City of Buellton

STORMWATER TECHNICAL GUIDE FOR LOW IMPACT DEVELOPMENT (LID)

DEVELOPER INFORMATION PACKET

Stormwater Control Plan (SWCP) Reference Documents within this packet:

- ☑ Stormwater Technical Guide for Low Impact Development
  - ☑ Appendix A: Stormwater Pollutant Sources and Source Controls Checklist
  - ☑ Appendix B: Bioretention Construction Inspection Checklist
  - ☑ Appendix C: Technical Criteria for Non-LID Treatment Facilities
  - ☑ SWCP Template for Small (Tier 1) Projects
  - ☑ SWCP Template for Tier 2, 3 and 4 Projects
  - ☑ Example:
    - ☑ SWCP for a Commercial Project
    - ☑ SWCP for a Residential Subdivision
  - ☑ Stormwater Control Measure (SCM) Sizing Calculator Instructions
    - ☑ SCM Sizing Calculator Form (MS Excel Required)
- ☐ Operation and Maintenance (O&M) Plan Template*****
  - ☑ Example:
    - ☑ O&M Plan for a Commercial Project
    - ☑ O&M Plan for a Residential Subdivision
- ☑ SCM Inspection and Maintenance Log
- ☑ SWCP Engineer's Certification of Approval
- ☑ SWMP Post Construction Requirement (PCR) Field Verification Log
- ☑ Drainage Maintenance Agreement
- ☑ Notice of Construction Site SW Compliance Inspections for Project Applicants / Developers
- ☑ Construction Industry's Guide to BMPs (English & Spanish Version)

Legend:

☑ Documents within Developer Information Packet

☐ Document-Future Release (To Be Determined)

****** Refer to the Stormwater Technical Guide for Low Impact Development for guidance on developing the SWCP's O&M Plan. The O&M Plan at a minimum should include: (1) Introduction; (2) Ownership and Responsibility for SCM (including O&M Funding Source and Vicinity Map, Designated Responsible Individuals); (3) Facility Design and Locations of SCM Facilities to be maintained; (4) Recordkeeping for Inspection and Maintenance Activities; (5) Inspection and Maintenance (Annual Compliance Letter and SCM Maintenance Schedule, SCM Inspection and Maintenance Log); (6) Timing of Inspection & Maintenance; (7) Contact Information; and (8) Certification; and (8) SWCP Exhibit; (8) SCM Design Manuals.*

Trash Treatment Control Devices:

If your project design includes installation of trash treatment control devices, please visit the State Water Resources Control Board's Trash Implementation Program Webpage and refer to the California State Water Resources Control Board (SWRCB) Certified Full Capture System List of Trash Treatment Control Devices https://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/trash_implementation/a1_certified_fcsdevicelist_05aug19.pdf.

Any trash treatment control devices proposed must be on the SWRCB's Certified Full Capture System List of Trash Treatment Devices.

Storm Water Drainage Wells (Class V Underground Injection Wells):

There are several types and designs of Storm Water Drainage Wells that are classified by the Environmental Protection Agency (EPA) as a Class V Underground Injection Well. By definition, a Class V Injection well is any bored, drilled, or driven shaft, or dug hole that is deeper than its widest surface dimension, or an improved sinkhole, or a subsurface fluid distribution system.

The EPA's Underground Injection Control (UIC) program requires registration of all Class V Underground Injection Wells due to concerns that infiltration of contaminated stormwater has the potential to impact the Underground Sources of Drinking Water (USDW). The EPA UIC program has 2 basic requirements: (1) Register Injection Wells (NO FEE REQUIRED) via online inventory form (2) Do Not Use Injection Wells in a manner that will contaminate underground sources of drinking water.

> *Note: If the UIC determines that the injection well will endanger the USDW, it would require a permit and possibly require the well to be closed.*

If your project design proposes either a (1) Surface Basin (unlined retention or detention basin with vertical graded height is deeper than its widest surface dimension), (2) Subsurface Well (dry/bored/drilled/driven shaft wells), (3) Fluid Distribution System/Galleries (manufactured chambers such as ADS, Stormtech or Contech) and/or (4) Infiltration Trench (with vertical graded height is deeper than its widest surface dimension) and it is approved, then the Legally Responsible Party will be required to complete an EPA UIC Registration Injection Well Inventory Form located on the EPA's UIC Registration for the Pacific Southwest (Region 9) Webpage https://www.epa.gov/uic/forms/underground-injection-well-registration-pacific-southwest-region-9

The City will require Proof of EPA UIC Registration prior to City's Permit Issuance and Project Closure. The projects Engineer of Record will be required to provide a statement specifying if the EPA Injection Well Registration is or is not required for the proposed Class V Underground Injection Well, and the rationale.

If EPA UIC Injection Well Registration is required, the Registration # will be required to be referenced in a box on the front of the SWCP's O&M Plan (refer to examples of the O&M Plan provided within this packet).

For more information about EPA's UIC Program, Visit EPA's UIC Webpage https://www.epa.gov/uic and/or refer to EPA's Fact Sheet "When are Storm Water Discharges Regulated as Class V Wells" within this packet.

All documents within the Developers Information Packet are available on the City of Buellton's Website. In addition, the following documents are also available on the City's website that may be helpful:

- LID Manual for Southern California
- LID – A Sensible Approach to Land Development and Stormwater Management
- LID – Contractors and Developers Technical Assistance Memo
- LID – Don't Get Caught with your Overflow Down
- LID – Rain Gardens
- Stormwater and the Construction Industry Poster

For more information about the City's Stormwater Management Program, Low Impact Development or California Stormwater Quality Association Best Management Practice Handbooks, Visit the City of Buellton's Public Works Webpage www.cityofbuellton.com or the County of Santa Barbara Project Clean Water's Webpage http://www.sbprojectcleanwater.org/development.aspx?id=76

The City's website also provides direct Resource links to the following California Stormwater Quality Association Best Management Practice Handbooks: Construction, Development and Redevelopment, Industrial/Commercial, and Municipal.

STORMWATER TECHNICAL GUIDE FOR LOW IMPACT DEVELOPMENT

Compliance with
Stormwater
Post-Construction
Requirements in
Santa Barbara County

2nd Edition
February 3, 2017

Project Clean Water
County of Santa Barbara
Water Resources Division

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PREFACE

In 1987, Congress amended the Clean Water Act to mandate controls on discharges from municipal separate storm sewer systems (MS4s). Acting under the Federal mandate and the California Water Code, California Water Boards issue National Pollutant Discharge Elimination System (NPDES) permits that require cities, towns, and counties to regulate activities which can result in pollutants entering their storm drains.

Municipalities implement comprehensive stormwater pollution-prevention programs. Municipal staff uses Best Management Practices (BMPs) when maintaining their own streets, storm drains, and municipal buildings. They inspect businesses and construction sites, enforce when pollutant discharges are found, educate the public, and monitor the storm drain system and receiving waters.

The comprehensive municipal programs have long included controls on new development projects. As conditions of municipal approvals and permits, development projects must control pollutant sources and reduce detain, retain, and treat specified amounts of runoff.

In July 2013, the Central Coast Water Board adopted Order R3-2013-0032, with new, more stringent Post-Construction Requirements (PCRs). Projects that receive their first discretionary approval for design elements (for example, building footprints, drainage features) after March 6, 2014—or if no discretionary approval is required, receive their first ministerial permit after that date—are subject to the PCRs, if they create or replace 2,500 square feet or more of impervious area.

The PCRs mandate that development projects use Low Impact Development (LID) to detain, retain, and treat runoff. LID incorporates and conserves on-site natural features, together with constructed hydrologic controls to more closely mimic pre-development hydrology and watershed processes.

The process of designing, checking, and building LID features and facilities into development projects can be complicated. In particular, it can be difficult to quantify the amount of runoff proposed features and facilities can detain, infiltrate, or treat and to show the LID design meets the criteria in the PCRs.

The County of Santa Barbara obtained a grant, funded by Proposition 84 and administered through the State Water Resources Control Board, to facilitate implementation of the PCRs. Grant funds enabled preparation of this *Stormwater Technical Guide*, a sizing calculator, templates, and other associated tools, as well as outreach and training for municipal staff and land development professionals.

Applicants for development approvals in the jurisdictions on the previous page should use this *Guide* when preparing Stormwater Control Plans. However, local requirements vary. Check with staff in the jurisdiction where your project is located to identify differences that may apply. A pre-application meeting is recommended for all projects subject to the PCRs.

Links

Santa Barbara County Project Clean Water http://www.sbprojectcleanwater.org/

Central Coast Regional Water Quality Control Board www.waterboards.ca.gov/centralcoast

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B. Bioretention Construction Inspection Checklist

C. Technical Criteria for Non-LID Treatment Facilities

Resources

Available at *www.sbprojectcleanwater.org*

Stormwater Control Plan Template and Directions for Tier 1 Projects

Stormwater Control Plan Template for Tier 2 and Tier 3 Projects

Stormwater Control Measure Sizing Calculator

Example Stormwater Control Plan for a Commercial Project

Example Stormwater Control Plan for a Residential Subdivision

Example Stormwater Facilities Operation and Maintenance Plan for a Commercial Project

Example Stormwater Facilities Operation and Maintenance Plan for a Residential Subdivision

Operation and Maintenance Forms

Acronyms

APN	Assessor's Parcel Number
BMP	Best Management Practice
CCRs	Covenants, Conditions, and Restrictions
CDP	Census-Designated Place
DMA	Drainage Management Area (see Chapter 4)
EISA	Equivalent Impervious Surface Area, as defined in the PCRs
HOA	Home Owners Association
HSG	Hydrologic Soils Group (A, B, C, or D, as defined by NRCS)
LID	Low Impact Development
MRSV	Minimum Required Storage Volume for a Stormwater Control Measure
MS4	Municipal Separate Storm Sewer System, as defined in the Clean Water Act
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service (US Department of Agriculture)
O&M	Operation and Maintenance
PCRs	Post-Construction Requirements, adopted by the Central Coast Water Board in July 2013
SCM	Stormwater Control Measure, as defined in the PCRs
SFH	Single-Family Home that is not part of a larger plan of development, as defined in the PCRs
USA	Urban Sustainability Area, as defined in the PCRs

CHAPTER 1

THE POST-CONSTRUCTION REQUIREMENTS

The California Regional Water Quality Control Board for the Central Coast Region (Water Board) adopted the Post-Construction Requirements (PCRs) in July 2013. The PCRs apply in urbanized areas, including many unincorporated census-designated places (CDPs), throughout the Central Coast Region.

This *Stormwater Technical Guide* (*Guide*) details requirements for the jurisdictions listed on the inside cover. The *Guide* is designed to ensure compliance with the PCRs, facilitate review of applications, and promote integrated Low Impact Development (LID) design. The *Guide* interprets, clarifies, and adds to the PCR requirements.

What Projects Must Comply?

Table 1-1 summarizes the minimum requirements. Development projects in Tier 2 must incorporate the requirements in Tiers 1 and 2. Projects in Tier 3 must incorporate the requirements of Tiers 1, 2, and 3.

Table 1-1. Requirements at a Glance

Type of Project	Requirements
Tier 1 Projects, including single-family homes that are not part of a larger plan of development (SFHs), that create or replace 2,500 square feet or more of impervious surface.	**Implement LID Measures:** • Limit disturbance of natural drainage features. • Limit clearing, grading, and soil compaction. • Minimize impervious surfaces. • Minimize runoff by dispersing runoff to landscape or using permeable pavements.
Tier 2 Projects, other than SFHs, that create or replace 5,000 SF or more net impervious surface.*	**Tier 1 requirements, plus:** • Treat runoff with an approved and appropriately sized LID treatment system prior to discharge from the site.
Tier 3 Projects, other than SFHs, that create or replace 15,000 SF or more of impervious surface. SFHs that create or replace 15,000 SF or more net impervious surface.*	**Tier 2 requirements, plus:** • Prevent offsite discharge from events up to the 95th percentile rainfall event using Stormwater Control Measures.
Tier 4 Projects that create or replace 22,500 square feet of impervious surface.	**Tier 3 requirements, plus:** • Control peak flows to not exceed pre-project flows for the 2-year through 10-year events.

* Net impervious surface equals new plus replaced impervious area, minus the total pre-project-to-post-project reduction in impervious area (if any). See the accompanying Stormwater Control Plan template.

"Low Impact Development is a stormwater management and land development strategy applied at the parcel and subdivision scale that emphasizes conservation and the use of on-site natural features integrated with engineered, small-scale hydrologic controls to more closely mimic pre-development hydrology.

— Puget Sound Action Team, 2005

Projects that are located within the NPDES permit boundaries defined by the Central Coast Regional Water Quality Control Board, including cities, certain institutions, and unincorporated urban areas are subject to the PCRs. See sbprojectcleanwater.org for map of permit areas within the unincorporated portions of Santa Barbara County.

The PCRs Tier 4 requirements are consistent with Santa Barbara County flood control requirements that were previously in effect. Additional peak-flow management, based on different criteria, may be required by the local flood control agency.

All projects must also conserve natural areas, protect slopes and channels against erosion, and comply with local stream setback and tree-preservation policies as determined by local planning departments.

What is Low Impact Development?

LID design aims to mimic pre-development site hydrology as well as protect water quality. Runoff from roofs and paved areas is dispersed to landscaped areas or routed to LID facilities distributed throughout the site. These LID facilities—typically bioretention—infiltrate most runoff. During long and intense storms, underdrains convey treated stormwater to storm drains. During exceptionally large events, overflows are safely conveyed off-site. See Figure 1-1.

Some of the advantages of LID are:

- Provides effective stormwater treatment by filtration and sequestration of pollutants within soils.
- Processes pollutants through biological action in the soil, rendering some pollutants less toxic.
- Facilities can be an attractive landscape amenity.
- Quick-draining bioretention facilities do not harbor mosquitoes or other vectors.
- Maintains the natural hydrologic condition, including recharge to groundwater and contribution to stream flows.
- Requires maintenance similar to landscaped areas of similar size; no special equipment is needed.
- Above-ground, visible facilities are easy to monitor and inspect.

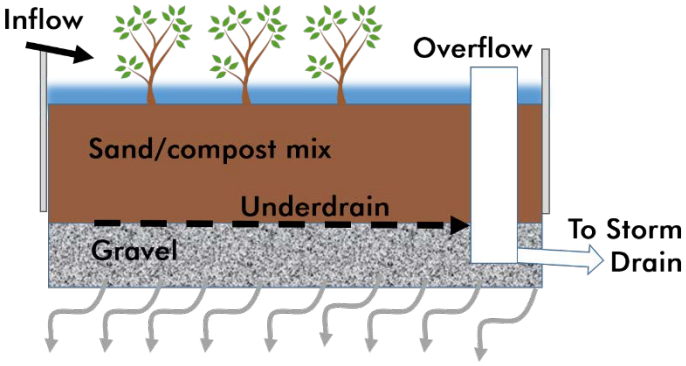


Figure 1-1. Bioretention facilities infiltrate most runoff (top) and can be an attractive landscape amenity (bottom).

CHAPTER 2

THE PATH TO STORMWATER COMPLIANCE

Start Early

LID features and facilities must be integrated into the planning, design, construction, operation, and maintenance of your development project.

Your LID strategy should be an integral part of the earliest decisions about how the site will be developed. Once subdivision lot lines have been sketched, or buildings and parking have been arranged on a commercial site, the LID design may already be constrained—often unnecessarily.

At this earliest stage, also consider who will be responsible for maintaining bioretention or other LID facilities in perpetuity.

The PCRs require the local municipality to maintain a database of LID facilities and ensure the facilities are operating as designed. The site layout, drainage and LID facilities are all conditions of project approval; as such, they may not be removed or rendered ineffective without the permitting agency's approval.

In most cases, the municipality will require the property owner, by agreement, to regularly inspect the facilities, allow access for municipal inspections, and give the municipality the right to conduct remedial maintenance and recover costs if facilities are not properly maintained.

In residential subdivisions, the need to provide for maintenance of stormwater treatment facilities can affect the layout of streets and lots, decisions whether to incorporate a homeowner's association (HOA), liability, insurance, and capital considerations, and the value of the individual built lots. In addition, municipalities may require the builder provide an extended maintenance and warranty period for the facilities before turning them over to an HOA or other entity for maintenance in perpetuity. Again, it's best to start early!

"Your LID strategy should be an integral part of the earliest decisions about how the site will be developed."

Here are some of the key stormwater compliance milestones as you manage your development project:

1: Pre-Application Meeting

2: Follow the Guide.

3: Stormwater Control Plan

4: Draft Stormwater Facilities Operation and Maintenance Plan

5: Detailed Project Design

6: Construct the Project

7: Transfer Maintenance Responsibility

1: Pre-Application Meeting

Discuss stormwater requirements for your project at a pre-application meeting with planning and development staff. Their experience with similar projects and with local procedures, requirements, and community plans can provide invaluable insights. Current

contacts are listed at the Project Clean Water website.

You should also discuss with staff the right timing for completing your Stormwater Control Plan. Often, site designs take a few iterative reviews (by staff and/or by a Design Review Committee) before a satisfactory site layout is achieved. It is important to consider site drainage and locations for bioretention facilities throughout this iterative process. However, it may make sense to delay compilation and formal submittal of your Stormwater Control Plan until the site layout is fairly well set.

2: Follow the Guide

Read this *Guide* all the way through and understand the principles and design procedures before beginning to design your project. Then, follow the steps in Chapter 3 as you lay out the site.

3: Stormwater Control Plan

Projects in Tier 1 may use the simple, abbreviated Stormwater Control Plan format and instructions in a template available on the Project Clean Water website.

For projects in Tiers 2 and 3, prepare and submit a complete Stormwater Control Plan with your application for a land use permit, or for other permits (grading or building) if planning and zoning approval is not required. The Stormwater Control Plan will demonstrate that adequate LID features and facilities can be accommodated within your site and landscape design.

Be sure the LID facilities shown on your Stormwater Control Plan Exhibit are also shown, as appropriate, on your preliminary site design, architectural design, and landscape designs.

Your Stormwater Control Plan may also be used in supporting a Negative Declaration or may be referenced in an Environmental Impact Report. In general, for most projects, implementing the techniques and criteria in this Guide will be considered to mitigate the project's potential impacts on stormwater runoff.

If your project receives planning and zoning discretionary approval, a Condition of Approval will specify the project be constructed consistent with the Stormwater Control Plan.

As described in Chapter 3, your Stormwater Control Plan will include a Construction Checklist of items to be followed up during the final design phase of your project.

Your Stormwater Control Plan must also include a statement accepting responsibility to maintain the stormwater treatment facilities until that responsibility is transferred to the project operator or owner or another responsible party, and a commitment to execute a maintenance agreement.

4: Draft Stormwater Facilities Operation and Maintenance Plan

The LID Facilities Operation and Maintenance Plan (O&M Plan) is a living document used to plan, direct, and record maintenance of stormwater treatment facilities. It identifies the individuals responsible for maintenance, who must keep an up-to-date copy and file periodic updates with the municipality.

The O&M plan should be updated with as-built documentation of how the facilities are constructed.

5: Detailed Project Design

During this stage, the landscape design must integrate the functionality of LID features and facilities into the aesthetic and functional values of the project.

Typical design issues include edges and transitions to allow runoff to flow from sidewalks and paved areas into bioretention areas, dissipation of energy gained by runoff flowing down slopes, planting and irrigation of bioretention facilities, and integration of berms, fences, and walls in or near bioretention facilities.

Chapter 4 includes design suggestions and tips. As a possible starting point for preparing construction drawings, see the drawings available (in .pdf and .dwg formats) by the Central Coast Low Impact Development Initiative, www.centralcoastlidi.org.

Your submitted construction documents will include a Construction Checklist cross-referencing the Stormwater Control Plan features with the plan sheets. This checklist helps the plan checker to review the architectural, landscape, and grading and drainage plans and ensure the LID design features and facilities are integrated into the project design.

6: Construct the Project

Careful construction of LID facilities, coordinated with the building of the development, will help ensure the facilities function as intended and will also minimize future maintenance problems. Items to check during construction include:

- Avoid compaction of native soils in and around where bioretention facilities will be constructed.
- Divert any runoff flows during their construction.
- Closely follow design elevations.
- Grade parking lots, driveways, and streets to promote evenly distributed sheet flow into self-retaining landscaped areas or bioretention facilities.
- Set overflow inlets at the proper height so the surface of the bioretention facility ponds as intended.

Appendix B contains an inspection schedule and checklist for construction of bioretention facilities.

7: Transfer Maintenance Responsibility

Following construction—or perhaps following a maintenance and warranty period—formally transfer maintenance responsibility to the owner or operator of the project, who will maintain the facilities in perpetuity. In the case of a residential subdivision, this may be a homeowners association, if that arrangement has been approved by your municipality.

"Grade parking lots, driveways and streets to promote evenly distributed sheet flow into self-retaining landscaped areas or bioretention facilities."

CHAPTER 3

PREPARING A STORMWATER CONTROL PLAN

Objectives

Projects in Tier 1 may use the simple, abbreviated Stormwater Control Plan format and instructions in a template available on the Project Clean Water website.

Your Stormwater Control Plan for a Tier 2 or Tier 3 project must demonstrate your project incorporates site design characteristics, landscape features, and engineered facilities that will:

- Minimize imperviousness.
- Detain and treat, and/or retain, the specified amounts of runoff.
- Slow runoff rates.
- Reduce pollutants in post-development runoff.

You will need to show all runoff from impervious areas is either dispersed to pervious areas or is routed to a properly designed LID facility.

A complete and thorough Stormwater Control Plan will enable municipal development review staff to verify your project complies with these requirements. It is strongly recommended you retain a design professional familiar with the requirements.

Contents

Your Stormwater Control Plan will consist of a report and an exhibit. Municipal staff will use the Stormwater Control Plan Checklist (page 3-2) to evaluate the completeness of your Plan.

Step by Step

Plan and design your stormwater controls integrally with the site plan and landscaping for your project. This strategy requires you invest in early and ongoing coordination among project architects, landscape architects, geotechnical engineers, and civil engineers. However, it can pay big dividends in a cost-effective, aesthetically pleasing design—and by avoiding design conflicts later.

Your initial, conceptual design for the project should include site drainage. This should include identifying areas where runoff can be dispersed and/or the location and approximate size of stormwater treatment and flow-control facilities.

"Plan and design your stormwater controls integrally with the site and landscaping for your project."

Follow these eight steps to complete your preliminary design and your Stormwater Control Plan.

Step 1: Project Information

Step 2: Opportunities and Constraints

Step 3: Conceptual Site Design

Step 4: Calculations and Documentation

Step 5: Design of LID Facilities

Step 6: Source Controls

Step 7: Stormwater Facility Maintenance

Step 8: Construction Cross-Checklist

Step 9: Certification

A template containing an example outline can be downloaded from the Project Clean Water website.

Stormwater Control Plan Checklist

Contents of Exhibit

- ❒ Existing natural hydrologic features (depressions, watercourses, relatively undisturbed areas) and significant natural resources.
- ❒ Proposed design features and surface treatments used to minimize imperviousness and reduce runoff.
- ❒ Existing and proposed site drainage network and connections to drainage off-site.
- ❒ Entire site divided into separate Drainage Management Areas (DMAs). Each DMA has a unique identifier and is characterized as self-retaining (zero-discharge), self-treating, or draining to a LID facility.
- ❒ Proposed locations and footprints of LID facilities (also called Stormwater Control Measures, or SCMs).
- ❒ Potential pollutant source areas, including loading docks, food service areas, refuse areas, outdoor processes and storage, vehicle cleaning, repair or maintenance, fuel dispensing, equipment washing, etc. listed in Appendix A.

Contents of Report

- ❒ Project information including project name; application number; location; parcel numbers; applicant contact information; land use information; site area; existing, new, and replaced impervious area, and applicable PCR requirements and exceptions.
- ❒ Narrative analysis or description of site features and conditions, and opportunities and constraints for stormwater control.
- ❒ Narrative description of site design characteristics that protect natural resources including endangered species habitat, protected vegetation, and archaeological resources, and preserve natural drainage features, minimize imperviousness, and disperse runoff from impervious areas.
- ❒ Tabulation of proposed pervious and impervious DMAs, showing self-treating areas, self-retaining areas, areas draining to self-retaining areas, and areas tributary to each LID facility.
- ❒ Proposed sizes, including supporting calculations, for each LID facility.
- ❒ Narrative description of each DMA and explanation of how runoff is routed from each impervious DMA to a self-retaining DMA or LID facility.
- ❒ Description of site activities and potential sources of pollutants.
- ❒ Table of pollutant sources identified from the list in Appendix A and for each source, the source control measure(s) used to reduce pollutants to the maximum extent practicable.
- ❒ Description of signage for bioretention facilities.
- ❒ General maintenance requirements for bioretention facilities and site design features.
- ❒ Means by which facility maintenance will be financed and implemented in perpetuity.
- ❒ Statement accepting responsibility for interim operation & maintenance of facilities.
- ❒ Stormwater Construction Checklist.
- ❒ Certification by a professional civil engineer, architect, or landscape architect.

1: Project Information

Enter the following into the Project Data Form in the Stormwater Control Plan Template:

- Project Name/Number
- Application Submittal Date
- Project Location
- Applicant Contact Information
- Project Phase
- Project Type and Description
- Project Site Area (square feet)
- Total Pre-Project Impervious Surface Area
- Total Post-Project Impervious Surface Area
- Total New Impervious Surface Area
- Total Replaced Impervious Surface Area within an Urban Sustainability Area (USA)
- Total Replaced Impervious Area not within a USA
- Watershed Management Zone
- Design Storm Frequency and Depth

To determine replaced impervious surface area, it is necessary to overlay a drawing of the existing, pre-project impervious areas with the proposed site plan and evaluate which portions of the existing impervious areas will be covered with new impervious surfaces. See the example in Figure 3-1.

Urban Sustainability Areas are areas, approved by Water Board staff, where municipalities seek to preserve or enhance an existing pedestrian and/or public-transit-oriented urban design through high-density infill and redevelopment. For a list of Urban Sustainability Areas (USAs) and associated maps, visit the Project Clean Water website.

2: Opportunities and Constraints

Review the following information before developing your stormwater control design:

- Existing natural hydrologic features, including natural areas, wetlands, watercourses, seeps, springs, and areas with significant trees.
- Site constraints such as endangered species habitat, protected vegetation, and archaeological resources.
- Site topography and drainage, including the contours of slopes, the general direction of surface drainage, local high or low points or depressions, and any outcrops or other significant geologic features.
- Zoning, including setbacks and minimum landscaping requirements and open space.
- Soil types—including NRCS Hydrologic Soil Groups—and depth to groundwater.

Prepare a brief narrative describing site opportunities and constraints.

Opportunities might include low areas, oddly configured or otherwise unbuildable areas,

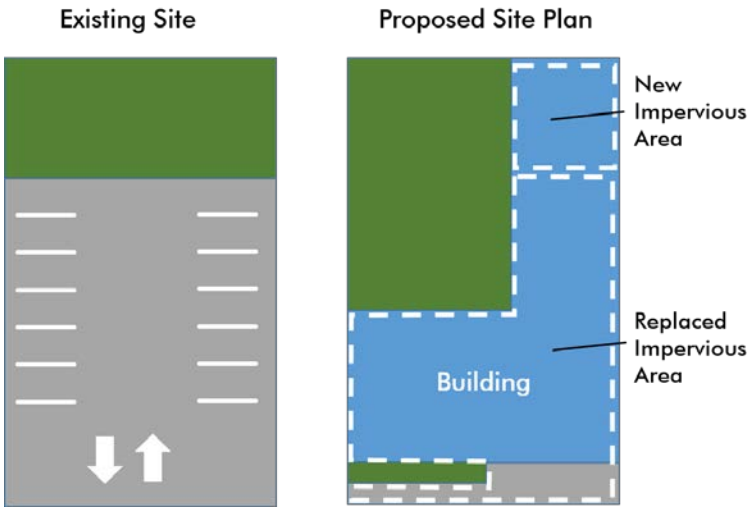


Figure 3-1. Illustration of Replaced Impervious Area.

setbacks, easements, or buffers (which can double as locations for bioretention facilities), differences in elevation (which can provide hydraulic head needed to move runoff to LID facilities), and soils favorable to infiltration.

Constraints might include impermeable soils, near-surface bedrock, high groundwater, groundwater pollution or contaminated soils, steep slopes, geotechnical instability (for example, coastal bluffs), high-intensity land use, heavy pedestrian or vehicle traffic, endangered species habitat, protected vegetation, archaeological resources, or safety concerns.

3: Conceptual Site Design

Begin by applying runoff reduction measures.

Optimize the site layout. Apply the following design principles:

- Define the development envelope and protected areas, identifying areas that are most suitable for development and areas that should be left undisturbed.
- Limit grading; preserve natural landforms and drainage patterns.
- Set back development from creeks, wetlands, and riparian habitats to the maximum degree practical and at minimum, as required by local policies.
- Preserve significant trees.

Limit paving and roofs. Where possible and consistent with zoning, design compact, taller structures, narrower and shorter streets and sidewalks, smaller parking lots (fewer stalls, smaller stalls, and more efficient lanes), and indoor or underground parking. Examine the site layout and circulation patterns and identify areas where landscaping or planter boxes can be substituted for pavement.

Use pervious pavements where possible. Inventory paved areas and identify locations where permeable pavements, such as crushed aggregate, turf block, unit pavers with permeable joints, pervious concrete, or pervious asphalt can be substituted for impervious concrete or asphalt paving. Pervious pavements are most applicable where native soils are permeable. On sites with clay soils, it may still be possible to use unit pavers or pervious pavement with a sufficiently deep and well-drained base course. Pervious pavements such as turf block can sometimes be used for overflow parking or for emergency access lanes (check with the local fire department).

Direct drainage to landscaped areas. There are two options for handling runoff from impervious areas:

- Disperse runoff to lawns or landscaping. Limit the ratio of impervious to pervious area to 2:1 maximum. Pervious areas must be relatively flat, and the surface should be graded to a slightly concave surface to create a "self-retaining" area. Sites in densely urbanized areas are often too constrained to implement this option.
- Route runoff to LID facilities (also called Stormwater Control Measures, or SCMs). LID facilities detain and infiltrate runoff. For rough site layout, consider that the surface area of a bioretention facility will be between 4% and 10% of tributary impervious area.

See Chapter 4 for design criteria for self-retaining areas and bioretention facilities.

Tips for Conceptual Drainage Design.

Most LID facilities are bioretention facilities and include underdrains. A bioretention facility requires two to four feet of head from

the inlet to the underdrain outlet, which can be the connected to an underground storm drain or daylighted.

On flat sites, it usually works best to intersperse self-retaining areas and bioretention facilities throughout the site. Grade parking lots, and driveways to sheet flow runoff directly into the landscaped areas. Use valley gutters or trench drains, rather than underground pipes, to convey runoff longer distances.

On sloped sites, it may work better to collect upslope runoff in conventional catch basins and pipe it to downslope bioretention facilities.

Use the head from roof downspouts by connecting leaders all the way to landscaping or bioretention facilities. Where necessary, bubble-ups can be used to disperse piped runoff.

Siting LID facilities/SCMs. Facilities should be easily accessible for inspection and maintenance.

In commercial, mixed-use, and multi-family developments, facilities can be located in parking medians, parking islands, street setbacks, side and rear setbacks, and other landscaped areas.

In residential subdivisions, the most practical strategy may be to drain the lots to the street in the conventional manner, and then drain the street to a bioretention area. It is most advantageous to create a separate parcel or parcels owned in common, which can double as a landscape amenity or a park. (This is one reason why it is important to plan stormwater treatment and flow-control before drawing subdivision lot lines.) Facilities in back or side yards should be avoided. If facilities are located on individual lots, prospective buyers may find undesirable the necessary legal restrictions on what they can do with those facilities.

Other types of treatment facilities. Bioretention facilities can typically be fit into parking medians, street setbacks, foundation plantings, and other landscaping features without significantly affecting the uses or layout of the site.

Further, bioretention facilities are relatively easy to maintain, provide aesthetic appeal, attenuate peak flows, and are quite effective at removing pollutants, including pollutants associated with very fine particulates in rain and atmospheric dust.

Alternative designs should provide equal or greater protection against shock loadings and spills, and equal or greater accessibility and ease of inspection and maintenance.

In some cases, it is very difficult to accommodate bioretention facilities on smaller, densely developed sites. Tree-box-type biofilters or in-vault media filters may be used to meet Tier 2 (treatment) requirements in the following circumstances:

- Projects that create or replace an acre or less of impervious area and are located in a locally designated pedestrian-oriented district, and have at least 85% of the entire project site covered by permanent structures
- Historic sites, structures, or landscapes that cannot alter their original configuration without compromising their historic integrity.

The proposed tree-box-type biofilters or in-vault media filters must meet the criteria in Appendix C.

"Setbacks, easements, and buffers can double as locations for bioretention facilities."

4. Calculations and Documentation

Your Stormwater Control Plan must include an Exhibit showing the entire site divided into Drainage Management Areas (DMAs) and the locations and approximate sizes of LID facilities. Each should be clearly labeled so the Exhibit can be cross-referenced to the text and tables in the report.

The report will include a brief description of each DMA, including self-treating and self-retaining areas, and of each LID facility—along with tabulated calculations.

Chapter 4 includes a detailed procedure for documenting your site design and showing your LID facilities meet the minimum sizing requirements. The Central Coast Stormwater Control Measure Sizing Calculator, available on the Project Clean Water website, facilitates calculations. The calculator MS Excel file should be submitted with your Stormwater Control Plan.

5. Design of LID Facilities

Design criteria in Chapter 4 will assist you to plan for construction of LID facilities as part of your project. The criteria that apply to your planned facilities should be summarized in your Stormwater Control Plan. Anticipated exceptions to the design criteria should be noted.

6. Source Controls

Your Stormwater Control Plan must identify and describe any potential pollutant sources that will be created or expanded as part of the development project.

Review the Pollutant Sources/Source Control Checklist (Appendix A). Begin by identifying which of the listed potential sources are associated with your project.

Then, create a table in the format shown in Table 3-1. Enter each identified source in the left-hand column. Then add the corresponding permanent, structural source controls from the Pollutant Sources/Source Control Checklist into the center column of your table.

