West Placer

Storm Water Quality Design Manual

April 2016

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Acknowledgements

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Questions or comments about the Manual should be directed to local storm water program staff in the jurisdictional agency where the proposed project is located. A table providing links to development websites at the time of Manual revision is presented in the table below. Specific web URLs for agencies and primary contacts are presented in footnotes as well.

Agency and Primary Contact	Weblink
County of Placer	Development Website[1]
City of Roseville	Development Website[2]
City of Auburn	Development Website[3]
City of Lincoln	Development Website[4]
Town of Loomis	Engineering Website[5]

[1]County Placer Development website is located at: https://www.placer.ca.gov/1714/Low-Impact-Development

[2]City of Roseville Development website is located at: https://www.roseville.ca.us/government/departments/development_services/engineering_land_development/stormwater_design_inspection/post_development_run-off_control

[3]City of Auburn Development website is located at: https://www.auburn.ca.gov/464/Stormwater-Quality-Management

[4]City of Lincoln Development website is located at: https://lincolnstormwater.org/development/

[2]Town of Loomis Engineering website is located at: https://loomis.ca.gov/departments/engineering/

Disclaimer

The contents of this Manual do not necessarily represent the policies of the supporting agencies as identified on the cover page. Although every reasonable effort has been made to ensure the integrity of the document, the supporting agencies do not make any warranty or representation, expressed or implied, with respect to the accuracy or completeness of the information contained herein.

This Manual is only applicable to new and redevelopment projects within the County of Placer, City of Roseville, City of Auburn, City of Lincoln, and the Town of Loomis that meet the requirements described herein. The storm water and trash controls are intended to meet the minimum standard of reducing the discharge of pollutants from the municipal storm drain systems to waters of the U.S. to the maximum extent practicable as required the State Water Resources Control Board[1] and other applicable requirements. It is the responsibility of the project owner to ensure compliance with all applicable regulations.

Mention of trade names or commercial products does not constitute endorsement or recommendation of those products.

[1] a) Order No. 2013-001-DWQ National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS000004 Waste Discharge Requirements for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems and subsequent renewals and revisions.
b) Amendment to the Ocean Plan and Part I Trash Provisions of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California (Statewide Trash Amendments).

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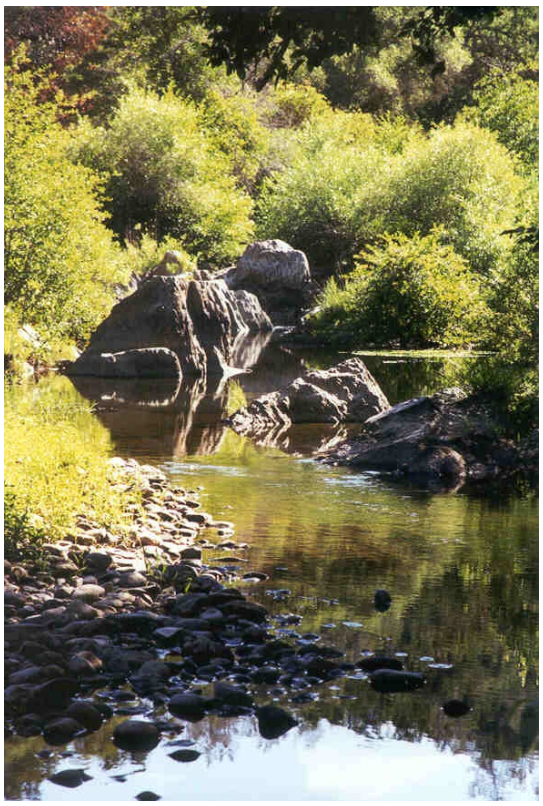
Chapter 1
Introduction

This *Storm Water Quality Design Manual* (Manual) requires storm water and trash controls for applicable new and redevelopment projects within Placer County, the City of Roseville, the City of Lincoln, the City of Auburn, and the Town of Loomis. The Manual has been developed cooperatively by the agencies to establish a consistent approach to address storm water management within the West Placer region. For the purposes of this Manual, the West Placer region refers to the areas of Placer County subject to the requirements of this Manual as described in **Chapter 2**. The Manual is periodically updated to reflect the most recent understanding of storm water management practices and regulatory requirements. The 2022 Manual is an update to the 2016 Manual (last revised in 2018) and incorporates the statewide trash control requirements for certain new development and redevelopment projects (**Section 1.1**).

As development transforms undeveloped pervious lands with vegetation into impervious surfaces such as pavement, concrete, buildings, or even compacted soils, the natural infiltration of rainfall and subsequent runoff into the soil and absorption of rainfall by vegetation is inhibited. This reduction of natural retention of rainfall increases the frequency and intensity of surface runoff which can mobilize and transport pollutants into downstream lakes, streams, and wetlands. The resulting changes in runoff patterns can also disrupt natural streams through a process known as hydromodification, causing impacts such as increased channel erosion, flooding, loss of habitat, and damage to aquatic ecosystems.



Hydrologic changes caused by development can damage natural waterways.
Photo Credit – Placer County

The State of California, together with local municipalities, has developed storm water management strategies to address the adverse effects of development by implementing regulations and storm water management programs to preserve the waterways and natural hydrologic processes. Storm water permits across the country now include requirements to implement low

impact development (LID) strategies that focus on preserving key elements of a project site's pre-development hydrologic function.

LID is a design strategy where storm water runoff is treated as a valuable resource that can recharge groundwater supplies, protect and enhance natural habitat and biodiversity, and add value to new development or redevelopment projects. Rather than discharging storm water runoff as a waste product, projects are designed to include a diverse set of post-construction storm water controls, or Best Management Practices (BMPs) that infiltrate, evapotranspire, or biotreat storm water runoff. By retaining storm water runoff on-site, downstream receiving waters are provided with protection from higher pollutant loads and alterations of hydrologic functions otherwise impacted by increased impervious surfaces and human activities. By protecting receiving waters, LID strategies help maintain beneficial uses of these resources including potable water sources, recreational uses, and fisheries. LID can also add value to new development and redevelopment by integrating storm water management features with landscaping and other improvements rather than the more traditional approach of constructing drainage impact mitigation measures (e.g., detention basins) as disconnected, often fenced off, features.

The intent of this Manual is to promote the following goals:

- Minimize adverse impacts of storm water runoff on water quality, biological integrity of receiving waters, and beneficial uses of water bodies.
- Minimize the percentage of impervious surfaces on land development projects and implement mitigation measures to approximately preserve the overall pre-development water balance through infiltration, evapotranspiration, and capture and use of storm water.

By directing storm water to natural or landscaped areas, rather than efficiently conveying it to the nearest water body, natural water resources can be protected.
Photo Credit – Greg Bates

- Minimize pollutant loadings from impervious surfaces such as roof tops, parking lots, and roadways using properly designed, technically appropriate storm water controls, including source control measures or good housekeeping practices, LID planning and design strategies, and treatment control BMPs.
- Guide proper selection, design and maintenance of storm water BMPs to address pollutants generated by land development, minimize post-development surface

flow volumes and rates, assure long-term functionality of BMPs, and avoid vector breeding.

- Guide proper selection, design and maintenance of trash control measures to prevent the discharge of trash to surface waters in compliance with statewide requirements.

1.1 Regulatory Background

National Pollutant Discharge Elimination System Permits

In 1972, the Federal Clean Water Act (CWA) was amended to prohibit the discharge of pollutants to waters of the United States from any point source, unless the discharge complies with a National Pollutant Discharge Elimination System (NPDES) permit. In 1987, amendments to the CWA added Section 402(p), which established a framework for regulating municipal storm water discharges under the NPDES program. Phase II regulations for smaller urban areas such as Placer County, City of Roseville, City of Lincoln, City of Auburn, and the Town of Loomis, were promulgated in 1999.

In California, the authority for the administration of the program was delegated from the United States Environmental Protection Agency (USEPA) to the California State Water Resources Control Board (SWRCB) and associated Regional Water Quality Control Boards (RWQCBs). The SWRCB issues and renews the Phase II General Permit (Phase II Permit)[2] which is then administered and enforced by the Central Valley RWQCB (CVRWQCB). The Phase II Permit requires municipalities to implement a variety of programs to prevent the discharge of pollutants, improve and protect storm water quality, and reduce storm water runoff including the Post Construction Storm Water Management Program.

Statewide Trash Amendments[3]

On April 7, 2015, the SWRCB adopted an Amendment to the Water Quality Control Plan for Ocean Waters of California to Control Trash and Part 1 Trash Provision of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries (ISWEBE Plan). Together, they are collectively referred to as the "Statewide Trash Amendments" (Trash Amendments). The Trash Amendments apply to all municipalities regulated by the NPDES municipal storm water program.

The Trash Amendments prohibit the discharge of trash to surface waters of the State or the deposition of trash where it may be discharged into surface waters of the State. The

[2] Water Quality Order No. 2013-0001-DWQ as amended by Order WQ 2015-0133-EXEC, Order WQ 2016-0069-EXEC, WQ Order 2017 XXXX-DWQ, Order WQ 2018-0001-EXEC, and Order WQ 2018-0007-EXEC. National Pollutant Discharge Elimination System General Permit and Waste Discharge Requirements for Storm Water Discharges from Small Municipal Separate Storm Sewer System or subsequent revised Permit. https://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/remediated_phase2ms4permit_v2.pdf

[3] https://www.waterboards.ca.gov/water_issues/programs/stormwater/trash_implementation.html

Trash Amendments require agencies with regulatory authority over priority land uses (PLUs) to comply with the prohibition of trash discharge to receiving waters. PLU areas, as defined in the Statewide Trash Amendments, include high-density residential, industrial, commercial, mixed urban, and public transportation stations. As such, new development and redevelopment projects within these PLU categories will be required to implement trash controls consistent with the Trash Amendment criteria.

401 Certifications

In addition to the storm water regulations, RWQCBs certify that permits under Section 404 of the CWA issued by the U.S. Army Corps of Engineers (Corps) meet state water quality requirements pursuant to Section 401 of the CWA. The 401 certification program provides the state with an opportunity to address the potential impacts of federally issued permits and licenses to aquatic resources. The CVRWQCB is responsible for issuing 401 certifications in the West Placer region. Also, pursuant to the Porter-Cologne Water Quality Act, adopted by the state, RWQCBs regulate activities that impact "Waters of the State," which include certain wetlands and waters not regulated by the Corps.

1.2 Purpose of this Manual

This Manual provides guidance for projects that are required to comply with relevant storm water regulations as well as the Statewide Trash Amendments and presents trash control and LID design standards to reduce runoff, treat storm water, and provide baseline hydromodification management[4].

Consistent with the CWA and the Phase II Permit, this Manual requires storm water controls to reduce pollutants to the maximum extent practicable (MEP). The MEP standard is an ever-evolving, flexible, and advancing concept, which considers technical and economic feasibility. Interpretation of the MEP standard will be carried out by the jurisdictional agency that has discretion over the project.

The process of developing a Storm Water Quality Plan (SWQP) for small and regulated new and redevelopment projects is outlined in this Manual and a SWQP Template is provided in **Appendix A**. The SWQP documents a project's compliance with the requirements identified within the Manual and provides a standardized format for complete and accurate analyses which will result in more efficient design, review, and project approval.

[4] Additional information can be found in Phase II Permit, Section E.12 - Post Construction Storm Water Management Program and Appendix E: Final Part 1 Trash Provisions of The Water Quality Control Plan For Inland Surface Waters, Enclosed Bays, And Estuaries Of California.

This Manual also addresses requirements under Placer County Aquatic Resources Program (CARP)[5].

1.3 Use of Outside References

Throughout this Manual, website references are provided to assist the designer with the development of the SWQP. The following websites provide certain baseline information that may enhance understanding and assist with the development of the SWQP:

- Placer County Stormwater Management Manual (SWMM)
  https://www.placer.ca.gov/DocumentCenter/View/1249/Stormwater-Management-Manual-PDF?bidId=
- Placer County Planning Division
  https://www.placer.ca.gov/2845/Planning-Services
- Natural Resources Conservation Service Web Soil Survey
  http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm
- Natural Resources Conservation Service TR-55 Manual
  http://www.hydrocad.net/pdf/TR-55%20Manual.pdf
- California State Water Resources Control Board Database of Registered Contaminated Sites
  http://geotracker.waterboards.ca.gov/
- U.S. EPA Brownfields Information
  http://www.epa.gov/brownfields
- CA Department of Toxic Substances Control Former Brownfields and Agricultural Sites
  http://www.dtsc.ca.gov/SiteCleanup/Brownfields/
- California Stormwater Quality Association
  http://www.casqa.org/resources/bmp-handbooks/
- California Statewide Water Quality Control Plans for Trash
  www.waterboards.ca.gov/water_issues/programs/water_quality_assessment/#impaired
- California State Water Resources Control Board Impaired Water Bodies Information
  https://www.waterboards.ca.gov/water_issues/programs/water_quality_assessment/#impaired

[5] https://www.placer.ca.gov/DocumentCenter/View/44650/Western-Placer-County-Aquatic-Resources-Program-PDF?bidId

1.4 How This Manual Relates to Other Requirements

This Manual is intended to satisfy the specific requirements of the Phase II Permit, the Statewide Trash Amendments, and CARP, as discussed above. Additional design requirements imposed by other regulations and permits, such as the Construction General Permit (CGP)[6], local grading ordinances, CAL Green, California Environmental Quality Act (CEQA), and hydraulic design for flood control, still apply as applicable to certain project categories. The governing agencies overseeing these regulations may, at their discretion, determine that designs in accordance with this Manual satisfy another requirement. Additionally, coverage under another regulation may trigger requirements outlined in this Manual. Check with the local governing agency for specific requirements.

1.5 Effective Date of the Revised Manual (2022)

The effective date for implementation of the trash requirements for private and public projects subject to the requirements outlined in this Manual is described below.

Private Projects

The trash control requirements apply to any private development projects that meet the project categories in **Section 2.2** and where the entitlement applications are deemed complete on or after January 1, 2023.

Broad planning documents (e.g., land use master plans, conceptual master plans, or broad-based California Environmental Quality Act [CEQA] or National Environmental Policy Act [NEPA]) approved or adopted by an Agency prior to the effective date of this Manual revision does not exempt a subsequent project from the requirements of this Manual unless the development application for the subsequent project has been deemed complete prior to January 1, 2023 or there is an approved Vesting Tentative Map.

Public Projects

The trash control requirements apply to any public projects that meet the project categories in **Section 2.2** and where the design process is initiated after January 1, 2023.

1.6 Need for Manual Revisions

It is recognized that the incorporation of LID-based features into new development and redevelopment projects is an emerging field, and while every effort has been made to ensure that this Manual is complete and accurate, revisions and/or amendments may be necessary. In addition, the Phase II Permit is typically reissued on a 5-year cycle, which may trigger required updates to this Manual. The current Phase II Permit expired in June 2018 and has been administratively extended until the SWRCB renews it.

[6] https://www.waterboards.ca.gov/water_issues/programs/stormwater/construction.html

Administrative revisions to improve permit processing and correct problems outside of the next scheduled Phase II Permit revision shall be authorized cooperatively by the participating jurisdictions' Directors (or their designee responsible for storm water compliance).

Chapter 2

Projects Subject to Requirements

The post-construction requirements described within this Manual apply to new development and redevelopment projects that meet the requirements described within this chapter. These requirements vary depending on the project's location and the amount of impervious surface that is being created. This chapter introduces a categorization process to define the project type and then determine what corresponding storm water requirements apply.

2.1 Project Location

The Phase II Permit boundary defines the areas that are subject to the requirements of this Manual. The boundary encompasses the urbanized areas of western Placer County and projects within this boundary (except the City of Rocklin), as well as major planning project areas under review by the participating jurisdictional agencies. Projects located outside of the Phase II Permit boundary and planning project areas, but within the CARP boundary will be addressed in a future revision to this Manual upon adoption of the CARP. Projects located outside of the Phase II Permit, CARP, and planning project area boundaries are not subject to the requirements of this Manual but may be subject to other post-construction storm water requirements (e.g., CGP).

The Phase II Permit and planning project areas are presented in **Figure 2-1** while the CARP compliance areas are presented in **Figure 2-2**. The union of these areas plus any major planning project areas defines the West Placer region for the purposes of this Manual. It should also be noted that, any areas that may be annexed in the future by any of the agencies subject to this Manual, such that the annexed area becomes a part of the regulated boundary, shall also be subject to the requirements of this Manual.

