County of San Luis Obispo

Post Construction Requirements Handbook

Strategies for Post-Construction Stormwater Management
and Low Impact Development in
New Development and Redevelopment

Version 1.2

Updated March 2017

(Updates to Chapter 5, Site Design Measures)

County of San Luis Obispo
Post Construction Stormwater Requirements Handbook

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Ch 1: Introduction

1.1 Purpose of this Handbook

The purpose of this handbook is to provide guidance and direction on how to comply with post-construction stormwater requirements within San Luis Obispo County. This handbook is intended for the use by developers, contractors, builders, designers, engineers, architects, planners, homeowners, and all others interested in learning how to address stormwater quality during the planning, design, and maintenance phases of a project.

Project applicants should use this handbook to:

- Determine which performance requirement apply
- Understand how each performance requirement will be applied within the County
- Obtain direction regarding means of demonstrating compliance

1.2 How to Use this Handbook

This handbook is a supplement to current County land use and development permit policies. It is meant to be used as a design aid for both the onsite and public improvement portions of projects; however, all improvements within the public right-of-way must be consistent with County Public Improvement Standards. Requests for adjustments to Design Standards, Standard Specifications or Standard Drawings for public improvements must follow the process identified in Section 1.2 "Design Adjustments" of the Public Improvement Standards. This process is also referenced in Land Use Ordinance Section 22.52.150B.1 and Coastal Zone Land Use Ordinance Section 23.05.048.b(1).

Overview

- **Chapter 2** gives the background and regulatory requirements for post-construction stormwater management.
- **Chapter 3** gives the steps for how to complete a successful project permit application.
- **Chapter 4** provides guidance for optimizing site design to minimize stormwater impacts using Low Impact Development techniques.
- **Chapter 5** provides additional measures which can be taken to reduce runoff volumes and rates. Chapter 5 also includes implementation detail regarding mandatory site design measures.

The appendices provide permit coverage area reference maps, checklists and forms, and support for calculations. A glossary is also provided.

Since LID and bio-retention designs are highly site-specific, only broad considerations can be provided in this handbook. References are provided to assist designers find detailed information for finalizing designs.

Ch 2: Background & Regulatory Requirements

2.1 The Impact of Development on Water Resources

Undeveloped natural landscape areas such as forests and grasslands act like sponges for rainfall. When natural landscape areas are covered with impervious (nonporous) surfaces like roads, parking lots, and roofs, this "sponge-like" function is lost and the amount of rainfall that can be absorbed is dramatically reduced. As shown in Figure 2-1, the percentage of impervious surface area of a site influences how much stormwater is infiltrated into the ground, evapotranspirated back into the atmosphere, or leaves the site as stormwater runoff.

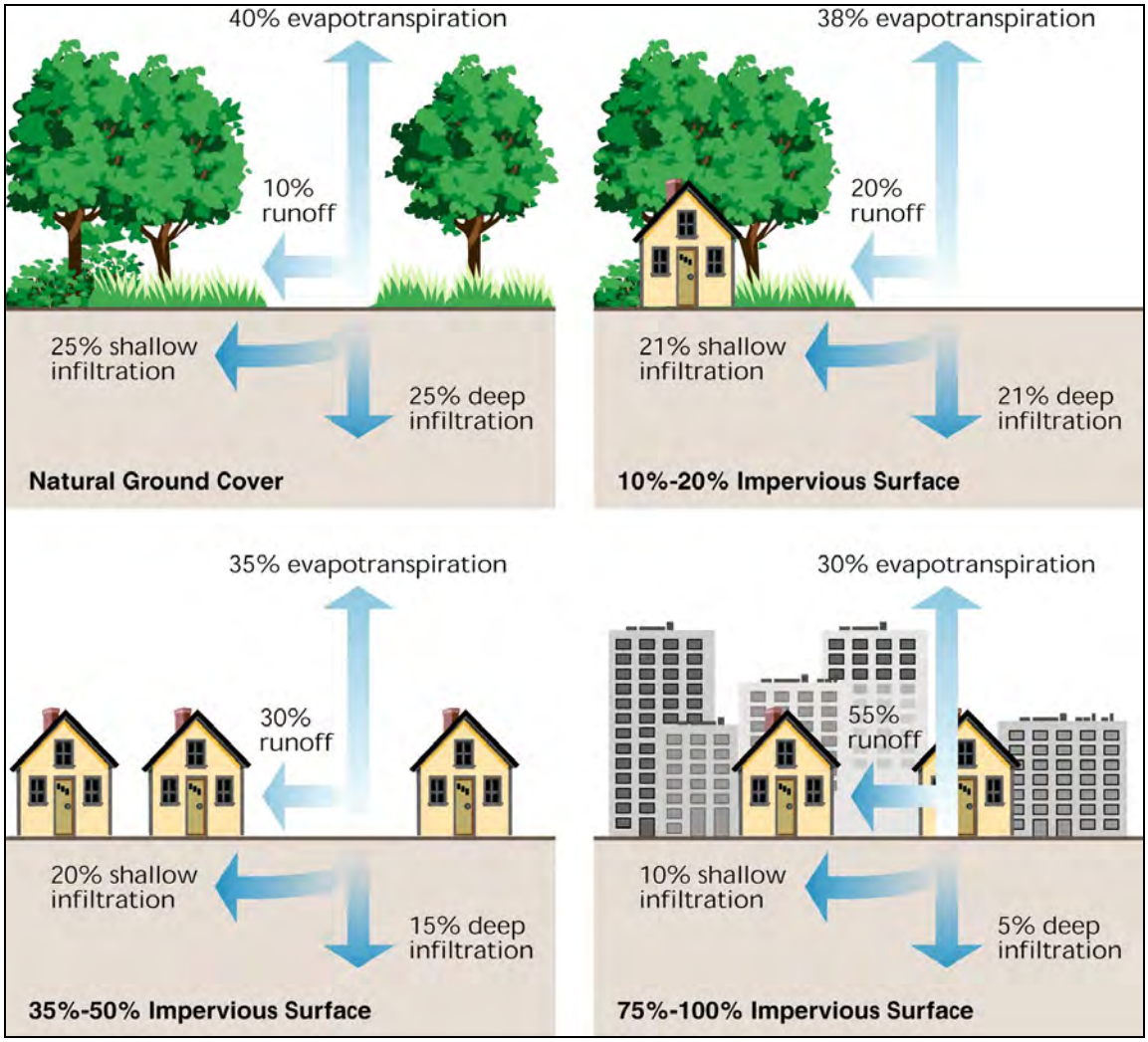


Figure 2-1 Relationship between impervious surface area, surface runoff, infiltration and evapotranspiration
(Source: Stream Corridor Restoration: Principles, Processes, & Practices, FISWG 1998)

Increasing the amount of impervious surface area of a site can interrupt normal watershed processes and lead to a host of problems in surface waters including:

- Increased loads of chemical pollutants;
- Increased toxicity;
- Changes to flow magnitude, frequency, and seasonality of various discharges;
- Physical changes to stream, lake, or wetland habitats
- Changes in the energy dynamics of food webs, sunlight, and temperature
- Changes in biotic interactions between native and exotic species

Additionally, urbanization can alter the amount and quality of stormwater that infiltrates and recharges groundwater aquifers.

Development projects can also impact neighboring properties. Traditional stormwater management practices emphasize conveyance; that is, using street gutters, curbs, pipes and canals to remove water from the developed areas as quickly as possible and engineered flood control measures such as dams, dikes, levees, and detention facilities to offset the impact of development. This transfers the immediate problems downstream by increasing the amount of runoff leaving sites. The compound effect of increased impervious surface area with more efficient collection and conveyance systems is an increase in downstream flooding and erosion.

Figure 2-2 Bank scour along San Luis Obispo Creek
(Source: USFWS)

When runoff leaves a storm drain network and empties into a creek, the excessive volume and energy can scour creek banks, damaging streamside vegetation and harming aquatic habitat. Runoff that travels over impervious surfaces often picks up pollutants that accumulated on that surface as a result of everyday activities such as driving, maintaining vehicles and lawns, disposing of waste, washing cars and even walking pets. Polluted runoff may contain nutrients, pathogens, hydrocarbons, toxic organics, sediments, metals, trash, and debris. Increased creek and lake temperatures may result as the runoff picks up heat from paved surfaces. Pollutants and warmer water are carried to the storm drain system and are discharged directly to lakes, streams, and the ocean where pollutants can accumulate and degrade water quality and aquatic habitat for fish and wildlife.

The loss of infiltration from urbanization has also resulted in profound groundwater changes. As more surface area becomes covered with impervious surfaces, less water is able to seep back into the ground. Reduced groundwater recharge rates may result in lower base flows during dry weather as less groundwater is available to move through the soil and into stream channels and aquifers.

To protect surface water quality and groundwater resources, new development and significant redevelopment projects should be designed, constructed, and maintained to minimize the interruption of natural watershed processes and to treat storm water as a resource and an asset, instead of a waste product.

2.2 Local Environmental and Economic Impacts

Polluted stormwater has measurable negative environmental and economic impacts, including increased flooding and public health concerns, harm to aquatic life, (including coastal shellfisheries), aesthetic impacts, impacts to tourism and recreation, and harm to community water supplies.

Flooding

According to the County Local Hazard Mitigation Plan[1] San Luis Obispo County has experienced severe flooding events that have resulted in loss of life and extensive property damage. Flooding can also inundate sewage treatment plants, prevent the safe passage of people and commodities, contaminate water supplies, damage agricultural resources, and result in accelerated rates of erosion.

Public Health

Stormwater can transport disease-causing bacteria, viruses, and protozoa. The County of San Luis Obispo Environmental Health Division consistently monitored 20 beach locations in 2007. Twenty percent of the samples taken during wet weather years received a grade of 'C' or 'D' according to the Heal the Bay Foundation. This grade indicates the presence of total coliforms, fecal coliforms, enterococcus and fecal ratios observed in the overall number of samples taken. A complete listing of San Luis Obispo County health advisories is available on Heal the Bay's website[2].

Harm to Aquatic Life

Urban runoff can harm aquatic life in many ways due to changes in water chemistry and habitat loss, including:

Nitrogen and Phosphorous promote toxic and non-toxic alga blooms that harm aquatic life by depleting the amount of oxygen in the water and by

The percentages on the map show how many samples exceeded the bacteria levels established for safe shellfish harvesting. This figure shows the approximate locations of established shellfish harvesting parcels. Harvesting is not currently allowed in portions of two parcels (shown in red on the map) due to elevated bacteria levels. The California Department of Health Services continues to monitor the areas surrounding the closed harvesting parcels to track the bacteria trends over time. The hope is that these parcels will eventually have clean enough water quality to resume shellfish operations. In the three active parcels (shown in green), growers are allowed to harvest shellfish during times of adequate water quality.

Figure 2-3 Excerpts from MBEP
(Source: http://www.mbnep.org/publications/)

[1] www.slocountyoes.com/lhmp_bos.pdf
[2] http://www.healthebay.org/brc/annual/2007/counties/slo/analysis.asp

decreasing light penetration for photosynthetic organisms. These pollutants also promote unwanted weeds.

Parking lots and roads can have an accumulation of **oil and grease.** The oil and grease forms a film over water which spreads and makes oxygen transfer difficult and is toxic to aquatic animals and plants.

Metals such as lead, copper, cadmium, zinc, mercury, chromium, selenium and nickel are toxic to fish and other forms of aquatic life and can cause genetic defects.

Organics may lead to human and animal reproductive abnormalities.

Sediment can reduce the suitability of creeks for spawning beds, decrease the light available for photosynthetic organisms and increase the transport of heavy metals and nutrients that adhere to the sediment particles.

Non-sediment solids, such as small plastic particles. Small plastic particles are ubiquitous in the surface layer of the ocean off the coast of California[3]. The degrading plastic pieces can look like food to wildlife. While further research is needed to know the consequences of these particles as they advance through the food chain, preliminary concerns include bio-accumulation of toxins and adverse impacts to endocrine systems.

Figure 2-4 Plastic particles removed from gut of Pacific Ocean fish
(Source: Drew Wheeler, Algalita Marine Research Foundation)

Plastics are also the most common type of debris found on the seafloor in both central and southern California[4].

Pathogens in stormwater also contaminate shellfish beds. Contaminated stormwater, along with pollution from other sources, have caused the closure of shellfish beds. According to the Morro Bay Estuary Program publication, "Estuary Tidings: A Report on the Health of the Morro Bay Estuary," two of the three harvesting parcels in Morro Bay have been partially closed to shellfish harvesting by the California Department of Health Services (DHS). DHS is responsible for ensuring that harvested shellfish are safe. DHS has concluded that bay waters are clean enough to support commercial shellfish operations in portions of the three parcels but require mandatory closures immediately following rainfall events due to high bacteria levels.

A key contributing factor is that levels of bacteria and viruses are usually 100 to 1,000 times greater in the bottom sediment, where shellfish live, than in the water above.

[3] Doyle, Miriam J.; Watson, William; Bowlin, Noelle M.; Sheavly, Seba B. Plastic particles in coastal pelagic ecosystems of the Northeast Pacific ocean. *Mar. Environ. Res*. **2011**, 71 (1): 41-52.
[4] Watters, Diana L.; Yoklavich, Mary M.; Love, Milton; Schroeder, Donna M. Assessing marine debris in deep seafloor habitats off California. *Bull. Mar. Sci*. **2010**, 60: 131-138.

Trash in stormwater harms wildlife. The plastic loops that hold six-packs of beer or soda together can strangle gulls and plastic bags cause the death of marine animals through ingestion or entanglement.

Aesthetic Impacts

The beauty of San Luis Obispo County's coastlines is world renowned. The presence of cigarette butts, polystyrene cups, and other trash that storm sewers dump into the streams, lakes and the ocean creates an unwelcome eyesore. Sediment loads in these waters reduce water clarity.

Impacts to Tourism and Recreation

Potential human illness and aesthetic losses result in more than unpleasantness. Coastal and recreational tourism are major components of the local economy. On a typical weekend, many visitors look to the Central Coast as a getaway destination. If the degradation of the water bodies that accept contaminated stormwater is allowed to continue, these locations will be less attractive for visitors and may deter people from making San Luis Obispo County a vacation or travel destination.

Harm to Community Water Supplies

Many groundwater basins within San Luis Obispo County are at or near overdraft. Excessive water withdrawals from our inland and coastal streams and basins will have potentially significant environmental impacts, including impacts to riparian habitats and altering of stream flows potentially affecting anadromous fish.

2.3 Stormwater NPDES Regulatory Requirements

To address the impacts of development on water quality, the National Pollutant Discharge Elimination System (NPDES) Small Municipal Separate Storm Sewer System (MS4) General Permit requires the County to develop and implement a Guidance Document that includes specific Best Management Practices (BMPs), measurable goals, and timetables for implementation in the following eleven program elements:

1. Program Management

   The County must have legal authority to control pollutant discharges into, and from within, the County's permit boundaries. This element also includes development of a Enforcement Response Plan to address repeat and continuing violations by implement a progressively stricter response as needed to achieve compliance.

2. Education and Outreach

   The County must educate the public, construction site operators and its staff, about the importance of their role in controlling pollutant discharges into, and from within, the County's permit boundaries.

3. Public Involvement and Participation

   The County must develop a strategy to get the community involved in development and implementation activities related to this permit. This element seeks to encourage volunteerism, public comment and input on policy, and activities in the community.

4. Illicit Discharge Detection and Elimination

The County must monitor outfalls and enforce ordinances or take equivalent measures to prohibit illicit discharges. The County must also implement a program to detect and eliminate illicit discharges.

5. Construction Site Stormwater Runoff Control

   The County must develop a program to identify, monitor and control the discharge of pollutants from construction sites within its permitted jurisdiction. The program must include review of construction plans, inspections of construction sites and enforcement actions against violators.

6. Pollution Prevention/Good Housekeeping for Municipal Operations

   The County must examine its own activities and develop a program to prevent the discharge of pollutants from these activities. The County must identify facilities that have a high potential to generate storm water and non-storm water pollutants. These potential hot-spot sites require additional monitoring.

   Additionally, the County must develop a process for incorporating water quality and habitat enhancement into new and rehabilitated flood management projects; and to reduce the amount of water, pesticides and fertilizers used in municipal operations.

7. Post-Construction Stormwater Management for New Development and Redevelopment

   The County must address storm water runoff from development and redevelopment projects through post-construction stormwater requirements based on a watershed-process approach developed and approved by the Central Coast Water Board, per Water Board Resolution R3-2013-0032.

   This handbook addresses the Post-Construction Stormwater Management aspect of the Program. For this program element, the County is required to develop procedures and update regulations as necessary to implement Central Coast Water Board Resolution R3-2013-0032. Central Coast Water Board Resolution R3-2013-0032 requires the County to:

   - Control urban runoff pollution by requiring a combination of onsite source control and LID BMPs augmented with treatment control BMPs before the runoff enters the MS4.

   - Provide long-term operation and maintenance of structural flow/volume control and treatment BMPs.

8. Water Quality Monitoring

   The County must conduct monitoring of discharges of water bodies with established Total Maximum Daily Loads (TMDL) and/or listing as a 303(d) impaired water body. Section *303(d) listed water bodies are those designated by the State as water bodies that do not meet water quality standards and are not supporting their beneficial uses.*

9. Program Effectiveness Assessment

   The County must examine its plan to obtain compliance with the General Permit and implement adaptive management strategies to reduce pollutants of concern, achieve the Maximum Extent Practicable (MEP) standard, and protect water quality. The County will document its approach to evaluating the effectiveness of prioritized BMPs

and the program implementation as a whole. The County is expected to continuously improve on the program based on the information gathered in the previous years.

10. Total Maximum Daily Loads Compliance Requirements

    The County must comply with all applicable Total Maximum Daily Loads (TMDLS) in its permit boundary that have an assigned Waste Load Allocation. TMDL designated water bodies in the County include Chorro Creek, Diary Creek, Las Tablas Creek, Los Osos Creek, etc. A complete listing of TMDL in the County can be obtained at:

    http://www.waterboards.ca.gov/centralcoast/water_issues/programs/tmdl/303d_and_tmdl_projects.shtml

11. Annual Reporting Program

    The County must submit a summary of the past year activities for each program element and certify compliance with all requirements of the General Permit.

2.4 Post Construction Requirements

The Central Coast Regional Water Quality Control Board recognizes that it is necessary to protect watershed processes so that beneficial uses of receiving waters are maintained and, were applicable, restored. The Central Coast Water Board secured funds from the State Water Quality Control Board's Cleanup and Abatement Account to support acquisition and assessment of local information that would create a methodology for development of appropriate post-construction requirements. Three types of post-construction requirements were developed: Performance, Alternative Compliance, Operation and Maintenance Plans, and Reporting Requirements.

The requirements are intended to support:

1. Utilization of Low Impact Development strategies to the extent feasible
2. Applicant-provided Stormwater Control Plans to demonstrate compliance
3. Implementation of retention and peak flow management techniques, where appropriate
4. Requirements commensurate with project size

Regulated projects may be required to meet some or all of these requirements. More detail regarding each of these requirements, as well as information regarding the specific steps that are required to identify which, if any, of the requirements will be required for your project, is provided in subsequent chapters.

Performance Requirements

The five Post-Construction Requirements (PCRs) developed from that effort are summarized below.

1. **Performance Requirement 1: Site Design and Runoff Reduction**

   All regulated projects are subject to PR 1 and must minimally incorporate the following Low Impact Development (LID) design strategies into the project:

   i) Limit disturbance of creeks and natural drainage features

   ii) Minimize compaction of highly permeable soils

iii) Limit clearing and grading of native vegetation at the site to the minimum area needed to build the project, allow access, and provide fire protection

iv) Minimize impervious surfaces by concentrating improvements on the least-sensitive portions of the site, while leaving the remaining land in a natural undisturbed state

v) Minimize stormwater runoff by implementing one or more of the following site design measures:

(1) Direct roof runoff into cisterns or rain barrels for reuse

(2) Direct roof runoff onto vegetated areas safely away from building foundations and footings, consistent with California building code

(3) Direct runoff from sidewalks, walkways, and/or patios onto vegetated areas safely away from building foundations and footings, consistent with California building code

(4) Direct runoff from driveways and/or uncovered parking lots onto vegetated areas safely away from building foundations and footings, consistent with California building code

(5) Construct bike lanes, driveways, uncovered parking lots, sidewalks, walkways, and patios with permeable surfaces

2. Performance Requirement 2: Water Quality Treatment

Regulated projects subject to PR2 must treat a defined minimum volume or maximum surface loading rate of runoff using onsite measures. Allowable onsite measures are listed in the order of preference (highest to lowest):

i) Low Impact Development

ii) Biofiltration Treatment Systems

iii) Non-Retention Based Treatment Systems

3. Performance Requirement 3: Runoff Retention

Regulated projects subject to PR3 must retain a designated design storm volume. Applicants of regulated projects subject to this requirement must:

i) Submit a Site Assessment Map that documents the development site's opportunities and constraints to implement LID Stormwater Control Measures.

ii) Submit a Stormwater Control Plan that supports a decentralized approach to stormwater management

4. Performance Requirement 4: Peak Management

Regulated projects subject to PR 4 must ensure that post-development peak flows, discharged from the site, do not exceed pre-project peak flows for the 2- through 10-year storm events.

5. Performance Requirement 5:Special Circumstances

Regulated projects subject to PR 5 may be exempt from Runoff Retention (PR3) and/or Peak Management (PR 4) performance requirements if those performance requirements would be ineffective to maintain or restore beneficial uses of receiving waters.

Alternative Compliance

Regulated projects unable to achieve some or all of the Performance Requirements determined to be applicable to their project on-site, must satisfy requirements using an alternative approach at another site within the same watershed as the regulated project.

Operational and Maintenance Plans

Operational and Maintenance Plans and Maintenance Agreements are required for projects that utilize structural Water Quality Treatment, Runoff Retention, and/or Peak Management controls on private and public Regulated Projects.

Reporting

The resolution requires two types of reporting.

1. Project applicant reporting to the County

   Applicants of regulated projects subject to Performance Requirement (PR 3) are required to demonstrate compliance with a Stormwater Control Plan. Additional supporting information is required if the project is subject to additional Performance Requirements.

2. County Reporting to the Water Board

   The County is required to report on all aspects of the Resolution, including quantification of the number of projects subject to each performance requirement, and providing supporting rationale for any projects granted approval for a deviation from the prescribed requirements.

2.5 Process Based Stormwater Management Strategies

The italicized text in this section is extracted directly from Attachment 2 of Resolution No. R3-2013-0032.

These Post-Construction Requirements shift from the historic, symptomatic approach to stormwater management and hydromodification control to an approach focusing on the protection of key watershed processes. Instead of identifying a problematic outcome of urban development (e.g., "eroding stream channels") and requiring a targeted 'fix' to the 'problem' (e.g., "armor the bank"), these Post-Construction Requirements target the root causes of changes to receiving waters—namely, aspects of development projects that disrupt the watershed processes that sustain the health and function of these waterbodies.

Furthermore, these Post-Construction Requirements reflect the geographic diversity of the Central Coast by stratifying the region into Watershed Management Zones allowing management to focus on watershed processes where they are known to occur. Management strategies, therefore, must focus on the key watershed processes of each Watershed Management Zone. The result is a process-based stormwater management approach.

To support process-based stormwater management, broad sets of management strategies can be assigned that target the protection of watershed processes in various settings, and for which numeric performance requirements are provided. Although there is no formally accepted "list" of such strategies, the following set offers a useful organizational framework:

1) Flow Control

Flow Control encompasses a broad range of stormwater criteria for addressing hydraulic and hydrologic goals. This includes regulations that typically mandate that (1) post-development peak flows are less than or equal to pre-development peak flows for a series of intermediate and/or large design storm events (i.e., "storm event peak flow" control); (2) runoff from flows with the highest risk potential for channel erosion, and by extension damage to aquatic habitat, are not increased in duration ("flow-duration control"); and (3) runoff is infiltrated or retained onsite, without specific reference to the range of stream-channel flows that are affected, to maintain groundwater flow or reduce overall runoff volume ("retain volume").

2) Water Quality Treatment

Water Quality Treatment includes a suite of Stormwater Control Measures (SCMs) that address the major link between urbanization and water quality impairment, which is caused by the increased runoff from impervious surfaces and soil compaction of pervious areas, and the delivery of urban sources of pollutants such as nutrients from fertilizer, metals from brake pads, and sediment from exposed soil surfaces.

3) Preserve Delivery of Sediment and Organics

Preserve Delivery of Sediment and Organics into the channel network is critical for the maintenance of various habitat features and aquatic ecosystems in the fluvial setting. While preservation of these functions is not a goal found in most stormwater regulations, it is often discussed qualitatively as a goal in establishing or justifying riparian buffer requirements.

4) Maintain Soil and Vegetation Regime

Maintain Soil and Vegetation Regime is a valuable and highly effective alternative to water quality treatment, because much impairment is due to the isolation of soil and vegetation from the path of urban stormwater runoff, which in turn eliminates the processes of filtration, adsorption, biological uptake, oxidation, and microbial breakdown (collectively termed the watershed process of "Chemical and Biological Transformations" by the Joint Effort). Note that this management strategy overlaps with several others: not only can it accomplish water-quality treatment, but also it can constitute stormwater volume-based flow control and preserve the delivery of sediment and organics to waterbodies if located adjacent to waterbodies. Moreover, it is a (typically intentional) byproduct of any application of land-preservation strategies as well.

5) Land Preservation

Land Preservation includes open space requirements and minimization of effective impervious area. Both have the goal of avoiding or directing runoff from impervious surfaces to pervious areas, rather than routing it directly to the storm drainage system.

Land Use Ordinance Section 22.52.110 and Coastal Zone Land Use Ordinance Section 23.05.040 et seq. require that the control of drainage and drainage facilities minimize harmful effects of stormwater runoff and resulting inundation and erosion on proposed projects, and protect neighboring and downstream properties from drainage problems resulting from new development. Where conflicts exist between the ordinances and the thresholds provided herein, the ordinances shall control.

Ch 3: Preparing Permit Applications

3.1 The Development Review Process

To comply with Federal and State NPDES stormwater regulatory requirements, the County has integrated post-construction stormwater management into the development review process. This chapter outlines the County's development review process and gives step-by-step instructions for how to prepare permit applications for new development and redevelopment projects. **Figure 3-1** illustrates the process for addressing stormwater-related requirements in permit applications.

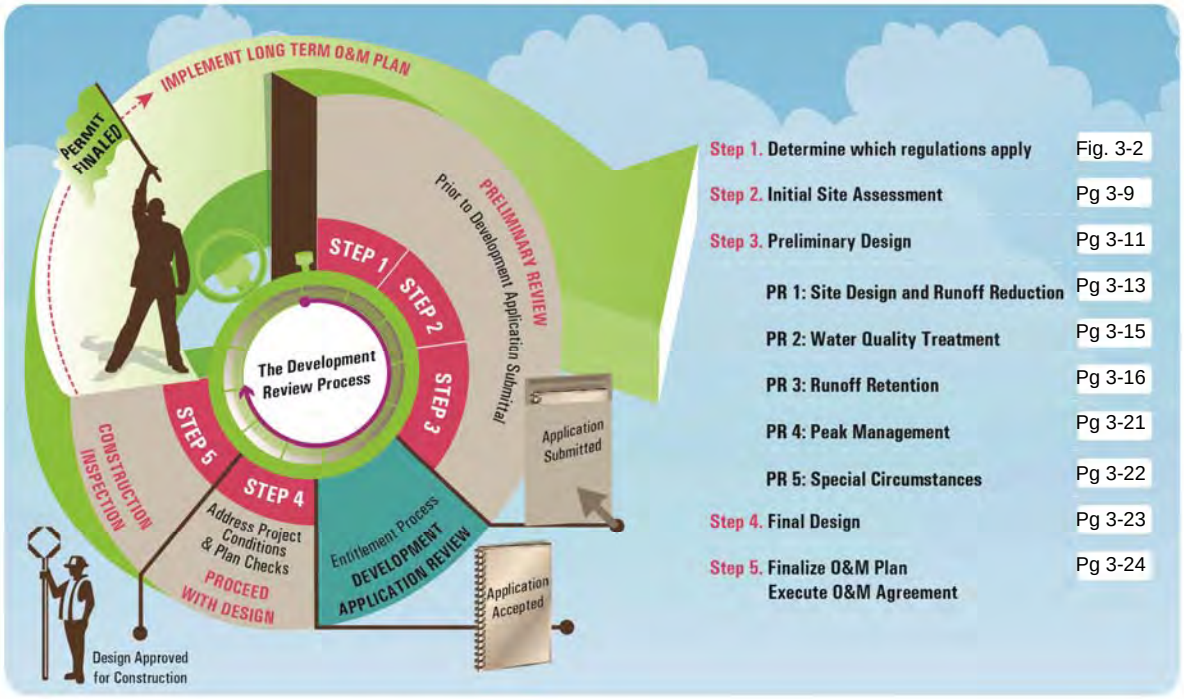


Figure 3-1 Addressing Stormwater Requirements during the Development Review Process

Stormwater management strategies should be considered early in site planning. Including stormwater management in the preliminary site plan can reduce overall project costs by minimizing rework and reducing infrastructure costs. Early planning enables more stormwater management flexibility.

The County's application process is designed to assure that post-construction stormwater controls are in place throughout the life of the project. The County requires additional documentation for erosion and sediment controls during construction.

3.2 Five Steps in the Project Application Process

The five steps outlined below must be followed to complete a successful Stormwater Control Plan (SWCP) Application (Appendix B). A SWCP application is required when applying for a development permit. Subsequent chapters in this handbook provide more detailed instructions on how to accomplish each step.

Step 1: Determine which regulations apply

As you complete your SWCP application use the flow chart on the next page **(Figure 3-2)** or as discussed in the following Decision Point A. Determine if the project is EXEMPT, or if the project is subject to one or more Performance Requirements (i.e. regulated). Information specific to meeting each of the Performance Requirements is provided in Step 3.

Figure 3-2. Which Performance Requirements Apply?

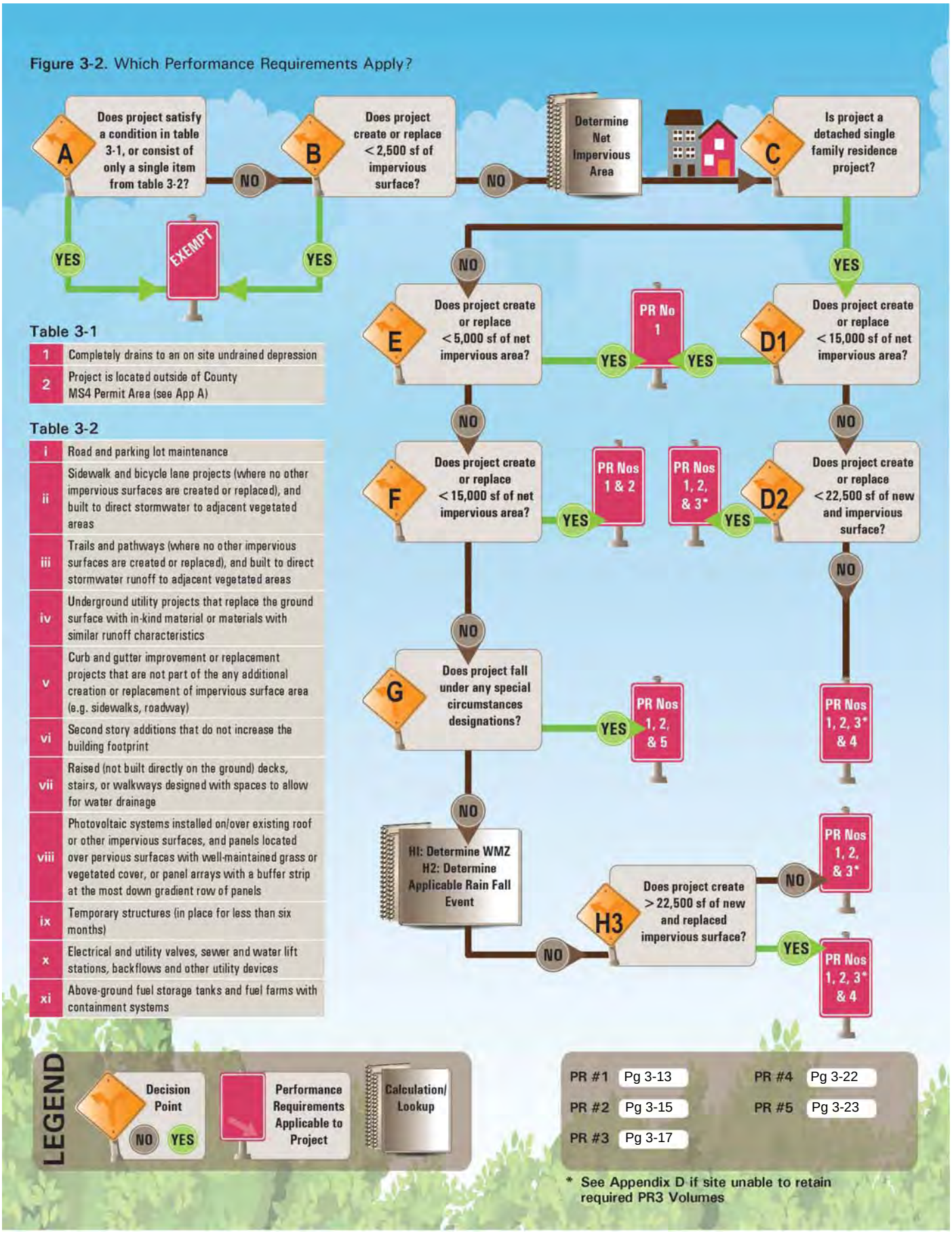


Table 3-1

1	Completely drains to an on site undrained depression
2	Project is located outside of County MS4 Permit Area (see App A)

Table 3-2

i	Road and parking lot maintenance
ii	Sidewalk and bicycle lane projects (where no other impervious surfaces are created or replaced), and built to direct stormwater to adjacent vegetated areas
iii	Trails and pathways (where no other impervious surfaces are created or replaced), and built to direct stormwater runoff to adjacent vegetated areas
iv	Underground utility projects that replace the ground surface with in-kind material or materials with similar runoff characteristics
v	Curb and gutter improvement or replacement projects that are not part of the any additional creation or replacement of impervious surface area (e.g. sidewalks, roadway)
vi	Second story additions that do not increase the building footprint
vii	Raised (not built directly on the ground) decks, stairs, or walkways designed with spaces to allow for water drainage
viii	Photovoltaic systems installed on/over existing roof or other impervious surfaces, and panels located over pervious surfaces with well-maintained grass or vegetated cover, or panel arrays with a buffer strip at the most down gradient row of panels
ix	Temporary structures (in place for less than six months)
x	Electrical and utility valves, sewer and water lift stations, backflows and other utility devices
xi	Above-ground fuel storage tanks and fuel farms with containment systems

Considering Figure 3-2, follow the decision point questions below to determine the project requirements (or if it is exempt):

Decision Point A. Does the project satisfy a condition in table 3-1, or consists of only a single item from table 3-2?

The situations in **Table 3-1** are considered exempt from the requirements of this handbook.

Table 3-1: Potential Exempting Conditions

NO.	CONDITION	NOTE
1	Project completely drains to an undrained depression.	Consult with Planning and Building Department if the undrained depression is located on your parcel. Consult with the Public Works Department if the undrained depression is not located on your parcel. The applicant will be required to provide supporting documentation regarding site drainage, and holding capacity of the undrained depression during back to back events.
2	Project is located outside of County MS4 Permit Area.	See **Appendix A** for Permit Coverage Area Maps. Projects that are outside of the permit coverage area are exempt from Post-Construction requirements outlined in Resolution R3-2013-0032 (but are subject to the Post-Construction requirements of the Construction General Permit if the project disturbance area is greater than 1 acre).

Maintenance and utility projects are also typically considered "exempt" from meeting the post-construction requirements specified in this handbook. Examples of exempt maintenance projects include routine overlays and slurry seals. Examples of exempt utility projects include the installation of an ADA ramps, or solar panels on rooftops, or repair of roads or aerial utilities. The complete list of projects typically considered exempt is provided below:

Table 3-2: Other Exempting Conditions

NO.	EXEMPTING CONDITION
i	Road and Parking Lot maintenance 1) Road surface repair including slurry sealing, fog sealing, and pothole and square cut patching 2) Overlaying existing asphalt or concrete pavement with asphalt or concrete without expanding the area of coverage 3) Shoulder grading 4) Cleaning, repairing, maintaining, reshaping, or re-grading drainage systems 5) Crack sealing 6) Resurfacing with in-kind material without expanding the road or parking lot 7) Practices to maintain original line and grade, hydraulic capacity, and overall footprint of the road or parking lot 8) Repair or reconstruction of the road because of slope failures, natural disasters, acts of God or other man-made disaster

No.	Exempting Condition
ii	Sidewalk and bicycle path lane projects, where no other impervious surfaces are created or replaced, built to direct stormwater runoff to adjacent vegetated areas
iii	Trails and pathways, where no other impervious surfaces are replaced or created, and built to direct stormwater runoff to adjacent vegetated areas
iv	Underground utility projects that replace the ground surface with in-kind material or materials with similar runoff characteristics
v	Curb and gutter improvement or replacement projects that are not part of any additional creation or replacement of impervious surface area (e.g., sidewalks, roadway)
vi	Second-story additions that do not increase the building footprint
vii	Raised (not built directly on the ground) decks, stairs, or walkways designed with spaces to allow for water drainage
viii	Photovoltaic systems installed on/over existing roof or other impervious surfaces, and panels located over pervious surfaces with well-maintained grass or vegetated groundcover, or panel arrays with a buffer strip at the most down gradient row of panels
ix	Temporary structures (in place for less than six months)
x	Electrical and utility vaults, sewer and water lift stations, backflows and other utility devices
xi	Above-ground fuel storage tanks and fuel farms with spill containment system

EXEMPT projects are not required to meet the stormwater performance requirements specified in this handbook. Non-exempt projects will require a Stormwater Control Plan (Appendix G) in addition to a completed SWCP Application.

Verify "Exempt" project status with Planning and Building Department officials.

Exempt projects are not required to follow the process outlined in Steps 2 through 5, however following these steps is recommended.

If the project is not on the exempt list, continue to decision point B.

Decision Point B. Does project create or replace less than 2,500 square foot of impervious surface?

The area of impervious surface created or replaced by the project includes all hardscapes (roofs, sidewalks, driveways, pools/spas). Permeable pavements may be excluded from the impervious surface area calculation if they are capable of infiltrating 5 inches in a 24 hour period.

If yes, the project meets the criteria to be considered "Exempt." Exempt project applicants are encouraged to implement practices that will reduce stormwater impacts associated with development. A list of suggested practices appropriate for homeowners is included on the "Measures Homeowners Can Take to Reduce Stormwater Impacts" checklist found in **Appendix B-6**.

If no, the project is considered to be a regulated project. **Regulated projects** will be required to meet Performance Requirement 1 (PR 1). Many regulated projects are required to meet additional performance requirements. To determine if the project must meet additional requirements, you must determine the Net Impervious Area.

The **Net Impervious Area** is the total (including new and replaced) post-construction impervious areas, minus any reduction in total imperviousness from the pre-project to post-project conditions. Remember, permeable pavements may only be excluded from the impervious surface area calculation if they are designed to infiltrate.

Net impervious area	=	**New and replaced impervious area**	–	**Pre-project to post-project reduction in impervious area, if any**

An applicant will be required to provide supporting documentation regarding permeable paver (or alternate surface) areas excluded from impervious area calculations.

Continue to decision point C to determine if additional performance requirements are necessary.

Decision Point C. Is the project a detached single family residence?

Detached single family residences should continue to decision point D1.

If the project consists of a detached single family residence on a small lot with steep slopes, it is strongly recommended to participate in a pre-application meeting with the County.

If yes, continue to decision point D1 If no, continue to decision point E

Decision Point D1. Does the project create or replace less than 15,000 sf of Net Impervious Area?

If yes, the project is only subject to Performance Requirement 1 "Site Design and Runoff Reduction". See Step 3 (Pg 3-13) for information regarding criteria necessary to satisfy Performance requirement 1.

If no, continue to decision point D2.

Decision Point D2. Does the project create or replace less than 22,500 sf of new and impervious surface?

Projects that must answer decision point D2 are subject to:

Performance Requirement 1 "Site Design and Runoff Reduction"
Performance Requirement 2 "Water Quality Treatment"
Performance Requirement 3 "Runoff Retention"

If you answered no to the above question, the project is also subject to:

Performance Requirement 4 "Peak Management"

See Step 3 (Pg 3-13) for information regarding criteria necessary to satisfy each of the Performance Requirements.

Decision Point E. Does project create or replace less than 5,000 sf Net Impervious Area?

If yes, you will be required to meet Performance Requirement 1 "Site Design and Runoff Reduction". If no, continue to decision point F.

Decision Point F. Does the project create or replace less than 15,000 sf of new and impervious surface?

Projects that answer yes to this question are subject to:

Performance Requirement Number 1 "Site Design and Runoff Reduction"

Performance Requirement Number 2 "Water Quality Treatment"

If no, proceed to decision point G.

Decision Point G. Does the project fall under any Special Circumstances designation?

If no, continue to H_1, H_2, and H_3.

If yes, the County may modify requirements for projects that are greater than 15,000 sf from runoff retention and/or peak management requirements if those requirements would be ineffective to maintain or restore the beneficial uses of receiving waters. Examples of special circumstances that will be considered by the County on a case-by-case basis include:

1. Highly Altered Channels special circumstances designation may be applicable to projects that drain into either a stream channels that are concrete-lined or otherwise continuously armored from the discharge point to the channel's confluence with a lake, or large[1] river or a subsurface, continuous storm drain system that discharges directly to a lake, or large river.

2. Intermediate Flow Control Facilities special circumstances designation may apply to projects that discharge to an existing[2] flow control facility that regulates flow volumes and durations to levels that have been demonstrated to be protective of the beneficial uses downstream of the facility. Applicants seeking this designation must demonstrate via their Stormwater Control Plan that:
   - The flow control facility has the capacity to accept the project's runoff;
   - The receiving facility has the capacity to accept runoff and to regulate flow volumes and durations; and,
   - No adverse impacts will be realized to downstream receiving waters.

3. Historic Lake and Wetlands special circumstances designation may apply to projects that are located where there was once a historic lake or wetland in which pre-development hydrologic processes included filtration and storage but no significant infiltration to support receiving waters. See **Appendix A** for a delineation of area that may qualify for this special circumstances designation. If the project is not located in one of the already identified historic lake and wetlands on **Appendix A,** the request must be submitted to the Executive Officer of the Central Coast Water Board for approval.

[1] >200 square mile drainage area
[2] Existing basins are those that existed as of September 6, 2012.

H_1. Determine Watershed Management Zones

Projects creating or replacing 15,000 square feet or more of impervious surfaces, that are not a detached single family residence, and do not qualify for a special circumstance designation, will need to know their Watershed Management Zone (WMZ).

Watershed Management Zones (WMZs) are the basis for determining if the project is subject to Runoff Retention Performance Standards, or Runoff Retention and Peak management Requirements Performance Standards.

Watershed management zones (WMZs) are based on common key watershed processes and receiving water type. They are the basis for determining if the project is subject to Runoff Retention Performance Standards, or Runoff Retention and Peak management Requirements Performance Standards.

There are ten Watershed Management Zones located throughout the County in urbanized areas. If the project is located on one or more WMZs, you will need to satisfy the requirements of each zone proportionately. **Appendix A** provides exhibits of the distribution of Watershed Management Zones throughout the county. This information will eventually be available on the County's web portal to their GIS system, for searching by address or APN number. The County's Planning and Building Department can assist you if the maps in **Appendix A** do not clearly identify the Watershed Management Zone that the project is located in.

Exemptions: Projects in WMZs 3, 4, 7, and 10 that do not overlie groundwater basins are exempt from PR3. WMZs 4, 5, 7, 8, and 10 are exempt from PR4. See **Table 3-3**.

H_2. Determine Applicable Rainfall Event

The performance criteria for post-construction retention standards is the percentile storm that best represents the volume that is fully infiltrated in a natural condition, and thus should be managed onsite to maintain the pre-development hydrology for duration, rate and volume of stormwater flows.

The percentile rain event will either be the 85th or 95th percentile rain event depending on the project's watershed management zone (WMZ) designation. As shown in **Table 3-3** below, the applicable rain event for the project may also be influenced by the presence or absence of a designated groundwater basin underlying the project site.

Table 3-3: Applicable Rainfall Event

WATERSHED MANAGEMENT ZONE (WMZ) (SEE APPENDIX A)	APPLICABLE RAINFALL EVENT (PERCENTILE)	COMPLIANCE, IF APPLICABLE, MUST BE ACHIEVED BY: (SEE TABLE 3-6):
1	95th	Infiltration
2	95th	Rainwater harvesting, infiltration, and/or evaporation
3		Not applicable*
4		If not above designated groundwater basin: Not applicable*

Watershed Management Zone (WMZ) (See Appendix A)	Applicable Rainfall Event (Percentile)	Compliance, if applicable, must be achieved by: (See Table 3-6):
	95th	If above designated groundwater basin: Infiltration
5	85th	Infiltration
6	85th	Rainwater harvesting, infiltration, and/or evaporation
7		If not above designated groundwater basin: Not applicable*
	95th	If above designated groundwater basin: Infiltration
8	85th	Infiltration
9	85th	Rainwater harvesting, infiltration, and/or evaporation
10		If not above designated groundwater basin: Not applicable*
	95th	If above designated groundwater basin: Infiltration

*If "not applicable" for compliance, the project is exempt from PR3.

Refer to the maps in **Appendix A** to determine what rainfall depth is associated with the designated design storm for the project. **Appendix A** also provides an exhibit delineating where designated groundwater basins occur throughout the County.***H_3: Does the project create or replace 22,500 sf or more of new and replaced impervious surface?***

All projects that are required to answer decision H are subject to Performance Requirement Number 3 "Runoff Retention". If the answer to decision H is yes, the project must also comply with Performance Requirement Number 4 "Peak Management".

Table 3-4 provides the section of this handbook to find information regarding techniques applicable to reduce runoff (volume) and peak runoff rates.

Table 3-4: Runoff Retention / Peak Management Techniques

Technique	Section Reference	V = Volume Control P = Peak Management		
		Rainwater Harvesting	Infiltration	Evaporation
Cisterns / Rain Barrels	5.2.1	V, P		
Roof runoff directed into vegetated areas	5.2.2		V, P	V, P
Runoff from sidewalks, walkways and/or patios directed into vegetated areas	5.2.3		V, P	V, P

Technique	Section Reference	V = Volume Control P = Peak Management		
		Rainwater Harvesting	Infiltration	Evaporation
Runoff from driveways and/or covered parking lots onto vegetated surfaces	5.2.4		V, P	V, P
Permeable pavements with infiltration bed	5.2.5		V, P	V, P
Runoff from driveways, uncovered parking lots, sidewalks, walkways, and patios constructed with permeable surfaces	5.2.5		V, P	

Applicants of projects subject to Performance Requirement 3 are encouraged to participate in a pre-application meeting.

Step 2: Initial Site Assessment

This step involves identifying the site characteristics that are best suited for the development of the project while minimizing the interruption of natural hydrologic functions. The initial site assessment begins with the collection and evaluation of project and site information listed in **Table 3-5**. The table provides a list of the most commonly needed information, its purpose, and its source. This list is preliminary and more specific information may be required prior to final design.

Table 3-5: Initial Site Assessment - Commonly Needed Site Information

Category	Description	Purpose	Source
Site Topography	Steep slopes, outcrops, or other significant geologic features, native vegetative areas and tree locations, existing site structures and utilities.	The project needs to comply with any local restrictions on development of steep slopes, and should seek to preserve existing native vegetation.	Field survey.
Soil Types	Hydrologic soil groups, soil properties and depth to groundwater	Determining the feasibility of onsite infiltration of stormwater.	Site Geotechnical Report. See **Appendix D** for guidance on assessing soil infiltration rates. Natural Resources Conservation Service (NRCS) Soils Survey maps http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

CATEGORY	DESCRIPTION	PURPOSE	SOURCE
Hydrologic features	Creeks, wetlands, watercourses, seeps, springs, ponds, lakes, areas of 100-year floodplain, any contiguous natural areas. Include locations of run-on, depth to seasonal high groundwater.	Development location should balance site constraints and opportunities (on the least sensitive portion of a site and conserving the naturally vegetated areas to minimize environmental impacts in general and stormwater runoff impacts in particular).	Site inspections, topographic survey and existing maps such as US Geologic Survey (USGS) quadrangle maps, Federal Emergency Management Agency (FEMA) floodplain maps, and US Fish and Wildlife Service (USFWS) wetland inventory maps.
Receiving Water Limitations	Discharge locations, including existing drainage, developed drainage and storm drain connections, where applicable.	The stormwater control plan should be designed considering the receiving water limitations based on the Clean Water Act 303 (d) list of impaired water bodies.	Receiving water quality Clean Water Act 303(d) list for the Central Coast Region http://www.waterboards.ca.gov/water_issues/programs/tmdl/docs/303dlists2006/epa/r3_06_303d_reqtmdls.pdf US Geologic Survey (USGS) quadrangle maps
Hazardous areas	Areas where contamination of soils and/or groundwater is known	Determine suitable BMPs to address these areas. Determine areas where it is not appropriate to infiltrate stormwater.	Evaluate previous uses of site to determine if there is a likelihood of contamination (soils and/or groundwater). Conduct Phase 1 Assessment if appropriate.
Pollutants of Concern (POCs) in Site Runoff	Existing POCs at site and possible POCs after project completion.	Knowing the target POCs at a site is necessary to designs appropriate post-construction BMPs.	Project Site History (see above) Project Pollutant Generating Activities
Effective Impervious Area (EIA)	Existing and proposed impervious surfaces, e.g., roof, sidewalk, street, parking lots	To measure the relationship that exists between watershed health and the percentage of impervious surface area within a watershed.	Site inspections, a topographic survey of the site.
Setbacks	Building, septic, wells, open space, creek & riparian habitat setbacks.	Development should be set back from creeks and riparian habitat as required by the local jurisdiction and the Central Coast Regional Water Quality Control Board.	County Dept. of Planning and Building County Code and Environmental requirements. www.sloplanning.org Water Quality Control Plan, Central Coast Region (Basin Plan) http://www.waterboards.ca.gov/centralcoast/BasinPlan/Index.htm

CATEGORY	DESCRIPTION	PURPOSE	SOURCE
Known or suspected Environmentally Sensitive Areas	Biological and culturally sensitive areas	Mature trees and native vegetation offer stormwater control benefits. Their preservation, along with other sensitive areas, is recommended.	County Dept. of Planning and Building County Code and Environmental requirements. www.sloplanning.org
Zoning, land use, covenants, easements, open space requirements, etc.	Site design constraints	Identify additional requirements.	County Dept. of Planning and Building County Code and Environmental requirements. www.sloplanning.org Title report

Review the project and site information listed above to define the optimal development envelope by identifying site constraints and opportunities to incorporate Low Impact Development (LID) design features into the site and landscape design. Constraints might include impermeable soils, high groundwater, steep slopes, and geotechnical instability. Opportunities might include existing natural areas, localized depressions, and unbuildable portions of irregularly shaped parcels.

Step 3: Preliminary Design

By this step, applicants should have a clear understanding of the Performance Requirements they are expected to satisfy (see flow chart in Step 1) and a sense of constraints and opportunities available on site to manage stormwater (site assessment discussed in Step 2).

Applicable performance requirements that the project may be subject to include:

- ☐ Performance Requirement 1: Site Design and Runoff Reduction
- ☐ Performance Requirement 2: Water Quality Treatment
- ☐ Performance Requirement 3: Runoff Retention
- ☐ Performance Requirement 4: Peak Management
- ☐ Performance Requirement 5: Special Circumstances
  - ___Highly Altered Channel
  - ___Intermediate Flow Control Facility
  - ___Historic Lake or Wetland
- ☐ Technical Infeasibility: _____

This step includes an overview of each performance requirement. Greater detail regarding each of the above performance requirements is provided in subsequent chapters of this handbook.

The project is expected to meet all applicable stormwater Performance Requirements and design requirements of the County.

The applicant must demonstrate that measures to reduce stormwater quality impacts have been incorporated into the project design. This information is conveyed to the County and certified by an appropriately licensed individual through a Stormwater Control Plan (SWCP) and application.

The SWCP describes how existing runoff characteristics will be affected by development and contains measures for mitigating any adverse impacts to water quality. The SWCP shall identify constraints, expected pollutants of concern, and site design measures that minimize impervious surfaces and redirect runoff from impervious surfaces to pervious surfaces, as well as source and treatment control BMP locations. The SWCP must be consistent with other application material (plans and reports). **Appendix B-7** provides a checklist of information required to be included in the SWCP.

Supporting documentation must include sufficient information to evaluate the environmental characteristics of affected areas, the potential impacts of the proposed development on water resources, and the effectiveness and acceptability of measures proposed for managing stormwater runoff.

A Stormwater Control Plan Application (Appendix B-1 to B-5) shall be submitted with the permit applications (e.g. land use permit, subdivision, grading permit, etc.) for the proposed project. It is recommended that a meeting with applicants and County staff take place at this early stage in order to come to concurrence on the requirements, especially if there are special circumstances involved. If the Application is approved by Planning, the applicant can proceed in completing the SWCP.

Within 30 days of receipt of project application and SWCP, the application will be evaluated for completeness and, if necessary, additional information will be requested.

Once found to be complete, an environmental determination will be made on the application to determine if significant environmental impacts could potentially result from the proposed project. Mitigation measures may be required to reduce impacts to a level of insignificance, or an Environmental Impact Report may be required.

PERFORMANCE REQUIREMENT 1: SITE DESIGN AND RUNOFF REDUCTION

The intent of Performance Requirement 1 (PR1) is for projects to be designed to mimic predevelopment hydrology to the extent feasible using Low Impact Design principals.

The best way to reduce stormwater quality issues over the life of a project is to employ good site planning techniques that:

- Conserve natural areas (existing trees, native vegetation, and soils)
- Limit the overall impervious footprint of the project
- Construct streets, sidewalks, or parking lot aisles to the minimum widths necessary (without compromising public safety or mobility)
- Set back development from creeks, wetlands, and riparian habitats
- Conform the site layout along natural conforms
- Avoid excessive grading and disturbance of vegetation and soils.

Table 3-6 is an excerpt from the Stormwater Control Plan **Checklist** (see **Appendix B-7** for full checklist). All regulated projects must utilize the checklist below to demonstrate that the project design implements strategies to minimize impacts and reduce runoff. The relevant handbook section listed adjacent to each design strategy provides additional detail regarding compliance with the design strategy.

Table 3-6: PR1 Mandatory Design Strategy Table

PERFORMANCE REQUIREMENT 1: SITE DESIGN AND RUNOFF REDUCTION			
MANDATORY DESIGN STRATEGY		**MEANS OF DEMONSTRATING COMPLIANCE**	**RELEVANT HANDBOOK SECTION**
1.	Limit disturbance of creeks and natural drainage features.	Pre and post drainage feature map	4.2.1
2.	Minimize compaction of highly permeable soils.	Exhibit of soil types, overlain with development footprint	4.2.2
3.	Limit clearing and grading of native vegetation at the site to the minimum area needed to build the project, allow access, and provide fire protection.	Exhibit with native vegetation, overlain with development footprint	4.2.3
4.	Minimize impervious surfaces by concentrating improvements on the least-sensitive portions of the site, while leaving the remaining land in a natural undisturbed state.	Exhibit with delineated sensitive areas overlain with development footprint.	4.2.4

Minimize stormwater runoff by implementing one or more of the design measures listed in **Table 3-7.** The relevant handbook section listed adjacent to each design measure provides additional detail regarding compliance with the design measure.

Table 3-7: PR1 Mandatory Site Design Measures

MANDATORY SITE DESIGN MEASURES (SELECT AT LEAST ONE)		SELECTED	REASON, IF NOT SELECTING	RELEVANT HANDBOOK SECTION
a.	Roof runoff directed into cisterns or rain barrels for reuse?			5.2.1
b.	Roof runoff directed into vegetated areas (safely away from building foundations and footings)?			5.2.2
c.	Runoff from sidewalks, walkaways, and/or patios directed onto vegetated areas (safely away from the building foundations and footings)?			5.2.3
d.	Runoff from driveways and/or uncovered parking lots onto vegetated areas (safely away from the building foundations and footings)?			5.2.4
e.	Construct bike lanes, driveways, uncovered parking lots, sidewalks, walkways, and patios with permeable surfaces?			5.2.5

See Chapters 5 and 6 for additional information regarding potentially suitable site design and runoff reduction measures.

A pre-application meeting at this step is beneficial and is recommended, and highly recommended for the following projects:

Detached single family residences being built on small lots with steep slopes

Or

Projects subject to Performance Requirement 3.

PERFORMANCE REQUIREMENT 2: WATER QUALITY TREATMENT

The purpose of this performance requirement is to reduce pollutant loads and concentrations in site generated stormwater runoff using physical, biological, and chemical removal processes. Regulated projects subject to Performance Requirement 2 have three options (or a combination thereof) to treat runoff using on site measures. They are listed below in order of preference (highest to lowest):

The use of ***runoff reduction measures*** can reduce the amount of treatment control measures required for a site.

1. Low Impact Development (LID) Treatment Systems involve harvesting and use, infiltration, and/or evapotranspiration Stormwater Control Measures to collectively retain stormwater runoff equal to the volume of runoff generated by the 85th percentile 24-hour storm event for the project area. See **Appendix A** for Stormwater depths.

2. Biofiltration Treatment Systems remove pollutants through the use of natural systems, such as swales and filter strips. Project proponents must demonstrate that the biofiltration system proposed is capable of effectively treating site runoff given a 0.2-inches per hour rainfall intensity loading rate; or the loading rate associated with two times the 85th percentile hourly rainfall intensity for the project area without causing scour, erosion or channeling within the treatment system. Surface loading rates cannot exceed 5 inches per hour. Refer to typical biofiltration treatment systems & specifications in **Appendix E**.

   Additionally, biofiltration treatment systems must include:

   - Minimum surface reservoir equal to the biofiltration treatment system surface area times a depth of 6 inches;
   - Minimum planting medium depth of 24 inches. The planting medium must sustain a minimum infiltration rate of 5 inches per hour throughout the life of the project and must maximize runoff retention and pollutant removal. A mixture of sand (60%-70%) meeting the specifications of American Society for Testing and Materials (ASTM) C33 and compost (30%-40%) may be used. A Regulated Project may utilize an alternative planting medium if it demonstrates its planting medium is equal to or more effective at attenuating pollutants than the specified planting medium mixture.
   - Proper plant selection;
   - Subsurface drainage/storage (gravel) layer with an area equal to the biofiltration treatment system surface area and having a minimum depth of 12 inches;
   - Underdrain with discharge elevation at top of gravel layer;
   - No compaction of soils beneath the biofiltration facility (ripping/loosening of soils required if compacted);
   - No liners or other barriers interfering with infiltration, except for situations where lateral infiltration is not technically feasible.

3. Non-Retention Based Treatment Systems are limited to locations that cannot implement LID or biofiltration treatment systems. Non-retention systems are considered "end of pipe" treatment approaches. They are the least favorable option because they are costly, maintenance intensive and tend not to provide additional benefits (such as treatment and runoff and/or peak management). Non-retention based treatment systems are designed either based on volume or flow hydraulic design criteria. **Table 3-8** outlines the design requirements.

Table 3-8: Non-Retention Based Treatment Control Sizing Criteria

PRIMARY MODE OF ACTION	DESIGN REQUIREMENTS*: TREAT STORMWATER RUNOFF EQUAL TO:
Volume Hydraulic Design Basis	The volume of runoff generated by the 85th percentile 24-hour storm event, based on local rainfall data.
Flow Hydraulic Design Basis	(i) The flow of runoff produced by a rain event equal to at least two times the 85th percentile hourly rainfall intensity for the applicable area, based on historical records of hourly rainfall depths; or (ii) The flow of runoff resulting from a rain event equal to at least 0.2 inches per hour intensity.

*Per CCRWQCB Res. No. R3-2013-0032 item 3.b.iii (a) and (b)

Non-retention Based Treatment System designs shall follow manufacturer's recommendations for level of treatment which, at a minimum, shall achieve 80% reduction in Total Suspended Solids (TSS). In parking areas, systems shall include the capacity for oil and grease removal. Design details (such as Product Name, Manufacturer/Model Number, Product Life, and Maintenance requirements) of these systems considered Structural Control Measures (SCMs) will be required in the design documents as well as in the Operations and Maintenance forms located in **Appendix B-16.**

LID and Biofiltration Systems are retention based systems and are preferred over non-retention based systems. Project proponents will be required to demonstrate the basis for determining that none of the preferred systems could be implemented in their Stormwater Control Plan.

See **Appendix C** for information regarding Hydrologic Analysis and Stormwater Control Measure (SMC) Sizing Guidance for retention based systems.