In a narrative, explain any special features, materials, or methods of construction that will be used to implement these permanent, structural source controls.

To complete your table, refer once again to the Pollutant Sources/Source Control Checklist (Appendix A, Column 4). List the operational source controls corresponding to the sources you've identified into the right-hand column of your table. These controls should be implemented as long as the identified activities (sources) continue at the site. These controls may be required as a condition of a land use permit or other discretionary approval for specific uses of the site.

7. Stormwater Facility Maintenance

For Tier 2 and 3 Projects, your Stormwater Control Plan will describe maintenance needs of your LID facilities and source control

Table 3-1. Format for Source Control Table

Potential Source of Runoff Pollutants	Permanent/Structural Source Control BMPs	Operational/Pollution Prevention BMPs

measures. The maintenance plan will identify the location of the facilities to be inspected, the frequency of periodic inspections, and maintenance responsibilities. Maintenance records must be retained by the owner.

For residential subdivisions, consult with municipal staff, then detail the planned arrangements in your Stormwater Control Plan. Include, as available and applicable, information about joint ownership of parcels where bioretention facilities are to be located, about incorporating a homeowners association, about provisions to be incorporated in Codes, Covenants, and Restrictions, and other relevant information.

Include in your Stormwater Control Plan the following statement:

"The applicant accepts responsibility for the operation and maintenance of stormwater treatment and flow-control facilities for the life of the project. Any future change or alteration, or the failure to maintain any feature described herein can result in penalties including but not limited to fines, property liens, and other actions for enforcement of a civil judgment."

A complete and detailed list of maintenance and inspection requirements, including inspection frequencies, will be required in your Stormwater Facilities Operation and Maintenance Plan (O&M Plan). Your O&M plan must also include detailed documentation of how your facilities are constructed. The O&M plan will be linked to a legally binding agreement executed between the owner and the municipality. That agreement identifies the legally responsible person charged with implementing the O&M Plan over the life of the project. This agreement is a covenant running with the land, so that transfer to a new owner will transfer the responsibility for O&M.

For this stage, include in your Stormwater Control Plan a summary of the general maintenance requirements for your bioretention facilities. You will find a discussion of maintenance requirements in Chapter 5.

8. Construction Cross-Checklist

Include in your Stormwater Control Plan a Stormwater Control Plan/Construction Documents Cross-Checklist following the format in Table 3-2.

Complete the first two columns in the checklist, listing each stormwater source control measure and LID facility identified in the plan and identifying the page number where it appears.

Later, you will cut-and-paste the same table into your construction documents. Complete the rightmost column, listing the sheet number(s) where the same measure is shown on the construction plans.

Table 3-2. Format for Stormwater Control Plan/Construction Documents Cross-Checklist

Page Number in Stormwater Control Plan	Source Control or LID Facility	Plan Sheet #

9. Certification

Include the following statement by a licensed civil engineer, architect, or landscape architect:

"The preliminary design of stormwater treatment facilities and other stormwater pollution control measures in this plan are in accordance with the current edition of the Santa Barbara County Project Clean Water's Stormwater Technical Guide."

Alternative Compliance Options

The PCRs allow two options for alternative compliance with on-site retention requirements (Tier 3). Both require a demonstration that on-site compliance, as described above, is technically infeasible. Tier 2 (treatment) requirements must still be met on-site.

To propose alternative compliance, first prepare a complete Stormwater Control Plan as described in this chapter. Prepare your LID design as described in Chapter 4. The Stormwater Control Plan should show a complete and thorough implementation of opportunities for implementing LID, including delineation of DMAs and sizing of LID facilities. Show clearly in the plan the extent to which LID can and will be implemented on-site and explain why further implementation of LID is infeasible.

Potential causes of infeasibility include:

- High seasonal groundwater limits infiltration and/or prevents construction of subgrade stormwater control measures
- Near-surface bedrock or other impermeable conditions limit infiltration
- Soil types significantly limit infiltration
- Pollutant mobilization in soil or groundwater is a documented concern
- Space constraints imposed by infill projects, some redevelopment, and high density development, etc.
- Geotechnical hazards
- Proximity to drinking water wells (within 100')
- Incompatibility with connections to the municipal storm drain system (for example, a project drains to an existing stormwater collection system, the elevation of which precludes connections to a properly functioning treatment or flow control facility).

Ten Percent Adjustment. Compliance with the criterion to prevent offsite discharge from events up to the 95th percentile rainfall event can be waived if stormwater control measures occupy an area equivalent to no less than 10% of the project's "Equivalent Impervious Surface Area."

Tabulate "Equivalent Impervious Surface Area" and the area of stormwater control measures and show totals for each; then divide the area of stormwater control measures by the Equivalent Impervious Surface Area to show the 10% criterion is met or exceeded.

Formats and instructions for this tabulation are in Chapter 4.

Off-site compliance. Nearly all development projects should be able to achieve on-site compliance using the instructions and criteria in the *Guide*.

If you believe on-site compliance is infeasible for your site, and you wish to propose an off-site mitigation project, begin by contacting municipal staff for further guidance.

CHAPTER 4

DOCUMENTING YOUR LID DESIGN

LID and Compliance with the PCRs

Projects in Tier 1 may use the simple, abbreviated Stormwater Control Plan format and instructions in a template available on the Project Clean Water website.

For projects in Tier 2 and Tier 3, the following design and documentation procedure facilitates rapid and thorough evaluation of a LID design for compliance with the Post-Construction Requirements.

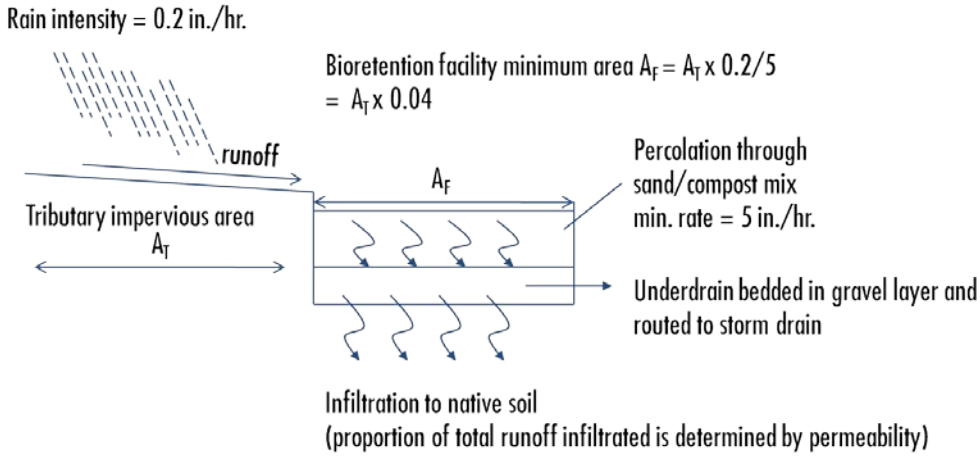
The procedure involves dividing the entire site into Drainage Management Areas (DMAs) and tracking the drainage from each DMA. The procedure accounts for pervious areas and dispersal of runoff from impervious area to landscape. The procedure is iterated until LID facilities are adequately sized to treat runoff (for projects in Tier 2) or infiltrate runoff (Tier 3).

For Tier 2 projects, LID facilities are designed to detain and treat runoff produced by a rainfall intensity of 0.2 inches per hour. A sizing factor of 0.04 is used, which greatly simplifies calculations. See Figure 4-1.

For Tier 3 projects, LID facilities are sized according to the design storm depth and soil type, which vary with location. LID facilities

Figure 4-1. Derivation of Sizing Factor of 0.04 for Tier 2 Bioretention Facilities

As specified in the PCRs, bioretention facilities for Tier 2 are designed to detain and treat runoff produced by a rainfall intensity equal to 0.2 inches per hour. Measured over years, these low-intensity storms produce most of the total volume of runoff (80% or more). The planting medium (sand/compost mix) specified in this Guide is designed to filter runoff at a rate of at least 5 inches per hour. If 100% of rainfall ends up as inflow to the bioretention facility (a conservative assumption), then the ratio of tributary impervious area to bioretention surface area needs to be: 0.2 inches/hour ÷ 5 inches/hour = 0.04.



may be sized with a volume equal to the runoff volume produced by the design storm (simple method) or by iterative calculations routing the design storm hydrograph through the facility. These calculations account for infiltration that occurs simultaneously with inflow (routing method). The routing method results in a smaller facility; the volume and footprint vary with the characteristics of the underlying soils as well as the design storm depth.

An MS-Excel-based calculator accompanying this *Guide* facilitates tracking of DMAs and sizing calculations for Tier 2 and Tier 3 projects. It should be used to prepare your design and your Stormwater Control Plan submittal.

As a runoff reduction measure, runoff from impervious areas, such as roofs, can be managed by routing it to self-retaining pervious areas. The maximum ratio is 2 parts impervious area for every 1 part pervious area.

Step-by-Step

The procedure requires the following steps:

1. Delineate entire site into DMAs.
2. Categorize and tabulate DMAs. Reduce runoff by minimizing the amount of impervious area draining to bioretention facilities.
3. Select and lay out LID facilities.
4. Use the Central Coast SCM Sizing Calculator to evaluate LID facility footprints.
5. Compare the required footprint to the area available. Iterate until all bioretention facilities meet or exceed the minimum required area.

1: Delineate entire site into DMAs

Drainage Management Areas (DMAs) are portions of a project site that drain to a common point. Delineate the entire site into DMAs. Each DMA must contain only one type of surface (e.g., landscaped, impervious, or pervious pavement).

In your Stormwater Control Plan Exhibit, lines delineating DMAs will generally follow roof ridges and grade breaks. It is advantageous to first prepare a base map using the project grading plan and roof plan, and then delineate the DMAs. This helps ensure your Stormwater Control Plan is consistent with the site plan, landscaping plan, and architectural plans.

There are four types of DMAs:

- Self-treating areas
- Self-retaining areas
- Areas draining to self-retaining areas
- Areas draining to a LID facility

Self treating areas are undisturbed areas, or areas planted with native, drought-tolerant, or LID-appropriate vegetation, that do not receive runoff from other areas. Self-treating areas do not drain to bioretention facilities, but rather drain directly off site or to the storm drain system. Examples include upslope undeveloped areas which are ditched and drained around a development and grassed slopes which drain directly to a street or storm drain. In general, self-treating areas include no impervious areas, unless the impervious area is very small (5% or less) relative to the receiving pervious area, and slopes are gentle enough to ensure runoff will be absorbed into the vegetation and soil.

Self-retaining areas are low-lying areas that retain the design storm and can also retain runoff from adjoining areas. Self-retaining areas are used where, because of site layout or topography, it is not possible to meet the conditions for self-treating areas. Self-retaining areas may have natural vegetation, or be

landscaped, or may be green roofs or pervious pavement, if the pervious pavement is designed to the criteria on page 4-13. If their capacity is exceeded, self-retaining areas overflow to another DMA onsite.

To create self-retaining turf and landscape areas in flat areas or on terraced slopes, berm the area or depress the grade into a concave cross-section. Inlets of area drains, if any, should be set 3 inches or more above the low point to allow ponding.

Areas draining to self-retaining areas. Runoff from impervious areas, such as roofs, driveways, parking, and sidewalks, can be managed by routing it to self-retaining areas. The maximum ratio is 2 parts impervious area

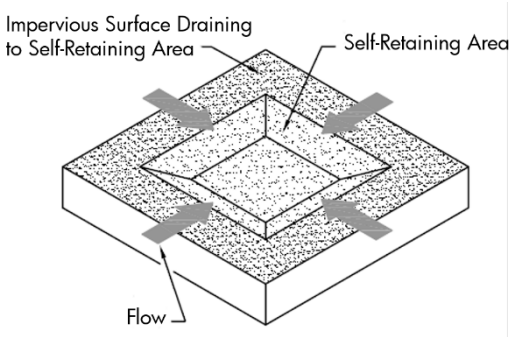


Figure 4-2. Ratio of impervious area draining to a self-retaining area shall be no more than 2:1.

for every 1 part pervious area. The runoff from the impervious area must be directed to and dispersed within the pervious area, and the pervious area must hold a volume equal to both areas times a 1-inch depth. For example, if the maximum ratio of two parts impervious area to one part pervious area is used, then the self-retaining pervious area must be graded concave or bermed so that three inches of water over its surface are retained and infiltrated.[1] Prolonged ponding is a potential problem at higher impervious/pervious ratios. In your design, ensure that the pervious area soils infiltrate well enough to handle the additional run-on.

Areas draining to a LID facility. The square footage of these areas is used to calculate the required footprint and volume of the LID facility. More than one drainage area (DMA) can drain to the same LID facility. However, any one DMA can only drain to one LID facility.

Where possible, design site drainage so only impervious roofs and pavement (not landscaped areas) drain to LID facilities. This yields a simpler, more efficient design and also helps protect LID facilities from becoming clogged by sediment.

2. Categorize and Tabulate DMAs

For each DMA, determine whether it will be self-treating, self-retaining, drains to a self-retaining area, or drains to a LID facility. For each DMA, tabulate the square footage and the post-project surface. Surface types and associated runoff factors are in Table 4-1.

3. Select and Lay Out LID Facilities

From your conceptual drainage design (see Chapter 3) identify the locations and footprint of LID facilities.

Design criteria for LID facilities are at the end of this chapter. Once you have laid out the LID facilities, calculate the square footage you have set aside for each LID facility.

[1] This scenario was simulated for a 2.4-inch storm depth (95th percentile storm for Santa Barbara) and a soil infiltration rate of 0.25 in./hr. The depth was found to be sufficient to retain and infiltrate all runoff.

Then, recalculate the square footage of your DMAs to omit the square footage now dedicated to LID facilities.

4. Size LID Facility Footprints

For Tier 2 projects, the minimum area for a bioretention facility can be found by summing up the contributions of each tributary DMA:

$\sum$ (square footage × runoff factor)

and multiplying by result by the sizing factor of 0.04. This sizing factor is used by the Central Coast Region SCM Sizing Calculator that accompanies this *Guide*.

For Tier 3 projects, you may use either of two methods: the simple method or the routing method. The routing method is facilitated by the Central Coast Region SCM Sizing Calculator.

To use either method, first find the applicable storm depth based on location. Use the maps and instructions on the Central Coast Water Board website (search for "Central Coast percentile rainfall depth maps"). The 95th percentile storm applies throughout the areas of Santa Barbara County to which the PCRs apply. Storm depths vary from 1.4 to 2.4 inches.

Next, determine any adjustments allowed for previously existing development, as follows:

- From your project data form, identify replaced impervious square footage within an Urban Sustainability Area (USA) and not within a USA.
- Replaced impervious square footage within a USA may be omitted from your LID facility sizing calculations (that is, multiply by zero).
- Replaced impervious square footage not within a USA may be multiplied by 0.5 before entering it into your LID facility sizing calculations.

Note that square footage omitted or halved may be applied, at your discretion, to any DMA, thereby reducing the required size of the LID facility to which that DMA is tributary.

To size facilities using the simple method: Determine the required minimum volume V (in cubic feet) for each facility by multiplying as follows:

V =
Σ [DMA SF × runoff factor] × storm depth

For bioretention facilities, divide the calculated minimum storage volume by 0.4 (porosity) to determine the volume of gravel required.

To size facilities using the routing method: First, enter the following information into the calculator accompanying this *Guide:*

- Name and location of project
- Applicability (Tier 2, 3, or 4)

Table 4-1. Runoff Factors for Small Storms (for LID design)

Roofs and paving	1.0
Landscaped areas	0.1
Bricks or solid pavers on sand base	0.5
Pervious concrete or asphalt	0.0
Turfblock or gravel—total section min. 6"	0.0

- Design rainfall depth (95th percentile storm)
- Total new impervious area
- Total replaced impervious area in a USA
- Total replaced impervious area not in a USA
- Total pervious or landscaped area

Then for each, DMA, enter the following:

- Name of DMA and type (self-treating, self-retaining, drains to self-retaining, or drains to Stormwater Control Measure)
- DMA area in square feet
- Type of surface (roof, landscape, etc.)
- New or replaced and whether in a USA
- For DMAs that are not self-treating or self-retaining, the connection to a self-retaining area or Stormwater Control Measure

For each LID Facility/SCM, enter:

- Name of SCM and type (bioretention or direct infiltration; see discussion below)
- Hydrologic Soil Group or design infiltration rate for subsurface soils (see discussion below)
- Surface reservoir volume (may be entered as an average depth if reservoir area is the same as facility infiltration area)
- Facility infiltration area (area in contact with subsurface soils)

The calculator performs the following based on the Santa Barbara Unit Hydrograph method:

- Distributes the design storm depth over time increments (Type 1 unit hydrograph)
- Calculates facility inflow rate and volume for each time increment
- Calculates facility infiltration rate and, for each time increment, the corresponding infiltration volume
- Calculates incremental increase or decrease in storage and cumulative storage for each time increment
- Tracks and outputs time for facility to drain fully

The calculator outputs the maximum cumulative storage volume required to retain the design storm. As required by the PCRs, the calculator multiplies this volume by 1.2 when the drawdown time exceeds 48 hours (the likely condition when facilities are located in lower-permeability soils).

This is the Minimum Required Storage Volume to be used for your design.

Infiltration rate for routing method: You may use the default option or, alternatively, submit data from on-site testing.

The default option is to use the Hydrologic Soil Group (HSG) that best characterizes site soils. To support your selection of an HSG, attach to your Stormwater Control Plan on-site boring logs or other information such as a geotechnical report for the site. In the calculator, HSG A/B soils (soils with no significant clay component) are assigned an infiltration rate of 0.75 in/hr. and HSG C/D soils are assigned an infiltration rate of 0.25 in/hr. Should you wish to submit data from on-site testing, consult in advance with municipal staff regarding acceptable test methods.[2]

[2] The publication "Native Soil Assessment for Small Infiltration-Based Stormwater Control Measures," prepared for the Central Coast Low Impact Development Initiative and available at the Central Coast Water Board website, outlines some test methods

Because of limitations in the precision of infiltration rate testing at low rates, this option may be used only to support an infiltration of 0.5 in/hr. or greater; otherwise the default 0.25 in/hr. will apply.

For direct infiltration SCMs—such as dry wells, infiltration trenches, or infiltration basins—the calculator divides the infiltration rate by a safety factor of 2 to account for potential reductions in infiltration rates over time. (This factor may be waived by local staff if an adequately designed and maintained treatment system is installed upstream of the infiltration facility.)

For bioretention SCMs, the Minimum Required Storage Volume is the volume of the voids in the gravel layer. It is assumed the porosity Φ of the gravel layer is equal to 0.4. The underdrain is placed at the top of this layer.

Flow-control orifice on underdrain: Ordinarily, the volume of the surface reservoir and the volume of pore spaces in the planting soil are not credited toward the Minimum Required Storage Volume.

However, if a flow restrictor is placed on the underdrain outlet, once the gravel layer fills, additional inflows can be made to back up into the soil layer and the reservoir rather than immediately exiting the underdrain. By increasing the volume detained by the facility and prolonging the detention time, additional volumes are infiltrated during the largest 5% of storms. Consequently, the volume of storage beneath the underdrain can be reduced by about 20%.

When using this option, consider the potential effect of prolonged inundation on the vegetation in the bioretention facility, and select the plant palette accordingly. Also consider the need to access the orifice for maintenance. See the schematic and criteria in Figure 4-4 on page 4-11.

To use this option, select "yes" to the option provided in the calculator. The calculator provides the diameter of the orifice. See the bioretention facility design criteria in this chapter for details on the orifice design.

Combining with an onsite downstream basin or vault. If a bioretention facility discharges to an on-site downstream detention basin or vault (for example, a basin used for flood control detention), then the bottom surface area of the basin, and the "dead storage" volume of the basin, may be applied toward meeting the Minimum Required Storage Volume. See Figure 4-3.

To do so, add the surface area of the basin "dead storage" to the area of the bioretention subsurface gravel storage, and enter the result as the SCM in the calculator. After launching the SBUH model, the volume of the basin "dead storage" may be credited toward the minimum required storage volume.

5. Repeat until facility area is acceptable

If the routing method is used, then the minimum storage volume required changes as the facility infiltration area (this is usually, but not always, the same as the footprint) is adjusted. Try entering different facility infiltration areas into the calculator, finding the resulting minimum storage volume, and determining the resulting gravel layer depth.

The calculator is set up to track DMAs and the routing of drainage from DMAs to LID facilities/SCMs. The calculator facilitates exploration of options to delineate DMAs differently and associate DMAs with different LID facilities and calculates the Minimum

Required Storage Volume that results. Iterate (repeat) this process to develop your design.

Review the site plan to determine if, for each LID facility, the square footage reserved is sufficient to accommodate the minimum footprint, plus any additional area for side slopes to match surrounding grade.

Also consider (for Tier 3 and Tier 4 projects) if the resulting gravel depth is constructible.

If necessary, revise your site plan, facility designs, or both. Revisions may include:

- Reducing the overall imperviousness of the project site.
- Changing the grading and drainage to redirect some runoff toward other LID facilities which may have more capacity.
- Making tributary landscaped DMAs self-treating or self-retaining.
- Expanding the LID facility footprint/infiltration area.
- Using a flow-control orifice on the underdrain
- Using large-diameter pipes, arches, vaults, or other structures to more efficiently create subsurface storage and thereby reduce the facility depth and volume of gravel required.

Bioretention facility design criteria

Layout. Bioretention facilities may be of any shape. However, the following layers must be designed and built flat and level throughout the facility:

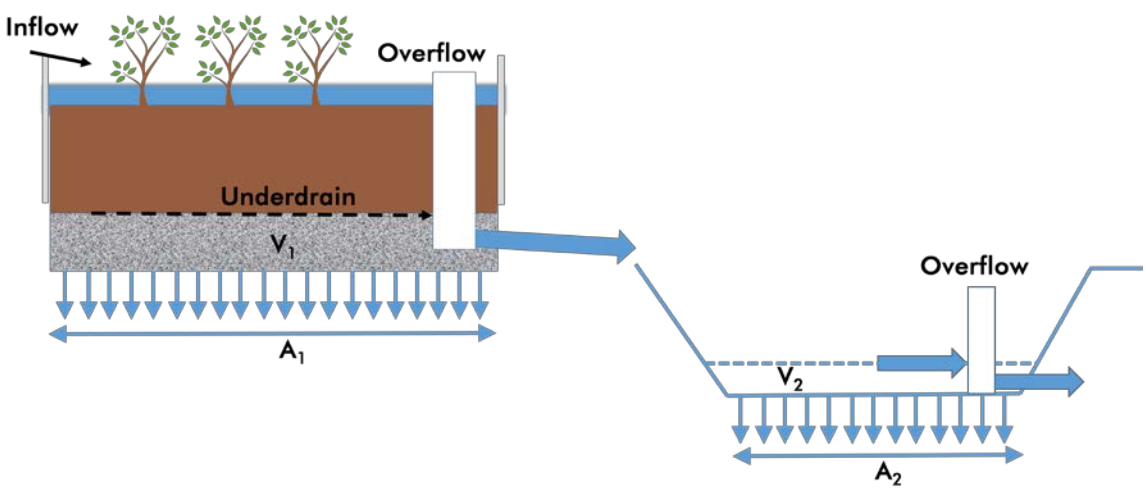
- bottom of the excavation
- top of gravel storage layer
- top of soil layer
- rim of facility reservoir

See Figure 4-4. The facility must be designed to "fill up like a bathtub." This rule ensures all the storage is used during intense rainfall,

Review the site plan to determine if, for each LID facility, the square footage reserved is sufficient to accommodate the minimum footprint, plus any additional area for side slopes to match the surrounding grade.

Figure 4-3. Schematic of Bioretention Facility Combined with a Downstream Basin

The surface areas A_1 and A_2 may be added and entered into the calculator. The required storage volume may be met by combining the subsurface storage in the bioretention facility (V_1) with "dead storage" (V_2, storage below the lowest discharge elevation) in the basin or vault.



prevents short-circuiting, and avoids erosion of the soil mix.

The surface reservoir should be level and circumscribed by a rigid boundary such as a concrete curb, masonry, or landscape timbers. To address concerns about a trip hazard, or to achieve a softer visual effect, soil mix and/or mulch may be gently mounded against the rigid edge. Plantings can be selected and arranged to discourage entry.

Gravel layer. "Class 2 permeable," Caltrans specification 68-2.02(F)(3), is recommended. Drain rock or other granular material may be used; however, a layer of pea gravel or other intermediate-sized material should cover the top of the drain rock to reduce movement of fines from the soil layer into the interstices of the drain rock. Do not use filter fabric for this purpose.

Soil mix. A mixture of 60%-70% washed sand (ASTM C33) and 30%-40% compost should be used. The specification developed by the Bay Area Stormwater Management Agencies Association (available on the Project Clean Water website) is recommended.

Overflow Structure. Overflows from bioretention facilities must be routed safely, typically via an overflow structure and connection to a storm drain. The best option is to use a precast concrete catch basin with frame and grate set to the desired overflow elevation, which should be specified in the plans. Note that if an orifice is used (see below), it needs to be accessible for maintenance, and the catch basin should be sized accordingly.

Underdrain. Use minimum 4" dia. PVC SDR 35 or equivalent, perforated pipe, installed with the holes facing down. The underdrain can be placed in a groove dug into the top of the gravel layer; the discharge elevation (typically, where the underdrain is connected to the overflow structure) is critical and must be no lower than the top of the gravel layer. Connect to the overflow structure using solid 4" dia. Schedule 80 or equivalent pipe. At the other end, provide a threaded, capped cleanout connected by a sweep bend.

Flow-restricting orifice. The orifice is constructed by threading the underdrain connection pipe where it protrudes into the overflow structure. The pipe is capped, and a hole of the required diameter (as provided by the Central Coast Stormwater Control Measures Sizing Calculator) is drilled in the cap.

Landscape Design. Many bioretention facilities incorporate native plants in an attractive garden setting, achieving low maintenance costs, low water demand, and maximum habitat value. However, combined uses, including active uses on turf or mulch, may be appropriate for part or all of a bioretention facility.

Select a plant palette to tolerate fast-draining soils and the microclimate specific to the facility location. The soil surface will be inundated briefly and rarely (for a few hours on possibly up to 5 occasions during a wet winter, but typically less frequently) but otherwise dry unless irrigated. Consider the facility's relationship to existing and proposed buildings and the resulting exposure to sun, heat, shade, and wind.

Here are some problem conditions that should be avoided when developing a planting plan:

- Overly dense plantings that, after growing in, prevent flow into and through the surface reservoir

- Aggressive roots that block inflow or percolation
- Invasive weeds
- Plants that need irrigation or fertilization

Trees and large shrubs installed in bioretention facilities are susceptible to blowing over before roots are established. They should be staked securely. Three stakes per tree are recommended at windy sites.

Aged mulch, also called compost mulch, reduces the ability of weeds to establish, keeps the soil mix moist, and replenishes soil nutrients. Compared to bark mulch, aged mulch has somewhat less tendency to float into overflow inlets during intense storms.

Irrigation. Irrigation controls should allow separate control of times and durations of irrigation for bioretention facilities vs. other landscape areas. Smart irrigation controllers are strongly encouraged. Available controllers can access weather stations, use sensors to measure soil temperature and moisture, and allow input of soil types, plant types, root depth, light conditions, slope, and usable rainfall. Bioretention facilities may need to be irrigated more than once a day, depending on the plants selected.

Drip emitters are strongly recommended over spray irrigation. Use multiple, lower-flow (0.5 to 2 gallons per hour) emitters—two to four emitters for perennials, ground covers, and bunchgrasses; four to six emitters for larger shrubs and trees. If spray heads are used, they must be positioned to avoid direct spray into outlet structures.

Signage. Each bioretention facility must include a sign meeting current Project Clean Water standards. Signs may be available from Project Clean Water; check for availability. Signs must be visible to site users and to maintenance personnel.

Tips for avoiding design conflicts

Review your bioretention design for the following:

- Elevations all around each facility are consistent with grading, drainage, and paving plans, and with architectural plans.
- Facilities do not interfere with circulation or with pedestrian access between parking areas and building entrances.
- Facilities are represented in architectural and landscape renderings.
- Bioretention facilities are shown in landscape plans, and a suitable plant palette has been chosen.
- Cable vaults, phone vaults, electrical boxes, and other utility boxes are accommodated in designated locations outside the bioretention facilities.
- Foundations and pavement subgrades adjacent to the facilities are shored and protected against moisture intrusion, as needed.

Designing SCMs Other than Bioretention

For dry wells, infiltration trenches, infiltration basins, and other retention facilities, demonstrate that your preliminary design meets the proposed infiltration area and Minimum Required Storage Volume (as shown in the calculator file submitted with your Stormwater Control Plan). Standard designs for these facilities may be used. Links to some design guidance manuals are on the Project Clean Water website.

Ten Percent Adjustment

As noted in Chapter 3, following determination that it is infeasible to incorporate facilities that will detain the specified amount of runoff on-site, compliance may be achieved by dedicating a minimum 10% of the site's "Equivalent Impervious Surface Area" (EISA) to Stormwater Control Measures (SCMs).

Calculation of EISA. Divide the site into DMAs. Delineate separate DMAs for each surface type.

Tabulate and total the square footage of DMAs with concrete or asphalt paving, conventional or metal roofs, or other wholly impervious surfaces.

Then tabulate the square footage of DMAs with the surfaces shown in Table 4-6. Multiply the square footage of each DMA by the "correction factor" shown and total the products.

Total the contributions of the pervious and partially pervious DMAs. This is the EISA for the site.

Calculation of SCM Area. Total the square footage of bioretention facilities and other facilities designed using the simple method or the calculator.

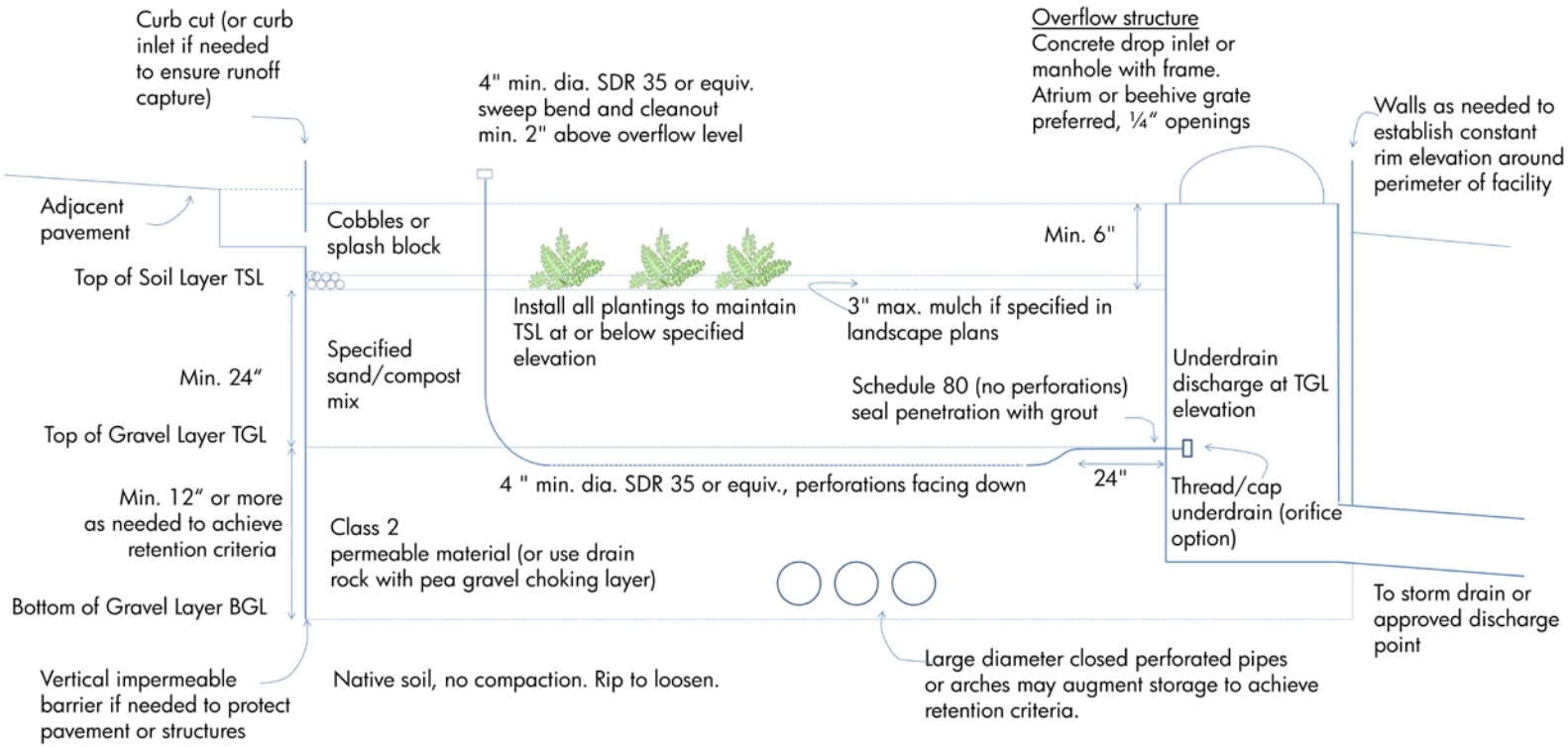
Ratio. Divide the SCM Area by the EISA to determine if the 10% criterion is met. Use of the 10% adjustment requires that the applicant first demonstrate the infeasibility of implementing bioretention facilities sized using the calculator to manage runoff from all impervious DMAs. The project must retain on-site the amount of runoff feasible.