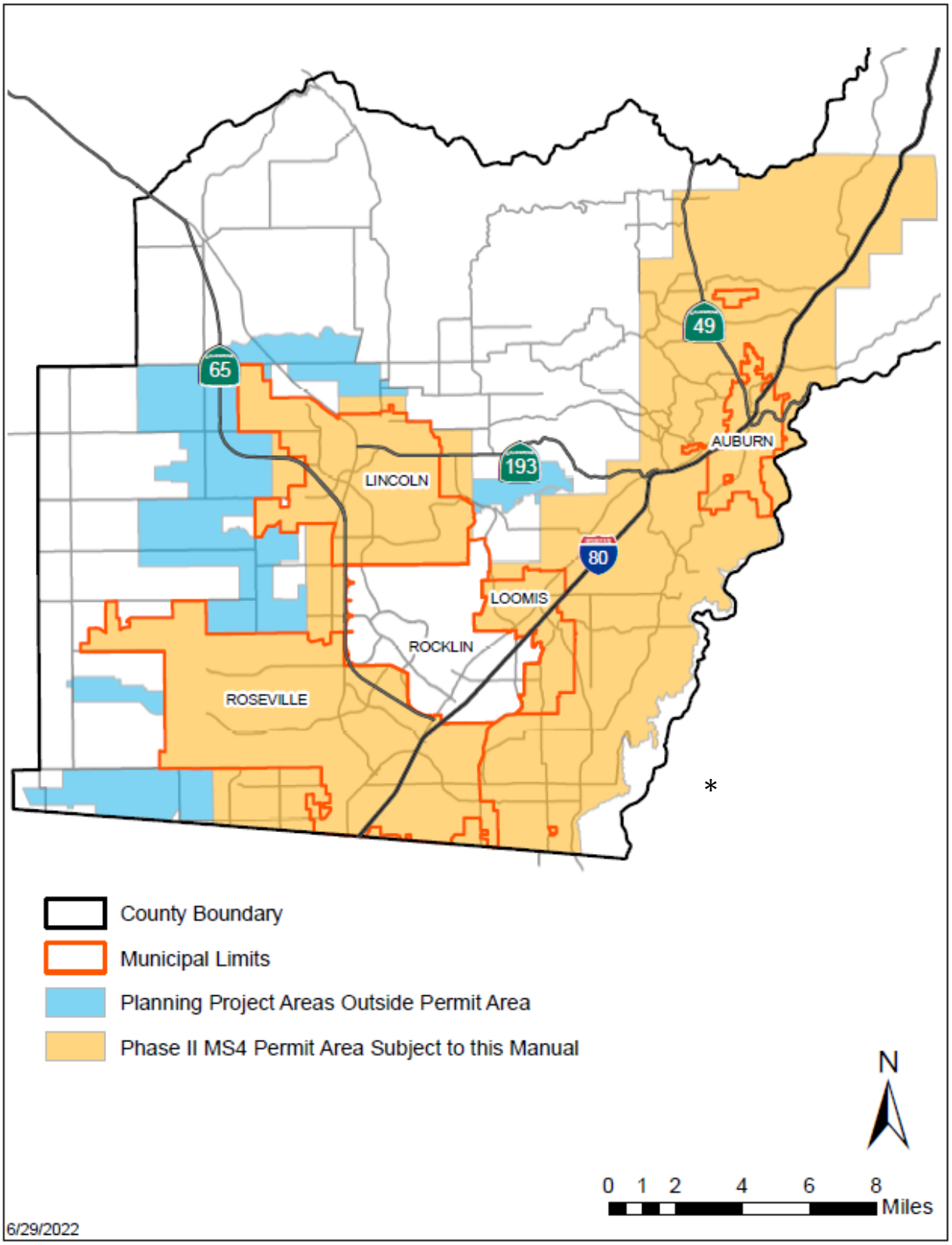
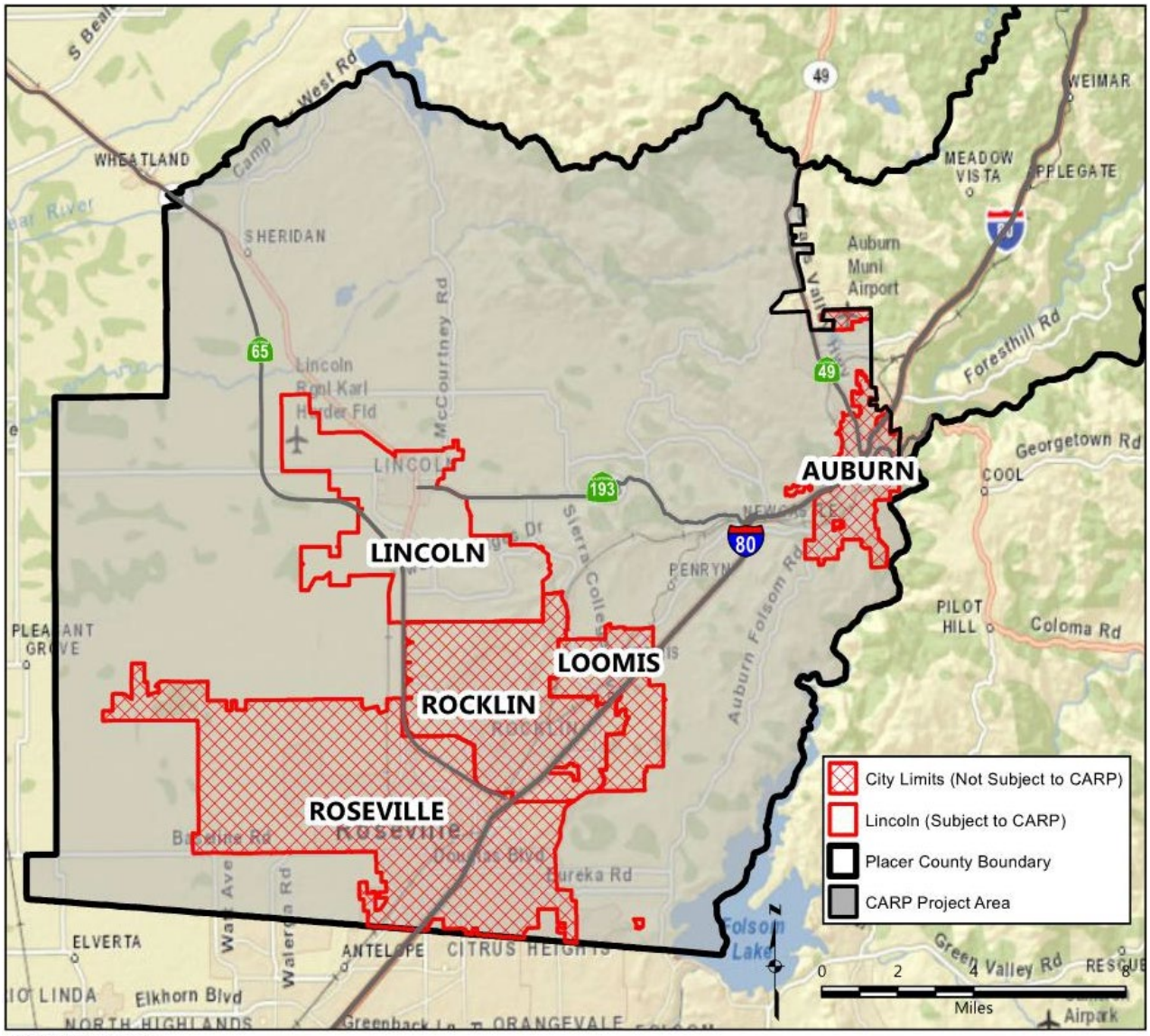


Figure 2-1
Phase II Permit Regulatory Boundaries

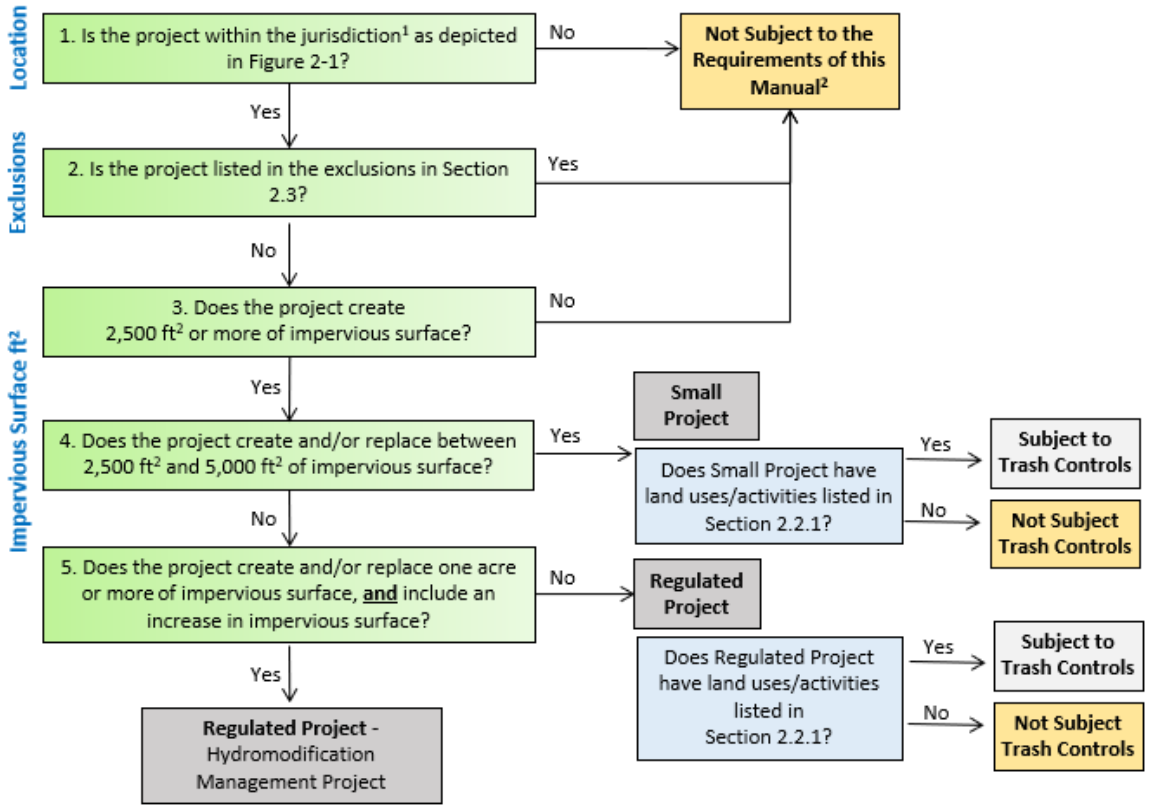


DATA DISCLAIMER:
The features on this map were prepared for geographic purposes only and are not intended to illustrate legal boundaries or supercede local ordinances. Official information concerning the features depicted on this map should be obtained from recorded documents and local governing agencies.
Base map provided by ESRI World Street Map.

Figure 2-2
CARP Regulatory Boundaries

2.2 Project Categorization

There are two types of projects that may be subject to the Manual: Small Projects and Regulated Projects (both of which may be subject to trash controls). The distinction between Small Projects and Regulated Projects is based on the amount of impervious surface that is created or replaced. The decision tree, below, may be used to assist in determining the project category.



1. Projects that do not fall within the Phase II Permit Area Subject to this Manual as shown in Figure 2-1 may be subject to the requirements of this Manual as determined by the jurisdiction.
2. Other State Water Resources Control Board General Orders may apply to the project (e.g., Construction General Permit or Industrial General Permit)

Figure 2-3
Project Category Decision Tree

2.2.1 Project Categorization for Trash Controls

Post-construction storm water trash controls are required for Small Projects and Regulated Projects that involve the following types of activities and/or land uses:

1. High Density Residential[7] – projects with at least 10 developed dwelling units per acre. *(Note: each agency may have different residential land use categories other than "High Density Residential" associated with the 10 developed dwelling unit/acre threshold)*
2. Industrial[7] – primary activities on the developed parcels involve product manufacture, storage, or distribution (e.g., manufacturing businesses, warehouses, equipment storage lots, junkyards, wholesale businesses, distribution centers, or building material sales yards).
3. Commercial[7] – primary activities on the developed parcels involve the sale or transfer of goods or services to consumers (e.g., business or professional buildings, shops, restaurants, theaters, vehicle repair shops, etc.).
4. Mixed Urban[7] – projects where high-density residential, industrial, and/or commercial land uses predominate collectively (i.e., are intermixed).
5. Public Transportation Stations[7] – facilities or sites where public transit agencies' vehicles load or unload passengers or goods (e.g., bus stations and stops).
6. Other Residential - [Projects within County of Placer jurisdiction] - Residential as required by the County.
7. Other Residential - [Projects within City of Auburn, City of Lincoln, City of Roseville, Town of Loomis jurisdiction] - All Residential Projects (with the exception of detached single family residential building permit applications or associated encroachment permit applications).
    a. Although trash control measures are not required for detached single family residential building permit or encroachment permit applications, LID post construction requirements are required for single family residential building permit applications (see **Table 2-1**).

The definitions of the project categories and a summary of the associated trash control and storm water requirements are presented in **Table 2-1**. Supplemental information for special case Regulated Projects is presented in **Table 2-2**. It should be noted that some

[7] Priority Land Use as defined in the Statewide Trash Amendments. Definitions are taken directly from the State Water Resources Control Board – Statewide Trash Amendments at the time of the 2022 Manual revision.

trash treatment controls may meet the water quality-based requirements as well as the trash-based requirements[8].

2.2.2 Post-Construction Requirements

The definitions of the project categories and a summary of the associated storm water requirements are presented in **Table 2-1**. Supplemental information for special case Regulated Projects is presented in **Table 2-2**.

Table 2-1 Project Categories

Project Category	Definition	Post-Construction Requirements	Reference for Additional Information
Small Projects	All projects that create and/or replace (including projects with no net increase in impervious footprint) more than 2,500 and up to 5,000 square feet of impervious surface, including detached single family homes that create and/or replace 2,500 square feet or more of impervious surface and are not part of a larger plan of development. Projects that are high-density residential, industrial, commercial, mixed urban, and public transportation stations, and other residential** **must also incorporate trash controls.** **For other residential projects, see the applicability of the requirements in Section 2.2.1.	Minimum of one Site Design Measure	Section 4.2
		Trash Controls, as applicable	Section 4.1
Regulated Projects	All projects that create and/or replace 5,000 square feet or more of impervious surface.	Site Assessment and Layout to optimize for capture and treatment of storm water	Chapter 3

[8] The certified multi-benefit trash treatment systems include bioretention, capture and use systems, detention basins, infiltration trenches and basins, and media filters. https://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/trash_implementation/mbts_coversheet_19jun19.pdf

Table 2-1 Project Categories

Project Category	Definition	Post-Construction Requirements	Reference for Additional Information
	Includes new development and redevelopment projects on public or private land that fall under the planning and permitting authority of the jurisdictional agency. Projects that are high-density residential, industrial, commercial, mixed urban, and public transportation stations, and other residential** **must also incorporate trash controls.** **For other residential projects, see the applicability of the requirements in Section 2.2.1.	Source Control Measures	Section 4.3.2
		Site Design Measures to the extent technically feasible	Section 4.3.3
		Storm Water Treatment and Baseline Hydromodification Measures	Section 4.3.4
		Operations and Maintenance Plan	Section 5.1 and 5.2
		Trash Controls, as applicable	Section 4.1

Table 2-2 Special Case Regulated Projects

Project Category	Definition	Post-Construction Requirements
Regulated Redevelopment Projects	Any land-disturbing activity that results in the creation, addition, or replacement of 5,000 square feet or more exterior impervious surface area on a site on which some past development has occurred.	Where a redevelopment project results in an increase equal to or greater than 50 percent of the impervious surface of a previously existing development, runoff from the entire project, consisting of all existing, new, and/or replaced impervious surfaces, must be treated per the requirements for Regulated Projects to the extent feasible.
		Where a redevelopment project results in an increase of less than 50 percent of the impervious surface of a previously existing development, only runoff from the new and/or replaced impervious surface, must be treated per the requirements for Regulated Projects.
Regulated Road Projects and Regulated Linear Underground/ Overhead Projects (LUPs)	Any of the following types of projects that create 5,000 square feet or more of newly constructed contiguous impervious surface and that are public road projects and/or fall under the building and planning authority of a Permittee: 1. New streets or roads, including sidewalks and bicycle lanes built as part of the new streets or roads. 2. Widening of existing streets or roads with additional traffic lanes. 3. LUPs	▪ Infiltrate impervious surface runoff onsite from the post-construction 85th percentile 24-hour storm event. ▪ Treatment of runoff that cannot be infiltrated onsite shall follow U.S. EPA guidance regarding green infrastructure to the extent feasible (EPA, 2008). ▪ Where the addition of traffic lanes results in an alteration of equal to or greater than 50 percent of the impervious surface of an existing street or road, runoff from the entire project, consisting of all existing, new, and/or replaced impervious surfaces, must be included in the treatment system design. ▪ Where the addition of traffic lanes results in an alteration of less than 50 percent of the impervious surface of an existing street or road, only runoff from the new, and/or replaced impervious surface must be included in the treatment system design.

Table 2-2 Special Case Regulated Projects

Project Category	Definition	Post-Construction Requirements
Hydromodification Management Projects	Regulated Projects that create and/or replace one acre or more of impervious surface. Projects that do not increase impervious surface area over the pre-project condition are not Hydromodification Management Projects.	Same as for Regulated Projects plus: ▪ Post project runoff shall not exceed estimated pre-project flow rate for the 2-year, 24-hour storm.

2.3 Exclusions

Projects located outside of the West Placer region (**Figures 2-1 and 2-2**) and projects that create and/or replace less than 2,500 square feet of impervious surface are excluded from the requirements of this Manual. The following additional specific project cases are also excluded:

- Interior remodels;
- Routine maintenance and repair activities that are conducted to maintain original line and grade, hydraulic capacity, and original purpose of facility such as: exterior wall surface replacement, reroofing, and pavement resurfacing within the existing footprint;
- Sidewalks and bicycle lanes built as part of new streets or roads and built to direct storm water runoff to adjacent vegetated areas;
- Impervious trails built to direct storm water runoff to adjacent vegetated areas, or other non-erodible permeable areas, preferably away from creeks or towards the outboard side of levees;
- Sidewalks, bicycle lanes, or trails constructed with permeable surfaces;
- Trenching, excavation and resurfacing associated with LUPs, unless the LUP has a discrete location that has 5,000 square feet of more of newly constructed contiguous impervious surface;
- Pavement grinding, surface treatments, and repaving and/or resurfacing of existing roadways and parking lots;
- Construction of new sidewalks, pedestrian ramps, or bike lanes on existing roadways;

- Emergency redevelopment activities required to protect public health and safety; and,
- Routine replacement of damaged pavement such as pothole repair or replacement of short, non-contiguous sections of roadway.

In addition, projects which are detached single family residential building permit or associated encroachment permit applications are not subject to the trash requirements (however these projects are still subject to the other requirements of this Manual).

2.4 Project Submittal and Approval Process

Once it is determined that a project is required to incorporate post-construction storm water and trash controls in accordance with this Manual, a Preliminary SWQP is required to be developed and submitted as part of the project entitlement application package and entitlement approval process, followed by a Final SWQP prior to the approval of construction plans/improvement plans or the issuance of a building permit.

The flowchart in **Figure 2-4** provides an overview of the SWQP development and submittal process. Each step is summarized below and then described in further detail in the applicable chapters that follow. This process is similar for Small and Regulated Projects; although the SWQP submittal for Small Projects is simpler.

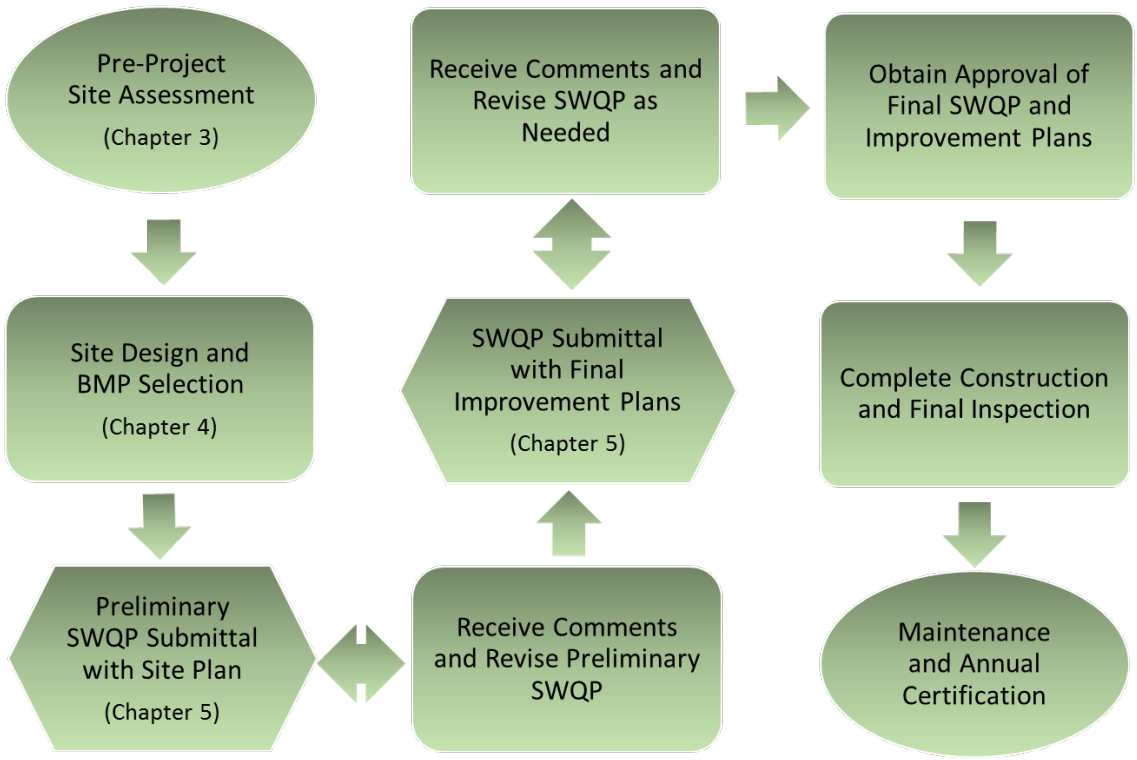


Figure 2-4
SWQP Development and Submittal Process

Detailed guidance for developing a SWQP is provided in the following sections and the electronic SWQP Template provided in **Appendix A**. The SWQP must be submitted as a Preliminary and Final document. The Preliminary SWQP is submitted with the Entitlement Application Package for Tentative Map (or equivalent) while the Final SWQP is submitted with the Final Improvement Plans and Building Permit Application Package (or equivalent). Both the Preliminary and Final SWQP submittals must include all of the forms in the template as required for the determined project category.

