Transportation Project BMP Guidance

San Bernardino County Municipal Stormwater Management Program

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Section 1 - Introduction

A. Purpose of the Guidance

The federal Clean Water Act (CWA) establishes requirements for the discharge of urban runoff from Municipal Separate Storm Sewer Systems (MS4) under the National Pollutant Discharge Elimination System (NPDES) program. On January 29, 2010, the Santa Ana Regional Water Quality Control Board (RWQCB) issued Permit Order No. R8-2010-0036 ("MS4 Permit") to authorize the discharge of urban runoff from MS4 facilities in San Bernardino County within the Santa Ana River watershed.

Generally, the accepted Santa Ana River watershed regional approach to WQMP development for managing transportation projects is to prepare a "functionally equivalent document" (Riverside County Transportation Guidance Document, November 2012) that incorporates site-specific engineering conditions into the BMP-selection analysis in order to manage project runoff to the MEP.

The MS4 Permit requires development of a standard design and post-development Best Management Practices (BMP) guidance to guide application of Low Impact Development (LID) BMPs to the maximum extent practicable (MEP) on transportation projects including public street, road, highway, freeway and bike/pedestrian path improvement projects to reduce the discharge of pollutants to receiving waters. The San Bernardino County MS4 Permittees prepared this Transportation Projects Guidance ("Guidance") to provide guidance to city engineers, planners, MS4 program staff, and transportation project proponents on how to address the MS4 Permit requirements within their jurisdictions. This guidance is largely based upon public street, road, highway, and freeway BMP techniques contained within USEPA's Municipal Handbook, *Managing Wet Weather with Green Infrastructure: Green Streets* (http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_munichandbook_green_sreets.pdf) and the *Low Impact Development Manual for Southern California* prepared for the Southern California Stormwater Monitoring Coalition, in cooperation with the State Water Resources Control Board, by the Low Impact Development Center. This Guidance also provides links and references to other sources of information regarding the application of LID-based BMPs to Transportation Projects (see Section 6: Resources).

The remaining parts of this section provide information regarding the applicability and appropriate use of this Guidance. Subsequent sections of this document provide detailed information on how to apply this Guidance to applicable projects.

B. NPDES Permit Requirement

The MS4 Permit establishes requirements for the application of LID BMP practices on all new development and significant redevelopment projects. For development activities specific to paved surfaces that will be used for vehicular transportation, the MS4 Permit requires the development of this Guidance by the Principal Permittee (San Bernardino County Flood Control District). Specifically, MS4 Permit Section XI.F.1 states:

"Within 24 months of adoption of this Order, the Principal Permittee, in cooperation with the Co-Permittees, shall develop standard design and post-development BMP guidance to be incorporated into projects for public streets, roads, highways, and freeway improvements to reduce the discharge of pollutants from the projects to the MEP. The draft guidance shall be submitted to the Executive Officer for review and approval and shall meet the performance standards for site design/LID BMPs, source control, and treatment control BMPs as well as the Hydrologic Conditions of Concern (HCOC) criteria. The guidance and BMPs shall address any

paved surface used for transportation of automobiles, trucks, motorcycles, and other vehicles, and excludes routine road maintenance activities where the surface footprint is not increased. The guidance shall incorporate principles contained in the USEPA guidance, "Managing Wet Weather with Green Infrastructure: Green Streets" to the MEP and include the following:

a. *Guidance specific to new road projects;*
b. *Guidance specific to projects for existing roads;*
c. *Size or impervious area criteria that trigger project coverage;*
d. *Preference for green infrastructure approaches wherever feasible;*
e. *Criteria for design and BMP feasibility analyses on a project-specific basis."*

This Guidance fulfills this MS4 Permit requirement. Accordingly, all jurisdictions subject to the requirements of the MS4 Permit shall implement this Guidance to the extent that it is applicable to their project.

C. Applicability

The effective date of this Guidance is six months after the approval of the Guidance by the Santa Ana RWQCB Executive Officer.

However, transportation projects are implemented to address many needs, ranging from improving the transportation network to support local and regional development to meeting public safety and maintenance needs. Given the vast array of potential activities carried out to develop and manage transportation networks, project proponents should routinely consult this Guidance to evaluate its applicability to a proposed project. **Table 1-1** and **Figure 1-1** summarize Guidance applicability.

Table 1-1. Transportation Project Guidance Applicability

This Guidance applies to the following projects: • Public Transportation Projects in the area covered by the Santa Ana Region MS4 Permit, which involve the construction of new transportation surfaces or the improvement of existing transportation surfaces • Proposed Road Projects in initial stages of planning and design
This Guidance does not apply to the following projects: • Transportation Project activities within the transportation corridor that do not modify the transportation surface • Projects proposing unpaved roadway surfaces (dirt or gravel roads) • Transportation Projects that have passed the preliminary engineering stages of the design process (i.e., 35 percent or similar) or at any stage past which funding has been secured • Transportation Projects that have received CEQA approval by the effective date of this Guidance • Projects that have completed design phases but have not been constructed (shelved projects) do not have to be redesigned to incorporate the requirements of this guidance as long as they have satisfied CEQA approval at the time of design. • Emergency Projects, as defined by this Guidance (see Section 2) • Maintenance Projects, as defined by this Guidance (see Section 2) • Transportation Projects that are part of a private new development or significant redevelopment project and required to prepare a Water Quality Management Plan (WQMP) • Transportation Projects subject to other MS4 Permit requirements, e.g., California Transportation Department (Caltrans) oversight projects, cooperative projects with an adjoining County or an agency outside the jurisdiction covered by the Santa Ana Region MS4 Permit

Project Type: For projects involving transportation surfaces, the following two key questions should be evaluated before moving forward with the application of this Guidance to your project:

Question 1 - Is this a cost-share transportation project with potential overlapping MS4 Permit requirements?

- Yes, this project is a cost-share with the California Department of Transportation (Caltrans) – Caltrans has its own MS4 Permit requirements to fulfill on transportation projects. The requirements applicable to the project proponent shall be applied to this project, i.e., if you are the project proponent, then this Guidance may apply; see Question 2. If Caltrans is the project proponent, then this Guidance does not apply.

- Yes, this project is a cost-share with a jurisdiction in adjacent Riverside, Orange, or Los Angeles County – The applicability of LID BMP practices to Transportation projects varies with each county, subject to the requirements of their respective MS4 Permits. The requirements applicable to the project proponent shall be applied to this project, i.e., if you are the project proponent, then this Guidance may apply; see Question 2. If another jurisdiction is the project proponent, then this Guidance does not apply.

- Yes, this project is a cost-share with a jurisdiction within San Bernardino County – This Guidance applies uniformly to all jurisdictions subject to the San Bernardino County MS4 Permit. This Guidance may be applicable to the proposed project; see Question 2.

- No, this project does not involve cost-share with another jurisdiction – This Guidance may apply; see Question 2.

Question 2 - Are the proposed transportation surfaces part of a larger development project or activity?

- Yes, new roads and streets will be constructed as part of a larger development activity – This Guidance does not apply. A Water Quality Management Plan (WQMP) is required for these types of projects regardless of whether the roads or streets are private or public after project completion; consult the Local Implementation Plan (LIP) for the jurisdiction within which the project is planned.

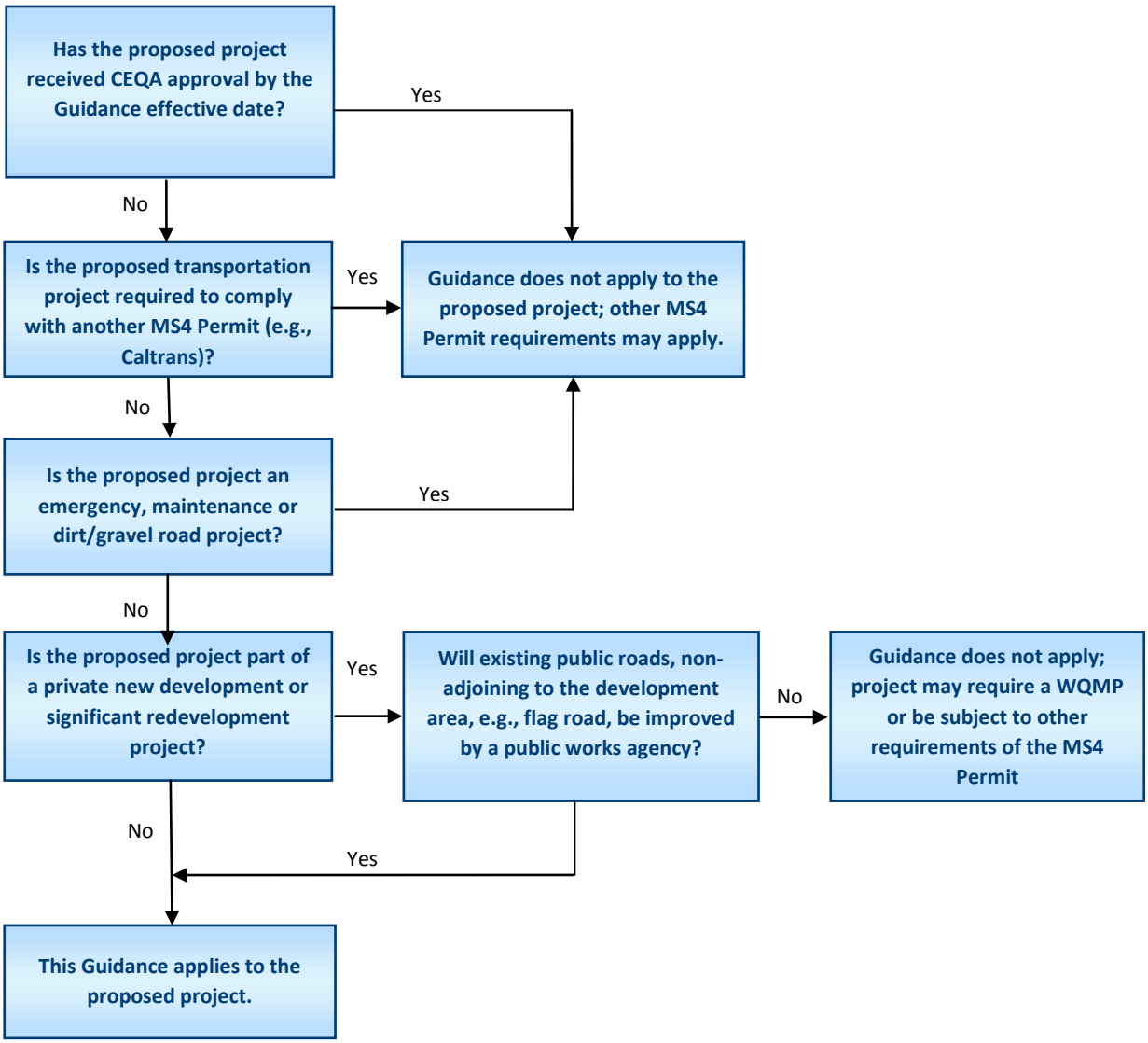
- Yes, existing adjacent roads and streets may be modified as part of the larger development activity - This Guidance does not apply. The WQMP required for the larger development activity will incorporate these adjacent road and street improvements. Consult the LIP for the jurisdiction within which the project is planned.

- Yes, existing non-adjacent roads and streets may be modified as part of the larger development activity - This Guidance may apply.

- No, the proposed project is not part of a larger development activity – This Guidance may apply.

If a finding of "This Guidance may apply" is made for either of the above questions, a project proponent should continue use of this Guidance to ensure compliance with MS4 Permit requirements applicable to transportation projects. If it is determined that this Guidance does not apply to the Transportation Project, this finding, along with the basis for the finding, should be documented in the project file. **Figure 1-1** illustrates the process for determining the applicability of this Guidance to proposed Transportation projects.

Figure 1-1. Applicability of the Transportation Project Guidance to a Proposed Project



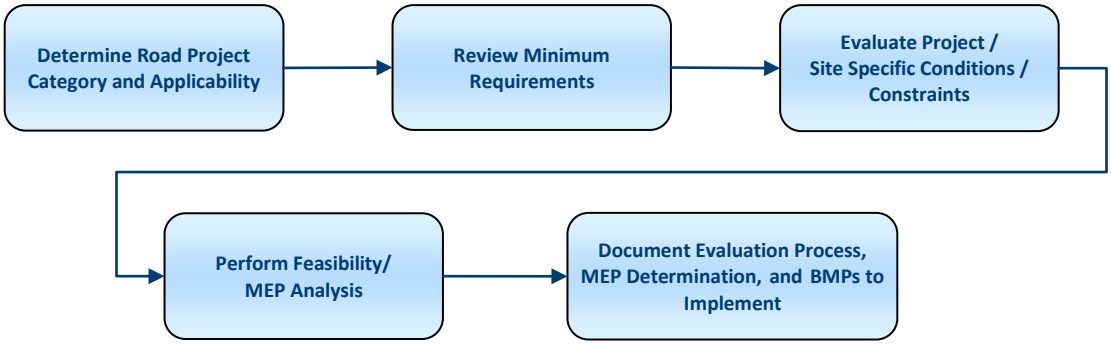
D. Functional Equivalence to WQMP

As stated in the MS4 Permit Order XI.F, the Santa Ana Region MS4 Permit requires the establishment of guidance that facilitates the development of project documents that are functionally equivalent to WQMP documents prepared for new development and significant redevelopment projects. This Guidance establishes minimum Site Design/LID BMPs to reduce the discharge of pollutants and address HCOCs, to the MEP and also includes site specific considerations for application of the Site Design/LID BMPs, to the MEP. For each specific project the feasibility analysis in Section 3 of this Guidance determines what is MEP, within the constraints associated with the project. Depending on the nature of the project and BMPs selected, this Guidance also establishes source control and treatment BMP requirements (e.g., as applicable to infiltration BMPs). HCOC criteria, within the context of pre and post project implementation, are to be considered as part of a project-specific feasibility analysis, but only to the maximum extent space is available, and the maximum extent feasible within the context of meeting other safety-related requirements to move water as quickly as possible off of impervious surfaces.