Table 4-2. Correction Factors for Use in Calculating Equivalent Impervious Surface Area (EISA) (from the PCRs)

Pervious Surface	Correction Factor
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

Figure 4-4. Bioretention Facility Cross-Section

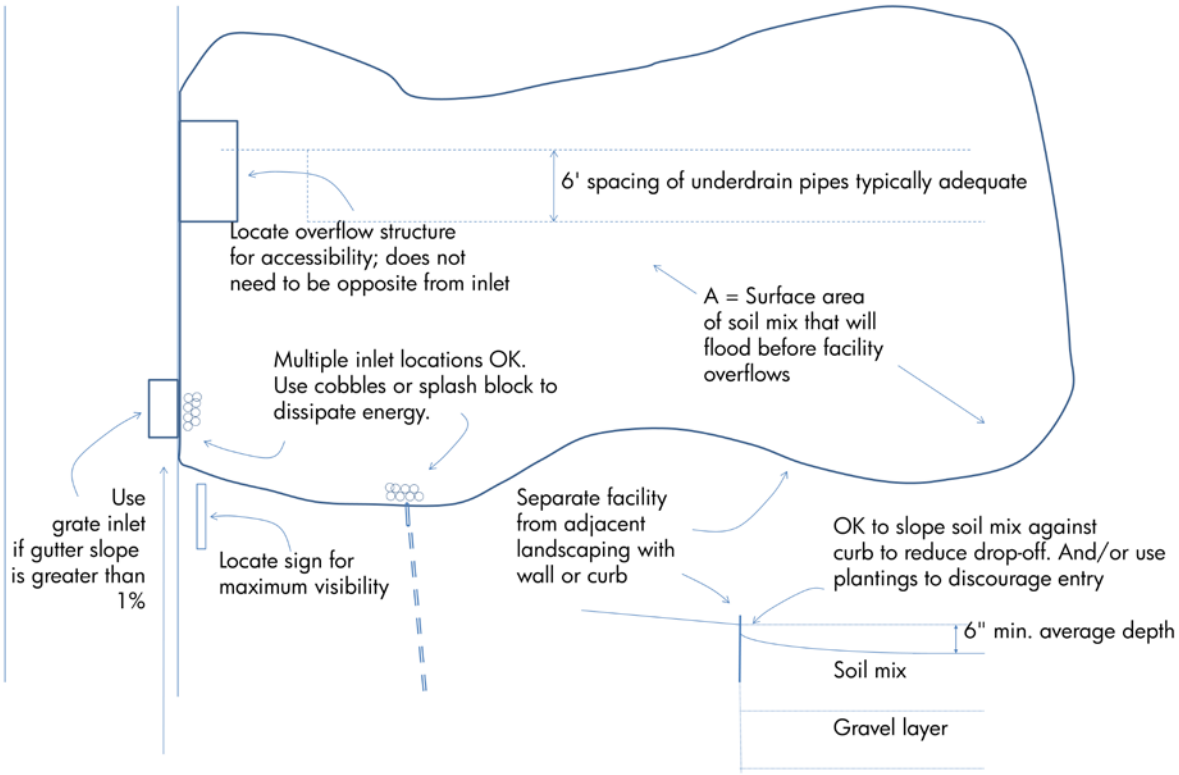
Not to Scale



Notes:

- No liner, no filter fabric, no landscape cloth.
- Maintain BGL. TGL, TSL throughout facility area at elevations to be specified in plan.
- Class 2 permeable material layer may extend below and underneath drop inlet.
- Elevation of underdrain discharge is at top of gravel layer.
- See Chapter 4 for instructions on facility sizing and additional specifications.
- Drawings available at www.centralcoastlidi.org can be adapted and customized to meet project requirements and these minimum specifications.

Figure 4-5. Bioretention Facility Plan
Not to Scale

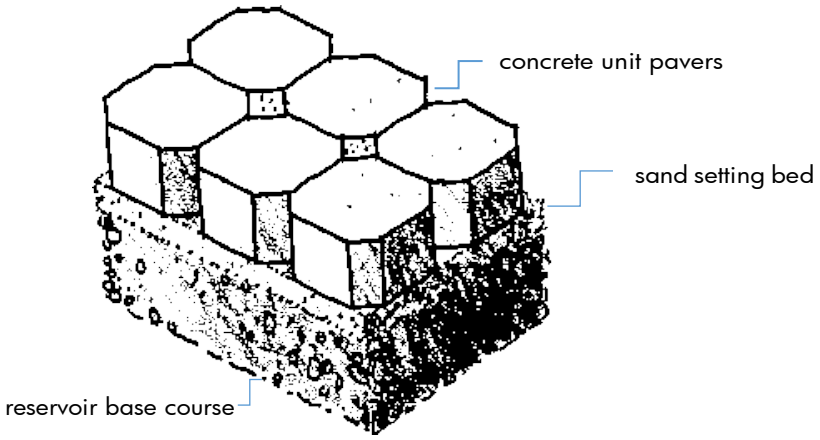


Note: Call out elevations of curb, pavement, inlet, top of soil layer (TSL), bottom of soil layer (BSL), and bottom of gravel layer (BGL) at all inlets and outlets and at key points along edge of facility.

Figure 4-6: Design Criteria for porous pavements to achieve runoff reduction

The following minimum design criteria must be followed where porous pavements are used as a site design measure for Tier 1 projects, or a self-retaining area for Tier 2 and 3 projects. As with other areas draining to self-retaining areas (p. 4-3), porous pavements built to these criteria may receive runoff from impervious areas up to a ratio of 2:1 impervious-to-pervious, if the soils underlying the porous pavement drain well enough to handle the additional run-on.

- ❑ No erodible areas drain on to permeable pavement.
- ❑ Subgrade is level and slopes are not so steep that subgrade is prone to erosion.
- ❑ Subgrade compaction is minimal.
- ❑ Reservoir base course is of open-graded crushed stone. Base depth (3" or more) is adequate to retain rainfall and support design loads (more depth may be required).
- ❑ No subdrain is included or, if a subdrain is included, outlet elevation is a minimum of 3 inches above bottom of base course/top of subgrade.
- ❑ Rigid edge is provided to retain granular pavements and unit pavers.
- ❑ Solid unit pavers, if used, are set in sand or gravel with minimum 3/8 inch gaps between the pavers. Joints are filled with an open-graded aggregate free of fines.
- ❑ Permeable concrete or porous asphalt, if used, are installed by industry-certified professionals according to the vendor's recommendations.
- ❑ Selection and location of pavements incorporates Americans with Disabilities Act requirements (if applicable), site aesthetics, and uses.



Typical configuration for a pervious pavement. The base course is a minimum 3" depth for runoff retention. A deeper base course is typically required for pavement stability.

CHAPTER 5

PREPARING YOUR BIORETENTION FACILITIES OPERATION & MAINTENANCE PLAN

Introduction

LID facilities—and in particular, bioretention facilities—require little care beyond normal maintenance and periodic rejuvenation of the landscaping.

However, applicants must verify provisions have been made for maintenance of the LID facilities in perpetuity.

This verification is accomplished by executing and recording an agreement that "runs with the land." The agreement provides the municipality a right of access for inspections and requires the owner to certify annually that facilities have been recently inspected and are functioning as intended. If maintenance is not adequate, the municipality may conduct any maintenance or repairs needed and bill the owner to recover costs. The agreement is binding on future owners of the entire property or any subdivided portion of the property. A model agreement is available at the Project Clean Water website.

When facilities are located in a privately owned common area, such as street or landscaped area within a residential subdivision, the joint responsibilities of the property owners must be spelled out in Covenants, Conditions, and Restrictions (CC&Rs).

Your Operation and Maintenance Plan (O&M Plan) will address the specific drainage patterns and treatment facilities on the development site and is typically referenced in the agreement or attached as an exhibit. The O&M Plan is used to plan, direct, and record maintenance of the SCMs. The O&M Plan is kept on-site, and a copy maintained at municipal offices.

Updated information, including contact information, must be provided to the municipality whenever a property is sold and whenever responsibility for maintenance is changed.

Step by Step

Follow these five steps to prepare your O&M Plan.

Step 1: Designate Responsible Individuals

Step 2: Describe the Facilities

Step 3: Document the Facilities "As Built"

Step 4: Schedule Maintenance Activities

Step 5: Compile the Plan

1. Designate Responsible Individuals.

Identify the following individuals:

- Person who will have direct responsibility for the maintenance of stormwater controls, maintain self-inspection records, and sign

any correspondence with the municipality regarding the inspections.

- Employees or contractors who will report to the designated contact and are responsible for carrying out maintenance.
- Contact for response to problems, such as clogged drains or broken irrigation mains, that would require immediate response should they occur during off-hours.

Describe the methods and schedule of initial training for staff or contractors regarding the purpose, mode of operation, and maintenance requirements for the facilities on the site.

"Municipalities will typically require a draft Operations and Maintenance Plan be submitted when building permits are applied for — or even before."

2. Describe the Facilities to be Maintained

Incorporate the following into the O&M Plan:

- Figures from your Stormwater Control Plan delineating the Drainage Management Areas on the site and showing the locations of the bioretention facilities.
- The tabulation of the Drainage Management Areas from the calculations in your Stormwater Control Plan.

3. Document Facilities "As Built"

Include from the final construction drawings:

- Plans, elevations, and details of the bioretention facilities. If necessary, annotate the drawings with the designations used in the Stormwater Control Plan so it is clear which drawing refers to which facility.
- Construction details and specifications, including depths of sand or soil, compaction, pipe materials, and bedding.
- Location and layouts of inflow piping and piping to off-site discharge.
- Native soils encountered (e.g., sand or clay lenses beneath or near facilities).

Municipalities may require a *draft* Operations and Maintenance Plan be submitted when building permits are applied for — or even before.

Changes made in the field during construction should be noted in the *final* Plan following construction.

4. Schedule Maintenance Activities

The following activities should be scheduled at least annually. The frequency should be adjusted in response to the needs of each particular facility.

Clean up. Remove any soil or debris blocking planter inlets or overflows. Remove trash that typically collects near inlets or gets caught in vegetation.

Prune or cut back plants for health and to ensure flow into inlets and across the surface of the facility. Remove and replant as necessary. When replanting, maintain the design surface elevation and minimize the introduction of soil.

Control weeds by manual methods and soil amendment. In response to problem areas or threatening invasions, corn gluten, white vinegar, vinegar-based products such as Burnout, or non-selective natural herbicides such as Safer's Sharpshooter may be used.

Add mulch. Aged mulch, also called compost mulch, reduces the ability of weeds to establish, keeps soil moist, and replenishes soil nutrients. Mulch may be added from time to time to maintain a mulch layer thickness of 1" to 2", but only if the underlying soil surface beneath the mulch layer is a minimum 6" below the overflow elevation,

consistently throughout the surface area of the facility.

Check signage. Remove graffiti and replace if necessary.

Check irrigation, if any, to confirm it is adequate but not excessive.

Landscape maintenance personnel should be aware of the following:

Do not add fertilizer to bioretention facilities. Compost tea, available from various nurseries and garden supply retailers, may be applied at a recommended rate of 5 gallons mixed with 15 gallons of water per acre, up to two weeks prior to planting and once per year between March and June. Do not apply when temperatures are below 50°F or above 90°F or when rain is forecast in the next 48 hours.

Do not use synthetic pesticides on bioretention facilities. Beneficial nematodes and non-toxic controls may be used. Acceptable natural pesticides include Safer® products and Neem oil.

5. Compiling the Plan

Format plans to 8½" x 11" where possible to facilitate duplication, filing, and handling. Include the revision date in the footer of each page.

Consider scanning the graphics and incorporating with the text in electronic files that can be backed up.

The following resources at the Project Clean Water website may help you when preparing your plan:

- Sample outline and format for an O&M Plan.
- Form for designating individuals responsible for operation and maintenance.
- Sample facility inspection and maintenance log.
- Sample contents of an inspector's report.

Updates to the O&M Plan

Updates can be made, and a copy transmitted to the municipality, at any time. In particular, contact information should be updated timely.

The O&M Plan should be reviewed annually and updated as needed.

Appendix A. Stormwater Pollutant Sources/Source Controls Checklist

How to use this worksheet (also see instructions on page 3-6 of the *Stormwater Technical Guide*):

1. Review Column 1 and identify which of these potential sources of stormwater pollutants apply to your site. Check each box that applies.
2. Review Column 2 and incorporate all of the corresponding applicable BMPs in your Stormwater Control Plan drawings.
3. Review Columns 3 and 4 and incorporate all of the corresponding applicable permanent controls and operational BMPs in a table in your Stormwater Control Plan. Use the format shown in Table 3-1 on page 3-6 of the *Stormwater Technical Guide*. Describe your specific BMPs in an accompanying narrative, and explain any special conditions or situations that required omitting BMPs or substituting alternative BMPs for those shown here.

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 Potential Sources of Runoff Pollutants	2 Strucutral/Permanent Controls—Show on Stormwater Control Plan Drawings	3 Structural/Permanent Controls—List in Stormwater Control Plan Table and Narrative	4 BMPs—Include in Stormwater Control Plan Table and Narrative
❑ **A.** On-site storm drain inlets (unauthorized non-stormwater discharges and accidental spills or leaks)	❑ Locations of inlets.	❑ Mark all inlets with the words "No Dumping! Flows to Bay" or similar.	❑ Maintain and periodically repaint or replace inlet markings. ❑ Provide stormwater pollution prevention information to new site owners, lessees, or operators. ❑ See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com ❑ Include the following in lease agreements: "Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains."

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 Potential Sources of Runoff Pollutants	2 Strucutral/Permanent Controls—Show on Stormwater Control Plan Drawings	3 Structural/Permanent Controls—List in Stormwater Control Plan Table and Narrative	4 BMPs—Include in Stormwater Control Plan Table and Narrative
❑ **B.** Interior floor drains and elevator shaft sump pumps		❑ State that interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer.	❑ Inspect and maintain drains to prevent blockages and overflow.
❑ **C.** Interior parking garages		❑ State that parking garage floor drains will be plumbed to the sanitary sewer.	❑ Inspect and maintain drains to prevent blockages and overflow.
❑ **D_1.** Need for future indoor & structural pest control		❑ Note building design features that discourage entry of pests.	❑ Provide Integrated Pest Management information to owners, lessees, and operators.

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 Potential Sources of Runoff Pollutants	2 Strucutral/Permanent Controls—Show on Stormwater Control Plan Drawings	3 Structural/Permanent Controls—List in Stormwater Control Plan Table and Narrative	4 BMPs—Include in Stormwater Control Plan Table and Narrative
❑ **D_2.** Landscape/ Outdoor Pesticide Use/Building and Grounds Maintenance	❑ Show locations of native trees or areas of shrubs and ground cover to be undisturbed and retained. ❑ Show self-retaining landscape areas, if any. ❑ Show stormwater treatment and retention SCMs. (See instructions in Chapter 4.)	State that final landscape plans will accomplish all of the following. ❑ Preserve existing native trees, shrubs, and ground cover to the maximum extent possible. ❑ Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution. ❑ Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions. ❑ Consider using pest-resistant plants, especially adjacent to hardscape. ❑ To insure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.	❑ Maintain landscaping using minimum or no pesticides. ❑ See applicable operational BMPs in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com ❑ Provide IPM information to new owners, lessees and operators.
❑ **E.** Pools, spas, ponds, decorative fountains, and other water features.	❑ Show location of water feature and a sanitary sewer cleanout in an accessible area within 10 feet.	If the local municipality requires pools to be plumbed to the sanitary sewer, place a note on the plans and state in the narrative that this connection will be made according to local requirements.	❑ See applicable operational BMPs in Fact Sheet SC-72, "Fountain and Pool Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

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❑ **F.** Food service	❑ For restaurants, grocery stores, and other food service operations, show location (indoors or in a covered area outdoors) of a floor sink or other area for cleaning floor mats, containers, and equipment. ❑ On the drawing, show a note that this drain will be connected to a grease interceptor before discharging to the sanitary sewer.	❑ Describe the location and features of the designated cleaning area. ❑ Describe the items to be cleaned in this facility and how it has been sized to insure that the largest items can be accommodated.	
❑ **G.** Refuse areas	❑ Show where site refuse and recycled materials will be handled and stored for pickup. See local municipal requirements for sizes and other details of refuse areas. ❑ If dumpsters or other receptacles are outdoors, show how the designated area will be covered, graded, and paved to prevent run-on and show locations of berms to prevent runoff from the area. ❑ Any drains from dumpsters, compactors, and tallow bin areas shall be connected to a grease removal device before discharge to sanitary sewer.	❑ State how site refuse will be handled and provide supporting detail to what is shown on plans. ❑ State that signs will be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar.	❑ State how the following will be implemented: Provide adequate number of receptacles. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post "no hazardous materials" signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available on-site. See Fact Sheet SC-34, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
❑ **H.** Industrial processes.	❑ Show process area.	❑ If industrial processes are to be located on site, state: "All process activities to be performed indoors. No processes to drain to exterior or to storm drain system."	❑ See Fact Sheet SC-10, "Non-Stormwater Discharges" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 Potential Sources of Runoff Pollutants	2 Strucutral/Permanent Controls—Show on Stormwater Control Plan Drawings	3 Structural/Permanent Controls—List in Stormwater Control Plan Table and Narrative	4 BMPs—Include in Stormwater Control Plan Table and Narrative
❑ **I.** Outdoor storage of equipment or materials. (See rows J and K for source control measures for vehicle cleaning, repair, and maintenance.)	❑ Show any outdoor storage areas, including how materials will be covered. Show how areas will be graded and bermed to prevent run-on or run-off from area. ❑ Storage of non-hazardous liquids shall be covered by a roof and/or drain to the sanitary sewer system, and be contained by berms, dikes, liners, or vaults. ❑ Storage of hazardous materials and wastes must be in compliance with the local hazardous materials ordinance and a Hazardous Materials Management Plan for the site.	❑ Include a detailed description of materials to be stored, storage areas, and structural features to prevent pollutants from entering storm drains. ❑ Where appropriate, reference documentation of compliance with the requirements of programs for: Hazardous Waste Generation Hazardous Materials Release Response and Inventory California Accidental Release (CalARP) Aboveground Storage Tank Uniform Fire Code Article 80 Section 103(b) & (c) 1991 Underground Storage Tank	❑ See the Fact Sheets SC-31, "Outdoor Liquid Container Storage" and SC-33, "Outdoor Storage of Raw Materials " in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 Potential Sources of Runoff Pollutants	2 Strucutral/Permanent Controls—Show on Stormwater Control Plan Drawings	3 Structural/Permanent Controls—List in Stormwater Control Plan Table and Narrative	4 BMPs—Include in Stormwater Control Plan Table and Narrative
❑ **J.** Vehicle and Equipment Cleaning	❑ Show on drawings as appropriate: (1) 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. (2) Multi-dwelling complexes shall have a paved, bermed, and covered car wash area (unless car washing is prohibited on-site and hoses are provided with an automatic shut-off to discourage such use). (3) Washing areas for cars, vehicles, and equipment shall be paved, designed to prevent run-on to or runoff from the area, and plumbed to drain to the sanitary sewer. (4) Commercial car wash facilities shall be designed such that no runoff from the facility is discharged to the storm drain system. Wastewater from the facility shall discharge to the sanitary sewer, or a wastewater reclamation system shall be installed.	❑ If a car wash area is not provided, describe measures taken to discourage on-site car washing and explain how these will be enforced.	Describe operational measures to implement the following (if applicable): ❑ Washwater from vehicle and equipment washing operations shall not be discharged to the storm drain system. ❑ Car dealerships and similar may rinse cars with water only. See Fact Sheet SC-21, "Vehicle and Equipment Cleaning," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
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❑ **K.** Vehicle/Equipment Repair and Maintenance	❑ Accommodate all vehicle equipment repair and maintenance indoors. Or designate an outdoor work area and design the area to prevent run-on and runoff of stormwater. ❑ Show secondary containment 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 areas. ❑ Add a note on the plans that states either (1) there are no floor drains, or (2) floor drains are connected to wastewater pretreatment systems prior to discharge to the sanitary sewer and an industrial waste discharge permit will be obtained.	❑ State that no vehicle repair or maintenance will be done outdoors, or else describe the required features of the outdoor work area. ❑ State that there are no floor drains or if there are floor drains, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements. ❑ State that there are no tanks, containers or sinks to be used for parts cleaning or rinsing or, if there are, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements.	In the Stormwater Control Plan, note that all of the following restrictions apply to use the site: ❑ No person shall dispose of, nor permit the disposal, directly or indirectly of vehicle fluids, hazardous materials, or rinsewater from parts cleaning into storm drains. ❑ No vehicle fluid removal shall be performed outside a building, nor on asphalt or ground surfaces, whether inside or outside a building, except in such a manner as to ensure that any spilled fluid will be in an area of secondary containment. Leaking vehicle fluids shall be contained or drained from the vehicle immediately. ❑ No person shall leave unattended drip parts or other open containers containing vehicle fluid, unless such containers are in use or in an area of secondary containment.

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 Potential Sources of Runoff Pollutants	2 Strucutral/Permanent Controls—Show on Stormwater Control Plan Drawings	3 Structural/Permanent Controls—List in Stormwater Control Plan Table and Narrative	4 BMPs—Include in Stormwater Control Plan Table and Narrative
❑ **L.** Fuel Dispensing Areas	❑ Fueling areas[1] shall have impermeable floors (i.e., portland cement concrete or equivalent smooth impervious surface) that are: a) graded at the minimum slope necessary to prevent ponding; and b) separated from the rest of the site by a grade break that prevents run-on of stormwater to the maximum extent practicable. ❑ Fueling areas shall be covered by a canopy that extends a minimum of ten feet in each direction from each pump. [Alternative: The fueling area must be covered and the cover's minimum dimensions must be equal to or greater than the area within the grade break or fuel dispensing area[1].] The canopy [or cover] shall not drain onto the fueling area.		❑ The property owner shall dry sweep the fueling area routinely. ❑ See the Business Guide Sheet, "Automotive Service—Service Stations" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

[1] The fueling area shall be defined as the area extending a minimum of 6.5 feet from the corner of each fuel dispenser or the length at which the hose and nozzle assembly may be operated plus a minimum of one foot, whichever is greater.

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 Potential Sources of Runoff Pollutants	2 Strucutral/Permanent Controls—Show on Stormwater Control Plan Drawings	3 Structural/Permanent Controls—List in Stormwater Control Plan Table and Narrative	4 BMPs—Include in Stormwater Control Plan Table and Narrative
❑ **M.** Loading Docks	❑ Show a preliminary design for the loading dock area, including roofing and drainage. Loading docks shall be covered and/or graded to minimize run-on to and runoff from the loading area. Roof downspouts shall be positioned to direct stormwater away from the loading area. Water from loading dock areas shall be drained to the sanitary sewer, or diverted and collected for ultimate discharge to the sanitary sewer. ❑ Loading dock areas draining directly to the sanitary sewer shall be equipped with a spill control valve or equivalent device, which shall be kept closed during periods of operation. ❑ Provide a roof overhang over the loading area or install door skirts (cowling) at each bay that enclose the end of the trailer.		❑ Move loaded and unloaded items indoors as soon as possible. ❑ See Fact Sheet SC-30, "Outdoor Loading and Unloading," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
❑ **N.** Fire Sprinkler Test Water		❑ Provide a means to drain fire sprinkler test water to the sanitary sewer.	❑ See the note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 Potential Sources of Runoff Pollutants	2 Strucutral/Permanent Controls—Show on Stormwater Control Plan Drawings	3 Structural/Permanent Controls—List in Stormwater Control Plan Table and Narrative	4 BMPs—Include in Stormwater Control Plan Table and Narrative
O. Miscellaneous Drain or Wash Water or Other Sources ❑ Boiler drain lines ❑ Condensate drain lines ❑ Rooftop equipment ❑ Drainage sumps ❑ Roofing, gutters, and trim. ❑ Other sources		❑ Boiler drain lines shall be directly or indirectly connected to the sanitary sewer system and may not discharge to the storm drain system. ❑ Condensate drain lines may discharge to landscaped areas if the flow is small enough that runoff will not occur. Condensate drain lines may not discharge to the storm drain system. ❑ Rooftop equipment with potential to produce pollutants shall be roofed and/or have secondary containment. ❑ Any drainage sumps on-site shall feature a sediment sump to reduce the quantity of sediment in pumped water. ❑ Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff. ❑ Include controls for other sources as specified by local reviewer.	
❑ **P.** Plazas, sidewalks, and parking lots.			❑ Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect washwater containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.

Appendix B. Bioretention Construction Inspection Checklist

Layout (to be confirmed prior to beginning excavation)

- ❒ Square footage of the facility meets or exceeds minimum shown in Stormwater Control Plan
- ❒ Site grading and grade breaks are consistent with the boundaries of the tributary Drainage Management Area(s) (DMAs) shown in the Stormwater Control Plan
- ❒ Inlet elevation of the facility is low enough to receive drainage from the entire tributary DMA
- ❒ Locations and elevations of overland flow or piping, including roof leaders, from impervious areas to the facility have been laid out and any conflicts resolved
- ❒ Rim elevation of the facility is laid out to be level all the way around, or elevations are consistent with a detailed cross-section showing location and height of interior dams
- ❒ Locations for vaults, utility boxes, and light standards have been identified so that they will not conflict with the facility
- ❒ Location for signage is identified
- ❒ Facility is protected as needed from construction-phase runoff and sediment

Excavation (to be confirmed prior to backfilling or pipe installation)

- ❒ Excavation conducted with materials and techniques to minimize compaction of soils within the facility area
- ❒ Excavation is to accurate area and depth
- ❒ Slopes or side walls protect from sloughing of native soils into the facility
- ❒ Vertical moisture barrier, if specified, has been added to protect adjacent pavement or structures.
- ❒ Native soils at bottom of excavation are ripped or loosened to promote infiltration

Overflow or Surface Connection to Storm Drainage
(to be confirmed prior to backfilling with any materials)

- ❒ Overflow is at specified elevation
- ❒ No knockouts or side inlets are in overflow riser
- ❒ Overflow location selected to minimize surface flow velocity (near, but offset from, inlet recommended)
- ❒ Grating excludes mulch and litter (beehive or atrium-style grates with ¼" openings recommended)
- ❒ Overflow is connected to storm drain via appropriately sized piping

Underground connection to storm drain/outlet orifice
(to be confirmed prior to backfilling with any materials)

- ❒ Perforated pipe underdrain (PVC SDR 35 or approved equivalent) is installed with holes facing down
- ❒ Perforated pipe is connected to storm drain at specified elevation (typ. bottom of soil elevation)
- ❒ Cleanouts are in accessible locations and connected via sweep bends
- ❒ Monitoring well, if required, is installed.
- ❒ Structures (arches or large diameter pipes) for additional surface storage are installed as shown in plans and specifications and have the specified volume

Drain Rock/Subdrain (to be confirmed prior to installation of soil mix)

- ❒ Rock is installed as specified. Class 2 permeable, Caltrans specification 68-2.02(F)(3) recommended, or 4"-6" depth of pea gravel is installed at the top of the crushed rock layer to prevent migration of fines into gravel layer
- ❒ Rock is smoothed to a level top elevation. Depth and top elevation are as shown in plans
- ❒ Slopes or side walls protect from sloughing of native soils into the facility
- ❒ No filter fabric is placed between the subdrain and soil mix layers

Soil Mix

- ❒ Soil mix is as specified.
- ❒ Mix installed in lifts not exceeding 12"
- ❒ Mix is not compacted during installation but may be thoroughly wetted to encourage consolidation
- ❒ Mix is smoothed to a level top elevation. Depth of mix (24" min.) and top elevation are as shown in plans, accounting for depth of mulch to follow and required reservoir depth

Irrigation

- ❒ Irrigation system is installed so it can be controlled separately from other landscaped areas. Smart irrigation controllers and drip emitters are recommended
- ❒ Spray heads, if any, are positioned to avoid direct spray into outlet structures

Planting

- ❒ Plants are installed consistent with approved planting plan
- ❒ Any trees and large shrubs are staked securely
- ❒ No fertilizer is added; compost tea may be used
- ❒ No native soil or clayey material are imported into the facility with plantings
- ❒ 1"-2" mulch may be applied following planting; mulch selected to avoid floating
- ❒ Final elevation of soil mix maintained following planting
- ❒ Curb openings are free of obstructions

Final Engineering Inspection

- ❒ Drainage Management Area(s) are free of construction sediment and landscaped areas are stabilized
- ❒ Inlets are installed to ensure entry of runoff from adjoining pavement, have sufficient reveal (drop from the adjoining pavement to the top of the mulch or soil mix, and are not blocked
- ❒ Rock or other energy dissipation at piped or surface inlets is adequate
- ❒ Inflows from roof leaders and pipes are connected and operable
- ❒ Temporary flow diversions are removed
- ❒ Overflow outlets are configured to allow the facility to flood and fill to near rim before overflow
- ❒ Plantings are healthy and becoming established
- ❒ Irrigation is operable
- ❒ Facility drains rapidly; no surface ponding is evident

- ❒ Any accumulated construction debris, trash, or sediment is removed from facility
- ❒ Permanent signage is installed and is visible to site users and maintenance personnel

Appendix C. Technical Criteria for Non-LID Treatment Facilities

Non-LID Treatment Facilities may be either tree-box-type high-flowrate biofilters or vault-based high-flowrate media filters.

General

- Design inflow rate is that generated by a continuous rainfall intensity of 0.2 inches per hour.
- Landscape and non-impervious surfaces should be made self-treating or self-retaining and not drain to treatment facilities, if feasible.
- Use the runoff factors in Table 4-1 (on p. 4-4) of the *Stormwater Technical Guide*.
- The applicant's Stormwater Control Plan (Plan) must include, as an attachment, a letter from the manufacturer stating the manufacturer has reviewed the Plan, the proposed device meets these technical criteria, and the manufacturer will provide a warranty for two years following activation of the facility.

High-Flowrate Tree-Box-Type Biofilters

- Maximum design surface loading rate of 50 inches per hour.
- Precast concrete construction.
- Inlet design to capture flows at least up to the maximum design surface loading rate and to bypass high flows.
- Minimum media depth of 1.8 feet (may be reduced, but maintaining the same media volume, if required because of inadequate head to discharge point).
- Media and facility configuration supports a healthy tree or other vegetation.

Vault-Based High-Flowrate Media Filters

- Replaceable cartridge filters.
- Maximum design filter surface loading rate (to cartridge filters) of 1 gpm/ft2
- Storage volume detains runoff and allows settling of coarse solids prior to filtration.
- Flow through the cartridge filters is controlled by an orifice or other device so that the design surface loading rate is not exceeded.

Alternatively, applicants may specify treatment systems that have received a General Use Level Designation (GULD) for Basic Treatment from the Washington State Department of Ecology based on independently verified field testing following the Technical Assessment Protocol – Ecology (TAPE). Treatment systems must be sized to treat the water quality flow rate at the design operating rate for which they received TAPE GULD certification for Basic Treatment.

Media filters and high flow rate tree well filters currently holding this certification can be found at the following link:
http://www.ecy.wa.gov/programs/wq/stormwater/newtech/technologies.html

Appendix A. Stormwater Pollutant Sources/Source Controls Checklist

How to use this worksheet (also see instructions on page 3-6 of the *Stormwater Technical Guide*):

1. Review Column 1 and identify which of these potential sources of stormwater pollutants apply to your site. Check each box that applies.
2. Review Column 2 and incorporate all of the corresponding applicable BMPs in your Stormwater Control Plan drawings.
3. Review Columns 3 and 4 and incorporate all of the corresponding applicable permanent controls and operational BMPs in a table in your Stormwater Control Plan. Use the format shown in Table 3-1 on page 3-6 of the *Stormwater Technical Guide*. Describe your specific BMPs in an accompanying narrative, and explain any special conditions or situations that required omitting BMPs or substituting alternative BMPs for those shown here.

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 Potential Sources of Runoff Pollutants	2 Strucutral/Permanent Controls—Show on Stormwater Control Plan Drawings	3 Structural/Permanent Controls—List in Stormwater Control Plan Table and Narrative	4 BMPs—Include in Stormwater Control Plan Table and Narrative
❑ **A.** On-site storm drain inlets (unauthorized non-stormwater discharges and accidental spills or leaks)	❑ Locations of inlets.	❑ Mark all inlets with the words "No Dumping! Flows to Bay" or similar.	❑ Maintain and periodically repaint or replace inlet markings. ❑ Provide stormwater pollution prevention information to new site owners, lessees, or operators. ❑ See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com ❑ Include the following in lease agreements: "Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains."

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 Potential Sources of Runoff Pollutants	2 Strucutral/Permanent Controls—Show on Stormwater Control Plan Drawings	3 Structural/Permanent Controls—List in Stormwater Control Plan Table and Narrative	4 BMPs—Include in Stormwater Control Plan Table and Narrative
❑ **B.** Interior floor drains and elevator shaft sump pumps		❑ State that interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer.	❑ Inspect and maintain drains to prevent blockages and overflow.
❑ **C.** Interior parking garages		❑ State that parking garage floor drains will be plumbed to the sanitary sewer.	❑ Inspect and maintain drains to prevent blockages and overflow.
❑ **D_1.** Need for future indoor & structural pest control		❑ Note building design features that discourage entry of pests.	❑ Provide Integrated Pest Management information to owners, lessees, and operators.

