STORMWATER TECHNICAL GUIDE

COMPLIANCE WITH STORMWATER POST-CONSTRUCTION REQUIREMENTS IN THE CITY OF SCOTTS VALLEY

A Low Impact Development Approach – Revised February 2015
Bioretention Soil Mix Minimum Depth – Revised December 2015
Project Data Form & Non-Bioretention Guidance -Revised August 2017

City of Scotts Valley
Public Works
The City of Scotts Valley gratefully acknowledges the County of Santa Barbara’s permission to adapt the Stormwater Technical Guide for the City's use.
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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 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 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 a Stormwater Technical Guide, a sizing calculator, templates, and other associated tools, as well as outreach and training for municipal staff and land development professionals. The City of Scotts Valley Stormwater Technical Guide and supporting documents are adapted from that work.

Applicants for development approvals in the City of Scotts Valley should use this Guide when preparing Stormwater Control Plans. A pre-application meeting is recommended for all projects subject to the PCRs.

Links

City of Scotts Valley Public Works stormwater page: http://www.scottsvalley.org/public_works/stormwater.html

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

County of Santa Cruz Stormwater Criteria: http://www.dpw.co.santa-cruz.ca.us/Storm_Water/StormDesign.htm

Resources

Available at http://www.scottsvalley.org/public_works/stormwater.html

Stormwater Control Plan Template and Directions for Tier 1 Projects
Stormwater Control Plan Template for Tier 2, 3 and 4 Projects
Stormwater Control Measure Sizing Calculator
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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 City of Scotts Valley is responsible for ensuring that all development or redevelopment projects within the City must meet the PCRs. Guide interprets and clarifies what the City requires project owners do to be in compliance. The City has created two data forms to help determine what requirements apply to specific projects. One form is strictly for Detached Single Family Home Projects and the other form is for all other projects. If the project is part of a larger project such as a new land division project, only one form should be used for the whole project.

1. Determining Project Requirements

After correctly filling out Section A and B of the Project Data Form, Section C and D will indicate the requirements for the Project.

In addition to the requirements in this guide, projects should comply with the City of Scotts Valley Standard Details, the CBC and general engineering design practices.

If your project is a Tier 1 project, stop here and use the Tier 1 project Guide.

2. How Projects Meet the Requirements

As shown in the data form, as project size increases, project tier increases. The Best Management Practice (BMP) Requirements for each tier include the specific requirements for that tier, and the requirements for all the lower tiers. For instance Tier 1 projects include only BMP and Runoff Reduction Requirements. For Tier 2, projects requirements include the requirements from Tier 1, as well as Water Quality Requirements.
ABOUT THE STORMWATER REQUIREMENTS

3. Post Construction Requirements Goals

The requirements aim to mimic pre-development site hydrology as well as protect water quality. This is sometimes called Low Impact Development (LID). Runoff from roofs and paved areas is dispersed to landscaped areas or routed to BMP facilities distributed throughout the site. These facilities—typically bioretention, (see Figure 1-1) 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.

**Tier 1: Site Design and Runoff Reduction**
- Limit disturbance of natural drainage features.
- Limit clearing, grading, and soil compaction.
- Minimize impervious surfaces and concentrating improvement to least sensitive areas.
- Minimize runoff by dispersing runoff to self-retaining landscape or use BMPs or permeable pavements

**Tier 2: Water Quality Treatment**
- Treat runoff with an approved and appropriately sized water quality treatment system (typically bioretention).

**Tier 3: Runoff Retention**
- Retain runoff from the 85th or 95th percentile storm events as determined by the Project Data Form spreadsheet.

**Tier 4: Peak Management**
- Post-development peak flows discharged from the site must not exceed pre-project peak flows for the 10-year 24-hour storm event.

No additional runoff, caused by development, can cross property lines regardless of Tier level. Mitigation facility shall be provided up to 10-year storm event to maintain predevelopment peak flow and velocity where there are no existing downstream drainage systems. In areas where there are existing storm drain systems, those systems must be adequately sized to accept the increased runoff. Runoff from the development shall not be allowed to flow across lot lines or across the subdivision boundaries onto the adjacent private property without an appropriate recorded easement being provided for this purpose. New drainage easements shall have a minimum width of 10 ft and shall be provided by the applicant at no cost to the City at the location acceptable to the City Engineer.

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.
THE PATH TO STORMWATER COMPLIANCE

Start Early

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

Your BMP 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 BMP design may already be constrained—often unnecessarily.

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

The PCRs require the local municipality to maintain a database of BMP facilities and ensure the facilities are operating as designed. The site layout, drainage and BMP 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.

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

1: Pre-Application Meeting
2: Follow this Guidance
3: Stormwater Control Plan
4: Draft Stormwater Facilities Operation and Maintenance Plan
5: Detailed Project Design
6: Construction
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.

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.

“Your LID strategy should be an integral part of the earliest decisions about how the site will be developed.”
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 City of Scotts Valley Public Works stormwater page.

For projects in Tiers 2, 3 and 4, 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 BMP features and facilities can be accommodated within your site and landscape design.

Be sure the BMP 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.