Design alternatives will only be considered if the applicant can demonstrate that ALL of the following measures of equivalent effectiveness are demonstrated:

1. Equal or greater amount of runoff infiltrated or evapotranspired;
2. Equal or lower pollutant concentrations in runoff that is discharged after biofiltration;
3. Equal or greater protection against shock loadings and spills; and
4. Equal or greater accessibility and ease of inspection and maintenance.

Technical guidance for designing bioretention facilities can be found in **Appendix E and Appendix H**. Additional guidance and specifications are available from the Central Coast LID Initiative. The LIDI Specifications are found in **Appendix E** and on their web site:

http://www.centralcoastlidi.org/Central_Coast_LIDI/LID_Structural_BMPs.html

The guidance includes design specifications and standard plans. Plant lists appropriate for installation of LID and Biofiltration Systems in the County of San Luis Obispo can be found in **Appendix F: Plant List & Guidelines for Landscape-Based Stormwater Measures**.

PERFORMANCE REQUIREMENT 3: RUNOFF RETENTION

The purpose of this performance requirement is to retain, and if necessary, restore the beneficial uses of a project's receiving waters. A flow chart is provided on the next page **(Figure 3-3)** to assist the designer in meeting the runoff retention performance requirement using an iterative approach.

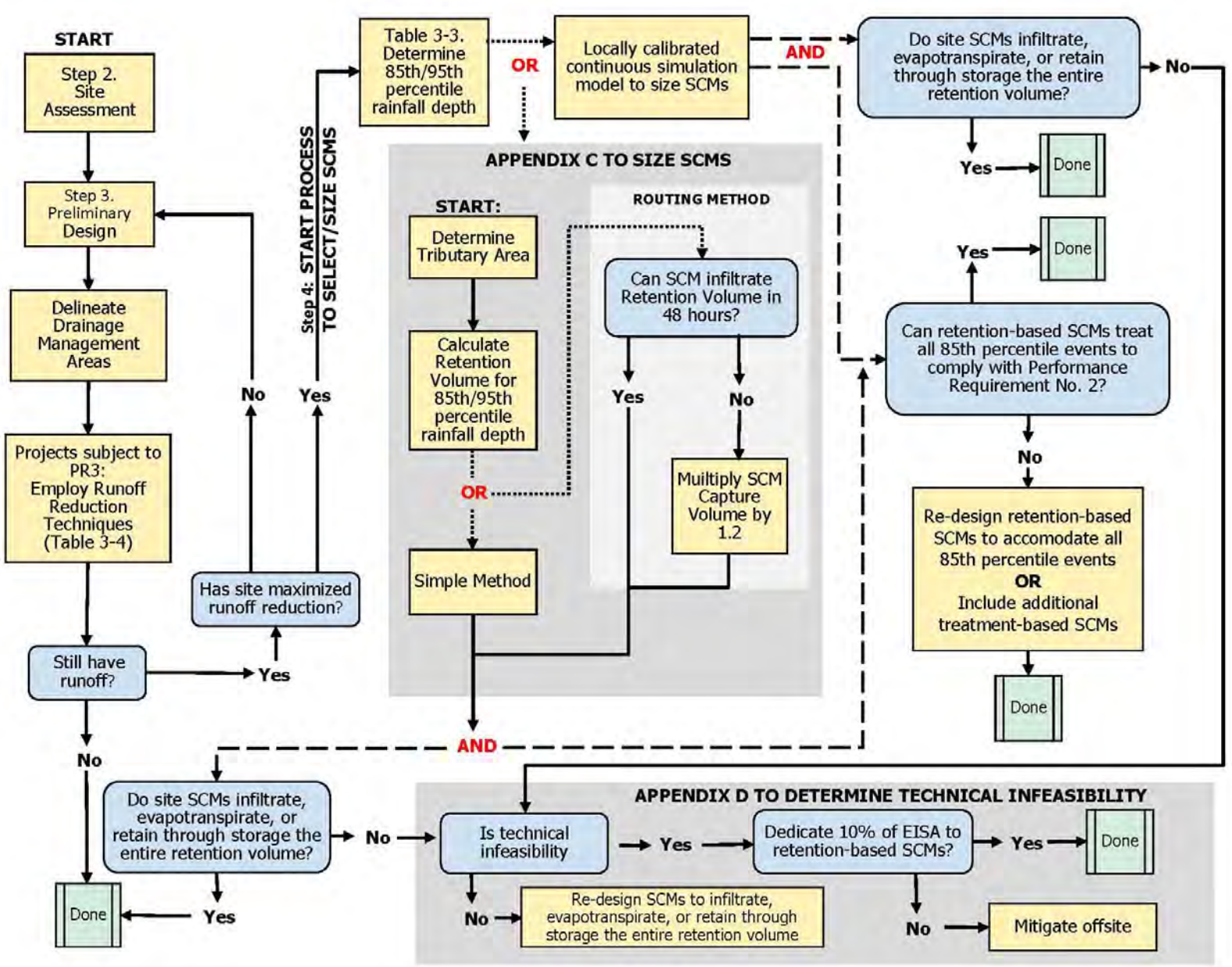


Figure 3.3 Runoff Retention Flow Chart

Drainage Management & Retention Tributary Areas

The designer must analyze the site by discrete drainage management areas, as well as the aggregate of these drainage management areas. Applicants will be expected to provide an exhibit delineating the boundary of each **Drainage Management Area** (DMA) in the Stormwater Control Plan (SWCP).

Drainage management areas typically follow grade breaks and roof ridge lines and account for each surface type (e.g. landscaping, pervious paving, or roofs).

Applicants must provide an exhibit delineating the boundary of each **Drainage Management Area** (DMA) within their site. Supporting calculations must also be provided for each DMA, as well as the site as a whole in the SWCP.

The volumes subject to PR3 are based on a determination of the Retention Tributary Area within each DMA. The retention tributary area is

Retention Tributary area	=	**Entire DMA**	–	**Undisturbed or Natural Landscaped areas**	–	**Impervious Surface Areas that discharge to infiltrating Areas**

Where:

Undisturbed or natural landscaped areas are defined as undisturbed area or areas planted with native, drought-tolerant, or LID appropriate vegetation that do not receive runoff from other areas (self-treating areas)

and

Impervious Surface Areas that discharge to infiltrating Areas are areas where the applicant can demonstrate that this runoff will be infiltrated and will not produce runoff to the storm drain system, or a surface receiving waterbody, or create nuisance ponding that may affect vegetation health or contribute to vector problems for the storm defined in **Section H_2** of this chapter.

The runoff off volume is based on the applicable rainfall event defined in **Table 3-3** based on the project's Watershed Management Zone. Where infiltration is listed as the means of compliance in **Table 3-3**, the applicant must use Structural Control Measures (SCMs) that retain the entire Retention Volume determined for the DMA.

Retention facilities must be sized using the Simple Method, a Routing Method or a calibrated continuous simulation model, without overflowing the design rainfall event (the 85th or 95th percentile storm, as applicable).

Simple Method, is a direct calculation of facility size based on the runoff volume generated by a single design rainfall event, applicable to the project.

Routing Method, utilizes hydrograph analysis to determine the volume needed to retain the design rainfall event, applicable to the project.

Calibrated continuous simulation models, must be approved by the Water Board prior to their use.

Design guidance for fully infiltrative SCMs include:

- The Contra Costa C.3 Manual
- The City of Santa Barbara LID BMP Manual
- The City of San Diego LID Design Manual, July 2011
- Central Coast LID Initiative Bioretention Design Guidance

There are numerous design strategies than reduce the volume of runoff. Applicants must apply all of the applicable design strategies listed in **Table 3-9** to minimize site runoff and demonstrate compliance with Performance Requirement 3.

Table 3-9: PR3 Mandatory Design Strategies

MANDATORY DESIGN STRATEGY		MEANS OF DEMONSTRATING COMPLIANCE	RELEVANT HANDBOOK SECTION
1.	Define the development envelope and protected areas, identifying areas that are most suitable for development and areas to be left undisturbed.	Site Constraints exhibit overlain with development footprint.	4.3.1
2.	Conserve natural areas, including existing trees, other vegetation, and soils	Exhibit with existing vegetation, overlain with development footprint	4.3.2
3.	Limit the overall impervious footprint of the project	Narrative in the Stormwater Control Plan to minimally discuss the concepts listed in Chapter 4, and how they were incorporated into the design, or the basis for rejection, if not adopted	4.3.3
4.	Construct streets, sidewalks, or parking lot aisles to the minimum widths necessary, provided that public safety or mobility uses are not compromised	Discussion on minimum allowable widths, and rationale for using larger values (if applicable) or confirmation that minimum values were used (where applicable)	4.3.4
5	Set back development from creeks, wetlands, and riparian habitats	Discussion on set-back dimension chosen. Exhibit with resource and setback line.	4.3.5
6	Conform the site layout along natural landforms	Topo with existing and planned contours cut and fill lines. Discussion of grading approach.	4.3.6
7	Avoid excessive grading and disturbance of vegetation and soils	Exhibit with vegetation, overlain with planned disturbed area limits.	4.3.7

Only after the site design has been maximized to reduce runoff, shall projects utilize non-infiltration based Structural Stormwater Control Measures (SCMs).

Is Project unable to meet Performance Requirements?

Technical Infeasibility and Alternative Compliance

This section introduces the process for establishing technical infeasibility as the basis for not fully satisfying all applicable Performance Requirements. Alternative Compliance refers to the need for off-site mitigation of retention requirements in the circumstances listed below. Project applicants that are pursuing either or both of these options should consult with the County Planning and Building Department for assistance.

Technical Infeasibility

Appendix D provides information regarding appropriate methods to demonstrate technical infeasibility on the project site. Potential site conditions that prevent full compliance with applicable Performance Requirements may include:

1. Depth to seasonable high groundwater limits infiltration and/or prevents construction of subgrade stormwater control measures.

2. Depth to an impervious layer such as bedrock limits infiltration.

3. Sites where soil types significantly limit infiltration.

4. Sites where pollutant mobilization in the soil or groundwater is a documented concern.

5. Space constraints (e.g., infill projects, some redevelopment projects, high density development).

6. Geotechnical hazards.

7. Stormwater Control Measures located within 100 feet of a groundwater well used for drinking water.

8. Incompatibility with surrounding drainage system (e.g., project drains to an existing stormwater collection system whose elevation or location precludes connection to a properly functioning treatment or flow control facility).

Note: Projects that are able to demonstrate technical infeasibility for runoff retention requirements are still required to meet PR2 (Water Quality Treatment) criteria on-site.

Alternative Compliance

Appendix B-14 provides a checklist for demonstrating the need for Alternative Compliance. The County will *only* consider alternative compliance/off-site mitigation for projects that:

- cannot retain the full runoff retention volume required, can demonstrate technical infeasibility for full retention AND are unable to dedicate 10% of the project's equivalent impervious surface area for retention purposes (see **Appendix D**).

- are within a Urban Sustainability Area (USA) (not applicable for San Luis Obispo County)

- are subject to a RWCQB approved Regional Stormwater Plan (not applicable for San Luis Obispo County)

Projects approved for alternative compliance must identify and secure rights to use an alternative site within the same watershed as the project and provide supporting calculations to demonstrate that the off-site mitigation project is able to satisfy required Performance Requirements.

Summary of Performance Requirement 3 submittals

Projects subject to PR 3 Runoff-retention requirements must submit the following details within their Stormwater Control Plan:

- Opportunities and constraints to implementing LID on the site

- Techniques used to optimize LID site design measures in areas where LID is feasible and appropriate to the site

- Design details to each discrete drainage management area (DMA), covering the entire site

- Site Design and Runoff Reduction measures implemented to satisfy Performance Requirement 1

- Strategies for minimizing stormwater pollutants from the site.

- Justification and design details for any Structural Stormwater Control Measures (SCMs) specified on site (please verify with the County Planning and Building Department prior to relying on structural stormwater control measures)

- Other unique aspects to the project, such as the basis for any technical infeasibility assertions claimed, use of off-site mitigations to satisfy project requirements, etc. (verify with the County Planning and Building Department prior to asserting technical infeasibility or pursing off site mitigation projects). Pre-application meetings are strongly recommended. A complete checklist of the components necessary to develop the Stormwater Control Plan is provided in **Appendix B-7.**

PERFORMANCE REQUIREMENT 4: PEAK MANAGEMENT

The purpose of this performance requirement is to retain, and if necessary, restore the beneficial uses of a project's receiving waters. The requirement is to manage peak flow stormwater runoff. The project designer will need to demonstrate that post-development peak flows discharged from the site do not exceed pre-project peak flows for the 2- through 10- year storm events in the Stormwater Control Plan (SWCP).

PERFORMANCE REQUIREMENT 5: SPECIAL CIRCUMSTANCES

The purpose of this performance requirement is to allow discretion in the permitting of projects that have site and/or receiving water conditions that prevent the project from being designed in a way that fully satisfies Performance Requirements 3 and 4, if those requirements are applicable.

Special circumstances that will be considered by the County on a case-by-case basis include:

1. Highly Altered Channels
2. Intermediate Flow Control Facilities
3. Historic Lake and Wetlands

Projects in which the County (and potentially the Regional Board may weigh in) deem eligible for a Special Designation must satisfy Performance Requirements 1 and 2, as well as the performance requirements provided in the table below.

Table 3-13: PR5 Special Circumstances Requirements

SPECIAL CIRCUMSTANCE	REQUIREMENT	APPLICABLE WATERSHEDS
Highly Altered Channels	Projects that create or replace ≥ 22,500 sf of impervious surface must meet PR 3	1, 2, 5, 8 or 4, 7, 10 with underlying designated groundwater basin
Intermediate Flow Control	Projects that create or replace ≥ 22,500 sf of impervious surface must meet PR 3	1, 2, 5, 8 or 4, 7, 10 with underlying designated groundwater basin
Historic Lake or Wetland	Projects that create and/or replace > 15,000 and < 22,500 sf of impervious surface must detain the 95th percentile 24-hour rainfall event	All
	Projects that create or replace ≥ 22,500 sf of impervious surface must manage peak flow by detaining runoff such that the post-project rate for the 95th percentile 24 hour event and the 2- through 10-year storm events does not exceed pre-project rates.	All

Although the County will not waive the Water Quality Treatment Performance Requirements, applicants providing supporting documentation demonstrating that applicable Performance Requirements would be ineffective in maintaining or restoring the beneficial uses of receiving waters will be considered. Applicants, who cannot satisfy required Performance Requirements for reasons other than those provided below, are directed to **Appendix D**.

Step 4: Finalize Design

With a clear understanding of project Performance Requirements, the iterative process of design can begin, and continue until all stormwater goals have been met. An overview of design considerations is provided in this handbook **(Chapters 3, 4, and 5)**. Specific design resources for designing bioretention facilities is available from the Central Coast LID Initiative web site:

http://www.centralcoastlidi.org/Central_Coast_LIDI/LID_Structural_BMPs.html

The CSUS Office of Water Programs in partnership with Central Coast LID Initiative and Watearth, Inc. have begun a project to create a web-based 'LID Sizing Tool for the Phase II Small MS4 General Permit'. Although not completed and active at the time of this handbook, it is recommended to check online for this helpful tool.

Acceptable design Guidance for fully infiltrative SCMs includes:

- The Contra Costa C.3 Manual
- The City of Santa Barbara LID BMP Manual
- The City of San Diego LID Design Manual, July 2011
- Central Coast LID Initiative Bioretention Design Guidance

Manufacture performance criteria will be the basis for design when proprietary systems are specified. Applicants will be required to justify the use of proprietary systems by demonstrating that retention based systems were not feasible.

Alternative designs will be considered if documentation is provided that includes supporting calculations and testing results that demonstrate equal water resource protection.

Projects will be required to implement all stormwater-related conditions of approval and mitigation measures associated with the approved project. The Stormwater Control Plan (SWCP) is the vehicle to be used to document the design process, findings, supporting calculations, and exhibits. See **Appendix B-7** for required content of the SWCP.

Once the project design complies will all stormwater goals, the final Stormwater Control Plan must be submitted for review.

A draft Operation and Maintenance Plan (O&M) is required for all projects that utilize Structural Control Measures (SCMs) to satisfy Performance Requirements 2, 3 and/or 4. A maintenance program is essential to ensure that the stormwater facilities continue to function as designed to maintain water quality and prevent possible flooding and property damage.

A proper maintenance plan must include:

- Site map of all SCMs requiring O&M practices to function as designed
- Procedures are provided for each structural control measure including, but not limited to, LID facilities, retention/detention basins, and proprietorship devices
- Short and long term maintenance requirements
- Estimated cost for maintenance

Appendix B-16 has templates to aid in the development of the O&M Plan.

The SWCP and O&M plan shall be prepared under the direction of a professional civil engineer registered in the State of California. The plans shall be stamped, signed and include a certifying statement indicating that all stormwater BMPs have been designed to meet the County's stormwater quality requirements. If the plans include additional plants not listed in the County's approved plant list, landscape plans shall be prepared under the direction of a professional landscape architect registered in the State of California.

For discretionary projects, the Department will prepare a staff report to the Review Authority (e.g., the County Planning Commission, Subdivision Review Board) for the project's consideration. The Review Authority, based on County ordinances and policies, project facts, the environmental determination, and recommendations from other agencies, may approve, conditionally approve or deny the application. Pursuant to Sections 22.10.155.J (Land Use Ordinance) and 23.04.450.j (Coastal Zone Land Use Ordinance), the Review Authority may consider a waiver or modifications of requirements under this Handbook. If the project is approved, proceed to Step 5.

Step 5: Finalize Permit

Prior to issuing final approval or occupancy to a project utilizing stormwater management BMPs, the property owner(s) must enter into a formal written operation and maintenance agreement with the County[3]. **Appendix B-16 and B-26** includes a template and instructions for recording the Construction Notification necessary to formalize the agreement. The permit cannot be finalized until the agreement is fully executed.

Once the installation of the stormwater system, including post-construction features (and all other elements of the project) have been satisfied, the O&M agreement can be executed, and occupancy permit can be provided to the owner, providing there are no other issues pending.

[3] Reference LUO Section 22.10.155G.7 and CZLUO Section 23.04.450.g(7)

Ch 4: Site Design Strategies

This chapter provides supporting information regarding mandatory site design strategies

4.1 Introduction to Good Site Planning & Design

New development and redevelopment projects[1] that consider stormwater management early in the design process are more likely to achieve their mandatory Performance Requirements for less expense. Thoughtful site design may also reduce, and potentially eliminate, the need for expensive stormwater treatment controls later.

4.1.1 Planning Principals

Stormwater is an important natural resource that is critical for replenishing our streams, reservoirs, and groundwater supplies. To reduce water quality impacts of development project, consider implementing these fundamental principles:

- Preserve or minimize disturbance to natural features. Designs that integrate natural features of the project site are better at mimicking pre-development runoff characteristics (volume, rate, timing and pollutant loading) and minimizing the adverse impacts commonly associated with development. Additionally, there is value in maintaining corridors of natural habitat.

- Minimize the extent of impervious cover. Impervious cover is any surface on the site that cannot effectively absorb or infiltrate rainfall. It can increase runoff and the pollutants being carried by runoff, reduce groundwater recharge rates, and displace natural habitats.

- Disconnect impervious surfaces. Well-connected impervious surfaces are hydraulically efficient at removing runoff and associated pollutants in small rain events (and even heavy fogs). In contrast, designs that disconnect impervious surfaces provide an opportunity for small storm events to be intercepted and infiltrated.

4.1.2 Getting Started

This chapter provides insight behind the required design strategies. Many of the design strategies mentioned in this chapter start with a site assessment. The site assessment targets the optimal location for the development to occur within a given project site by identifying major site considerations (topography, existing structures, drainage features, trees, and soil types, etc.).

Oftentimes, it will be necessary to rely on a variety of disciplines to properly assess a site. Specific disciplines will vary based on the complexity of site but might include one or more of the following professionals: surveyors, engineers, landscape architects, biologists, geologist, and maybe even a geomorphologist.

The remainder of this chapter is intended to aid the designer in understanding some of the key elements to sustainable site design.

[1] "Redevelopment projects" are as defined in the Land Use Ordinance and Coastal Zone Land Use Ordinance. An example of a redevelopment project would be the creation or addition of at least 5,000 square feet of impervious area on a previously developed site.

4.2 Performance Requirement 1 Design Strategies

Performance Requirement 1 mandates that the following design strategies are employed for all projects:

- Limit disturbance of creeks and natural drainage features (4.2.1).
- Minimize compaction of highly permeable soils (4.2.2).
- Limit clearing and grading of native vegetation at the site to the minimum area needed to build the project, allow access, and provide fire protection (4.2.3).
- Minimize impervious surfaces by concentrating improvements on the least-sensitive portions of the site, while leaving the remaining land in a natural undisturbed state (4.2.4).

4.2.1 Limit disturbance of creeks and natural drainage areas

Everyone lives in a watershed. Each watershed is made up of many smaller sub-watersheds and many more even smaller catchment areas. Smaller catchment areas include ephemeral drainages which may not even appear 'creek' like, but if properly maintained can provide big benefits from a watershed perspective.

A well vegetated swale, or a historically 'wet' spot, can infiltrate and attenuate stormwater runoff, as well as filter pollutants. They can also provide greater diversity in the habitat.

Key Benefits

- Helps to preserve a site's natural hydrology and water balance
- Can act as a non-structural stormwater feature to promote additional filtration and infiltration
- Can help preserve a site's natural character, habitat and aesthetic appeal

Applicability

These procedures are suited for all sites adjacent to, or that contain, creeks and natural drainage areas including natural ponds, springs, vernal pools, marshes, wet meadows, swales and small channels. The principals apply whether the drainage area is considered perennial or ephemeral.

Limitations

None

Design Criteria

- Survey the site to delineate creek and natural drainage areas.
- To the extent possible, design the development around natural drainage features, and enhance these drainage features with native vegetation and a buffer area between them and the development.
- Require exclusionary fencing during construction to prevent inadvertent damage to these drainage resources.

Means of Demonstrating Compliance

Provide pre and post drainage features map on the Site Stormwater Assessment Exhibit in the Stormwater Control Plan (SWCP).

4.2.2 Minimize compaction of highly permeable soils

Undisturbed top soil has characteristics (texture, structure and biology) well suited for infiltration and water treatment. When soil is compacted or otherwise disturbed, it can lose its texture, structure and biology.

The soil on the left has pore spaces indicative of healthy soil that allows the efficient exchange of air and water. The soil on the right is compacted and will restrict root growth, and limit infiltration of air and water.

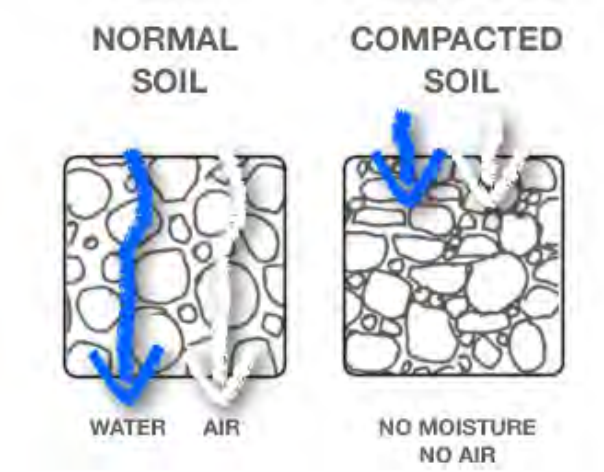


Figure 4.1 Normal versus Compact Soil
Source: http://www.landscaperesource.com/articles/introduction-soil-compaction-in-landscape.htm

Key Benefits

- Increases infiltration / decreases runoff
- Promotes healthy conditions for vegetation and soil biota

Applicability
These procedures are suited for sites where the development will not span the entire area.

Limitations
Even clay soils benefit from being protected from compaction, although the infiltration benefits are not as great as with non-clay soils.

Design Criteria

- To the extent possible, limit construction traffic to areas that will eventually be 'impervious'. This can be accomplished by delineating the soils to remain in place on the plans, and installing orange construction fencing around these areas to protect them from heavy equipment.
- Excavate and stockpile the top soil layer in areas requiring cuts. The stockpiled native top soil should be replaced on the surface of the area cut or used elsewhere on the site to amend areas with deficient topsoil. Stockpile

depths shall not exceed 3 feet if left in staging area for more than 6 months. Stockpiled top soil shall be spread onto cut slopes that have been tilled to a depth of 6 inches. The top soil shall be placed in lifts not exceeding 1 foot. Compaction should be limited to the density of existing, undisturbed areas.

Means of Demonstrating Compliance
Provide Site Stormwater Assessment Exhibit with soil types overlain with development footprint, including soil conservation areas. Designate the following:

- No disturbance areas,
- Areas that will required minimal disturbance
- Areas to be restored to (or mimic) the natural state (i.e. cut slope with native top soil or LID area) and
- Areas that are delineated for construction access and/or development footprint.

4.2.3 Limit clearing and grading of native vegetation at the site to the minimum area needed to build the project, allow access, and provide fire protection

Native vegetation provides numerous benefits, including providing sustenance for local wildlife. Additionally, native vegetation is well adapted to the local conditions and therefore requires less water and maintenance.

Key Benefits

- Reduces soil exposure (and resultant erosion and re-vegetation costs)
- Minimizes loss of native habitat and food source for native insects and animals

Applicability
These procedures are suited for sites that currently have native vegetation.

Limitations
Rural developments must adhere to Cal Fire/SLO County Fire Department “Road & Driveway Vegetation Clearance” and “Sample Site Plan” exhibits which may necessitate relocating planned features (road and structures) or extending clearance limits to adhere to the Cal Fire/SLO County Fire Department requirements.

Design Criteria
To the extent possible,

- Restrict clearing to that which is required to construct the project safely
- Cluster developments to minimize impacts to native vegetation
- Preserve native trees by protecting their root zones during construction.

Means of Demonstrating Compliance
Provide Site Stormwater Assessment Exhibit with native vegetation, overlain with development footprint.

4.2.4 Minimize impervious surfaces by concentrating improvements on the least-sensitive portions of the site, while leaving the remaining land in a natural undisturbed state

Development should be limited to site locations that avoid sensitive resource areas such as floodplains, steep slopes, erodible soils, wetlands, mature forests and critical habitat areas.

Buildings, roadways and parking areas should be planned on the least sensitive portions of the site to minimize impact, such as previously disturbed land which has been graded and/or compacted,

Key benefits

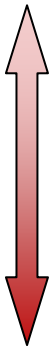
- Preserves the natural hydrology and drainage patterns of the site.
- Reduces grading impacts (including erosion and future stabilization)
- Reduces flood loss impacts
- Preserves riparian corridors

Applicability
Projects that do not consume the entire site.

Limitations
Sensitive resource areas on small sites can limit development options.

Sensitivity Scale:

Low



High

Design Criteria
Develop an exhibit showing location of sensitive resource areas on the site. Prioritize preservation of the resources. The following list provides a guideline for determining the least sensitive portion of the site, in order of increasing sensitivity:

1. Areas devoid of vegetation, including previously graded areas and agricultural fields.
2. Areas of non-native vegetation, disturbed habitats and Eucalyptus woodlands.
3. Areas of Chamise or mixed Chaparral, and non-native grasslands.
4. Areas containing coastal scrub communities.
5. All other upland communities.
6. Occupied habitat of sensitive species and all wetlands.
7. All areas necessary to maintain the viability of wildlife corridors.

Within each of the previous categories, areas containing hillsides should be considered more sensitive than the same category without hillsides.

In brief, concentrate or cluster development on the least environmentally sensitive portions of the site while leaving the remaining land in natural, undisturbed condition.

Means of Demonstrating Compliance
Provide Site Stormwater Assessment Exhibit with sensitive areas identified, overlain with development footprint. Include narrative in SWCP.

4.3 Performance Requirement 3 Design Strategies

Although the following design strategies are mandatory for projects subject to Performance Requirement 3, their implementation is encouraged for most projects. These strategies expand on Performance Requirement 2 considerations, including more specific consideration on placement of development:

To determine the most suitable areas for development, you will also need to consider other constraints, such as visual, traffic, septic systems, easements, etc.

To receive an overview of the process and a checklist of information and materials you will need to provide, schedule a **pre-application meeting** with County planning staff.

- Define the development envelope and protected areas, identifying areas that are most suitable for development and areas to be left undisturbed (4.3.1)
- Conserve natural areas, including existing trees, other vegetation, and soils (4.3.2)
- Limit the overall impervious footprint of the project (4.3.3)
    a. Clustering impervious areas
    b. Paving with permeable materials
    c. Shared parking agreements
    d. Street and sidewalk layout alternatives
- Construct streets, sidewalks, or parking lot aisles to the minimum widths necessary, provided that public safety or mobility uses are not compromised (4.3.4)
    a. Street widths
    b. Sidewalk widths
    c. Parking lot stall and aisle widths
- Set back development from creeks, wetlands, and riparian habitats (4.3.5)
- Conform the site layout along natural landforms (4.4.6)
- Avoid excessive grading and disturbance of vegetation and soils (4.3.7)

4.3.1 Define the development envelope and protected areas, identifying areas that are most suitable for development and areas to be left undisturbed

Most sites possess variability in topography, drainage patterns, soils types, etc. Some characteristics are more suitable for development than others.

The goal of this design strategy is to integrate the development project into the site rather than modifying the site to fit the development project. A site assessment will yield an opportunities and constraints map which can be used to help determine the most suitable location for the development to occur.

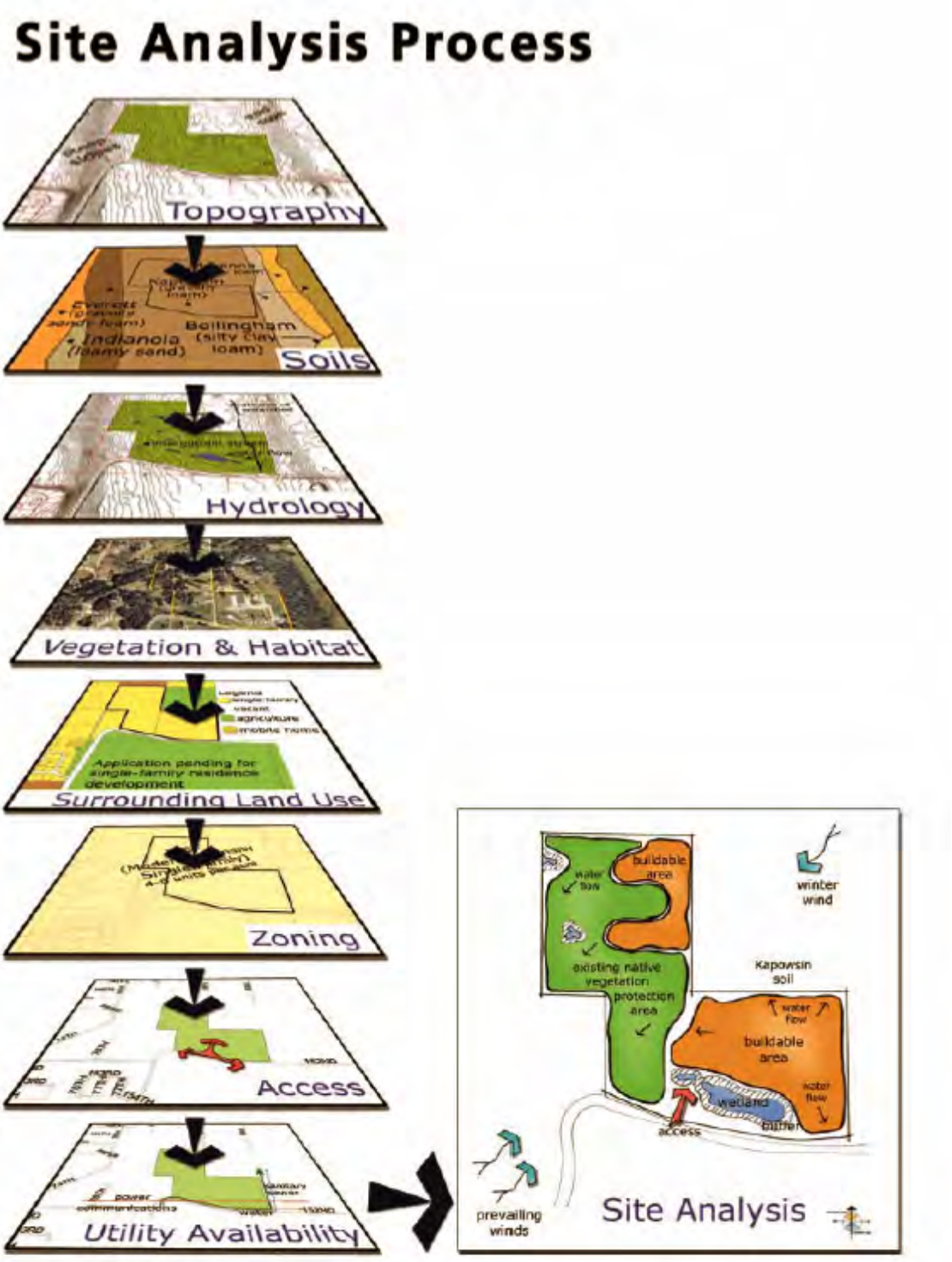


Figure 4.2 Site Analysis Process
Source Puget Sound LID Manual, graphic by AHBL Engineering

Key Benefits

- Reduces storm water impacts
- Preserves sensitive areas

Applicability
These procedures are most suitable for new development projects or projects seeking to expand.

Limitations
Redevelopment and in-fill projects may have limited opportunity to incorporate these recommendations.

Design Criteria
Inventory the environmental features of the site and adjacent properties to assess how the project will impact or be influenced by the surrounding areas. The analysis should consider both site and watershed-wide features, including:

___ Creeks, wetlands, watercourses, seeps, springs, ponds, lakes and areas within the 100-year floodplain. Consider existing drainage patterns, including locations of concentrated run-on and runoff.

___ Natural steep slopes, cliffs, outcrops, or other significant geologic features, as well as geotechnical hazard areas.

___ Tree conservation areas (include tree species, diameter at breast height, canopy cover and condition of ground cover and shrub layer).

___ Hydrologic soil groups and areas with high groundwater. Highlight the soils that provide the greatest opportunity for storage and partial infiltration.

___ Existing impervious surfaces, e.g., roofs, sidewalks, streets, and parking lots.

___ Evaluate average daily travel (ADT) volume of streets. Differentiate between those with lower volume (i.e. 15,000 ADT) and higher (i.e. 25,000 ADT)

___ Archeological and biological sensitive areas, including potential wildlife movement corridors (use terminology such as “Environmentally Sensitive Area”).

___ Existing fuel tanks (both on-site and within 500 feet of site).

___ Public and private wells and septic systems including leach lines (within 250 feet of the site).

Use the site information collected to locate the most suitable areas for development on the site constraints map.

Means of Demonstrating Compliance
Provide Site Stormwater Assessment Exhibit, overlain with development footprint.

4.3.2 Conserve natural areas, including existing trees, other vegetation, and soils

Natural areas generate the least amount of stormwater runoff and pollutant loads. From a stormwater standpoint, it is desirable to maintain as much of the site with natural vegetation and undisturbed soils as possible.

Key benefits

- Helps maintain the pre-development hydrology of a site by reducing runoff and promoting infiltration
- Native vegetation prevents erosion by stabilizing soil, filtering sediment and pollutants from runoff, and nutrient uptake
- Sites able to conserve undisturbed natural areas are able to minimize treatment requirements

Design Criteria.

- Identify and delineate natural areas present at the development site.
- Modify the layout of the development project to take advantage of natural features, preserve the most sensitive areas
- Buildings and roads should be located around the natural topography and drainage so as to avoid unnecessary disturbance of vegetation, soils and natural drainage ways.
- Provide exclusionary fencing during construction to prevent damage to tree roots and soils.

Means of Demonstrating Compliance
Provide Site Stormwater Assessment Exhibit with existing vegetation, overlain with development footprint.

4.3.3 Limit the overall impervious footprint of the project

There are numerous ways to limit the overall impervious footprint of the site. Four concepts are provided here:

1. Clustering impervious surfaces,
2. Using permeable surfaces in lieu of traditional impervious materials,
3. Implementing shared parking agreements with compatible adjacent property owners and
4. Adopting non-traditional street and sidewalk layout configurations. Other concepts, not discussed here, such as reducing building footprints, or increasing building density (number of stories above or below ground surface), should also be explored.

Include a narrative in the Stormwater Control Plan to minimally discuss the four concepts listed here, and how they were incorporated into the design, or the basis for rejection, if not adopted.

a. Clustering Impervious Surfaces

Clustering is the grouping of development structures within a project to allow a greater area to be preserved for open space, recreation or agriculture.

Key Benefits

- Maximizes open space, recreation and/or agriculture resources
- Encourages site planning sensitive to the natural characteristics of the land
- Helps reduce the effective impervious area associated with development
- Reduces required infrastructure

Applicability
Clustering may be used with nearly all development projects, but is most effectively used in the development of subdivision of larger parcels, where concentrating the allowable development on only a portion of the site allows preservation of sensitive resources. Incentives such as smaller lot size or bonus density increases, over that permitted in the zone, are often components of cluster development.

Limitations
Grading plans must comply with geotechnical engineering recommendations.

Design Criteria
Identify land to be protected: preserve areas within or adjacent to identified sensitive areas (steep slopes, wetlands, riparian corridors, etc.) or with high infiltration capacity.

- Run-on to preserved areas should mimic existing natural drainage patterns (i.e. if run-on formerly was conveyed to an area under sheet flow conditions, sheet flow conditions shall be maintained to the preserved area even after development of the surrounding area).
- Pre-development flow path lengths in natural drainage patterns are maintained, or lengthened as necessary to prevent an increase in runoff rates.

Locate site for potential development area. Include in the Stormwater Control Plan narrative, the preferred project density, and identify conflicts with code, if applicable.

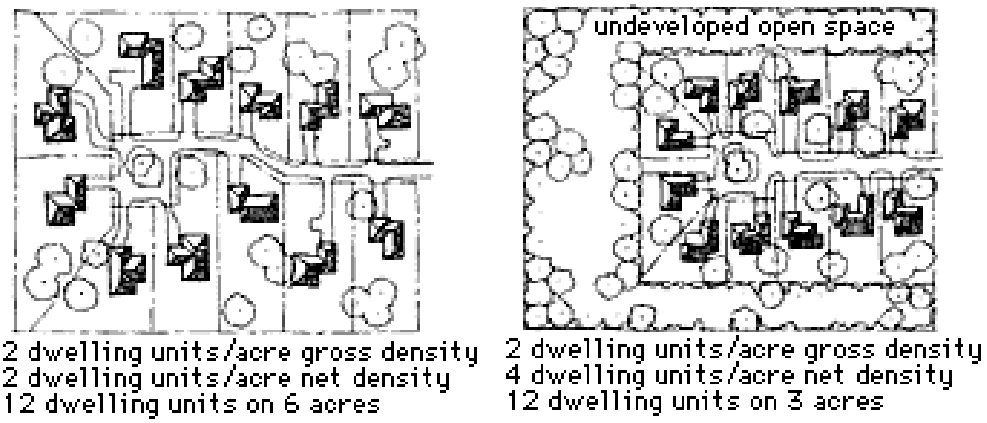


Figure 4.3 Clustering Impervious Surfaces
Source: City of Chesapeake, VA –Design Guidelines Handbook

b. Using permeable surfaces

Permeable surfaces allow water to percolate into the soil while serving as a structural surface. Permeable pavement surfaces may be used to replace traditionally impervious surfaces. Examples of materials that have increased permeability include unit pavers, granular materials, porous concrete or porous asphalt.

Key Benefits

- Allows for infiltration, reduces stormwater runoff volumes
- Facilitates groundwater recharge

Applicability
Parking lots, low traffic streets, walkways and driveways. Alternative parking surfaces are most effective in areas with native sandy soils. The ability of porous concrete and asphalt to exchange air and water makes it especially suitable for use around trees.

Limitations
Most suited for flat to gentle sloped areas, with light traffic and a low water table. The designer must certify that any porous surface proposed for use is able to provide adequate structural integrity for the intended purpose. These materials are not suitable for areas with a hard pan soils, high water table or in commercial/industrial areas of any soil type that have the potential for hazardous spills to occur on the parking surface. Development projects in areas with native clay soils require a subsurface drainage system.

Design Criteria
To the extent possible:

- Replace traditional impervious parking surfaces with an alternative pervious surface such as porous concrete, porous asphalt, permeable pavers, turf pave, etc. Pavers should have rigid edge systems to prevent movement of paving stones.
- Vegetate parking overhang areas or the area between the tire paths.

- Surface and stone recharge bed must be suitable for design traffic load.
- An underdrain is required for soils with limited infiltration rates.
- Terraced infiltration beds are required if porous concrete and asphalt are used on steep hills.
- Pre-treatment is advised in areas with high sediment loads.

c. Shared Parking Agreements

Shared Parking not only reduces impervious surface area, but also reduces parking related development cost and is intended to assure that the number and type of parking spaces specified does not exceed the number of parking spaces needed for the project.

Key benefits

- Reduces impervious area
- Reduces parking related development costs

Applicability

Parking alternatives are appropriate for adjacent developments with different peak demand periods and can be effective in compact and/or high density communities where dwelling units are within walking distance to transit stops and services.

Limitations

Reduction or elimination of off-street parking requirements for one neighborhood or commercial center may increase the parking density of adjacent neighborhoods or commercial centers. Shared parking agreements must include a contingency plan to accommodate changes in ownership, operations or other uses that might increase the parking demand in the future.

Figure 4.4 Shared Parking Agreements: Commercial parking lot for business closed on the weekends is opened on Sundays for additional church parking

Design Criteria

- Parking requirements should reflect projected demand for parking and include an analysis of the potential impact of spillover parking on adjacent areas.
- Minimize off-street parking to meet or decrease Title 22 and 23 parking ratios. If additional parking beyond the parking ratios is permitted, consider using pervious materials or storied parking garages.
- Maximize the use of compact car spaces.
- Use parking garages where feasible.

- Use pervious parking surfaces.
- Use legally binding shared parking agreements when adjacent proposed land uses have peak parking demands at different times of the day or week.
- Incorporate bioretention areas into parking lots.

d. Street and sidewalk layout alternatives

Subdivision street and sidewalk layout influences the amount of impervious area significantly. As shown below, the overall impervious area associated with streets is significant. Various street configurations can also influence the connectivity of a neighborhood and the land available for open space.

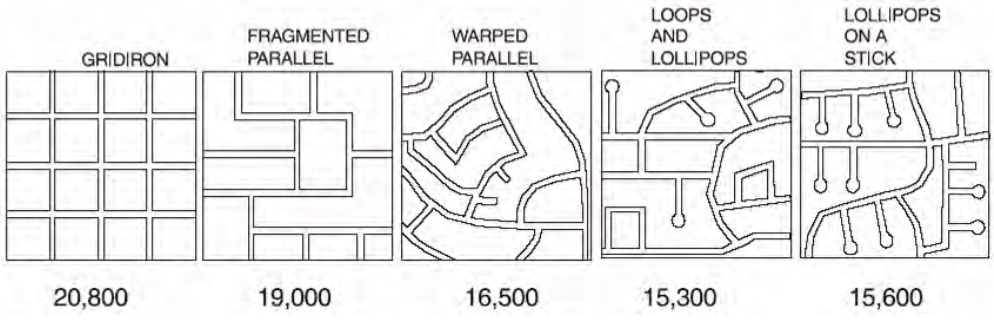


Figure 4.5 Comparison of linear feet of pavement associated with various street layout alternatives. (Source: NEMO LID Handbook, originally adapted from ULI 1980)

There are tradeoffs that must be evaluated between loss of connectivity and decreased impervious area. One option, in residential neighborhoods, balances the loss of car-focused connectivity with an increase of pedestrian-focused connectivity. The benefit of the later is that the green space provided for the pedestrian connectivity can be used to meet stormwater and open space goals. As shown in the City of Davis Bike Map, pedestrian and recreational facilities can also be used to meet stormwater and open space goals.

Figure 4.6 Optimizing Pedestrian and Recreational Facilities
Source: City of Davis Bike Map

Applicability
These procedures are suitable for all development projects, but must be weighed against other considerations, such as the amount of earthwork required, specific traffic patterns to the site and surrounding areas, as well as the design's impact to public safety.

Limitations
The roadway system must follow County Improvement Standards and safely accommodate all users of the road including pedestrians, people requiring mobility aids, bicyclists, drivers and passengers of transit vehicles, trucks, automobiles, and motorcycles. Requests to incorporate LID will require an exception in accordance with Section 1.2 "Design Adjustments" of the Public Improvement Standards. The minimum street widths for a particular project may be limited based on average traffic daily counts and/or terrain and size of vehicles requiring regular access to the site.

Design Criteria
To the extent possible,

- Provide pedestrian and bicycle path connections to encourage walking and cycling and increase access without adding significant impervious areas. Plot a likely "paths" exhibit using the lot layout to map pedestrian routes to schools, bus stop and neighborhood services.
- Reduce the length and width of residential streets by reviewing minimum lot widths and exploring alternative street layouts.
- Street location considerations should include natural drainage patterns and soil permeability and must provide for large vehicles, equipment, and emergency vehicles access where applicable.

See the Public Improvement Standard Plans for minimum street widths for public roads and adjustment procedures. Discuss options for reduced street widths with the applicable fire agency.

4.3.4 Construct streets, sidewalks, or parking lot aisles to the minimum widths necessary, provided that public safety or mobility uses are not compromised

Nearly all rainfall falling onto parking areas constructed of impervious surfaces (asphalt and concrete) will runoff the site. As runoff travels over the parking surface, it picks up sediment, dust, oils and greases. The smooth surface of the pavement increases the rate and volume of runoff.

Include a narrative in the Stormwater Control Plan to minimally discuss the concepts listed here, and how they were incorporated into the design, or the basis for rejection, if not adopted.

a. Minimize street widths

Excessively wide streets are a significant source of impervious cover (and stormwater runoff) in many residential developments. Narrower road sections and limiting street parking can reduce the amount of street width required to safely convey traffic.

Key Benefits

- Reduces impervious area (and resulting runoff)
- More room for trees and landscaping (improved aesthetics)

Applicability
Streets with low traffic volumes and adequate off-street parking facilities.

Limitations
The roadway system must follow County Improvement Standards and safely accommodate all users of the road including pedestrians, people requiring mobility aids, bicyclists, drivers and passengers of transit vehicles, trucks, automobiles, and motorcycles. Requests to incorporate LID will require an exception in accordance with Section 1.2 “Design Adjustments” of the Public Improvement Standards. The minimum street widths for a particular project may be limited based on average traffic daily counts and/or terrain and size of vehicles requiring regular access to the site.

Design Criteria
In addition to the criteria in section ‘Street & Sidewalk Layout Alternatives’ (4.3.3.b). design residential streets for minimum required pavement width needed to support travel lanes; on-street parking and emergency, maintenance and service vehicle access. These widths should be based on traffic volume.

To the extent possible, in addition to 4.3.3.b considerations,

- Minimize pavement by using alternative roadway layouts, restricting on-street parking, and minimizing cul-de-sac radii.

b. Minimize sidewalk widths

Sidewalk widths must comply with ADA regulations and should not be so narrow as to discourage walking. However, the impervious surface associated with sidewalks can be decreased, while still accommodating the comfortable use by the pedestrian.

Key benefit:

- Reduced impervious area
- More room for trees and landscaping (improved aesthetics)

Design Criteria
To the extent possible, in residential neighborhoods, eliminate the sidewalk from one side of the road and incorporate pervious surfaces (such as pervious concrete pavers for the sidewalk path that will remain.

c. Minimize parking lot stall and aisle widths

A minor reduction in parking stall and aisle dimensions can result in a significant impact on the overall size of a parking lot.

Key Benefit:

- Reduced impervious area
- More room for trees and landscaping (improved aesthetics)

Design Criteria

- Parking stalls and aisles should be reduced to the extent feasible in order to decrease total impervious cover.
- Consider implementing one-way aisles used in conjunction with angled parking to reduce the amount of aisle space needed to access each stall, depending on the geometry of the parking lot.
- Consider dedicating a portion of parking lots to compact car spaces. The most important element of a successful compact car parking space program is providing a clear system of signage that indicates which spaces are intended for compact cars and which are not.

4.3.5 Set back development from creeks, wetlands, and riparian habitats

A setback is a minimum distance between a natural resource (creek, wetland and/or riparian habitat) and the planned development.

Key Benefits

- Providing a canopy for reducing stream temperatures. Shade can keep creek waters cooler in summer months. Cooler water holds more oxygen and reduces stress on fish
- Supporting native wildlife habitat (if native vegetation is selected). Continuous stretches of riparian vegetation can also serve as wildlife corridors
- Diffusing raindrop velocities, and therefore reducing soil erosion
- Producing the necessary organic litter to support organisms
- Providing roots to hold bank soils in place
- Regulating stream flows. Riparian vegetation can slow the velocity of runoff and promote infiltration of stormwater into the soil
- Reducing pollutants and sediments in surface runoff being delivered to the creek.
- Providing room for flood flows and a buffer to development when creeks meander over time.

Riparian areas should be well vegetated with native plants. The ideal width of the vegetative buffer (or creek setback) varies throughout the County. Consult County Land Use Ordinance for specific requirements.

Applicability
These procedures are suited for all sites adjacent to creeks and natural drainage areas, including natural ponds, springs, vernal pools, marshes and wet meadows and apply whether or not the drainage area is present intermittently, or the creek is considered perennial or ephemeral.

Limitations
None

Design Criteria
Delineate the required setbacks on the plans, and in the field. The minimum setback is defined in the applicable regulations. The ideal setback is at the edge of the vegetated buffer, or the minimum setback, whichever is greater.

Within the Coastal Zone, the required setback from the upland extent of riparian vegetation is 100 feet. This setback is reduced to 50 feet within Urban Reserve Lines (URLs). Reductions to the riparian setback may only be approved as set forth in Section 23.07.174.d(2) of the Coastal Zone Land Use Ordinance.

To the extent possible,

- Ensure riparian areas are well vegetated with native plants
- Forecast where the creek hinge point will be if the bank soils are eroded (and consider the potential of creek meander over time). Provide a buffer from the future hinge point

Means of Demonstrating Compliance
Include a narrative of why setback(s) were chosen, and an exhibit showing resource and setback line. (Can be included in Site Stormwater Assessment Exhibit.)

4.3.6 Conform the site layout along natural landforms

Landform grading is a technique that converts “engineered” slopes to stable, naturally functioning slopes that mimic nature. Concave slopes allow water and vegetation to concentrate at flow lines. Grasses and groundcovers are planted on the convex portions of the slopes. Landform grading is intended to reduce erosion potential, runoff, and water quality degradation associated with land form alteration (grading).

Key Benefits

- Reduce erosion potential
- Reduce runoff
- Increase water quality

Applicability

Landform grading is suitable on all development projects that require significant cut and fill and where the average natural slope is ten percent or greater.

Limitations

Grading must be consistent with geotechnical engineering recommendations.

Design Criteria

The overall grading of the project should work together with the surrounding topography, existing vegetation, circulation, and land features as well as other elements of the total project site to minimize the erosion potential, runoff and water quality degradation associated with land form alteration (grading). Grading proposals should conform to the following standards:

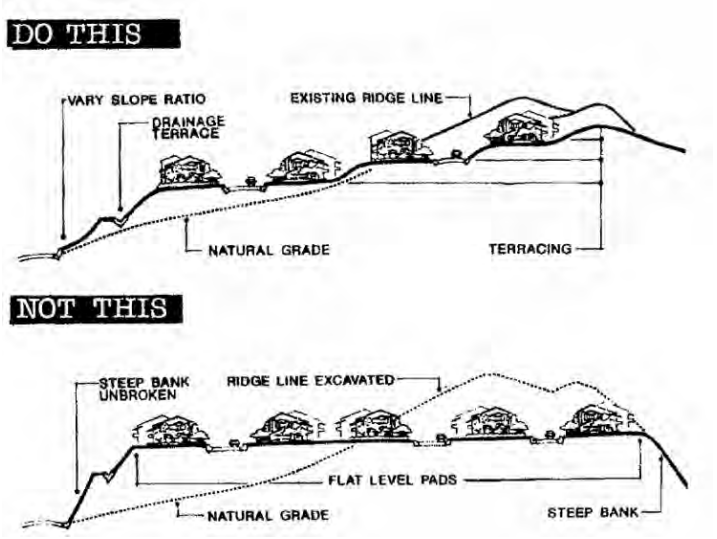


Figure 4.7 Landform Grading
Source: White County Sample Mountain and Hillside protection ordinance

- In lieu of one large pad, development proposed for hillsides should use smaller pads gradually terracing up hillsides, where feasible.
- The use of long, continuous slopes with sharp, angular forms should be avoided. Slopes should retain a natural appearance.
- Hillside development should conceal graded slopes and retaining walls, where possible. Retaining walls and all significantly graded slopes should be planted.
- Pads should not be built on compacted soil that is significantly raised above existing topography, unless no feasible alternatives exist given engineering constraints.
- Avoid creating directly connected impervious areas, where possible.
- Require compacted soils in areas receiving sheet flow runoff (such as yards, down slope of downspouts) be disked and amended with loam prior to planting.
- Ensure that concentrated flow paths have stable outlets able to handle the water expected to be received.
- Minimize building setbacks and road frontage criteria

Means of Demonstrating Compliance

Include a narrative discussion grading approach. Provide topography map with existing and planned contours, as well as cut and fill lines for the development. (Could be included in Drainage Management Areas (DMA) Exhibit.)

4.3.7 Avoid excessive grading and disturbance of vegetation and soils

Clearing and grading of the site should be limited to the minimum amount needed for the development to function.

Key Benefits

- Greater areas of a site that are preserved in their natural state retain their natural hydrology and may help buffer construction related erosion.
- Greater area can be used to preserve some of the hydrologic functions for a site. Building footprints can be minimized by using pillars, pin foundations, multiple stories, and stepped foundations.
- Reduced long term maintenance cost of site's landscaping
- Provides habitat and food for native species.

Applicability

These procedures are suitable on all development projects but are most easily applied on large lots in rural areas.

Limitations

In areas with heavy clay soils, there is significant runoff from undeveloped areas and the addition of impervious areas may not significantly increase the amount of runoff. Building height restrictions may limit allowable structure heights which lead to increased structural footprints.

Design Criteria

To the extent possible

- Design development 'up' and not 'out' to minimize construction area.
- Restrict clearing to minimum required for building footprints, construction access and safety setbacks.
- Implement phasing of grading operations to avoid mass grading of a site.

Means of Demonstrating Compliance

Include on Drainage Management Areas (DMA) Exhibit the planned disturbance areas, and construction fencing to set aside native areas to be preserved from construction equipment.

Ch 5: Site Design Measures

This chapter provides guidance to assist applicants in integrating stormwater management and hydrologic goals and objectives into good site design.

5.1 Introduction to Site Design Measures

After implementing the design strategies discussed in Chapter 4, there are numerous other measures that can be taken to minimize stormwater–related impacts on a site. This chapter focuses on additional non-structural design measures.

Non-structural design measures do not require a device or separate facility to manage runoff quality or quantity. Non-structural measures can be implemented through the site design (disconnecting impervious areas, retention grading, and tree planting).

Section 5.2 focuses on the selection of site design measures associated with Performance Requirement 1. Section 5.3 focuses on additional source control measures that should be considered for all projects (but are not mandatory).

5.2 Performance Requirement 1 Mandatory Design Measures

All regulated projects must implement at least one of the following site design measures:

- Roof runoff directed into cisterns or rain barrels for reuse (5.2.1)
- Roof runoff directed into vegetated areas (5.2.2)
- Runoff from sidewalks, walkways, and/or patios directed onto vegetated areas (5.2.3)
- Runoff from driveways and/or uncovered parking lots onto vegetated areas (5.2.4)
- Bike lanes, driveways, uncovered parking lots, sidewalks, walkways, and patios constructed with permeable surfaces (5.2.5)

Techniques to disconnect impervious areas, in addition to the items above, are provided in Section 5.2.6.

5.2.1 Cisterns and Rain Barrels

Capturing and reusing rainwater in water barrels or cisterns reduces the volume of runoff during rain events. Roof runoff can easily be used later for landscape irrigation or other outdoor non-potable uses. Large cisterns are necessary if the goal is to capture the full capacity of a significant rain event.

Key Benefits

- Reduces runoff volumes and peak rate
- Water stored can be reused, reducing water demand

Applicability

The volume of roof runoff to be intercepted is directly proportional to the area of the roof.

Limitations

Roofs constructed with tar, gravel, treated cedar shakes or old asbestos shingle roofs are not appropriate for rainwater harvesting. Similarly, rainwater should not be harvested if it is conveyed via gutters with lead soldering or lead-based paints. Runoff from roofs exposed to air borne particles originating from industrial facilities, agricultural operations or concentrated automobile emissions may have poor water quality.

Increased storage capacities may add to construction and operating/maintenance costs. Space constraints due to required setbacks may limit the available storage area for rain barrels or cisterns.

2017 Design Guidelines (Updated)

- Sizing of cisterns and rain barrels should be based on roof area, localized rainfall patterns, and anticipated non-potable water needs of the site.
- The minimum storage capacity required to meet Performance Requirement #1 is 110 gallons.
- Rainwater storage tanks should be of durable construction with non-transparent materials (or shielded from sunlight).
- Rain barrels or cisterns capturing rainwater must be marked with the words: "NONPOTABLE WATER, DO NOT DRINK"
- A reuse plan is not required for outdoor non-potable reuse of captured and stored rainwater up to a capacity of 360 gallons.
- Separate permitting is required for tanks with a storage capacity greater than 5,000 gallons per the requirements of the California Plumbing Code.
- Screens shall be installed on inlets and overflow pipes to prevent entry by animals or insects. Screens must have an aperture of not greater than 1/16 of an inch.
- A minimum of one access opening shall be provided to allow inspection and cleaning. Rainwater tank manholes and access openings shall be secured by either a lockable device or other approved method to prevent unauthorized access.
- Tanks must be located on stable, flat ground. The height to diameter or width ratio should not exceed 2:1.
- Rain cisterns and rain barrels must be equipped with screened overflow devices able to convey excess water away from any adjacent structures. The overflow device must not have a shut off valve.
- Rainwater collected and intended for indoor non-potable use (such as flushing toilets) will require parallel plumbing. See the latest California Plumbing Code for direction.

- Rainwater collected for potable use will be required to meet the standards defined in the latest California Plumbing Code and must be certified by the County Public Health Department.
- Please reference the most recent California Plumbing Code for additional information on Nonpotable Rainwater Catchment Systems.

Figure 5.1 Rainwater Harvesting
(Picture from
http://www.lid-stormwater.net/images/cistern4.jpg)

5.2.2 Roof runoff directed into vegetated areas

When rooftop runoff is 'disconnected' and directed to an area

where it can infiltrate the soil or flow to a vegetated area or a swale, the adverse impact of the impervious roof can be mitigated.

Figure 5.3 Roof scuppers are used to direct runoff through planters. This practice reduces the overall volume of runoff leaving the site during small storms.
Source: www.tualatinriverkeepers.org

Key Benefits

- Reduces runoff volumes and peak rate
- Promotes infiltration

Limitations
Requires a vegetated infiltration area away from building footings.

2017 Design Guidelines (Updated)

- Surfaces adjacent to structures must be graded so that runoff flows away from foundations. It is recommended that tributary rooftop square footage not exceed twice the square footage of the receiving vegetated area.
- Runoff should be directed to vegetated areas in a non-erosive manner for example, over a splash block or rip rap lined channel).
- Runoff should be equally divided to disperse and slow the velocity of flows.
- The receiving slope conveying runoff to vegetation should be less than or equal to 5%.

5.2.3 Runoff from sidewalks, walkways, and/or patios directed onto vegetated areas

When runoff from impervious sidewalks, walkways and/or patios is directed to an area where it can infiltrate the soil or vegetated area, the impact of the additional runoff volume can be mitigated.

Key Benefits

- Reduces runoff volumes and peak rate
- No maintenance verification requirement

Applicability
Impervious sidewalks, walkways, and/or patios

Limitations
Requires sufficient vegetated area for infiltration. Works best with Hydrologic Soil Groups A and B.

2017 Design Guidelines (Updated)

- Generally, the length of the vegetated area should be no less than half the length of the impervious area that drains to it.
- The disconnected impervious are should drain continuously to a vegetated channel, swale, or filter.
- The receiving slope receiving or conveying runoff to a vegetated area should be less than or equal to 5%.
- Runoff should be directed to vegetated areas in a non-erosive manner (for example, over a splash block, grass, or rip rap lined channel).

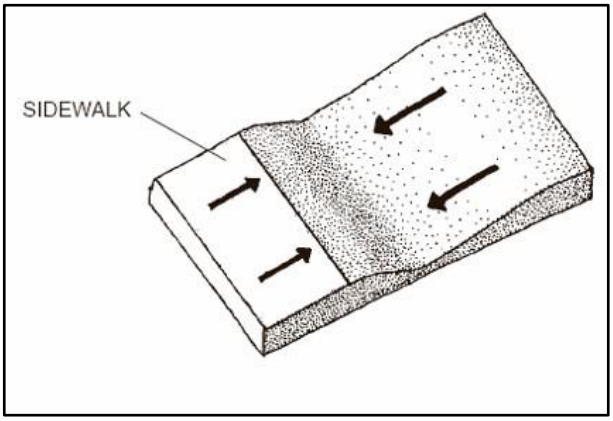


Figure 5.4 Sidewalk Runoff Directed to Landscaping Source: dot.tucsonaz.gov/stormwater/downloads/2006WaterH arvesting.pdf

- Paved areas may be sloped so that drainage is routed to the receiving vegetated area as sheet flow when practical.
- Tributary square footage generating runoff (impervious area) should not exceed twice the square footage of the receiving vegetated area.