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 Potential Sources of Runoff Pollutants	2 Strucutral/Permanent Controls—Show on Stormwater Control Plan Drawings	3 Structural/Permanent Controls—List in Stormwater Control Plan Table and Narrative	4 BMPs—Include in Stormwater Control Plan Table and Narrative
❑ **D_2.** Landscape/ Outdoor Pesticide Use/Building and Grounds Maintenance	❑ Show locations of native trees or areas of shrubs and ground cover to be undisturbed and retained. ❑ Show self-retaining landscape areas, if any. ❑ Show stormwater treatment and retention SCMs. (See instructions in Chapter 4.)	State that final landscape plans will accomplish all of the following. ❑ Preserve existing native trees, shrubs, and ground cover to the maximum extent possible. ❑ Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution. ❑ Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions. ❑ Consider using pest-resistant plants, especially adjacent to hardscape. ❑ To insure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.	❑ Maintain landscaping using minimum or no pesticides. ❑ See applicable operational BMPs in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com ❑ Provide IPM information to new owners, lessees and operators.
❑ **E.** Pools, spas, ponds, decorative fountains, and other water features.	❑ Show location of water feature and a sanitary sewer cleanout in an accessible area within 10 feet.	If the local municipality requires pools to be plumbed to the sanitary sewer, place a note on the plans and state in the narrative that this connection will be made according to local requirements.	❑ See applicable operational BMPs in Fact Sheet SC-72, "Fountain and Pool Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

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❑ **F.** Food service	❑ For restaurants, grocery stores, and other food service operations, show location (indoors or in a covered area outdoors) of a floor sink or other area for cleaning floor mats, containers, and equipment. ❑ On the drawing, show a note that this drain will be connected to a grease interceptor before discharging to the sanitary sewer.	❑ Describe the location and features of the designated cleaning area. ❑ Describe the items to be cleaned in this facility and how it has been sized to insure that the largest items can be accommodated.	
❑ **G.** Refuse areas	❑ Show where site refuse and recycled materials will be handled and stored for pickup. See local municipal requirements for sizes and other details of refuse areas. ❑ If dumpsters or other receptacles are outdoors, show how the designated area will be covered, graded, and paved to prevent run-on and show locations of berms to prevent runoff from the area. ❑ Any drains from dumpsters, compactors, and tallow bin areas shall be connected to a grease removal device before discharge to sanitary sewer.	❑ State how site refuse will be handled and provide supporting detail to what is shown on plans. ❑ State that signs will be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar.	❑ State how the following will be implemented: Provide adequate number of receptacles. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post "no hazardous materials" signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available on-site. See Fact Sheet SC-34, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
❑ **H.** Industrial processes.	❑ Show process area.	❑ If industrial processes are to be located on site, state: "All process activities to be performed indoors. No processes to drain to exterior or to storm drain system."	❑ See Fact Sheet SC-10, "Non-Stormwater Discharges" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

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❑ **I.** Outdoor storage of equipment or materials. (See rows J and K for source control measures for vehicle cleaning, repair, and maintenance.)	❑ Show any outdoor storage areas, including how materials will be covered. Show how areas will be graded and bermed to prevent run-on or run-off from area. ❑ Storage of non-hazardous liquids shall be covered by a roof and/or drain to the sanitary sewer system, and be contained by berms, dikes, liners, or vaults. ❑ Storage of hazardous materials and wastes must be in compliance with the local hazardous materials ordinance and a Hazardous Materials Management Plan for the site.	❑ Include a detailed description of materials to be stored, storage areas, and structural features to prevent pollutants from entering storm drains. ❑ Where appropriate, reference documentation of compliance with the requirements of programs for: Hazardous Waste Generation Hazardous Materials Release Response and Inventory California Accidental Release (CalARP) Aboveground Storage Tank Uniform Fire Code Article 80 Section 103(b) & (c) 1991 Underground Storage Tank	❑ See the Fact Sheets SC-31, "Outdoor Liquid Container Storage" and SC-33, "Outdoor Storage of Raw Materials " in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 Potential Sources of Runoff Pollutants	2 Strucutral/Permanent Controls—Show on Stormwater Control Plan Drawings	3 Structural/Permanent Controls—List in Stormwater Control Plan Table and Narrative	4 BMPs—Include in Stormwater Control Plan Table and Narrative
❑ **J.** Vehicle and Equipment Cleaning	❑ Show on drawings as appropriate: (1) 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. (2) Multi-dwelling complexes shall have a paved, bermed, and covered car wash area (unless car washing is prohibited on-site and hoses are provided with an automatic shut-off to discourage such use). (3) Washing areas for cars, vehicles, and equipment shall be paved, designed to prevent run-on to or runoff from the area, and plumbed to drain to the sanitary sewer. (4) Commercial car wash facilities shall be designed such that no runoff from the facility is discharged to the storm drain system. Wastewater from the facility shall discharge to the sanitary sewer, or a wastewater reclamation system shall be installed.	❑ If a car wash area is not provided, describe measures taken to discourage on-site car washing and explain how these will be enforced.	Describe operational measures to implement the following (if applicable): ❑ Washwater from vehicle and equipment washing operations shall not be discharged to the storm drain system. ❑ Car dealerships and similar may rinse cars with water only. See Fact Sheet SC-21, "Vehicle and Equipment Cleaning," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

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❑ **K.** Vehicle/Equipment Repair and Maintenance	❑ Accommodate all vehicle equipment repair and maintenance indoors. Or designate an outdoor work area and design the area to prevent run-on and runoff of stormwater. ❑ Show secondary containment 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 areas. ❑ Add a note on the plans that states either (1) there are no floor drains, or (2) floor drains are connected to wastewater pretreatment systems prior to discharge to the sanitary sewer and an industrial waste discharge permit will be obtained.	❑ State that no vehicle repair or maintenance will be done outdoors, or else describe the required features of the outdoor work area. ❑ State that there are no floor drains or if there are floor drains, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements. ❑ State that there are no tanks, containers or sinks to be used for parts cleaning or rinsing or, if there are, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements.	In the Stormwater Control Plan, note that all of the following restrictions apply to use the site: ❑ No person shall dispose of, nor permit the disposal, directly or indirectly of vehicle fluids, hazardous materials, or rinsewater from parts cleaning into storm drains. ❑ No vehicle fluid removal shall be performed outside a building, nor on asphalt or ground surfaces, whether inside or outside a building, except in such a manner as to ensure that any spilled fluid will be in an area of secondary containment. Leaking vehicle fluids shall be contained or drained from the vehicle immediately. ❑ No person shall leave unattended drip parts or other open containers containing vehicle fluid, unless such containers are in use or in an area of secondary containment.

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
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❑ **L.** Fuel Dispensing Areas	❑ Fueling areas[1] shall have impermeable floors (i.e., portland cement concrete or equivalent smooth impervious surface) that are: a) graded at the minimum slope necessary to prevent ponding; and b) separated from the rest of the site by a grade break that prevents run-on of stormwater to the maximum extent practicable. ❑ Fueling areas shall be covered by a canopy that extends a minimum of ten feet in each direction from each pump. [Alternative: The fueling area must be covered and the cover's minimum dimensions must be equal to or greater than the area within the grade break or fuel dispensing area[1].] The canopy [or cover] shall not drain onto the fueling area.		❑ The property owner shall dry sweep the fueling area routinely. ❑ See the Business Guide Sheet, "Automotive Service—Service Stations" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

[1] The fueling area shall be defined as the area extending a minimum of 6.5 feet from the corner of each fuel dispenser or the length at which the hose and nozzle assembly may be operated plus a minimum of one foot, whichever is greater.

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❑ **M.** Loading Docks	❑ Show a preliminary design for the loading dock area, including roofing and drainage. Loading docks shall be covered and/or graded to minimize run-on to and runoff from the loading area. Roof downspouts shall be positioned to direct stormwater away from the loading area. Water from loading dock areas shall be drained to the sanitary sewer, or diverted and collected for ultimate discharge to the sanitary sewer. ❑ Loading dock areas draining directly to the sanitary sewer shall be equipped with a spill control valve or equivalent device, which shall be kept closed during periods of operation. ❑ Provide a roof overhang over the loading area or install door skirts (cowling) at each bay that enclose the end of the trailer.		❑ Move loaded and unloaded items indoors as soon as possible. ❑ See Fact Sheet SC-30, "Outdoor Loading and Unloading," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
❑ **N.** Fire Sprinkler Test Water		❑ Provide a means to drain fire sprinkler test water to the sanitary sewer.	❑ See the note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
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O. Miscellaneous Drain or Wash Water or Other Sources ❑ Boiler drain lines ❑ Condensate drain lines ❑ Rooftop equipment ❑ Drainage sumps ❑ Roofing, gutters, and trim. ❑ Other sources		❑ Boiler drain lines shall be directly or indirectly connected to the sanitary sewer system and may not discharge to the storm drain system. ❑ Condensate drain lines may discharge to landscaped areas if the flow is small enough that runoff will not occur. Condensate drain lines may not discharge to the storm drain system. ❑ Rooftop equipment with potential to produce pollutants shall be roofed and/or have secondary containment. ❑ Any drainage sumps on-site shall feature a sediment sump to reduce the quantity of sediment in pumped water. ❑ Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff. ❑ Include controls for other sources as specified by local reviewer.	
❑ **P.** Plazas, sidewalks, and parking lots.			❑ Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect washwater containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.

Appendix B. Bioretention Construction Inspection Checklist

Layout (to be confirmed prior to beginning excavation)

- ❒ Square footage of the facility meets or exceeds minimum shown in Stormwater Control Plan
- ❒ Site grading and grade breaks are consistent with the boundaries of the tributary Drainage Management Area(s) (DMAs) shown in the Stormwater Control Plan
- ❒ Inlet elevation of the facility is low enough to receive drainage from the entire tributary DMA
- ❒ Locations and elevations of overland flow or piping, including roof leaders, from impervious areas to the facility have been laid out and any conflicts resolved
- ❒ Rim elevation of the facility is laid out to be level all the way around, or elevations are consistent with a detailed cross-section showing location and height of interior dams
- ❒ Locations for vaults, utility boxes, and light standards have been identified so that they will not conflict with the facility
- ❒ Location for signage is identified
- ❒ Facility is protected as needed from construction-phase runoff and sediment

Excavation (to be confirmed prior to backfilling or pipe installation)

- ❒ Excavation conducted with materials and techniques to minimize compaction of soils within the facility area
- ❒ Excavation is to accurate area and depth
- ❒ Slopes or side walls protect from sloughing of native soils into the facility
- ❒ Vertical moisture barrier, if specified, has been added to protect adjacent pavement or structures.
- ❒ Native soils at bottom of excavation are ripped or loosened to promote infiltration

Overflow or Surface Connection to Storm Drainage
(to be confirmed prior to backfilling with any materials)

- ❒ Overflow is at specified elevation
- ❒ No knockouts or side inlets are in overflow riser
- ❒ Overflow location selected to minimize surface flow velocity (near, but offset from, inlet recommended)
- ❒ Grating excludes mulch and litter (beehive or atrium-style grates with ¼" openings recommended)
- ❒ Overflow is connected to storm drain via appropriately sized piping

Underground connection to storm drain/outlet orifice
(to be confirmed prior to backfilling with any materials)

- ❒ Perforated pipe underdrain (PVC SDR 35 or approved equivalent) is installed with holes facing down
- ❒ Perforated pipe is connected to storm drain at specified elevation (typ. bottom of soil elevation)
- ❒ Cleanouts are in accessible locations and connected via sweep bends
- ❒ Monitoring well, if required, is installed.
- ❒ Structures (arches or large diameter pipes) for additional surface storage are installed as shown in plans and specifications and have the specified volume

Drain Rock/Subdrain (to be confirmed prior to installation of soil mix)

- ❒ Rock is installed as specified. Class 2 permeable, Caltrans specification 68-2.02(F)(3) recommended, or 4"-6" depth of pea gravel is installed at the top of the crushed rock layer to prevent migration of fines into gravel layer
- ❒ Rock is smoothed to a level top elevation. Depth and top elevation are as shown in plans
- ❒ Slopes or side walls protect from sloughing of native soils into the facility
- ❒ No filter fabric is placed between the subdrain and soil mix layers

Soil Mix

- ❒ Soil mix is as specified.
- ❒ Mix installed in lifts not exceeding 12"
- ❒ Mix is not compacted during installation but may be thoroughly wetted to encourage consolidation
- ❒ Mix is smoothed to a level top elevation. Depth of mix (24" min.) and top elevation are as shown in plans, accounting for depth of mulch to follow and required reservoir depth

Irrigation

- ❒ Irrigation system is installed so it can be controlled separately from other landscaped areas. Smart irrigation controllers and drip emitters are recommended
- ❒ Spray heads, if any, are positioned to avoid direct spray into outlet structures

Planting

- ❒ Plants are installed consistent with approved planting plan
- ❒ Any trees and large shrubs are staked securely
- ❒ No fertilizer is added; compost tea may be used
- ❒ No native soil or clayey material are imported into the facility with plantings
- ❒ 1"-2" mulch may be applied following planting; mulch selected to avoid floating
- ❒ Final elevation of soil mix maintained following planting
- ❒ Curb openings are free of obstructions

Final Engineering Inspection

- ❒ Drainage Management Area(s) are free of construction sediment and landscaped areas are stabilized
- ❒ Inlets are installed to ensure entry of runoff from adjoining pavement, have sufficient reveal (drop from the adjoining pavement to the top of the mulch or soil mix, and are not blocked
- ❒ Rock or other energy dissipation at piped or surface inlets is adequate
- ❒ Inflows from roof leaders and pipes are connected and operable
- ❒ Temporary flow diversions are removed
- ❒ Overflow outlets are configured to allow the facility to flood and fill to near rim before overflow
- ❒ Plantings are healthy and becoming established
- ❒ Irrigation is operable
- ❒ Facility drains rapidly; no surface ponding is evident

- ❒ Any accumulated construction debris, trash, or sediment is removed from facility
- ❒ Permanent signage is installed and is visible to site users and maintenance personnel

Appendix C. Technical Criteria for Non-LID Treatment Facilities

Non-LID Treatment Facilities may be either tree-box-type high-flowrate biofilters or vault-based high-flowrate media filters.

General

- Design inflow rate is that generated by a continuous rainfall intensity of 0.2 inches per hour.
- Landscape and non-impervious surfaces should be made self-treating or self-retaining and not drain to treatment facilities, if feasible.
- Use the runoff factors in Table 4-1 (on p. 4-4) of the *Stormwater Technical Guide*.
- The applicant's Stormwater Control Plan (Plan) must include, as an attachment, a letter from the manufacturer stating the manufacturer has reviewed the Plan, the proposed device meets these technical criteria, and the manufacturer will provide a warranty for two years following activation of the facility.

High-Flowrate Tree-Box-Type Biofilters

- Maximum design surface loading rate of 50 inches per hour.
- Precast concrete construction.
- Inlet design to capture flows at least up to the maximum design surface loading rate and to bypass high flows.
- Minimum media depth of 1.8 feet (may be reduced, but maintaining the same media volume, if required because of inadequate head to discharge point).
- Media and facility configuration supports a healthy tree or other vegetation.

Vault-Based High-Flowrate Media Filters

- Replaceable cartridge filters.
- Maximum design filter surface loading rate (to cartridge filters) of 1 gpm/ft2
- Storage volume detains runoff and allows settling of coarse solids prior to filtration.
- Flow through the cartridge filters is controlled by an orifice or other device so that the design surface loading rate is not exceeded.

Alternatively, applicants may specify treatment systems that have received a General Use Level Designation (GULD) for Basic Treatment from the Washington State Department of Ecology based on independently verified field testing following the Technical Assessment Protocol – Ecology (TAPE). Treatment systems must be sized to treat the water quality flow rate at the design operating rate for which they received TAPE GULD certification for Basic Treatment.

Media filters and high flow rate tree well filters currently holding this certification can be found at the following link:
http://www.ecy.wa.gov/programs/wq/stormwater/newtech/technologies.html

Tier 1 Stormwater Control Plan

For Small (Tier 1) Land Development Projects

Development projects that create or replace 2,500 sf or more of impervious surface (roofs or pavement) must incorporate specific measures to reduce stormwater runoff. This Stormwater Control Plan template applies to Small Tier 1 Projects[1]. Please complete the following template and include with your land use permit application submittal.

It is fairly easy to accomplish the stormwater requirements for most small land development projects. However, compliance must be carefully documented. The municipal stormwater staff will review your Tier 1 Stormwater Control Plan, site plan, and associated permit submittals to confirm that the following design strategies have been incorporated:

- Limit disturbance of creeks and natural drainage features
- Minimize compaction of highly permeable soils
- 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
- Minimize impervious surfaces by concentrating improvements on the least-sensitive portions of the site, while leaving the remaining land in a natural undisturbed state
- Minimize stormwater runoff by implementing one or more site design measures, consistent with the checklist below.

Here are the simple step-by-step instructions for completing a Tier 1 Stormwater Control Plan for Small (Tier 1) Land Development projects:

Step 1: Project Data Form

[1] Projects that create or replace 5,000 sf or more of impervious surface (not single-family), and all other projects including single-family projects that create or replace 15,000 sf or more of impervious surface, require a more comprehensive *Stormwater Control Plan*. Please see Santa Barbara County's Stormwater Technical Guide for more information, including definition of "net impervious" as applicable . www.sbprojectcleanwater.org

Complete all fields in the Project Data form. Select one or more runoff reduction measures.

Step 2: Delineate Impervious Areas and Runoff Reduction Measures

Delineate the impervious area. On an attached site plan or sketch, show the impervious area—for example, a roof, or portion of a roof, or a paved area—that will drain to your runoff reduction measure. Typically these delineations follow roof ridge lines or grade breaks. Alternatively, show the type and extent of pervious paving. An example sketch follows.

Indicate the location and type of runoff reduction measure(s) you've selected. On the site plan or sketch, show the reduction measure(s) selected. At least one measure is required that is designed to minimize runoff from some amount of impervious area.

Step 3: Complete Checklist and Submit Your Tier 1 Stormwater Control Plan

For each measure selected, fill out the brief checklist to verify that your design meets the minimum standards. Include the checklist with your Stormwater Control Plan.

This Stormwater Control Plan will accompany your land use application submittal and include:

1. Project Data form including the runoff reduction measures(s) selected
2. Site plan or sketch showing runoff management from impervious areas (see attached)
3. Checklist of runoff reduction measures design standards (see below)

Tier 1 Stormwater Control Plan Project Data

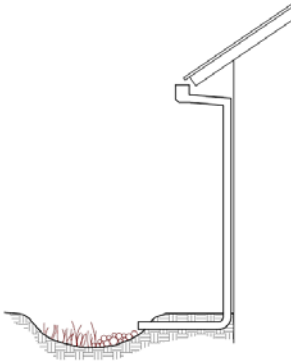
[Complete all fields]

Project Name / Case File Number	
Project Location [Street Address if available, or intersection and/or APN]	
Name of Owner or Developer	
Project Type and Description [Examples: "Single Family Residence," "Parking Lot Addition," "Retail and Parking"]	
Total New Impervious Surface Area (square feet) [Sum of currently pervious areas that will be covered with new impervious surfaces]	
Total Replaced Impervious Surface Area [Sum of currently impervious areas that will be covered with new impervious surfaces.]	
Total Pre-Project Impervious Surface Area	
Total Post-Project Impervious Surface Area	
Runoff Reduction Measure(s) Selected (Check one or more)	❑ 1. Disperse runoff from roofs or pavement to vegetated area ❑ 2. Permeable pavement ❑ 3. Cisterns or Rain Barrels ❑ 4. Bioretention Facility or Planter Box

Stormwater Control Plan Runoff Reduction Measures Design Standards Checklist

Measure 1: Disperse runoff from roofs or pavement to vegetated areas.

This is the simplest option. Downspouts can be directed to flat or concave vegetated areas adjacent to buildings, or extended via pipes to reach vegetated areas further away. Paved areas can be designed with curb cuts, or without curbs, to direct flow into surrounding vegetation.



Connecting a roof leader to a vegetated area. The head from the eave height makes it possible to route roof drainage some distance away from the building.

On the site plan, show:

- ❑ Each impervious area from which runoff will be directed, and its square footage.
- ❑ The vegetated areas that will receive runoff, and the approximate square footage of each.
- ❑ If necessary, explain in notes on the plan how runoff will be routed from impervious surfaces to vegetated areas.

Confirm the following standards are met:

- ❑ Pervious areas must be relatively flat and if graded, the surface should be slightly concave. Tributary impervious square footage in no instance exceeds twice the square footage of the receiving pervious area. On your sketch, show rough dimensions that will confirm this criterion is met.
- ❑ Roof areas collect runoff and route it to the receiving pervious area via gutters and downspouts.
- ❑ Paved areas are sloped so drainage is routed to the receiving pervious area.
- ❑ Runoff is dispersed across the vegetated area (for example, with a splash block) to avoid erosion and promote infiltration.
- ❑ Vegetated area has amended soils, vegetation, and irrigation as required to maintain soil stability and permeability.
- ❑ Any area drains within the vegetated area have inlets at least 3 inches above surrounding grade.
- ❑ Additional comments:_____

Measure 2: Permeable Pavement

Permeable pavements may include pervious concrete, pervious asphalt, porous pavers, crushed aggregate, open pavers with grass or plantings (turf block), open pavers with gravel, or solid pavers with open (non-grouted) joints.

Show on your site plan:

- ❑ Location, extent and types of pervious pavements.

Confirm the following standardsare met:

- ❑ No erodible areas drain on to permeable pavement.
- ❑ Subgrade compaction is minimal.
- ❑ Reservoir base course is of open-graded crushed stone. Base depth (3" or more) is adequate to retain rainfall and support design loads (more depth may be required).
- ❑ No subdrain is included or, if a subdrain is included, outlet elevation is a minimum of 3 inches above bottom of base course.
- ❑ Subgrade is level and slopes are not so steep that subgrade is prone to erosion.
- ❑ Rigid edge is provided to retain granular pavements and unit pavers.
- ❑ Solid unit pavers, if used, are set in sand or gravel with minimum 3/8 inch gaps between the pavers. Joints are filled with an open-graded aggregate free of fines.
- ❑ Permeable concrete or porous asphalt, if used, are installed by industry-certified professionals according to the vendor's recommendations.
- ❑ Selection and location of pavements incorporates Americans with Disabilities Act requirements (if applicable), site aesthetics, and uses.
- ❑ Additional comments:_____

Check with local Fire Department for applicability criteria using permeable pavement.

Measure 3: Cisterns or Rain Barrels

Use of cisterns or rain barrels to comply with this requirement may be subject to municipality approval. Planning and Building Permits may be required for very large systems.

Show on your site plan:

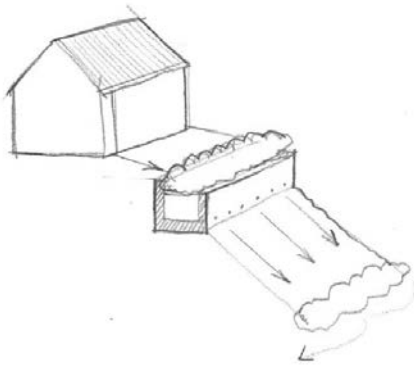
- ❑ Impervious areas tributary to each cistern or rain barrel.
- ❑ Location of each cistern or rain barrel.

Confirm the following standards are met:

- ❑ Rain barrels are sited at or above grade on a sound and level surface at or near gutter downspouts.
- ❑ Gutters tributary to rain barrels are screened with a leaf guard or maximum ½-inch to ¼-inch-minimum corrosion-resistant metallic hardware fabric.
- ❑ Water collected will be used for irrigation only.
- ❑ Openings are screened with a corrosion-resistant metallic fine mesh (1/16 inch or smaller) to prevent mosquito harborage.
- ❑ Lids are secured to prevent entry by children.
- ❑ Rain barrels and gutters are to be cleaned annually.
- ❑ Additional comments:_____

Measure 4: Bioretention Facility or Planter Box

An above-ground planter box may be appropriate if the development site lacks level landscaped areas for dispersion and pervious pavements are not practical. Planter boxes and bioretention facilities can treat runoff from impervious surfaces 25 times their area (sizing factor of 0.04).



Flow-through planter built into a hillside. Flows from the underdrain and overflow must be directed in accordance with local requirements.

Detailed design guidance for bioretention facilities is in the *Stormwater Technical Guide*.

Show on your site plan:

- ❑ Impervious areas tributary to the facility.
- ❑ Location and footprint of facility.

Confirm the following standards are met:

- ❑ Ponding depth is 4"-6" minimum.
- ❑ Minimum 18" depth soil mix (60%-70% sand; 30%-40% compost) with minimum long-term infiltration rate of 5"/hour.
- ❑ Surface area of soil mix is a minimum 0.04 times the tributary impervious area.
- ❑ "Class 2 permeable" (Caltrans specification 68-2.02(F)(3) drainage layer 12" deep.
- ❑ No filter fabric.
- ❑ Perforated pipe (PVC SDR 35 or approved equivalent) underdrain.
- ❑ Connection with sufficient head to storm drain or discharge point.
- ❑ Underdrain has a clean-out port consisting of a vertical, rigid, non-perforated PVC pipe, connected to the underdrain via a sweep bend, with a minimum diameter of 4" and a watertight cap.
- ❑ Overflow outlet connected to a downstream storm drain or approved discharge point.
- ❑ Planter is set level.
- ❑ Emergency spillage will be safely conveyed overland.
- ❑ Plantings are suitable to the climate, exposure, and a well-drained soil.
- ❑ Irrigation system, if any, controlled as a separate zone.
- ❑ Additional comments:_____

Useful Resources

The following references may be useful for design. Designs must meet the minimum standard specifications herein.

Santa Barbara Project Clean Water Stormwater Technical Guide. Available at http://www.sbprojectcleanwater.org

Start At the Source: Design Guidance Manual for Stormwater Quality.
Bay Area Stormwater Management Agencies Association, 1999.

California Nevada Cement Association, www.cncpc.org

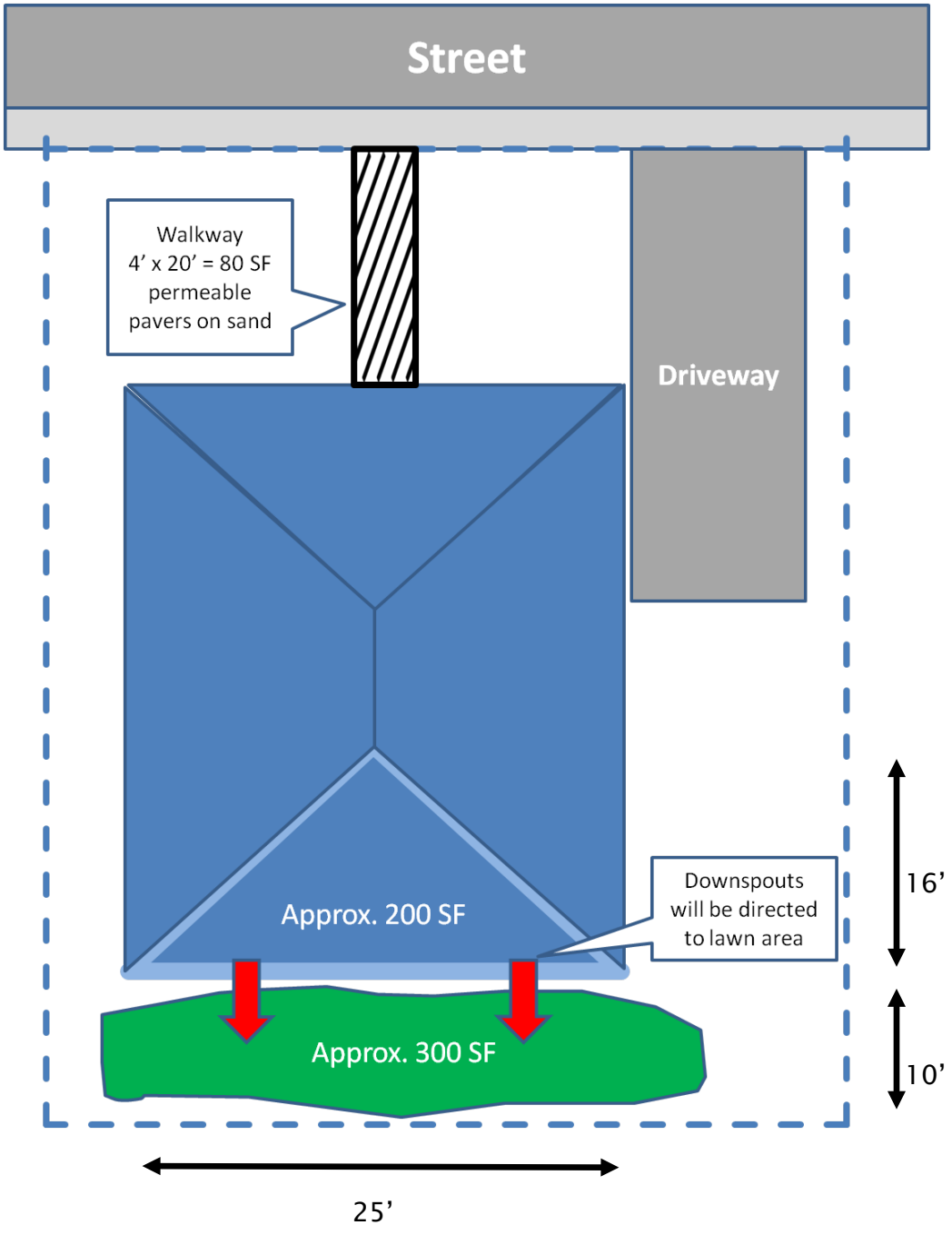
Specifier's Guide for Pervious Concrete, Colorado Ready Mixed Concrete Association. www.crmca.org
Interlocking Concrete Pavement Institute
http://www.icpi.org/

Porous Pavements, by Bruce K. Ferguson. 2005. ISBN 0-8493-2670-2

Stormwater Control Plan Example Sketch

The example below illustrates the level of detail required. This site plan addresses two Runoff Reduction Measures: permeable paving and dispersing runoff to vegetated areas.

Not to Scale



Stormwater Control Plan

for

[Name of Project]

[date]

[This template is to be used in conjunction with the instructions, criteria, and minimum requirements in the Santa Barbara Project Clean Water *Stormwater Technical Guide.*

Check the Project Clean Water website for new information and updates to the *Stormwater Technical Guide* and this template.]

[Name of Owner]
[Owner's Representative and Contact Information]

prepared by:

[Preparer's Name]
[Preparer's Contact Information]

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Stormwater Control Plan Exhibit

Stormwater Control Measures Sizing Calculator (submit Excel file)

Appendices

This Stormwater Control Plan was prepared using the template dated January 2017.

I. Project Data

Table 1. Project Data

Project Name/Project Case Number	
Project Location	[Street Address if available, or intersection and/or APN]
Project Phase No.	[If project is being constructed in phases, indicate the phase number. If not, enter "NA"]
Project Type and Description	[Example entries: "Detached single-family residence," "5-story office building," "Residential with 160 single-family homes," "Five 4-story buildings to contain 200 condominiums," "100-unit, 2-story shopping mall," "mixed use retail and residential development (apartments)", "Industrial warehouse."]
New Impervious Surface Area (sf)	
Replaced Impervious Surface Area (sf)	
Pre-Project Impervious Surface Area (sf)	
Post-Project Impervious Surface Area (sf)	
"Net Impervious" Area, if applicable	Only applies to redevelopment, and only for Tier 2 or Tier 3 SFH. Net Impervious = [(New + Replaced) – (Pre-Project – Post-Project). If less than zero, Not Applicable
Watershed Management Zone(s)	[See Central Coast RWQCB Post-Construction Requirements for WMZ map]
Tier	[Tier 2, 3, or 4]
Design Storm Frequency Used (85th or 95th percentile) and Design Storm Depth (in)	
Urban Sustainability Area, if applicable	[Contact municipality]

II. Setting

II.A. Project Location and Description

[Include site location, division of parcels, planned land uses, zoning, setback and open space requirements, project phasing, number of residential units or square footage of office or retail, parking requirements, neighborhood character, project design objectives (for example LEED certification), other notable project characteristics. A vicinity map may also be useful.]

II.B. Existing Site Features and Conditions

[Include site size, shape, and topography. Hydrologic features, including any contiguous natural areas, wetlands, watercourses, seeps or springs. Existing land uses. Soil types and hydrologic soil groups, vegetative cover, and impervious areas, if any. Wells, landslides, slumps, or rock outcrops, if any. Existing drainage for site and nearby areas, including location of municipal storm drains.]

II.C. Opportunities and Constraints for Stormwater Control

[Examples of opportunities: Existing natural areas, low areas, oddly configured or otherwise unbuildable areas, easements and required landscape amenities including open space and buffers that might be used for bioretention facilities, and differences in elevation, which can provide needed hydraulic head.]

[Examples of constraints: impermeable soils or near-surface 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.]

II.D. Summary of Design Approach for Meeting the Post-Construction Requirements

[Describe the key measures, including Site Design Measures, Structural Control Measures, and any unique stormwater management systems designed to meet the Post-Construction Requirements. This section should identify each design element intended to accomplish these requirements, and provide a summary description of how the overall project meets the Post-Construction Requirements.]

III. Low Impact Development Design Strategies

III.A.Site Design and Runoff Reduction (Performance Requirement No.1)

III.A.1. Limit disturbance to creeks and natural drainage features, if applicable

III.A.2. Minimize compaction of highly permeable soils, if applicable

III.A.3. Limit of clearing and grading of native vegetation to minimum area needed, if applicable

[Describe how project concentrates improvements on the least-sensitive portions of the site while leaving remaining land in undisturbed state]

III.A.4. Apply setbacks from creeks, wetlands, and riparian habitats, if applicable

III.A.5. Minimize stormwater runoff using one or more of the following site design measures

[Examples include: collecting roof runoff for later use, direct runoff onto vegetated areas safely away from building foundations and footings, use permeable surfaces for areas of pavement.]

III.A.6. Consideration of drainage as a design element within the project

III.A.7. Tier 3 projects must include:

[Definition of the development envelope and protected areas, conservation of natural areas such as trees, vegetation, soils, describe how the design limits overall impervious footprint such as using minimum widths/areas necessary, conform the site layout to natural landforms, and minimize grading and excessive disturbance of vegetation and topsoils.]

III.B. Site Constraints

III.B.1. Limitation of development envelope due to site constraints including:

[Examples: high groundwater, proximity to impervious layer such as bedrock, soil types that limit infiltration, documented pollutants in the soil or groundwater, space constraints (i.e. infill or redevelopment), geotechnical hazards, proximity to well used for drinking water, incompatibility with existing drainage system.]

III.C. Dispersal of Runoff to Pervious Areas

III.C.1. Reduce amount of runoff for which Structural Control Measures are required.

[Describe the use of Drainage Management Areas that are undisturbed or otherwise do not receive runoff from other DMAs, and those that do receive runoff from other DMAs and that runoff will be infiltrated and (Self-Retaining). These areas serve to reduce overall runoff and must be maximized to the maximum extent practical before directing runoff through Structural Control Measures.]

IV. Documentation of Drainage Design

IV.A. Descriptions of each Drainage Management Area

Table 2. Drainage Management Areas

DMA Name	DMA Type	Area (sf)	Surface type	Drains to

Drainage Management Area Narrative Descriptions

DMA [name], totaling x,xxx square feet, drains [description of area]. DMA [name] drains to [Self-Retaining DMA name or SCM name]. [Describe notable or exceptional characteristics or conditions.]