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: BMP Facilities Operation and Maintenance Plan

The BMP 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 BMP 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.

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 BMP design features and facilities are integrated into the project design.
6: Construct the Project

Careful construction of BMP 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.”
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 City of Scotts Valley Public Works stormwater page.

Your Stormwater Control Plan for a Tier 2, 3 and 4 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 BMP 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.

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 3a: Alternative Compliance
Step 4: Calculations and Documentation
Step 5: Design Details
Step 6: Source Controls
Step 7: Maintenance
Step 8: Certification

A template containing an example outline can be downloaded from the City of Scotts Valley Public Works stormwater page.
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 BMP facility.
- Proposed locations and footprints of BMP facilities.
- 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 BMP facility.
- Proposed sizes, including supporting calculations, for each BMP facility.
- Narrative description of each DMA and explanation of how runoff is routed from each impervious DMA to a self-retaining DMA or BMP 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 features.
- Means by which facility maintenance will be financed and implemented in perpetuity.
- Statement accepting responsibility for interim operation & maintenance of facilities.
1: Project Information

Fill out the Project Data Form spreadsheet which is available on the City of Scotts Valley website.

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.

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, 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 BMP 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

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.
PREPARING A STORMWATER CONTROL PLAN

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 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 be treated for water quality. There are two main options for handling runoff from impervious areas, retain stormwater or treat it through filtration. The preferred options are below:

- 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 bioretention facilities. Bioretention facilities treat and infiltrate runoff. For rough site layout, consider that bioretention facilities require between 4% and 10% of tributary impervious area. Avoid draining pervious area to the bioretention facilities and design those areas to be self-retaining where feasible.

See Chapter 4 for design criteria for water quality treatment.

Tips for Conceptual Drainage Design. Most BMP facilities are bioretention facilities and include underdrains. A bioretention facility requires three to four feet of head from inlet to underdrain outlet, which can be 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 downsputs by connecting leaders all the way to landscaping or bioretention facilities. Where necessary, bubble-ups can be used to disperse piped runoff.

Siting BMP facilities. 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 water quality 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
- Site where other treatment measures are deemed infeasible (if approved by the DPW).
- Facilities receiving runoff solely from existing (pre-project) impervious areas.
- 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.

When required by tier provide retention. The easiest solution for providing retention would be to meet the requirement though gravel storage under the bioretention areas and/or pervious pavements. See Step 3-a for water quality treatment options where facilities described here-in are found to be infeasible.

When required by tier provide flow control. Typical flow control measures include providing orifice or weirs which meter the flow leaving retention areas.

3.a. 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 BMP design as described in Chapter 4. The Stormwater Control Plan should show a complete and thorough implementation of opportunities for implementing BMP, including delineation of DMAs and sizing of BMP facilities. Show clearly in the plan the extent to which BMP can and will be implemented on-site and explain why further implementation of BMP 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.

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 BMP 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 and each BMP facility—and tabulated calculations.

Chapter 4 includes a detailed procedure for documenting your site design and showing your BMP facilities meet the minimum sizing requirements.

Typically projects which require a Stormwater Control Plan will also require hydrologic and hydraulic calculations in accordance with the City of Scotts Valley Standard Details Part 3; Storm Drainage.

5. Design of BMP Facilities

Design criteria in Chapter 4 will assist you to plan for construction of BMP 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 use permit or other revocable discretionary approval for specific uses of the site.
7. BMP Facility Maintenance

For Tier 2, 3 and 4 Projects, your Stormwater Control Plan will describe maintenance needs of your bioretention facilities, source control measures, and stormwater conveyance systems. The maintenance plan will identify the location of the facilities to be inspected, the frequency of periodic inspections, and maintenance responsibilities. Annual reporting will be provided to the municipality at the facility owner’s expense.

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 BMP facilities. You will find a discussion of maintenance requirements in Chapter 5.

8. 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 City of Scotts Valley Stormwater Technical Guide.”
BMPs and Compliance with the PCRs

The following design and documentation procedure facilitates rapid and thorough evaluation of a BMP design for compliance with the Post-Construction Requirements.

The procedure involves dividing the site into Drainage Management Areas (DMAs) and tracking the drainage from each DMA. Where runoff from existing impervious surfaces cannot be separated from runoff from new and replaced impervious surfaces, the treatment facility shall be sized to treat the runoff from existing, new, and replaced impervious surfaces. The procedure accounts for pervious areas and dispersal of runoff from impervious area to landscape.

Minimum time of concentration used for intensity calculations shall be 15 minutes. A sample calculation is attached in Appendix F. The MS-excel of the sample calculations is also available on the County of Santa Cruz Stormwater website, use P60=1.8 for the City of Scotts Valley.

Where feasible, projects should implement water quality BMPs according to the priority as listed below.

For Tier 2 projects, the following designs are acceptable:

1. Retain the stormwater runoff from the 85th percentile 24-hr storm event.
2. Biofiltration/Bioretention facilities designed to treat runoff produced by a rainfall intensity of 0.2 inches per hour. A rough sizing factor of 0.04 is used, which greatly simplifies preliminary calculations (see Figure 4-1.)
3. Non-retention based treatment systems must be capable of treatment for a volume of stormwater runoff generated from the 85th percentile 24-hr storm event, or the stormwater runoff flow from a 0.2 inch per hour intensity (or 2 times the 85th percentile hourly rainfall intensity.)