5.2.4 Runoff from driveways and/or uncovered parking lots onto vegetated areas

When runoff from impervious driveways and/or uncovered parking lots is "disconnected" and directed to a vegetated area or swale, the additional runoff volume from the impervious surface can be mitigated. Paved areas can be designed with curb cuts, or without curbs, to direct flow into surrounding vegetation.

Key Benefits

- Reduces runoff volumes and peak flow rate
- No maintenance verification requirement

Applicability
Impervious driveways and/or uncovered parking lots.

Limitations
Requires area for infiltration. Works best with Hydrologic Soil Groups A and B.

2017 Design Guidelines (Updated)

- The square footage of the receiving vegetated area should be no less than half the square footage of the impervious area that drains to it.
- Runoff should be equally divided to disperse and slow the velocity of flows.

- The disconnected impervious area should drain continuously to a vegetated channel, swale, or filter.
- The receiving slope should be less than or equal to 5%, and be well vegetated to minimize erosion potential.
- Paved areas should be sloped so that drainage is routed to the receiving vegetated area as sheet flow when practical. Concentrated flows may be transformed to sheet flows using level spreaders, or energy dissipation techniques.

5.2.5 Bike lanes, driveways, uncovered parking lots, sidewalks, walkways, and patios constructed with permeable surfaces

A significant portion of impervious cover in an urban watershed is derived from parking lots and roadways. Substituting traditional impervious surfaces (concrete, asphalt) with permeable surfaces (unit pavers, pervious concrete, etc.) can significantly reduce the volume of stormwater runoff.

Key Benefits

- Reduces or eliminates stormwater runoff
- Reduces downstream flooding
- Promotes infiltration
- Alternative materials can help distinguish parking and bike lanes from travel ways

Applicability

Impervious parking areas, bike lanes, driveways, uncovered parking lots, sidewalks, walkways, and patios.

The ability of porous concrete and asphalt to exchange air and water makes it suitable for use around trees.

Figure 5.5 Porous Concrete Parking Lot
Porous concrete was used in lieu of traditional asphalt to protect the oak tree adjacent to the parking lot.
Source: Wallace Group.

Limitations

Generally not appropriate for high traffic or heavy vehicle load areas, or on steep slopes. These materials are not suitable for areas with hard pan soils, high water table or in commercial/industrial areas that have the potential for hazardous spills to occur on the permeable surface.

2017 Design Guidelines (Updated)

- To achieve compliance with Performance Requirement #1, permeable pavement must comprise 20% or more of the total square footage of outdoor bike lanes, driveways, uncovered parking lots, sidewalks, walkways and patios.
- Drainage directed to permeable pavement should be free of sediment or chemical pollutants. Contributing drainage areas must be fully stabilized to prevent future soil erosion.
- If a subdrain is necessary, the outlet elevation is a minimum of 2 inches above the bottom of base course. Subdrain outlets shall be directed to an approved location.
- The selection and location of permeable pavements must incorporate accessibility requirements where applicable.
- Subgrade is level and slopes are not so steep that subgrade is prone to erosion.
- A rigid edge is necessary to retain granular pavements and unit pavers.
- Infiltration based permeable systems should be placed at the recommendation of the soils engineer.
- Provide an overflow pathway to a stabilized location (storm drain or well-vegetated area). Overflow design may direct sheet flows to vegetation or a storm drain system.

5.2.1 Disconnecting Impervious Area Techniques

Runoff from an impervious area to a pervious area must be conveyed in a manner that is non-erosive. This section contains additional techniques to disconnecting impervious areas.

Key Benefits
Reduces or eliminates stormwater runoff

a. Curb and Gutter Alternatives, including Curb Cuts

Curb, gutters and catch basin inlet systems are highly discouraged for use as stormwater collection systems because they concentrate flows and pollutants, increase velocities and discourage groundwater recharge.

Applicability
Alternatives to curb and gutter are encouraged in parking lots and in low- and medium-density residential zones where soils and slopes permit.

Limitations
Drainage inlets may be more appropriate in localized areas subject to frequent flooding during minor rain events. Curb and gutter systems may be required in urban settings, or where a new road must tie into an existing collector road. Additionally,

where high-speed traffic and pedestrian use occur in the same vicinity, a curb and gutter system may be necessary to provide distinct area for each use.

Design Criteria

- Where curb and gutters have been designated as a means of separation between pedestrians and motorized traffic, consider the following hybrid LID/conventional stormwater management approaches:
  - The ability to place a vegetated channel between the sidewalk and the roadway.
  - The potential to incorporate a two-foot wide concrete strip constructed along the edge of the pavement at the same surface elevation of the pavement. This concrete strip gives drivers a visual cue of the edge of the driving surface and helps protect the vegetated channel from tire ruts.
  - Implementing a curb and gutter system on one side of the road and allowing the road to drain to the other side of the road (road will have super-elevation instead of crowned section).
- Where curb and gutter systems are required for drainage purposes, curb cuts can be spaced strategically to allow runoff to be intercepted into a surface feature (such as a planter or sand filter) where there is an opportunity to infiltrate runoff instead of conveying it directly to a subsurface drainage network. The frequency of curb cut openings is determined to minimize the spread width of stormwater on the road during primary storm events or to keep the volume and velocity of discharge passing through the curb cut from being erosive in the vegetated swale.
- Parking lots that incorporate sumped vegetation areas can use wheel stops in lieu of curb systems to protect the vegetated area from traffic intrusion while allowing parking lot runoff to be drained into the vegetation.
- The design shall provide an emergency overflow path.

b. Intercept drains

Impervious areas that drain into the stormwater system are considered "connected impervious areas." These areas can be "disconnected" by directing the runoff to a landscaped area instead. Traditionally "connected" impervious areas well suited for "disconnection" include roof tops, parking lots and driveways.

Applicability

These procedures are suitable on all development projects including redevelopment.

Figure 5.7 Intercepting Driveway Runoff
Directing driveway runoff into a vegetated area by intercepting it with a trench drain is one way to reduce the volume of runoff leaving the site during small storms.
Source: Unknown

Limitations
Runoff must be discharged at locations that will flow away from structures, have adequate area available to receive the runoff, and are sloped to avoid erosion.

Design Criteria
To the extent possible,

- Roofing downspouts should be redirected to a yard, garden or swale or replaced with drip chains or scuppers.
- Runoff from driveways should not drain directly to a road; instead driveways should:
- Be constructed from pervious materials, or
- Be sloped to drain onto stabilized groundcover area, or
- Be designed to intercept and drain runoff in dispersion trench to adjacent vegetated area.
- Sidewalks and street runoff should drain to stabilized groundcover areas.

5.3 Source Control Measures

Source control refers to any schedules of activities, prohibitions of practices, maintenance procedures, managerial practices or operational practices that prevent stormwater pollution by reducing the potential for contamination at the source of pollution.

Source control measures are required for all projects. Source control measures can be categorized as Structural, Procedural or Operational.

> Structural source control measures are physical measures employed to prevent stormwater from contacting work and storage areas to prevent stormwater from picking up pollutants.
>
> Operational source control BMPs are non-structural practices such as employee training, record keeping, good housekeeping, preventative maintenance, spill prevention and cleanup.
>
> Procedural source controls BMPs include implementing process changes such as substituting a less hazardous material for a highly hazardous material in an industrial process.

Implementing operational and procedural source control BMPs are generally considered more cost-effective in minimizing pollution than structural source control measures. Operational and procedural source controls are addressed in Chapter 8 “Operation and Maintenance” of this handbook.

While some source control measures can be broadly applied to development, others are site and pollutant specific. This chapter describes the purpose, design criteria, maintenance requirements and appropriate use of structural source control measures approved for use in the unincorporated areas of San Luis Obispo County.

The following source control measures are discussed in this section.

- Storm Drain Markers (5.3.1)
- Efficient Irrigation (5.3.2)
- Trash & recycling storage areas (5.3.3)
- Vehicle and Equipment wash areas (5.3.4)
- Material storage areas (5.3.5)
- Mutt Mitt Stations (5.3.6)
- Alternative Building Materials (5.3.7)
- Interceptor Trees (5.3.8)

5.3.1 Storm Drain Markers

Storm drain markers are highly visible source controls that are placed adjacent to storm drain inlets. This measure informs the public that runoff drains directly to water bodies. Storm drain markers raise awareness to help deter littering and illegal dumping.

Key Benefits
Raise awareness

Applicability
Storm drain marking procedures are suitable for storm drain inlets with concrete curb and gutters.

Design Criteria
All new storm drain inlets shall be provided with a marker as specified by the County Public Improvement Standards.

Figure 5.8 Storm Drain Markers
Source: Unknown

5.3.2 Efficient Irrigation

Efficient irrigation techniques minimize waste and reduce the amount of dry weather runoff discharged to the storm drain system. Efficient irrigation techniques include rain and wind-triggered shutoff devices, automatic line break detection shutoff valves and soil moisture sensors.

Key Benefits

- Minimize water use
- Preserves structural integrity of adjacent hardscapes

Applicability
Efficient irrigation is suitable for all development with irrigated areas.

Limitations
None

Design Criteria
To the extent possible, install

- Native plants that require minimum irrigation.
- Underground or surface drip irrigation
- "Smart" Irrigation controllers with evapotranspiration, high wind, and rainfall sensors to prevent over- and under-watering and watering during rainfall events and/or with programmable schedules to set watering time and duration according to plant and seasonal needs. These controllers can also detect and shut off water when the sensor indicates an out of expected flow rate.

Figure 5.9 Poor Example of Efficient Irrigation

5.3.3 Trash/Recycling Storage Areas

The trash and recycling storage area refers to an area where trash and/or recycling receptacles (dumpsters) are located for use as a repository for solid wastes. Loose trash and debris can easily be transported by the forces of water or wind into nearby storm drain inlets, channel, and/or creeks.

Key Benefits

- Minimizes risk of loose debris
- Reduces risk of contaminating stormwater runoff

Applicability
These procedures are suitable for all multi-family residential units with four or more units, commercial projects, and industrial trash areas. Single family residences are exempt from these requirements.

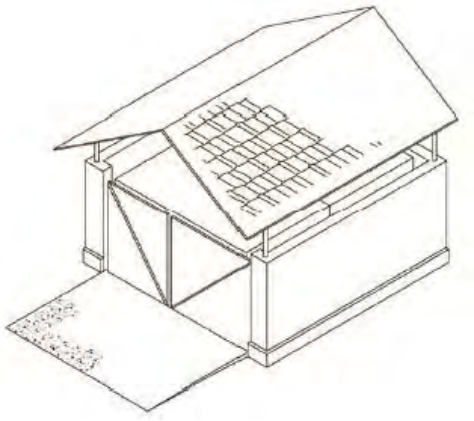


Figure 5.10 Trash/Recycling Storage Area protected from wind and rain

Design Criteria

- Project design should provide an appropriate number of adequately sized receptacles.
- Trash and recycling storage areas must divert drainage from adjoining roofs and pavements around the area(s). Project plans should show how the container

area will be graded and paved to prevent run-on into the area and to prevent runoff from leaving the area.

- Trash and recycling storage container areas must be screened or walled to prevent offsite transport of trash.
- Trash and recycling storage within containers should be secured to prevent loose trash and debris from being dispersed by the wind.
- Uncovered bins should be roofed to prevent rainwater from co-mingling with the bin's contents.
- Trash and recycling storage enclosure pads should be designed to drain to a pervious surface through indirect soil infiltration or to an appropriate treatment control BMP prior to connection to a sanitary sewer.
- The proposed enclosure detail shall be submitted to the County and contracted recycling and garbage hauler for review and approval. Before a building permit can be issued, a form from each hauler accepting the relevant container location and enclosure detail must be submitted.
- No connection to the storm drain system is allowed for new facilities.

5.3.4 Vehicle and Equipment Wash Areas

Vehicle and equipment wash waters commonly contain high concentrations of sediments, oils and grease, cleaning chemicals, phosphates, antifreeze and heavy metals. These materials are prohibited from entering the storm drain system through the illicit discharge detection elimination ordinance.

Key Benefits

- Minimizes risk of loose debris
- Reduced non-storm water runoff

Applicability

These procedures are suitable for all multi-family residential, commercial and industrial areas.

Design Criteria

Describe measures taken to discourage onsite vehicle and equipment washing and explain how these will comply with the appropriate design criteria provided below for commercial/industrial, restaurant, and residential applications.

Commercial/industrial applications:

- Commercial/industrial facilities having vehicle/equipment cleaning needs shall either provide a covered, bermed area for washing activities or discourage vehicle/equipment washing by removing hose bibs and installing signs prohibiting such uses.
- Commercial car wash facilities shall be designed such that no runoff from the facility is discharged to the storm drain system.
- Wastewater from the commercial vehicle and equipment wash areas shall be equipped with (at a minimum) a clarifier, or other pretreatment facility, and

properly connected to the sanitary sewer, or other appropriately permitted disposal facility. Vehicle wash water should only be discharged to the sanitary sewer and only after obtaining permission from the local wastewater treatment authority.

- Fueling and maintenance activities shall be isolated from vehicle and equipment wash areas.
- Secondary containment shall be provided for exterior work areas where motor oil, brake fluid, gasoline, diesel fuel, radiator fluid, acid-containing batteries or other hazardous materials or hazardous wastes are used or stored. Drains shall not be installed within the secondary containment area.
- Tanks, containers or sinks used for parts cleaning or rinsing shall not be connected to the storm drain system and may only be connected to the sanitary sewer system. These connections may require additional approvals and permits.

Residential application:

- Multi-dwelling complexes shall have a paved, bermed, and covered car wash area (unless car washing is prohibited onsite and hoses are provided with an automatic shutoff to discourage such use).
- Washing areas for cars, vehicles, and equipment shall be paved, designed to prevent run-on to or runoff from the area. Large common areas shall be plumbed to drain to the sanitary sewer.

Restaurant application:

- Collect grease in containers and contact a licensed recycling company to haul them away. The grease will be recycled into useful products like soaps, animal feed, or bio-diesel fuel.

- Food service facilities, including restaurants and grocery stores shall have a sink or other area for cleaning floor mats, containers and equipment. The cleaning area must be located over a paved area and have secondary containment. It must be large enough to clean the largest mat or piece of equipment that needs cleaning. The sink or cleaning area shall be connected to a grease interceptor prior to discharge to the sanitary sewer system.

5.3.5 Material Storage Areas

Outdoor material storage areas include areas or facilities designated solely for storage of materials. Improper storage of materials outdoors may provide an opportunity for toxic compounds, oil and grease, heavy metals, nutrients, suspended solids, and other pollutants to enter the storm drain system.

Proper storage is necessary to prevent materials being stored outside from being washed away in stormwater runoff, spilled, or inadvertently discharged to the storm drain system.

<u>Key Benefits</u>

- Minimizes risk of loose debris

- Minimizes potential for groundwater pollutants
- Minimize risk of contaminating stormwater runoff

Applicability

These procedures are suitable for all projects that include outdoor storage areas for materials. Sites with large quantities or liquids or bulk materials at sites that are connected to the storm drain system are at greatest risk, including:

- Nurseries and garden centers
- Auto recyclers/body shops
- Building supply outlets
- Landfills and recycling centers
- Solid waste and composting facilities

Design Criteria

- Store materials indoors, if feasible.
- Infiltration is discouraged in outdoor material storage areas.
- Protect materials stored outside from rainfall and wind dispersal by keeping them in an enclosure such as a cabinet or shed.
- Protect materials stored outside from run-on by constructing a secondary containment structures (such as berms, dikes or curbs) around the perimeter of the storage area.
- Provide an area to pool spills for collection and disposal or, if allowed, pre-treat and drain the area to the sanitary sewer system. If required, obtain an Industrial Waste Discharge Permit. Secondary containment areas should be sized to hold 110% of the volume of the storage tank or container unless other containment sizing regulations apply (e.g. fire codes).
- Store materials on paved or impervious surfaces.
- Exterior storage areas shall be covered with a roof or awning to minimize collection of stormwater within the secondary containment area.
- Hazardous materials signage, if applicable.

5.3.6 Pet Mitt Stations

Pet waste is a known contributor to stormwater pollution. Providing pet mitt stations at locations that are attractive to dog owners can encourage owners to pick up pet waste.

Key Benefits

Reduces nutrient load conveyed to surface and groundwater

Figure 5.11 Pet Waste Station, Morro Bay

Applicability
These procedures are suitable for all properties with large, accessible open areas.

Design Criteria
Pet mitt stations should consist of a dispenser with biodegradable bags for scooping pet waste and informational signage.

5.3.7 Alternative Building Materials

Some building materials, such as copper, are prone to leach toxic compounds into stormwater runoff. Some building materials require the routine use of pollutants (i.e. toxic paints and finishes) to maintain their integrity. This BMP employs alternative materials that are not prone to leach toxic compounds or require toxic compounds to maintain their integrity.

Key Benefits
Minimizes risk of contaminating runoff

Applicability
Alternative building materials are suitable for all developments.

Design Criteria

- Consider using building materials that incorporate green technology, use less toxic materials in their manufacturer, or require minimum maintenance.
- Avoid roofing, gutters, and trim made of copper or other unprotected metals that could leach into runoff.

5.3.8 Interceptor Trees

Trees are effective in intercepting light storm events by temporarily capturing, storing and evaporating rain water from their leaves, branches and trunk bark.

Key Benefits

- Reduced runoff
- Increased absorption

Applicability
Interceptor trees are well suited for parking lots and can be incorporated into a project's landscaped areas.

Limitations
Trees should not be planted where they will interfere with utility lines (both surface and subsurface facilities) or create a fire hazard. Certain trees should not be used as their roots are known to damage adjacent impervious hardscapes. Consider the potential impacts of tree shade on adjacent structures and landscaping.

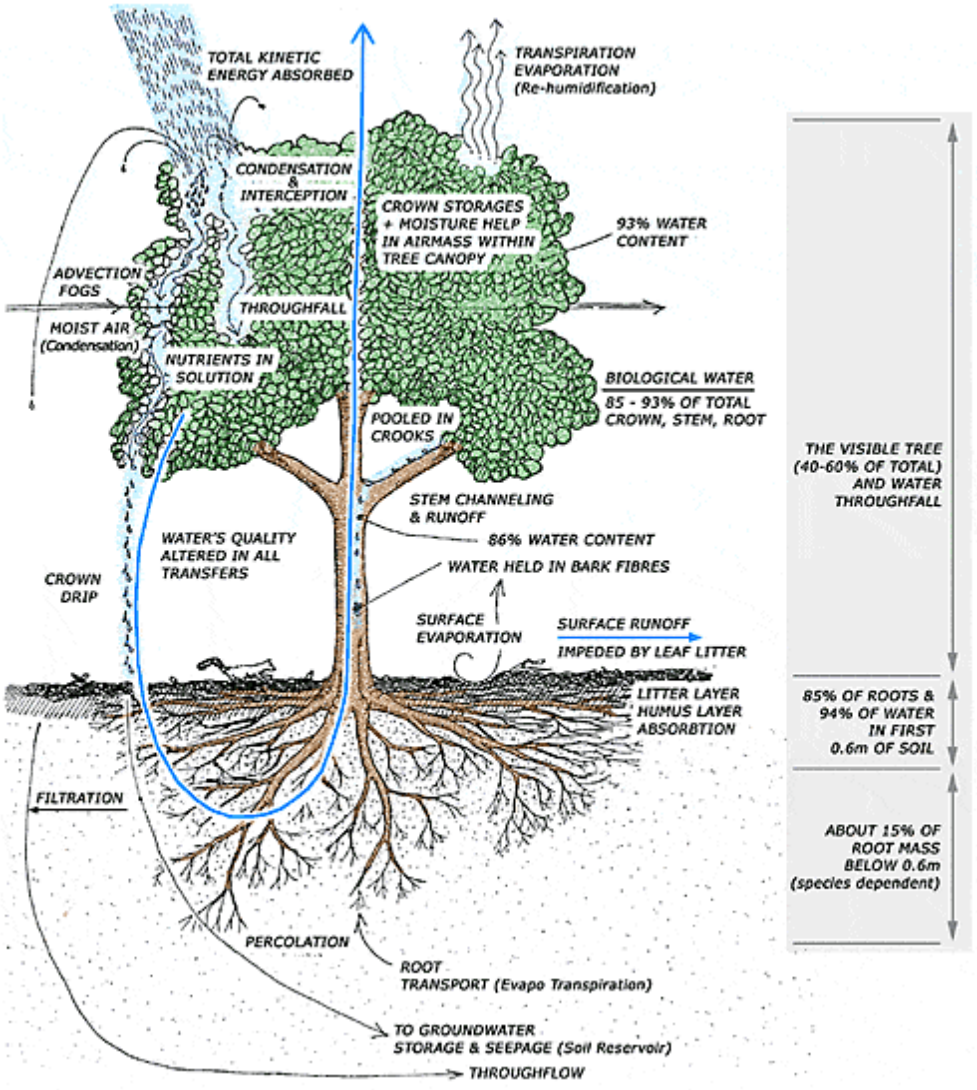


Figure 5.12 Interceptor Trees
Source: http://www.water-sos.org/sketches/trees-500pix.gif

Design Criteria

Broadleaf evergreens and conifers intercept more rainfall than deciduous species. Trees that grow well in winter in San Luis Obispo County include:

- Cedrus deodara / Deodar Cedar
- Cupaniopsis anacardioides / Carrot Wood
- Ilex altaclarensis 'Wilsonii' / Wilson Holly
- Laurus nobilis 'Saratoga' / Sweet Bay
- Olea europaea / Olive (male specimens only)
- Pittosporum undulatum / Victorian Box
- Quercus ilex / Holly Oak
- Quercus suber / Cork Oak

- Quercus virginiana / Southern Live Oak
- Rhus lancea / African Sumac
- Tristania conferta / Brisbane Box
- Umbellularia californica / California Bay

Use native or drought tolerant plants to decrease the need for supplemental irrigation. Root barriers are suggested if trees will not be irrigated once established.

5.3.9 Amend Soils

Physical, chemical and/or biological properties of soils can be improved through the addition of soil amendments. The potential hydrologic benefits of compost amended soils include increasing the soil's permeability and water holding capacity, thereby delaying and often reducing the peak stormwater runoff flow rate, and decreasing irrigation water, fertilizer and pesticide requirements.

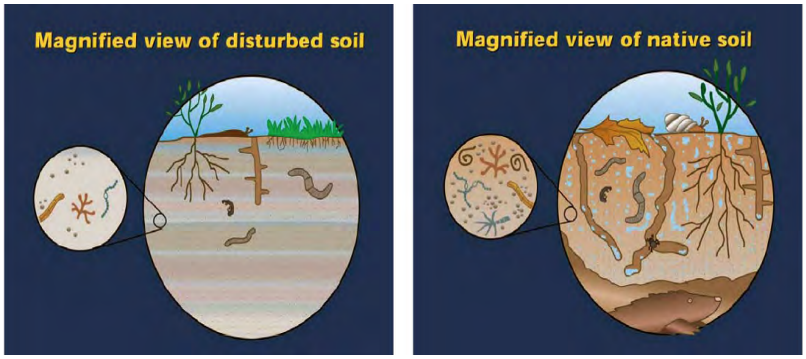


Figure 5.13 Disturbed vs Native Soil
Source: www.deq.state.or.us/lq/pubs/docs/sw/compost/RestoringSoilHealth.pdf

Disruption of soil can kill most of the beneficial biota and remove the air spaces in the soil that the aerobic biota need to thrive. Surface plantings, fertilizer and other nutrient supplements typically only help the first few inches of soil to develop new biota. Chemical fertilizer addition can actually kill or restrict the development of this biota. The biota is necessary for healthy vegetation.

A cup of undisturbed native topsoil can contain numerous bacteria, fungi, protozoa, nematodes, earthworms and arthropods. These living organisms are essential for maintaining healthy soil.

Where soil impacts cannot be avoided or sterile fill is brought in, the soil organic matter can be restored through numerous materials such as compost, composted yard waste, industrial by-products and wood residuals. It is important that the materials used to improve post-construction soil quality be appropriate and beneficial to the plant cover to be established.

Applicability

These procedures are suitable for soils that have been compacted as a result of construction or previous land use and for soils where the organic quality has been compromised due to overuse of pesticides and fertilizers or an exposure to household/industrial chemicals, concentration of pet waste or extreme and unnatural temperatures.

Limitations

Soil testing should be done to verify that soil amendments will produce a soil with similar chemistry, fertility and biology found in healthy regional soils.

Design Criteria

To the extent possible,

- Wherever the subsoil has been compacted by equipment operation, ripping, spading or tilling of the soil is recommended to alleviate soil compaction Amending existing soil mitigates sub-soil compaction when compost is incorporated to a 12 inch depth.
- The upper eight inches of existing soils should be amended to restore the soil organic matter to pre-disturbed levels.

Glossary

The following are the terms and acronyms used frequently in this handbook.

ADT— Average daily traffic

Base flow — Streamflow which results from precipitation that infiltrates into the soil and eventually moves through the soil to the stream channel. This is also referred to as groundwater flow, or dry-weather flow.

Biofilter— Any of a number of devices used to control pollution using living materials to filter or chemically process pollutants.

Bioretention— A Stormwater Control Measure designed to retain stormwater runoff using vegetated depressions and soils engineered to collect, store, treat, and infiltrate runoff. Bioretention designs do not include underdrains.

Biotreatment or Biofiltration Treatment — A Stormwater Control Measure designed to detain stormwater runoff, filter stormwater through soil media and plant roots, and release the treated stormwater runoff to the storm drain system. Biotreatment systems include an underdrain.

Best Management Practices (BMPs) —Schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of "waters of the United States." BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw materials storage. BMPs include structural and nonstructural controls, and operation and maintenance procedures, which can be applied before, during, and/or after pollution producing activities.

Buffer— A zone created or sustained adjacent to a shoreline, wetland or stream where development is restricted or prohibited to minimize the negative effects of land development on animals and plants and their habitats.

CCRWQCB— Central Coast Regional Water Quality Control Board

Cluster Development — The principle of cluster development incorporates grouping new homes onto part of a development parcel so that the remaining land can be preserved as open space.

Commercial Development — Any development on private land that is not heavy industrial or residential. The category includes, but is not limited to hospitals, laboratories and other medical facilities, educational institutions, recreational facilities, plant nurseries, car wash facilities, mini-malls, business complexes, shopping malls, hotels, office buildings, public warehouses, and light industrial complexes.

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

Connected Impervious Area — An impervious area is considered connected if runoff from it flows directly into the drainage system. It is also considered connected if runoff from it occurs as concentrated shallow flow that runs over a pervious area and then into a drainage system.

Construction — Clearing, grading, excavating, building and related activities that result in soil disturbance. Construction includes structure teardown. It does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of facility; emergency construction activities required to immediately protect public health and safety; interior remodeling with no outside exposure of construction material or construction waste to stormwater; mechanical permit work; or sign permit work.

Control — To minimize, reduce, eliminate, or prohibit by technological, legal, contractual or other means, the discharge of pollutants from an activity or activities.

Control Structure — A device used to hold back or direct a calculated amount of stormwater to or from a stormwater management facility. Typical control structures include vaults or manholes fitted with baffles, weirs, or orifices.

Conveyance — The transport of stormwater from one point to another.

Design Storm — Rainfall runoff data or where rainfall runoff data is not available, data based on a synthetic rainstorm, as defined by rainfall intensities and durations.

Detention — The process of detaining or holding stormwater runoff and slowly discharging it from the site to reduce peak flows and downstream flooding. Underground vaults and constructed ponds are the most common types of detention facilities.

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. It does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of facility, nor does it include emergency construction activities required to immediately protect public health and safety.

Development Standards — Standards that the County has developed for new development and significant redevelopment projects to control the discharge of stormwater pollutants in post-construction stormwater.

Directly Adjacent — Situated within 200 feet.

Directly Connected Impervious Area or Surface — The area of impervious surface which drains directly into the storm drain system without first allowing flow across a pervious area (e.g. lawn).

Discharging directly to — An outflow from a drainage conveyance system that is composed entirely of flow from the subject development or redevelopment site and not commingled with flows from adjacent land.

Disconnected impervious area or surface — An impervious area or surface that drains across a pervious area prior to discharge to a storm drain system.

Discretionary Approval — A project approval which requires the exercise of judgment or deliberation when the MS4 decides to approve or disapprove a particular activity, as distinguished from situations where the MS4 merely has to determine whether there has been conformity with applicable statutes, ordinances, or regulations.

Dispersion — The practice of routing stormwater runoff from impervious areas, such as rooftops, walkways, and patios, onto the surface of adjacent pervious areas. Stormwater runoff is dispersed via splash block, dispersion trench, or sheet flow and soaks into the ground as it moves slowly across the surface of the pervious area.

Drainage Management Area (DMAs) — Following the low impact development principle of managing stormwater through small-scale, decentralized measures, DMAs are designated individual drainage areas within a Regulated Project that typically follow grade breaks and roof ridge lines and account for each surface type (e.g., landscaping, pervious paving, or roofs). Stormwater Control Measures for runoff reduction and structural facilities are designed for each DMA.

Drawdown — The time required for a stormwater 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.

Drywell — A structural subsurface facility with perforated sides or bottom, used to infiltrate stormwater into the ground.

Effective Imperiousness Area (EIA) — All of the impervious surfaces that directly contribute to site runoff. Impervious surfaces can be removed from the EIA by directing runoff to areas with infiltration soils, converting paved surfaces to permeable pavement, or converting a rooftop to a green roof.

Environmentally Sensitive areas (ESA) — Areas that include but are not limited to all Clean Water Act Section 303(d) impaired water bodies; areas designated as special biological significance by the State Water Resource Control Board, water bodies designated with the habitat-related uses EST, WET, MAR, WILD, BIO, RARE, SPWN by the State Water Resource Control Board, areas designated as preserves within the County of San Luis Obispo.

Equivalent Impervious Surface Area — is equal to *Impervious Tributary Surface Area* (ft_2) + *Pervious Tributary Surface Area* (ft_2), where *Impervious Tributary Surface Area* is defined as the sum of all of the site's conventional impervious surfaces, and *Pervious Tributary Surface Area* is defined as the sum of all of the site's pervious surfaces, corrected by a factor equal to the surface's runoff coefficient.

Evapotranspiration (ET) — The loss of water to the atmosphere by the combined processes of evaporation (from soil and plant surfaces) and transpiration (from plant tissues).

Erosion — (1) The loosening and transportation of rock and soil debris by wind, rain, or running water. (2) The gradual wearing away of the upper layers of earth.

Feasible— Capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental and technological factors. Infeasibility must be supported by substantial evidence developed through good faith efforts to investigate alternatives that would result in less adverse impacts. A substantial modification to the configuration of a development, or reduction in density or intensity, would not be considered infeasible unless supported by the above factors.

Flow-Based Treatment Control Measures — Stormwater quality treatment measures that rely on flow capacity to treat stormwater. These measures remove pollutants from a moving stream of water through filtration, infiltration, adsorption, and/or biological processes. Examples: vegetated swales and filter strips.

Flow-Through Water Quality Treatment Systems — Stormwater Control Measures that are designed to treat stormwater through filtration and/or settling. Flow-through systems do not provide significant retention or detention benefits for stormwater volume control.

General Construction Activities Stormwater Permit (Construction General Permit) — The general NPDES permit adopted by the State Regional Water Quality Control Board, which authorizes the discharge of stormwater from construction activities under certain conditions.

General Industrial Activities Stormwater Permit (Industrial General Permit) — The general NPDES permit adopted by the State Board which authorizes the discharge of stormwater from certain industrial activities under certain conditions.

Green Infrastructure — "Green Infrastructure" is a relatively new and flexible term, and its use depends on the context. However, for the purposes of EPA's efforts to implement the

Green Infrastructure Statement of Intent, the term generally refers to systems and practices that use or mimic natural processes to infiltrate, evapotranspirate, or reuse stormwater or runoff on the site where it is generated. Green infrastructure can be used at a wide range of landscape scales in place of, or in addition to, more traditional stormwater control elements to support the principles of LID. To learn more about how EPA is promoting green infrastructure to manage wet weather impacts in urban areas, see EPA's Green Infrastructure Page (http://www.epa.gov/owow/nps/lid) and 2008 Action Strategy for green infrastructure.

Groundwater Basins – Groundwater basin areas defined by the California Department of Water Resources (DWR) and used in the Central Coast Water Board Joint Effort for Hydromodification Control to identify groundwater receiving-water issues and areas where recharge is a key watershed process. DWR based identification of the groundwater basins on the presence and areal extent of unconsolidated alluvial soils identified on a 1:250,000 scale from geologic maps provided by the California Department of Conservation, Division of Mines and Geology. DWR then further evaluated identified groundwater basin areas through review of relevant geologic and hydrogeologic reports, well completion reports, court-determined adjudicated basin boundaries, and contact with local agencies to refine the basin boundaries.

Habitat-Related Uses — Several habitat-related beneficial uses defined by the Regional Water Quality Control Board that include warm and cold freshwater habitats; estuarine, wetland and marine habitats; wildlife habitat; biological habitats (including Areas of Special Biological Significance); habitats that support rare, threatened, or endangered species; habitats that support migration of aquatic organisms; and habitats that support spawning, reproduction, and/or early development of fish.

Head (hydraulic head) — Energy represented as a difference in elevation. In slow-flowing open systems, the difference in water surface elevation, e.g., between an inlet and outlet

Heat Island Effect — The increase in ambient temperatures generated by heat radiating from paved surfaces exposed to sunlight.

Hillside — Lands that have a natural gradient of 10 percent or greater.

Hot Spots — A land use or activity that produces higher concentrations of trace metals, hydrocarbons or priority pollutants than normally found in urban runoff. Hot spots are typically associated with auto recyclers, vehicle service, maintenance and washing facilities, industrial facilities with outdoor storage or loading docks.

Hydraulic Residence Time — The average time required to completely renew a waterbody's water volume.

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

Hydromodification — The process by which changes in land cover alters a site’s runoff and transport characteristics.

Hydrologic Soil Group (HSG) — A group of soils having similar runoff potential under similar storm and cover conditions. Natural Resource Conservation Service (NRCS) HSG information for a given site can be used to identify the likelihood that native soils can be used for infiltration BMPs (http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx). There are four types of HSG's.

1. (Low runoff potential). The soils have a high infiltration rate even when thoroughly wetted. They chiefly consist of deep, well drained to excessively drained sands or gravels. They have a high rate of water transmission (1 to 8.3 inches per hour).
2. The soils have a moderate infiltration rate when thoroughly wetted. They chiefly are moderately deep to deep, moderately well drained to well drained soils that have moderately fine to moderately coarse textures. They have a moderate rate of water transmission (0.5 to 1 inch per hour).
3. The soils have a slow infiltration rate when thoroughly wetted. They chiefly have a layer that impedes downward movement of water or have moderately fine to fine texture. They have a slow rate of water transmission (0.17 to 0.27 inches per hour).
4. (High runoff potential). The soils have a very slow infiltration rate when thoroughly wetted. They chiefly consist of clay soils that have a high swelling potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and shallow soils over nearly impervious material. They have a very slow rate of water transmission (0.02 to 0.1 inches per hour).

Typically those designated as Type 1 and Type 2 are more readily available for use with infiltration BMPs

Illicit Connection — Any man-made conveyance that is connected to the storm drain system without a permit, excluding roof drains and other similar type connections. Examples include channels, pipelines, conduits, inlets, or outlets that are connected directly to the storm drain system.

Illicit Discharge — Any discharge to the storm drain system that is prohibited under local, state, or federal statutes, ordinances, codes, or regulations. The term illicit discharge includes all non storm-water discharges except discharges pursuant to an NPDES permit, discharges that are identified as "allowable" in NPDES Municipal Stormwater Permits, and discharges authorized by the Regional Board.

Impervious Surface — A hard, non-vegetated surface area that prevents or significantly limits the entry of water into the soil mantle, as would occur under natural conditions prior to development. Common impervious surfaces include, but are not limited to, roof tops, walkways, patios, driveways, parking lots or storage areas, concrete or asphalt paving, oiled, macadam or other surfaces which similarly impede the natural infiltration of stormwater. Open, uncovered retention/detention facilities shall not be considered as impervious surfaces for purposes of determining whether the thresholds for application of

Performance Requirements are exceeded. However, for modeling purposes, open, uncovered facilities that retain/detain water (e.g., retention ponds, pools) shall be considered impervious surfaces.

Impervious Surface Area — A hard surface area that prevents or retards the entry of water into the soil, thus causing water to run off the surface in greater quantities and at an increased rate of flow. These surfaces include conventional rooftops and paved areas. Many landscaped areas, road shoulders, etc. become impervious to varying degrees due to soil compaction.

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

Inspection — Entry and the conduct of an on-site review of a facility and its operations, at reasonable times, to determine compliance with specific municipal or other legal requirements.

Integrated Management Practices (IMPs) — A LID practice or combination of practices that are the most effective and practicable (including technological, economic, and institutional considerations) means of controlling the predevelopment site hydrology, point or non-point source pollutants at levels compatible with environmental quality goals. They are small-scale structural stormwater practices distributed through out a site or drainage area for the purpose of managing or influencing the site hydrology.

Land recycling — The reuse of abandoned, vacant, or underused properties for redevelopment or repurposing.

Landscaped Areas — Areas of soil and vegetation not including any impervious surfaces of ancillary features such as impervious patios, BBQ areas, and pools.

Large River — A river draining 200 square miles or more.

Low Impact Development (LID) — A stormwater and land use management strategy that strives to mimic pre-disturbance hydrologic processes of infiltration, filtration, storage, evaporation, and transpiration by emphasizing conservation, use of on-site natural features, site planning, and distributed stormwater management practices that are integrated into a project design.

LID Best Management Practices — A practice or combination of practices that are the most effective and practicable (technical, economic, environmental) means of controlling stormwater runoff at levels compatible with environmental quality goals.

Maximum Extent Practicable (MEP) — Section 402(p)(3)(B) of the Clean Water Act (CWA) directs the Regional Board to issue NPDES Municipal Stormwater Permits which require the dischargers to develop and implement programs with the goal of reducing the discharge of pollutants in stormwater runoff to the maximum extent practicable (MEP). The SWRCB through a State Board's Office of Chief Counsel (OCC) issued memorandum (dated 11

February 1993) defined MEP to include *technical feasibility, cost, and benefit derived with the burden being on the municipality to demonstrate compliance with MEP by showing that a BMP is not technically feasible in the locality or that BMP costs would exceed any benefit to be derived* (dated 11 February 1993).

Ministerial Approval — A project approval which involves little or no personal judgment by the MS4 as to the wisdom or manner of carrying out the project and only involves the use of fixed standards or objective measurements.

Municipal Separate Storm Sewer System (MS4) — A conveyance or system of conveyances (including roads with drainage systems, municipal streets, alleys, catch basins, curbs, gutters, ditches, manmade channels, or storm drains) owned by a State, city, county, town or other public body, that is designed or used for collecting or conveying stormwater, which is not a combined sewer, and which is not part of a publicly owned treatment works, and which discharges to waters of the United States.

National Pollutant Discharge Elimination System (NPDES) — The national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits under Clean Water Act §307, 402, 318, and 405.

Native Vegetation — Vegetation comprised of plant species indigenous to the Central Coast Region and which reasonably could have been expected to naturally occur on the site.

Natural Drainage System — An unlined or unimproved (not engineered) creek, stream, river or similar waterway.

Net Impervious Area — The sum of new and replaced post-project impervious areas, minus any reduction in total imperviousness from the pre-project to post-project condition: *Net Impervious Area = (New and Replaced Impervious Area) – (Reduced Impervious Area Credit),* where *Reduced Impervious Area Credit* is the total pre-project to post-project reduction in impervious area, if any.

New Development — Land disturbing activities that include the construction or installation of buildings, roads, driveways and other impervious surfaces. Development projects with preexisting impervious surfaces are not considered New Development.

Nonpoint Source Pollution— Pollution that enters water from dispersed and uncontrolled sources, such as rainfall, moving over and through the ground rather than a single, identifiable source.

Non-Stormwater Discharge — Any discharge to a storm drain that is not composed entirely of stormwater. Certain non-stormwater discharges are authorized per the NPDES Municipal Stormwater Permits.

Non-Structural Practices — Natural features or directed activities specifically utilized for the purpose of managing or influencing the site hydrology and/or improving water quality.

Non-structural practices can include pollution prevention, preservation of open space and natural flow paths, street sweeping, etc.

Not Directly Connected Pavement — See Disconnected Pavement.

NPDES Municipal Stormwater Permit — A permit issued by a Regional Water Quality Control Board to local government agencies (Dischargers) placing provisions on allowable discharges of municipal stormwater to waters of the state.

Peak Runoff — The maximum stormwater runoff rate (cfs) determined for the design storm, or design rainfall intensity.

Percentile Rainfall Event (e.g., 85th and 95th) — A percentile rainfall event represents a rainfall amount which a certain percent of all rainfall events for the period of record do not exceed. For example, the 95th percentile rainfall event is defined as the measured rainfall depth accumulated over a 24-hour period, for the period of record, which ranks as the 95^{th} percentile rainfall depth based on the range of all daily event occurrences during this period.

Performance Standard — A narrative or measurable number specifying the minimum acceptable outcome for a pollution control practice.

Permeable — A type of material that allows passage of water.

Permeable or Pervious Surface — A surface that allows varying amounts of stormwater to infiltrate into the ground. Examples include pasture, native vegetation areas, landscape areas, and permeable pavements designed to infiltrate.

Permitting Agency — The entity responsible for issuing grading, building and encroachment permits for new and redevelopment projects.

Pervious Pavement — See Porous Pavement.

Pollutants — Any introduced gas, liquid, or solid that makes a resource unfit for its normal or usual purpose and substances defined in CWA §502(6) (33.U.S.C.§1362(6)), and incorporated by reference into California Water Code §13373.

Pollutants of Concern (POC) — Biochemical oxygen demand (BOD), sediment or a parameter that addresses sediment (such as total suspended solids, turbidity or siltation), pathogens, oil and grease, and any pollutant that has been identified as a cause of impairment in any water body to which the MS4 discharges.

Point Source Pollution — A source of pollutants from a single point of conveyance, such as a pipe. For example, the discharge from a sewage treatment plant or a factory is a point source pollutant.

Porous Pavements (Pervious pavements) — Pavements for roadways, sidewalks, parking lots or plazas that are designed to infiltrate runoff, such as: pervious concrete, pervious asphalt, unit pavers- on-sand, and crushed gravel.

Post-Construction Stormwater Quality Plan — A plan specifying and documenting permanent site features and control measures that are designed to control pollutants for the life of the project. The plan should include sufficient design detail and calculations to demonstrate the adequacy of the stormwater quality control measures to control pollution from the developed site. This plan may be required prior to issuance of certain development permits; check with your local permitting agency.

Pre-Developed Condition — Native vegetation and soils that existed at a site prior to any development. The pre-developed condition may be assumed to be an area with the typical vegetation, soil, and stormwater runoff characteristics of open space areas typical of California's central coast unless reasonable historic information is provided that the area was atypical.

Pre-Project – Stormwater runoff conditions that exist onsite immediately before development activities occur. This definition is not intended to be interpreted as that period before any human-induced land activities occurred. This definition pertains to redevelopment as well as initial development.

Priority Development Project — Any development project that falls within any of the following categories:

- Single-family hillside residence
- Commercial development where the land area for development is $\geq$ 100,000 sf
- Automotive repair shop defined in any of the following standard industrial classification codes: 5013, 5014, 5541, 7532-7534, or 7536-7539.
- Retail Gasoline Outlet
- Restaurant where the land area for development or redevelopment $\geq$or 5,000 sf. (SIC Code 5812)
- Detached residential development of 10 or more units
- Attached residential development of 10 or more units
- Parking lots $\geq$ 5,000 sf or with at least 25 parking spaces AND potentially exposed to stormwater runoff
- Discharging to receiving waters within defined *Environmentally Sensitive Areas.* All development and redevelopment located within or directly adjacent to or discharging directly to an environmentally sensitive areas.

Project Site — The area defined by the legal boundaries of a parcel or parcels of land within which the new development or redevelopment takes place and is subject to these Post- Construction Stormwater Management Requirements.

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

Rainwater Harvest — Capture and storage of rainwater or stormwater runoff for later use, such as irrigation (without runoff), domestic use (e.g. toilets), or storage for fire suppression.

Rainy Season — For San Luis Obispo County, the calendar period beginning October 15 and ending April 15.

Rational Method — A method of calculating runoff flows based on rainfall intensity, and tributary area, and a factor representing the proportion of rainfall that runs off.

Receiving Waters — Bodies of water, surface water systems or groundwater that receive surface water runoff through a point source, sheet flow or infiltration.

Recharge— Infiltration of surface water to groundwater.

Redevelopment — On a site that has already been developed, construction or installation of a building or other structure subject to the Permittee's planning and building authority including: 1) the creation or addition of impervious surfaces; 2) the expansion of a building footprint or addition or replacement of a structure; or 3) structural development including construction, installation or expansion of a building or other structure. It does not include routine road maintenance, nor does it include emergency construction activities required to immediately protect public health and safety.

Regional Stormwater Quality Treatment Facility (Regional Facility) — A facility that treats runoff from more than one project or parcel. A regional facility may be in lieu of on-site treatment controls to treat urban runoff prior to discharge to Waters of the State, subject to the approval of the applicable permitting agency.

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. There are nine California RWQCBs. San Luis Obispo County is within the Central Coast Regional Water Quality Control Board (Region 3).

Replaced Impervious Surface — The removal of existing impervious surfaces down to bare soil or base course, and replacement with new impervious surface. Replacement of impervious surfaces that are part of routine road maintenance activities are not considered replaced impervious surfaces.

Restaurant — A facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC Code 5812).

Retail Gasoline Outlet — Any facility engaged in selling gasoline and lubricating oils.

Retention — The process of holding or retaining runoff close to the source for infiltration, evapotranspiration, or reuse.

Retention Tributary Area – The entire project area except for undisturbed areas, planted areas with native, drought-tolerant, or LID appropriate vegetation that do not receive runoff from other areas, and impervious surface areas that discharge to infiltrating areas that will not produce runoff or create nuisance ponding. The Drainage Management Areas are smaller Retention Tributary Areas that cumulatively make up the Retention Tributary Area for the entire site.

Routine Road Maintenance — includes pothole and square cut patching; overlaying existing asphalt or concrete pavement with asphalt or concrete without expanding the area of coverage; shoulder grading; reshaping/regrading drainage systems; crack sealing; resurfacing with in kind material without expanding the road prism or altering the original line and grade and/or hydraulic capacity of the road.

Runoff — See Stormwater Runoff, Urban Runoff

Run-on - Any runoff (see Urban Runoff and Storm Runoff) that flows onto a site from off-site sources.

Runoff Coefficient — A measure of the permeability that is used to estimate the portion of the rainfall that will run off the watershed.

Self-Retaining Areas — (also called “zero discharge” areas), are designed to retain some amount of rainfall (by ponding and infiltration and/or evapotranspiration) without producing stormwater runoff. Self-Retaining Areas may include graded depressions with landscaping or pervious pavement.

Self-Treating Areas — are a portion of a Regulated Project in which infiltration, evapotranspiration and other natural processes remove pollutants from stormwater. The self-treating areas may include conserved natural open areas and areas planted with native, drought-tolerant, or LID appropriate vegetation. The self-treating area only treats the rain falling on itself and does not receive stormwater runoff from other areas.

Setback— The required distance between a structure and a lot line.

Sheet flow — A flow condition during a storm where the depth of stormwater runoff is shallow and informally spread over the land surface.

SIC Code — Standard Industrial Classification Codes as defined by the U.S. Department of Labor (see http://www.osha.gov/pls/imis/sic_manual.html)

Significant Redevelopment — Includes, but is not limited to: expansion of a building footprint; replacement of a structure; replacement of impervious surface that is not part of routine maintenance activity; and land-disturbing activities related to structural or impervious surfaces. For redevelopment projects subject to this manual, the applicable design standards apply only to the redeveloped area, and not to the entire site, except in cases where untreated drainage from the existing developed portion is allowed to enter/flow through the redeveloped portion. In such cases, any new required treatment control

measures must be designed for the entire contributing drainage area. Redevelopment and infill project applicants should check with the local permitting agency at the start of project design to verify whether or not the manual requirements apply.

Significant Tree— Any tree which is more than 12-inches in diameter measured four and one-half feet above the root crown; or any native or historically significant tree designated by the County as a tree to be preserved.

Single-Family Residence — 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.

Smart Growth — An urban planning strategy that focuses development in areas where existing infrastructure is available and opportunities for infill development and conservation of natural resources are maximized. Smart Growth is intended to reduce the impacts of urban sprawl.

Source Control Measure — Any schedule of activities, prohibition of practices, maintenance procedure, managerial practice or operational practice that aims to prevent stormwater pollution by reducing the potential for contamination at the source of pollution.

Steep Slope — An area of land that has a slope angle of 10% or greater.

Storm Runoff — Surplus surface water generated by rainfall that does not seep into the earth and flows overland to flowing or stagnant bodies of water.

Stormwater — Stormwater runoff, snowmelt runoff, and surface runoff and drainage.

Stormwater Control Measures — Stormwater management measures integrated into project designs that emphasize protection of watershed processes through replication of pre development runoff patterns (rate, volume, duration). Physical control measures include, but are not limited to, bioretention/rain gardens, permeable pavements, roof downspout controls, dispersion, soil quality and depth, minimal excavation foundations, vegetated roofs, and water use. Design control measures include but are not limited to conserving and protecting the function of existing natural areas, maintaining or creating riparian buffers, using onsite natural drainage features, directing runoff from impervious surfaces toward pervious areas, and distributing physical control measures to maximize infiltration, filtration, storage, evaporation, and transpiration of stormwater before it becomes runoff.

Stormwater Control Plan — A plan, developed by the Regulated Project applicant, detailing how the project will achieve the applicable Post-Construction Stormwater Management Requirements (for both onsite and offsite systems).

Stormwater Quality Plan — See Post-Construction Stormwater Quality Plan

Structural Practices — Any man made stormwater practice or feature that requires maintenance in order to function or provide the hydrologic benefit as designed. Structural

practices include, but are not limited to, rain gardens, stormwater bioretention basins, stormwater infiltration facilities, stormwater retention and detention facilities, engineered vegetated filter strips, and any other features that are designed, constructed and maintained in order to managing or influencing the site hydrology and/or improve runoff water quality.

Target Pollutants — Pollutants identified by the County or RWQCB as most likely to impair local receiving waters, based on evaluation of available monitoring data and other information.

Time of Concentration (Tc) – The time for runoff to travel from the hydraulically most distant point of the development site to the watershed outlet or study point.

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 UV 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.

Treatment train — A stormwater technique in which several treatment types (filtration, infiltration, retention, evaporation) are used in conjunction with one another and are integrated into a comprehensive runoff management system.

Urban Runoff — Any runoff from urbanized areas including stormwater 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.

Vector— Any insect or organism that is capable of harboring or transmitting a causative agent of human disease.

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

Water Board(s) — Generic reference to the State Water Resources Control Board (SWRCB) and/or the nine Regional Water Quality Control Boards (RWQCBs).

Water Quality Volume (WQV) — For stormwater treatment BMPs that depend on detention to work, the volume of water that must be detained to achieve maximum extent practicable pollutant removal. This volume of water must be detained for a specified drawdown time.

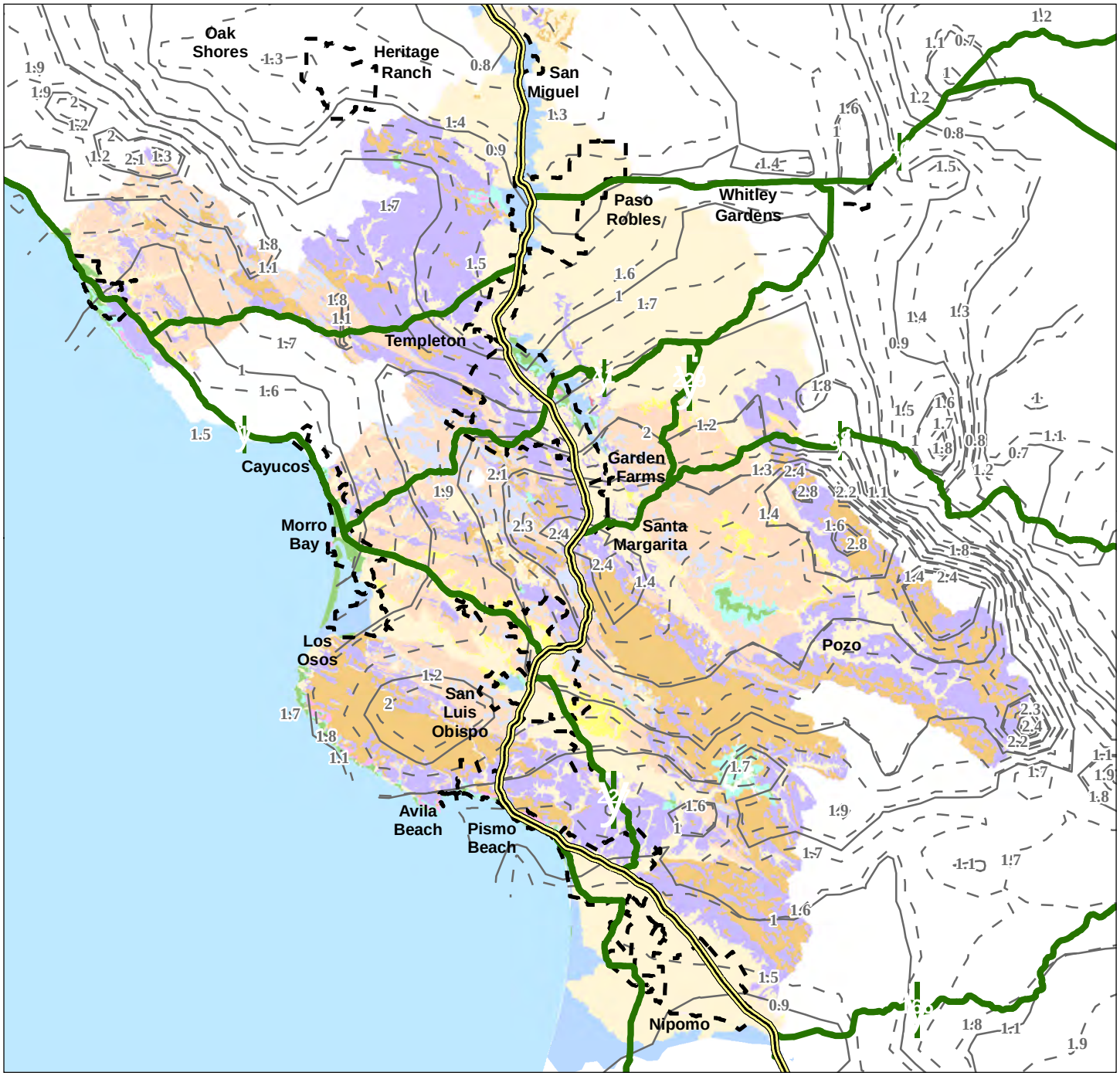
Water Table — The upper surface of groundwater or the level below which the soil is saturate with water. The water table indicates the uppermost extent of groundwater.

Appendix A -

Permit Coverage Area Maps

Also see County website: http://www.sloplanning.org/PermitViewMap/MapSearch for GIS maps

National Pollution Discharge Elimination System (NPDES)
San Luis Obispo County
Coverage Areas



Source: San Luis Obispo County, 2010 Census, Stillwater Sciences, PRISM Climate Group, and Oregon State University. Map created January 2014

0 2.5 5 10
Miles

PUBLIC WORKS
GIS SERVICES
SAN LUIS OBISPO COUNTY

3

Coverage Areas

Isohyetal 24 Hour Rainfall (in.)

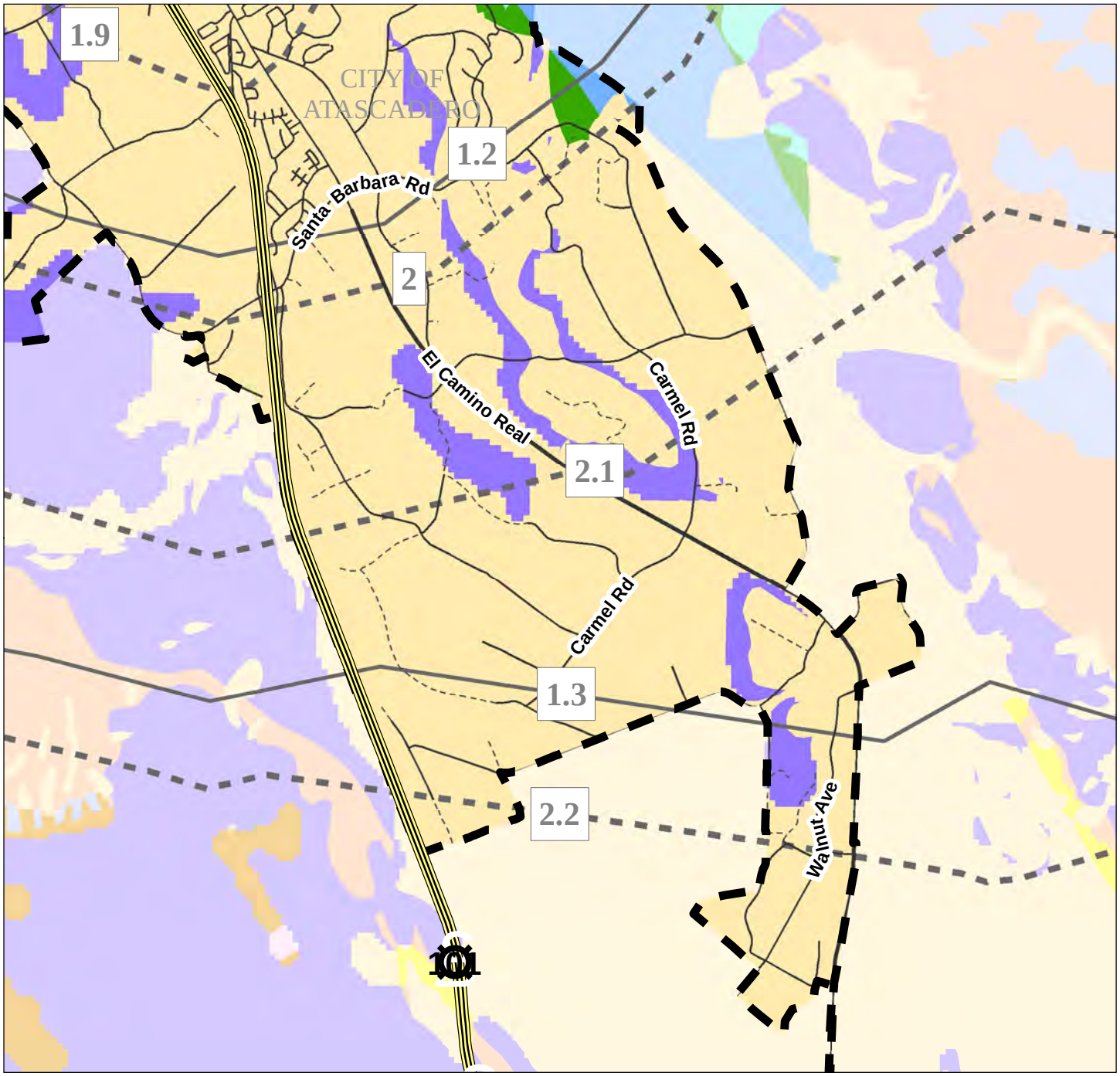
85th Percentile

95th Percentile

Watershed Management Zones

1 2 3 4 4* 5 6 7 7* 8 9 10

National Pollution Discharge Elimination System (NPDES)
San Luis Obispo County
Coverage Areas - **Atascadero Fringe**



Source: San Luis Obispo County, 2010 Census, Stillwater Sciences, PRISM Climate Group, and Oregon State University. Map created January 2014

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SAN LUIS OBISPO COUNTY

Coverage Areas

Isohyetal 24 Hour Rainfall (in.)

