



FAIRFIELD-SUISUN
URBAN RUNOFF MANAGEMENT PROGRAM

STORMWATER C.3 GUIDEBOOK

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GLOSSARY OF TERMS

DEFINITIONS

Best Management Practice (BMP)	Any procedure or device designed to minimize the quantity of pollutants that enter the storm drain system or to control stormwater flow.
C.3	Provision of the San Francisco Bay Regional Water Quality Control Board's (see definition) stormwater NPDES permit (see definition). Requires each Discharger (see definition) to change its development review process to control the flow of stormwater and stormwater pollutants from new development sites. Order R2-2009-0074.
California Association of Stormwater Quality Agencies (CASQA)	Publisher of the California Stormwater Best Management Practices Handbooks, available at www.cabmphandbooks.com . Successor to the Storm Water Quality Task Force (SWQTF).
California BMP Method	A method for determining the required volume of stormwater treatment facilities. Described in Section 5.5.1 of the California Stormwater Best Management Practice Manual (New Development) (CASQA, 2003).
Commercial Development	Development or redevelopment to be used for commercial purposes, such as office buildings, retail or wholesale facilities, restaurants, shopping centers, hotels, and warehouses.

Compensatory Mitigation

Treatment of an equivalent pollutant loading or quantity of stormwater runoff or other equivalent water quality benefit, created where no other requirement for treatment exists, in lieu of on-site treatment facilities.

Conditions of Approval (COAs)

Requirements a municipality may adopt for a project in connection with a discretionary action (e.g., adoption of an EIR or negative declaration or issuance of a use permit). COAs may specify features required to be incorporated into the final plans for the project and may also specify uses, activities, and operational measures that must be observed over the life of the project.

Construction General Permit or General Permit

Dischargers whose projects disturb one (1) or more acres of soil or whose projects disturb less than one (1) acre but are part of a larger common plan of development that in total disturbs one (1) or more acres, are required to obtain coverage under the General Permit for Discharges of Stormwater Associated with Construction Activity (Construction General Permit, 2009-0009-DWQ). Construction activity subject to this permit includes clearing, grading and disturbances to the ground such as stockpiling, or excavation, but does not include regular maintenance activities performed to restore the original line, grade, or capacity of the facility. For more information see: <http://www.swrcb.ca.gov/stormwtr/construction.html>

Construction Site

Any project, including projects requiring coverage under the General Construction Permit, that involves soil disturbing activities including, but not limited to, clearing, grading, paving, disturbances to ground such as stockpiling, and excavation. Construction sites are all sites with disturbed or graded land area not protected by vegetation, or pavement, that are subject to a building or grading permit.

Deemed Complete	The City reviews development applications within 30 days of submittal to determine whether all the required information has been provided and the application can be “deemed complete” and accepted. If the application submittal is incomplete, staff sends a letter to the applicant indicating that the application is “deemed incomplete” and lists the items needed to complete the application. If the Planning Division’s written determination is not made within 30 days after receipt of the application, under State Law, it is deemed “complete” and staff proceeds with processing the application.
Design Storm	A hypothetical rainstorm defined by rainfall intensities and durations.
Detention	The practice of holding stormwater runoff in ponds, vaults, within berms, or in depressed areas and letting it discharge slowly to the storm drain system. See definitions of infiltration and retention .
Directly Connected Impervious Area	Any impervious surface which drains into a catch basin, area drain, or other conveyance structure without first allowing flow across pervious areas (e.g. lawns).
Direct Infiltration	Infiltration via methods or devices, such as dry wells or infiltration trenches, designed to bypass unsaturated surface soils and transmit runoff directly to groundwater.
Discharger	Any responsible party or site owner or operator within the Permittees’ jurisdiction whose site discharges stormwater runoff, or a non-stormwater discharge

Drawdown time	The time required for a stormwater detention or infiltration facility to drain and return to the dry-weather condition. For detention facilities, drawdown time is a function of basin volume and outlet orifice size. For infiltration facilities, drawdown time is a function of basin volume and infiltration rate.
Exemption	Exemption from the requirement to provide compensatory mitigation may be allowed for projects that meet certain criteria set by the RWQCB. These projects must, however, show impracticability (see definition of impracticable) of on-site treatment facilities and also show that the costs of compensatory mitigation would place an “undue burden” on the project.
Fairfield-Suisun Urban Runoff Management Program (FSURMP)	FSURMP is a collaboration established by an agreement between the City of Fairfield and the City of Suisun City. FSURMP implements common tasks and assists the member agencies to implement their local stormwater pollution prevention programs.
Flow Control	Control of runoff rates and durations as required by the FSURMP’s Hydrograph Modification Management Plan.
Head	In hydraulics, energy represented as a difference in elevation. In slow-flowing open systems, the difference in water surface elevation, e.g., between an inlet and outlet.
Hydrograph	A graph showing the runoff flow rate plotted as a function of time.

Hydrograph Modification Management Plan (HMP)	A Plan implemented by the dischargers so that post-project runoff from Group 1 Projects shall not exceed estimated pre-project rates and/or durations, where increased runoff would result in increased potential for erosion or other adverse impacts to beneficial uses. Also see definition for flow control .
Hydrologic Soil Group	Classification of soils by the Natural Resources Conservation Service into A, B, C, and D groups according to infiltration capacity.
Impervious surface	Constructed or modified surface that cannot effectively infiltrate rainfall. Impervious surface includes but is not limited to building rooftops, pavement, sidewalks, and driveways where such surfaces are not constructed with pervious materials.
Impervious Surface Area Replacement	Replacement of building structure with like – kind of roof; Reconstruction of pavement and base rock material.
Impracticable	As applied to on-site treatment facilities, technically infeasible (see definition) or excessively costly, as demonstrated by set criteria.
Infeasible	As applied to on-site treatment facilities, impossible to implement because of technical constraints specific to the site.
Indirect Infiltration	Infiltration via facilities, such as bioretention areas, expressly designed to treat runoff and then allow infiltration to surface soils.

Infiltration	Seepage of runoff through soil to mix with groundwater. See definition of retention .
Infiltration Device	Any structure that is deeper than wide and designed to infiltrate stormwater into the subsurface, and, as designed, bypass the natural groundwater protection afforded by surface soil. These devices include dry wells, injection wells, and infiltration trenches (includes French drains).
Integrated Pest Management (IPM)	An approach to pest management that relies on information about the life cycles of pests and their interaction with the environment. Pest control methods are applied with the most economical means and with the least possible hazard to people, property, and the environment.
Lead Agency	The public agency that has the principal responsibility for carrying out or approving a project. (California Environmental Quality Act Guidelines §15367).
Low Impact Development (LID)	An integrated site design methodology that uses small-scale detention and retention (Integrated Management Practices, or IMPS) to protect water quality and mimic pre-existing site hydrological conditions.
Major Development Or Redevelopment Project	Project applications that are deemed complete on or after October 16, 2006, a major development or redevelopment project means a project that creates, adds or replaces 10,000 square feet or more of impervious surface.

Maximum Extent Practicable (MEP)	A standard for implementation of stormwater management actions to reduce pollutants in stormwater. Clean Water Act 402(p)(3)(B)(iii) requires that municipal stormwater permits “shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants.” Also see State Board Order WQ 2000-11.
National Pollutant Discharge Elimination System (NPDES)	A national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing discharge permits, and imposing and enforcing pretreatment requirements, under sections 307, 402, 318, and 405 of the Clean Water Act.
Notice of Intent (NOI)	The application form by which dischargers seek coverage under the Construction General Permits, unless the General Permit requires otherwise.
Numeric Criteria	Sizing requirements for stormwater treatment facilities established in Provision C.3.d. of the RWQCB’s stormwater NPDES permit.
Operation and Maintenance (O&M)	Refers to requirements in the Stormwater NPDES Permit to inspect treatment BMPs and implement preventative and corrective maintenance in perpetuity. See Chapter Five.

Percentile Rainfall Intensity	A method of determining design rainfall intensity. Storms occurring over a long period are ranked by rainfall intensity. The storm corresponding to a given percentile yields the design rainfall intensity.
Permeable Pavements	Pavements for roadways, sidewalks, or plazas that are designed to infiltrate runoff, including but not limited to: pervious concrete, pervious asphalt, unit-pavers-on-sand, and crushed gravel.
Permeable Surfaces	Surfaces designed to infiltrate runoff, including but not limited to: pervious concrete, porous asphalt, unit pavers, and granular materials
Pervious Surface	Any constructed or modified surface that allows water to penetrate the surface. Pervious surfaces include but are not limited to porous concrete, gravel and permeable interlocking concrete.
Planned Unit Development (PUD)	Allows land to be developed in a manner that does not conform to existing zoning requirements. Allows greater flexibility and innovation because the PUD is regulated as one unit rather than each component lot being regulated separately.
Pre-Project Runoff Conditions	Stormwater runoff conditions that exit onsite immediately before development activities occur. This definition is not intended to be interpreted as that period before any human-induced land activities occurred. This definition pertains to redevelopment as well as initial development.

**Project With Significant
Pollution Potential**

Any project determined by the FSURMP to be likely to have significant sources of pollutants on-site and/or to contribute a significant amount of pollutants to stormwater after project completion, based on a review of the proposed uses of or activities planned for the site.

Rational Method

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

**Regional (or Watershed)
Stormwater
Treatment Facility**

A facility that treats runoff from more than one project or parcel. Participation in a regional facility may be in lieu of on-site treatment controls, subject to the requirements of NPDES permit provision C.3.g and the discretion of the local jurisdiction.

**Regional Water Quality
Control Board (Regional
Water Board or RWQCB)**

California RWQCBs are responsible for implementing pollution control provisions of the Clean Water Act and California Water Code within their jurisdiction. California is divided into nine RWQCBs. Western and central Solano County are under the jurisdiction of the [RWQCB for the San Francisco Bay Region](#); eastern Solano County is under the jurisdiction of the [RWQCB for the Central Valley Region](#).

Retention

The practice of holding stormwater in ponds or basins and allowing it to slowly infiltrate to groundwater. Some portion will evaporate. See definitions for **infiltration** and **detention**.

Self-retaining area	An area designed to retain runoff. Self-retaining areas may include graded depressions with landscaping or pervious pavements.
Self-treating area	Natural, landscaped, or turf areas that drain overland off-site or to the storm drain system.
Source Control BMP	Land use or site planning practices, or structural or nonstructural measures, that aim to prevent runoff pollution by reducing the potential for contact with rainfall runoff at the source of pollution. Source control BMPs minimize the contact between pollutants and urban runoff.
Stormwater NPDES Permit	A permit issued by a Regional Water Quality Control Board (see definition) to local government agencies (Dischargers) placing provisions on allowable discharges of municipal stormwater to waters of the state.
Stormwater Pollution Prevention Plan (SWPPP)	A plan providing for temporary measures to control sediment and other pollutants during construction.
Stormwater Pollution Prevention Program	A comprehensive program of activities designed to minimize the quantity of pollutants entering storm drains.
Treatment	Any method, technique, or process designed to remove pollutants and/or solids from polluted stormwater runoff, wastewater, or effluent.

WEF Method	A method for determining the minimum design volume of stormwater treatment facilities, recommended by the Water Environment Federation (WEF) and American Society of Civil Engineers. Described in <i>Urban Runoff Quality Management</i> (WEF/ASCE, 1998).
Water Board	See Regional Water Quality Control Board .
Water Quality Volume (WQV)	For stormwater treatment facilities that depend on detention to work properly, the volume of water that must be detained to achieve maximum extent practicable pollutant removal. This volume of water must be detained for a specified drawdown time .

ABBREVIATIONS AND ACRONYMS

APN	Assessor's Parcel Number
ASCE	American Society of Civil Engineers
BASMAA	Bay Area Stormwater Management Agencies Association
BMP	Best Management Practice
CASQA	California Stormwater Quality Association
CCRs	Conditions, Covenants and Restrictions
CEQA	California Environmental Quality Act
City	City of Fairfield and/or Suisun City
COA	Conditions of Approval
CWA	California Water Act
EPA	Environmental Protection Agency
FSSD	Fairfield-Suisun Sewer District
FSURMP	Fairfield-Suisun Urban Runoff Management Program
HMP	Hydrograph Modification Management Plan
IMP	Integrated Management Practice
IPM	Integrated Pest Management
LID	Low Impact Development
NRCS	Natural Resources Conservation Service
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
PUD	Planned Unit Development
O&M	Operations and Maintenance
SAS	Start at the Source
SCMAD	Solano County Mosquito Abatement District
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TMDL	Total Maximum Daily Load
URQM	Urban Runoff Quality Management
Water Board	Regional Water Quality Control Board
WEF	Water Environment Federation
WDRs	Waste Discharge Requirements
WQV	Water Quality Volume

INTRODUCTION

This guidebook is designed to help project proponents of new and redevelopment projects understand and comply with the stormwater requirements for the cities of Fairfield and Suisun City. The cities of Fairfield and Suisun City are required to address protection of stormwater quality during development review and implement stormwater controls for new and redevelopment projects. This guidebook contains five chapters as discussed below.

CHAPTER 1: OVERVIEW AND APPLICABILITY

This chapter provides a basic understanding of the stormwater control requirements and describes which projects are applicable.

CHAPTER 2: COMPLETING THE NEW AND REDEVELOPMENT POST CONSTRUCTION STORMWATER REQUIREMENTS APPLICATION

This chapter provides guidance for completing the New and Redevelopment Post Construction Stormwater Requirements Application.

CHAPTER 3: SITE DESIGN AND SOURCE CONTROL FOR NPDES COMPLIANCE

This chapter provides information on source control, hydrology concepts, and designing the site to include source control best management practices (BMPs)

CHAPTER 4: LOW IMPACT DEVELOPMENT DESIGN GUIDE

This chapter provides guidance on preparing construction documents and overseeing construction of **Low Impact Development** facilities.

CHAPTER 5: OPERATIONS AND MAINTENANCE

This chapter provides information on the Stormwater Treatment Measures Maintenance Agreement and other operation and maintenance requirements. Step-by-step instructions for preparing a **Stormwater Facilities Operation and Maintenance Plan** are included in this chapter.

The San Francisco Bay Regional Water Quality Control Board's C.3 requirements are complex and technical, and most applicants will require the assistance of a qualified civil engineer, architect, or landscape architect. Because every project is different, you should begin by scheduling a **pre-application meeting** with municipal staff.

PLAN AHEAD TO AVOID THE THREE MOST COMMON MISTAKES

The most common (and costly) errors made by applicants for development approvals with respect to C.3 compliance are:

1. Not Planning For C.3 Compliance Early Enough

You should start thinking about your strategy for C.3 compliance before completing a conceptual site design or sketching a layout.

2. Assuming Proprietary Stormwater Treatment Facilities Will Be Adequate For Compliance

A complete Low Impact Development Design, including feasibility evaluation of reuse, infiltration, evapotranspiration, or bioretention facilities at the project site, is now required for nearly all projects.

3. Not Planning For Periodic Inspections and Maintenance of Treatment Facilities.

Consider who will own and who will maintain the facilities in perpetuity and how they will obtain access, and identify which arrangements are acceptable to your municipality.

Chapter 1: Overview and Applicability

IT'S FEDERAL LAW

Urban stormwater runoff is a significant source of pollutants to the nation's waters. In 1987, Congress began to address this problem by requiring municipal stormwater programs to obtain National Pollutant Discharge Elimination System (NPDES) permits. This resulted in local requirements for the regulation of the quality of stormwater runoff from development projects.

THE LOCAL STORMWATER PROGRAM

In Fairfield and Suisun City, development projects must comply with the Municipal Regional Stormwater NPDES Permit (MRP) issued by the San Francisco Bay Regional Water Quality Control Board (Water Board). This permit was issued to the Fairfield-Suisun Urban Runoff Management Program (FSURMP) among other agencies and stormwater programs. The MRP was issued in October 2009 with substantial new requirements placed on new development and redevelopment projects.

HOW IT WORKS LOCALLY

Development projects within the cities of Fairfield and Suisun City are required to address stormwater quality during development review. Projects must use best management practices (BMPs) during construction to mitigate impacts from construction work, and also during post construction to mitigate post-construction impacts to water quality. Long-term water quality impacts must be reduced using site design and source control measures to help keep pollutants out of stormwater. You can save a good amount of money by avoiding and mitigating stormwater impacts early in the project planning phase. This guidebook is designed to assist you in minimizing these impacts.

WHAT IS REQUIRED OF ALL PROJECTS?

Most new development and redevelopment projects must use construction BMPs and implement appropriate site design and source control measures to reduce pollutant discharges in stormwater. Projects that create 10,000 square feet or more of impervious surface (or auto service, gas stations, restaurants, and uncovered parking that create 5,000 square feet or more of impervious surface, as described below) must meet standards that are more stringent.

New Restrictions on Methods of Stormwater Treatment

As of December 1, 2011, all projects that are required to treat stormwater will need to treat the permit-specified amount of stormwater runoff with the following Low Impact Development (LID) methods: rainwater harvesting and use, infiltration, evapotranspiration, or biotreatment.

However, biotreatment will allowed only when it can be shown that other LID methods are infeasible at the project site. Vault-based treatment is not allowed as a stand-alone treatment measure.

NEW RULES FOR AUTO SERVICE FACILITIES, RETAIL GASOLINE OUTLETS, RESTAURANTS, AND UNCOVERED PARKING

Also as of December 1, 2011, projects that create and/or replace 5,000 square feet or more of impervious surface related to auto service facilities, retail gasoline outlets, restaurants, and/or surface parking are required to provide Low Impact Development treatment of stormwater runoff. This requirement applies to uncovered parking that is standalone or included as part of any other development project, and it applies to the top uncovered portion of a parking structure, unless drainage from the uncovered portion is connected to the sanitary sewer. For all other land use categories, 10,000 square feet remains the regional threshold for requiring Low Impact Development, source control site design, and stormwater treatment.

See next section for projects that are exempt from the new and redevelopment requirements.

PROJECTS EXEMPT FROM THE NEW AND REDEVELOPMENT REQUIREMENTS

Some projects are exempt from the new and redevelopment requirements (see below). If your project is not included in this list, refer to the flow chart (found later in this section) to determine what additional stormwater requirements should be included within your project.