E. Organization and Use of the Guidance

The extent to which LID BMP practices are applicable to a proposed project is determined by evaluating and determining the project category, project type and site-specific conditions and constraints. Each step in the process of evaluating a proposed project per this Guidance is presented in Figure 1-2.

Figure 1-2. Project Evaluation Steps



The remaining sections of this Guidance describe each step in the process, specifically:

- **Section 2, Transportation Project Categories** – In some cases, this guidance may still not apply to the proposed project. This section further refines Guidance applicability.
- **Section 3, Minimum Requirements** – This section identifies minimum LID BMP requirements applicable to Transportation projects to which this Guidance applies. Minimum requirements will vary depending on the nature, location, and size of the project. The Guidance does establish specific minimum area criteria that trigger project coverage, and Section 3 (a) establishes minimum BMP design principles and techniques that shall be considered for all projects to which the Guidance applies; (b) summarizes site constraints that should be evaluated with each project; and (c) provides project-specific BMP feasibility criteria for consideration to evaluate the feasibility of incorporating green infrastructure elements (LID Principles and BMPs) into the proposed project.
- **Section 4, Source Control BMPs -** This section identifies recommended source control BMPs that should be evaluated for applicability to Transportation projects

- **Section 5, Project Implementation Requirements** – This section describes the minimum documentation requirements applicable to Transportation projects and nexus between the Transportation project evaluation and other permit requirements.
- **Section 6, Resources** – This section includes resources for implementation, including planning and design information to facilitate implementation of LID-based BMPs in Transportation Projects, a Glossary, and Transportation Project BMP Template that should be used as part of the evaluation process for proposed Transportation Projects.

Section 2 - Transportation Project Categories

Four categories of Transportation projects have been established for the purposes of this Guidance:

- Category 1 – Emergency Street/Road Projects
- Category 2 – Routine Street/Road Maintenance Projects
- Category 3 – Re-development Street/Existing Road Projects
- Category 4 – New Street/Road Projects

Consistent with MS4 Permit Provisions XI.F.1 and XI.D.4.i, Category 1 or 2 projects (emergency road projects and routine road maintenance activities) are considered exempt from the LID and Source Control BMP implementation requirements contained within this Guidance and the WQMP. The project owner and operator should consult the Local Implementation Plan (LIP) for the jurisdiction within which the project will be built to identify applicable requirements, such as for Category 2 – Maintenance Projects.

This Guidance is only applicable to two categories: Category 3 and 4 (**Table 2-1**). Accordingly, the LID Principles and BMPs applicable to the project type shall be evaluated and incorporated into the project design to the MEP (see Section 3).

Category 3 projects may be subcategorized into capacity improvement, non-capacity improvement, or Class I Bikeway and sidewalk projects (not adjoining an existing road). This sub-categorization may be important for the selection and evaluation of appropriate LID Principles and BMPs for incorporation into the project (see Section 3). If a Transportation project includes adjoining bikeway or sidewalk features, the selection and evaluation of BMPs should consider both the road and the adjoining bikeway/sidewalk features as a single project.

The design of new bridge projects as identified in Category 4 on Table 2-1 below will be evaluated using the following references from the U.S. Department of Transportation, Federal Highway Administration, for design considerations and channel stability assessments:

- Hydraulic Engineering Circular No. 14, *Hydraulic Design of Energy Dissipators for Culverts and Channels*

  http://www.fhwa.dot.gov/engineering/hydraulics/pubs/06086/hec14.pdf

- Publication No. FHWA-HRT-05-072, *Assessing Stream Channel Stability at Bridges in Physiographic Regions*

  http://www.fhwa.dot.gov/publications/research/infrastructure/hydraulics/05072/05072.pdf

Table 2-1. Project Categories and Example Projects[1]

Exempt from Guidance Requirements		Category 3 Re-Development Street/Road Projects	Category 4 New Street/Road Projects
Category 1 Emergency Street/Road Projects	**Category 2 Routine Street/Road Maintenance Projects**		
▪ Emergency road work of any nature that occurs outside the normal planning process	▪ Alteration of the existing road profile within the existing surface footprint ▪ Reconstruction of the road base and asphalt concrete within the existing surface footprint ▪ Bridge replacement or reconstruction ▪ Routine, reactive, or preventive maintenance activities including, seal coat, slurry seal, cape seal, chip seal, full-depth reclamation, hot in-place recycling, cold planning in-place recycling and overlay ▪ Traffic control device improvements to address safety concerns ▪ Seismic enhancement/retrofit projects ▪ Safety enhancement projects that result in the addition of no new transportation surfaces ▪ Median improvement projects, with no new road surface, and/or do not increase the overall median imperviousness by more than 5% ▪ Curb and gutter improvements ▪ Utility cuts	▪ Roadway Capacity Improvement Projects - Lane additions - Bridge capacity improvements - Grade separation projects, where capacity is increased ▪ Non-Capacity Roadway Improvement Projects - Shoulder / parking lane improvements - Turn pocket additions - Signal project that adds a turn lane - Horizontal alignment correction to improve sight distance - Grade separation projects, where no change in capacity - Addition of passing lane - Addition of a turn out - Addition of a bike lane or sidewalk that adjoins an existing roadway	▪ New road, street, and highway projects ▪ New bridge projects

Section 3 - Project Evaluation

A. Criteria for Project Coverage

Category 3 or 4 Projects that meet the following criteria shall meet the minimum BMP requirements contained within this section:

1. Residential Street Project

   Residential street projects comprising an entire block length, intersection to intersection, with a minimum length of ¼ mile

2. City Street / Road Project

   City street / road arterial projects (single or multi-lane) extending from arterial intersection to arterial intersection, with a minimum length of ½ mile

3. Highway / Freeway

   Highway / freeway projects with a minimum length of 1 mile. Local grade separation projects that are part of a highway / freeway projects with a minimum length of 1 mile.

Category 3 or 4 Projects that do not meet the project criteria described above are not subject to the BMP requirements described in the sections that follow. This finding should be included in the documentation file associated with the proposed project (see also Section 5.A).

B. Minimum Requirements

Project proponents for Category 3 and 4 Projects that meet the criteria described above shall implement the following design principles to the maximum extent practicable (MEP):

- Conservation of natural areas to the extent feasible
- Minimization of the impervious footprint
- Minimization of disturbances to natural drainage
- Design and construction of pervious areas (medians, parkway strips, roadway setback areas) to receive runoff from new roadway surfaces
- Use of landscaping that minimizes irrigation and runoff, promotes surface infiltration, and minimizes the use of pesticides and fertilizers

To implement these design principles, Category 3 and 4 Projects shall incorporate, to the MEP, the following BMP techniques described within USEPA's Guidance *Managing Wet Weather with Green Infrastructure: Green Streets*:

- Minimizing Street Widths
- Drainage Swales
- Bioretention
- Permeable Pavements
- Sidewalk Trees and Tree Boxes
- Infiltration Basins/Trenches

Project applicants shall refer to the design principles listed below, as well as the sources cited above, for general guidance on road construction or widening projects, with the understanding that these are examples of typical green street design and that final configuration of street profiles, roadway drainage areas, etc. is subject to review and approval by Agency Planning and Engineering staff. The example design drawings also do not usurp the ability of City and County Engineers and Planners to make local land use determinations or to adjust, modify, or reject these guidelines, if the local development condition or traffic safety warrants those actions.

Minimizing Street Widths

a. Plan site layout and street network to respect the existing hydrologic functions of the land (preserve wetlands, buffers, high-permeability soils, etc.) and minimize the impervious area.

b. Minimize street widths while maintaining jurisdictional code requirements for emergency service vehicles, sight distance, and a free flow of traffic. The USEPA Municipal Handbook, *Managing Wet Weather with Green Infrastructure: Green Streets* provides example for additional information. Street widths shall meet minimum requirements of the approving agency.

c. Look for opportunities to eliminate imperviousness within all areas of the proposed project site.

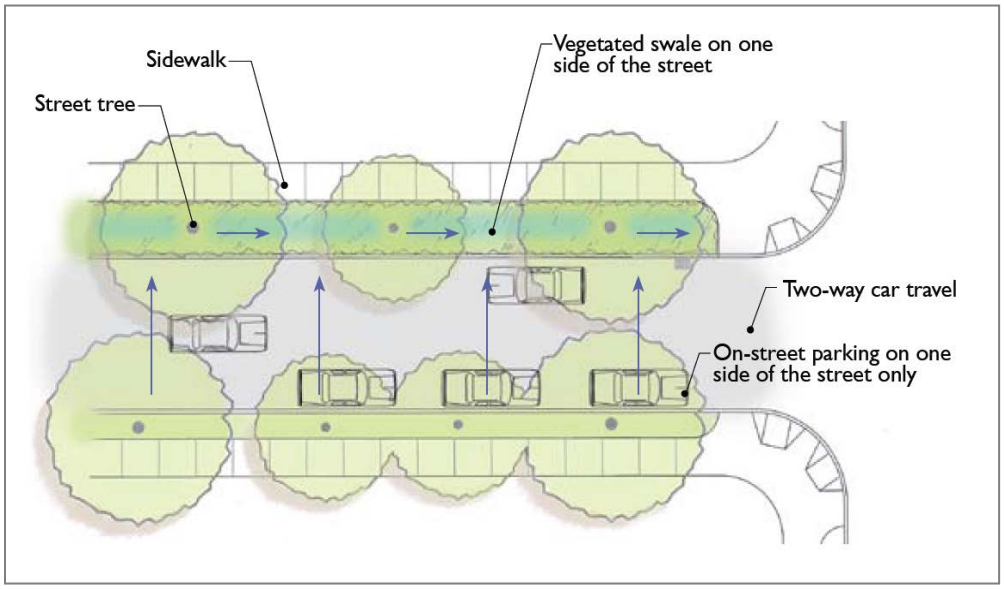
Drainage Swales

a. Plan site drainage using vegetated swales and curb and gutter modifications to accept sheet flow runoff from new or expanded roadway areas and convey it in broad shallow flow to reduce stormwater volume through infiltration, improve water quality through vegetative and soil filtration, and reduce flow velocity by increasing channel roughness. See picture and plan view schematic below.

b. Consider use of vegetated or pervious material swales for site drainage before considering use of hard lined impervious channels.

Green Streets: EPA-833-F-09-002, August 2009, www.epa.gov/greeninfrastructure

c. Identify additional benefits that may be attained from swales through amended soils, bioretention soils, gravel storage areas, underdrains, weirs, and thick diverse vegetation, including, where possible, use of native vegetation.



Plan View of Typical Drainage Swale on Residential Street (source: EPA-833-F-09-002, August 2009, www.epa.gov/greeninfrastructure

Bioretention Curb Extensions, Reverse Parkway Drains, Curb Cuts and Sidewalk Planters

a. Plan site layout using bioretention features such as curb extensions, reverse parkway drains, curb cuts, sidewalk planters, and tree boxes designed to take runoff from the street. See picture and plan view schematic below.

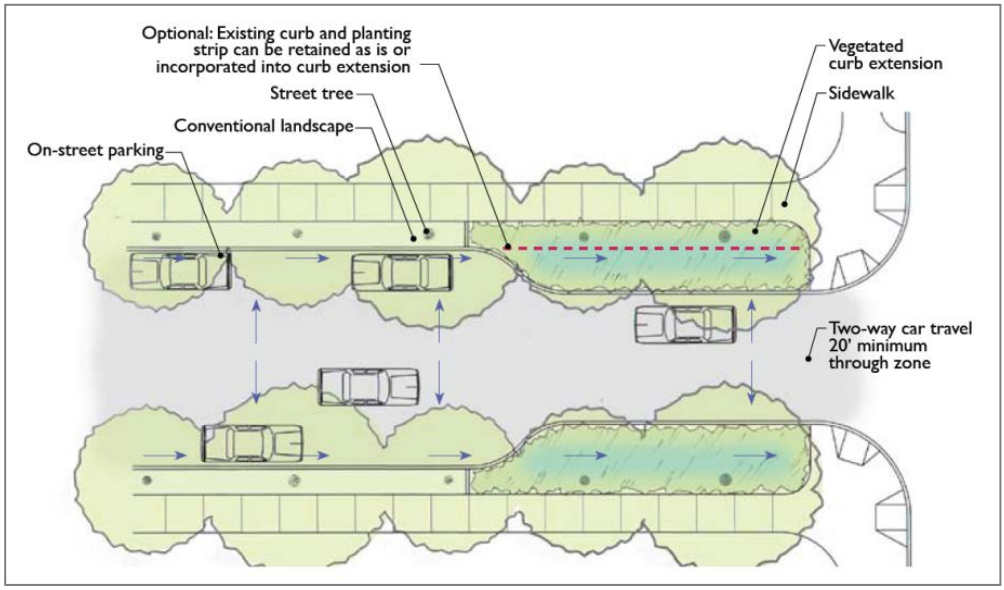
b. Look for opportunities to incorporate site specific bioretention features into specifications and standards.

c. Evaluate street configurations, topography, soil conditions, and space availability for opportunities to incorporate bioretention features.

d. Evaluate existing site utilities for opportunities to incorporate bioretention features as a retrofit.

e. Evaluate and select plants with respect to maintenance requirements and salt tolerance, considering sidewalk interference/buckling and plant height for traffic safety and security. Plants should be selected from the permittee's approved plant list, where one exists.