DMA [name], totaling x,xxx square feet, drains [description of area]. DMA [name] drains to [Self-Retaining DMA name or SCM name]. [Describe notable or exceptional characteristics or conditions.]

DMA [name], totaling x,xxx square feet, drains [description of area]. DMA [name] drains to [Self-Retaining DMA name or SCM name]. [Describe notable or exceptional characteristics or conditions.]

DMA [name], totaling x,xxx square feet, drains [description of area]. DMA [name] drains to [Self-Retaining DMA name or SCM name]. [Describe notable or exceptional characteristics or conditions.]

Etc.

IV.B. Description of each Stormwater Structural Control Measure

[Describe Structural Control Measures required to treat (Tier 2) or treat and retain (Tier 3 OR Tier 4) remaining runoff. Peak runoff controls for Tier 4 projects will be reviewed separately.]

SCM-[name], totaling XXX square feet, is a [describe facility, i.e bioretention, direct infiltration, basin, etc] and located [describe location]. SCM-[name] [treats/retains] runoff from DMA-[name]. Treated water and high flow bypass discharges to [describe].

SCM-[name], totaling XXX square feet, is a [describe facility, i.e bioretention, direct infiltration, basin, etc] and located [describe location]. SCM-[name] [treats/retains] runoff from DMA-[name]. Treated water and high flow bypass discharge to [describe].

SCM-[name], totaling XXX square feet, is a [describe facility, i.e bioretention, direct infiltration, basin, etc] and located [describe location]. SCM-[name] [treats/retains] runoff from DMA-[name]. Treated water and high flow bypass discharge to [describe].

Etc.

IV.C. Tabulation and Sizing Calculations for Structural Control Measures

[For Tier 3 and 4 Projects, attach the Stormwater Calculator results. Include sizing and design considerations for anything other than bioretention and how runoff from each DMA is managed.]

[Attach the Stormwater Calculator results for Tier 2 Projects-only. As alternative you may use the following table for Tier 2 Projects]

DMA	DMA Area (square feet)	Post-project surface type	DMA Runoff factor	DMA Area × runoff factor	**SCM-[Name]**		
DMA-[name]					SCM Sizing factor	Minimum SCM Size	Proposed SCM Size
Etc.							

Total>		0.04		

Include the following note on plans:

[LID Facilities] shall be protected during construction from sediment and erosion. Heavy machinery will not compact soils in areas of infiltration. If any sediment discharges into LID facility, contractor shall restore to performance design specifications as verified by civil engineer. Contractor shall notify grading or building inspector 24-hours prior to installation of gravel and bioretention soil to verify material quality.

V. Source Control Measures

V.A. Site activities and potential sources of pollutants

[See the instructions on page 3-6 of the *Stormwater Technical Guide* and the checklist in Appendix A.]

[Describe potential source of pollutants, and both Structural Source Control measures as well as any operational BMPs. Include features, materials, and methods of construction of Source Control BMPs. Refer to Appendix A for typical pollutants and BMPs.]

V.B. Source Control BMPs Table

Table x. Source Control BMPs

Potential source of runoff pollutants	Permanent source control BMPs	Operational source control BMPs

VI. Stormwater Facility Maintenance

[See Chapter 5 of the *Stormwater Technical Guide*]

[Draft: Include a brief summary in the draft Stormwater Control Plan highlighting the maintenance activities required for 1) Site Design and LID measures, 2) each Structural Control Measure including bioretention or any other treatment/retention BMP, and 3) Source Control BMPs, as appropriate.

Final: A **separate** and detailed maintenance plan will be required as part of the recorded Maintenance Agreement. In the final Stormwater Control Plan, the maintenance plan can be referenced herein.]

VII. Stormwater Control Plan/Construction Documents Cross-Checklist

[See the instructions on page 3-7 of the Stormwater Technical Guide.]

Table x. Stormwater Control Plan/Construction Documents Cross-Checklist

Stormwater Control Plan Page #	Source Control or LID Facility	See Plan Sheet #s

VIII. Certifications

The preliminary design of stormwater treatment facilities and other stormwater pollution control measures in this plan are in accordance with the current edition of the Santa Barbara County Project Clean Water's Stormwater Technical Guide. [Check with local staff regarding other certification requirements.]

Example
Stormwater Control Plan
For a Commercial Project
123 Main Street
Anytown, USA

January 2017

XYZ Corporation
Jane Jones, 805-555-1212

This example prepared by Dan Cloak Environmental Consulting
for the County of Santa Barbara Project Clean Water
to assist users of the *Stormwater Technical Guide*

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Stormwater Control Plan Exhibit
Central Coast Post-Construction Requirements Calculator Spreadsheet

This Stormwater Control Plan was prepared using the template dated January 2017.

I. Project Data

Table 1. Project Data

Project Name/Number	Example Commercial Project
Project Location	123 Main St., Anytown, USA
Project Phase No.	Not Applicable
Project Type and Description	4,680 SF Retail Building with drive-through lane and parking
Total Project Site Area (acres)	0.6 acres
Total New Impervious Surface Area	0 SF
Total Replaced Impervious Surface Area	21,050 SF
Total Pre-Project Impervious Surface Area	24,000 SF±
Total Post-Project Impervious Surface Area	21,050 SF
Net Impervious Area	18,100 SF
Applicable Requirements	Tier 3
Watershed Management Zone	1
Design Storm Frequency and Depth	2.1 inches (95th percentile)
Urban Sustainability Area	The project is not in an Urban Sustainability Area

II. Setting

II.A. Project Location and Description

This project involves the demolition of an existing restaurant building and parking lot and replacement with a new restaurant/retail building and parking lot. The parcel fronts an arterial roadway. See Figure 1.

The proposed use is consistent with current commercial zoning. The project will include a drive-through lane for a planned coffee shop, plus two additional retail spaces within the same building.

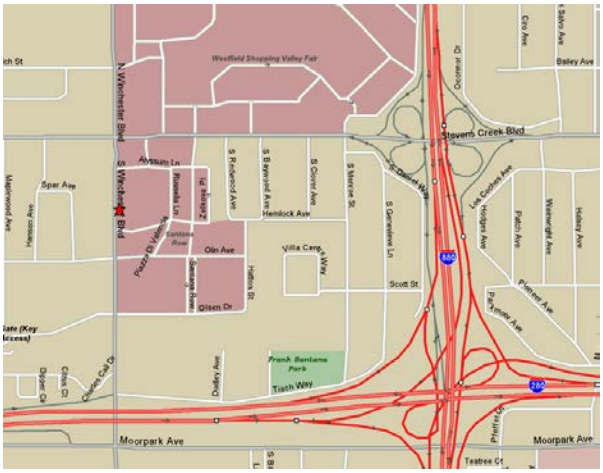


Figure 1. Location of 123 Main Street, Anytown.

II.B. Existing Site Features and Conditions

The site is nearly square and generally flat. Most of the site is covered with buildings or is paved. The perimeter of the site (except for the frontage on Main Street) is landscaped with mature trees. See Figure 2. Soils are silty clays typical of the area (Hydrologic Soil Group "D"). The existing drainage system is connected to a municipal storm drain in the southbound lanes of Main Street in front of the site.

Figure 2. Existing Site Conditions.

II.C. Opportunities and Constraints for Stormwater Control

Constraints include impermeable soils (hydrologic soil group D), very high intensity land use, and flat slopes. Disposal of runoff to deep infiltration is not feasible on this site due to the low permeability of the clay soils. High land values, the objective of creating a dense retail area, and parking requirements limit opportunities to reduce site imperviousness.

Setback areas—five feet on each side of the site and ten feet at the back of the site—might be usable as locations for treatment BMPs; however, these areas include significant trees which must be protected. The City storm drain system in Main Street is deep enough to provide sufficient hydraulic head to route runoff across the surface of the site to a stormwater treatment facility, through the facility, and then to drain treated runoff to the City storm drain.

III. Low Impact Development Design Strategies

III.A. Site Design and Runoff Reduction

The site is densely developed infill within the existing urbanized area. Future retail areas have been included in the development plan, in addition to the initial use of a portion of the building as a drive-through coffee shop. Existing significant trees around the perimeter of the site are to be preserved. The landscaped setback areas surrounding the trees will be expanded to the extent practicable, given project parking and circulation requirements, to reduce impervious area of the project. Landscaping in these areas will be upgraded to maximize aesthetic value and ensure the continued health of the mature trees.

III.B. Site Constraints

Conventional concrete and conventional asphalt are to be used to construct the circulation and parking areas. Permeable pavements are not cost-effective for this site, in part because the pavements overlie expansive clay soils. This condition would necessitate a very deep gravel base course, which would, in turn, require large quantities of excavation and off-haul.

III.C. Dispersal of Runoff to Pervious Areas

Landscaped areas at the perimeter of the site could be used to disperse runoff from some portions of the parking lot; however, the areas are at a slightly higher elevation and can't be re-graded without removing or damaging the existing trees.

IV. Documentation of Drainage Design

IV.A. Descriptions of Each Drainage Management Area

IV.A.1. Drainage Management Areas

Table 2. Drainage Management Areas (DMAs) as shown on the Exhibit.

DMA Name	DMA Type	Area (SF)	Surface Type
DMA-1	Drains to SCM	2805	Paving
DMA-2	Drains to SCM	6130	Paving
DMA-3	Drains to SCM	4680	Roof
DMA-4	Self-Retaining	1770	Landscape
DMA-5	Self-Retaining	155	Landscape
DMA-6	Self-Retaining	550	Landscape
DMA-7	Self-Retaining	4285	Landscape
DMA-8	Drains to SCM	6369	Paving

IV.A.2. Drainage Management Area Descriptions

DMA 1, totaling 2,805 square feet, drains the northwest section of the parking area, the roof of the trash enclosure, and a portion of a paved traffic island. DMA-1 drains to Bioretention Facility #1. Runoff will enter the facility through curb cuts.

DMA 2, totaling 6,130 square feet, drains the northeast section of the parking area and a portion of the plaza surrounding the building. DMA-2 drains to Bioretention Facility #2.

DMA 3, totaling 4,680 square feet, drains the roof of the building. DMA 3 drains to Bioretention Facility #3, and will be connected via a tight-lined downspout and bubble-up.

DMA 4, totaling 1,770 square feet, is a landscaped area with existing trees. The trees will be retained and the area reconfigured. Drainage from DMA 4 will be retained by a surrounding curb.

DMA 5, totaling 155 square feet, is a landscaped area with existing trees. The trees will be retained and the area reconfigured. Drainage from DMA 5 will be retained by a surrounding curb.

DMA 6, totaling 550 square feet, is a landscaped area with some existing trees, as well as some new landscaping adjacent to Main St. Drainage from DMA 6 will be retained by a surrounding curb.

DMA 7, totaling 4,285 square feet, is a landscaped area with existing trees on the west and south sides of the site. Drainage from DMA 7 will be retained by a surrounding curb.

DMA 8, totaling 6.369 square feet, comprises the paved drive-through and travel lanes on the south side of the site and parking on the west side of the site, as well as walkway and plaza areas on the west,

south, and east sides of the building. DMA 8 drains to Bioretention Facility #3, with runoff entering via curb cuts.

IV.B. Stormwater Control Measures

Runoff from all impervious areas on the site, including roofs and paved areas, will be routed to three bioretention facilities (see Exhibit). The facilities will be designed and constructed to the criteria in the Project Clean Water *Stormwater Technical Guide* (February 2014), including the following features:

- Surrounded by a concrete curb. Where adjacent to pavement, curbs will be thickened and an impermeable vertical cutoff wall will be included.
- Each layer built flat, level, and to the elevations specified in the plans:
    - Bottom of Gravel Layer (BGL)
    - Top of Gravel Layer (TGL)
    - Top of Soil Layer (TSL)
    - Overflow Grate
    - Facility Rim

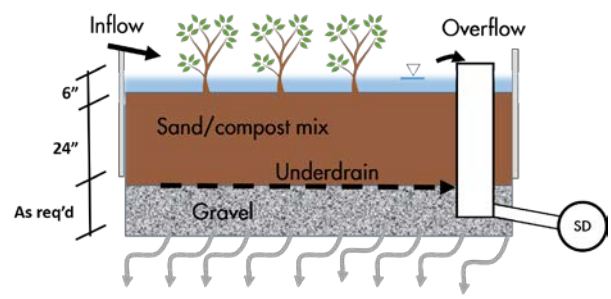


Figure 3. Bioretention Facility Cross-Section (Schematic)

- Class 2 permeable, Caltrans specification 68-2.02F(3), depth as specified in the Stormwater Control Measure Sizing Calculator output
- 24 inches sand/compost mix meeting BASMAA specifications
- 4 in. dia. PVC SDR 35 perforated pipe underdrain, installed with the invert at the top of the Class 2 permeable layer with holes facing down, and connected to the overflow structure at that same elevation
- 6-inch-deep reservoir between top of soil elevation and overflow grate elevation
- Concrete drop inlet with frame overflow structure, with grate set to specified elevation, connected to storm drain in Main Street
- Vertical cutoff walls to protect adjacent pavement
- Plantings selected for water conservation
- Irrigation system on a separate zone, with drip emitters and "smart" irrigation controllers
- Sign identifying the facility as a stormwater treatment facility.

The only areas on the site which do not drain to a bioretention facility are small portions of the two entrances from Main Street. These areas drain toward the street. The size of these areas has been minimized by designing the grading and drainage to place the grade break as close to the street as practicable.

The pervious setback areas are higher in elevation than the parking area. Drainage from these areas will be retained by new concrete curbs surrounding the areas.

IV.C. Tabulation and Sizing Calculations

IV.C.1. Information Summary for LID Facility Design

See the attached entries and output from the Central Coast Stormwater Control Measure Sizing Calculator.

V. Source Control Measures

V.A. Site activities and potential sources of pollutants

On-site activities that could potentially produce stormwater pollutants include:

- Driveways and parking lots
- Food Service
- Trash Management

V.B. Potential Pollutant Sources and Source Control Measures

Table 3. Pollutant Sources and Source Control Measures

Potential source of runoff pollutants	Permanent source control BMPs	Operational source control BMPs
Inlets (bioretention overflows)	All inlets will be marked with "No Dumping! Flows to Local Waterways" or similar	Markings will be regularly inspected and repainted or replaced as needed. Lessees will receive stormwater pollution prevention brochures. Lease agreements will include the following provision: "Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains."
Indoor and structural pest control		Owner will retain only companies that are certified in Integrated Pest Management (IPM) for on-site pest-management.
Landscape maintenance	Existing mature trees to be retained. Landscaping will minimize irrigation and runoff and be selected for pest resistance, and will minimize the need for fertilizers and pesticides.	Landscaping will be maintained using minimum or no pesticides. IPM information will be provided to new owners, lessees, and operators.

Potential source of runoff pollutants	Permanent source control BMPs	Operational source control BMPs
	Plants will be selected appropriate to site soils, slopes, climate, sun, wind rain, land use, air movement, ecological consistency, and plant interactions.	
Food service.	Coffee shop will include a floor sink for cleaning floor mats, containers, and equipment. The floor sink will be connected to a grease interceptor before discharging to the sanitary sewer.	
Refuse area.	Refuse and recycled materials will be handled in the refuse area shown on the Exhibit. This area is to be roofed, bermed, and equipped with a drain to a grease interceptor and then to the sanitary sewer.	All dumpsters will be posted with signs stating "Do not dump hazardous materials here" or similar.
Plazas, sidewalks, and parking lots		Trash receptacles to be provided in plaza area and on drive-through and emptied daily. Site to be policed at least twice daily for trash. Plazas, sidewalks, and parking lots will be swept regularly. Debris and washwater from periodic pressure washing will be collected and disposed of to the sanitary sewer.

VI. Stormwater Facility Maintenance

VI.A. Ownership and Responsibility for Maintenance in Perpetuity

Maintenance of stormwater facilities will be the responsibility of the property owner and will be performed by the owner's contractors or employees as part of routine maintenance of buildings, grounds, and landscaping. The applicant has reviewed the Anytown, USA, standard agreement

regarding the maintenance of stormwater facilities and commits to execute any necessary agreements prior to completion of construction. Applicant accepts responsibility for interim operation and maintenance of stormwater treatment and flow-control facilities until such time as this responsibility is formally transferred to a subsequent owner.

VI.B. Summary of Maintenance Requirements for Each Stormwater Facility

The three bioretention facilities will be maintained on the following schedule at a minimum. Details of maintenance responsibilities and procedures will be included in a Stormwater Facility Operation and Maintenance Plan to be submitted for approval as required in the conditions of approval.

At no time will synthetic pesticides or fertilizers be applied, nor will any soil amendments, other than aged compost mulch or sand/compost mix, be introduced.

Daily: The facilities will be examined for visible trash during regular policing of the site, and trash will be removed.

After Significant Rain Events: A significant rain event is one that produces approximately a half-inch or more rainfall in a 24-hour period. Within 24 hours after each such event, the following will be conducted:

The surface of the facility will be observed to confirm there is no ponding.

- Inlets will be inspected, and any accumulations of trash or debris will be removed.
- The surface of the mulch layer will be inspected for movement of material. Mulch will be replaced and raked smooth if needed.

Prior to the Start of the Rainy Season: In September or each year, the facility will be inspected to confirm there is no accumulation of debris that would block flow, and that growth and spread of plantings does not block inlets or the movement of runoff across the surface of the facility.

Annual Landscape Maintenance: In December – February of each year, vegetation will be cut back as needed, debris removed, and plants and mulch replaced as needed. The concrete work will be inspected for damage. The elevation of the top of soil and mulch layer will be confirmed to be consistent with the 6-inch reservoir depth.

VII. Construction Checklist

Table 4. Construction Checklist Table to be incorporated in Construction Drawings

Stormwater Control Plan Page #	Source Control or Treatment Control Measure	See Plan Sheet #s
3 and Exhibit	Drainage from DMAs 4, 5, 6, and 7 is retained by surrounding curbs.	
3 and Exhibit	DMA 1 drains to Bioretention Facility #1; facility is designed as specified	
3 and Exhibit	DMA 2 drains to Bioretention Facility #2; facility is designed as specified	
3 and Exhibit	DMA 3 is connected via tight-lined downspout to Bioretention Facility #3	
3 and Exhibit	DMA 8 drains to Bioretention Facility #3; facility is designed as specified	
5	Bioretention Facility #1, #2, #3 overflows are marked with "No Dumping" message	
5	Existing mature trees are preserved	
6	Coffee shop/food service facility is equipped with a floor sink connected to a grease interceptor and then to sanitary sewer	
6	Trash receptacles are located in plaza area and are accessible to drive-through lane	

VIII. Certifications

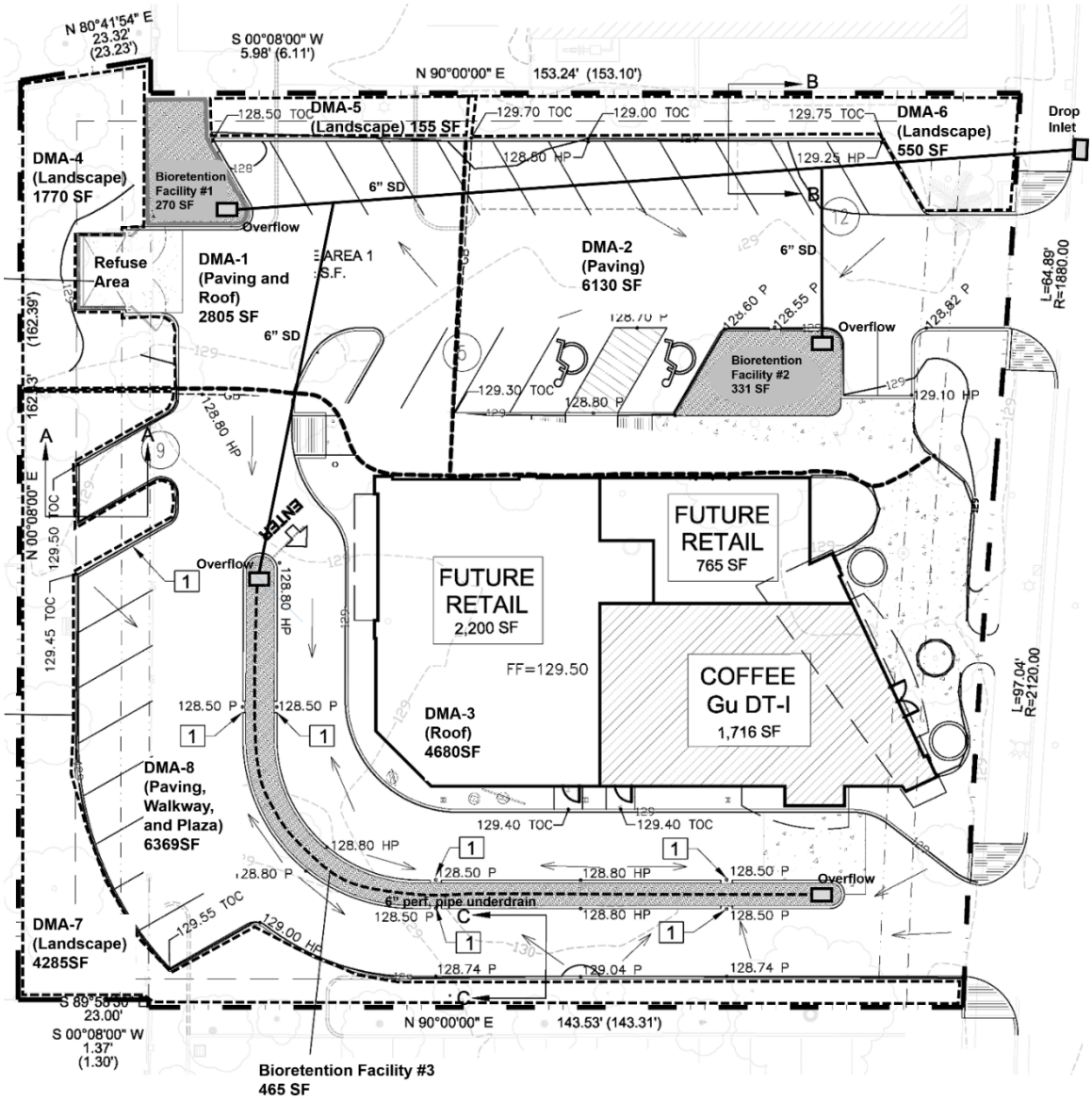
The preliminary design of Stormwater Control Measures and other stormwater pollution control measures in this plan are in accordance with the current edition of the Santa Barbara County Project Clean Water's Stormwater Technical Guide.

Example Commercial Site

123 Main Street

Anytown, USA

No Scale



Example
Stormwater Control Plan
For a Residential Subdivision Project

Whispering Pines Lane
Anytown, USA

September 30, 2015

XYZ Corporation
Jane Jones, 707-555-1212

This example prepared by Dan Cloak Environmental Consulting
for the County of Santa Barbara Project Clean Water
to assist users of the *Stormwater Technical Guide*

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Attachments

Stormwater Control Plan Exhibit
Central Coast Post-Construction Requirements Calculator Spreadsheet

This Stormwater Control Plan was prepared using the template dated February 18, 2014.

I. Project Data

Table 1. Project Data Form

Project Name/Number	Example Residential Subdivision Project
Application Submittal Date	30 September 2015 [to be verified by municipal staff]
Project Location	Whispering Pines Lane, Anytown, USA
Project Phase No.	Not Applicable
Project Type and Description	Nine single family homes with public street and associated infrastructure
Total Project Site Area (acres)	3.0 acres
Total New Impervious Surface Area	60,054 SF
Total Replaced Impervious Surface Area	0 SF
Total Pre-Project Impervious Surface Area	0 SF
Total Post-Project Impervious Surface Area	60,054 SF
Net Impervious Area	60,054
Watershed Management Zone(s)	1
Design Storm Frequency and Depth	2.1 inches (95th percentile)
Urban Sustainability Area	The project is not in an Urban Sustainability Area

II. Setting

II.A. Project Location and Description

The project consists of nine single family homes, a new street with a cul-de-sac, and sidewalks. In addition, sidewalks will be constructed along the frontage of Arterial Road. See Figure 1.

II.B. Existing Site Features and Conditions

This 3-acre undeveloped infill site is nearly flat, sloping only 0.15% toward Arterial Road. The site was formerly agricultural, and there are no significant trees. See Figure 2. Soils are silty sands typical of the area (Hydrologic Soil Group "B"). There are no swales or other natural drainage

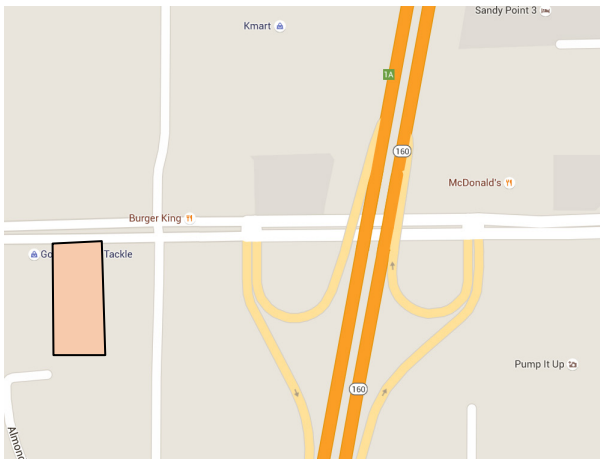


Figure 1. Location of Whispering Pines Lane, Anytown.

features, and there are no storm drains on site. A municipal storm drain exists in Arterial Road bordering the site.

II.C. Opportunities and Constraints for Stormwater Control

Soils are relatively permeable, reducing the area needed to achieve the required amount of infiltration.

The planned development includes large front yards and rear yards, allowing runoff from some impervious areas to be managed by dispersal to landscaping.

There is a storm drain in Arterial Road; however, it is at a shallow depth, limiting the potential for connecting underdrains from bioretention facilities located more than a short distance from Arterial Road.

Figure 2. Existing Site Conditions.

III. Low Impact Development Design Strategies

III.A. Optimization of Site Layout

The site is infill within the existing urbanized area. Density reflects that of surrounding developments and is consistent with zoning.

To minimize street length and pavement area, the street is double loaded (driveways on each side). Street widths, sidewalk widths, and the radius of the cul-de-sac (with mountable curbs) are the minimum allowable consistent with City public works standards and fire district requirements.

The planned location of bioretention facilities along Arterial Road provides a buffer between the residences and the street.

III.B. Use of Permeable Pavements

Conventional concrete and conventional asphalt are to be used to construct the street, sidewalks, and driveways. Permeable pavements could be used, given the relatively permeable and competent soils, but are not cost-effective when compared to the option of using conventional pavements and draining paved areas to bioretention facilities.

III.C. Dispersal of Runoff to Pervious Areas

Runoff from the rear portion of each house (about 50% of roof area) will be dispersed to rear yards, which will be graded concave to retain runoff resulting from the first inch of rainfall. In addition, the landscaped front yards will be graded to retain runoff.

III.D. Stormwater Control Measures

Runoff from the front portion of each house roof and from driveways will be routed to the street gutters. The combined runoff from lots and streets will be routed to two bioretention facilities located in separate parcels along Arterial Road. See Exhibit. The facilities will be designed and constructed to the criteria in the *Stormwater Technical Guide* (February 2014), and will include the following features:

- Surrounded by a concrete curb.
- Each layer built flat, level, and to the elevations specified in the plans:

- Bottom of Gravel Layer (BGL)
- Top of Gravel Layer (TGL)
- Top of Soil Layer (TSL)
- Overflow Grate
- Facility Rim

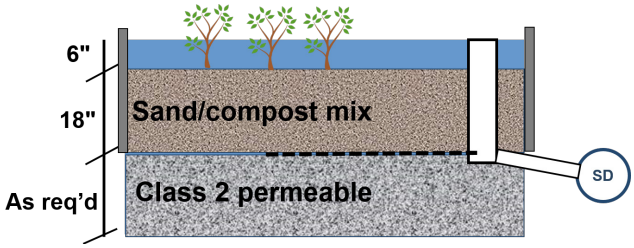


Figure 3. Bioretention Facility Cross-Section (Schematic)

- Class 2 permeable, Caltrans specification 68-2.02F(3), depth as specified in the Stormwater Control Measure Sizing Calculator output
- 18 inches sand/compost mix meeting BASMAA specifications
- 4 in. dia. PVC SDR 35 perforated pipe underdrain, installed with the invert at the top of the Class 2 permeable layer with holes facing down, and connected to the overflow structure at that same elevation
- 6-inch-deep reservoir between top of soil elevation and overflow grate elevation
- Concrete drop inlet with frame overflow structure, with grate set to specified elevation, connected to storm drain in Arterial Road
- Plantings selected for water conservation
- Irrigation system on a separate zone, with drip emitters and "smart" irrigation controllers
- Sign identifying the facility as a stormwater treatment facility.

IV. Documentation of Drainage Design

IV.A. Descriptions of Each Drainage Management Area

IV.A.1. Drainage Management Areas

Table 2. Drainage Management Areas (DMAs) as shown on the Exhibit.

	DMA ID	Description	Surface Type	SF
Lot 1	1-RF	Roof, front	Roof	1846
	1-RR	Roof, rear	Roof	1388
	1-DW	Driveway	Paved	805
	1-FY-1	Front Yard	Landscaped	780
	1-FY-2	Front Yard	Landscaped	1625
	1-RY	Rear Yard	Landscaped	4910
Lot 2	2-RF	Roof, front	Roof	2204
	2-RR	Roof, rear	Roof	2550
	2-DW	Driveway	Paved	400
	2-FY-1	Front Yard	Landscaped	1620
	2-FY-2	Front Yard	Landscaped	370
	2-RY	Rear Yard	Landscaped	3580
Lot 3	3-RF	Roof, front	Roof	1846
	3-RR	Roof, rear	Roof	1388
	3-DW	Driveway	Paved	1000
	3-FY-1	Front Yard	Landscaped	1145
	3-FY-2	Front Yard	Landscaped	1665
	3-RY	Rear Yard	Landscaped	3775
Lot 4	4-RF	Roof, front	Roof	1792
	4-RR	Roof, rear	Roof	1753
	4-DW	Driveway	Paved	520
	4-FY-1	Front Yard	Landscaped	730
	4-FY-2	Front Yard	Landscaped	1575
	4-RY	Rear Yard	Landscaped	8045
Lot 5	5-RF	Roof, front	Roof	1846
	5-RR	Roof, rear	Roof	1388
	5-DW	Driveway	Paved	955
	5-FY-1	Front Yard	Landscaped	1045
	5-FY-2	Front Yard	Landscaped	1790
	5-RY	Rear Yard	Landscaped	5390
Lot 6	6-RF	Roof, front	Roof	1792
	6-RR	Roof, rear	Roof	1753
	6-DW	Driveway	Paved	555
	6-FY-1	Front Yard	Landscaped	1615
	6-FY-2	Front Yard	Landscaped	615
	6-RY	Rear Yard	Landscaped	8235
Lot 7	7-RF	Roof, front	Roof	2204
	7-RR	Roof, rear	Roof	2550
	7-DW	Driveway	Paved	670

	7-FY-1	Front Yard	Landscaped	1845
	7-FY-2	Front Yard	Landscaped	920
	7-RY	Rear Yard	Landscaped	2760
Lot 8	8-RF	Roof, front	Roof	1792
	8-RR	Roof, rear	Roof	1753
	8-DW	Driveway	Paved	480
	8-FY-1	Front Yard	Landscaped	870
	8-FY-2	Front Yard	Landscaped	1715
	8-RY	Rear Yard	Landscaped	4190
Lot 9	9-RF	Roof, front	Roof	2204
	9-RR	Roof, rear	Roof	2550
	9-DW	Driveway	Paved	370
	9-FY-1	Front Yard	Landscaped	460
	9-FY-2	Front Yard	Landscaped	1670
	9-RY	Rear Yard	Landscaped	4150
Street	S-1	Street	Paved	9330
	S-2	Street	Paved	10370

IV.A.2. Drainage Management Area Descriptions

Front Roofs (DMAs 1-RF, 2-RF, 3-RF, 4-RF, 5-RF, 6-RF, 7-RF, 8-RF, and 9-RF, totaling 17,526 square feet), drain via gutters to driveways or swales adjacent to the driveways and from there to the street gutters.

Driveways (DMAs 1-DW, 2-DW, 3-DW, 4-DW, 5-DW, 6-DW, 7-DW, 8-DW, and 9-DW, totaling 5,755 square feet, drain to the street gutters.

Sidewalks and Whispering Pines Lane, (DMAs S-1 and S-2, totaling 19,700 square feet) drain to Bioretention Facilities 1 and 2, respectively.

Rear Roofs (DMAs 1-RR, 2-RR, 3-RR, 4-RR, 5-RR, 6-RR, 7-RR, 8-RR, and 9-RR totaling 4,680 square feet), each drain to the associated rear yards.

Rear Yards (DMAs 1-RY, 2-RY, 3-RY, 4-RY, 5-RY, 6-RY, 7-RY, 8-RY, and 9-RY totaling 46,485 square feet) will be graded slightly concave to promote runoff retention. Each will receive runoff from rear roofs on the same lot.

Front Yards (DMAs 1-FY-1, 1-FY-2, 2-FY-1, 2-FY-2, 3-FY-1, 3-FY-2, 4-FY-1, 4-FY-2, 5-FY-1, 5-FY-2, 6-FY-1, 6-FY-2, 7-FY-1,7-FY-2, 8-FY-1, 8-FY-2, and 9-FY-1 and 9-FY-2, totaling 23,105 square feet will be graded slightly concave to promote runoff retention.

IV.B. Tabulation and Sizing Calculations

IV.B.1. Information Summary for LID Facility Design

Total Project Area (Square Feet)	130,680 SF
Design Storm Depth	2.1 inches
Applicable Requirements	Tier 3

See the attached entries and results in the Central Coast Region Stormwater Control Measure Sizing Calculator.