Land Use Category	Exempted Land Use
Residential developments	Construction of one single-family home that is not part of a larger common plan of development, with the incorporation of appropriate pollutant source control and design measures, and the use of landscaping to appropriately treat runoff from roof and house-associated impervious surfaces (e.g., runoff from roofs, patios, driveways, sidewalks, and similar surfaces), would be in substantial compliance with the stormwater requirements.
Roadway projects that are under the City’s jurisdiction	Sidewalks built as a part of new streets or roads and built to direct stormwater runoff to adjacent vegetated areas; bicycle lanes that are built as part of new streets or roads but are not hydraulically connected to the new streets or roads and that direct stormwater runoff to adjacent vegetated areas; impervious trails built to direct stormwater runoff to adjacent vegetated areas, or other non-erodible permeable areas, preferably away from creeks or towards the outboard side of levees; sidewalks, bicycle lanes, or trails constructed with permeable surfaces; or Caltrans highway projects and associated facilities.
Significant redevelopment projects	Interior remodels and routine maintenance or repair (e.g., roof or exterior surface replacement, pavement resurfacing, repaving and road pavement structural section rehabilitation within the existing footprint, and any other reconstruction work within a public street or road right-of-way where both sides of that right-of-way are developed).

SO I NEED TO MEET THE STORMWATER REQUIREMENTS. NOW WHAT SHOULD I DO?

In addition to construction BMPs used to prevent stormwater pollution during construction, and site design and source controls for post-construction, projects will need to include Low Impact Development (LID) design and/or post-construction treatment measures. In certain areas of Fairfield, where increased runoff flow and volume may cause excessive creek or storm erosion, projects may need to control the quantity of stormwater runoff. See Appendix D (HMP) for locations inside the City of Fairfield where the control of stormwater quantity applies.

NEW STORMWATER TREATMENT REQUIREMENTS: LOW IMPACT DEVELOPMENT

Effective December 1, 2011, all projects that are required to treat stormwater need to treat the permit-specified amount with the following LID methods: rainwater harvesting and reuse, infiltration, evapotranspiration, or biotreatment. Biotreatment (filtering stormwater through vegetation and soils before discharging to the storm drain system) is only allowed if it can be demonstrated that harvesting and use, infiltration and evapotranspiration are infeasible at the project site. Vault-based treatment is no longer allowed as a stand-alone treatment measure. Where stormwater harvesting and use, infiltration, or evapotranspiration are infeasible, vault-based treatment measures may be used in series with biotreatment, for example, to remove trash or other large solids.

WILL THESE NEW REQUIREMENTS AFFECT MY PROJECT?

- If you submitted a development application that was deemed complete before December 1, 2009, and you diligently pursued the project, the additional, new requirements will not affect your project.
- If you submit a development application that is deemed complete after December 1, 2009, the additional new requirements will not apply if the development application received final discretionary approval before December 1, 2011.
- In all other cases, the additional, new requirements will apply.

WHAT IS REQUIRED DURING CONSTRUCTION?

Construction sites are a significant source of stormwater pollution. The most common causes of stormwater pollution from construction sites are: poor erosion and sediment control; poor housekeeping practices; and poor material management. Contractors must be familiar with BMPs that are required at project sites including:

- Preparation and implementation of sediment and erosion control plans;
- Control of exposed soil by stabilizing slopes; and
- Control of sediment in runoff using sand bag barriers or straw wattles.

All development sites in the Fairfield-Suisun area must have a Stormwater Pollution Prevention Plan (SWPPP) prior to the start of construction. Sites disturbing less than one acre of soil may have an abbreviated SWPPP. Sites disturbing one acre or more of land must comply with the State Water Resources Control Board's Construction General Permit (CGP).

ADDITIONAL RESOURCES FOR STORMWATER CONSTRUCTION REQUIREMENTS

The following resources can provide assistance in meeting the stormwater construction requirements. Some resources are available from the Cities or the Fairfield-Suisun Sewer District.

- FSURMP brochure on Construction Erosion and Sediment Controls – Resources for Developers, Builders and Project Proponents (2006)
- Bay Area Stormwater Management Agencies Association (BASMAA) – Blueprint for a Clean Bay (2003)
- California Regional Water Quality Control Board San Francisco Bay Region – Guidelines for Construction Projects (2003)
- California Regional Water Quality Control Board San Francisco Bay Region – Erosion and Sediment Control Field Manual (August 2002 or latest)
- Association of Bay Area Governments – Manual of Standards for Erosion and Sediment Control Measures (May 1995)

CHAPTER 2: COMPLETING THE NEW AND REDEVELOPMENT POST CONSTRUCTION STORMWATER REQUIREMENTS APPLICATION

The application is included in Appendix A and is designed to collect the necessary information related to stormwater for your project. Although portions of the application will be useful to project proponents early in the development planning process as guidance and encouragement for reducing impervious surfaces, the final information should be collected at the building permitting stage. The following guidance is provided to assist project proponents with completing the application.

Project Name:	Provide name of owner/project proponent.
APN:	Provide Assessor's Parcel Number (APN) of site.
Applicant Name:	Provide full legal name of owner/project proponent.
Project Description:	Provide a brief description of the project.
Project Location:	On the first line, indicate the address of the proposed project site. If a street address is not available, provide other descriptors such that the site could be located. On the second line, indicate the watershed that the project is located in (main creek/river or Bay) and the immediate receiving water (tributary, creek, marsh, Bay).
Project Type:	Indicate whether the project will be located on an undeveloped site (New Development) or at a site with existing development (Redevelopment).
Project Use:	Indicate whether the project is Residential, Commercial, Industrial, Public, Road, Multi-use or Other per the definitions in the City's zoning code, as appropriate. For mixed-use developments, select all applicable boxes. Public projects include institutional developments (e.g., governmental offices and public schools). Although often a subcategory of public projects, roads are listed separately due to their distinguishing characteristics.

Project Use cont.

If the project is a single-family residential home that is not part of a larger common plan of development, the project will be considered in compliance with the stormwater requirements, if appropriate pollutant source control and site design measures are implemented. This may include the use of landscaping to appropriately treat roof and house-associated impervious surface runoff.

Project Size:

The seven subsections in this section provide a pathway for determining the total and percent increase or replacement of impervious surface area (see items e. and f., respectively). The amount of impervious surface at the site is essential to determining the applicability of C.3. requirements to part or all of the site.

Type of Pesticide Reduction measures Used:

City staff should check the appropriate boxes if educational materials (e.g., fact sheets or information on pest resistant plants is provided to the owner/project proponent--Education or if the pesticide-reduction related Conditions of Approval were placed on the project--Conditions of Approval. Some development projects may not have a landscaping element. In such cases “Does not Apply” should be checked.

Types of Stormwater Controls Used:

This item provides three selections: site design, source control, and treatment measures. These items refer to categories of specific stormwater control measures found on page 3 of the application. Permittees and/or project proponents can indicate on that page what specific stormwater control measures will be incorporated into the project. If the control(s) fall under the headings of stormwater treatment, source controls and/or site design, the requisite boxes should also be checked on page 2 of the application. Single-family residential homes not part of a common development should only consider or incorporate source control and site design measures. For additional information on stormwater treatment measures, see Chapter 4. For additional information on source controls and site design measures, see Chapter 3. Additional resources include BASMAA’s Start at the Source (1999) available at the Cities’ websites and the California Stormwater BMP Handbooks, located on the web at www.cabmphandbooks.com.

Hydromodification Management Plan Applicability:

For certain areas in the City of Fairfield, the project may need to meet additional requirements associated with the Hydromodification Management Plan (HMP). Refer to the two figures attached to the application to determine the project's HMP applicability. For further detail, refer to the Program's HMP in Appendix D.

In subsection 6.a. of this item, indicate whether the project discharges directly to a municipal storm drain system, a creek or Suisun Bay. Under subsection 6.b, indicate whether the project is exempt. This definition will be provided by City of Fairfield's stormwater staff. Currently all projects in Suisun City are exempt.

Specific Stormwater Control Measures:

The list on page 3 of the application provides many of the stormwater treatment, source control, and site design measures that could be incorporated into the project.

Treatment Control Details

The table provided on Page 4 of the application should be used to enter additional details regarding treatment control BMPs installed

ADDITIONAL RESOURCES AND CONTACTS

Contacts for More Information:

- City of Fairfield (707) 428-7485
- City of Suisun City (707) 421-7430
- San Francisco Bay Regional Water Quality Control Board (510) 622-2300
- United States Army Corps of Engineers (Section 404 Permit) (415) 977-8461
- CA Department of Fish & Game (Section 1603 Streambed Alteration) (707) 944-5520

Resources:

- Bay Area Stormwater Management Agencies Association, Start at the Source, 1999.
<http://www.basmaa.org/resources/files/Start%20at%20the%20Source%20-%20Design%20Guidance%20Manual%20for%20Stormwater%20Quality%20Protection.pdf>

- Bay Area Stormwater Management Agencies Association, Using Site Design Techniques to Meet Development Requirements, 2003.
<http://www.basmaa.org/resources/files/Using%20Site%20Design%20Techniques.pdf>.
- California BMP Handbooks (New Development and Redevelopment; Construction) January 2003. <http://www.cabmphandbooks.com/>
- FSURMP, “Guidance for Design of Detention Basins For Water Quality Improvements.” April 1996.
- FSURMP, “Landscape Maintenance Techniques for Pest Reduction.”
- Municipal Regional Stormwater Permit, Order No. R2-2009-0074, NPDES Permit No. CAS612008.

Additional References:

- CASQA, California Best Management Practice Handbook New Development and Redevelopment, Appendix D: “Unit Basin Volume for 80% Capture,” May 2003.
- Solano County Water Agency. Hydrology Manual. June 1999.
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CHAPTER 3: SITE DESIGN AND SOURCE CONTROL FOR NPDES COMPLIANCE

All regulated projects must consider site design and source controls. The use of site designs can help minimize the need for Low Impact Development Design and treatment controls as described in Chapter 4.

SITE DESIGN FOR WATER QUALITY

Site design measures integrate basic stormwater management and hydrological concepts into site planning to help minimize the impact on stormwater quality. This often includes working with the natural topography, locating the development on the least sensitive portions of a site while protecting sensitive areas, and using design techniques to minimize and infiltrate runoff.

Some of the many ways to reduce water quality impacts through site design include:

- Reduce impervious surfaces;
- Drain rooftop downspouts to lawns or other landscaping; and
- Use landscaping as a storm drainage and treatment feature for paved surfaces.

Incorporating site design measures that are water quality friendly can save money by reducing the costs of construction materials (e.g. fewer storm drain pipes and catch basins, less pavement) and reducing maintenance of stormwater treatment controls. Site design can also enhance the aesthetic potential of the site by using protected sensitive areas as a selling point for uniqueness of property. For more information on how to save time and money by incorporating site design and source controls early in the design process, consult the following resources from the Bay Area Stormwater Management Agencies Association (BASMAA).

- BASMAA, “Start at the Source,” 1999
- BASMAA, “Using Site Design Techniques to Meet Development Requirements,” 2003

WHAT IS SOURCE CONTROL?

Source control is keeping sources of pollution away from stormwater. Some source control measures include:

- Roofs over trash enclosures and loading docks,
- Sanitary sewer drains in covered parking structures and vehicle wash areas; and
- Indoor wash racks for mats and equipment.

Design guideline drawings for common source controls, including car wash exits, loading dock drainage, trash enclosures, and fueling areas are included in Appendix B.

INTEGRATED PEST MANAGEMENT

Either by rain or irrigation, pesticides used on landscaping and gardens can be washed off the plants and soils upon which they have been applied. This stormwater runs off the land and flows to the nearest storm drain, which ultimately carries the stormwater to local creeks, the Suisun Marsh, and Suisun Bay without treatment. The State of California has found that pesticides carried within stormwater may be harmful to fish and other organisms. Therefore, reducing the use of pesticides in landscape maintenance helps protect water quality, aquatic life and human health.

When designing your project and landscaping, consider using designs that discourage pests. As you set up the necessary operation and maintenance requirements for the project, consider pest resistant plants and promoting integrated pest management (IPM) methods of pest control. IPM is a decision-making process for managing pests. This approach uses monitoring to determine pest-caused injury levels and the most effective methods for pest control. To effectively control pests while minimizing pesticide usage, IPM uses a combination of biological controls (natural enemies or predators); physical or mechanical controls (hand labor or mowing); cultural controls (mulching, disking, or alternative plant type selection); and reduced risk chemical controls (soaps or oils). If pesticides are necessary, IPM methods will use the least hazardous pesticides available as a last resort for controlling pests. For more information on pesticide reduction in landscape maintenance and design, please refer to the FSURMP brochure entitled “Landscape Maintenance Techniques for Pest Reduction.”

STORMWATER POLLUTION SOURCE CONTROL MEASURES LIST

This list, included in Appendix C, includes measures that the Cities may require as conditions of approval on projects, as appropriate. The list describes some of the stormwater control measures that may be included into your project. The Cities can assist in determining which measures may be used for a specific project. Both site design and source control measures can be implemented, many of which are designed to reduce the amount of impervious surface area. By reducing the amount of impervious surface area on a project, the amount of area requiring more costly treatment BMPs is reduced.

SMALL PROJECTS AND DETACHED SINGLE-FAMILY HOME PROJECTS

Beginning in December 2012, all development projects that create and/or replace from 2,500 square feet to 10,000 square feet of impervious surface, and detached single-family home

projects¹ that create and/or replace greater than 2,500 square feet or more of impervious surface, shall incorporate one or more of the following site design measures:

- Direct roof runoff into cisterns or rain barrels for reuse.
- Direct roof runoff onto vegetated areas.
- Direct runoff from sidewalks, walkways, and/or patios onto vegetated areas.
- Direct runoff from driveways and/or uncovered parking lots onto vegetated areas.
- Construct sidewalks, walkways, and/or patios with permeable surfaces.
- Construct bike lanes, driveways, and/or uncovered parking lots with permeable surfaces.

¹ **Detached single-family home project** – The building of one single new house or the addition and/or replacement of impervious surface to one single existing house, which is not part of a larger plan of development.

CHAPTER 4: LOW IMPACT DEVELOPMENT DESIGN GUIDE

Your Application Package—to be submitted with your application for planning and zoning approvals (entitlements)—must include an analysis related to stormwater treatment for the project site. This includes the completion of the LID Feasibility Worksheet found in Appendix E.

The overall design of the project must take into consideration LID stormwater treatment measures. This requires careful documentation of:

- Pervious and impervious areas in the planned project.
- Drainage from each of these areas.
- Locations, sizes, and types of proposed treatment and flow-control facilities.

Your overall design submittal must include calculations showing that the site drainage and proposed treatment facilities meet the criteria in this Guidebook.

This Low Impact Development Design Guide will help you:

- ✓ Analyze your project and identify and select options for implementing LID techniques to meet runoff treatment requirements
- ✓ Design and document drainage for the whole site and document how that design meets this Guidebook’s stormwater treatment criteria
- ✓ Specify design details
- ✓ Integrate your LID drainage design with your paving and landscaping design

Alternatives to LID design are discussed in the final section of this chapter.

Before beginning your LID design, determine whether HMP requirements apply to your site. (See Appendix D, HMP Applicability and Compliance). If HMP requirements apply, review Appendix D to understand your options for meeting those requirements. If HMP requirements do not apply (i.e., your project is outside of the area delineated in the HMP), or if you are using another option to meet HMP requirements, then you may use the treatment-only factors to size your facilities.

ANALYZE YOUR PROJECT FOR LID

Conceptually, there are five LID strategies for managing runoff from impervious surfaces:

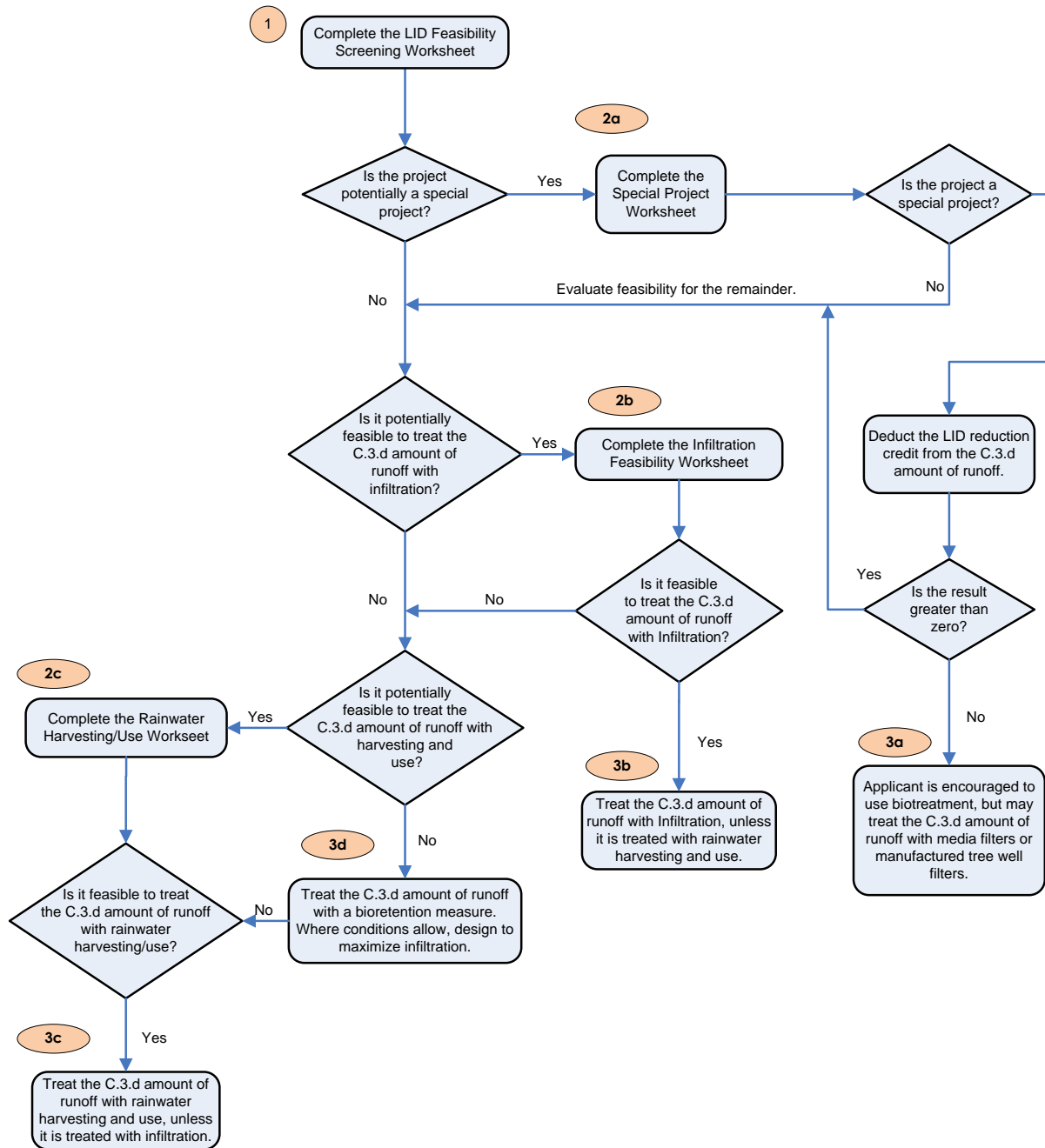
1. **Optimize the site layout** by preserving natural drainage features and designing buildings and circulation to minimize the amount of roofs, paving, and other impervious surfaces.
2. **Use pervious (self-treating/self-retaining) surfaces** such as turf, gravel, or pervious pavement, or use surfaces that retain rainfall, such as “green roofs.”

