pyrethroids	ng/L				ND		37.8				ND		ND	ND	268.6					ND			
*Total Pyethroids	ng/L				214		88.1				ND		ND	74.6	436.1					203.9			

< - results less than the method detection limit (MDL).

ND - results less than the MDLs (multiple results)

Green fill- concentration is greater than California Ocean Plan Imax criteria

Note 1 - Site associated with Receiving Water Station S01

Note 2 - Site associated with Receiving Water Station S02

Note 3 - PAHs based on constituents listed in Ocean Plan

Note 4 - Total PAHs based on constituents listed in Bight 2013 Work Plan.

Table 5-3. February 2014 Outfall Chemistry Results

Parameter	Units	CA Ocean Plan	001	002	003	004	005	008	011	013	016[1]	018	021	022	023	024	025	026	027	028[2]	029	030	031	24-BB-02Z	24-BB-03Z
		Instantaneous Maximum	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014	2/28/2014
General Chemistry																									
Ammonia as N	mg/L	6			4.95		0.37				0.68		0.43	1.51	<0.02					0.21					0.47
Nitrate as N	mg/L				0.63		0.54				0.72		0.86	1.53	24.54					0.27					0.2
Oil & Grease	mg/L		<1	<1	2.5	<1	<1	Not Sampled	<1	<1	<1	<1	<1	<1	<1	<1	<1	2.5	1.3	1J	<1	1.3	Not Sampled	ND	ND
Total Orthophosphate as P	mg/L				1.08		0.2				0.86		0.83	0.84	0.94					0.27					0.34
Total Suspended Solids	mg/L		79.2	296	5095	593	497		70.4	119	803	55.3	148	7.9	4.8	27.5	18.2	103.2	78.8	40.3	1.9	42.6		82.8	393
Total Metals																									
Arsenic (As)	µg/L	80			9.083		1.792				2.748		3.523	3.733	4.731					0.656					2.598
Cadmium (Cd)	µg/L	10			3.8221		0.5467				1.4084		0.5483	0.1789	0.2771					0.1864					0.5776
Chromium (Cr)	µg/L	20			75.3533		20.632				23.607		5.9767	2.1554	1.7879					1.2621					22.7594
Copper (Cu)	µg/L	30			109.663		27.954				29.906		25.054	56.105	84.921					26.219					28.435
Lead (Pb)	µg/L	20			71.7821		6.1139	Not Sampled			8.1312		5.7255	2.1098	0.5393					17.5522			Not Sampled		16.3304
Mercury (Hg)	µg/L	0.4			<0.0012		<0.0012				<0.0012		<0.0012	<0.0012	<0.0012					<0.0012					<0.0012
Nickel (Ni)	µg/L	50			91.1114		25.8248				38.049		9.1185	4.7738	8.8064					2.9016					11.9473
Selenium (Se)	µg/L	150			0.331		0.221				0.226		0.319	1.22	5.101					0.334					0.099
Silver (Ag)	µg/L	7			0.17		0.08				0.1		0.07	0.21	0.06					0.01J					0.02
Zinc (Zn)	µg/L	200			454.8282		98.3671				151.1528		93.2702	97.0057	199.0364					87.6536					177.7661
Organophosphorus Pesticides																									
*All OP Pesticides	ng/L				ND		ND	N.S.			ND		ND	ND	ND					ND			N.S.		ND
Polynuclear Aromatic Hydrocarbons																									
Fluoranthene	ng/L				753.3		243				92.6		105.8	14.2	612.6					204.7					210.7
PAHs[3]	ng/L				7159.2		906.4	Not Sampled			778		570.3	54.7	1982.1					812.2			Not Sampled		1633.1
Total PAHs[4]	ng/L				9115.8		1341.8				1087.2		773.6	130.2	3195.6					1178.8					2187.2
Pyrethroids																									
Bifenthrin	ng/L				694.4		43.4				5.4		80.3	16.9	188.7					1673.6					31.6
Deltamethrin/Tralomethrin	ng/L				<0.5		<0.5				<0.5		<0.5	<0.5	<0.5					<0.5					<0.5
Esfenvalerate	ng/L				15.6		<0.5	Not Sampled			<0.5		1.5J	0.6J	<0.5					<0.5			Not Sampled		<0.5
All Other Pyrethroids	ng/L				3979.8		1.6				132.4		7.6	86.6	19.9					2.2					44.6
*Total Pyethroids	ng/L				4689.8		45				137.8		89.4	104.1	208.6					1675.8					76.2

< - results less than the method detection limit (MDL).
ND - results less than the MDLs (multiple results)
Green fill- concentration is greater than California Ocean Plan Imax criteria
Note 1 - Site associated with Receiving Water Station S01
Note 2 - Site associated with Receiving Water Station S02
Note 3 - PAHs based on constituents listed in Ocean Plan
Note 4 - Total PAHs based on constituents listed in Bight 2013 Work Plan.

The Ocean Plan Table 1 Instantaneous Maximum WQOs for mercury and selenium are 0.4 µg/L and 150 µg/L, respectively. Table 1 does not list Instantaneous Maximum WQOs for PAHs. This Plan focused on mercury and selenium in this assessment of pollutant load reduction targets. During the three monitored events the sampling results were all below these Ocean Plan Table 1 Instantaneous Maximum values. During the first storm monitored in 2013 (February 8, 2013), the highest measured values mercury and selenium were 0.16 µg/L and 0.79 µg/L, respectively, at ASBS-003. Outfall ASBS-028 had measured mercury and selenium concentrations of 0.06 µg/L and 1.0 µg/L, respectively, during the second monitored storm, which occurred in March 2013. During the third monitored storm, which occurred in February 2014, the measured selenium concentration at Outfall ASBS-023 was the highest value measured at 5.1 µg/L. All outfall samples collected and analyzed for mercury had results of non-detect during the third event. The summary of the highest measured values in comparison with the Ocean Plan Table 1 Instantaneous Maximum values as well as other Ocean Plan Table 1 limiting concentrations is provided on Table 5-4.

Table 5-4. Ocean Plan Comparison to Summary of Maximum Outfall Results

	Ocean Plan Table 1 Values (Receiving Water Mixing Zone)			Maximum Measured Value (in Outfall Prior to Mixing Zone)		
Parameter	6-Month Median	Daily Maximum	Instantaneous Maximum	February 2013, Event 1	March 2013, Event 2	February 2014, Event 3
Mercury	0.04	0.16	0.4	0.16	0.06	<0.0012
Selenium	15	60	150	0.79	1.0	5.1

The summary table of maximum outfall results values for mercury and selenium indicate that the pollutant loading storm water discharges from outfalls for these constituents is far below the Ocean Plan Table 1 Instantaneous Maximum values. The highest mercury value measured is equal to the Ocean Plan Table 1 Daily Maximum values. The highest selenium value measured is below the Ocean Plan Table 1 Instantaneous Maximum with over an order of magnitude difference between the two. The highest selenium value measured is also below the most limiting concentration of the Ocean Plan Table 1, which the 6-Month Median value. The measured values of mercury and selenium, besides those presented in the summary table above, were significantly less than the maximum measured.

Common major sources of mercury include scrap metal piles, deteriorating metal and paint, and airborne emissions from burning coal, oil or municipal waste (UWE, 1997). Selenium is a naturally occurring element that persists in soils and aquatic sediments and may be leached from sediments as a result of modifications in the natural hydrologic regime (LARWQCB, 2002).

5.2 Outfall Assessment Conclusions

Following the guidance found in the Special Protections an assessment of outfalls was performed to determine where structural controls may be required to achieve the specified pollutant loading limitations on point source discharges into ASBS 24. Preceding the outfall assessment was the receiving water assessment that indicated, also based on the guidance found in the Special Protections, that there are exceedances of natural water in the receiving water during wet weather events for mercury, selenium, and total PAHs where samples were available for this assessment. The outfall assessment included comparing the monitoring data for mercury and selenium to

Ocean Plan Table 1 Instantaneous Maximum limitations. The Ocean Plan Table 1 does not list Instantaneous Maximum values for the protection of marine aquatic life for total PAHs, it only lists 30-day Average concentration limits for the protection of human health. The results of the comparison indicate the discharges to the ASBS from point sources (outfalls) are currently achieving, and significantly below, the target levels. Therefore, based on available data and guidance documents, the outfalls being evaluated in this Plan under the Regional Monitoring Program are currently not considered priority outfalls, and in accordance with the Special Protections of the General Exception, additional controls (e.g., BMPs) to achieve pollutant load reductions are not required in the tributary drainage areas to the Parties' outfalls.

Based on the guidance presented within the Special Protections, the assessments performed in the preparation of this Compliance Plan indicated that additional structural BMPs are not required. However, the Parties recognize that the ABSB 24 is one of most valued resources in the region and that wherever possible, and feasible, additional reductions in pollutant loading should be achieved. Accordingly, proposed structural BMPs are currently in the construction phase for the areas of Broad Beach Road and Wildlife Road. Various existing nonstructural programs will continue to be implemented in order to maintain compliance with the requirements of the Special Protections and possibly achieve further reductions in pollutant loading. The Parties are considering implementing nonstructural controls and enhancements to existing controls for the purpose of further reducing pollutant loading to the ASBS.

6.0 CONTROL MEASURES

6.1 Enhanced Nonstructural Programs

Existing nonstructural PIPPs, O&M programs, and enforcement programs will continue to be implemented and maintained into the future to ensure ongoing protection of ASBS 24 and to meet the requirements of the ASBS Special Protections. This section describes enhancements to existing nonstructural programs intended to further promote load reductions and further improve and protect ASBS water quality. Proposed Potential program enhancements for feasibility consideration that will be evaluated and are presented in Appendix C and include the following:

- Infrastructure priority re-evaluation program.
- Enhanced, collaborative, environmentally friendly, alternative services program(s).
- ASBS education signage (County).
- Aggressive street sweeping (City).
- Street sweeping parking ordinances (City).
- Architectural copper and metal building material mitigation program(s) (City).
- Metal building material ordinances (City).

6.1.1.1 Infrastructure Priority Re-Evaluation Program

Currently, the County is in the design phase of retrofitting Unincorporated County areas catch basins in in North Santa Monica Bay from Arroyo Sequit on the northwest through Topanga Canyon on the southeast with full capture trash screens (this area includes the ASBS 24 drainage area). This activity includes a complete field inventory of all catch basins in the area. The Parties will enhance their existing annual cleaning programs for retrofitted catch basins.

If evaluation of future wet weather monitoring data indicates that additional nonstructural solutions are necessary to meet the Special Protection water quality criteria, the City and County will review and re-evaluate the existing inspection/cleaning priorities assigned to infrastructures located in the ASBS 24 drainage area. Agency-wide infrastructure inspection/cleaning programs (priorities and frequencies) are established using NPDES permit criteria and historic debris load data for each system. The receiving water or watershed of each system (e.g., catch basin, street, and parking lot) is not directly considered. Increased cleaning may be appropriate for ASBS 24 to enhance source control of gross pollutants (e.g., trash, debris, sediments) as well as associated pollutants, such as metals, organics, and nutrients. An infrastructure re-evaluation program may also provide benefits such as a streamlined, efficient, and effective implementation program for ASBS 24

6.1.1.2 Enhanced Collaborative Environmentally Friendly Alternative Services Program(s)

When implementing this type of program, the County and City will look for opportunities to enhance existing environmentally friendly alternative services and PIPPs currently provided by the Parties. Types of existing PIPPs that may be enhanced include the Clean Bay Restaurant Certification Program, the *Keep It Clean, Malibu* campaign, City of Malibu's Environmentally Preferable Purchases and Practices Policy (EPPP), Recycled Products Purchasing Policy (RCPP), Restaurant Certification Program, and Los Angeles County's Rethink LA Program. The LACoMAX platform has been presented as an example of types of enhancements and synergies, which may be implemented depending on water quality needs and available funding.

Users have identified LACoMAX as “easy, fast and rewarding” and a “great resource for L.A. County” to exchange goods. To reach a larger audience, this program could be cross-referenced with similar programs such as the Malibu Green Room webpage, Craigslist-Los Angeles, and other regional websites. The platform currently provides six management regions for exchange, and the platform could be expanded to include ASBS- and TMDL-specific regions, along with educational information related to the benefits of the program and reduced impacts to the ASBS and receiving waters that may be caused by improper disposal of unwanted items. Partner webpages could provide links to other exchange programs and up-cycling venues (e.g., Goodwill, consignment, thrift stores, and swap meets). Additional enhancements to the platform may be identified by analyzing user data from the existing platform and/or requesting users to complete questionnaires.

6.1.1.3 ASBS Educational Signage

This program would involve the design and installation of educational placards along boardwalks and at parking lot entrances to the beaches. These placards, translated in both English and Spanish, will describe the unique resources of ASBS 24 and highlight features of interest specific to each beach. Additional educational messages related to source controls and pollution prevention measures will be determined based on wet weather data and targeted sources. This program could provide a direct nonstructural intervention to potential pollutant sources at County beaches, as well as influence behavior for local beachgoers who live in residential areas that discharge to ASBS 24.

6.1.1.4 Aggressive Street Sweeping

This program would involve enhancing the City’s existing street sweeping program. Aggressive street sweeping may include increased frequency of sweeping, use of enhanced sweeping technologies, or other sweeping solutions (USEPA, 2012a). The City may choose to implement a pilot study to determine the optimal sweeping program prior to full-scale implementation.

The City currently sweeps roads within its jurisdiction once each month and shares a contract with Caltrans to have PCH swept weekly. This program would involve increasing the frequency of sweeping on City streets located within the area draining to ASBS 24 to once per week. Increasing the sweeping frequency has been shown to increase the potential load reduction associated with metals, sediments, trash, and debris (City of San Diego, 2010a).

Vacuum and regenerative-air street sweeping technologies have been shown to be more effective than mechanical sweeping technologies at removing fine particulate matter, especially related to metals debris (City of San Diego, 2010a; City of Portland, 2006). As of 2013, the City uses motorized mechanical street sweeping equipment for all street sweeping activities. This proposed nonstructural program enhancement would apply to all City-maintained streets and would involve either: 1) replacing mechanical street sweepers with enhanced sweeping technologies during the standard end of the equipment life-cycle, or 2) requiring contractors responsible for local sweeping activities to only use enhanced sweeping technologies.

Because the City shares a street sweeping contract with Caltrans for sweeping the PCH it is subject to conditions of an agreement. At present, Caltrans' policy requires once-per-week sweeping using mechanical sweeping equipment. Historically, the City used enhanced sweeping technologies for streets within their jurisdiction, including the PCH. The City was requested by Caltrans to use mechanical sweepers due to their state-wide policy. Implementation of this recommended nonstructural program enhancement will require one of the following Caltrans policy changes: 1) a state-wide policy change, 2) local exemption to the state-wide policy, or 3) agreement to do additional sweeping beyond the state-wide policy requirement, using a vacuum or regenerative-air sweeper along the PCH in the ASBS 24 drainage area.

6.1.1.5 Street Sweeping Parking Ordinances

Mechanical sweeping technologies are most effective at removing trash, debris, and sediment from paved surfaces when the equipment travels along the curb and gutter (City of San Diego, 2010a; City of Portland, 2006). Under the existing City street sweeping program, residents and business owners have been requested to use off-street parking on scheduled street sweeping days whenever possible. Vehicles continue to park along the PCH and City streets during street sweeping days. The City currently does not have an ordinance restricting parking.

The City may consider implementing an ordinance prohibiting parking on City-maintained streets during regularly scheduled street sweeping activities. This programmatic enhancement would increase the potential load reduction associated with street sweeping activities independent of modifications to existing street sweeping equipment and sweeping frequency. Prior to implementation of a general parking ordinance, the City may need to conduct an education and outreach campaign and public opinion survey to identify the most effective street sweeping schedule and evaluate the public's appetite for program implementation. However, it is important to note that such an ordinance would be subject to scrutiny by the California Coastal Commission due to public beach access concerns, and is not likely to be feasible.

6.1.1.6 Architectural Copper and Metal Building Material Mitigation Program(s)

Metal building materials may appear to be a limited wet weather source, but in coastal areas buildings may be a year-round source of runoff and metals loading because the marine layer can create measurable runoff as water condenses on rooftops and buildings structures (City of San Diego, 2010b). Monitoring data of storm water wash-off from some metal building materials has been shown to be associated with elevated copper and zinc levels (Golding, 2008).

This program will investigate the feasibility of offering rebates for architectural copper and zinc mitigation measures applied to metal building structures. Potential mitigation measures may include: application of sacrificial paint (e.g., copper and zinc oxidation protection paints), downspout diversions, rain barrels, and cisterns. The rebate program could be modeled after the Cash for Grass and other water conservation incentive programs discussed in Section 3.2.1.2. Education materials could be incorporated into existing materials, such as the Surfrider OFG materials and ASBS materials, and online media, such as the Malibu Green Room and Clean LA websites.

6.1.1.7 Metal Building Material Ordinances

As discussed in Section 6.1.1.6, buildings with metal architectural features may be a year-round source of runoff and metals loading. Metal building material ordinances, including the architectural copper ban and zinc alternative building material ordinance, are proposed as a potential programs enhancement and are a true source control. It is generally recognized that implementation of any kind of metal building material ordinance will require significant education and outreach. Targeted audiences will include residents and businesses, and may also include architects and engineers who design and build structures within the ASBS 24 drainage area. A program such as this would first need to go through a feasibility review and also receive City Council approval.

Architectural Copper Ban

This City ordinance would prohibit use of architectural copper for all new developments and re-development projects for buildings and facilities located within the ASBS 24 watershed.

Zinc Alternative Building Material Ordinance

Galvanized zinc is frequently specified by agencies, including Caltrans, for outdoor installations due to material durability and lack of maintenance requirements. This City program would evaluate the feasibility of implementing a zinc building material policy that would eliminate, reduce, mitigate, or control the use of zinc building materials. Concurrent with the feasibility analysis, stakeholders would be engaged through public meetings. Based upon the findings of the feasibility analysis and stakeholder engagement process, a proposed zinc ordinance would be implemented.

6.2 Structural BMPs

The pollutant loading reduction assessment (Section 5.0) performed in preparation of this Plan indicated that structural BMPs are not required (pollutant loading is on average below the Ocean Plan Table B Instantaneous Maximum WQOs for the modeled design storm). However, the City is currently in the construction phase for roadway drainage improvements along Broad Beach Road and Wildlife Road. These projects will each install biofiltration BMP improvements and the Wildlife Road project only will also include infiltration improvements to capture and treat wet weather flows entering the associated catch basins. Additional information on these projects, including conceptual design and drainage analysis, is included in Appendix C.

6.3 Pollutant Load Reduction Quantification For Nonstructural Controls

This section demonstrates how existing nonstructural programs have contributed to compliance with the zero dry weather discharge criteria of the Special Protections. This section also discusses the quantifiable percent reductions that have been achieved and that will be achieved using enhanced nonstructural controls. The quantification of the effectiveness of nonstructural controls is a developing science. Although the effectiveness of most nonstructural controls is not well documented in available literature, data on recent studies (e.g., street sweeping and source studies) provide a basis for developing quantification estimates. It has also been recently documented (City of San Diego, 2010a; Brown et al., 2010; Pohl, 2010; Cac and Ogawa, 2010;

Krieger et al., 2010) that nonstructural controls that target operational and true source controls can provide far more cost-effective, long-term solutions than end-of-pipe treatment BMPs.

Nonstructural BMPs are designed to reduce the concentrations of constituents at the source prior to the generation of surface storm water runoff and therefore prior to runoff entering storm drains, reaching BMPs, and reaching the receiving water. Typical load reductions associated with the quantification of nonstructural programs is on the order of 25% (LARWQCB, 2005) (County of Los Angeles, 2012).

6.3.1 Load Reductions Associated with Nonstructural Solutions

The scope of the nonstructural program load reduction quantification is limited. Many nonstructural programs currently implemented within ASBS 24, such as the Parties' IC/ID and spill response programs, cannot be quantified and entered into a load reduction model because they are designed to control constituents at their source for a sporadic event. However, these programs do offer a water quality benefit, and various types of data are available and may be used to demonstrate changes in public behavior.

When targeted at the actual pollutant source, nonstructural solutions (e.g., operational source controls) have been shown in studies to be very effective at removing the source and therefore reducing concentrations/loads to below regulatory requirements. For example, the *Mission Bay Clean Beaches Initiative Bacterial Source Identification Study* found birds and over-irrigation to be two major sources of bacterial contamination (Weston, 2004). Monitoring conducted following a redesign of the irrigation system and relocation of an in-water raft popularly used by birds indicated that bacterial concentrations in the receiving waters were very low. During the study, there was one exceedance, and follow-up studies showed that the source of the exceedance was not associated with irrigation runoff or birds (Weston, 2006).

Furthermore, true source controls that replace or modify the constituent content of products that have been determined to impact water quality should be part of the nonstructural program. True source controls have been proven to be highly cost effective as in the case of the banning of the pesticide Diazinon, which has resulted in a clear reduction from well above to now below the water quality objective in the Chollas Creek watershed, which is under a TMDL for this contaminant (SDRWQCB, 2007). The recently approved legislation which requires reduction of copper in brake pads in California was achieved through the Brake Pad Partnership. The legislation was based on scientific data showing the impact of copper from brake pads on water quality in urban areas. This true source control approach will significantly reduce copper concentrations in most urbanized watersheds. In the urbanized Chollas Creek watershed (which is under a dissolved metals TMDL), it has been estimated that approximately 90% of the copper loading is from brake pad deposition (City of San Diego, 2009). It is anticipated that most of the copper load reduction necessary to meet the Chollas Creek TMDL will be achieved from the reduction of copper in brake pads, a true source control strategy.

As indicated in the Outfall Wet Weather Monitoring Results for 2013 and the Pollutant Load Reduction Targets, zinc and TSS are currently considered to be in exceedance of the natural water quality in ASBS 24. Nonstructural controls that include both operational and true source control measures to reduce zinc and TSS loading have therefore been emphasized.

6.3.2 Aggressive Street Sweeping

According to the EPA, street sweeping programs may reduce the need for other structural storm water BMPs and may prove more cost effective than structural BMPs, especially in more urbanized areas (USEPA, 2012a). Aggressive street sweeping can be highly effective in reducing wet weather metals loading (City of San Diego, 2010a; Seattle Public Utilities, 2009; City of Portland, 2006) and, to a lesser extent, bacteria (Skinner et al., 2010), while continuing to address trash, debris, and sediment pollution.

The County has implemented an aggressive street sweeping program at County Beach parking lots (i.e., sweeping three to four times per week with enhanced sweeping equipment). Given that these parking lots experience a reduced traffic load compared to the PCH and City streets and have an aggressive sweeping schedule and program, the County's existing parking lot sweeping program is considered to be appropriate for protecting ASBS 24 water quality (i.e., program at a high level where adding enhancements may provide diminishing returns).

The City currently implements a two-part street sweeping program, including weekly mechanical sweeping along PCH and monthly mechanical sweeping along City-maintained streets. Sections 6.1.1.4 and 6.1.1.5 discuss potential enhancements to the City's existing sweeping program, including modifications to the sweeping schedule, sweeping equipment, and City parking policies. The pollutant load reductions associated with these enhanced sweeping program options are discussed in Appendix A. Program implementation may be limited by cost, especially once enhanced sweeping programs have reached a point of diminishing returns (USEPA, 2012a).

6.3.3 Commercial Programs

Commercial land use represents a very small portion of the ASBS 24 watershed, and the City's existing commercial inspection and outreach programs have been effective at preventing discharges from these facilities. Restaurants and grocers represent the predominant commercial business within this drainage area and existing programs have ensured compliance with the zero dry weather runoff criteria of the Special Protections by eliminating outdoor washing activities and promoting pollution prevention measures. As of February 2013, 51 of the 63 qualifying restaurants and food management businesses within the City's entire jurisdiction (e.g., 81% overall participation) were re-certified as being 100% compliant with all Clean Bay Restaurant Certificate Program criteria, which includes zero dry weather discharge off-site. It is important to note that the program also includes criteria that are not related to water quality. For instance, if a business is not implementing a recycling program, they would not be eligible for certification. Therefore, the percentage of businesses protecting water quality is likely to be higher than the overall participation rate. Ongoing implementation of this program will continue to ensure continue compliance with the zero dry weather runoff criteria of the Special Protections.

The City's existing commercial programs also provide wet weather water quality benefits. For example, waste management and spill prevention programs eliminate or control outdoor trash, metals, grease, and bacteria sources, which may be washed into the MS4 during storm events. Elimination of outdoor washing activities, especially near landscaped areas, can also control erosion and sediment disturbance. To date, the existing commercial inspection and outreach programs implemented by the City have potentially resulted in a 1% to 4% pollutant load reduction and have been incorporated into the initial assessment of wet weather load. Additional future load reductions may be achieved as participation in the Clean Bay Restaurant Certificate Program grows towards 100% participation and as synergies between PIPP programs are identified and incorporated into Enhanced Collaborative Environmentally Friendly Alternative Services Program(s).

6.3.4 Outreach, Water Conservation, and Irrigation Management Programs

Nationally, lawn care accounts for 32% of the total residential outdoor water use (USEPA, 2013) and over-irrigation is a common source of runoff. While irrigation runoff is a freshwater source and does not represent a pollutant unto itself, irrigation-related dry weather flows have the potential to erode landscaping and mobilize pollutants. Even when irrigation water does not reach the MS4, pollutant mobilization to impervious surfaces can create a non-point source of pollution during wet weather.

Use of water-saving devices (e.g., irrigation controllers, sprinkler heads) conserve water and prevent over-irrigation. The former LIEP and Water Saving Devices Rebates Programs educational literature provide an estimated water savings of 13,500 gallons per location converted per year. Use of drought-tolerant plants and landscaping in place of grass provides additional water savings and further reduces the likelihood of over-irrigation. The water conservation and over-irrigation reduction programs that the County and the City administer and provide educational support for in the ASBS 24 drainage area have helped control over-irrigation runoff and achieve compliance with the zero dry weather discharge criteria of the Special Protections. These programs have also helped reduce pollutant mobilization and creation of non-point sources on impervious surfaces. As participation in the rebate program grows, there is potential for an additional 1% to 2% wet weather pollutant load reduction through this indirect source control program.

OFGs and CA Friendly Landscapes are structural BMPs that infiltrate runoff and bio-remediate pollutants, effectively disconnecting both dry weather and the first flush of storm water runoff from the receiving water. The City has two demonstration landscapes that can be used as examples to the community: one at Legacy Park and one at Bluffs Park. The City recognizes three residential OFGs, one of which is located within ASBS 24 at Point Dume. Promotion of local OFGs contributes to their implementation by residents, educational institutions, and businesses. Ongoing implementation of this program and the resulting net increase in OFG implementation will likely translate to an additional 1% to 2% wet weather pollutant load reduction.

The City provides education and outreach on water-saving incentive programs and OFGs, and responds to irrigation-related IC/IDs. The City's new 24-hour Pollution Prevention Hotline has received fewer than 10 calls to date, or on average less than one per month. (The Clean LA hotline, which is shared with the District, fielded 34,064 calls during the fiscal year covered under the 2011-2012 Annual Report [LACDPW, 2012].) Most of the IC/ID field investigations have been due to over-irrigation and were resolved within a month through collaboration between the CPS and the property owner. Additionally, as of September 5, 2014, the City has launched new online water wasting report form in response to the historic drought conditions. This reporting form will make it more efficient for the community to notify and the City to respond to incidents of runoff due to over-irrigation among other water wasting activities. Ongoing implementation of the ASBS Focused Outreach Program will continue to increase participation in rebate programs and OFG and CA Friendly Landscape implementation, contributing to the wet weather load reductions previously discussed.

6.3.5 Metal Building Material Management Program

Recent studies have shown that architectural copper and galvanized steel building materials can elevate the metals concentrations measured in storm water runoff from 10 to 100 times greater than concentrations measured for non-metal building materials (City of San Diego, 2009; Chang et al., 2004; Davis et al., 2001). Zinc in storm water runoff measured directly from galvanized metal surfaces is typically very high, between 1,000 and 15,000 µg/L (Golding, 2008).

An aggressive outreach and incentive program may encourage targeted audiences to proactively modify infrastructure (e.g., install OFGs and rain barrels to capture runoff, replace with non-metal materials, diversion of air conditioning condensate away from metal infrastructure) and behaviors (e.g., proactive housekeeping, apply and maintain sacrificial coatings). In the ASBS, a phase-out and full ban of copper and zinc building materials represents a true source control measure that could significantly reduce metals loading to ASBS 24. In Palo Alto, CA, a similar metal building material ordinance for copper plumbing fixtures was implemented in response to a copper TMDL (City of Palo Alto, 2011). Institutional controls and regulatory change also represent an important step toward laying the foundation for inspections, if determined to be appropriate.

A Simple Method model was prepared to estimate the load reductions from implementing this program. To complete the model, several assumptions related to a typical watershed were made and include the following:

- An urban watershed composed of 50% residential, 40% open space, and 10% transportation.
- Of runoff from these land uses, 25% have elevated concentrations of copper resulting from building materials (e.g., copper rain gutters).
- Incentive program would be utilized by 20% of the residential land use area.
- Where the incentive program is utilized, copper concentration reductions in storm water would be in the range of 40% to 80%.

Based on these assumptions, metal building material management programs could result in a 6% to 12% pollutant load reduction. For more information on the load reduction calculations, see Appendix D.

7.0 ASSESSMENT OF ANTHROPOGENIC SEDIMENTATION POTENTIAL

In accordance with the requirements of the General Exemption, the natural habitat conditions in the ASBS shall not be altered as a result of anthropogenic sedimentation (SWRCB, 2012b). An assessment of the potential areas prone to anthropogenic sedimentation was performed as part of this Compliance Plan for the purpose of identifying areas where sediment control BMPs may be required. The general assessment process included first performing a desktop analysis of geological conditions, topography, land use, and aerial imagery for the applicable area. Next, a reconnaissance of the area was performed to verify desktop findings and further analyze the drainage areas. Finally, the desktop and reconnaissance data collected were then compiled into this Plan, which details the assessment methodologies, results, and conclusions.

7.1 Sedimentation Definitions

Basic definitions relating to sedimentation and the coverage/applicability of the sedimentation identification assessment are provided below. These terms are relevant to the entire sedimentation assessment. Additional terms, applicable to specific subsections, are defined within the applicable subsection, as needed.

Erosion
"The process by which soil particles are detached and transported by the actions of wind, water, or gravity." (SWRCB, 2010).

Sediment
"Solid particulate matter, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice and has come to rest on the earth's surface either above or below sea level." (SWRCB, 2010).

Sedimentation
"Process of deposition of suspended matter carried by water, wastewater, or other liquids, by gravity. It is usually accomplished by reducing the velocity of the liquid below the point at which it can transport the suspended material." (SWRCB, 2010).

Anthropogenic Sedimentation
For the purposes of this assessment, anthropogenic sedimentation is defined as sedimentation resulting from mankind activities in the past or present. Stated differently, anthropogenic sedimentation is any sedimentation that would not be present in nature in the absence of mankind and mankind improvements (i.e., past and present absence of mankind).

Compliance Plan Anthropogenic Sedimentation Assessment Area
In accordance with the General Exception, the Compliance Plan focuses on the assessment of point source discharges, including pollutants, and the potential controls to reduce pollutant loading from these point sources. Therefore, the Compliance Plan assessment of areas prone to anthropogenic sedimentation was limited to the tributary drainages areas associated with the point source outfalls detailed in Section 2.6 of the Compliance Plan. Figure 7-1 shows the Parties' identified outfalls and drainage areas (catchment areas).

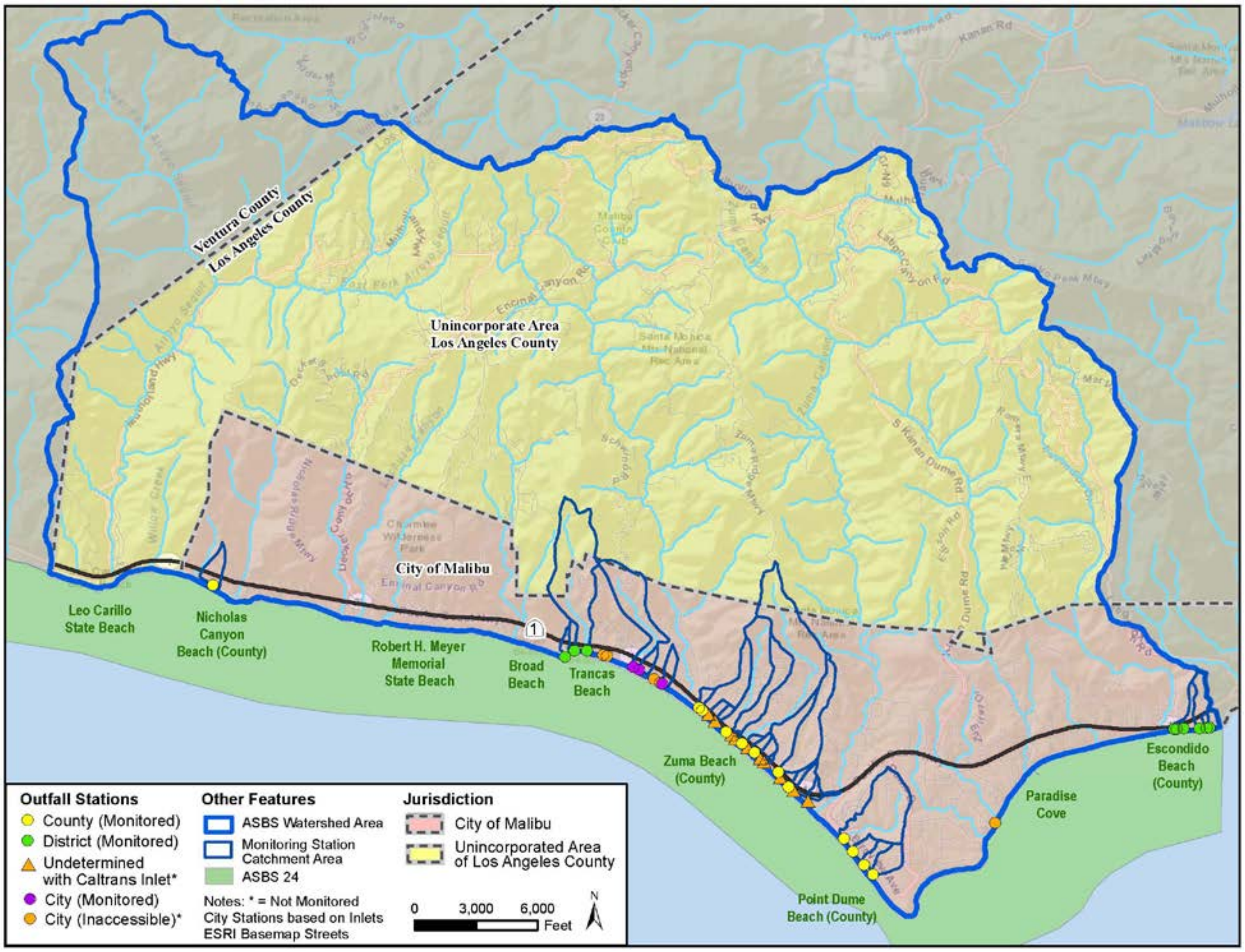

Figure 7-1. ASBS 24 Identified Outfall Catchment Areas

7.2 Desktop Analysis

A desktop analysis was performed evaluating the geology, topography, land use, and general surface condition (e.g., vegetation cover) in order to identify potential areas prone to erosion within the drainage areas tributary to the Parties' outfalls. The collection of area geological data included conducting literature reviews of five references applicable to the region ([City, 1995], [NPS, 1997], [Yerkes and Campbell, 1979],[SWRCB, 1979], and [SWRCB, 2012c]). County of Los Angeles Department of Transportation staff were interviewed regarding roadway maintenance activities and the frequency of sediment removal performed in the area. Sediment risk data for the area, obtained from the General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Actives (Construction General Permit) (SWRCB, 2010), were evaluated to determine the general sediment risk for disturbed areas. GIS data relating to topography, land use, and aerial imagery were analyzed to evaluated surface gradients and vegetative coverage types in the area.