Green Streets: EPA-833-F-09-002, August 2009, www.epa.gov/greeninfrastructure



Plan View of Typical Bioretention Curb Extension on Residential Street (source: EPA-833-F-09-002, August 2009, www.epa.gov/greeninfrastructure

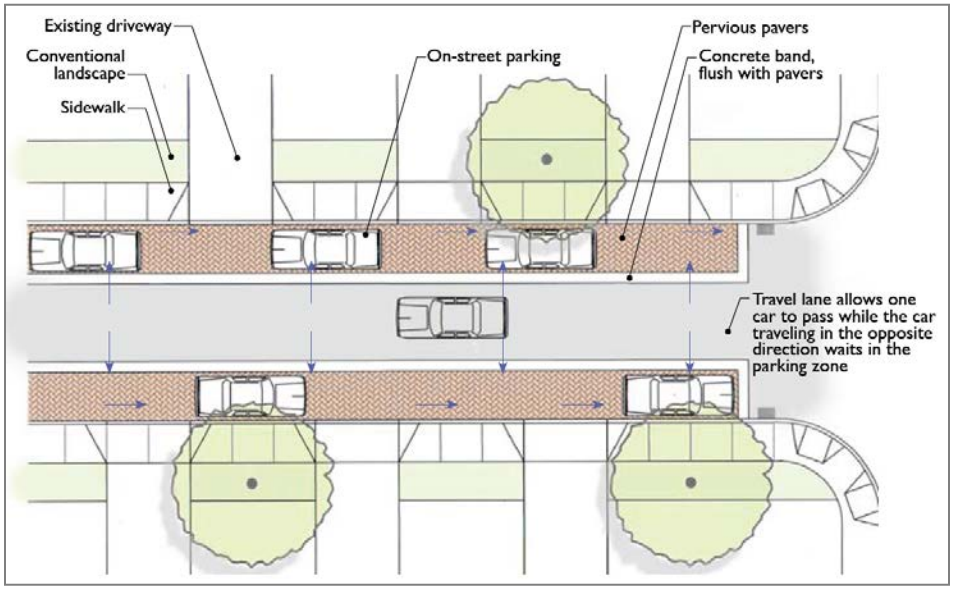
Permeable Pavement

a. Plan site layout with areas for incorporating permeable pavement. See picture and plan view schematic below.

b. Evaluate permeable gutters.

c. Evaluate permeable concrete, permeable asphalt, permeable interlocking concrete pavers, and grid pavers as alternatives to conventional, less pervious concrete and asphalt surfaces.

Green Streets: EPA-833-F-09-002, August 2009, www.epa.gov/greeninfrastructure



Plan View of Typical Permeable Pavement on Residential Street (source: EPA-833-F-09-002, August 2009, www.epa.gov/greeninfrastructure

d. Incorporate an aggregate base to provide structural support, runoff storage, and pollutant removal through filtering and adsorption.

e. In areas with freezing winter conditions, design permeable pavement structures that will always drain and never freeze solid. Make necessary adjustments to snow removal and deicing program implementation, such as adjusting snow plow blade height to prevent scraping the permeable surface, and eliminating the use of sand and other traction fines that will clog the pervious surface.

Sidewalk Trees and Tree Boxes

a. Incorporate tree cover into the site layout. See picture and plan view schematic below.

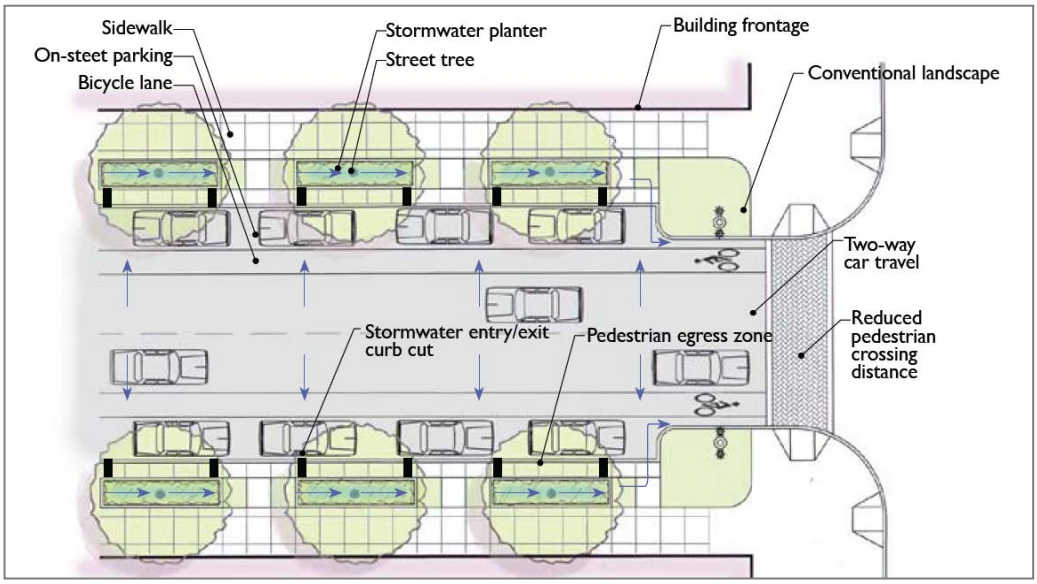
b. Evaluate site opportunities for sidewalk tree features and tree boxes, including catch basin drains or other means of directing surface runoff to them.

c. Provide sufficient uncompacted soil and space for proper tree health and growth via larger tree boxes, structural soils, root paths, or "silva cells" that allow sufficient tree root space.

d. Consider sufficient tree space in the right-of-way while maintaining traffic and pedestrian safety.

e. Evaluate space for trees vs. added construction costs.

Green Streets: EPA-833-F-09-002, August 2009, www.epa.gov/greeninfrastructure



Plan View of Typical Sidewalk Planters and Street Trees on Commercial Street (source: EPA-833-F-09-002, August 2009, www.epa.gov/greeninfrastructure

Infiltration Basins

a. Plan roadway drainage to be directed away from the road surface to infiltration basins. Typical detention or retention basins may be designed as infiltration facilities in some cases, with the ability to store runoff until it gradually exfiltrates through the soil. A 72-hour drawn down is usually recommended.

b. Incorporate infiltration basins, which can have high pollutant removal efficiency and can reduce flows to mimic pre-development hydrologic conditions.

www.casqa.org – Califonia BMP Handbooks

c. Use of infiltration BMPs shall be consistent with the pretreatment of runoff prior to infiltration requirements established by the MS4 Permit for areas subject to high vehicular traffic (25,000 or more average daily traffic).

d. Evaluate appropriate soil conditions for infiltration and site constraints. Groundwater separation should be at least 10 feet from the basin invert to the measured ground water elevation.

e. Evaluate traffic / pedestrian safety and site aesthetics while locating infiltration basins.

f. Reference the county's design criteria for infiltration basins for consistency with these and other design elements. Caltrans also has specific design requirements for infiltration basins in their ROW.

C. Project Specific Conditions/Constraints

The extent to which the BMP techniques described above are applied to a Transportation Project depends on the results of the BMP feasibility analysis completed for each project. All potential BMP techniques described above shall be considered for each project.

Several site conditions and constraints must be considered for implementation of the BMP techniques contained within this guidance. Each project is unique and will have unique conditions and constraints that influence the implementation of the techniques, and affect the feasibility of implementation. These may be internal to the project or may be related to connecting project features to existing sites or to infrastructure within adjoining jurisdictions. Table 3-1 contains example project site constraints to be considered as part of the effort to evaluate the feasibility of implementing the BMP techniques contained within this Guidance (Figure 3-1).

Table 3-1. Potential Project Specific Criteria to Support Evaluation

- Regulatory Requirements
  - TMDL/Impaired Waters requirements
  - Environmentally sensitive areas
  - Receiving Waters
  - CEQA conditions
- Site-specific Characteristics
  - Drainage characteristics
  - Soil characteristics, geologic conditions
  - Elevated groundwater conditions
  - Groundwater protection areas
  - Natural sediment loads
- Infrastructure & Project-specific Characteristics
  - Programmatic or funding restrictions
  - Right of way constraints
  - Existing features (drainage, curb and gutter, grades, etc.)
  - Utility constraints (e.g., pipelines, cables)
  - Availability of irrigation water
  - Availability of power
  - Types of traffic loads
  - Maintenance resources and expertise

D. Feasibility/MEP Analysis of LID Design Principles

The feasibility criteria in Table 3-2 may be considered for Category 3 and 4 Projects. The criteria may be used to demonstrate the maximum extent a BMP can be implemented for a specific project, as well as to determine certain BMP techniques as infeasible.

The following sections identify common Transportation Project elements that should be evaluated as part of the analysis to determine the feasibility of implementing BMPs to the MEP.

Table 3-2. Feasibility Criteria

1. Funding Restrictions / Other Programmatic Restrictions	Programmatic restrictions / constraints (partial infeasibility)
	Programmatic infeasibility (total infeasibility)
a. The BMPs techniques described within this Guidance may be implementable and approvable for a wide variety of Transportation Projects, capital improvement programs, and funding sources; however, some programs or funding sources may place constraints on the nature or type of project features that can be implemented. For example, funding sources for certain safety improvement projects may have strict project / program requirements that only allow funding for select project features. Such constraints may restrict the feasibility of some BMP techniques. b. Other programs may require project features that affect BMP implementation, such as compliance with Americans with Disabilities Act (ADA) requirements. c. Some BMP techniques may be too costly for the scope of the project.	

Table 3-2. Feasibility Criteria

2. Drainage Connectivity and Utilities	Drainage connectivity opportunities / constraints with adjoining sites / jurisdictions
	Utility conflicts
	Proximity to environmentally sensitive areas, drinking water wells, etc.
a. The project may alter previously established drainage patterns. New Transportation Projects and improvements to existing transportation facilities must tie into adjoining drainage features creating opportunities for and potential constraints on implementation of BMP techniques. The drainage characteristics of each project site must be evaluated to determine which BMP techniques will be feasible, and the extent to which such BMPs may be implemented. **b.** Run-on conditions from adjoining properties or existing roadway surfaces will affect how certain BMP techniques can be implemented within a project. Run-on conditions should be determined and analyzed to determine the extent to which they influence BMP selection and implementation. Opportunities for re-directing run-on prior to entering the project site to reduce the hydraulic impact on water quality BMPs should be considered. **c.** Location of existing utilities may reduce the feasibility of certain BMP techniques. **d.** Design and placement of new utilities can provide opportunities for implementation of BMP techniques. New utilities should be considered along with BMP design and placement to maximize implementation opportunities and minimize feasibility constraints.	
3. Street Widths and Parking Requirements	General Plan roadway classification
	Code restrictions on street widths
	Parking requirements / restrictions
a. General Plan roadway classifications and local code requirements may place minimum width restrictions on roads, limiting the amount of impervious surface that can be reduced and the remaining space available for BMP technique implementation. b. Parking area requirements and restrictions may limit the amount of pervious surface that can be reduced and the remaining space available for BMP implementation.	
4. Drainage Swales	Sufficient right-of- way for swale installation
	Sufficient grade / drainage connectivity
	Drainage area size / ability to divert run-on
	Soil characteristics
	Aesthetics
	Vector issues
	ADA compliance
a. Sufficient ROW must be present for proper swale installation. Proper grade and drainage connectivity must be available to provide for broader, shallower flows while tying into existing local drainage. b. The size of the project's drainage area, amount of site run-on, and ability to redirect the run-on will affect the size and feasibility of drainage swales. c. Vegetated drainage swales require healthy vegetation for proper functionality. Irrigation water and power must be available for maintaining proper vegetative growth during dry periods. Using non-native vegetation may increase maintenance costs and resource requirements, which may affect feasibility of implementation. d. Soil characteristics should allow for infiltration. e. Aesthetic goals and vector control requirements may necessitate specific swale features or affect the feasibility of their implementation.	

Table 3-2. Feasibility Criteria

5. Bioretention Curb Extensions and Sidewalk Planters	Sufficient right of way for installation
	Drainage connectivity
	Safety protection
	Plant maintenance suitability / feasibility, including irrigation availability
a. Sufficient ROW must be present for using the median for bioretention or including bioretention curb extension or sidewalk planters within a Transportation Project, including ADA requirements. **b.** Bioretention features must tie into existing drainage conditions. **c.** Traffic and pedestrian safety and site aesthetics may affect the feasibility of the use of medians for bioretention or the feasibility of identifying locations for installation of curb extensions or sidewalk planters. **d.** Irrigation water and power must be available for proper plant maintenance. Using native vegetation vs. non-native may reduce the need for maintenance, improving feasibility.	
6. Permeable Pavement	Traffic suitability, including projected traffic index/structural section to accommodate traffic loading requirements
	Parking surfaces present
	Soils characteristics
e. Permeable pavement can be an effective BMP technique in selected low speed areas, e.g., entrance/exits to parking lots, or parking areas (e.g., dedicated areas or along existing streets) applications, but is not considered suitable for most city and county Transportation Projects. f. Permeable pavement is not suitable for transportation surfaces with high traffic or that may bear a heavy load. g. Using permeable pavement for parking surfaces may be feasible unless soil characteristics will not support infiltration or drainage conditions affect functionality. h. Specialized maintenance is necessary for permeable pavements to maintain the intended infiltration capacity. The ability for a public agency to provide resources (funding, labor, and equipment) for proper maintenance of permeable surfaces will affect feasibility.	
7. Sidewalk Trees and Tree Boxes	Sufficient ROW for installation
	Sufficient space to prevent sidewalk buckling or for root barriers
	Safety protection
a. Sufficient ROW within the Transportation Project site must be present for implementation of this BMP technique. b. Irrigation water and power must be available for proper tree maintenance. Using native vs. non-native trees may reduce the need for maintenance, improving feasibility. c. Traffic and pedestrian safety and site aesthetics may affect locating sidewalk trees or tree boxes and their feasibility.	
8. Maintenance Requirements	Maintenance funding availability
	Maintenance expertise / equipment availability
a. Every BMP technique described in this Guidance requires maintenance to help ensure long term effectiveness. The feasibility of any BMP technique will depend upon the level of maintenance resources available in the long term. b. The feasibility of BMP techniques will depend on the level of expertise necessary to maintain the BMPs. Project owners and operators must have the expertise and equipment necessary to maintain all aspects of the BMP techniques selected for a project, or have the resources to contract for the maintenance. c. Several BMP techniques may require another public agency or department for proper maintenance. For example, maintenance of vegetated BMPs may fall within a local landscape maintenance program. As such, the resources, equipment, expertise available from other agencies may affect BMP feasibility. d. Several BMP techniques may require consideration of existing source control programs, e.g., catch-basin cleaning or street sweeping. The local LIP should be consulted for applicable source control requirements.	

Section 4 - Source Control BMPs

Each Category 3 or 4 Project must evaluate and incorporate applicable Source Control BMPs into project planning to control pollutants after project construction is complete and the project is put into its intended service.