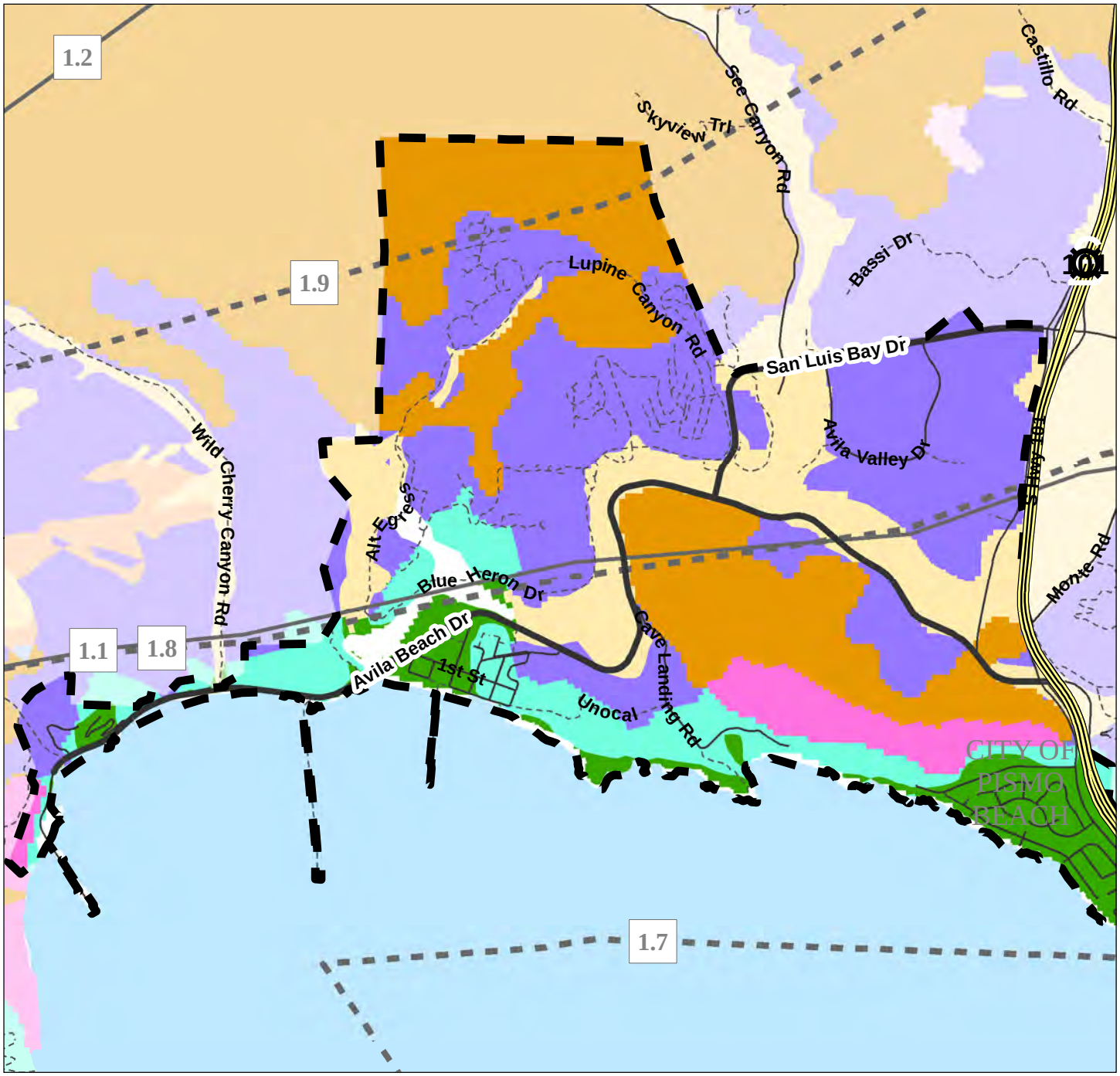
85th Percentile

95th Percentile

Watershed Management Zones

1 2 3 4 4* 5 6 7 7* 8 9 10

National Pollution Discharge Elimination System (NPDES)
San Luis Obispo County
Coverage Areas - **Avila Beach**



Source: San Luis Obispo County, 2010 Census, Stillwater Sciences, PRISM Climate Group, and Oregon State University. Map created January 2014

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SAN LUIS OBISPO COUNTY

Coverage Areas

Isohyetal 24 Hour Rainfall (in.)

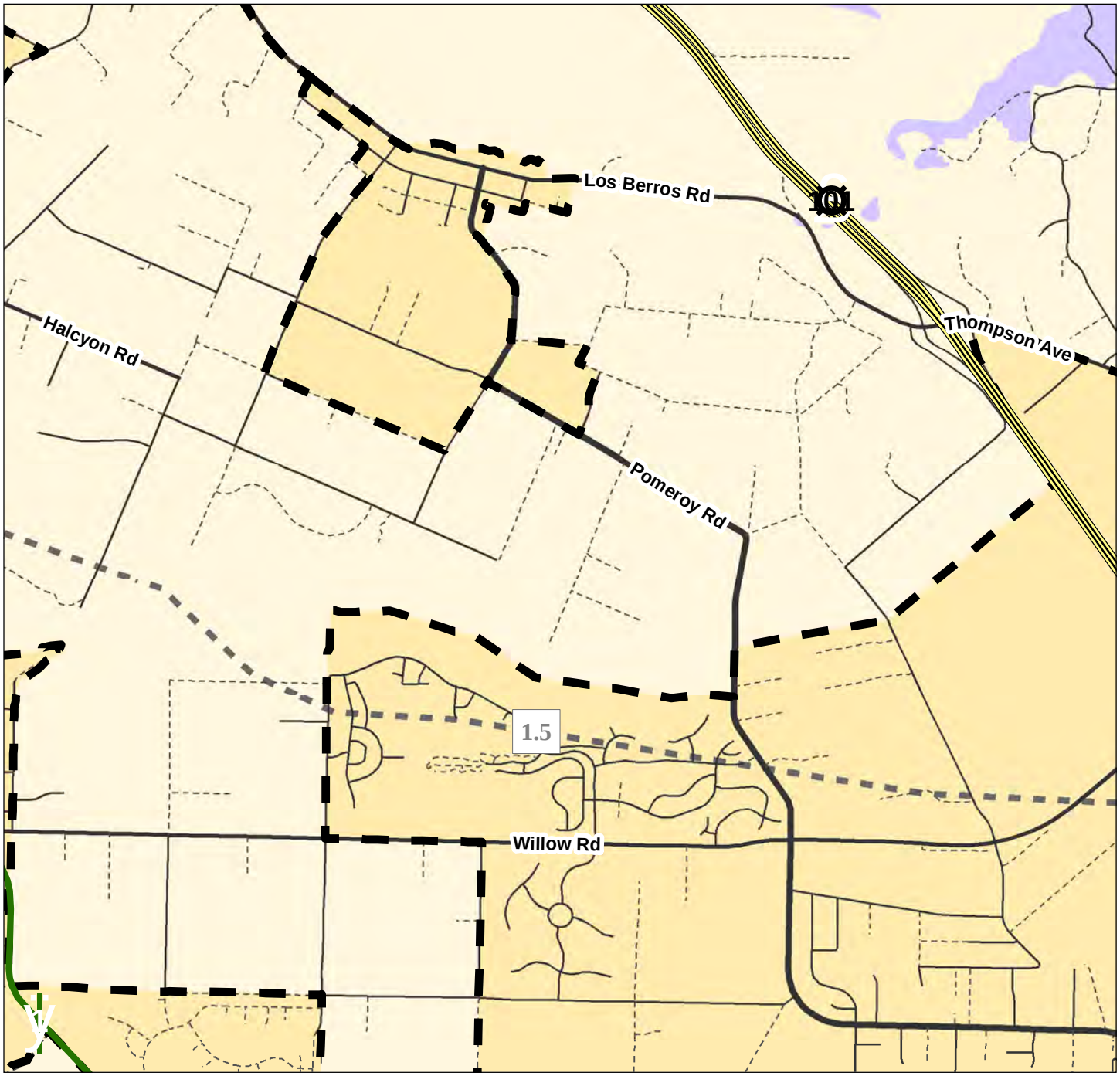
85th Percentile

95th Percentile

Watershed Management Zones

1 2 3 4 4* 5 6 7 7* 8 9 10

National Pollution Discharge Elimination System (NPDES)
San Luis Obispo County
Coverage Areas - **Los Berros and Black Lake**



Source: San Luis Obispo County, 2010 Census, Stillwater Sciences, PRISM Climate Group, and Oregon State University. Map created January 2014

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SAN LUIS OBISPO COUNTY

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Coverage Areas

Isohyetal 24 Hour Rainfall (in.)

85th Percentile

95th Percentile

Watershed Management Zones

1 2 3 4 4* 5 6 7 7* 8 9 10

National Pollution Discharge Elimination System (NPDES)
San Luis Obispo County
Coverage Areas - **Callender-Garret and Palo Mesa**

Source: San Luis Obispo County, 2010 Census, Stillwater Sciences, PRISM Climate Group, and Oregon State University. Map created January 2014

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Coverage Areas

Isohyetal 24 Hour Rainfall (in.)

85th Percentile

95th Percentile

Watershed Management Zones

1 2 3 4 4* 5 6 7 7* 8 9 10

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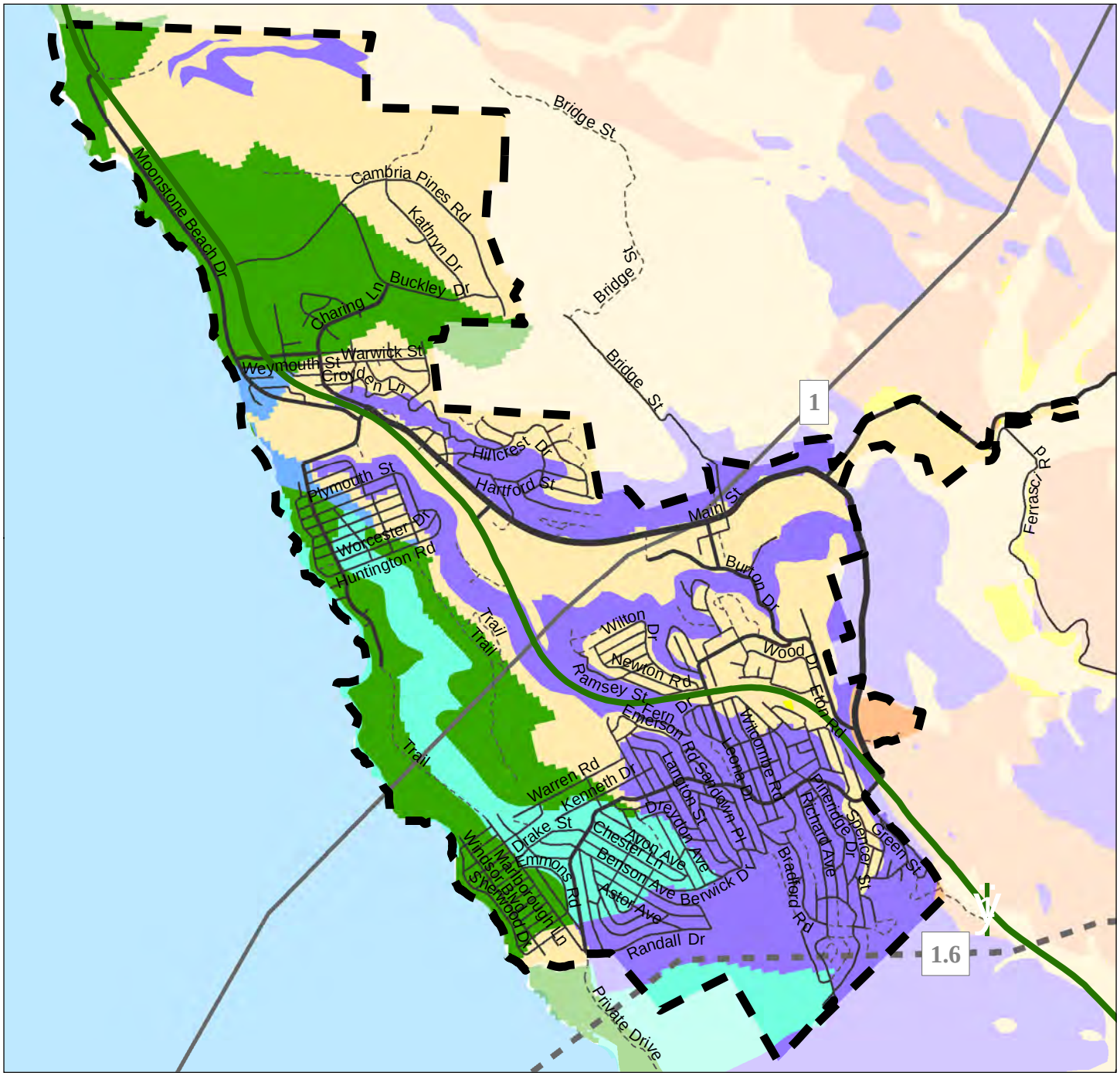
SAN LUIS OBISPO COUNTY

National Pollution Discharge Elimination System (NPDES)
San Luis Obispo County
Coverage Areas - **Cambria**



Source: San Luis Obispo County, 2010 Census, Stillwater Sciences, PRISM Climate Group, and Oregon State University. Map created January 2014

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PUBLIC WORKS
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SAN LUIS OBISPO COUNTY

Coverage Areas

Isohyetal 24 Hour Rainfall (in.)

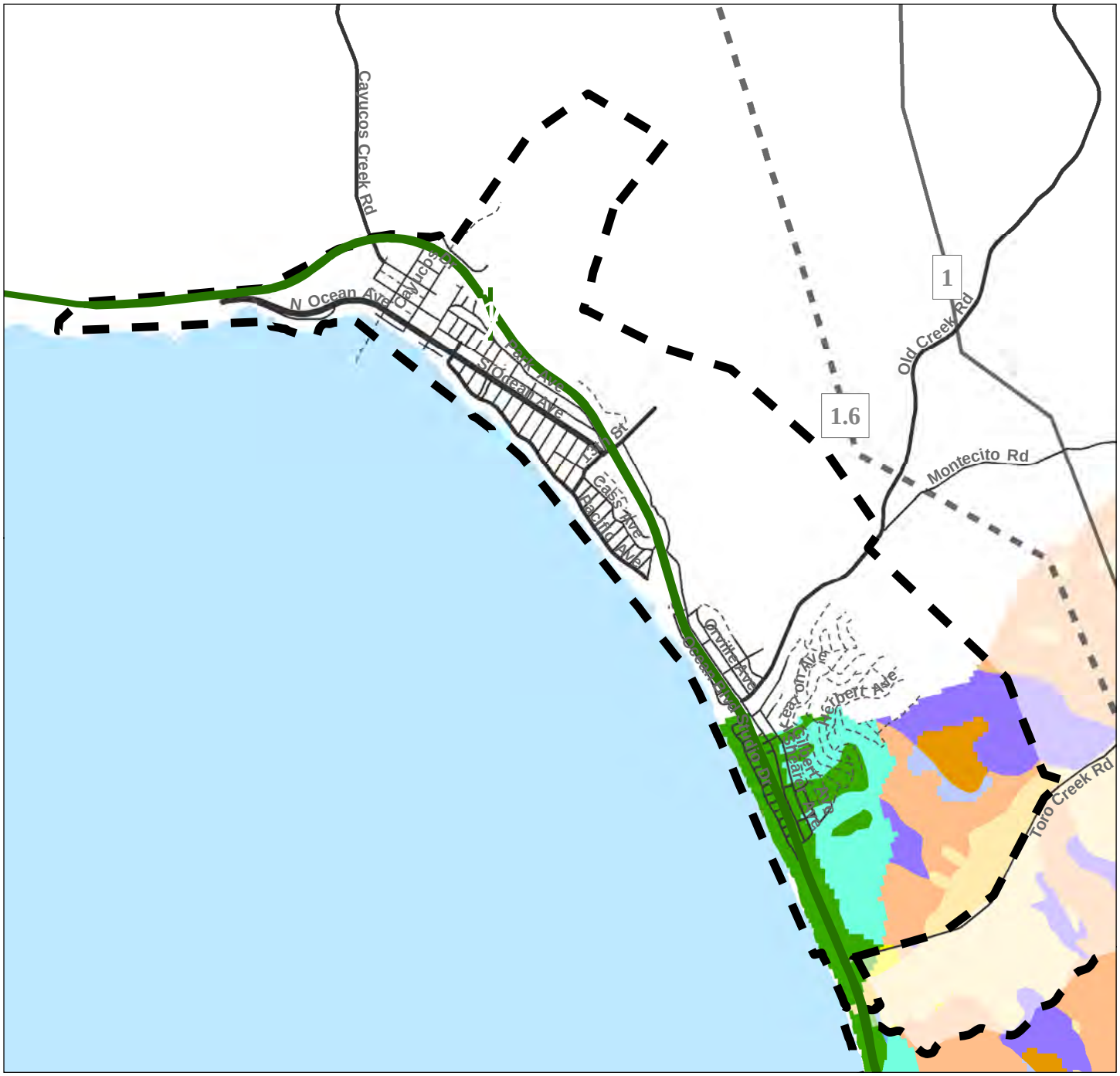
85th Percentile

95th Percentile

Watershed Management Zones

1 2 3 4 4* 5 6 7 7* 8 9 10

National Pollution Discharge Elimination System (NPDES)
San Luis Obispo County
Coverage Areas - **Cayucos**



Source: San Luis Obispo County, 2010 Census, Stillwater Sciences, PRISM Climate Group, and Oregon State University. Map created January 2014

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PUBLIC WORKS
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SAN LUIS OBISPO COUNTY

Coverage Areas

Isohyetal 24 Hour Rainfall (in.)

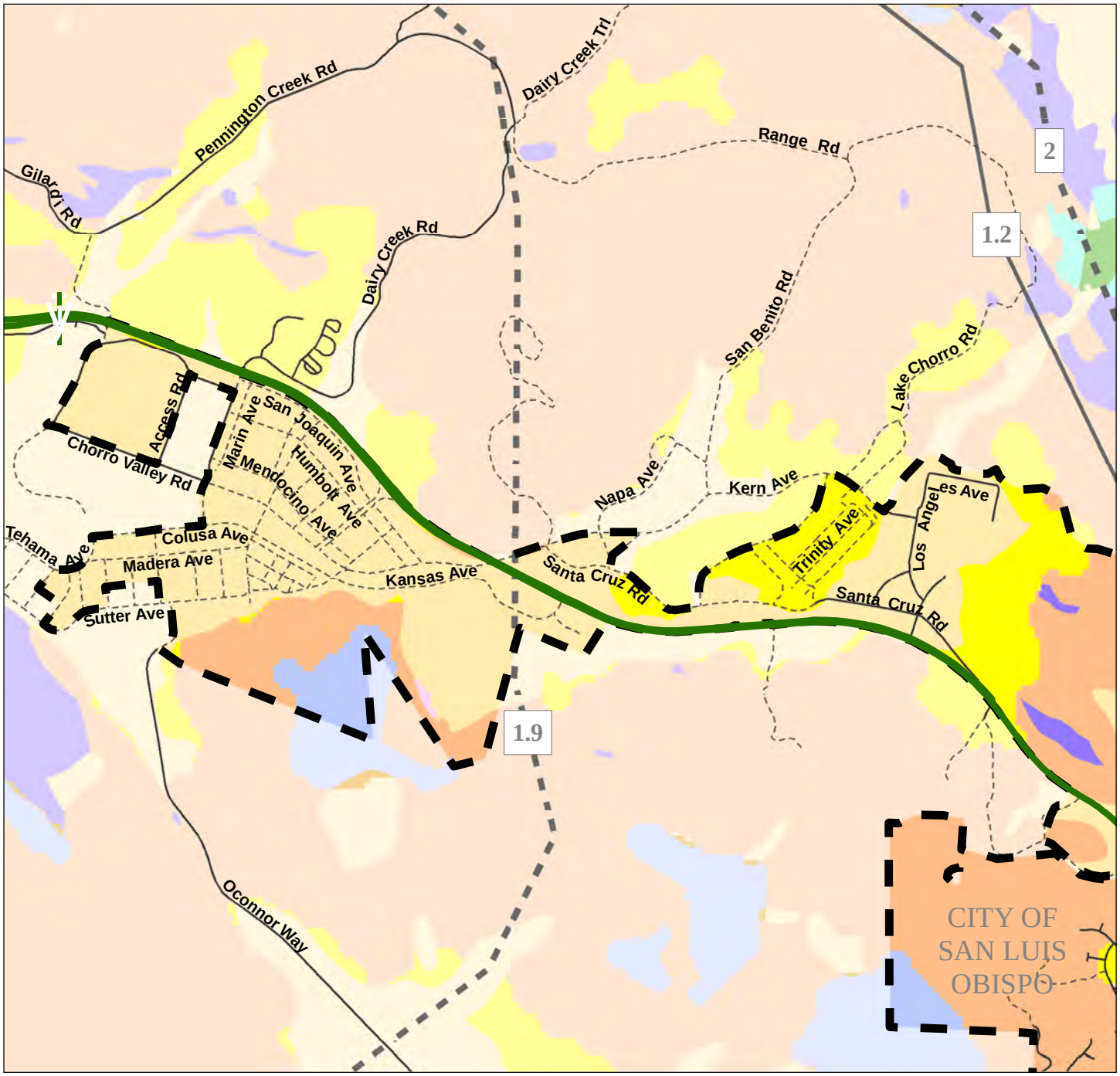
85th Percentile

95th Percentile

Watershed Management Zones

1 2 3 4 4* 5 6 7 7* 8 9 10

National Pollution Discharge Elimination System (NPDES)
San Luis Obispo County
Coverage Areas - **Chorro Valley**



Source: San Luis Obispo County, 2010 Census, Stillwater Sciences, PRISM Climate Group, and Oregon State University. Map created January 2014

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Coverage Areas

Isohyetal 24 Hour Rainfall (in.)

85th Percentile

95th Percentile

Watershed Management Zones

1 2 3 4 4* 5 6 7 7* 8 9 10

PUBLIC WORKS
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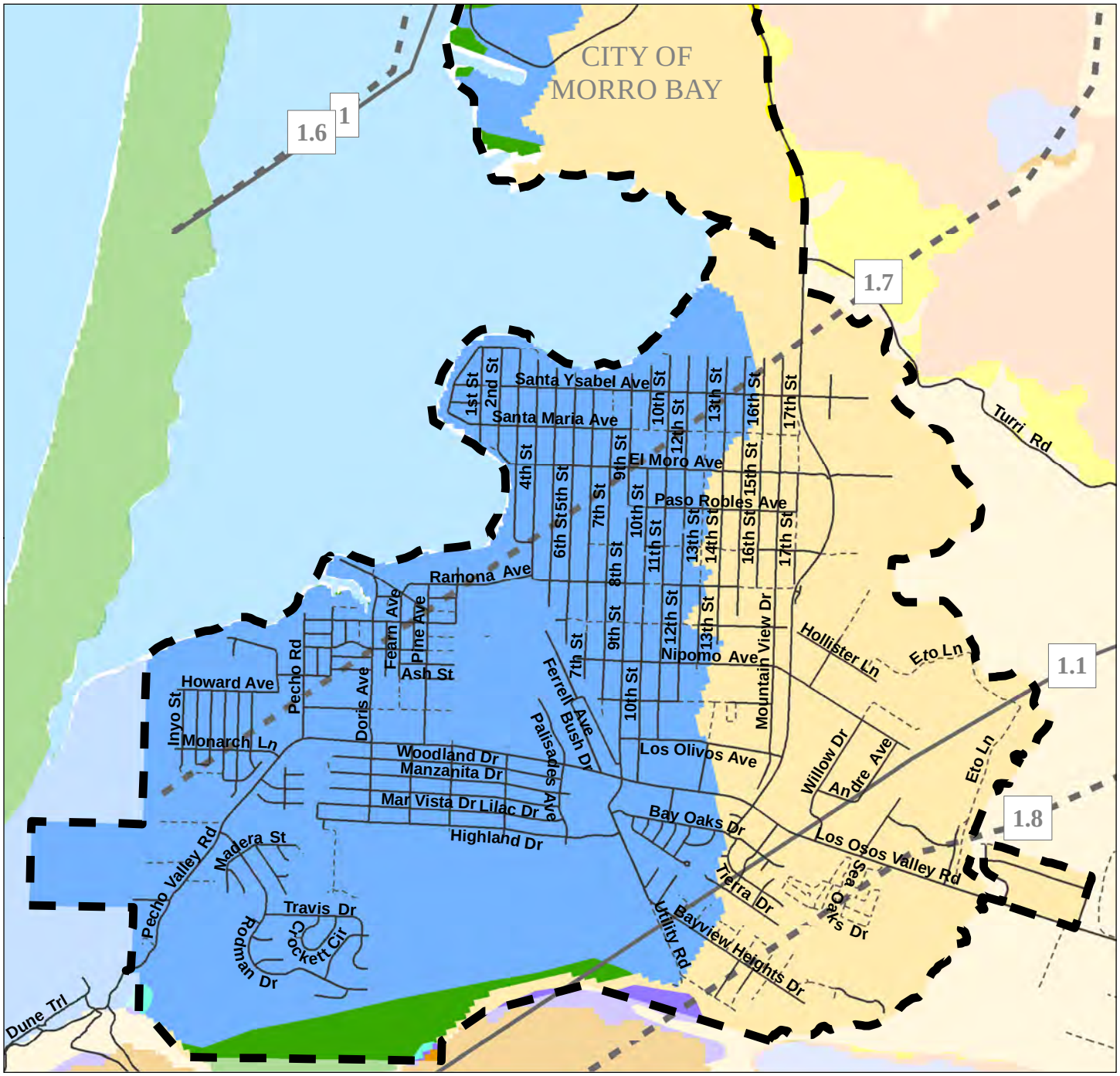
SAN LUIS OBISPO COUNTY

National Pollution Discharge Elimination System (NPDES)
San Luis Obispo County
Coverage Areas - **Los Osos**



Source: San Luis Obispo County, 2010 Census, Stillwater Sciences, PRISM Climate Group, and Oregon State University. Map created January 2014

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SAN LUIS OBISPO COUNTY

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Coverage Areas

Isohyetal 24 Hour Rainfall (in.)

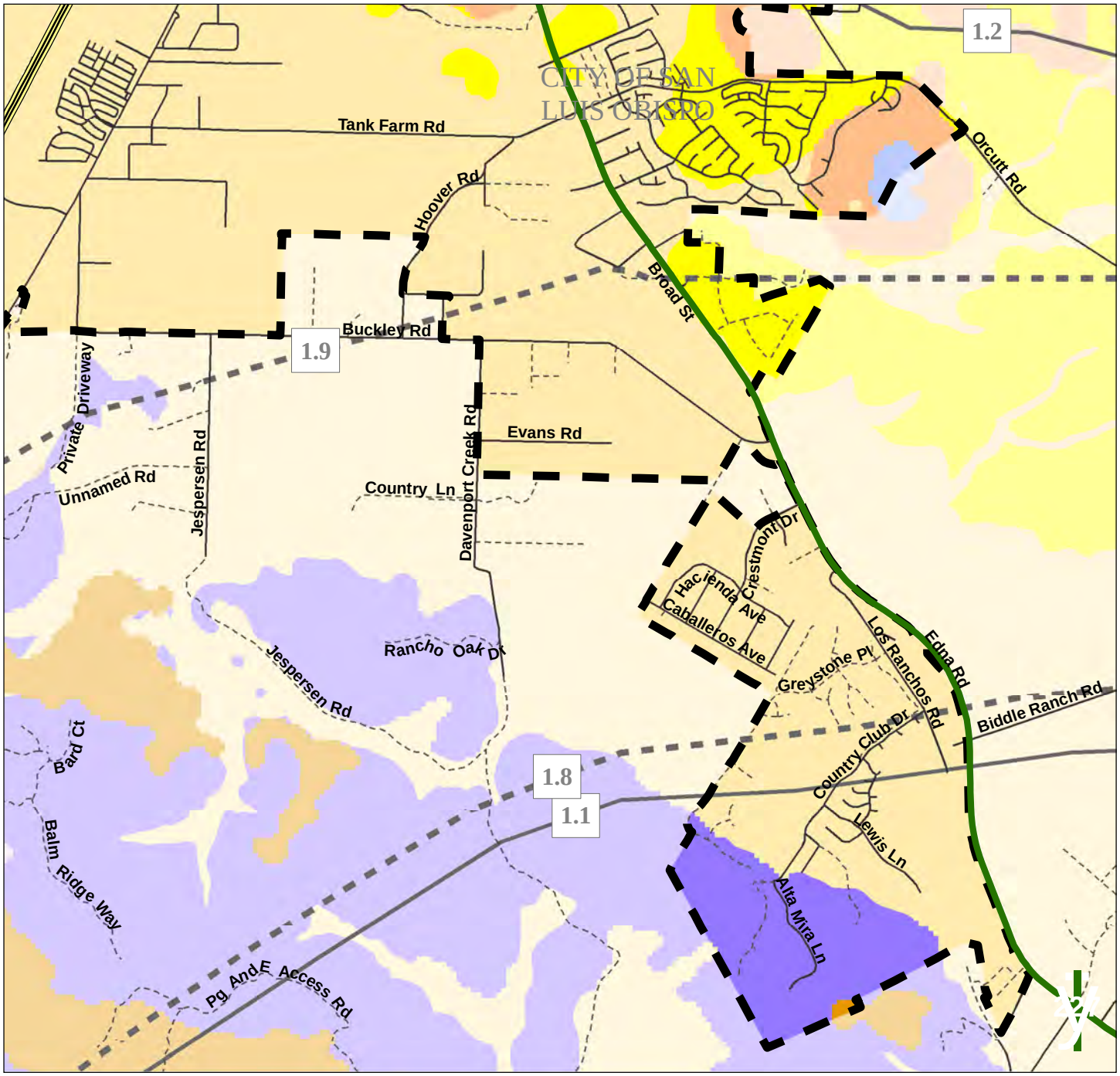
85th Percentile

95th Percentile

Watershed Management Zones

1 2 3 4 4* 5 6 7 7* 8 9 10

National Pollution Discharge Elimination System (NPDES)
San Luis Obispo County
Coverage Areas - **Los Ranchos and Edna**



Source: San Luis Obispo County, 2010 Census, Stillwater Sciences, PRISM Climate Group, and Oregon State University. Map created January 2014

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SAN LUIS OBISPO COUNTY

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Coverage Areas

Isohyetal 24 Hour Rainfall (in.)

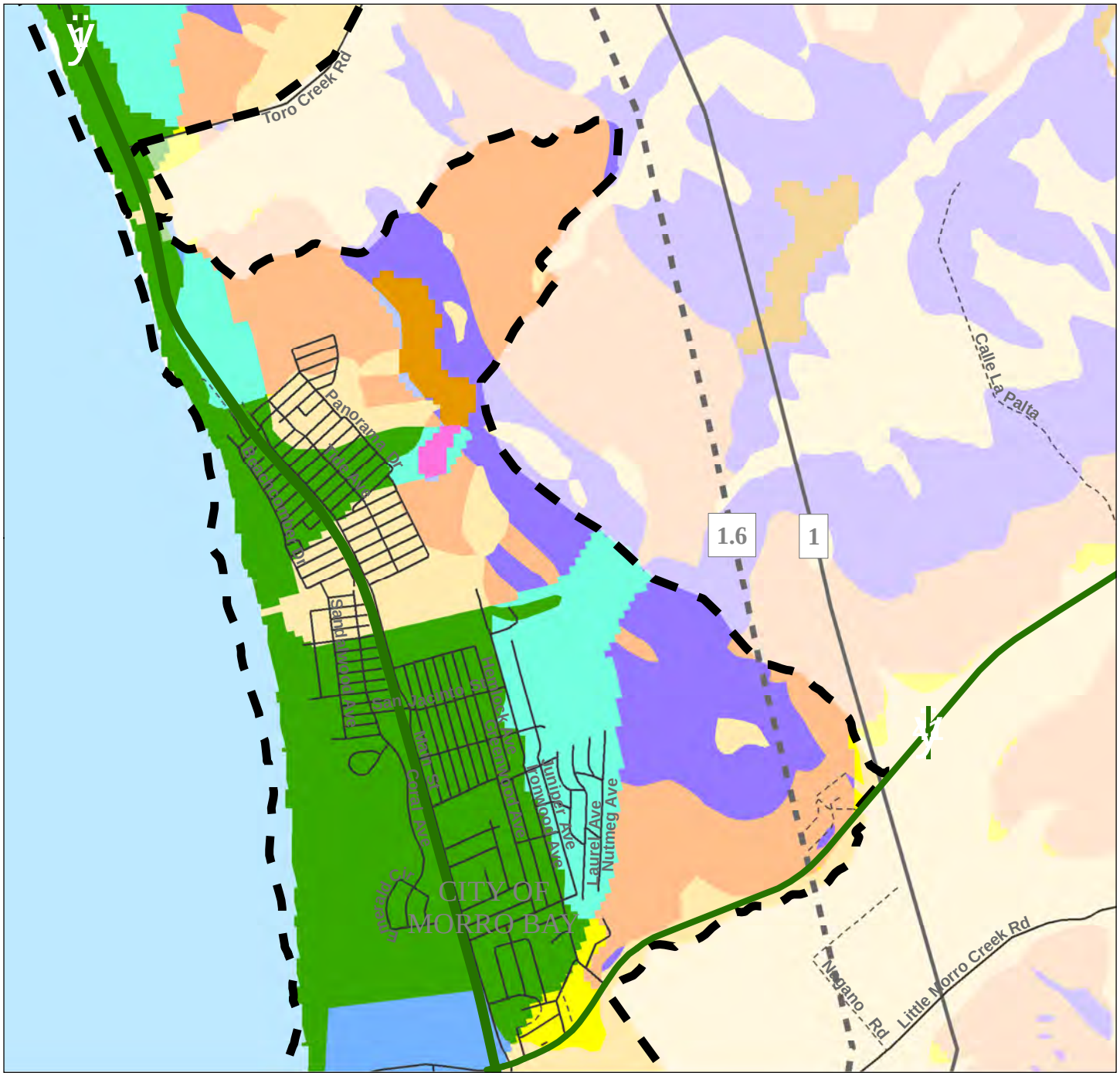
85th Percentile

95th Percentile

Watershed Management Zones

1 2 3 4 4* 5 6 7 7* 8 9 10

National Pollution Discharge Elimination System (NPDES)
San Luis Obispo County
Coverage Areas - **North Morro Bay**



Source: San Luis Obispo County, 2010 Census, Stillwater Sciences, PRISM Climate Group, and Oregon State University. Map created January 2014

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PUBLIC WORKS
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SAN LUIS OBISPO COUNTY

Coverage Areas

Isohyetal 24 Hour Rainfall (in.)

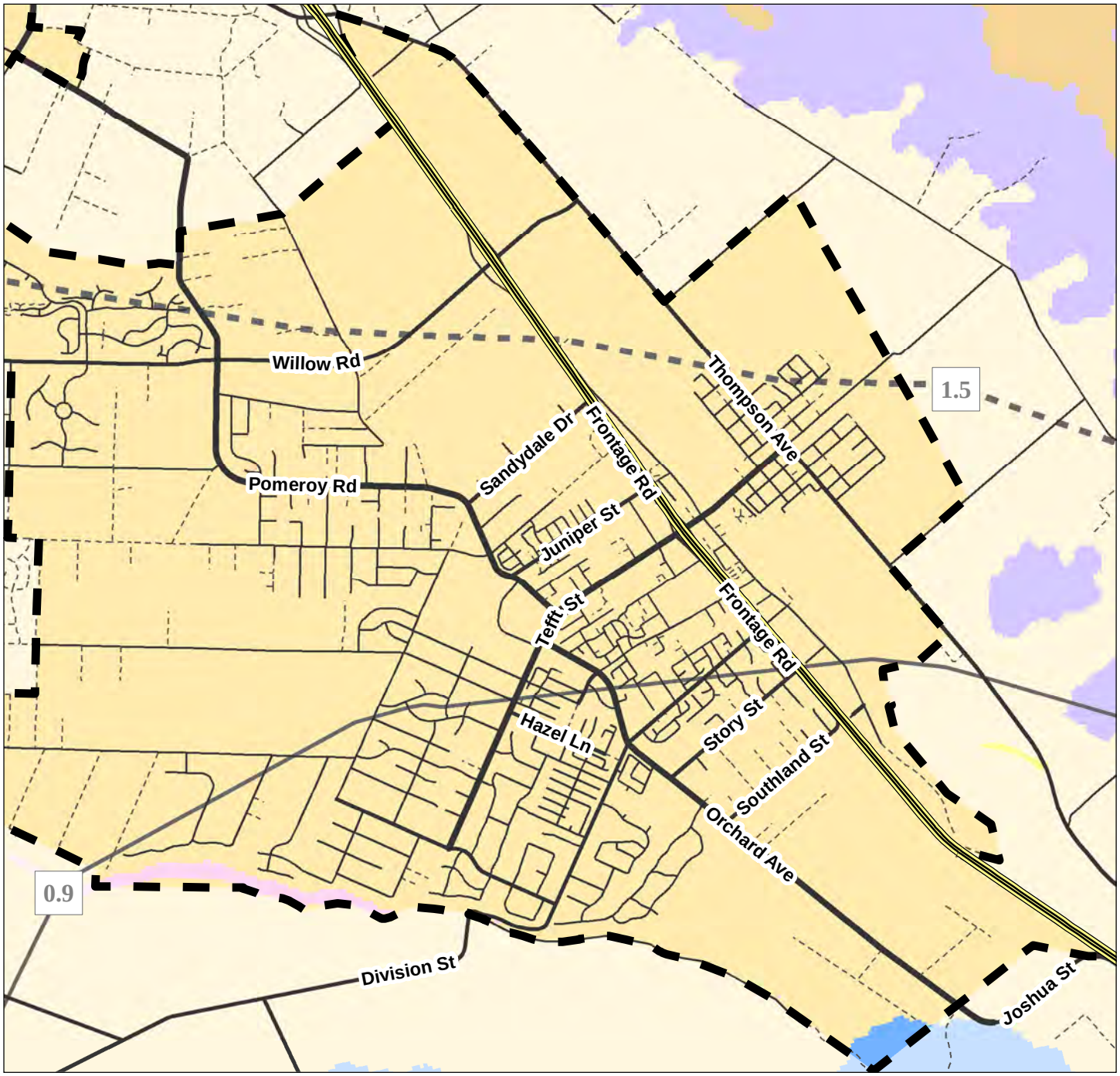
85th Percentile

95th Percentile

Watershed Management Zones

1 2 3 4 4* 5 6 7 7* 8 9 10

National Pollution Discharge Elimination System (NPDES)
San Luis Obispo County
Coverage Areas - **Nipomo**



Source: San Luis Obispo County, 2010 Census, Stillwater Sciences, PRISM Climate Group, and Oregon State University. Map created January 2014

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SAN LUIS OBISPO COUNTY

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Coverage Areas

Isohyetal 24 Hour Rainfall (in.)

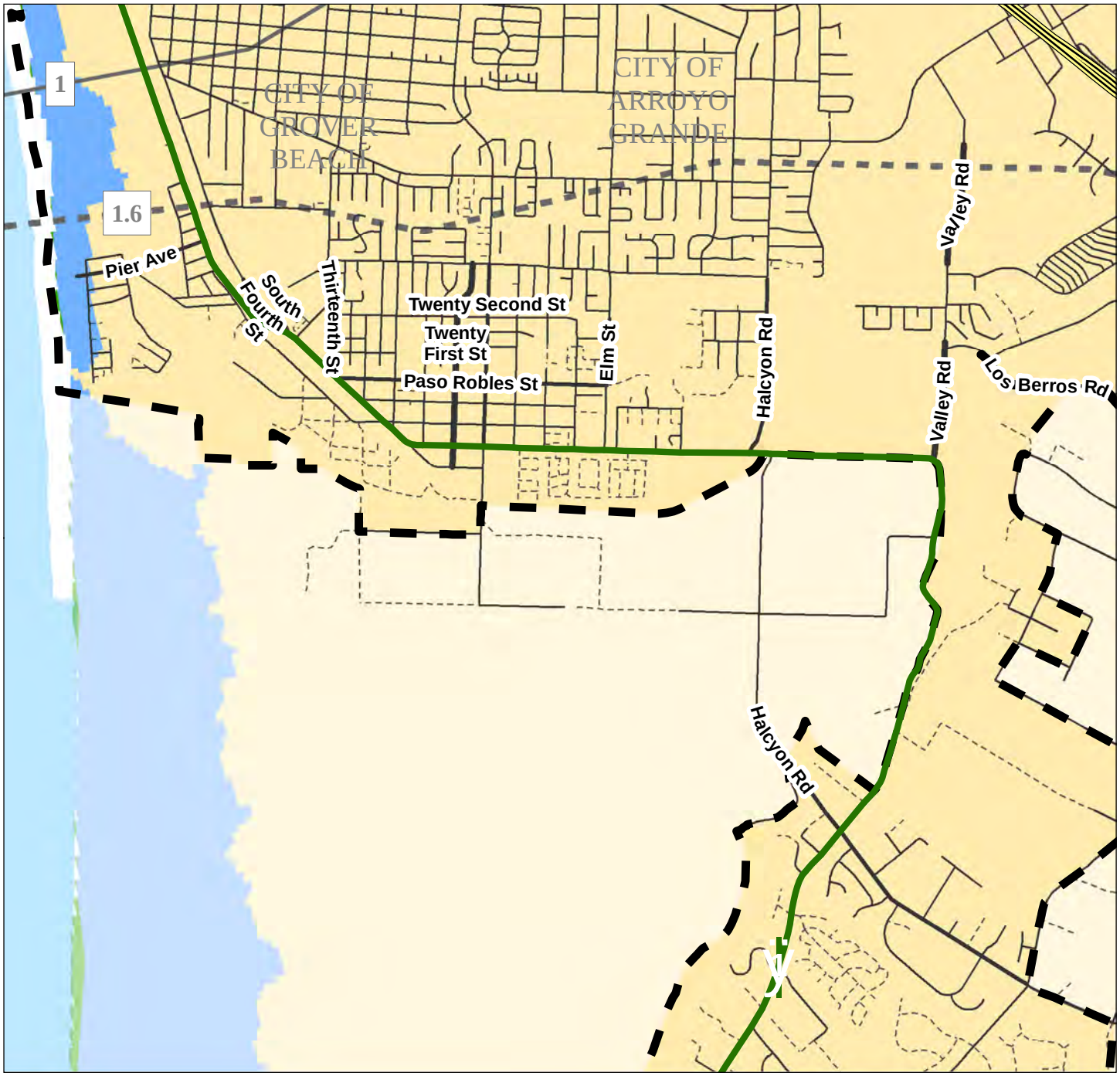
85th Percentile

95th Percentile

Watershed Management Zones

1 2 3 4 4* 5 6 7 7* 8 9 10

National Pollution Discharge Elimination System (NPDES)
San Luis Obispo County
Coverage Areas - **Oceano**



Source: San Luis Obispo County, 2010 Census, Stillwater Sciences, PRISM Climate Group, and Oregon State University. Map created January 2014

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SAN LUIS OBISPO COUNTY

Coverage Areas

Isohyetal 24 Hour Rainfall (in.)

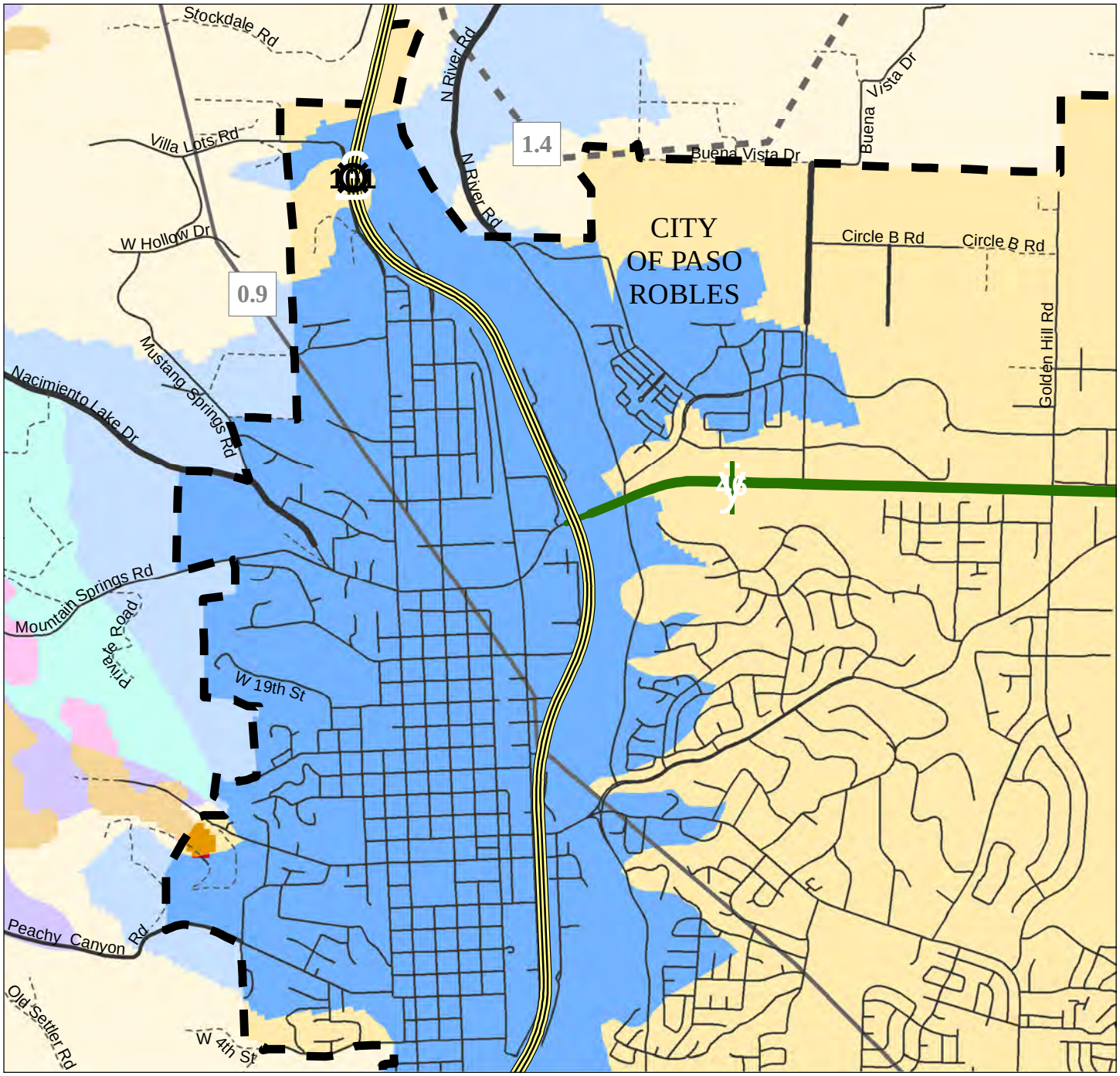
85th Percentile

95th Percentile

Watershed Management Zones

1 2 3 4 4* 5 6 7 7* 8 9 10

National Pollution Discharge Elimination System (NPDES)
San Luis Obispo County
Coverage Areas - **Paso Robles**



Source: San Luis Obispo County, 2010 Census, Stillwater Sciences, PRISM Climate Group, and Oregon State University. Map created January 2014

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PUBLIC WORKS
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SAN LUIS OBISPO COUNTY

Coverage Areas

Isohyetal 24 Hour Rainfall (in.)

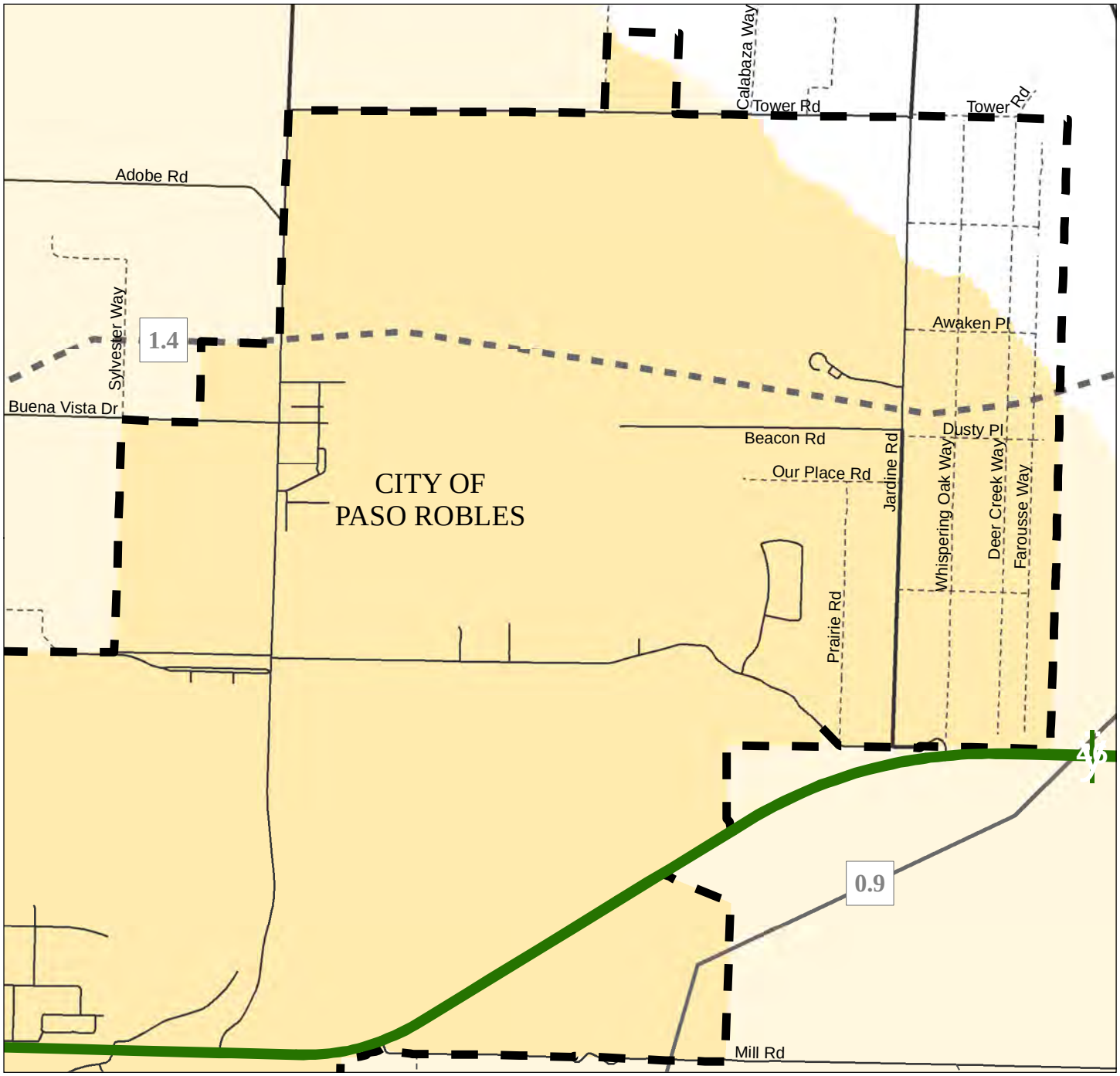
85th Percentile

95th Percentile

Watershed Management Zones

1 2 3 4 4* 5 6 7 7* 8 9 10

National Pollution Discharge Elimination System (NPDES)
San Luis Obispo County
Coverage Areas - **Northeastern Paso Robles**



Source: San Luis Obispo County, 2010 Census, Stillwater Sciences, PRISM Climate Group, and Oregon State University. Map created January 2014

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PUBLIC WORKS
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SAN LUIS OBISPO COUNTY

Coverage Areas

Isohyetal 24 Hour Rainfall (in.)

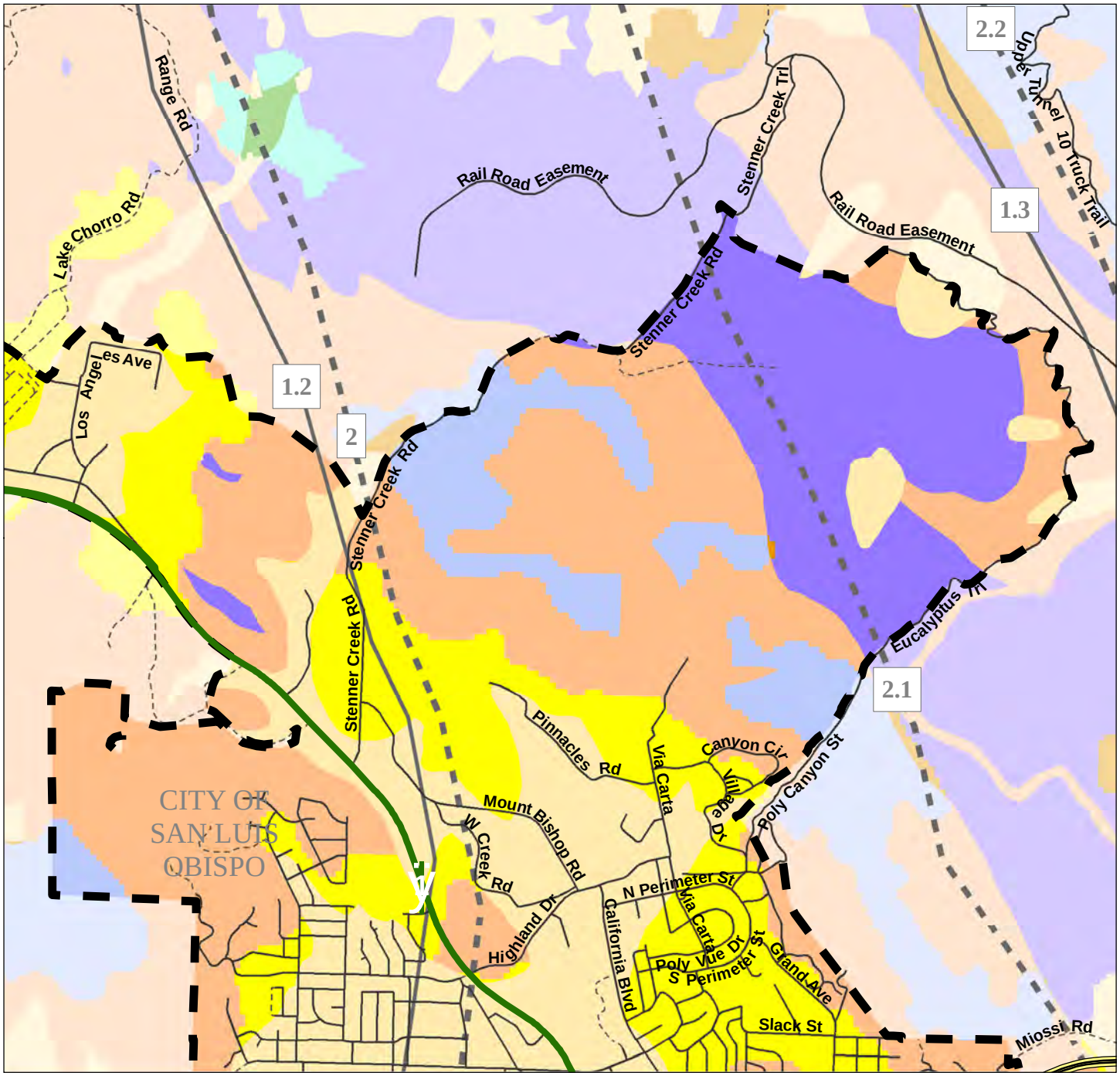
85th Percentile

95th Percentile

Watershed Management Zones

1 2 3 4 4* 5 6 7 7* 8 9 10

National Pollution Discharge Elimination System (NPDES)
San Luis Obispo County
Coverage Areas - **Northern San Luis Obispo Fringe**



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Coverage Areas

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85th Percentile

95th Percentile

Watershed Management Zones

1 2 3 4 4* 5 6 7 7* 8 9 10

PUBLIC WORKS
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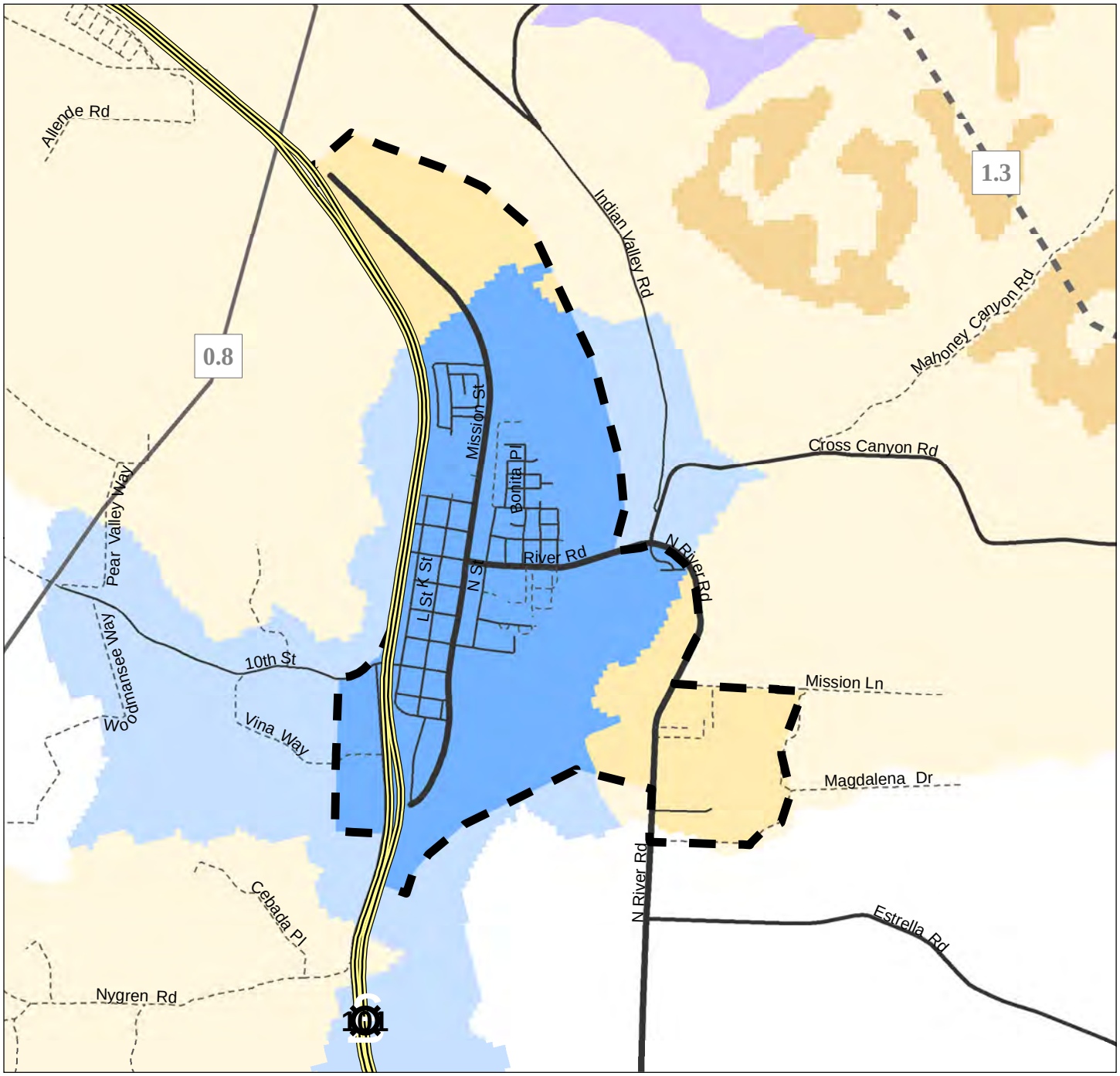
SAN LUIS OBISPO COUNTY

National Pollution Discharge Elimination System (NPDES)
San Luis Obispo County
Coverage Areas - **San Miguel**



Source: San Luis Obispo County, 2010 Census, Stillwater Sciences, PRISM Climate Group, and Oregon State University. Map created January 2014

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Coverage Areas

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85th Percentile

95th Percentile

Watershed Management Zones

1 2 3 4 4* 5 6 7 7* 8 9 10

PUBLIC WORKS
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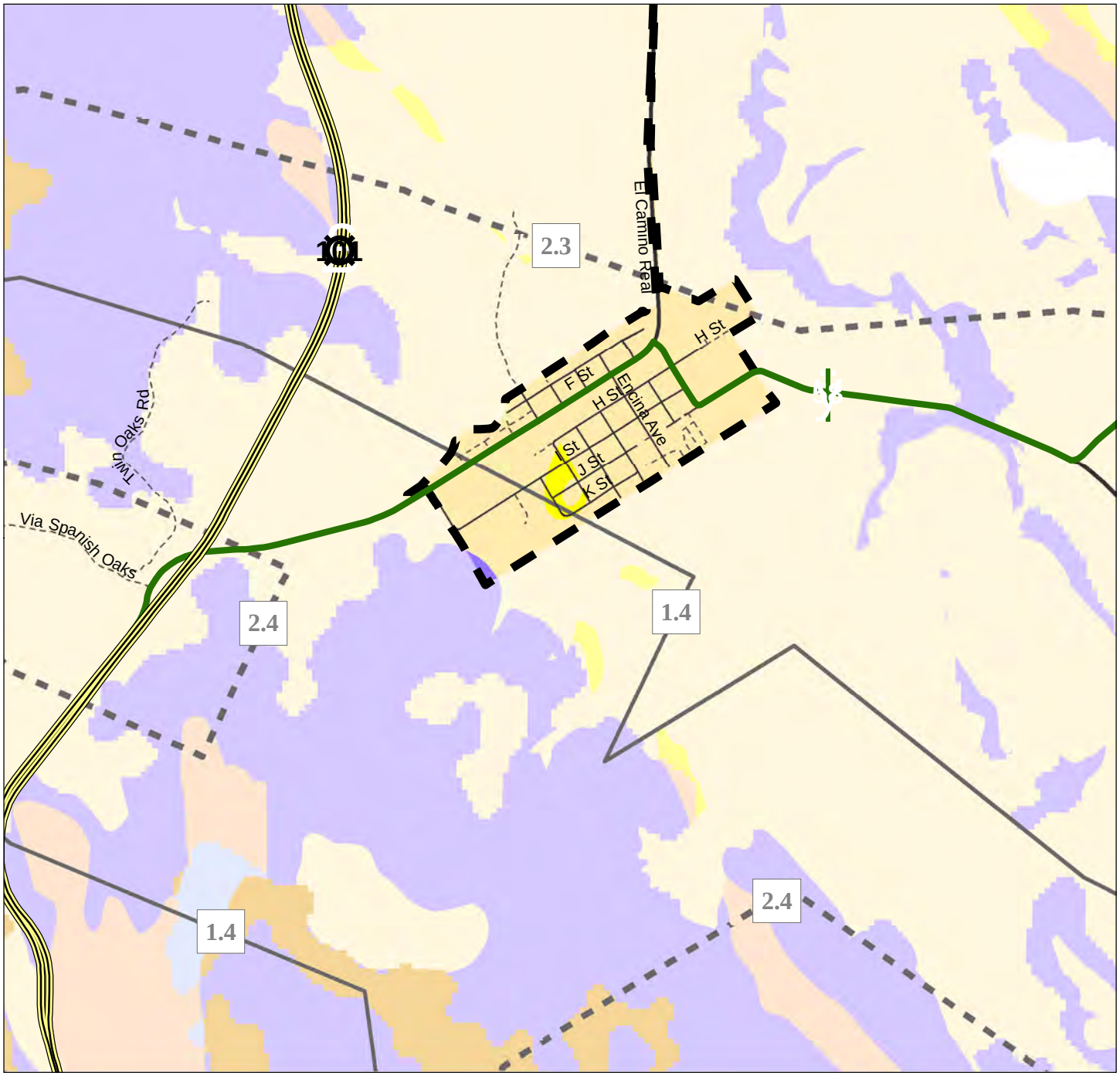
SAN LUIS OBISPO COUNTY

National Pollution Discharge Elimination System (NPDES)
San Luis Obispo County
Coverage Areas - **Santa Margarita**



Source: San Luis Obispo County, 2010 Census, Stillwater Sciences, PRISM Climate Group, and Oregon State University. Map created January 2014

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Coverage Areas

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85th Percentile

95th Percentile

Watershed Management Zones

1 2 3 4 4* 5 6 7 7* 8 9 10

PUBLIC WORKS
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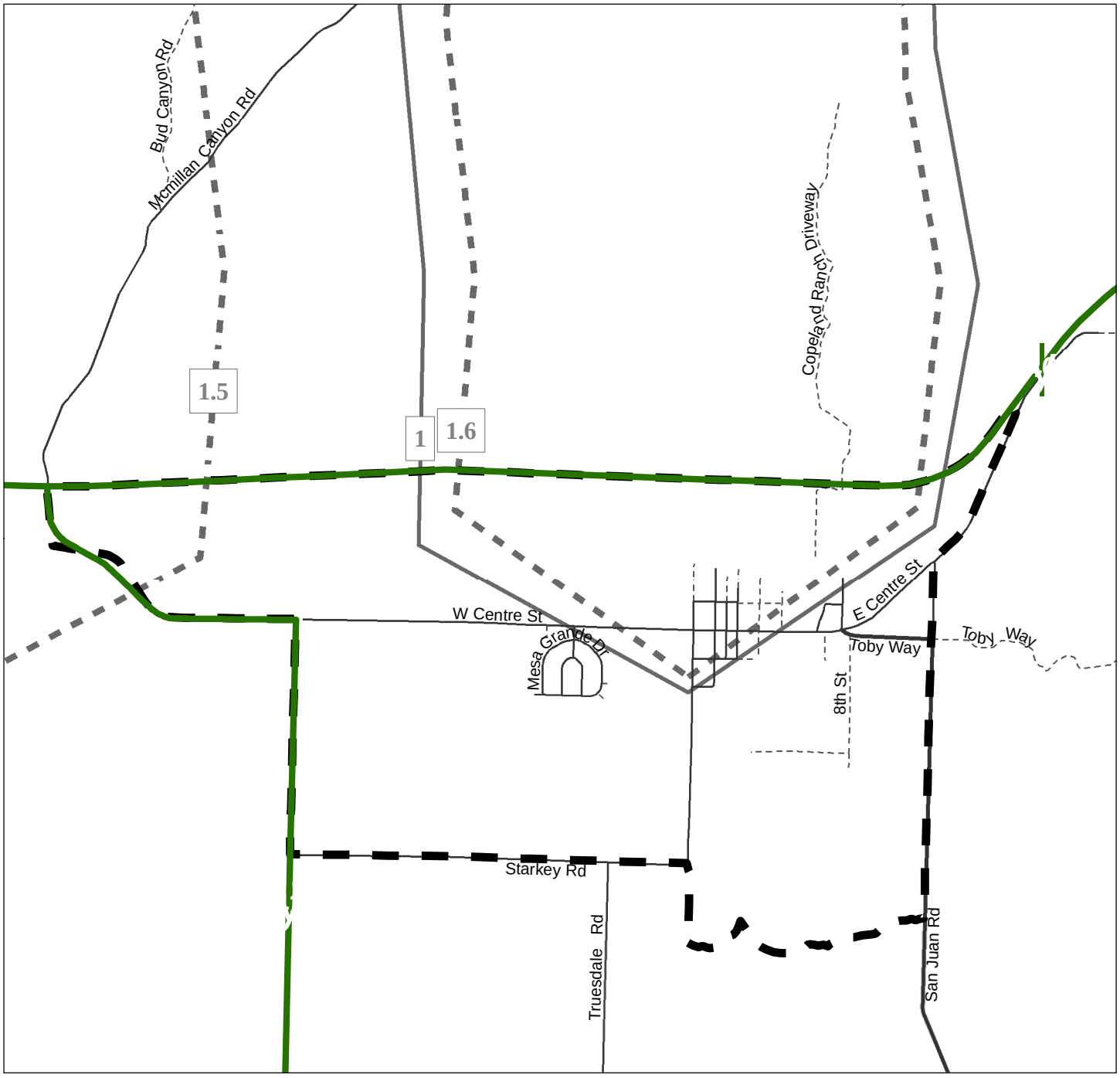
SAN LUIS OBISPO COUNTY

National Pollution Discharge Elimination System (NPDES)
San Luis Obispo County
Coverage Areas - **Shandon**



Source: San Luis Obispo County, 2010 Census, Stillwater Sciences, PRISM Climate Group, and Oregon State University. Map created January 2014

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PUBLIC WORKS
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Isohyetal 24 Hour Rainfall (in.)