7.2.1 ASBS 24 Assessment Area Geology

As detailed in Section 2.6, the Compliance Plan identified 38 outfall point sources along the ASBS 24 coast within the Parties' jurisdiction. The drainage area for the northerly most outfall, located near Nicholas Canyon State Beach (ASBS-031), consists primarily of Santa Monica Mountain (Topanga Formations) with Trancas Formation along the shoreline. The drainage areas for the outfalls along the west half of Broad Beach (ASBS-001, -002, and -003) consist primarily of the Santa Monica Mountains (Topanga, Santa Susana/Coal Canyon, and Llajas Formations) with small areas of Trancas Formation along the coastline. The outfalls along the east half of Broad Beach and the northeast half of Zuma Beach (BB-001 through BB-003 and ASBS-004 through ASBS-016) have drainage areas that consist of varying percentages of Modelo Formation along the coast and Santa Monica Mountains (Topanga, Santa Susana/Coal Canyon, and Llajas Formations; Conejo Volcanics; and Diabase Intrusions). The outfalls located along the southeast half of Zuma Beach and Point Dume Beach (Westward Beach) (ASBS-017 through ASBS-024) have drainage areas within the Monterey/Modelo Formation. The drainage areas of the six outfalls located along Escondido consist of Santa Monica Mountain and small areas of Modelo Formation along the coast. Figure 7-2 and Figure 7-3 show the geological features and drainage areas of the Parties' outfalls identified in this Plan (NPS, 2007).

Map symbols used along the coastal area were defined using the National Geologic Map Database. Pleistocene marine terrace deposits along the shoreline include the Trancas and Monterey Formations. The symbols used to depict general costal geologic features in Figure 7-2 through Figure 7-3 included the following:

- Qa – Alluvial gravel, sand, and clay of flood plains.
- Qaf – Artificial cut and fill.
- Qao – Older dissected alluvial gravel, sand, and clay; on coastal area deposited in part on a wave-cut platform, forms several terraces.
- Qg – Gravel and sand of major stream channels.
- Qls – Landslide debris.
- Qos – Old dune sand at Point Dume.
- Qs – Beach Sand.
- Tr – Trancas Formation composed of marine sandstone, mudstone, silty shale, and claystone.
- Tmt – Modelo/Monterey Formation composed of marine clay shale and laminated to platy siltstone with sandstone.

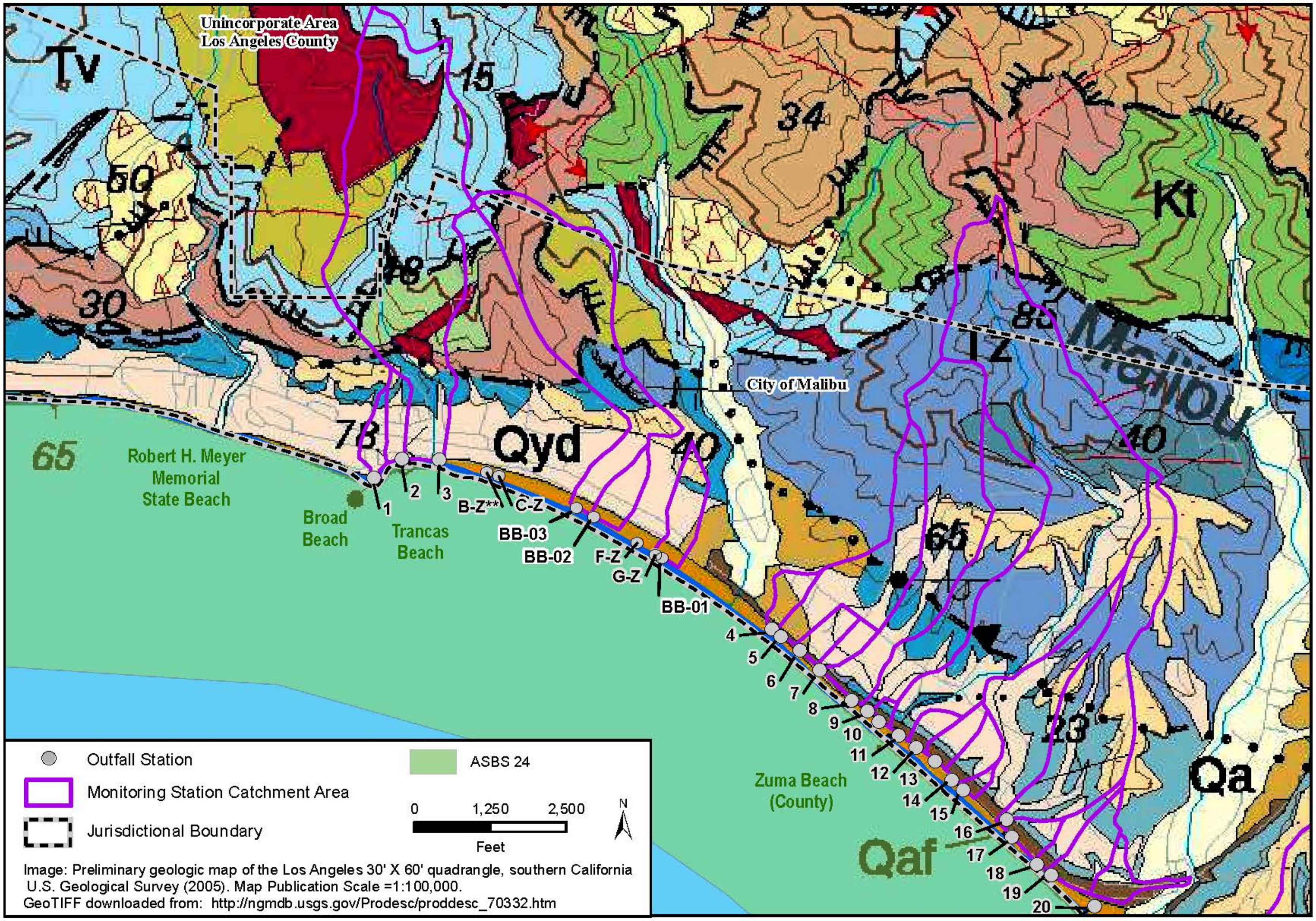

Figure 7-2. Geology of Outfall Drainage Areas, Broad Beach, and Zuma Beach

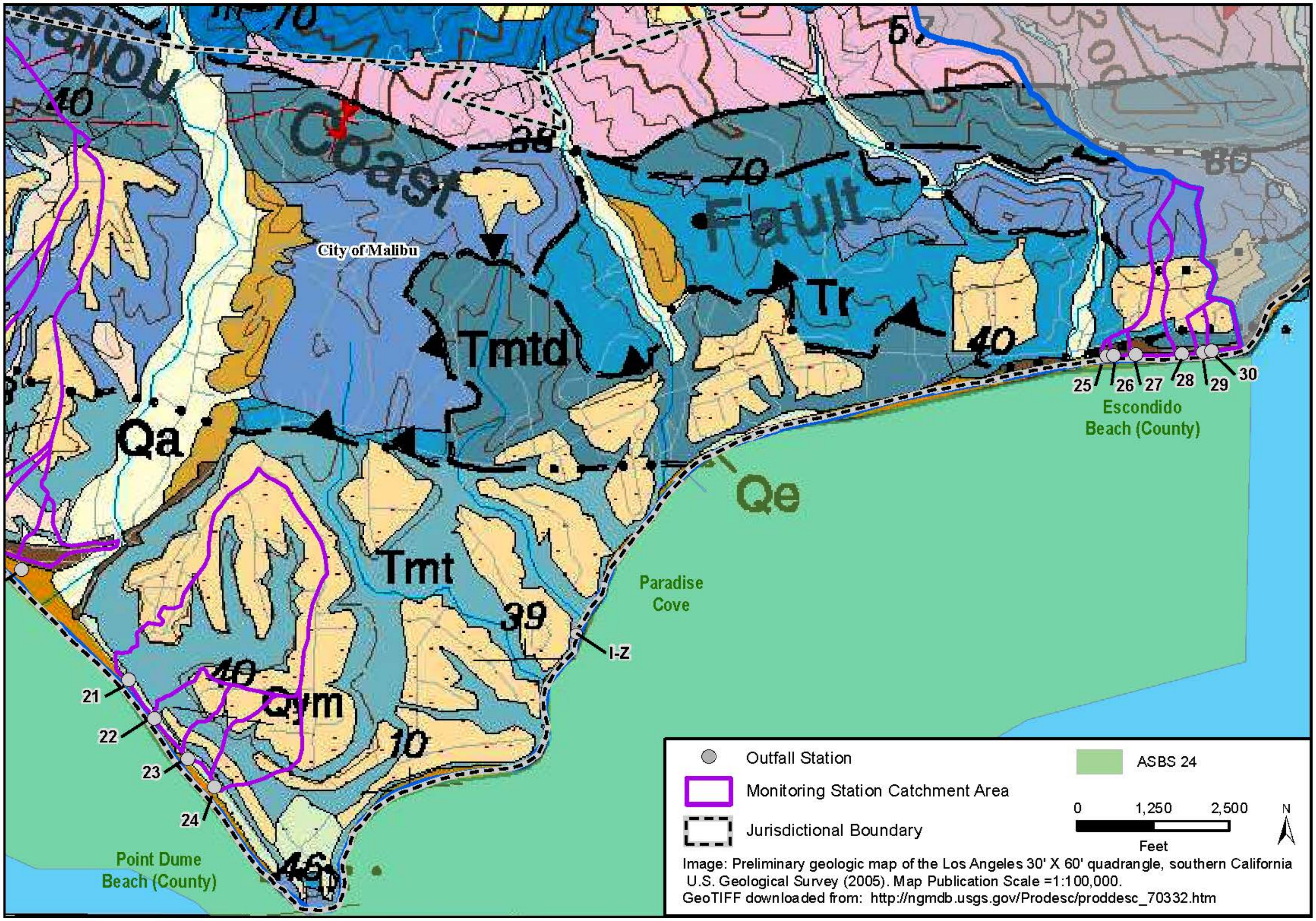

Figure 7-3. Geology of Outfall Drainage Areas, Point Dume Beach to Escondido Beach

7.2.2 Assessment Area Land Use

In general, land use within the drainage area tributary to the Parties' identified outfalls that discharge to ASBS 24 consists of various categories of residential and vacant land with relatively small amounts of commercial, transportation, and specialized (e.g., school, water storage) land uses. Table 7-1 summarizes the jurisdictional land uses for each catchment area.

Table 7-1. Outfall Drainage Area Land Use Summary

Land Use Designation	Catchment Outfall Designation													
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
City														
Horse Ranches													0.8	2.0
Nurseries		3.4	1.5											
Duplexes, Triplexes, and 2- or 3-Unit Condos and Townhouses (THs)														
Low-Rise Apartments, Condos, and THs	0.2		3.7											
High-Density, Single-Family Residential	2.7	1.3	0.3	2.9					0.3		0.4			
Low-Density, Single-Family Residential	1.2	0.3	1.5	2.5	8.7	2.0	4.9	14.3	10.1		18.9	2.5	1.6	2.5
Rural Residential, High-Density	1.9	2.0	36.3	1.6	36.0	4.9	0.8	45.3	55.2	0.7	110.2	2.5	2.2	5.2
Rural Residential, Low-Density			18.4											
Trailer Parks and Mobile Home Courts, High-Density														
Retail Centers (Non-strip)														
Senior High Schools											14.5		0.3	
Transportation Rights-of-Way (ROWs)	0.6	0.4	0.9	1.3	4.7		0.1	4.3	2.7		8.9		0.2	0.1
Transportation ROWs – Pacific Coast Highway (PCH)	0.9	0.7	1.5	0.7	1.0	1.1	0.4	1.9	0.5	0.6	0.9	0.8	1.1	1.0
Vacant Undifferentiated	2.1	2.6	52.0		9.7	1.2	1.4	19.0	9.4		11.4		2.4	
Water Storage Facilities					0.5			1.1			0.8			
Undeveloped Reg. Parks and Rec. (U.S. Government)					4.1			27.2			86.3			
City Subtotal	**9.6**	**10.7**	**116.1**	**9**	**64.7**	**9.2**	**7.6**	**113.1**	**78.2**	**1.3**	**252.3**	**5.8**	**8.6**	**10.8**
County														
Beaches (Vacant)		0.1	0.3											
Beach Parks				0.7	1.1	1	0.3	1.6	0.4	1.1	1.4	1.3	1.7	1.4
Rural Residential, Low-Density														
Transportation ROWs														
Vacant Undifferentiated			95.8								2.8			
Vacant Undifferentiated (U.S. Government)			41.3								47.0			
County Subtotal	**-**	**0.1**	**137.4**	**0.7**	**1.1**	**1**	**0.3**	**1.6**	**0.4**	**1.1**	**51.2**	**1.3**	**1.7**	**1.4**
Total	**9.6**	**10.8**	**253.5**	**9.7**	**65.8**	**10.2**	**7.9**	**114.7**	**78.6**	**2.4**	**303.5**	**7.1**	**10.3**	**12.2**

Table 7-1. Outfall Drainage Area Land Use Summary (Continued)

Land Use Designation	Catchment Outfall Designation													
	15	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**
City														
Horse Ranches														
Nurseries														2.9
Duplexes, Triplexes, and 2- or 3-Unit Condos and THs							3.3		0.2	1.7			0.5	1.0
Low-Rise Apartments, Condos, and THs							6.1							0.0
High-Density, Single-Family Residential		0.5							0.1		0.2	0.4	1.5	0.7
Low-Density, Single-Family Residential		14.5	0.4	2.2	4.4		19.7	5.4	4.8	6.7	0.1	0.3	2.7	1.4
Rural Residential, High-Density	1.2	26.5	2.8	4.7	7.9	3.7	86.2	8.4	9.2	22.2			9.0	13.1
Rural Residential, Low-Density														
Trailer Parks and Mobile Home Courts, High-Density							38.8							
Retail Centers (Non-Strip)						0.1	0.7							
Senior High Schools		38.2												
Transportation ROWs		8.1		0.3	0.5		4.4	1.8	1.1	1.8			0.5	
Transportation ROWs - PCH	0.6	0.5	1.7	0.7	1.7	3.1					0.6	0.7	1.9	5.0
Vacant Undifferentiated		24.1	1.4	1.3	3.7	2.5	4.6	1.8	1.8	1.7		1.0	2.8	11.8
Water Storage Facilities														
Undeveloped Reg. Parks and Rec. (U.S. Government)		2.1												
City Subtotal	**1.8**	**114.5**	**6.3**	**9.2**	**18.2**	**9.4**	**163.8**	**17.4**	**17.2**	**34.1**	**0.9**	**2.4**	**18.9**	**35.9**
County														
Beaches (Vacant)														
Beach Parks	1.2	0.6	2.6	0.9	2.6	2.8	1.9	1	1.1	0.7				
Rural Residential, Low-Density														
Transportation ROW							4.2							
Vacant Undifferentiated														
Vacant Undifferentiated (U.S. Government)														
County Subtotal	**1.2**	**0.6**	**2.6**	**0.9**	**2.6**	**2.8**	**6.1**	**1**	**1.1**	**0.7**	**-**	**-**	**-**	**-**
Total	**3.0**	**115.1**	**8.9**	**10.1**	**20.8**	**12.2**	**169.9**	**18.4**	**18.3**	**34.8**	**0.9**	**2.4**	**18.9**	**35.9**

Table 7-1. Outfall Drainage Area Land Use Summary (Continued)

Land Use Designation	Catchment Outfall Designation						
	29	**30**	**31**	**BB01**	**BB02**	**BB03**	**Total**
City							
Horse Ranches							**2.8**
Nurseries							**7.8**
Duplexes, Triplexes, and 2- or 3-Unit Condos & THs						2.1	**8.8**
Low-Rise Apartments, Condos, and THs							**10.0**
High-Density, Single-Family Residential	0.3	0.7		0.3			**12.6**
Low-Density, Single-Family Residential				5.7	3.1	8.6	**151.0**
Rural Residential, High-Density	3.5	6.5	0.3			19.3	**529.3**
Rural Residential, Low-Density			5.4				**23.8**
Trailer Parks and Mobile Home Courts, High-Density							**38.8**
Retail Centers (Non-Strip)				0.7			**1.5**
Senior High Schools							**53.0**
Transportation ROWs		0.9		1.3	0.8	2.4	**48.1**
Transportation ROWs – PCH	0.1	0.1	2.3	1.1	1.3	0.9	**35.4**
Vacant Undifferentiated		0.8	13.5	10.6	8.6	89.0	**292.2**
Water Storage Facilities							**2.4**
Undeveloped Reg. Parks & Rec. (U.S. Government)							**119.7**
City Subtotal	**3.9**	**9**	**21.5**	**19.7**	**13.8**	**122.3**	**1337.2**
County							
Beaches (Vacant)							**0.4**
Beach Parks			9.5				**36.9**
Rural Residential, Low-Density						0.7	**0.7**
Transportation ROW						0.1	**4.3**
Vacant Undifferentiated						4.5	**103.1**
Vacant Undifferentiated (U.S. Government)							**88.3**
County Subtotal	**-**	**-**	**9.5**	**-**	**-**	**5.3**	**233.3**
Total	**3.9**	**9.0**	**31.0**	**19.7**	**13.8**	**127.6**	**1,571.3**

7.2.3 Imagery Review

Aerial and other photographic imagery data were reviewed using Google Earth® software and Environmental Systems Research Institute® (ESRI) GIS imagery sources to determine the types of land cover within the Parties' outfall drainage areas. The review showed that areas occupied by residential lots along the coast typically consisted of single-family dwellings, each surrounded by large areas of well-maintained landscaping that included grass, shrubs and brushes, and trees. Further inland, north of the PCH, residential lots were occupied by single-family dwellings and either well-maintained landscape and/or open space, natural type vegetation. The Google Earth® street view tool imageries were reviewed, which showed the residential lots and secondary roadways as having well-maintained vegetated areas with very little non-vegetated (bare) areas.

Caltrans' PCH right-of-way and highway traverses several of the Parties' outfall drainage areas. Although Caltrans is not a responsible applicant included under this Compliance Plan, the area within the Caltrans right-of-way drains to the Parties' outfall and thus, was evaluated to determine if the area has the potential to contribute anthropogenic sedimentation to ASBS 24. The desktop review showed that some cuts (excavations) were made into native soils along the roadway. The review did not reveal obvious areas of excessive erosion and sedimentation. However, due to the common historic erosion problems associated with similar roadways throughout the state, the areas where cuts were potentially made during roadway construction were flagged for further detailed evaluation during the field reconnaissance phase.

7.2.4 General Sedimentation Risk Assessment

In order to estimate the general sediment risk for the areas that drain to the Parties' outfalls, a sediment risk was determined for a hypothetical site based on the procedures detailed in the *NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities* (Construction General Permit). The intent of this assessment is to determine the potential sediment for areas where minor improvements (e.g., landscaping) or other circumstances may result in bare soil that would not be considered construction activity. The assessment completed as part of this plan is not performed for the purpose of assessing construction activities, which are permitted and inspected through applicable County and City programs, and which require that risks be determined and mitigated through the proper implementation of BMPs.

7.2.4.1 Sedimentation Risk Assessment Methodology

The risk determination procedure detailed in the Construction General Permit includes determining both the "project sediment risk" and the "receiving water risk." The two risks are then used in combination to determine the overall project risk. However, for this plan (assessing potential sedimentation), only the sediment risk was evaluated.

The Construction General Permit describes two options for determining sediment risk: 1) GIS Map Method – EPA Rainfall Erosivity Calculator and GIS map, and 2) Individual Method – EPA Rainfall Erosivity Calculator and individual data. Both of these methods include using available EPA resources to estimate a rainfall-runoff erosivity factor. Depending on the method selected, the soil erodibility, project length, and slope parameters are estimated either from a map (Method 1) or from site-specific data applied to an erodibility factor nomograph and length-slope factor table (Method 2). For both methods, the data are applied to the Universal Soil Loss Equation (USLE) to estimate a sediment load for the applicable period (SWRCB, 2010). The USLE is detailed as follows:

$$A = R*K*LS*C*P$$

Where:

A = the computed soil loss (sheet and rill erosion) (tons/acre).
R = the rainfall erosive factor for the given period.
L = the slope length factor.
S = the slope gradient factor.
C = cover factor (1.0 for bare ground conditions).
P = management operations & support practice (1.0 for bare ground conditions).

Based on the computed soil loss (sediment load), the site is classified as having either a low-, medium-, or high-sediment risk (SWRCB, 2010). Table 7-2 summarizes the risk levels associated with the various soil loss quantities.

Table 7-2. Sediment Risk Levels

Soil Loss	Risk Level
<15 tons/acre	Low
15 – 75 tons/acre	Medium
>75 tons/acre	High

Source: SWRCB, 2010.

7.2.4.2 Sedimentation Assessment Calculations

To assess the general sediment risk for the area, a hypothetical site was evaluated using the methods described in the Construction General Permit. The time period was estimated to be 2 months in duration, from December 1^{st} through January 31^{st}.

The rainfall erositvity factor, or R factor, is calculated as a product of the Erosivity Index (EI) percentage and the average annual R value. These two parameters were obtained from the *Storm Water Phase II Final Rule Construction Rainfall Erosivity Wavier*. The R factors are used as surrogate measures of the impact that rainfall has on erosion and have been mapped using isoerodent contours (USEPA, 2012b). The R values are based on the analyses of data which indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-minute intensity (I). The numerical value of R is the average annual sum of EI for storm events during a rainfall record of at least 22 years, and the isoerodent maps were developed based on R values calculated for more than 1,000 locations in the western United States (SWRCB, 2010). The average annual R value, based on the referenced isoerodent contour maps for the area, was estimated to be between the values of 60 and 80 (80 selected), with units of hundreds ft.*tonf*in*(ac*h*yr)$^{-1}$.

Next, it was determined that the area is within EI distribution zone 25. Based on this zone, the percentages of the EI distributions throughout the year were determined and are summarized on Table 7-3.

Table 7-3. Erosivity Index, Annual Distribution for Zone 25

Month	Jan	Jan	Jan	Feb	Mar	Mar	Mar	Apr	Apr	May	May	Jun	Jun
Day	1	16	31	15	1	16	31	15	30	15	30	14	29
EI (%)	0	9.8	20.8	30.2	37.6	45.8	50.6	54.4	56.0	56.8	57.1	57.11	57.2
Month	Jul	Jul	Aug	Aug	Sept	Sept	Oct	Oct	Nov	Nov	Dec	Dec	
Day	14	29	13	28	12	27	12	27	11	26	11	31	
EI (%)	57.6	58.5	59.8	62.2	65.3	67.5	68.2	69.4	74.8	86.6	93	100	

Source: USEPA, 2012b.

The final R factor calculation is summarized on Table 7-4.

Table 7-4. R Factor Calculation Summary

Parameter	Value
EI % (Oct. 1 – Dec. 31)	11.7%
EI % (Jan. 1 – Mar. 30)	20.8%
Total EI %	32.5%
Average Annual R Factor	80 (100*ft.*tonf*in)*(ac*h*yr)$^{-1}$
Computed R Factor	26.0 (100*ft.*tonf*in)*(ac*h*yr)$^{-1}$

7.2.4.3 GIS Map Method for KLS Factor

The Construction General Permit details the use of the EPA Monitoring & Assessment Program (EPA EMAP) map to assist with determining the combined K, L, and S parameters for use in the USLE equation.

The soil erodibility factor K represents the susceptibility of soil or surface material to erosion, transportability of the sediment, and the amount and rate of runoff given a particular rainfall input (or lack of absorption and infiltration), as measured under a standard condition. Fine-textured soils that are high in clay have low K values (approximately 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured sandy soils also have low K values (approximately 0.05 to 0.2) because of high infiltration resulting in low runoff. Medium-textured soils (e.g., silt loam) have moderate K values (approximately 0.25 to 0.45) because they are moderately susceptible to particle detachment and produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and be as large as 0.65 (SWRCB, 2010).

The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a slope length factor, L, and the slope gradient factor, S. Typically, as slope length and/or slope gradient increase, soil loss increases.

Figure 7-4 shows the EPA EMAP map. Based on this map, a KLS value of 1.6 was selected for the ASBS 24 drainage area.

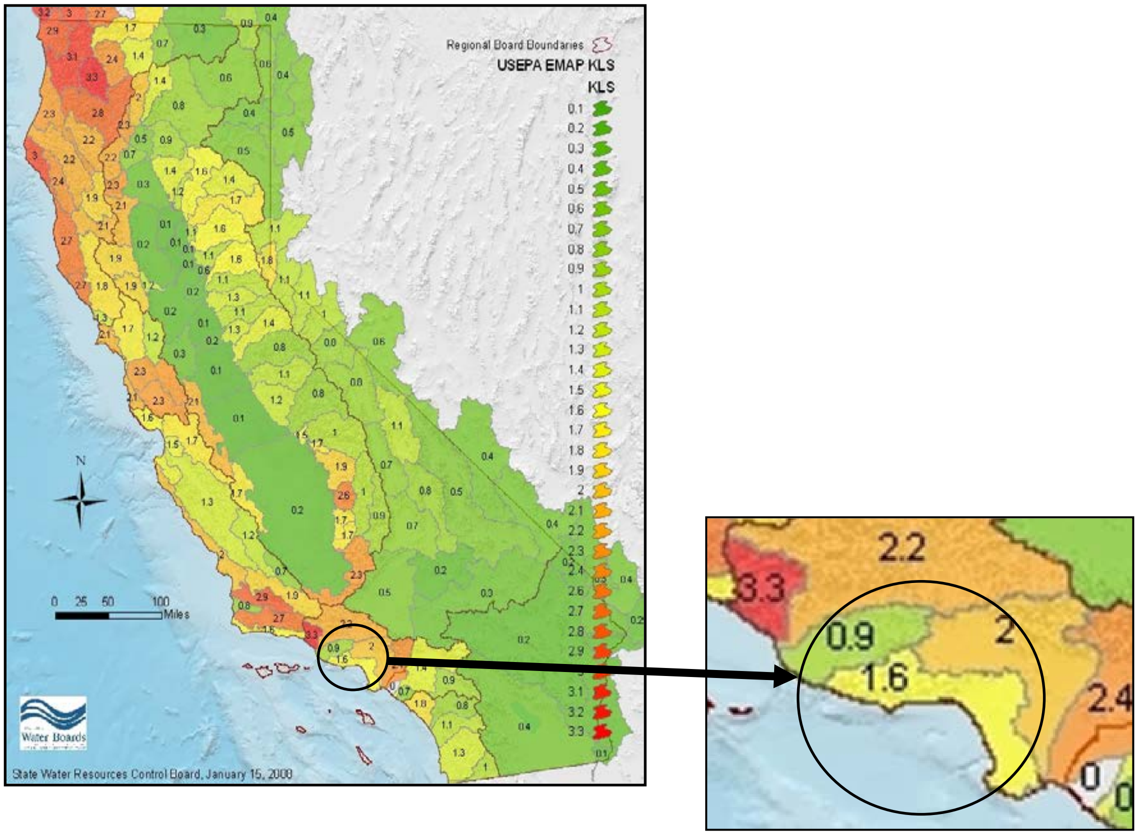

Figure 7-4. EPA EMAP (SWRCB, 2010)

The soil loss was calculated based on the assumptions made and values determined in this assessment. The soil loss for the hypothetical site was calculated to be 41.6 tons per acre. Based on the Construction General Permit sediment risk matrix (summarized on Table 7-2) and this value, disturbed areas (e.g., bare soil) draining to the ASBS would have, in general, a medium-level sediment risk.

7.2.4.4 Individual Method for KLS Factor

The Construction General Permit allows for site-specific data to be used in determining the KLS factor for the USLE equation. This includes performing soil analysis to determine the soil grain size distribution, site length, and average slope. This method was performed with the assumption that the soils consist of 60% sandy, 20% silty, and 20% clayey materials, which is reasonable for mountain formations and coastal bluffs. Based on an area of 0.25 acres (square), a length of 100 ft. was estimated. Based on the topography in the developed areas with slopes of approximately 2 to 10%, the higher end of the range was selected (10% slope).

Using the Soil Erodibility Factor Nomograph provided in the Construction General Permit, the K factor for the assumed soil composition was determined to be 0.19. Based on the LS Factors Table provided in the Construction General Permit and the stated assumptions, the LS factor was determined to be 1.46. Combining these parameters, it was determined that KLS is 0.277, the soil loss would be 7.2 tons per acre. Based on the Construction General Permit sediment risk matrix (summarized on Table 7-2), this value is considered a low-sediment risk for the applicable disturbed area.

7.2.4.5 Sediment Risk Assessment Summary

The assessment of the general sediment risk for disturbed areas with the ASBS 24 drainage area indicates that an area of disturbed soils without controls during the two relatively high rainfall months (December and January) during average conditions would have a potential sediment load of 7.2 tons per acre (per Method 2, individual site data calculations) or 41.6 tons per acre (per Method 1, GIS map data calculations). Smaller areas would have proportionally lower potential yields, as would disturbed areas with controls and/or disturbed areas that do not have a direct connection to the storm drain inlets (e.g., small area of disturbance above turf vegetation). Based on guidance found in the Construction General Permit, this equates to a low- (Method 1) to medium- (Method 2) sediment risk.

The difference between methods is based solely on the method used to calculate the KLS factor. The GIS map shows a large area with the same value, including the Santa Monica Mountains. Including the steep mountain terrain in the weighted average (by area), the slope calculation for the GIS map appears to have overestimated the KLS for the areas along the ASBS coast where developed areas are located. Additionally, the GIS map may overestimate the project slope length factor and slope gradient factor (LS factor). As such, the Method 2, site-specific data method seems much more accurate for the applicable area.

This assessment provides a general estimate of the sediment yield potential for disturbed (or bare) soil cover for the stated assumptions. The results of this assessment were used to aid in the evaluation of the drainage areas during field reconnaissance. Considering the soil loss calculations, the R factor is fixed for the area and the K factor may change slightly in the different geology across the drainage areas. However, the slope length (L) and slope gradient (S) vary greatly when areas with the potential to be prone to sedimentation are evaluated. The field reconnaissance was performed with a focus on the implications that the length and slope parameters have on the potential soil loss for areas of bare soil or spare vegetation. Table 7-5 provides annual soil loss calculations performed for various typical sloped small areas with bare soil or sparse vegetation cover throughout the year.

Table 7-5. Annual Soil Loss Calculations for Sloped Areas

Slope Length (ft.)	Slope Height (ft.)	Slope Gradient (%)	Width (ft.)	Area (acres)	KLS Factor	Annual Soil Loss (tons/year)
10	0.2	2	100	0.023	0.025	0.05
20	0.4	2	100	0.046	0.029	0.10
30	0.6	2	100	0.069	0.032	0.18
40	0.8	2	100	0.092	0.036	0.27
50	1	2	100	0.115	0.040	0.37
10	1	10	100	0.023	0.072	0.13
20	2	10	100	0.046	0.093	0.34
30	3	10	100	0.069	0.122	0.67
40	4	10	100	0.092	0.146	1.1
50	5	10	100	0.115	0.173	1.6
10	2.5	25	100	0.023	0.160	0.3
20	5	25	100	0.046	0.247	0.9
30	7.5	25	100	0.069	0.338	1.9
40	10	25	100	0.092	0.424	3.1
50	12.5	25	100	0.115	0.507	4.7
10	5	50	100	0.023	0.268	0.5
20	10	50	100	0.046	0.458	1.7
30	15	50	100	0.069	0.638	3.5
40	20	50	100	0.092	0.809	5.9
50	25	50	100	0.115	0.980	9.0

R = 80 (100*ft.*tonf*in)*(ac*h*yr)$^{-1}$.
K = 0.19.

Relative to the 50% (2:1 [horizontal: vertical]) gradient slope, the 2% slope gradient is estimated to lose only 4% as much soil for a 50-ft slope length, and the 10% slope gradient is estimated to lose approximately 18% as much. This relationship in non-linear, and as the slope gradient increases, the potential soil loss significantly increases. Similarly, as the slope length increases, the potential soil loss significantly increases. The 50-ft slope length calculation for the 2% slope gradient is estimated to have approximately seven times the soil loss of the 10-ft slope length for the same gradient. The 50-ft slope length calculation for the 50% slope gradient is estimated to have approximately 1,400% the soil loss of the 10-ft slope length for the same gradient. These typical calculations indicate that in areas where disturbance has created unnatural sloped areas, the potential for soil loss exponentially increases as the slope gradient and/or the slope length increase.

7.3 Sediment Assessment Field Reconnaissance

A field reconnaissance was conducted to confirm the desktop analysis and evaluate the ASBS 24 outfall drainage areas prone to erosion and sedimentation. All areas draining to outfalls that discharge to the ASBS 24 were observed for indications of existing or potential anthropogenic sedimentation. The field reconnaissance included driving the length of ASBS 24 as well as performing reconnaissance on foot within each outfall drainage area to perform a thorough evaluation. In general, the areas of developed land use evaluated were observed to be residences with associated hardscape (e.g., driveways, walkways) and well-maintained landscaping. Some areas were observed to have partially exposed (spare vegetation) natural bluff materials. Vegetation within the bluff areas consisted of a mixture of native scrubs and non-native species (e.g., ice plant). However, signs of erosion (e.g., rills, sloughing) were not observed on these exposed bluff materials, indicating that bluff material consisted of dense siltstone and/or sandstone formations consistent with a desktop geology evaluation performed as part of this plan. The field reconnaissance is presented, starting at the northerly most identified outfall located at Nicholas Canyon County Beach, moving south, and finishing at the southeast limits of ASBS 24 and the Escondido Beach area.

The photograph depicted in Figure 7-5 was taken looking west and downward towards the Nicholas Canyon County Beach parking lot. The up-gradient area between PCH and the parking lot is shown to have fairly good vegetation cover. A narrow foot/animal path leads down the sloped area. Signs of erosion were not observed in the area. Compared to natural cover, a parking lot with an impervious surface located on a mesa, such as the case here, increases storm water runoff quantity and velocity resulting in the potential to erode soils if not properly designed. The parking lot was observed to have several storm drain inlets with associated piping to convey collected storm water down to the ocean without the potential to increase erosion of the bluffs (i.e., outfall located at sea level along rocky shoreline).