The Preliminary SWQP must contain a site plan identifying selected BMPs, their locations, tributary drainage areas, preliminary sizing calculations, and preliminary inspection and maintenance documentation.

The Final SWQP must include the Final Improvement Plans showing all BMPs and necessary design details on the appropriate sheets. The BMP Checklist from the SWQP Template must be included on the cover sheet of the Final Improvement Plans. The Final SWQP also must include final sizing calculations, inspection and maintenance schedules and procedures, identification of responsible parties, and all required signatures. The Final SWQP serves as the Project Maintenance Agreement between the owner and the permitting jurisdictional agency and provides jurisdictional agency staff with permission to access the project location to conduct BMP inspections.

SWQP preparation consists of systematically collecting and documenting project specific information that includes the following key components.

General Project Information – Documentation of permitting jurisdictional agency, project name, and other identifying information.

Responsible Parties – Project owner and engineer certifications of responsibility and Permission to Access.

Site Assessment – Documentation of existing site conditions and storm water quality management opportunities and constraints. Detailed information regarding the process of conducting an LID-based site assessment and developing a site layout that supports the retention of storm water runoff on-site is provided in **Section 3**.

Design Documentation – Project plans showing the location and size of storm water management measures and sizing calculations. Detailed information on the selection of source control measures, site design measures, and storm water treatment and baseline hydromodification measures is provided in **Section 4**. Design guidance is provided in the SWQP Template (**Appendix A**) and the BMP Fact Sheets (**Appendix B**).

Operations and Maintenance (O&M) Documentation – O&M Plan listing BMP-specific inspection and O&M requirements. See the BMP Fact Sheets in **Appendix B** for guidance on O&M requirements.

Chapter 3

Pre-Project Site Assessment

During the early planning stages of any project, a thorough site assessment can provide valuable information for planning the layout of site improvements. Developing a site layout considering storm water and trash management to the extent feasible can provide substantial reductions in cost and improve the effectiveness of the project's storm water and trash control measures. Consideration of terrain, required buffer areas, and other natural features can lead to efficient location of BMPs. Additionally, a site layout that keeps clean flows separated from contaminated flows can reduce the need for, and size of, downstream treatment controls. To the extent feasible, projects can be configured to direct storm water runoff from impervious surfaces to landscaped or natural areas, rather than to convey it directly to a discharge location, which may require a structural BMP.

3.1 Site Assessment

A site assessment must be completed for all Regulated Projects and considered for Small Projects during the earliest stages of project planning to appropriately plan the site layout for the capture and treatment of storm water runoff. The incorporation of storm water and trash control features are more effective, and often less costly, when site conditions such as soils, vegetation, and drainage characteristics are considered when evaluating the placement of buildings, paved areas, drainage facilities and other improvements.

A careful evaluation of a site's pre-developed condition is key to minimizing the impacts of development.
Photo Credit – Placer County

Site assessments consist of collecting and evaluating data from a variety of sources including, but not limited to, surveys, topographic maps, geotechnical investigations, groundwater records, and site-specific measurements and field observations. The site assessment should evaluate the following key site characteristics:

- Soil, Geologic, and Groundwater Characteristics;
- Topography, Hydrology, and Drainage Characteristics;
- Existing Vegetation and Natural Areas;
- Contaminated Soil or Groundwater;

- Existing Improvements and Easements; and
- Opportunities and constraints for preserving or enhancing existing natural resources.

The subsections below provide reference information and guidance for evaluating each key site characteristic and incorporating insights into the process of establishing a layout of improvements and the development of a site plan.

3.1.1 Soil, Geologic, and Groundwater Characteristics

Information regarding the geologic setting of a project area including soil, geologic, and groundwater characteristics are necessary for determining the feasibility of infiltrating storm water runoff on a site and will assist in identifying appropriate locations for proposed improvements and the required storm water management measures. Where feasible, buildings, pavement, and other impervious surfaces should be located in areas where soils have lower infiltration rates while infiltration facilities should be installed in more permeable soil areas where there is an average separation of 10 feet between the bottom elevation of the infiltrating BMP and the groundwater surface elevation. At no time shall the separation between the bottom elevation of the infiltrating BMP and the seasonal high groundwater surface elevation be less than 5 feet.

Some information regarding soil types and their potential suitability for infiltrating storm water can be obtained from the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Web Soil Survey (WSS) at the following website:

http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm

Soils are categorized into one of four Hydrologic Soil Groups (HSGs) A, B, C or D based on their capacity to percolate water. Type A soils are well drained and highly permeable, while Type D soils consist of low permeability materials such as clays that infiltrate water very slowly. A soils map illustrating the HSGs and their general locations in West Placer region is provided in **Figure 3-1**. As shown, much of the region's soils are classified as Types C and D indicating high clay content with slow to very slow infiltration rates. Although not ideal for infiltration, LID measures can still be implemented effectively on sites with HSG C and D soils as long as these constraints are considered during the design process. Ideally, site designs allow infiltration to occur to the maximum extent that the native soil will accept and allow for the safe bypass of overflows. In some cases, native soils can be amended to increase their storage and infiltration capacity by mixing organic mulches and/or sandy materials with the less permeable native soils. Additional information on the use of soil amendments is provided in the Fact Sheet SDM-2 in **Appendix B**.

The WSS provides planning level information such as soil type, HSG, typical infiltration rates, saturated hydraulic conductivity, typical depth to restrictive layers, and typical

depth to groundwater. The Placer County Stormwater Management Manual[9] (SWMM) (Placer County, 1994) provides additional guidance in determining soil infiltration rates based on the HSG and the type and condition of ground cover. This information may be used for pre-project runoff calculations, but a site-specific geotechnical evaluation is recommended to obtain more accurate soil characteristics and infiltration rates for the design of infiltration facilities. It should be noted that saturated hydraulic conductivity can be used for designing infiltration facilities, but a site-specific measurement of the infiltration rate of soils underlying potential infiltration facilities is strongly recommended for final design.

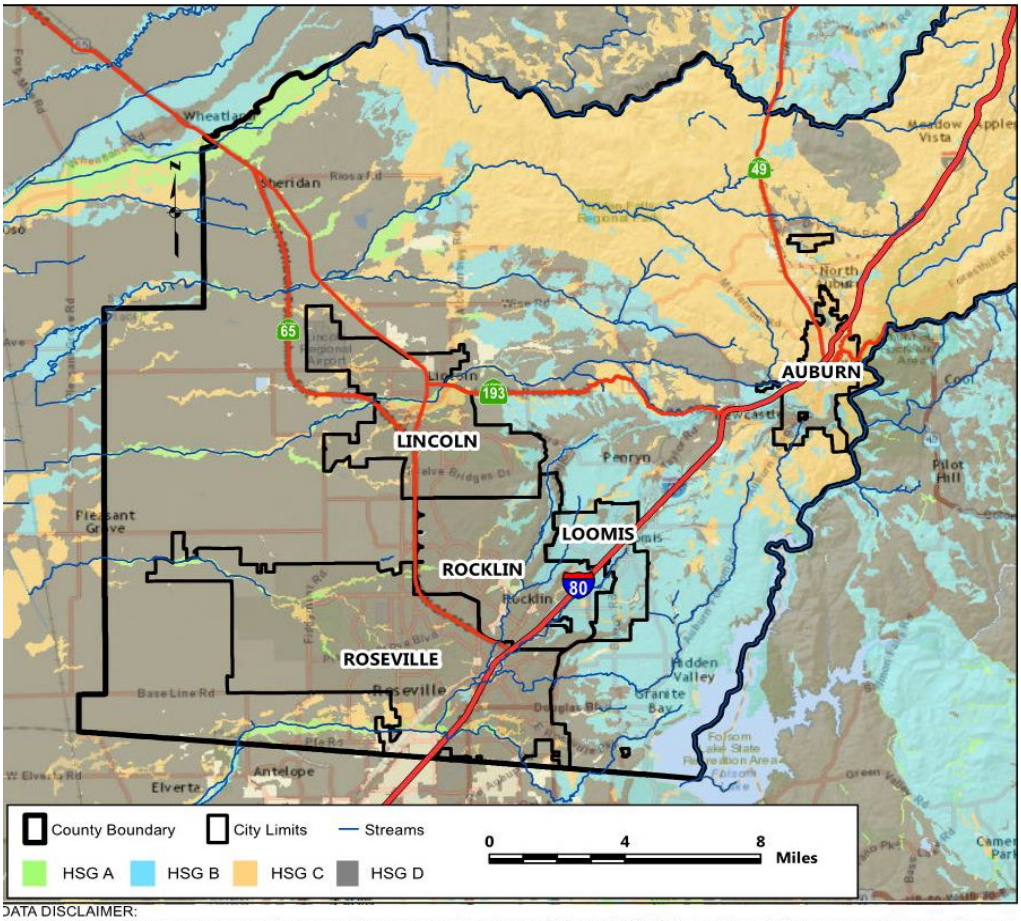


Figure 3-1
NRCS Hydrologic Soil Groups

A site-specific geotechnical investigation should be conducted under the guidance of a licensed geotechnical, soils, or civil engineer and include digging test pits and conducting

[9] The Placer County Stormwater Management Manual is available for download at: https://www.placer.ca.gov/DocumentCenter/View/1249/Stormwater-Management-Manual-PDF?bidId=

infiltration rate measurements in locations where infiltration-based BMPs may be located. Test pits will help confirm the types of soils present onsite, identify soil layers that may impede infiltration, and locate the depth to seasonally high groundwater. Testing should be performed at the soil surface as well as the approximate bottom depth of the infiltration BMP to establish appropriate infiltration rates to support the design process. The infiltration measurement methodology must be selected by an appropriately licensed engineer and applied in a manner that adjusts for the relative influence of sidewall flow in the test configuration to the effectiveness of sidewall flow in the proposed BMP configuration. The potential for long-term degradation of the infiltration rate and the ability to monitor performance and rehabilitate facilities must also be considered. In many cases, the design infiltration rate will be no more than one-half of the adjusted measured rate.

The geological assessment must also evaluate a site's susceptibility to landslides. Landslides occur when the stability of a slope changes from a stable to an unstable condition due to natural and/or anthropogenic causes. Soil saturation is a primary cause of landslides, and infiltration should be limited in areas of high landslide risk, especially when downhill structures, roads, and infrastructure are at risk of being damaged. LID design in areas prone to landslides, especially those that utilize infiltration, should be carefully considered and must be prepared by a licensed civil or geotechnical engineer.

3.1.2 Topography, Hydrology, and Drainage Characteristics

Site topography, hydrology, and drainage characteristics are also critical factors in developing an appropriate site layout for LID implementation. Clearing, grading, and building should be avoided on slopes greater than 25 percent, and, as discussed above, steep slopes and landslide-prone areas are not recommended for infiltration facilities. The design of storm water conveyance and treatment measures relies on existing, or constructed, grades to direct runoff to desired locations and provide adequate hydraulic head (pressure) to drive flows through treatment measures.

The topography of upstream and downstream sites should be considered for any potential contribution to the total runoff generated during a storm event. Designing effective LID into new or existing sites requires a careful analysis of the topography and how and where storm water runoff will concentrate and flow. Site assessment of the pre-developed site during a storm event is highly recommended to observe and map areas of natural infiltration, concentration, flow, and offsite discharge points.

For previously developed sites, record or as-built drawings should be reviewed if available. In the event that topographic data does not already exist for the site or the accuracy of available data is inadequate, a professional topographic survey should be performed prior to proceeding with project design. The survey should produce a detailed topographic base map of the site with contour lines for each foot of elevation change. The survey should also identify the location and elevation of any existing improvements, utilities, and storm water structures (e.g. curb and gutter, swales, catch basins, storm

drain pipe inverts, outfalls). This base map provides the starting point in the development of the site plan.

Hydrologic and drainage characteristics of the site should be identified and assessed including:

- ***Onsite streams and water bodies***: Streams and water bodies should be delineated for the project site to locate setbacks and buffer zones. The presence and extent of receiving waters, wetlands, environmentally sensitive areas (ESAs), and impaired water bodies on the 303(d) list or with established Total Maximum Daily Loads (TMDLs) should be clearly defined (see the SWRCB website below for identification of pertinent water bodies).

  www.waterboards.ca.gov/water_issues/programs/water_quality_assessment

- ***Floodplains and drainage hazards***: Floodplains on the site should be delineated to identify areas where significant flooding may occur. LID principles may be effectively implemented in floodplains, where allowed by the jurisdictional agency, but the impacts of potential flooding on proposed LID improvements should be assessed. LID siting and development within the floodplain should be avoided to the extent practicable. Areas of the site with other potential drainage hazards such as erosion and landslides should also be identified.

- ***Drainage areas, flow paths, and run-on/runoff locations:*** For the pre-project condition, area(s) within the site that drain to common discharge location(s) should be clearly defined. For undeveloped sites, these areas are defined by the natural topography of the site. For previously developed sites, any existing drainage improvements must be considered since they can alter the locations of drainage area boundaries.

  The key characteristics of existing flow paths include locations, direction of flow, and capacity. It is also critical to identify all locations where storm water might enter a site (run-on) and where it discharges from a site.

3.1.3 Existing Vegetation and Natural Areas

LID design strategies include the preserving or enhancing the quality of existing native, and other desirable vegetation to the maximum extent practicable. The designer should identify existing natural and environmentally sensitive areas on the site and consider how these areas can be preserved and integrated into the site design. Avoiding sensitive areas and preserving natural open space may reduce the need for other permits and provides opportunities for reducing the amount of storm water runoff that needs to be treated. Storm water runoff can sometimes be directed to these areas for infiltration and irrigation. Preservation of existing trees and other vegetation can help intercept rainfall and reduce runoff. Where vernal pools are present, it may be necessary to maintain natural runoff quantities to these sensitive areas.

3.1.4 Contaminated Soil or Groundwater

Additional LID design considerations need to be taken into account if a site is determined to be impacted by contaminated soils and/or groundwater. Infiltration of storm water runoff in areas with contaminated soils and/or groundwater should be avoided to prevent further mobilization and dispersion of the pollutants. Sites must be reviewed to ascertain if there is a potential that contamination is present. Redevelopment sites must be investigated for underground storage tanks and other potential sources of contamination. If soil and/or groundwater contamination is suspected, LID implementation must avoid further infiltration of storm water runoff and focus on flow-through type treatment devices.

As part of the Preliminary SWQP, the site must be evaluated for the presence of contamination. The SWRCB maintains a database of registered contaminated sites through their Geotracker® program. Sites with soil contamination (brownfields) and former agriculture sites are managed by EPA and the California Department of Toxic Substances Control. For preliminary investigation of site contamination, the websites for these agencies can be accessed as follows:

- SWRCB: http://geotracker.waterboards.ca.gov/
- EPA Brownfield: http://www.epa.gov/brownfields
- California Department of Toxic Substances Control: http://www.dtsc.ca.gov/SiteCleanup/Brownfields/

3.1.5 Existing Improvements and Easements

Existing improvements from previous on-site development, adjacent properties, public infrastructure, and underground or overhead utilities must be identified and evaluated when planning the site layout. If available, as-built or record drawings should be reviewed and compared to actual site conditions to verify site features such as buildings and structures, parking lots, roads, drainage systems, landscaped areas.

Previously developed sites may have existing underground utilities, including storm water conveyance/detention, sanitary sewers, and/or gas lines, as well as underground or overhead electrical and/or communications lines. Locations of utilities, whether below ground or overhead, must be noted on the site plan so that any conflicts with storm water, or other improvements may be readily identified.

All easement encumbrances for existing or proposed utilities should also be identified and shown on the site plan as they may indicate a future utility, road, or other structure that may conflict with LID features.

Existing improvements and easements can constrain storm water management alternatives.
Photo Credit – Placer County

Chapter 4

Site Planning and BMP Selection

Selection of an effective set of integrated storm water control measures, or BMPs, can be challenging. Each site is unique, and the application of BMPs will vary depending on site characteristics and proposed use of the site. The storm water management requirements vary depending on the different project categories (i.e., Small, Regulated, Hydromodification Management Projects). This chapter provides a step-wise process for selecting complementary BMPs to complete an effective and integrated design.

This chapter is organized by project categories as described in **Chapter 2**. Information in the corresponding subsection(s) below provides guidance for selection of BMPs that are appropriate for the site and project type.

4.1 Small and Regulated Projects - Trash Controls

Small and Regulated Projects must implement controls that prevent trash[10] from entering the storm drain system or surface waters from the project area. The trash controls must meet the design criteria identified below and be selected from the list of full capture systems or multi-benefit trash treatment systems certified by the SWRCB[11]. Projects requiring trash controls that will be implemented in the public right-of-way or will be in easements that will be maintained by the applicable jurisdiction must receive input from the approving jurisdiction and/or be selected from an approved list[12] . Once constructed and implemented, the trash controls must be operated and maintained consistent with the manufacturer's specifications and/or requirements as specified by the applicable jurisdiction and/or the SWRCB (**Chapter 5**)[13].

4.1.1 Full Capture Systems (FCS)

An FCS is defined as a treatment control, or series of treatment controls, including but not limited to, a multi-benefit trash treatment system or an LID control that meets the design criteria and operations and maintenance requirements. An FCS must be designed to trap all particles that are 5 mm or greater, and have a design treatment capacity that either:

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[10] All improperly discarded solid material from any production, manufacturing, or processing operation including, but not limited to, products, product packaging, or containers constructed of plastic, steel, aluminum, glass, paper, or other synthetic or natural materials.
[11] See the current lists https://www.casqa.org/resources/trash
[12] A current list of devices may be obtained by contacting the applicable jurisdiction's Storm Water Program.
[13] The current design and operations and maintenance criteria are provided by the State Water Resources Control Board and can be found here https://www.waterboards.ca.gov/water_issues/programs/stormwater/trash_implementation.html

a) Of not less than the peak flow rate, Q, resulting from a one-year, one-hour, storm in the subdrainage area (0.362 inches), or

b) Appropriately sized to, and designed to carry at least the same flows as, the corresponding storm drain.