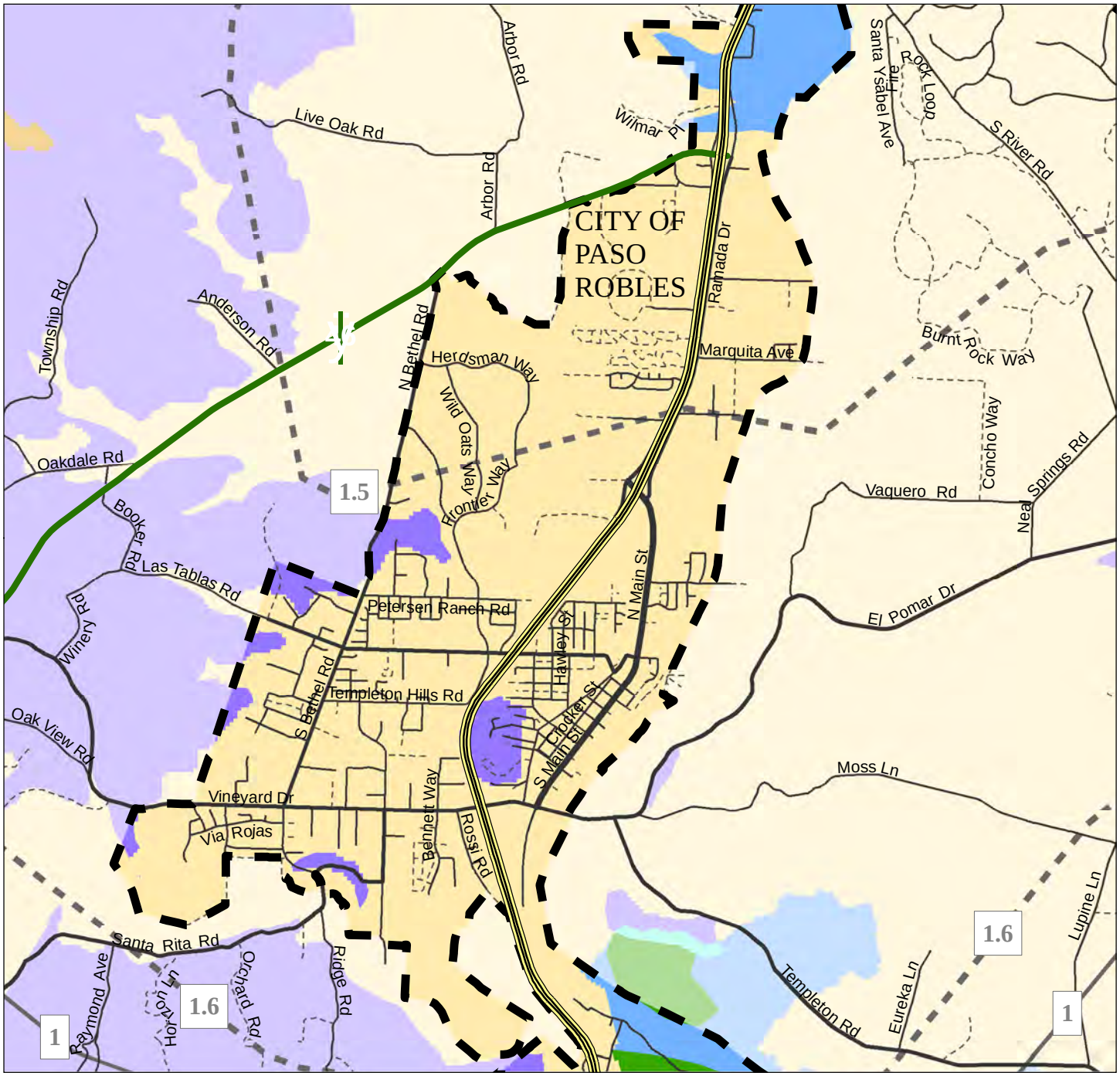
85th Percentile

95th Percentile

Watershed Management Zones

1 2 3 4 4* 5 6 7 7* 8 9 10

National Pollution Discharge Elimination System (NPDES)
San Luis Obispo County
Coverage Areas - **Templeton**



Source: San Luis Obispo County, 2010 Census, Stillwater Sciences, PRISM Climate Group, and Oregon State University. Map created January 2014

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PUBLIC WORKS
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Coverage Areas

Isohyetal 24 Hour Rainfall (in.)

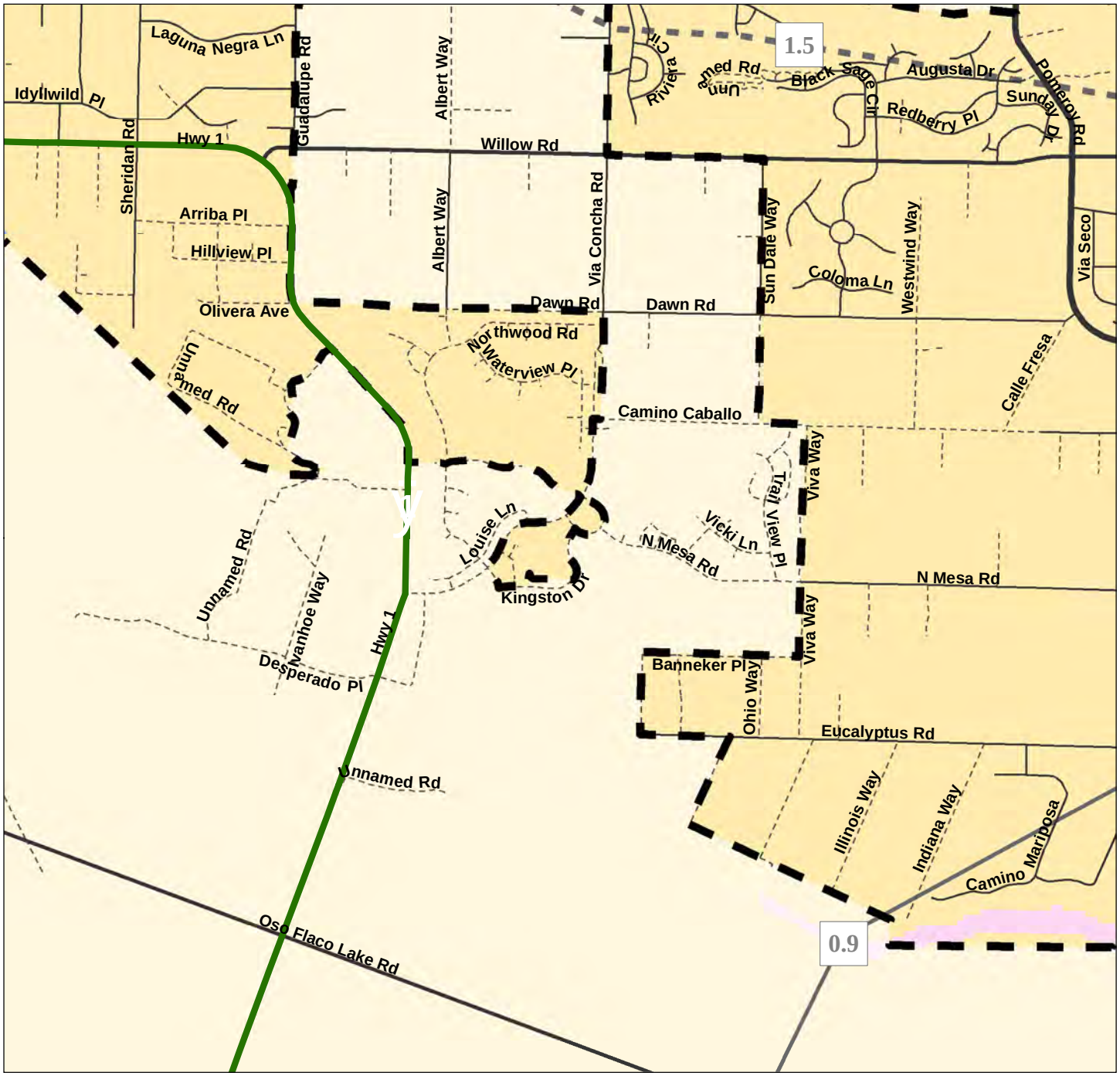
85th Percentile

95th Percentile

Watershed Management Zones

1 2 3 4 4* 5 6 7 7* 8 9 10

National Pollution Discharge Elimination System (NPDES)
San Luis Obispo County
Coverage Areas - **Woodlands**



Source: San Luis Obispo County, 2010 Census, Stillwater Sciences, PRISM Climate Group, and Oregon State University. Map created January 2014

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Miles

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PUBLIC WORKS
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SAN LUIS OBISPO COUNTY

Coverage Areas

Isohyetal 24 Hour Rainfall (in.)

85th Percentile

95th Percentile

Watershed Management Zones

1 2 3 4 4* 5 6 7 7* 8 9 10

Appendix B -

Stormwater Control Plan (SWCP) Application, Checklists, & Forms

STORMWATER CONTROL PLAN
APPLICATION AND COVERSHEET

PLANNING & BUILDING DEPARTMENT • COUNTY OF SAN LUIS OBISPO
976 OSOS STREET • ROOM 200 • SAN LUIS OBISPO • CALIFORNIA 93408 • (805) 781-5600

1) APPLICANT INFORMATION

Applicant Name: _____ Daytime Phone: _____

Mailing Address: _____ Zip Code: _____

Email Address: _____

2) PROJECT INFORMATION

❑ **PRELIMINARY** – Subdivision or Land Use Permit ❑ **FINAL** – Construction Permit

Permit Number: _____

Property APN: _____

FOR ITEMS # 3, 4, and 5 – Please Refer to Chapter 3 of the PCR Handbook

3) IMPERVIOUS SURFACE VALUES – *Refer to the Glossary or Appendix C in the PCR Handbook*

Pre-Project (sqft)

Impervious Area: _____ Total Project Area: _____

Post-Project (sqft)

Total Impervious Area: _____ Pervious Area: _____

New Imp. Surface: _____ *Removed Imp. Surface:* _____

Replaced Imp. Surface: _____

Total Site Disturbance _____

4) REVIEW FOR EXEMPTION – *Refer to Figure 3-2 in the PCR Handbook*

❑ **SWCP REQUIRED** – The project is located in a Stormwater Management (MS4) Area and involves at least 2,500 square feet of impervious surface area.

❑ **SWCP EXEMPT** – The project is exempt from a Stormwater Control Plan for the following reason:

□ **Outside of MS4.** The project is not located in a Stormwater Management Area.

□ **Less than 2,500 square feet.** The project creates or replaces less than 2,500 square feet of impervious area.

□ **Previous land use approval.** The project has received land use approval prior to March 6, 2014. Project Number: _____

5) PERFORMANCE REQUIREMENTS

Check the applicable performance requirements and identify whether the project meets the requirement:

❑ **Exempt from SWCP**			
❑ **#1 – Site Design**	Performance Requirement Met?	❑ YES	❑ NO
❑ **#2 – Water Quality Treatment**	Performance Requirement Met?	❑ YES	❑ NO
❑ **#3 – Runoff Retention**	Performance Requirement Met?	❑ YES	❑ NO
❑ **#4 – Peak Management**	Performance Requirement Met?	❑ YES	❑ NO

Are structural stormwater control measures proposed? ❑ YES ❑ NO

6) DESIGN CRITERIA – *Refer to PCR Handbook, Appendix A*

❑ Exempt from SWCP

Watershed Management Zone # _____

Applicable Rainfall Event (percentile): _____

24-hour Rainfall Isohyetal Line (in): _____

7) CERTIFICATION

❑ **Exempt.** This project is exempt from submitting a SWCP.

❑ **Full Compliance.** This project fully complies with all applicable Performance Requirements.

❑ **Alternative Compliance.** This project is unable to fully comply with all applicable Performance Requirements. As such, the applicant is requesting to use methods of alternative compliance.

Reason for non-compliance: _____

_____

Method for alternative compliance: _____

_____

This SWCP was prepared by a Registered Civil Engineer: ❑ YES ❑ NO

Engineer Name _____ License No. _____

I have completed this form accurately and declare that all statements here are true.

Preparer signature_____ Date_____

Preparer's name (if other than the Engineer listed above) _____

STORMWATER SITE DESIGN ANALYSIS

San Luis Obispo County Department of Planning and Building File No _____

SITE DESCRIPTION

Is the project site within the Central Business District?	❑ YES	❑ NO
Was the project site previously developed?	❑ YES	❑ NO
Is the project site surrounded on all sides by development?	❑ YES	❑ NO

SITE DESIGN

For each of the following, please describe how this project has complied to the *maximum extent practicable* with the following site design and runoff reduction strategies (attach additional pages if needed):

1. Limit disturbance of creeks and natural drainage features.

_____

_____

_____

2. Minimize compaction of highly permeable soils.

_____

_____

_____

3. Limit clearing and grading of native vegetation at the site to the minimum area needed to build the project, allow access, and provide fire protection.

_____

_____

_____

4. Minimize impervious surfaces by concentrating improvements on the least-sensitive portions of the site, while leaving the remaining land in a natural, undisturbed state.

_____

_____

_____

Measures Homeowners Can Take to Reduce Stormwater Impacts

Everyone is strongly encouraged to reduce stormwater impacts associated with development and redevelopment by taking these actions:

- ☐ Protect soils from compaction that will ultimately be used in planted areas
- ☐ Amend soils designated to be used as planted areas
- ☐ Sumped planted areas are preferred over mounded planting areas to better retain irrigation and rain water.
- ☐ Direct driveway runoff and runoff from roof downspouts at least 10-feet away from foundations and towards planting beds and lawns where water can safely soak into the ground. Plant rain gardens.
- ☐ Protect existing trees from construction impacts by placing safety fence around the root zone of the tree (minimally the shadow of the tree canopy at high noon) and/or plant new trees
- ☐ Use permeable pavers for walkways, driveway and patios instead of concrete
- ☐ Through minor grading, encourage water retention on site (but away from foundations)
- ☐ Install rain cisterns and/or rain barrels to capture and re-use roof rain water

Stormwater Control Plan (SWCP) Checklist

Report

- ☐ Stormwater Control Plan (SWCP) Application (**Appendix B-5 to B-13**)
- ☐ Stormwater Site Design Analysis (**Appendix B-3**)
- ☐ SWCP Completed according to SWCP Template in **Appendix G.**

Attachments

- ☐ Support Calculations
- ☐ Completed checklists (**Appendix B-5 to B-13)** for SWCP and each applicable Performance Requirement or Alternative Compliance, as appropriate.
- ☐ Site Stormwater Assessment Exhibit.
  - Site map with (existing and proposed) topographic information
  - Delineation of sensitive areas, native vegetation and soils types. (Can be provided on multiple exhibits to supplement design strategy narrative)

For projects subject to PR 2, 3, and/or 4:

- ☐ Drainage Management Area (DMA) Exhibit.
  - Uniquely identify each DMA and indicate if the DMA is self-retaining (zero discharge), self-treating, or draining to a treatment/flow control facility.
  - Include location of all infiltration, treatment, or flow-control facilities, their tributary area and basis for sizing (rational C, NRCS CN value, Tc, etc)
  - Potential pollutant source areas (if applicable), including loading docks, food service areas, refuse areas, outdoor processes and storage, vehicle cleaning, repair or maintenance, fuel dispensing, equipment washing, etc.
  - Plan Set with Construction Details for drainage related items (as appropriate)
- ☐ Operation and Maintenance Documentation (if applicable) (**Appendix B-18**)
  - Constructive Notification
  - EXHIBIT A – Post Construction Stormwater Management System Operations & Maintenance Plan
    - PART 1 – General Information and Specifications
    - PART 2 – Drawings & Photos
    - PART 3 – Certification and Approval
  - EXHIBIT B – Post Construction Stormwater Management System Operations & Maintenance Checklist

Performance Requirement 1: Site Design and Runoff Reduction SWCP Checklist				
DESIGN STRATEGY (HANDBOOK LOCATION)			MEANS OF DEMONSTRATING COMPLIANCE	
*Please complete the **Stormwater Site Design Analysis** form providing a narrative description of how the project incorporates all of the following design strategies.*				
1.	Limit disturbance of creeks and natural drainage features. (4.2.1)		Pre and post drainage feature map. Delineate natural drainage features on Site Stormwater Assessment Exhibit and DMA Exhibit, as applicable.	
2.	Minimize compaction of highly permeable soils. (4.2.2)		Site Stormwater Assessment Exhibit of soil types, overlain with development footprint	
3.	Limit clearing and grading of native vegetation at the site to the minimum area needed to build the project, allow access, and provide fire protection. (4.2.3)		Site Stormwater Assessment Exhibit with native vegetation, overlain with development footprint	
4.	Minimize impervious surfaces by concentrating improvements on the least-sensitive portions of the site, while leaving the remaining land in a natural undisturbed state. (4.2.4)		Site Stormwater Assessment Exhibit with delineated sensitive areas overlain with development footprint	
MINIMIZE STORMWATER RUNOFF BY IMPLEMENTING ONE OR MORE OF THE FOLLOWING DESIGN MEASURES:				
5.	MANDATORY SITE DESIGN MEASURES (SELECT AT LEAST ONE)		Selected	Reason, for not selecting
	a.	Roof runoff directed into cisterns or rain barrels for reuse? (5.2.1)		
	b.	Roof runoff directed into vegetated areas (safely away from building foundations and footings)? (5.2.2)		
	c.	Runoff from sidewalks, walkaways, and/or patios directed onto vegetated areas (safely away from the building foundations and footings)? (5.2.3)		
	d.	Runoff from driveways and/or uncovered parking lots onto vegetated areas (safely away from the building foundations and footings)? (5.2.4)		
	e.	Are bike lanes, driveways, uncovered parking lots, sidewalks, walkways, and patios constructed with permeable surfaces? (5.2.5)		

This checklist must be included with every SWCP (except for projects deemed EXEMPT). See Figure 3-2 of Chapter 3 to determine if your project is considered exempt, or regulated.

Performance Requirement 2: Water Quality Treatment SWCP Checklist

Project Level Documentation, identify

☐ Project Net Impervious Area

☐ Certification that on-site water quality treatment measures have been met on site, or if not achievable:
- Documentation of the volume of runoff for which compliance cannot be achieved on site and the associated off-site compliance requirements
- Statement of intent to comply with Water Quality Treatment Performance Requirement through Alternative Compliance

For each Drainage Management Area, provide:

☐ Unique DMA Number, area, and likely pollutant(s) of concern

☐ Water Quality Treatment Approach
N/A if self-treating, or,
Through the use of LID, Biofiltration or Non-retention Based Treatment System)

☐ Supporting calculations demonstrating compliance with Treatment Performance Requirement

☐ Plan sheet page and detail number (if appropriate) of Drainage Management Areas (DMA) Exhibit where construction details are provided for each DMA.

For DMAs using Low Impact Development Treatment Systems, provide:

☐ 85th percentile 24-hour storm event value, and basis of determination

For DMAs using Biofiltration Systems, provide:

☐ Statement indicating why an LID treatment system was not appropriate

☐ Surface loading rate approach, and basis of determination
(0.2 x per hour intensity, or 2 x 85th percentile hourly rainfall intensity)

☐ Calculations to demonstrate that the minimum surface reservoir volume is equal to the biofiltration treatment system surface area time a depth of 6-inches

☐ Construction detail (or reference to page on plans) which provides:
- Minimum planting depth
- Planting medium specifications. Either:
  - Specify 60 to 70% ASTM C33 sand, with 30-40% compost , or
  - Provide testing documentation demonstrating planting medium specified can minimally infiltrate at a rate of 5 inches per hour)
- Plant selection consistent with Appendix L
- Subsurface drainage/storage (gravel) layer with an area equal to the biofiltration treatment system surface area and having a minimum depth of 12 inches;
- Underdrain with discharge elevation at top of gravel layer;
- No compaction of soils beneath the biofiltration facility (ripping/loosening of soils required if compacted)
- No liners or other barriers interfering with infiltration, except for situations where lateral infiltration is not technically feasible.

For **DMAs using Non-Retention Based Treatment Systems**, provide:

☐ Statement indicating why an LID, or Biofiltration treatment system was not appropriate

☐ Hydraulic Sizing Criteria used, and basis of determination
(Volume = to 85th percentile, 24-hour storm, or flow basis (2 x 85th percentile hourly rainfall intensity or 0.2 x inches per hour intensity)

Performance Requirement 3: Runoff Retention SWCP Checklist

SITE ASSESSMENT MEASURES: (see table 3.5)
Include an exhibit and narrative of the opportunities and constraints to implementing LID Stormwater Control measures based on the following items (as applicable):

☐ Site topography	☐ Run-on characteristics (source and estimated runoff from offsite which discharges to the project area)
☐ Hydrologic features including contiguous natural areas, wetlands, watercourses, seeps, or springs	☐ Existing drainage infrastructure for the site and nearby areas, including the location of municipal storm drains
☐ Depth to seasonal high groundwater	☐ Structures, including retaining walls
☐ Locations of groundwater wells used for drinking water	☐ Utilities
☐ Depth to an impervious layer such as bedrock	☐ Easements
☐ Presence of unique geology (e.g., karst)	☐ Covenants
☐ Geotechnical hazards	☐ Zoning/Land Use
☐ Documented soil and/or groundwater contamination	☐ Setbacks
☐ Soil types and hydrologic soil groups	☐ Open space requirements
☐ Vegetative cover/trees	☐ Other pertinent overlay(s)

SITE DESIGN MEASURES
Include in narrative, and provide supporting exhibits as necessary, to demonstrate that the project design has implemented the following design strategies (as applicable)

	DESIGN STRATEGY	MEANS OF DEMONSTRATING COMPLIANCE
1.	Define the development envelope and protected areas, identifying areas that are most suitable for development and areas to be left undisturbed.	Site Stormwater Assessment Exhibit.
2.	Conserve natural areas, including existing trees, other vegetation, and soils	Site Stormwater Assessment Exhibit with native vegetation, overlain with development footprint
3.	Limit the overall impervious footprint of the project	Discussion regarding other building configurations considered (and ultimately rejected)
4.	Construct streets, sidewalks, or parking lot aisles to the minimum widths necessary, provided that public safety or mobility uses are not compromised	Discussion on minimum allowable widths, and rationale for using larger values (if applicable) or confirmation that minimum values were used (where applicable).
5	Set back development from creeks, wetlands, and riparian habitats	Discussion on set-back dimensions chosen.
6	Conform the site layout along natural landforms	Within the Drainage Management Area (DMA) Exhibit, show Topo survey with existing and planned contours cut and fill lines. Discussion of grading approach.
7	Avoid excessive grading and disturbance of vegetation and soils	Exhibit with native vegetation, overlain with planned disturbed area limits.

Performance Requirement 3: Runoff Retention SWCP Checklist Continued

STORMWATER STRUCTURAL CONTROL MEASURE SIZING

For Overall project,

☐ Certification statement indicating that the selection, sizing, and design of Stormwater Control measures meets the applicable Water Quality Treatment and Runoff Retention Performance Requirements, or, if not achievable

- Provide documentation of the volume of runoff for which compliance cannot be achieved on-site and the associated off-site compliance volume
- Statement of intent to comply with Water Quality Treatment and Runoff Retention Performance Requirements through an Alternative Compliance Agreement

☐ Documentation demonstrating percentage of the project's Equivalent Impervious Surface Area dedicated to retention-based Stormwater Control Measures

For each DMA,

☐ Indicate sizing strategy used

- Hydrologic analysis and sizing methods as outline in **Attachment C**
- Locally/regionally calibrated continuous simulation model that results in equivalent optimization of on-site runoff retention volumes
- Hydrologic analysis and sizing methods, equally effective in optimizing on-site retention volumes of the runoff generated by the rainfall events specified in **Table 3-3**

☐ Provide supporting calculations demonstrating compliance with Runoff Retention Performance Requirement

☐ Indicate if a ten percent adjustment (based on technical infeasibility) is included in design approach (see **Appendix D**)

☐ Indicate if off-site mitigation is included in design approach (see **Appendix D**)

Performance Requirement 4: Peak Management SWCP Checklist
Project Level Documentation, identify ☐ Point source discharge locations ☐ Hydraulic Report demonstrating that post development storm water runoff peak flows discharged from the site do not exceed pre-project peak flows for the 2- through 10-yer storm events) ☐ Certification that on-site water quality treatment measures have been met on site, or if not achievable: o Documentation of the volume of runoff for which compliance cannot be achieved on site and the associated off-site compliance requirements o Statement of intent to comply with Water Quality Treatment Performance Requirement through Alternative Compliance

Performance Requirement 5: Special Circumstances SWCP Checklist

Project Level Documentation, identify

☐ Which types of Special Circumstances apply

☐ Which Watershed Management Zones (WMZ) the project is located in

☐ Identification if the project is located atop of a designated Groundwater Basin

☐ Proposed Performance Requirement modifications based on special circumstances

- Peak Management
- Runoff Retention

For **highly altered channels**,

☐ Vicinity map indicating channel location relative to project, and downstream receiving waters

☐ Narrative, and supporting calculations (as applicable) regarding anticipated impacts to downstream waters

For **intermediate flow control facilities**,

☐ Vicinity map indicating location of intermediate flow control facilities relative to project, and downstream receiving waters

☐ Quantification of pre-project tributary area to intermediate flow control facility performance

☐ Quantification of proposed post-project tributary area to intermediate flow control facility performance

☐ Summarize flow control performance data (pre and post) and include supporting performance information based on numeric, hydraulic modeling, including flow volumes, durations and velocities

☐ Narrative, and supporting calculations (as applicable) regarding anticipated impacts to downstream waters

The County must obtain approval from the Water Board prior to authorizing the use of a **Historic Lake and Wetlands Special Circumstance.** Your SWCP must include;

☐ Vicinity map delineating location of historic lake and/or wetlands relative to project

☐ Supporting technical information to substantiate the request

☐ Narrative, and supporting calculations (as applicable) regarding anticipated impacts to downstream waters

☐ Stamped submittal (by registered professional engineer, geologist, architect, and/or landscape architect)

Alternate (Off-Site) Compliance SWCP Checklist

The County will *only* consider alternative compliance for projects that:

- cannot retain the full runoff retention volume required, can demonstrate technical infeasibility for full retention AND are unable to dedicate 10% of the project's equivalent impervious surface area for retention purposes (see **Appendix D**).
- are within a Urban Sustainability Area (USA)
- are subject to a RWCQB approved Regional Stormwater Plan

Projects approved for alternative compliance must identify and secure rights to use an alternative site. Potential off-site compliance alternative projects might include green streets retrofits, off-site drainage features, riparian habitat restoration projects, etc. The off-site compliance alternative project must be located within the same watershed as the project.

It is recommended that discussions with County staff begin early in the development process regarding the acceptability of an off-site compliance alternative project.

Project Level Documentation, identify

☐ Indication of site conditions which are resulting in LID technical infeasibility

- Depth to seasonable high groundwater limits infiltration and/or prevents construction of subgrade stormwater control measures
- Depth to an impervious layer such as bedrock limits infiltration
- Sites where soil types significantly limit infiltration
- Sites where pollutant mobilization in the soil or groundwater is a documented concern
- Space constraints (e.g., infill projects, some redevelopment projects, high density development)
- Geotechnical hazards
- Stormwater Control Measures located within 100 feet of a groundwater well used for drinking water
- Incompatibility with surrounding drainage system (e.g., project drains to an existing stormwater collection system whose elevation or location precludes connection to a properly functioning treatment or flow control facility)

☐ Indication of site conditions which are resulting in Bioretention technical infeasibility

- Biofiltration is not compatible with surrounding drainage system
- Location available for biofiltration facility is in an area with identified erosion or landslide hazards
- Location available for biofiltration facility is on a slope equal to or in excess of 8 percent
- Location available for biofiltration facility is within 50-feet from the projected top of the slope (using projected angle of repose) that is great than 20%
- Areas where runoff potentially contains industrial wastes
- Areas where there is a higher risk of concentrated spills (such as gas stations, truck stops)

☐ Site-specific hydrologic and/or design analysis conducted and endorsed by a registered professional engineer, geologist, architect, and/or landscape architect, demonstrating that compliance with the applicable numeric Post-Construction Stormwater Management requirements is technically infeasible.

Alternate (Off-Site) Compliance SWCP Checklist
☐ Schedule for completion of offsite project with milestone dates to identify funding, design, and construction of the off-site project(s)

Guidance in Preparation of the Stormwater Control Plan (SWCP) Application

Application Submittal

- *Complete the application using 'Chapter 3: Preparing Permit Applications' as a guide.*
- *Refer to Figure 3-2 (Appendix B-16) for a flow chart. The worksheet below is based upon this flow chart.*
- *Use "n/a" where information requested is not applicable. If you are unsure regarding how to fill out any of the information, please come in and request assistance from a staff person.*
- *Utilize the Quick Reference SWCP Requirements Guide included as part of this application*
- *Exempt Projects only require the application coversheet (Pages 1 and 2 or Appendix B-1 and B-2) to be completed and returned with your project submittals.*
- *Non-Exempt Projects require the application, the stormwater site design analysis worksheet, and a SWCP (Appendix G).*
- *See the SWCP Checklist (starting on Appendix B-5) for the necessary documents to be included in the SWCP.*

The following worksheet is based on the decision points shown in Figure 3-2. Use this worksheet when designing your project. The information in this worksheet will help you complete the SWCP Application.

Applicable Performance Requirements (Refer to **Figure 3-2** and **pages 3-3 thru 3-12**)

Does the project fall under a category in Table 3-1 or Table 3-2?

☐ YES ☐ NO

If YES, the project is EXEMPT. Fill out the SWCP Application and mark that the project is exempt. No SWCP is required.

If NO, continue to B.

Does the project create or replace less than 2,500 square feet of impervious surface?

Determine Net Impervious Area

New + Replaced Impervious Area: _____ sqft -

Reduction in Impervious Area (pre to post) _____ sqft

= Net Impervious Area _____ sqft

☐ YES ☐ NO

If YES, the project is EXEMPT. Fill out the SWCP Application and mark that the project is exempt. No SWCP is required.

If NO, continue to C.

Is the project a detached single family residence?

☐ YES ☐ NO

If YES, continue to D1, if NO, continue to E.

Does the project create or replace less than 5,000 SF of net impervious area?

☐ YES ☐ NO

If YES, **PR No. 1** applicable to project. SWCP required. If NO, continue to F.

Does the project create or replace less than 15,000 SF of net impervious area?

☐ YES ☐ NO

If project is a single family residence and YES, **PR No. 1** applicable. SWCP required. If project is not a single family residence and YES, **PR Nos. 1 & 2** are applicable. SWCP required.

If NO, D1 to continue to D2 and F to continue to G.

Does the project create or replace less than 22,500 square feet of net impervious area?

☐ YES ☐ NO

If project is a single family residence and YES, **PR No. 1, 2 and 3*** are applicable. SWCP required.

If NO, **PR Nos. 1**, **2, 3* and 4** are applicable. (*PR 3 Exemptions may apply – see Table 3-3). SWCP required.

Does the project fall under any special circumstances?

☐ YES ☐ NO

If YES, Which of these special circumstances apply:

☐ Highly Altered Channel

☐ Intermediate Flow Control Facilities

☐ Historic Lake or Wetland

If YES, **PR No. 1, 2 and 5** are applicable to project. SWCP required.

If NO, continue to H1 and H2.

Determine the Watershed Management Zone (Appendix A) and Rainfall Event:

Property is in WMZ # _____

Rainfall Event _____ in.

Any exemptions per Table 3-3? _____

Continue to H3.

Does the project create or replace greater than 22,500 square feet of new and replaced impervious area?

☐ YES ☐ NO

If YES, **PR Nos. 1**, **2, 3* and 4** are applicable. SWCP required.

If NO, **PR Nos. 1**, **2, 3*** are applicable. (*PR 3 Exemptions may apply – see Table 3-3). SWCP required.

Figure 3-2. Which Performance Requirements Apply?

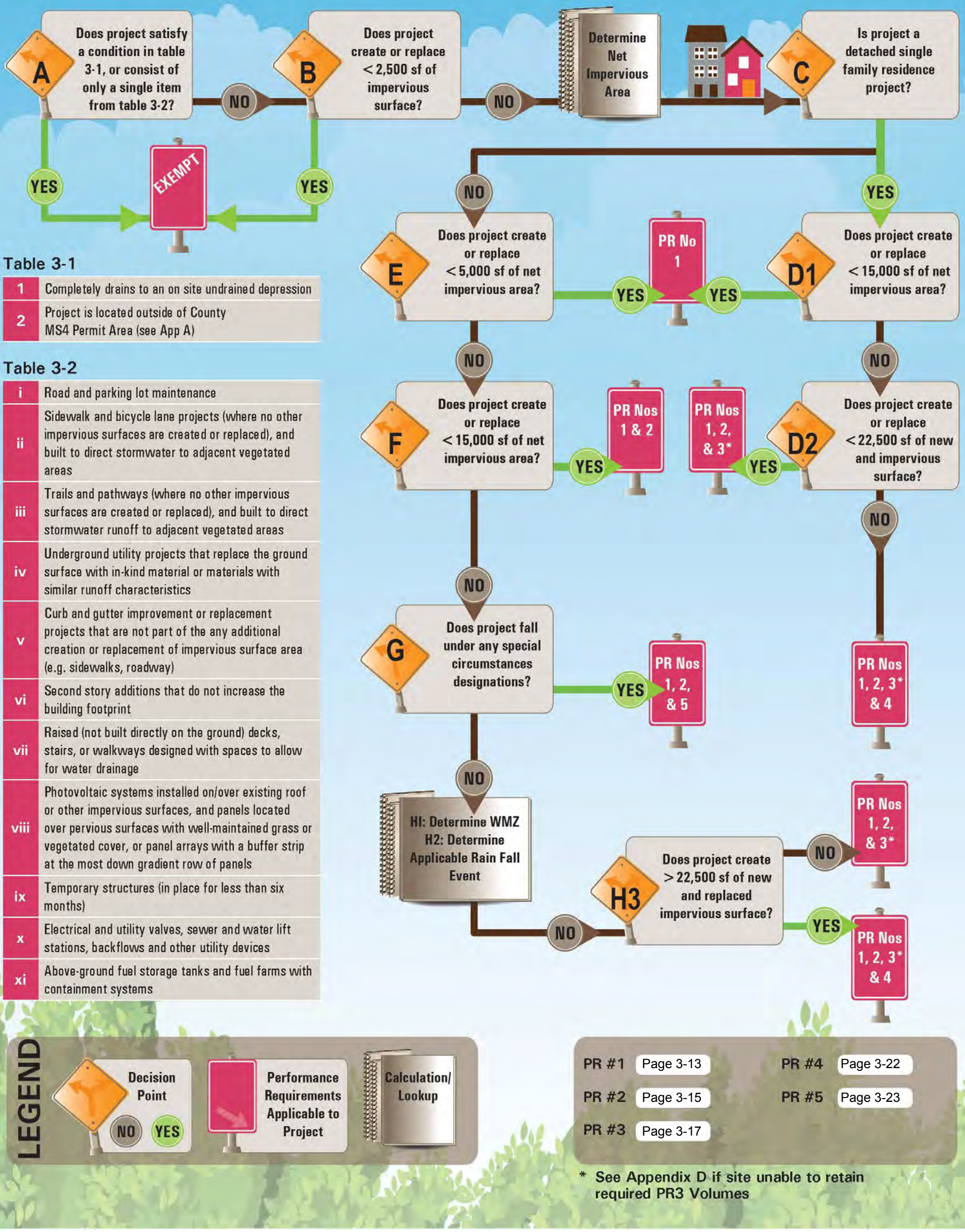


Table 3-1

1	Completely drains to an on site undrained depression
2	Project is located outside of County MS4 Permit Area (see App A)

Table 3-2

i	Road and parking lot maintenance
ii	Sidewalk and bicycle lane projects (where no other impervious surfaces are created or replaced), and built to direct stormwater to adjacent vegetated areas
iii	Trails and pathways (where no other impervious surfaces are created or replaced), and built to direct stormwater runoff to adjacent vegetated areas
iv	Underground utility projects that replace the ground surface with in-kind material or materials with similar runoff characteristics
v	Curb and gutter improvement or replacement projects that are not part of the any additional creation or replacement of impervious surface area (e.g. sidewalks, roadway)
vi	Second story additions that do not increase the building footprint
vii	Raised (not built directly on the ground) decks, stairs, or walkways designed with spaces to allow for water drainage
viii	Photovoltaic systems installed on/over existing roof or other impervious surfaces, and panels located over pervious surfaces with well-maintained grass or vegetated cover, or panel arrays with a buffer strip at the most down gradient row of panels
ix	Temporary structures (in place for less than six months)
x	Electrical and utility valves, sewer and water lift stations, backflows and other utility devices
xi	Above-ground fuel storage tanks and fuel farms with containment systems

Quick Reference for SWCP Requirements

	EXEMPT	PR No 1	PR Nos 1 & 2	PR Nos 1, 2, & 3*	PR Nos 1, 2, & 5	PR Nos 1, 2, 3*, & 4
Description	Projects that involve minimal impervious surfaces or are outside of an urbanized area.	Projects with less than 5,000 SF of impervious surface. Single family residences with less than 15,000 SF of impervious surface.	Projects with between 5,000 and 15,000 SF of impervious surfaces (except single family residences)	Projects with between 15,000 and 22,500 SF of impervious surfaces.	Projects with special circumstances.	Projects with 22,500 SF or more of impervious surface.
Prepare a SWCP? (Appendix G)	No, SWCP Application Only	Yes	Yes	Yes	Yes	Yes
Sizing Calculations Needed?	No	No	Yes	Yes	Yes	Yes
Retention Needed?	Maybe	Maybe	Maybe	Yes	Maybe	Yes
Structural Stormwater Measures?	No	Maybe	Maybe	Yes	Maybe	Yes
Annual Reporting? (O&M Agreements)	No	No	Yes	Yes	Yes	Yes

(Stormwater Control Plan Applications are required for all project submittals)
* See **Table 3-3** of Handbook to determine if PR 3 requirements apply.

Appendix C -

Sizing Methods

Hydrologic Analysis and Stormwater Control Measure Sizing Guidance

Project site conditions will influence the ability to comply with the Water Quality Treatment and Runoff Retention Performance Requirements. This Appendix provides the acceptable hydrologic analysis and Stormwater Control Measure (SCM) sizing methodology to evaluate runoff characteristics. This guidance provides an event-based hydrologic analysis approach. Calculations are conservative to acknowledge the limitations of event-based approaches. Using an event-based approach avoids the necessity of using calibrated, continuous simulation modeling. The project applicant may use a locally/regionally calibrated continuous simulation-based model to improve hydrologic analysis and SCM sizing.

1) Determination of Retention Tributary Area

Determining the Retention Tributary Area is the basis for calculating the runoff volumes subject to Performance Requirement Number 3. Retention Tributary Area should be calculated for each individual Drainage Management Area (DMA) to facilitate the design of SCMs for each DMA. The generic equation below illustrates how various portions of the site are addressed when determining the Retention Tributary Area. The Retention Tributary Area calculation must also account for the adjustments for Redevelopment Projects subject to Performance Requirement No. 3.

a) Compute the Retention Tributary Area, using the equation:

Retention Tributary Area = (Entire Project Area) – (Undisturbed or Planted Areas) – (Impervious Surface Areas that Discharge to Infiltrating Areas)***

* As defined in Section B.4.d.iv.1.

** As defined in Section B.4.d.iv.2.

b) Adjustments for Redevelopment Project Retention Tributary Area – Where the Project includes replaced impervious surface, the following Retention Tributary Area adjustments apply:

i) Redevelopment Projects outside an approved Urban Sustainability Area, as described in the Alternative Compliance section – The total amount of replaced impervious surface area shall be multiplied by 0.5 when calculating the Tributary Area.

ii) Redevelopment Projects located within an approved Urban Sustainability Area – The replaced impervious surface areas may be subtracted from the Retention Tributary Area. The total amount of runoff volume to be retained from replaced impervious surfaces shall be equivalent to the pre-project runoff volume retained.

2) Determination of Retention Volume

a) Based on the Regulated Project's Watershed Management Zone, determine the Regulated Project's Runoff Retention Requirement (e.g., Retain 95th Percentile 24-hour Rainfall Event, or, Retain 85th Percentile 24-hour Rainfall Event). See **Appendix A** for rainfall depth.

b) Determine the 85th or 95th percentile 24-hour rainfall event:
Use either the methodology provided in Part I.D of the December 2009 Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of

the Energy Independence and Security Act,[1] or, rainfall statistics provided by the Central Coast Water Board, whichever produces a more accurate value for rainfall depth.

c) Compute the Runoff Coefficient[2] "C" for the area tributary to the SCMs, using the equation:
$C = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$ (As alternative a weighted "C" per H-3, H-3a of County Standards may be used)

Where "i" is the fraction of the tributary area that is impervious[3]

d) Compute Retention Volume:

Retention Volume for 95th Percentile 24-hr Rainfall Depth = C x Rainfall $Depth_{95th}$ x Tributary Area

Retention Volume for 85th Percentile 24-hr Rainfall Depth = C x Rainfall $Depth_{85th}$ x Tributary Area

All rainfall directly incident to each SCM must be considered in determining runoff, including: tributary landscaping, impervious areas, pervious pavements, and bioretention features.

e) Calculate SCM Capture Volume:
Calculate the required SCM Capture Volume associated with the Regulated Project's Runoff Retention Requirement by one of the following methods:

Method 1: Simple Method

SCM Capture Volume = Retention Volume for 95th Percentile 24-hr Rainfall Depth

or,

SCM Capture Volume = Retention Volume for 85th Percentile 24-hr Rainfall Depth

Method 2: Routing Method

Use a hydrograph analysis[4] to determine the SCM Capture Volume needed to retain the Retention Volume for 95th or 85th Percentile 24-hr Rainfall Depth calculated in 2 (above). The SCM Capture Volume shall be based on both the rate of flow from tributary areas into the SCM, and the rate of flow out of the SCM through infiltration into the underlying soil during the rain event. When conducting the hydrograph analysis, adhere to the criteria included in Table 1. The SCM shall be designed such that a single 95th or 85th Percentile 24-hr Rainfall Event will not overflow the SCM.

[1] USEPA, 841-B-09-00. http://www.epa.gov/owow/NPS/lid/section438/pdf/final_sec438_eisa.pdf
[2] As set forth in WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998), pages 175-178 and based on the translation of rainfall to runoff using a runoff regression equation developed using two years of data from more than 60 urban watersheds nationwide.
[3] As defined in Post-Construction Requirements Appendix C.
[4] HydroCAD is an example of a commonly used and widely accepted program for performing hydrograph analyses and design of stormwater infrastructure. HydroCAD is based on U.S. Department of Agriculture Soil Conservation Service's (now Natural Resources Conservation Service) TR-55: Urban Hydrology for Small Watersheds.

If the Retention Volume cannot infiltrate within 48-hours, a multiplier of 1.20 shall be applied to the SCM Capture Volume calculated through the routing method.

TABLE 1: Routing Method Criteria

Parameter	Criteria
Hydrograph Analysis Method	National Resources Conservation Service or Santa Barbara Urban Hydrograph
Pond Routing Method	Storage-indication, unless otherwise justified to be more correct based on site and storage conditions.
Infiltration Rate	Underlying soil saturated infiltration rate, as indicated by locally accepted data approved by the Permittee and/or by on-site testing, whichever is more accurate.
Rainfall Distribution	National Resources Conservation Service Type I[5] or based on local rainfall data
Time of Concentration	Permittee's current drainage and flood control standard
Time Increment	0.10 hour, unless otherwise justified to be more correct based on rainfall distribution

Note: For redevelopment projects located within an approved Urban Sustainability Area the total amount of runoff volume to be retained from replaced impervious surfaces shall be equivalent to the pre-project runoff volume retained.

3) Structural Stormwater Control Measure Sizing

The Project Engineer shall use structural SCMs that optimize retention and result in optimal protection and restoration of watershed processes, such as Structural Control Measures associated with small-scale, decentralized facilities designed to infiltrate evapotranspirate, filter, or capture and use stormwater, to address the volumes calculated in 2 (above). Where the Project is within a Watershed Management Zone where infiltration is required, the project design must use SCM designs that optimize infiltration of the entire Retention Volume to minimize the potential need for off-site mitigation. Various resources provide design guidance for fully infiltrative SCMs including:

- The Contra Costa C.3 Manual
- The City of Santa Barbara LID BMP Manual
- The City of San Diego LID Design Manual
- Central Coast LID Initiative Bioretention Design Guidance

[5] The National Resources Conservation Service developed standard 24-hour rainfall distributions for hydrograph analyses. These rainfall distributions were intended to represent intensities associated with shorter duration storms, ranging from durations of 30 minutes to 12 hours. The National Resources Conservation Service Type 1 storm applies to the California West Coast, including the Central Coast Region. The Type 1 rainfall distribution was derived using National Oceanic Atmospheric Administration Atlas 2 rainfall statistics for the 1-year through 100-year storm.

Per Resolution No. R3-2013-0032 the maximum surface loading rate appropriate to prevent erosion, scour and channeling within the bio-filtration treatment system itself and equal to 5 inches per hour, based on the flow of runoff produced from a rain event equal to or at least 0.2 inches per hour. Thus the ratio of tributary impervious area to bio-filtration surface area needs to be: 0.2 inches per hour / 5 inches per hour =0.04.

a) Demonstration of Compliance – Require Regulated Projects to demonstrate that site SCMs: a) will infiltrate and/or evapotranspirate the Retention Volume or, b) will provide sufficient Capture Volume to retain the Retention Volume. Any outlet (i.e., underdrain) installed in a structural SCM shall be installed above the elevation of any portion of the structural SCM dedicated to Retention Volume storage.

b) Compliance with Water Quality Treatment Performance Requirement – Require Regulated Projects that propose to use the retention-based structural Stormwater Control Measures to also meet the Water Quality Treatment Performance Requirement, to demonstrate, in the Stormwater Control Plan, that the Water Quality Treatment Performance Requirement is being fully met.

Runoff Factors for Self-Retaining Areas

The following information is excerpted from the *C.3 Stormwater Handbook* (February 12, 2012 – 6th Edition):

Runoff from impervious or partially pervious areas can be managed by routing it to self-retaining pervious areas. For example, roof downspouts can be directed to lawns, and driveways can be sloped toward landscaped areas. The maximum ration is 2 parts impervious area for every 1 part pervious area if only treatment requirements apply to the development project. If flow-control requirements also apply, the maximum ration is 1 part impervious area for every 1 part pervious area.

The drainage from the impervious area must be directed to and dispersed within the pervious area, and the entire area must be designed to retain an inch of rainfall without flowing off-site. For example, if the maximum ratio of 2 parts impervious area into 1 part pervious area is used, then the pervious area must absorb 3 inches of water over its surface before overflowing to an off-site drain.

A partially pervious area may be drained to a self-retaining area. For example, a driveway composed of unit pavers may drain to an adjacent lawn. In this case, the maximum ratios are, for treatment-only site:

$$\text{(runoff factor)} \times \text{(tributary area)} \leq 2 \times \text{(self-retaining area)}$$

For sites subject to flow-control requirements:

$$\text{(runoff factor)} \times \text{(tributary area)} \leq 1 \times \text{(self-retaining area)}$$

Use the runoff factors in [Table 2].

Prolonged ponding is a potential problem at higher impervious/pervious ratios. In your design, ensure that the pervious area soils can handle the additional run-on and are sufficiently well-drained.

Runoff from self-treating and self-retaining areas does not require any further treatment or flow control. Further, there is no requirement for operation and maintenance inspections.

Table 2: Runoff Factors		
Surface	**PR # 2 and #3 Treatment and Flow Control**	**PR #2 Treatment Only**
Roofs	1.0	1.0
Concrete or Asphalt	1.0	1.0
Pervious Concrete	0.1	0.1
Porous Asphalt	0.1	0.1
Grouted Unit Pavers	1.0	1.0
Solid Unit Pavers Set in Sand	0.5	0.2
Crushed Aggregate	0.1	0.1
Turfblock	0.1	0.1
Landscape, Group A Soil	0.1	0.1
Landscape, Group B Soil	0.3	0.1
Landscape, Group C Soil	0.5	0.1
Landscape, Group D Soil	0.7	0.1

Appendix D -

Retention Based Technical Infeasibility Determination Procedures Sizing Methods

Appendix D-1

The following guidance for determining a site's potential use for LID was prepared by the Joint Effort Reporting Team (JERT). A site deemed not appropriate for LID must evaluate the potential to utilize bio-retention techniques prior to making a technical infeasibility determination. See **Appendix D-2** for Bio-Filtration Feasibility Assessment Steps.

SOIL INFILTRATION ASSESSMENT
for
Low Impact Development

Introduction and Purpose

This document provides guidance for conducting a Soil Infiltration Assessment to support the use of shallow or deep infiltration based stormwater control measures (SCMs), such as low impact development. This guidance is intended to provide a universal starting point for assessment of the infiltration characteristics of each project site and provide useful data in a cost-effective manner. Consideration and discussion of the application of these guidelines among the jurisdiction, the design professional and the geotechnical engineer is encouraged. They should be modified using sound engineering and geologic judgment to accommodate the unique characteristics of each project as they relate to each unique site.

The guidelines walk the user through a step-wise process from an Initial Site Assessment to a level of soil/geotechnical methodology appropriate for the site. The concept is to obtain information to:

1. Assess the general potential within the site for infiltration based SCMs
2. Provide a preliminary methodology to obtain soil infiltration data while balancing the need for data with the cost of acquiring the data.
3. Provide an extended or more comprehensive soil/geotechnical methodology where the results from the preliminary methodology as well as other site considerations warrant a more thorough soil analysis to facilitate better SCM design.

Note: Throughout this document the term "boring" is used for the purpose of observing the soil profile. However, except as indicated otherwise, an "excavation" may be substituted for the same purpose. Similarly, the term "drill" is the term used as the means of creating the boring. Except as otherwise indicated, it is meant to be synonymous with "excavating" or "digging" of an excavation. The two methods are meant to be interchangeable.

THESE METHODS DO NOT ADDRESS HEALTH OR SAFETY ASPECTS ASSOCIATED WITH THEIR USE. HEALTH AND SAFETY OF PERSONEL

CONDUCTING THE METHODOLOGIES AND OF PEDESTRIANS, PASSERS-BY, SITE OWNERS OR TENANTS, ETC. SHOULD BE CONSIDERED. IT IS THE RESPONSIBILITY OF THE USER TO COMPLY WITH ALL APPLICABLE HEALTH AND SAFETY LAWS, REGULATIONS, POLICIES AND PROCEDURES, AND TO ENSURE THAT THE METHODOLOGIES ARE USED SAFELY.

The methodologies are guidelines only for the means of assessing the infiltration rates. Aspects related to permits, disposal of soil cuttings and samples, backfill, compaction, site restoration, etc. are not addressed. It is incumbent on the user to follow all laws, regulations, policies and procedures in decommissioning the borings.

Step 1: Initial Site Assessment

Initial Site Assessment is encouraged early in the design of post-construction SCMs. Infiltration SCMs may be required to comply with State post-construction stormwater control requirements. Various characteristics of a site may limit or preclude the use of infiltration SCMs including soil and geotechnical constraints. Early in the project planning phase, the Project Applicant should identify all site characteristics that may influence (both positively and negatively), the ability of the site to infiltrate stormwater. The list below relates to soil and geotechnical feasibility only and the Project Applicant is encouraged review the full list of possible infeasibility constraints as provided by the municipality.

Initial Site Assessment related to infiltration potential should include, but is not limited to:

- Slope / topography of parcel
- Descending slopes nearby
- Protected Vegetation (endangered species, heritage oaks, etc.)
- Springs, seeps
- Bedrock outcrops
- Soil types from USDA Soil Charts, local geologic and geotechnical knowledge, etc.
- Area(s) available for infiltration
- Nearby wells
- Soil of groundwater contamination
- Other geotechnical constraints that may impact public safety or property

Step 2: Interpretation of Initial Site Assessment

If the Initial Site Assessment indicates that there is documentation of characteristics that entirely preclude the use of shallow or deep infiltration based SCMs, go to **Step 2A**.

Examples of such characteristics might be unstable slopes throughout the site; high groundwater, shallow impervious bedrock throughout the site, etc. Note: poor soils do not necessarily preclude the use of infiltration based BMPs but may limit the amount of infiltration.

If the Initial Site Assessment indicates that site characteristics do not preclude the use of infiltration based SCMs, go to **Step 2B**.

Step 2A: Omit use of infiltration-based SCMs, Infiltration analysis complete.

When site conditions entirely preclude the use of infiltration-based SCMs, the Project Applicant will need to contact the municipal representative responsible for the project to determine any required documentation of the infiltration infeasibility and the adjusted post-construction requirements for the project.

Step 2B: Conduct Quick Infiltration Testing

If Initial Site Assessment indicates that use of shallow infiltration-based SCMs (e.g. vegetated swales, bioswales, bioretention facilities, shallow infiltration basins, etc.) may be feasible, a "Shallow Quick Infiltration Test" may provide information to refine shallow SCM siting within the project and associated sizing calculations. See **Attachment 1** for Shallow Quick Infiltration Test methodology.

If Initial Site Assessment indicates that use of deep SCMs (e.g. seepage pits, deep infiltration basins, etc.) may be feasible, a "Deep Quick Infiltration Test" may provide information to refine deep SCM siting within the project and associated sizing calculations. See **Attachment 2** for Deep Quick Infiltration Test methodology.

Step 2C: Interpretation of Quick Infiltration Test Results

If results of the "quick" test (shallow or deep) are 5 inches/hour or slower (moderate to poor soils), then no further data are needed and soil infiltration assessment is complete. Design of SCMs should be based upon the data acquired, as modified by appropriate factors (i.e. factors for size and scale of the SCM, anticipated maintenance, initial and final silt loading, etc.)

Similarly, if results of the Quick Infiltration Testing (shallow or deep) indicate good soils (infiltration rates faster than 5 inches/hour), AND no further data are considered to be necessary for the SCM design, soil infiltration assessment is complete. Design of SCMs should be based upon the data acquired, as modified by appropriate factors (i.e. factors for size and scale of the SCM, anticipated maintenance, initial and final silt loading, etc.).

If results of the Quick Infiltration Testing (shallow or deep) indicate good soils (i.e. infiltration rates faster than 5 inches/hour), AND other considerations may necessitate more soil data, then "Extended Infiltration Testing" should be conducted. See **Attachment 3** for Extended Infiltration Testing methodology.