Figure 7-5. Nicholas Canyon County Beach Parking Lot

Figure 7-6 shows the area east of the PCH up-gradient from Nicholas Canyon County Beach. PCH and a residence occupy the area, where it appears that the highway and residential access driveway were constructed by cutting away (excavating) some the native materials and creating 2:1 (horizontal: vertical) slopes. These slopes are shown with vegetation cover and without evidence of active erosion.

Figure 7-6. Nicholas Canyon Beach Upper Watershed Area

The photograph depicted in Figure 7-7 was taken above Broad Beach and shows the bluff area located between PCH and the residences that are situated along the shoreline. During the field reconnaissance, the majority of the bluff appeared to have vegetation cover. Some steep portions were exposed, resembling natural bluffs observed in the area where development has been restricted (e.g., the nearby El Matador State Beach). Signs of erosion from these bare areas were not observed in the bluff along Broad Beach Road.

Figure 7-7. Bluff Area Above Broad Beach

The photograph depicted in Figure 7-8 shows the area along PCH and directly above Broad Beach. Similar bluff materials, but having lower height, were observed at this location with similar vegetation cover as the bluffs located along Broad Beach. Thick vegetation was observed at the bottom of the bluff material adjacent to the roadway.

Figure 7-8. Directly Above Broad Beach Area

The east end of Broad Beach Road has thicker vegetation cover and a lower bluff height compared to the west area. Figure 7-9 shows the typical street composition of residences and associated improvements along the south (seaward) side and off-street parking area along the north side followed by a vegetated sloped area.

Figure 7-9. East Portion of Broad Beach

Further up the watershed to Broad Beach the geology changes to that of the Santa Monica Mountains with hills and valleys. Figure 7-10 shows the residential development and associated landscaping in this area.

Figure 7-10. Area Up-Gradient of Broad Beach

The photograph depicted in Figure 7-11 shows the area across from the southeast side of Zuma County Beach, north of PCH. Field reconnaissance observed a large vertical bluff. This bluff appears to be Miocene age Modelo Formation that may have been a naturally formed vertical wall or a result of grading associated with the construction of PCH. Evidence of erosion was not observed during the reconnaissance. The materials appeared to be very hard and resistant to erosive forces of nature.

Figure 7-11. Vertical Bluff Across from Zuma Beach

As with the other areas evaluated, away from the coast the geology was observed to be Santa Monica Mountains in the watersheds upstream of the Zuma County Beach shoreline. Good vegetation cover was observed in the sloped areas around the existing improvements, which included residences and a water tank (Figure 7-12). Thick native vegetation was observed above the developed areas.

Figure 7-12. Up-Gradient of Zuma Beach Area

Figure 7-13 shows a residential property located east of the intersection of Birdview Avenue and Bluewater Road. Typical of residences in the area, the landscaping included a mixture of brushes and trees on the sloped areas and turf in the flatter areas.

Figure 7-13. Residence Near Birdview Avenue & Bluewater Road

The photograph depicted in Figure 7-14 shows the area above Escondido Beach. This area was observed to have more gentle slopes of approximately 4:1 (horizontal: vertical) compared to the bluff areas observed near Zuma County Beach and Broad Beach. East of Escondido Creek and north of PCH, thick vegetation cover was observed, consisting primarily of ice plant, palm trees, and eucalyptus trees.

Figure 7-14. Pacific Coast Highway Near Escondido Beach

7.4 Anthropogenic Sedimentation Assessment Summary and Conclusion

The assessment included a review of the topography, geology, land use, and imagery to determine potential areas prone to anthropogenic sedimentation. This review indicated that the topography, geology, and land use are related. Geologic processes, beginning as far back as 80 million years, formed the sedimentary formations predominantly found along the coast shoreline and Point Dume upland mesa area, which include siltstone and sandstone. Approximately 16 million years ago, seismic actively began and continued for 3 million years to form the Santa Monica Mountains, which are composed of a combination of sedimentary and igneous rock formations (City, 1995). Land use zoning and development have occurred predominantly along the coast within the flatter areas at lower elevations. Some development has occurred inland within the Santa Monica Mountains, but for the most part, development in the mountainous areas of the ASBS 24 watershed has been restricted due to the conservation of the area at the federal, state, and local levels.

The desktop analysis included determining the general sediment risk for the area based on the procedures outlined in the Construction General Permit. These procedures included determining the rainfall erosivity (R factor), which is based on data collected over several years to determine the annual storm kinetic energy, on average, for the area. That factor, combined with properties of common soils and various slopes (up to 50%) and heights (up to 50 ft.), were used to determine the potential annual soils for disturbed loose soil areas within the watershed. Calculation results indicated that the potential for soil loss within disturbed areas increases rapidly for areas having slopes greater than 10% and heights of greater than a few feet. These results were used during the field reconnaissance to aid in determining if areas have the potential to contribute anthropogenic sedimentation to ASBS 24.

Field reconnaissance was performed in the areas with a focus on the areas that drain to the identified outfalls that discharge to the ASBS 24. In general, the drainage areas primarily consisted of larger lots (0.25 to approximately 1 acre) with existing residential structures, hardscape improvements, and landscaping. Landscape vegetation of sloped areas within developed areas, including residential properties and roadway rights-of-way, were observed to have fairly good cover. No signs of erosion (e.g., rills, gullies) were observed in sloped areas or alongside secondary roads or PCH.

The conclusion of this sediment identification assessment is that currently there are no areas prone to anthropogenic sedimentation within the drainage areas tributary to the identified outfalls that discharge to ASBS 24. Land use in the drainage areas consists predominantly of residential and vacant (open space) designations with associated roadway connections. The sloped areas associated with residential properties were observed to have good vegetation cover and appeared to be regularly maintained by landscaping professionals. Areas where cuts (excavation) were made during the construction of roadways were observed to have either good vegetation cover that has been maintained by responsible property owners or consist of hard coastal bluff materials resistant to erosive forces (e.g., large bluff along the southeast portion of Zuma County Beach, as shown in Figure 7-11). Therefore, at this time, no additional sediment BMPs are required by this plan.

8.0 IMPLEMENTATION SCHEDULES

8.1 General Exception Schedule

The General Exception (Resolution No. 2012-0012) was adopted and became effective on March 20, 2012. Resolution No. 2012-0031 amended the General Exception to revise some of the sections to be consistent with other sections. The two documents collectively are referenced to as the General Exception with Resolution No. 2012-0012, establishing the effective date and Resolution No. 2012-0031 providing referenced content. Table 8-1 provides a summary of the key milestones specified in the General Exception. The General Exception states that the Draft Compliance Plan shall be submitted to the State Board within 18 months of the effective date of the General Exception. However, due to the limited number of monitoring opportunities during the 2012-2013 wet season, the Parties requested and were granted an extension of 12 months in order to perform additional wet weather monitoring. This timeline extension is included in the summary table.

Table 8-1. General Exception Schedule of Milestones

Description	Duration	Date
Resolution No. 2012-012 (General Exception)		Adopted March 20, 2012
Resolution No. 2012-021 (Amended General Exception)		Adopted June 19, 2012
Non-authorized non-storm water discharges prohibited	Effective date of the General Exception	March 20, 2012
Nonstructural controls necessary to comply shall be implemented	18 months after the General Exception effective date	September 20, 2013
Draft Compliance Plan	*30 months after the General Exception effective date	September 20, 2014
Final Compliance Plan	*42 months after the General Exception effective date	September 20, 2015
Structural controls identified in Compliance Plan necessary to comply shall be operational	*7 years after the General Exception effective date	March 20, 2019
All discharges comply with the General Exception requirements	*7 years after the General Exception effective date	March 20, 2019

*Additional 12 months added to duration based on Draft Compliance Plan extension granted by State Board to allow for additional wet weather core monitoring.

8.2 Nonstructural Controls Implementation Schedule

The Compliance Plan uses adaptive management (**Error! Reference source not found.**) to plan, implement, assess, and refine nonstructural solutions implemented by the Parties in the ASBS 24 tributary drainage area. The initial assessment included special studies and existing PIPP, enforcement, and O&M nonstructural programs (see Appendix B); the Parties are currently meeting the compliance requirements detailed in the General Exception. The steps forward listed in this section include nonstructural programs that will allow the Parties to continue to be in compliance and may reduce wet weather pollutant loading. These steps forward include the following:

- Continue to implement, track, and refine effectiveness assessment protocols for nonstructural programs, as discussed in Section 3.0.

Table 8-2. Milestones and Schedule for Implementation of Enhanced Nonstructural Programs and Key Steps Forward

Timeline	Objective	Nonstructural Program(s) & Key Steps Forward
Initial Phase: 2005–2012	1. Understand baseline conditions in ASBS. 2. Identify/address dry-weather and storm water runoff. 3. Progress towards zero dry weather runoff.	Progressed towards existing nonstructural programs identified in Section 3.2.
Before September 20, 2013	1. Zero discharge of non-authorized non-storm water to ASBS 24. 2. Inspection Policies in compliance with General Exception.	▪ Public Outreach (see Section 3.2). ▪ Outfall inspection program. ▪ Catch basin program re-evaluated. ▪ Amended Inspection Program (see Section 3.3).
09/20/2013	Compliance with ASBS Special Protections for Dry Weather	
09/20/2014	Submit Draft ASBS Compliance Plan for ASBS 24	
Wet Weather: 2014–2015	1. Maintain zero dry weather runoff to ASBS 24. 2. Evaluate nonstructural BMPs that may provide wet weather load reductions.	▪ Evaluate aggressive street sweeping on City streets. ▪ Feasibility assessment and initial outreach for metal building materials ordinances.
09/20/2015	Submit Final ASBS Compliance Plan for ASBS 24	
Wet Weather: 2015–2019	1. Maintain zero dry weather runoff to ASBS 24. 2. Evaluate nonstructural BMPs that may provide wet weather load reductions.	▪ Enhanced aggressive street sweeping on PCH, if feasible. ▪ Evaluate metal building materials ordinances and metal building material management incentive programs. ▪ Evaluate enhanced collaborative environmentally friendly alternative services program(s).

9.0 COST ESTIMATES

The Parties have implemented numerous nonstructural controls and related programs in order to eliminate non-authorized discharges to ASBS 24. The Parties continue to maintain these measures, and the annual estimated costs associated with the key programs, which are detailed in Section 3.0, are provided on Table 9-1. For more information on existing nonstructural measures, see Appendix B.

Table 9-1. Annual Nonstructural Program Costs

Program Type	Program Name	Approximate Cost ($/year)
Public Information & Participation Programs (PIPP)	Rethink L.A.	[1]$10,000
	Los Angeles County Materials Exchange (LACoMAX)	Costs in Rethink L.A.
	Water District #29 Tiered Water Rates Based on Increased Usage	N/A
	Water Conservation Program – Water Saving Devices Rebate Program	[1]$5,000
	Cash for Grass	[1]$5,000
	Landscape Irrigation Efficiency Program (LIEP)	[1]$5,000
	Ocean Friendly Garden (OFG) Program	Included in ASBS Focused Outreach Program
	Pepperdine Business School OFG Partnership	Included in ASBS Focused Outreach Program
	Solid Waste Management Program	$167,450
	Coastal Preservation Specialist (CPS)	[2]$35,957
PIPP Sub-total		**$228,407**
Operations & Maintenance (O&M)	City Curb & Gutter Cleaning & Repair Program	[3]$295,000
	City Storm Drain/Culvert Facilities Maintenance	[3]$25,000
	City Street Sweeping Contract	[3]$42,500
	Los Angeles County Street Sweeping	[1]$435,000
	City Trash Collection	[3]$25,000
	County Beaches Trash Collection	[1]$360,000
	County Beaches – Sanitation Program	Included in Trash Collect.
	Environmentally Preferable Purchases and Practices Policy (EPPP), Recycled Products Purchasing Policy (RCPP)	N/A
O&M Sub-total		**$1,182,500**
Enforcement	City IC/ID Elimination Program	[3]$5,700
	County IC/ID Program	[1]$20,000
	City Pollution Prevention Hotline	$600
	Pollution Prevention Hotline, 1(888)Clean LA	[1]$3,000
	Coastal Preservation Specialist (CPS)	[2]$35,957
	Outfall Inspections	[4]$10,800
	City Commercial & Industrial Inspection Program	[4]$8,000
	Clean Bay Restaurant Certification Program	Included in Inspection
	Santa Monica Bay Regulations Review	N/A
	City Local Coastal Program	Included in Inspection
	City Construction Inspection Program	Included in Inspection
	Los Angeles County Construction Inspection Program	[4]$2,000
	Smoking at Beaches Ban	[1]$20,000
Enforcement Subtotal		**$106,057**
Total		**$1,516,964**

Note 1: Cost estimated based on fraction of regional program total cost (approximately 5%).
Note 2: Coastal Preservation Specialist cost divided evenly between PIPP and enforcement.
Note 3: Cost estimated based on fraction of City wide program total cost (approximately 50%).
Note 4: Cost estimated based on staff time to complete associated tasks.

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APPENDIX A

Compliance Plan Map

COMPLIANCE PLAN MAP- AREA OF SPECIAL BIOLOGICAL SIGNIFICANCE (ASBS) 24
Legend
Stations by Responsible Party
County Monitored Outfall
Undetermined Outfall with Caltrans Inlet
District Monitored Outfall
Monitored Outfall with City Inlet
Inaccessible Outfall with City Inlet
Ocean Receiving Water
Reference Site (County Station)
Other Outfalls (Identified in Recon Activities)
District Undetermined
Ownership Undetermined (County Recon)
Private or Undetermined Ownership (City Recon)
Catch Basins
City of Malibu
District
Road Maintenance Division
Private or Undetermined Ownership
Other Storm Drain Features
Inlet or Outlet Storm Drain Feature
Storm Drain Line
Storm Drain Channel
Creek
Planned BMP
Drainage Areas
Delineated Catchments of Outfall Stations
Overall ASBS Watershed Area
Subbasins ASBS Watershed Area
Subbasin Flow Direction Arrows
Areas of Potential Sheet Flow
Sewer Facilities
Sewer Treatment Plant
Sewer Pump Station
Sewer Pipe
Sewer Maintenance Service Area
Roads
Pacific Coast Highway
Secondary - Collector
Ramp
Minor - Local
Private Road
Hazardous Materials
Facilities with Hazardous Material Storage Areas
Jurisdictional Boundary
County Boundary
Unincorporated Area of Los Angeles County
City of Mailbu
State and Federal Lands
State of California
Federal Land
Other Boundaries and Zones
ASBS-24
USGS Landslide Zones (digital version only)
Notes:
1. District = Los Angeles County Flood Control District
2. All outfalls shown on this map are ≥18 inches diameter
3. Data subject to revision
4. No areas prone to erosion have been identified
DRAFT 9/17/14
0 0.25 0.5 0.75 1 Miles
VENTURA COUNTY
LOS ANGELES COUNTY
Leo Carillo State Park
Leo Carillo State Beach
Nicholas Canyon Beach (County)
Malibu Springs Open Space
Charmlee County Park
Robert H. Meyer Memorial State Beach
Broad Beach
Trancas Beach
Broad Beach Road Biofiltration Project
Zuma Beach (County)
Santa Monica Mountains National Recreation Area
Escondido Falls
Paradise Cove
Point Dume Beach a.k.a. Westward Beach (County)
Escondido Beach (County)
ASBS-24
PACIFIC OCEAN
Mulholland Hwy
Lechusa Rd
Decker Canyon Rd
Decker Rd
Encinal Canyon Rd
Latigo Canyon Rd
Kanan Dume Rd
Pacific Coast Hwy
State Rte-1
ASBS-R01
ASBS-031
ASBS-001
ASBS-002
ASBS-003
ASBS-B
ASBS-C
24-BB-03
BB-03R
24-BB-02
ASBS-F-Z
ASBS-G-Z
24-BB-01
ASBS-004
ASBS-005
ASBS-006
ASBS-007
ASBS-008
ASBS-009
ASBS-010
ASBS-011
ASBS-012
ASBS-013
ASBS-014
ASBS-015
ASBS-016
ASBS-S01
ASBS-017
ASBS-018
ASBS-019
ASBS-020
ASBS-021
ASBS-022
ASBS-023
ASBS-024
ASBS-I-Z
ASBS-025
ASBS-026
ASBS-027
ASBS-028
ASBS-029
ASBS-030
ASBS-S02

APPENDIX B

Existing Nonstructural Programs Table

Existing Nonstructural Programs Within the ASBS 24 Area

Nonstructural Program	Program Subcategory	Name of Nonstructural Control	Project Descriptions for Existing Nonstructural Controls	Project Location	Target Source/ Target Audience	Targeted Water Quality Problem	Method of Measure	Program Start Date	Implementation Status/ Completion Date	Lead Agency	Approx. Cost ($/year)
Enforcement	IC/ID	City of Malibu Illicit Connection/ Illicit Discharge (IC/ID) Elimination Program	This program involves coordination of multiple City Departments to cease and eliminate pollution by illicit connections and discharges to the storm water system. The City has an active education, response, and enforcement program.	Regional	Residential, Commercial	Urban Runoff	# IC/IDs responses/year	November 1997	Ongoing implementation	City of Malibu	$11,395 (City Wide)
Enforcement	IC/ID	Los Angeles County (County) IC/ID Program	This program involves coordination of multiple County departments to cease and eliminate pollution by illicit connections and discharges to the storm water system. The County has an active education, response, and enforcement program. The data are tracked for the County region, as well as for the County's Road Maintenance Division (RMD), as part of its annual pre-storm season drainage inspection program.	Regional	Residential, Commercial, Industrial	Urban Runoff	# IC/IDs responses/year	November 1997	Ongoing implementation	Los Angeles County, District	$443,500 *(Regional)*
Enforcement	IC/ID	City of Malibu Pollution Prevention Hotline	A 24-hour hotline was launched to enhance the IC/ID program. The goal of this program is to offer a consistent reporting tool to citizens during non-business hours for spills or runoff that may pollute streams or coastal waters. Calls are received and dispatched to the appropriate personnel for investigation and resolution. The hotline is available in English and Spanish. The community may call 310-359-8003 to report incidents.	Regional	Residential, Commercial	Urban Runoff	# Hotline calls/year # IC/ID abated/year due to hotline	June 2012	Ongoing implementation	City of Malibu	$600 (FY 13-14, phone)
Enforcement	IC/ID	Pollution Prevention Hotline, 1(888)Clean LA	A 24-hour, bilingual hotline offers County staff, cities, and the public a means to report spills or runoff that may pollute coastal waters. Calls are received and dispatched to the appropriate personnel for investigation and resolution. The hotline is available in English and Spanish. A Chinese hotline is also available in Mandarin.	Regional	Residential, Commercial, Industrial	Urban Runoff	# Hotline calls/year # IC/ID abated/year due to hotline	November 1997	Ongoing implementation	Los Angeles County, District	-
Enforcement	Education, Inspections, Enforcement and ID	City of Malibu Water Waster Online Reporting Form	An online form to allow the community to report water waste has been introduced. All stakeholders are encouraged to make a collective effort to use water wisely, eliminate runoff, and reduce water waste, creating a culture of water conservation and water quality protection, and keep each other accountable by talking with those they see wasting water and using the reporting form. The form includes options to report issues included in the City's water conservation code. The City will provide notice, education and enforcement where needed to resolve issues. The online Water Waster Report form can be found at this link www.malibucity.org/WaterWaster	Regional	Residential, Commercial	Water Conservation, Urban Runoff	# Reports/year # Reports which included runoff abated/year	September 2014	Ongoing implementation	City of Malibu	Staff Time

Existing Nonstructural Programs Within the ASBS 24 Area

Nonstructural Program	Program Subcategory	Name of Nonstructural Control	Project Descriptions for Existing Nonstructural Controls	Project Location	Target Source/ Target Audience	Targeted Water Quality Problem	Method of Measure	Program Start Date	Implementation Status/ Completion Date	Lead Agency	Approx. Cost ($/year)
Enforcement	Education, Inspections, Enforcement	Commercial & Industrial Inspection Program	The County and City have implemented protocols to identify commercial and industrial facilities located within the applicable ASBS 24 drainage area and currently perform inspections at these sites in accordance with the Special Protections requirements (commercial facilities twice during the rainy season and industrial facilities monthly during the rainy season) The goals of these inspections include compliance verification, enforcement as needed, and education regarding storm water and urban runoff issues, recycling, and environmental quality ordinances. The County has not identified commercial or industrial sites within the applicable unincorporated County. City Environmental Programs staff, Code Enforcement Officers, Public Works staff, and Building Safety staff are regularly trained to watch for storm water best management practice (BMP) infractions. Staff are authorized and directed to issue correction notices. Repeat offenses are subject to increased enforcement procedures ranging from cease and desist orders to administrative fines and traditional enforcement remedies (City of Malibu Ordinance 325). If commercial or industrial sites apply for permits within the applicable unincorporated County, the sites will be inspected at the required frequencies listed in the Special Protections. Additionally, an annual voluntary training is conducted for all City staff to learn about protecting water quality.	Regional	Commercial, "Industrial"	Bacteria Organics Oil/Grease Trash Urban Runoff	<u>Changes in Inspection Results for Facilities:)</u>	November 1997	Ongoing implementation	City of Malibu	$8,000
Enforcement/ PIPP	Education, Incentives, Inspections	Clean Bay Restaurant Certification Program	The program is implemented in partnership with the Bay Foundation (also known as the Santa Monica Bay Restoration Commission & Foundation) and other bay cities. The goal is to recognize restaurants and food facilities that go above and beyond the minimum required by law to prevent pollution. Facilities are inspected annually. Only businesses with an inspection score of 100% receive certification. The City implements the rescinding policy for the Clean Bay Restaurant Certificate program, whereby a business that has been certified is subject to having its Clean Bay status rescinded for failing to maintain all of the criteria.	Regional, City of Malibu	Commercial	Bacteria Organics Oil/Grease Trash Urban Runoff	# Certified facilities *Rate of certification has increased 30% between 2009 & 2013.*	April 2009	Ongoing implementation	City of Malibu	See Commercial & Industrial Inspection Program
Enforcement	City Planning	City of Malibu Local Coastal Program	The City of Malibu Local Coastal Program, as certified by the California Coastal Commission, includes the Land Use Plan (LUP) and Local Implementation Plan (LIP) that details many environmental quality and protection standards, objectives, and implementation measures for new development and redevelopment projects. Additionally, conditions are placed prohibiting the installation of any new drains to the ASBS.	City of Malibu	Construction	Trash, Sediments, Urban Runoff, Storm Water Runoff	See Construction Inspection Program	September 1998	Ongoing implementation	City of Malibu	See Commercial & Industrial Inspection Program

Existing Nonstructural Programs Within the ASBS 24 Area

Nonstructural Program	Program Subcategory	Name of Nonstructural Control	Project Descriptions for Existing Nonstructural Controls	Project Location	Target Source/ Target Audience	Targeted Water Quality Problem	Method of Measure	Program Start Date	Implementation Status/ Completion Date	Lead Agency	Approx. Cost ($/year)
Enforcement	Education, Inspections, Enforcement	City of Malibu Construction Inspection Program	The City has implemented protocols to identify existing and future construction sites located within the applicable ASBS 24 drainage area. Identified sites will be inspected in accordance with the Special Protections requirements (weekly during the rainy season). Grading within the City is limited to single lot development (see Ordinance No. 51U). The City engages with construction contractors throughout the construction process. At a pre-grading meeting, the contractor, deputy building official, and inspector(s) review the Storm Water Pollution Prevention Plan (SWPPP) and identify appropriate BMPs. The SWPPP is again discussed at commencement of construction, with a reminder of the repercussions (i.e., job site shut-down) of failing to comply. Project sites are visited regularly during the grading phase and construction phase. BMP implementation and maintenance is checked at each inspection.	Regional	Construction	Trash, Sediments, Urban Runoff	# of Grading Inspections # of Building Inspections	November 1997	Ongoing implementation	City of Malibu	See Commercial & Industrial Inspection Program
Enforcement	Education, Inspections, Enforcement	Los Angeles County Construction Inspection Program	The County has implemented protocols to identify existing and future construction sites located within the applicable ASBS 24 drainage area. Identified sites will be inspected in accordance with the Special Protections requirements (weekly during the rainy season). All construction permit applicants are required to prepare a Wet Weather Erosion Control Plan or Local SWPPP based on the Construction BMP Handbook. The County conducts inspections, follow-ups, and enforcement. A computer database is used to track all single-lot (non-tract) projects that are categorized by the disturbed/graded area (acres).	Regional	Construction	Trash, Sediments, Urban Runoff	<u>Winter 10-11:</u> 3,383 sites underwent wet weather inspections	November-1997	Program Enhancement August 2013	Los Angeles County	$11,000 *(Regional)*
Enforcement	Code Enforcement	Expanded Polystyrene Packaging Ban Inspections & Enforcement	Approximately 65 food facilities are inspected each year for compliance with Ordinance No. 286, M.M.C. Chapter 9.24, Ban on Expanded Polystyrene Food Packaging.	Regional	Commercial	Trash, Urban Runoff	Approximately 80 food facilities inspected/year	October 2005	Ongoing implementation	City of Malibu	See Commercial & Industrial Inspection Program
Enforcement	Code Enforcement	Smoking at Beaches Ban	The Los Angeles County Sheriff engages Beach Patrol for enforcement of Ordinance No. 265, M.M.C. Chapter 12.05.035, Ban on Smoking at Malibu Beaches.	Regional	Residential, Commercial	Trash, Urban Runoff	21 miles of beaches patrolled	May 2000	Ongoing implementation	City of Malibu	$482,983 (total Beach Patrol cost)
O&M	Street Maintenance	City of Malibu Curb & Gutter Cleaning & Repair Program	Contract for annual curb and gutter cleaning and repair. This service ensures proper functioning of drainage facilities.	City of Malibu	City Facilities	Trash, Metals, Sediments, Urban Runoff	# Facilities cleaned/year Pounds material removed/year	February 1987	Ongoing implementation	City of Malibu	$590,000 (FY 13-14, City Wide)

Existing Nonstructural Programs Within the ASBS 24 Area

Nonstructural Program	Program Subcategory	Name of Nonstructural Control	Project Descriptions for Existing Nonstructural Controls	Project Location	Target Source/ Target Audience	Targeted Water Quality Problem	Method of Measure	Program Start Date	Implementation Status/ Completion Date	Lead Agency	Approx. Cost ($/year)
O&M	Street Maintenance	City of Malibu Storm Drain/Culvert Facilities Maintenance	Contract for annual and post-storm inspection and cleaning of storm drain facilities. All storm drains are cleaned annually. Priority storm drains are cleaned at a minimum of twice annually. This program ensures that litter, debris, and pollutants are removed to prevent them getting into the local waterways and impacting beneficial uses.	Regional	City Facilities	Trash, Metals, Sediments, Urban Runoff	# facilities cleaned/year, by priority Pounds material removed/year	February 1987	Ongoing implementation	City of Malibu	$50,000 (FY 13-14, City Wide)
O&M	Street Maintenance	City of Malibu Street Sweeping Contract	Contract for sweeping for public streets in City by means of a mechanical-type street sweeper. Street sweeping is a requirement of the NPDES permit and is intended to remove litter, debris, and pollutants from the roadways, thus preventing them from getting into local waterways. City streets are swept monthly (90 miles total, ~60 miles within the ASBS). The Pacific Coast Highway is swept weekly (54 miles total, 16 miles within the ASBS).	Regional	Streets/Parking	Trash, Metals, Sediments, Urban Runoff	Broom miles swept/year Pounds removed/year	March 2002	Ongoing implementation	City of Malibu	$85,000 (FY 13-14, City Wide)
O&M	Street Maintenance	Los Angeles County Street Sweeping	The County sweeps parking lots along the coastal ASBS to remove litter, debris, and pollutants from the roadways, thus preventing them from getting into local waterways. Parking lots are swept with vacuum or regenerative air sweepers three times per week, based upon seasonal use rates. Sweeping occurs at: Zuma Beach (12 lots), Point Dume (1 lot), and Nicholas Canyon (1 lot).	County Beaches - Parking Lots	Streets/Parking	Trash, Metals, Sediments, Urban Runoff	Broom miles swept/year Pounds removed/year	November 1997	Ongoing implementation	Los Angeles County	$8.7 Million *(Regional)*
O&M	Waste Management	City of Malibu Trash Collection	The City performed a needs study and subsequent implementation of placing trash receptacles at bus stops and high-use areas along the Pacific Coast Highway and City streets. Additional animal-proof containers were placed in the ASBS watershed including along PCH and in the Point Dume area. The refuse is collected weekly to prevent littering and any additional debris from getting into local water ways and drains.	Regional	Residential, Commercial	Trash, Urban Runoff	Frequency of removal	August 2003	Ongoing implementation	City of Malibu	$50,000 (FY 13-14, City Wide)
O&M	Waste Management	County Beaches Trash Collection	County staff empty beach trash cans 7 days a week, as needed, to prevent littering and any additional debris from getting into local water ways and drains. Trash cans are donated by Adopt-A-Beach and broken cans are replaced quarterly, as needed.	County Beaches	Streets/Parking	Trash, Urban Runoff	Frequency of removal	November 1997	Ongoing implementation	Los Angeles County	$7.2 Million *(Regional)*
O&M	Waste Management	County Beaches - Sanitation Program	County staff "sanitizes" the beach 3 days a week, provided the sand is not wet. A tractor with rake and screen system is used to collect trash and turn over the beach sand. This process removes solids and debris and allows the sun to "sanitize" the sand during the day. Operations are between 5 am and 13:30 pm daily.	County Beaches	Residential	Trash	Daily pickup	-	Ongoing implementation	Los Angeles County	See County's Trash Collection Program

Existing Nonstructural Programs Within the ASBS 24 Area

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O&M	Recycled Products Purchasing Policy	Environmentally Preferable Purchases and Practices Policy (EPPP), Recycled Products Purchasing Policy (RCP)	In accordance with Administrative Guideline No. 7.1.3 and M.M.C. 2.63.100, a policy was established to reduce waste by instituting new office practices that emphasize purchase of environmentally preferable products. The policy establishes the goal for all City employees to make waste diversion and reduction a routine part of the jobs, whenever feasible.	City of Malibu	City Facilities, City Staff	Trash, Urban Runoff	-	-	Ongoing implementation	City of Malibu	-
PIPP, O&M	Education, Waste Management	Solid Waste Management Program	Solid Waste Management Program was formed to comply with AB939 (California Integrated Waste Management Act of 1989) and implement source reduction of solid waste, including recycling, composting, environmentally safe transport, and land disposal. This includes City programs for safe disposal of household hazardous waste; used oil collection/recycling events; waste management education; solid waste hauler permitting; Christmas tree recycling; brush clearance/green waste recycling events; bulky item collection; construction and demolition debris recycling; electronic and universal waste disposal; and expanded polystyrene foam recycling program (i.e., Waste to Waves program). Program is in support of the CalRecycle goals to divert municipal waste from landfills.	Regional	Residential, Commercial	Trash, Urban Runoff	Changes to Malibu's Annual Recycling Rate: 57% (2000) to 68% (2012)	March 1997	Ongoing implementation	City of Malibu	$167,450
PIPP, O&M	Education, Waste Management	Rethink L.A.	Education and outreach program designed to encourage “rethinking” about waste management, including opportunities to implement reduction, recycling, and reuse. Program provides resources for buying recycled products and encourages carbon footprint BMPs, including a carbon footprint calculator, energy efficiency tips, and means of alternative transportation.	Regional	Residential, Commercial, Industrial	Trash, Urban Runoff	# Website visits # Workshops # Brochures # Attendees Regional Recycling Rate	-	Ongoing implementation	Los Angeles County	$200K *(Regional)*
PIPP, O&M	Education, Waste Management	Los Angeles County Materials Exchange (LACoMAX)	The goal of this program is to reduce waste transported to the landfill. The LACoMAX is an on-line service where the public may find, make available, or identify an entrepreneurial opportunity for discarding resource materials. The data platform includes 15 material classifications and six regions. It is also a location where garage sales may be advertised. The data platform provides information to other County waste management programs.	Regional	Residential, Commercial, Industrial, Construction	Trash, Urban Runoff	# Website visits # Workshops # Brochures # Attendees Regional Recycling Rate	-	Ongoing implementation	Los Angeles County	See Rethink L.A. program
PIPP	Education	Malibu Parks and Recreation Quarterly Newsletter	The Malibu Recreation Guide and Quarterly Newsletter is sent to residents and includes articles related to the Clean Water Program and Solid Waste Program. The City takes the opportunity to give reminders to the community about how to prevent pollution and reduce waste, as well as local event opportunities. The newsletters are also available at City Hall. ASBS articles have been regularly contributed since 2012.	City of Malibu	Residential	Urban Runoff	4 Issues/year # Newsletters mailed	December 1995	Ongoing implementation	City of Malibu	$33,000

Existing Nonstructural Programs Within the ASBS 24 Area

Nonstructural Program	Program Subcategory	Name of Nonstructural Control	Project Descriptions for Existing Nonstructural Controls	Project Location	Target Source/ Target Audience	Targeted Water Quality Problem	Method of Measure	Program Start Date	Implementation Status/ Completion Date	Lead Agency	Approx. Cost ($/year)
PIPP	Education	Malibu Chamber of Commerce Environmental Committee	The City is an active participant in the Malibu Chamber of Commerce Environmental Committee which aims to provide education and learning opportunities and recognition to local businesses and community through events, awards, workshops, and outreach campaigns.	Regional	Commercial, Residential,	Urban Runoff, Water Conservation, trash/recycling	# Workshops # Attendees # Brochures distributed	September 1999	Ongoing implementation	Malibu Chamber of Commerce	Not Applicable
PIPP	Education	Clean Water Act and Our Backyards Video	The Clean Water Act and Our Backyards video was produced locally in partnership with the Malibu Creek Watershed Council. It is regularly played on cable, and at local events and trainings. It gives an overview of how routine activities can affect water quality, BMPs to prevent pollution, and an explanation of TMDLs.	Regional	Residential	Urban Runoff	# Video presentations # Attendees/presentation	January 2002	Ongoing implementation	Malibu Creek Watershed Council	Not Applicable
PIPP	Education	*Living Lightly in Our Watersheds* Environmental Guide	The City and County collaborated with the Resource Conservation District of the Santa Monica Mountains in the revision and distribution of the *Living Lightly in Our Watersheds: A Guide for Residents of the Santa Monica Bay Watersheds* <www.malibuwatershed.org>. The guide was distributed to all Malibu residences and businesses. The City contributes to printing costs and distribution by mail and distributes materials at events. A new web-based and mobile platform is currently under development and is expected to launch by 2015. A new print edition of the guide is also expected in 2015.	Regional	Residential, Commercial	Urban Runoff	# Guides mailed # Visits to the website	July 2005	Ongoing implementation	Malibu Creek Watershed Council	$3,000 (City of Malibu) $20,000 (County of Los Angeles)
PIPP	Education	*Malibu Life* Environmental Newsletter	*Malibu Life* (formerly *Malibu Current*) Environmental Quarterly Newsletter is sent to all Malibu residences and businesses and distributed continuously to educate about ongoing environmental concerns and what the community can do to help, and provides updates on City environmental projects and programs. An ASBS article was published in Issue 2 Volume 1 in April 2007.	Regional	Residential	Urban Runoff, Water Conservation	# Articles # Newsletters mailed	April 2007	Implementation halted in 2010	City of Malibu	$2,000 (2010, printing & postage)
PIPP	Education	Wildlife and Marine Rescue Services	The City has had a contract with the California Wildlife Center since April 1996 to provide wildlife rescue services and was later amended to include marine mammal rescue services. In 2003, the City, in partnership with the California Wildlife Center, applied for and received a John H. Prescott Marine Mammal Rescue Assistance Grant. Wild Rescue is a secondary responder. Public outreach and education are also a part of the grant.	City of Malibu	Residential	Urban Runoff, Water Conservation	# Outreach events supported	March 1992	Ongoing implementation	City of Malibu, California Wildlife Center	$2,500 (FY 13-14) *($1,000-$2,500 historically)*