V. Source Control Measures

V.A. Site activities and potential sources of pollutants

On-site activities that could potentially produce stormwater pollutants include:

- Indoor and structural pest control
- Landscape maintenance

V.B. Potential Pollutant Sources and Source Control Measures

Table 3. Pollutant Sources and Source Control Measures

Potential source of runoff pollutants	**Permanent source control BMPs**	**Operational source control BMPs**
Indoor and structural pest control	New construction minimizes potential for pest entry.	Integrated Pest Management (IPM) information will be provided to new homeowners.
Landscape maintenance	Developer-installed landscaping will minimize irrigation and runoff and be selected for pest resistance, and will minimize the need for fertilizers and pesticides. Plants will be selected appropriate to site soils, slopes, climate, sun, wind rain, land use, air movement, ecological consistency, and plant interactions.	IPM information will be provided to new homeowners. Landscaping will be maintainable using minimum or no pesticides.

VI. Stormwater Facility Maintenance

VI.A. Ownership and Responsibility for Maintenance in Perpetuity

The two bioretention facilities will each be located on a jointly owned parcel, with easy access to the public street. Owners of parcels 1, 2, 3, and 4 will jointly own the parcel on which Bioretention Facility 1 is located, and will be jointly responsible for the maintenance of that facility, subject to provisions in the subdivision map and Conditions, Covenants, and Restrictions (CC&Rs) recorded against the subdivision. Similarly, owners of parcels 5, 6, 7, 8, and 9 will jointly own the parcel on which Bioretention Facility 2 is located, and will be jointly responsible for the maintenance of that facility. The applicant has reviewed the map provisions and CC&Rs provided by Anytown, USA, for applicant's review, and commits to execute any additional agreements necessary to ensure uninterrupted maintenance of the facilities. Applicant accepts responsibility for interim operation and maintenance of stormwater treatment and flow-control facilities until such time as this responsibility is formally transferred to subsequent owners.

VI.B. Summary of Maintenance Requirements for Each Stormwater Facility

The two bioretention facilities will be maintained on the following schedule at a minimum. Details of maintenance responsibilities and procedures will be included in a Stormwater Facility Operation and Maintenance Plan to be submitted for approval prior to the completion of construction.

At no time will synthetic pesticides or fertilizers be applied, nor will any soil amendments, other than aged compost mulch or sand/compost mix, be introduced.

Weekly: The facilities will be examined for visible trash during regular policing of the site, and trash will be removed.

After Significant Rain Events: A significant rain event is one that produces approximately a half-inch or more rainfall in a 24-hour period. Within 24 hours after each such event, the following will be conducted:

The surface of the facility will be observed to confirm there is no ponding.

- Inlets will be inspected, and any accumulations of trash or debris will be removed.
- The surface of the mulch layer will be inspected for movement of material. Mulch will be replaced and raked smooth if needed.

Prior to the Start of the Rainy Season: In September of each year, the facility will be inspected to confirm there is no accumulation of debris that would block flow, and that growth and spread of plantings does not block inlets or the movement of runoff across the surface of the facility.

Annual Landscape Maintenance: In December – February of each year, vegetation will be cut back as needed, debris removed, and plants and mulch replaced as needed. The concrete work will be inspected for damage. The elevation of the top of soil and mulch layer will be confirmed to be consistent with the 6-inch reservoir depth.

VII. Construction Checklist

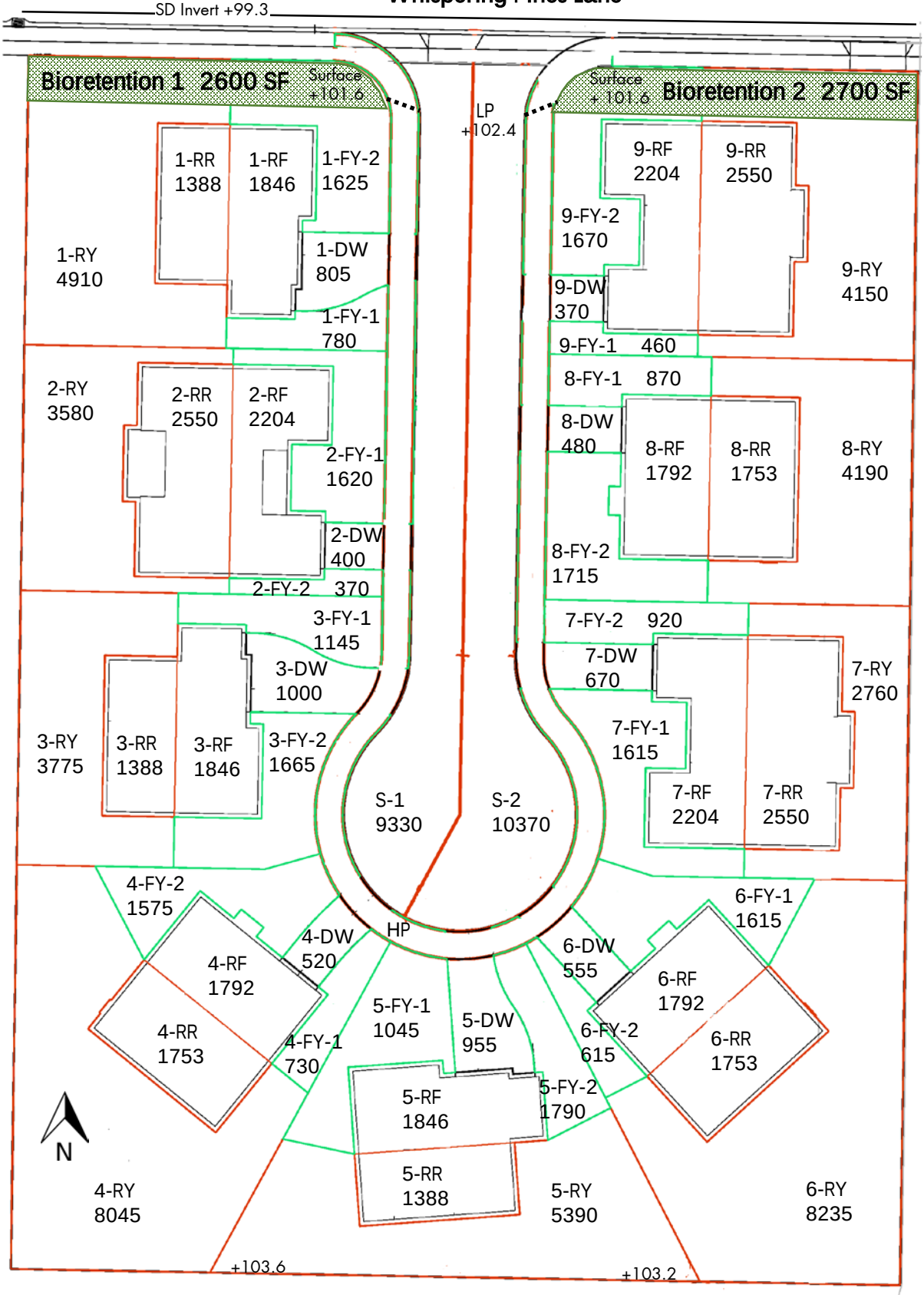
Table 4. Construction Checklist Table to be incorporated in Construction Drawings

Stormwater Control Plan Page #	Source Control or Treatment Control Measure	See Plan Sheet #s
p. 5 and Exhibit	Drainage from rear roofs is directed and dispersed to rear yards	
p.5 and Exhibit	Rear yards are graded concave	
p. 5 and Exhibit	Front yards are graded concave	
p. 5 and Exhibit	Front roofs and driveways drain to street	
p. 5 and Exhibit	Street drains to bioretention facilities. High point/grade break as shown on Exhibit	
p. 3, Exhibit, and Stormwater Control Measure Sizing Calculator Output	Bioretention facilities are detailed per specifications in the *Stormwater Technical Guide for Low Impact Development* with areas and gravel depths as shown in the attached results from the Stormwater Control Measure Sizing Calculator	

VIII. Certifications

The preliminary design of Stormwater Control Measures and other stormwater pollution control measures in this plan are in accordance with the current edition of the Santa Barbara County Project Clean Water's Stormwater Technical Guide.

Stormwater Control Plan Exhibit
Whispering Pines Lane



EXAMPLE RESIDENTIAL SUBDIVISION EXHIBIT SEPTEMBER 24, 2015

Central Coast Region Stormwater Control Measure Sizing Calculator

Version: 2/26/2014

1. Project Information

Project name:	Whispering Pines Subdivision
Project location:	Arterial Road, Anytown, USA
Tier 2/Tier 3:	Tier 3 - Retention
Design rainfall depth (in):	2.1
Total project area (ft2):	130680
Total new impervious area (ft2):	60054
Total replaced impervious in a USA (ft2):	0
Total replaced impervious not in a USA (ft2):	0
Total pervious/landscape area (ft2):	70626

2. DMA Characterization

Name	DMA Type	Area (ft2)	Surface Type	New, Replaced?	Connection
1-RF	Drains to SCM	1846	Roof	New	Bioretention-1
1-RR	Drains to Self-Retaining	1388	Roof		1-RY
1-DW	Drains to SCM	805	Concrete or asphalt	New	Bioretention-1
1-FY-1	Self-Retaining	780			
1-FY-2	Self-Retaining	1625			
1-RY	Self-Retaining	4910			
2-RF	Drains to SCM	2204	Roof	New	Bioretention-1
2-RR	Drains to Self-Retaining	2550	Roof		2-RY
2-DW	Drains to SCM	400	Concrete or asphalt	New	Bioretention-1
2-FY-1	Self-Retaining	1620			
2-FY-2	Self-Retaining	370			
2-RY	Self-Retaining	3580			
3-RF	Drains to SCM	1846	Roof	New	Bioretention-1
3-RR	Drains to Self-Retaining	1388	Roof		3-RY
3-DW	Drains to SCM	1000	Concrete or asphalt	New	Bioretention-1
3-FY-1	Self-Retaining	1145			
3-FY-2	Self-Retaining	1665			
3-RY	Self-Retaining	3775			
4-RF	Drains to SCM	1792	Roof	New	Bioretention-1
4-RR	Drains to Self-Retaining	1753	Roof		4-RY
4-DW	Drains to SCM	520	Concrete or asphalt	New	Bioretention-1
4-FY-1	Self-Retaining	730			
4-FY-2	Self-Retaining	1575			
4-RY	Self-Retaining	8045			
5-RF	Drains to SCM	1846	Roof	New	Bioretention-2
5-RR	Drains to Self-Retaining	1388	Roof		5-RY
5-DW	Drains to SCM	955	Concrete or asphalt	New	Bioretention-2
5-FY-1	Self-Retaining	1045			
5-FY-2	Self-Retaining	1790			
5-RY	Self-Retaining	5390			
6-RF	Drains to SCM	1792	Roof	New	Bioretention-2
6-RR	Drains to Self-Retaining	1753	Roof		6-RY
6-DW	Drains to SCM	555	Concrete or asphalt	New	Bioretention-2
6-FY-1	Self-Retaining	1615			
6-FY-2	Self-Retaining	615			
6-RY	Self-Retaining	8235			
7-RF	Drains to SCM	2204	Roof	New	Bioretention-2
7-RR	Drains to Self-Retaining	2550	Roof		7-RY

7-DW	Drains to SCM	670	Concrete or asphalt	New	Bioretention-2
7-FY-1	Self-Retaining	1615			
7-FY-2	Self-Retaining	920			
7-RY	Self-Retaining	2760			
8-RF	Drains to SCM	1792	Roof	New	Bioretention-2
8-RR	Drains to Self-Retaining	1753	Roof		8-RY
8-DW	Drains to SCM	480	Concrete or asphalt	New	Bioretention-2
8-FY-1	Self-Retaining	870			
8-FY-2	Self-Retaining	1715			
8-RY	Self-Retaining	4190			
9-RF	Drains to SCM	2204	Roof	New	Bioretention-2
9-RR	Drains to Self-Retaining	2550	Roof		9-RY
9-DW	Drains to SCM	370	Concrete or asphalt	New	Bioretention-2
9-FY-1	Self-Retaining	460			
9-FY-2	Self-Retaining	1670			
9-RY	Self-Retaining	4150			
S-1	Drains to SCM	9330	Concrete or asphalt	New	Bioretention-1
S-2	Drains to SCM	10370	Concrete or asphalt	New	Bioretention-2

DMA Summary Area	
Total project impervious area (ft2):	60054
New impervious area (ft2):	42981
Replaced impervious within a USA (ft2):	0
Replaced impervious not in a USA (ft2):	0
Total pervious/landscape area (ft2):	0

3. SCM Characterization

Name	SCM Type	Safety Factor	SCM Soil Type	Infilt. Rate (in/hr)	Area (ft2)
Bioretention-1	Bioretention	1	HSG A/B	0.75	2600
Bioretention-2	Bioretention	1	HSG A/B	0.75	2700

4. Run SBUH Model

5. SCM Minimum Sizing Requirements

SCM Name	Min. Required Storage Vol. (ft3)	Depth Below Underdrain (ft)	Drain Time (hours)
Bioretention-1	1194	1.15	2.9
Bioretention-2	1490	1.38	5.1

6. Self-Retaining Area Sizing Checks

Self-Retaining DMA Name	Self-Retaining DMA Area (ft2)	Tributary DMA Name	Tributary DMA Area (ft2)	Tributary / SRA Area Ratio
1-FY-1	780		0	0.00
1-FY-2	1625		0	0.00
1-RY	4910	1-RR	1388	0.28
2-FY-1	1620		0	0.00
2-FY-2	370		0	0.00
2-RY	3580	2-RR	2550	0.71
3-FY-1	1145		0	0.00
3-FY-2	1665		0	0.00
3-RY	3775	3-RR	1388	0.37
4-FY-1	730		0	0.00
4-FY-2	1575		0	0.00
4-RY	8045	4-RR	1753	0.22
5-FY-1	1045		0	0.00

5-FY-2	1790		0	0.00
5-RY	5390	5-RR	1388	0.26
6-FY-1	1615		0	0.00
6-FY-2	615		0	0.00
6-RY	8235	6-RR	1753	0.21
7-FY-1	1615		0	0.00
7-FY-2	920		0	0.00
7-RY	2760	7-RR	2550	0.92
8-FY-1	870		0	0.00
8-FY-2	1715		0	0.00
8-RY	4190	8-RR	1753	0.42
9-FY-1	460		0	0.00
9-FY-2	1670		0	0.00
9-RY	4150	9-RR	2550	0.61

Central Coast Region
Stormwater Control Measure Sizing Calculator

Introduction and Instructions

Version: 3/28/2017

Software Features and Notes

- Calculator is a MS Excel workbook with VBA code to guide data entry and hydraulic calculations
  - ***Allow "Macros" when opening***
- Worksheets are "protected" to prevent changes in format, row and column locations, etc., and to protect embedded equations

```
'-----------------------------------------
'Runoff Retention option
'-----------------------------------------

    '-----------------------------------------------
    'Prepare an SBUH model for each active SCM
    '-----------------------------------------------
    'Switch to "SBUH Model" tab and delete all but the first SBUH mode
    Worksheets("SBUH Model").Activate
    Columns("R:XFD").Delete

    'Count the number of SCMs that receive flow from DMAs
    ActiveSCM_Count = 0
    For i = 1 To nSCMrows
        If Worksheets("Project Information").Cells(SCMcellUL.Row + (i
            ActiveSCM_Count = ActiveSCM_Count + 1
        End If
    Next
    'MsgBox ActiveSCM_Count & " SCMs connected to DMAs"

    If ActiveSCM_Count = 0 Then
        MsgBox "No SCMs have been connected to DMAs. Please revise inp
        Worksheets("Project Information").Activate
        Cells(1, 1).Select
        Exit Sub
    End If
```

- Cells are color-shaded to match their use:

yellow = data entry

Name
DMA #1
DMA #2

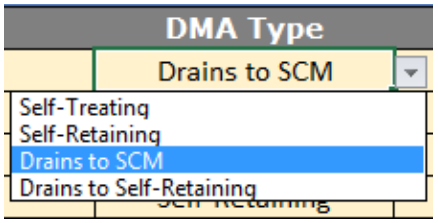
blue = generated results

Min. Required Storage Vol. (ft3)
455
109

grayed-out = not used

Surface Type

- Combo box/drop down lists are used wherever possible to guide data entry values:



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Software Features and Notes (Cont.)

- Calculator contains four worksheets:
  1. Project Information:
     - Project site, DMA, SCM characterization and results summary
  2. SBUH Model:
     - Location where model calculations are performed
  3. SCS, SBUH Equations:
     - Reference equations used by Calculator
  4. Lookups, Constants:
     - Values used in drop down lists and equations

Core of the user interface: Described in detail over the next 8 slides

Background calculations: Described in the final 3 slides

Project Information Worksheet Overview

Central Coast Region
Stormwater Control Measure
Sizing Calculator

Version: 3/28/2017

1. Project Information

Project name:	Test Project - Santa Barbara
Project location:	Santa Barbara
Tier 2/Tier 3:	Tier 3 - Retention
Design rainfall depth (in):	2.0
Total project area (ft2):	32100
Total DMA area (ft2):	30000
Total new impervious area (ft2):	21000
Total replaced impervious within a USA (ft2):	0
Total replaced impervious not in a USA (ft2):	3000
Total pervious/landscape area (ft2):	6000
Total SCM area (ft2):	2100

Enter project site location and characteristics using drainage planning documents

2. DMA Characterization

Add DMA Row | Remove DMA Row

Name	DMA Type	Area (ft2)	Surface Type	New, Replaced?	Connection
DMA-1	Drains to SCM	3000	Concrete or asphalt	Replaced	SCM-1
DMA-2	Drains to Self-Retaining	10000	Roof		DMA - SRA#1
DMA-3	Drains to SCM	11000	Roof	New	SCM-2
DMA - SRA#1	Self-Retaining	6000			

DMA Summary Area	
Total DMA area (ft2):	30000
New impervious area (ft2):	21000
Replaced impervious within a USA (ft2):	0
Replaced impervious not in a USA (ft2):	3000
Total pervious/landscape area (ft2):	6000

Define Drainage Management Areas. Iteratively add/remove and modify their characteristics

3. SCM Characterization

Add SCM Row | Remove SCM Row

Name	SCM Type	Safety Factor	SCM Soil Type	Infilt. Rate (in/hr)	Area (ft2)	Flow Control Orifice?	Reservoir Depth (in)
SCM-1	Bioretention	1	HSG C/D	0.25	1000	No	
SCM-2	Bioretention	1	HSG C/D	0.25	1100	Yes	6

Define Stormwater Control Measure characteristics. Iteratively test different configurations

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Project Information Overview (Cont.)

After DMAs and SCMs are defined, click to launch sizing calculations

4. Run SBUH Model

Launch Model

5. SCM Minimum Sizing Requirements

SCM Name	Min. Required Storage Vol. (ft3)	Depth Below Underdrain (ft)	Drain Time (hours)	Orifice Diameter (in)
SCM-1	440	1.00	0.0	
SCM-2	849	1.93	30.9	0.25

Calculator runs SBUH model and provides min. volume, depth and drainage time for each SCM

6. Self-Retaining Area Sizing Checks

Self-Retaining DMA Name	Self-Retaining DMA Area (ft2)	Tributary DMA Name(s)	Eff. Tributary DMA Area (ft2)	Effective Tributary / SRA Area Ratio
DMA - SRA#1	6000	DMA-2	10000	1.67

Calculator tracks connections and tributary area ratio for each self-retaining area

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Project Information Table

1. Project Information	
Project name:	Test Project - Santa Barbara
Project location:	Santa Barbara
Tier 2/Tier 3:	Tier 3 - Retention
Design rainfall depth (in):	2.0
Total project area (ft2):	32100
Total DMA area (ft2):	30000
Total new impervious area (ft2):	21000
Total replaced impervious within a USA (ft2):	0
Total replaced impervious not in a USA (ft2):	3000
Total pervious/landscape area (ft2):	6000
Total SCM area (ft2):	2100

Enter project name and location

Select: "Tier 2 – Treatment," "Tier 2 – Storage" or "Tier 3 – Retention"

Select design rainfall depth for project area

Summarize values from your drainage plan in the yellow cells. Calculator will compare these values to the DMAs you enter later.

<u>Note:</u> Self-retaining areas should be included in the "total pervious/landscape area" row

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DMA Characteristics Table

Add or remove DMAs here: not by manually inserting/deleting rows

2. DMA Characterization Add DMA Row | Remove DMA Row

Name	DMA Type	Area (ft2)	Surface Type	New, Replaced?	Connection
DMA-1	Drains to SCM	3000	Concrete or asphalt	Replaced	SCM-1
DMA-2	Drains to Self-Retaining	10000	Roof		DMA - SRA#1
DMA-3	Drains to SCM	11000	Roof	New	SCM-2
DMA - SRA#1	Self-Retaining	6000			

Provide descriptive name

Select:
1) Self-Treating
2) Self-Retaining
3) Drains to SCM
4) Drains to Self-Retaining

Enter DMA Area

Select:
1) Roof
2) Concrete/asphalt
3) Grouted unit pavers
4) Pervious concrete
5) Porous asphalt
6) Unit pavers in sand
7) Open/porous pavers
8) Crushed aggregate
9) Turfblock
10) Landscape

For impervious areas, select:
1) New
2) Replaced
3) Replaced in an Urban Sustainability Area

Select DMA connection for “Drains to SCM” and “Drains to Self-Retaining” DMA types:

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DMA Summary Area and Data Check

- Calculator summarizes DMA impervious and pervious area types

Calculator flags any values that differ from Project Information values by more than 2 percent

DMA Summary Area		
Total DMA area (ft2):	30000	
New impervious area (ft2):	21000	*Check DMA table areas against plan sheet areas*
Replaced impervious within a USA (ft2):	0	
Replaced impervious not in a USA (ft2):	3000	*Check DMA table areas against plan sheet areas*
Total pervious/landscape area (ft2):	6000	

Values are automatically computed from information entered in the DMA Characteristics table

SCM Characteristics Table

Add or remove SCMs here: not by manually inserting/deleting rows

3. SCM Characterization — Add SCM Row | Remove SCM Row

Name	SCM Type	Safety Factor	SCM Soil Type	Infilt. Rate (in/hr)	Area (ft2)	Flow Control Orifice?	Reservoir Depth (in)
SCM-1	Bioretention	1	HSG C/D	0.25	1000	No	
SCM-2	Bioretention	1	HSG C/D	0.25	1100	Yes	6

Provide descriptive name

Select:
1) Direct Infiltration
2) Bioretention

Safely factor is computed

Select:
1) HSG A/B
2) HSG C/D
3) Site-specific

Reads selection on the left:
A/B = 0.75 in/hr
C/D = 0.25 in/hr
Site-specific = user-provided

Enter SCM plan area

Enter flow control orifice and reservoir information

Notes:

- For Tier 2 projects:
  - *Bioretention* applies to "Tier 2 – Treatment" projects; SCM plan area equals 4 percent of tributary area
  - *Direct Infiltration* applies to "Tier 2 – Storage" projects; can be used to simulate bioretention + buried vault facilities; SCM volume computed by SBUH model → make sure to enter 85th percentile rain
- You will need to enter SCMs here before you can "connect" DMAs to them
- You can iteratively modify SCM characteristics to test design concepts and fine tune the design

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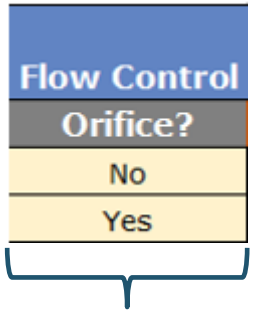
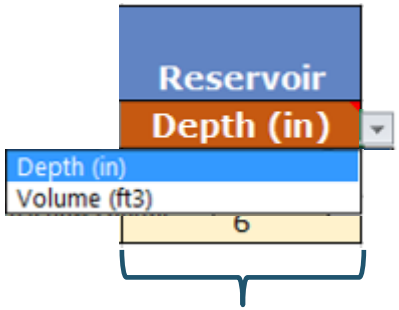
Effect of Flow Control Orifice

Background:

1. SCM designs with a flow control orifice can reduce the plan area and/or storage volume
2. The flow control orifice promotes efficient water storage by allowing water to accumulate in the bioretention soils and surface reservoir, which encourages more water to infiltrate into the soils surrounding the SCM
3. The SCM Sizing Calculator computes SCM volume using an SBUH model and then applies volume reductions that were developed using continuous simulation modeling



Select "Yes" or "No"
Only available for bioretention



Specify reservoir size in depth or volume (depth <= 12 inches)

Pros	Cons
Reduces SCM storage volume	Requires additional engineering design
Reduces SCM plan area	Additional cost for outlet structure
Standard design allows O&M	Need maintenance strategy/process
Bioretention orifices have record of reliability	

Design consideration:

- Volume reductions are most beneficial for large facilities in space-constrained areas
  - Additional complexity/cost of outlet structure may not pencil out for small facilities

Launching Calculations and Viewing Results

4. Run SBUH Model

Launch Model

Click here after you have entered/updated all DMAs and SCMs. Software runs SBUH model for each connected SCM.

5. SCM Minimum Sizing Requirements

SCM Name	Min. Required Storage Vol. (ft3)	Depth Below Underdrain (ft)	Drain Time (hours)	Orifice Diameter (in)
SCM-1	440	1.00	0.0	
SCM-2	849	1.93	30.9	0.25

Model results, minimum sizing is reported here.

Note: Drain Time = 0 means the bioretention is dry before the 24 storm has ended (exfiltration > inflow)

6. Self-Retaining Area Sizing Checks

Self-Retaining DMA Name	Self-Retaining DMA Area (ft2)	Tributary DMA Name(s)	Eff. Tributary DMA Area (ft2)	Effective Tributary / SRA Area Ratio
DMA - SRA#1	6000	DMA-2	10000	1.67

Self-Retaining Area tributary connections are reported here. If the Tributary Area Ratio > 2 the cells turns red.

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SBUH Model Worksheet

Yellow-shaded cells are copied from “Project Information” sheet

Blue-shaded cells contains results that are copied to the “Project Information” sheet

SCM-1

SBUH Parameters:

Design rainfall depth (in) =	2.00
Model time step (min) =	6

DMA Summary	Area (ft2)	CN	S	Weighting	Imp. Weighting
New impervious area:	0	98	0.20	1	1
Replaced impervious in USA:	0	98	0.20	0	1
Replaced impervious not USA:	3000	98	0.20	0.5	1
Landscape area:	0	68	4.71	1	0.11
Solid unit pavers set in sand:	0	89	1.24	1	0.58
Non-runoff generating area:	0	N/A	N/A	0	0
Weighted impervious (ft2) =	3000				
Travel path length (ft) =	0.0				
Time of concentration (min) =	5.0	*(rain/runoff)*		*(rain/runoff)*	*(rain/runoff)*
		89%		*10%*	*51%*

Runoff to SCM:

Total runoff (in) =	1.77
Total runoff (ft3) =	444

Runoff to SCM is summarized

SCM Parameters:

Plan area (ft2) =	1000
Sizing factor =	0.333
Design infiltration rate (in/hr) =	0.25
Safety factor =	1
SCM Exfiltration rate (cfs) =	0.0058
Drainage time (hours) =	0
Minimum storage volume (ft3) =	400
Gravel volume (ft3) =	1000
Gravel depth (ft) =	1.0

runoff %	*direct rain vol*	*% inflow that is exfiltrated*	*(max/total vol.)*
44%	*166.7*	*100%*	*30%*

SBUH Runoff Calculations

				Impervious		Landscape		Solid unit pavers set in sand			
Time (minutes)	Distribution (Type I)	Rainfall Depth (in)	Cumulative Rainfall (in)	Cumulative Runoff Depth (in)	Instantaneous Runoff (in)	Cumulative Runoff Depth (in)	Instantaneous Runoff (in)	Cumulative Runoff Depth (in)	Instantaneous Runoff (in)	Instantaneous Runoff Rate (cfs)	Routed Flow Rate (cfs)
0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	0.0017	0.0035	0.0035	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
12	0.0017	0.0035	0.0070	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
18	0.0017	0.0035	0.0104	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Bioretention Hydraulics

Stormwater Inflow (ft3)	Direct Rain (ft3)	Exfiltration Outflow (ft3)	Bioretention Water Volume (ft3)
0.0000	0.0000	0.0000	0.0000
0.0000	0.2900	-0.2900	0.0000
0.0000	0.2903	-0.2903	0.0000
0.0000	0.2903	-0.2903	0.0000

SBUH runoff and routing calculations. Equations are visible to the user

Bioretention hydraulic calculations

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SCS, SBUH Equations Worksheet

- Documents SCS rainfall distribution and hydrologic and hydraulic equations

SCS Type I Distribution (6-min)

Step	Minute	Cummulative Distribution	Incremental Distribution
0	0	0.0000	0.0000
1	6	0.0017	0.0017
2	12	0.0035	0.0017
3	18	0.0052	0.0017
4	24	0.0070	0.0017
5	30	0.0087	0.0017
6	36	0.0105	0.0017
7	42	0.0122	0.0017
8	48	0.0140	0.0017
9	54	0.0157	0.0017
10	60	0.0175	0.0018
11	66	0.0192	0.0018
12	72	0.0210	0.0018
13	78	0.0227	0.0018
14	84	0.0245	0.0018
15	90	0.0262	0.0018
16	96	0.0280	0.0018
17	102	0.0297	0.0018
18	108	0.0315	0.0018
19	114	0.0332	0.0018
20	120	0.0350	0.0018
21	126	0.0368	0.0018
22	132	0.0386	0.0018
23	138	0.0404	0.0018
24	144	0.0423	0.0019
25	150	0.0442	0.0019
26	156	0.0461	0.0019
27	162	0.0480	0.0019
28	168	0.0500	0.0020
29	174	0.0520	0.0020
30	180	0.0541	0.0020

Stormwater Runoff and Routing Equations:

Computing Runoff (SCS and SBUH are the same):

$$R = \frac{(P - I_a)^2}{P - I_a + S}$$

$$I_a = 0.2S$$

$$R = \frac{(P - 0.2S)^2}{P - 0.8S}$$

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

where:
R = runoff (in)
P = rainfall (in)
Ia = initial abstraction (in)
S = potential maximum soil moisture retention after runoff begins (in)
CN = runoff curve number

SBUH Runoff Routing:

$$I_t = \frac{R_t \times A}{dt} \times \frac{1}{12 \times 60}$$

$$Q_{t+1} = Q_t + w[I_t + I_{t+1} - 2Q_t]$$

$$w = \frac{dt}{(2T_c + dt)}$$

$$T_c = \frac{0.007(nL)^{0.8}}{(P_2)^{0.5} \times s^{0.4}}$$

where:
It = instantaneous hydrograph (cfs)
Rt = runoff for current time step (in)
A = contributing area (ft)
dt = calculation time step (min)

Qt = routed stormwater flow
w = routing function
Tc = time of concentration

n = Manning's roughness (0.011 for pavement)
L = flow lenth (ft; computed from tributary area)
P2 = 2-year, 24-hour rainfall (in)
s = 0.005 (ft/ft; assumed value)
Note: set minimum Tc = 5 minutes (Portland BES recommendation)

Lookups, Constants Worksheet

Lookup Tables for Combo Boxes			Hydraulic Constants	
DMA Type	**Code**		Gravel layer porosity:	0.4
Self-Treating	STA			
Self-Retaining	SRA			
Drains to SCM	2SCM			
Drains to Self-Retaining	2SRA			
SCM Type				
Bioretention				
Direct Infiltration				
DMA Surface Types	**Curve Number**	**Runoff Factor (WQ)**		
Roof	98	0.9		
Concrete or asphalt	98	0.9		
Grouted unit pavers	98	0.9		
Pervious concrete		0.0		
Porous asphalt		0.0		
Unit pavers set in sand	89	0.2		
Open/porous pavers		0.0		
Crushed aggregate		0.0		
Turfblock		0.0		
Landscape	68	0.1		
SCM Optimization				
Area				
Depth				
USA Lookup				
Yes				
No				
Compliance Approach				
WQ Treatment				
Runoff Retention				
Infiltration Rate				
HSG A/B				
HGS C/D				
Site-Specific				

Values include:

- Lists of types/values that populate the combo boxes
- Constants used by SBUH model equations

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Central Coast Region Stormwater Control Measure Sizing Calculator

Version: 8/4/2017

1. Project Information

Project name:	
Project location:	
Tier 2/Tier 3:	Tier 3 - Retention
Design rainfall depth (in):	
Total project area (ft2):	
Total DMA area (ft2):	0
Total new impervious area (ft2):	
Total replaced impervious within a USA (ft2):	
Total replaced impervious not in a USA (ft2):	
Total pervious/landscape area (ft2):	
Total SCM area (ft2):	

2. DMA Characterization

Name	DMA Type	Area (ft2)	Surface Type	New, Replaced?	Connection

DMA Summary Area	
Total assigned DMA area (ft2):	0
New impervious area (ft2):	0
Replaced impervious within a USA (ft2):	0
Replaced impervious not in a USA (ft2):	0
Total pervious/landscape area (ft2):	0

3. SCM Characterization

Name	SCM Type	Safety Factor	SCM Soil Type	Infilt. Rate (in/hr)	Area (ft2)	Flow Control Orifice?	Reservoir Depth (in)

4. Run SBUH Model

5. SCM Minimum Sizing Requirements

SCM Name	Min. Required Storage Vol. (ft3)	Depth Below Underdrain (ft)	Drain Time (hours)	Orifice Diameter (in)

6. Self-Retaining Area Sizing Checks

Self-Retaining DMA Name	Self-Retaining DMA Area (ft2)	Tributary DMA Name(s)	Eff. Tributary DMA Area (ft2)	Effective Tributary / SRA Area Ratio

City of Buellton Requirement

Operation and Maintenance Plans submitted to the City of Buellton must include the EPA Underground Injection Control (UIC) Registration # for each Class V Underground Injection Well approved under the Stormwater Control Plan for this project.

EPA UIC Registration #:

EXAMPLE

Stormwater Treatment Facilities Operation and Maintenance Plan

for a Commercial Project
123 Main Street
Anytown, USA

January 2017

XYZ Corporation
Jane Jones, 805-555-1212

This example prepared by Dan Cloak Environmental Consulting
for County of Santa Barbara Project Clean Water
to assist users of the *Stormwater Technical Guide*

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Stormwater Control Plan Exhibit

As-Built Drawings (in Final O&M Plan)

I. Introduction

I.A. Site Description

The site is flat and abuts Main Street, a major arterial. Total site area is 28,800 square feet, including:

- A 4,680 SF single-story retail building.
- About 15,000 SF paved area including walkways, a plaza, parking areas, and circulation. Circulation includes a drive-through lane for a coffee shop.