3. **Infiltration/Evapotranspiration:** Disperse runoff from impervious surfaces onto adjacent pervious infiltrating surfaces (e.g., direct runoff to an infiltration or retention basin).
4. **Harvest and Use:** Use rainfall for irrigation or other non-potable use (such as toilet flushing, industrial use, or washing).
5. **Biotreatment:** Drain impervious surfaces to engineered **Integrated Management Practices** (IMPs), such as flow-through planters. IMPs infiltrate runoff to groundwater and/or percolate runoff through engineered soil and allow it to drain away slowly.

LID FEASIBILITY DETERMINATION

Several worksheets and guidance documents have been developed to assist project applicants and City staff in determining whether it is feasible or infeasible for individual projects to treat the full volume of stormwater runoff using infiltration or rainwater harvesting and use. Where these LID measures are determined to be infeasible, biotreatment is allowed. The following flowchart is adapted from draft guidance prepared by the Bay Area Stormwater Management Agencies Association (BASMAA), based on a Criteria Report submitted to the Regional Board on May 1, 2011. Worksheets referred to in the flow chart are included in Appendix E. The worksheets aid in determining whether infiltration and/or harvesting and use are feasible.

Due to the types of soils found in the FSURMP area (mainly type C & D), it is unlikely that infiltration will be feasible for projects in Fairfield or Suisun City. Furthermore, rainfall harvest and re-use is expected to be infeasible due to the ratio of pervious to impervious surface and the project density. It is anticipated that completion of the LID Feasibility worksheets in Appendix E will show biotreatment as the stormwater quality treatment method of choice.



Design criteria has been developed for the following IMPs:

- **Bioretention facilities**, which can be configured as swales, free-form areas, or planters to integrate with the landscape design.
- **Flow-through planters**, which can be used near building foundations and other locations where infiltration to native soils is not desired.
- **Dry wells** and other infiltration facilities, which can be used only where soils are suitable.
- **Cisterns**, in combination with a bioretention facility.

See the **design sheets** in Appendix F.

Finding the right location for treatment and flow-control facilities on your site involves a careful and creative integration of several factors:

- To make the most efficient use of the site and to maximize aesthetic value, **integrate IMPs with site landscaping**. Many local zoning codes may require landscape setbacks or buffers, or may specify that a minimum portion of the site be landscaped. It may be possible to locate some or all of the site's treatment and flow-control facilities within this same area, or within utility easements or other non-buildable areas.
- Planter boxes and bioretention facilities should be **level or nearly level** all the way around. Linear bioretention facilities (swales) may be gently sloped end to end, but opposite sides should be at the same elevation.
- For effective, low-maintenance operation, **locate facilities so drainage into and out of the device is by gravity flow**. Pumped systems are feasible, but are expensive, require more maintenance, are prone to untimely failure, and can cause mosquito control problems. Most IMPs require three (3) feet or more of head.
- Bioretention facilities and other IMPs may require excavations three (3) or more feet deep, which can conflict with underground utilities.
- If the property is being subdivided now or in the future, the facility should be in a **common, accessible area**. In particular, avoid locating facilities on private residential lots. Even if the facility will serve only one site owner or operator, make sure the facility is located for easy access by inspectors from the local municipality and the Solano Mosquito Abatement District.
- The facility must be accessible to equipment needed for its maintenance. **Access requirements for maintenance** will vary with the type of facility selected. Bioretention facilities will typically need access for the same types of equipment used for landscape maintenance.

To complete your analysis, include a brief **narrative** documenting the site layout and site design decisions you made. This will provide background and context for how your design meets the quantitative LID design criteria.

DEVELOP AND DOCUMENT YOUR DRAINAGE DESIGN

The FSURMP’s **design documentation procedure** begins with careful delineation of pervious areas and impervious areas (including roofs) throughout the site. The procedure accounts for how runoff from each delineated area is managed. For areas draining to IMPs, the procedure ensures each IMP is appropriately sized.

The procedure results in a space-efficient, cost-efficient LID design for meeting C.3 requirements on most residential and commercial/industrial developments. The procedure arranges documentation of drainage design and IMP sizing in a consistent format for presentation and review.

STEP 1: DELINEATE DRAINAGE MANAGEMENT AREAS

This is the key first step. You must divide the **ENTIRE PROJECT AREA** into individual, discrete Drainage Management Areas (DMAs). Typically, lines delineating DMAs follow grade breaks and roof ridge lines. The site map, tables, text, and calculations in your Stormwater Control Plan will illustrate, describe, and account for runoff from each of these areas.

Use separate DMAs for each surface type (e.g., landscaping, pervious paving, or roofs). Each DMA must be assigned a single hydrologic soil group. Assign each DMA an identification number and determine its size in square feet.

STEP 2: CLASSIFY DMAS AND DETERMINE RUNOFF FACTORS

Next, determine how drainage from each DMA will be handled. Each DMA will be one of the following types:

1. Self-treating areas.
2. Self-retaining areas (also called “zero-discharge” areas).
3. Areas that drain to self-retaining areas.
4. Areas that drain to IMPs.

SELF-TREATING AREAS (FIGURE 4-1)

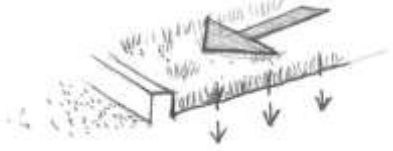


FIGURE 4-1. Self-treating areas are entirely pervious and drain directly off-site or to the storm drain system.

Self-Treating Areas are landscaped or turf areas that do not drain to IMPs, but rather drain directly off site or to the storm drain system. Examples include upslope undeveloped areas which are ditched and drain around a development, and grassed slopes that drain off-site to an existing public street or storm drain. In general, self-treating areas include no impervious areas, unless the impervious area is very small (5% or less) in relationship to the receiving pervious area and slopes are gentle enough to ensure runoff from impervious areas will be absorbed into the vegetation and soil.

SELF-RETAINING AREAS (FIGURE 4-2)

Self-retaining areas are designed to retain the first one inch of rainfall without producing any runoff. The technique works best on flat, heavily landscaped sites. It may be used on mild slopes if there is a reasonable expectation that a one-inch rainfall event would produce no runoff.

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. Grade slopes, if any, toward the center of the pervious area. Inlets of area drains, if any, should be set 3 inches above the low point to allow ponding.

Under some circumstances, pervious pavement (e.g., crushed stone, pervious asphalt, or pervious concrete) can be self-retaining. Adjacent roofs or impervious pavement may drain on to the pervious pavement in the same maximum ratios as described below. A gravel base course four or more inches deep will ensure an adequate proportion of rainfall is infiltrated into native soils (including clay soils) rather than producing runoff. Consult with a qualified engineer regarding infiltration rates, pavement stability, and suitability for the intended traffic.

Drainage from “green roofs” is considered to be “self-retained.” An emergency overflow should be provided for extreme events.

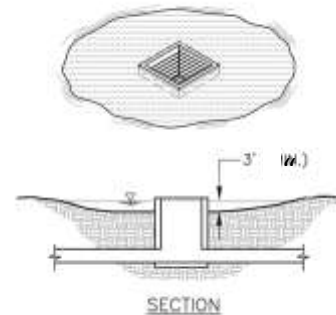


FIGURE 4-2. Self-retaining areas. Berm or depress the grade to retain at least an inch of rainfall and set inlets of any area drains at least 3 inches above low point to allow ponding.

AREAS DRAINING TO SELF-RETAINING AREAS (FIGURE 4-3)

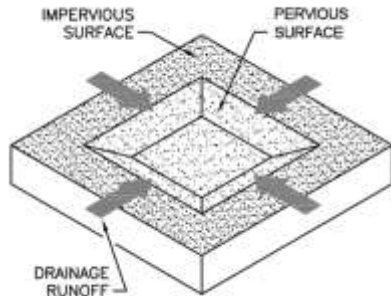


FIGURE 4-3. Relationship of impervious to pervious area for self-retaining areas.
 $pervious \geq \frac{1}{2} impervious$

Runoff from impervious or partially pervious areas can be managed by routing flow to self-retaining areas. For example, roof downspouts can be directed to lawns, and driveways can be sloped toward landscaped areas. **The maximum ratio is 2 parts impervious area for every 1 part pervious area, if treatment only requirements apply to the development project.**

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 to 1 part pervious area is used, then the pervious area must absorb 3 inches of water over its surface before overflowing to an off-site drain.

A partially pervious area may be drained to a self-retaining area. For example, a driveway composed of unit pavers may drain to an adjacent lawn. In this case, the maximum ratios are:

$$(Runoff\ factor) * (tributary\ area) \leq 2 * (selfretaining\ area)$$

For treatment-only sites. Use the runoff factors in Table 4-2.

Prolonged ponding is a potential problem at higher impervious/pervious ratios. In your design, ensure that the pervious area soils can handle the additional run-on and are sufficiently well-drained.

Runoff from self-treating and self-retaining areas does not require any further treatment.

TABLE 4-2. Runoff factors to be used when sizing IMPs.

Surface	Treatment Runoff Factor
Roofs	1.0
Concrete or Asphalt	1.0
Pervious Concrete	0.1
Porous Asphalt	0.1
Grouted Unit Pavers	1.0
Solid Unit Pavers	0.2
Crushed Aggregate	0.1
Turfblock	0.1
Landscape, Group A Soil	0.1
Landscape, Group B Soil	0.1
Landscape, Group C Soil	0.1
Landscape, Group D Soil	0.1

AREAS DRAINING TO LID MEASURES (INFILTRATION & HARVESTING AND USE)

The design of these types of measures must be coordinated with the Engineering Department of the Fairfield or Suisun City Public Works Department.

AREAS DRAINING TO IMPs

Areas draining to IMPs are used to calculate the required size of the IMP. On most densely developed sites—such as commercial and mixed-use developments and small-lot residential subdivisions—most DMAs will drain to IMPs.

Sizing factors (ratios of IMP area to impervious DMA area) have been developed.

More than one DMA can drain to the same IMP.

Where possible, design site drainage so **only impervious roofs and pavement** drain to IMPs. This yields a simpler, more efficient design and also helps protect IMPs from becoming clogged by sediment.

If it is necessary to include turf, landscaping, or pervious pavements within the area draining to an IMP, list each surface as a separate DMA. A runoff factor (similar to a “C” factor used in the rational method) is applied to account for the reduction in the quantity of runoff. For example, when a turf or landscaped drainage management area drains to an IMP, the resulting increment in IMP size is:

$$(pervious\ area) \times (runoff\ factor) \times (sizing\ factor)$$

Use the runoff factors in Table 4-2.

STEP 3: TABULATE DRAINAGE MANAGEMENT AREAS

- Tabulate each self-treating area:
 - DMA Name: _____ Area: _____ sf

- Tabulate each self-retaining area:
 - DMA Name: _____ Area: _____ sf

- Tabulate areas draining to self-retaining areas. Check to be sure the total amount of (square feet of tributary area × runoff factor) for all DMAs draining to a receiving self-retaining area is no greater than a 1:1 ratio to the square footage of the receiving self-retaining area itself. A 1:1 ratio shall be used on sites subject to flow-control.

<i>DMA Name</i>	<i>Area (square feet)</i>	<i>Post-project surface type</i>	<i>Runoff factor</i>	<i>Product (Area x runoff factor)[A]</i>	<i>Receiving self-retaining DMA</i>	<i>Receiving self-retaining DMA Area (square feet) [B]</i>	<i>Ratio [A]/[B] (check)</i>

Compile a list of DMAs draining to IMPs. Proceed to Step 4 to check the sizing of the IMPs.

STEP 4: SELECT AND LAY OUT IMPs ON SITE PLAN

Descriptions, illustrations, designs, and design criteria for IMPs are in the design sheets in Appendix F. Once you have laid out the IMPs, calculate the square footage you have set aside on your site plan for each IMP.

STEP 5: CALCULATE MINIMUM AREA OF EACH IMP

The minimum area of each IMP is found by summing up the contributions of each tributary DMA and multiplying by the adjusted sizing factor (from Table 4-2) for the IMP.

STEP 6: DETERMINE IF IMP AREA IS ADEQUATE

Sizing and configuring IMPs may be an iterative process. After computing the minimum IMP area using Steps 1–5, review the site plan to determine if the reserved IMP area is sufficient. If so, the planned IMPs will meet the Provision C.3 sizing requirements. If not, revise the plan accordingly. Revisions may include:

- Reducing the overall imperviousness of the project site.
- Changing the grading and drainage to redirect some runoff toward other IMPs which may have excess capacity.
- Making tributary landscaped DMAs self-treating or self-retaining (may require changes to grading).
- Expanding IMP surface area.

Note revisions to square footage of an IMP typically require a corresponding revision to the square footage of the surrounding or adjacent DMA area.

STEP 7: COMPLETE YOUR SUMMARY REPORT

Present your IMP sizing calculations in tabular form. Adapt the following format as appropriate to your project.

Sum the total area of all DMAs and IMPs listed and show it is equal to the total project area. This step may include adjusting the square footage of some DMAs to account for area used for IMPs.

Project Name: _____

Project Location: _____

APN or Subdivision Number: _____

Total Project Area (square feet): _____

Mean Annual Precipitation at Project Site: _____

IMPs designed for (treatment only or treatment-and-flow-control): _____

Self-treating areas:

DMA Name: _____ Area: _____ sf

Self-retaining areas:

DMA Name: _____ Area: _____ sf

Areas draining to self-retaining areas:

<i>DMA Name</i>	<i>Area (square feet)</i>	<i>Post-project surface type</i>	<i>Runoff factor</i>	<i>Product runoff factor</i> [A]	<i>Receiving self-retaining DMA</i>	<i>Receiving self-retaining DMA Area (square feet)</i> [B]	<i>Ratio</i> [A]/[B]

Areas draining to IMPs (repeat for each IMP):

<i>DMA Name</i>	<i>DMA Area (square feet)</i>	<i>Post-project surface type</i>	<i>DMA Runoff factor</i>	<i>DMA Area × runoff factor</i>	<i>Soil Type:</i>	<i>IMP Name</i>				
						<i>IMP Sizing factor</i>	<i>Rain Adjust-ment Factor</i>	<i>Minimum Area or Volume</i>	<i>Proposed Area or Volume</i>	
Total										IMP Area

SPECIFY PRELIMINARY DESIGN DETAILS

Describe your features and facilities in sufficient detail to demonstrate that the area and other criteria of each can be met within the constraints of the site.

Ensure these details are consistent with preliminary site plans, landscaping plans, and architectural plans submitted with your application for planning and zoning approvals.

Design sheets for the following are included in Appendix F:

- Self-treating and self-retaining areas
- Pervious pavements
- Bioretention facilities
- Flow-through planter
- Cistern with Biotreatment

These design sheets include recommended configurations and details, and example applications, for these features and facilities. The information in these design sheets must be adapted and applied to the conditions specific to the development project. Local planning, building, and public works officials have final review and approval authority over the project design.

Keep in mind that proper and functional design of facilities is the responsibility of the applicant. Effective operation of facilities throughout the project's lifetime will be the responsibility of the property owner.

ALTERNATIVES TO LID DESIGN

If you believe LID design is infeasible for your development site, review the criteria for the selection of stormwater treatment facilities in Appendix E. If HMP requirements apply, also review the options for compliance in Appendix D, then consult with municipal staff before preparing an alternative design for stormwater treatment.

For all alternative designs, the applicant must submit an exhibit showing the entire site divided into discrete Drainage Management Areas, text and tables showing how drainage is routed from each DMA to a treatment facility, and calculations demonstrating the design achieves the applicable design criteria for each facility.