Existing Nonstructural Programs Within the ASBS 24 Area

Nonstructural Program	Program Subcategory	Name of Nonstructural Control	Project Descriptions for Existing Nonstructural Controls	Project Location	Target Source/ Target Audience	Targeted Water Quality Problem	Method of Measure	Program Start Date	Implementation Status/ Completion Date	Lead Agency	Approx. Cost ($/year)
PIPP	Education, Inspections, Incentives/ Enforcement	ASBS Focused Outreach Program Proposition 84 Project	This began as a Proposition 84 grant program, officially titled the Wildlife Road Treatment & ASBS Focused Outreach Program Proposition 84 Project. The temporary Coastal Preservation Specialist (CPS) position was created to perform outreach to the community. The CPS conducted field work throughout the ASBS area, including coastal and inland areas, to look for dry-weather runoff and other pollution threats. When individual properties were identified as being out of compliance with ASBS regulations, letters to “cease and desist” the discharge as well as educational materials were mailed. The City, via the CPS and/or other City staff worked with the property owners to help fix the problem. The property owner was required to submit a report detailing how the problem was fixed. The CPS and/or other City staff conducted site visits, continued monitoring the site, and performed other additional actions (case-specific). General letters, including Notices to Comply, were sent to neighborhoods and individuals of high priority that were considered more likely to impact the ASBS to inform them of ASBS discharge restrictions. A general ASBS letter was mailed to every parcel within the ASBS. A database with information on every case is maintained as issues arise in the ASBS watershed and includes all communications and photos. The project also included the installation of a structural BMP on Wildlife Road. The City plans to continue this program on a modified scale.	ASBS 24 (Area in Malibu city limits)	Residential, Commercial	Urban Runoff, Water Conservation	# ASBS letters mailed # Cease and Desist letters mailed # Follow-up 1-month reports submitted % Compliance with Orders to Cease and Desist Discharge # Notices to Comply letter mailed to high-priority addresses % Change in high-priority addresses. Photo documentation	November 2011	Ongoing implementation End of grant: July 2014 City Continuing Program	City of Malibu	$71,914 (grant)
PIPP	Education	Community Meetings and ASBS Presentations	Outreach presentations to home owner associations, property owner associations, and other community groups about the City’s Clean Water Program, including protecting water quality and conserving water have been conducted. Recent outreach by the CPS was about urban runoff and the ASBS.	ASBS 24 (Area in Malibu city limits)	Residential	Urban Runoff	# Presentations	October 2007	Ongoing implementation End of grant: July 2014	City of Malibu	See ASBS Focused Outreach Program
PIPP	Education	Point Dume Marine Science School Assembly and Science Projects	The City has collaborated with the Point Dume Marine Science School on various programs since 2005. An assembly to grades K-5 was conducted including a presentation on the water cycle, urban runoff, and how to prevent pollution from reaching the ASBS. Each grade level then completed a science project related to some component of the assembly at the appropriate grade level. A video of the science day was filmed and posted on the City's YouTube channel. The assembly and project was implemented by the CPS as part of the ASBS Focused Outreach Program.	Point Dume Marine Science School	Students (Residents)	Urban Runoff	# Students # Science day projects # Video views/year	2005	Completed May 2012	City of Malibu	See ASBS Focused Outreach Program

Existing Nonstructural Programs Within the ASBS 24 Area

Nonstructural Program	Program Subcategory	Name of Nonstructural Control	Project Descriptions for Existing Nonstructural Controls	Project Location	Target Source/ Target Audience	Targeted Water Quality Problem	Method of Measure	Program Start Date	Implementation Status/ Completion Date	Lead Agency	Approx. Cost ($/year)
PIPP	Training	In-House ASBS Training	City staff has been trained about the ASBS. The most recent training in November 2012 discussed what to look for in the field, and how to work on ASBS cases. Binders with inspection report forms and educational handouts were created and placed in each City vehicle.	City of Malibu, City Hall	City Staff	Urban Runoff	# Staff trained	2007	Ongoing Implementation	City of Malibu	See ASBS Focused Outreach Program
PIPP	Education	ASBS Webpage	An ASBS section is on the City of Malibu website. The webpage provides interactive maps and information about ASBS, including many educational resources to help residents, businesses, and visitors understand and comply with ASBS regulations. Events, rebates, and other incentive programs are also posted. The web-page section can be viewed at this link www.malibucity.org/ASBS.	City of Malibu, Website	Residential, Commercial, Visitors	Urban Runoff, Water Conservation	# ASBS page views/year	May 2012	Ongoing implementation	City of Malibu	See ASBS Focused Outreach Program
PIPP	Education	Keep it Clean, Malibu Campaign	As part of the Proposition 84 State funding, an outreach campaign was developed (as an item in the CPS scope of work) to educate people about the issue and the result was Keep it Clean, Malibu – a multi-platform educational campaign designed to positively and proactively teach about the ASBS, and make people think about storm drains and what goes into them. The campaign contains five main elements: storm drain art murals and associated educational video, 4 public Service videos, a robust social media campaign, special events, and collateral materials giveaways that featured the campaign slogan and ASBS logo. The campaign can be viewed on this web-page www.malibucity.org/keepitclean.	City of Malibu, Website, Social Media	Residential, Commercial, Visitors	Urban Runoff, Water Conservation, Pollution Prevention	# of "likes" # of tags on social media # ASBS video views # of pledges signed/year	April 2014	Ongoing implementation	City of Malibu	See ASBS Focused Outreach Program
PIPP	Education	Malibu Green Room Webpage	This is an overview of City's sustainability practices, environmental projects, ordinances, and regulations, including coastal water protection and water drought response. Rebates and incentives provided by partner agencies are included on this web-page. The Green Room can be accessed from the Environmental Programs main page from this web-page www.malibucity.org/environmentalprograms.	Regional, City of Malibu, Website	Residential, Commercial	Urban Runoff, Water Conservation	# Malibu Green Room views/year	June 2012	Ongoing implementation	City of Malibu	Staff Time
PIPP	Education	City of Malibu Clean Water Program and Clean Water Team	The City's Clean Water Program and Team were formed with the ultimate goal of reducing or eliminating dry weather flow to the City's storm drains. It includes education of the businesses, residents, and visitors on water quality issues and BMPs and encourages participating in the team. It is the overlying program that manages regulatory compliance (e.g., NPDES, TMDLs), education, training, inspections and incidents response, and public agency activities. Outreach is provided on the City's website, at public speaking events, on local cable stations, at community events, and on distributed materials.	City of Malibu	Residential, Commercial	Urban Runoff, Storm Water Runoff	See other activities for defined metrics.	July 2002	Ongoing implementation	City of Malibu	Staff Time and Professional Services

Existing Nonstructural Programs Within the ASBS 24 Area

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PIPP	Education, Incentives	Malibu Area Conservation Coalition	The Malibu Area Conservation Coalition (MACC) is a partnership of local government agencies, utilities, resource districts, and community stakeholders working within Malibu and the North Santa Monica Mountains that share the common goal of empowering local communities to conserve and protect natural and economic resources and habitat. Recognizing that watersheds, oceans, water, and power generation and delivery systems do not stop at jurisdictional boundaries, the coalition is dedicated to providing effective programs, environmental education, and outreach. MACC members work on joint projects and also cross-promote individual organizations' programs. Recent programs included Ocean Friendly Garden Program, Landscape Irrigation Efficiency Program, Cash for Grass, Earth Day festivals, and the Wild and Scenic Film Festival.	City of Malibu	Residential, Commercial	Trash, Urban Runoff, Water Conservation	# Participants # Events (certain programs will have more defined metrics)	August 2009	Ongoing implementation	City of Malibu	Staff Time
PIPP	Education, Incentives	Ocean Friendly Garden (OFG) Program	The OFG Program targets residences and businesses to promote water conservation and eliminate non-point source pollution from landscaping. It was implemented locally as a partnership of West Basin Municipal Water District and the Surfrider Foundation as part of a Proposition 50 Grant from the State. The program includes educational workshops, training events, irrigation controller rebates, and the design/build of demonstration gardens. The Bluffs Park OFG was redesigned and rebuilt (February-March 2013) into a demonstration garden. Outreach Events included: * Ribbon cutting ceremony (3/20/2013) * OFG Workshop (6/2013) * Urbanite Workshop * Chumash Day PowWow (4/13-14/2013) The overall OFG Program of the Surfrider Foundation offers additional resources.	Regional, Bluffs Park OFG	Residential, Commercial	Urban Runoff, Water conservation, Pollution prevention	# Events/year # Attendees/event # Demonstration gardens constructed	April 2009	Ongoing implementation	Surfrider, West Basin Municipal Water District, City of Malibu	See ASBS Focused Outreach Program for education. *OFG cost not included*
PIPP	Education, Incentives	CA Friendly Landscaping Program	The CA Friendly Landscaping Program targets residences and businesses to promote water conservation and eliminate non-point source pollution from landscaping. It is a reimagining of the OFG Program by the Metropolitan Water District in an attempt to engage a broader audience statewide. Similarly to the OFG Program, it is promoted by its local water Districts and agencies. The program includes educational workshops, training events, and incentives such as landscape water efficiency rebates. The City hosted two CA Friendly Landscaping Workshops from 2013-2014.	Regional	Residential, Commercial	Urban Runoff, Water conservation, Pollution prevention	# Events/year # Attendees/event # Participants/incentive program	2013	Ongoing implementation	West Basin Municipal Water District, Los Angeles County Waterworks District 29, City of Malibu	Staff Time

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PIPP	Education	Pepperdine Business School Sustainability Project	Pepperdine business students created urban runoff and ASBS outreach materials, including posters and videos (available in English and Spanish). Materials are available on the Protect the Coast section on the Malibu City website. The students also mapped the process to develop a potential OFG Program on campus, created a guide for a green business certification program, and researched compliance and opinion of a local water ordinance as part of a project management class.	Pepperdine University	Residential, Commercial	Urban Runoff	# Videos created (2) # Posters created Pepperdine OFG guide	January 2012	Completed March 2012	Pepperdine University, City of Malibu	See ASBS Focused Outreach Program
PIPP	Incentive	Water District #29 Tiered Water Rates Based on Increased Usage	Los Angeles County Water District 29 has implemented tiered water rates based on increased usage to encourage water conservation and reduce water waste to provide economic incentive to reduce landscape irrigation runoff.	City of Malibu	Residential, Commercial	Urban Runoff, Water Conservation	Regional change in water usage over time	February 2003	Ongoing implementation	Los Angeles County Water District #29	-
PIPP	Education	Water Conservation Program	This program is an education and incentive program promoting water conservation. Educational information on water conservation is provided on the website and distributed at workshops. An education program targeted at students (3rd-12th grade) has also been developed.	Regional	Residential, Commercial	Urban Runoff, Water Conservation	# Site visits # Workshops	April 2009	Ongoing implementation	Los Angeles County Waterworks	Regional Program Cost
PIPP	Education, Incentives	Water Conservation Program – Water Saving Devices Rebate Program	Rebates are offered for water saving devices, including high-efficiency washing machines, sprinkler nozzles, and irrigation controllers. Rebates of $25 to $100 per irrigation controller, depending upon Water District and property (capped at $235/applicant), are provided.	Regional	Residential, Commercial	Urban Runoff, Water Conservation	# Rebates obtained *Assumed up to 15% runoff reduction per site*	April 2009	Ongoing implementation	Los Angeles County Waterworks	Regional Program Cost
PIPP	Incentives	Cash for Grass (and other turf removal program iterations)	Through this program, residents are offered a rebate of $1 per square foot of grass replaced with water-efficient landscaping (i.e., native plants, mulch, un-grouted stepping stones, permeable hardscape, and crushed rock). The goal of this program is to encourage water conservation for outdoor landscaping methods, including native plantings, using mulch, and installing permeable pavers.	Regional	Residential, Commercial	Urban Runoff, Water Conservation	# Applications # Completed projects $ Rebates	April-09	Ongoing implementation	Los Angeles County Waterworks	Regional Program Cost
PIPP	Incentives	Landscape Irrigation Efficiency Program (LIEP) (and other water efficiency evaluation programs)	This grant funded program consisted of free water use surveys of properties by a certified landscape professional. The program also included free installation of efficient irrigation controllers (i.e., rotator sprinklers in place of conventional spray heads) for qualified sites. Programs of this type are ongoing and evolving as funding arises.	Regional	Residential, Commercial	Urban Runoff, Water Conservation	# Surveys # Sprinklers exchanged *Assumed up to 70% runoff reduction per site*	April 2009	Ongoing implementation as funding and resources allow	West Basin Municipal Water District	Regional Program Cost
PIPP	Education	Billboard Educational Campaign	This program was a countywide, 8-week billboard campaign designed to promote protective waste management practices. A used motor oil educational advertisement was displayed on 20 billboards throughout Los Angeles County.	Regional	Residential, Commercial	Bacteria, Oil, Urban Runoff	Route of advertisements # Impressions	February 13, 2012	Completed April 2012	District, Los Angeles County	-

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Compliance Monitoring	Compliance Monitoring	Santa Monica Bay Comprehensive Monitoring Program	The Santa Monica Bay Beaches Bacteria TMDL includes a coordinated shoreline monitoring program with regular monitoring of 9 sites within the City boundaries of the ASBS and 1 in the Unincorporated County (25 sample sites in North Santa Monica Bay total), and adoption of a wet Weather Implementation Plan to eliminate exceedances of bacteria above contact recreation standards in local waters, but specifically Santa Monica Bay beaches.	Santa Monica Bay	Water quality data	Recreational waters beneficial use	Annual compliance monitoring data	April 2000	Ongoing implementation	Los Angeles County, City of Malibu, Caltrans	County: $35K - $190K City: $112,000
Special Study	Compliance Monitoring/ Special Study	Assessment of Subtidal Rocky-Reef Resources in Santa Monica Bay	Assessment determined the status of algal, invertebrate, and fish communities in the Subtidal Rocky-Reef Resources in Santa Monica Bay, Malibu ASBS. The study provided baseline information on the condition of subtidal rocky reef habitats and established a monitoring program to track changes in the condition of subtidal rocky reef habitat over time, per the Santa Monica Bay Comprehensive Monitoring Program.	Santa Monica Bay	Biological assessments data	ASBS Assessment	Final Report	August 2003	Completed March 2005	SMBRC, SCCWRP	-
Special Study	Special Study	Marine Habitat Gaps in Santa Monica Bay	Compared existing data with the lists of key habitats and species of concern and identified information gaps and study needs.	Santa Monica Bay	Water quality data	ASBS Assessment	Final Report	January 2003	Completed July 2004	SCCWRP, SMBRC	-
Special Study	Special Study	Santa Monica Bay Marine Habitats and Living Resources Inventory	The Santa Monica Bay Marine Habitats and Living Resources Inventory was a literature review to identify gaps in existing studies of habitats and species in the region. Upon update of the inventory, data summary reports from the inventory by site location, habitat type, and taxa were generated.	Santa Monica Bay	Data assessment	ASBS Assessment	Final Report	July 2003	Completed February 2004	SCCWRP, SMBRC	-
Special Study	Database Management	Santa Monica Bay Spatial Database & Santa Monica Bay Data Evaluation	Data collected under existing monitoring protocols used throughout Santa Monica Bay were evaluated to determine their applicability in the Marine Life Protection Act (MLPA) process (complete January 2003-February 2004). A spatial database was developed to be compatible with the GIS database for the central coast marine-protected areas and has been populated with data for Santa Monica Bay (complete January 2003-July 2004).	Santa Monica Bay	Data assessment	ASBS Assessment	Database	July 2003	Completed July 2004	SCCWRP, SMBRC	-
Special Study	Special Study	Oceanographic Information for Trend Analysis in Santa Monica Bay	In collaboration with the Southern California Coastal Ocean Observing System (SCCOOS), collect and compile historical physical and biological oceanographic information for trend analysis in Santa Monica Bay.	Santa Monica Bay	Data assessment	ASBS Assessment	Final Report	October 2003	Completed July 2004	SCCWRP, SMBRC	-
Special Study	BIGHT '03; BIGH '08; BIGHT '13	Marine Habitat Study of Santa Monica Bay and ASBS	Collaboration with southern California Bight partners to identify key types of marine habitats and develop a master list of species of concern for Santa Monica Bay & the Southern California Bight. In 2008, the State Water Resources Control Board (SWRCB) worked with ASBS dischargers to collaboratively conduct a statewide ASBS regional monitoring program to provide better scientific information to the SWRCB for regulation of the ASBS	Santa Monica Bay & ASBS 24	Biological assessments data, Water quality data	Urban Runoff, Storm Water Runoff	Monitoring Data, Final Report	Jan. 2003, Nov. 2008, Sept. 2013	July 2004, April 2009, July 2014	SCCWRP, City of Malibu and Los Angeles County as partners	$35,000 (2003) $74,087 (2008) $74,087 (2013)

Existing Nonstructural Programs Within the ASBS 24 Area

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			and in drafting the special protections for the ASBS. The City of Malibu and County contributed to scientific analysis of data for pre and post storm monitoring events in 2008 and 2013- 2014. The City will continue the wet weather monitoring program in 2014-2015 wet seasons in order to meet the obligations of the Special Protections.								
Special Study	Special Study	Malibu Creek Bacteria TMDL Reference Watershed Study	Monitoring of dry weather, dry winter weather, and wet weather for one year to develop representative numeric target for bacteria exceedance days. This study was conducted in Arroyo Sequit, a watershed which outlets at Leo Carillo State Beach in the ASBS.	Arroyo Sequit	Water quality data	Urban Runoff, Storm Water Runoff	Final Report	June 2006	Completed July 2007	SCCWRP	$1,594
Special Study	Special Study	Source ID Study of Ramirez and Escondido Creek	North Santa Monica Bay Bacteria Source Identification Study of Ramirez and Escondido Creeks conducted by the County of Los Angeles. The City was a participant and served on the technical advisory committee to develop a methodology to track sources of bacteria indicators. The County of Los Angeles halted this study in 2008 study due to low bacterial levels measured. Monitoring resumed in 2009. Study ended in 2011, after no exceedances were observed.	Ramirez and Escondido Creeks	Water quality data	Urban Runoff, Storm Water Runoff	Final Report	March 2007	Completed July 2011	Los Angeles County, SCCWRP	-
Special Study	Special Study	Low-Flow Diversion Task Force	The low-flow diversion task force recommended management actions that optimize operations for the District. The task force completed a pilot project in June 2010 to test new technologies for low-flow diversion monitoring that would be used to better operate the system and characterize the sources of dry weather flows. This pilot project was successful and the District is pursuing a project implement these improvements at all of its low-flow diversions.	Regional	Dry Weather Flow	Urban Runoff	Low-Flow Diversion Structure Improvement List	2009 (start pilot program) June 2010	June 2010 (end of pilot program) Ongoing task force efforts	District	Staff Time

APPENDIX C

Potential Enhanced Nonstructural Programs Table

Potential Nonstructural Program Enhancements to Achieve Additional Wet Weather Load Reductions

Nonstructural Program	Program Sub-Category	Name of Nonstructural Control	Project Descriptions for Enhanced Nonstructural Controls	Target Source/ Target Audience	Targeted Water Quality Problem	Method of Measure	Lead Agency	Implementation Cost (Approx.)
O&M	Street Maintenance	Infrastructure Priority Re-Evaluation Program	This activity is a review and re-evaluation of existing inspection/cleaning priorities assigned to the catch basins, street, parking lot and other systems located in the ASBS 24 watershed. Prioritization criteria are based on the NPDES permit and are typically based upon historic trash and debris loading to a given system. This prioritization does not take into account the watershed or receiving water body that may be impacted by a given piece of infrastructure. Increased cleaning may be appropriate to meet the requirements of the ASBS Special Protections and General Exception or to provide a streamlined, efficient and effective implementation program for ASBS 24.	Residential, Commercial	Trash/Debris, Sediment	Existing Catch Basin Program Assessment, Other Program Assessments, Inspection Data, Pounds Removed / year	City of Malibu, County	$10K, +$25K/Year, maintenance per existing program
PIPP	Education, Incentives	Enhanced Collaborative Environmentally Friendly Alternative Services Program	This program would look for opportunities to enhance existing environmentally friendly services programs. For example, the LACoMAX could include an ASBS-specific region search and/or the City of Malibu could provide a link to via the Malibu Green Room webpage, with information related to local exchanges, a list of consignment facilities, etc. Programs that may also be enhanced in the future include the Clean Bay Restaurant Certification Program, City of Malibu's EPPP and RCP, and Los Angeles County's Rethink LA Program.	Residential, Commercial	Urban Runoff, Trash	Program-specific metrics will be developed	Los Angeles County, City of Malibu, Malibu Chamber of Commerce	$5K / Year
PIPP	Education	ASBS Signage at Beaches	Educational placards describing the ASBS would be developed and installed along the board walk and/or main public beach accesses along the ASBS. This signage would describe unique features of the ASBS, as well as highlight recommended BMPs for trash management, sediment management, irrigation control, etc.	Residential, Public	Urban Runoff, Trash	# placards installed, # beach visits/year	Los Angeles County, State of California	$20K
O&M	Street Sweeping	Increased Sweeping Frequency	This program would involve a pilot project to adjust the frequency of sweeping on City streets located within the ASBS drainage area from once per month to more frequently, paired with a runoff study to determine pollutant loading. Increasing the sweeping frequency has been shown to increase the potential load reduction associated with metals, sediments, trash, and debris.	Residential, Commercial	Metals, Sediments, Trash	Pounds of debris removed per year % reduction in pollutant loading vs. cost	City of Malibu	$360,000
O&M	Street Sweeping	Equipment Upgrade	As of 2013, the City of Malibu sweeps city streets using motorized mechanical street sweeping equipment. This proposed nonstructural program enhancement would involve either: 1) replacing mechanical street sweepers with enhanced sweeping technologies during the standard end of the equipment life-cycle, or 2) requiring contractors responsible for local sweeping activities to only use vacuum or regenerative air sweeping technologies.	Residential, Commercial	Metals, Sediments, Trash	Increased efficiency and pollutant load reduction for machine operation.	City of Malibu	Additional cost of ~$25K per machine.
PIPP	Education, Incentives	Architectural Copper and Metal Building Material Mitigation Program	This program would offer rebates for architectural copper and zinc mitigation measures. Rebates would be offered for existing structures and could be modeled after the Grass for Cash program. Potential mitigation measures may include: application of sacrificial paint (e.g., copper and zinc oxidation protection paints), downspout diversions, rain barrels and cisterns. Information could be incorporated into existing educational materials and through the ASBS Focused Outreach program, etc.	Residential, Commercial	Metals	# rebates offered, # facilities mitigated	City of Malibu, Los Angeles County	$150K / Year

Potential Nonstructural Program Enhancements to Achieve Additional Wet Weather Load Reductions

Nonstructural Program	Program Sub-Category	Name of Nonstructural Control	Project Descriptions for Enhanced Nonstructural Controls	Target Source/ Target Audience	Targeted Water Quality Problem	Method of Measure	Lead Agency	Implementation Cost (Approx.)
PIPP / Enforcement	City Ordinance, Education, Enforcement	Architectural Copper Ban	Monitoring data of storm water wash off collected from metal building materials have been shown to be associated with elevated copper levels (City of San Diego, 2009 and 2010a). This ordinance would prohibit use of architectural copper for all new developments and re-development projects, especially for buildings and facilities along the ASBS and PCH. This ordinance would likely require significant education and outreach to engineers and architects, as well as residents and general public.	Residential, Commercial	Copper	# brochures distributed, # workshops, Ordinance/Policy, # facilities enforced	City of Malibu	$5K
PIPP / Enforcement	City Ordinance, Education, Enforcement	Zinc Alternative Building Material Ordinance	It is recognized that for maintenance and durability, building materials are often specified as galvanized zinc. Monitoring data collected of storm water wash off from metal building materials have been shown to be associated with elevated zinc levels. This project would evaluate the feasibility and implement a zinc building material policy which would eliminate, reduce, mitigate or control the use of zinc building materials, based upon the findings of a feasibility analysis and stakeholder engagement process.	Residential, Commercial	Zinc	Feasibility analysis, Ordinance/Policy	City of Malibu	$10K + $5K/Year *(outreach)*

APPENDIX D

Enhanced Nonstructural Programs

Quantification Calculations

- Aggressive Street Sweeping
- Building Material Management Program

AGGRESSIVE STREET SWEEPING

Aggressive street sweeping can be highly effective in reducing metals loading (City of San Diego, 2010; Seattle Public Utilities, 2009; City of Portland, 2006) and, to a lesser extent, bacteria (Skinner et al., 2010), while continuing to address trash, debris, and sediment pollution. The County has implemented an aggressive street sweeping program at County Beach parking lots (i.e., sweeping three times per week with enhanced sweeping equipment). Given that these parking lots experience a reduced traffic load compared to the PCH and City streets and have an aggressive sweeping schedule and program, the County's existing parking lot sweeping program is considered to be appropriate for protecting water quality of the ASBS 24 (i.e., program at a high level where adding enhancements may provide diminishing returns). The City currently implements a two-part street sweeping program, including weekly mechanical sweeping along PCH and monthly mechanical sweeping along City-maintained streets. This assessment focuses on quantifying the potential additional water quality benefits that could be realized through enhancements to the sweeping programs associated with City street sweeping programs. Data from the *City of San Diego Targeted Aggressive Street Sweeping Pilot Study Effectiveness Assessment*, which evaluated the effectiveness of three types of street sweepers at two aggressive sweeping frequencies, are used in this section to evaluate the potential load reduction associated with sweeping the PCH and City-maintained streets.

The referenced 2010 City of San Diego report uses debris removal, or collection rate as a metric to assess the relative pollutant load reduction associated with the various aggressive street sweeping programs evaluated. The fine sediments collected in special study bins were weighed, sampled, and analyzed for grain size, metals, pesticides, and other constituents of concern. Daily sweeping data were translated into pounds of debris removed per linear broom mile swept, and pollutant-specific load reduction rates were estimated (City of San Diego, 2010). This method of measure was used to compare the effectiveness of different types of street sweepers at twice-per-week and once-per-week sweeping frequencies.

The 2010 City of San Diego study included detailed analysis of various routes through different types of watersheds (hilly, flat, rural, and urban), including the urban areas of Chollas Creek. The average pounds of debris removal per broom mile for mechanical and vacuum sweepers, at both once and twice a week frequencies for this particular urban route, are presented on Table D-1. The broom mileage data used to produce these sediment removal rates were extracted from the 2010 City of San Diego study (City of San Diego, 2010), which is available on the Think Blue San Diego website. Note that the frequency of sweeping implemented under a few of the existing sweeping programs implemented by the County (3 times/week) and City (once/month) do not perfectly correspond with the available data. Removal rates for these frequencies were extrapolated using the best-fit curves presented on Table D-1 and in Figure D-1.

Table D-1. Sediment Load Reductions Associated with Mechanical and Vacuum Sweeping (City of San Diego, 2010)

Sweeper Technology	Sweeping Frequency	Average Sediment Removal Rate (lb/broom mile)
Mechanical	Once/week[1]	49.4
	Twice/week[1]	30.9
	Once/month[2]	63.3
	Twice/month[2]	58.7
Vacuum	Once/week[1]	80.0
	Twice/week[1]	83.3
	Once/month[2]	77.5
	Twice/month[2]	78.4

[1] Calculated debris removal rate from referenced special study (City of San Diego, 2010).
[2] Calculated using interpolated values.

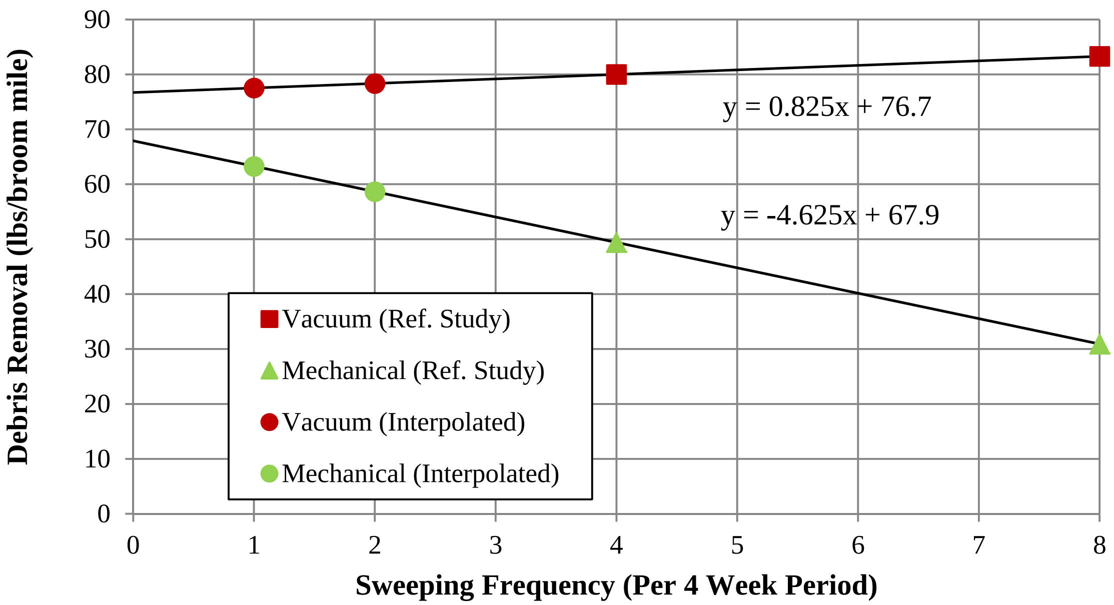

Figure D-1. Sediment Load Reductions Associated with Mechanical and Vacuum Sweeping (City of San Diego, 2010)

The potential debris reductions associated with street sweeping within ASBS 24 were calculated by determining the linear broom miles or path of travel and multiplying that length by the appropriate removal rate. The linear broom miles for each parking lot were determined using GIS information (aerial images, parcel layer, and land use data). Sweeping data for existing programs within the ASBS 24 are presented on Table D-2.

.

Table D-2. Existing Street Sweeping Programs Within ASBS 24

Authority	Beach Name	Acres (acres)	Single Trip Broom Miles (miles)	Yearly Broom Miles at Once/month frequency (miles/year)	Yearly Broom Miles at Twice/Month Frequency (miles/year)	Yearly Broom Miles at Once/Week Frequency (miles/year)
City of Malibu	PCH	-	16	192	384	832
	City Streets	-	59	702	1,404	3,042

The potential debris removal for each sweeping option considered was estimated by multiplying the yearly linear broom mileage by the applicable debris removal rate and results of these calculations are provided on Table D-3.

Table D-3. Potential Debris Removal Summary for Each Sweeping Method

Authority	Machine	Location	Frequency	Broom Miles (miles/ year)	Debris Removal Rate (lb/ miles)	Debris Removal Rate (lb/year)	Debris Removal Rate (kg/year)
City of Malibu	Mechanical	PCH	Once/month	192	63.3	12,149	5,503
			Twice/month	384	58.7	22,541	10,211
			Once/week	832	49.4	41,101	18,619
		City Streets	Once/month	702	63.3	44,419	20,122
			Twice/month	1,404	58.7	8,2415	37,334
			Once/week	3,042	49.4	150,275	68,074
	Vacuum	PCH	Once/month	192	77.5	14,885	6,743
			Twice/month	384	78.4	30,106	13,638
			Once/week	832	80.0	66,560	30,152
		City Streets	Once/month	702	77.5	54,423	24,653
			Twice/month	1,404	78.4	110,074	49,863
			Once/week	3,042	80.0	243,360	110,242

Debris removal includes sediment, organics, and trash. The 2010 San Diego study did not directly correlate debris removal to TSS removal. The potential debris removal calculations for the different street sweeping scenarios are provided to show the comparison between different types of sweepers and sweeping frequencies.

The 2010 San Diego study included monitoring the water quality for three storm events at sites located within the Chollas watershed (Route 3J). For each monitored event, three different street segments were sampled representing sites that had been swept by either a vacuum or mechanical sweeper, once per week and for the three continuous weeks prior to the storm event and an "unswept" site that had been swept once every two months prior to the event (City of San Diego, 2010). A summary of the TSS results and calculated load reductions are provided on Table D-4. .

Table D-4. Summary of Street Sweeping Water Quality Results (City of San Diego, 2010)

Storm Event	Type of Sweeping	TSS (mg/L)	TSS Percent Reduction
Mean of Three Storms	Un-swept (Once/2 months)	927.0	N/A
	Mechanical (Once/week)	243.8	73.7%
	Vacuum (Once/week)	135.8	85.3%

The TSS removal efficiencies shown on Table D-4 can be used in combination with watershed model output data to estimate the transportation land use TSS pollutant load reductions associated with enhancing programs to perform sweeping at a once-per-week frequency with these types of machinery. The estimated TSS load reduction can also be compared to the total TSS load from watershed model data to estimate the overall pollutant load reductions from the street sweeping program.

The load reductions summarized on Table D-4 are based on the 2010 San Diego study and removal efficiencies of mechanical and vacuum sweeping at a once-a-week frequency (City of San Diego, 2010). As part of this study, storm event monitoring samples (wet weather) were not collected for comparison of un-swept sites to sites that were swept at a frequency of once per month or twice per month. However, based on the debris removal data collected in the referenced study and applied to the ASBS 24 watershed (see Table D-3), sweeping less frequently (e.g., once per month or twice per month) would provide less of a load reduction, even though a specific percentage is not provided by this quantification analysis. There is a correlation between TSS and metals in urban storm water runoff (LARWQCB, 2005), and the reductions in TSS load shown on Table D-4 also represent load reductions of metals.

REFERENCES

City of Portland. 2006. *Technical Memorandum Nonstructural Stormwater BMP Assessment* Work Order 14531043. Prepared for the City of Portland by Herrera Environmental Consultants. May 2006.