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

As specified in the PCRs, bioretention facilities for Tier 2 are designed to retain 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.

For Tier 3 and Tier 4 projects, BMP facilities are sized according to the design storm depth as determined through the Project Data worksheet. BMP facilities 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 volume and footprint.
An MS-Excel-based calculator accompanying this Guide facilitates tracking of DMAs and sizing calculations for Tier 2 and Tier 3 projects. Tier 4 projects may use the same MS-Excel for sizing calculations as Tier 3 to meet retention requirements. It should be used to prepare your design and your Stormwater Control Plan submittal. If runoff will be routed through retention facilities prior to entering the onsite detention facilities, credit may be given for the stormwater volume that will be detained in the gravel bed or chamber beneath the underdrain of a retention facility.

**Step-by-Step**

The procedure for all tiers requires the following steps:

1. **Delineate DMAs.**
2. **Identify DMA types.** Minimize the amount of pervious area draining to BMP facilities.
3. **Identify BMP facility locations.**
4. **Calculate the required minimum area** (and depth for Tiers 3 and 4) of each BMP facility.
5. **Compare the required footprint to the area available.** (For Tier 3 and 4 determine if depth of facility is feasible). Iterate until all BMP facilities meet or exceed the minimum required area and depth.

**1: Delineate DMAs**

Drainage Management Areas (DMAs) are portions of a project site that drain to a common point. 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-retaining areas
- Self-treating areas
- Areas draining to self-retaining areas
- Areas draining to a BMP facility

**Self treating areas** are natural or landscaped areas that do not drain to BMP 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 used where, because of site layout or topography, it is not possible to drain entirely pervious areas off-site separately. The technique works best on flat, heavily landscaped sites. 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 so that these areas will retain the first inch of rainfall. Specify slopes, if any, toward the center of the pervious areas. Inlets of area drains, if any, should be set 3 inches or more above the low point to allow ponding. **Green roofs** and **pervious pavements**—when constructed according to the design criteria in this Guide—are considered self-retaining areas.

**Areas draining to self-retaining areas.** 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. The drainage from the impervious area must be directed to and...
dispersed within the pervious area, and the entire area must be designed to retain an inch of rainfall without flowing off-site. For example, if the maximum ratio of 2 parts impervious area into 1 part pervious area is used, then the pervious area must be graded concave or bermed so that 3 inches of water over its surface are absorbed before overflowing to an off-site drain. 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 BMP facility.** The square footage of these areas is used to calculate the required footprint and volume of the BMP facility. More than one drainage area (DMA) can drain to the same BMP facility. However, a particular DMA can only drain to one BMP facility.

Where possible, design site drainage so only impervious roofs and pavement (not landscaped areas) drain to BMP facilities. This yields a simpler, more efficient design and also helps protect BMP 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 BMP facility. Group the DMAs by type. For each DMA, tabulate the square footage and the post-project surface. For DMAs draining to a BMP facility sum the DMA areas for each BMP to determine the BMP tributary area. Based on the type of BMPs used determine the appropriate runoff factor.

For filtration and flow-type treatment, use the surface types and runoff factors below:

**Table 4-1. Runoff Factors for small storms (C)**

<table>
<thead>
<tr>
<th>Surface Type</th>
<th>Runoff Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roofs and paving</td>
<td>1.0</td>
</tr>
<tr>
<td>Landscaped areas</td>
<td>0.1</td>
</tr>
<tr>
<td>Bricks or solid pavers on sand base</td>
<td>0.5</td>
</tr>
<tr>
<td>Pervious concrete or asphalt</td>
<td>0.0</td>
</tr>
<tr>
<td>Turfblock on drain rock—total section at least</td>
<td>0.0</td>
</tr>
</tbody>
</table>

For retention and volume-type treatment use the following equation to determine the runoff factor.

\[
C = 0.858 i^3 - 0.774 i + 0.04
\]

Where “i” is the fraction of the tributary area that’s impervious.

**3. Select and Lay Out BMP Facilities**

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

Design criteria for BMP facilities are at the end of this chapter.

Once you have laid out the BMP facilities, calculate the square footage you have set aside for each BMP facility.

Then, **recalculate the square footage of your DMAs** to omit the square footage now dedicated to BMP facilities.
4. Calculate minimum facility sizes

For all projects, the minimum size for treatment facilities can be found differently based on the BMP type as shown in the steps below, and the C value calculations from Step 2.