“IMP” EXAMPLE PROJECT

The Project:

1. Approximate 10,000 SF Commercial Building on 1 acre
2. 10-foot wide sidewalks along building where there is parking; 5-foot elsewhere
3. 45 parking spaces proposed, including ADA spaces (trash enclosure located in corner)
4. 15-foot landscape setbacks, with bio-retention proposed within landscape strips

Solve: Determine width of Bio-retention swales needed to meet minimum design standards

Steps:

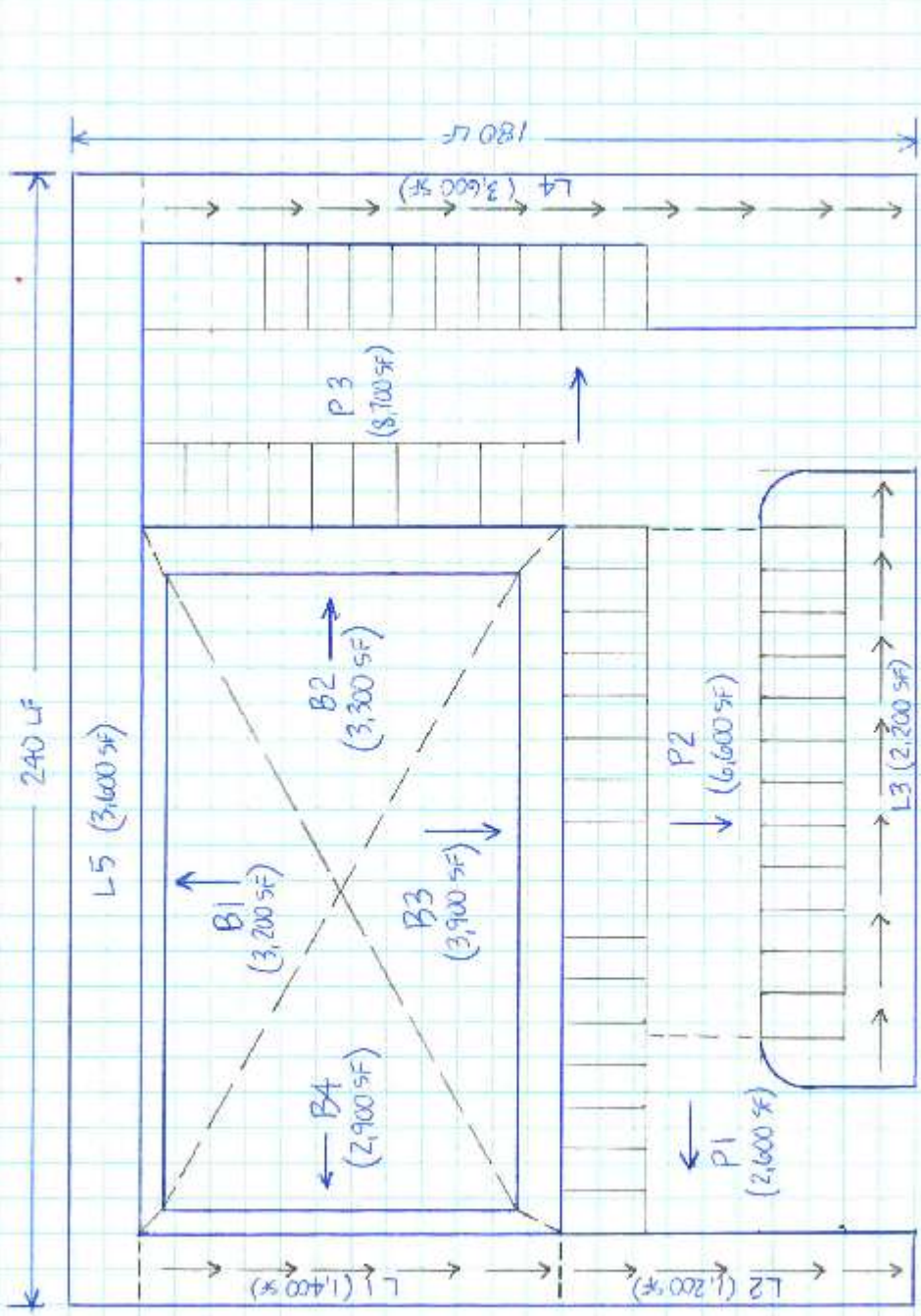
1. Break up project into Drainage Management Areas (DMAs), including identifying Self-Treating and Self-Retaining Areas:

DMA Name	Area (SF)	Description	Runoff Factor	Area X RO Factor (A)	Drains to/ Area (B)	Equation (A/B)	Ratio OK?
B1	3200	Building Roof	1.0	3200	L5/3600	3200/3600	Y (<2:1)
B2	3300	Building Roof	1.0	3300	L4/360	12000/360	NO (>1:1)
B3	3900	Building Roof	1.0	3900	L3/220	10500/220	NO (>1:1)
B4	2900	Building Roof	1.0	2900	L1/140	2900/140	NO (>1:1)
P1	2600	Parking Lot	1.0	2600	L2/120	2600/120	NO (>1:1)
P2	6600	Parking Lot	1.0	6600	L3/220	10500/220	NO (>1:1)
P3	8700	Parking Lot	1.0	8700	L4/360	12000/360	NO (>1:1)
L1	1400	LS (Self-Treating)	0.1	140			
L2	1200	LS (Self-Treating)	0.1	120			
L3	2200	LS (Self-Treating)	0.1	220			
L4	3600	LS (Self-Treating)	0.1	360			
L5	3600	LS (Self-Retaining)	N/A	N/A			

2. For DMA's needing IMP's, determine Minimum Treatment Areas

DMA Name	Area (SF)	Drains to	Treatment Factor	Area X TF	Swale length	Min. width of Bio-treatment	Proposed width of Bio-
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							treatment
B2 & P3	12000	L4	.04	480	160 LF	$480/160 = 3$ ft	3.0 ft
B3 & P2	10500	L3	.04	420	130 LF	$420/130 = 3.2$ ft	3.5 ft
B4	2900	L1	.04	116	90 LF	$116/90 = 1.3$ ft	2.0 ft
P1	2600	L2	.04	104	75 LF	$104/75 = 1.4$ ft	2.0 ft



SCALE: 1" = 30'

CHAPTER 5: OPERATION AND MAINTENANCE OF POST-CONSTRUCTION CONTROL REQUIREMENTS

Stormwater NPDES Permit Provision C.3.h. requires each municipality verify stormwater treatment and flow-control facilities are adequately maintained. The Program must report the results of inspections to the Water Board annually.

Maintenance is recognized as a critical component of stormwater treatment BMP effectiveness and useful life. All owners/operators of developments subject to the stormwater requirements are required to operate and maintain their BMPs so that they continue to perform properly as designed over the life of the project, and that they minimize potential nuisances and public health impacts from vector breeding (e.g. mosquitoes). City staff will require you to enter into operation & maintenance agreements and will require annual reporting of the post-construction controls that you incorporate into your project. See Appendix G for the Stormwater Treatment Measures Maintenance Agreement that the development owner will be required to enter into prior to final approval of the project building permits.

The Stormwater Treatment Measures Operations & Maintenance Agreement will be signed by an authorized city representative and the property owner or authorized representative of the HOA or Special District. The agreement shall be a recorded document with the Solano County Assessor's Office, and shall be a document that runs with the property.

For more information on operation and maintenance requirements, contact your City Public Works staff representative. The Stormwater Treatment Measures Operations & Maintenance Agreement, inspection checklists, fact sheets and reporting forms are provided within Appendix G of this packet.

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APPENDIX A: POST-CONSTRUCTION STORMWATER APPLICATION



FAIRFIELD-SUISUN
URBAN RUNOFF MANAGEMENT PROGRAM

STAFF ONLY		
Application	Submittal Date	Initials
Initial	_____	_____
Final	_____	_____
Application Approval Date	_____	

NEW AND REDEVELOPMENT POST CONSTRUCTION STORMWATER REQUIREMENTS APPLICATION

WHICH PROJECTS APPLY?

Beginning December 1, 2011, all projects that are required to treat stormwater will need to treat the permit-specified amount of stormwater runoff with one or more of the following low impact development methods: rainwater harvest and use, infiltration, evapotranspiration, or biotreatment. Biotreatment will be allowed only where harvesting and reuse, infiltration, and evapotranspiration are shown to be infeasible at the project site. Vault-based treatment will not be allowed as a stand-alone treatment measure. Where stormwater harvesting and reuse, infiltration, or evapotranspiration are infeasible, vault based treatment measures may be used in series with biotreatment, for example, to remove trash or other large solids.

WHAT IS AN IMPERVIOUS SURFACE?

An impervious surface prevents the infiltration or passage of water into the soil. Onsite impervious surfaces include building rooftops, paved patios, covered patios, driveways, parking lots, paved walkways, sidewalks and streets.

Project Name: _____ APN # _____ - _____ - _____

Project Description: _____

Applicant Name: _____

Project Location: _____
(address)

_____ (watershed) _____ (receiving water)

LID FEASIBILITY EVALUATION ATTACHED? Yes No (See Appendix E. Must be attached)

CERTIFICATION:

I hereby certify under penalty of perjury that the information presented in this application and attachments is true and complete:

(Signature of Property Owner or Other Responsible Party)

(Date)

(Type or Print Name)

(E-mail)

(Mailing Address)

(Phone)

1. PROJECT TYPE (CHECK ONE):

- New Development Redevelopment

2. PROJECT USE (CHECK ONE):

- Residential Commercial Industrial Public Road
 Multi-use Other: _____

If Residential, does the project consist of a single-family home that is not part of a larger common plan of development? Yes No

If yes, no numeric sizing criteria or Operation and Maintenance Agreement is required and the project will be considered in compliance with stormwater requirements with the incorporation of appropriate pollutant source control and low impact development site design measures.

3. PROJECT SIZE:

- a. Site size _____sq. ft. or _____ acres
b. Existing impervious surface area (includes land covered by buildings, sheds, patios/covers, parking lots, streets, sidewalks, paved walkways and driveways onsite) _____sq. ft.
c. New impervious surface area created _____sq. ft.
d. Impervious surface area replaced _____sq. ft.
e. Impervious surface area created or replaced (c + d) _____sq. ft.
f. Percent increase/replacement of impervious surface area _____ %
e/b X 100
g. Estimated area of land disturbance during construction _____sq. ft.
(including clearing, grading, or excavating).

4. TYPE OF PESTICIDE REDUCTION MEASURES USED (to be checked by City staff):

- Education (e.g., fact sheet, plant list) Conditions of Approval
 Does not Apply (Project has no landscape element) Other (Describe:_____)

5. TYPES OF STORMWATER CONTROLS USED (check all that apply, using lists on page 3 of this application):

- Treatment Measures Source Control Measures Site Design Measures

6. HYDROMODIFICATION MANAGEMENT PLAN APPLICABILITY:

- a. Direct Discharge Point of Project:
 Municipal Storm Drain System Creek Suisun Bay
b. Receiving Body Exempt? Yes No*

**PROJECTS LOCATED IN THE MID TO UPPER WATERSHEDS OF LAUREL AND LEDGEWOOD CREEKS SHALL REFER TO THE THE ATTACHED FIGURES 2 AND 3 FROM THE PROGRAM'S HYDROMODIFICATION MANGEMENT PLAN (HMP) FOR PROJECT'S HMP APPLICABILITY. FOR FURTHER DETAIL PLEASE SEE THE PROGRAM'S HMP.*

7. SPECIFIC STORMWATER TREATMENT AND CONTROL MEASURES:

Check all site design, source control and stormwater treatment control measures that will be incorporated into the project.

SITE DESIGN

- Minimize land disturbance
- Minimize impervious surfaces
- Minimum-impact street design (narrow residential streets, roadside swales)
- Minimum-impact parking lot design
- Cluster structures/pavement
- Porous/Permeable pavement
- Alternative driveway design
- Disconnect downspouts
- Microdetention in landscape
- Preserve open space: _____ ac. or sq.ft. (circle one)
- Protect riparian and wetland areas, riparian buffers (Setback from top of bank: _____ft.)
- Other _____

SOURCE CONTROLS

- Alternative Building Materials
- Wash area/racks, drain to sanitary sewer
- Covered dumpster area, drain to sanitary sewer
- Swimming pool/fountain drain to sanitary sewer
- Beneficial landscaping (minimizes irrigation, runoff, pesticides and fertilizers; promotes treatment)
- Outdoor material storage protection
- Covers, drains for loading docks, maintenance bays, fueling areas
- Maintenance (street sweeping, catch basin cleaning)
- Storm Drain Signage
- Green or Blue Roofs
- Other _____

STORMWATER TREATMENT

- Vegetated Swale
- Vegetated Buffer Strip
- Bioretention
- Extended Detention basin (dry)
- Wet Pond/Constructed wetland (basin or channel) (retention)
- Underground detention (e.g. Porous Pavement Recharge Bed)
- Media filter (sand, organic matter, manufactured)
- Hydrodynamic Separator Device (commercially available in-line treatment unit e.g., CDS, wet vault, vortex separator)
- Retention/Irrigation
- Water Quality Inlet/Oil/Water Separators
- Roof Garden/Green Roofs (rooftop vegetation)
- Planter Boxes
- Exfiltration Trench
- Other _____

8. TREATMENT CONTROL DETAILS

For each treatment control measure included as part of your project, provide the name and the sizing method used. Use additional sheets if necessary

NOTE: All numeric sizing calculations shall be submitted as part of the final application, and **must** include a signed certification, from a licensed civil engineer registered in the state of California, that the plan meets the criteria established in Order No. R2-2009-0074. A final *New and Redevelopment Post Construction Stormwater Requirements Application* must be submitted with the final construction drawings.

	TREATMENT CONTROL BMP	SIZING METHOD USED (VOLUME, FLOW, COMBINATION OF FLOW & VOLUME)
1.		
2.		
3.		
4.		
5.		

A. Property Owners Name _____

B. Responsible Party—Stormwater Treatment Measure Owner or Operator’s Information:

a. Name: _____

b. Address: _____

c. Phone/Fax/E-mail: _____

THIS PAGE TO BE COMPLETED BY PROGRAM STAFF ONLY:

MORE DETAILED INFORMATION ABOUT ACCESS ASSURANCE AND O&M RESPONSIBILITIES:

Describe how access permission is assured for O&M verification by public agencies or their representatives (e.g., City, Fairfield-Suisun Sewer District, Regional Water Quality Control Board, and Solano County Mosquito Abatement District):

Indicate how responsibility for O&M is assured. Check all that apply:

- Signed statement from private entity accepting responsibility for O&M until responsibility is legally transferred.
 - Signed statement from public entity assuming O&M and that the treatment measures meet all local design standards.
 - Written conditions in the sales or lease agreement requiring the buyer or lessee to assume O&M (in the case of purchase and sale agreements, conditions shall survive the close of escrow).
 - Written text in project conditions, covenants and restrictions for residential properties assigning O&M responsibilities to the homeowners association.
 - Any other legally enforceable agreement or mechanism that assigns responsibility and describe below.
-

LOCAL AGENCY O&M VERIFICATION PROGRAM

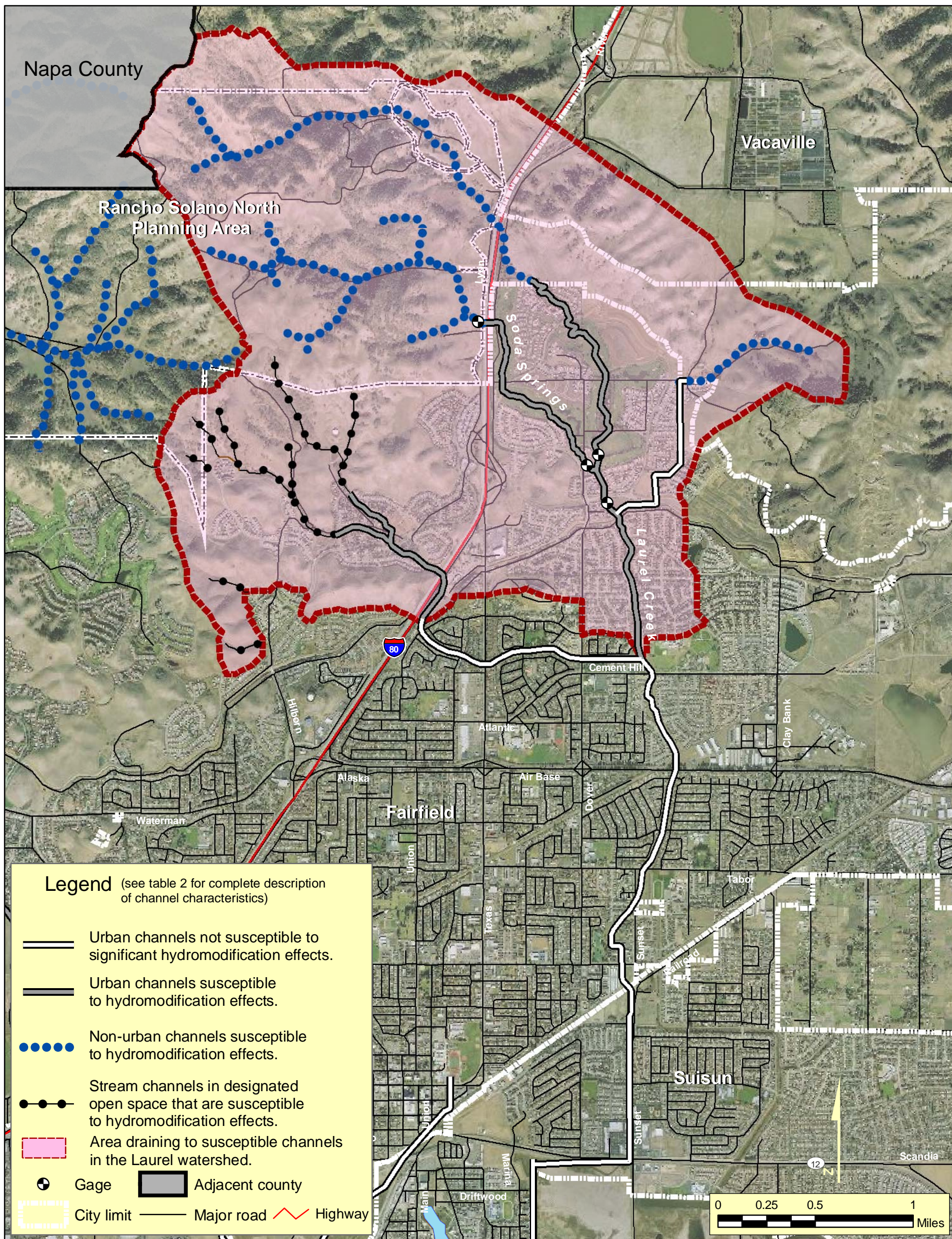
Name of municipality or Flood Control District responsible under the NPDES permit for verifying O&M.

Describe where information documenting responsibility for O&M is kept and updated.