City of San Diego. 2010. *City of San Diego Targeted Aggressive Street Sweeping Pilot Study Effectiveness Assessment*. Prepared for the City of San Diego by Weston Solutions, June 2010.

Seattle Public Utilities. 2009. *Seattle Street Sweeping Pilot Study Monitoring Report. Prepared by Herrera Environmental Consultants*. April 22, 2009.

Skinner et al. (Skinner, J., J. Guzman and J. Kappeler). 2010. “Regrowth of Enterococci & Fecal Coliform in Biofilm, Studies of Street Gutters and Storm Drains in Newport Beach, CA,” In *Stormwater*. July–August 2010. Accessed at: http://www.stormh2o.com/july-august-2010/regrowth-enterococci-fecalcoliform.aspx.

Simple Method Model to Estimate Copper Load Reduction Associated with Nonstructional BMP Program

Watershed Parameters

Area	1	ac	
Rainfall	1	inch	
Percent of Resid that have cu	25%		
w/cu material factor	25	times std EMC	
Residential Cu EMS (w/cu)	432.5	ug/L	
Residential Cu EMC	17.3	ug/L	(LARWQCB, 2005)
Open Space Cu EMC	9.1	ug/L	(LARWQCB, 2005)
Transportation Cu EMC	51.9	ug/L	(LARWQCB, 2005)

Land Use	Coverage	Impervious %	**Rv Value**
Residential	50%	35%	0.365
Open Space	40%	3%	0.077
Transportation	10%	75%	0.725

Base Line (Exisiting Conditions No Program)

Calculations:

Land Use	Coverage	Impervious %	**Rv Value**	Cu EMC (ug/L)	Loading (kg/(1-in*1 ac)
Residential Cu EMS (w/cu)	12.5%	35%	0.365	432.5	0.0219
Residential Cu EMC	37.5%	35%	0.365	17.3	0.0026
Open Space Cu EMC	40.0%	3%	0.077	9.1	0.0003
Transportation Cu EMC	10.0%	75%	0.725	51.9	0.0042
Total	**100.0%**				**0.0290**

With Program - Lower End of Reductions Based on Stated Asssumptions

Assumptions:		Results	
Percent of Program Utilization	20.0%	Load Reduction =	6.0%
Load Reduction	40.0%		

Calculations:

Land Use	Coverage	Impervious %	**Rv Value**	Cu EMC (ug/L)	Loading (kg/(1-in*1 ac)
Residential Cu EMS (w/cu)	10.00%	35%	0.365	432.5	0.0175
Residential Cu EMS (w/cu) on Program	2.50%	35%	0.365	259.5	0.0026
Residential Cu EMC	37.5%	35%	0.365	17.3	0.0026
Open Space Cu EMC	40.0%	3%	0.077	9.1	0.0003
Transportation Cu EMC	10.0%	75%	0.725	51.9	0.0042
Total	**100.0%**				**0.0273**

With Program - Upper End of Reductions Based on Stated Asssumptions

Assumptions:		Results	
Percent of Program Utilization	20.0%	Load Reduction =	12.1%
Load Reduction	80.0%		

Calculations:

Land Use	Coverage	Impervious %	**Rv Value**	Cu EMC (ug/L)	Loading (kg/(1-in*1 ac)
Residential Cu EMS (w/cu)	10.00%	35%	0.365	432.5	0.0175
Residential Cu EMS (w/cu) on Program	2.50%	35%	0.365	86.5	0.0009
Residential Cu EMC	37.5%	35%	0.365	17.3	0.0026
Open Space Cu EMC	40.0%	3%	0.077	9.1	0.0003
Transportation Cu EMC	10.0%	75%	0.725	51.9	0.0042
Total	**100.0%**				**0.0255**

LARWQCB (Los Angeles Regional Water Quality Control Board). 2005. Total Maximum Daily Load for Toxic Pollutants in Marina del Rey. October 6, 2005. EMCs were estimated based on LADPW's stormwater data from 1994 to 2000.

APPENDIX E

Preliminary Design Report

Broad Beach Structural BMPs

Prepared for:

City of Malibu
23825 Stuart Ranch Road
Malibu, CA 90265-4861

Broad Beach Road Biofiltration Project

Preliminary Design Report

Prepared by:

Geosyntec consultants

engineers | scientists | innovators

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Project Number LA0245

April 2011

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LIST OF ABBREVIATIONS AND ACRONYMS

BMP	Best Management Practice
CDP	Coastal Development Permit
CEQA	California Environmental Quality Act
ETWU	Estimated Total Water Usage
LACFD	Los Angeles County Fire Department
LCP	Local Coastal Program
LIP	Local Implementation Plan
MAWA	Maximum Applied Water Allowance
MEP	Maximum Extent Practicable
MS4	Municipal Separate Storm Sewer System
MSL	Mean Sea Level
NPDES	National Pollutant Discharge Elimination System
OWTS	Onsite Wastewater Treatment System
PAH	Polycyclic Aromatic Hydrocarbon
PCH	Pacific Coast Highway
PDR	Preliminary Design Report
POC	Pollutant of Concern
SWRCB	State Water Resources Control Board

The Broad Beach Road Biofiltration Project (Project) is funded in part by the City of Malibu (City) and in part by the State Water Resources Control Board (SWRCB) through a Proposition 84 Grant Agreement between the two parties. The contents of this document do not necessarily reflect the views and policies of the State Water Resources Control Board, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

1. INTRODUCTION

The purpose of this report is to present the design basis and the evaluation of design alternatives for the Broad Beach Road Biofiltration Project (Project). This Preliminary Design Report will form the basis for the critical evaluation and selection of the Project design approach.

The Preliminary Design Report (PDR) is intended to document all the relevant studies, evaluations, and calculations for the Broad Beach Road Biofiltration Project and to produce two conceptual design alternatives for the Project. The Project scope of work requires that the PDR include the following:

- Hydrology studies and soils report;
- Groundwater mounding analyses;
- Utility maps and identification of utility interferences;
- Development of two conceptual design alternatives presented at the 10 percent design level;
- Site plans showing proposed improvements, landscaping, and best management practices (BMPs);
- Performance and maintenance for the proposed alternatives;
- Construction cost estimate; and
- Final design recommendations.

This report is presented in 10 sections. Section 1 is this report and Project introduction. Section 2 reviews the existing Project site conditions, including topographic maps and utility maps. Section 3 reviews various regulations and approvals considered in the development of the Project conceptual design. Section 4 presents the results of the soil and groundwater investigation, including the infiltration study and groundwater mounding analysis. Section 5 introduces the Project hydrology evaluation, including a review of site drainage and development of the Project site design capture volume. Section 6 reviews the Project objectives, introduces the proposed BMPs and site improvements, and develops two stormwater improvement alternatives. Section 7 presents construction cost estimates for the two alternatives. Section 8 includes a discussion of the two alternatives, with recommendations. Section 9 defines the limitations on use of this report. Section 10 presents pertinent references cited in this report.

1.1 Project Description and Background

The city of Malibu was awarded a Proposition 84 grant by the State Water Resources Control Board (SWRCB) for the Broad Beach Road Biofiltration Project. The stated purpose of this grant is for "diverting dry-weather and some stormwater runoff from a series of eight (8) storm drains onto permeable surfaces and into a biofiltration system along a one (1) mile stretch of Broad Beach Road to prevent discharges to Broad Beach." [SWRCB, 2011]. The City of Malibu has contracted with Geosyntec Consultants to prepare studies, develop design documents, provide community outreach, and support the City during construction of this Project.

The Project includes various stormwater BMPs, landscape, and other improvements to eliminate or greatly reduce dry-weather flows, improve stormwater quality through treatment, reduce erosion and sediment tracking, and possibly capture and use stormwater. Overall, the Project will improve runoff quality and reduce wet weather and dry weather flows to Broad Beach.

1.2 Project Objectives

The Project objectives are:

- Eliminate dry weather flows to the storm drain;
- Reduce wet weather flows to storm drain (as feasible);
- Improve water quality of wet weather flows to storm drain (i.e., storm water treatment, pollutant reduction) to the maximum extent practicable (MEP);
- Reduce potable water use for irrigation (as feasible);
- Restore habitat above Broad Beach Road (as feasible);
- Reduce slope erosion (as feasible); and
- Preserve street and visitor parking.

1.3 Terms of Reference

This report was prepared for the City of Malibu (City) by Geosyntec Consultant Team (Geosyntec) in support of the Broad Beach Road Biofiltration Project in the City of Malibu, California. This work was authorized under Agreement executed on October 27, 2011; this report satisfies Task 1.11 of the scope of services. This report was written by Jan Coward and Patrick Galvin, PE, with senior review conducted by Ken Susilo, PE, in accordance with Geosyntec's quality review procedures.

The City project manager for the Project is senior civil engineer Rob DuBoux, Esq., PE.

The Project is funded in part by the City of Malibu and in part by the State Water Resources Control Board through a Proposition 84 Grant Agreement between the two parties.

2. EXISTING SITE CHARACTERISTICS

2.1 General Site Condition and Location

Broad Beach Road, situated between Broad Beach and Pacific Coast Highway (PCH) in Malibu, California, runs parallel to the coastline with a general orientation within the Project area of southeast to northwest. Broad Beach Road is a paved two-lane residential street providing residents access to their homes along the south side of the road and providing parking and beach access for residents and visitors. A mostly unpaved strip along the northern edge of Broad Beach Road varying in width from 10 to 20 feet provides public parking on the north side of the road. This parking strip is separated from PCH by a vegetated hillside which varies in slope from slightly steep to nearly vertical bluffs where the elevation difference between the two roadways is at its greatest. The Project area is located in the western end of Malibu approximately three miles northwest of Point Dume (see Vicinity Map, Figure 2-1).

The Project drainage area encompasses approximately 4,500 linear feet of Broad Beach Road between PCH and Victoria Point Road and extends for the most part from the center line of Broad Beach Road to the top of the hillside between Broad Beach Road and PCH. The total Project drainage area is 12.3 acres.

The Project area is located at the mouth of Trancas Canyon (see Figure 2-2). Trancas Canyon Creek, which drains the 6,233 acre Trancas Canyon watershed, runs to the east of the Project area culminating in a small disturbed coastal lagoon adjacent to the commercial center at the intersection of Trancas Canyon Road and Pacific Coast Highway. The area north of the Project area and west of Trancas Canyon Road drains to Caltrans-owned catch basins along the northern edge of PCH. The Trancas Canyon watershed drainage is not addressed by this Project. With the exception of one area located on PCH, the drainage from PCH is not addressed by this Project.

2.2 Site Topography

The site topography is fairly consistent along the length of Broad Beach Road varying mainly in the elevation difference between Broad Beach Road and PCH and the steepness of the hillside. The Project area, corresponding to the drainage area, encompasses 12.3 acres, approximately 1.6 acres of which is asphalt and concrete paved roadway and parking area. A topographic survey was performed for the Project. The topographic maps are presented in Appendix A.

Broad Beach Road is paved with asphalt and has two lanes, each lane approximately 10 feet wide. The road is crowned at the center line with a lateral slope of roughly two percent. Thus, storm water runoff that lands on the south side of the road flows toward the private residence drains and storm water from the north side of the road flows to the city-owned catch basins. The roadway undulates but is relatively flat except for the western end which reaches a slope of up to five percent. The stretch of road within the Project area has four low points and the roadway elevation varies from 18 to 64 feet above mean sea level measured at roadway center line.

A shoulder area varying in width from roughly 10 to 20 feet lies on the north side of the road along the entire stretch, separating it from the hillside –this area is used for parking by visitors and residents. This area is mostly unpaved, covered by varying materials including gravel, decomposed granite, compacted dirt, sand, and patches of asphalt and concrete. The parking strip follows the same undulating gradient as the roadway in the longitudinal direction and slopes slightly from the toe of the hillside toward the edge of the roadway pavement.

The hillside that separates the parking area and the shoulder along the south side of PCH is relatively steep and in certain areas nearly vertical. The elevation difference from the top of the hillside to the bottom of the hillside varies between 20 and 60 feet. The vertical bluff sections coincide with where the shoulder along PCH is widened to allow for roadside parking.

The entrances to the properties along the south side of Broad Beach Road generally lie at the same elevation as the roadway, or lower.

Existing drainage patterns are described in *Section 5 Hydrology* .

2.3 Utilities

The major utilities within the Project area consist of storm drains, sanitary sewer, potable water, electricity, communication, and natural gas. In support of the development of this preliminary design, the Geosyntec team performed utility research and located existing utilities in the Project area. This work was done using available utility maps and by requesting utility owners to mark their utilities at the Project site. No independent field verification of utilities was conducted. The utility maps are presented in Appendix B.

2.4 Biology

In support of the development of this preliminary design, the Geosyntec team performed a preliminary Biological Assessment of the Project area. The intention of the Biological Assessment was to provide an objective preliminary evaluation of potential impacts of the Project on existing biological resources. The information presented below is a summary of the conclusions and recommendations from this assessment. The preliminary draft of the Biological Assessment report is presented in its entirety in Appendix C.

Based on review of historic vegetation maps, the site is significantly degraded from its historic condition prior to development of Broad Beach. Field surveys found that the vegetation was heavily invaded by naturalized and planted exotic species. The vegetation classifications described below were determined to best characterize the assessment area.

- *Coastal Bluff Scrub (3.1 acres)* - Coastal bluff scrub consists primarily of native plant species, although exotic invasives are present throughout. This vegetation occurs on the upper, steeper bluff slopes between Pacific Coast Highway and the lower landscaped zone along Broad Beach Road.

- *Ornamental Landscaping (4.2 acres)* - Ornamental landscaping consists primarily of exotic vegetation that has been planted and irrigated, including pines, junipers, eucalyptus, bamboo, bougainvilla, and invasive species such as pampas grass. This vegetation dominates the lower slope of the assessment area along Broad Beach Road.

- *Ornamental Landscaping/Coastal Bluff Scrub (1.1 acre)* - This classification represents an integration of native and planted vegetation, with invasive exotics such as iceplant also present throughout.

- *Ornamental Landscaping (Planted Sycamores) (0.2 acre)* - Planted and irrigated sycamores occupy a localized, small area between Broad Beach Road and artificial terraces upslope. These trees may fall under the protection of the City's Native Tree Protection Ordinance because they are native to California.

In general, the area has relatively few wildlife species present or expected to occur, due to its condition as fragmented habitat surrounded by high-traffic roads, frequent human disturbance, construction noise, and dominance of exotic vegetation. The exotic vegetation provides cover and limited nesting habitat for birds, but few food resources for native wildlife. Certain wildlife species, especially goldfinches and crows, were frequently observed moving between the assessment area and landscaping on residential properties to the south. After the Project design is further advanced, an additional biological assessment will be conducted to specifically address the proposed activities and their potential biological impact on the final Project areas.

2.5 Climate

The climate characteristics of the site reflect the general Mediterranean climate of central coastal regions of California. This climate regime is characterized by cool, wet winters and warm, dry summers with occasional periods of fog. Although infrequent, Malibu is periodically subjected to intense coastal storms.

The average daytime summer temperatures in the area are usually in the 70s to 80s (Fahrenheit). Nighttime low temperatures during the summer are typically in the high 50s to low 60s, while the winter high temperature tends to be in the 60s. Characteristic of Malibu's marine microclimate, the winter low temperatures are in the low 50s. The annual average rainfall in Malibu is about 20 inches. Winter months tend to be wetter than summer months. The wettest month of the year is January with an average rainfall of about 5 inches.

2.6 Hardscape and Landscape

Many Broad Beach Road residents have created gardens across from their residences on city property. These gardens include many non-native invasive or ornamental plants and shrubs. On several parcels, numerous potted plants are also stored along the roadway. Although this property is owned by the city, many homeowners have installed private irrigation systems plumbed back to their residential water services. Irrigation piping runs under the road and was also observed within existing storm drain pipe. The private irrigation of gardens creates uncontrolled and unmanageable dry-weather flows which have been observed during recent site visits.

Residents have also constructed several garden and retaining walls along the hillside. These walls are constructed of a myriad of materials including cobbles, broken concrete, masonry brick, and cast-in-place concrete. Some walls appear to have served as a means of disposal of waste broken concrete from driveway replacements. The parcel-specific variable hardscape and landscape elements have created an inconsistent environmental theme for the neighborhood.

Examples of existing hardscape, landscape, and irrigation systems are presented in Figures 2-3 through 2-9.

3. REGULATORY REQUIREMENTS

3.1 Water Quality

The City storm drains within the Project area ultimately discharge through private drains to private beaches. After passing through a wave wash mixing zone in the Pacific Ocean, flows reach the Pacific Ocean and a designated Area of Special Biological Significance (ASBS 24). The California Ocean Plan [SWRCB, 2009] defines water quality objectives for ocean waters including all ASBS. Since compliance with Ocean Plan's stringent objectives is not always economically feasible nor in the public interest, the Ocean Plan allows the State Water Board to grant exceptions to its provisions as long as the public interest will be served and beneficial uses are protected.

As part of an application for a general exception to Ocean Plan requirements, Special Protections [SWRCB, 2012] have been proposed to fulfill the state mandate for protection of water quality in ASBS and to address the requirements identified in the Ocean Plan. On March 20, 2012 these Special Protections were recommended by the State Water Board as part of an Ocean Plan Exception. According to these Special Protections, the design storm for treatment control BMPs is defined as follows:

> "Design storm – For purposes of these Special Protections, a design storm is defined as the volume of runoff produced from one inch of precipitation per day or, if this definition is inconsistent with the discharger's applicable storm water permit, then the design storm shall be the definition included in the discharger's applicable storm water permit."

The applicable storm water permit in this case is the Los Angeles County National Pollutant Discharge Elimination System (NPDES) Municipal Storm Sewer Systems (MS4) Permit. Since under this permit the Broad Beach project is not considered a new development or a redevelopment, the permit requires that pollutants in stormwater discharge be reduced to the maximum extent practicable (MEP). In Los Angeles County the 0.75 inch design storm event is generally accepted as equivalent to MEP per the MS4 permit. This is also in compliance with the design storm requirements in the proposed revised MS4 Permit [LA RWQCB, 2012]. Since the one inch event is inconsistent with the applicable permit, the conclusion of this study is that the Broad Beach treatment control BMPs should be designed for the 0.75 inch design storm event.

3.2 Environmental Review

The Project is subject to the requirements of the California Environmental Quality Act (CEQA). CEQA requires that all projects be reviewed and that their environmental impacts be evaluated. The lead agency for the Project is the city of Malibu. On behalf of the city of Malibu, Geosyntec will prepare an Initial Study for the project.

This Project is an environmental improvement project (stormwater quality improvement) and the new constructed facilities will likely be hardscape and landscape improvements and natural water quality treatment facilities such as vegetated swales and biofilters. It is expected that the Initial Study will result in a finding of no impact or no significant impact with mitigation, qualifying the Project for a Negative Declaration or a Mitigated Negative Declaration.

As part of the CEQA process, a Frequently Asked Questions sheet will be published and distributed to the community to inform them of the Project. A public notice will be filed in the local newspaper and a public meeting will be conducted to provide the interested public with the opportunity to comment on the Project plans.

3.3 Coastal Development Permit

The California Coastal Act of 1976 (Div. 20 CA Public Resources Code Sections 30000 et. seq.) was adopted by the California Legislature in 1976 and became effective January 1, 1977. The Coastal Act provides a comprehensive regulatory framework for all new proposed non-exempt “development” (See PRC Sec. 30106 and 30610) within the Coastal Zone of the state of California. Pursuant to Sec. 30500 et. seq. of the Coastal Act each local government is responsible for preparing and adopting a Local Coastal Program (LCP) so as to implement the policies and provisions of the Act within its jurisdictional boundaries. Prior to Certification of an LCP the California Coastal Commission generally retains jurisdiction for the processing of Coastal Development Permits (CDPs) consistent with the Act; following certification of an LCP it becomes the primary responsibility of the Local government to review and approve all new proposed development within the Coastal Zone consistent with the provisions contained within its LCP.

In 2002 the City of Malibu’s Local Coastal Program was approved by the California Legislature and became law. Any new non-exempt development proposed within the City of Malibu must apply for and receive a Coastal Development Permit prior to commencement of development (See 13.3 of the Malibu Local Implementation Plan—“LIP”). The LIP and the Malibu Municipal Code provide the primary regulatory framework for review of new development.

The Project is located within the Coastal Zone in the City of Malibu and does propose new development therein; therefore the Project is governed by the City's Certified Local Coastal Program and is required to obtain a Coastal Development Permit prior to Project commencement in addition to other requisite Project entitlements.

3.4 Water Use Guidelines

The Los Angeles County Department of Public Health has established guidelines [Los Angeles County, 2011] for harvesting of rainwater, stormwater, and urban runoff for outdoor non-potable uses such as irrigation. The guidelines have categorized rainwater harvesting systems into four classes, Tier I – IV, depending on the potential water sources, and provide requirements for minimum water quality standard and treatment processes.

- Tier I – On-site collection of rainwater in rain barrels for on-site use in gravity flow systems.

- Tier II - On-site collection of rainwater in cisterns for on-site use.

- Tier III - On-site or off-site collection of rainwater, stormwater, and urban runoff in cisterns for on-site or off-site use. (Excludes water collected from locations zoned for high use transportation corridors, industrial, agricultural or manufacturing uses).

- Tier IV - On-site or off-site collection of rainwater, stormwater, and urban runoff in cisterns for on-site or off-site use. (Includes water collected from locations zoned for high use transportation corridors, industrial, agricultural or manufacturing uses).

Any rainwater harvesting systems based on storage of runoff from Broad Beach Road in underground cisterns would most likely be regulated under Tier III, due to the presence of urban (dry-weather) runoff generated from irrigation of the hillside.

For Tier III systems, if captured runoff is to be used for spray irrigation, irrigation water must be disinfected by chlorination or an equivalent technology. For drip or sub-surface irrigation, Tier III systems require only pre-screening (sediment filtration) of irrigation water. Project biofilters are anticipated to satisfy pre-screening requirements.

4. GEOTECHNICAL AND GROUNDWATER INVESTIGATIONS

4.1 General

To support the development of the preliminary design, Geosyntec performed geotechnical and groundwater investigations for the Project area. The information presented below is a summary of the investigations and the conclusions and recommendations from the Geotechnical and Groundwater Studies Report [Geosyntec, 2012]. The report in its entirety is included on a CD in Appendix D.

4.2 Purpose and Objectives

The Geotechnical and Groundwater investigations focused on the evaluation of subgrade soils along the Project alignment for the purpose of providing design input. This included assessment of groundwater conditions and infiltration potential. Geosyntec's scope of work consisted primarily of the following tasks:

- Gathering available geotechnical and geologic information;
- Performing a geotechnical field investigation consisting of six hollow-stem auger borings and six Geoprobe soundings;
- Performing a constant head infiltration test in the vadose zone and in saturated zones at the locations of the six Geoprobe soundings;
- Constructing temporary piezometers and monitoring groundwater elevations at select Geoprobe locations;
- Conducting laboratory testing of selected soil samples obtained from the borings and analytical testing of groundwater samples; and
- Conducting geotechnical engineering analysis.

4.3 Summary of Existing Conditions

4.3.1 Surface and Subsurface Conditions

To the north, the site is bounded by a predominantly vegetated bluff slope that extends up to the relict marine terraced platform on which Pacific Coast Highway is located. However, localized portions of the adjacent slope are devoid of vegetation and expose the rilled granular material of the marine terrace bluff. Exploratory borings encountered artificial fill, Quaternary Terrace deposits, and the Tertiary age Trancas Formation at depth.

Artificial fill deposits were encountered in five of the six explorations along Broad Beach Road. In general, the fill deposits consist of brown sands with varying amounts of gravel and clay. Within the limits of the explorations, artificial fills extended from the ground surface to maximum depths of four feet.

Quaternary-age terrace deposits were encountered within all of the 12 explorations performed for the investigation at the ground surface or underlying the artificial fill. The terrace deposits generally range in composition from brown to reddish brown, clayey to gravelly sand, to light brown to tan, silty sand. Within the older, upper terrace bluff (Qt), densities generally increase with depth from medium dense to very dense.

Along the terrace surface underlying Broad Beach Road, the densities generally ranged from medium dense to dense. A subset of these terrace deposits, identified as the “Beach Sands” or Qb is present at a number of the investigation locations along Broad Beach Road. This deposit identified separately from other terrace deposits due to its characteristic fine sand and relatively low fines content (20 percent).

At the location of Broad Beach Road, the beach sand is typically less than approximately 10 feet thick. Based on information from other investigations between Broad Beach Road and the ocean this thickness increases to 10-15 feet typically.

The Tertiary age Trancas Formation underlies the entire site at depth and was encountered in nine of the explorations –this formation generally consists of a hard, gray fat claystone. Along Broad Beach Road, the Trancas Formation was encountered beneath the terrace deposits at an elevation of +18 feet mean seal level (MSL) at the west end of the Project area and slopes down to an elevation of -5 feet MSL at the east end. It is anticipated that the erosional unconformity between the overlying terrace deposits and the Trancas Formation slopes up to the north beneath Pacific Coast Highway and slopes down towards the beach on the south.

Dozens of single family residences are present along the south side of Broad Beach Road along the Project alignment. Review of numerous foundation reports for these structures indicates that while some are founded on the Trancas formation using deep foundations other structures and appurtenances may be founded on the beach sands using shallow foundations.

4.3.2 Groundwater

The investigations performed by Geosyntec indicate that the groundwater gradient in the Beach Sands is typically from north to south (i.e., toward the ocean). It is expected that water that infiltrates at the surface along Broad Beach Road will flow within the Beach Sands toward the ocean along the sloping unconformity between the Trancas formation and Beach Sand. Additional flow infiltrated by this Project may raise groundwater elevations within the Beach Sand.

The measured static groundwater elevation varied along the alignment of Broad Beach Road from approximately 7.0 to approximately 20.5 ft above MSL. In general, the observed groundwater elevations are assumed to represent a dry-weather condition although “wet year” and “wet-weather” conditions are assumed to be within a few feet of these conditions as indicated by observations. The groundwater elevations recorded remained fairly constant over the monitoring period, suggesting that there is no significant tidal influence at these locations.

In conversations with Broad Beach residents, concerns were expressed regarding making changes that potentially increase infiltration and consequentially raise groundwater levels. Some homes have basements and at least one homeowner has observed water, presumably groundwater, leaking into the basement.

4.3.3 Onsite Wastewater Treatment Systems

Onsite wastewater treatment systems (OWTS), such as septic systems, for the residences along the south side of Broad Beach discharge to leach fields that are in some areas located in the backyards between the homes and the dunes, in the courtyard area between the garage and the house, or between the house and Broad Beach Road. Based on analysis of groundwater samples carried out for this Project, it appears that the locations sampled are generally unaffected by the operation of the OWTS’s.

4.4 <u>Findings</u>

The California Department of Transportation (Caltrans) Stormwater Quality Handbook: Project Planning and Design Guide [Caltrans, 2007] and the Los Angeles County Department of Public Works Stormwater Best Management Practice Design and Maintenance Manual [LADPW, 2009] both present guidelines related to the siting of infiltration BMPs. The criterion for selection of an appropriate site for infiltration trenches contained in these documents were used as primary screening criteria for selection of appropriate locations for Project infiltration features.

Based on the results of the investigations and evaluations, from a geotechnical viewpoint, the proposed stormwater best management practices and streetscape improvements are feasible as long as direct infiltration is not included as a Project feature. While infiltration rates in some areas are within the acceptable ranges, the following design criteria restrict the use of infiltration:

- The shallow groundwater and a shallow confining layer will impose significant constraints on the geometry of infiltration facilities.

- Typically the invert of infiltration features would be approximately five feet below grade, which in areas of shallow groundwater would violate the criteria of a 10-foot separation from groundwater provided in Caltrans [2007] and CASQA [2003].

- Dozens of OWTS are potentially present within 50 feet of the proposed infiltration facilities. Operation of infiltration facilities within 100 feet of septic system or a leach field violates the Caltrans [2007] criteria.

- Structural foundations are present within 100 feet down gradient of the location of the proposed features. This violates the Caltrans [2007] criteria. Infiltration will produce an increase in groundwater elevations (however minor or temporary) in the beach sand unit where some unknown number of these foundations is located. Evaluations indicate that, for some areas, there is potential for liquefaction in the current groundwater configuration and an increased risk for liquefaction under mounded groundwater conditions. This is of particular concern for foundations within the beach sand. The impact on individual structures is difficult to assess given that they are so numerous and have such a variety of foundation systems and soil conditions.

The following proposed Project components are feasible from a geotechnical perspective:

- Biofiltration with underdrains and impermeable geo-membranes;

- Permeable pavements with no infiltration to subgrade; and

- Vegetated swales.

The following proposed Project components are not feasible from a geotechnical perspective:

- Biofiltration including infiltration; and
- Permeable pavements with infiltration to subgrade.

Limited equilibrium slope stability analyses indicate that existing slopes are stable under current conditions and are not a constraint on Project design in their current configuration.

With the stated limitations on infiltration and given the presence of only minimally liquefiable deposits along the alignment of the proposed BMPs, liquefaction of subgrade soils is not a constraint on the design of proposed drainage features and appurtenant structures.

4.5 Design and Construction Recommendations

The Geotechnical and Groundwater Studies Report includes geotechnical recommendations for proposed construction in the following areas:

(1) Drainage features, including biofiltration features and permeable pavements;
(2) Foundation design; and
(3) Earthwork.

A copy of the Geotechnical and Groundwater Studies Report is included as Appendix D.

5. HYDROLOGY

5.1 General

This section presents an analysis of the existing Project area hydrologic conditions and is intended to:

- Describe the existing hydrologic conditions including drainage infrastructure, catchment boundaries, soils, climate, and flow pattern; and

- Present the hydrologic basis for proposed stormwater BMPs.

5.2 Existing Hydrologic Conditions

5.2.1 General

The watershed associated with the Project site is roughly bounded on the north by the top of the hillside along the south side of PCH and on the south by the center line of Broad Beach Road, and has a total area of 12.3 acres. The watershed encompasses approximately 4,500 feet of Broad Beach Road. The total impervious area is estimated to be 1.5 acres consisting mainly of the asphalt pavement on Broad Beach Road area and PCH; however, there are also patches of concrete and asphalt along the roadside parking strip. There are eight catchment areas and ten City catch basins within the Project area. Drainage maps showing the catchment boundaries, drainage infrastructure, flow patterns, and pervious and impervious areas are presented in Appendix E.

5.2.2 Drainage Infrastructure and Flow Patterns

Broad Beach Road has local depressions and is crowned so that runoff from the northern half of the roadway flows toward the hillside, and runoff from the southern half flows toward the homes where it is typically collected in trench drains at the top or bottom of each resident's driveway. Hillside runoff (in which gullies and surface erosion were observed) and roadway runoff comingle on the mostly unpaved roadside parking strip to the north. The parking area is typically at its lowest elevation closest to the roadway. This directs the surface runoff along the road edge towards the catch basins.

The catch basins for Catchments 1 to 7 are located along the north side of Broad Beach Road are recessed into the hillside with a local depression in the area immediately in front of the inlet. Catchment 8 drains to a storm drain inlet, and although technically not a catch basin, it is referred to such in this report (see Appendix E).

As shown in Appendix E, within the vicinity of the low point of Catchment 5A there are three City catch basins; CB5A, CB5B, and CB5C. The outfalls from all three catch basins feed to the same storm drain. CB5A drains Catchment 5A. CB5B receives only flow from a non-City-owned storm drains that run down the hillside and no direct runoff from the Project area. CB5C drains only an area of a few hundred square feet of the southern half of Broad Beach Road.

The catch basin curb inlets typically have approximately 17 inch openings with varying widths. The distance from inlet invert to catch basin bottom varies from 2 to 4 feet.

Runoff from PCH and adjacent roadside areas flows toward slope drain inlets on both sides of PCH. With one exception, slope drains along the southern side of PCH drop directly into the catch basins along the northern side of Broad Beach Road. These flows are conveyed in Caltrans-owned buried pipes (slope drains) to the below-grade catch basins. As this is not part of the City MS4, it is not addressed by this Project. From the catch basins, water flows through storm drain pipes that cross under Broad Beach Road and tie into private storm drains at the residential property lines prior to discharge to the outfall points on the ocean side of the homes.

The exception to the description above is one slope drain in the western end of the Project area that drains 0.6 acres of PCH, including the road shoulder. This drain daylights at the bottom of the embankment slope; runoff from PCH comingles with surface runoff from Broad Beach Road prior to entering the catch basin.

Delineation of the eight catchment boundaries was carried out based on the following information:

- Topographic maps based on a survey performed for the Project;
- Topographic data (GIS) and aerial photos from Los Angeles County; and
- Field observations and measurements.

5.3 Stormwater Quality Design Volume

5.3.1 Technical Approach

The stormwater quality design volume per catchment was calculated using the methodology described in the Los Angeles County Department of Public Works' *Development Planning for Stormwater Management, A Manual for the Standard Urban Stormwater Mitigation Plan, Appendix A, Volume and Flow Rate Calculations*, issued on September 2002. The design storm event is the 0.75 inch 24-hour storm event which complies with the sizing requirements in the Los Angeles County NPDES MS4 Permit for structural and treatment control BMPs for new development and redevelopment projects. This is consistent with the recommendations in the *City of Malibu Local Coastal Program Local Implementation Plan* and in the Special Protections of the proposed General Exception to the Ocean Plan. Although the Project is a storm water quality improvement project and does not formally qualify as new development or redevelopment, this design criterion was selected for the Project.

The catchments correspond to the tributary areas for the catch basins.

The runoff coefficient curve for the pervious surfaces within the tributary area was selected based on soil maps from Los Angeles County Department of Public Works Water Resources Division. The soils in the Malibu area are identified as soil ID No. 038 [Los Angeles County GIS Data Portal, 2011].

5.3.2 Stormwater Quality Design Volume Calculation

Stormwater Quality Design Volume (SWQDv) was calculated using the following equation:

$$SWQDv\ (ft^3) = (2{,}722.5\ ft/acre) * [(A_I)(0.9) + (A_P + A_U)(C_U)]$$

Where:

A_C = Catchment Total Area (acres) = $A_I + A_P$

A_I = Impervious Area (acres)

A_P = Pervious Area (acres)

A_U = Contributing Undeveloped Upstream Area (acres)

C_U = Undeveloped Runoff Coefficient (-)

Values for A_I, and A_P were determined using the available topographic maps and aerial photos. A_I includes all paved area and A_P includes the remaining area. A_U was determined to be zero for all catchments. C_U was assigned the value of 0.1 based on the runoff coefficient curve for soil no. 038 [LADPW, 2006]. The calculated design volumes are presented in Table 5-1.

6. CONCEPTUAL DESIGN ALTERNATIVES

This section begins with a review of the Project objectives and a discussion of how those objectives are satisfied. Following this, each proposed stormwater BMP or improvement is presented. Finally, two stormwater alternatives are developed and described in detail.