ATTACHMENT 1

Shallow Quick Infiltration Testing Methodology

1. For small sites with limited areas for infiltration-based SCMs, drill 1 profile boring and 2 infiltration test borings in each potential SCM area.

2. For acreage and unconstrained sites:

   - Up to 5 acres: drill 1 profile boring and 2 infiltration test borings per acre potentially usable for SCMs.
   - Over 5 acres: drill 1 profile boring and 2 infiltration test borings per geologic unit that may be usable for SCMs, with 2 to 4 infiltration test borings associated with each profile boring.

3. Profile borings should be 6" to 12" diameter. Where the planned SCMs will be constructed near the site's existing grade, borings should be 10' to 15' deep. If significant cuts will be necessary to install the SCMs, the borings should extend 5' to 10' below the invert of the planned SCM. The boring cuttings should be observed and the soils in the borings sampled as necessary to allow accurate logging. Where excavations are utilized to determine the profile, they should be no wider than necessary to facilitate logging of the strata with the same level of detail as for borings.

4. All soil strata should be identified on the logs as to USCS classification, consistency, presence of moisture or free water, color, impermeable and permeable zones, and any other characteristics that may be pertinent to infiltration potential. All logs should include the boring identification, date of drilling, auger type and diameter, sampling methods, and surface elevation (known or assumed).

5. Infiltration test borings should also be 6" to 12" diameter. They should be of depths such that the zone tested will range from about the elevation of SCM invert, to about 2' below the elevation of the invert.

6. Infiltration test excavations should be dug by any means to approximately the elevation of the *top* of the planned SCM. From the elevation of the top of the planned SCM to 2' below the elevation of the *invert* of the SCM, a hand auger or hand shovel should be used to excavate the actual test zone. Preferably, the test zone should be 6" to 12" in diameter; if conditions mandate a larger diameter, it should be as close to 12" as is practicable.

7. A perforated pipe, of a diameter that will facilitate the taking of the test measurements should be placed in each test boring or in the test zone of each test excavation.

8. The annulus between each perforated pipe and the boring sidewall should be filled with fine gravel.

9. A suitable elevation datum should be established from which each measurement can be taken. The elevation of the datum relative to the elevation of the top of the SCM should be noted.

10. Using a hose equipped with a water meter, a graduated water tank, or other suitable means of measuring water volume, add water to the approximate elevation of *top* of the planned SCM and maintain the head for 30 minutes.

11. At the end of the 30-minute period, shut off water and record volume of water that entered the test boring.

12. As the water level falls, measure from the datum to the water level at suitable intervals. Measurements should be to the degree of precision practicable (usually 1/8-inch or 0.01 foot) for a period of 2 hours. Depending upon the rate of fall, intervals between measurements may need to be from 1 minute to 30 minutes. Intervals should be as uniform as is practicable, however, as the water level falls and the head is reduced, the infiltration rate may decrease and the measurement intervals may need to be incrementally lengthened.

13. If a test boring runs dry within 2-hour measurement period, refill the boring and continue measuring the falling head to end of original 2-hour period. If it runs dry again, refill and continue measurements to the end of the original 2-hour period. If it runs dry a third time, do not refill, the testing of that boring is complete.

14. If the fall recorded in any test boring is less than 6” in 2 hours, continue taking measurements for an additional 2 hours (4 hours total).

15. See **Attachment 4** for a discussion of how to report the test results.

ATTACHEMENT 2

Deep Quick Infiltration Testing Methodology

1. For small sites with limited areas for infiltration-based SCMs, drill 2 profile / test borings in each potential deep SCM area.

2. For acreage and unconstrained sites:
   - Up to 5 acres: drill 3 profile / test borings per acre potentially usable for SCMs.
   - Over 5 acres: drill 4 profile / test borings per geologic unit that may be usable for SCMs.

3. Profile / test borings should be 6" to 12" diameter. The borings should extend 5' to 10' below the bottom of the planned SCM. The boring cuttings should be observed and the soils in the borings sampled as necessary to allow accurate logging. Use of excavations for deep testing is probably not practical.

4. All soil strata should be identified on the logs as to USCS classification, consistency, presence of moisture or free water, color, permeable and impermeable zones, and any other characteristics that may be pertinent to infiltration potential. All logs should include the boring identification, date of drilling, auger type and diameter, sampling methods, and surface elevation (known or assumed).

5. A perforated pipe, of a diameter that will facilitate the taking of test measurements should be placed in each profile / test boring.

6. The annulus between each perforated pipe and the boring sidewall should be filled with fine gravel.

7. A suitable elevation datum should be established from which each measurement can be taken. The elevation of the datum relative to the elevation of the top of the SCM should be noted.

8. Using a garden hose equipped with a water meter, a graduated water tank, or other suitable means of measuring water volume, add water to approximate elevation of *top* of the planned SCM and maintain the head for 30 minutes.

9. At the end of the 30-minute period, shut off water and record volume of water that entered the test boring.

10. As the water level falls, measure from the datum to the water level at suitable intervals. Measurements should be to the degree of precision practicable

(usually 1/8-inch or 0.01 foot) for a period of 2 hours. Depending upon the rate of fall, intervals between measurements may need to be from 1 minute to 30 minutes. Intervals should be as uniform as is practicable, however, as the water level falls and the head is reduced, the infiltration rate may decrease and the reading intervals may need to be incrementally lengthened.

11. If a test boring runs dry within the 2-hour measurement period, refill the boring and continue measuring the falling head to end of original 2-hour period. If it runs dry again, refill and continue measurements to the end of the original 2-hour period. If it runs dry a third time, do not refill, the testing of that boring is complete.

12. If the fall recorded in any test boring is less than 6" in 2 hours, discontinue testing as deep infiltration is not practical.

13. See **Attachment 4** for a discussion of how to report the test results.

ATTACHMENT 3

Extended Test Methodology

The following "extended" methodology is intended to provide more comprehensive soil/geotechnical information where the results from the Initial Site Assessment and/or Quick methodology, as well as other site and design considerations warrant a more thorough soil analysis to facilitate better SCM design.

1. Extended test methodology for *deep* SCMs is too complex an issue to be adequately addressed in these guidelines. Test locations, depths, methods, etc. should be discussed among the jurisdiction, the design professional and the geotechnical engineer and a consensus reached as to the appropriate means of securing the data required for design of the deep SCMs on the specific site.

2. For *shallow* extended testing, locations, depths, continuity of subsurface conditions, etc. should be discussed among the jurisdiction, the design professional and the geotechnical engineer. Consideration should be given to drilling and testing at least twice as many test borings as recommended under Quick Testing.

3. Extended shallow test methodology should be essentially the same as Steps 3 through 14 under Quick Testing, except for the following:
    a. Consideration should be given to presoaking the test borings for up to 24 hours prior to commencing testing.
    b. Measurements for extended testing should continue for 4 hours or more, regardless of infiltration rates.
    c. The 30-minute constant head period may be excluded if adequate constant head data were obtained during Quick Testing.

4. See **Attachment 4** for a discussion of how to report the test results.

ATTACHMENT 4

Reporting of Test Results

1. Reporting of test results, whether quick or extended, shallow or deep, should contain essentially the same information.

2. For each test boring, tabulate the test data showing:
   a. Test identification
   b. Date drilled
   c. Date tested
   d. Test boring diameter
   e. Perforated pipe diameter
   f. Test boring depth
   g. Stratum present in the test zone
   h. Elevation of top of SCM (known or assumed)
   i. Elevation of invert of SCM (known or assumed)
   j. Test duration
   k. Volume introduced between commencement of filling and the end of the 30-minute constant head period, typically in units of cubic feet
   l. Head during initial 30-minute period
   m. Time of the first falling head measurement and depth to the water surface
   n. Time of each subsequent measurement and depth to the water surface
   o. Intervals between measurements
   p. Incremental drop between measurements
   q. Infiltration rate between measurements, typically in units of inches per hour

3. Provide a map showing the approximate locations of all profile and test borings, as well as property lines, landmarks, planned improvements and SCM locations (if known), and other pertinent features that will help the user better understand the boring and testing program.

4. Provide log of each profile boring

5. Provide report summarizing data and discussing the potential for use of infiltration based SCMs on the site or area(s) tested.

Appendix D2: Biofiltration Infeasibility Criteria

If Low Impact Development is not technically infeasible, the project may utilize the checklist below to determine if the project is also exempt from using biofiltration measures:

- ☐ Biofiltration is not compatible with surrounding drainage system
- ☐ Location available for biofiltration facility is in an area with identified erosion or landslide hazards
- ☐ Location available for biofiltration facility is on a slope equal to or in excess of 8 percent.
- ☐ Location available for biofiltration facility is within 50-feet from the projected top of the slope (using projected angle of repose) that is great than 20%
- ☐ Areas where runoff potentially contains industrial wastes
- ☐ Areas where there is a higher risk of concentrated spills (such as gas stations, truck stops)
- ☐ _____

The checklist above is not absolute, and still requires County concurrence.

Appendix D3: Ten Percent Adjustment to Retention Volume

Calculation Instructions

When full on-site compliance with the Runoff Retention Performance Requirement is prevented due to technical infeasibility, on-site retention of the full Retention Volume is not required and the Regulated Project is required to dedicate no less than ten percent of the Regulated Project's Equivalent Impervious Surface Area to retention-based Stormwater Control Measures.

The Water Quality Treatment Performance Requirement is not subject to this adjustment, i.e., mitigation to achieve full compliance is required on- or off-site.

1) Calculating Ten Percent of a Project's Equivalent Impervious Surface Area

The area of the project that must be dedicated to structural SCMs to waive off-site compliance with the Runoff Retention Requirement is equal to ten percent of the project's Equivalent Impervious Surface Area, defined as:

Equivalent Impervious Surface Area (ft^2) = (Impervious Tributary Surface Area (ft^2) + (Pervious Tributary Surface Area (ft^2))

Impervious Tributary Surface Area is defined as the sum of all of the site's conventional impervious surfaces. When calculating Impervious Tributary Area:

Do include: concrete, asphalt, conventional roofs, metal structures and similar surfaces
Do not include: green roofs

Pervious Tributary Surface Area is defined as the sum of all of the site's pervious surfaces, corrected by a factor equal to the surface's runoff coefficient. When calculating Pervious Tributary Surface Area:

Do include surfaces such as: unit pavers on sand; managed turf[1]; disturbed soils; and conventional landscaped areas (see Table 1 for correction factors).

Example:

Project Site includes 500 ft^2 of unit pavers on sand.
Pervious Tributary Surface Area = 500 ft^2 x C = 50 ft^2
Where C = Correction Factor for unit pavers, 0.1, from Table 1.

Do not include: Infiltration SCM surfaces (e.g., SCMs designed to specific performance objectives for retention/infiltration) including bioretention cells, bioswales; natural and undisturbed landscape areas, or landscape areas compliant with the Model Water Efficient Landscape Ordinance (California Code of Regulations, Title 23. Waters, Division 2.

[1] Managed Turf includes turf areas intended to be mowed and maintained as turf within residential, commercial, industrial, and institutional settings.

Department of Water Resources, Chapter 2.7.), or a local ordinance at least as effective as the Model Water Efficient Landscape Ordinance.

TABLE 1: Correction Factors[2] for Use in Calculating Equivalent Impervious Surface Area

Pervious Surface	**Correction Factor**
Disturbed Soils/Managed Turf (dependent on original Hydrologic Soil Group)	A: 0.15 B: 0.20 C: 0.22 D: 0.25
Pervious Concrete	0.60
Cobbles	0.60
Pervious Asphalt	0.55
Natural Stone (without grout)	0.25
Turf Block	0.15
Brick (without grout)	0.13
Unit Pavers on Sand	0.10
Crushed Aggregate	0.10
Grass	0.10

[2] Factors are based on runoff coefficients selected from different sources: Turf and Disturbed Soils *from Technical Memorandum: The Runoff Reduction Method*. Center for Watershed Protection & Chesapeake Stormwater Network. p.13, April 18, 2008.
http://town.plympton.ma.us/pdf/land/scheuler_runoff_reduction_method_techMemo.pdf.
All other correction factors from *C.3 Stormwater Handbook, Santa Clara Valley Urban Runoff Pollution Prevention Program, Appendix F*, p. F-9., May 2004.
http://www.sanjoseca.gov/planning/stormwater/pdfs/appendices_files/Appendix_F_Final.pdf

Appendix E -

Low Impact Development (LIDI) Specifications

Appendix E – Low Impact Development Institute (LIDI) Specifications

BIORETENTION SOIL MEDIA (BSM)

BSM shall by comprise of:

INGREDIENT	PERCENT BY VOLUME
Mature Compost	30-40
Sand	60-70

BSM shall not be mixed on site.

Mature Compost

Unless otherwise approved by the Low Impact Development Initiative staff, compost must be derived from one or a combination of the following types of materials:

1. Green material consisting of chipped, shredded or ground vegetation or clean, processed recycled wood products
2. Biosolids*
3. Mixed food waste

*Compost must not be derived from mixed, municipal solid waste and must not contain paint, petroleum products, pesticides or other chemical residues harmful to plant or animal life. Compost shall be relatively free of inert ingredients, including glass, plastic and paper,

Mature compost must arrive on site at a temperature < 120° F and meet at least one of the following stability methods:

METHOD	UNITS	REQUIREMENT
NH_4- : NO_3-N Ratio	None	< 3
Total NH3-N	ppm, dry basis	< 500
Seed Germination	Percent	> 80 of control
Plant Trials®	Percent	> 80 of control
Solvita®	Index value	> 5

AND at least one of the following maturity indices in the following table:

METHOD	UNITS	REQUIREMENT
OUR Test	O2 / unit TS / hr	< 1.3
SOUR Test	O2 / unit BVS / hr	< 1.5
CO2 Test	C / unit VS / day	< 8
Dewar	Temp. rise (oC)	< 20
Solvita®	Index value	> 5

Compost must comply with the following gradation requirements below

SIEVE SIZE	PERCENT PASSING (BY WEIGHT)	
	MIN	*MAX*
1 inch	99	100
½-inch	90	100
¼-inch	40	90
No. 200	2	10

Compost shall comply with the requirements shown in the following table:

PROPERTY	REQUIREMENT
Bulk Density	500 and 1100 dry lbs/cubic yard
Moisture Content	30% - 55% of dry solids
Inert Materials	< 1 % by weight or volume combined total
Carbon : Nitrogen Ratio	15:1 < C:N < 25:1
Salinity	< 6.0 mmhos/cm
pH	6.5 < pH < 8.0
Total Nitrogen content	> 0.9%
Boron	< 8- ppm dry < 2.5 ppm soluable

Where TMECC= Test Methods for the Examination of Composting and Compost

Sand

ASTM C33 for fine aggregate, or…the following gradation requirements:

SIEVE SIZE	PERCENT PASSING (BY WEIGHT)	
	Min	***Max***
3/8 inch	100	100
No. 4	90	100
No. 8	70	100
No. 16	40	95
No. 30	15	70
No. 40	5	55
No. 100	0	15
No. 200	0	5

COMPOST MULCH

Compost mulch shall consist of 100% of mature compost. See BSM for aged compost specifications.

GRAVEL FILTER

Gravel filter shall consist of 3" deep layer of ¾" (no. 4) open-graded aggregate.

OR

Gravel filter shall conform to Caltrans Class 2 Permeable Material (Section 68-2.02F(3)) gradation requirements:

SIEVE SIZE	PERCENT PASSING
1 inch	100
3/4 inch	90 -100
3/8 inch	40-100
No. 4	25-40
No. 8	18-33
No. 30	5-15
No. 50	0-7
No. 200	0-3

Class 2 permeable material must have a sand equivalent value of not less than 75.

PLANT PALETTE The plant palette shall be according the Plant List found in **Appendix F**.

Appendix F -

Plant List & Guidelines for Landscape-Based Stormwater Measures

Appendix F - Plant List & Guidelines for Landscape-Based Stormwater Measures

Introduction

Of the list of Best Management Practices published by the EPA, the following depend on plant material for their success:

- Infiltration Basin;
- Grassed Channel;
- Infiltration Trench;
- Vegetated Filter Strip;
- Dry Swale;
- Bioretention;
- Dry Detention Pond;
- Wet Swale;
- Wet Pond;
- Storm Water Wetland.

Therefore, the careful selection of plant species is a critical step in successful LID design and implementation. Plants facilitate natural infiltration of surface runoff, increase evapotranspiration, reduce the 'heat island' effect of urbanized areas, and reduce the rate, volume, and pollutant loading of urban runoff that ultimately ends up in local waterways or in local aquifers.

For the drainage features to function optimally, several plant characteristics need to be considered to determine their appropriateness for that particular BMP, and more specifically, the zone at which they are located within it. Most of these characteristics are included in the LID Plant List table, but basically for each plant selection, the following need to be looked at: water requirements; tolerance for inundation; root and leaf structure; and the ability to filter pollutants.

California native plants make up the entire LID Plant List, and this is the case for several reasons: they are perfectly adapted to local environmental conditions; they generally require less water and fertilization; and they limit the impact to native habitats. Native plants are also less susceptible to pests and diseases. There are a vast number of plants native to San Luis Obispo County that should provide designers with enough choices for virtually every scenario likely to be encountered. While the list does not within the County, it provides a good basis point for developing project specific plant palettes. Non-native species are inappropriate because they can become invasive, and water can quickly spread their occurrence and alter downstream habitats. Turf grass is also discouraged for LID drainage features due to its tendency to require large amounts of supplemental water, fertilizers, and regular maintenance.

The Planting Zones

Zone A
The area at the bottom of the drainage feature where water temporarily ponds during either a rain event, or an upstream activity such as washing or irrigation. This zone should not be designed to hold water, but should completely drain within 72 hours. However, during rainy seasons, this zone may be inundated for extended periods of time. Species planted in this zone should have the following characteristics:

- Water tolerant;
- Dense root structure and vegetative cover to discourage erosion, slow runoff velocities, and provide maximum pollutant filtration.
- Native grasses and groundcovers are excellent choices for this zone.

Zone B
This zone is the side slopes of the drainage feature, whose primary function is to slow down runoff velocity. While water passes through this area and saturates the soil, it does not stand for any period of time during typical storm events. Species planted in this zone should have the following characteristics:

- Tolerant of periodic inundation;
- Tolerant of periods without water;
- Dense root structure to provide erosion protection of side slopes.

include every suitable plant species for use

Planting Design Criteria

There are numerous conditions to consider when choosing plant species for LID drainage features. Not surprisingly, many of the species on the LID Plant List have native habitats that mimic the various and (sometimes) disparate conditions that these features employ.

The purpose of the LID Plant List is to provide a cross section of suitable plant species as a base point for the development of project specific plant palettes. Designers and property owners are encouraged to propose other species that meet the spirit of these guidelines; the County will have the discretionary right to permit or deny their use. The following characteristics should be considered when proposing new plants:

- The planting zone(s) where the plant will be located (see Planting Zones Diagram); The size of the planting area and the size of the plant species at maturity;
  Native to California, preferably to San Luis Obispo County (non-native plants are inappropriate);
  Tolerant of San Luis Obispo County's climatic patterns (such as prolonged dry periods, prevailing winds, or coastal conditions);
- Tolerant of seasonal flooding/inundation;
- Low maintenance requirements;
- Adaptability;
- Non-invasive species. (check California inventory at www.cal-ipc.org)

Plant species should aim to control erosion and wick water from soils. Some of the best choices for Zone A are groundcovers and grasses that quickly cover exposed soil. Low shrubs, grasses and groundcovers are suitable for the Zone B, depending on the area, gradient, soil type, and drainage patterns (sheet flow vs. concentrated flow, or flooding). Trees and larger shrubs are best planted in the Zone B where their deeper roots can provide reinforcement to the drainage feature, and absorb the infiltration.

Energy dispersion devices may be required to be installed or constructed in certain situations to protect the integrity of the drainage feature, and the vegetation itself. These situations occur where features receive a concentrated flow, and may include such elements as gabions, weirs, or cobblestones. Where conditions absolutely demand, small areas of hardscape may be used.

Plant Layout

Some rules of thumb for planting layout of LID drainage features are:

- The smallest practical area of land should be exposed at any one time during development to minimize erosion. Erosion control measures should be integrated into planting designs, such as biodegradable erosion control mats. Plant mixes applied though a hydroseeding process should include erosion control specifications, which may be via a mulching process, or an integral part of the seed mix;
- Vegetation should be installed as soon as possible after soil is exposed;
- Plants should be laid out in staggered rows, and spaced so 100% coverage is attained at two-thirds of the species mature size.

Soil Specification

Soils Test

Prior to planting, but after grading operations are substantially complete, a soils test shall be undertaken by a qualified soil laboratory. The test results shall become a part of the design review submittal. Surface soils in San Luis Obispo County vary from almost pure sand at the coast, to heavy clay for much of the inland areas. Since the soils percolation rate, ability to allow the infiltration of water, and the depth to groundwater, is critical to the design of LID drainage features, this test will help to determine which BMP(s) are appropriate for that site. The soil report should contain, at a minimum:

- Native soil composition;
- Infiltration rates;
- Texture test;
- Depth at which groundwater was encountered (if at all);
- Cation exchange capacity;
- Agricultural suitability analysis;
- Recommended amendments for plant species to survive;

Prior to planting, and on the advice of the soils report, the soil shall be amended to provide premium growing conditions for the plants specified.

Landscape design documents for LID projects must include a bioretention soil specification that specifies the exact materials to be used in the mix (aggregates and compost), the percent of each material included in the mix, how they are to be placed (i.e. in 8" to 12" lifts) and the soil mix depth.

General Bioretention Soil Specifications

Bioretention soil shall achieve a long-term, inplace infiltration rate of at least 5 inches per hour. Bioretention soil shall also support vigorous plant growth. Bioretention Soil shall be a well-blended mixture of mineral aggregate and compost, measured on a volume basis. Bioretention soil shall consist of two parts compost (approximately 35 to 40 percent) by volume and three parts Mineral Aggregate (approximately 60 to 65 percent), by volume. The mixture shall be well blended to produce a homogeneous mix.

Mulch

Immediately after planting, all exposed soil shall be covered with mulch to minimize erosion, and aid soil moisture retention. Mulch material may be either mineral (e.g. cobble or uncompacted decomposed granite) or biodegradable (e.g. bark or wood-chips). Biodegradable erosion control mats may also be used either on their own, or in conjunction with another mulch material. Mulch materials must not inhibit infiltration, and must be stable enough to withstand occasional high velocity runoff. Bark chips that have a tendency to float are not recommended. Acceptable mulching materials are:

- Nitrogen fortified bark (1" to 2" diameter);
- Redwood bark (1" to 2" diameter);
- Chipped gravel, crushed stone, or cobbles (1/2" to 2-1/2" diameter);
- 50/50 blend of top soil and aged compost.

Shredded bark (sometimes called 'Gorilla Hair') is not acceptable due to its tendency to form a tightly woven mat that can become almost

- Date of test.

Other Requirements

Maintenance

Good design and planning can minimize the amount of maintenance required for a drainage feature. Weeds can be suppressed by a good coverage of vegetation and the avoidance of over-planting will reduce the amount of pruning needed. The most critical time for the vegetation is in the period immediately following construction, when plant species are not fully established; weed control, and supplemental irrigation may be required to ensure a healthy, vigorous vegetative cover.

Irrigation is an important aspect of any landscape establishment. Typically new plantings need two to three years of irrigation to become established. After that period, native plants will need little to no supplemental irrigation to survive. Plants may enter a dry season dormancy, which affects their appearance. Where this "dry look" is not desired, summer irrigation may be utilized. Systems should include a weather-based controller to avoid watering during wet weather. Because bioretention soils are formulated to infiltrate, irrigation application rates must be properly designed to avoid overwatering and prevent potential discharges via underdrains.

Fertilizer should not be used in bioretention areas. Instead, a compost top dressing or application of compost tea can be used to introduce nutrients and beneficial microorganisms to the soil. Apply compost mulch once per year in spring or fall or spray apply compost tea once per year between March and June.

Weeds compete with plants for nutrients, water and sunlight. They should be regularly removed, with their roots, by hand pulling or with manual pincer-type weeding tools. Care should be given to avoid unnecessary compaction of soils while weeding.

It is worth noting the County policy of not using any herbicides or pesticides on any of their rights-of-way. Native plants are less susceptible to pests and diseases, and are therefore often more durable choices.

Replace plants that die due to unsuitable plant

impervious, and can also encourage mold growth.

be removed and replaced to avoid spreading disease, establishment of weeds in bare areas and reduced LID function. Before replacing with the same species, determine if another species may be better suited to the conditions.

Given the nature of the LID drainage features, they will likely capture trash and debris (particularly after a significant rain event) and will need to be periodically cleaned out. Depending on the adjacent land uses, there may also be a build-up of silt that should be removed as necessary to allow optimum functionality of the feature. In the event that cleaning and maintenance operations damage the vegetation, it should be replaced as soon as possible.

Tree Placement Guidance

Including trees in bioretention areas provides additional aesthetic and performance benefits. Following these guidelines will maximize their success and survival:

- Provide sufficient landscape width (a rule of thumb is 8' min.)
- Locate trees on the side slopes (Zone B), not in areas that pond (Zone A). Trees improperly located, in narrow planters that pond, are unlikely to thrive and may eventually fail.
- Select trees that will tolerate seasonally wet soils.
- Do not specify trees with invasive roots.

Provide extra support to trees planted in bioretention areas, especially in high wind areas. They should be securely staked during establishment and inspected once or twice a year and following storm events. Stakes should be removed as soon as they are no longer needed to stabilize the tree (between one and two years).

Guidelines for Municipalities

Project managers who are preparing RFPs or bid packages for public projects that include bioretention systems should clearly define expectations for the following:

- Bioretention soil mix specification
- Guidance for plant species selection

conditions, disease, underwatering or other unforeseen issues. Dead and dying plants must

Nursery Sources

Environmental Seed Producers Inc.
P.O. Box 2709
Lompoc, CA 93438
(805) 735-8888
www.espseeds.com

Las Pilitas Nursery
3232 Las Pilitas Road
Santa Margarita, CA 93453
(805) 438-5992
www.laspilitas.com

Native Sons Inc.
379 West El Campo Road Arroyo Grande, CA 93420 (805) 481-5996
www.nativeson.com

S&S Seeds
P.O. Box 1275
Carpinteria, CA 93014
(805) 684-0436
www.ssseeds.com

San Marcos Growers
125 South San Marcos Road Santa Barbara, CA 93111
(805) 683-1561
www.smgrowers.com

Slo starts
1858 Los Osos Valley Road Los Osos, CA 93402
(805) 528-7533

- Appropriate plant zone placement
- Operations and maintenance protocols

References

Brenzel Norris, Kathleen. Sunset Western Garden Book. Menlo Park: Sunset Publishing Corporation, 2001.

Joni L. Janecki & Associates, Inc. City of Salinas Development Standards Plan - LID Development Practices for Urban Storm Drainage Management, 2007.

Bornstein, Fross & O'Brien. California Native Plants for the Garden. Cachuma Press, Los Olivos, California, 2005

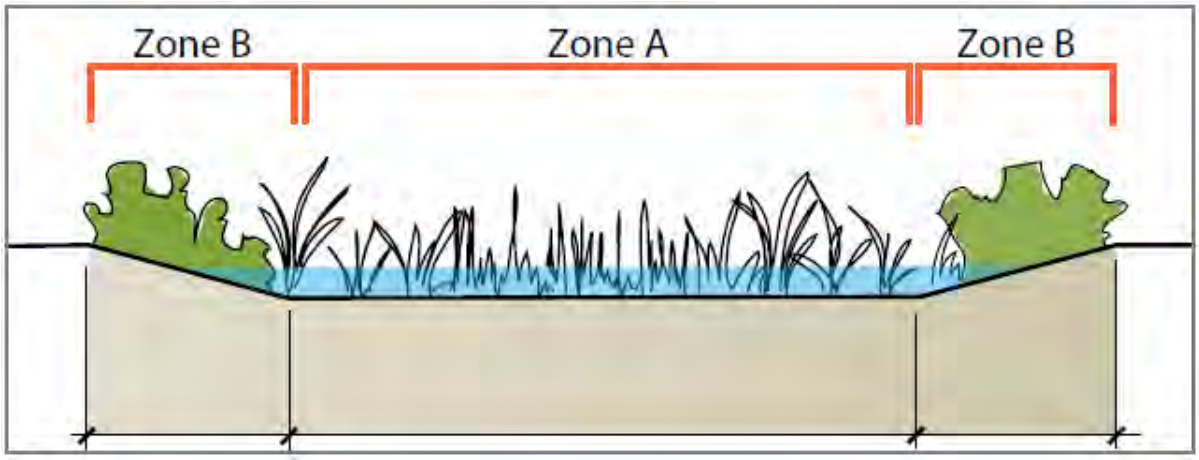
Greenlee, John. The Encyclopedia of Ornamental Grasses. Rodale Press, Pennsylvania, 1992

Las Pilitas Nursery. Online native plants information resource. Available at www.lasoilitas.com.

Native Sons Nursery. Online native plants information resource. Available at www.nativeson. com.

USDA Natural Resources Conservation Service Plants Database. Online plant information resource. Available at htto://olants.usda.gov/

US Environment Protection Agency. Online storm water BMP resource. Available at v.nv.emcw.



Planting Zones Diagram

This diagram illustrates the two basic planting zones for landscape-based stormwater measures. Used in conjunction with the LID Plant List, it shows the general zones that are recommended for each species. Site specific conditions should also be considered, such as solar orientation and micro-climate.

Plant List for Landscape-Based Stormwater Measures

Botanical Name	Common Name	Planting Zones[1]		LID Design Considerations[2]											Notes
		Zone A	Zone B	Small Planting Strips (< 5' Wide)	Large Planting Areas (> 5' Wide)	Tolerates Prolonged Saturation	Tolerates Periodic Flooding	Tolerates Prolonged Dry Periods	Requires Good Drainage	Tolerates Mowing	Phytoremediation Capabilities	Tolerates Clay Soils	Light	Climate Zones[3]	
Trees															
Cercis occidentalis	Western Redbud		✓	✓	✓		✓	✓	✓			✓	sun	All but coastal	Good erosion control
Chilopsis linearis	Desert Willow		✓		✓		✓	✓				✓	sun	All, but 1A-3A	
Platanus racemosa	Western Sycamore		✓		✓		✓					✓	sun	All, but 1A-3A	Avoid underground water/sewer pipes
Quercus agrifolia	Coast Live Oak		✓		✓	✓	✓	✓					sun -shade	All, but 1A-3A	
Large Shrubs															
Heteromeles arburifolia	Toyon		✓		✓			✓	✓			✓	sun – pt shade	All, but 1A-3A	Good erosion control
Myrica californica	Pacific Wax Myrtle		✓	✓	✓		✓					✓	sun – pt shade	All, but 1A-3A	
Sambucus mexicana	Western Elderberry		✓		✓		✓	✓				✓	sun – pt shade	All, but 1A-3A	

Botanical Name	Common Name	Planting Zones[1]		LID Design Considerations[2]											Notes
		Zone A	Zone B	Small Planting Strips (< 5' Wide)	Large Planting Areas (> 5' Wide)	Tolerates Prolonged Saturation	Tolerates Periodic Flooding	Tolerates Prolonged Dry Periods	Requires Good Drainage	Tolerates Mowing	Phytoremediation Capabilities	Tolerates Clay Soils	Light	Climate Zones[3]	
Shrubs and Subshrubs															
Baccharis pilularis	Coyote Brush		✓	✓	✓		✓	✓				✓	sun	All, but 1A-3A	Good erosion control; Fast growing
Rosa californica	California Wild Rose	✓	✓		✓	✓	✓	✓					sun – pt shade	All	Good erosion control; Potentially invasive
Perennials															
Achillea millefolium	Yarrow		✓	✓	✓				✓	✓		✓	sun – pt shade	All	Good erosion control
Fragaria chiloensis	Beach Strawberry		✓	✓	✓		✓	✓	✓			✓	sun – pt shade	All, but 1A-3A	
Iris douglasiana	Douglas Iris		✓	✓	✓		✓		✓			✓	sun – shade	All, but 1A-3A	Good erosion control
Salvia spathacea	Hummingbird Sage		✓	✓			✓	✓				✓	sun – shade	All, but 1A-3A	
*Salvia uliginosa**	Bog Sage		✓	✓	✓		✓					✓	sun	All, but 1A-3A	
Sisyrinchium helium	Blue-Eyed Grass		✓	✓	✓			✓		✓			sun	All, but	

Botanical Name	Common Name	Planting Zones[1]		LID Design Considerations[2]											Notes
		Zone A	Zone B	Small Planting Strips (< 5' Wide)	Large Planting Areas (> 5' Wide)	Tolerates Prolonged Saturation	Tolerates Periodic Flooding	Tolerates Prolonged Dry Periods	Requires Good Drainage	Tolerates Mowing	Phytoremediation Capabilities	Tolerates Clay Soils	Light	Climate Zones[3]	
														1A-3A	
Solidago californica	California Goldenrod		✓	✓			✓	✓					sun – pt shade	All, but 24	
Grasses and Grass-like Plants															
*Carex divulsa**	Berkeley Sedge, Grey Sedge	✓	✓	✓		✓	✓	✓					sun – pt shade	All, but 1A-3A	
Carex pansa	California Meadow Sedge	✓	✓	✓	✓		✓		✓	✓			sun – shade	All, but 1A-3A	Good erosion control
Carex praegracilis	Clustered Field Sedge	✓		✓	✓	✓	✓	✓		✓			sun – pt shade	All, but 1A-3A	Good erosion control
Carex spissa	San Diego Sedge	✓		✓	✓		✓	✓				✓	sun – shade	All, but 1A-3A	
*Chondropetalum tectorum**	Small Cape Rush	✓	✓	✓	✓	✓	✓	✓				✓	sun – pt shade	All, but 1A-3A and 7	
Festuca rubra 'Molate'	Molate Red Fescue	✓	✓	✓	✓		✓	✓					sun – shade	All	Good erosion control
Juncus effusus	Soft Rush	✓		✓	✓	✓	✓	✓					sun – pt	All	Good erosion control

Botanical Name	Common Name	Planting Zones[1]		LID Design Considerations[2]												Notes
		Zone A	Zone B	Small Planting Strips (< 5' Wide)	Large Planting Areas (> 5' Wide)	Tolerates Prolonged Saturation	Tolerates Periodic Flooding	Tolerates Prolonged Dry Periods	Requires Good Drainage	Tolerates Mowing	Phytoremediation Capabilities	Tolerates Clay Soils	Light	Climate Zones[3]		
													shade			
Juncus patens	Wire Grass, Blue Rush	✓		✓	✓	✓	✓	✓					sun – shade	All, but 1A-3A		Good erosion control
Leymus condensatus	'Canyon Prince' Canyon Prince Wild Rye		✓	✓	✓		✓	✓					sun – pt shade	All, but 1A-3A		
Muhlenbergia rigens	Deer Grass		✓	✓	✓		✓	✓				✓	sun – pt shade	All, but 1A-3A		Good erosion control; Fast spreading

Footnotes:

[1] See Planting Zone illustration above for zones as they relate to stormwater BMP's.

[2] Lid design considerations are specific factors that relate to landscape-based stormwater measures. Designers should also consider usual environmental factors such as sun/shade requirements, coastal exposure, wind tolerance, etc., when developing site specific plant lists.

[3] Refers to Sunset Western Garden Book Climate Zones. The Central Coast includes Zones 1A, 2A, 3A, 7, 9, and 14-24. www.sunset.com/garden/climate-zones.

* Indicates non native species. Non natives are only recommended for use in urbanized settings and should not be used on sites in proximity to natural areas.

Appendix G -

Stormwater Control Plan (SWCP) Template

STORMWATER CONTROL PLAN (SWCP)

FOR

[NAME OF PROJECT]

[date]

[This template is to be used in conjunction with the requirements, instructions, and criteria set forth in the ***County of San Luis Obispo Post Construction Stormwater Requirements Handbook***.

Check with the County of San Luis Obispo Planning and Building and Public Works Departments for new information and updates to the ***Handbook*** and this template.]

[Name of Owner]

[Owners Representative and Contact Information]

Prepared By:

[Preparers Name and Contact Information]

TABLE OF CONTENTS [*Edit to be project-specific, delete bracketed text*]

V. Source Control Measures

    a. Site activities and identification of potential sources of pollutants

    b. Pollutant Source and Source Control Table

VI. Stormwater Facilities Operations and Maintenance

    a. Summary of Maintenance Requirements of each Stormwater Facility

VII. Certification Statement Forms

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Table X. Drainage Management Areas

Table X. Table of Runoff Reduction and Structural Control Measures

Table X. Compliance with Peak Management Requirements (PR 3)

Table X. Sources and Source Control Measures

ATTACHMENTS

A. Support Calculations

B. Completed SWCP Checklist and Performance Requirement Checklists

C. Site Stormwater Assessment Exhibit

D. Drainage Management Area (DMA) Exhibit

E. Draft Operations and Maintenance Forms

APPENDICES

[Examples: Maps, Soils/Geotechnical Report(s), Project Drainage Report]

I. Project Overview

Table 1. Project Overview

Project Name/Permit Number	*[As stated on County Permit Applications]*
Project Location	*[Street Address if available, or intersection and/or APN(s). Vicinity Map required in Section II below.]*
Project Phase No.	*[If project is being constructed in phases indicate the phase number. If not, enter N/A. Note: A separate SWCP will be required for each phase.]*
Project Type and Description	*[Example entries: "Detached single-family residence", "mixed use retail and residential development", "Industrial Warehouse". For phased projects (i.e. Conditional Use Permits phased over 20 years) note the overall scheme and what is to be specifically completed in this phase. (Example: Airport Area Master Plan, Phase 1A: Office and Commercial Lots 1, 2, and 3.)]*
Total Project Site Area (acres)	*[If Phased, include only the Phase covered by this SWCP.]*
Total Pre-project Impervious Area (SF)	
Total New Impervious Area (SF)	
Total Replaced Impervious Area (SF)	
Total Post-project Impervious Area (SF)	
Net Impervious Area	*[= New + Replaced – (Pre - Post)]*

II. **Site Stormwater Assessment** [*Correlating to the Site Stormwater Assessment Exhibit*]

a. Project Description

[Include site information, such as division of parcels, planned land uses, zoning setbacks and open space requirements, project phasing details, number of units or square footage, parking requirements, neighborhood characteristics, project design objectives (i.e. LEED certification). List of permits requested and other permits required (401, 404, Caltrans Encroachment, etc). Include Vicinity Map.]

b. Existing Site Features and Conditions

[Include narrative of site characteristics and topography, especially hydrological features, including natural areas, wetlands, watercourses (including seasonal), seeps or springs. Note existing and previously known land uses and potential sources of pollutants. Describe soil types and hydrologic soil groups, vegetative cover, previously compacted and impervious areas. Note wells, interesting land formations, or rock outcrops, if any. Describe existing drainage for the site and nearby areas, including any municipal storm drains or private storm drain networks. Note any stormwater run-on to be considered. Note the Watershed Management Zone(s) numbers and if there are any design exception per Table 3-3. Refer to the Site Stormwater Assessment Exhibit.]

c. Opportunities and Constraints for Stormwater Control

[Example of Opportunities: Existing natural or native areas, low areas or sumps, unbuildable areas, easements and required setbacks (open space or buffer zones), that could potentially be used for bioretention facilities. Differences in elevation that can provide hydraulic head for drainage. Landscape amenity requirements and use of drainage as a design element.]

[Example of Constraints: impermeable soils or bedrock, high groundwater, groundwater pollution or contaminated soils, steep slopes, geotechnical instability, density/high intensity land use, heavy pedestrian or vehicular traffic, utility locations, safety concerns.]

III. Design Strategy Narrative

a. Optimization of Site Layout *[Describe how each of the following was achieved:]*

i. Limitation of development envelope

ii. Preservation of natural drainage features

iii. Setbacks from creeks, wetlands, and riparian habitats

iv. Minimization of imperviousness

b. Use of Permeable Pavements

[If applicable, describe the pavement product, placement and any infiltration-related details.]

c. Low Impact Development (LID) Measures Used

[Describe the use of LID in the design and for what purpose – treatment, runoff reduction, as a structural control measure? If not used, explain why. Refer to Support Calculations in Attachment A but do not include in text.]

IV. Documentation of Drainage Design

a. List of Performance Requirements that Apply to the Project

[This list must correlate to the Coversheet and Checklists found in Appendix B, which are to be included as Attachment B]

b. Description of each Drainage Management Areas (DMAs)

i. Table X. Drainage Management Areas

[See next page - Correlating to the Drainage Management Area (DMA) Exhibit]

DMA Name/ Number	Surface Type	Area (square feet)	Drains [description of area]	Drains to			Notable or Exceptional characteristics or conditions
				Self-retaining/ treating	SCM (Name)	DMA (Name)	
[1]	*[Roof]*	*[1000]*	*[roof run-off]*			*[DMA 4]*	*[Roof runoff directed into vegetated areas for infiltration.]*
[2]	*[Parking with Permeable Pavers.]*	*[250]*	*[northwest corner of parking lot.]*	*[X]*			*[Area within Hydrologic soil group B, allowing for infiltration.]*
	Total Area	*[1250]*					

[Add rows as needed to cover the entire site so Total Area = Total Project Site Area.]

b. Summary of Runoff Reduction Measures (PR 1) and Structural Control Measures, by DMA (and entire site)

[Describe the use of Measures here in narrative or tabular form.]

a. Summary of Calculations meeting Water Treatment, Runoff Retention and Peak Performance Requirements (PR 2, 3 and 4)*[as applicable] [Refer to Support Calculations (Attachment A)]*

i. Water Treatment (PR 2)

[Include narrative of which Water Treatment system(s) was chosen and why (Low Impact Development (LID) Measures, Biofiltration, or Non-Retention Based Systems.]

ii. Runoff Retention (PR 3)

[Include narrative of which Runoff Retention measures (and Structural Control Measures (SCMs) were chosen and why. Include reference or a summary table showing how the project has met required hydraulic analysis and sizing methods.]

iii. Peak Performance (PR 4)

[Provide or refer to a summary table (Compliance with Peak Management Requirements (PR 3)) showing that post-development flows will not exceed pre-project flows for the 2 through 10 year storm events.]

b. Special Circumstances Documentation (PR 5) *[if applicable]*

[State special circumstance: 1) Highly Altered Channel 2) Intermediate Flow Control Facility, or 3) Historic Lake or Wetland? Provide evidence that the project cannot meet PRs for Runoff retention and Peak Performance requirements, and that the design does not result in adverse impacts to downstream receiving waters. Reference Support Calculations (Attachment A). In these cases, the County will be required to submit the SWCP to the Central Coast RWQCB for review and approval, so state the case clearly and comprehensively to help the process.]

c. Technical Infeasibility Documentation *[if applicable]*

[Describe reason(s) for Technical Infeasibility, summary of Equivalent Impervious Surface Area calculation, and description of how the site has accomplished dedication of no less than 10% of the Equivalent Impervious Surface Area for retention.]

d. Alternative Compliance Documentation *[if applicable]*

[Must include, at a minimum:

- *the location of the proposed off site project(s) that must be in the same watershed. (If outside, requires Central Coast RWQCB approval.)*
- *A schedule for completion of the off-site project(s).]*

V. Source Control Measures

a. Site activities and identification of potential sources of pollutants

[Include narrative]

b. Pollutant Source and Source Control Table

Potential Source of runoff pollutants (note DMA)	Permanent source control BMPs proposed	Operational source control BMPs proposed
[Parking Lot - Oil and Grease]	*[Oil and grease separator.]*	*[Have vehicles serviced regularly.]*

VI. Stormwater Facilities Operations and Maintenance

a. Narrative and Summary of Maintenance Requirements of each Stormwater Facility

[*Correlates to the O & M Forms found in Appendix B-16 of Handbook. Recordation required prior to occupancy.]*

VII. Certification Statement Forms [*Templates in Appendix B-16 of Handbook.*]

TABLES

Table 1. Project Data

Table X. Drainage Management Areas

Table X. Table of Runoff Reduction and Structural Control Measures

Table X. Compliance with Peak Management Requirements (PR 3)

Table X. Sources and Source Control Measures

ATTACHMENTS

A. Support Calculations

B. Completed Stormwater Control Plan Checklist and Performance Requirement Checklists *[from Handbook Appendix B-7].*

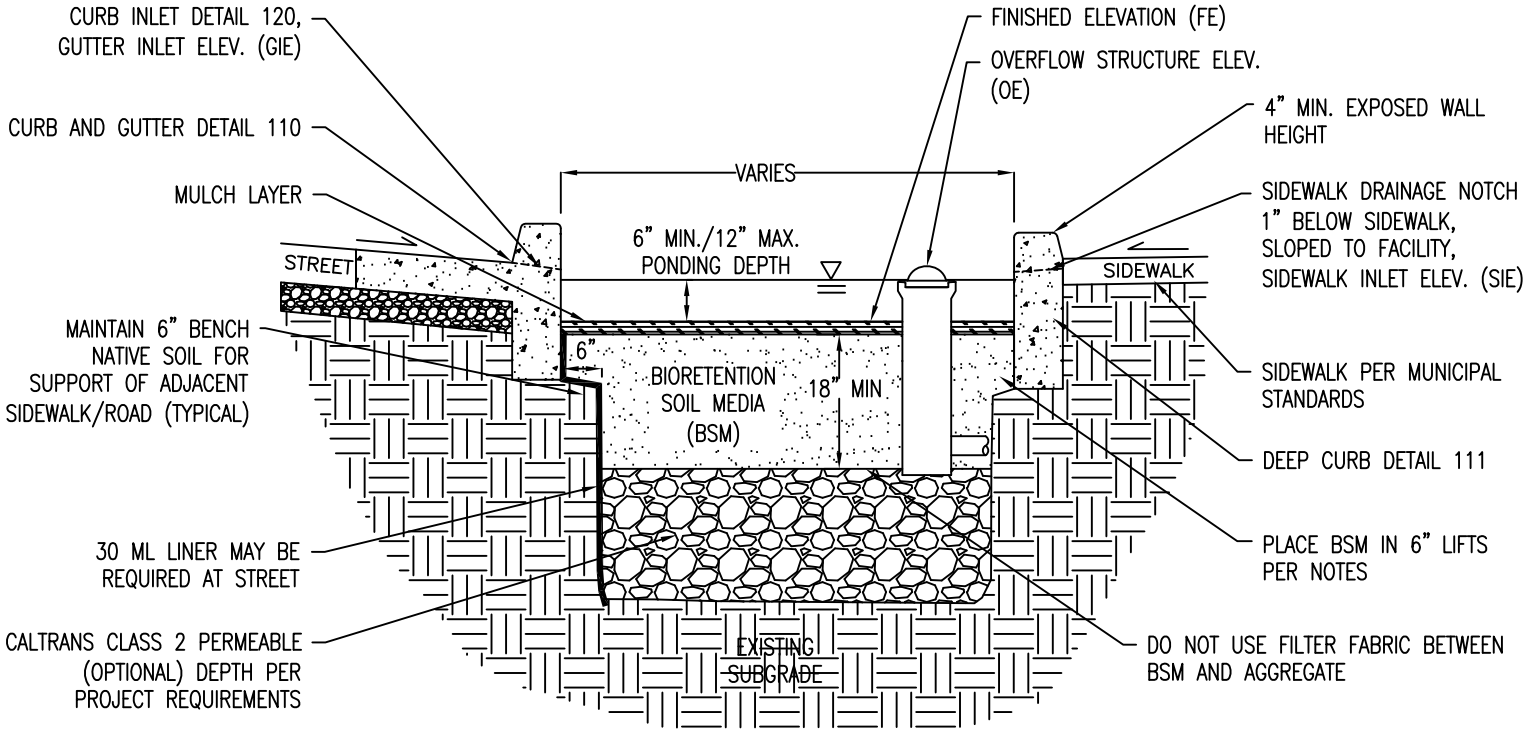
C. Site Stormwater Assessment Exhibit *[See SWCP Checklist for description]*

D. Drainage Management Area (DMA) Exhibit *[See SWCP Checklist for description.]*

E. Draft Operations and Maintenance Forms *[from Handbook Appendix B-16].*

Appendix H -

Low Impact Development Stormwater Management Typical Details



DESIGN NOTES

1. ADDITIONAL DESIGN GUIDANCE PROVIDED IN BIORETENTION TECHNICAL SPECIFICATIONS DOCUMENT.
2. OVERFLOW STRUCTURE REQUIRED FOR IN-LINE SYSTEMS WITHOUT OVERFLOW BYPASS, DETAIL 140.
3. PROVIDE SPOT ELEVATIONS AT INLETS ON CIVIL PLANS (FE, OE, GIE, SIE). SEE DETAIL 120.
4. EDGE CONDITION WILL VARY FOR NEW AND RETROFIT PROJECTS. CURB, WALL, AND SIDEWALK DETAILS MAY BE MODIFIED FOR PROJECT BY CIVIL AND GEOTECHNICAL ENGINEERS.
5. IF CHECK DAMS ARE NEEDED, SEE CONCRETE CHECK DAM DETAIL 131.
6. PROVIDE MONITORING WELL IN EACH FACILITY, PER BIORETENTION TECHNICAL SPECIFICATIONS.
7. IF CALTRANS CLASS 2 PERMEABLE IS NOT AVAILABLE, SUBSTITUTE CLASS 3 PERMEABLE WITH AN OVERLYING 3" DEEP LAYER OF 3/4" (NO. 4) OPEN-GRADED AGGREGATE.
8. BIORETENTION SOIL MEDIA (BSM) SPECIFICATION PER BIORETENTION TECHNICAL SPECIFICATIONS.
9. PLANTING DESIGN AND IRRIGATION PER BIORETENTION TECHNICAL SPECIFICATIONS.
10. MULCH (OPTIONAL) PER BIORETENTION TECHNICAL SPECIFICATIONS.
11. LOCATE ENERGY DISSIPATION COBBLE ONLY AS SPECIFIED IN INLET DETAILS – AVOID DECORATIVE USE.

CONSTRUCTION NOTES

1. SCARIFY SUBGRADE BEFORE INSTALLING BIORETENTION AREA AGGREGATE AND BSM.
2. FACILITY EXCAVATION TO ALLOW FOR SPECIFIED SOIL AND MULCH DEPTHS TO ACHIEVE FINISHED ELEVATIONS ON CIVIL PLANS.
3. COMPACT EACH 6" LIFT OF BSM WITH LANDSCAPE ROLLER OR BY LIGHTLY WETTING. IF WETTING, ALLOW TO DRY OVERNIGHT BEFORE PLANTING.
4. DO NOT WORK WITHIN BIORETENTION AREA DURING RAIN OR UNDER WET CONDITIONS.
5. KEEP HEAVY MACHINERY OUTSIDE BIORETENTION AREA LIMITS.

LOW IMPACT DEVELOPMENT STORMWATER MANAGEMENT TYPICAL DETAILS VERSION: 3/6/2013

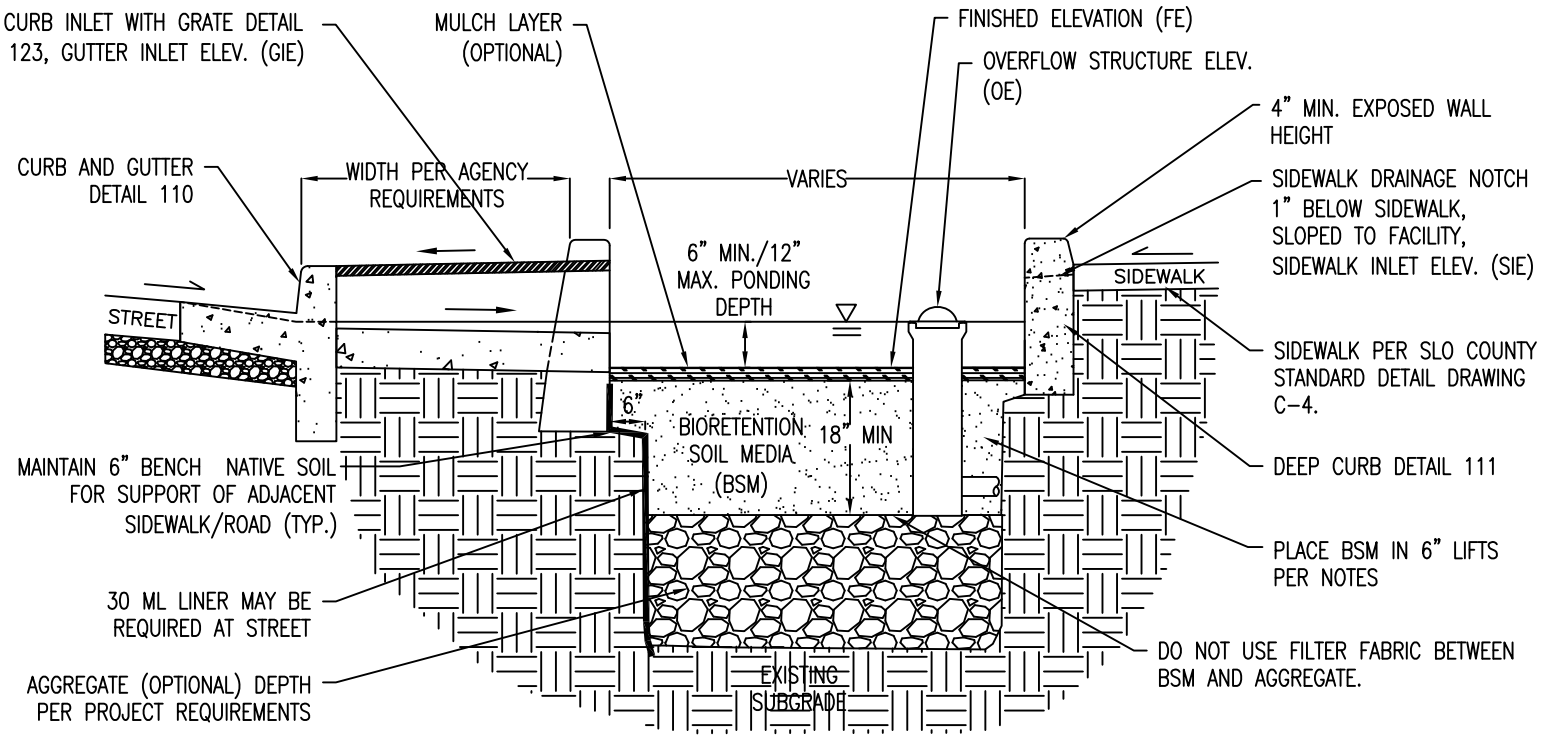
Detail Number

SAN LUIS OBISPO COUNTY

Street Bioretention Facility

(flat/planter, no on-street parking, sidewalk, without underdrain)

100



DESIGN NOTES

1. ADDITIONAL DESIGN GUIDANCE PROVIDED IN BIORETENTION TECHNICAL SPECIFICATIONS DOCUMENT.
2. OVERFLOW STRUCTURE REQUIRED FOR IN-LINE SYSTEMS WITHOUT OVERFLOW BYPASS, DETAIL 140.
3. PROVIDE SPOT ELEVATIONS AT INLETS ON CIVIL PLANS (FE, OE, GIE, SIE). SEE DETAIL 120.
4. EDGE CONDITION WILL VARY FOR NEW AND RETROFIT PROJECTS. CURB, WALL, AND SIDEWALK DETAILS MAY BE MODIFIED FOR PROJECT BY CIVIL AND GEOTECHNICAL ENGINEERS.
5. IF CHECK DAMS ARE NEEDED, SEE CONCRETE CHECK DAM DETAIL 131.
6. PROVIDE MONITORING WELL IN EACH FACILITY, PER BIORETENTION TECHNICAL SPECIFICATIONS.
7. IF CALTRANS CLASS 2 PERMEABLE IS NOT AVAILABLE, SUBSTITUTE CLASS 3 PERMEABLE WITH AN OVERLYING 3" DEEP LAYER OF 3/4" (NO. 4) OPEN-GRADED AGGREGATE.
8. BIORETENTION SOIL MEDIA (BSM) SPECIFICATION PER BIORETENTION TECHNICAL SPECIFICATIONS.
9. PLANTING DESIGN AND IRRIGATION PER BIORETENTION TECHNICAL SPECIFICATIONS.
10. MULCH (OPTIONAL) PER BIORETENTION TECHNICAL SPECIFICATIONS.
11. LOCATE ENERGY DISSIPATION COBBLE ONLY AS SPECIFIED IN INLET DETAILS – AVOID DECORATIVE USE.

CONSTRUCTION NOTES

1. SCARIFY SUBGRADE BEFORE INSTALLING BIORETENTION AREA AGGREGATE AND BSM.
2. FACILITY EXCAVATION TO ALLOW FOR SPECIFIED SOIL AND MULCH DEPTHS TO ACHIEVE FINISHED ELEVATIONS ON CIVIL PLANS.
3. COMPACT EACH 6" LIFT OF BSM WITH LANDSCAPE ROLLER OR BY LIGHTLY WETTING. IF WETTING, ALLOW TO DRY OVERNIGHT BEFORE PLANTING.
4. DO NOT WORK WITHIN BIORETENTION AREA DURING RAIN OR UNDER WET CONDITIONS.
5. KEEP HEAVY MACHINERY OUTSIDE BIORETENTION AREA LIMITS.

LOW IMPACT DEVELOPMENT STORMWATER MANAGEMENT TYPICAL DETAILS VERSION: 3/6/2013

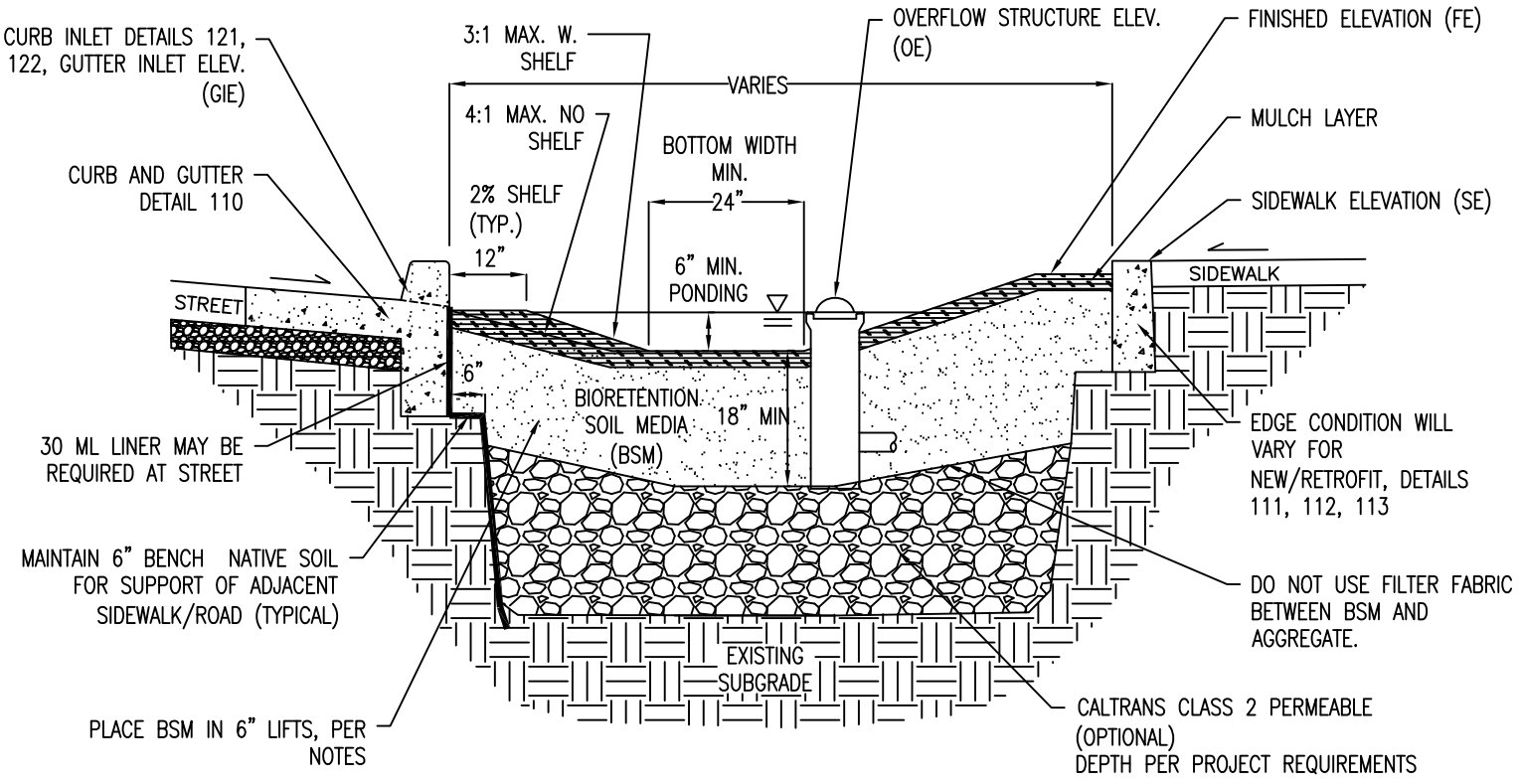
SAN LUIS OBISPO COUNTY

Street Bioretention Facility

(flat/planter, on-street parking, sidewalk, without underdrain)

Detail Number

101



DESIGN NOTES

1. ADDITIONAL DESIGN GUIDANCE PROVIDED IN BIORETENTION TECHNICAL SPECIFICATIONS DOCUMENT.
2. OVERFLOW STRUCTURE REQUIRED FOR IN-LINE SYSTEMS WITHOUT OVERFLOW BYPASS, DETAIL 140.
3. PROVIDE SPOT ELEVATIONS AT INLETS ON CIVIL PLANS (FE, OE, GIE, SE). SEE DETAILS 121, 122.
4. MAX. LONGITUDINAL SLOPE 6% WITH CHECK DAMS. SEE DETAILS 130, 131.
5. EDGE CONDITION WILL VARY FOR NEW AND RETROFIT PROJECTS. CURB AND SIDEWALK DETAILS MAY BE MODIFIED FOR PROJECT BY CIVIL AND GEOTECHNICAL ENGINEERS.
6. PROVIDE MONITORING WELL IN EACH FACILITY, PER BIORETENTION TECHNICAL SPECIFICATIONS.
7. IF CALTRANS CLASS 2 PERMEABLE IS NOT AVAILABLE, SUBSTITUTE CLASS 3 PERMEABLE WITH AN OVERLYING 3" DEEP LAYER OF 3/4" (NO. 4) OPEN-GRADED AGGREGATE.
8. BIORETENTION SOIL MEDIA (BSM) SPECIFICATION PER BIORETENTION TECHNICAL SPECIFICATIONS.
8. PLANTING DESIGN AND IRRIGATION PER BIORETENTION TECHNICAL SPECIFICATIONS.
8. MULCH (OPTIONAL) PER BIORETENTION TECHNICAL SPECIFICATIONS.
9. LOCATE ENERGY DISSIPATION COBBLE ONLY AS SPECIFIED IN INLET DETAILS – AVOID DECORATIVE USE.