APPLICATION REVIEWED BY (PLEASE INITIAL EACH LINE):

Planning and Development Department
Planning Division: _____

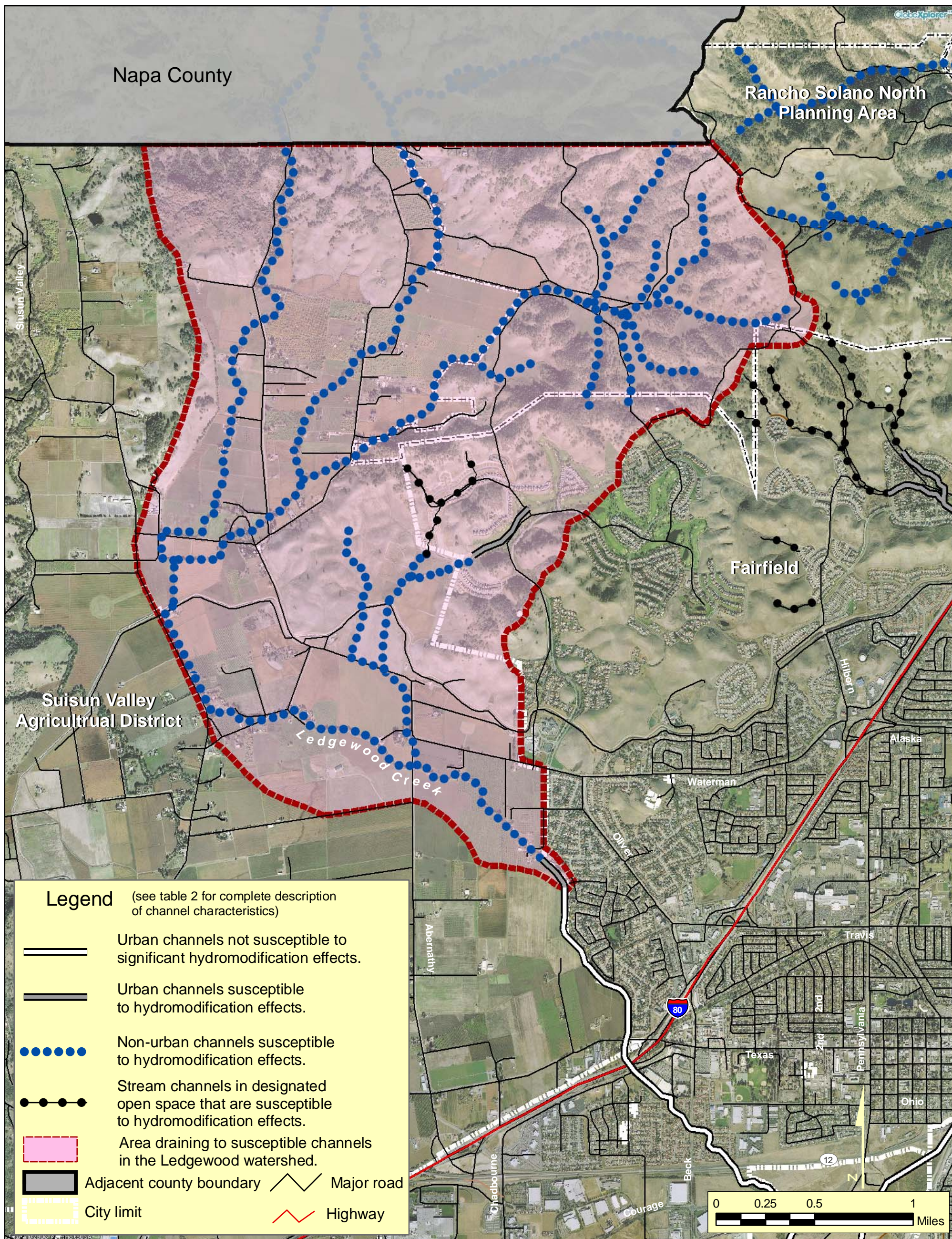
Public Works Department
Engineering Division: _____



Source: Basemap data provided by Fairfield-Suisun Sewer District. Note that the roads layer does not include the most recently urbanized areas (north of Cement Hill Road, for example).



Figure 2. Map showing HMP channel Classification for the Laurel Creek watershed. The mid- to upper reaches include all channels within the watershed that are susceptible to hydromodification effects (dotted and gray-shaded channels on this map). Hydromodification controls are not required for projects that drain directly to non-susceptible urban channels.



Basemap data provided by Fairfield-Suisun Sewer District. Note that the roads layer does not include the most recently urbanized areas, as shown in the aerial photo.

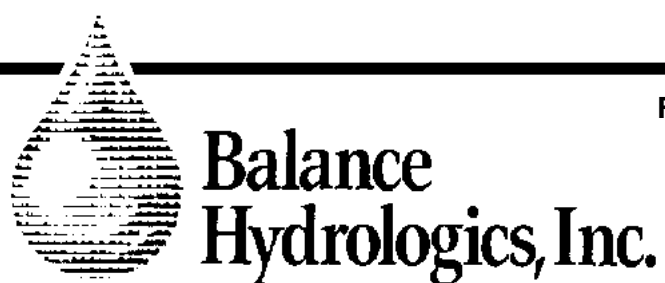


Figure 3. Map showing HMP channel Classification for the LedgeWood Creek watershed.

The mid- to upper reaches include all channels within the watershed that are susceptible to hydromodification effects (dotted and gray-shaded channels on this map), however areas outside the City of Fairfield are not included in this permit unless annexed by the city. The non-developed areas within the current city limits are designated open space in relatively steep terrain, and are unlikely to be converted to urban areas however the HMP still applies in these areas.

APPENDIX B: STORMWATER POLLUTION SOURCE CONTROL
MEASURES LIST

STORMWATER POLLUTION SOURCE CONTROL MEASURES

INTRODUCTION

The following list contains measures to control sources of stormwater pollutants associated with the post-construction phase of new development and redevelopment projects. Each identified source of pollutants may have one or more appropriate control measures. The model list is intended to be a menu from which municipalities may select appropriate measures to apply to specific projects.

1. Limit disturbance of natural water bodies and drainage systems; minimize compaction of highly permeable soils; protect slopes and channels; and minimize impacts from stormwater and urban runoff on the biological integrity of natural drainage systems and water bodies;
2. Conserve natural areas, including existing trees, other vegetation, and soils;
3. Minimize impervious surfaces;
4. Minimize disturbances to natural drainages; and
5. Minimize stormwater runoff by implementing one or more of the following site design measures:
 - Direct roof runoff into cisterns or rain barrels for reuse.
 - Direct roof runoff onto vegetated areas.
 - Direct runoff from sidewalks, walkways, and/or patios onto vegetated areas.
 - Direct runoff from driveways and/or uncovered parking lots onto vegetated areas.
 - Construct sidewalks, walkways, and/or patios with permeable surfaces.
 - Construct driveways, bike lanes, and/or uncovered parking lots with permeable surfaces.

GENERAL

1. The project will incorporate site design measures for reducing water quality impacts of the project, in compliance with the MRP NPDES Stormwater Permit Provision C.3. requirements. Guidance on approved site design measures is available from the Public Works Department. Final approval for site design measures must be obtained from the Public Works Department.
2. Significant natural features and resources on site such as undisturbed forest area, setbacks, easements, trees, steep slopes, erosive soils, wetlands or riparian areas shall be identified within the area to be developed and protected during construction and during future use of the site.
3. Site layout shall conform to natural landforms on-site. Buildings shall be located to utilize natural drainage systems as much as possible and avoid unnecessary

disturbance of vegetation and soils. Development on unstable or easily erodible soils shall be avoided due to their greater erosion potential.

4. Directly connected impervious surfaces shall be minimized. Runoff from impervious areas shall be channeled to pervious areas (e.g., park strips, vegetated planters) where possible prior to discharge to the storm drain.
5. Site permeability shall be maximized by clustering buildings, reducing building footprints, minimizing impervious surfaces, and paving with permeable materials where feasible.
6. The project shall cluster structures and incorporate smaller lot sizes where feasible to reduce overall impervious surface coverage and provide more undisturbed open space, for protection of water resources.
7. The amount of open space on the site shall be maximized and the open space area maintained in a natural manner.
8. Undisturbed natural areas such as conservation areas and stream buffers shall be utilized to treat and control stormwater runoff from other areas of the site with proper design.
9. The project shall utilize infiltration measures to reduce stormwater discharge to the greatest extent feasible.
10. The applicant shall minimize increases in stormwater flow and volume resulting from the development project to protect creeks and waterways from flooding and erosion impacts.

ILLEGAL DUMPING TO STORM DRAIN INLETS AND WATERWAYS

On-site storm drain inlets shall be clearly marked with the words “No Dumping! Flows to Creek,” or equivalent.

INTERIOR FLOOR DRAINS

Interior floor drains shall be plumbed to the sanitary sewer system and shall not be connected to storm drains.

PARKING GARAGES

Interior level parking garage floor drains shall be connected to a properly sized oil-water separator prior to discharging to the sanitary sewer system. The applicant shall contact the Fairfield-Suisun Sewer District for specific connection and discharge requirements.

PESTICIDE/FERTILIZER APPLICATION

1. Landscaping shall be designed to minimize irrigation and runoff, promote surface infiltration where appropriate, and minimize the use of fertilizers and pesticides that can contribute to stormwater pollution.
2. Structures shall be designed to discourage the occurrence and entry of pests into buildings, and thus minimize the need for pesticides. For example, dumpster areas should be located away from occupied buildings, and building foundation vents shall be covered with screens.
3. If a landscaping plan is required as part of a development project application, the plan shall meet the following conditions related to reduction of pesticide use on the project site:
 - a. Where feasible, landscaping shall be designed and operated to treat stormwater runoff by incorporating elements that collect, detain, and allow infiltration of runoff. In areas that provide detention of water, plants that are tolerant of saturated soil conditions and prolonged exposure to water shall be specified.
 - b. Plant materials selected shall be appropriate to site specific characteristics such as soil type, topography, climate, amount and timing of sunlight, prevailing winds, rainfall, air movement, patterns of land use, ecological consistency and plant interactions to ensure successful establishment.
 - c. Existing native trees, shrubs, and ground cover shall be retained and incorporated into the landscape plan to the maximum extent practicable.
 - d. Proper maintenance of landscaping, with minimal pesticide use, shall be the responsibility of the property owner.
 - e. Integrated Pest Management (IPM) principles and techniques shall be encouraged as part of the landscaping design to the maximum extent practicable. Examples of IPM principles and techniques include:
 - i. Select plants that are well adapted to soil conditions at the site.
 - ii. Select plants that are well adapted to sun and shade conditions at the site. In making these selections, consider future conditions when plants reach maturity, as well as seasonal changes.
 - iii. Provide irrigation appropriate to the water requirements of the selected plants.
 - iv. Select pest- and disease-resistant plants.
 - v. Plant a diversity of species to prevent a potential pest infestation from affecting the entire landscaping plan.
 - vi. Use insect friendly plants in the landscaping to attract and keep beneficial insects.

POOL, SPA, AND FOUNTAIN DISCHARGES

Pool (including swimming pools, hot tubs, spas and fountains) discharge drains shall not be connected directly to the storm drain or sanitary sewer system unless the connection is specifically approved by the Fairfield-Suisun Sewer District. Public pool discharge drains shall be connected to the sanitary sewer system, in accordance with applicable local requirements of the Fairfield-Suisun Sewer District.

When draining is necessary, a hose or other temporary system shall be directed into a sanitary sewer clean out. The clean out shall be installed in a readily accessible area (i.e. within 10 feet of the pool/spa/fountain).

FOOD SERVICE EQUIPMENT CLEANING

Food service facilities (including restaurants and grocery stores) shall have a sink or other floor mat, container, and equipment cleaning area that is connected to a grease interceptor prior to discharging to the sanitary sewer system. The cleaning area shall be large enough to clean the largest mat or piece of equipment to be cleaned. The cleaning area shall be indoors or in a roofed area outdoors; both areas must be plumbed to the grease interceptor and the sanitary sewer. Outdoor cleaning areas shall be designed to prevent stormwater run-on from entering the sanitary sewer and to prevent stormwater run-off from carrying pollutants to the storm drain. Signs shall be posted indicating that all food service equipment washing activities shall be conducted in this area. Regular maintenance and cleaning of the grease interceptor is required and may be subject to periodic inspections conducted by municipal staff.

REFUSE AREAS

1. New buildings such as food service facilities and/or multi-family residential complexes shall provide a roofed and enclosed area for dumpsters and recycling containers. The area shall be designed to prevent water run-on to the area and runoff from the area and to contain litter and trash, so that it is not dispersed by the wind or runoff during waste removal. See drawing SW-3 for details.
2. Runoff from trash enclosures, recycling areas, and/or food compactor enclosures, or similar facilities shall not discharge to the storm drain system. Trash enclosure areas shall be designed to avoid run-on to the trash enclosure area. If any drains are installed in or beneath dumpsters, compactors, and tallow bin areas serving food service facilities, the drains shall be connected to a properly sized grease removal device and/or treatment devices prior to discharging to the sanitary sewer.

OUTDOOR PROCESS ACTIVITIES/EQUIPMENT

1. Process activities shall be performed either indoors or in roofed outdoor areas. If performed outdoors, the area shall be designed to prevent run-on to and runoff from the area with process activities. Examples of appropriate design to prevent run-on and runoff include using a berm or grade break.
2. Process equipment areas shall drain to the sanitary sewer system. The applicant shall contact the Fairfield-Suisun Sewer District for specific connection and discharge requirements.

OUTDOOR EQUIPMENT/MATERIALS STORAGE

1. All outdoor equipment and materials storage areas shall be covered and bermed, or shall be designed to limit the potential for runoff to contact pollutants. Storage or maintenance/repair activities shall occur only on paved and contained areas.
2. Storage areas containing non-hazardous liquids shall be covered by a roof and contained by berms, dikes, liners, vaults, or similar spill containment devices.
3. All on-site hazardous materials and wastes, as defined by the California Public Health Code and the local Certified Unified Program Agency (CUPA) must be used and managed in compliance with the applicable CUPA program regulations and the facility hazardous materials management plan approved by the CUPA authority. Please contact Solano County's Environmental Health Division at 707-421-6765 for further details.

VEHICLE/EQUIPMENT CLEANING

1. Wastewater from vehicle and equipment washing operations shall not be discharged to the storm drain system. Any wastewater discharges to the sanitary sewer are subject to approval by the Fairfield-Suisun Sewer District.
2. Commercial/industrial facilities having vehicle/equipment cleaning needs and new residential complexes of 25 units or greater shall either provide a roofed, bermed area for washing activities or discourage vehicle/equipment washing by removing hose bibs (faucets) and installing signs prohibiting such uses. Vehicle/equipment washing areas shall be paved, designed to prevent run-on to or runoff from the area, and plumbed to drain to a sand and grit separator and then to the sanitary sewer. A sign shall be posted indicating the location and allowed uses in the designated wash area. The applicant shall contact the Fairfield-Suisun Sewer District for specific connection and discharge requirements.
3. Commercial car wash facilities shall be designed and operated 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 and the wastewater reused with no discharges to the storm drain. The applicant shall contact

the Fairfield-Suisun Sewer District for specific connection and discharge requirements. See drawing SW-1 for details.

VEHICLE/EQUIPMENT REPAIR AND MAINTENANCE

1. Vehicle/equipment repair and maintenance shall be performed in a designated area indoors, or if such services must be performed outdoors, in an area designed to prevent the run-on and runoff of stormwater.
2. Secondary containment shall be provided for exterior work areas where motor oil, brake fluid, gasoline, diesel fuel, radiator fluid, acid-containing batteries or other hazardous materials or hazardous wastes are used or stored. Drains shall not be installed within the secondary containment areas.
3. Vehicle service facilities shall not contain floor drains unless the floor drains are connected to wastewater pretreatment systems prior to discharge to the sanitary sewer, for which an industrial waste discharge permit has been obtained. The applicant shall contact the Fairfield-Suisun Sewer District for specific connection and discharge requirements.

FUEL DISPENSING AREAS

1. Fueling areas shall have impermeable surfaces (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.
2. The fueling area must be roofed and the roof's minimum dimensions must be equal to or greater than the area within the grade break or fuel dispensing area, as defined below. The canopy shall not drain onto the fueling area. See drawing SW-4 for details.

LOADING DOCKS

1. 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 plumbed as depicted in drawing SW-2 (Appendix C). The applicant shall contact the Fairfield-Suisun Sewer District for specific connection and discharge requirements.
2. Loading dock areas shall be equipped with a spill control valve or equivalent device, which shall be kept closed during periods of operation, subject to approval by the Fairfield-Suisun Sewer District.
3. Door skirts between the trailers and the building shall be installed to prevent exposure of loading activities to rain, unless one of the following conditions apply: the loading dock is covered, or the applicant demonstrates that rainfall will not result in an untreated discharge to the storm drain system.

FIRE SPRINKLER TEST WATER

Provisions shall be made in the project design and construction to allow for the discharge of fire sprinkler test water to the sanitary sewer or to a landscaped area.

MISCELLANEOUS DRAIN OR WASH WATER

Boiler drain lines shall be directly or indirectly connected to the sanitary sewer system and may not discharge to the storm drain system.

For small air conditioning units, air conditioning condensate should be directed to landscaped areas as a minimum BMP. For large air conditioning units, in new developments or significant redevelopments, the preferred alternatives are for condensate lines to be directed to landscaped areas, or alternatively connected to the sanitary sewer system after obtaining permission from the Fairfield-Suisun Sewer District. As with smaller units, any anti-algal, descaling agents or other byproducts must be properly disposed of at an appropriately permitted disposal facility. Any air conditioning condensate that is discharged to land without flowing to a storm drain may be subject to the requirements of the State Water Resources Control Board's (SWRCB) Statewide General Waste Discharge Requirements (WDRs) for Discharges to Land with a Low Threat to Water Quality.

Roof drains shall discharge and drain away from the building foundation to an unpaved area wherever practicable.

Roof top equipment including that producing air conditioning condensate shall drain to the sanitary sewer or be covered and have no discharge to the storm drain. The applicant shall contact the Fairfield-Suisun Sewer District for specific connection and discharge requirements.