6.1 Project Objectives and Stormwater Alternatives Development

As stated in Section 1, the goals for the Project are to:

1. Eliminate dry-weather flows to the storm drain;
2. Reduce wet weather flows to storm drain (as feasible);
3. Improve water quality of wet weather flows to storm drain (i.e., storm water treatment, pollutant reduction) to the maximum extent practicable (MEP);
4. Reduce potable water use for irrigation (as feasible);
5. Restore habitat above Broad Beach Road (as feasible);
6. Reduce slope erosion (as feasible); and
7. Preserve street and visitor parking.

In addition, feedback from the residents has indicated a preference that the constructed project should not create or perpetuate the existing condition of highly variable parking and landscape/hardscape elements. The Project should be consistent with the rustic natural environment that currently exists along portions of Broad Beach Road. Therefore, we have created an additional objective (new Objective 8) which is to ensure that proposed improvements are consistent with the neighborhood landscape theme of a rustic natural environment.

To address these objectives, Geosyntec developed two stormwater management alternatives. A discussion of each objective and how it is satisfied by the alternatives is provided below.

Objective 1: Eliminate dry-weather flows to the storm drain. It is assumed that the primary dry-weather flows that occur within the Project area are related to irrigation runoff. All the residences are located on the south side of Broad Beach Road and any residential runoff from irrigation, pavement cleaning, car washing, etc. is captured by private drains owned by each residence. Many residents have installed separate private irrigation systems on the north side of the street, on city of Malibu property and within the Project area. To eliminate dry-weather flows, these irrigation systems will be removed and city-operated water-efficient irrigation will be installed in place of these private systems. High-water-use ornamental and exotic plants will be removed and replaced with drought-tolerant native species, reducing the need for frequent irrigation during the dry season.

Objective 2: Reduce wet-weather flows to storm drain (as feasible). This objective is focused on water storage, use, and/or infiltration as a means of reducing discharge to the storm drains. Alternative 2 includes a water use option to reduce wet-weather flow. The soil and groundwater investigation specifically recommended no infiltration for this project, primarily due to the proximity to OWTS, low depth to groundwater, and concern for water intrusion in basements; therefore, infiltration is not considered an option for wet-weather flow reduction.

Objective 3: Improve water quality of wet-weather flows to storm drain (i.e., storm water treatment, pollutant reduction) to the MEP. This objective is met by several proposed Project elements. First, the roadway parking strip is proposed to be paved using concrete interlocking pavers. The construction of these pavers will not enhance stormwater infiltration (see Objective 2 above) but will reduce tracking of sediment from the currently soil/gravel parking strip to the proposed paved parking strip. Second, the parking strip area between the road and the toe of the embankment would be regraded to direct stormwater sheet flow away from the road and to vegetated swales located at the toe of the embankment. Vegetated swales will provide stormwater quality improvement. Third, garden walls (slough walls) and retaining walls are planned for various areas along the toe of the embankment, reducing erosion from the hillside and improving stormwater quality. Fourth, biofilters are proposed to treat wet-weather flows prior to discharge to the existing catch basins. Fifth, for Alternative 2, stormwater capture, storage, and use for irrigation are proposed. This provides a viable use option for a portion of the Project stormwater, if site conditions warrant use for irrigation. If site conditions do not support irrigation, the water will be discharged to and treated by the proposed biofilters, improving stormwater quality prior to discharge.

Objective 4: Reduce potable water use for irrigation (as feasible). This objective is satisfied by the removal of the numerous privately-owned irrigation systems on city property and installing a city-managed low water use irrigation system. The removal of non-native exotic plant species and replacement with native drought tolerant species also reduces potable water use for irrigation. Finally, for Alternative 2, captured stormwater is proposed to be used to replace potable water, for a portion of the Project area irrigation needs.

Objective 5: Restore habitat above Broad Beach Road (as feasible). The Project budget will support removal of invasive and non-native exotic species for portions of the Project area and planting of native species in areas disturbed by construction. These plantings will provide partial habitat restoration of the areas above Broad Beach Road, reducing water usage and reducing hillside erosion.

Objective 6: Reduce slope erosion (as feasible). As stated under Objective 5 above, the partial habitat restoration included in the Project will reduce slope erosion. The proposed garden walls and retaining walls will further reduce slope erosion.

Objective 7: Preserve street and visitor parking. Currently, the only visitor parking available for beach-goers or residential visitors is along the north side of Broad Beach Road. The proposed storm water improvements (i.e., swales and biofilters) have been set back from the road such that the parallel parking opportunities along the full stretch of Broad Beach Road are unchanged.

Objective 8: Proposed Project improvements should preserve and enhance the rustic landscape/hardscape theme for the neighborhood. This objective is met by the proposed landscape and hardscape elements. The landscape architect has developed a rural neighborhood theme which is carried through all the proposed stormwater improvements including pavers, garden and retaining walls, vegetated swales, biofilters, and plantings.

6.2 BMPs and Stormwater Improvements

6.2.1 General

This section provides descriptions of the proposed stormwater BMPs and stormwater improvements and identifies how they would function to meet the Project objectives. An overview of proposed BMPs and improvements to be included in each alternative is presented in Table 6-1.

6.2.2 Biofiltration

Biofiltration systems will be used as the primary treatment control BMP for treatment of stormwater and dry-weather runoff from the Project area. Biofiltration systems, sometimes referred to as bioretention systems, are landscaped shallow depressions that capture and filter stormwater and dry-weather runoff. These facilities function as soil-and plant-based filtration devices that remove pollutants through a variety of physical, biological, and chemical treatment processes. Biofilters typically consist of a surface ponding area, mulch layer, planting soils, and plantings. As water flows across the plantings and passes down through the organic-rich planting soil, pollutants are filtered, adsorbed, and biodegraded by the soil and plants. These systems provide a fairly high level of treatment. Because infiltration is unacceptable for this Project, biofilters will be designed with a lower impermeable membrane and a perforated underdrain to collect the treated water. The underdrain will connect to a collector pipe which will convey the treated water to a nearby catch basin. The outlet of the collector pipe in the catch basin will be located to facilitate sampling of biofilter effluent. Alternatively, an access point will be installed along the collector pipe to allow for effluent sampling. Typical cross-sections and details for the biofilters proposed for Broad Beach are shown in Figure 6-1.

Where sediment, trash and debris is expected in site runoff and a vegetated swale is not provided for water pretreatment, a pretreatment forebay will be included upstream of the biofilters. A forebay will reduce the rate of clogging of the biofilter and facilitate maintenance.

For this Project, the biofilters will <u>not</u> be designed to retain and infiltrate water - most water will flow through the filters and be discharged. However, low flows (i.e., dry-weather flows) may be partially or fully retained in the filter media. These relatively small water volumes are expected to be ultimately reduced by evapotranspiration.

The Project biofilters are designed to capture and treat the design capture volume during a storm event. A description of the biofilter sizing methodology for this Project is included in Appendix F. The calculated values for the required biofilter media surface area (A_{media}) for the two alternatives described later in this section are presented in Table 6-1.

6.2.3 Vegetated Swales

At present, stormwater flows off the embankment and towards a low elevation flow line between the street and the parking strip. The area between the edge of road pavement and the toe of the embankment will be graded to cause stormwater to flow off the road and off the parking strip to the embankment toe. A vegetated swale will be installed along the embankment toe, parallel to the road and will convey stormwater to storage or biofilter treatment facilities. Vegetated swales are an effective stormwater pretreatment BMP to filter out trash, debris, and coarse sediments - they also provide aesthetic enhancement for the area. The installation of vegetated swales will reduce pollutant loading and clogging on the downstream biofilters, extending the biofilter media life.

Vegetated swales are sloped and are not designed to pond water. Therefore, infiltration of water through vegetated swales is insignificant and it should not be necessary to install impermeable liners under the swales.

6.2.4 Water Collection, Storage, and Use or Treatment

Stormwater runoff can be collected in below-ground enclosed storage facilities (cisterns) and used for landscape irrigation, as required. Runoff would be conveyed in swales and gravity drain into systems of vaults, tanks, or pipes to store the water until needed. When needed, the water can be pumped from the underground storage and conveyed in pressurized pipes for use in drip irrigation. Drip irrigation is selected as the most viable use option. This site would be classified as a Tier III system under Los Angeles County requirements for rainwater and stormwater harvesting systems. Drip irrigation requires only sediment filtration prior to water use. Spray irrigation requires water disinfection, which adds an unattractive level of complexity to this stormwater use application.

If stored water cannot be used for landscape irrigation due to lack of irrigation water demand, the water would be pumped and discharged to biofilters after the storm peak had passed and the surface stormwater had been filtered and discharged. In this way, the biofilters can be used to filter stored water during times when the filters are otherwise not in use.

Local residents have expressed concern regarding underground storage of stormwater and the potential for leakage and infiltration of this water, possibly exacerbating a high groundwater condition in the neighborhood. Should stormwater storage be implemented, various technologies such as impermeable lining systems could be employed to provide additional assurance against leakage of stored water.

6.2.5 Concrete Pavers

The majority of the parking strip that runs parallel to Broad Beach Road is unpaved – the existing surface varies, including sand, soil, decomposed granite, and various types of gravel. This parking strip is commonly used for parking by residential visitors, workers, and beachgoers. Surface erosion of the unpaved parking surfaces can reduce stormwater quality. Sediment tracking from parking areas to the roadway mobilizes sediment and can reduce stormwater quality. This condition is exacerbated by muddy and wet conditions during storm events. The installation of pavers from the edge of road to form an approximately 10 foot wide parking strip is proposed. Pavers would provide a uniform surface for parking and greatly reduce erosion and sediment tracking. Paver selection and design will be made to reduce stormwater infiltration to the extent possible. In any event, the minor infiltration through paver system is expected to be significantly less than the existing condition where stormwater infiltrates through unpaved ground.

6.2.6 Retaining and Garden Walls

Retaining walls (structural walls) and garden walls (non-structural slough walls) are proposed for various locations along the hillside. The walls fulfill three purposes. First, installation of walls in designated locations will allow for the embankment to be cut back, opening up needed areas for biofilter installation. Second, the walls reduce soil erosion and sloughing from the hillside, which is a key contributor to sediment in stormwater. Third, the installation of walls creates a uniform hardscape theme across the neighborhood. Existing retaining walls are not engineered, are often ineffective for erosion reduction, and are constructed of a myriad of materials including cobbles, broken concrete, masonry brick, and cast-in-place concrete.

6.2.7 Irrigation System Removal/Replacement

A key element to reducing or eliminating dry-weather flows is the removal of privately-owned irrigation systems on the north side of the road. Although this property is owned by the city, homeowners have installed private irrigation systems plumbed back to their water services and have created private gardens and landscapes on city property. The private irrigation of gardens creates uncontrolled and unmanageable dry-weather flows which have been observed during recent site visits. Private systems would be removed and replaced with water-efficient low-volume irrigation controlled by city-controlled, automated evapotranspiration controllers. Water would be provided by the city and water use would be managed by the city. We recognize the communication efforts that will be required to implement the removal of these private irrigation systems. An estimate of annual water use for Broad Beach Road irrigation is provided in Appendix G.

6.2.8 Habitat Restoration

As mentioned above, many Broad Beach Road residents have created gardens across from their residences on city property. These gardens include many non-native invasive or ornamental plants and shrubs, most which require frequent irrigation. To reduce irrigation requirements and reduce the erosion potential, high water-demand ornamental plants and shrubs within 20 feet of the toe of embankment slope would be removed and replaced with more drought-tolerant, native species plants and shrubs. This will allow the city to manage irrigation (and reduce or eliminate dry-weather flows) and reduce potable water use on the hillside. Areas disturbed by construction will be revegetated with appropriate species. Other ornamental or exotic species will be removed, depending on proximity to the roadway and the plant-specific water consumption requirements. The creation of a more uniform native species plant/shrub environment furthers the objective of creating a more uniform landscape theme for the neighborhood. Again, we recognize the communication efforts that will be required to implement the removal of nonnative species that were planted by residents.

6.3 Stormwater Alternative 1

Stormwater Alternative 1 is comprised of a combination of BMPs and improvements including stormwater conveyance and treatment BMPs, retaining and garden walls, parking strip pavers, irrigation, and landscape improvements. Alternative 1 is differentiated from Alternative 2 in that Alternative 1 contains no stormwater storage or use options – in Alternative 1, all stormwater up to the design storm event is captured, treated, and discharged. A flow diagram illustrating the stormwater management principles for Alternative 1 is presented in Figure 6-2. In the subsections below, the specific application of these BMPs and improvements are addressed, as are issues related to parking, utilities, and operation and maintenance. The general layout and features of Alternative 1 are shown on Figures 6-4 through 6-14.

6.3.1 Stormwater Management Improvements

For Catchments 2 to 7 runoff will be collected from the road, parking strip and embankment and transported in vegetated swales that drain to biofilters located upstream of the catch basins. The swales will provide pretreatment while primary treatment will occur in the biofilters.

The swales will run along the toe of the hillside slope intercepting hillside runoff. The parking area will be regraded such that both the road and the parking area drain toward the swales. The swales will serve to channelize flow to the biofilters and will widen at the biofilters entrance to create sheet flow into the biofilter.

Biofilters will be located between the toe of the slope and the paved parking area. In some cases cuts will be made into the hillside to create more available filter area. Filtered water will be collected in underdrains that connect to collector pipes, discharging to the existing catch basins, or to the storm drains if more feasible. When the ponding capacity of the biofilters is exceeded, overflow will occur over a weir located at the end of the biofilter closest to the catch basin and then surface flow to the catch basin inlet. The top of weir elevation will be the same as the water surface elevation corresponding to the biofilter design ponding depth.

Locating adequately sized biofilters in Catchment 1 and the eastern part (east of CB8) of Catchment 8 was not deemed feasible due to lack of area and other logistical constraints such as utilities, parking, and steep slopes. For these two catchments, runoff is diverted to other areas where adequate area for treatment is available.

Runoff from Catchment 1 is diverted via gravity flow from catch basin CB1 to a biofilter in Catchment 2. The diversion structure will be designed to divert low flows while during high runoff events (in excess of design storm) water will overflow to catch basin CB1.

Runoff from Catchment 8 will be captured in a new wet sump adjacent to storm drain inlet CB8 and pumped to a biofilter in the western end of Catchment 8. The wet sump will be designed to receive and pump flows up to the design storm – events in excess of the design storm will overflow to CB8. A submersible pump can be used for this application. Noise levels outside of the sump are expected to be imperceptible to residents.

In general, the biofilters are sized for the design capture volume generated in their immediate tributary area. However, the biofilters in Catchment 2 and 8 are sized for both direct catchment runoff as well as the diverted runoff from other areas.

The proposed stormwater system improvements do not significantly alter the existing drainage patterns. Hillside and roadway runoff patterns are generally unchanged; however, regrading of the Broad Beach Road parking strip will concentrate flow along the toe of the slope instead of along the road pavement edge. Biofilters and swales are sited in order to maintain flood paths to existing catch basins.

6.3.2 Landscape, Hardscape, and Irrigation

Alternative 1 includes construction of garden and retaining walls and parking strip pavers, removal/modification of some of the existing garden and retaining walls, removal of all private irrigation systems and replacement with city-controlled, water-efficient irrigation systems, and replacement of exotic, ornamental, and invasive plant species. This alternative also includes replanting in areas disturbed by construction. The general plan indicating the Project areas where hardscape, irrigation, and planting improvements will be made is shown on Figures 6-4 through 6-14.

Selective plant material will be removed from the Project area to help create consistent landscape theme, reduce irrigation water use, and facilitate Coastal Bluff Scrub Habitat Restoration. The specific criteria applied to each area to determine which existing ornamental, exotic, or invasive plant species should be replaced are as follows:

- Invasive plant species will be removed from the first 20 feet of the Project slopes and parkway to the extent practical;

- Vegetation will be removed from existing utility setbacks;

- Vegetation will be removed from Project improvement areas including biofilter areas, vegetated swales, retaining walls, garden walls, parking areas, and concrete swales and gutters;

- Vegetation will be removed in locations where conflicts occur with the proposed slope irrigation improvements and proper system operations;

- Native vegetation that constitutes a high fire risk per Los Angeles County Fire Department Fuel Modification Plan will be removed;

- Trees with invasive roots will be removed that are located within 10 feet of proposed Project retaining walls, garden walls, and biofiltration areas; and

- Selective ornamental vegetation that is high water use will be removed.

The proposed irrigation system for the Project will be a low water use system featuring a smart weather based controller combined with low volume drip, bubbler and overhead rotary stream spray heads. The smart controller will allow for daily automatic adjustments to the watering schedule based on real time weather data. Flow sensing devices allow for system shut-down and delays in response to rain events and system failures. Low volume point to point irrigation using drip and bubbler systems provide for maximum water use efficiency. Rotary stream heads provide additional water savings with 30% increased efficiency over traditional spray heads. The estimated total water usage (ETWU) for the Project is approximately 740,000 gallons per year. This represents about 50% of the maximum applied water allowance (MAWA) for the proposed design.

Feedback from a conversation with one of the Broad Beach homeowners indicates that some of the existing irrigation systems may have been installed to serve as fire protection. This has not been confirmed but the need for fire protection will be evaluated during the design phase and more information will be solicited from the Broad Beach homeowners. The final design will comply with existing code and fuel modification requirements including the following:

- All proposed landscape and irrigation improvements will be implemented per the Los Angeles County Fire Department (LACFD) Fuel Modification Plan

Guidelines [LACFD, 2011] to create the desired defensible space around all combustible structures in a fire environment.

- All proposed landscape improvement plant species are subject to LACFD approval and will be inherently fire resistant and spaced appropriately.

- Existing native vegetation and ornamental plantings within the project fuel modification zones will be modified by thinning and removal of species constituting a high fire risk (refer to the LACFD Undesirable Plant List).

- Routine fuel modification maintenance will be regularly performed in all zones. Maintenance includes irrigation, pruning, thinning and annual removal of weeds, dead materials and other undesirable flammable vegetation required to keep the area in a fire safe condition. (Refer to the LACFD Fuel Modification Plan Maintenance and Long Term Maintenance sections)

The proposed planting for the Project will consist of native and drought tolerant grass species for the biofilter areas and vegetated swales. This vegetation provides water quality improvements for Project runoff and creates a distinct theme for the Project parkway. The slope planting will consist of a combination of drought-tolerant shrubs to enhance the existing plant material to create a more consistent landscape theme combined with Coastal Bluff Scrub species to facilitate native slope habitat restoration.

The proposed hardscape improvements for the project will include an interlocking concrete paver parking area, concrete veneer retaining walls and dry stacked boulder garden/slough walls. These elements will be installed throughout the project construction limits creating a consistent rural neighborhood theme and materials palette for the project. Miscellaneous existing garden/slough walls will be removed and either omitted or replaced with project theme walls as needed to construct the proposed biofiltration areas and vegetated swales. Existing retaining walls that are required due to existing grade and are structurally sound will remain and be enhanced with the project theme veneer so that all walls are consistent.

A plant palette exhibit and a materials exhibit for pavers and wall veneers are included in Appendix H. The exhibits present several different options.

6.3.3 Parking Considerations

The proposed improvements will allow for parallel parking along the entire stretch of roadway within the Project boundaries, similar to the current-day parking locations.

The installation of pavers will improve parking conditions in several areas where the surface is uneven due to ditches and erosion.

6.3.4 Utility Considerations

Existing utilities have been identified both by review of historical maps and by marking on Broad Beach Road by the utility owners. The preliminary design of BMPs and improvements has been developed in consideration of all known utilities and no significant utility conflicts are known. Prior to construction of the Project, the city of Malibu's contractor will be required to mark and locate all utilities within the Project area and to field verify locations of utilities that could be threatened by the work.

Los Angeles County owns a sewer line that runs along Broad Beach Road, between the road edge and the embankment. A sewage pumping station is located in Catchment 1. In some areas, this sewer line will be located under the proposed location of parking strip pavers. The depth of this utility will need to be verified to ensure it is protected during grading and subgrade improvement work.

The Gas Company owns a gas line that also runs parallel to the road between the sewer line and the road. Similar to the sewer line, this gas line will be under the parking strip where pavers are proposed. The depth of this utility will also need to be field verified to ensure it is protected during construction.

There are electrical transformers owned by Southern California Edison located along the north side of Broad Beach Road within the Project area. Electrical laterals traverse the parking area. We have not identified any significant conflicts between the electrical lines and the proposed construction. Locations and depths can be verified prior to construction. Vegetation will need to be removed around the existing transformers.

Charter Communications owns communications lines that primarily run along the south side of the road, outside of the Project area. We have identified several communications lines that cross the road to roadside amplifier boxes. These crossings are within the Project area but do not pose a conflict for the proposed work.

The Los Angeles County Waterworks owns a water main that is located near the road centerline and provides water to residents and to two hydrants located along the north side of the road within the Project area. These water supply lines are marked and do not pose a conflict for the proposed work. During design, coordination with the local fire department will be required to identify parking restrictions in front of fire hydrants. Currently, there are no posted parking restrictions in this area; however, we expect that the fire department may impose parking prohibitions in certain areas to ensure emergency hydrant access.

No telephone utilities were identified in the Project area.

6.3.5 Performance

The proposed configuration of treatment control BMPs and improvements will be designed to treat 100% of the runoff generated within the Project tributary area for storm events equal to or less than the design storm. Using vegetated swales and biofilters, pollutant removal treatment effectiveness is predicted to be medium to high. It is our expectation that, barring an unforeseen water line break, all dry-weather runoff will be treated by the biofilter system. Dry-weather runoff should be substantially reduced or even eliminated by the removal of private irrigation systems and the installation of new water efficient irrigation with smart controllers. Other than irrigation runoff, there are no other known sources of dry-weather runoff within the Project area.

Retaining walls, garden walls, and parking strip pavers will all reduce erosion and sediment transport in runoff. Pavers will also reduce sediment tracking from the parking strip to the roadway. New plantings of native species will also reduce erosion.

Potable water use will be reduced by elimination of the numerous private irrigation systems and installation of new water-efficient irrigation and smart irrigation controllers.

6.3.6 Operation and Maintenance

The following is a description of anticipated operation and maintenance requirements for the proposed BMPs and improvements.

Vegetated swales will require periodic removal of accumulated trash and debris. Removal of accumulated sediment and revegetation may also be required. Weed removal, trimming, and pruning are also necessary. Vegetated swales will require some minimal irrigation during dry months.

Biofilters will require periodic removal of accumulated trash and debris. If sediment removal is required, replacement of mulch and vegetation may also be necessary. Occasional pruning of shrubs and cleanup of leaves and organic waste may be required. Periodic replacement or addition of planting material and mulch will be needed to sustain the biofilter's treatment effectiveness. Minimal biofilter irrigation will be needed, especially during dry months. Irrigation needs will significantly diminish after plants become established.

Irrigation system maintenance will include periodic inspections of system performance and verification that dry weather flows are eliminated. Damaged sprinkler piping, sprinkler heads, and drip emitters will require replacement. Verification of proper operation of irrigation controllers will be required. The total water usage for the first year is estimated at 740,000 gallons. The yearly cost for this water usage is roughly $5,500 based on current water rates (see water usage and cost calculations in Appendix G). Water usage, and consequentially water costs, can be reduced after plants are established.

Areas that have been revegetated due to replacement of inappropriate species or in areas disturbed by construction will require inspection and landscape maintenance to ensure that plants are properly established and the plant health is sustained.

The wet sump in Catchment 8 and the pumping system will require periodic inspection and verification of proper operation. Pump maintenance will be minimal. Electricity to run this pump represents a trivial expense.

6.4 Stormwater Alternative 2

Stormwater Alternative 2 has many common elements to Alternative 1. The primary difference between the alternatives is that Alternative 2 includes collection and storage of runoff in underground cisterns. The collected water from the two proposed cisterns can be pumped for irrigation use or pumped to biofilters for treatment after the storm peak has passed. This storage and off-peak treatment permits more efficient use of the biofilters and results in a smaller Project biofilters footprint. In the subsections below, the proposed BMPs and improvements are presented. A flow diagram illustrating the stormwater management principles for Alternative 2 is presented in Figure 6-3. The general layout and features of Alternative 2 are shown on Figures 6-4 through 6-14.

6.4.1 Stormwater Management Improvements

As previously stated, stormwater management BMPs and improvements for Alternative 2 are similar to Alternative 1. However, Alternative 2 collects surface runoff from Catchment 1, part of Catchment 2, and Catchment 8 and stores this water in two underground stormwater cisterns. The cisterns are proposed to be constructed of a system of buried pipe that functions like a storage tank and is specifically manufactured for underground water storage. One cistern is located within Catchment 8 – all the runoff from Catchment 8 drains to swales, flows to a drain inlet, and is conveyed to the cistern. The total storage for the Catchment 8 cistern is 520 cubic feet. When storage capacity is exceeded, runoff will overflow to the existing storm drain inlet. Refer to Figure 6-5 for the proposed location of the storage system.

Stormwater in Catchment 1 and the western portion of Catchment 2 is captured in swales and gutters and flows to two drain inlets that are routed to a cistern located in Catchment 2, for storage. The total storage for this cistern is 2,080 cubic feet. Refer to Figures 6-11 and 6-12 for the proposed location of the storage system. When storage capacity is exceeded, runoff will overflow to the existing storm drain outfall from catch basins CB1 and CB2.

Residents have expressed concern that underground water storage facilities could leak, causing groundwater mounding and potentially exacerbating a high water table condition under their homes. If the manufactured cistern system is not determined to be sufficiently reliable for water storage, a system of synthetic liners can be considered to provide additional assurance that the water storage systems do not leak and infiltrate water to the subsurface.

Each of the two cisterns will be constructed with a wet sump to evacuate the stored water. Stored water can either be directed to biofilters located in Catchments 2 and 7 or water can be used for landscape irrigation. Each wet sump would be fitted with two pumps, one for landscape (a higher pressure, higher flow application) and one for water transfer to the biofilters (a lower pressure, lower flow application). Submersible pump noise is expected to be imperceptible to residents. Pumps would be controlled by a smart stormwater controller that assesses the volume of water in the cisterns, evaluates current climatic conditions and the forecast for future storms, assesses the need for irrigation based on evapotranspiration data, and controls each pump appropriately.

For portions of Catchment 2 and Catchments 3-7, the BMPs and improvements proposed are the same as Alternative 1. Refer to Figures 6-4 through 6-14 for details.

The Project benefits of stormwater storage are that there is approximately 2,600 cubic feet (approximately 19,500 gallons) of stored water available for irrigation. If irrigation is not needed, which is often the case in the winter, the water can be stored and discharged to the biofilters after the storm peak as passed, allowing the biofilters to be used more efficiently and resulting in a reduced area footprint for the biofilters. The reduced biofilter area for Alternative 2 is nearly 1,900 square feet (refer to Table 6-1) less than Alternative 1. The layout of Alternative 2 increases vegetated swale length by approximately 300 linear feet.

6.4.2 Landscape, Hardscape, and Irrigation

Landscape elements are similar between Alternatives 1 and 2. Hardscape elements are similar between the Alternatives with the exception that Alternative 2 has a smaller Catchment 2 retaining wall, due to the smaller biofilter area required. Alternative 2 has the same irrigation plan as Alternative 1 supplemented by an additional parallel drip irrigation system to support the use of stored stormwater. To avoid cross connection concerns, it is necessary to have completely independent irrigation systems supplied by potable water and supplied by stormwater.

6.4.3 Parking Considerations

There is no difference between Alternative 1 and Alternative 2 with regard to parking on Broad Beach Road.

6.4.4 Utility Considerations

The utility considerations unique to Alternative 2 are related to the underground storage of stormwater. Stormwater from Catchment 1 and a portion of Catchment 2 will be stored in a large diameter buried pipe located in Catchment 2. The pipe will require an excavation of up to approximately eight feet in depth. We have considered the need for shoring during this installation. The pipe location should not conflict with any existing utilities. For Catchment 8, the underground storage pipe installation will require an excavation to a depth of approximately six feet. This will likely require shoring, careful location of the adjacent sewer line, and ultimately replacement of the toe-of-slope swale.

6.4.5 Performance

Stored stormwater that is used for irrigation represents a net reduction in discharge to the ocean. That is consistent with the Project objectives. Furthermore, the stored water used for irrigation replaces potable water. The proposed storage systems have a capacity to store roughly one-third of the total design capture volume for the Project area. The performance of vegetated swales, biofilters, and landscape and hardscape elements is similar to Alternative 1.

6.4.6 Operation and Maintenance

The operation and maintenance items for Alternative 2 are similar to Alternative 1 with a few minor exceptions. The parallel drip irrigation system for stormwater irrigation use would require periodic maintenance. The submersible pumps found in the cisterns would require periodic inspection and occasional maintenance. The cost of electricity for pumping is considered trivial.

The total water usage for the first year is estimated at 715,000 gallons: 625,000 gallons for slope vegetation and 90,000 gallons for biofilter and swale vegetation.

Potable water use would be reduced for Alternative 2, due to use of stored water for irrigation. The cisterns will store approximately 2,600 cubic feet with equates to approximately 19,500 gallons. Water from the cisterns will be used to irrigate the biofilters and the vegetated swales. Although difficult to predict how much stormwater will substitute for potable water, we believe it is reasonable to expect that stormwater use for irrigation may replace between 5 and 10 percent of potable water use.

The yearly average cost for water usage is estimated to vary between $4,400 and $5,200 based on current water rates (see water usage and cost calculations in Appendix G). Assuming that 50% of the irrigation demand for the biofilters and vegetated swales is supplied by cistern water, the yearly average cost is estimated to be $4,800, roughly $700/yr less than Alternative 1. The amount of irrigation water for biofilters and vegetated swales supplied by cistern water can potentially reach 100%; however, this is unlikely since the demand will be greatest during dry periods when supply is low. These costs represent water usage for the first year. Water usage, and consequentially water costs, can be reduced after plants are established.

7. CONSTRUCTION COST ESTIMATE

Cost estimates were developed for the two proposed design alternatives for this 10 percent design level. The estimates represent solely contractor costs and do not include oversight, independent testing, construction management, or documentation. A 20 percent contingency was applied to each estimate. For this conceptual design, the costs were not escalated to spring of 2013, the predicted construction start date.

The following is a list of the various cost resources used in the development of the cost estimates:

- The Geosyntec team’s experience on similar projects;
- Cost data for two recent, similar projects constructed in Malibu;
- Vendor quotes; and
- RS Means cost guide.

Through an iterative process the scope of construction was modified (reduced) in order to generally meet the Grant construction budget which is $1,675,836. Estimated construction costs correspond only to the improvements in the Project area that fall within the limits of construction on Figures 6-6 and 6-11, unless otherwise noted on the figures.

The estimate of construction costs for the two alternatives are:

Alternative 1 - $1,625,000

Alternative 2 - $1,688,000

A summary table of the primary cost items is presented in Table 7-1. Detailed cost estimates are presented in Appendix I.

8. DISCUSSION AND RECOMMENDATION

Alternatives 1 and 2 both generally satisfy the Project objectives. Each alternative eliminates or at least substantially reduces dry-weather flows. Both alternatives reduce erosion and sediment tracking through hardscape and landscape improvements. Both alternatives provide stormwater treatment and associated improvements in water quality for water discharged to Broad Beach. Both alternatives provide habitat restoration and reductions in potable water use related to planting of drought tolerant species. Both alternatives include consistent hardscape and landscape themes and carry these themes throughout the Project area.

The stormwater management elements that are different between the two alternatives are:

1. Reduction of potable water for irrigation; and

2. Volume of water discharged to Broad Beach.

Alternative 2 is a partial capture and treat alternative. Alternative 2 provides storage for approximately one-third of the design capture volume of runoff and either uses that water for irrigation or treats the stored water after the storm has passed, allowing for more efficient use of biofilters. This capture and use strategy reduces potable water needed for irrigation and reduces the volume of treated water discharged to Broad Beach. The capture and use strategy is progressive and demonstrates leadership and innovation by the city of Malibu.

The challenges related to Alternative 2 are that water storage and use adds additional cost, as compared to Alternative 1. The need for pumping systems increases the Project complexity and maintenance costs are also slightly higher (primarily related to maintaining a separate irrigation system). Finally, there may be a perception by the local residents that there is a risk of stormwater leakage from the cisterns, potentially causing undesirable infiltration.

Geosyntec believes both Alternatives are viable and attractive stormwater management approaches for Broad Beach Road. However, Geosyntec believes that Alternative 2 goes further to meet the goals of the grant by promoting a greater reduction of wet weather flow to the storm drain and by reducing potable water use for irrigation; Geosyntec therefore recommends Alternative 2.

9. LIMITATIONS

This Preliminary Design Report was developed in accordance with the scope of work, purpose, terms, and conditions described in the Terms of Reference, described in Section 1.

The conclusions contained in this investigation are based on the conditions as observed by Geosyntec personnel and as reported by relevant agencies and other named sources at the time the investigation was performed.

No warranty, expressed or implied, is made regarding the professional opinions expressed in this report or concerning the completeness of the data presented to us. If actual conditions are found to differ from those described in the report, or if new information regarding the site is obtained, Geosyntec should be notified and additional recommendations, if required, will be provided.

Geosyntec is not liable for any use of the information contained in this report by persons other than the City of Malibu as intended for the subject Project.

10. REFERENCES

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SWRCB [2011], Proposition 84 Areas of Special Biological Significance (ASBS) Grant Program Grant Agreement between the State Water Resources Control Board, and City of Malibu, Broad Beach Road Biofiltration, Agreement no. 10-411-550, State Water Resources Control Board.

TABLES

Table 5-1. Areas and Stormwater Quality Design Volume per Catchment

Catchment No.	Catchment Section	A_C (ac)	A_I (ac)	A_P (ac)	A_U (ac)	C_U (-)	SWQDv (ft^3)
1		2.34	0.53	1.81	0	0.1	1788
2	west	0.57	0.05	0.53	0	0.1	254
	east	1.61	0.15	1.46	0	0.1	766
3		0.75	0.09	0.66	0	0.1	395
4		1.48	0.11	1.37	0	0.1	644
5A	west	0.85	0.10	0.75	0	0.1	457
	east	1.70	0.13	1.57	0	0.1	734
6		1.08	0.11	0.96	0	0.1	534
7	west	0.76	0.09	0.67	0	0.1	406
	east	0.31	0.03	0.28	0	0.1	145
8		0.82	0.13	0.69	0	0.1	514
Total		**12.27**	**1.51**	**10.75**			**6637**

Table 6-1. Proposed BMPs and Improvements for each Alternative per Catchment

Catchment No.	Biofilters	Vegetated Swales (incl. grading)	Water Storage and Use or Treatment	Concrete Pavers	Retaining and Garden Walls	Irrigation System Removal/ Replacement	Habitat Restoration
1			Alt. 2	Both Alt.	Both Alt.[1]	Both Alt.	Both Alt.
2	Both Alt.	Both Alt.	Alt. 2	Both Alt.	Both Alt.	Both Alt.	Both Alt.
3	Both Alt.	Both Alt.		Both Alt.	Both Alt.	Both Alt.	Both Alt.
4	Both Alt.	Both Alt.		Both Alt.	Both Alt.	Both Alt.	Both Alt.
5A	Both Alt.	Both Alt.		Both Alt.	Both Alt.	Both Alt.	Both Alt.
6	Both Alt.	Both Alt.		Both Alt.	Both Alt.	Both Alt.	Both Alt.
7	Both Alt.	Both Alt.		Both Alt.	Both Alt.	Both Alt.	Both Alt.
8	Alt. 1	Alt. 2	Alt. 2	Both Alt.	Both Alt.	Both Alt.	Both Alt.