Table 4-1 identifies the recommended Source Control BMPs applicable to Category 3 or 4 Projects. Structural and Non-Structural Source Control BMPs may be applicable.

The agency responsible for implementing and maintaining the applicable Source Control BMPs should be identified and documented. In addition, it is recommended that the project proponent review the Source Control BMPs identified within the LIP of the jurisdiction within which the project is planned to determine if any additional Source Control BMPs may apply to the project.

Table 4-1. Potential Source Control BMPs for Transportation Projects

Recommended Source Control BMPs
Category 3 or 4 Projects
Non-Structural Source Control BMPs
▪ Landscape Management ▪ BMP Maintenance ▪ Litter Control ▪ Sweeping of Road Surfaces Adjoining Curb and Gutter ▪ Other Non-structural Measures for Public Agency Projects ▪ Drainage Facility Inspection and Maintenance
Structural Source Control BMPs
▪ Provide Storm Drain System Stenciling and Signage ▪ Use Efficient Irrigation Systems & Landscape Design, Water Conservation, Smart Controllers, and Source Control ▪ Finished Grade of Landscaped Areas ▪ Protect Slopes and Channels ▪ Site Design and Landscape Planning (Hillside Landscaping)

Section 5 - Other Programmatic Elements

A. Project Documentation

For Category 1 and 2 projects (Emergency and Maintenance Projects, respectively), the project development file should contain documentation showing that this Guidance and the implementation of LID-based BMP practices did not apply.

All Category 3 and 4 projects require supplemental documentation in the project development file that includes the following:

- Project category and type;
- Site constraints;
- Project feasibility analysis findings; and
- LID-based BMPs incorporated into the project.

Where a Category 3 or 4 Project meets the Criteria for Project Coverage, and an evaluation of the feasibility of incorporating the LID BMP techniques described within this Guidance has been performed, the type and extent of the BMP techniques determined feasible will be incorporated into project plans and documented within the development files associated with the project. Permittee MS4 staff responsible for assuring compliance with MS4 Permit requirements will evaluate the applicability and feasibility determination made by project proponents for each project. Where appropriate, these staff may require additional information to demonstrate compliance with this guidance in order for acceptance and permitting. Appendix B includes a template for documenting the project specific analysis for Category 3 and 4 projects.

If the funding source of a Category 3 or 4 Project has requirements that affect what project features and/or BMPs may be incorporated or implemented, such as block grant funding, the funding requirements may be used in determining the feasibility of BMPs. Funding requirements affecting BMP implementation must be documented to demonstrate how the requirements affect the feasibility determinations within the Transportation Project BMP Template, or similar documentation, and must be included within the project file.

A project proponent may document the proposed BMP techniques via the Transportation Project BMP Template (See attached) to the proposed project plans, such as contract documents or specifications, or directly within the project plans as plan notes. Project plans and file documentation will show or describe the types, sizes, and locations of BMP techniques proposed for each proposed project. The Permittee will maintain the documentation along with all other information required for approval and permitting the proposed project within the project files.

B. Compliance with Other Permit Requirements

Other regulations and requirements are applicable to public street, road, highway, and freeway projects, for example, 404 Permit/401 Certification requirements, and NPDES General Construction Permit requirements. Other permit conditions may require additional or more (or less) stringent BMP implementation. Compliance with this Guidance does not supplant all conditions associated with other permits and programs. In cases where other requirements are similar but not prescriptive nor specific, they do not automatically overrule a feasibility evaluation performed using this Guidance. In such cases, the feasibility evaluation performed using this Guidance shall be considered the most thorough evaluation also meeting the intent of the other similar requirements.

Projects that have completed design phases but have not been constructed (shelved projects) do not have to be redesigned to incorporate the requirements of this guidance as long as they have satisfied CEQA approval at the time of design.

C. Project BMP Credits

Concepts for earning and applying BMP credits from one Transportation project to another may be developed by each Permittee. Reference local program implementation plan documentation for program availability and the process for applying project BMP credits.

D. Other Considerations

This Guidance has been developed to assist project proponents and Permittee staff with implementing the public street, road, highway, and freeway BMP requirements within the MS4 Permit. Project proponents or Permittees wishing to go beyond MEP requirements to develop "demonstration projects" for stormwater quality design may do so, as long as the MEP requirements for each BMP technique are met. Such demonstration projects would be developed under a different, more expansive determination of feasibility not considered to be the standard applicable to conventional Transportation projects.

A. Glossary

B. Transportation Project BMP Template

A. Glossary

Adjacent – Proposed project sites (or land parcels) or jurisdictions that share a common border. For example, a parcel slated for new development or significant redevelopment that has a common border with an existing road ROW that will be modified as a result of the development project.

Best Management Practice (BMP) – Defined in 40 CFR 122.2 as schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of Waters of the U.S. BMPs also include treatment requirements, operating procedures and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. In the case of MS4 permits, BMPs are typically used in place of numeric effluent limits.

Bioretention - BMP that functions as a soil and plant-based filtration device that removes pollutants through a variety of physical, biological, and chemical treatment processes. These facilities normally consist of a grass buffer strip, sand bed, ponding area, organic layer or mulch layer, planting soil, and plants. The runoff's velocity is reduced by passing over or through buffer strip and subsequently distributed evenly along a ponding area. Exfiltration of the stored water in the bioretention area planting soil into the underlying soils occurs over a period of days.

California Environmental Quality Act (CEQA) Approval – Formal approval of a proposed project under CEQA (California environmental legislation that establishes procedures for conducting an environmental analysis for all projects in California [California Public Resources Code, Section 21000, et. seq.]).

Curb Cuts – Curb openings that allow street runoff to enter landscaped areas, vegetated swales, planters, rain gardens and other BMP features.

Curb Extension - Landscaped areas within the parking zone of a street that capture urban runoff. Curb extensions are enclosed by a curb on the street side, which has openings, called "curb cuts," that allow street runoff to enter and exit the facility. Extending into the street from the curb narrows the road width which also increases pedestrian safety and helps calm traffic. A curb extension allows water to flow into a landscaped area that may include vegetated swales, planters, or rain gardens.

Drainage Swale - Open channels designed to accept sheet flow runoff and convey it in broad shallow flow. The intent of swales is to reduce stormwater volume through infiltration, improve water quality through vegetative or soil filtration, and reduce flow velocity by increasing channel roughness.

Emergency - Any sudden, unexpected occurrence, involving a clear and imminent danger, demanding immediate action to prevent or mitigate loss of, or damage to, life, health, property, or essential public services. "Emergency" includes such occurrences as fire, flood, earthquake, or other soil or geologic movements, as well as such occurrences as riot, accident, or sabotage.

Existing Road Project – Proposed redevelopment street/road project that will modify or redevelop an existing transportation surface in a manner that increases the surface footprint or impervious area of the roadway.

Freeway – A divided arterial highway with full control of access and with grade separations at intersections.

General Plan - Blueprints for jurisdictions in the San Bernardino County MS4 Permit area that describe the future growth and development planned within the area over the long term. The General Plan acts as

a constitution for both public and private development, the foundation upon which local leaders make growth and use related decisions. The General Plan is meant to express goals with respect to both human-made and natural environments and sets forth the policies and implementation measures to achieve them for the welfare of those who live, work, and do business in the area.

Grade Separation - A crossing of two highways or a highway and a railroad at different levels.

Highway, Street, or Road – A general term denoting a public way for the transportation of people, materials, goods, and services but primarily for vehicular travel.

Horizontal Alignment Correction – A road project designed to increase the sight distance for drivers that does not change existing road capacity.

Hydrologic Conditions of Concern (HCOC) - Condition when a proposed hydrologic change is deemed to have the potential to cause significant impacts on downstream channels and aquatic habitats, alone or in conjunction with impacts of other projects.

Impervious - Any surface in the landscape that cannot effectively absorb or infiltrate rainfall; for example, sidewalks, rooftops, roads, and parking lots.

Local Implementation Plan (LIP) - Document describing an individual Permittee's implementation procedures for compliance with the MS4 Permit, including ordinances, databases, plans, and reporting materials.

Low Impact Development (LID) – A stormwater management and land development strategy that combines a hydrologically functional site design with pollution prevention measures to compensate for land development impacts on hydrology and water quality. LID techniques mimic the site predevelopment site hydrology by using site design techniques that store, infiltrate, evapotranspire, bio-filter or detain runoff close to its source.

Maximum Extent Practicable (MEP) – Is not defined in the CWA; it refers to management practices, control techniques, and system design and engineering methods for the control of pollutants taking into account considerations of synergistic, additive, and competing factors, including, but not limited to pollutant removal effectiveness, regulatory compliance, gravity of the problem, public acceptance, social benefits, cost and technological feasibility. MEP is the technology-based standard established by Congress in CWA section 402(p)(3)(B)(iii) that operators of MS4s must meet. Technology-based standards establish the level of pollutant reductions that dischargers must achieve, typically by treatment or by a combination of source control and treatment control BMPs. MEP generally emphasizes pollution prevention and source control BMPs primarily (as the first line of defense) in combination with treatment methods serving as a backup (additional line of defense). MEP considers economics and is generally, but not necessarily, less stringent than BAT. A definition for MEP is not provided either in the statute or in the regulations. Instead, the definition of MEP is dynamic and will be defined by the following process over time: municipalities propose their definition of MEP by way of their urban runoff management programs. Their total collective and individual activities conducted pursuant to the urban runoff management programs becomes their proposal for MEP as it applies both to their overall effort, as well as to specific activities (e.g., MEP for street sweeping, or MEP for MS4 maintenance). In the absence of a proposal acceptable to the Regional Board, the Regional Board defines MEP.

MS4 Permit – National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for the San Bernardino County Flood Control District, San Bernardino County, and the

incorporated Cities of San Bernardino County within the Santa Ana Region (Order No. R8-2010-0036, NPDES Permit No. CAS618036).

New Development – Categories of development identified in Section XI.D of the MS4 Permit. "New Development" does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of a facility, nor does it include emergency required to protect public health and safety.

New Street/Road Project – Proposed street/road project that will establish a new highway, street, or road, rather than modify an existing road.

Non-Adjacent – Proposed project sites (or land parcels) that do not share a common border. For example, a parcel slated for new development or significant redevelopment that does not share a common border with an existing road that will be improved as a result of the development project.

Overlay – An overlay is a layer, usually hot mix asphalt, placed on existing flexible or rigid pavement to restore ride quality, to increase structural strength (load carrying capacity), and to extend the service life.

Pervious – Surface or area that is not impervious (see definition for "impervious").

Pollutant – Any agent that may cause or contribute to the degradation of water quality such that a condition of pollution or contamination is created or aggravated. It includes any type of industrial, municipal, and agricultural waste discharged into water. The term "pollutant" is defined in section 502(6) of the Clean Water Act as follows: "The term 'pollutant' means dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water." It has also been interpreted to include water characteristics such as toxicity or acidity.

Pollutants of Concern - A list of potential pollutants to be analyzed for in the Monitoring and Reporting Program. This list shall include: TSS, total inorganic nitrogen, total phosphorus, soluble reactive phosphorus, acute toxicity, fecal coliform, total coliform, pH, and chemicals/potential pollutants expected to be present on the project site. In developing this list, consideration should be given to the chemicals and potential pollutants available for stormwater to pick-up or transport to receiving waters, all Pollutants for which a waterbody within the permit area that has been listed as impaired under CWA Section 303(d), the category of development and the type of pollutants associated with that development category. It also refers to pollutants for which water bodies are listed as impaired under CWA section 303(d), pollutants associated with the land use type of a development, and/or pollutants commonly associated with urban runoff. pollutants commonly associated with urban runoff include total suspended solids; sediment; pathogens (e.g., bacteria, viruses, protozoa); heavy metals (e.g., copper, lead, zinc, and cadmium); petroleum products and polynuclear aromatic hydrocarbons; synthetic organics (e.g., pesticides, herbicides, and PCBs); nutrients (e.g., nitrogen and phosphorus fertilizers); oxygen-demanding substances (decaying vegetation, animal waste, and anthropogenic litter).

Preventive Maintenance - A planned treatment on a road in good condition that is intended to preserve the system retard future deterioration, prolong service life, and delay the need for rehabilitation.

Project Proponent – The agency or jurisdiction responsible for the management and maintenance of the Transportation project following its completion.

Receiving Water – Waters of the U.S. (as defined by the MS4 Permit) within the area under the jurisdiction of the MS4 Permit.

Reverse Parkway Drain – A design feature that allows for street runoff to enter a parkway, rather than conventionally draining a parkway area into the street. For example, curb cuts that allow street drainage into the parkway where vegetated BMPs may be implemented.

Right-of-Way (ROW) - A general term denoting land, property, or interest therein (usually in a strip) acquired for or devoted to transportation purposes.

Road – see "Highway, Street, or Road"

Routine Street/Road Maintenance – Maintenance work that is planned and performed on a regular basis to maintain and preserve the condition of the highway system or to respond to specific conditions and events that restore the highway system to an adequate level of service.

Shoulder - The paved or unpaved portion of the roadway contiguous with the traveled way for accommodating stopped vehicles, for emergency use, and for lateral support of base and surface courses.

Significant Redevelopment – The addition or creation of 5,000, or more, square feet of impervious surface on an existing developed site. This includes, but is not limited to, construction of additional buildings and/or structures, extension of the existing footprint of a building, construction of impervious or compacted soil parking lots. Significant Redevelopment does not include routine maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, the original purpose of the constructed facility or emergency actions required to protect public health and safety

Street – see "Highway, Street, or Road"

Surface Footprint – The area of an existing road that is part of the active transportation surface.

Transportation Projects – Public streets, roads, highways or freeway improvements within the area under the jurisdiction of the MS4 Permit used for transportation of automobiles, trucks, motorcycles, and other vehicles; excludes routine road maintenance activities where the surface footprint is not increased.

Turn Pocket – Addition of impervious surface at an existing roadway intersection for the purpose of facilitating right or left turns.

Water Quality Management Plan (WQMP) – A plan developed to mitigate the impacts of urban runoff from new development and significant redevelopment projects - requirements contained within Section XI.D of the MS4 Permit.