The rational method equation is used to compute the peak flow rate: Q = C * I * A

Q = design flow rate (cubic feet per second, cfs)

C = runoff coefficient (dimensionless)[14]

I = design rainfall intensity (inches per hour)

A = subdrainage area (acres)

In addition, the installation shall also be designed according to the following criteria:

a) Do not bypass trash below the design storm under maximum operational loading conditions; and

b) Do not have a diversion structure present upstream such that a portion of the peak flow is not treated to trap all particles 5 mm or greater.

4.1.2 Multi-Benefit Trash Treatment Systems

A multi-benefit trash treatment system (MBTTS) is defined as a treatment control project designed to achieve any of the benefits set forth in section 10562, subdivision (d) of the Water Code. MBTTS may be considered an FCS so long as it meets the design criteria as well as criteria for operations and maintenance. Certified MBTTS must be designed, installed, and maintained to perform in accordance with the following:

1. A MBTTS[15] shall be designed and maintained to trap trash particles that are 5 mm or greater for the following:
    a. The peak flow rate generated by the region specific 1-year, 1-hour storm event from the applicable sub-drainage area; or
    b. The peak flow rate of the corresponding storm drain (if corresponding storm drain is designed for less than the peak flow rate generated from a 1-year, 1hour storm event).
2. MBTTS may include either or both of the following to trap trash particles for either flow described above in section 1.a or 1.b:
    a. A screen at the system's inlet, overflow, or bypass outlet; or

[14] C values for various materials are as follows: roofs 0.95, asphalt/concrete pavement 0.90, gravel pavement 0.80, turf 0.25, disturbed soil 0.25.
[15] Certified MBTTS, including those that are volume based, shall have a design capacity to trap trash from flows not less than the peak flow rate at any time within a storm event.

   b. An upgradient structure designed to bypass flows exceeding the flows described above in section 1.a or 1.b.[16]

3. The peak flow rates referenced in section 1.a, above, shall be calculated using one of the following methods:
   a. For small drainage areas (generally less than 50 acres) – the Rational Equation Method (Q = C * I * A)
   b. For large drainage areas (~50 acres or more) other accepted hydrologic mathematical methods are allowed that more accurately calculate peak flow rates from large drainage areas.
4. A MBTTS design shall be stamped and signed by a registered California licensed professional engineer as required by California Business & Profession Code sections 6700, et seq.

The types of approved MBTTS include:

- Bioretention;
- Capture and Use Systems;
- Detention Basin;
- Infiltration Trench or Basin; or
- Media Filter.

4.2 Small Projects

For Small Projects a site plan showing the layout of improvements and storm water control measures is required to demonstrate consideration of the following:

- Define the development envelope and protected areas, identifying areas that are most suitable for development and areas to be landscaped, or left undisturbed, and used for infiltration (**Sections 3.1.1 through 3.1.5**).
- Minimize overall impervious coverage (paving and roofs) of the site.
- Set back development from creeks, wetlands, and riparian habitats in accordance with local ordinances. To the extent practicable, avoid developing, including siting of LID features, within the floodplain (**Sections 3.1.1 through 3.1.3**). Preserve significant trees and native vegetation (**Section 3.1.3**).
- Conform the site layout along natural landforms (**Section 3.1.2**).

[16] Upon approval by the Central Valley Regional Water Quality Control Board Executive Officer, a 5mm screen and/or upgradient structure may not be required if a MBTTS is designed for flows generated from very large 24-hour storm events.

- Avoid excessive grading and disturbance of vegetation and soils and stabilize disturbed areas.
- Replicate the site's natural drainage patterns (**Section 3.1.2**).
- Locations for trash controls, as applicable (**Section 4.1**).

Implementation of one or more Site Design Measure(s), listed in **Table 4-1**, is required to reduce project site runoff. The Site Design Measure(s) must be included on the site plan and final improvement plans that are submitted with the building permit application.

Note that some of the Site Design Measures for Small Projects are required to be designed by an appropriately qualified professional engineer licensed in the State of California. Fact Sheets in **Appendix B** provide detailed descriptions and design requirements for each Site Design Measure listed.

Additional guidance for incorporating the required storm water measures into Small Projects is provided in **Chapter 6** and the SWQP Template in **Appendix A**.

Table 4-1 Selection of Site Design Measures for Small Projects[1]

Small Projects must incorporate at least one Site Design Measure	Fact Sheet (Appendix B)	Selection Considerations
Adjacent/On-Site Stream Setbacks and Buffers	SDM-1	Applicable for sites with streams on, or directly adjacent to the property.
Soil Quality Improvement and Maintenance	SDM-2	Consult a qualified professional before using in areas of high groundwater, soil or groundwater contamination, or slopes greater than 10 percent.
Tree Planting and Preservation	SDM-3	Irrigation requirements Defensible space for wildfire
Rooftop and Impervious Area Disconnection	SDM-4	Roof drain discharge must be at least six (6) feet from a basement and at least two (2) feet from a crawl space or structural foundation.
Porous Pavement	SDM-5	Consult a professional engineer before using in areas of high groundwater, soil or groundwater contamination, or slopes greater than 10 percent.
Vegetated Swales	SDM-6	Consult a professional engineer before using in areas of high groundwater, soil or groundwater contamination, or slopes greater than 10 percent.
Rain Barrels and Cisterns	SDM-7	Operation and Maintenance requirements

Table 4-1 Selection of Site Design Measures for Small Projects[1]

Small Projects must incorporate at least one Site Design Measure	Fact Sheet (Appendix B)	Selection Considerations

1. The Phase II Permit also allows the use of green roofs. This Site Design Measure has been omitted from this Manual as a practice that may not be suitable due to the climate of the region and water conservation requirements. However, project applicants may propose green roofs as a Site Design Measure for consideration on a case-by-case basis.

4.3 Regulated Projects

This section provides guidance for site design considerations and the selection and layout of storm water and trash control measures for Regulated Projects. The approach consists of applying information from the site assessment to lay out improvements and BMPs to reduce storm water runoff volumes and pollutant concentrations. This information is intended as a reference source for the development of SWQPs for Regulated Projects which are required to be completed by an appropriately qualified professional engineer licensed in the State of California.

Requirements for Regulated Projects include the following:

- Completing a site assessment to evaluate local conditions and identify LID opportunities and constraints;
- Developing a site layout that incorporates LID storm water management strategies;
- Implementing Site Design Measures to reduce surface runoff by infiltration, evapotranspiration, and/or harvesting and use as close to its source as possible;
- Implementing Storm Water Treatment and Baseline Hydromodification Measures using bioretention-based facilities or facilities of demonstrated equivalent effectiveness;
- Implementing biotreatment/media filters for special case exceptions to bioretention or facility of demonstrated equivalent effectiveness;
- Implementing trash controls, as applicable (**Section 4.1**);
- Implementing hydromodification management measures to control post-project runoff rates (required for projects that create or replace more than one (1) acre of impervious surface and result in a net increase in impervious area);
- Securing access for continued maintenance of LID and trash control measures, and
- Maintaining and implementing an O&M Plan.

For maximum effectiveness, the BMPs listed above should be designed to work together in an integrated system. BMPs can be designed in series to provide multiple treatment steps for pollutant removal and volume reduction. Pretreatment, which refers to design features that facilitate the settling of large particles before storm water enters a storm water treatment facility, is important to ensure proper operation of the facility and reduce the long-term maintenance burden. Perhaps the most common example is a sediment trap placed upstream of another BMP to remove bulk coarse solids in a location that is easily accessed for maintenance upstream from a facility that provides further treatment and runoff reduction. By reducing sediment loads entering a bioretention facility or other infiltration-based facility, pretreatment protects the engineered planting media and/or underlying soil from being occluded prematurely and maintains the infiltration rate of the facility. Another example is installing an oil/water separator upstream of another BMP to remove potential hazardous materials prior to infiltrating runoff. The Phase II Permit requires that additional treatment steps be considered in high-risk areas such as fueling stations, truck stops, auto repairs, and heavy industrial sites to protect groundwater quality.

The completed SWQP for Regulated Projects provides a multi-layered approach to protect water quality and downstream water bodies. The following sections describe the site planning and BMP selection processes that must be used to develop an effective, integrated SWQP.

4.3.1 Site Plan Layout

The results of the site assessment are used to develop the layout of improvements and the site plan, which is submitted with the Preliminary SWQP (see **Figure 4-1** for an example). A list with the information required to be included on the site plan is provided in **Chapter 6** under the Form 3-4 guidance. The site plan, together with the SWQP, documents consideration of the following items:

- Define the development envelope and protected areas, identifying areas that are most suitable for development and areas to be left undisturbed (**Sections 3.1.2 through 3.1.4**);
- Concentrate development on portions of the site with less permeable soils and preserve areas that can promote infiltration (**Section 3.1.1**);
- Minimize overall impervious coverage (paving and roofs) of the site;
- Set back development from creeks, wetlands, and riparian habitats in accordance with local ordinances. To the extent practicable, avoid developing, including siting of LID features, within the floodplain (**Sections 3.1.2 and 3.1.3**);
- Preserve significant trees (**Section 3.1.3**);

- Conform the site layout along natural landforms (**Section 3.1.2**);
- Avoid excessive grading and disturbance of vegetation and soils;
- Replicate the site's natural drainage patterns (**Section 3.1.2**); and
- Detain and retain runoff throughout the site.

4.3.1.1 Drainage Management Areas

As the proposed new or replaced impervious surfaces are laid out, the associated drainage management areas (DMAs) must be defined and identified on the site plan. DMAs are the tributary areas within the project site that drain to a common location where BMPs can be implemented to reduce and treat storm water runoff. DMAs must be carefully defined for each BMP that receive storm water runoff (from both pervious and impervious surfaces) so that they may be appropriately designed. Ideally, DMAs are defined and identified by separating areas that may drain pervious and impervious surfaces. However, depending on the project site grading, it may not be possible to completely separate pervious and impervious surfaces when defining and identifying DMAs. If multiple types of surfaces are present in a DMA, an appropriate composite storm water runoff coefficient must be used. The placement of BMPs and identification of DMAs is typically an iterative process as alternative layouts and storm water management strategies are developed and considered.

As described previously, an LID storm water management strategy for a project site can involve the implementation of various BMP combinations in series. Generally, upstream BMPs, or Site Design Measures, are smaller, distributed measures that function to slow and reduce runoff. Downstream BMPs, or Storm Water Treatment and Baseline Hydromodification Measures, function to remove pollutants from the remaining runoff and provide additional runoff flow rate and volume control. BMPs are not required to account for flows/volumes that have already been treated by upstream or downstream BMPs. In some cases, DMAs that discharge to separate upstream BMPs may need to be combined for the design of BMPs located further downstream in the site's drainage system.

The site plan provided in **Figure 4-1** presents an example of a new development project consisting of an office building, driveway, and parking lot. The site was separated into four discrete DMAs. DMA 1 consists of the western portion of the office building roof, DMA 2 consists of the eastern portion of the office building roof, DMA 3 consists of a paved driveway, and DMA 4 consists of a paved parking lot.

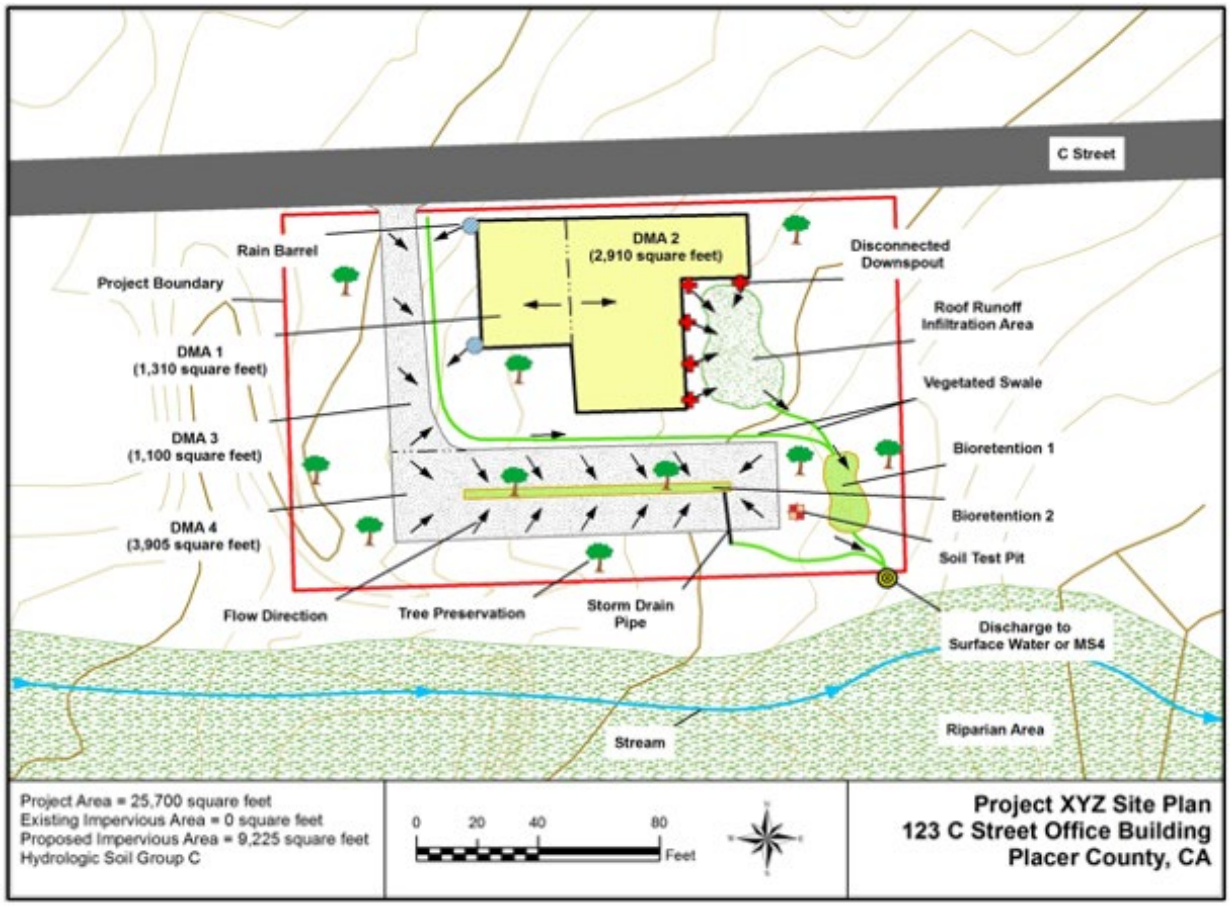

Figure 4-1
Site Plan Example

Site Design Measures and storm water treatment/baseline hydromodification BMPs (bioretention) to manage runoff from each DMA are also included in **Figure 4-1**. Roof runoff from DMA 1 discharges to two rain barrels. The rain barrels overflow to a vegetated swale which discharges to a bioretention BMP during larger storm events. Roof downspouts from DMA 2 discharge away from the building to a natural depression where infiltration occurs. The natural depression area overflows into a vegetated swale which conveys runoff to a bioretention BMP. Driveway runoff from DMA 3 slopes towards a vegetated swale which also conveys runoff to a bioretention BMP during larger storm events. In this example, DMAs 1, 2, and 3 all discharge to the same bioretention BMP which would need to be designed to treat flows from all three DMAs. Parking lot runoff from DMA 4 flows to a separate bioretention BMP (parking lot landscaped area) which contains two existing trees to be preserved. Treated storm water and overflow from both bioretention BMPs is combined at a single discharge point and released offsite into the municipal storm drain system or natural drainage way.

4.3.2 Source Control Measures

After properly assessing a site and refining the layout, source control measures are implemented to reduce the potential for storm water runoff and pollutants from coming into contact with one another. The goal of source control measures is to keep water clean.

Source control measures can include both structural and operational measures. Structural source control measures include a physical or structural component for controlling the pollutant source such as installing an efficient irrigation system to prevent overspray and off-site runoff or covering trash enclosures or fuel dispensing operations. Operational source control measures involve practices such as storm water management training, trash management and litter control practices, and general good housekeeping practices. When properly implemented, source control measures are effective in preventing pollutants from entering storm water runoff and are typically less expensive than other types of storm water BMPs.

Regulated Projects with potential pollutant-generating activities and sources are required to implement applicable structural and/or operational source control measures. Selection of source control measures must be based on an assessment of potential pollutant generating activities or sources that are anticipated to occur at the site. Depending on the site operations and activities, typical pollutants of concern that can be mobilized and transported by storm water runoff may include, but are not limited to, microbial pathogens (bacteria and viruses), metals, nutrients, toxic organic compounds, suspended solids/sediment, trash and debris, and oil and grease. Some examples of source control measures include trash enclosures, street or parking lot sweeping, and proper materials storage practices.

In some areas, downstream water bodies may be impaired, or subject to TMDL requirements (**Chapter 3**). In these situations, the pollutant(s) of concern must be identified along with any additional actions that may be required to control potential releases of the pollutant(s).

The Source Control Measures Selection Table (**Appendix C**) shall be used as a guideline to identify and select source control measures for inclusion in the SWQP. In some cases, multiple source control measures will be used in combination. The table does not include all possible pollutant generating project characteristics/activities that may warrant the consideration of source control measures and additional operational or structural source control measures may be required.

The California Stormwater Quality Association (CASQA) Storm Water BMP Handbooks, or an accepted equivalent reference document, provide recommended guidance for design of source control measures. CASQA has published several storm water BMP handbooks for various project applications and settings, and the source control measures identified in **Appendix C** reference fact sheets in one or more of these handbooks. The

identification codes in the table correspond to the CASQA fact sheets which can be referenced for more information on each source control measure. The CASQA Storm Water BMP Handbooks are available for purchase at:

www.casqa.org/resources/bmp-handbooks/

4.3.3 Site Design Measures (LID BMP Selection)

Site Design Measures are generally small-scale, distributed BMPs that are intended to reduce and treat surface runoff volumes by managing storm water as close to its source as possible. Site Design Measures often incorporate vegetation which can further reduce runoff through evapotranspiration. These storm water controls are critical for maintaining a site's predevelopment hydrology, which is a primary goal of LID.

Distributed Site Design Measures, such as this cistern, can provide significant reductions in site runoff.
Photo Credit – U.S. EPA

Regulated Projects are required to incorporate the Site Design Measures listed in **Table 4-3** to the extent technically feasible with the objective of retaining the impervious runoff volume generated by the post-construction 85th percentile, 24-hour storm event by means of infiltration, evapotranspiration, and/or harvesting and use. Typical feasibility considerations are included in the table, but technical feasibility can vary based on a wide variety of site specific conditions that must be evaluated and determined by a professional engineer. Technical feasibility also requires approval by the jurisdictional agency.

If Site Design Measures applied are demonstrated to completely treat and retain the impervious runoff from the post-construction 85th percentile, 24-hour storm event, then no additional downstream BMPs are required. This determination is made during the development of the SWQP (**Appendix A**). The Site Design Measure Fact Sheets (**Appendix B**) provide detailed descriptions and design requirements for each measure listed in **Table 4-2**.