[1] Walls are not proposed for Catchment 1. However, a concrete swale along the slope will function as a slough wall.

Table 6-2. Design Biofilter Volume (Bv) and Biofilter Media Surface Area (A_{media}) for Alternatives 1 and 2

Catchment No.	Catchment Section	Alternative 1		Alternative 2	
		Bv (ft^3)	A_{media} (ft^2)	Bv (ft^3)	A_{media} (ft^2)
1					
2	west	3063	1541		
	east	1149	541	1149	541
3		593	326	593	326
4		966	448	966	448
5A	west	685	334	685	334
	east	1101	560	1101	560
6		801	365	801	365
7	west	608	268	608	268
	east	218	107	218	107
8	west	771	350		
Total		**9956**	**4840**	**6122**	**2949**

Table 7-1. Summary of Construction Cost Estimates for Alternatives 1 and 2

Total Construction Costs	Alt. 1	Alt. 2	Notes
Biofilters	$159,000	$96,000	
Vegetated Swale	$31,000	$34,000	
Planting of Slope	$38,000	$38,000	
Irrigation	$150,000	$156,000	
Walls (new and existing)	$169,000	$116,000	
Concrete Interlocking Pavers	$528,000	$527,000	
Diversion and Storage Structures - Catchment 2	$3,000	$124,000	Alt. 1 does not include storage
Diversion and Storage Structures - Catchment 8	$43,000	$77,000	Alt. 1 does not include storage
Maintenance of planting and irrigation	$8,000	$8,000	3 month maintenance period
Demolition of hardscape/landscape	$34,000	$34,000	
SUBTOTAL 1	*$1,163,000*	*$1,210,000*	
Mobilization & Demobilization	$116,000	$121,000	10% of Subtotal 1
Bonds	$35,000	$36,000	3% of Subtotal 1
Traffic Control	$20,000	$20,000	
SWPPP	$20,000	$20,000	
SUBTOTAL 2	*$1,354,000*	*$1,407,000*	
Contingency	$271,000	$281,000	20% of Subtotal 2
Total Construction Cost	**$1,625,000**	**$1,688,000**	

FIGURES

Figure 2-1. Vicinity map of Project area

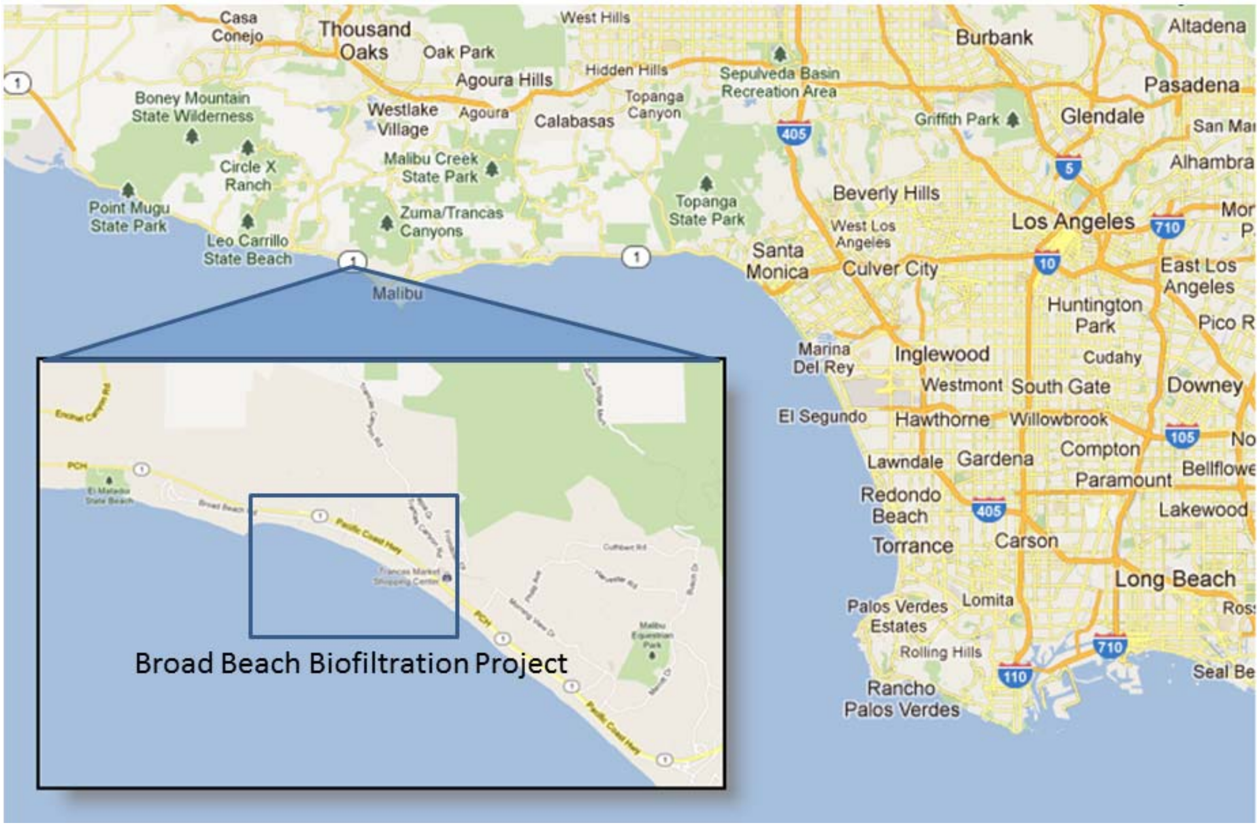

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Figure 2-2. Location map of Project area

Figure 2-3. Private irrigation system contributing to dry-weather runoff

Figure 2-4. Private irrigation piping in storm drain

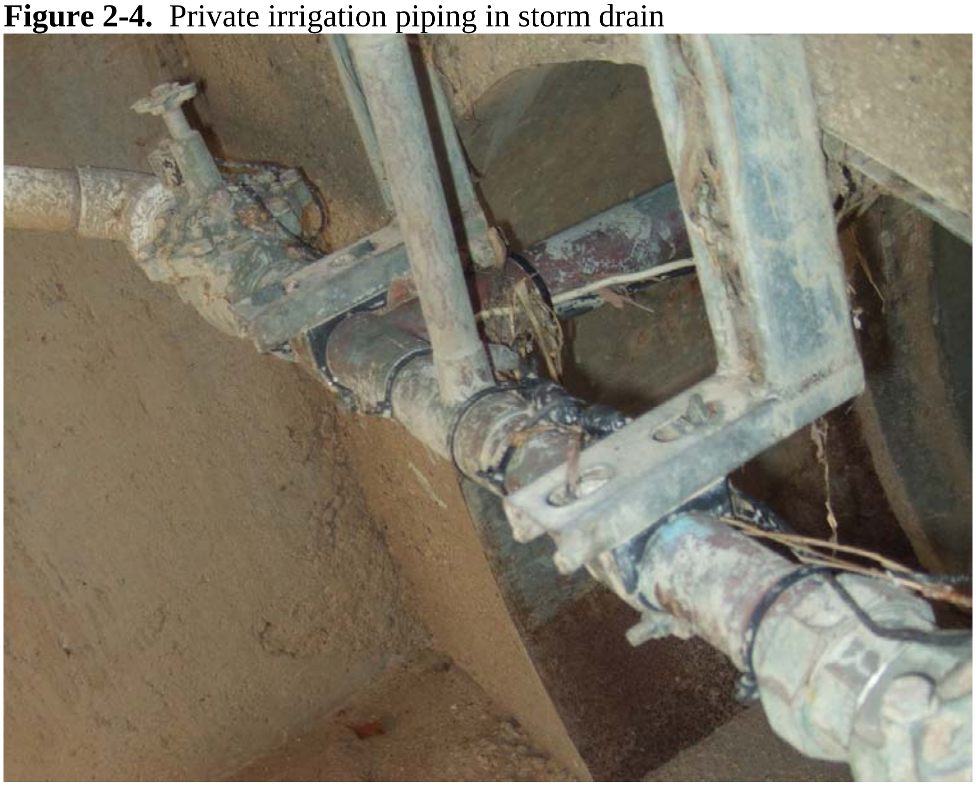


Figure 2-5. Unpaved parking strip with potted plants

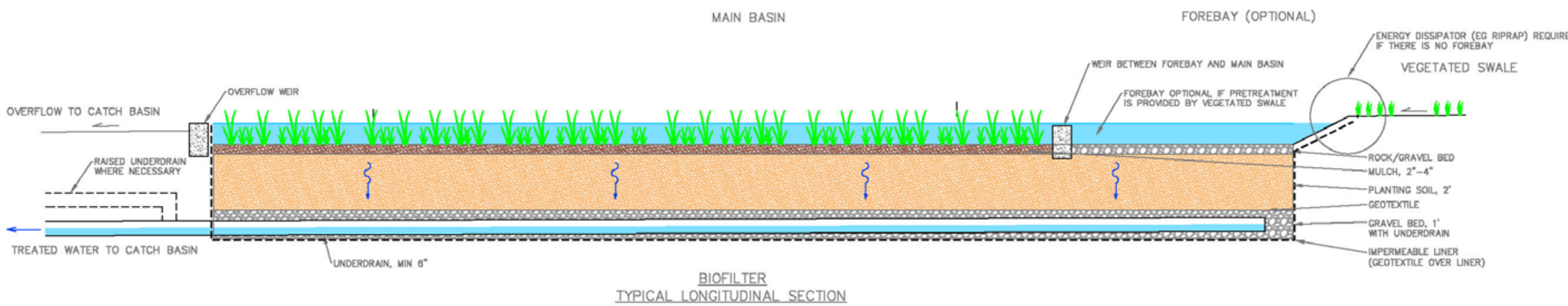
Figure 2-6. Cast in place concrete retaining wall with parking apron

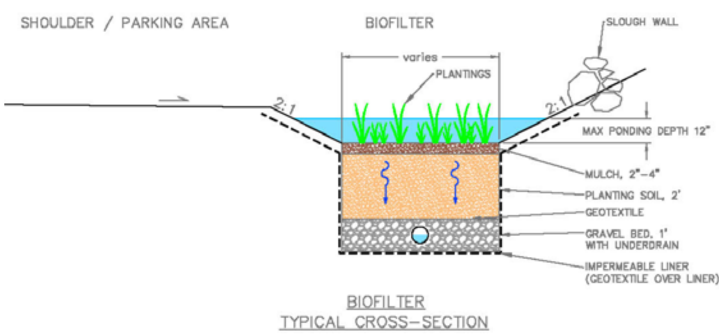
Figure 2-7. Privately constructed waste concrete hardscape

Figure 2-8. Brick retaining wall

Figure 2-9. Treated wood retaining wall

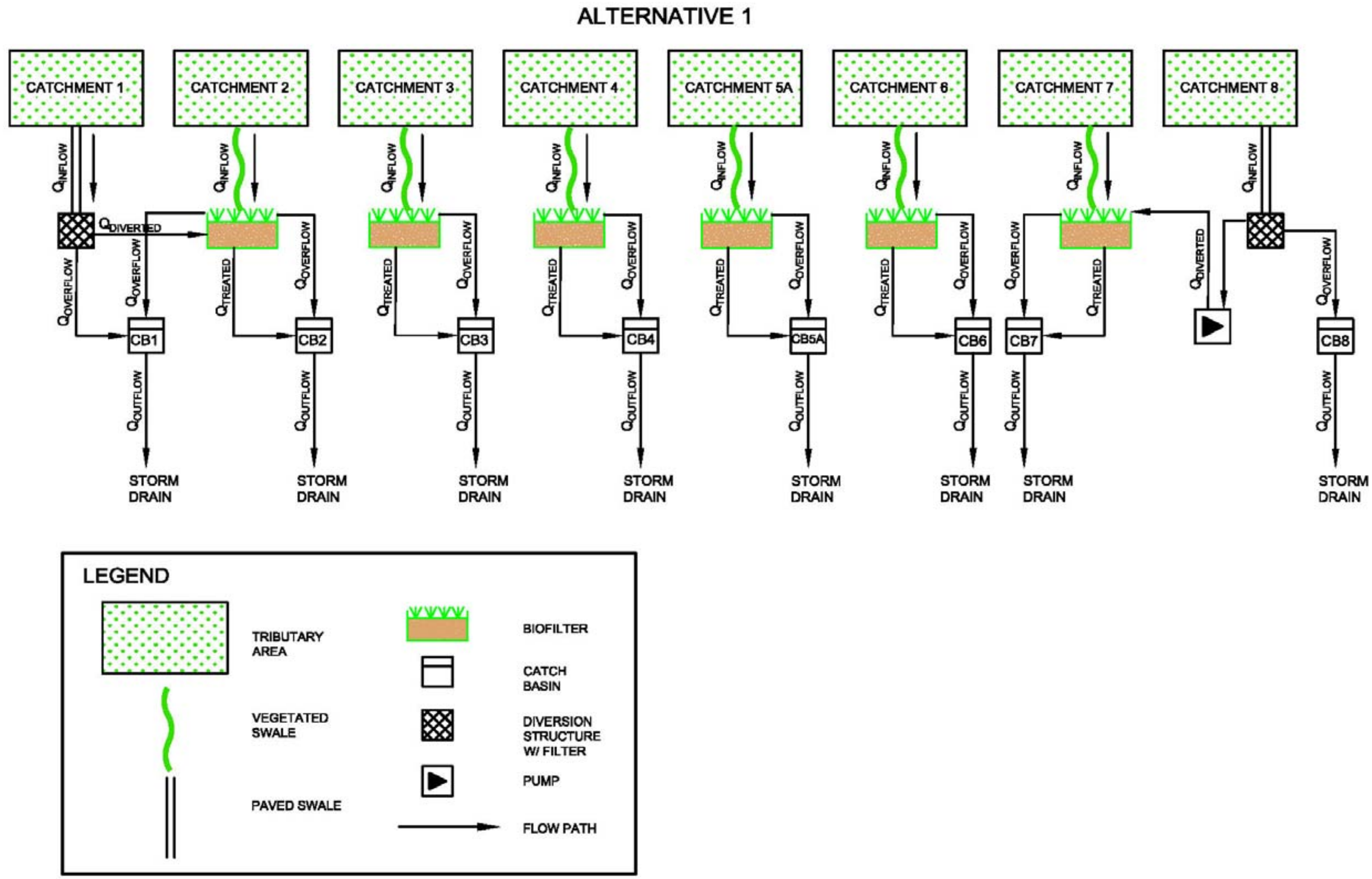
Figure 6-1. Typical biofilter cross-sections and details





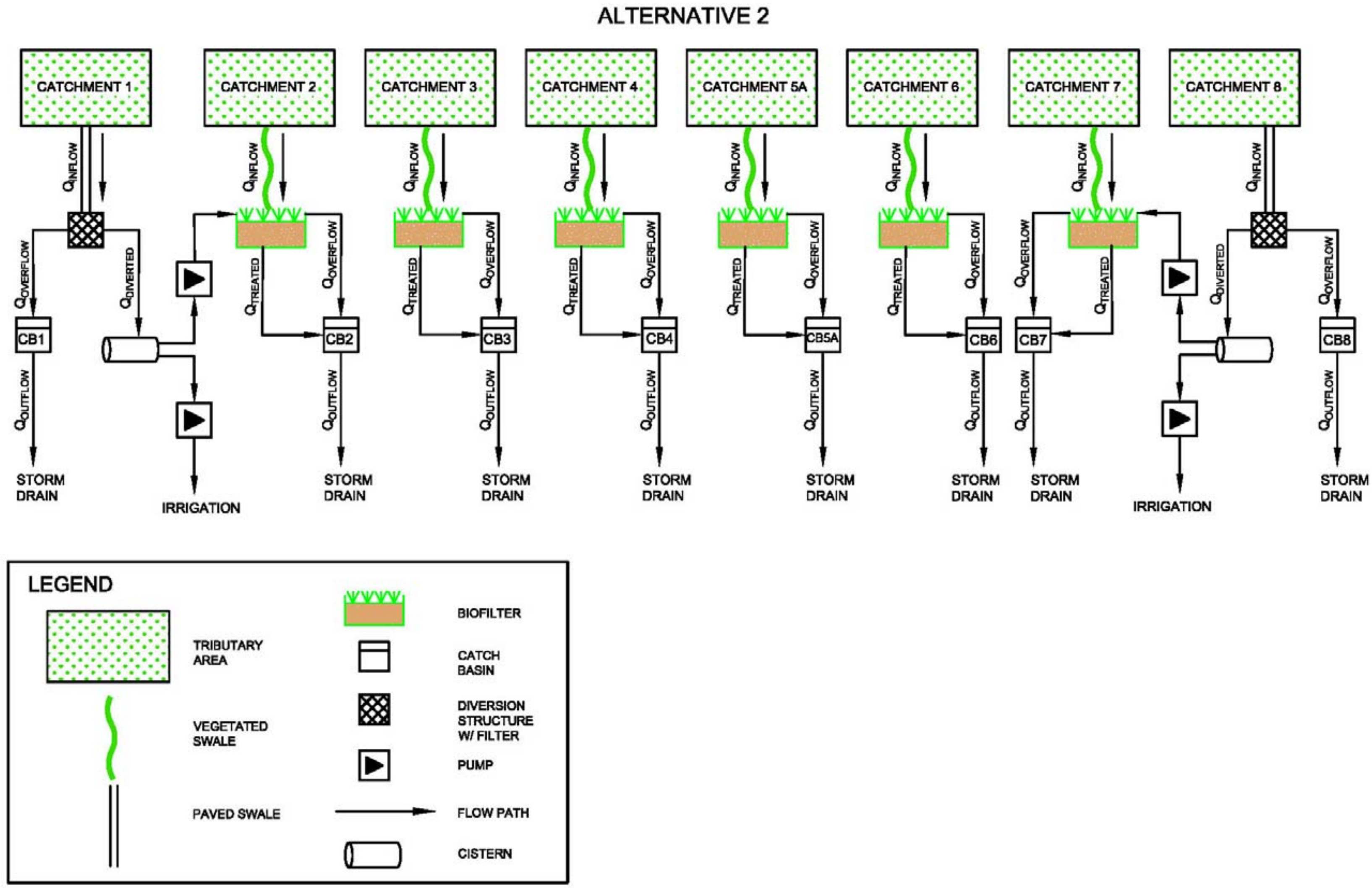
DETAILS ARE NOT TO SCALE

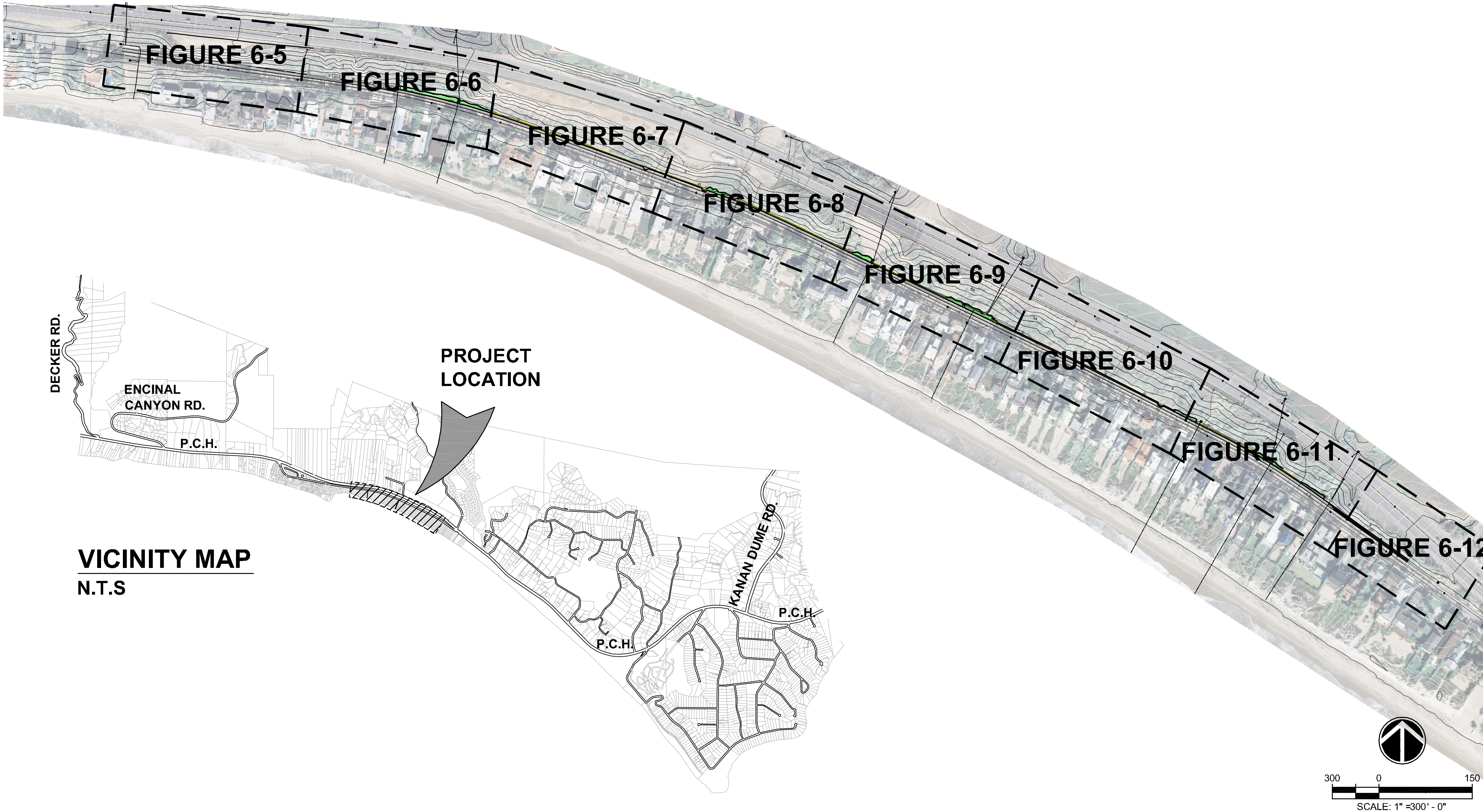
Figure 6-2. Flow diagram for Alternative 1



RB-AR 5325

Figure 6-3. Flow diagram for Alternative 2





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- Biological Restoration

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RB-AR 5327

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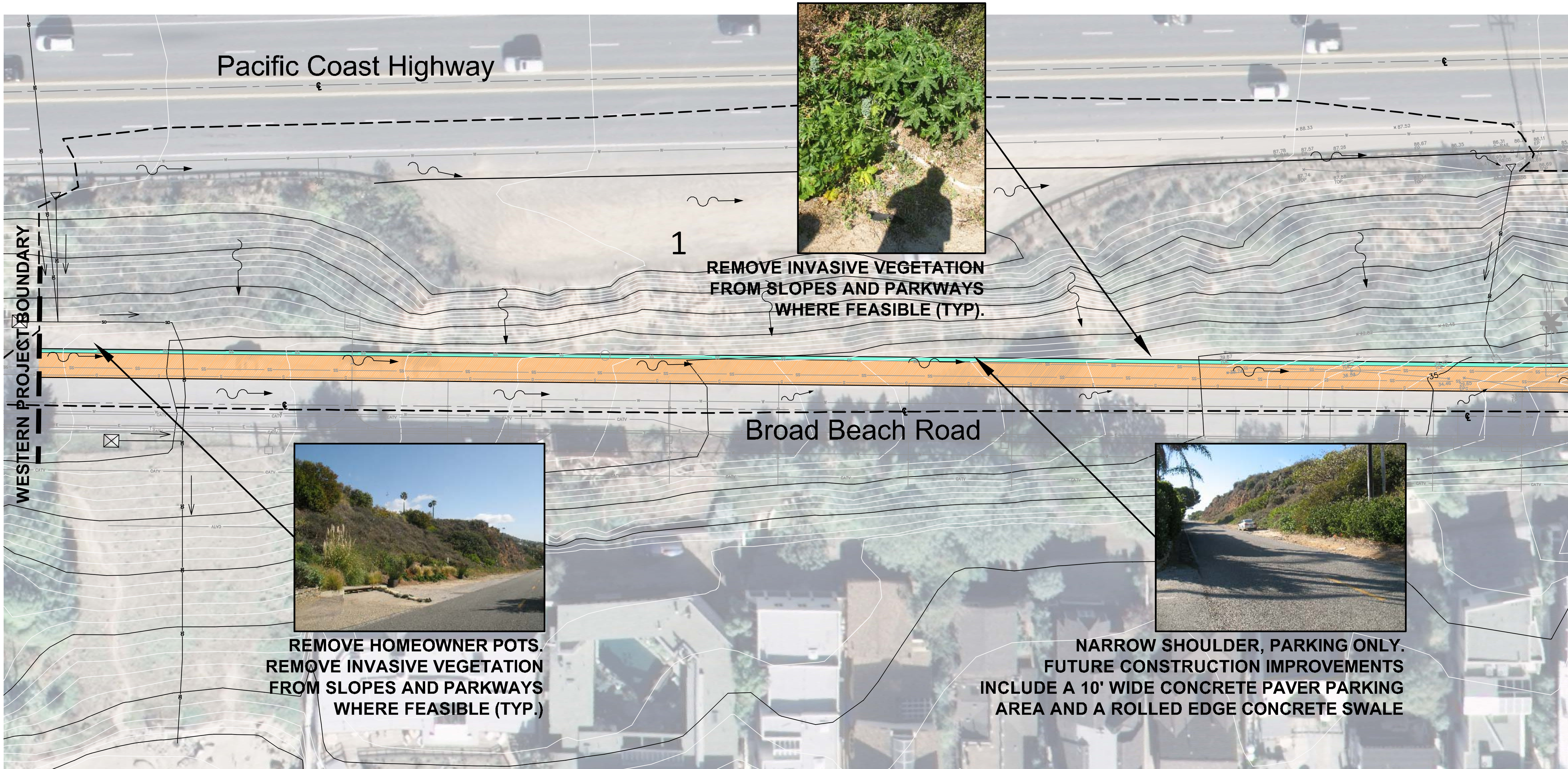
Figure 6-4



FUTURE CONSTRUCTION IMPROVEMENTS

(These areas are to be completed under separate funding at a later date)

- 10' Wide Concrete Paver Parking Area
- Rolled Edge Concrete Swale
- Concrete Swale

NOTE: Selective vegetation removal and site clean-up shall occur within the entire project boundary as part of this construction scope-of-work and budget.

20 0 40
SCALE: 1" = 40' - 0"

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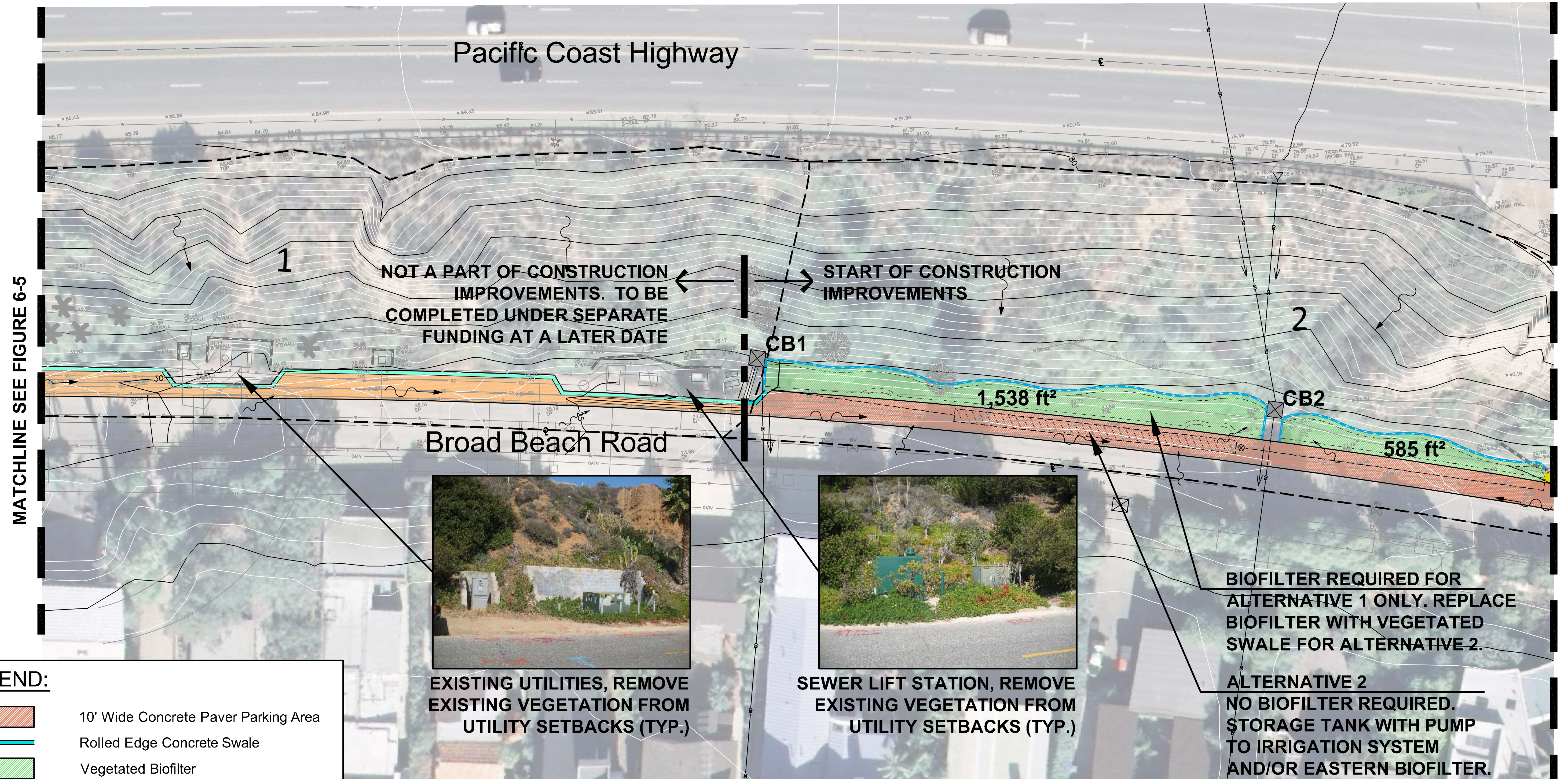
Figure 6-5

RB-AR 5328



LEGEND:

- 10' Wide Concrete Paver Parking Area
- Rolled Edge Concrete Swale
- Vegetated Biofilter
- Vegetated Swale
- Alternative 2 Storage Tank
- Wall
- Catchment Area Boundary
- Existing Catch Basin

FUTURE CONSTRUCTION IMPROVEMENTS

(These areas are to be completed under separate funding at a later date)

- 10' Wide Concrete Paver Parking Area
- Rolled Edge Concrete Swale
- Concrete Swale

NOTE: Selective vegetation removal and site clean-up shall occur within the entire project boundary as part of this construction scope-of-work and budget.

20 0 40

SCALE: 1" = 40' - 0"

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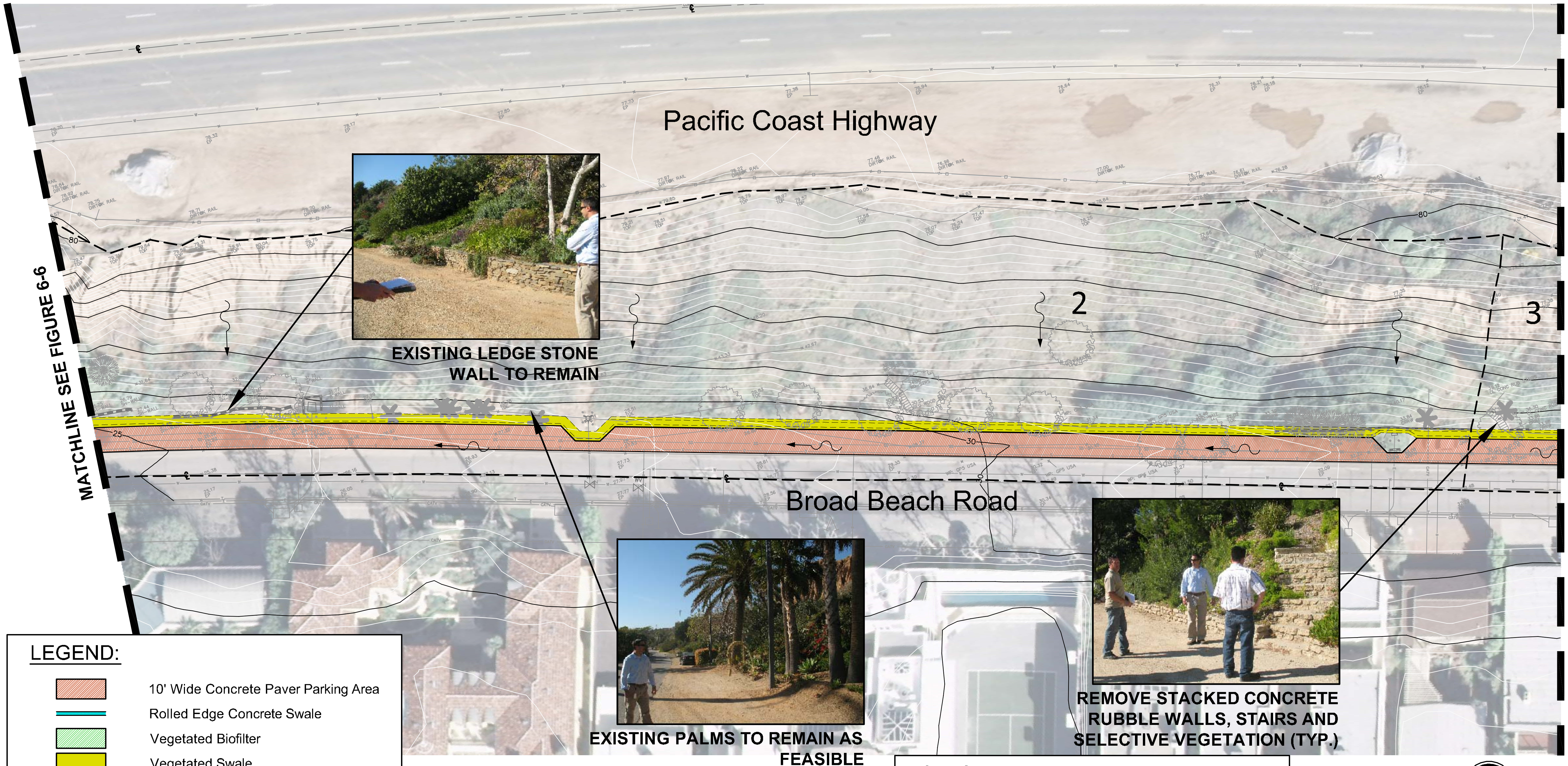
Figure 6-6

RB-AR 5329



LEGEND:

- 10' Wide Concrete Paver Parking Area
- Rolled Edge Concrete Swale
- Vegetated Biofilter
- Vegetated Swale
- Alternative 2 Storage Tank
- Wall
- Catchment Area Boundary
- Existing Catch Basin

NOTE: Selective vegetation removal and site clean-up shall occur within the entire project boundary as part of this construction scope-of-work and budget.