An appropriately equipped facility that drains to the sanitary sewer must be provided for washing and/or steam cleaning activities. Sanitary connections are subject to the review, approval and conditions of the Fairfield-Suisun Sewer District for receiving the discharge. These conditions shall be required for automotive related businesses.

STREETS

1. Where density, topography, soils, slope and safety issues permit, vegetated open channels or other landscape measures shall be used in the street right of way to convey and treat stormwater runoff from roadways.
2. Sidewalks shall be sloped to drain to adjacent vegetated park strips.

PARKING LOTS

1. Where feasible, parking lots and other impervious areas shall be designed to drain stormwater runoff to vegetated drainage swales, filter strips, and/or other treatment devices that can be integrated into required landscaping areas and traffic islands prior to discharge into storm drain systems.
2. The amount of impervious area associated with parking lots shall be minimized by providing compact car spaces, reducing stall dimensions, incorporating efficient parking lanes, and using permeable pavement in overflow parking areas where feasible.
3. Curb cuts (one approximately every 10 feet), tire stops, or other means shall be provided to protect landscaped areas and allow maximum flow of stormwater into landscaped areas.
4. The use of permeable paving for parking and driveway surfaces is encouraged, to reduce runoff from the site. Such paving should meet Fire Department requirements and be structurally appropriate for the location.

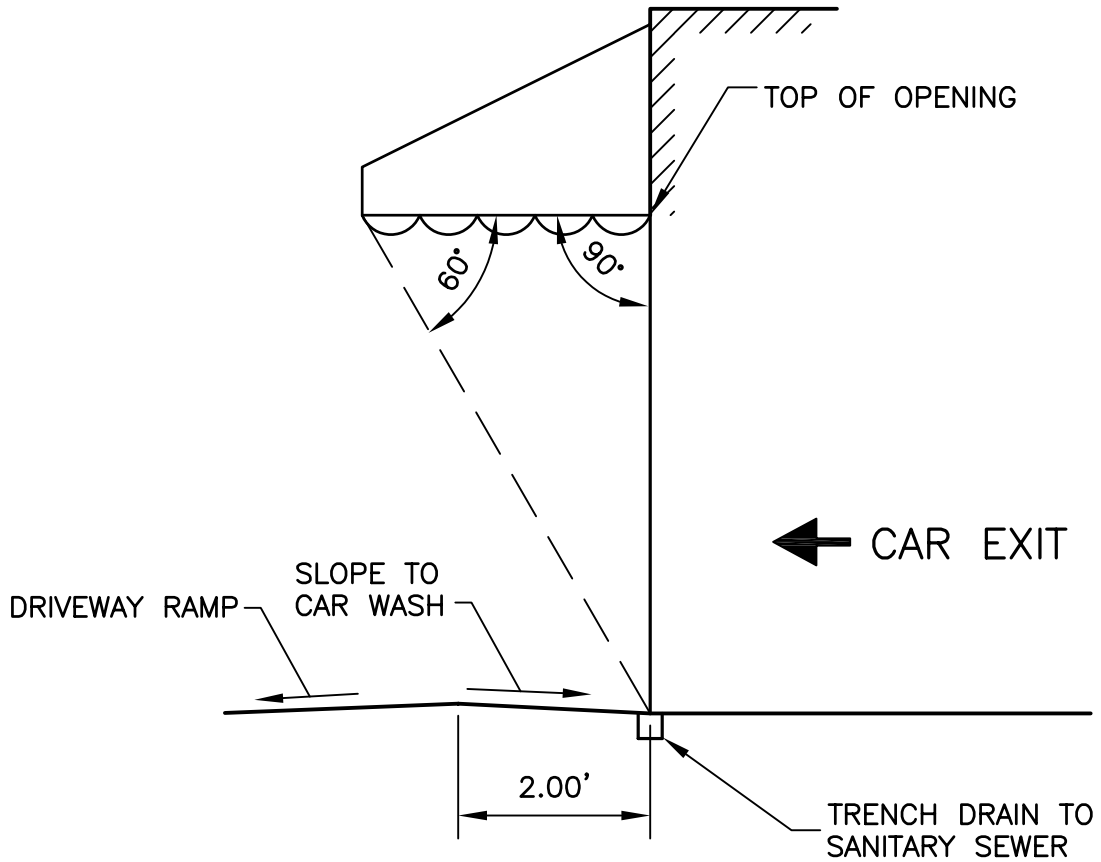
LANDSCAPING

1. Projects shall be designed to direct stormwater runoff into landscaping or natural vegetation where feasible.
2. Large landscaped areas shall be designed to collect and infiltrate stormwater where feasible. Overflow drains shall be placed so that landscaped areas can store runoff and drain at capacity. Such collection areas shall be designed and maintained to meet vector control requirements.
3. Where possible, runoff from impervious areas such as rooftops, roadways and parking lots shall be directed to pervious areas, open channels or vegetated areas prior to discharge to the storm drain system.

RIPARIAN AREAS

Naturally vegetated buffers shall be delineated and preserved along perennial streams, rivers, lakes and wetlands.

APPENDIX C: DESIGN DRAWINGS FOR COMMON SOURCE CONTROLS



STORM WATER BMP - POST-CONSTRUCTION

DWG. NO.

CAR WASH EXIT

SW-1

SCALE
NTS

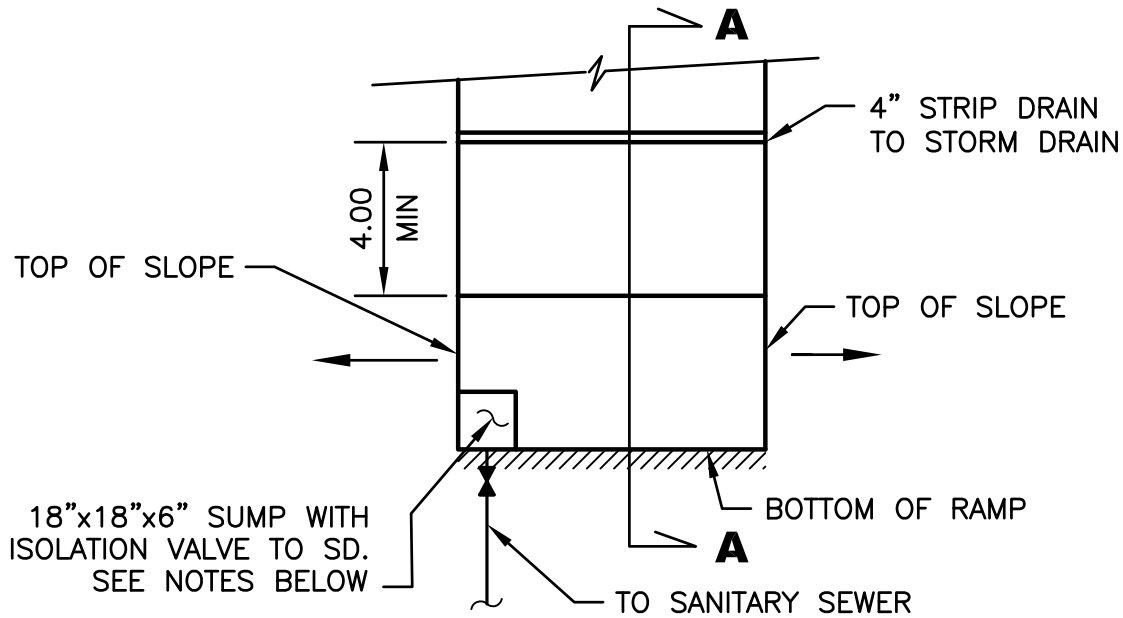
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DESIGNED BY:
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RH

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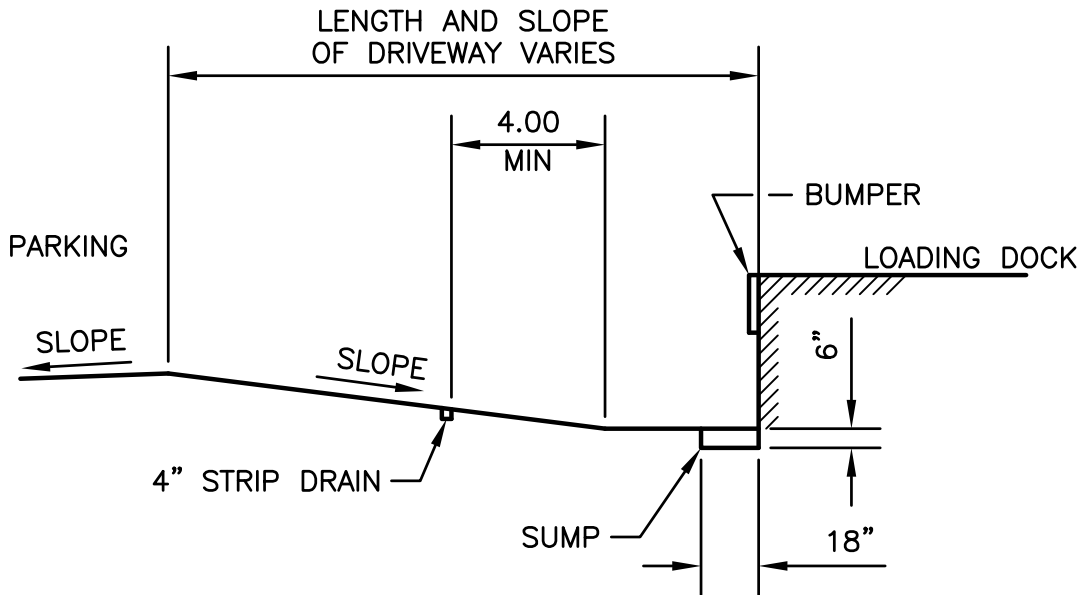
DATE
1/11/05



NOTES:

1. AN "EMERGENCY DRAIN SHUT OFF VALVE" SIGN SHALL BE LOCATED AT VALVE.
2. HANDLE TO ISOLATE VALVE SHALL BE WITHIN 10 FT.

PLAN



SECTION A-A



STORM WATER BMP - POST-CONSTRUCTION

DWG. NO.

LOADING DOCK

SW-2

SCALE
NTS

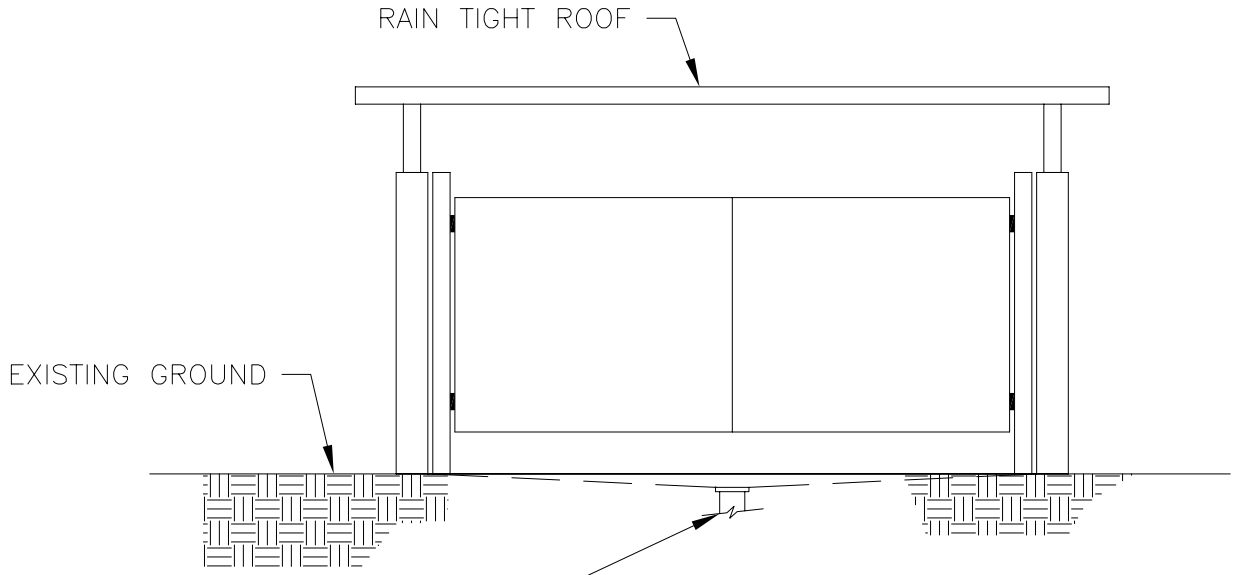
DRAWN BY:
ND

DESIGNED BY:
DA

APPROVED BY:
KC

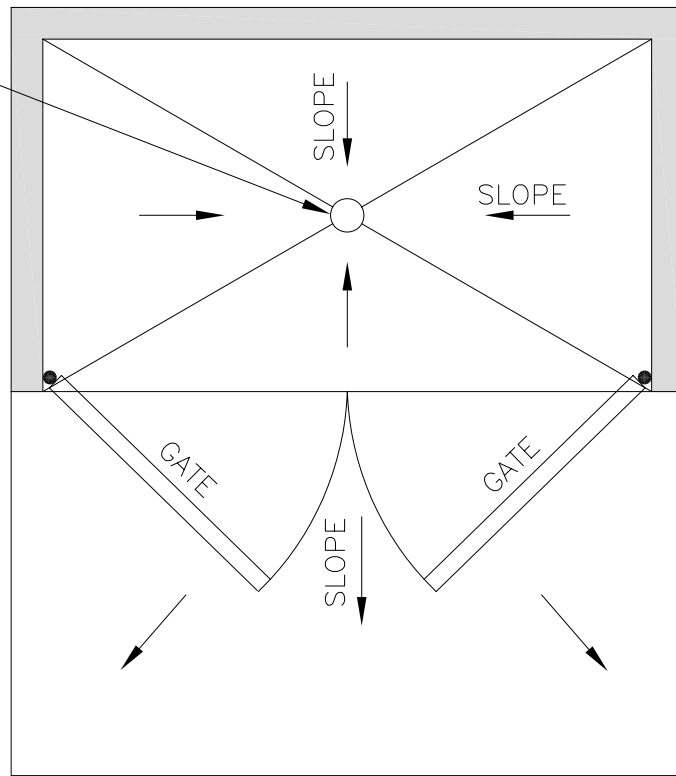
REV. NO.
3

DATE
6/22/06



ELEVATION

DRAIN TO SANITARY SEWER VIA P-TRAP



PLAN



STORM WATER BMP - POST-CONSTRUCTION

DWG. NO.

TRASH ENCLOSURE

SW-3

SCALE
NTS

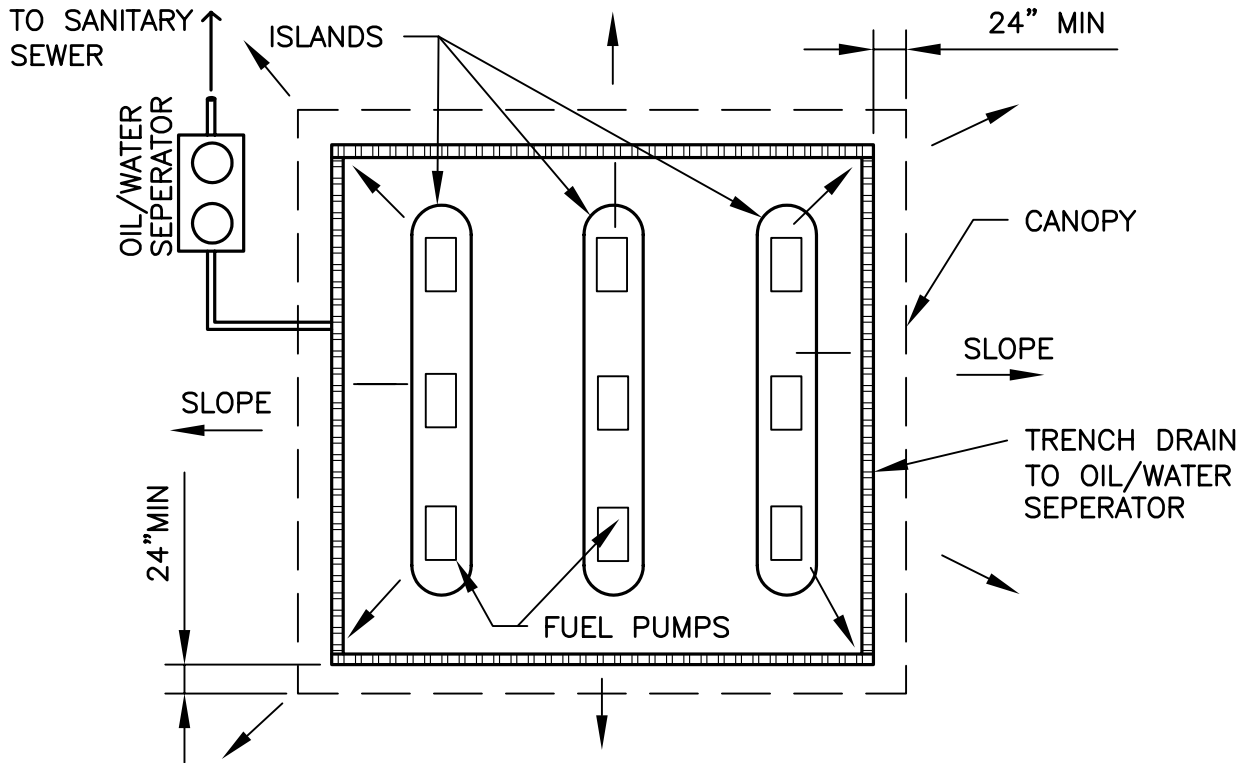
DRAWN BY:
ND

DESIGNED BY:
DA

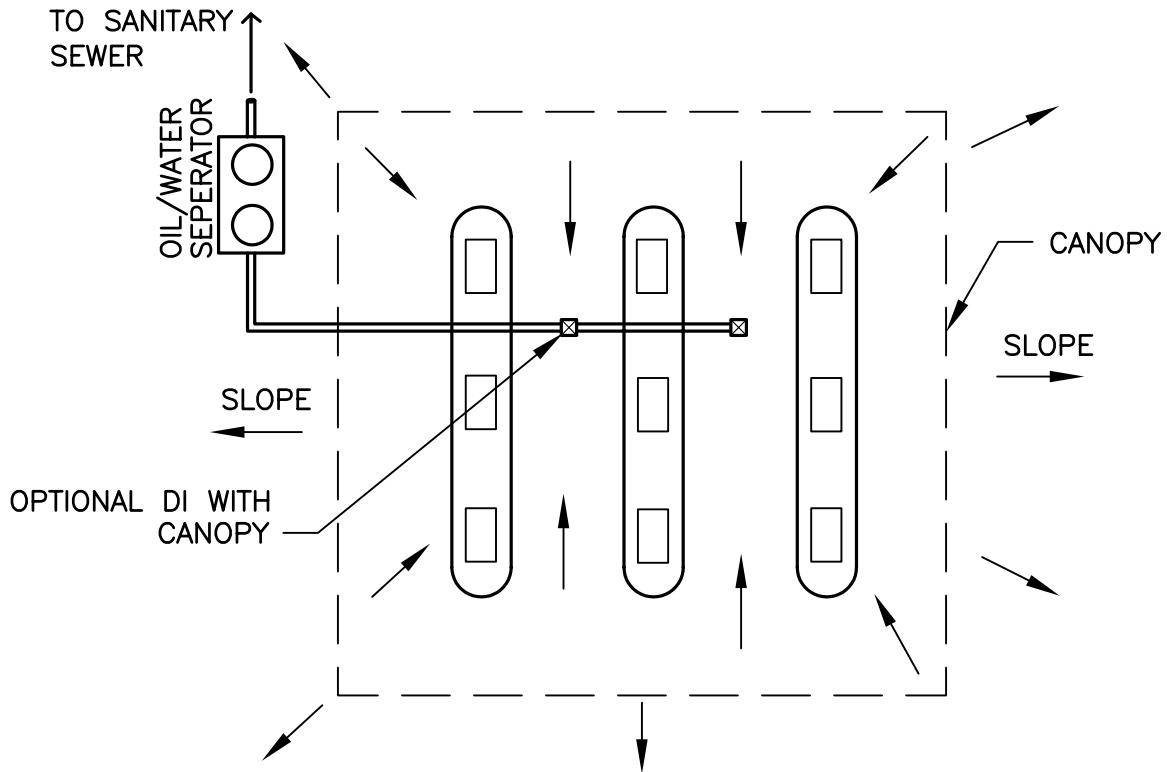
APPROVED BY:
RH

REV. NO.
3

DATE
4-26-05



OPTION 1



OPTION 2

NOTE:

1. ROOF DRAINS SHALL NOT DRAIN TO SANITARY SEWER.



STORM WATER BMP - POST-CONSTRUCTION

DWG. NO.