Table 4-2 Selection of Site Design Measures for Regulated Projects[1]

Regulated Projects must incorporate Site Design Measures to the Extent Technically Feasible	Fact Sheet (Appendix B)	Feasibility Considerations
Stream Setbacks and Buffers	SDM-1	▪ Applicable for sites with streams on or directly adjacent to the property.
Soil Quality Improvement and Maintenance	SDM-2	▪ Not suitable in areas of high groundwater, soil or groundwater contamination, or slopes greater than 10 percent.
Tree Planting and Preservation	SDM-3	▪ Irrigation requirements ▪ Defensible space for wildfire
Rooftop and Impervious Area Disconnection	SDM-4	▪ Roof drain discharge must be at least six (6) feet from a basement and at least two (2) feet from a crawl space or structural foundation.
Porous Pavement	SDM-5	▪ Not suitable in areas of high groundwater, soil or groundwater contamination, or slopes greater than 10 percent. ▪ Not ideal for sites with infiltration rates less than 0.5 in/hr. ▪ Not suitable in areas with heavy equipment or traffic loads. ▪ Sediment deposition will cause clogging.
Vegetated Swales	SDM-6	▪ Not suitable in areas of high groundwater, soil or groundwater contamination, or slopes greater than 10 percent.
Rain Barrels and Cisterns	SDM-7	▪ Must be emptied to re-establish storage volume between storm events.

1. The Phase II Permit also allows the use of green roofs. This Site Design Measure has been omitted from this Manual as a practice that may not be suitable due to the climate of the region and water conservation requirements. However, project applicants may propose green roofs as a Site Design Measure which will be evaluated on a case-by-case basis.

4.3.4 Storm Water Treatment and Baseline Hydromodification Management

Bioretention can be integrated into a site's landscaping to provide water quality and aesthetic benefits while also reducing project costs.
Photo Credit – Greg Bates

After implementation of Site Design Measures, remaining runoff that is not retained by the Site Design Measures must be directed to storm water treatment/baseline hydromodification facilities sized to manage the remaining portion of the post-construction 85th percentile, 24-hour storm event runoff. These treatment facilities, also known as bioretention facilities, are designed to infiltrate, evapotranspire, and/or bioretain the remaining storm water similar to the LID principles of the Site Design Measures. Depending on site characteristics, infiltrating or non-infiltrating flow-through bioretention facilities are typically used to meet this requirement. Infiltrating systems are preferred, and the use of flow-through systems with impervious liners to prevent infiltration is only permitted in several specific cases. These specific circumstances include shallow groundwater conditions, the existence of underlying groundwater or soil contamination, when infiltration creates the potential for geotechnical hazards, or when the facility is located on an elevated plaza or other structure. Bioretention facilities provide pollutant removal through several mechanisms including sedimentation, filtration, and biological processes. Additionally, they reduce runoff volumes and peak flow rates to mitigate the potential hydromodification effects of development.

The determination of which type of storm water treatment/baseline hydromodification control measure(s) to implement can be made using the following flow chart in **Figure 4-2**. As shown, infiltrating bioretention BMPs are required in the majority of cases. Once the appropriate storm water treatment BMP(s) is (are) selected, refer to the corresponding Fact Sheet (**Appendix B**) for further design considerations and allowable variations.

In addition, and consistent with **Section 4.1**, trash full capture systems must be installed.

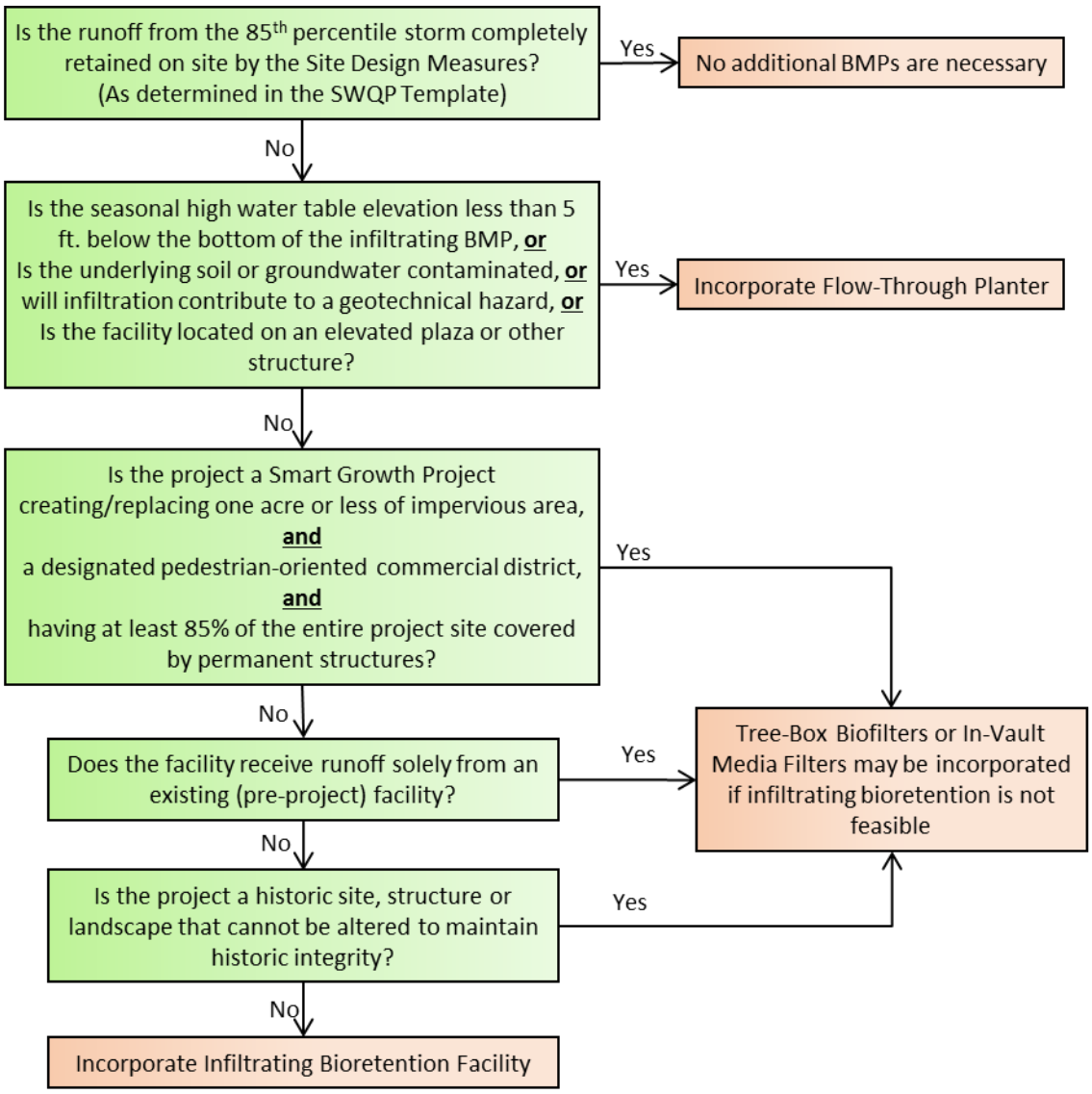

Figure 4-2
Selection of Storm Water Treatment/Baseline Hydromodification Controls

Alternative storm water treatment and baseline hydromodification facilities may be proposed by the designer if the designer can demonstrate that the proposed facility meets all of the following measures of equivalent effectiveness criteria when compared to bioretention facilities:

- Equal or greater amount of storm water runoff infiltrated or evapotranspired for alternatives to infiltrating bioretention facilities
- Equal or greater rate of storm water treatment for flow-through facilities

- Equal or lower pollutant concentrations in storm water runoff that is discharged after biotreatment
- Equal or greater protection against shock loadings and spills
- Equal or greater accessibility and ease of inspection and maintenance

Proposed alternative storm water treatment and baseline hydromodification facilities will be reviewed on a case-by-case basis by the jurisdictional agency. Again, these alternative configurations must include trash full capture systems consistent with **Section 4.1**.

4.4 Hydromodification Management Projects

The term "hydromodification" is used to define the changes that occur to the natural hydrologic systems of streams and watersheds due to the alteration of land surface characteristics and how they have the potential to disrupt natural balances within the watershed. Hydromodification resulting from land development has the potential to create impacts such as excessive erosion, sediment transport and deposition, stream bed instability, loss of habitat, pollutant loading, and damage to the overall ecosystem in downstream reaches of watershed systems. The dynamics of development projects have historically decreased groundwater recharge, increased runoff volume and peak flow frequencies, and altered the natural hydraulic loading of the receiving water (creek system) hydrology. Most LID principles incorporated into this Manual begin to address and minimize these impacts. In the event that storm water runoff reductions do not meet post-construction condition requirements, as demonstrated with the runoff reduction calculator (made part of the Storm Water Template provides in **Appendix A**), additional hydromodification treatment measures are required for Regulated Projects creating and/or replacing one acre or more of impervious surface that create a net increase in impervious surface.

The required performance standard for hydromodification control consists of maintaining post-project runoff at or below pre-project flow rates for the 2-year, 24-hour storm event. If this standard can be achieved through the implementation of Site Design Measures and storm water treatment/baseline hydromodification controls (as referenced in **Section 4.2** above), then no further storm water controls are required. If post-construction peak flows do not meet this standard, then additional storage capacity with flow control at the discharge point must be incorporated into the design. Note that treatment controls are not required for the difference between the runoff volume generated by the 85th percentile, 48-hour storm event and the 2-year, 24-hour storm event. Only flow controls (detention) are required for this additional volume.

For hydromodification management projects in sensitive environmental locations, and/or larger sized projects with complex hydrologic characteristics, the jurisdictional

agency may require an alternative approach to using the template forms. In these cases, additional hydrologic modeling analyses, using modeling platforms such as a HEC-1 or HEC-HMS discrete storm analysis, may be required to compare pre- and post-project discharge rates for compliance. In these cases, the **Section 4** form should be replaced with documentation of model results showing that post-construction runoff is less than or equal to the pre-construction runoff rate for a 2-year, 24-hour storm event.

BMP selection for hydromodification controls should be based on the amount of additional storage needed. Additional storage capacity for hydromodification management can be provided by either increasing the size of the control measures (e.g., Site Design Measures or storm water treatment and baseline hydromodification facilities) that are already incorporated in the design or by adding separate structures such as detention basins or vaults. Detained runoff needs to be released within 48-hours of the storm's passing to prevent potentially contributing to vector breeding.

Project owners and those supporting them comply with hydromodification management requirements should follow the procedures outlined in **Chapter 6** and the SWQP Template to determine the additional storage volume required and select a viable alternative. If relatively little additional storage is needed, then increasing the capacity of the Site Design and/or storm water treatment measures is likely to be the preferred alternative. For larger additional storage requirements, separate detention facilities are recommended.

4.5 In Lieu Program – Future Consideration

Storm water management requirements must be met within and on the project site to the MEP standard as specified in this Manual. If the storm water management goals specified in this Manual cannot be fully met on the project site due to feasibility constraints, then an In Lieu Project may be identified to satisfy the remaining requirements. All projects that utilize the In Lieu program require review and approval by the CVRWQCB in addition to the jurisdictional agency. At this time, an In Lieu Program is not yet available to developers in areas served by this Manual (the County of Placer, City of Roseville, City of Auburn, City of Lincoln, and the Town of Loomis). Nevertheless, the Manual outlines and explains process of setting up of a potential In Lieu Program to ensure coverage should such a program be developed at a local level and offered as a potential option for projects in the future. At the time of Manual revision, the Statewide Trash Amendments do not allow for In Lieu compliance effectively limiting a theoretical In Lieu Program to projects that do not contain PLUs.

The In Lieu program provides two options:

Option 1- In Lieu Projects

A separate LID or other environmental protection/enhancement project may be selected from the list of pre-approved projects developed by the jurisdictional agency and approved by the CVRWQCB. If an In Lieu Project option is chosen, the jurisdictional agency will identify the In Lieu Project in the Conditions of Approvals to ensure that the requirement is documented in case the property and/or project is sold or ownership is transferred. The pre-approved list of In Lieu Projects may be amended periodically on a case-by-case basis with approval from both the CVRWQCB and jurisdictional agency.

In Lieu Projects should treat the same type of pollutants that are generated by the untreated portion of the new development or redevelopment project. For example; if the untreated portion of the new development or redevelopment site is roadway, then the In Lieu Project selected should treat runoff from a roadway.

In Lieu Projects should be located within the same jurisdiction or unincorporated area in which the new development or redevelopment project causing the impact is located. Projects located in other areas may be approved on a case-by-case basis. Projects that have the potential to cause a significant impact to a particular water body, as determined by the jurisdictional agency, either because of the size of the project or the sensitivity of the water body, will need to choose an In Lieu Project in the same watershed, if feasible.

In Lieu Projects must be implemented within two years of the completion of the qualifying new development or redevelopment project. If additional time is needed to complete the In Lieu Project, an extension may be requested and approved on a case-by-case basis. To compensate for long-term water quality and hydromodification impacts downstream of the project, penalties, in the form of additional fees or additional treatment areas, may be imposed on projects requiring time extensions by the jurisdictional agency.

Option 2 - In Lieu Fee

An In Lieu Fee may be paid toward the completion of a larger project from the pre-approved list. The amount of the In Lieu Fee will be calculated based on the treatment and/or volume capture not achieved on the project site, including maintenance costs, times a multiplier.

Chapter 5

BMP Inspection, Operation and Maintenance

Treatment controls required for Regulated Projects must *meet manufacturers' or designer's recommendation for operation and maintenance* to ensure that the facilities are functioning as designed and do not create health and safety hazards.

To support these requirements, owners of Regulated Projects must provide specific operations and maintenance (O&M) related information with the SWQP during the project permitting process and submit annual self-certification reports documenting that the O&M activities are performed to ensure that BMPs are functioning properly. Sites must be designed to allow access to the BMPs for the necessary inspection and maintenance activities.

5.1 Operation and Maintenance for Trash Full Capture Systems

Specific requirements for trash controls include the following:

- Full Capture Systems - FCS must be operated and maintained in a manner that is consistent with the manufacturer's recommendations/requirements.
- Multi-Benefit Trash Treatment System - MBTTS must be operated and maintained in a manner that is consistent with the designer's recommendation. Additionally, regular maintenance is required to maintain adequate trash capture capacity and to ensure that captured trash does not migrate offsite. The owner shall establish a maintenance schedule based on site-specific factors, including the design trash capacity of the MBTTS, storm frequency, and estimated or measured trash loading from the drainage area. Additional information for each of the MBTTS can be found on the SWRCB's certified MBTTS summary[17].

5.2 Operation and Maintenance Submittal Requirements at the Permitting Stage

The following items are required to be included in the SWQP for all Regulated Projects:

- A signed statement from the project owner accepting responsibility for inspection and O&M activities for all treatment controls at the project site until such responsibility is legally transferred to another entity. If the project owner

[17] https://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/trash_implementation/mbts_coversheet_19jun19.pdf

transfers this responsibility to a jurisdictional entity, the facilities in need of O&M need to be located on a stand-alone parcel on the tentative/final project plan, with publicly-available access or a dedicated easement.

- A signed statement from the project owner granting access to all representatives of the jurisdictional agency for the sole purpose of performing inspections of the installed treatment systems(s), and hydromodification control(s) if any. Alternatively, this requirement is considered satisfied if an easement dedication or irrevocable offer of dedication is made to the jurisdictional agency providing equivalent access.
- A list of all treatment controls on the project site and their specific inspection and O&M requirements. BMP-specific inspection and O&M requirements are included on the respective Fact Sheets (**Appendix B**). It is the responsibility of the project owner to review these requirements and develop a detailed site-specific O&M Plan to document these requirements and include it with the SWQP.
- A copy of any maintenance agreements that modify the BMP O&M responsibilities for the project.

5.3 Annual Self-Certification Reports

In addition to the above items, which are required at the permitting phase, Annual Self-Certification Reports must be submitted by the responsible party for the life of the project. In accordance with the Phase II Permit, the Annual Self-Certification Reports must include, at a minimum, the following information:

- Dates and findings of field observations to determine the effectiveness of the treatment controls in removing pollutants of concern from storm water runoff and/or reducing hydromodification impacts as designed.
- Long-term plan for conducting regular maintenance of BMPs, including the frequency of such maintenance.

Where available, responsible parties are encouraged to consult the website of their applicable local jurisdiction for updated information and additional resources regarding the Annual Self-Certification requirements.

Agency	Weblink
County of Placer	Annual Self Certification
City of Roseville	Annual Self Certification
City of Auburn	Not Available
City of Lincoln	Not Available
Town of Loomis	Annual Self Certification

Chapter 6

Developing a Post-Construction Storm Water Quality Plan (SWQP)

This chapter, in conjunction with the SWQP Template in **Appendix A**, provides project applicants, project owners, and design professionals with supplemental guidance for developing a SWQP for the various project categories defined in this Manual.

The SWQP Template also provides planning and design review staff with a standardized submittal format to streamline the project review and approval process. In some cases, if the applicant wishes to propose alternative storm water control measures, supplemental documentation is required to be submitted to demonstrate equivalent performance per the listed criteria.

The SWQP for Regulated Projects must outline project compliance with the requirements of this Manual and include a signed certification statement by a California licensed professional engineer and project owner accepting responsibility for its development and implementation. SWQPs for Small Projects do not require a professional engineer's certification, however; some storm water control measures may require engineered designs. A copy of the Final SWQP shall be available at the project site for the duration of construction and then stored with the project approval documentation and improvement plans in perpetuity.

The SWQP development process begins with identifying the Project Category (see **Chapter 2**) and completing the corresponding sections in the SWQP template. **Table 6-1** below lists the sections in the SWQP that must be completed for each Project Category.

Table 6-1 Required SWQP Sections by Project Category

Project Category	Required SWQP Sections
Small Projects	Sections 1 and 2
Regulated Projects, Regulated Redevelopment Projects, Regulated Road Projects, and Regulated LUPs	Sections 1, 3, 5 and 6
Regulated Hydromodification Management Projects	Sections 1, 3 through 6

For Small Projects, the project owner may prepare the SWQP. If the SWQP is prepared by the project owner, then the project owner takes responsibility for ensuring the proper

design of any storm water control measures that are included in the project. For Regulated Projects, a California licensed professional engineer is required to prepare, sign, and stamp the SWQP. Storm water control measures described in this Manual must be designed by, or under the supervision of, a qualified California licensed professional engineer with other specialists as may be needed.

Using the SWQP Template (Appendix A)

The SWQP Template is an automated Microsoft Excel-based tool that is provided in electronic format. The user proceeds through a series of pages by opening the workbook tabs which are labeled to indicate which form they contain. Required information is entered in the shaded gray cells, while other cells will self-populate, to complete the form. Each section below provides supporting information and guidance on completing the associated forms in the SWQP Template. Other more detailed reference information is provided in the preceding Chapters of this Manual and in the BMP fact sheets in **Appendix B**.

Title Page

The title page identifies the project, project owner, and individual or consulting firm responsible for the preparation of the SWQP. It also lists the jurisdictional agency with approval authority for the project and responsibility for implementing the requirements of the Phase II Permit.

Project identification information such as Building or Grading Permit Numbers may vary among the jurisdictional agencies and should be included as appropriate for the specific project.