B. Transportation Project BMP Template

Transportation Project BMP Template
San Bernardino County Municipal Stormwater Management Program

The federal Clean Water Act establishes requirements for the discharge of urban runoff from Municipal Separate Storm Sewer Systems (MS4) under the National Pollutant Discharge Elimination System (NPDES) program. On January 29, 2010, the Santa Ana Regional Water Quality Control Board (RWQCB) issued Permit Order No. R8-2010-0036 ("MS4 Permit") to authorize the discharge of urban runoff from MS4 facilities in San Bernardino County within the Santa Ana River watershed.

The MS4 Permit requires development of a standard design and post-development Best Management Practices (BMP) guidance to guide application of Low Impact Development (LID) BMPs to the maximum extent practicable (MEP) on public street, road, highway, and freeway improvement projects to reduce the discharge of pollutants to receiving waters. The San Bernardino County MS4 Permittees have prepared the Transportation Projects Guidance (Guidance) to provide guidance to city engineers, planners, MS4 program staff, and Transportation project proponents on how to address the permit requirements within their jurisdictions. The guidance is largely based upon public street, road, highway, and freeway BMP techniques contained within USEPA's Municipal Handbook *Managing Wet Weather with Green Infrastructure: Green Streets*.

This template was prepared to provide a tool for project proponents to (1) determine the applicability of the Guidance to a proposed Transportation Project; (2) provide a process for evaluating the feasibility of using LID-based techniques in the proposed project; and (3) establish a template for documenting the project evaluation process and the decisions made regarding the feasibility to incorporate LID-based BMPs into the design of the project.

This Transportation Project BMP Template has been prepared to assist the Permittees with documenting the incorporation of LID BMPs into public street, road, highway, and freeway projects consistent with the following criteria:

- Residential Street Projects
  Residential street projects comprising an entire block length, intersection to intersection, with a minimum length of ¼ mile.

- City Street / Road Projects
  City street / road arterial projects (single or multi-lane) extending from arterial intersection to arterial intersection, with a minimum length of ½ mile.

- Highways / Freeways
  Highway / freeway projects with a minimum length of 1 mile. Local grade separation projects that are part of a highway / freeway project with a minimum length of 1 mile.

If the Guidance applies to the proposed project, this template should be used to evaluate the feasibility of incorporating LID-based BMPs into the project design. Figure 1-1 illustrates the process for completing the template.

DRAFT

San Bernardino County

Santa Ana Region MS4 Permit Program

Template for
Low Impact Development:
Guidance and Standards for Transportation Projects

Insert Project Name

Insert Project Address

Insert Project City, State, ZIP

Prepared for/by:

Insert Owner/Developer Name

Insert Address

Insert City, State, ZIP

Insert Telephone

Prepared by (if prepared by Consultant):

Insert Consulting/Engineering Firm Name

Insert Address

Insert City, State, ZIP

Insert Telephone

Project Certification

This report has been completed in compliance with the *Low Impact Development: Guidance and Standards for Transportation Projects*, prepared to comply with the Santa Ana Region MS4 Permit requirements applicable to Transportation Projects. The signatory of this document attests to the technical information contained herein and the date upon which recommendations, conclusions, and decisions have been based. I find this report to be complete, current, and accurate:

Name: _____

Title: _____

Agency: _____

Date: _____

Section 1: Introduction

Overview

The federal Clean Water Act (CWA) establishes requirements for the discharge of urban runoff from Municipal Separate Storm Sewer Systems (MS4) under the National Pollutant Discharge Elimination System (NPDES) program. On January 29, 2010, the Santa Ana Regional Water Quality Control Board (RWQCB) issued Permit Order No. R8-2010-0036 ("MS4 Permit") to authorize the discharge of urban runoff from MS4 facilities in San Bernardino County within the Santa Ana Region MS4 Permit area.

The MS4 Permit requires development of a standard design and post-development Best Management Practices (BMP) guidance to guide application of Low Impact Development (LID) BMPs to the maximum extent practicable (MEP) on streets, roads, highways or freeways under the jurisdiction of the Permittees used for transportation of automobiles, trucks, motorcycles, and other vehicles. To provide consistency within the Santa Ana River Watershed, this Guidance attempts to mirror much of the *Low Impact Development: Guidance and Standards for Transportation Projects* documents previously prepared by Riverside County's stormwater program and approved by the RWQCB. This Transportation Guidance provides direction to Transportation Project owners and operators regarding how to address MS4 Permit requirements for public works Transportation Projects within the MS4 Permit jurisdiction.

The LID-based BMP techniques contained within this document are based on information provided by a variety of sources, including the *Design Handbook for Low Impact Development Best Management Practices* prepared by the Riverside County Flood Control and Water Conservation District, USEPA's Municipal Handbook, *Managing Wet Weather with Green Infrastructure: Green Streets*, and the *Low Impact Development Manual for Southern California* prepared for the Southern California Stormwater Monitoring Coalition, in cooperation with the State Water Resources Control Board, by the Low Impact Development Center. This Guidance also provides links and references to other sources of information regarding the application of LID-based BMPs to Transportation Projects (Section 6). This referenced material should be used by the project owner/operator as appropriate to support the use of this template during the project design phase.

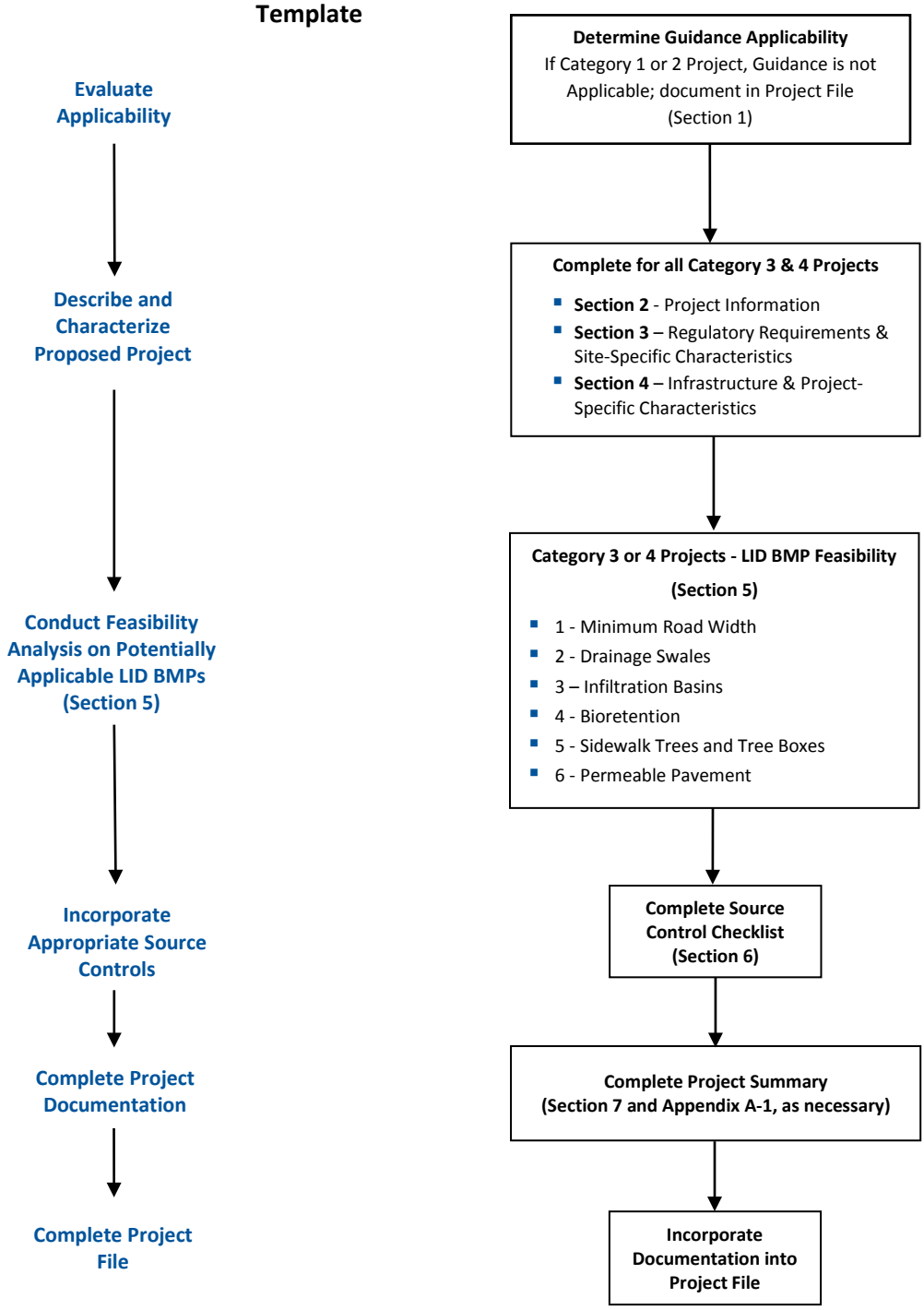
This template was prepared to provide a tool for project proponents to (1) determine the applicability of the Guidance to a proposed Transportation Project; (2) provide a process for evaluating the feasibility of using LID-based techniques in the proposed project; and (3) establish a template for documenting the project evaluation process and the decisions made regarding the feasibility to incorporate LID-based BMPs into the design of the project. Users should review the Guidance before applying this template to a proposed project.

Guidance Applicability

The Transportation Project BMP Template provides a framework for the documentation of the feasibility and scope of both LID and treatment BMP implementation. Table 1.1 summarizes the applicability of the Guidance to Transportation Projects. If the Guidance applies to the proposed project, this Template should be used to evaluate the feasibility of incorporating LID-based BMPs into the project design. Figure 1-1 illustrates the process for completing the template. Data gathered during completion of the feasibility analysis (Sections 5 and 6) are entered into Table 7.1. Appendix A-1 is used only for those BMPs designated as feasible in Table 7.1. Full documentation of infeasibility and BMP sizing is required for submittal and approval by the approving jurisdiction.

Table 1.1. Transportation Project Guidance Applicability
The Transportation Project Guidance applies to the following projects: • Public Transportation Projects in the area covered by the Santa Ana Region MS4 Permit, which involve the construction of new transportation surfaces or the improvement of existing transportation surfaces.
The Transportation Project Guidance does not apply to the following projects that are either exempt or covered by other MS4 Permit requirements: • Transportation Projects that have received CEQA approval by the effective date of this Guidance • Emergency Projects, as defined by this Guidance (see Section 2 of the Guidance) • Maintenance Projects, as defined by this Guidance (see Section 2 of the Guidance) • Dirt or gravel roads • Transportation Projects that are part of a private new development or significant redevelopment project and required to prepare a Water Quality Management Plan (WQMP) • Transportation Projects subject to other MS4 Permit requirements, e.g., California Transportation Department (Caltrans) oversight projects, cooperative projects with an adjoining County or an agency outside the jurisdiction covered by the Santa Ana Region MS4 Permit

Figure 1-1. Process to Complete Transportation Project BMP Template



Section 2: Project Information

The purpose of this section is to provide general project information and a description of the proposed project. The description should have sufficient detail to identify the project location, project boundaries and size, and, if classified as a Category 3 Project, the basis for the subcategorization (Capacity vs. Non-Capacity Roadway Improvement Project).

Table 2.1 - Project Characteristics						
Project Name						
Project Owner/Operator (Agency)						
Project Contact Name:						
Mailing Address:		E-mail Address:		Telephone:		
Project Category	Check the box for the applicable Project Category *(See Table 2-1 in Guidance)* ☐ Category 3 – Existing Transportation Project ☐ Category 4 – New Transportation Project					
Check the appropriate boxes below, based on the Project Category checked above						
Category 3	☐ Roadway Capacity Improvement Project	☐ Lane additions ☐ Bridge project ☐ Grade separation project ☐ Other project type				
	☐ Non-Capacity Roadway Improvement Project	☐ Shoulder improvements ☐ Parking lane improvements ☐ Turn pocket addition ☐ Signal project that adds a turn lane ☐ Horizontal alignment correction (improve sight distance) ☐ Grade separation project ☐ Passing lane addition ☐ Turn out addition ☐ Other project type				
Category 4	☐ New road project ☐ New bridge project					
Project Schedule:						

Table 2.2 - Project Description					
General Project Description:					
Project Area (ft^2):		Project Length (ft):		Coordinates of the approximate center of the project:	Latitude: Longitude:
For Category 3 & 4 projects, complete the information below.					
Describe how the existing surface footprint will be modified, if applicable					
Describe how the capacity of the existing transportation surface (if any) will be improved					

Section 3: Regulatory Requirements & Site-Specific Chararacteristics

Describe the regulatory requirements and site-specific characteristics associated with the project site that can influence the selection of LID-based BMPs. Attach supporting information, as needed.

Table 3.1 – Regulatory Requirements & Site-Specific Characteristics	
Regulatory Requirements	
Consult Local Implementation Plan(s) to document pollutants of concern based on impaired waters listings or TMDL implementation requirements. *Go to: http://permitrack.sbcounty.gov/wap/*	
Document any known CEQA conditions, Multi-Species Habitat Conservation Plan, California Fish & Game Code Section 1600, CWA Section 401, or CWA Section 404 requirements. *Go to: http://permitrack.sbcounty.gov/wap/*	
Site-Specific Characteristics	
Drainage Area (ft^2)	
Existing Site Impervious Area (ft^2)	
Expected Post-Project Impervious Area (ft^2)	
Hydrologic Soil Group* *Describe hydrologic soil group and associated infiltration characteristics, if known* *Go to: http://permitrack.sbcounty.gov/wap/*	
Expected Infiltration Characteristics *Describe known infiltration characteristics based on soil group or soil test data (attach if such data are available)*	
Natural Sediment Load Characteristics *Describe local sediment characteristics that could impact selection or functionality of BMPs*	
Depth to Groundwater *Determine depth to groundwater, if known (provide source of information)* *Go to: http://permitrack.sbcounty.gov/wap/*	

* See soils section of the Flood Control District's Hydrology Manual
http://www.sbcounty.gov/dpw/floodcontrol/pdf/HydrologyManual.pdf

Section 4: Infrastructure & Project-Specific Characteristics

Describe the existing infrastructure and project-specific characteristics associated with the project site that can influence the selection of LID-based BMPs. Attach supporting information, as needed; insert N/A for any element that is not applicable to the proposed project.