1. Retention of stormwater runoff from the 85th percentile 24-hr storm event.
   
   \[
   \text{Retention Volume} = C \times 85^{\text{th}} \text{ percentile 24-hr storm Rainfall Depth} \times \text{Tributary Area}
   \]

2. Retention of stormwater runoff from the 95th percentile 24-hr storm event.
   
   \[
   \text{Retention Volume} = C \times 95^{\text{th}} \text{ percentile 24-hr storm Rainfall Depth} \times \text{Tributary Area}
   \]

Note: For retention, replaced impervious square footage may be multiplied by 0.5 before entering it into your BMP facility sizing calculations

3. Biofiltration/Bioretention facilities:
   
   \[
   \text{Biofiltration Area} = 0.04 \times (\sum C \times \text{DMA})
   \]

4. Non-retention based systems must be capable of one of the following:
   
   - Provide treatment for a volume equivalent to the retention volume for the 85th percentile 24-hr storm event, or
   - Provide treatment for flow = C x Tributary Area x 0.2 inch per hour (or 2 times the 85th percentile hourly rainfall intensity.)

Table 4-2. Format for Tabulating Self-Treating Areas

<table>
<thead>
<tr>
<th>DMA Name</th>
<th>Area (square feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

Table 4-3. Format for Tabulating Self-Retaining Areas

<table>
<thead>
<tr>
<th>DMA Name</th>
<th>Area (square feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4-4. Format for Tabulating Areas Draining to Self-Retaining Areas

<table>
<thead>
<tr>
<th>DMA Name</th>
<th>Area (square feet)</th>
<th>Post-project surface type</th>
<th>Runoff factor</th>
<th>(Area × Runoff Factor)</th>
<th>Receiving self-retaining DMA Area (square feet)</th>
<th>Receiving self-retaining DMA Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

Table 4-5. Format for Tabulating Areas Draining to Bioretention Facilities and Calculating Minimum Bioretention Facility Size (Tier 2, 3 and 4 Projects)

<table>
<thead>
<tr>
<th>DMA Name</th>
<th>DMA Area (square feet)</th>
<th>Post-project surface type</th>
<th>DMA Runoff factor</th>
<th>DMA Area x runoff factor</th>
<th>Facility Name</th>
<th>Facility Sizing factor</th>
<th>Minimum Facility Size</th>
<th>Proposed Facility Size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>0.04</td>
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<td></td>
</tr>
</tbody>
</table>
The calculator accompanying this Guide allows you to enter, for each DMA, new impervious area, replaced impervious area in a USA (not applicable to Scotts Valley), and replaced impervious area not in a USA (all locations within the City are not in a USA). Do not halve the amount of replaced impervious area entered into the calculator.

The retention equations above are the simple method. Alternatively sizing may be done through the routing method described below:

**Routing method:** Enter the following data into the calculator accompanying this Guide:

- New tributary impervious area
- Replaced tributary impervious area within a USA (not applicable)
- Replaced tributary impervious area not within a USA
- Design storm depth
- Hydrologic Soil Group or design infiltration rate for subsurface soils (see discussion below)
- Facility infiltration area (area in contact with subsurface soils—minimum is 4% of tributary impervious area)

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

- Distributes the design storm depth over time increments according to a Type 1 unit hydrograph
- Calculates facility inflow rate and volume for each time increment
- Calculates facility infiltration rate and infiltration volume for each time increment
- 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 routing method 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).

The maximum drawdown time should be 72 hours. Where drawdown time exceeds 72 hours revise BMP area. If soil infiltration rates are poor and BMP drawdown is infeasible review options for alternative compliance.

This is the minimum 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, the acceptable standard method is the Double Ring Infiltrometer Test. Other local soil survey data and methods may be accepted at the discretion of the municipal staff. 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 BMP facilities other than bioretention—such as dry wells, infiltration trenches, or infiltration basins—divide 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.)

To design a bioretention facility that contains the minimum volume, assume the porosity $\Phi$ of the gravel layer is equal to 0.4. The underdrain is placed at the top of this layer. Storage in the planting soil and surface reservoir is not credited.
If the simple method is used for sizing, then divide the calculated minimum storage volume by 0.4 to determine the volume of gravel required. Dividing the volume of gravel by the facility infiltration area (horizontal plane in contact with native soils, in square feet) yields the required average gravel layer depth.

If the routing method is used, then the minimum storage volume required changes as the facility infiltration area (typically this is 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.

5. Repeat until facility area is adequate

The calculator is set up to track DMAs and the routing of drainage from DMAs to BMP facilities. The calculator facilitates exploration of options to delineate DMAs differently and associate DMAs with different BMP facilities and calculates the minimum storage volume that results. Iterate (repeat) this process to develop your design.

Review the site plan to determine if, for each BMP facility, the square footage reserved is sufficient to accommodate the minimum footprint. Also consider (for Tier 3 and 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 BMP facilities which may have more capacity.
- Making tributary landscaped DMAs self-treating or self-retaining.
- Expanding the BMP facility footprint/infiltration area.
- 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.

6. Retention Alternative Compliance Calculations

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.

Impervious Tributary Surface Area is defined as the sum of all of the site’s conventional impervious surfaces. When calculating Impervious Tributary Area:

- Do include: concrete, asphalt, conventional roof, metal structures and similar surfaces.
- Do not include: green roofs
**Pervious Tributary Surface Area** is defined as the sum of all the site’s pervious surfaces, corrected by a factor equal to the surface’s runoff coefficient. When calculating Pervious Tributary Area:

- Do include surfaces such as: pavers on sand, managed turf; disturbed soils; and conventional landscaped areas.
- Do not include: Infiltration SCM surfaces, natural and undisturbed landscape areas, or landscape areas compliant with the Model Efficient Landscape Ordinance (California Code of Regulations, Title 23. Waters, Division 2. Department of Water Resources, Chapter 2.7), or a local ordinance at least as effective Model Water Efficient Landscape Ordinance.