The SWQP preparation date is added by the preparer and the approval date is added by the approving jurisdictional agency to the cover as they become available.

Section 1 General Project Information

Section 1 documents basic information pertaining to the project and identifies the individual(s) responsible for the development and implementation of the SWQP. The Project Category is identified here.

There are two forms to be completed in Section 1 as follows:

Form 1-1 Project Identification and Owner's Certification

Form 1-1 supplements information provided on the title page with additional detail including the project address and a brief description of the project. For larger or more complex projects, sheets may be added to describe the project.

The project owner's signature is required to certify that they take responsibility for proper implementation of the SWQP. For Regulated Projects, the project owner signature

also provides permission to access to all representatives of the jurisdictional agency for the sole purpose of performing O&M inspections of the installed treatment system(s) and hydromodification control(s), if any.

For Regulated Projects, a California licensed professional civil engineer is required to sign and stamp the SWQP. The professional engineer is responsible for designing all of the storm water control measures for the project site and developing the SWQP per the requirements set forth in the Phase II Permit and this Manual.

Form 1-2 Project Category

Form 1-2 identifies the project category. Determine the appropriate category by determining the land use type of the project, quantifying the size of the newly created and/or replaced impervious surface, and using the decision tree in **Figure 2-3**. Once the project category is determined, check the appropriate box(es) on the form.

For redevelopment projects, determine the percent increase of impervious surface and check the appropriate box. The percent increase calculation must include both newly created and replaced surfaces.

Use the form to indicate if the project is a road or linear underground/overhead project (LUP) that creates 5,000 ft^2 or more of newly constructed contiguous impervious surface or is a public road project and/or falls under the building and planning authority of a jurisdictional agency.

After determining and checking the appropriate project category, enter the total new and/or replaced impervious surface area for the project.

Section 2 Requirements for Small Projects

Owners of Small Projects are required to complete the forms in Section 1 and 2 of the SWQP Template. The forms in Section 2 guide the development of the project layout, as discussed in **Chapter 4**, and incorporate one or more of the Site Design Measures listed in **Table 4-1**. **Section 2** includes two forms to address these requirements.

Form 2-1 LID Site Assessment and Layout Documentation

The goal of the site assessment is to develop the site in a way that minimizes impacts to the site hydrology and other environmental functions and processes. The form lists a series of considerations that should be taken into account when developing the layout. For each item, check the appropriate box to indicate that it has been considered and appropriately incorporated or that it is not applicable (N/A) and provide a brief explanation (use a separate sheet if necessary). To complete this form, develop and attach the site plan that illustrates the proposed site layout. The site plan may consist of a preliminary, or conceptual level design drawing, and it is a key requirement of the Preliminary SWQP described in Section 2.

Ensure that the following items, at a minimum, are included in the site plan:

- Site boundary;
- Topographic data with one-foot contours (five foot contour intervals may be used for steeper sites);
- Existing natural hydrologic features (e.g., depressions, watercourses, wetlands, riparian corridors);
- Floodplain boundaries;
- Environmentally-sensitive areas and areas to be preserved;
- Proposed locations and footprints of improvements creating new or replaced impervious surfaces;
- Proposed site drainage with flow directions and site run-on and discharge locations; and
- Proposed Site Design Measures to reduce runoff.

Form 2-2 Runoff Reduction Calculator Site Design Measures for Small Projects

This form is used to identify one or more Site Design Measures to implement for Small Projects and calculate the associated storm water runoff reduction. After identifying the Site Design Measure(s), enter the associated dimensions and quantity information into the form to calculate the storm water runoff reduction and effective treated impervious area. There is no minimum runoff reduction required for Small Projects. Design guidance for Site Design Measures is provided in the Fact Sheets in **Appendix B**. The equations, variables and units that are used to calculate the Site Design Measure volume reductions (V_r) are presented below for reference.

Adjacent/On-Site Stream Setbacks and Buffers

$$V_r = \left(\frac{1\ ft}{12\ in}\right) \times A_{imp} \times V_{85}$$

A_{imp} (ft^2) - Impervious drainage area discharging to the buffer
V_{85} (in) – Runoff volume from the 85th percentile, 24-hour design storm

Soil Quality Improvement and Maintenance

$$V_r = \left(A_{pond} \times D_{pond}\right) + \left(A_{sa} \times D_{sa} \times \eta\right)$$

A_{pond} (ft^2) – Ponding area over soil improvement area
D_{pond} (ft) – Ponding depth over soil improvement area
A_{sa} (ft^2) – Surface area of improved soils
D_{sa} (ft) – Depth, or thickness, of improved soil layer

η - Porosity of amended soil

Tree Planting and Preservation

$$V_r = [(218 \times n_e) + (109 \times n_d) + A_{tc}] * V_{85} * \left(\frac{1\ ft}{12\ in}\right)$$

n_e – Number of new evergreen trees
n_d – Number of new deciduous trees
A_{tc} (ft^2) – A_{tc} (ft^2) – Canopy area of existing trees to remain on the property
V_{85} (in) – Runoff volume from the 85th percentile, 24-hour design storm

Rooftop and Impervious Area Disconnection

$$V_r = \left(\frac{1\ ft}{12\ in}\right) \times A_{imp} \times V_{85}$$

A_{imp} (ft^2) - Impervious rooftop or other area draining to pervious infiltration area
V_{85} (in) – Runoff volume from the 85th percentile, 24-hour design storm

Porous Pavement

$$V_r = A_{res} \times D_{res} \times \eta_{agg} \times C$$

A_{res} (ft^2) – Area of underlying gravel storage layer
D_{res} (ft) – Depth of underlying gravel storage layer
η_{agg} – Porosity of aggregate
C – Efficiency factor (See table in Fact Sheet SDM-5)

Vegetated Swales

$$V_r = \left(\frac{1\ ft}{12\ in}\right) \times A_{imp} \times V_{85}$$

A_{imp} (ft^2) - Impervious rooftop or other area draining to swale
V_{85} (in) – Runoff volume from the 85th percentile, 24-hour design storm

Rain Barrels and Cisterns

$$V_r = 0.5 \times N \times V_a$$

N - Number of rain barrels and/or cisterns
V_a (ft^3) - Volume of each rain barrel and/or cistern

Form 2-2 includes storm water runoff reduction calculations that are equivalent to those in the SWRCB's SMARTS Runoff Reduction Calculator. The volume reductions calculated

by these methods are dependent on the Site Design Measure(s) being designed per the requirements in the respective Fact Sheets in **Appendix B**.

In order to calculate runoff reductions, Form 2-2 requires the project elevation, which is inserted at the top of the form. The form then calculates the impervious runoff volume generated by the design storm. A table is included as a footnote to the form showing the design storm depths that correspond to the elevation of the project. Corresponding runoff volumes are calculated using a runoff coefficient of 0.9 for impervious surfaces.

Form 2-3 Trash Control Measures for Small Projects

The purpose of Form 2-3 is to identify the types of Trash Control BMPs that will be installed at the Small Project (consistent with Section 4.1).

The Form requires owners or developers to identify the type of trash control measure, the number of control measures present on site, as well additional characteristics such as the size of drainage area tributary to each measure, and any special features, materials, or methods of construction that will be used.

Section 3 Requirements for Regulated Projects

This section addresses the requirements for Regulated Projects. The forms in this section are used to document project characteristics and to facilitate the selection and design of storm water control measures. Projects in this category are required to implement the following storm water control measures to the maximum extent practicable:

- LID site assessment to appropriately plan the layout of improvements for capturing and retaining storm water runoff;
- Source control measures to mitigate potential pollutant generating activities and sources that are anticipated at the site;
- Site Design Measures to infiltrate, evapotranspire, and/or harvest and use the impervious runoff from the post-construction 85th percentile, 24-hour storm runoff event; and
- Storm Water Treatment and Baseline Hydromodification Measures to infiltrate, evapotranspire, and/or bioretain remaining runoff from impervious surfaces, if necessary, after implementation of Site Design Measures.

Section 3 contains seven forms to address each of the above requirements.

Form 3-1 Site Location and Hydrologic Features

Enter the project-specific information to document the site location and elevation to calculate the 85th percentile, 24-hour design storm depth. For reference, the table below

provides the 85th percentile, 24-hour design storm depths for three elevation increments within the West Placer region.

85th Percentile, 24-Hour Design Storm Depth
Elevation <500 feet = 0.9 inch
Elevation 500-1,000 feet = 1.0 inch
Elevation 1,000-1,500 feet = 1.1 inch

Identify the ultimate receiving waters and provide a general description of their location and distance in relation to the project site.

If the receiving waters are listed as impaired on the state 303(d) list, identify the pollutant(s) of concern. Refer to SWRCB website for the most current information:

www.waterboards.ca.gov/water_issues/programs/water_quality_assessment/#impaired

For phased projects, the form clarifies requirements for defining DMAs and incorporating storm water control measures as each phase is developed.

This form is also used to define the project's DMAs, as described in **Chapter 4**. For projects with more than one DMA, a conceptual level schematic should be developed showing the DMAs that have been defined for the project and their hydrologic connections to the site discharge location(s). The conceptual DMA diagram in this form should be referenced when laying out DMAs and conveyances in the project's site plan as required in Form 3-2.

Form 3-2 LID Site Assessment and Layout Documentation

A site assessment must be conducted as early as possible in the project planning process to appropriately plan the site layout for the capture and treatment of storm water runoff. The goal is to develop a site layout that minimizes impacts to site hydrology and other environmental systems, functions, and processes.

The form lists a series of considerations that should be evaluated when developing the site layout. For each item, check the appropriate box to indicate that it has been considered and appropriately incorporated, or that it is not applicable (N/A) and provide a brief explanation (use a separate sheet if necessary). To complete this form, develop and attach a site plan that illustrates the proposed site layout. The site plan may consist of a preliminary or conceptual level design drawing, but it is a key requirement of the Preliminary SWQP described in **Section 2**.

Ensure that the following items are included in the site plan:

- Site boundary;

- Soil types and areal extents, test pit and infiltration test locations;
- Topographic data with 1-foot contours (5-foot contour intervals may be used for steeper sites);
- Existing natural hydrologic features (e.g., depressions, watercourses, wetlands, riparian corridors);
- Floodplain boundaries;
- Environmentally-sensitive areas and areas to be preserved;
- Proposed locations and footprints of improvements creating new, or replaced, impervious surfaces;
- Potential pollutant sources areas;
- DMAs for the proposed BMPs that will receive storm water runoff;
- Existing and proposed site drainage network with flow directions and site run-on and discharge locations;
- Proposed design features and surface treatments used to minimize imperviousness and reduce runoff;
- Proposed locations and footprints of treatment and hydromodification management facilities;
- Design features for managing authorized non-storm water discharges;
- Areas of soil and/or groundwater contamination;
- Existing utilities and easements; and
- Maintenance areas.

Form 3-3 Source Control Measures

Source control measures are required on all Regulated Projects to prevent onsite pollutants from being mobilized and transported by storm water runoff. The goal of source control is to keep clean water clean. For each item listed in the form, check the box for activities and sources that may occur on the project and use the Source Control Measures Selection Table (**Appendix C**) to identify permanent structural, and/or operational source control measures. Add project specific descriptions of how each measure will be implemented in the project and attach additional pages if necessary. Be sure to describe any special features, materials, or methods of construction that will be used to implement the source control measures. The identification codes in the table correspond to the CASQA fact sheets which can be referenced for more information on each source control measure. The CASQA Storm Water BMP Handbooks are available for purchase at:

www.casqa.org/resources/bmp-handbooks/

Form 3-4 Runoff Reduction Calculator for Site Design Measures on Regulated Projects

On Regulated Projects, Site Design Measures must be implemented, to the extent technically feasible, to infiltrate, evapotranspire, and/or harvest and use the impervious surface runoff from the post-construction 85th percentile, 24-hour storm event.

For each DMA, identify the Site Design Measure(s) for implementation and enter the associated dimensions and quantity information into the form to calculate the resulting runoff reduction and the effective treated impervious area. Design guidance for Site Design Measures in provided in the Fact Sheets in **Appendix B**. The equations, variables and units that are used to calculate the Site Design Measure volume reductions (V_r) are presented below for reference.

Adjacent/On-Site Stream Setbacks and Buffers

$$V_r = \left(\frac{1\ ft}{12\ in}\right) \times A_{imp} \times V_{85}$$

A_{imp} (ft^2) - Impervious drainage area discharging to the buffer
V_{85} (in) – Runoff volume from the 85th percentile, 24-hour design storm

Soil Quality Improvement and Maintenance

$$V_r = \left(A_{pond} \times D_{pond}\right) + (A_{sa} \times D_{sa} \times \eta)$$

A_{pond} (ft^2) – Ponding area over soil improvement area
D_{pond} (ft) – Ponding depth over soil improvement area
A_{sa} (ft^2) – Surface area of improved soils
D_{sa} (ft) – Depth, or thickness, of improved soil layer
η - Porosity of amended soil

Tree Planting and Preservation

$$V_r = [(218 \times n_e) + (109 \times n_d) + A_{tc}] * V_{85} * \left(\frac{1\ ft}{12\ in}\right)$$

n_e – Number of new evergreen trees
n_d – Number of new deciduous trees
A_{tc} (ft^2) – Canopy area of existing trees to remain on the property
V_{85} (in) – Runoff volume from the 85th percentile, 24-hour design storm

Rooftop and Impervious Area Disconnection

$$V_r = \left(\frac{1\ ft}{12\ in}\right) \times A_{imp} \times V_{85}$$

A_{imp} (ft^2) - Impervious rooftop or other area draining to pervious infiltration area
V_{85} (in) – Runoff volume from the 85th percentile, 24-hour design storm

Porous Pavement

$$V_r = A_{res} \times D_{res} \times \eta_{agg} \times C$$

A_{res} (ft^2) – Area of underlying gravel storage layer
D_{res} (ft) – Depth of underlying gravel storage layer
η_{agg} – Porosity of aggregate
C – Efficiency factor (0.5 recommended)

Vegetated Swales

$$V_r = \left(\frac{1\ ft}{12\ in}\right) \times A_{imp} \times V_{85}$$

A_{imp} (ft^2) - Impervious rooftop or other area draining to swale
V_{85} (in) – Runoff volume from the 85th percentile, 24-hour design storm

Rain Barrels and Cisterns

$$V_r = 0.5 \times N \times V_a$$

N - Number of rain barrels and/or cisterns
V_a (ft^3) - Volume of each rain barrel and/or cistern

Form 3-4 includes runoff reduction calculations that are equivalent to those in the SWRCB's SMARTS Runoff Reduction Calculator. The volume reductions calculated by these methods are dependent on the Site Design Measure(s) being designed per the requirements in the respective Fact Sheets in **Appendix B**.

Form 3-4 calculates the impervious runoff volume generated by the design storm using a runoff coefficient of 0.9 for impervious surfaces.

The form calculates the effective treated impervious area by dividing the runoff reduction by the depth of runoff produced by the 85th percentile, 24-hour design storm depth.

If the post-construction 85th percentile, 24-hour storm event runoff from all impervious surfaces in a DMA is treated, no additional storm water control measures are required for that DMA. If there is untreated impervious area remaining, then Storm Water Treatment and Baseline Hydromodification Measures are required.

Form 3-5 Computation of Water Quality Design Criteria for Storm Water Treatment and Baseline Hydromodification Measures

After implementation of Site Design Measures, any remaining storm water runoff for each DMA must be directed to one or more facilities designed to infiltrate, evapotranspire, and/or bioretain these remaining storm water flows. This form calculates the target Water Quality Volumes and Flows (WQV and WQF, respectively) using the tributary drainage area sizes and characteristics and local rainfall statistics. If all impervious area requiring treatment is treated by Site Design Measures, this form will return a zero value for WQV and WQF as no additional downstream BMPs are required. The Unit WQV referenced in the form is based on the site elevation and a 48-hr. drawdown time as follows:

Project Elevation (ft. above mean sea level)	Unit Water Quality Volume (WQV_u) (inches)
Over 1,000 ft.	0.9
500 ft – 1,000 ft.	0.75
Under 500 ft	0.65

Storm water runoff entering a site from adjacent properties (run-on) becomes the responsibility of the owner. When entering the DMA sizes in this form, all offsite areas that may contribute run-on flows to the treatment facility must be included.

For DMAs containing multiple types of land cover, the form requires the user to enter a composite, area-weighted, runoff coefficient representing the DMA. The composite runoff coefficient can be calculated as:

$$C_w = \frac{\sum_{j=1}^{n} C_j A_j}{\sum_{j=1}^{n} A_j}$$

- C_w = weighted runoff coefficient
- C_j = runoff coefficient for area j [18]
- A_j (ft^2) = area for land cover j
- n = number of distinct land covers

[18] Runoff coefficient values for various areas are as follows: roofs 0.95, asphalt/concrete pavement 0.90, gravel pavement 0.80, turf 0.25, disturbed soil 0.25.

The equations, variables, and units that are used to calculate the WQV and WQF are presented below for reference.

Water Quality Volume (WQV)

$$WQV\ (ft^3) = \left(\frac{1\ ft}{12\ in}\right) \times A \times C_w \times WQV_u$$

A (ft^2) – Tributary Area to BMP
C_w – Weighted runoff coefficient
WQV_u (in) - Unit Water Quality Volume (design storm based on elevation and 48-hr drawdown time, see table above)

Water Quality Flow (WQF)

$$WQF(ft^3/s) = \left(\frac{1\ ft}{12\ in}\right) \times \left(\frac{1\ hr}{3600\ s}\right) \times A \times i_u \times C_w$$

WQF (ft^3/s) = $A_{untreated}$ * I_u * (1ft/12in) * (1hr/3600s)

A (ft^2) – Tributary Area to BMP
i_u (in/hr) – Uniform Rainfall Intensity = 0.2 in/hr
C_w – Weighted runoff coefficient

Form 3-6 Infiltrating Bioretention Measures

Form 4-6 is a sizing tool for volume-based, infiltrating bioretention facilities. Enter the dimensions and other required design parameters for each bioretention facility to calculate volume reductions and determine if the required performance criteria have been achieved. The form is intended to be used in conjunction with the bioretention BMP Fact Sheet(s) in **Appendix B** which provide additional design guidance. Note that all ponded water is required to be drained within 48 hours to prevent vector breeding.

The following inputs must be determined by the designer and entered into the appropriate cells:

- DMA ID No. – Previously defined DMAs for the Site Design Measures should be combined if they are draining to a single bioretention measure. Enter a unique identifier for the combined DMAs.
- Water Quality Volume (WQV) – If multiple DMAs are combined, as described above, the WQVs for each DMA must be summed.
- Surface Loading Rate (R_{surf})(in/hr)
- BMP Surface Area (top of BMP)(SA_{top}) (ft^2)

- Infiltration rate of soils underlying the BMP (use field measurement at the level where infiltration will occur)(in/hr).
- Maximum ponding depth (d_{max}) (ft)
- Infiltrating surface area (bottom of BMP) (SA_{bottom}) (ft^2)
- Planting media depth (d_{media}) (ft)
- Planting media porosity (n_{media})
- Gravel depth (d_{gravel}) (ft)
- Gravel porosity (η_{gravel})
- Total Treated Flow Rate for Project (Q_{total})(ft^3/s) – Enter the total sum of all treated flows from all DMAs

Calculated values in Form 3-6 include the following:

Ponding depth (d_{pond}) (ft) – This is determined by comparing the depth of water infiltrated within the drawdown time (48 hours maximum) and the maximum ponding depth. The lesser value is taken as the ponding depth.