Table 4.1 - Infrastructure & Project-Specific Characteristics	
Programmatic & Funding Restrictions	
Project Funding *Provide information regarding project funding*	Project Budget:
	Funding Source:
	Are there any limitations or restrictions on the use of dedicated funds: ☐ No ☐ Yes; if this box checked, explain limitations
Programmatic Constraints *Identify any programmatic or regulatory constraints, e.g., Americans with Disabilities Act; need for emergency access, etc.*	Does the project require compliance with other programmatic, regulatory, or code requirements that may affect application of BMPs? ☐ No ☐ Yes; if this box checked, explain limitations
Impaired Waters & TMDL Requirements	
Regulatory Constraints *Describe applicable BMP specific requirements to address impaired water related concerns*	Identify the MS4 Local Implementation Plan(s) consulted: Does the applicable LIP(s) identify any BMP requirements that need to be implemented in the project area: ☐ No ☐ Yes; describe the BMP requirements and how they have been addressed in the project design:
Right-of-Way (ROW)	
ROW Constraints *Describe potential ROW constraints to BMP implementation*	

Table 4.1 - Infrastructure & Project-Specific Characteristics	
Drainage Connectivity	
Connectivity Constraints *Based on drainage features of the project site, describe potential constraints to BMP implementation*	
Utilities	
Utility Constraints *Identify any utility-related constraints*	Does the project have any utility constraints that that may affect application of BMPs? ☐ No ☐ Yes; if this box checked, explain constraints
Resource Availability	
Irrigation Water *Describe availability of irrigation water to support BMPs that require establishment of landscaping*	
Power *Describe availability of power to support use of an irrigation system*	
Estimated Road Use	
Vehicle Load *Describe the expected vehicle loads, e.g., H-20 truck loads, that will use the transportation surface after project completion*	
Maximum Allowable Speed (MAS) *Describe expected speed of vehicles on completed transportation surface; if variable, provide the MAS for different project elements*	
Roadside Parking Requirements *Describe any minimum requirements associated with design of roadside parking areas*	
Capacity Design (Average Daily Traffic, ADT). Is the ADT ≥ 25,000?	☐ Yes ☐ No

Section 5: BMP Feasibility Analysis

Section 5.1 - Overview

Projects categorized as a Category 3 or Category 4 shall incorporate the following site design BMP principles to the maximum extent feasible:

Conservation of natural areas to the extent feasible

Minimization of the impervious footprint

Minimization of disturbances to natural drainage

Design and construction of pervious areas to receive runoff from impervious areas

Use of landscaping that minimizes irrigation and runoff, promotes surface infiltration, and minimizes the use of pesticides and fertilizers

The extent to which these design principles may be incorporated into a project through the use of BMP techniques depends on the project type and the project-specific feasibility analysis. This section provides a stepwise approach for evaluating the feasibility to incorporate LID-based BMPs into a proposed project. Table 5.1 identifies the BMPs required for evaluation in relation to the project category or type. Based on the box checked the project reviewer is directed to the appropriate table for subsequent analyses. Table 5.2 provides sources for BMP planning and design information that may be considered for use in Transportation Projects. Table 5.3 provides a checklist for LID BMP feasibility analysis for Category 3 or 4 projects.

Section 5.2 – BMP References

To support completion of the feasibility analyses for each LID-based BMP in Table 5.3, Table 5.2 provides sources for BMP design information that may be considered for use in Transportation Projects. These information sources are intended to guide decision-making with regards to making feasibility determinations about the efficacy of incorporating LID-based BMPs in the project design. Additional general information regarding the use of LID-based BMPs in Transportation Projects may be found in Section 6.C of the Guidance.

The resource information provided in Table 5.2 does not represent an exhaustive list of source material regarding LIP-based BMPs; in fact, new information regarding how to design LID-based BMPs is regularly published. In addition, this information is not to be used as a substitute for development of engineering designs appropriate to the project site.

Table 5.1 - LID BMP Evaluation Requirements
These LID BMPs must be included in the feasibility analysis
▪ 1 - Minimum Road Width ▪ 2 - Drainage Swales ▪ 3 – Infiltration Basins ▪ 4 - Bioretention ▪ 5 - Sidewalk Trees and Tree Boxes ▪ 6 - Permeable Pavement

Table 5.2 – BMP Design Information

LID-based BMP Information Source	Minimum Street Width[3]	Drainage Swales	Infiltration Basins	Bioretention	Sidewalk Trees & Tree Boxes	Permeable Pavement
Riverside County Flood Control and Water Conservation District Design Handbook for Low Impact Development Management Practices http://rcflood.org/NPDES/LIDBMP.aspx	--	--	Section 3.1	Section 3.5	Section 3.5, p. 5[1]	Section 3.3
Low Impact Development Manual for Southern California: Technical Guidance and Site Planning Strategies http://www.casqa.org/LID/SoCalLID/tabid/218/Default.aspx	--	pp. 137-138	--	pp. 68-84	p. 71[1]	pp. 83-113
U. S. EPA Municipal Handbook: Green Streets, Managing Wet Weather with Green Infrastructure[2] http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_munichandbook_green_streets.pdf	pp. 2-4[3]	--	--	--	--	--
County of San Diego, Low Impact Development Handbook: Stormwater Management Strategies http://www.sdcounty.ca.gov/dplu/docs/LID-Handbook.pdf (General Information) http://www.sdcounty.ca.gov/dplu/docs/LID-Appendices.pdf (Fact Sheets)	Fact Sheet 14, 15[3]	--	--	Fact Sheets 15, 19	--	pp. 46-51, Fact Sheets 8, 9, 10
County of Los Angeles Low Impact Development Standards Manual. January 2009. http://dpw.lacounty.gov/wmd/LA_County_LID_Manual.pdf	--	--	--	--	pp. 49-52[1]	pp. 53-57
City of Santa Barbara Storm Water BMP Guidance Manual http://www.santabarbaraca.gov/Resident/Community/Creeks/Storm_Water_Management_Program.htm	--	Section 6.6.2	--	Section 6.6.1	Section 6.9.2[1]	Section 6.8
Caltrans Treatment Control BMP Technology Report http://www.dot.ca.gov/hq/env/stormwater/annual_report/2008/annual_report_06-07/attachments/Treatment_BMP_Technology_Rprt.pdf	--	p. D-5	--	pp. B-11 – B-12	pp. B-7 – B-10	--
Evaluation of Best Management Practices for Highway Runoff Control: *Low Impact Development Design Manual for Highway Runoff Control* http://www.coralreef.gov/transportation/evalbmp.pdf	--	Section 14	--	Section 5	--	Section 10

[1] Information focuses on design of planter boxes
[2] Handbook provides information on all LID types except Infiltration Basins, but information is general in nature
[3] Shall follow approving agency's street width standards.

Table 5.3 – LID BMP Feasibility Analysis Category 1 – Minimum Road Widths	
1.a - Does the project need to meet jurisdictional code or General Plan requirements for minimum road widths?	☐ No ☐ Yes; if checked, describe requirements
1.b – Based on the findings of 1.a., determine if this BMP can be applied to the project. If applicable, describe how it was incorporated into the project design.	☐ Applicable, describe design features incorporating this BMP; include in Table 7.1 ☐ Not Applicable, describe basis for decision (e.g., project requirements, traffic or pedestrian safety concerns)

Table 5.3 – LID BMP Feasibility Analysis Category 2 – Drainage Swales	
2.a – Are there any programmatic constraints that prevent the use of this BMP, *e.g., Americans with Disabilities Act; need for emergency access, funding restrictions, etc.? See Section 3.b of the Guidance.*	☐ Yes; if checked, provide basis for finding and STOP; this BMP is infeasible ☐ No; BMP is potentially feasible, continue to 2.b
2.b - Considering grade and need for drainage connectivity, is there sufficient ROW for proper swale installation?	☐ Yes ☐ No; if checked, provide basis for finding
2.c - Can drainage swales be sized large enough to capture site run-on and redirect it into the drainage system?	☐ Yes ☐ No; if checked, provide basis for finding
2.d - Are existing soil characteristics sufficient to support infiltration such that nuisance or vector conditions are not created by any ponded water that may occur?	☐ Yes ☐ No; if checked, provide basis for finding
• If "No" is checked for 2.b, 2.c, <u>or</u> 2.d, then STOP - this BMP is infeasible; attach appropriate documentation support as needed • If "Yes" is checked for 2.b, 2.c, <u>and</u> 2.d, then this BMP is potentially feasible, continue on to 2.e and 2.f	
2.e - Are irrigation water and power available to support vegetation in swale during dry periods?	☐ Yes ☐ No; if checked, provide basis for finding
2.f - If irrigation water and power are not available, can the site support native vegetation that does not require irrigation?	☐ Yes ☐ No; if checked, provide basis for finding
• If "No" is checked for 2.e <u>and</u> 2.f, this BMP is infeasible • If "Yes" is checked for 2.e <u>or</u> 2.f, then this BMP is potentially feasible; continue to 2.g	

Table 5.3 – LID BMP Feasibility Analysis Category 2 – Drainage Swales (continued)	
2.g – Are there any special maintenance, equipment, or experience requirements associated with the implementation of this BMP?	☐ Yes; if checked, provide basis for finding and determine whether the findings prevent implementation of this BMP ☐ No
2.h – If this BMP is implemented, will there be any one-time capital costs incurred, e.g., for new equipment required to maintain the BMP, that impacts project funding?	☐ Yes; if checked, provide basis for finding and determine whether the findings prevent implementation of this BMP ☐ No
2.i – Is there long-term funding available to maintain this BMP?	☐ Yes ☐ No
• If any of the findings from 2.g, 2.h <u>or</u> 2.i prevent the use of this BMP, then this BMP is infeasible; attach appropriate documentation as needed • If the findings from 2.g., 2.h, <u>and</u> 2.i do not prevent implementation of this BMP, then the BMP is feasible; incorporate into Table 7.1	

Table 5.3 – LID BMP Feasibility Analysis Category 3 – Infiltration Basins	
3.a – Are there any programmatic constraints that prevent the use of this BMP, *e.g., Americans with Disabilities Act; need for emergency access, funding restrictions, etc.? See Section 3.b of the Guidance.*	☐ Yes; if checked, provide basis for finding and STOP; this BMP is infeasible ☐ No; BMP is potentially feasible, continue to 3.b
3.b - Do appropriate soil conditions exist at the project site to allow effective infiltration consistent with a drawdown period, not to exceed 72 hours?	☐ Yes ☐ No; if checked, provide basis for finding
3.c - Is there at least 10 feet separation between the planned basin invert and the measured groundwater elevation?	☐ Yes ☐ No; if checked, provide basis for finding
3.d- Is there at least 100 feet separation from the proposed basin(s) and any known water supply wells?	☐ Yes ☐ No; if checked, provide basis for finding
3.e - Is the underlying soil and/or groundwater free from any known contamination?	☐ Yes ☐ No; if checked, provide basis for finding
3.f - Is there sufficient space to size or place an infiltration basin that: • Has slopes that are no steeper than 4:1, <u>and</u> • Is located at least 100 feet from bridge structures?	☐ Yes ☐ No; if checked, provide basis for finding
3.g - For a project area that has high vehicular traffic (25,000 or more average daily traffic), can the planned infiltration basin meet the MS4 Permit's pretreatment of runoff requirements?	☐ Yes ☐ No; if checked, provide basis for finding

Table 5.3 – LID BMP Feasibility Analysis Category 3 – Infiltration Basins (continued)	
3.h - Can an infiltration basin be incorporated into the site plan in a manner that does not create traffic or pedestrian safety concerns?	☐ Yes ☐ No; if checked, provide basis for finding
3.i - Does inclusion of an infiltration basin detract from the aesthetics of the roadway or project area that cannot be mitigated?	☐ Yes ☐ No; if checked, provide basis for finding
• If "No" is checked for any of the above questions (3.b – 3.i), this BMP is infeasible • If "Yes" is checked for all of the above (3.b - 3.i), then this BMP is potentially feasible; continue to 3.j	
3.j – Are there any special maintenance, equipment, or experience requirements associated with the implementation of this BMP?	☐ Yes; if checked, provide basis for finding and determine whether the findings prevent implementation of this BMP ☐ No
3.k – If this BMP is implemented, will there be any one-time capital costs incurred, e.g., for new equipment required to maintain the BMP, that impacts project funding?	☐ Yes; if checked, provide basis for finding and determine whether the findings prevent implementation of this BMP ☐ No
3.l – Is there long-term funding available to maintain this BMP?	☐ Yes ☐ No
• If any of the findings from 3.j, 3.k <u>or</u> 3.l prevent the use of this BMP, then this BMP is infeasible; attach appropriate documentation as needed • If the findings from 3.j., 3.k, <u>and</u> 3.l do not prevent implementation of this BMP, then the BMP is feasible; incorporate into Table 7.1	

Table 5.3 – LID BMP Feasibility Analysis Catergory 4 – Bioretention	
4.a – Are there any programmatic constraints that prevent the use of this BMP, *e.g., Americans with Disabilities Act; need for emergency access, funding restrictions, etc.? See Section 3.b of the Guidance.*	☐ Yes; if checked, provide basis for finding and STOP; this BMP is infeasible ☐ No; BMP is potentially feasible, continue to 4.b
4.b - Is there sufficient ROW to consider curb extensions?	☐ Yes ☐ No; if checked, provide basis for finding
4.c - Is there sufficient ROW to consider sidewalk planters?	☐ Yes ☐ No; if checked, provide basis for finding
4.d – Is there sufficient space to consider using the road median for bioretention?	☐ Yes ☐ No; if checked, provide basis for finding
• If "No" is checked for 4.b, 4.c <u>and</u> 4.d, then STOP - this BMP is infeasible; attach appropriate documentation support as needed • If "Yes" is checked for 4.b, 4.c <u>or</u> 4.d, then this BMP is potentially feasible, continue on to 4.e	
4.e – Can the site be designed so that median, curb extensions or sidewalk planters tie into the existing drainage at the project site?	☐ Yes ☐ No; if checked, provide basis for finding
• If "No" is checked for 4.e, then STOP - this BMP is infeasible; attach appropriate documentation support as needed • If "Yes" is checked for 4.e, then this BMP is potentially feasible, continue on to 4.f and 4.g	