Soils are silty clays (Hydrologic Soil Group "D").

Stormwater treatment is provided by three bioretention facilities designed to capture and retain runoff from the first 1.5 inches of rain. During larger storms and high-intensity events, the bioretention facility surface reservoir overflows. Treated runoff and untreated overflow is discharged via drop inlet into the public storm drain system on Main Street.

II. Designation of Responsible Individuals (to be completed in Final O&M Plan)

II.A. Designated Contact for Operation and Maintenance

[name, title or position]
[address]
[telephone and email]

II.B. Off-Hours or Emergency Contact

[name, title or position]
[address]
[telephone and email]

II.C. Corporate Officer (authorized to execute agreements with the City, Town, or County)

[name, title or position]
[address]
[telephone and email]

II.D. Initial Training of Responsible Individuals

Following completion of construction, the bioretention facilities will be maintained by the contractor for two years, except for routine policing for trash, which will be done by the owner's and lessee's personnel. During this 2-year period, the owner's landscape maintenance crew will coordinate to meet with the contractor's personnel on-site during maintenance. At these times, the contractor's personnel will demonstrate proper maintenance procedures.

III. Facilities to be Maintained

III.A. Facility Descriptions

There are three bioretention facilities on-site. All have the following features:

- Surrounded by a concrete curb. Where adjacent to pavement, curbs are thickened and an impermeable vertical cutoff wall protects the pavement subgrade from moisture intrusion.

- Each layer built flat and level. See Figure 1.
- Class 2 permeable, Caltrans specification 68-2.02F(3). Depths are as shown in the as-built drawings.
- 18 inches mixture of washed sand (60-70%) and compost (30-40%)
- 4 in. dia. PVC SDR 35 perforated pipe underdrain, installed with the invert at the top of the Class 2 permeable layer with holes facing down, and connected to the overflow structure at that same elevation
- 6-inch-deep reservoir between top of soil elevation and overflow grate elevation
- Concrete drop inlet with frame overflow structure, with grate set to specified elevation, connected to storm drain in Main Street
- Plantings including *Carex globosa, Eleocharis macrostachya, Muhlenbergia rigens*
- Irrigation system with drip emitters and "smart" irrigation controllers
- Sign identifying the facility as a stormwater treatment facility.

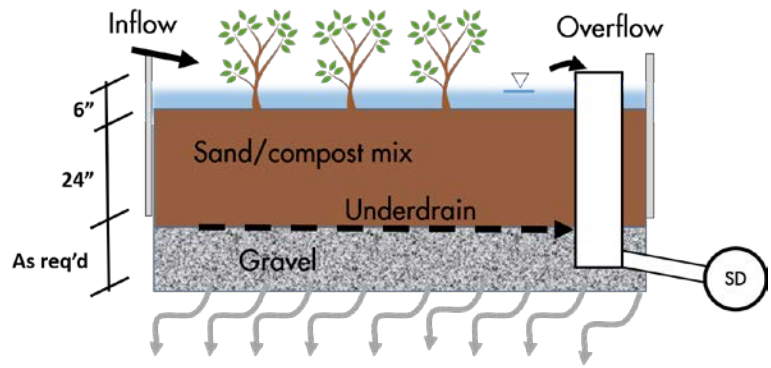


Figure 1. Bioretention Cross-Section (schematic)

III.A.1. Bioretention Facility #1

See the attached Stormwater Control Plan Exhibit. Bioretention Facility #1 receives drainage from Drainage Management Area (DMA) 1, which includes the roof of the refuse area and the delineated portion of the parking lot, totaling 2,805 SF of impervious surface. Inflow is via curb cuts that accept sheet flow from the pavement. The facility underdrain is connected to the overflow structure [specify in final O&M Plan], which is connected via a [specify pipe] to the City's storm drain system at a drop inlet in front of the site.

III.A.2. Bioretention Facility #2

See the attached Stormwater Control Plan Exhibit. Bioretention Facility #2 receives drainage from DMA-2, comprising the walkway on the north side of the building and the delineated portion of the parking lot, totaling 6,130 SF of impervious surface. Inflow is via curb cuts that accept sheet flow from the pavement. The facility underdrain is connected to the overflow structure [specify in final O&M Plan], which is connected via a [specify pipe] to the City's storm drain system at a drop inlet in front of the site.

III.A.3. Bioretention Facility #3

See the attached Stormwater Control Plan Exhibit. Bioretention Facility #3 receives drainage from DMA-3, comprising the roof of the building, the walkway on the south side of the building, and the plaza on the street side. The roof drainage is piped via a tight-lined downspout on the south side of the building that goes under the drive-through aisle and "bubbles up" within the bioretention facility. DMA-8 also includes the driveway and drive-through lane to the south and west of the building, and

the parking area on the west side of the site, north side of the building and the delineated portion of the parking lot, totaling 6,369 SF of impervious surface. Inflow from the paved areas is via curb cuts that accept sheet flow from the pavement. These are labeled on the Stormwater Control Plan Exhibit. The facility underdrain is connected to the overflow structure [specify in final O&M Plan], which is connected via a [specify pipe] to the City's storm drain system at a drop inlet in front of the site.

IV. Maintenance Activities

IV.A. General Maintenance Rules

At no time will synthetic pesticides or fertilizers be applied, nor will any soil amendments, other than aged compost mulch or sand/compost mix, be introduced. The top of soil surface will be maintained at or near the design elevation throughout. Irrigation systems will be maintained to conserve water while maintaining plant health.

Although it is unlikely to be needed, if plants are not thriving compost tea may be applied at a recommended rate of 5 gallons mixed with 15 gallons of water per acre, up to once per year between March and June. Compost tea will not be applied when temperatures are below 50°F or above 90°F or when rain is forecast within the next 48 hours.

The following may be applied for pest control if needed:

- Beneficial nematodes
- Safer® products
- Neem oil

Plants may need to be replaced with the following mix as specified by the landscape architect [list species] or with similar plantings appropriate for the unique conditions.

IV.B. Maintenance Schedule

The three bioretention facilities will be maintained on the following schedule at a minimum.

IV.B.1. Routine Activities

The facilities should be examined daily for visible trash, and trash will be removed. Any graffiti, vandalism, or other damage will be noted and addressed within 48 hours.

The planted areas will be weeded by hand approximately monthly. At this time plants will be inspected for health and the irrigation system will be turned on manually and checked for any leaks or broken lines, misdirected spray patterns etc. Any dead plants will be replaced.

IV.B.2. Following Significant Rain Events

A significant rain event will be considered to be one that produces approximately a half-inch or more rainfall in a 24-hour period. Within 24 hours after each such event, the following will be conducted:

The surface of the facility will be observed to confirm there is no ponding.

- Inlets will be inspected, and any accumulations of trash or debris will be removed. Any erosion at inlets should be restored to grade.
- The surface of the mulch layer will be inspected for movement of material. Mulch will be replaced and raked smooth if needed.

- Outlet structure will be inspected for any obstructions to assure that mulch is not washed out.

IV.B.3. Prior to the Start of the Rainy Season

In September or each year, facility inlets and outlets will be inspected to confirm there is no accumulation of debris that would block flow. Stormwater should drain freely into the bioretention facilities. If not previously addressed during monthly maintenance, any growth and spread of plantings that blocks inlets or the movement of runoff across the surface of the facility will be cut back or removed.

If the facilities are not completely drained in 24 hours, the underdrain may be clogged. Check the overflow outlet to determine if the underdrain is performing properly. There should be no filter fabri or geotextile in the horizontal layers or wrapped at the underdrain. If the underdrain is working, the bioretention media may contain fines. Replace material with mixture of 30-40% aged compost and 60-70% washed granular sand, no fines.

IV.B.4. Annually During Winter

Once, in December – February of each year, vegetation will be cut back as needed, debris removed, and plants and mulch replaced as needed. The concrete work will be inspected for damage. The elevation of the top of soil and mulch layer will be confirmed to be consistent with the 6-inch reservoir depth.

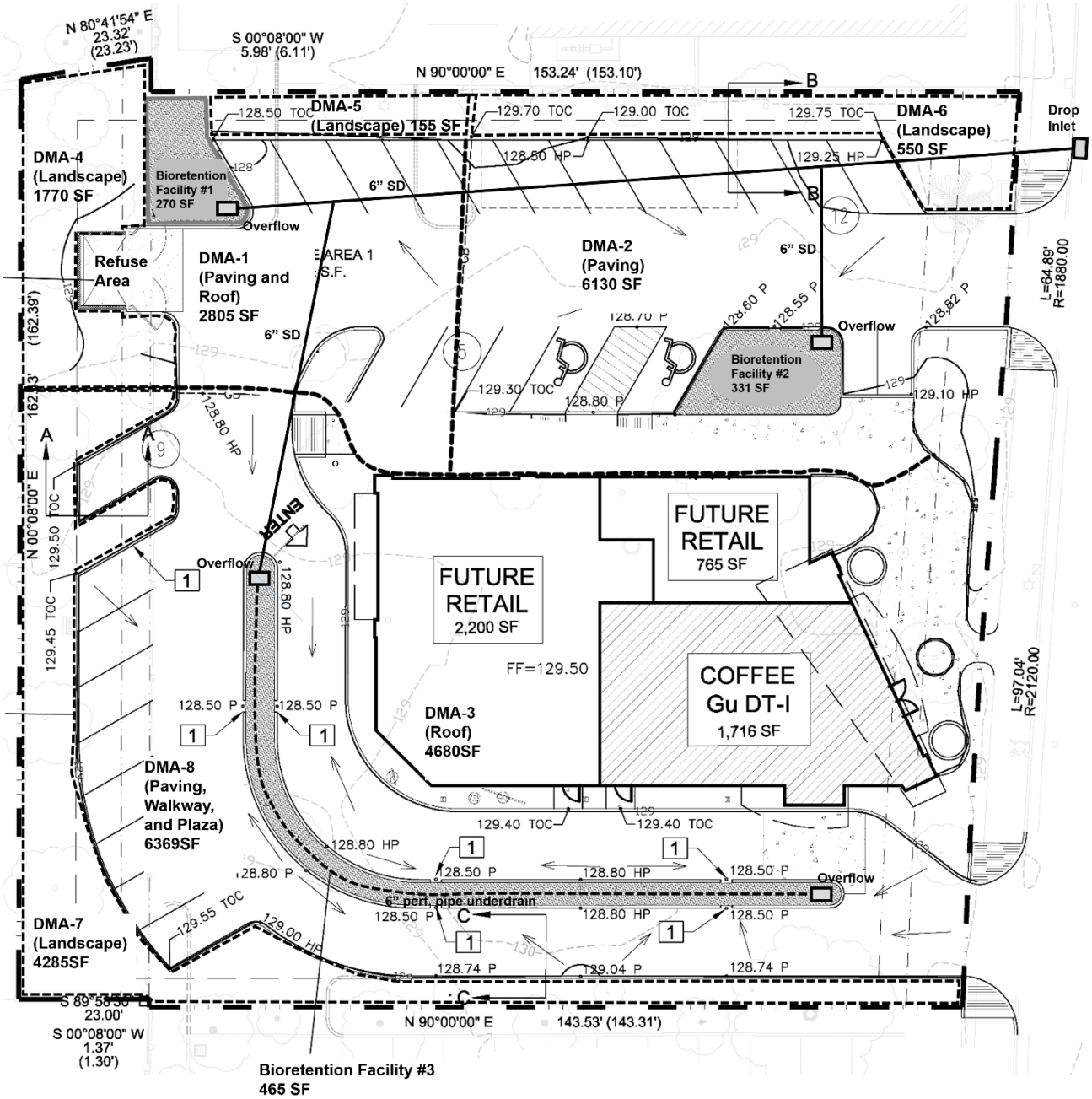
Stormwater Control Plan Exhibit

Example Commercial Site

123 Main Street

Anytown, USA

No Scale



City of Buellton Requirement

Operation and Maintenance Plans submitted to the City of Buellton must include the EPA Underground Injection Control (UIC) Registration # for each Class V Underground Injection Well approved under the Stormwater Control Plan for this project.

EPA UIC Registration #:

EXAMPLE

DRAFT

Stormwater Treatment Facilities Operation and Maintenance Plan

for a Residential Subdivision Project Whispering Pines Lane Anytown, USA

30 September 2015

XYZ Corporation
Jane Jones, 805-555-1212

This example prepared by Dan Cloak Environmental Consulting for County of Santa Barbara Project Clean Water to assist users of the *Stormwater Technical Guide*

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Stormwater Control Plan

Stormwater Control Plan Exhibit

As-Built Drawings (in Final O&M Plan)

I. Introduction

I.A. Site Description

The site is flat and abuts Arterial Street. Total site area is 3 acres, including nine single-family residences and a connecting street with sidewalks.

Soils are silty sands (Hydrologic Soil Group "B").

Stormwater treatment is provided by two bioretention facilities.

II. Designation of Responsible Individuals

The two bioretention facilities will each be located on a jointly owned parcel, with easy access to the public street. Owners of parcels 1, 2, 3, and 4 will jointly own the parcel on which Bioretention Facility 1 is located, and will be jointly responsible for the maintenance of that facility, subject to provisions in the subdivision map and Conditions, Covenants, and Restrictions (CC&Rs) recorded against the subdivision. Similarly, owners of parcels 5, 6, 7, 8, and 9 will jointly own the parcel on which Bioretention Facility 2 is located, and will be jointly responsible for the maintenance of that facility.

XYZ Corporation will be responsible for maintenance of the facilities until all nine properties have been transferred to new owners, the new owners have engaged licensed landscape contractors to maintain each of the facilities, and the owners of each of the facilities have selected one owner to be the designated contact for that facility. The owners of parcels 1, 2, 3, and 4 will engage a licensed landscape contractor to maintain Bioretention Facility 1 and the owners of parcels 5, 6, 7, 8, and 9 will engage a licensed contractor to maintain Bioretention Facility 2.

II.A. Designated Contacts for Operation and Maintenance

II.A.1. Bioretention Facility 1

[name, title or position]
[address]
[telephone and email]

II.A.2. Bioretention Facility 2

[name, title or position]
[address]
[telephone and email]

II.B. Off-Hours or Emergency Contact(s)

This is expected to be the contractor(s) selected by the owners of the individual lots.

II.B.1. Bioretention Facility 1

[name, title or position]
[address]
[telephone and email]

II.B.2. Bioretention Facility 2

[name, title or position]
[address]
[telephone and email]

II.C. Initial Training of Responsible Individuals

Following completion of construction, the bioretention facilities will be maintained by XYZ Corporation's contractor for two years. During this time, XYZ Corporation's contractor will provide written guidelines and conduct at least two on-site training sessions attended by the new owners' contractor(s).

III. Facilities to be Maintained

III.A. Facility Descriptions

There are two bioretention facilities on-site. Each has the following features:

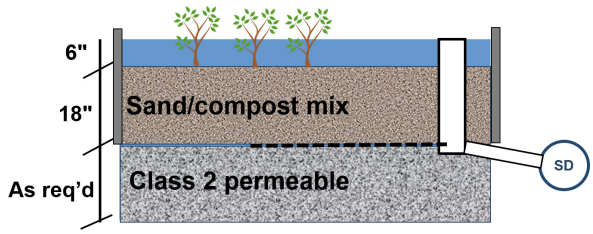


Figure 1. Bioretention Cross-Section (schematic)

- Surrounded by a concrete curb. Where adjacent to pavement, curbs are thickened and an impermeable vertical cutoff wall protects the pavement subgrade from moisture intrusion.
- Each layer built flat and level. See Figure 1.
- Class 2 permeable, Caltrans specification 68-2.02F(3); depth as shown in as-built drawings
- 18 inches sand/compost mix
- 4 in. dia. PVC SDR 35 perforated pipe underdrain, installed with the invert at the top of the Class 2 permeable layer with holes facing down, and connected to the overflow structure at that same elevation
- 6-inch-deep reservoir between top of soil elevation and overflow grate elevation
- Concrete drop inlet with frame overflow structure, with grate set to specified elevation, connected to storm drain in Main Street
- Plantings
- Irrigation system with drip emitters and "smart" irrigation controllers
- Sign identifying the facility as a stormwater treatment facility.

III.A.1. Bioretention Facility #1

See the attached Stormwater Control Plan Exhibit. Bioretention Facility #1 receives drainage from the front portion of the roofs, and from the driveways, of Lots 1, 2, 3, and 4. It also receives drainage from the portion of the Whispering Pines Lane fronting these properties, from the crown to curb. Runoff collects in the curb and drains to an inlet and duct beneath the sidewalk, which conveys flows

to the facility. The facility overflow and underdrain is connected via a [specify pipe] to the City's storm drain system at a drop inlet near the corner of the site.

III.A.2. Bioretention Facility #2

See the attached Stormwater Control Plan Exhibit. Bioretention Facility #1 receives drainage from the front portion of the roofs, and from the driveways, of Lots 5, 6, 7, 8, and 9. It also receives drainage from the portion of the Whispering Pines Lane fronting these properties, from the crown to curb. Runoff collects in the curb and drains to an inlet and duct beneath the sidewalk, which conveys flows to the facility. The facility overflow and underdrain is connected via a [specify pipe] to the City's storm drain system at a drop inlet near the corner of the site.

III.B. Facility Construction Details

[To be added following construction]

[Attach As-Built Drawings to Final O&M Plan]

IV. Maintenance Activities

IV.A. General Maintenance Rules

At no time will synthetic pesticides or fertilizers be applied, nor will any soil amendments, other than aged compost mulch or sand/compost mix, be introduced. The top of soil surface will be maintained at or near the design elevation throughout. Irrigation systems will be maintained to conserve water while maintaining plant health.

Although it is unlikely to be needed, if plants are not thriving compost tea may be applied at a recommended rate of 5 gallons mixed with 15 gallons of water per acre, up to once per year between March and June. Compost tea will not be applied when temperatures are below 50°F or above 90°F or when rain is forecast within the next 48 hours.

The following may be applied for pest control if needed:

- Beneficial nematodes
- Safer® products
- Neem oil

IV.B. Maintenance Schedule

The three bioretention facilities will be maintained on the following schedule at a minimum.

IV.B.1. Routine Activities

The facilities will be examined daily for visible trash during regular policing of the site, and trash will be removed. Any graffiti, vandalism, or other damage will be noted and addressed within 48 hours.

The planted areas will be weeded by hand approximately monthly. At this time plants will be inspected for health and the irrigation system will be turned on manually and checked for any leaks or broken lines, misdirected spray patterns etc. Any dead plants will be replaced.

IV.B.2. Following Significant Rain Events

A significant rain event will be considered to be one that produces approximately a half-inch or more rainfall in a 24-hour period. Within 24 hours after each such event, the following will be conducted:

The surface of the facility will be observed to confirm there is no ponding.

- Inlets will be inspected, and any accumulations of trash or debris will be removed.
- The surface of the mulch layer will be inspected for movement of material. Mulch will be replaced and raked smooth if needed.

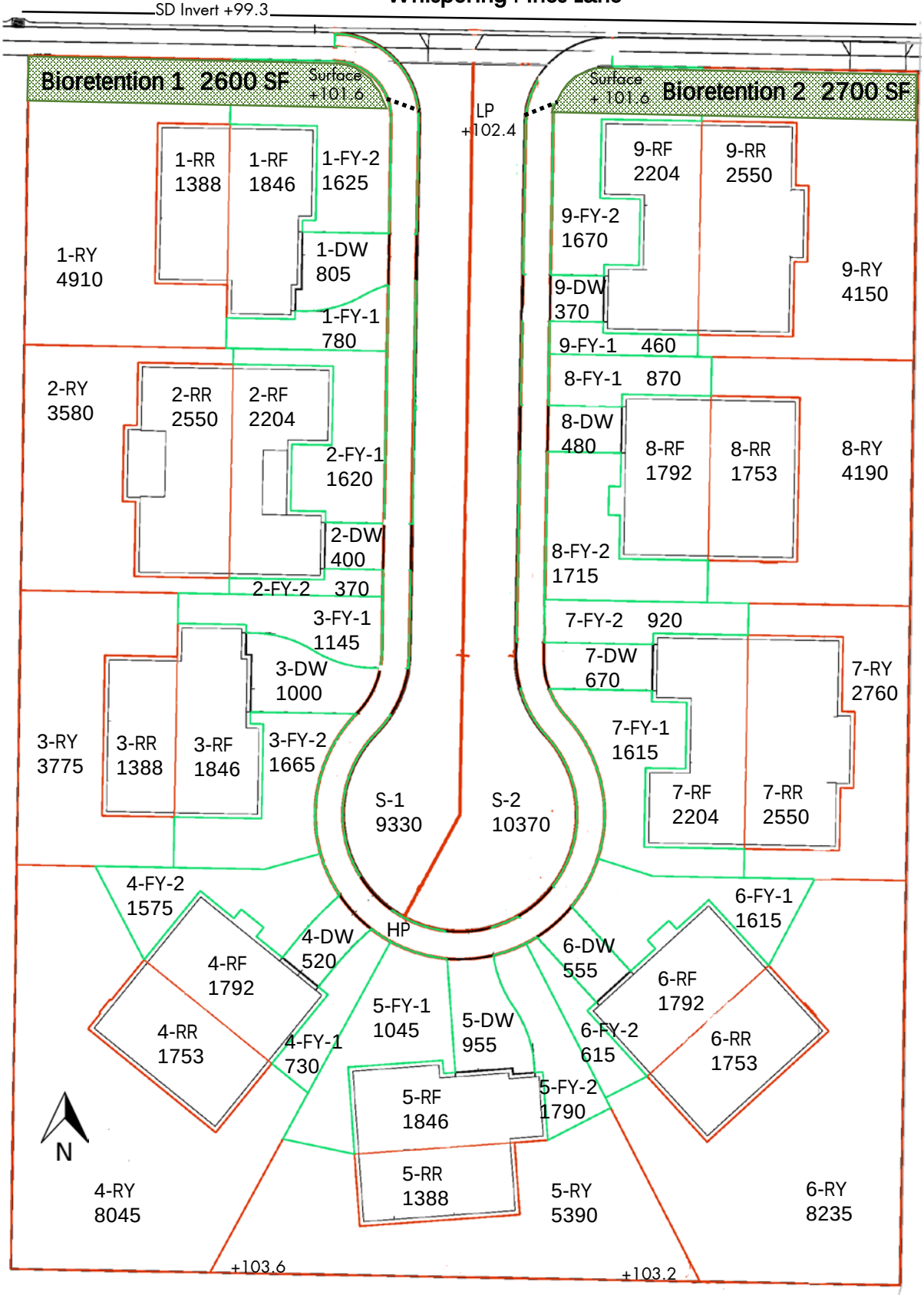
IV.B.3. Prior to the Start of the Rainy Season

In September or each year, facility inlets and outlets will be inspected to confirm there is no accumulation of debris that would block flow. If not previously addressed during monthly maintenance, any growth and spread of plantings that blocks inlets or the movement of runoff across the surface of the facility will be cut back or removed.

IV.B.4. Annually During Winter

Once, in December – February of each year, vegetation will be cut back as needed, debris removed, and plants and mulch replaced as needed. The concrete work will be inspected for damage. The elevation of the top of soil and mulch layer will be confirmed to be consistent with the design elevation and with the design 6-inch reservoir depth.

Stormwater Control Plan Exhibit
Whispering Pines Lane



EXAMPLE RESIDENTIAL SUBDIVISION EXHIBIT SEPTEMBER 24, 2015

Stormwater Control Measure (SCM) Inspection and Maintenance Log

Facility Name
Address
Responsible Individual

Date	SCM ID#	SCM Description	Inspected by:	Cause for Inspection	Exceptions Noted	Comments and Actions Taken

Instructions: Record all inspections and maintenance for all treatment BMPs on this form. Use additional log sheets and/or attach extended comments or documentation as necessary. Submit a copy of the completed log with the annual independent inspectors' report to the municipality, and start a new log at that time.

- SCM ID# — Use ID# from the Stormwater Control Plan and Calculator.
- Inspected by — Note all inspections and maintenance on this form, including the required independent annual inspection.
- Cause for inspection — Note if the inspection is routine, pre-rainy-season, post-storm, annual, or in response to a noted problem or complaint.
- Exceptions noted — Note any condition that requires correction or indicates a need for maintenance.
- Comments and actions taken — Describe any maintenance done and need for follow-up.

CITY OF BUELLTON
PUBLIC WORKS DEPARTMENT
STORMWATER CONTROL PLAN
ENGINEER'S CERTIFICATION OF APPROVAL

SUBMIT COMPLETED FORM TO: CITY OF BUELLTON'S PUBLIC WORKS DEPARTMENT PRIOR TO OCCUPANCY CLEARANCE REQUEST

Project Name: _____ Project #: _____

Project Address: _____

Assessor's Parcel #: _____

I, the undersigned California Registered Civil Engineer, hereby certify that I or my authorized agent have inspected the permanent/structural Stormwater Control Measures (i.e. bioretention, basins, landscapes, grading and drainage contours, storm drain conveyance systems, inlet and overflow elevations, junctions, swales, etc.) required for the approval of the above referenced Project consistent with the approved Stormwater Control Plan, and that such controls were constructed and are now sufficiently stabilized in substantial conformance with the approved Grading and/or Improvement Plans. Any revisions made during construction to the originally- approved plans were reviewed and approved by City staff and are shown on the attached As-Builts, submitted as part of the Conditions of Approval.

_____ _____
Date Signature of Registered Civil Engineer

_____
Print Name of Registered Civil Engineer & License #

_____
Firm/Company Name

_____
Firm/Company Address

_____
Registered Civil Engineer's Stamp

STORMWATER MANAGEMENT PROGRAM'S
POST CONSTRUCTION REQUIREMENT (PCR)
FIELD VERIFICATION LOG

COMPLETE THE FOLLOWING SECTIONS AND SUBMIT TO: CITY OF BUELLTON'S PUBLIC WORKS DEPARTMENT PRIOR TO OCCUPANCY CLEARANCE REQUEST

Project Name, Project Address, SCM ID, SCM Surface Type and SCM Description

GENERAL INFORMATION:						
Project Name:			**Project Address:**		**Photographs:** (Check ☑ Yes or No)	☐ Yes ☐ No
Inspection Date:		**Inspection Time** (Military)**:**		**Inspector: (Check ☑ as appropriate)**	☐ City Staff ☐ Authorized Contract Staff ☐ Authorized Enforcement Agency	
Inspector Name:				**Inspector Title:**		

SCM ID	**SCM Surface Type**	**SCM Installed** (Check ☑ Yes or No)	**SCM Description**	**Comments**
		☐ Yes ☐ No		
		☐ Yes ☐ No		
		☐ Yes ☐ No		
		☐ Yes ☐ No		
		☐ Yes ☐ No		
		☐ Yes ☐ No		
		☐ Yes ☐ No		
		☐ Yes ☐ No		
		☐ Yes ☐ No		
		☐ Yes ☐ No		
		☐ Yes ☐ No		
		☐ Yes ☐ No		
		☐ Yes ☐ No		
		☐ Yes ☐ No		
		☐ Yes ☐ No		

Notes:

RECORDED AT THE REQUEST OF AND WHEN RECORDED MAIL TO: Public Works City of Buellton PO Box 1819 Buellton, CA 93427 *Recorded for the benefit of City of Buellton.* *No fee required (Government Code §27383)*	

DRAINAGE AND MAINTENANCE AGREEMENT
FOR PROJECT NO. Click here to enter Project No.

OWNER: Click here to enter Owner's Name

PROPERTY ADDRESS: Click here to enter Property Address

THIS AGREEMENT is made and entered into this Click here to enter Day of Click here to enter Month and Year by and between Click here to enter Name of Property Owner, Property Owner ("Owner") and the City of Buellton, a general law city and municipal corporation ("CITY"). The Parties agree as follows:

1. RECITALS. This Agreement is entered into with reference to the following:

A. Owner owns real property ("Property") in CITY's jurisdiction, more specifically described in attached Exhibit "A" and shown on the vicinity map in Exhibit "B", each of which is incorporated by this reference.

B. On Click here to enter Day, of Click here to enter Month and Year the Owner received conditions of approval for Click here to enter Developer's/Contractor's Name to construct Click here to enter item to be constructed on the Property located at Click here to enter Property Address. CITY required the project to employ on-site control measures to minimize pollutants in urban runoff.

C. Owner installed the following device(s) Click here to enter Name of each Structural Control Measure(s) (collectively, "Devices") as the on-site control measure(s) to minimize pollutants in urban runoff as shown in the attached Exhibit "C", which is incorporated by this reference, and on the Stormwater Control Plan for Click here to enter Name of Project.

D. The Devices are installed in accordance with approved plans and specifications shown on Grading/Drainage Improvement Plans on file with City Engineer, and incorporated by this reference.

E. The Devices are installed on private property and drain only onto private property, and is/are a private facility. All maintenance or replacement of the Devices is the sole responsibility of Owner in accordance with the terms of this Agreement.

F. Owner is aware that periodic and continuous maintenance, including, without limitation, filter material replacement and sediment removal, is required to ensure peak performance of the Devices, and that such maintenance activity will require compliance with all local, state, or federal laws and regulations, including those pertaining to confined space and waste disposal methods in effect at the time such maintenance occurs.

G. CITY believes that it is in the public interest to enter into this Agreement.

2. INSPECTION AND DOCUMENTATION. Owner will use its best efforts to diligently maintain said Devices in a manner assuring peak performance at all times. Refer to the Stormwater Control Plan for further maintenance instructions and the attached Exhibit "C." All reasonable precautions will be exercised by Owner and Owner's representative or contractor in the removal and extraction of materials(s) from the Devices and the ultimate disposal of the material(s) in a manner consistent with all relevant laws and regulations in effect at the time. In October of each year, Owner will provide CITY with documentation identifying the date of inspection, type and quantity of material(s) removed and disposal destination, and other maintenance performed. These activities shall be performed no later than September, prior to the rain season. Owner will pay all costs associated with the repair, replacement, and restoration of said Devices. If Owner fails to provide CITY with documentation identifying the date of inspection, type and quantity of material(s) removed and disposal destination, and other maintenance performed, as authorized by Buellton Municipal Code section 15.01.190, CITY and its authorized agents and employees may enter the Property to perform the inspection upon 24 hours' notice to Owner, and take whatever steps CITY deems necessary to ensure compliance with the NPDES permit and this Agreement.

3. CITY'S RIGHT OF ENTRY. Should CITY determine, in its sole discretion, that the Owner has not performed its maintenance obligations, or in the event of an emergency threatening the safety of public facilities, the CITY may, but is not required to, enter the Property and perform maintenance and repairs upon said Devices at property Owner's expense upon ten (10) calendar days notification to the property owner except in the event of an emergency, in which case CITY may enter without notice. Owner shall reimburse CITY for any costs incurred by CITY within thirty (30) days of receipt of the CITY's demand. If the costs are not paid within the prescribed period, CITY may assess the Owner for the costs and any applicable penalties using the procedure described in Buellton Municipal Code sections 8.04.110-8.04.120. These actions are in addition to, and not in lieu of, any and all legal remedies available to CITY.

4. COVENANT RUNNING WITH THE LAND. This Agreement shall run in perpetuity as a covenant running with the land pursuant to California Civil Code Section 1468, and is binding upon and inures to the benefit of the Owner, its heirs, successors, assigns, executors and administrators. It is the intent of CITY and Owner that this Agreement is recorded and shall be binding upon all persons purchasing or otherwise acquiring any lot, unit or portion of the Property.

5. INDEMNIFICATION.

A. Owner indemnifies and holds CITY harmless from and against any claim, action, damages, costs (including, without limitation, attorney's fees), injuries, or liability,

arising out of this Agreement, or its performance. Should CITY be named in any suit, or should any claim be brought against it by suit or otherwise, whether the same be groundless or not, arising out of this Agreement, or its performance, Owner will defend CITY (at CITY'S request and with counsel satisfactory to CITY) and will indemnify CITY for any judgment rendered against it or any sums paid out in settlement or otherwise.

B. For purposes of this section "CITY" includes CITY's officers, officials, employees, agents, representatives, and certified volunteers.

C. It is expressly understood and agreed that the foregoing provisions will survive termination of this Agreement.

6. NOTICES. Any notice to a party required or called for in this Agreement will be served in person, or by deposit in the U.S. Mail, first-class postage prepaid, to the address set forth below. Notice will be deemed effective upon receipt, or 72 hours after deposit in the U.S. Mail, whichever is earlier. A party may change a notice address only by providing written notice to the other party.

IF TO CITY: IF TO OWNER:

City of Buellton	Click here to enter Owner Name
Attn: Public Works Director	Click here to enter Street Address
PO Box 1819	Click here to enter City, State & Zip Code
Buellton, CA 93427	

7. ENFORCEMENT. If CITY finds it necessary to enforce the terms of this Agreement by administrative or legal action, Owner agrees to pay all costs associated with such enforcement including, without limitation, reasonable attorney's fees.

8. COMPLIANCE WITH LAW. Owner will comply with all laws concerning the Property and its maintenance of the Property, including, without limitation, the obligation at Owner's cost to alter, maintain, or restore the common areas of the Property and said Devices installed therein, in compliance and conformity with all laws relating to the condition, use, or occupancy of the Property during the term. Owner will also comply with all applicable laws concerning the Property when constructing or remodeling such common areas.

9. CONSTRUCTION. The language of each part of this Agreement will be construed simply and according to its fair meaning, and this Agreement will never be construed either for or against either party.

10. SEVERABLE. If any portion of this Agreement is declared by a court of competent jurisdiction to be invalid or unenforceable, then such portion will be deemed modified to the extent necessary in the opinion of the court to render such portion enforceable and, as so modified, such portion and the balance of this Agreement will continue in full force and effect.

11. CAPTIONS. The captions of the paragraphs of this Agreement are for convenience of reference only and will not affect the interpretation of this Agreement.

12. WAIVER. Waiver of any provision of this Agreement will not be deemed to constitute a waiver of any other provision, nor will such waiver constitute a continuing waiver.

13. GOVERNING LAW. This Agreement has been made in and will be construed in accordance with the laws of the State of California and exclusive venue for any action involving this Agreement will be in Santa Barbara County.