### Table 4-6 Correction Factors for Use in Calculating Equivalent Impervious Surface Area (EISA)

<table>
<thead>
<tr>
<th>Pervious Surface</th>
<th>Correction Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disturbed Soils / Managed Turf (dependent on original Hydrologic Soil Group)</td>
<td>A: 0.15</td>
</tr>
<tr>
<td></td>
<td>B: 0.20</td>
</tr>
<tr>
<td></td>
<td>C: 0.22</td>
</tr>
<tr>
<td>Pervious concrete (not designed as self-retaining)</td>
<td>0.60</td>
</tr>
<tr>
<td>Cobble</td>
<td>0.60</td>
</tr>
<tr>
<td>Pervious Asphalt (not designed as self-retaining)</td>
<td>0.55</td>
</tr>
<tr>
<td>Natural Stone (without grout)</td>
<td>0.25</td>
</tr>
<tr>
<td>Turf Block on native soil or permeable material</td>
<td>0.15</td>
</tr>
<tr>
<td>Brick on sand (without grout)</td>
<td>0.13</td>
</tr>
<tr>
<td>Unit Pavers on Sand</td>
<td>0.10</td>
</tr>
<tr>
<td>Crushed Aggregate</td>
<td>0.10</td>
</tr>
<tr>
<td>Grass</td>
<td>0.10</td>
</tr>
</tbody>
</table>

**7. Flow Control**

Post development flows shall not leave the site for the 10-year 24-hour storm event. The volume detained shall be calculated using the Rational Method and IDF curves from Part 3 Stormwater Management of the County of Santa Cruz Design Criteria.

**8. BMP Detailed design**

Detailed here are some typical BMPs and necessary design elements. All BMPs should have safe overflow measures.

**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 page 4-10. The facility must be designed to “fill up like a bathtub.” This rule ensures all the storage is used during intense rainfall, prevents short-circuiting, and avoids erosion of soil mix. The surface reservoir should be level and surrounded by a boundary such as a concrete curb, land berms, or timbers. To address concerns about a trip hazard, soil mix and/or mulch may be mounded against a rigid edge. Plantings can be arranged to discourage entry.

**Gravel layer.** “Class 2 permeable,” Caltrans specification 68-2.02(F)(3), is recommended. Drain rock or 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 to the drain rock. (Do not use fabric for this purpose).

**Soil mix.** A mixture of sand (60%-70%) and compost (30%-40%) should be used. The specification developed by the Bay Area Stormwater Management Agencies Association (BASMAA, 2010) is recommended.

**Underdrain.** Use minimum 4” dia. PVC SDR 35 or equivalent, perforated pipe, installed with the holes facing down. The underdrain itself must be in the bedded in 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. Provide cleanout connected by a sweep bend. A concrete box and lid, such as Christy V1, is recommended to provide protection to the cleanout structure against damages that could occur from landscaping operations.
Landscape Design and Landscaping.
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.

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 standards. 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.
Infiltration facility design criteria

**Layout.** Gravel retention facilities may be of any shape. However, the engineer should determine a means to convey the water through the facility at a rate which avoids any issues such as erosion, clogging or back-up issues. Tributary impervious square footage does not exceed 4% the square footage of the dry well area unless necessary due to site constrictions. On your sketch, show area or rough dimensions.

**Gravel layer.** “Class 2 permeable,” Caltrans specification 682.02(F)(3), is recommended. Use filter fabric to separate prevent the surrounding soil from clogging the gravel media. Provide construction detail showing dry well is at least 12 inches deep and 12 inches wide filled. Show at least 12” cover.

**Underdrain.** Use minimum 4” dia. PVC SDR 35 or equivalent, perforated pipe, installed with the holes facing down. The underdrain itself must be embedded in the gravel layer; the discharge elevation (typically, where the underdrain is connected to the overflow structure) is critical and must be above the depth required for storage. Provide cleanout connected by a sweep bend. A concrete box and lid, such as Christy V1, is recommended to protect the cleanout structure against damages that could occur from landscaping operations.

The overflow for the system is be directed to a public drainage system.

Pervious Pavement Retention

**Layout.** Prevent erodible areas from draining to pervious pavements. Keep pervious pavement slopes below 5% or use berms up to slopes of 15% max. Provide a ridged edge to contain pavement section.

**Gravel layer.** Reservoir base course should be open graded crushed stone. Determine the minimum structural pavement base course. The depth of the reservoir base may be increased to provide additional retention volume.
Bioretention Facility

Cross-section
Not to Scale

Overflow structure
Concrete drop inlet or manhole with frame. 24" min x 36" min. if access required; citrum or beehive grate preferred, 1/4" openings

Walls as needed to establish constant rim elevation around perimeter of facility

To storm drain or approved discharge point

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.
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.
Design Criteria for Porous Pavements

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, 3 and 4 projects.