Table 5.3 – LID BMP Feasibility Analysis Catergory 4 – Bioretention (continued)	
4.f - Are irrigation water and power available to support bioretention area or sidewalk planters?	☐ Yes ☐ No; if checked, provide basis for finding
4.g - If irrigation water and power are not available, can the site support native vegetation that does not require irrigation?	☐ Yes ☐ No; if checked, provide basis for finding
• If "No" is checked for 4.f and 4.g, then STOP - this BMP is infeasible • If "Yes" is checked for 4.f or 4.g, then this BMP is potentially feasible; continue on to 4.h	
4.h – Based on anticipated traffic capacity and MAS applicable to the project site, are there any traffic or pedestrian safety concerns that prevent application of this BMP?	☐ Yes; if checked, provide basis for finding ☐ No
• If "Yes" is checked for 4.h this BMP is infeasible • If "No" is checked for 4.h, then this BMP is potentially feasible; continue to 4.i.	
4.i – Are there any special maintenance, equipment, or experience requirements associated with the implementation of this BMP?	☐ Yes; if checked, provide basis for finding and determine whether the findings prevent implementation of this BMP ☐ No
4.j – If this BMP is implemented, will there be any one-time capital costs incurred, e.g., for new equipment required to maintain the BMP, that impacts project funding?	☐ Yes; if checked, provide basis for finding and determine whether the findings prevent implementation of this BMP ☐ No
4.j – Is there long-term funding available to maintain this BMP?	☐ Yes ☐ No
• If any of the findings from 4.i, 4.j or 4.k prevent the use of this BMP, then this BMP is infeasible; attach appropriate documentation as needed • If the findings from 4.i, 4.j, and 4.k do not prevent implementation of this BMP, then the BMP is feasible; incorporate into Table 7.1	

Table 5.3 – LID BMP Feasibility Analysis Category 5 – Sidewalk Trees and Tree Boxes	
5.a – Are there any or programmatic constraints that prevent the use of this BMP, *e.g., Americans with Disabilities Act; need for emergency access, funding restrictions, etc.? See Section 3.b of the Guidance.*	☐ Yes; if checked, provide basis for finding and STOP; this BMP is infeasible ☐ No; BMP is potentially feasible, continue to 5.b
5.b - Is there sufficient ROW to incorporate sidewalk trees or tree boxes into the project site?	☐ Yes ☐ No; if checked, provide basis for finding
• If "No" is checked for 5.b, then STOP - this BMP is infeasible; attach appropriate documentation support as needed • If "Yes" is checked for 5.b, then this BMP is potentially feasible, continue on to 5.c and 5.d	
5.c - Are irrigation water and power available to support vegetation in the bioretention area or sidewalk planters?	☐ Yes ☐ No; if checked, provide basis for finding
5.d - If irrigation water and power are not available, can the site support native vegetation that does not require irrigation?	☐ Yes ☐ No; if checked, provide basis for finding
• If "No" is checked for 5.c <u>and</u> 5.d, then STOP - this BMP is infeasible • If "Yes" is checked for 5.c <u>or</u> 5.d, then this BMP is potentially feasible; continue on to 5.e	
5.e – Based on anticipated traffic capacity and MAS applicable to the project site, are there any traffic or pedestrian safety concerns that prevent application of this BMP?	☐ Yes; if checked, provide basis for finding ☐ No
• If "Yes" is checked for 5.e this BMP is infeasible • If "No" is checked for 5.e, then this BMP is potentially feasible; continue to 5.f	

Table 5.3 – LID BMP Feasibility Analysis Category 5 – Sidewalk Trees and Tree Boxes (continued)	
5.f – Are there any special maintenance, equipment, or experience requirements associated with the implementation of this BMP?	☐ Yes; if checked, provide basis for finding and determine whether the findings prevent implementation of this BMP ☐ No
5.g – If this BMP is implemented, will there be any one-time capital costs incurred, e.g., for new equipment required to maintain the BMP, that impacts project funding?	☐ Yes; if checked, provide basis for finding and determine whether the findings prevent implementation of this BMP ☐ No
5.h – Is there long-term funding available to maintain this BMP?	☐ Yes ☐ No
• If any of the findings from 5.f, 5.g <u>or</u> 5.h prevent the use of this BMP, then this BMP is infeasible; attach appropriate documentation as needed • If the findings from 5.f, 5.g <u>and</u> 5.h do not prevent implementation of this BMP, then the BMP is feasible; incorporate into Table 7.1	

Table 5.3 – LID BMP Feasibility Analysis Category 6 – Permeable Pavement	
6.a – Are there any or programmatic constraints that prevent the use of this BMP, *e.g., Americans with Disabilities Act; need for emergency access, funding restrictions, etc.? See Section 3.b of the Guidance.*	☐ Yes; if checked, provide basis for finding; STOP, this BMP is infeasible ☐ No; BMP is potentially feasible, continue to 6.b
6.b - Does the planned road project include any of the listed types of impervious surfaces (check all that apply)?	☐ Roadside parking/parking lane ☐ Driveways ☐ Sidewalks, walkways ☐ None of the above
• If "none of the above" is checked in 6.b, then STOP – BMP is infeasible • If any box other than "none of the above" is checked, BMP is potentially feasible; continue to 6.c	
6.c – Will any of the transportation surfaces checked in 6.b be subject to high traffic volume or heavy traffic loads that prevent the use of permeable pavement?	☐ Yes; if checked, provide basis for finding ☐ No
6.d – Do the underlying soils at the project site provide adequate infiltration capacity for use of this BMP while not causing structural concerns?	☐ Yes ☐ No; if checked, provide basis for finding
• If "Yes" is checked for 6.c <u>or</u> "No" is checked for 6.d, then STOP - this BMP is infeasible; attach appropriate documentation support as needed • If "No" is checked for 6.c <u>and</u> "Yes" is checked for 6.d, then this BMP is potentially feasible for all impervious surface types checked in 6.b; continue to 6.e • If "Yes" is checked for 6.c <u>and</u> 6.d <u>and</u> "sidewalks, walkways" was checked in 6.b, then this BMP is potentially feasible for sidewalk or walkway elements of the project; continue to 6.e	

Table 5.3 – LID BMP Feasibility Analysis Category 6 – Permeable Pavement (continued)	
6.e – Are there any special maintenance, equipment, or experience requirements associated with the implementation of this BMP?	☐ Yes ☐ No; if checked, provide basis for finding and determine whether the findings prevent implementation of this BMP
6.f – Will the BMP maintain an adequate service life (at least 5 years) such that the BMP is economically feasible?	☐ Yes ☐ No; if checked, provide basis for finding and determine whether the findings prevent implementation of this BMP
6.g – If this BMP is implemented, will there be any one-time capital costs incurred, e.g., for new equipment required to maintain the BMP, that impacts project funding?	☐ Yes; if checked, provide basis for finding and determine whether the findings prevent implementation of this BMP ☐ No
6.h – Is there long-term funding available to maintain this BMP?	☐ Yes ☐ No
• If any of the findings from 6.e, 6.f, 6.g <u>or</u> 6.h prevent the use of this BMP, then this BMP is infeasible; attach appropriate documentation as needed • If the findings from 6.e, 6.f, 6.g <u>and</u> 6.h do not prevent implementation of this BMP, then the BMP is feasible; incorporate into Table 7.1	

Section 6: Source Control BMPs

Section 6 identifies source control BMPs potentially applicable to the proposed project. The project reviewer should evaluate the applicability of each source control BMP and identify the agency responsible for implementing the BMPs once the project is constructed.

Table 6.1 - Source Control BMPs

Source Control BMP	Check One		If not Included, Provide Basis	If Included, Agency Responsible for Implementation
	Included	Not Included		
Category 3 or 4 Projects				
Irrigation System and Landscape Maintenance	☐	☐		
Sweeping of Transportation Surfaces adjoining curb and gutter	☐	☐		
Drainage Facility Inspection and Maintenance	☐	☐		
MS4 Stenciling and Signage	☐	☐		
Landscape and Irrigation System Design	☐	☐		
Protect Slopes and Channels	☐	☐		

Section 7: Conformance and Project Summary

Table7.1 summarizes and documents (a) applicability and use of LID-based BMPs in the project design (from Section 5); (b) applicable source control BMPs (from Section 6); and (c) known regulatory requirements that impacted the project design (from Section 3). Fill out the information relevant to the project type and provide supporting information where needed. Continue to Section 8 on the following page for the steps to follow for applicable projects to appropriately size proposed BMP(s). If the project has more than one outlet, then complete additional versions of this form for each outlet.

Table 7.1 Conformance Summary

1 – Minimum Road Width

☐ Infeasible ☐ Feasible

2 – Drainage Swales

☐ Infeasible ☐ Feasible

If required, LID BMP Volume equivalency (%):
Copy Item 13 in Form A-6

3 – Infiltration Basins

☐ Infeasible ☐ Feasible

If feasible, Retention Volume (ft^3):
Copy Item 12a or 12b (for applicable BMP) from Table A-7

4 – Bioretention (w/o Underdrains)

☐ Infeasible ☐ Feasible

If feasible, Retention Volume (ft^3):
Copy Item 15 from Table A-8

5 – Sidewalk Trees and Tree Boxes

☐ Infeasible ☐ Feasible

If feasible, Retention Volume (ft^3):
Copy Item 3 from Table A-9

6 – Permeable Pavement

☐ Infeasible ☐ Feasible

If feasible, Retention Volume (ft^3):
Copy Item 8 from Table A-10

7 – Bioretention (with Underdrains)

☐ Infeasible ☐ Feasible

If feasible, Retention Volume (ft^3):
Copy Item 15 in Form A-11

8 - Total LID DCV for the Transportation Project (ft^3): *Copy Item 7 in Form A-2*

LID BMP performance criteria are achieved if answer to any of the following is "Yes":

- Full retention of LID DCV with infiltration basins, bioretention without underdrains, permeable pavement, and street trees: Yes ☐ No ☐ *If yes, sum of Items 3, 4, 5 , and 6 is greater than Item 8*
- Combination of on-site retention and infiltration BMPs for a portion of the LID DCV, and flow-based biotreatment BMPs that address all pollutants of concern for the remaining LID DCV: Yes ☐ No ☐ *If yes, sum of Items 3, 4, 5, 6 and 7 is greater than Item 8; and Item 2 is greater than the percent remaining DCV based on Figure 5-2 from TGD for WQMP.*
- On-site retention is determined to be infeasible and biotreatment BMPs provide flow-based biotreatment for all pollutants of concern for full LID DCV:

  Yes ☐ No ☐ *If yes, Item 2 is greater than Item 8, based on Figure 5-2 from the TGD for WQMP*

Table 7.1 Conformance Summary (cont.)	
Regulatory Requirements Document design elements that address any known regulatory requirements (see Table 3.1); if none, check the N/A box.	☐ Design elements affected by regulatory requirements Describe: ☐ N/A
Source Control BMPs Summarize the applicable source controls and the agency responsible for implementation	

Section 8: BMP Sizing for Applicable Green Streets Projects

*NOTE: **All** documentation and analyses used in this section shall be provided using the forms in Appendix A-1, Project BMP Sizing Documentation or by using the Riverside County LID Manual Worksheets. Submitted Transportation Project documents will include completed copies of these worksheets or forms.*

The following steps are used to size previously selected BMPs (e.g. LID and Treatment Control) for **Category 3 and 4** projects:

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

2. Using the information provided in Table 5.2 above, look up the recommended sizing method for the BMP selected in each drainage area and calculate target sizing criteria (e.g., Design Capture Volume).

3. Using the information provided in Table 5.2 above, appropriately design your BMP(s) per the provided guidance links.

4. Attempt to provide the calculated sizing criteria for the selected BMPs.

5. If sizing criteria cannot be achieved, document the constraints that override the application of BMPs, and provide the largest portion of the sizing criteria that can be reasonably provided given constraints.

If BMPs cannot be sized to provide the calculated volume for the tributary area, it is still essential to design the BMP inlet, energy dissipation, and overflow capacity for the full tributary area to ensure that flooding and scour is avoided. It is strongly recommended that BMPs which are designed to less than their target design volume be designed to bypass peak flows.

For those **Category 4** projects that cannot meet the sizing criteria, notification to the Santa Ana Regional Water Quality Control Board – Inland Stormwater Unit is required. Notification must include a cover letter justifying why your **Category 4** project cannot meet the sizing criteria and needs to include the feasibility analysis used to reach that conclusion. A copy of this notification must also be included in Appendix A-1, below.