Retention Volume (V_d) (ft^3) – This is the total runoff volume reduction achieved by the bioretention measure. Retention volume is calculated as follows:

$$V_r = SA_{bottom} \times \left[d_{pond} + d_{media} \times \eta_{media} + d_{gravel} \times \eta_{gravel} + \left(\frac{1\ ft}{12\ in} \right) \times T_f \times I\ X\ 0.5 \right]$$

The time of filling (Tf) represents the amount of time typically required for the bioretention measure to fill after the initial onset of rain. A value of 3 hours is assumed and is incorporated into the calculation.

A safety factor of 0.5 is applied to the field measured infiltration rate (I) to account for the degradation of this rate as the facility ages.

Untreated Volume ($V_{untreated}$) (ft^3) – This is the difference between the WQV and retention volume. The retention volume must be greater than or equal to the WQV for each DMA so that "Yes" can be checked as the final item to complete the form.

Treated Flow Rate ($Q_{treated}$) (ft^3/s) – This is the volumetric treatment rate achieved by the bioretention facility. The treated flow rate is calculated as follows:

$$Q_{treated} = \left(\frac{1\ ft}{12\ in} \right) \times \left(\frac{1\ hr}{3600\ s} \right) \times R_{surf} \times SA$$

If an alternative to bioretention is proposed, the designer must submit separate documentation to demonstrate that the proposed facility meets all of the following measures of equivalent effectiveness criteria when compared to bioretention facilities:

- Equal or greater amount of storm water runoff infiltrated or evapotranspired
- Equal or lower pollutant concentrations in storm water runoff that is discharged after biotreatment
- Equal or greater protection against shock loadings and spills
- Equal or greater accessibility and ease of inspection and maintenance

Form 3-7 Flow-Through Planters, Tree Box and Media Filters

This form provides a tool for flow-based sizing of biotreatment and filtration facilities. Enter the dimensions and other required design parameters for each biotreatment facility to calculate volume reductions and determine if the required performance criteria have been achieved. The form is intended to be used in conjunction with the Fact Sheets found in **Appendix B** for flow-through facilities to help determine the required dimensions of the structure.

The following inputs must be determined by the designer and entered into the appropriate cells:

- DMA ID No. – Previously defined DMAs for the Site Design Measures should be combined if they are draining to a single treatment measure. Enter a unique identifier for the combined DMAs.
- Water Quality Flow (WQF) – If multiple DMAs are combined, as described above, the WQFs for each DMA must be summed.
- Surface loading rate (R_{surf}) (in/hr) – A maximum of 5 in/hr is allowed.
- Maximum ponding depth (d_{max}) (ft)
- Soil/media surface area (SA) (ft^2)
- Soil/media depth (d_{media}) (ft)
- Soil/media porosity (η_{media})
- Gravel depth (d_{gravel}) (ft)
- Gravel porosity (η_{gravel})

- Total Treated Flow Rate for Project (Q_{total})(ft^3/s) – Enter the total sum of all treated flows from all DMAs

Calculated values in Form 3-7 include the following:

Detention Volume (V_d) – This is the volume of storm water runoff detained by the flow-through facility for filtration and discharge. Detention volume is calculated as follows:

$$V_d = SA \times \left[d_{pond} + d_{media} \times \eta_{media} + d_{gravel} \times \eta_{gravel} + \left(\frac{1\ ft}{12\ in} \right) \times R_{surf} \times T_f \right]$$

The time of filling (Tf) represents the amount of time typically required for the bioretention measure to fill after the initial onset of rain. A value of 3 hours is assumed and is incorporated into the calculation.

Treated Flow Rate ($Q_{treated}$) (ft^3/s) – This is the volumetric treatment rate achieved by the flow-through planter or filter. The treated flow rate is calculated as follows:

$$Q_{treated} = \left(\frac{1\ ft}{12\ in} \right) \times \left(\frac{1\ hr}{3600\ s} \right) \times R_{surf} \times SA$$

Untreated Flow Rate ($Q_{untreated}$) (ft^3/s) – This is the difference between the WQF and the treated flow rate. The treated flow rate must be greater than or equal to the WQF for each DMA so that "Yes" can be checked as the final item to complete the form.

Form 3-7 also provides a line item for entering the treated flow rate for proprietary devices that do not follow the design approach specified in this form. For proprietary devices, the treated flow rate is entered and the product specifications and design documentation must be included in the SWQP to justify and document the flow rates used.

If an alternative to flow-through planters or tree box or media filters is proposed, the designer must demonstrate that the proposed facility meets all of the following measures of equivalent effectiveness criteria when compared to flow-through planters or tree box or media filters:

- Equal or greater rate of storm water treatment
- Equal or lower pollutant concentrations in storm water runoff that is discharged after biotreatment
- Equal or greater protection against shock loadings and spills
- Equal or greater accessibility and ease of inspection and maintenance

Form 3-8 Trash Control Measures for Regulated Projects

The purpose of Form 3-8 is to identify the types of Trash Control BMPs that will be installed at the Regulated Project (consistent with Section 4.1).

The Form requires owners or developers to identify the type of trash control measure, the number of control measures present on site, as well additional characteristics such as the size of drainage area tributary to each measure, and any special features, materials, or methods of construction that will be used.

Section 4 Requirements for Hydromodification Management Projects

This section covers the additional requirements for Hydromodification Management Projects. Projects in this category must meet the same requirements as other Regulated Projects and also confirm that post-construction peak runoff rates are less than or equal to the pre-construction peak runoff rate for a 2-yr, 24-hr storm event.

This section incorporates the hydrology methods in Section V of the Placer County SWMM. There are three forms in this section which are used to determine the pre-project peak flows and demonstrate compliance.

For projects in sensitive environmental locations, such as those discharging to impaired waters or wetlands, and/or larger sized projects (> 200 acres) with ponding, where flow routing through sub-basins is required, or other projects with complex hydrologic characteristics, the jurisdictional agency may require an alternative approach to using the template forms. In these cases additional hydrologic modeling analyses, such as a HEC-1 or HEC-HMS discrete storm analysis may be required to compare pre- and post-project discharge rates for compliance. In these cases, the Section 4 forms should be replaced with model results documentation showing that post-construction runoff is less than or equal to the pre-construction runoff rate for a 2-yr, 24-hr storm event.

Hydromodification DMAs

The hydromodification analysis is performed at the project outlet points and requires that outlet level DMAs be defined for the project outlet points. These outlet level DMAs may be different than the previously defined DMAs used for BMP design, and will typically consist of combinations of these previously defined DMAs.

Form 4-1 Peak Runoff Response Time

Complete the form utilizing the reference information in the Placer County SWMM to calculate peak runoff response time for each outlet level DMA. The following inputs must be determined by the designer and entered into the appropriate cells:

- Length of longest overland flow path (L_o) (ft) – A maximum value of 100 feet is recommended since storm water runoff will typically concentrate and form

rivulets or small gullies within this distance rather than staying in a sheet flow type regime.

- Slope of overland flow path (S_o) (ft/ft)
- Manning's roughness coefficient for the overland flow surface (n_o)
- Hydrologic soil group (HSG)
- Current Land Cover Type(s)
- Pervious Area Condition
- Infiltration Rate (I)(in/hr) – The rates for the newly define outlet level DMA are required to be entered. These may vary from the infiltration rates for the previously developed DMAs used for BMP design.
- Length of collector flow path (L_c)(ft)
- Cross-sectional area of collector flow facility (ft^2)(A)
- Wetted perimeter of collector flow facility (ft) (P)
- Manning's roughness coefficient for collector flow facility (n_c)
- Slope of collector flow facility (S_c)(ft/ft)

Calculated values in Form 4-1 include the following:

Overland flow response time (T_o)(min) – This is the response time of the overland flow areas for each DMA.

$$T_o = \left(\frac{0.355(nL)\text{^}0.6}{\text{So}\text{^}0.3}\right)$$

Channel flow velocity (V) (ft/s) – This is used to calculate the response time of the flow conveyances for each DMA and is calculated using Manning's equation as follows:

$$V = \frac{1.49}{n_c} \times \left(\frac{A}{P}\right)^{2/3} \times S^{0.5}$$

Collector flow facility response time (T_c) (min) – This is the response time of the flow conveyances for each DMA.

$$T_c = \left(\frac{1\ min}{60\ s}\right) \times \frac{L_c}{V}$$

Total response time (T_t) (min) – This is combined overland and collector flow response time.

$$T_t = T_c + T_o$$

Form 4-2 Hydromodification Target for Peak Runoff

Form 4-2 computes the peak pre- and post-construction storm water runoff rates for each outlet level DMA. This form also provides a comparison of the pre-project peak flows to the post-project peak flows and requires flow control at the BMP discharges to be modified, if necessary, to meet the hydromodification management performance criteria.

The following inputs must be determined by the designer and entered into the appropriate cells:

- Drainage Area (A) (ft^2) – This is the total area of each outlet level DMA including pervious and impervious surfaces.
- Impervious Area (A_i)(ft^2) – This is the total impervious area of each outlet level DMA.
- Rainfall depth (P_r) (in) – This is the depth of the 2-yr, 24-hour storm event with a duration equal to the total response time calculated in Form 4-1.
- Total Pre-Project Peak Runoff (ft^3/s) – This is the combined total of the pre-project peak runoff rates for each DMA.

Calculated values in Form 4-2 include the following:

Unit peak runoff (q) ($ft^3/s/acre$)

$$q = 60 \times P_2 \times \frac{1}{T_t}$$

Infiltration factor (F_i) ($ft^3/s/acre$)

$$F_i = \text{Infiltration Rate (I)} * \left(1 + \frac{1}{1.3 \times 0.0005 \times Site\ Elevation}\right)$$

Peak Runoff (Q_p) (ft^3/s)

$$Q_p = A \times q - F_i \times (A - A_i)$$

Form 4-3 Detention Volumes for Hydromodification Management

Form 4-3 is used to demonstrate whether the combined detention capacity of the project's Site Design Measures and Storm Water Treatment and Baseline Hydromodification Measures is sufficient to meet the hydromodification requirements. The NRCS TR-55 Manual is utilized and referenced for information to complete this form and is available at the following website:

http://www.hydrocad.net/pdf/TR-55%20Manual.pdf

The following inputs must be determined by the designer and entered into the appropriate cells:

- Land cover and hydrologic condition
- Curve number (CN)
- Precipitation depth (P_2) (in) – This if the depth of the 2-yr, 24-hr storm event.
- Equalization factor *(V_s/V_r)* – The ratio of storage capacity to runoff volume. This is determined by using the attenuation factor and the nomograph in **Figure 6-1** of the NRCS TR-55 Manual for Type 1A rainfall distribution.
- Site Design Measure volume (ft^3) – This is the combined volume of all Site Design Measures within each of the outlet level DMA.
- Bioretention volume (ft^3) – This is the combined volume of all bioretention facilities within each of the outlet level DMA.
- Flow-Through Detention Volume (ft^3) - This is the combined volume of all flow-through treatment facilities within each of the outlet level DMA.
- Supplemental volume (ft^3) – This is the volume of any additional detention facilities that have been incorporated into the outlet level DMA to meet the hydromodification management performance criteria.

Calculated values in Form 4-3 include the following:

Post-development soil storage capacity (S) (in)

$$S = \frac{1000}{CN} - 10$$

Post-development runoff volume (V_{runoff}) (ft^3)

$$V_{runoff} = \left(\frac{1\ ft}{12\ in}\right) \times A \times \frac{(P_2 - 0.2 \times S)^2}{P_2 + 0.8 \times S}$$

Attenuation factor ($q_{out/in}$) – The ratio of the target outflow rate (pre-development peak discharge) to the peak inflow rate (post-development peak discharge).

$$q_{out/in} = \frac{Pre - development\ Q_p}{Post - development\ Q_p}$$

Runoff detention capacity required to achieve hydromodification management performance criteria ($D_{hydromod}$)(ft^3)

$$D_{hydromod} = \frac{V_s}{V_r} \times V_{runoff}$$

Combined Detention Volume (ft^3) – This is the combined volume of all Site Design Measures, bioretention facilities, and any supplemental volume in each outlet level DMA.

The combined detention volume must be greater than or equal to the required runoff detention capacity to achieve hydromodification management performance criterial so that "Yes" can be checked as the final item to complete the form.

Section 5 Inspection and Maintenance of Post-Construction BMPs

An O&M Verification Program will be implemented for all treatment control measures. Project owners must provide a signed statement, prior to Improvement Plan or Grading Permit approval, accepting responsibility for O&M requirements until the responsibility is legally transferred to another entity. A signed statement must also be provided that grants access to all representatives of the jurisdictional agency for the sole purpose of performing O&M inspections of the installed treatment systems(s) and hydromodification control(s) if any.

Form 5-1 BMP Inspection and Maintenance

For Regulated Projects, the Final SWQP serves as a Maintenance Agreement and Permission to Access Agreement unless the jurisdictional agency has a separate mechanism in places such as the City of Roseville. The City of Roseville requires a separate agreement according to its ordinance. The Final SWQP is recorded with the property ownership documentation to ensure that the maintenance responsibilities and access agreement are transferred to the subsequent owner(s) upon sale of the property.

For all BMPs included in the SWQP, project owners and the teams supporting them should assess the site-specific conditions and reference the Fact Sheets in **Appendix B** to develop BMP inspection and maintenance requirements and complete Form 5-1. For proprietary BMPs, reference the standard inspection and maintenance documents for the product. SWQPs are required to include a detailed O&M Plan for all BMPs (attach O&M Plan) and a signed certification statement accepting responsibility for its implementation.

Section 6 Compliance Checklist

The purpose of this section is to provide a mechanism for ensuring that all of the storm water control measures identified in the SWQP are also included on the approved Improvement Plans and will be constructed with the project.

Form 6-1 Post-Construction Storm Water BMPs

List each BMP included in the SWQP and the corresponding plan sheet number on the Improvement Plans. Create a copy of Form 6-1 and include it on the cover of the Improvement Plans.

Glossary

Baseline Hydromodification Management Measures – Storm water control measures designed to mitigate hydromodification on Regulated Projects that are not Hydromodification Management Projects.

Best Management Practices (BMPs) – Methods, measures, or practices designed and selected to reduce or eliminate the discharge of pollutants to surface waters from point and non-point source discharges including storm water. BMPs include structural, which are permanent, and non-structural controls and operation and maintenance procedures, which when implemented prevent, control, remove, or reduce pollution from entering surface waters.

Bioretention – Post-construction storm water treatment BMP that treats storm water runoff vertically through an engineered soil filter media and vegetation and retains storm water runoff on-site through infiltration or evapotranspiration.

Bioswale – Shallow channels lined with grass and used to convey and store runoff.

Brownfields - Sites with soil contamination.

Buffer – A forested or otherwise vegetated are located between water bodies such as streams, wetlands, and lakes that provides a permanent barrier against runoff from development, agriculture, construction, and other land uses. Buffers are designed to filter pollutants in storm water runoff before the pollutants reach surface waters.

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.]).

California State Water Resources Control Board (SWRCB) - The state-level entity that regulates storm water runoff and treatment in California.

California Stormwater Quality Association (CASQA) – Statewide association of municipalities, storm water quality managers, and other interested parties. Publisher of the California Stormwater Best Management Practices Handbooks, available at www.cabmphandbooks.com. Successor to the Storm Water Quality Task Force (SWQTF).

Check Dam – Structures constructed of a non-erosive material, such as suitably sized aggregate, wood, gabions, riprap, or concrete, used to slow water to allow sedimentation, filtration, evapotranspiration, and infiltration into the underlying native soil. Check dams can be employed in practices such as dry and enhanced grass swales.

Clean Water Act (CWA) – (33 U.S.C. 1251 et seq.) The Federal Water Pollution Control Act.

Common/Larger Plan of Development or Sale – A contiguous area, plan area, specific plan, subdivision or any other project site that has evaluated storm water management and may be phased in the future or where multiple, distinct construction activities may be taking place at different times under one plan.

Conveyance System – Any channel, swale, gutter, or pipe for collecting and directing storm water.

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

Design Engineer – Engineer responsible for preparing the SWQP for Regulated Projects, site design, and site plan.

Design Storm (for trash see Full Capture System) – A synthetic rainstorm based on historic rainfall data. For purposes of this Manual, the design storm is defined as the volume of runoff produced from the 85th percentile, 24-hour storm event. In the West Placer County Phase II Permit area, the 85th percentile, 24-hour storm event varies with elevation as follows:

Elevation	85th Percentile 24-Hour Storm Depth (Inches)
< 500 ft.	0.9
500 – 1,000 ft.	1.0
1,000 – 1,500 ft.	1.1

Detached Single-family Home Project – The building of one single new house or the addition and/or replacement of impervious surface associated with one single existing house, which is not part of a larger plan of development.

Storm Water Detention – The practice of temporarily storing peak storm water flows in basins, ponds, vaults, within berms, or in depressed areas and controlling the discharge rates into the storm drain system or receiving water. The detention process allows sediment and associated pollutants to settle out of the runoff while also reducing peak flows and potential hydromodification impacts.

Development – Any construction, rehabilitation, redevelopment, or reconstruction of any public or private residential project (whether single-family, multi-unit or planned unit development); industrial, commercial, retail and other non-residential projects,

including public agency projects; or mass grading for future construction. Development does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of facility, nor does it include emergency construction activities required to immediately protect public health and safety.

Direct Discharge – A discharge that is routed directly to waters of the United States by means of a pipe, channel, or ditch (including a municipal separate storm sewer system), or through surface runoff.

Directly Connected Impervious Area (DCIA) or Surface – Any impervious surface which drains directly into the storm drain system without first allowing flow through a pervious area (e.g., lawn).

Discharger – Any responsible party or site owner or operator within the Permittees' jurisdiction whose site discharges storm water or non-storm water runoff.

Disconnected Pavement – An impervious area that drains through a pervious area prior to discharge to the storm drain system.

Drainage Management Area (DMA) – A discrete area within a project site that contributes all precipitation falling within its boundaries to a single common outflow point and is defined for the purpose of siting and designing storm water control measures in accordance with the Phase II Permit.

Drawdown Time – The time required for a storm water detention or infiltration BMP to drain and return to the dry-weather condition. For detention BMPs, drawdown time is a function of basin volume and outlet orifice size. For infiltration BMPs, drawdown time is a function of basin volume and infiltration rate. Draw down times often are required to not exceed 48 hours to prevent potential vector breeding.

Environmentally Sensitive Area (ESA) – A designated area that requires special protection because of its landscape, wildlife, and/or historical value.

Erosion – The physical detachment of soil due to wind or water. Often the detached fine soil fraction becomes a pollutant transported storm water runoff. Erosion occurs naturally, but can be accelerated by land disturbance and grading activities such as farming, development, road building, and timber harvesting.