- 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 drain rock 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.
PREPARING YOUR BEST MANAGEMENT PRACTICE
FACILITIES OPERATION & MAINTENANCE PLAN

Introduction

BMP 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 BMP 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 in Appendix E.

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 codes, covenants, 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:

- Owner or 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.

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 BMP 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).

The City of Scotts Valley requires a draft Operations and Maintenance Plan be submitted when building or grading permits are applied for (or before). Changes made in the field during construction should be noted in the final Plan following construction.

4. Schedule Maintenance Activities

A visual inspection of all facilities should be scheduled for twice a year. More in-depth inspections and maintenance may be scheduled annually.

The frequency should be adjusted in response to the needs of each particular facility.

Bioretention Facilities

**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 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.

**Clean Outs.** If clogging issues are apparent, utilize the clean out to flush sediment from the system.

**Pervious Pavements**

**Sweeping.** Pervious Pavements should be vacuum swept at least once a year. Vacuum sweepers should be calibrated for the appropriate surface type.

**Surface Improvements.** Inspections should be conducted to determine if there are issues with paver infill, sediment, and clogging.

**Clean Outs.** If clogging issues are apparent, utilize the clean out to flush sediment from the system.

**Manufactured BMPs**

If manufactured BMPs are utilized, include O&Ms per the manufacturer’s recommendations. Some facilities will require a manufacturer’s representative or engineer’s inspection.

### 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.

**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.

<table>
<thead>
<tr>
<th>IF THESE SOURCES WILL BE ON THE PROJECT SITE …</th>
<th>… THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Potential Sources of Runoff Pollutants</td>
<td>2 Structural/Permanent Controls—Show on Stormwater Control Plan Drawings</td>
</tr>
<tr>
<td>☐ A. On-site storm drain inlets (unauthorized non-stormwater discharges and accidental spills or leaks)</td>
<td>☐ Locations of inlets.</td>
</tr>
<tr>
<td>☐ Mark all inlets with the words “No Dumping! Flows to Bay” or similar.</td>
<td>☐ Maintain and periodically repaint or replace inlet markings.</td>
</tr>
<tr>
<td>☐ Provide stormwater pollution prevention information to new site owners, lessees, or operators.</td>
<td>☐ See applicable operational BMPs in Fact Sheet SC-44, “Drainage System Maintenance,” in the CASQA Stormwater Quality Handbooks at <a href="http://www.cabmphandbooks.com">www.cabmphandbooks.com</a></td>
</tr>
<tr>
<td>☐ 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.”</td>
<td></td>
</tr>
<tr>
<td>☐ B. Interior floor drains and elevator shaft sump pumps</td>
<td>☐ State that interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer.</td>
</tr>
<tr>
<td>☐ Inspect and maintain drains to prevent blockages and overflow.</td>
<td></td>
</tr>
<tr>
<td>☐ C. Interior parking garages</td>
<td>☐ State that parking garage floor drains will be plumbed to the sanitary sewer.</td>
</tr>
<tr>
<td></td>
<td>☐ Inspect and maintain drains to prevent blockages and overflow.</td>
</tr>
<tr>
<td>IF THESE SOURCES WILL BE ON THE PROJECT SITE …</td>
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<td>-----------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>1</strong> Potential Sources of Runoff Pollutants</td>
<td><strong>2</strong> Structural/Permanent Controls—Show on Stormwater Control Plan Drawings</td>
</tr>
<tr>
<td><strong>D1.</strong> Need for future indoor &amp; structural pest control</td>
<td><strong>3</strong> Structural/Permanent Controls—List in Stormwater Control Plan Table and Narrative</td>
</tr>
<tr>
<td>• Show locations of native trees or areas of shrubs and ground cover to be undisturbed and retained.</td>
<td>• Note building design features that discourage entry of pests.</td>
</tr>
<tr>
<td>• Show self-retaining landscape areas, if any.</td>
<td>• Provide Integrated Pest Management information to owners, lessees, and operators.</td>
</tr>
<tr>
<td>• Show stormwater treatment and retention SCMs. (See instructions in Chapter 4.)</td>
<td><strong>4</strong> BMPs—Include in Stormwater Control Plan Table and Narrative</td>
</tr>
</tbody>
</table>

| **D2.** Landscape/ Outdoor Pesticide Use/Building and Grounds Maintenance | **D2.** 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. | State that final landscape plans will accomplish all of the following. |
| • Show self-retaining landscape areas, if any. | • Preserve existing native trees, shrubs, and ground cover to the maximum extent possible. |
| • Show stormwater treatment and retention SCMs. (See instructions in Chapter 4.) | • 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. |

| **E.** Pools, spas, ponds, decorative fountains, and other water features. | **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. |

<p>| • See applicable operational BMPs in Fact Sheet SC-72, “Fountain and Pool Maintenance,” in the CASQA Stormwater Quality Handbooks at <a href="http://www.cabmphandbooks.com">www.cabmphandbooks.com</a> |</p>
<table>
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<tr>
<td></td>
<td>4 BMPs—Include in Stormwater Control Plan Table and Narrative</td>
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</table>

- **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.