Appendix A-1: Project BMP Sizing Documentation

Table A-1 LID BMP Performance Criteria for Design Capture Volume

1 Drainage area (ft^2):	**2** Imperviousness after applying preventative site design practices (Imp%):	**3** Runoff Coefficient (Rc): *$R_c = 0.858(Imp\%)^{\wedge 3} - 0.78(Imp\%)^{\wedge 2} + 0.774(Imp\%) + 0.04$*
4 Determine 1-hour rainfall depth for a 2-year return period $P_{2yr\text{-}1hr}$ (in):		*http://hdsc.nws.noaa.gov/hdsc/pfds/sa/sca_pfds.html*
5 Compute P_6, Mean 6-hr Precipitation (inches): *P_6 = Item 4 *C_1, where C_1 is a function of site climatic region specified in Table 3-2 of the TGD for WQMP (Valley = 1.4807; Mountain = 1.909; Desert = 1.2371)*		
6 Drawdown Rate *Use 48 hours unless site has soils with average field-measured permeability greater than 2 inches/hr. The necessary BMP footprint is a function of drawdown time. While shorter drawdown times reduce the performance criteria for LID BMP design capture volume, the depth of water that can be stored is also reduced, therefore larger BMP footprints may be needed to capture smaller design capture volume in sites with soil permeability less than 2 in/hr.*		24-hrs ☐ 48-hrs ☐
7 Compute design capture volume V_{DCV} (ft^3): *V_{SDCV} = 1/12 * [Item 1* Item 3 *Item 5 * C_2], where C_2 is a function of drawdown rate (24-hr = 1.582; 48-hr = 1.963)* *Compute separate V_{DCV} for each DA to a roadway inlet*		

Table A-2 Summary of HCOC Assessment

Does project have the potential to cause or contribute to an HCOC in a downstream channel: Yes ☐ No ☐
Go to: http://sbcounty.permitrack.com/WAP/
If "Yes", then complete HCOC assessment of site hydrology for 2 yr storm event using Tables A-3 through A-5 and insert results below. Tables A-3 through A-5 may be replaced by computer software analysis that is based on the San Bernardino County Hydrology Manual.
Complete separate HCOC assessment for each DA to a roadway inlet
If "No," then proceed to Form A-6

Condition	Runoff Volume (ft^3)	Time of Concentration (min)	Peak Runoff (cfs)
Pre-developed	**1** *Table A-3, Item 8*	**2** *Table A-4, Item 13*	**3** *Table A-5, Item $6_{pre\text{-}developed}$*
Post-developed	**4** *Table A-3, Item 9*	**5** *Table A-4, Item 14*	**6** *Table A-5, Item $6_{post\text{-}developed}$*
Difference	**7** *Item 4 – Item 1*	**8** *Item 2 – Item 5*	**9** *Item 6 – Item 3*
Difference (as % of pre-developed)	**10** % *Item 7 / Item 1*	**11** % *Item 8 / Item 2*	**12** % *Item 9 / Item 3*

Table A-3 HCOC Assessment for Runoff Volume

Variables *Complete separate HCOC assessment for each DA to a roadway inlet*	**Pre-developed DA**	**Post-developed DA**
1 Land cover		
2 Hydrologic Soil Group		
3 Drainage Area (ft^2) *Sum of DAs should equal total site area (Form 2-2)*		
4 Curve Number (CN) *Use Items 1 and 2 to select curve number from TGD for WQMP Appendix C-2*		
5 Pre-developed soil storage capacity, S (in): *S = 1000 / Item 4 - 10*		
6 Pre-developed initial abstraction, I_a (in): *I_a = 0.2 * Item 5*		
7 Precipitation for 2 yr, 24 hr storm (in): *Go to: http://hdsc.nws.noaa.gov/hdsc/pfds/sa/sca_pfds.html*		
8 Pre-developed volume (ft^3): *V_{pre} =(1 / 12) * (Item 3) * [(Item 7 – Item 6)^2 / (Item 7 – Item 6 + Item 5)]*		
9 Post-developed volume (ft^3): *V_{post} = (1 / 12) * (Item 3) * [(Item 7 – Item 6)^2 / (Item 7 – Item 6 + Item 5)]*		
10 Volume Reduction Needed to meet HCOC Requirement (ft^3): *V_{HCOC} = (Item 9 * 0.95) – Item 8*		

Table A-4 HCOC Assessment for Time of Concentration

Compute time of concentration for pre and post developed conditions *(For projects using the Hydrology Manual complete the form below)*

Variables	Pre-developed DA	Post-developed DA
1 Length of flowpath (ft) *Use Form 3-2 Item 5 for pre-developed condition*		
2 Change in elevation (ft)		
3 Slope (ft/ft) *S_o = Item 2 / Item 1*		
4 Land cover		
5 Initial DA Time of Concentration (min) *TGD for WQMP Appendix C-1*		
6 Length of conveyance from DA outlet to project site outlet (ft) *For post-developed condition, use length of linear BMP receiving runoff from the DA*		
7 Cross-sectional area of channel / gutter / swale (ft^2)		
8 Wetted perimeter of channel / gutter / swale (ft)		
9 Manning's roughness of channel / gutter / swale (n)		
10 Flow velocity (ft/sec): *V_{fps} = (1.49 / Item 9) * (Item 7/Item 8)$^{\wedge 0.67}$ * (Item 3)$^{\wedge 0.5}$*		
11 Travel time to outlet (min): *T_t = Item 6 / (Item 10 * 60) or if BMP is not a swale or linear bioretention, then provide the hydraulic retention time*		
12 Total time of concentration (min): *T_c = Item 5 + Item 11*		
13 Pre-developed time of concentration (min):		
14 Post-developed time of concentration (min):		
15 Additional time of concentration needed to meet HCOC requirement (min): *$T_{C\text{-}HCOC}$ = (Item 13 * 0.95) – Item 14*		

Table A-5 HCOC Assessment for Peak Runoff

Compute peak runoff for pre and post developed conditions. *(For projects using the Hydrology Manual complete the form below)*

Variables *Complete separate HCOC assessment for each DA to a roadway inlet*	Pre-developed DA	Post-developed DA
1 Rainfall Intensity for storm duration equal to time of concentration: *I_{peak} = 10^(LOG Form A-2 Item 4 - 0.7 LOG Form A-5 Item 5 + 1.067)*		
2 Drainage Area (Acres)		
3 Ratio of pervious area to total area		
4 Pervious area infiltration rate (in/hr) *Use pervious area CN and antecedent moisture condition with TGD for WQMP Appendix C-3*		
5 Maximum loss rate (in/hr): *F_m = Item 2 * Item 3*		
6 Peak Flow from DA (cfs): *Q_p =Item 2 * 0.9 * (Item 1 - Item 5)*		
7 Peak runoff reduction needed to meet HCOC Requirement (cfs):	*$Q_{p\text{-}HCOC}$ = (Item 6$_{post\text{-}developed}$ * 0.95) – Item 6$_{pre\text{-}developed}$*	

Table A-6 Drainage Swale			
Variable *Use columns to the right to compute runoff volume treatment from proposed Drainage Swales*	DA	DA	DA
1 Pollutants addressed with BMP *List all pollutant of concern that will be effectively reduced through specific Unit Operations and Processes described in Table 5-5 of the WQMP Guidance*			
2 Flow depth for water quality treatment (ft) *BMP specific, see Table 5-6 in TGD for WQMP for reference to BMP design details*			
3 Bed slope (ft/ft) *BMP specific, see Table 5-6 in TGD for WQMP for reference to BMP design details*			
4 Manning's roughness coefficient			
5 Bottom width (ft): *b_w = (Form 4.3-5 Item 6 * Item 4) / (1.49 * Item 2^1.67 * Item 3^0.5)*			
6 Side Slope (ft/ft) *BMP specific, see Table 5-6 in TGD for WQMP for reference to BMP design details*			
7 Cross sectional area (ft^2): *A = (Item 5 * Item 2) + (Item 6 * Item 2^2)*			
8 Water quality flow velocity (ft/sec): *V = Form 4.3-5 Item 6 / Item 7*			
9 Flow capacity (cfs): *Q = Item 7 * Item 8*			
10 Hydraulic residence time (min) *Pollutant specific, see Table 5-6 in TGD for WQMP for reference to BMP design details*			
11 Length of flow based BMP (ft): *L = Item 8 * Item 10 * 60*			
12 Water surface area at water quality flow depth (ft^2): *SA_{top} = (Item 5 + (2 * Item 2 * Item 6)) * Item 11*			
13 LID BMP Volume equivalency (%): *Use Item 9 (flow capacity) and Figure 5-2 in the TGD for WQMP*			

Table A-7 Infiltration Basins			
Variable *Use columns to the right to compute runoff volume retention from Infiltration Basin and Infiltration Trench BMPs*	DA	DA	DA
1 Infiltration rate of underlying soils (in/hr), *See Section 5.4.2 and Appendix D of the TGD for WQMP for minimum requirements for assessment methods.*			
2 Infiltration safety factor, *See Section 5.4.2 and Appendix D of the TGD for WQMP*			
3 Design percolation rate (in/hr): P_{design} *= Item 1 / Item 2*			
4 Infiltrating surface area, SA_{BMP} (ft^2), *surface area of basin or trench bottom*			
5 Ponded water drawdown time (hr), *default is 48 hrs*			
6 Duration of storm as basin is filling (hrs) *Typical ~ 3hrs*			
7 Ponding surface area, SA_{ponded} (ft^2), *Only included in certain BMP types, see Table 5-4 in the TGD for WQMP for reference to BMP design details*			
8 Ponding Depth (ft): d_{pond} *= Minimum of (1/12 * Item 3 * Item 5) or maximum ponding depth – see Section 5.4.2 and Appendix D of the TGD for WQMP for minimum requirements for assessment methods*			
9 Gravel layer surface area, SA_{gravel} (ft^2), *Only included in certain BMP types, see Table 5-4 in the TGD for WQMP for reference to BMP design details*			
10 Gravel depth, d_{gravel} (ft) *Only included in certain BMP types, see Table 5-4 in the TGD for WQMP for reference to BMP design details*			
11 Gravel porosity, *Only included in certain BMP types, see Table 5-4 in the TGD for WQMP for reference to BMP design details*			
12a Basin Retention Volume (ft^3): $V_{retention}$ *= Item 3 *Item 4 * (Item 5 + Item 6)*			
12b Trench Retention Volume (ft^3): $V_{retention}$ *= (Item 3 * Item 4 * Item 6) + (Item 7 * Item 8) + (Item9 * Item 10 * Item 11)*			

Table A-8 Bioretention (w/o Underdrains)			
Variable *Use columns to the right to compute runoff volume retention from Infiltration Bioretention BMPs without Underdrains*	DA	DA	DA
1 Infiltration rate of underlying soils (in/hr), *See Section 5.4.2 and Appendix D of the TGD for WQMP for minimum requirements for assessment methods.*			
2 Infiltration safety factor, *See Section 5.4.2 and Appendix D of the TGD for WQMP*			
3 Design percolation rate (in/hr): P_{design} *= Item 1 / Item 2*			
4 Infiltrating surface area, SA_{inf} (ft^2), *surface area of basin or trench bottom*			
5 Ponded water drawdown time (hr), *default is 48 hrs*			
6 Duration of storm as basin is filling (hrs) *Typical ~ 3hrs*			
7 Ponding surface area, SA_{ponded} (ft^2), *area of surface ponding*			
8 Ponding Depth (ft): d_{pond} *= Minimum of (1/12 * Item 3 * Item 5) or maximum ponding depth – see Section 5.4.2 and Appendix D of the TGD for WQMP for minimum requirements for assessment methods*			
9 Gravel layer surface area, SA_{gravel} (ft^2), *area of gravel layer surface*			
10 Gravel depth, d_{gravel} (ft), *depth of gravel layer*			
11 Gravel porosity, n_{gravel}, *effective porosity of gravel layer*			
12 Soil layer surface area, SA_{soil} (ft^2), *area of soil layer surface*			
13 Soil layer depth, d_{soil} (ft), *depth of gravel layer*			
14 Soil porosity, n_{soil}, *effective porosity of gravel layer*			
15 Retention Volume (ft^3): $V_{retention}$ *= (Item 3 * Item 4 * Item 6) + (Item 7 * Item 8) + (Item9 * Item 10 * Item 11) + (Item 12 * Item 13 * Item 14)*			

Table A-9 Sidewalk Trees and Tree Boxes			
Variable *Use columns to the right to compute runoff volume retention from proposed street tree BMPs. If street tree is in a planterbox that receives runoff from the street via curbcut, then use Form A-11 to compute additional retention volume*	DA	DA	DA
1 Number of Street Trees			
2 Average canopy cover over impervious area (ft^2)			
3 Runoff volume retention from street trees (ft^3): *$V_{retention}$ = Item 1 * Item 2 * (0.05/12) assuming retention of 0.05 inches of runoff*			

Table A-10 Permeable Pavement BMPs			
Variable *Use columns to the right to compute runoff volume retention from proposed permeable pavement BMPs*	DA	DA	DA
1 Infiltration rate of underlying soils (in/hr) *See Section 5.4.2 and Appendix D of the TGD for WQMP for minimum requirements for assessment methods*			
2 Infiltration safety factor *See Section 5.4.2 and Appendix D of the TGD for WQMP*			
3 Design percolation rate (in/hr): *P_{design} = Item 1 / Item 2*			
4 Infiltrating surface area, SA_{BMP} (ft^2)			
5 Gravel depth, d_{media} (ft)			
6 Gravel porosity			
7 Duration of storm as basin is filling (hrs) *Typical ~ 3hrs*			
8 Retention Volume (ft^3): *$V_{retention}$ = Item 4 * [(Item 5 * Item 6) + (Item 7 * (Item 3 / 12)]*			

Table A-11 Bioretention (with Underdrain)

Variable *Use columns to the right to compute runoff volume retention from Bioretention (w/o Underdrain) BMPs*	DA	DA	DA
1 Infiltration rate of underlying soils (in/hr) *See Guidance Section 5.4.2 and Appendix D for minimum requirements for assessment methods.*			
2 Infiltration safety factor *See Guidance Section 5.4.2 and Appendix D*			
3 Design percolation rate (in/hr) P_{design} *= Item 1 / Item 2*			
4 Ponded water drawdown time (hr), *default is 48 hrs*			
5 Maximum ponding depth (ft) *BMP specific, see Table 5-4 in Guidance for reference to BMP design details*			
6 Ponding Depth (ft) d_{BMP} *= Minimum of (1/12 * Item 2 * Item 3) or Item 5*			
7 Infiltrating surface area, SA_{BMP} (ft^2) *area beneath gravel layer for BMPs without underdrains*			
8 Amended soil depth, d_{media} (ft) *Only included in certain BMP types, see Table 5-4 in Guidance for reference to BMP design details*			
9 Amended soil porosity			
10 Gravel depth, d_{media} (ft) *Only included in certain BMP types, see Table 5-4 in Guidance for reference to BMP design details*			
11 Gravel porosity			
12 Duration of storm as basin is filling (hrs) *Typical ~ 3hrs*			
13 Retention Volume (ft^3) $V_{retention}$ *= Item 7 * [Item 6 + (Item 8 * Item 9) + (Item 10 * Item 11) + (Item 12 * (Item 3 / 12))]*			

BMP Inspection / Maintenance			
BMP	**Responsible Party(ies)**	**Inspection / Maintenance Activities Required**	**Minimum Frequency of Activities**