CONSTRUCTION NOTES

1. SCARIFY SUBGRADE BEFORE INSTALLING BIORETENTION AREA AGGREGATE AND BSM.
2. FACILITY EXCAVATION TO ALLOW FOR SPECIFIED SOIL AND MULCH DEPTHS TO ACHIEVE FINISHED ELEVATIONS ON CIVIL PLANS.
3. COMPACT EACH 6" LIFT OF BSM WITH LANDSCAPE ROLLER OR BY LIGHTLY WETTING. IF WETTING, ALLOW TO DRY OVERNIGHT BEFORE PLANTING.
4. DO NOT WORK WITHIN BIORETENTION AREA DURING RAIN OR UNDER WET CONDITIONS.
5. KEEP HEAVY MACHINERY OUTSIDE BIORETENTION AREA LIMITS.

LOW IMPACT DEVELOPMENT STORMWATER MANAGEMENT TYPICAL DETAILS VERSION: 3/6/2013

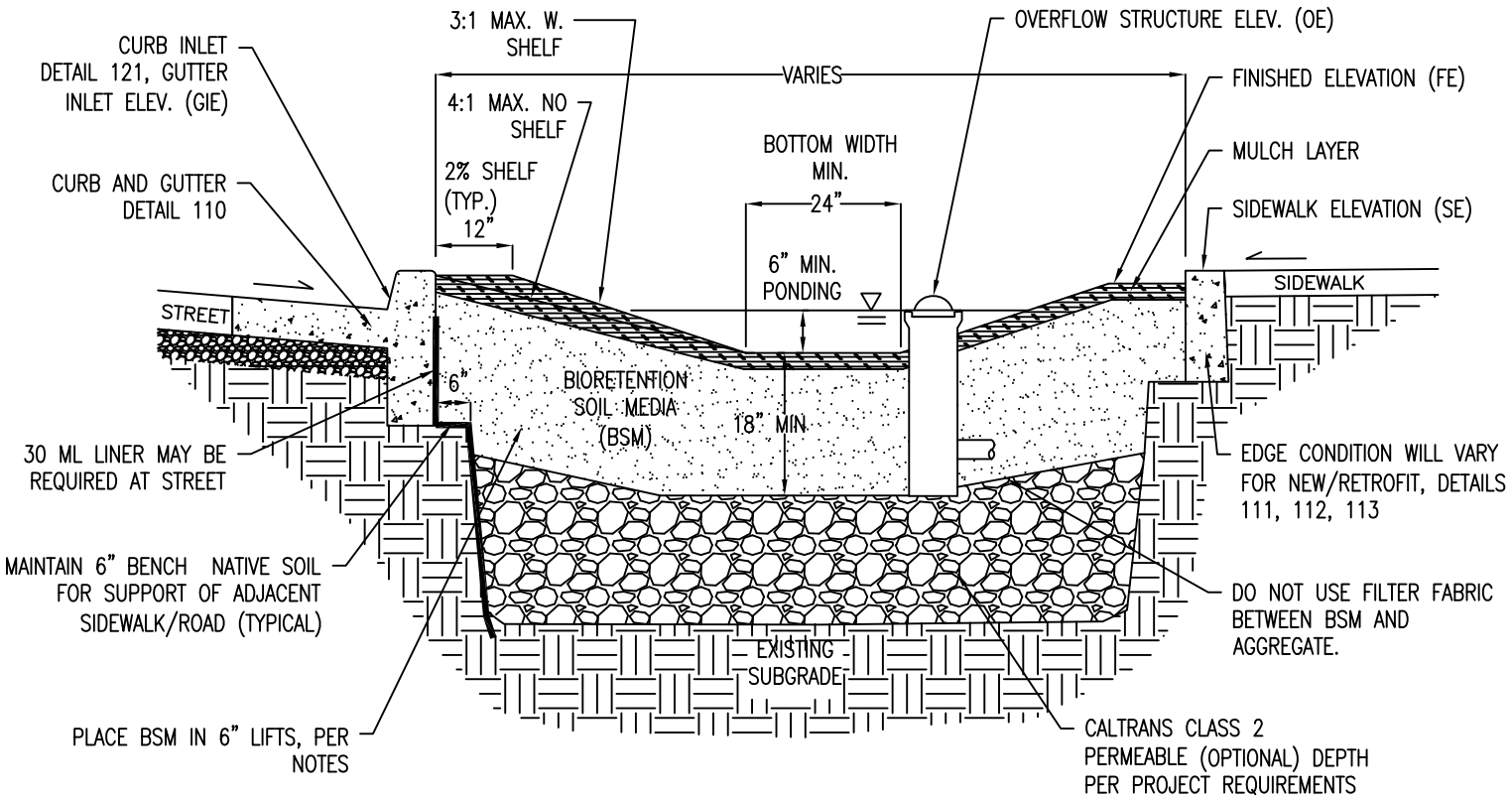
Detail Number

SAN LUIS OBISPO COUNTY

Street Bioretention Facility

(sloped sided, no on-street parking, sidewalk, without underdrain)

102



DESIGN NOTES

1. ADDITIONAL DESIGN GUIDANCE PROVIDED IN BIORETENTION TECHNICAL SPECIFICATIONS DOCUMENT.
2. OVERFLOW STRUCTURE REQUIRED FOR IN-LINE SYSTEMS WITHOUT OVERFLOW BYPASS, DETAIL 140.
3. PROVIDE SPOT ELEVATIONS AT INLETS ON CIVIL PLANS (FE, OE, GIE, SE). SEE DETAIL 121.
4. MAX. LONGITUDINAL SLOPE 6% WITH CHECK DAMS. SEE DETAILS 130, 131.
5. EDGE CONDITION WILL VARY FOR NEW AND RETROFIT PROJECTS. CURB AND SIDEWALK DETAILS MAY BE MODIFIED FOR PROJECT BY CIVIL AND GEOTECHNICAL ENGINEERS.
6. PROVIDE MONITORING WELL IN EACH FACILITY, PER BIORETENTION TECHNICAL SPECIFICATIONS.
7. IF CALTRANS CLASS 2 PERMEABLE IS NOT AVAILABLE, SUBSTITUTE CLASS 3 PERMEABLE WITH AN OVERLYING 3" DEEP LAYER OF 3/4" (NO. 4) OPEN-GRADED AGGREGATE.
8. BIORETENTION SOIL MEDIA (BSM) SPECIFICATION PER BIORETENTION TECHNICAL SPECIFICATIONS.
8. PLANTING DESIGN AND IRRIGATION PER BIORETENTION TECHNICAL SPECIFICATIONS.
8. MULCH (OPTIONAL) PER BIORETENTION TECHNICAL SPECIFICATIONS.
9. LOCATE ENERGY DISSIPATION COBBLE ONLY AS SPECIFIED IN INLET DETAILS – AVOID DECORATIVE USE.

CONSTRUCTION NOTES

1. SCARIFY SUBGRADE BEFORE INSTALLING BIORETENTION AREA AGGREGATE AND BSM.
2. FACILITY EXCAVATION TO ALLOW FOR SPECIFIED SOIL AND MULCH DEPTHS TO ACHIEVE FINISHED ELEVATIONS ON CIVIL PLANS.
3. COMPACT EACH 6" LIFT OF BSM WITH LANDSCAPE ROLLER OR BY LIGHTLY WETTING.

   IF WETTING, ALLOW TO DRY OVERNIGHT BEFORE PLANTING.
4. DO NOT WORK WITHIN BIORETENTION AREA DURING RAIN OR UNDER WET CONDITIONS.
5. KEEP HEAVY MACHINERY OUTSIDE BIORETENTION AREA LIMITS.

LOW IMPACT DEVELOPMENT STORMWATER MANAGEMENT TYPICAL DETAILS VERSION: 3/6/2013

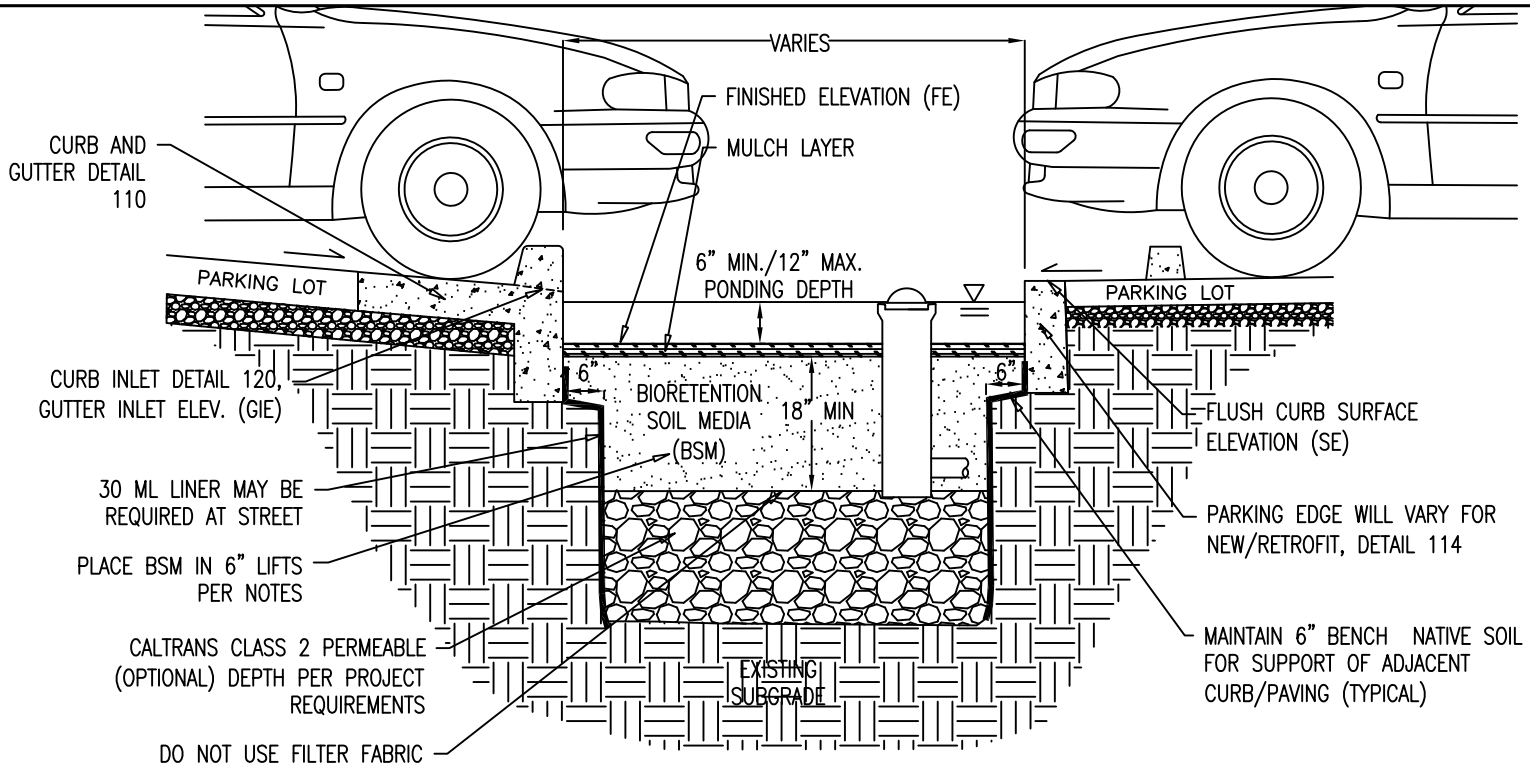
SAN LUIS OBISPO COUNTY

Street Bioretention Facility

(sloped sided, w. on-street parking, sidewalk, without underdrain)

Detail Number

103



DESIGN NOTES

1. ADDITIONAL DESIGN GUIDANCE PROVIDED IN BIORETENTION TECHNICAL SPECIFICATIONS DOCUMENT.
2. OVERFLOW STRUCTURE REQUIRED FOR IN-LINE SYSTEMS WITHOUT OVERFLOW BYPASS, DETAIL 140.
3. PROVIDE SPOT ELEVATIONS AT INLETS ON CIVIL PLANS (FE, OE, GIE, SE). SEE DETAIL 120.
4. EDGE CONDITION WILL VARY FOR PARKING LOT PROJECTS. SEE PARKING LOT EDGE OPTIONS DETAILS, 114. CURB AND FLUSH EDGE DETAILS MAY BE MODIFIED FOR PROJECT BY CIVIL AND GEOTECHNICAL ENGINEERS.
5. IF CHECK DAMS ARE NEEDED, SEE CONCRETE CHECK DAM DETAIL 131.
6. PROVIDE MONITORING WELL IN EACH FACILITY, PER BIORETENTION TECHNICAL SPECIFICATIONS.
7. IF CALTRANS CLASS 2 PERMEABLE IS NOT AVAILABLE, SUBSTITUTE CLASS 3 PERMEABLE WITH AN OVERLYING 3" DEEP LAYER OF 3/4" (NO. 4) OPEN-GRADED AGGREGATE.
8. BIORETENTION SOIL MEDIA (BSM) SPECIFICATION PER BIORETENTION TECHNICAL SPECIFICATIONS.
9. PLANTING DESIGN AND IRRIGATION PER BIORETENTION TECHNICAL SPECIFICATIONS.
10. MULCH (OPTIONAL) PER BIORETENTION TECHNICAL SPECIFICATIONS.
11. LOCATE ENERGY DISSIPATION COBBLE ONLY AS SPECIFIED IN INLET DETAILS – AVOID DECORATIVE USE.

CONSTRUCTION NOTES

1. SCARIFY SUBGRADE BEFORE INSTALLING BIORETENTION AREA AGGREGATE AND BSM.
2. FACILITY EXCAVATION TO ALLOW FOR SPECIFIED SOIL AND MULCH DEPTHS TO ACHIEVE FINISHED ELEVATIONS ON CIVIL PLANS.
3. COMPACT EACH 6" LIFT OF BSM WITH LANDSCAPE ROLLER OR BY LIGHTLY WETTING.

   IF WETTING, ALLOW TO DRY OVERNIGHT BEFORE PLANTING.
4. DO NOT WORK WITHIN BIORETENTION AREA DURING RAIN OR UNDER WET CONDITIONS.
5. KEEP HEAVY MACHINERY OUTSIDE BIORETENTION AREA LIMITS.

LOW IMPACT DEVELOPMENT STORMWATER MANAGEMENT TYPICAL DETAILS VERSION: 3/6/2013

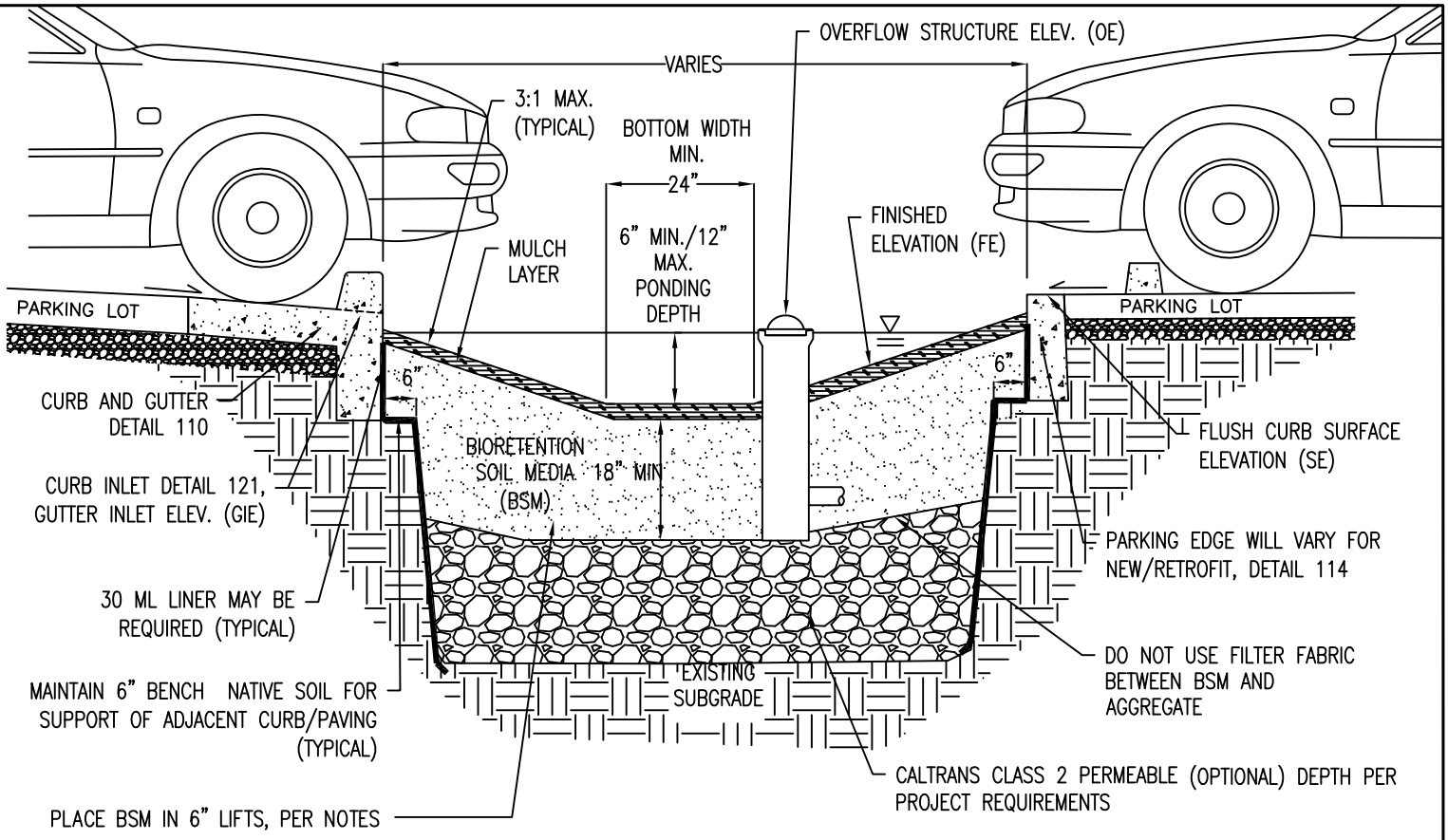
Detail Number

SAN LUIS OBISPO COUNTY

Parking Lot Bioretention Facility

(flat/planter, without underdrain)

104



DESIGN NOTES

1. ADDITIONAL DESIGN GUIDANCE PROVIDED IN BIORETENTION TECHNICAL SPECIFICATIONS DOCUMENT.
2. OVERFLOW STRUCTURE REQUIRED FOR IN-LINE SYSTEMS WITHOUT OVERFLOW BYPASS, DETAIL 140.
3. PROVIDE SPOT ELEVATIONS AT INLETS ON CIVIL PLANS (FE, OE, GIE, SE). SEE DETAIL 121.
4. MAX. LONGITUDINAL SLOPE 6% WITH CHECK DAMS. SEE DETAILS 130, 131.
4. EDGE CONDITION WILL VARY FOR PARKING LOT PROJECTS. SEE PARKING LOT EDGE OPTIONS DETAILS, 114. CURB AND FLUSH EDGE DETAILS MAY BE MODIFIED FOR PROJECT BY CIVIL AND GEOTECHNICAL ENGINEERS.
5. PROVIDE MONITORING WELL IN EACH FACILITY, PER BIORETENTION TECHNICAL SPECIFICATIONS.
6. IF CALTRANS CLASS 2 PERMEABLE IS NOT AVAILABLE, SUBSTITUTE CLASS 3 PERMEABLE WITH AN OVERLYING 3" DEEP LAYER OF 3/4" (NO. 4) OPEN-GRADED AGGREGATE.
7. BIORETENTION SOIL MEDIA (BSM) SPECIFICATION PER BIORETENTION TECHNICAL SPECIFICATIONS.
8. PLANTING DESIGN AND IRRIGATION PER BIORETENTION TECHNICAL SPECIFICATIONS.
8. MULCH (OPTIONAL) PER BIORETENTION TECHNICAL SPECIFICATIONS.
9. LOCATE ENERGY DISSIPATION COBBLE ONLY AS SPECIFIED IN INLET DETAILS – AVOID DECORATIVE USE.

CONSTRUCTION NOTES

1. SCARIFY SUBGRADE BEFORE INSTALLING BIORETENTION AREA AGGREGATE AND BSM.
2. FACILITY EXCAVATION TO ALLOW FOR SPECIFIED SOIL AND MULCH DEPTHS TO ACHIEVE FINISHED ELEVATIONS ON CIVIL PLANS.
3. COMPACT EACH 6" LIFT OF BSM WITH LANDSCAPE ROLLER OR BY LIGHTLY WETTING. IF WETTING, ALLOW TO DRY OVERNIGHT BEFORE PLANTING.
4. DO NOT WORK WITHIN BIORETENTION AREA DURING RAIN OR UNDER WET CONDITIONS.
5. KEEP HEAVY MACHINERY OUTSIDE BIORETENTION AREA LIMITS.

LOW IMPACT DEVELOPMENT STORMWATER MANAGEMENT TYPICAL DETAILS VERSION: 3/6/2013

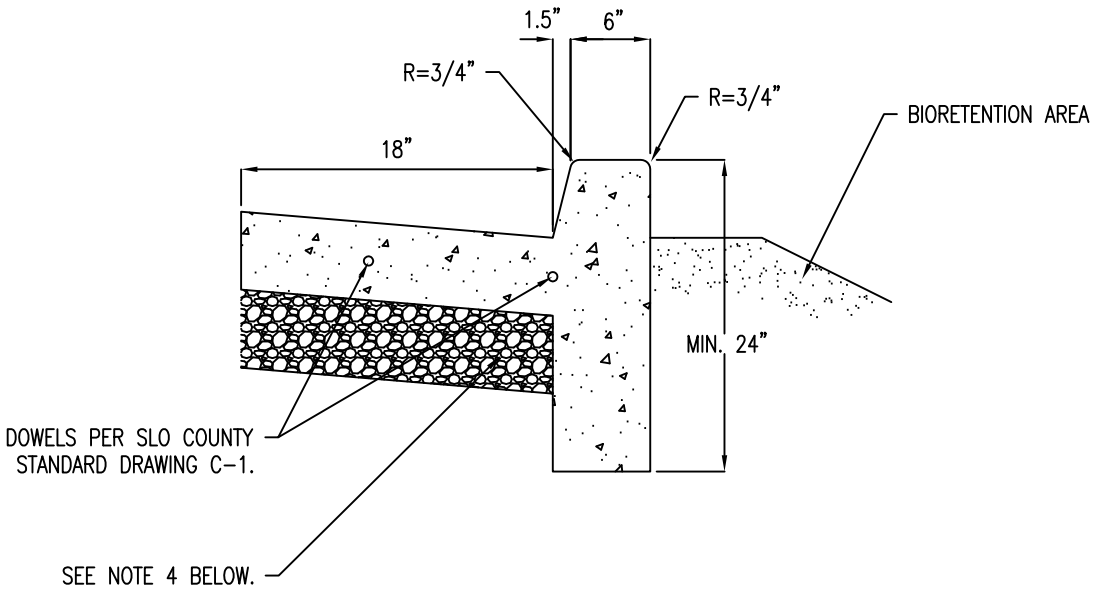
Detail Number

SAN LUIS OBISPO COUNTY

Parking Lot Bioretention Facility

(sloped sided, without underdrain)

105



DESIGN NOTES

1. SPECIAL DESIGN CONSIDERATION OR STRUCTURAL REVIEW MAY BE REQUIRED FOR LONGER PLANTER WALL SPANS. STEEL REINFORCEMENT OR ADDITIONAL CONCRETE CHECK DAMS MAY BE NEEDED FOR STABILITY.

2. EDGE CONDITION WILL VARY FOR NEW AND RETROFIT PROJECTS. CURB, GUTTER, AND WALL DETAILS MAY BE MODIFIED BY CIVIL AND GEOTECHNICAL ENGINEERS. CONSTRUCT

   CURB & GUTTER PER SLO COUNTY STANDARD DRAWING C-2, MODIFY AS SHOWN.

3. CONCRETE AND EXPANSION JOINTS SHALL MEET THE REQUIREMENTS OF SAN LUIS OBISPO COUNTY STANDARD DRAWING C-1.

4. 6" MINIMUM CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION OR MATCH BASE THICKNESS REQUIREMENT FOR NEW OR EXISTING ROAD SECTION, WHICHEVER IS GREATEST.

CONSTRUCTION NOTES

1. FINISH ALL EXPOSED CONCRETE SURFACES.

MODIFIED CURB AND GUTTER (110)
N.T.S.

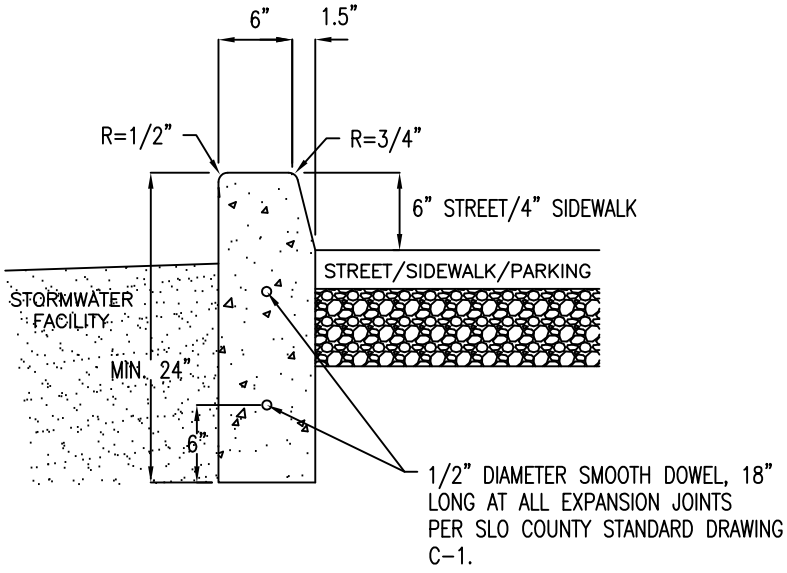
LOW IMPACT DEVELOPMENT STORMWATER MANAGEMENT TYPICAL DETAILS VERSION: 3/6/2013

SAN LUIS OBISPO COUNTY

Modified Curb and Gutter at Bioretention Facility

Detail Number

110



DESIGN NOTES

1. SPECIAL DESIGN CONSIDERATION OR STRUCTURAL REVIEW MAY BE REQUIRED FOR LONGER SWALE EDGE SPANS. STEEL REINFORCEMENT OR ADDITIONAL CONCRETE CHECK DAMS MAY BE NEEDED FOR STABILITY.

2. WHEN SIDEWALK DRAINS TO PLANTER, PROVIDE 4" – 6" WIDE NOTCH OPENINGS, 1" BELOW SIDEWALK, SLOPED TO FACILITY, PER BIORETENTION PLANTER DETAILS. SPACE OPENINGS TO CONVEY FLOWS. PROVIDE MINIMUM 2" COVER BETWEEN DRAINAGE NOTCH OPENING AND DOWELS.

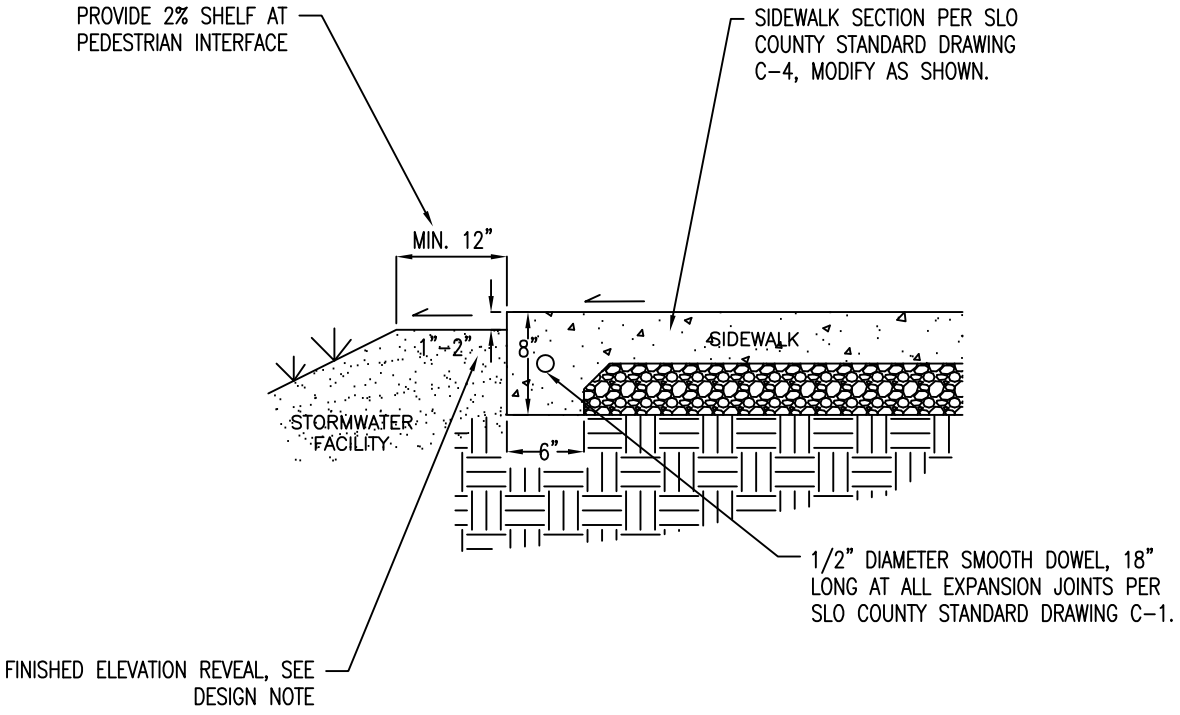
3. CONCRETE AND EXPANSION JOINTS SHALL MEET THE REQUIREMENTS OF SAN LUIS OBISPO COUNTY STANDARD DRAWING C-1.

CONSTRUCTION NOTES

1. FINISH ALL EXPOSED CONCRETE SURFACES.

DEEP CURB 111

N.T.S.



DESIGN NOTES

1. SPECIAL DESIGN CONSIDERATION OR STRUCTURAL REVIEW MAY BE REQUIRED FOR LONGER FACILITY EDGE SPANS. STEEL REINFORCEMENT OR ADDITIONAL CONCRETE CHECK DAMS MAY BE NEEDED FOR STABILITY.

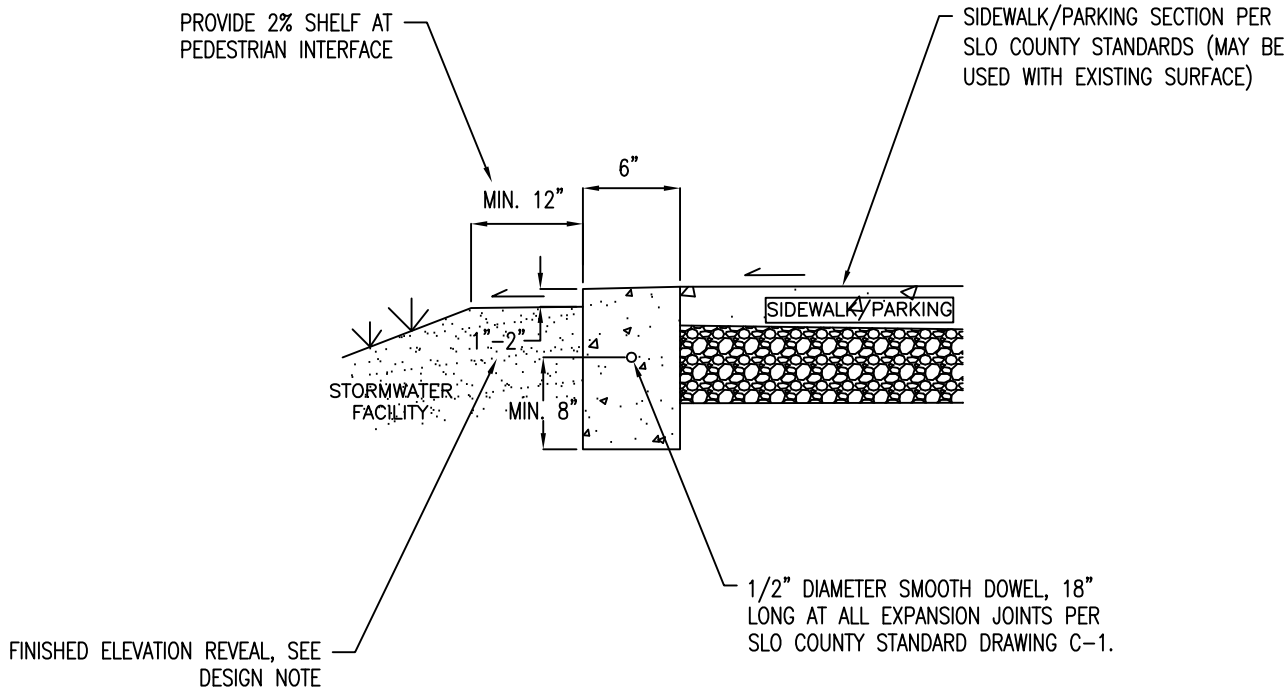
3. FINISHED ELEVATION REVEAL – WHERE SIDEWALK CONVEYS SHEET FLOW TO FACILITY, A 1"–2" REVEAL SHOULD BE MAINTAINED BETWEEN SIDEWALK AND FACILITY FINISHED GRADE TO AVOID MULCH OR PLANT BUILDUP FROM BLOCKING FLOWS.

4. CONCRETE AND EXPANSION JOINTS SHALL MEET THE REQUIREMENTS OF SAN LUIS OBISPO COUNTY STANDARD DRAWING C–1.

CONSTRUCTION NOTES

1. FINISH ALL EXPOSED CONCRETE SURFACES.

THICKENED EDGE SIDEWALK 112
N.T.S.



DESIGN NOTES

1. SPECIAL DESIGN CONSIDERATION OR STRUCTURAL REVIEW MAY BE REQUIRED FOR LONGER FACILITY EDGE SPANS. STEEL REINFORCEMENT OR ADDITIONAL CONCRETE CHECK DAMS MAY BE NEEDED FOR STABILITY.
2. EDGE CONDITION WILL VARY FOR PROJECTS. CURB DETAILS MAY BE MODIFIED BY CIVIL AND GEOTECHNICAL ENGINEERS.
3. CONCRETE AND EXPANSION JOINTS SHALL MEET THE REQUIREMENTS OF SLO COUNTY STANDARD DRAWING C–1.
4. FINISHED ELEVATION REVEAL AT SIDEWALK – WHERE SIDEWALK CONVEYS SHEET FLOW TO FACILITY, A 1"–2" REVEAL SHOULD BE MAINTAINED BETWEEN SIDEWALK AND FACILITY FINISHED GRADE TO AVOID MULCH OR PLANT BUILDUP FROM BLOCKING FLOWS AND REDUCE DROP AT PEDESTRIAN INTERFACE.

CONSTRUCTION NOTES

1. FINISH ALL EXPOSED CONCRETE SURFACES.

FLUSH CURB AT SIDEWALK

N.T.S.

113

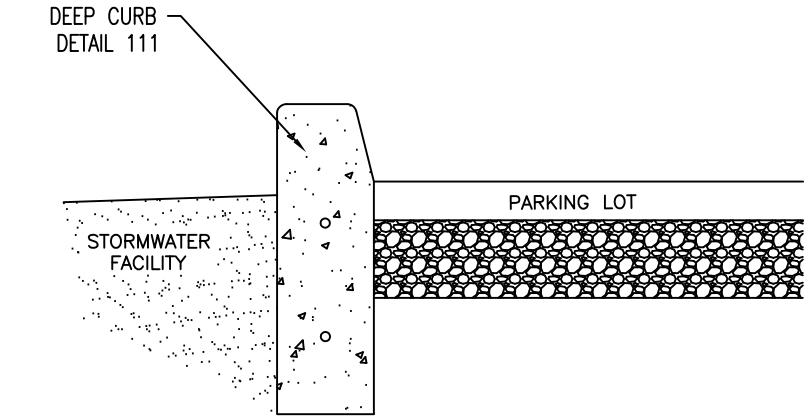
LOW IMPACT DEVELOPMENT STORMWATER MANAGEMENT TYPICAL DETAILS VERSION: 3/6/2013

SAN LUIS OBISPO COUNTY

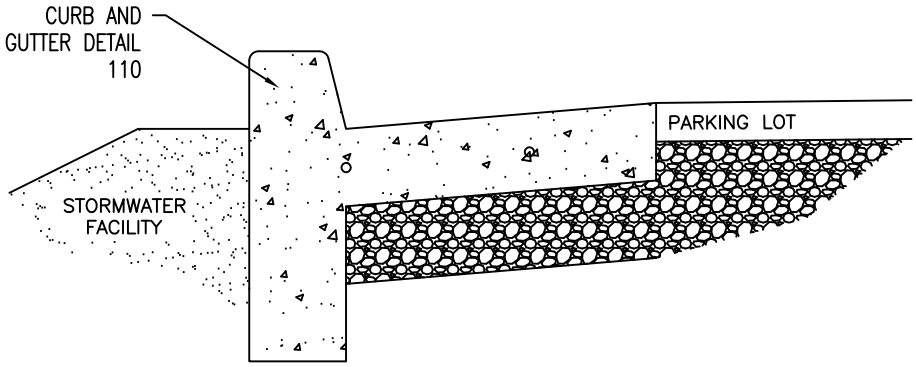
Flush Curb at Sidewalk

Detail Number

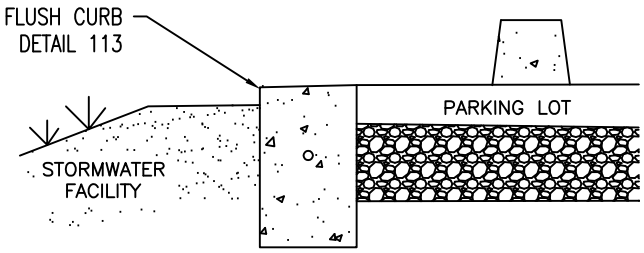
113



DEEP CURB



CURB AND GUTTER



FLUSH EDGE/WHEEL STOPS

DESIGN NOTES

1. WHEEL STOPS MAY BE USED ON NON-FLUSH DESIGNS TO KEEP CARS FROM OVERHANGING BIORETENTION FACILITY.
2. VEHICLE OVERHANG CAN BE USED TO REDUCE IMPERVIOUS PAVEMENT AREA.
3. WHERE VEHICLE OVERHANG IS UTILIZED SELECT LOW GROWING PLANTS THAT WILL TOLERATE SHADING.

PARKING LOT EDGE OPTIONS 114

N.T.S.

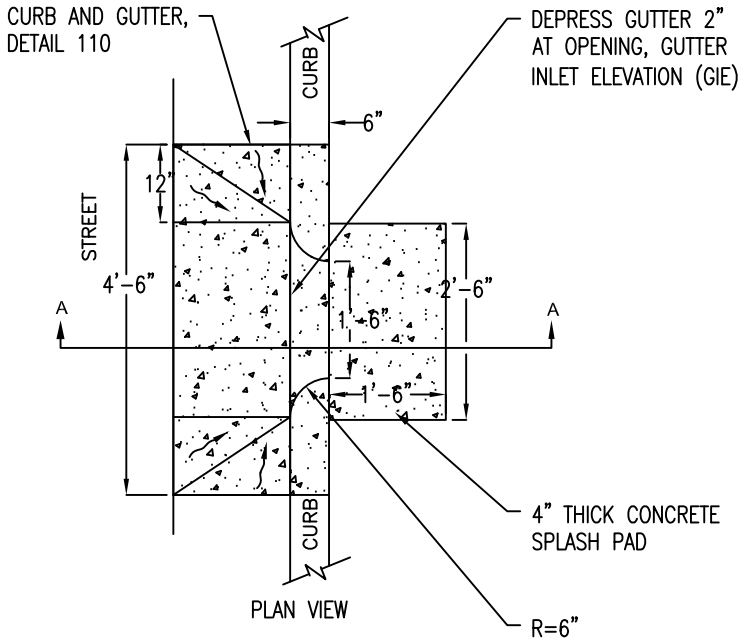
LOW IMPACT DEVELOPMENT STORMWATER MANAGEMENT TYPICAL DETAILS VERSION: 3/6/2013

Detail Number

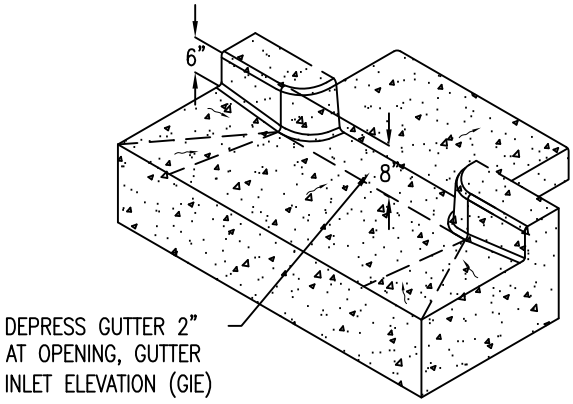
SAN LUIS OBISPO COUNTY

Parking Lot Edge Options

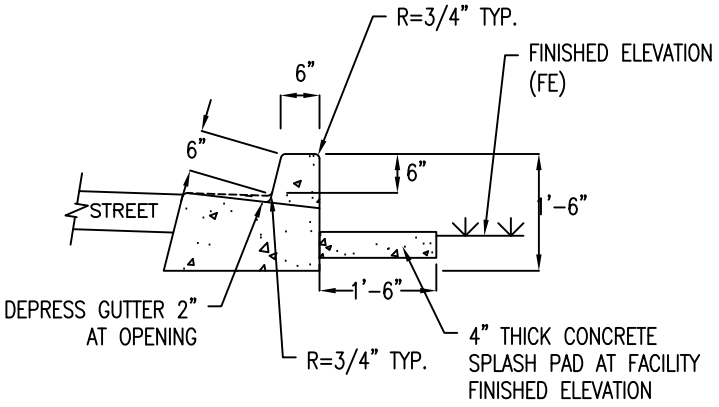
114



PLAN VIEW



PERSPECTIVE VIEW



SECTION A–A

\pt7.5;BIORETENTION DESIGN NOTES

1. FOR USE WITH STORMWATER FACILITIES WITH FLAT BOTTOMS.
2. PROVIDE SPOT ELEVATIONS ON PLANS (FE, OE, GIE, IE). SEE DETAIL 100.
3. CURB AND WALL DETAILS MAY BE MODIFIED BY CIVIL AND GEOTECHNICAL ENGINEERS.
4. CURB HEIGHT MAY BE REDUCED TO 4–INCHES WHERE ADJACENT TO A SIDEWALK. SEE DETAILS 110 & 111.

CONSTRUCTION NOTES

1. AFTER CONSTRUCTION PLACE SAND BAGS AT GUTTER

   OPENINGS TO KEEP STORM FLOWS FROM ENTERING FACILITY UNTIL VEGETATION IS ESTABLISHED.

CURB CUT TYPE 1

N.T.S.

120

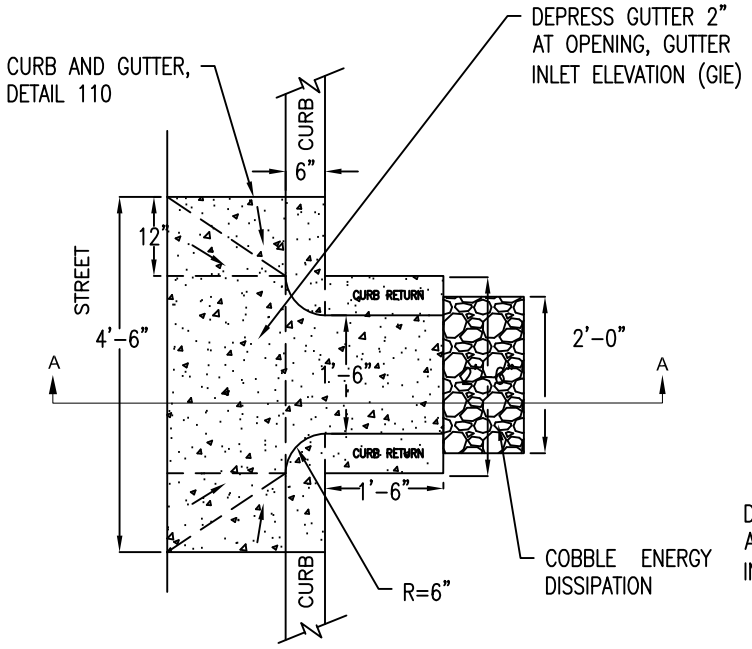
LOW IMPACT DEVELOPMENT STORMWATER MANAGEMENT TYPICAL DETAILS VERSION: 3/6/2013

Detail Number

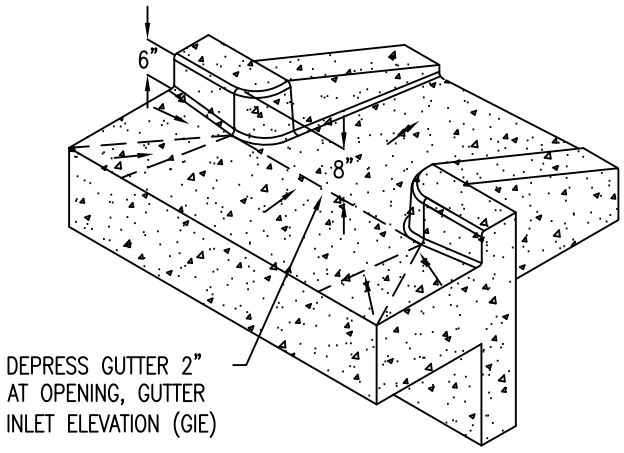
SAN LUIS OBISPO COUNTY

Curb Cut Inlet for Planters

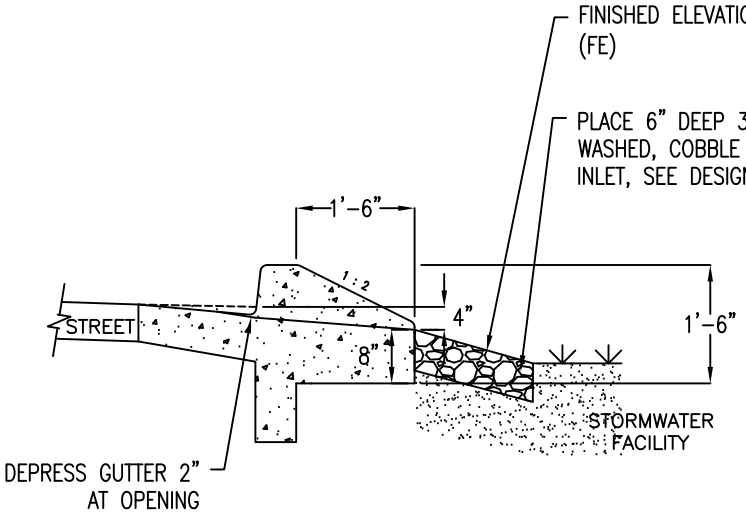
120



PLAN VIEW



PERSPECTIVE VIEW



SECTION A-A

\pt7.5;BIORETENTION DESIGN NOTES

1. FOR USE WITH STORMWATER FACILITIES WITH SIDE SLOPES.
2. PROVIDE SPOT ELEVATIONS ON PLANS (FE, OE, GIE, IE). SEE DETAIL 100.
3. CURB AND WALL DETAILS MAY BE MODIFIED BY CIVIL AND GEOTECHNICAL ENGINEERS.
4. WHERE INLET FLOW VELOCITY IS HIGH, EXTEND COBBLE INTO FACILITY, BUT AVOID EXCESSIVE USE.
5. CURB HEIGHT MAY BE REDUCED TO 4-INCHES WHERE ADJACENT TO A SIDEWALK. SEE DETAILS 110 & 111.

CONSTRUCTION NOTES

1. AFTER CONSTRUCTION PLACE SAND BAGS AT GUTTER OPENINGS TO KEEP STORM FLOWS FROM ENTERING FACILITY UNTIL VEGETATION IS ESTABLISHED.

CURB CUT TYPE 2

N.T.S.

121

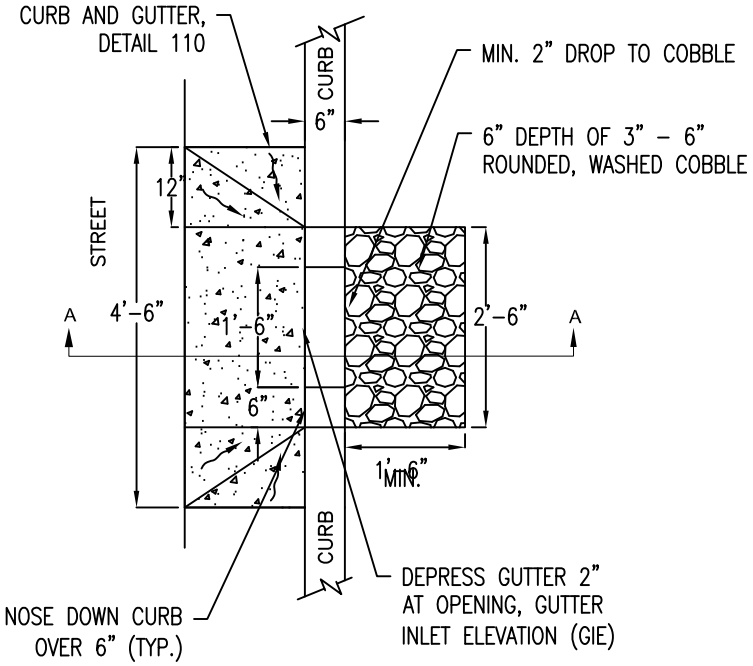
LOW IMPACT DEVELOPMENT STORMWATER MANAGEMENT TYPICAL DETAILS VERSION: 3/6/2013

Detail Number

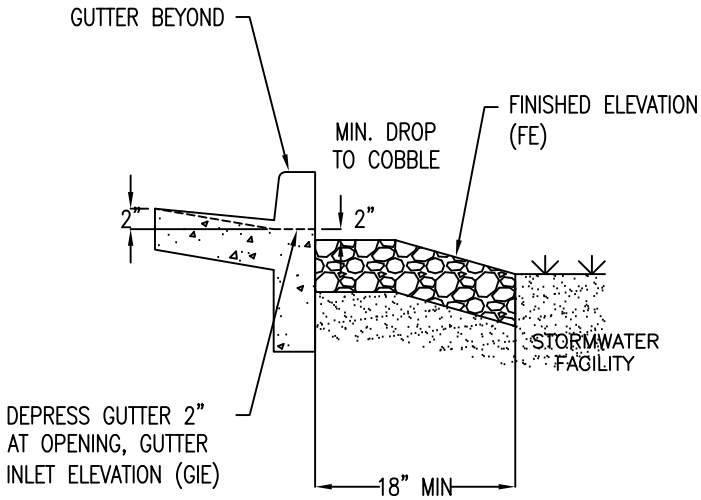
SAN LUIS OBISPO COUNTY

Curb Cut Inlet for Side Slopes (rain garden or swale)

121



PLAN VIEW



SECTION A–A

\pt7.5;BIORETENTION DESIGN NOTES

1. FOR USE WITH STORMWATER FACILITIES WITH SLOPED SIDES OR FLAT BOTTOMS.
2. PROVIDE SPOT ELEVATIONS ON PLANS (FE, OE, GIE, IE). SEE DETAILS 100, 101.
3. DROP FROM INLET TO AGGREGATE PAD WILL BE GREATER FOR PLANTERS.
3. CURB AND WALL DETAILS MAY BE MODIFIED BY CIVIL AND GEOTECHNICAL ENGINEERS.
4. WHERE INLET FLOW VELOCITY IS HIGH, EXTEND

CONSTRUCTION NOTES

1. AFTER CONSTRUCTION PLACE SAND BAGS AT GUTTER OPENINGS TO KEEP STORM FLOWS FROM ENTERING FACILITY UNTIL VEGETATION IS ESTABLISHED.

CURB CUT TYPE 3

N.T.S.

122

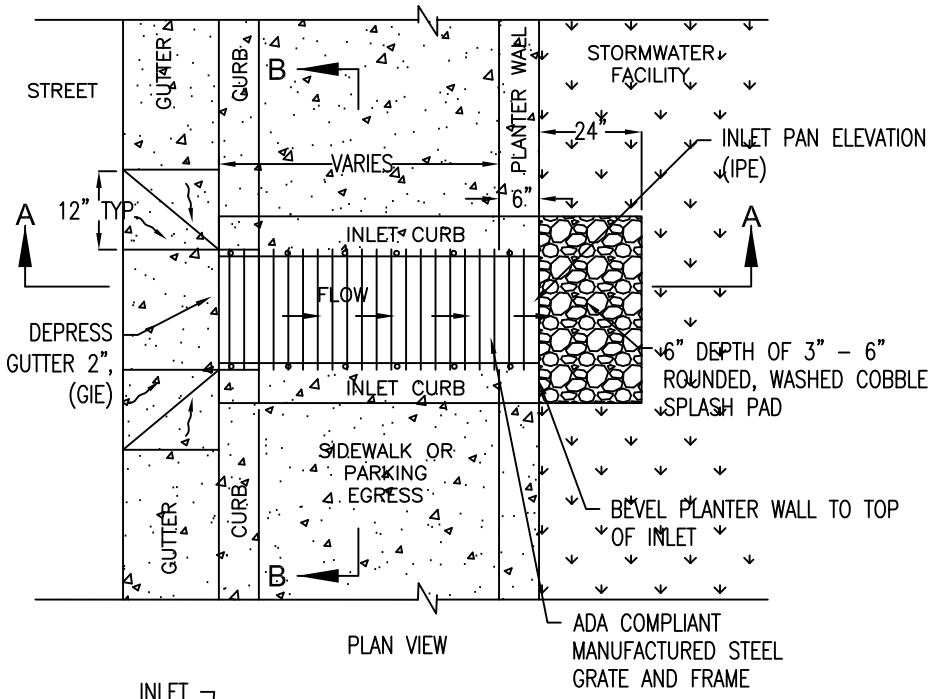
LOW IMPACT DEVELOPMENT STORMWATER MANAGEMENT TYPICAL DETAILS VERSION: 3/6/2013

Detail Number

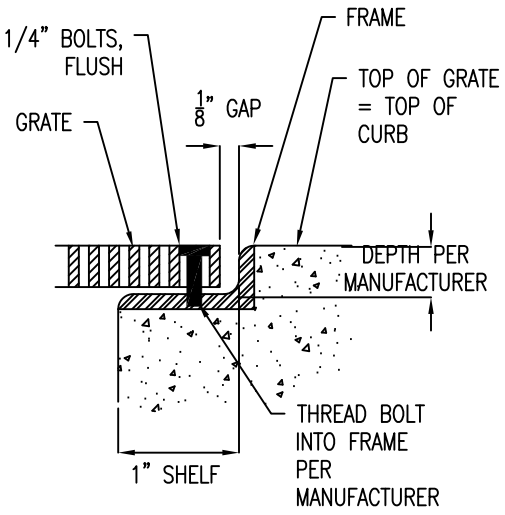
SAN LUIS OBISPO COUNTY

Curb Cut Inlet with Gravel Energy Dissipation

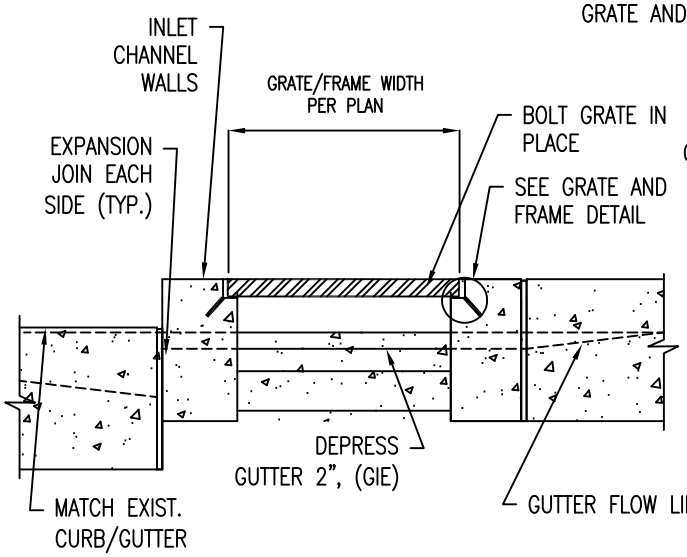
122



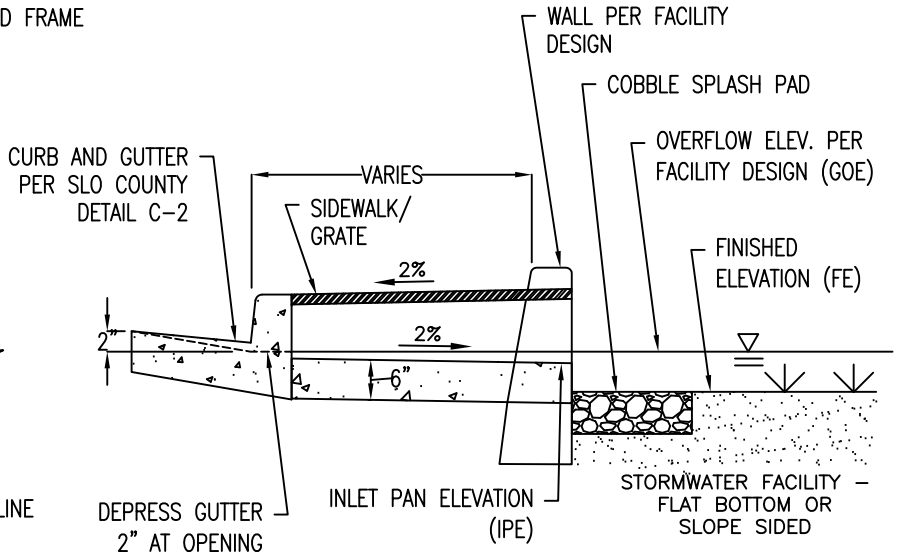
PLAN VIEW



GRATE AND FRAME



SECTION B–B



SECTION A–A

\pt7.5;BIORETENTION DESIGN NOTES

1. FOR USE WITH STORMWATER FACILITIES WITH SLOPED SIDES OR FLAT BOTTOMS.
2. PROVIDE SPOT ELEVATIONS ON PLANS (FE, OE, GIE, IPE). SEE DETAILS 100, 101.
3. REFER TO SLO COUNTY STANDARD DRAWINGS AND MATCH GUTTER PAN OF ADJACENT CURB AND GUTTER.
4. IF SLOPED SIDES, WHERE INLET FLOW VELOCITY IS HIGH, EXTEND COBBLE INTO FACILITY, BUT AVOID EXCESSIVE USE.
5. BASE MATERIAL FOR CURB, GUTTER, AND SIDEWALK PER SLO COUNTY STANDARDS.

CONSTRUCTION NOTES

1. AFTER CONSTRUCTION PLACE SAND BAGS AT GUTTER OPENINGS TO KEEP STORM FLOWS FROM ENTERING FACILITY UNTIL VEGETATION IS ESTABLISHED.

INLET WITH GRATE 123

N.T.S.