- **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

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<tr>
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</tr>
<tr>
<td>3</td>
<td>Structural/Permanent Controls—List in Stormwater Control Plan Table and Narrative</td>
</tr>
<tr>
<td>4</td>
<td>BMPs—Include in Stormwater Control Plan Table and Narrative</td>
</tr>
</tbody>
</table>

- **1. 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.

- **2.** Include a detailed description of materials to be stored, storage areas, and structural features to prevent pollutants from entering storm drains.

- **3.** 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

**IF THESE SOURCES WILL BE ON THE PROJECT SITE …**

**THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs**

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<th>4 BMPs—Include in Stormwater Control Plan Table and Narrative</th>
</tr>
</thead>
</table>
| J. Vehicle and Equipment Cleaning | Show on drawings as appropriate:  
(1) Commercial/industrial facilities having vehicle/equipment cleaning needs shall either provide a covered, berm 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.  
### IF THESE SOURCES WILL BE ON THE PROJECT SITE ...

#### THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs

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</table>
| **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. |
### Potential Sources of Runoff Pollutants

<table>
<thead>
<tr>
<th>Source</th>
<th>Description</th>
</tr>
</thead>
</table>
| **L. Fuel Dispensing Areas** | - Fueling areas 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 area1.] 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 |

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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

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<th>BMPs—Include in Stormwater Control Plan Table and Narrative</th>
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<tbody>
<tr>
<td>M. Loading Docks</td>
<td>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 (crowning) at each bay that enclose the end of the trailer.</td>
<td>Provide a means to drain fire sprinkler test water to the sanitary sewer.</td>
<td>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 <a href="http://www.cabmphandbooks.com">www.cabmphandbooks.com</a></td>
</tr>
<tr>
<td>N. Fire Sprinkler Test Water</td>
<td>Provide a means to drain fire sprinkler test water to the sanitary sewer.</td>
<td>Provide a means to drain fire sprinkler test water to the sanitary sewer.</td>
<td>See the note in Fact Sheet SC-41, “Building and Grounds Maintenance,” in the CASQA Stormwater Quality Handbooks at <a href="http://www.cabmphandbooks.com">www.cabmphandbooks.com</a></td>
</tr>
<tr>
<td></td>
<td>IF THESE SOURCES WILL BE ON THE PROJECT SITE ...</td>
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<td><strong>1</strong></td>
<td>Potential Sources of Runoff Pollutants</td>
<td><strong>2</strong></td>
<td>Structural/Permanent Controls—Show on Stormwater Control Plan Drawings</td>
</tr>
<tr>
<td><strong>O.</strong></td>
<td>Miscellaneous Drain or Wash Water or Other Sources</td>
<td><strong>3</strong></td>
<td>Structural/Permanent Controls—List in Stormwater Control Plan Table and Narrative</td>
</tr>
<tr>
<td>➡</td>
<td>Boiler drain lines</td>
<td>➡</td>
<td>Boiler drain lines shall be directly or indirectly connected to the sanitary sewer system and may not discharge to the storm drain system.</td>
</tr>
<tr>
<td>➡</td>
<td>Condensate drain lines</td>
<td>➡</td>
<td>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.</td>
</tr>
<tr>
<td>➡</td>
<td>Rooftop equipment</td>
<td>➡</td>
<td>Rooftop equipment with potential to produce pollutants shall be roofed and/or have secondary containment.</td>
</tr>
<tr>
<td>➡</td>
<td>Drainage sumps</td>
<td>➡</td>
<td>Any drainage sumps on-site shall feature a sediment sump to reduce the quantity of sediment in pumped water.</td>
</tr>
<tr>
<td>➡</td>
<td>Roofing, gutters, and trim.</td>
<td>➡</td>
<td>Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff.</td>
</tr>
<tr>
<td>➡</td>
<td>Other sources</td>
<td>➡</td>
<td>Include controls for other sources as specified by local reviewer.</td>
</tr>
<tr>
<td><strong>P.</strong></td>
<td>Plazas, sidewalks, and parking lots.</td>
<td>➡</td>
<td>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.</td>
</tr>
</tbody>
</table>
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-Retention Treatment Facilities

Non-Retention 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 or provide treatment for a volume equivalent to the retention volume for the 85th percentile 24-hr storm event.
- 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 3.5 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.
Appendix D. Watershed Management Zones and Performance Requirements