14. AUTHORITY/MODIFICATION. This Agreement is not binding upon CITY until executed by the CITY'S City Manager. The Parties represent and warrant that all necessary action has been taken by the Parties to authorize the undersigned to execute this Agreement and to engage in the actions described herein. This Agreement may be modified by written agreement. CITY's City Manager may execute any such amendment on behalf of CITY.

15. ENTIRE AGREEMENT. This Agreement constitutes the sole agreement between Owner and CITY respecting the maintenance of the Property's common areas and Devices installed therein, and correctly sets forth the obligations of Owner and CITY. There are no other understandings, terms or other agreements expressed or implied, oral or written.

16. SECURITY. CITY may require Owner to post security in form and for a time period satisfactory to CITY to guarantee the performance of this Agreement. Should Owner fail to perform the obligations under this Agreement, CITY may, in the case of a cash bond, act for Owner using the proceeds from it, or in the case of a surety bond, require the surety to perform the obligations of the Agreement. As an additional remedy, Director may cause the withdrawal of any previous stormwater related approval with respect to the property on which said Devices have been installed, until such time as Owner repays to CITY its reasonable costs.

17. RECORDATION. This Agreement will be recorded in the Santa Barbara County Recorder's Office at Owner's expense and will constitute notice to all successors and assigns of title to the Property of Owner's obligations, and also a lien in such amount as will fully reimburse CITY, including interest, subject to foreclosure in event of default in payment.

18. TIME IS OF ESSENCE. Time is of essence in the performance of this Agreement.

22. SUCCESSORS. This Agreement is binding upon the heirs, successors, executors, administrators and assigns of the Parties. The term "Owner" includes not only the present Owner, but also its heirs, successors, executors, administrators, and assigns. Owner will notify any successor to title of all or part of the Property about the existence of this Agreement. Owner will provide such notice before such successor obtaining an interest in all or part of the Property. Owner will provide a copy of such notice to CITY at the same time such notice is provided to the successor.

IN WITNESS THEREOF, the parties hereto affixed their signatures as of the date first hereinabove written.

CITY OF BUELLTON:
A general law city and municipal corporation By:

Click here to enter City Manager Name
City Manager

City Manager (Signature)

ATTEST:

Click here to enter City Clerk Name

City Clerk

City Clerk (Signature)

APPROVED AS TO FORM:

By:

Click here to enter City Attorney Name

City Attorney

City Attorney (Signature)

ACKNOWLEDGMENT

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

STATE OF CALIFORNIA }
}
COUNTY OF_____ }

On _____ before me, _____, a Notary Public, personally appeared _____, who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature _____ **(Seal)**

EXHIBIT A

LEGAL DESCRIPTION OF PROPERTY

EXHIBIT B

VICINITY MAP

EXHIBIT C

STORMWATER OPERATION AND MAINTENANCE PLAN

City of Buellton

December 21, 2018

Notice: Construction Site Stormwater Compliance Inspections for Project Applicants/Developers

Background

In accordance to the Phase II Municipal Separate Storm Sewer Systems (MS4) General Permit, the City of Buellton (City) is required to develop and implement and enforce a program to prevent construction site discharges of pollutants and impacts on beneficial uses of receiving water. The City's program includes the development of an enforceable construction site storm water runoff control ordinance for all projects that disturb less than one acre of soil. The construction site storm water runoff control ordinance includes requirements for erosion and sediment controls, soil stabilization, dewatering, source controls, pollution prevention measures and prohibited discharges. Projects that disturb one acre or more of soil or disturb less than one acre but are part of a larger common plan or development or sale are subject to the Construction General Permit (CGP) in addition to the construction site storm water runoff control ordinance.

Buellton's Stormwater Quality Management and Discharge Control Ordinance (Ordinance) was developed to meet these requirements. This Ordinance along with the City's Stormwater Program Management Certification Statement provides full legal authority to implement and enforce each of these stormwater management requirements which include inspection, surveillance and monitoring activities necessary to ensure compliance with the Ordinance. The City has also developed and implemented an Enforcement Response Plan that provides guidance to City Staff when enforcing under the Ordinance.

City Inspections

The City, its staff, authorized contract staff or other designee (authorized enforcement agency) are authorized under Section 15.01.210-Access to Facilities to enter and inspect facilities to determine compliance with the Ordinance. In addition, Section 15.01.100-Discharges in violation of industrial or construction activity NPDES stormwater discharge permit allows for the City to obtain proof of compliance with the CGP upon inspection of a facility.

The City will be conducting the following type of Construction Site Stormwater Compliance Inspections to meet the requirements of the Phase II MS4 General Permit, Section E.10.c Construction Site Inspection and Enforcement and the City's Stormwater Management Program's Guidance Document at the specified inspection intervals below to access compliance with the Ordinance.

Inspection Type:

1) Prior to Land Disturbances - To ensure all necessary sediment controls are in place prior to land disturbance.
2) During Active Construction - To ensure all Temporary Erosion and Sediment Control Best Management Practices (BMPs), Temporary BMPs (including Run-on and Run-off Control, Good Site Management and Non-Stormwater Management) are installed, maintained and effective for verification that pollutants of concern are not discharge into the receiving water body.
3) Following Active Construction -To ensure that all disturbed areas are stabilized and all Temporary Erosion and Sediment Control BMPs and Temporary BMPs that are no longer needed have been removed; and Permanent Structural Control Measures (if applicable) are installed and maintained accordingly.

Inspection Interval:

- Pre-Land Disturbance (during rainy season)
- Active Construction (at minimum monthly)
- Following Active Construction

Inspection:
The City does not typically provide advance notice to Project Applicants and/or Developers prior to arriving on site to conduct construction site storm water compliance inspections. Upon arrival to the project site, City staff will attempt to contact the Developer staff (Site Superintendent/Representative) prior to beginning the inspection. If Site Superintendent is available, City staff will inquiry about any site changes to BMPs, site conditions and/or safety concerns prior to inspection. If Site Superintendent/Representative is not available, City staff will attempt to make verbal notification via mobile phone prior to proceeding with inspection.

Inspection Findings:

- Projects -Less than one acre of soil disturbance - The findings from the Construction Site Stormwater Compliance Inspection which require Corrective/Abatement Actions and/or Violations will be summarized verbally to the Site Superintendent/Representative if someone is available onsite and sent via electronic transmission with photo documentation to the Property Owner and Site Superintendent for resolution. If Site Superintendent/Representative is not available City staff attempt to make verbal notification via mobile phone to discuss the inspection findings prior to sending the electronic transmission with photo documentation to the property owner and Site Superintendent.

- Projects-Disturb one acre or more of soil or disturb less than one acre but are part of a larger common plan or development or sale - For projects subject to the CGP, the findings from the Construction Site Stormwater Compliance Inspection which require Corrective/Abatement Actions and/or Violations will be summarized verbally to the Site Superintendent if someone is available onsite and sent via electronic transmission with photo documentation to the Developer, Stormwater Pollution Prevention Plan's (SWPPP) Legally Responsible Person (LRP), Qualified SWPPP Designer (QSD) and Qualified SWPPP Practitioner (QSP) for resolution. If Site Superintendent is not available onsite, City staff attempt to make verbal notification via mobile phone to discuss the inspection findings prior to sending the electronic transmission with photo documentation to the Property Owner and Site Superintendent.

A copy of the formal inspection report will be made available upon request.

Corrective/Abatement Actions and/or Violation Resolution
All inspection findings requiring Corrective/Abatement Actions and/or Violations shall be completed within 72 hours and/or no later than agreed upon schedule compliance date. Corrective/Abatement Actions not completed within 72 hours and/or Repeat/Ongoing/Continued Violations will be subject to Escalated Enforcement Measures as specified within the City's Enforcement Response Plan and may require SWRCB referral.

Construction Sites with Stormwater Pollution Prevention Plans (SWPPPs)
The LRP must ensure that all Permit Registration Documents (NOI, Risk Assessment, Site Map, SWPPP, Annual Fee, and Signed Certification Statement and NOT) have been electrically filed within the SWRCB's Stormwater Multi-Application Reporting & Tracking System (SMARTS) in accordance to the CGP. *Refer to the Construction General Permit for information related to Revising Permit Coverage for Change of Acreage or New Ownership.*

The LRP must ensure an up-to-date copy of the signed SWPPP retained at the construction site and that a copy of the CGP is available for review at the construction site. The LRP must also ensure that the SWPPP is written, amended and certified by a QSD and that all construction site inspections are being conducted by a QSP. The LRP must also prepare and electronically submit an Annual Report with SMARTS no later than September 1 of each year.

BUELLTON SOLVANG STORMWATER

THE CONSTRUCTION INDUSTRY'S GUIDE
BEST MANAGEMENT PRACTICES (BMPs)

COMMON POLLUTANTS

Construction Industry
- Dirt and sediment
- Trash and debris
- Concrete, stucco, and mortar
- Metal
- Oil, grease, gasoline, and diesel
- Paint
- Sewage
- Fertilizer

Take Advantage of These FREE Services
- Download or print BMP materials

Be Sure to Always
- Understand on-site drainage patterns
- Identify all on-site storm drain inlets and catch basins or the nearest offsite drain location
- Ensure all on-site storm drain inlets are protected to capture pollutants

Training
- Provide BMP training to all new construction personnel and offer existing construction personnel an annual refresher on stormwater pollution prevention
- Post BMPs within the construction trailer or employee break areas
- Keep all training records on site and available for inspection

ABOUT THIS GUIDE

Many people in the construction trades don't realize their practices can pollute our local streams, creeks, lakes, river, or the ocean. This guide provides general BMPs for construction projects.

Construction activities generate pollutants that can be picked up while watering or by stormwater runoff and transported to the nearest storm drain inlet and into our waterways. You can help reduce water pollution year-round by implementing BMPs. Included in this guide is a list of typical BMPs utilized in the Construction Industry. These BMPs are required by your project's Erosion and Sediment Control Plan (E&SCP) and/or Stormwater Pollution Prevention Plan (SWPPP). Additional post-construction stormwater control measures (SCMs) are required for retaining and treating stormwater runoff from completed projects to prevent long-term impacts to water bodies. SCMs are different than active construction BMPs because their function is to capture and lessen pollutants in runoff from the completed project long into the future.

Do you know? Stormwater requirements are based on total square feet (SF) of soil disturbance and/or the creation or replacement of impervious surfaces. It's important to check city or county grading/building permit exemptions and requirements to stay compliant with codes and standards.

PROJECT SIZE	STORMWATER REQUIREMENTS
Any land disturbing activities that may generate pollutants but do not require a grading/building permit *Refer to city or county code for Grading/ Building Permit Exemptions*	• No Site Plan is required • Discharges of pollutants are prohibited under city and county code • Implement construction BMPs as appropriate to prevent pollutant discharges and violation of city and county code
All projects requiring a Grading/Building Permit *Refer to city or county code for Grading/ Building Permit Requirements*	• Site Plan required • Implement construction BMPs per city or county code • Prepare and get approval for E&SCP by city or county
All large projects ≥ 1 acre soil disturbance OR < 1 acre but part of a larger common plan of development (≥ 1 total acres of disturbance) *Refer to Construction General Permit Requirements*	• Large projects must be permitted before starting any soil disturbances • Implement construction BMPs specified within an approved SWPPP *SWPPPs developed pursuant to the Construction General Permit may substitute for the E&SCP for those projects where a SWPPP is required, if it contains the requirements of the E&SCP*

Note: Projects that create or replace ≥ 2,500SF or more of impervious surface collectively over the entire project site are Regulated Projects and must comply with the Central Coast Regional Water Quality Control Board's Post Construction Requirements (R3-2013-0032). Regulated Projects must submit a Stormwater Control Plan. Applicants should follow the County of Santa Barbara's Stormwater Technical Guide for Low Impact Development (LID) to assist with the Stormwater Control Plan.

EROSION CONTROL BMPs

- Conduct grading activities during the dry months to avoid soil disturbance during the rainy season (October–May).
- Schedule earth moving and construction activities in phases to minimize soil disturbance at any one time.
- Mark areas of vegetation to be preserved, install tree protection fencing and/or riparian area barrier where needed.
- Apply temporary mulch, hydroseed, and/or soil binders to protect soil from wind or water (rain or irrigation) exposure until permanent stabilization is established. Make sure to follow manufacturer's application instructions, avoid overspray, and reapply as needed.

FOR ADDITIONAL INFORMATION CONTACT OUR PARTNERING AGENCIES

City of Buellton
www.CityofBuellton.com
Public Works Department
805.688.5177
swmp@cityofbuellton.com

City of Carpinteria
www.carpinteria.ca.us
Public Works Department
805.880.3415
stormwater@ci.carpinteria.ca.us

City of Goleta
www.CityofGoleta.org
Public Works Department
805.961.7500
stormwater@cityofgoleta.org

City of Solvang
www.CityofSolvang.com
Public Works Department
805.688.5575
stormwater@cityofsolvang.com

Santa Barbara County
www.SBProjectCleanWater.org
Project Clean Water
805.568.3440
cleanwater@cosbpw.net

BUELLTON SOLVANG STORMWATER

THE CONSTRUCTION INDUSTRY'S GUIDE
BEST MANAGEMENT PRACTICES (BMPs)

ADDITIONAL BMPs

SEDIMENT CONTROL BMPs

- Key-in (trench and stake) fiber rolls and silt fences properly.
- Inspect the construction site daily. Remove any sediment accumulation on roadways, driveways, sidewalks, gutters, and such by sweeping (manual or street sweeper). Do not use hoses to rinse down impervious surfaces!
- Regularly inspect, repair, and/or replace storm drain inlet protection (screens, filter fabric, and gravel bag berms).
- Install appropriately sized sediment/detention basin(s) to allow fine sediment to settle for up to 48 hours before the runoff is released if appropriate for a project.

TRACKING CONTROL BMPs

- Stabilize all construction entrance(s)/exit(s) by installing rumble plates and/or 3-inch rock to eliminate off-site tracking of dirt and sediment.
- Regularly inspect all stabilized construction entrance(s)/exit(s) and remove sediment accumulation within rumble plates or rock base when 1/3 full.

RUN-ON AND RUN-OFF CONTROL BMPs

- Establish run-on controls (earth dikes or drainage swales) to redirect rainwater away from loose soil in disturbed areas.
- Properly grade the site to contain run-off on site where it can be managed.

GOOD HOUSEKEEPING BMPs

- Routinely inspect temporary concrete/paint/drywall/plaster/stucco washout areas (WAs) for leaks and coverage at the end of each day and/or prior to rain. Maintain WAs with a minimum freeboard of 4 inches for above grade and 12 inches for below grade facilities. Don't forget to change out when 75% full and clean up spills when they happen.
- Inspect and remove trash/debris accumulation regularly throughout your site and dispose of properly.
- Cover trash cans, dumpsters and/or roll-offs at the end of each day and/or prior to rain. Empty regularly so trash/debris are not dispersed on or off-site.
- Locate portable toilets a minimum of 50 feet away from drainage facilities (concrete swales, etc.) and high-traffic areas, when possible. Install secondary containment trays when needed.
- Protect stockpiles (soil, landscaping materials or other loose materials) from wind and water (rain or irrigation) erosion and if non-active 14 days or more.
- Store hazardous materials/wastes within watertight containers, secondary containment, under a tarp or storage shed, to prevent exposure during the rainy season.

NON-STORMWATER MANAGEMENT

- Maintain vehicles to prevent leaks and spills. Keep drip pans and spill kits readily available.
- Designate a vehicle and equipment cleaning/fueling/maintenance area that cannot discharge to street or storm drain.
- Periodically inspect potable water/irrigation sources (water truck or hoses) to ensure no leaks and no excess water irrigation and/or water line discharges.
- Use approved dewatering operations to manage accumulated stormwater and authorized non-stormwater discharges at construction sites (please check local and/or state permit/plan requirements).

STABILIZE DISTURBED AREAS

- Use wet suppression frequently (water truck or hoses) for dust control to stabilize disturbed areas until establishment of permanent vegetation, pavers or completion of asphalt, concrete or chip and seal.

POST-CONSTRUCTION BMPs

- Protect post-construction measures such as underground chambers or bioretention basins from sedimentation during construction activities or until site is stabilized.
- Keep post-construction measures off-line until you've stabilized the surrounding areas.
- Minimize compaction of soils in the post-construction measure area to ensure infiltration rates are not affected.

WANT TO KNOW MORE?

The Cities of Buellton, Carpinteria, Goleta, and Solvang and the County of Santa Barbara have extensive Stormwater Management Programs, with more information and useful tools to help your business on their websites!

Spill Prevention and Clean Up

- Keep a spill kit on site and available for use
- Clean spills or drips immediately
- Designate a key employee to monitor the management and clean up of oil or vehicle fluids
- Use dry methods for cleaning up spills (absorbent, sweep) rather than rinsing down areas

TIP: If you coordinate the implementation of BMPs with each phase of construction, it will help prevent sediment from leaving the site!

ONLY RAIN DOWN THE STORM DRAIN

City of Buellton
www.CityofBuellton.com

City of Carpinteria
www.carpinteria.ca.us

City of Goleta
www.CityofGoleta.com

City of Solvang
www.CityofSolvang.com

Santa Barbara County
www.SBProjectCleanWater.org

BUELLTON SOLVANG STORMWATER

GUÍA DE LA INDUSTRIA DE LA CONSTRUCCIÓN
MEJORES PRÁCTICAS DE MANEJO (BMPs)

CONTAMINANTES COMUNES

Industria de Construcción
- Tierra y sedimento
- Basura y escombros
- Cemento, estuco y mortero
- Metal
- Aceite, grasa, gasolina y diésel
- Pintura
- Drenaje
- Fertilizante

Aproveche de los siguientes servicios gratuitos
- Descarga o imprima los materiales de BMP

Asegúrese de siempre
- Comprender el drenaje del sitio.
- Identificar todas las entradas de desagüe de tormenta en el sitio o drenaje más cercano
- Asegurar que se etiqueten todas entradas de desagüe de tormenta en el sitio.

Entrenamiento
- Provee entrenamiento de BMP a los nuevos empleados y ofrezca a sus empleados una actualización anual sobre prevención de la contaminación de aguas pluviales.
- Publique la ordenación dentro del tráiler de construcción y áreas de descanso.
- Mantenga todos los registros de formación en el sitio y disponible para inspección.

ACERCA DE ESTA GUIA

Muchos trabajadores de la construcción no saben que sus prácticas pueden contaminar nuestros arroyos locales, lagos, ríos u océano. Esta guía facilita ordenación general para los proyectos de construcción.

Actividades de construcción generan contaminantes que pueden ser transportados con el agua de riego y escurrimiento de aguas pluviales. Estos contaminantes terminan en el desagüe de tormenta y en nuestras vías fluviales. Usted puede ayudar a reducir la contaminación durante todo el año mediante la aplicación de BMPs. Incluido en esta guía es una lista de ordenación típica utilizada en la industria de la construcción. Estos BMPs son requeridos por el plan de control de sedimentos (E & SCP) o plan de prevención de contaminación del agua de lluvia (SWPPP) de su proyecto. Medidas adicionales son necesarias después de la construcción (SCMs) para la retención y tratamiento de aguas pluviales para evitar el impacto al largo plazo a los cuerpos de agua. Los SCMs son diferentes a los BMPs porque su función es capturar y reducir los contaminantes en la escorrentía del proyecto en el futuro.

¿Sabía Usted? Los requisitos de aguas pluviales se basan en los pies cuadrados totales (SF) de la perturbación del suelo y/o la creación o reemplazo de superficies impermeables. Es importante verificar las exenciones y los requisitos del permiso de clasificación /construcción de la ciudad o el condado para cumplir con los códigos y normas.

TAMAÑO DE PROYECTO	REQUISITOS DE AGUAS TORMENTAS
Cualquier actividad perturbadora de la tierra que pueda generar contaminantes pero que no requiera un permiso de clasificación/construcción *Consulte el código de la ciudad o del condado para las excepciones de permisos de clasificación/ construcción*	• No se requiere ningún plan de sitio • Las descargas de contaminantes están prohibidas por el código de la ciudad y el condado • Implemente BMPs de construcción apropiados para prevenir las descargas de contaminantes y la violación del código de la ciudad y el condado
Todos los proyectos que requieren una clasificación/ permiso de construcción *Consulte el código de la ciudad o del condado para las excepciones de permisos de clasificación/ construcción*	• Plan de sitio requerido • Implemente BMPs de construcción por código de cuidad o condado • Prepare un E&SCP aprobado por la ciudad o condado
Todos los proyectos grandes de 1 acre de perturbación del suelo O <1 acre, pero parte de un plan común de desarrollo más grande (1 total de hectáreas de perturbación) *Consulte los requisitos de permisos generales de construcción*	• Proyectos grandes deben ser permitidos antes de iniciar cualquier perturbación de suelo. • Implemente BMPs de construcción especificados dentro de un SWPPP aprobado *Los SWPP desarrollados de conformidad con el Permiso General de Construcción pueden sustituir al E&SCP para aquellos proyectos en los que se requiera una SWPPP, si contiene los requisitos del E&SCP.*

Nota: Los proyectos que crean o sustituyen ≥ 2,500SF o más de superficie impermeable y colectivamente sobre el sitio de construcción entero son proyectos regulados y deben cumplir con los requisitos de construcción posterior de la Junta Regional; de Control de Calidad del Agua de la Costa Central (R3-2013-0032). Los proyectos regulados deben presentar un plan de control de aguas de tormentas. Los solicitantes deben seguir la guía técnica de aguas de tormentas del condado de Santa Bárbara para el desarrollo de bajo impacto (LID) para ayudar con el plan de control de aguas de tormentas.

CONTROL DE EROSION BMPs

- Realice actividades de clasificación durante los meses secos para evitar perturbaciones del suelo durante la temporada de lluvias (Octubre–Mayo).
- Programe el movimiento de tierras y actividades de construcción en fases para minimizar la perturbación del suelo.
- Marque zonas de vegetación a preservar, instale cercas para proteger árboles y/o instale la barrera del área ribereña donde sea necesario.
- Aplique mantilla temporal, hidrosemillas y/o aglutinantes del suelo para proteger el suelo de la exposición al viento o al agua (lluvia o riego) hasta establecer una estabilización permanente. Asegúrese de seguir las instrucciones de aplicación del fabricante, evite la pulverización y aplique según sea necesario.

PARA OBTENER MÁS INFORMACIÓN PÓNGASE EN CONTACTO CON NUESTRAS AGENCIAS ASOCIADAS

Ciudad de Buellton
www.CityofBuellton.com
Public Works Department
805.688.5177
swmp@cityofbuellton.com

Ciudad de Carpinteria
www.carpinteria.ca.us
Public Works Department
805.880.3415
stormwater@ci.carpinteria.ca.us

Ciudad de Goleta
www.CityofGoleta.org
Public Works Department
805.961.7500
stormwater@cityofgoleta.org

Ciudad de Solvang
www.CityofSolvang.com
Public Works Department
805.688.5575
stormwater@cityofsolvang.com

Condado de Santa Bárbara
www.SBProjectCleanWater.org
Project Clean Water
805.568.3440
cleanwater@cosbpw.net

BUELLTON SOLVANG STORMWATER

GUÍA DE LA INDUSTRIA DE LA CONSTRUCCIÓN
MEJORES PRÁCTICAS DE MANEJO (BMPs)

¿QUIERE SABER MAS?

Ciudades de Buellton, Carpintería, Lompoc, Santa Bárbara, Solvang y el condado de Santa Bárbara tienen un amplio programa de gestión de aguas pluviales con una selección aun mayor de información y herramientas útiles para ayudar a sus negocios ser sostenible.

Prevención de Derrames y Limpieza

- Mantenga un kit de derrame disponible en el sitio para su uso
- Limpie derrames o goteos inmediatamente
- Designe un empleado para monitorear la gestión y limpieza de fluidos de aceite o fluidos de vehículo
- Use métodos secos para limpiar los derrames (absorber, barrer) en lugar de enjuagar las áreas.

CONSEJO: Si coordina la implementación de BMP con cada fase de construcción, ayudaría a evitar que los sedimentos salgan del sitio.

SOLO LA LLUVIA POR EL DRENAJE DE TORMENTA

BMPs ADICIONALES

BMPs DE CONTROL DE SEDIMENTO

- Zanje y estaque rollos de fibra y cercas de limo correctamente.
- Inspeccione la obra de la construcción diariamente. Quite cualquier acumulación de sedimento en carreteras, calzadas, aceras, canales, etc. barriendo (barrendero manual o de la calle). ¡No use mangueras para lavar superficies abajo impermeables!
- Instale las cuencas de sedimento/detención del tamaño adecuado para permitir que los sedimentos finos se asienten hasta 48 horas antes de que se libere la escorrentía, si es apropiado para un proyecto.

BMPs DE CONTROL DE SEGUIMIENTO

- Estabilice todas las entradas/salidas de la construcción instalando placas de estruendo y/o roca de 3 pulgadas para eliminar el seguimiento fuera del sitio de suciedad y sedimentos.
- Con regularidad inspeccione toda la entradas de construcción estabilizadas / salidas y quite la acumulación de sedimento dentro de platos del estruendo o base de la roca cuando 1/3 lleno.

BMPs DE CONTROL DE CORRIENTE Y ESCORRENTIA

- Establezca controles de corriente (diques de tierra o drenaje humedales) para redirigir el agua de lluvia lejos de la tierra suelta en áreas perturbadas.
- Correctamente clasifique el sitio para contener escorrentía donde se pueda administrar.

BMPs DE ORGANIZACIÓN

- Inspeccione rutinariamente las áreas de lavado de cemento/pintura/paneles de yeso/yeso/estuco para detectar fugas y cobertura al final de cada día y/o antes de la lluvia. Mantenga las áreas de lavado con un mínimo de 4 pulgada sobre grado y 12 pulgadas de bajo grado. No olvide de cambiar cunado se llene el 75& y limpie derrames cuando ocurren.
- Inspeccione y elimine la acumulación de basura/escombros regularmente en todo el sitio y deséchelos de manera adecuada.
- Cubra los contendores de basura al fin de cada día y/o antes de la lluvia. Vacié la basura regularmente parea que la basura/desechos no se dispersen en el sitio ni afuera del sitio.
- Ubique los baños portátiles a un mínimo de 50 pies de distancia de las instalaciones de drenaje (cunetas de concreto, etc.) y áreas de mucho tráfico, cada cuando sea posible.
- Proteja las reservas de tierra, materiales de jardinería u otros materiales sueltos contra la erosión causada por el viento y el agua de lluvia o irrigación. También si no se usan en 14 días o más.
- Almacene los materiales/desechos peligrosos dentro de recipientes herméticos, contención secundaria, debajo de una lona o cobertizo de almacenamiento para evitar la exposición durante la temporada de lluvias.

GESTION DE AGUAS NO PLUVIALES

- Mantenga los vehículos para evitar fugas y derrames. Mantenga las bandejas de goteo y los kits de derrames disponibles.
- Designe un vehículo y área de limpieza, abastecimiento de combustible, mantenimiento de equipo que no pueda descargar al desagüe o drenaje de tormentas.
- Periódicamente inspeccione fuentes de agua/irrigación potables (camión de agua o mangueras) para garantizar que no haya fugas ni descaras de la líneas de agua ni exceso de riego.
- Utilice operación de deshidratación aprobadas para administrar las aguas pluviales y las aguas no pluviales autorizadas en los sitios de construcción (consulte los requisitos de permiso/plan locales y/o estatales).

ESTABLICE LAS ÁREAS PERTURBADAS

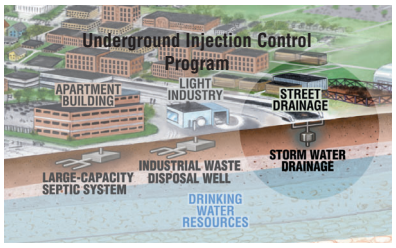
- Utilice la supresión húmeda con frecuencia (camión de agua o mangueras) para el control del polvo para estabilizar las áreas perturbadas hasta el establecimiento de vegetación permanente, adoques o la finalización de asfalto, hormigón o virutas y sellado.

BMPs DESPUES DE LA CONSTRUCCIÓN

- Proteja las medidas posteriores a la construcción, como las cámaras subterráneas o las cuencas de biorretención, de la sedimentación durante las actividades de construcción o hasta que el sitio se estabilice.
- Guarde medidas de postconstrucción fuera de línea hasta que se haya estabilizado los alrededores.
- Minimice la compactación de suelos en el área de la medida de postconstrucción para asegurar que los precios de infiltración no sean afectados.

United States Environmental Protection Agency

WHEN ARE STORM WATER DISCHARGES REGULATED AS CLASS V WELLS?



Audience: This fact sheet is for storm water managers that implement the National Pollutant Discharge Elimination System (NPDES) program.

Purpose: To increase awareness that storm water drainage wells are regulated as Class V injection wells and to ensure that NPDES regulators understand the minimum federal requirements under the Safe Drinking Water Act (SDWA) for the Underground Injection Control (UIC) program.

ARE STORM WATER DRAINAGE WELLS REGULATED BY THE UIC PROGRAM?

Yes. These wells are regulated by EPA and primacy states through the UIC program as Class V injection wells with requirements to protect underground sources of drinking water (USDWs). A USDW is defined as an aquifer that contains less than 10,000 mg/L total dissolved solids and is capable of supplying water to a public drinking water system.

Class V storm water drainage wells are typically shallow disposal wells designed to place rain water or melted snow below the land surface. By definition, a Class V injection well is any bored, drilled, or driven shaft, or dug hole that is deeper than its widest surface dimension, or an improved sinkhole, or a subsurface fluid distribution system.

Storm water management strategies that include subsurface drainage must comply with UIC program regulations.

WHY ARE STORM WATER DRAINAGE WELLS A CONCERN?

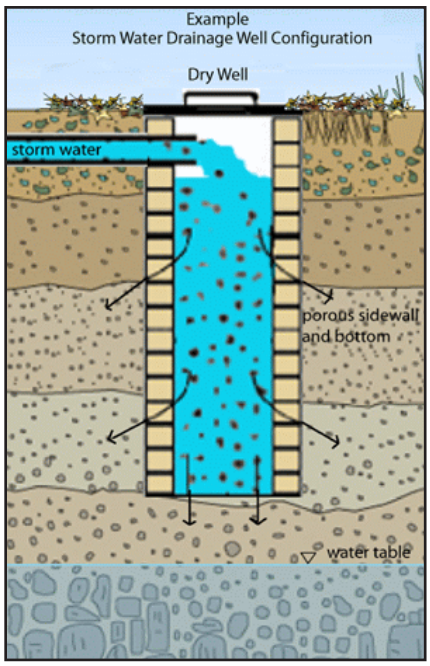
State and federal UIC program representatives are concerned that there may be a dramatic increase in the use of Class V wells as an NPDES Best Management Practice (BMP) to dispose of storm water. Infiltration through storm water drainage wells has the potential to adversely impact USDWs. The runoff that enters storm water drainage wells may be contaminated with sediments, nutrients, metals, salts, fertilizers, pesticides, and microorganisms.

WHAT ARE SOME EXAMPLES OF STORM WATER DRAINAGE WELLS?

The broad definition of Class V wells covers a variety of storm water injection well configurations, including:

- Dry wells
- Bored wells
- Infiltration galleries

The underground injection well definition applies to any subsurface drainfields that release fluids underground. These can include French drains, tile drains, infiltration sumps, and percolation areas with vertical drainage. Improved sinkholes designed for storm water management are also considered Class V storm water drainage wells. These wells are natural karst depressions or open fractures that have been intentionally altered to accept and drain storm water runoff. The pictures on the back page illustrate an example of a Class V injection well that is subject to UIC requirements.



WHAT INFILTRATION SYSTEMS ARE NOT STORM WATER DRAINAGE WELLS?

Two types of infiltration systems are not considered storm water drainage wells:

- **Infiltration trenches** are excavated trenches filled with stone (no piping or drain tile) to create an underground reservoir. They are usually wider than they are deep.
- **Surface impoundments or ditches** are excavated ponds, lagoons, and ditches (lined or unlined, without piping or drain tile) with an opened surface. They are used to hold storm water. These devices **would be** considered Class V injection wells, however, if they include subsurface fluid distribution systems.

Picture and schematic drawing of parking lot infiltration (Source: Louisiana Department of Transportation)

Storm water drainage well designs can be as varied as the engineers who design them. A fluid distribution system that discharges underground through piping is typically the defining characteristic. If you are unsure about the classification of your infiltration system, contact your UIC program representative for clarification.

HOW ARE STORM WATER DRAINAGE WELLS REGULATED?

Under the minimum federal requirements, storm water drainage wells are "authorized by rule" (40 CFR 144). This means that storm water drainage wells do not require a permit if **they do not** endanger USDWs **and they comply with** federal UIC program requirements. The prohibition on endangerment means the introduction of any storm water contaminant must not result in a violation of drinking water standards or otherwise endanger human health. Primacy states may have more stringent requirements.

Federal program requirements include:

- Submitting basic inventory information about the storm water drainage wells to the state or EPA. (Contact your UIC program to learn what inventory information must be submitted and when.) In some cases, the information may be required prior to constructing the well.
- Constructing, operating, and closing the drainage well in a manner that does not endanger USDWs.
- Meeting any additional prohibitions or requirements (including permitting or closure requirements) specified by a primacy state or EPA region.

HOW CAN I HELP PREVENT NEGATIVE IMPACTS FROM STORM WATER DRAINAGE WELLS?

As an NPDES storm water manager, you can help to ensure that current and future storm water systems using Class V wells meet regulatory requirements under the UIC program. You can also help identify storm water drainage systems that may affect USDWs, and recommend BMPs to protect USDWs. BMPs for storm water drainage wells may address well siting, design, and operation, as well as education and outreach to prevent misuse.

For More Information...

EPA's Office of Ground Water and Drinking Water Web Site:
http://www.epa.gov/safewater

UIC Program Contacts:
http://www.epa.gov/safewater/uic/primacy.html

EPA's NPDES Web Site:
http://www.epa.gov/NPDES/Stormwater

Safe Drinking Water Hotline:
1-800-426-4791

Office of Ground Water and Drinking Water (4606M)

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