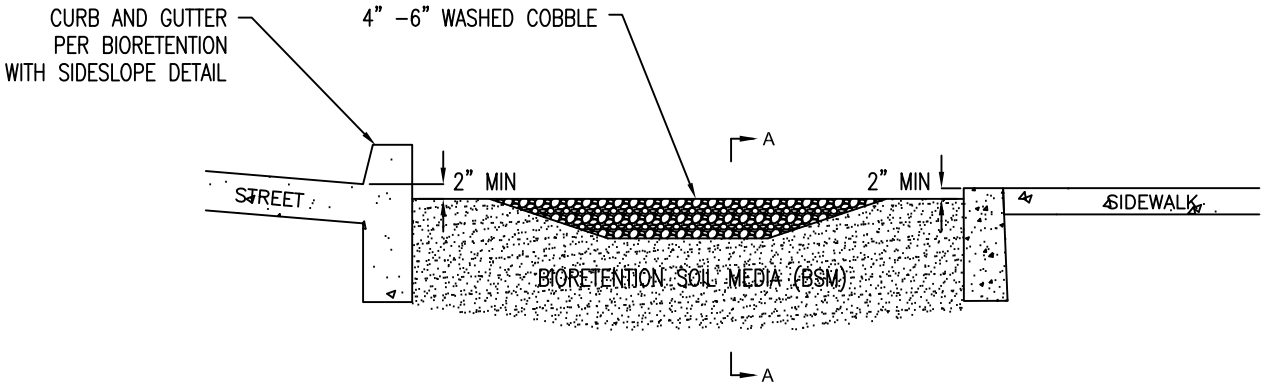
LOW IMPACT DEVELOPMENT STORMWATER MANAGEMENT TYPICAL DETAILS VERSION: 3/6/2013

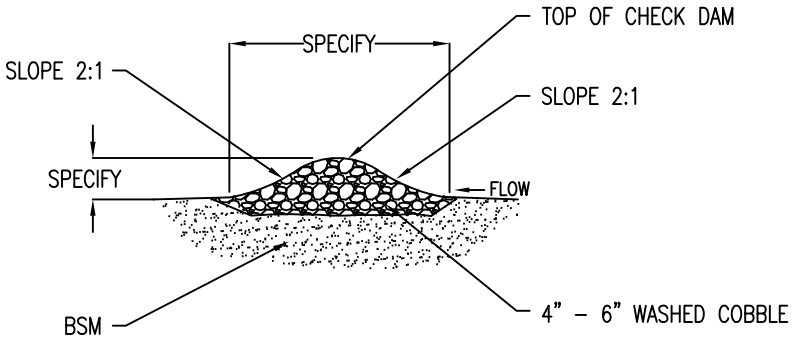
Detail Number

SAN LUIS OBISPO COUNTY

Inlet with Grate

123





SECTION A-A

\pt7.5;BIORETENTION DESIGN NOTES

1. FOR USE WITH STORMWATER FACILITIES WITH SLOPED SIDES.
2. BEST SUITED FOR FACILITIES WITH LONGITUDINAL SLOPES ≤ 2% .
3. PROVIDE ELEVATIONS AND STATIONING AND/OR DIMENSIONING FOR CHECK DAMS.
4. SPACE CHECK DAMS TO MAXIMIZE PONDING ACROSS ENTIRE CELL.
5. ENSURE THAT CHECK DAM ELEVATIONS DO NOT CAUSE STORMWATER TO OVERFLOW TO SIDEWALK.

CONSTRUCTION NOTES

1. DO NOT WORK DURING RAIN OR UNDER WET CONDITIONS.
2. KEEP ALL HEAVY MACHINERY OUTSIDE BIORETENTION AREA LIMITS.

GRAVEL CHECK DAM 130
N.T.S.

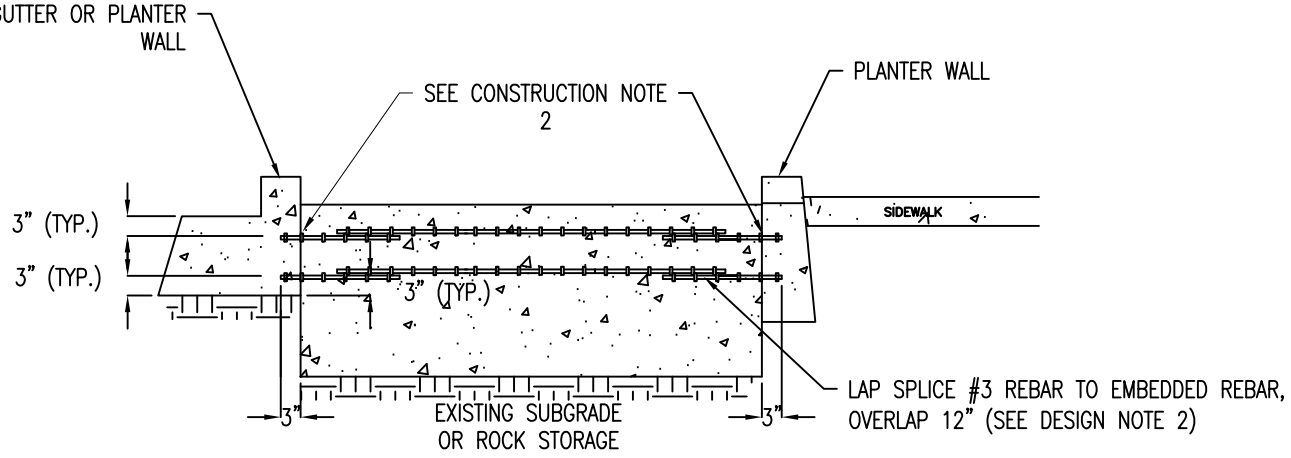
LOW IMPACT DEVELOPMENT STORMWATER MANAGEMENT TYPICAL DETAILS VERSION: 3/6/2013

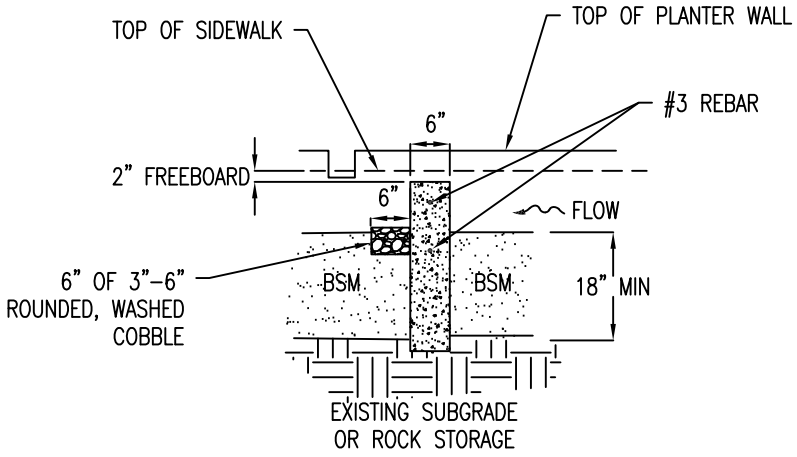
Detail Number

SAN LUIS OBISPO COUNTY

Gravel Check Dam

130





\pt7.5;BIORETENTION DESIGN NOTES

1. FOR USE WITH BIORETENTION PLANTERS OR SLOPED SIDED SWALES/RAIN GARDENS.
2. FOR CHECK DAMS LONGER THAN 12' SPECIFY REBAR OVERLAP LENGTH.
3. SPACE CHECK DAMS TO MAXIMIZE PONDING ACROSS CELLS.
4. PROVIDE ELEVATIONS AND STATIONING AND/OR DIMENSIONING FOR CHECK DAMS.
5. ENSURE THAT CHECK DAM ELEVATIONS DO NOT CAUSE STORMWATER TO OVERFLOW TO SIDEWALK.
6. SHOW PLANTER WALL EMBEDDED IN EXISTING SUBGRADE OR DRAINROCK.

CONSTRUCTION NOTES

1. EMBED #3 REBAR 3" INTO CURB AND PLANTER WALL.
2. DO NOT WORK DURING RAIN OR UNDER WET CONDITIONS.
3. KEEP ALL HEAVY MACHINERY OUTSIDE BIORETENTION AREA LIMITS.

CONCRETE CHECK DAM
N.T.S.
131

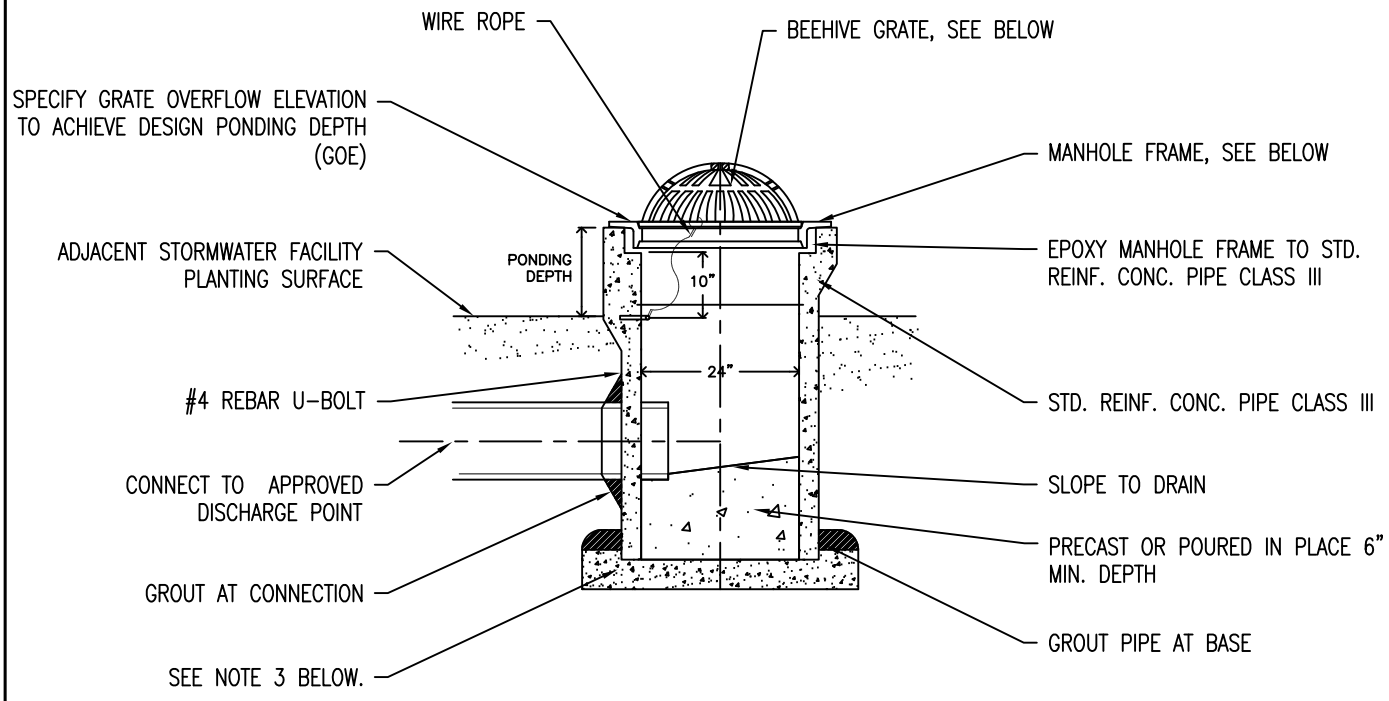
LOW IMPACT DEVELOPMENT STORMWATER MANAGEMENT TYPICAL DETAILS VERSION: 3/6/2013

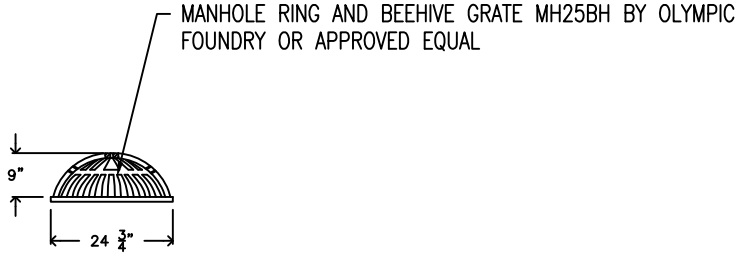
Detail Number

SAN LUIS OBISPO COUNTY

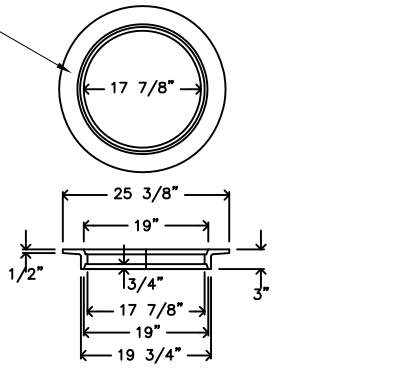
Concrete Check Dam

131





BEEHIVE GRATE



24"x4" REVERSIBLE MANHOLE FRAME

\pt7.5;DESIGN NOTES

1. PROVIDE GRATE OVERFLOW ELEVATION ON PLANS.
2. TO INCORPORATE FLEXIBILITY INTO DESIGN OVERFLOW ELEVATION OR CORRECT ELEVATION OF AN EXISTING STRUCTURE, INSTALL OVERFLOW COLLAR, PER DETAIL 141.
3. CONCRETE SHALL BE 565 LBS/CY CEMENTITIOUS MATERIAL [6 SACK], OVER 6-INCH MINIMUM CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION.

CONSTRUCTION NOTES

1. DO NOT ADJUST OVERFLOW GRATE ELEVATION, CONSTRUCT AS SHOWN ON PLANS.

OVERFLOW STRUCTURE 140
N.T.S.

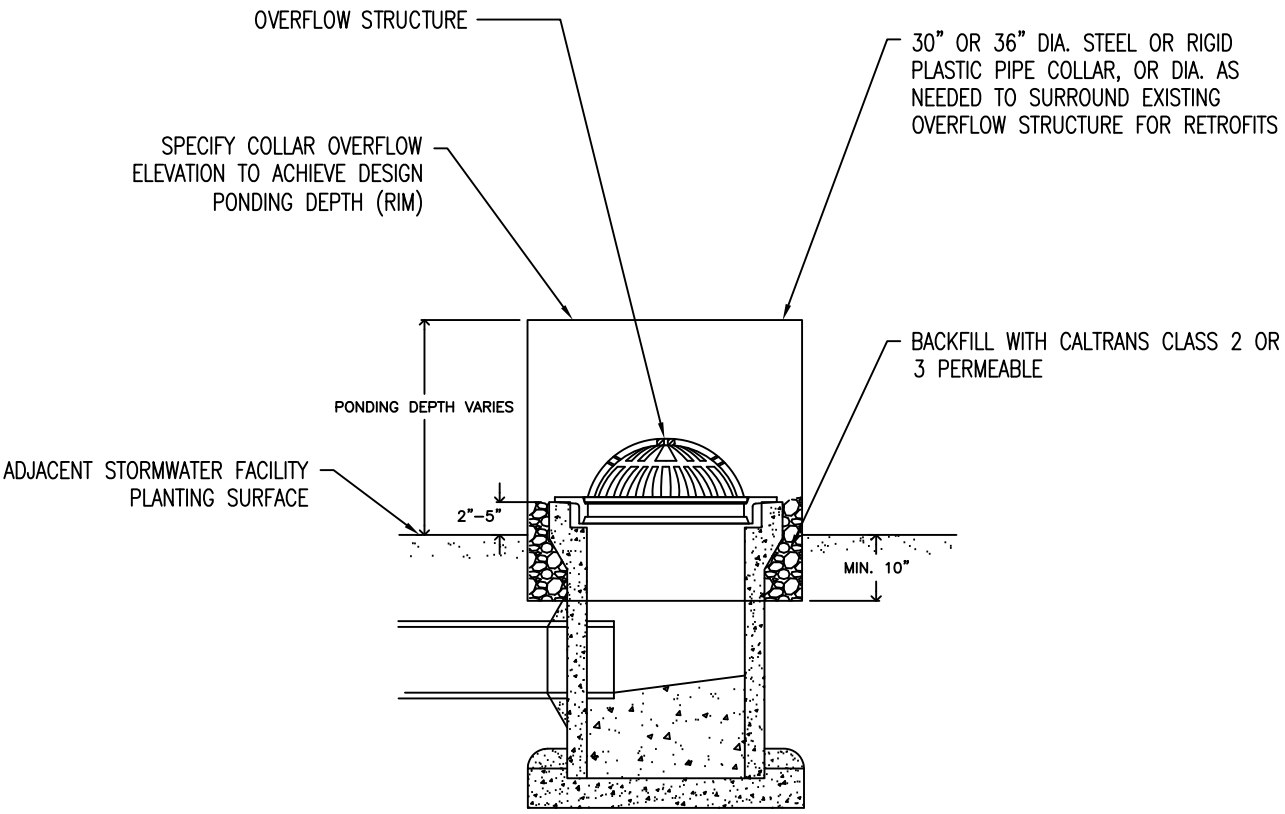
LOW IMPACT DEVELOPMENT STORMWATER MANAGEMENT TYPICAL DETAILS VERSION: 3/6/2013

Detail Number

SAN LUIS OBISPO COUNTY

Overflow Structure w/ Beehive Grate

140



\pt7.5;DESIGN NOTES

1. MAY BE USED IN CONJUNCTION WITH OVERFLOW STRUCTURES TO ALLOW FOR FIELD ADJUSTMENT OF OVERFLOW ELEVATION, OR AS RETROFIT TO CORRECT EXISTING STRUCTURE THAT DOES NOT ALLOW PONDING TO OCCUR.
2. PROVIDE COLLAR OVERFLOW ELEVATION (RIM) ON PLANS.

CONSTRUCTION NOTES

1. CENTER COLLAR ON OVERFLOW GRATE.

OVERFLOW STRUCTURE COLLAR

N.T.S.

141

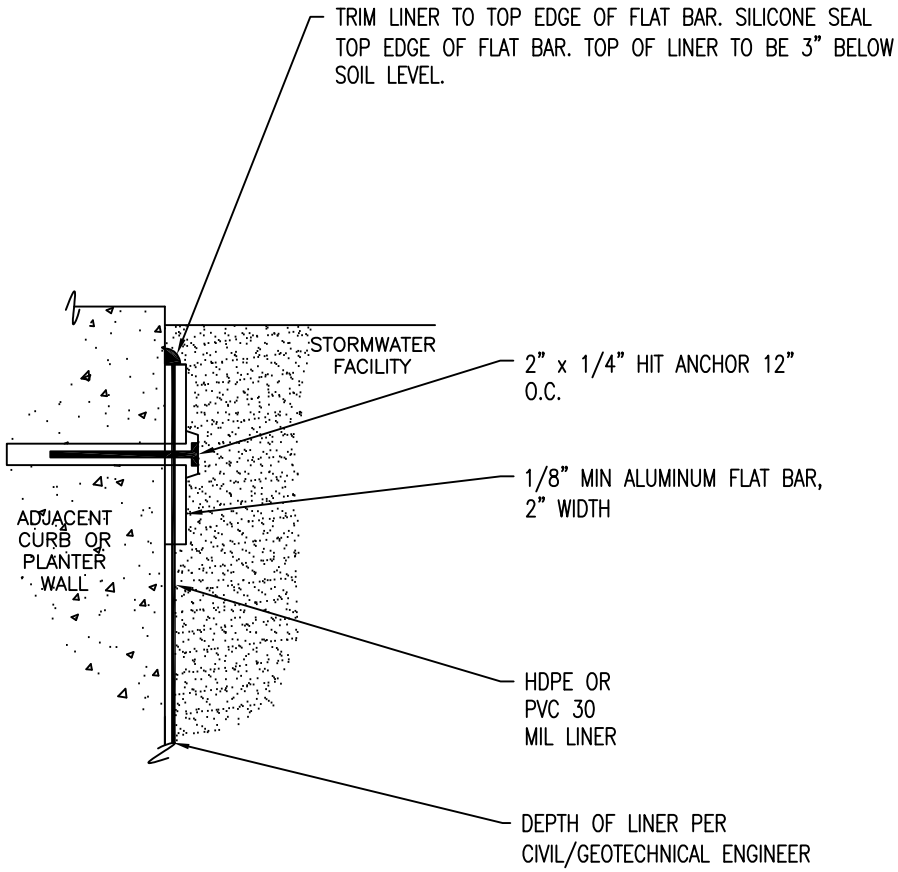
LOW IMPACT DEVELOPMENT STORMWATER MANAGEMENT TYPICAL DETAILS VERSION: 3/6/2013

Detail Number

SAN LUIS OBISPO COUNTY

Overflow Structure Collar

141



IMPERMEABLE LAYER 150

N.T.S.

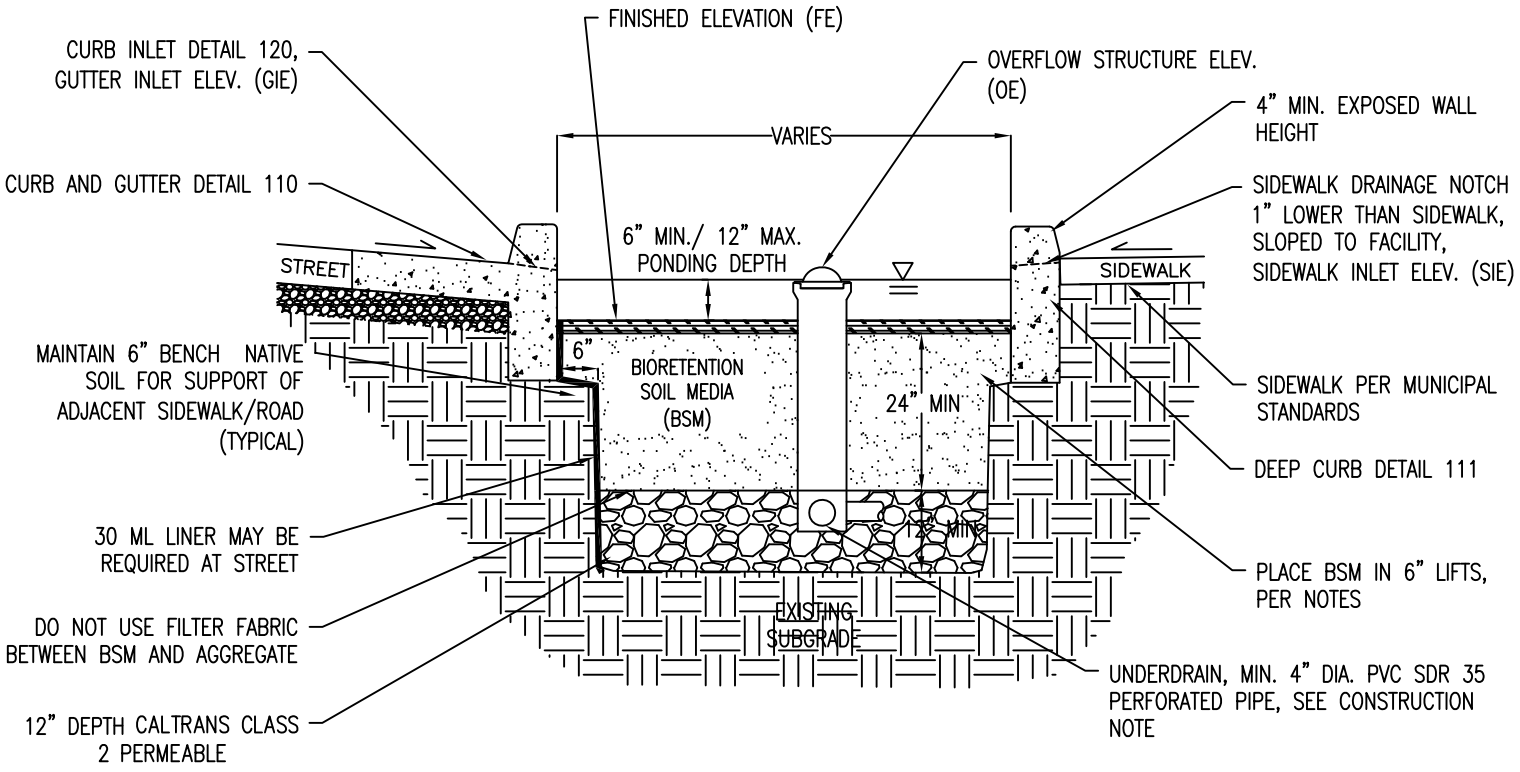
LOW IMPACT DEVELOPMENT STORMWATER MANAGEMENT TYPICAL DETAILS VERSION: 3/6/2013

Detail Number

SAN LUIS OBISPO COUNTY

Impermeable Layer

150



DESIGN NOTES

1. ADDITIONAL DESIGN GUIDANCE PROVIDED IN BIORETENTION TECHNICAL SPECIFICATIONS DOCUMENT.
2. OVERFLOW STRUCTURE REQUIRED FOR IN-LINE SYSTEMS WITHOUT OVERFLOW BYPASS, DETAIL 140.
3. PROVIDE SPOT ELEVATIONS AT INLETS ON CIVIL PLANS (FE,OE, GIE, SIE). SEE DETAIL 120.
4. EDGE CONDITION WILL VARY FOR NEW AND RETROFIT PROJECTS. CURB, WALL, AND SIDEWALK DETAILS MAY BE MODIFIED FOR PROJECT BY CIVIL AND GEOTECHNICAL ENGINEERS.
5. PROVIDE CAPPED, THREADED PVC CLEANOUT FOR UNDERDRAIN, 4" MIN. DIA. WITH SWEEP BEND.
6. PROVIDE MONITORING WELL IN EACH FACILITY, PER BIORETENTION TECHNICAL SPECIFICATIONS.
7. IF CHECK DAMS ARE NEEDED, SEE CONCRETE CHECK DAM DETAIL 131.
8. IF CALTRANS CLASS 2 PERMEABLE IS NOT AVAILABLE, SUBSTITUTE CLASS 3 PERMEABLE WITH AN OVERLYING 3" DEEP LAYER OF 3/4" (NO. 4) OPEN-GRADED AGGREGATE.
9. BIORETENTION SOIL MEDIA (BSM) SPECIFICATION PER BIORETENTION TECHNICAL SPECIFICATIONS.
10. PLANT SELECTION PER BIORETENTION TECHNICAL SPECIFICATIONS.
11. MULCH (OPTIONAL) PER BIORETENTION TECHNICAL SPECIFICATIONS.
12. LOCATE ENERGY DISSIPATION COBBLE PADS AS SPECIFIED IN INLET DETAILS – AVOID DECORATIVE USE.

CONSTRUCTION NOTES

1. SCARIFY SUBGRADE BEFORE INSTALLING BIORETENTION AREA AGGREGATE AND BSM.
2. FACILITY EXCAVATION TO ALLOW FOR SPECIFIED SOIL AND MULCH DEPTHS TO ACHIEVE FINISHED ELEVATIONS ON CIVIL PLANS.
3. INSTALL UNDERDRAIN WITH HOLES FACING DOWN. UNDERDRAIN DISCHARGE ELEVATION SHALL BE NEAR TOP OF AGGREGATE LAYER.

   UNDERDRAIN SLOPE MAY BE FLAT.
4. COMPACT EACH 6" LIFT OF BSM WITH LANDSCAPE ROLLER OR BY LIGHTLY WETTING.

   IF WETTING, LET DRY OVERNIGHT BEFORE PLANTING.
4. DO NOT WORK WITHIN BIORETENTION AREA DURING RAIN OR UNDER WET CONDITIONS.
5. KEEP HEAVY MACHINERY OUTSIDE BIORETENTION AREA LIMITS.

LOW IMPACT DEVELOPMENT STORMWATER MANAGEMENT TYPICAL DETAILS VERSION: 3/6/2013

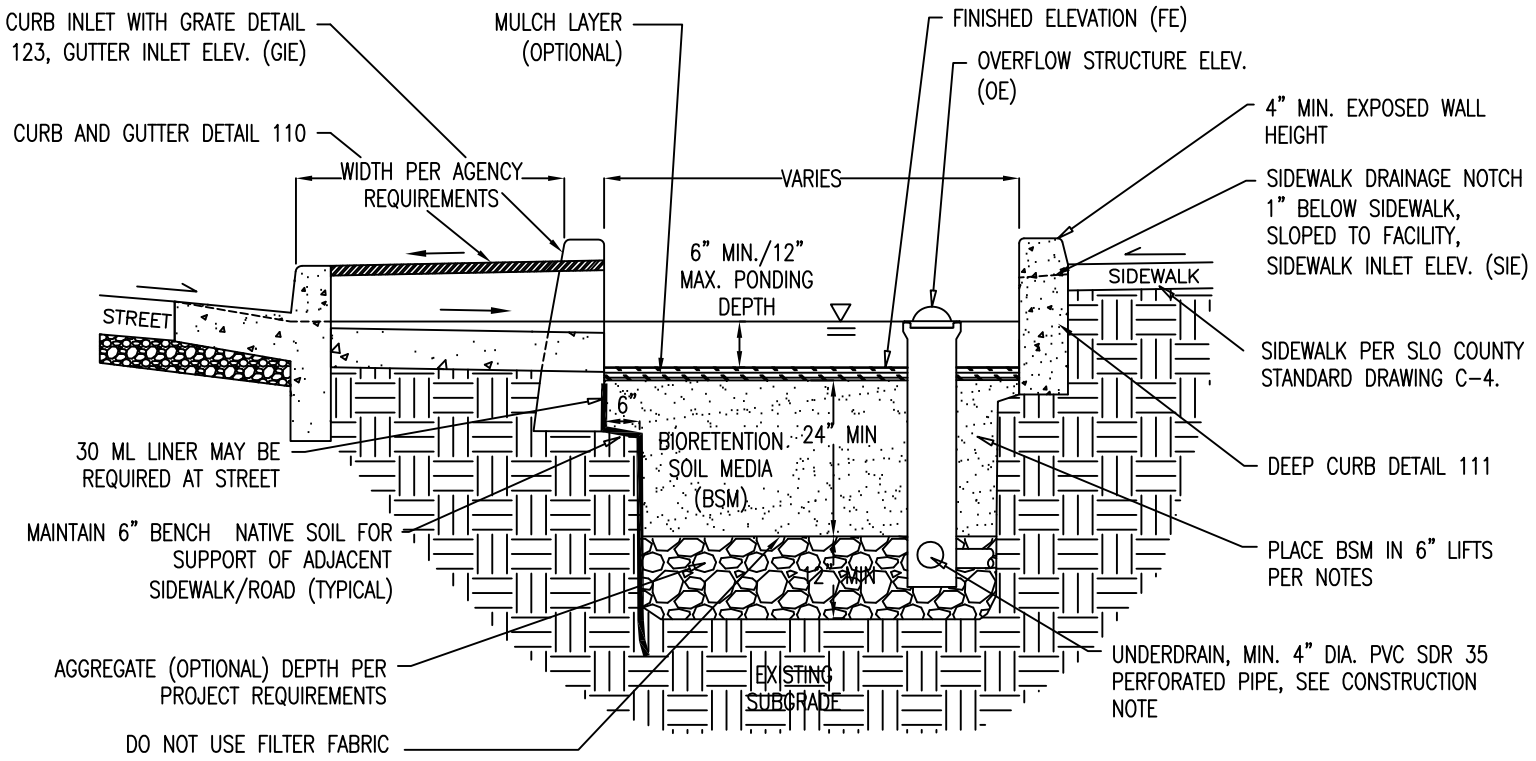
SAN LUIS OBISPO COUNTY

Street Bioretention Facility

(flat/planter, no on-street parking, sidewalk, with underdrain)

Detail Number

200



DESIGN NOTES

1. ADDITIONAL DESIGN GUIDANCE PROVIDED IN BIORETENTION TECHNICAL SPECIFICATIONS DOCUMENT.
2. OVERFLOW STRUCTURE REQUIRED FOR IN-LINE SYSTEMS WITHOUT OVERFLOW BYPASS, DETAIL 140.
3. PROVIDE SPOT ELEVATIONS AT INLETS ON CIVIL PLANS (FE, OE, GIE, SIE). SEE DETAIL 120.
4. EDGE CONDITION WILL VARY FOR NEW AND RETROFIT PROJECTS. CURB, WALL, AND SIDEWALK DETAILS MAY BE MODIFIED FOR PROJECT BY CIVIL AND GEOTECHNICAL ENGINEERS.
5. IF CHECK DAMS ARE NEEDED, SEE CONCRETE CHECK DAM DETAIL 131.
6. PROVIDE MONITORING WELL IN EACH FACILITY, PER BIORETENTION TECHNICAL SPECIFICATIONS.
7. IF CALTRANS CLASS 2 PERMEABLE IS NOT AVAILABLE, SUBSTITUTE CLASS 3 PERMEABLE WITH AN OVERLYING 3" DEEP LAYER OF 3/4" (NO. 4) OPEN-GRADED AGGREGATE.
8. BIORETENTION SOIL MEDIA (BSM) SPECIFICATION PER BIORETENTION TECHNICAL SPECIFICATIONS.
9. PLANTING DESIGN AND IRRIGATION PER BIORETENTION TECHNICAL SPECIFICATIONS.
10. MULCH (OPTIONAL) PER BIORETENTION TECHNICAL SPECIFICATIONS.
11. LOCATE ENERGY DISSIPATION COBBLE ONLY AS SPECIFIED IN INLET DETAILS – AVOID DECORATIVE USE.

CONSTRUCTION NOTES

1. SCARIFY SUBGRADE BEFORE INSTALLING BIORETENTION AREA AGGREGATE AND BSM.
2. FACILITY EXCAVATION TO ALLOW FOR SPECIFIED SOIL AND MULCH DEPTHS TO ACHIEVE FINISHED ELEVATIONS ON CIVIL PLANS.
3. COMPACT EACH 6" LIFT OF BSM WITH LANDSCAPE ROLLER OR BY LIGHTLY WETTING. IF WETTING, ALLOW TO DRY OVERNIGHT BEFORE PLANTING.
4. DO NOT WORK WITHIN BIORETENTION AREA DURING RAIN OR UNDER WET CONDITIONS.
5. KEEP HEAVY MACHINERY OUTSIDE BIORETENTION AREA LIMITS.

LOW IMPACT DEVELOPMENT STORMWATER MANAGEMENT TYPICAL DETAILS VERSION: 3/6/2013

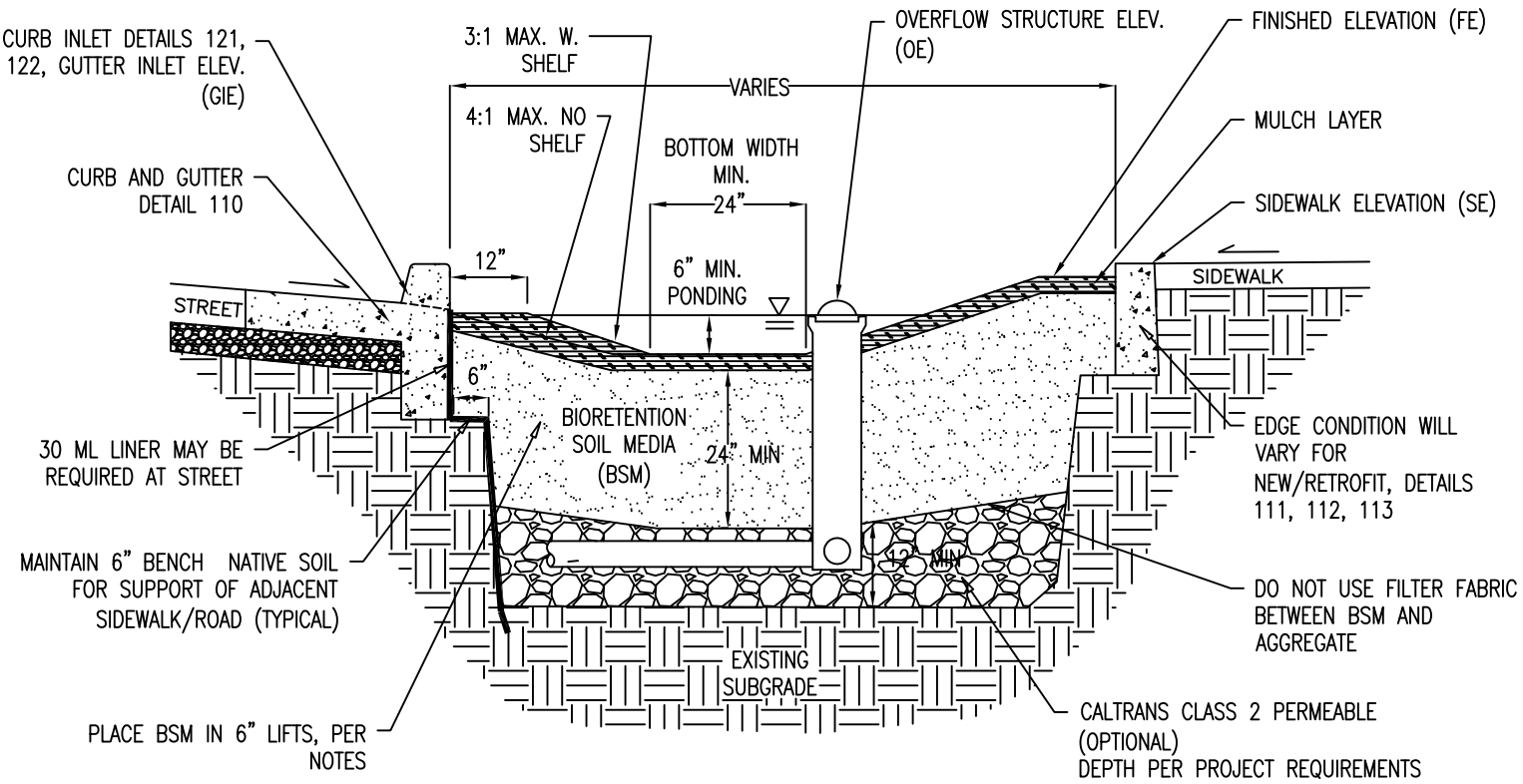
Detail Number

SAN LUIS OBISPO COUNTY

Street Bioretention Facility

(flat/planter, with on-street parking, sidewalk, with underdrain)

201



DESIGN NOTES

1. ADDITIONAL DESIGN GUIDANCE PROVIDED IN BIORETENTION TECHNICAL SPECIFICATIONS DOCUMENT.
2. OVERFLOW STRUCTURE REQUIRED FOR IN-LINE SYSTEMS WITHOUT OVERFLOW BYPASS, DETAIL 140.
3. PROVIDE SPOT ELEVATIONS AT INLETS ON CIVIL PLANS (FE, OE, GIE, SE). SEE DETAILS 121, 122.
4. MAX. LONGITUDINAL SLOPE 6% WITH CHECK DAMS. SEE DETAILS 130, 131.
5. EDGE CONDITION WILL VARY FOR NEW AND RETROFIT PROJECTS. CURB AND SIDEWALK DETAILS MAY BE MODIFIED FOR PROJECT BY CIVIL AND GEOTECHNICAL ENGINEERS.
6. PROVIDE MONITORING WELL IN EACH FACILITY, PER BIORETENTION TECHNICAL SPECIFICATIONS.
7. IF CALTRANS CLASS 2 PERMEABLE IS NOT AVAILABLE, SUBSTITUTE CLASS 3 PERMEABLE WITH AN OVERLYING 3" DEEP LAYER OF 3/4" (NO. 4) OPEN-GRADED AGGREGATE.
8. BIORETENTION SOIL MEDIA (BSM) SPECIFICATION PER BIORETENTION TECHNICAL SPECIFICATIONS.
8. PLANTING DESIGN AND IRRIGATION PER BIORETENTION TECHNICAL SPECIFICATIONS.
8. MULCH (OPTIONAL) PER BIORETENTION TECHNICAL SPECIFICATIONS.
9. LOCATE ENERGY DISSIPATION COBBLE ONLY AS SPECIFIED IN INLET DETAILS – AVOID DECORATIVE USE.

CONSTRUCTION NOTES

1. SCARIFY SUBGRADE BEFORE INSTALLING BIORETENTION AREA AGGREGATE AND BSM.
2. FACILITY EXCAVATION TO ALLOW FOR SPECIFIED SOIL AND MULCH DEPTHS TO ACHIEVE FINISHED ELEVATIONS ON CIVIL PLANS.
3. COMPACT EACH 6" LIFT OF BSM WITH LANDSCAPE ROLLER OR BY LIGHTLY WETTING. IF WETTING, ALLOW TO DRY OVERNIGHT BEFORE PLANTING.
4. DO NOT WORK WITHIN BIORETENTION AREA DURING RAIN OR UNDER WET CONDITIONS.
5. KEEP HEAVY MACHINERY OUTSIDE BIORETENTION AREA LIMITS.

LOW IMPACT DEVELOPMENT STORMWATER MANAGEMENT TYPICAL DETAILS VERSION: 3/6/2013

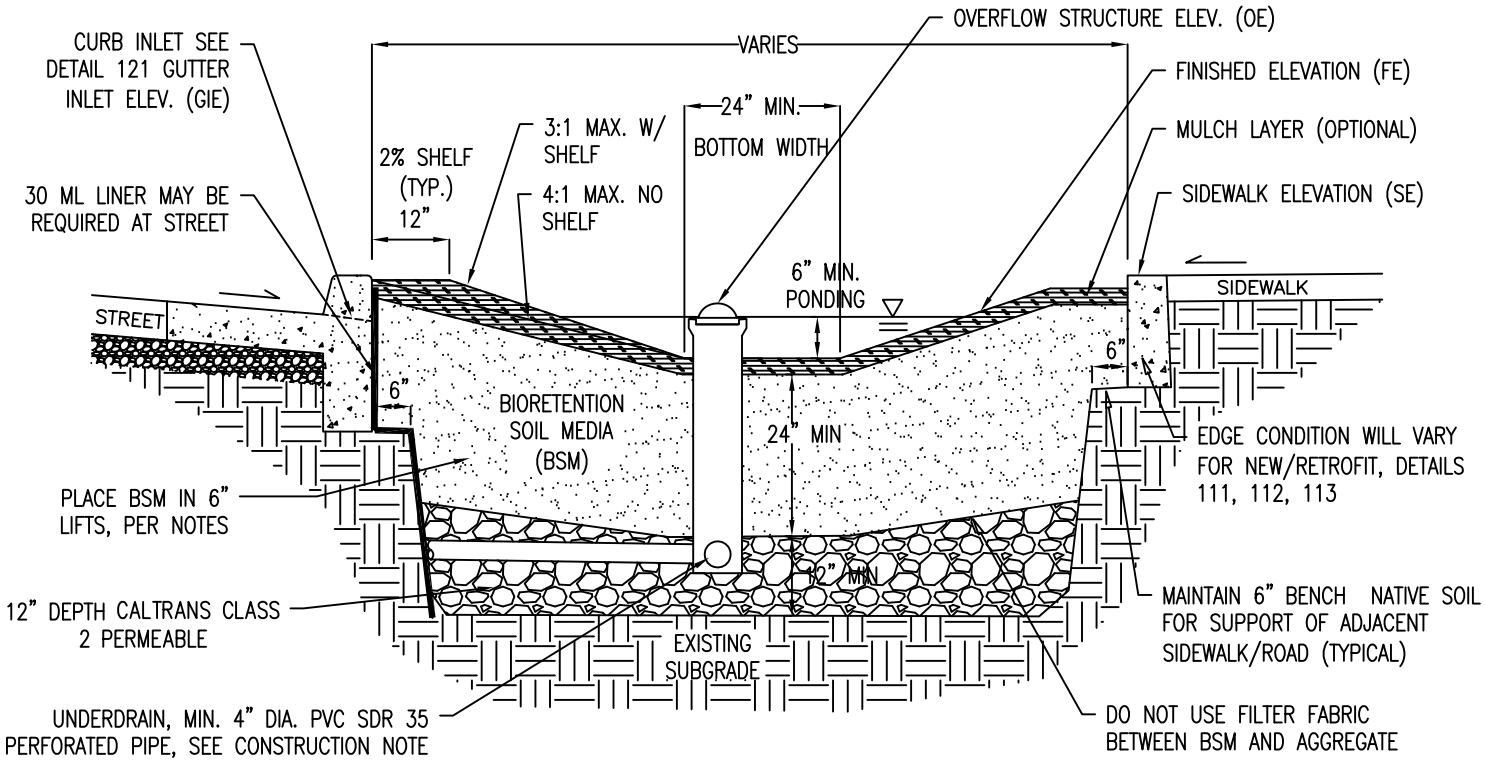
Detail Number

SAN LUIS OBISPO COUNTY

Street Bioretention Facility

(sloped sided, no on-street parking, sidewalk, with underdrain)

202



DESIGN NOTES

1. FULL DESIGN GUIDANCE PROVIDED IN BIORETENTION TECHNICAL SPECIFICATIONS DOCUMENT.
2. OVERFLOW STRUCTURE REQUIRED FOR IN-LINE SYSTEMS WITHOUT AN OVERFLOW BYPASS, DETAIL 140.
3. PROVIDE SPOT ELEVATIONS AT INLETS ON CIVIL PLANS (FE, OE, GIE, SE). SEE INLET DETAIL 121.
4. MAX. LONGITUDINAL SLOPE 6% WITH CHECK DAMS. SEE DETAILS 130, 131.
5. EDGE CONDITION WILL VARY FOR NEW AND RETROFIT PROJECTS. CURB AND SIDEWALK DETAILS MAY BE MODIFIED FOR PROJECT BY CIVIL AND GEOTECHNICAL ENGINEERS.
6. IF CALTRANS CLASS 2 PERMEABLE IS NOT AVAILABLE, SUBSTITUTE CLASS 3 PERMEABLE WITH AN OVERLYING 3" DEEP LAYER OF 3/4" (NO. 4) OPEN-GRADED AGGREGATE.
7. BIORETENTION SOIL MEDIA (BSM) SPECIFICATION PER BIORETENTION TECHNICAL SPECIFICATIONS.
8. PLANTING DESIGN AND IRRIGATION PER BIORETENTION TECHNICAL SPECIFICATIONS.
9. MULCH (OPTIONAL) PER BIORETENTION TECHNICAL SPECIFICATIONS.
10. LOCATE ENERGY DISSIPATION COBBLE PADS AS SPECIFIED IN INLET DETAILS – AVOID DECORATIVE USE.

CONSTRUCTION NOTES

1. SCARIFY SUBGRADE BEFORE INSTALLING BIORETENTION AREA AGGREGATE AND BSM.
2. FACILITY EXCAVATION TO ALLOW FOR SPECIFIED SOIL AND MULCH DEPTHS TO ACHIEVE FINISHED ELEVATIONS ON CIVIL PLANS.
3. INSTALL UNDERDRAIN WITH HOLES FACING DOWN. UNDERDRAIN DISCHARGE ELEVATION SHALL BE NEAR TOP OF AGGREGATE LAYER. UNDERDRAIN SLOPE MAY BE FLAT.
4. COMPACT EACH 6" LIFT OF BSM WITH LANDSCAPE ROLLER OR BY LIGHTLY WETTING. IF WETTING, LET DRY OVERNIGHT BEFORE PLANTING.
4. DO NOT WORK WITHIN BIORETENTION AREA DURING RAIN OR UNDER WET CONDITIONS.
5. KEEP HEAVY MACHINERY OUTSIDE BIORETENTION AREA LIMITS.

LOW IMPACT DEVELOPMENT STORMWATER MANAGEMENT TYPICAL DETAILS VERSION: 3/6/2013

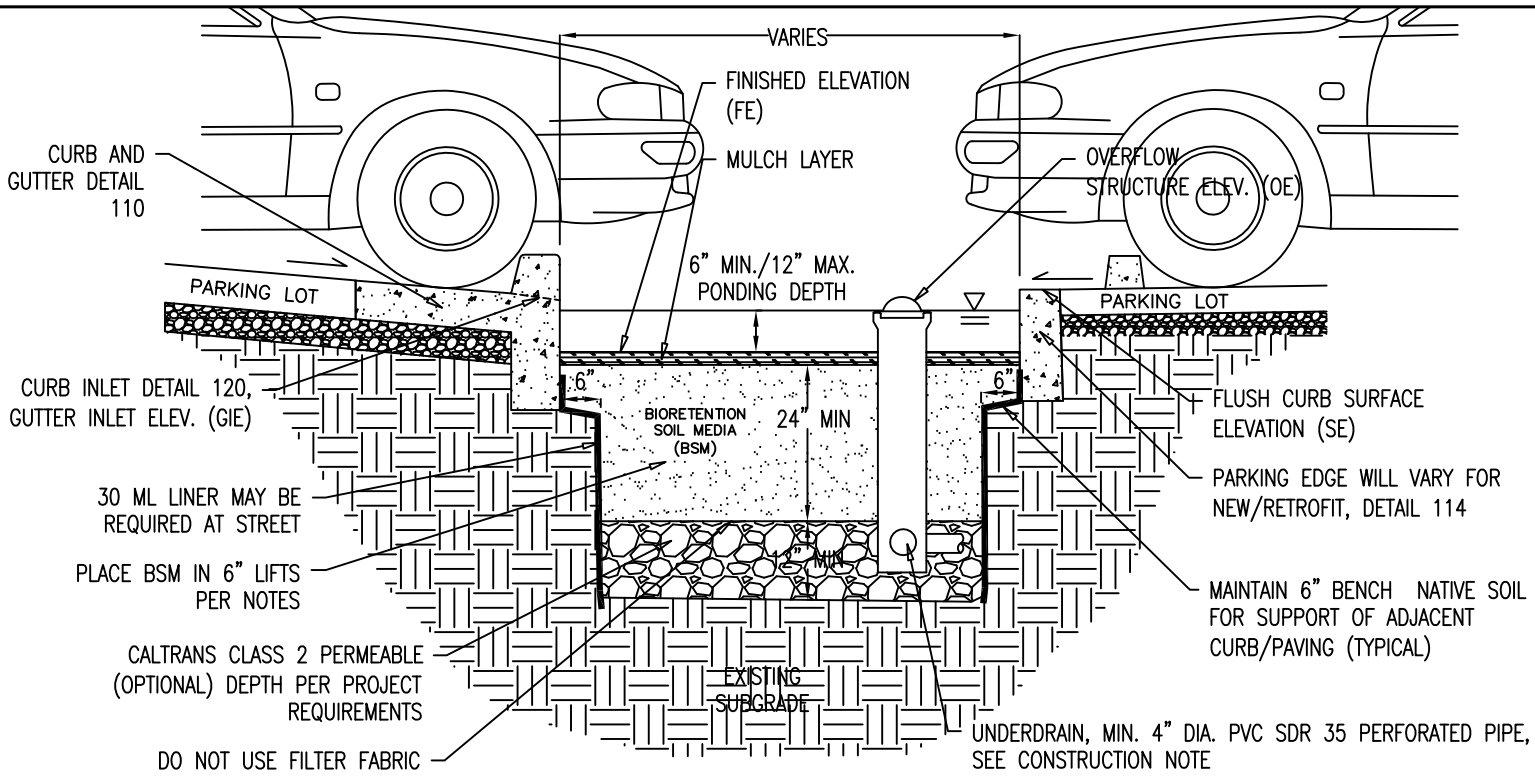
Detail Number

SAN LUIS OBISPO COUNTY

Street Bioretention Facility

(sloped sided, with on-street parking, sidewalk, with underdrain)

203



BIORETENTION DESIGN NOTES

1. ADDITIONAL DESIGN GUIDANCE PROVIDED IN BIORETENTION TECHNICAL SPECIFICATIONS DOCUMENT.
2. OVERFLOW STRUCTURE REQUIRED FOR IN-LINE SYSTEMS WITHOUT OVERFLOW BYPASS, DETAIL 140.
3. PROVIDE SPOT ELEVATIONS AT INLETS ON CIVIL PLANS (FE, OE, GIE, SE). SEE DETAIL 120.
4. EDGE CONDITION WILL VARY FOR PARKING LOT PROJECTS. SEE PARKING LOT EDGE OPTIONS DETAILS, 114. CURB AND FLUSH EDGE DETAILS MAY BE MODIFIED FOR PROJECT BY CIVIL AND GEOTECHNICAL ENGINEERS.
5. IF CHECK DAMS ARE NEEDED, SEE CONCRETE CHECK DAM DETAIL 131.
6. PROVIDE MONITORING WELL IN EACH FACILITY, PER BIORETENTION TECHNICAL SPECIFICATIONS.
7. IF CALTRANS CLASS 2 PERMEABLE IS NOT AVAILABLE, SUBSTITUTE CLASS 3 PERMEABLE WITH AN OVERLYING 3" DEEP LAYER OF 3/4" (NO. 4) OPEN-GRADED AGGREGATE.
8. BIORETENTION SOIL MEDIA (BSM) SPECIFICATION PER BIORETENTION TECHNICAL SPECIFICATIONS.
9. PLANTING DESIGN AND IRRIGATION PER BIORETENTION TECHNICAL SPECIFICATIONS.
10. MULCH (OPTIONAL) PER BIORETENTION TECHNICAL SPECIFICATIONS.
11. LOCATE ENERGY DISSIPATION COBBLE ONLY AS SPECIFIED IN INLET DETAILS – AVOID DECORATIVE USE.

CONSTRUCTION NOTES

1. SCARIFY SUBGRADE BEFORE INSTALLING BIORETENTION AREA AGGREGATE AND BSM.
2. FACILITY EXCAVATION TO ALLOW FOR SPECIFIED SOIL AND MULCH DEPTHS TO ACHIEVE FINISHED ELEVATIONS ON CIVIL PLANS.
3. INSTALL UNDERDRAIN WITH HOLES FACING DOWN. UNDERDRAIN DISCHARGE ELEVATION SHALL BE NEAR TOP OF AGGREGATE LAYER. UNDERDRAIN SLOPE MAY BE FLAT.
4. COMPACT EACH 6" LIFT OF BSM WITH LANDSCAPE ROLLER OR BY LIGHTLY WETTING.

   IF WETTING, ALLOW TO DRY OVERNIGHT BEFORE PLANTING.
5. DO NOT WORK WITHIN BIORETENTION AREA DURING RAIN OR UNDER WET CONDITIONS.
6. KEEP HEAVY MACHINERY OUTSIDE BIORETENTION AREA LIMITS.

LOW IMPACT DEVELOPMENT STORMWATER MANAGEMENT TYPICAL DETAILS VERSION: 3/6/2013

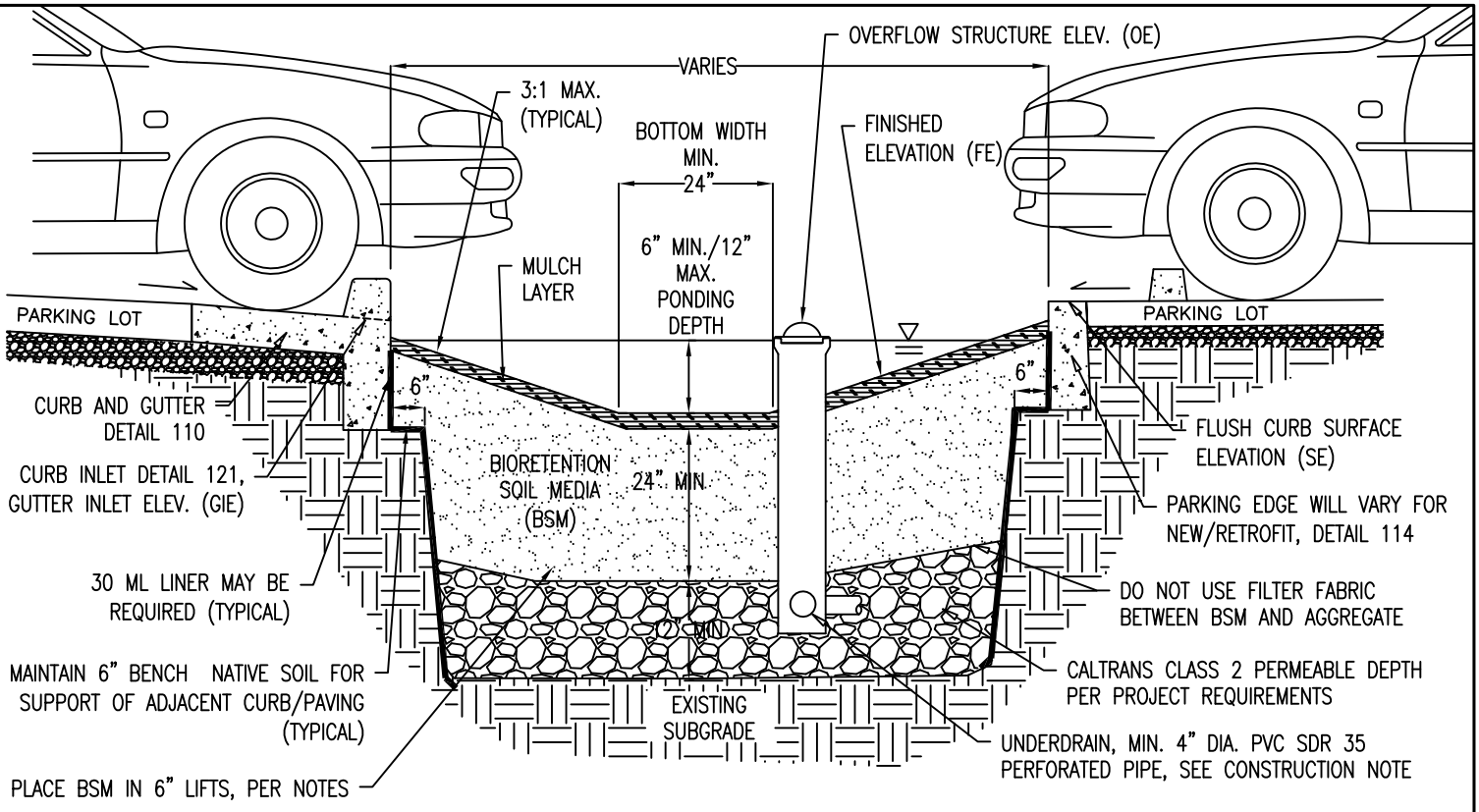
Detail Number

SAN LUIS OBISPO COUNTY

Parking Lot Bioretention Facility

(flat/planter, with underdrain)

204



DESIGN NOTES

1. ADDITIONAL DESIGN GUIDANCE PROVIDED IN BIORETENTION TECHNICAL SPECIFICATIONS DOCUMENT.
2. OVERFLOW STRUCTURE REQUIRED FOR IN-LINE SYSTEMS WITHOUT OVERFLOW BYPASS, DETAIL 140.
3. PROVIDE SPOT ELEVATIONS AT INLETS ON CIVIL PLANS (FE, OE, GIE, SE). SEE DETAIL 121.
4. MAX. LONGITUDINAL SLOPE 6% WITH CHECK DAMS. SEE DETAILS 130, 131.
4. EDGE CONDITION WILL VARY FOR PARKING LOT PROJECTS. SEE PARKING LOT EDGE OPTIONS DETAILS, 114. CURB AND FLUSH EDGE DETAILS MAY BE MODIFIED FOR PROJECT BY CIVIL AND GEOTECHNICAL ENGINEERS.
5. PROVIDE MONITORING WELL IN EACH FACILITY, PER BIORETENTION TECHNICAL SPECIFICATIONS.
6. IF CALTRANS CLASS 2 PERMEABLE IS NOT AVAILABLE, SUBSTITUTE CLASS 3 PERMEABLE WITH AN OVERLYING 3" DEEP LAYER OF 3/4" (NO. 4) OPEN-GRADED AGGREGATE.
7. BIORETENTION SOIL MEDIA (BSM) SPECIFICATION PER BIORETENTION TECHNICAL SPECIFICATIONS.
8. PLANTING DESIGN AND IRRIGATION PER BIORETENTION TECHNICAL SPECIFICATIONS.
8. MULCH (OPTIONAL) PER BIORETENTION TECHNICAL SPECIFICATIONS.
9. LOCATE ENERGY DISSIPATION COBBLE ONLY AS SPECIFIED IN INLET DETAILS – AVOID DECORATIVE USE.

CONSTRUCTION NOTES

1. SCARIFY SUBGRADE BEFORE INSTALLING BIORETENTION AREA AGGREGATE AND BSM.
2. FACILITY EXCAVATION TO ALLOW FOR SPECIFIED SOIL AND MULCH DEPTHS TO ACHIEVE FINISHED ELEVATIONS ON CIVIL PLANS.
3. INSTALL UNDERDRAIN WITH HOLES FACING DOWN. UNDERDRAIN DISCHARGE ELEVATION SHALL BE NEAR TOP OF AGGREGATE LAYER.

   UNDERDRAIN SLOPE MAY BE FLAT.
4. COMPACT EACH 6" LIFT OF BSM WITH LANDSCAPE ROLLER OR BY LIGHTLY WETTING. IF WETTING, ALLOW TO DRY OVERNIGHT BEFORE PLANTING.
5. DO NOT WORK WITHIN BIORETENTION AREA DURING RAIN OR UNDER WET CONDITIONS.
6. KEEP HEAVY MACHINERY OUTSIDE BIORETENTION AREA LIMITS.

LOW IMPACT DEVELOPMENT STORMWATER MANAGEMENT TYPICAL DETAILS VERSION: 3/6/2013

Detail Number

SAN LUIS OBISPO COUNTY

Parking Lot Bioretention Facility

(sloped sided, with underdrain)

205

Appendix I -

Example Project Submittals

Alternate (Off-Site) Compliance SWCP Checklist
☐ Schedule for completion of offsite project with milestone dates to identify funding, design, and construction of the off-site project(s)