FUELING AREA

SW-4

SCALE
NTS

DRAWN BY:
ND

DESIGNED BY:
DA

APPROVED BY:
KC

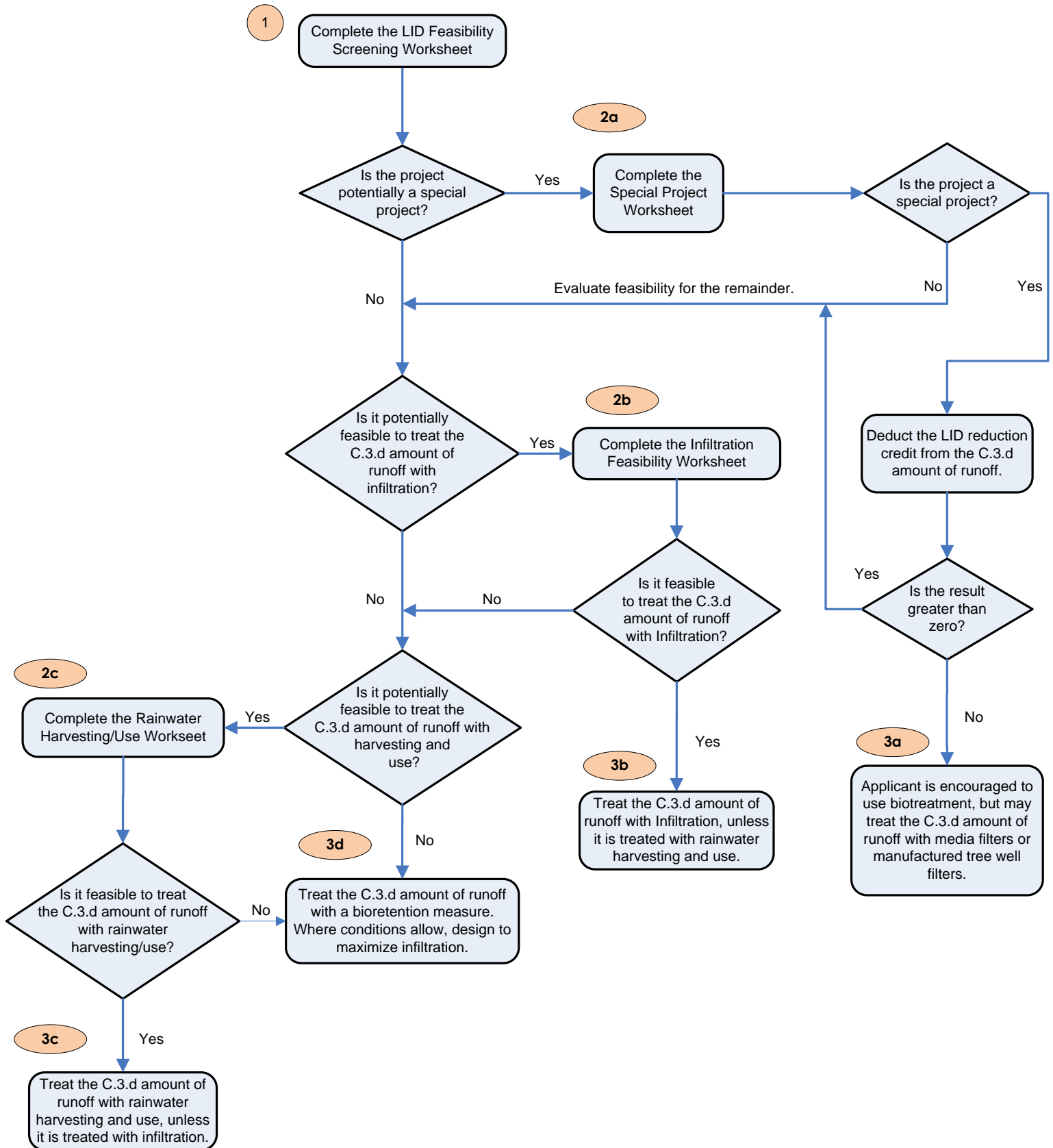
REV. NO.
2

DATE
1/11/05

APPENDIX D: HYDROMODIFICATION MANAGEMENT PLAN (HMP)

APPENDIX E: LID FEASIBILITY

LID FEASIBILITY WORKSHEETS FLOW CHART





Infiltration/Harvesting and Use Feasibility Screening Worksheet

Apply these screening criteria for C.3 Regulated Projects required to implement Provision C.3 stormwater treatment requirements. Contact municipal staff to determine whether the project meets Special Project criteria. If the project meets Special Project criteria, it will receive LID treatment reduction credits.

1. Applicant Info

Site Address: _____, CA APN: _____
 Applicant Name: _____ Phone No.: _____
 Mailing Address: _____

2. Feasibility Screening for Infiltration

Do site soils either (a) have a saturated hydraulic conductivity (Ksat) that will NOT allow infiltration of 80% of the annual runoff (that is, the Ksat is LESS than 1.6 inches/hour), or, if the Ksat rate is not available, (b) consist of Type C or D soils?¹

- Yes (continue) No – complete the Infiltration Feasibility Worksheet. If infiltration of the C.3.d amount of runoff is found to be feasible, there is no need to complete the rest of this screening worksheet.

3. Recycled Water Use

Check the box if the project is installing and using a recycled water plumbing system for non-potable water use.

- The project is installing a recycled water plumbing system, and the installation of a second non-potable water system for harvested rainwater is impractical, and considered infeasible due to cost considerations. Skip to Section 6.

4. Calculate the Potential Rainwater Capture Area for Screening of Harvesting and Use

Complete this section for the entire project area. If completing this form shows that rainwater harvesting and use is infeasible for the entire project, and the project includes one or more buildings that each have an individual roof area of 10,000 sq. ft. or more, then complete Sections 4 and 5 of this form for each of these buildings. For special projects that receive < 100% LID treatment reduction, skip Sections 4 through 6 of this form and use the Rainwater Harvesting and Use Feasibility Worksheet to determine feasibility of harvest and use.

4.1 Table 1 for (check one): The whole project Area of 1 building roof (10,000 sq.ft. min.)

Table 1: Calculation of the Potential Rainwater Capture Area				
<i>The Potential Rainwater Capture Area may consist of either the entire project area or one building with a roof area of 10,000 sq. ft. or more.</i>				
	1	2	3	4
	Pre-Project Impervious surface ² (sq.ft.), if applicable	Proposed Impervious Surface ² (IS), in sq. ft.		Post-project landscaping (sq.ft.), if applicable
		Replaced ³ IS	Created ⁴ IS	
a. Enter the totals for the area to be evaluated:				
b. Sum of replaced and created impervious surface:	N/A	N/A		N/A
c. Area of existing impervious surface that will NOT be replaced by the project.	N/A	N/A		N/A

4.2 Answer this question ONLY if you are completing this section for the entire project area. If existing impervious surface will be replaced by the project, does the area to be replaced equal at least 50%, but less than 100%, of the

¹ Base this response on the site-specific soil report, if available. If this is not available, consult soil hydraulic conductivity maps in Attachment 3.
² Enter the total of all impervious surfaces, including the building footprint, driveway(s), patio(s), impervious deck(s), unroofed porch(es), uncovered parking lot (including top deck of parking structure), impervious trails, miscellaneous paving or structures, and off-lot impervious surface (new, contiguous impervious surface created from road projects, including sidewalks and/or bike lanes built as part of new street). Impervious surfaces do NOT include vegetated roofs or pervious pavement that stores and infiltrates rainfall at a rate equal to immediately surrounding, unpaved landscaped areas, or that stores and infiltrates the C.3.d amount of runoff.
³ “Replaced” means that the project will install impervious surface where existing impervious surface is removed.
⁴ “Created” means the project will install new impervious surface where there is currently no impervious surface.

existing area of impervious surface? (Refer to Table 1, Row "a". Is the area in Column 2 \geq 50%, but < 100%, of Column 1?)

- Yes, C.3. stormwater treatment requirements apply to areas of impervious surface that will remain in place as well as the area created and/or replaced. This is known as the 50% rule.
- No, C.3. requirements apply only to the impervious area created and/or replaced.

4.3 Enter the square footage of the Potential Rainwater Capture Area. If you are evaluating only the roof area of a building, or you answered "no" to Question 4.2, this amount is from Row "b" in Table 1. If you answered "yes" to Question 4.2, this amount is the sum of Rows "b" and "c" in Table 1.:
 _____ square feet.

4.4 Convert the measurement of the Potential Rainwater Capture Area from square feet to acres (divide the amount in Item 4.3 by 43,560):
 _____ acres.

5. Feasibility Screening for Rainwater Harvesting and Use

5.1 Use of harvested rainwater for landscape irrigation:

Is the onsite landscaping LESS than 3.2 times the size of the Potential Rainwater Capture Area (Item 4.3)? (Note that the landscape area(s) would have to be contiguous and within the same Drainage Management Area to use harvested rainwater for irrigation via gravity flow.)

- Yes (continue)
- No – direct runoff from impervious areas to self-retaining areas OR refer to Table 11 and the curves in Appendix F of the LID Feasibility Report to evaluate feasibility of harvesting and using the C.3.d amount of runoff for irrigation.

5.2 Use of harvested rainwater for toilet flushing or non-potable industrial use:

a. Residential Projects: Proposed number of dwelling units: _____
 Calculate the dwelling units per impervious acre by dividing the number of dwelling units by the acres of the Potential Rainwater Capture Area in Item 4.4. Enter the result here:

_____)

Is the number of dwelling units per impervious acre LESS than 124 (assuming 2.7 occupants/unit)?

- Yes (continue)
- No – complete the Harvest/Use Feasibility Worksheet.

b. Commercial/Industrial Projects: Proposed interior floor area: _____ (sq. ft.)

Calculate the proposed interior floor area (sq.ft.) per acre of impervious surface by *dividing the interior floor area (sq.ft.) by the acres of the Potential Rainwater Capture Area in Item 4.4*. Enter the result here:

Does square footage of the interior floor space per impervious acre equal LESS than 84,000?)

- Yes (continue)
- No – complete the Harvest/Use Feasibility Worksheet

c. School Projects: Proposed interior floor area: _____ (sq. ft.)

Calculate the proposed interior floor area per acre of impervious surface by *dividing the interior floor area (sq.ft.) by the acres of the Potential Rainwater Capture Area in Item 4.4*. Enter the result here:

_____.

Does square footage of the interior floor space per impervious acre equal LESS than 27,000?)

- Yes (continue)
- No – complete the Harvest/Use Feasibility Worksheet

d. Mixed Commercial and Residential Use Projects

- Evaluate the residential toilet flushing demand based on the dwelling units per impervious acre for the residential portion of the project, following the instructions in Item 5.2.a, except you will use a prorated acreage of impervious surface, based on the percentage of the project dedicated to residential use.
- Evaluate the commercial toilet flushing demand per impervious acre for the commercial portion of the project, following the instructions in Item 5.2.b, except you will use a prorated acreage of impervious surface, based on the percentage of the project dedicated to commercial use.

e. Industrial Projects: Estimated non-potable water demand (gal/day): _____

Is the non-potable demand LESS than 2,900 gal/day per acre of the Potential Rainwater Capture Area?

- Yes (continue) No – refer to the curves in Appendix F of the LID Feasibility Report to evaluate feasibility of harvesting and using the C.3.d amount of runoff for industrial use.

6. Use of Biotreatment

If only the “Yes” boxes were checked for all questions in Sections 2 and 5, or the project will have a recycled water system for non-potable use (Section 3), then the applicant may use appropriately designed bioretention facilities for compliance with C.3 treatment requirements. The applicant is encouraged to maximize infiltration of stormwater if site conditions allow.

7. Results of Screening Analysis

Based on this screening analysis, the following steps will be taken for the project (If biotreatment is allowed, check the biotreatment option only. If further analysis is needed, check all that apply):

- Implement biotreatment measures (such as an appropriately designed bioretention area).
- Conduct further analysis of infiltration feasibility by completing the Infiltration Feasibility Worksheet.
- Conduct further analysis of rainwater harvesting and use by (check one):
 - Completing the Rainwater Harvesting and Use Feasibility Worksheet for:
 - The entire project
 - Individual building(s), if applicable, describe: _____
 - Evaluating the feasibility of harvesting and using the C.3.d amount of runoff for irrigation, based on Table 11 and the curves in Appendix F of the LID Feasibility Report
 - Evaluating the feasibility of harvesting and using the C.3.d amount of runoff for non-potable industrial use, based on the curves in Appendix F of the LID Feasibility Report.

Infiltration Feasibility Worksheet

Municipal Regional Stormwater Permit (MRP)

Stormwater Controls for Development Projects

Complete this worksheet for C.3 Regulated Projects* for which the soil hydraulic conductivity (Ksat) exceeds 1.6. Use this checklist to determine the feasibility of treating the C.3.d amount of runoff* with infiltration. Where it is infeasible to treat the C.3.d amount of runoff* with infiltration or rainwater harvesting and use, stormwater may be treated with biotreatment* measures. See Glossary (Attachment 1) for definitions of terms marked with an asterisk (*).

1. Enter Project Data.

- 1.1 Project Name: _____
- 1.2 Project Address: _____
- 1.3 Applicant/Agent Name: _____
- 1.4 Applicant/Agent Address: _____
- 1.5 Applicant/Agent Email: _____ Applicant / Agent Phone: _____

2. Evaluate infiltration feasibility.

Check "Yes" or "No" to indicate whether the following conditions apply to the project. If "Yes" is checked for any question, then infiltration is infeasible, and you can continue to Item 3.1 without answering any further questions in Section 2. If all of the answers in Section 2 are "No," then infiltration is feasible, and you may design infiltration facilities* for the area from which runoff must be treated. Items 2.1 through 2.3 address the feasibility of using infiltration facilities*, as well as the potential need to line bioretention areas.

- | | Yes | No |
|--|--------------------------|--------------------------|
| 2.1 Would infiltration facilities at this site conflict with the location of existing or proposed underground utilities or easements, or would the siting of infiltration facilities at this site result in their placement on top of underground utilities, or otherwise oriented to underground utilities, such that they would discharge to the utility trench, restrict access, or cause stability concerns? (If yes, attach evidence documenting this condition.) | <input type="checkbox"/> | <input type="checkbox"/> |
| 2.2 Is there a documented concern that there is a potential on the site for soil or groundwater pollutants to be mobilized? (If yes, attach documentation of mobilization concerns.) | <input type="checkbox"/> | <input type="checkbox"/> |
| 2.3 Are geotechnical hazards present, such as steep slopes, areas with landslide potential, soils subject to liquefaction, or would an infiltration facility need to be built less than 10 feet from a building foundation or other improvements subject to undermining by saturated soils? (If yes, attach documentation of geotechnical hazard.) | <input type="checkbox"/> | <input type="checkbox"/> |

Respond to Questions 2.4 through 2.9 only if the project proposes to use an infiltration device*.