Evapotranspiration (ET) – The general uptake and release of water by vegetation to the atmosphere.

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.

Filter Strip – Bands of closely-growing vegetation, usually grass, planted between pollution sources and downstream receiving water bodies.

Filtration Rate – The rate at which fluid passes through a porous medium (or media).

Flow-Based Treatment Control Measures – Storm water quality treatment measures that rely on flow capacity to treat storm water. These measures remove pollutants from a moving stream of water through filtration, infiltration, adsorption, and/or biological processes (e.g., vegetated swales and filter strips).

Flow-Through Planters – Structural landscaped reservoirs placed on impervious surfaces used to collect, filter, and temporarily store storm water runoff, allowing pollutants to settle and filter out as the water percolates through the planter soil until flowing through to an approved conveyance.

Full Capture System (FCS): A treatment control, or series of treatment controls, including but not limited to, a Multi-Benefit project or a low impact development control that traps all particles that are 5 mm or greater, and has a design treatment capacity that is either: a) of not less than the peak flow rate, Q, resulting from a one-year, one-hour storm in the subdrainage area, or b) appropriately sized to, and designed to carry at least the same flows as, the corresponding storm drain.

Green Roof – Conventional rooftops that include a thin covering of vegetation allowing the roof to function more like a vegetated surface. The layer thickness varies between 2-6 inches and consists of vegetation, waterproofing, insulation, fabrics, growth media, and other synthetic components.

Green Street – A Green Street uses a natural systems approach to reduce storm water flow, improve water quality, reduce urban heating, enhance pedestrian safety, reduce carbon footprints, and beautify neighborhoods. Green Street features include vegetated curb extensions, sidewalk planters, landscaped medians, vegetated swales, permeable paving, and street trees. (EPA, 2009)

Groundwater – Water that is underground in cracks and spaces in soil, sand, and rocks. The layers of soil, sand, and rocks are also known as aquifers.

Groundwater Recharge – The replenishment of existing natural water bearing subsurface layers of porous stone, sand, gravel, silt or clay via infiltration.

Hydrograph – Runoff flow rate plotted as a function of time.

Hydrologic Cycle – The movement of rainfall from the atmosphere to the land surface, to receiving waters and then back to the atmosphere through evaporation.

Hydrologic Soil Group – A soil classification system created by the National Resource Conservation Service (formerly Soil Conservation Service) based on the ability to convey and store water; divided into four groups:

- A – Well drained sands and gravel, high infiltration capacity, high leaching potential and low runoff potential;
- B – Moderately drained fine to coarse grained soils, moderate infiltration capacity, moderate leaching potential and moderate runoff potential;
- C – Fine grained, low infiltration capacity, low leaching potential and high runoff potential;
- D – Clay soils, very low infiltration capacity, very low leaching potential and very high runoff potential.

Typical Infiltration Rates

Soil Type (Hydrologic Soul Group)	Infiltration Rate (in/hr.)
A	1.00 – 8.3
B	0.5 – 1.00
C	0.17 – 0.27
D	0.02 – 0.10
Infiltration rates shown represent the range covered by multiple sources, e.g., ASCE, BASMAA, etc.	

Hydrology – The science dealing with the waters of the earth, their distribution on the surface and underground, and the cycle involving evaporation, precipitation, and flow to the seas.

Hydromodification – Modification of hydrologic pathways (precipitation, surface runoff, infiltration, groundwater flow, return flow, surface-water storage, groundwater storage, evaporation and transpiration) that results in negative impacts to watershed health and functions. Hydromodification results in an artificially altered rate of natural channel erosion and sedimentation processes.

Impaired Water Body – A waterbody (e.g., stream reaches, lakes, waterbody segments) with chronic or recurring monitored violations of the applicable numeric and/or narrative water quality criteria. An impaired water is a water that has been listed on the California 303(d) list or has not yet been listed but otherwise meets the criteria for listing. A water is a portion of a surface water of the state, including ocean, estuary, lake, river, creek, or wetland. The water currently may not be meeting state water quality standards or may be determined to be threatened and have the potential to not meet

standards in the future. The State of California's 303(d) list can be found at http://www.swrcb.ca.gov/quality.html.

Impervious Surface – A surface covering or pavement of a developed parcel of land that prevents the land's natural ability to absorb and infiltrate rainfall/storm water.

Infiltration – The entry of water into the soil. Infiltration rate (or infiltration capacity) is the maximum rate at which a soil in a given condition will absorb water.

Jurisdictional Agency – The municipal agency/agencies with approval authority for private and public projects that fall under the requirements of the Phase II Permit.

Linear Underground/Overhead Projects (LUPs) – Include, but are not limited to, any conveyance, pipe, or pipeline for the transportation of any gaseous, liquid (including water and wastewater for domestic municipal services), liquescent, or slurry substance; any cable line or wire for the transmission of electrical energy; any cable line or wire for communications (e.g., telephone, telegraph, radio, or television messages); and associated ancillary facilities. Construction activities associated with LUPs include, but are not limited to, (a) those activities necessary for the installation of underground and overhead linear facilities (e.g., conduits, substructures, pipelines, towers, poles, cables, wires, connectors, switching, regulating and transforming equipment, and associated ancillary facilities); and include, but are not limited to, (b) underground utility mark-out, potholing, concrete and asphalt cutting and removal, trenching, excavation, boring and drilling, access road and pole/tower pad and cable/wire pull station, substation construction, substructure installation, construction of tower footings and/or foundations, pole and tower installations, pipeline installations, welding, concrete and/ or pavement repair or replacement, and stockpile/borrow locations.

Low Impact Development (LID) – A sustainable practice that benefits water supply and contributes to water quality protection. Unlike traditional storm water management, which collects and conveys storm water runoff through storm drains, pipes, or other conveyances to a centralized storm water facility, LID takes a different approach by using site design and storm water management to maintain the site's pre-development runoff rates and volumes. The goal of LID is to approximate a site's pre-development hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain storm water runoff close to the source of rainfall.

Maximum Extent Practicable (MEP) – The minimum required performance standard for implementation of municipal storm water management programs to reduce pollutants in storm water. Clean Water Act § 402(p)(3)(B)(iii) requires that municipal permits "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants." MEP is the cumulative

effect of implementing, evaluating, and making corresponding changes to a variety of technically appropriate and economically feasible BMPs, ensuring that the most appropriate controls are implemented in the most effective manner. This process of implementing, evaluating, revising, or adding new BMPs is commonly referred to as the iterative process.

Multi-Benefit Project: A treatment control project designed to achieve any of the benefits set forth in section 10562, subdivision (d) of the Water Code. Examples include projects designed to: infiltrate, recharge or store storm water for beneficial reuse; develop or enhance habitat and open space through storm water and non-storm water management; and/or reduce storm water and non-storm water runoff volume.

Municipal Separate Storm Sewer System (MS4) – The regulatory definition of an MS4 (40 CFR 122.26(b)(8)) is "a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): (i) Owned or operated by a state, city, town, borough, county, parish, district, association, or other public body (created to or pursuant to state law) including special districts under state law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the Clean Water Act that discharges into waters of the United States. (ii) Designed or used for collecting or conveying storm water; (iii) Which is not a combined sewer; and (iv) Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2."

In practical terms, operators of MS4s can include municipalities and local sewer districts, state and federal departments of transportation, public universities, public hospitals, military bases, and correctional facilities. The Storm Water Phase II Rule added federal systems, such as military bases and correctional facilities by including them in the definition of small MS4s.

National Pollutant Discharge Elimination System (NPDES) – A national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under sections 307, 402, 318, and 405 of the Clean Water Act.

Natural Resources Conservation Service (NRCS) – NRCS provides technical expertise and conservation planning for farmers, ranchers and forest landowners wanting to make conservation improvements to their land.

Non-Storm Water Discharge – Any discharge to a storm drain that is not composed entirely of storm water derived from rainfall and subsequent runoff. Certain non-storm water discharges are authorized per the NPDES Municipal Storm Water Permits.

Open Space – Pervious area within the project that is subtracted from the total project area to reduce the area used in sizing treatment and LID BMPs. For LID implementation, open space includes, but is not limited to, natural storage reservoirs, drainage corridors, buffer zones for natural water bodies, and flood control detention basins.

Operations and Maintenance (O&M) – Continuing activities required to keep storm water management facilities and their components functioning in accordance with design objectives.

Outfall – A point source, as defined by 40 CFR 122.2, at the point where an MS4 discharges to waters of the United States and does not include open conveyances connecting two MS4s, or pipes, tunnels or other conveyances which connect segments of the same stream or other waters of the United States and are used to convey waters of the United States.

Peak Discharge Rate – The maximum instantaneous rate of flow (volume of water passing a given point over a specific duration, such as cubic feet per second) during a storm, usually in reference to a specific design storm event.

Permeable – Soil or other material that allows the infiltration or passage of water or other liquids.

Permeable or Pervious Pavement – Asphalt or concrete rendered porous by the aggregate structure surfaces that allow water to pass through voids in the paving material and/or between paving units while providing a stable, load-bearing surface. An important component to permeable pavement is the reservoir base course, which provides stability for load-bearing surfaces and underground storage for runoff.

Permittee/Permittees – Municipal agency/agencies and non-traditional small MS4s that are named in and subject to the requirements of the Phase II Permit.

Phase II Permit - SWRCB Water Quality Order No. 2013-001-DWQ, NPDES General Permit No. CAS000004, Waste Discharge Requirements for Storm Water Discharges from Small MS4s.

Placer County Aquatic Resources Program (CARP) – A multidisciplinary approach for identifying, classifying, ranking, and protecting the aquatic resources of western Placer County. Broadly defined, aquatic resources are those now regulated by the U.S. Army Corps of Engineers, CVRWQCB, the California Department of Fish and Game, and the City of Lincoln and Placer County General Plans.

Placer County Conservation Plan (PCCP) – A Placer County-proposed solution to coordinate and streamline the permitting process by allowing local entities to issue state and federal permits. The proposed PCCP is a Habitat Conservation Plan (HCP) under the

Federal Endangered Species Act and a Natural Community Conservation Plan (NCCP) under the California Natural Community Conservation Planning Act.

Placer County Stormwater Management Manual (SWMM) – A guidance manual produced by the Placer County Flood Control District and Water Conservation District to provide consistent, specific guidance and requirements for storm water management, including regulation of the development process, to achieve storm water management objectives.

Pollutant – Those substances defined in CWA §502(6) (33.U.S.C. §1362(6)) and incorporated by reference into California Water Code §13373.

Porosity – Ratio of pore volume to total solids volume.

Priority Land Uses – Those developed sites, facilities, or land uses (i.e., not simply zoned land uses) within the MS4 permittee's jurisdiction from which discharges of trash are regulated

1) High-density residential: all land uses with at least ten (10) developed dwelling units/acre.
2) Industrial: land uses where the primary activities on the developed parcels involve product manufacture, storage, or distribution (e.g., manufacturing businesses, warehouses, equipment storage lots, junkyards, wholesale businesses, distribution centers, or building material sales yards).
3) Commercial: land uses where the primary activities on the developed parcels involve the sale or transfer of goods or services to consumers (e.g., business or professional buildings, shops, restaurants, theaters, vehicle repair shops, etc.)
4) Mixed urban: land uses where high-density residential, industrial, and/or commercial land uses predominate collectively (i.e., are intermixed).
5) Public transportation stations: facilities or sites where public transit agencies' vehicles load or unload passengers or goods (e.g., bus stations and stops).

Project Owner – Owner of a parcel proposed for development or redevelopment.

Rain Event or Storm Event – Any rain event greater than 0.1 inch in 24 hours except where specifically stated otherwise.

Rain Garden – A lot-level bioretention cell designed to receive and detain, infiltrate, and filter storm water runoff, typically used for discharge from roof leaders.

Rainwater Harvesting – The practice of intercepting, conveying, and storing rainwater for future use. Captured rainwater is typically used for outdoor non-potable water uses such as irrigation and pressure washing, or in the building to flush toilets or urinals or other uses that do not require potable water.

Receiving Water – Surface water that receives regulated and unregulated discharges from activities on land.

Recharge – The infiltration and movement of surface water into the soil, past the vegetation root zone, to the zone of saturation or water table.

Reconstruction – The removal and replacement of paving material down to subgrade.

Redevelopment – Land-disturbing activity that results in the creation, addition, or replacement of exterior impervious surface area on a site on which some past development has occurred. Redevelopment does not include trenching, excavation and resurfacing associated with LUPs; pavement grinding and resurfacing of existing roadways; construction of new sidewalks, pedestrian ramps, or bike lanes on existing roadways; or routine replacement of damaged pavement such as pothole repair or replacement of short, non-contiguous sections of roadway.

Regional Water Quality Control Board (RWQCB) – California RWQCBs are responsible for implementing pollution control provisions of the Clean Water Act and California Water Code within their jurisdiction.

Regulated Project – Refers to projects subject to the new and redevelopment standards in Section E.12 in the Phase II Permit.

Regulated Small MS4 – A Small MS4 that discharges to a water of the United States or to another MS4 regulated by an NPDES permit and has been designated as regulated by the SWRCB or RWQCB under criteria provided in the Phase II Permit.

Retention – The practice of holding storm water in ponds or basins and allowing it to slowly infiltrate to groundwater. Some portion will evaporate. Also see infiltration.

Retrofitting – Improving pollution and/or flow control at existing developments and facilities to protect or restore beneficial uses and watershed functions.

Riparian Areas – Plant communities contiguous to and affected by surface and subsurface hydrologic features of perennial or intermittent waterbodies. Riparian areas have one or both of the following characteristics: 1) distinctively different vegetative species than adjacent areas, and 2) species similar to adjacent areas but exhibiting more vigorous or robust growth forms. Riparian areas are usually transitional between wetland and upland.

Runoff – Water flowing across the land that does not infiltrate the soil, but drains into surface or groundwater, or when rainfall exceeds the infiltration capacity of the land.

Run-on – Storm water surface flow or other surface flow that enters property that did not originate onsite.

Setback – The minimum distance that design elements must be placed from other elements. For example, houses usually have front, side, and rear yard setbacks from streets and other buildings.

Site Design Measure – Typically small, distributed structural or non-structural measures that aim to reduce the volume of storm water runoff close to the source of the rainfall.

Soil Amendment – Minerals and organic material added to soil to increase its capacity for absorbing moisture and sustaining vegetation.

Source Control – Land use or site planning practices, or structural or non-structural measures, that aim to prevent pollution of runoff by reducing the potential for contact with runoff at the source of pollution. Source control measures minimize the contact between pollutants and urban runoff.

Storm Water – Storm water is generated when precipitation from rain and snowmelt events flows over land or impervious surfaces and does not percolate into the ground. As storm water flows over the land or impervious surfaces, it accumulates debris, chemicals, sediment or other pollutants that could adversely affect water quality if the storm water is discharged untreated.

Storm Water Management – The process of collecting, conveying, storing, treating, and disposing of storm water to ensure control of the magnitude and frequency of runoff to minimize the hazards associated with flooding and the impact on water quality caused by manmade changes to the land.

Storm Water Quality Plan (SWQP) – The SWQP documents a project's compliance with the Phase II Permit and provides a standardized application form that produces complete and accurate submittals which result in more efficient reviews and project approvals.

Surface Loading Rate (Rsurf) – A hydraulic loading factor, expressed in terms of flow over surface area, representing the flow rate of storm water runoff over the surface area of the treatment measure (i.e. a bioretention cell).

Swale – A shallow storm water channel that can be vegetated with some combination of grasses, shrubs, and/or trees designed to slow, filter, and often infiltrate storm water runoff.

Total Maximum Daily Loads (TMDLs) – The maximum amount of a pollutant that can be discharged into a water body from all sources (point and nonpoint) and still meet water quality standards. Under CWA section 303(d), TMDLs must be developed for all water bodies that do not meet water quality standards even after application of technology-based controls, more stringent effluent limitations required by a state or local authority, and other pollution control requirements such as BMPs.

Trash – All improperly discarded solid material from any production, manufacturing, or processing operation including, but not limited to, products, product packaging, or containers constructed of plastic, steel, aluminum, glass, paper, or other synthetic or natural materials.

Trash Amendments – *Amendment to the Water Quality Control Plan for Ocean Waters of California to Control Trash* and *Part 1 Trash Provision of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries*; they are collectively referred to as "the Trash Amendments". The State Water Quality Control Board adopted these on April 7, 2015.

Trash Control Measure, also referred to as Treatment Control Measures in the Trash Amendments – controls to either

a) remove pollutants and/or solids from Storm Water runoff, wastewater, or effluent, or

b) capture, infiltrate or reuse storm water runoff, wastewater, or effluent.

Trash controls include full capture systems and low impact development controls.

Treatment – The application of engineered systems that use physical, chemical, or biological processes to remove pollutants. Such processes include, but are not limited to, filtration, gravity settling, media absorption, biodegradation, biological uptake, chemical oxidation, and ultraviolet light radiation.

Treatment Control Measure – Any engineered system designed to remove pollutants by simple gravity settling of particulate pollutants, filtration, biological uptake, media absorption, or any other physical, biological, or chemical process.

Tributary Area – The physical area that drains to a specific BMP or drainage feature.

Underdrain – A perforated pipe used to assist the draining of soils in some LID applications that have impaired infiltration.

Urban Runoff – Any runoff from urbanized areas that enters the MS4 including storm water and dry weather flows from a drainage area that reaches a receiving water body or subsurface. During dry weather, urban runoff may be comprised of groundwater base flow and/or nuisance flows, such as excess irrigation water.

Vegetated Filter Strip – Gently sloping, densely vegetated areas that treat runoff as sheet flow from adjacent impervious areas. They function by slowing runoff velocity and filtering out suspended sediment and associated pollutants, and by providing some infiltration into underlying soils. Also known as buffer strips and grassed filter strips.

Vegetated Swale – A long and narrow, trapezoidal or semicircular channel, planted with a variety of trees, shrubs, and grasses or with a dense mix of grasses. Storm water runoff from impervious surfaces is directed through the swale, where it is slowed and in some

cases infiltrated, allowing pollutants to settle out. Check dams are often used to create small ponded areas to facilitate infiltration.

Volume-Based Treatment Control Measures – Storm water quality treatment measures that rely on volume capacity to treat storm water runoff. These measures detain or retain runoff and treat it primarily through settling or infiltration. Examples: detention and infiltration basins, porous pavement and storm water planters (bioretention).

Water Quality Flow (WQF) – For storm water treatment BMPs that depend on flow-through processes, such as filtration, to work, the flow rate of water that must be passed through the facility to achieve maximum extent practicable pollutant removal.

Water Quality Volume (WQV) – For storm water treatment BMPs that depend on detention to work, the volume of water that must be detained to achieve maximum extent practicable pollutant removal.

Water Table – Subsurface water level defined by the level below which all the spaces in the soil are filled with water; the entire region below the water table is called the saturated zone.

Web Soil Survey (WSS) – An interactive, internet-based soils database developed and administered by NRCS.

Wet Season (Rainy Season) – For the West Placer region, the calendar period beginning October 1 and ending April 30. Note: This differs from the California Department of Fish and Wildlife's wet weather definition, which is October 15 – April 15.