### Exhibit 1. Post-Construction BMP Requirements Summary

<table>
<thead>
<tr>
<th>Watershed Management Zone (WMZ)</th>
<th>Tier 1 Site Design &amp; Runoff Reduction</th>
<th>Tier 2 Water Quality Treatment</th>
<th>Tier 3 Runoff Retention</th>
<th>Tier 4 Peak Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Required</td>
<td>Required</td>
<td>Required - 95&lt;sup&gt;th&lt;/sup&gt; Optimize Infiltration</td>
<td>Required</td>
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<tr>
<td>2</td>
<td>Required</td>
<td>Required</td>
<td>Required - 95&lt;sup&gt;th&lt;/sup&gt;</td>
<td>Required</td>
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<tr>
<td>3</td>
<td>Required</td>
<td>Required</td>
<td>Exempt</td>
<td>Required</td>
</tr>
<tr>
<td>5</td>
<td>Required</td>
<td>Required</td>
<td>Required - 85&lt;sup&gt;th&lt;/sup&gt; Optimize Infiltration</td>
<td>Exempt</td>
</tr>
<tr>
<td>9</td>
<td>Required</td>
<td>Required</td>
<td>Required - 85&lt;sup&gt;th&lt;/sup&gt;</td>
<td>Required</td>
</tr>
</tbody>
</table>

* Where runoff retention requirement compliance requires optimize infiltration, the project shall design stormwater management facility to provide infiltration as the first priority method of mitigation. Compliance for the retention of the remaining volume must be achieved via storage, rainwater harvesting and/or evapotranspiration.

* Where optimize infiltration is not required, compliance must be achieved via storage, rainwater harvesting, infiltration, and/or evapotranspiration.

* See Appendix D to determine the project’s Watershed Management Zone.

* 85<sup>th</sup> Percentile 24-hour rainfall depth = 1.5” and 95<sup>th</sup> Percentile 24-hour rainfall depth = 2.6”

### Exhibit 2. BMP Recommendations

<table>
<thead>
<tr>
<th>Performance Requirement</th>
<th>Direct Runoff to Landscaping Areas</th>
<th>Porous Pavement</th>
<th>Rainwater Harvesting</th>
<th>Flow Through Planter</th>
<th>Bioretention</th>
<th>Drywell / Infiltration Trench</th>
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</thead>
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<tr>
<td>Tier 1 Runoff Reduction</td>
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<tr>
<td>Tier 2 Water Quality</td>
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<td></td>
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<tr>
<td>Tier 3 Runoff Retention</td>
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<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Porous pavement may be designed to provide water quality treatment as self-retaining area to retain runoff from at least the 85<sup>th</sup> Percentile 24-hour storm event.
Appendix E. Sample Maintenance Agreement

Upon recording return to:

City of Scotts Valley
Public Work Department
One Civic Center Drive, Scotts Valley 95066

(Space above this line for Recorder’s use)

City of Scotts Valley
Storm Water
Maintenance Agreement Regarding Maintenance of
Structural or Treatment Control
Best Management Practices (BMPs)

For: Address: ______________

I, ________________, being the owner of the real property, APN No. __________________, which is located at __________________________, Scotts Valley, California, consents and agrees to inspect and maintain any and all structural or treatment control Best Management Practices (BMPs) as outlined in the approved project Storm Water Operation and Maintenance Plan on the subject property. The structural or treatment control BMPs on the subject property include(s): __________________________

I agree to send a letter that provides proof of inspection and maintenance to the City of Scotts Valley Department of Public Works prior to December 1 of each year. Proof of inspection and maintenance shall include a log of inspection and maintenance dates for the past year, and receipts if conducted by a hired service. The log should also indicate any significant observations or repairs made. The proof of inspection and maintenance should be sent to: Storm Water Maintenance, Department of Public Works, City of Scotts Valley, 701 Lundy Lane, Scotts Valley, CA 95066.

You are required herein to pay an annual service charge of $_____ to cover the City’s cost of inspection, oversight, and reporting requirements to the Regional Water Quality Control Board. The annual service charge is subjected to change based on annual inflation adjustments.

As part of this agreement you agree to allow the City staff to enter the subject property to inspect the stormwater facility in the event that you fail to provide the satisfactory inspection and maintenance reporting by December 1 and/or the stormwater facility on the subject property is not functioning satisfactorily. You will be charged for additional fee for re-inspection if you fail to follow up with the proper maintenance and reporting requirements.
In the event that the property is sold, transferred, or leased, the obligations hereby imposed on the property owner shall be assumed by subsequent property owners and lessees. To this end, property owner, in any deed transferring an ownership interest in the property or in any lease agreement for the property, shall include a term by which the subsequent property owner or lessee acknowledges his or her understanding of the obligations imposed by this agreement and expressly agrees to accept the assume responsibility for complying with all said obligations imposed by this agreement.

In addition, I will provide printed information to the new property owner or lessee regarding proper BMP inspection and maintenance frequency and methods. The information shall accompany the first deed transfer. This information shall include the following:

1. a description of any and all storm water structural or treatment control BMPs;
2. a map of the property indicating the BMP locations; and
3. a description of how inspections and necessary maintenance can be performed.

The transfer of this information shall also be required with any subsequent sale of property.

Failure to comply with the provisions of the Maintenance Agreement may result in enforcement actions including assessment of civil penalties as allowed by the City’s Municipal Code, Chapter 12.14.060 Storm Water Conveyance Systems.

I have read the above agreement and understand it.

This agreement shall be binding on and shall inure to the benefit of the heirs, executors, administrators, and assigns of owner.

Owner name: 

Owner signature 

Date this____________________ day of________________, ________

Owners address: 

Phone: 

Email: 

(Note: All signatures on this form must be notarized.)