20 0 40
SCALE: 1" = 40' - 0"

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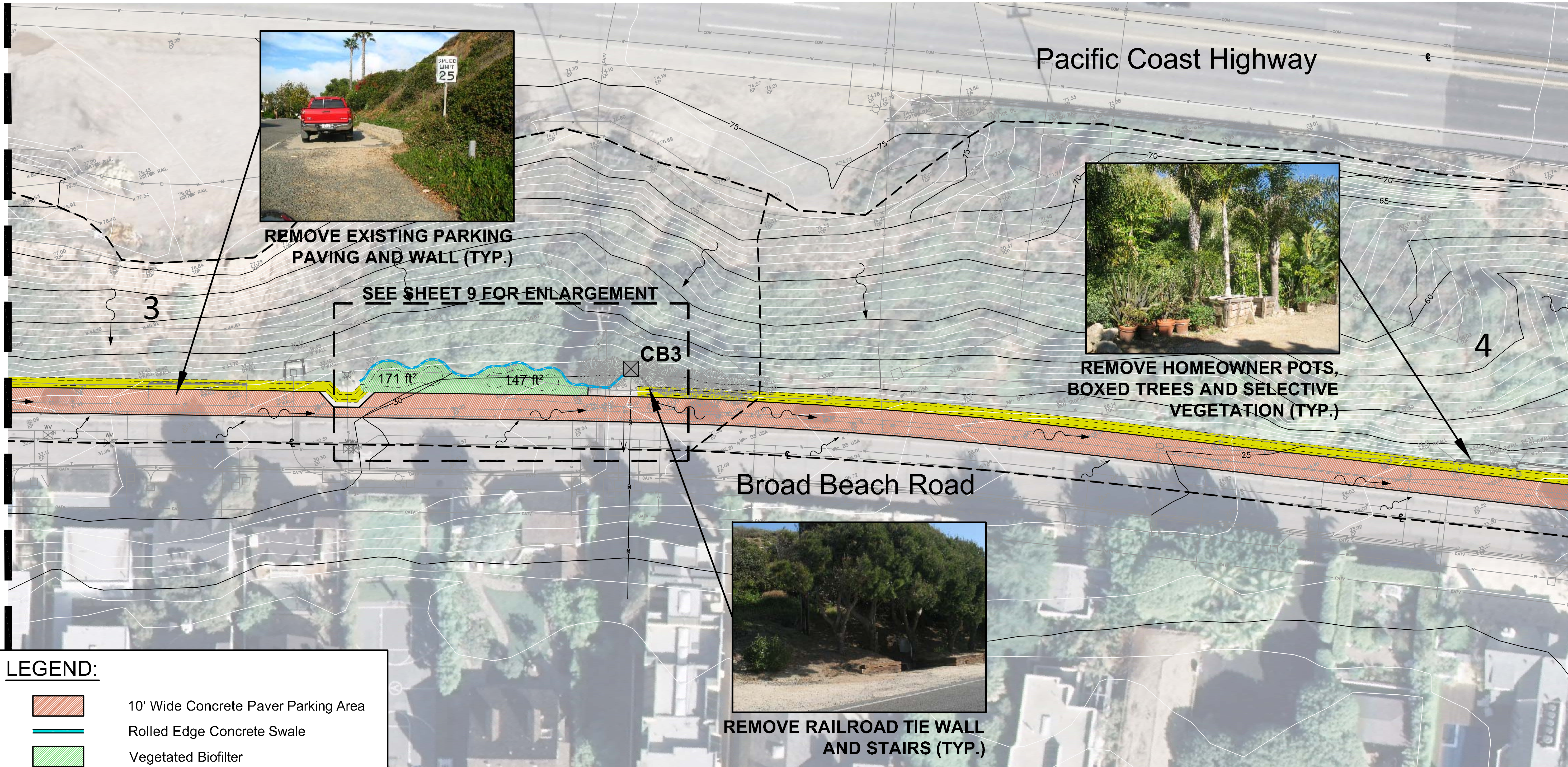
Figure 6-7



LEGEND:

- 10' Wide Concrete Paver Parking Area
- Rolled Edge Concrete Swale
- Vegetated Biofilter
- Vegetated Swale
- Alternative 2 Storage Tank
- Wall
- Catchment Area Boundary
- Existing Catch Basin

NOTE: Selective vegetation removal and site clean-up shall occur within the entire project boundary as part of this construction scope-of-work and budget.

20 0 40

SCALE: 1" = 40' - 0"

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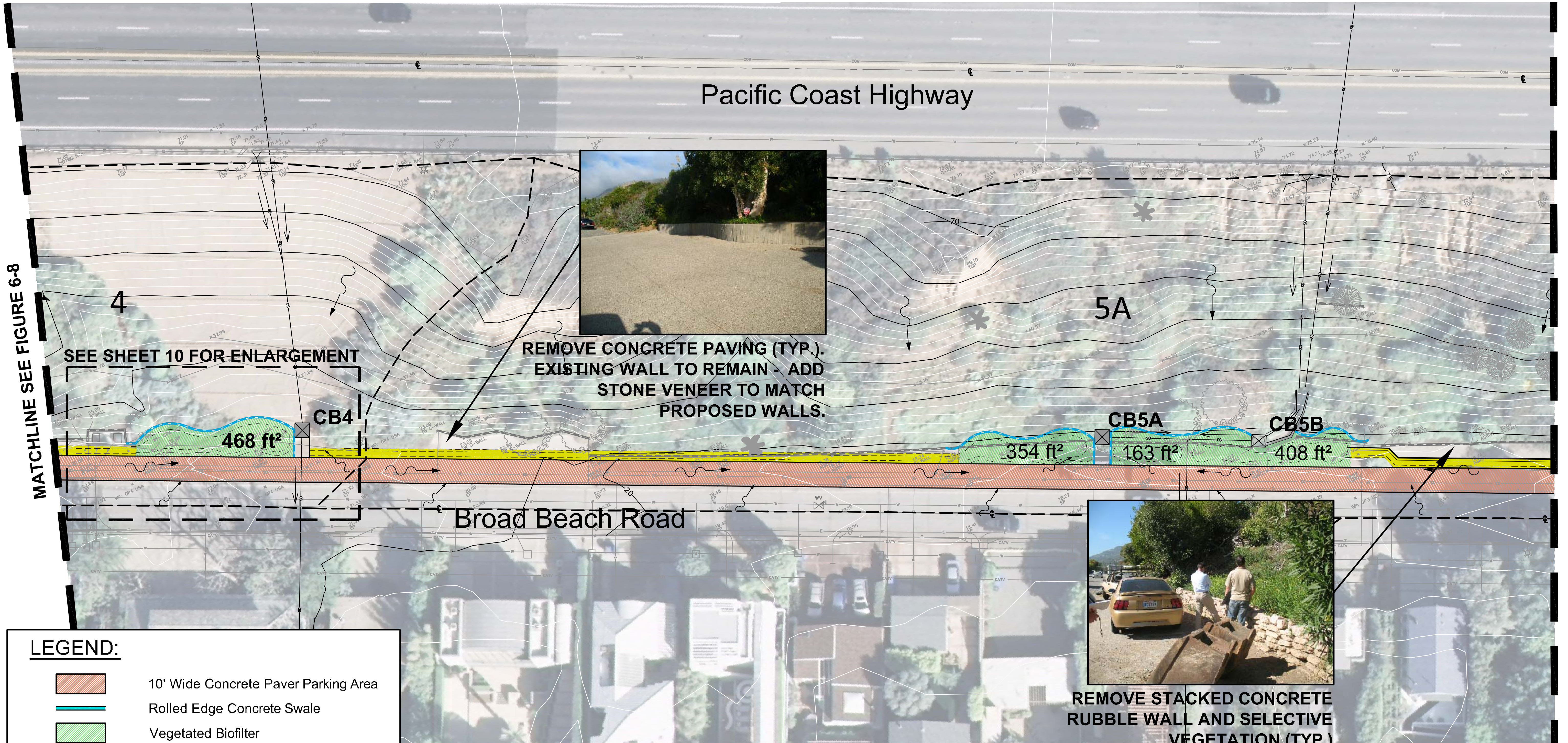
Figure 6-8



LEGEND:

	10' Wide Concrete Paver Parking Area
	Rolled Edge Concrete Swale
	Vegetated Biofilter
	Vegetated Swale
	Alternative 2 Storage Tank
	Wall
	Catchment Area Boundary
	Existing Catch Basin

NOTE: Selective vegetation removal and site clean-up shall occur within the entire project boundary as part of this construction scope-of-work and budget.

20 0 40

SCALE: 1" = 40' - 0"

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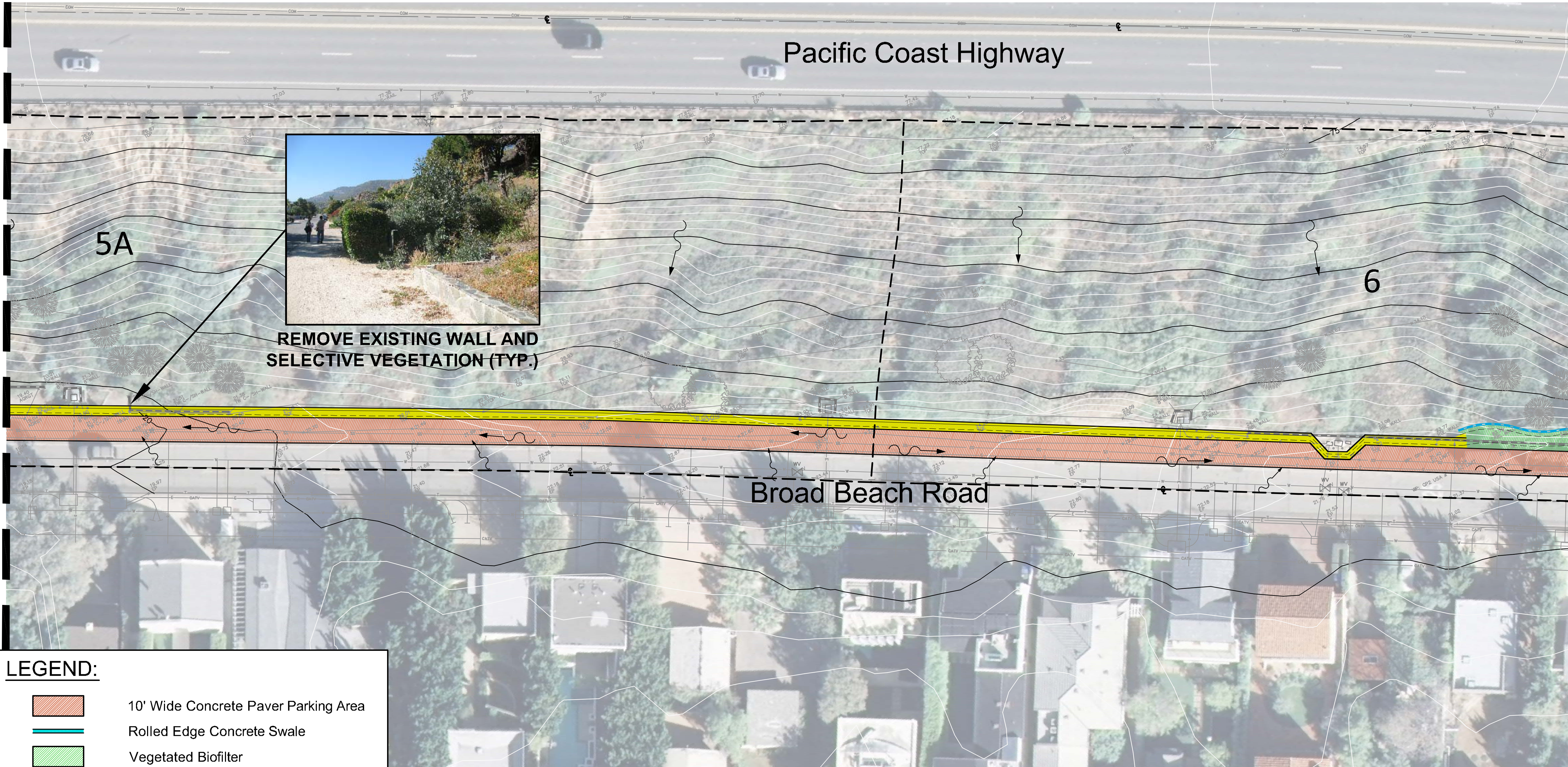

LEGEND:

- 10' Wide Concrete Paver Parking Area
- Rolled Edge Concrete Swale
- Vegetated Biofilter
- Vegetated Swale
- Alternative 2 Storage Tank
- Wall
- Catchment Area Boundary
- Existing Catch Basin

NOTE: Selective vegetation removal and site clean-up shall occur within the entire project boundary as part of this construction scope-of-work and budget.

20 0 40

SCALE: 1" = 40' - 0"

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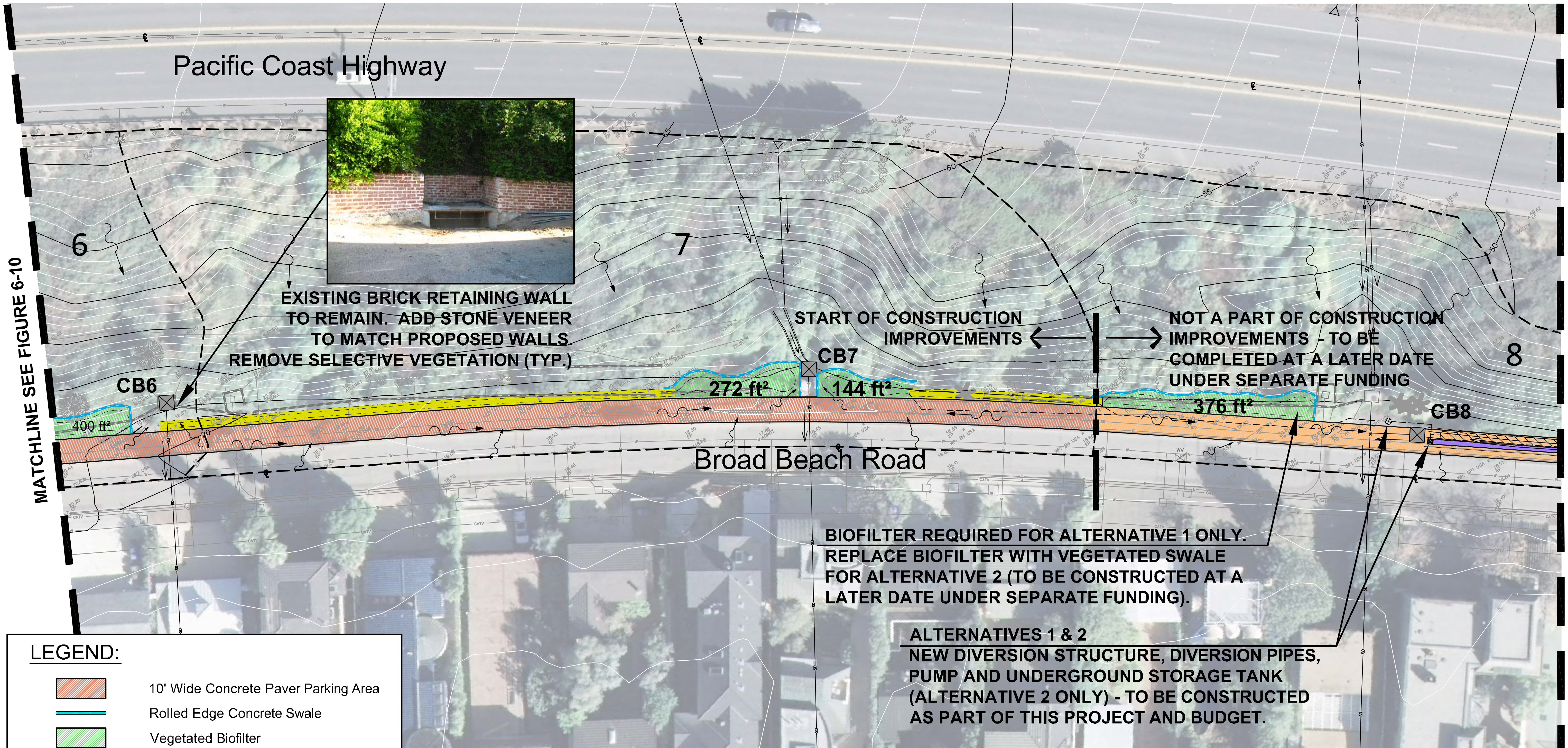
Figure 6-10



LEGEND:

- 10' Wide Concrete Paver Parking Area
- Rolled Edge Concrete Swale
- Vegetated Biofilter
- Vegetated Swale
- Alternative 2 Storage Tank
- Wall
- Catchment Area Boundary
- Existing Catch Basin

FUTURE CONSTRUCTION IMPROVEMENTS
(These areas are to be completed under separate funding at a later date)

- 10' Wide Concrete Paver Parking Area
- Rolled Edge Concrete Swale
- Concrete Swale

NOTE: Selective vegetation removal and site clean-up shall occur within the entire project boundary as part of this construction scope-of-work and budget.

20 0 40
SCALE: 1" = 40' - 0"

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Figure 6-11

FUTURE CONSTRUCTION IMPROVEMENTS

(These areas are to be completed under separate funding at a later date)

- 10' Wide Concrete Paver Parking Area
- Rolled Edge Concrete Swale
- Concrete Swale

NOTE: Selective vegetation removal and site clean-up shall occur within the entire project boundary as part of this construction scope-of-work and budget.

20 0 40

SCALE: 1" = 40' - 0"

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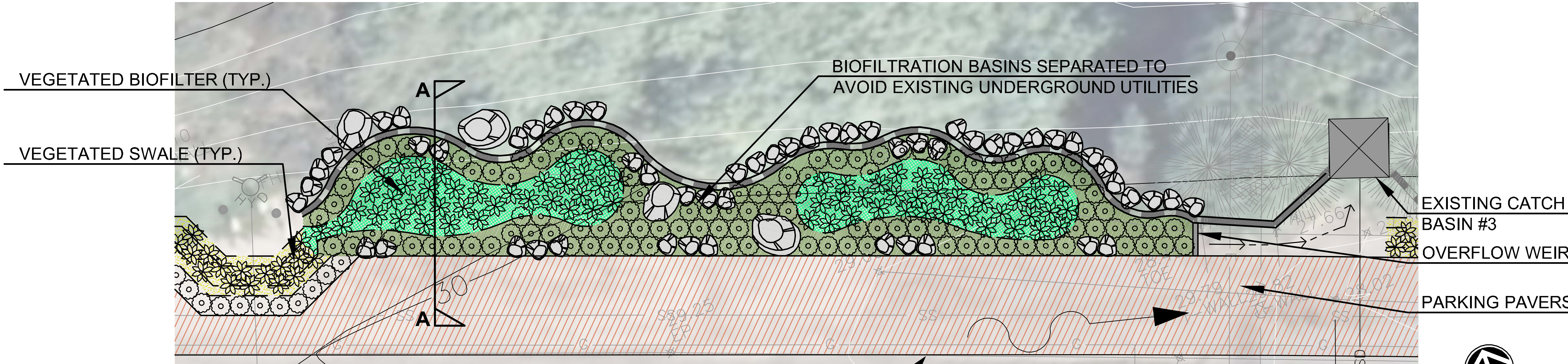
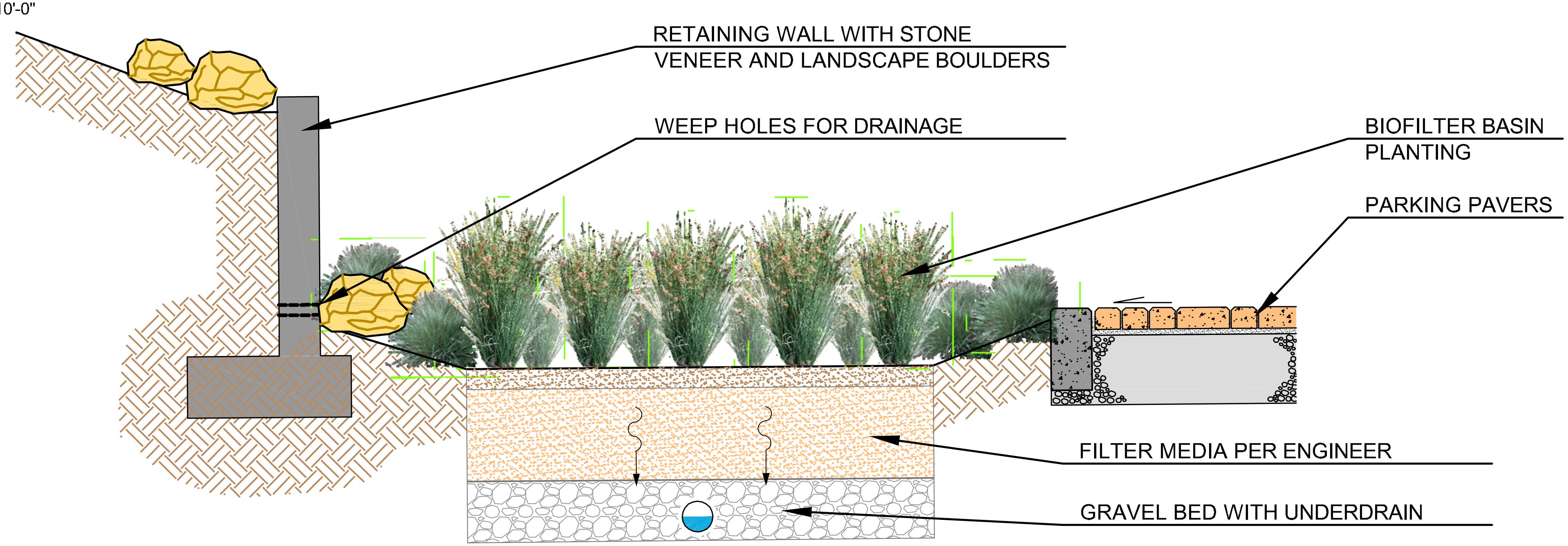
Figure 6-12



PLAN VIEW

SCALE: 1" = 10'-0"



SECTION A-A

1/2" = 1'-0"

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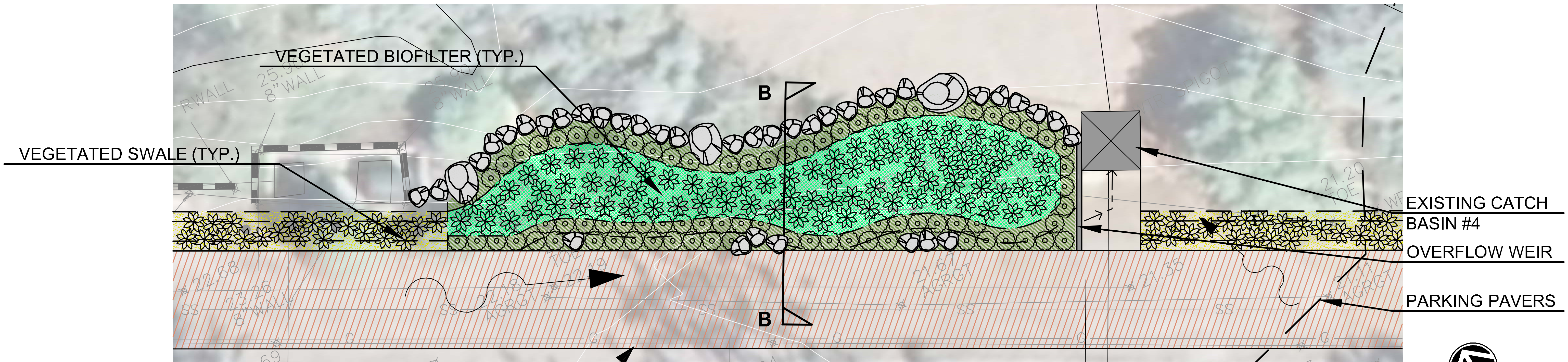
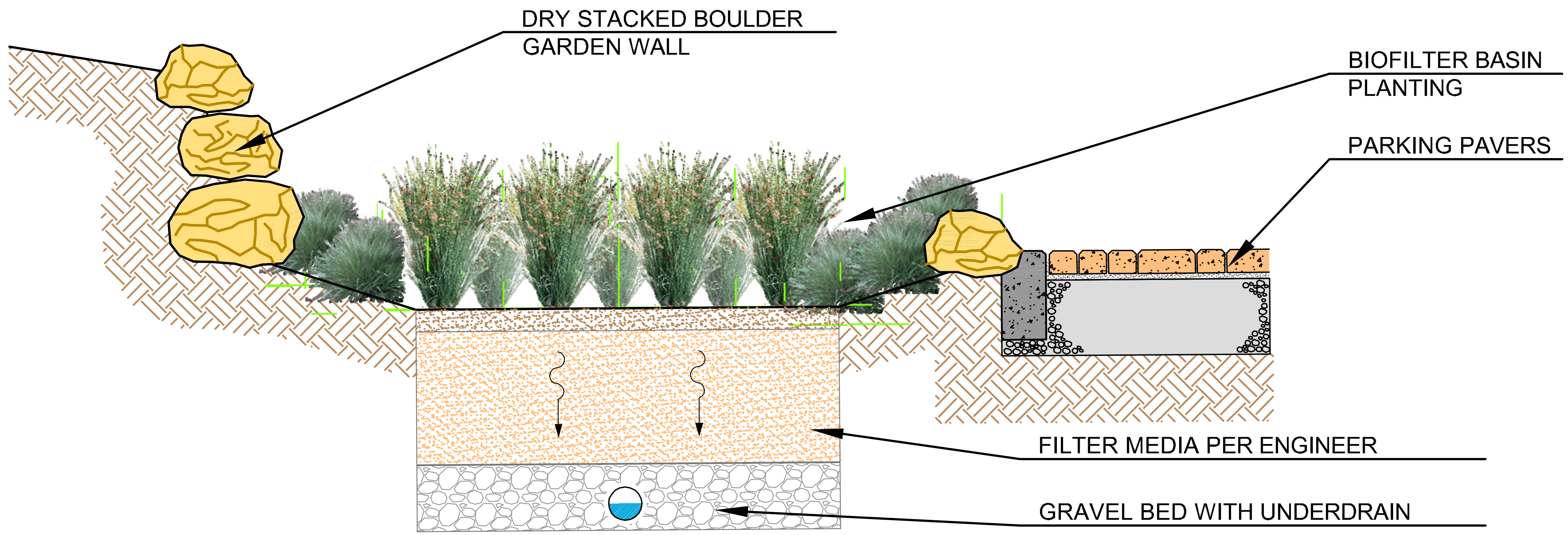
Figure 6-13



PLAN VIEW

SCALE: 1" = 10'-0"



SECTION B-B

1/2" = 1'-0"

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Figure 6-14

APPENDIX F

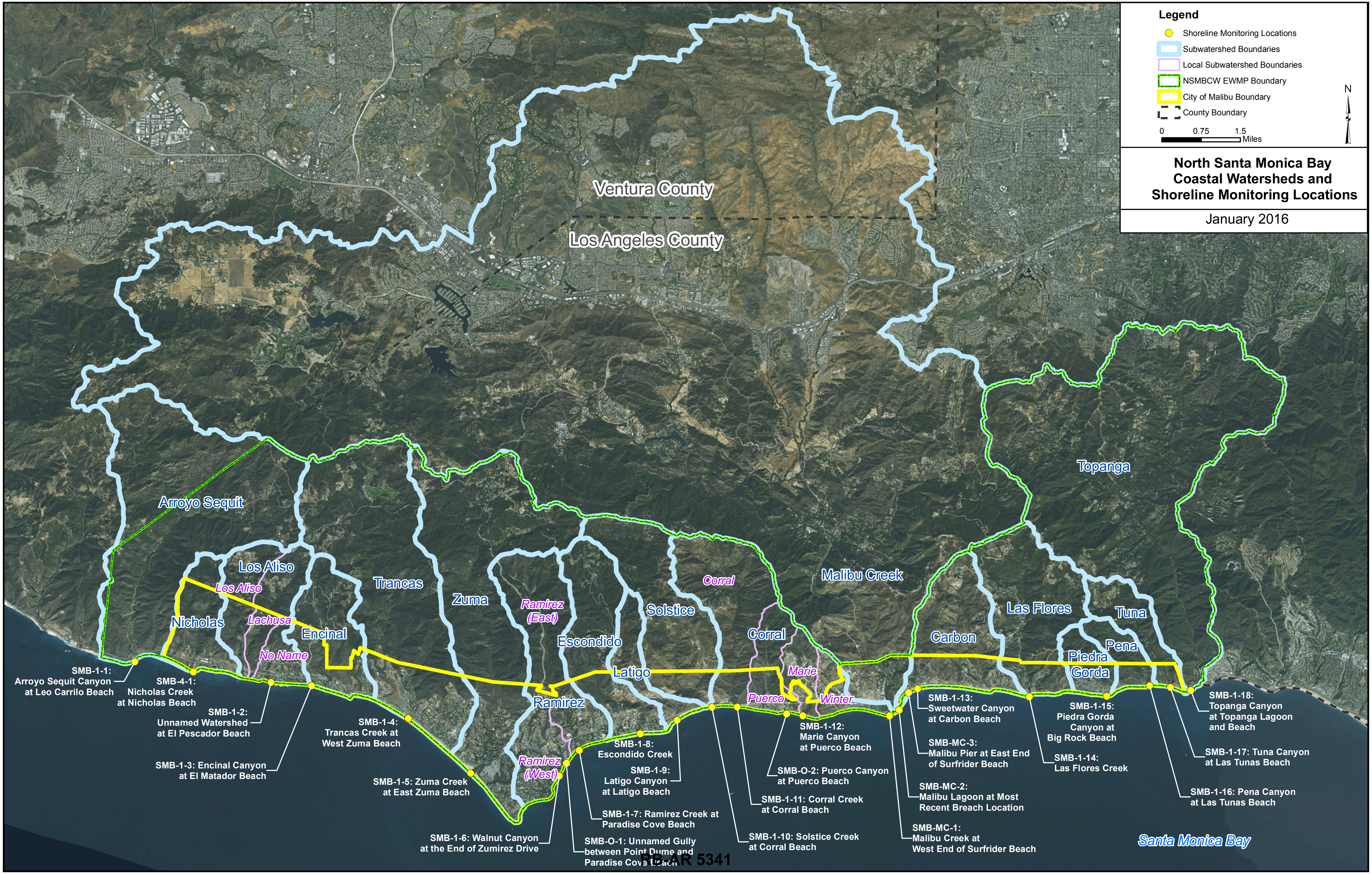
Non-Stormwater Outfall Screening Results

Outfall Screening Event	Outfall ID	Event 1 County/City Event		Event 2 County Event		Event 3 City Event		Event 4 City Event		Event 5 County Event		Event 6 City Event	
		Date	Observed Flow	Date	Observed Flow	Date	Observed Flow	Date	Observed Flow	Date	Observed Flow	Date	Observed Flow
1st Screening in 2014	CSTL-009K	8/19/2014	No Flow	-	---------	-	---------	-	---------	5/19/2015	No Flow	11/6/2015	No Flow
	MALBUC-004	8/19/2014	Tidal Influence	10/21/2014	Tidal Influence	10/30/2014	Tidal Influence	-	---------	-	---------	-	---------
	MARIC-001	8/19/2014	Inaccessible	10/21/2014	Trickle	10/30/2014	Trickle	-	---------	-	---------	-	---------
	CSTL-004B	8/19/2014	No Flow	-	---------	-	---------	-	---------	5/19/2015	No Flow	11/6/2015	No Flow
	CSTL-007C	8/19/2014	No Flow	-	---------	-	---------	-	---------	5/19/2015	No Flow	11/6/2015	No Flow
	TRANCC-012	8/19/2014	Inaccessible	10/21/2014	No Flow	10/29/2014	No Flow	-	---------	-	---------	-	---------
	TRANCC-017	8/19/2014	Trickle	10/21/2014	Trickle	10/29/2014	Trickle	-	---------	-	---------	-	---------
	TRANCC-004A	8/19/2014	Trickle	10/21/2014	Trickle	10/29/2014	Trickle	-	---------	5/19/2015	No flow	-	---------
	TRANCC-004B	-	---------	-	---------	10/30/2014	Trickle	11/13/2014	Trickle	5/19/2015	No flow	-	---------

* = County Outfall

APPENDIX G

Figure of the NSMBCW EWMP Area and Shoreline Monitoring Locations



Legend
Shoreline Monitoring Locations
Subwatershed Boundaries
Local Subwatershed Boundaries
NSMBCW EWMP Boundary
City of Malibu Boundary
County Boundary
0 0.75 1.5 Miles
N
North Santa Monica Bay Coastal Watersheds and Shoreline Monitoring Locations
January 2016
Ventura County
Los Angeles County
Arroyo Sequit
Los Aliso
Los Aliso
Nicholas
Lachusa
Encinal
No Name
Trancas
Zuma
Ramirez (East)
Escondido
Solstice
Corral
Corral
Malibu Creek
Latigo
Ramirez
Ramirez (West)
Marie
Puerco
Winter
Carbon
Las Flores
Tuna
Pena
Piedra Gorda
Topanga
Santa Monica Bay
SMB-1-1: Arroyo Sequit Canyon at Leo Carrilo Beach
SMB-4-1: Nicholas Creek at Nicholas Beach
SMB-1-2: Unnamed Watershed at El Pescador Beach
SMB-1-3: Encinal Canyon at El Matador Beach
SMB-1-4: Trancas Creek at West Zuma Beach
SMB-1-5: Zuma Creek at East Zuma Beach
SMB-1-6: Walnut Canyon at the End of Zumirez Drive
SMB-O-1: Unnamed Gully between Point Dume and Paradise Cove Beach
SMB-1-7: Ramirez Creek at Paradise Cove Beach
SMB-1-8: Escondido Creek
SMB-1-9: Latigo Canyon at Latigo Beach
SMB-1-10: Solstice Creek at Corral Beach
SMB-1-11: Corral Creek at Corral Beach
SMB-O-2: Puerco Canyon at Puerco Beach
SMB-1-12: Marie Canyon at Puerco Beach
SMB-MC-1: Malibu Creek at West End of Surfrider Beach
SMB-MC-2: Malibu Lagoon at Most Recent Breach Location
SMB-MC-3: Malibu Pier at East End of Surfrider Beach
SMB-1-13: Sweetwater Canyon at Carbon Beach
SMB-1-14: Las Flores Creek
SMB-1-15: Piedra Gorda Canyon at Big Rock Beach
SMB-1-16: Pena Canyon at Las Tunas Beach
SMB-1-17: Tuna Canyon at Las Tunas Beach
SMB-1-18: Topanga Canyon at Topanga Lagoon and Beach

RB-AR 5341