- | | | |
|---|--------------------------|--------------------------|
| 2.4 Do local water district or other agency's policies or guidelines regarding the locations where infiltration may occur, the separation from seasonal high groundwater, or setbacks from potential sources of pollution prevent infiltration devices from being implemented at this site? (If yes, attach evidence documenting this condition.) | <input type="checkbox"/> | <input type="checkbox"/> |
| 2.5 If there are highly infiltrative native soils, such as sandy soil with an infiltration rate greater than 10" per hour, is there evidence that the soils are not sufficiently protective of groundwater to allow infiltration. (If yes, attach evidence documenting this condition.) | <input type="checkbox"/> | <input type="checkbox"/> |

- | | Yes | No |
|---|--------------------------|--------------------------|
| 2.6 Would construction of an infiltration device require that it be located less than 100 feet away from a septic tank, underground storage tank with hazardous materials, or other potential underground source of pollution? (If yes, attach evidence documenting this claim.) | <input type="checkbox"/> | <input type="checkbox"/> |
| 2.7 Is there a seasonal high groundwater table or mounded groundwater that would be within 10 feet of the base of an infiltration device* constructed on the site? (If yes, attach documentation of high groundwater.) | <input type="checkbox"/> | <input type="checkbox"/> |
| 2.8 Are there land uses that pose a high threat to water quality – including but not limited to industrial and light industrial activities, high vehicular traffic (i.e., 25,000 or greater average daily traffic on a main roadway or 15,000 or more average daily traffic on any intersecting roadway), automotive repair shops, car washes, fleet storage areas, or nurseries? (If yes, attach evidence documenting this claim.) | <input type="checkbox"/> | <input type="checkbox"/> |
| 2.9 Is there a groundwater production well within 100 feet of the location where an infiltration device would be constructed? (If yes, attach map showing the well.) | <input type="checkbox"/> | <input type="checkbox"/> |

3. Results of Feasibility Determination

- | | Infeasible | Feasible |
|--|--------------------------|--------------------------|
| 3.1 Based on the results of the Section 2 feasibility analysis, infiltration is (check one): | <input type="checkbox"/> | <input type="checkbox"/> |

→ If "FEASIBLE" is indicated for Item 3.1, then the amount of stormwater requiring treatment must be treated with infiltration (or rainwater harvest and use, if feasible). **Infiltration facilities*** may be designed for the area from which runoff must be treated.

→ If "INFEASIBLE" is checked for item 3.1, then the applicant may use appropriately designed biotreatment facilities for compliance with C.3 treatment requirements. The applicant is encouraged to maximize infiltration of stormwater if site conditions allow.

Name of Applicant (Print)

Name of Applicant (Sign)

Date

Rainwater Harvesting and Use Feasibility Worksheet

Municipal Regional Stormwater Permit (MRP)

Stormwater Controls for Development Projects

Complete this worksheet for all C.3 Regulated Projects* for which the project density exceeds the screening density* provided by municipal staff. Use this worksheet to determine the feasibility of treating the C.3.d amount of runoff* with rainwater harvesting and use for indoor, non-potable water uses. Where it is infeasible to treat the C.3d amount of runoff with either harvesting and use or infiltration, stormwater may be treated with biotreatment* measures. See Glossary (Attachment 1) for definitions of terms marked with an asterisk (*).

Complete this worksheet for the entire project area, or, if the project includes one or more buildings that each individually has a roof area of 10,000 square feet, complete a separate copy of this form for each of these buildings.

1. Enter Project Data.

1.1	Project Name:	
1.2	Project Address:	
1.3	Applicant/Agent Name:	
1.4	Applicant/Agent Address:	

(For projects with a potential non-potable water use other than toilet flushing, skip to Question 5.1)

1.5	Project Type:		If residential or mixed use, enter # of dwelling units:	
1.6			Enter square footage of non-residential interior floor area.:	
1.7	Potential rainwater capture area*:			sq.ft.
1.8	If it is a Special Project*, indicate the percentage of LID treatment* reduction:			percent
	<i>(Item 1.8 applies only to entire project evaluations, not individual roof area evaluations.)</i>			
1.9	Total potential rainwater capture area that will require LID treatment:			0 sq.ft.
	<i>(This is the total rain capture area remaining after any Special Project LID treatment reduction is applied.)</i>			

2. Calculate Area of Self-Treating Areas, Self-Retaining Areas, and Areas Contributing to Self-Retaining Areas.

(For areas within the Potential Rain Capture Area only)

2.1	If evaluating the entire project, enter square footage of any self-treating areas* on site:		sq.ft.
2.2	If evaluating the entire project, enter square footage of any self-retaining areas* on the site:		sq.ft.
2.3	For all projects, enter the square footage of areas contributing runoff to self-retaining area*:		sq.ft.
2.4	TOTAL of Items 2.1, 2.2, and 2.3:	-	sq.ft.

3. Subtract credit for self-treating/self-retaining areas from area requiring treatment.

3.1	Subtract the TOTAL in Item 2.4 from the potential rainwater capture area in Item 1.8		sq.ft.
3.3	Convert the remaining area required for treatment in Item 3.1 from square feet to acres	0.00	acres

4. Determine feasibility of use for toilet flushing based on demand

4.1	Project's dwelling units per acre of adjusted potential rain capture area (Divide the number in 1.5 by the number in 3.3)		dwelling units/acre
4.2	Non-residential interior floor area per acre of adjusted potential rain capture area (Divide the number in 1.6 by the number in 3.3)		Int. non-res. floor area/acre

Note: formulas in Items 4.1 and 4.2 are set up, respectively, for a residential or a non-residential project. Do not use these pre-set formulas for mixed use projects. For mixed use projects, evaluate the residential toilet flushing demand based on the dwelling units per acre for the residential portion of the project (use a prorated acreage, based on the percentage of the project dedicated to residential use). Then evaluate the commercial toilet flushing demand per acre for the commercial portion of the project (use a prorated acreage, based on the percentage of the project dedicated to commercial use).

4.3 Refer to the applicable countywide table in Attachment 2. Identify the number of dwelling units per impervious acre needed in your Rain Gauge Area to provide the toilet flushing demand required for rainwater harvest feasibility.

	dwelling units/acre
	int. non-res. floor area/acre

4.4 Refer to the applicable countywide table in Attachment 2. Identify the square feet of non-residential interior floor area per impervious acre needed in your Rain Gauge Area to provide the toilet flushing demand required for rainwater harvest feasibility.

Check "Yes" or "No" to indicate whether the following conditions apply. If "Yes" is checked for any question, then rainwater harvesting and use is infeasible. As soon as you answer "Yes", you can skip to Item 6.1. If "No" is checked for all items, then rainwater harvesting and use is feasible and you must harvest and use the C.3.d amount of stormwater, unless you infiltrate the C.3.d amount of stormwater*.

4.5 Is the project's number of dwelling units per acre of adjusted area requiring treatment (listed in Item 4.1) LESS than the number identified in Item 4.3? Yes No

4.6 Is the project's square footage of non-residential interior floor area per acre of adjusted area requiring treatment (listed in Item 4.2) LESS than the number identified in Item 4.4? Yes No

5. Determine feasibility of rainwater harvesting and use based on factors other than demand.

5.1 Would the technical requirements cause the harvesting system to exceed 2% of the Total Project Cost, or has the applicant documented economic hardship in relation to maintenance costs? (If so, attach an explanation.) Yes No

5.2 Do constraints, such as a slope above 10% or lack of available space at the site, make it infeasible to locate on the site a cistern of adequate size to harvest and use the C.3.d amount of water? (If so, attach an explanation.) Yes No

5.3 Are there geotechnical/stability concerns related to the surface (roof or ground) where a cistern would be located that make the use of rainwater harvesting infeasible? (If so, attach an explanation.) Yes No

5.4 Does the location of utilities, a septic system and/or **heritage trees*** limit the placement of a cistern on the site to the extent that rainwater harvesting is infeasible? (If so, attach an explanation.) Yes No

Note 1: It is assumed that projects with significant amounts of landscaping will either treat runoff with landscape dispersal (self-treating and self-retaining areas) or will evaluate the feasibility of harvesting and using rainwater for irrigation using the curves in Appendix F of the LID Feasibility Report.

6. Results of Feasibility Determination

6.1 Based on the results of the feasibility analysis in Item 4.4 and Section 5, rainwater harvesting/use is (check one): Infeasible Feasible

→ If "FEASIBLE" is indicated for Item 6.1 the amount of stormwater requiring treatment must be treated with harvesting/use, unless it is infiltrated into the soil.

→ If "INFEASIBLE" is checked for Item 6.1, then the applicant may use appropriately designed bioretention facilities for compliance with C.3 treatment requirements. If Ksat > 1.6 in./hr., and infiltration is unimpeded by subsurface conditions, then the bioretention facilities are predicted to infiltrate 80% or more average annual runoff. If Ksat < 1.6, maximize infiltration of stormwater by using bioinfiltration if site conditions allow, and remaining runoff will be discharged to storm drains via facility underdrains. If site conditions preclude infiltration, a lined bioretention area or flow-through planter may be used.

Applicant (Print)

Applicant (Sign)

Date

* See definitions in Glossary (Attachment 1)

LID Feasibility Worksheet

Attachment 1: Glossary

Biotreatment

A type of low impact development treatment allowed under Provision C.3.c of the *MRP**, if infiltration, evapotranspiration and rain water harvesting and use are infeasible. As required by Provision C.3.c.i(2)(vi), biotreatment systems shall be designed to have a surface area no smaller than what is required to accommodate a 5 inches/hour stormwater runoff surface loading rate and shall use biotreatment soil as specified in the biotreatment soil specifications submitted by the MRP co-permittees to the Regional Water Quality Control Board on April 29, 2011, or equivalent.

C.3 Regulated Projects:

Development projects as defined by Provision C.3.b.ii of the *MRP**. This includes public and private projects that create and/or replace 10,000 square feet or more of impervious surface, and it includes restaurants, retail gasoline outlets, auto service facilities, and uncovered parking lots (stand-alone or part of another use) that create and/or replace 5,000 square feet or more of impervious surface. Single family homes that are not part of a larger plan of development are specifically excluded.

C.3.d Amount of Runoff

The amount of stormwater runoff from C.3 Regulated Projects that must receive stormwater treatment, as described by hydraulic sizing design criteria in Provision C.3.d of the *MRP**.

Diameter at Breast Height (DBH)

The trunk diameter of a tree measured at breast height, 4.5 feet above the ground.

Heritage Tree

An individual tree of any size or species given the 'heritage tree' designation as defined by the municipality's tree ordinance or other section of the municipal code.

Infiltration Devices

Infiltration facilities that are deeper than they are wide and designed to infiltrate stormwater runoff into the subsurface and, as designed, bypass the natural groundwater protection afforded by surface soil. These devices include dry wells, injection wells and infiltration trenches (includes French drains).

Infiltration Facilities

A term that refers to both infiltration devices and measures.

Infiltration Measures

Infiltration facilities that are wider than they are deep (e.g., bioinfiltration, infiltration basins and shallow wide infiltration trenches and dry wells).

Low Impact Development (LID) Treatment

Removal of pollutants from stormwater runoff using the following types of stormwater treatment measures: rainwater harvesting and use, infiltration, evapotranspiration, or, where these are infeasible, biotreatment may be used.

Municipal Regional Stormwater Permit (MRP)

The municipal stormwater NPDES permit under which discharges are permitted from municipal separate storm sewer systems throughout the NPDES Phase I jurisdictions within the San Francisco Bay Region.

Potential Rain Capture Area

The area defined as the C.3 site area, if the rainwater harvesting and use evaluation considers the entire site; or, if the rainwater harvesting and use evaluation considers only the roof area, the Potential Rain Capture Area consists only of the roof area of the project.

Screening Density

A threshold of density per acre of impervious surface, set by a municipality, for C.3 regulated projects. If the screening density is met or exceeded, the Rainwater Harvesting and Use Feasibility Worksheet must be completed for the project.

Self-Retaining Area

A portion of a development site designed to retain the first one inch of rainfall (by ponding and infiltration and/or evapotranspiration) without producing stormwater runoff. Self-retaining areas must have at least a 2:1 ratio of contributing area to a self-retaining area and a 3" ponding depth. Self-retaining areas may include graded depressions with landscaping or pervious pavement. **Areas that Contribute Runoff to Self-Retaining Areas** are impervious or partially pervious areas that drain to self-retaining areas.

Self-Treating Area

A portion of a development site in which infiltration, evapotranspiration and other natural processes remove pollutants from stormwater. Self-treating areas may include conserved natural open areas, areas of landscaping, green roofs and pervious pavement. Self-treating areas treat only the rain falling on them and do not receive stormwater runoff from other areas.

Special Projects

Certain types of smart growth, high density and transit oriented development projects that are allowed, under Provision C.3.e.ii of the MRP, to receive LID treatment reductions. The specific development project types will be described in an amendment to the MRP, anticipated in Fall 2011.

Total Project Cost

Total project cost includes the construction (labor) and materials cost of the physical improvements proposed; however, it does not include land, transactions, financing, permitting, demolition, or off-site mitigation costs.

LID Feasibility Worksheet
Attachment 2: Toilet-Flushing Demand Required for Rainwater Harvesting Feasibility
per Impervious Acre (IA) ^{1,2}

Table 1 - Alameda County:

Rain Gauge ³	Required Demand (gal/day/IA) ⁴	Residential		Office/Retail ⁵		Schools ⁶	
		No. of residents per IA ⁷	Dwelling Units per IA ⁸	Employees per IA ⁹	Interior Floor Area (sq.ft./IA) ¹⁰	Employees ¹¹ per IA	Interior Floor Area (sq.ft./IA) ¹²
Berkeley	5,900	690	255	860	172,000	170	51,000
Dublin	4,100	480	177	590	118,000	120	36,000
Hayward	4,800	560	207	700	140,000	140	42,000
Palo Alto	2,900	340	125	420	84,000	90	27,000
San Jose	2,400	280	103	350	70,000	70	21,000

Table 2 - Santa Clara County:

Rain Gauge ³	Required Demand (gal/day/IA) ⁴	Residential		Office/Retail ⁵		Schools ⁶	
		No. of residents per IA ⁷	Dwelling Units per IA ⁸	Employees per IA ⁹	Interior Floor Area (sq.ft./IA) ¹⁰	Employees ¹¹ per IA	Interior Floor Area (sq.ft./IA) ¹²
Morgan Hill	6,500	760	260	940	188,000	190	57,000
Palo Alto	2,900	340	116	420	84,000	90	27,000
San Jose	2,400	280	96	350	70,000	70	21,000

Table 3 – San Mateo County:

Rain Gauge ³	Required Demand (gal/day/IA) ⁴	Residential		Office/Retail ⁵		Schools ⁶	
		No. of residents per IA ⁷	Dwelling Units per IA ⁸	Employees per IA ⁹	Interior Floor Area (sq.ft./IA) ¹⁰	Employees ¹¹ per IA	Interior Floor Area (sq.ft./IA) ¹²
Palo Alto	2,900	340	124	420	84,000	90	27,000
San Francisco	4,600	530	193	670	134,000	140	42,000
SF Oceanside	4,300	500	182	620	124,000	130	39,000

Table 4 – Contra Costa County:

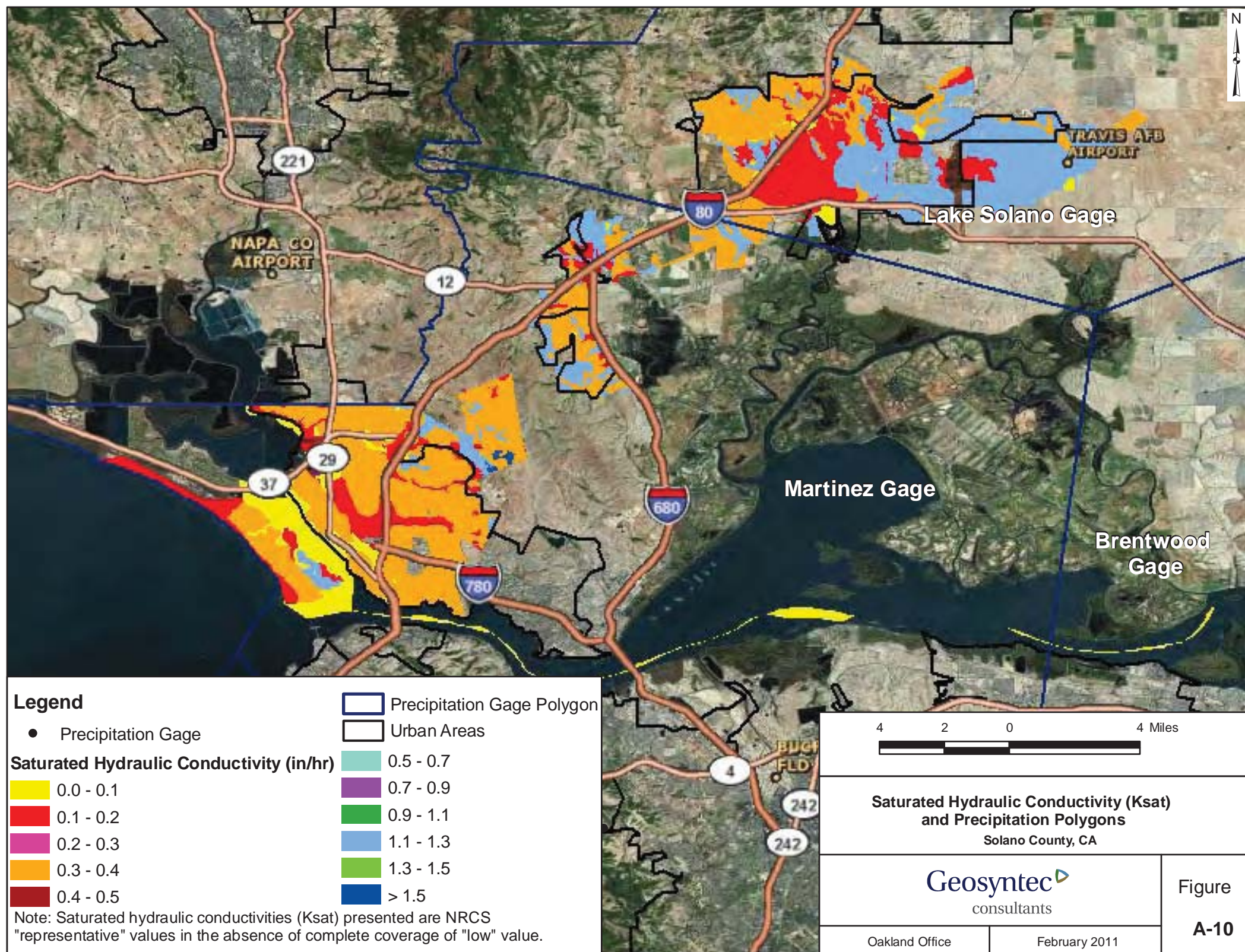
Rain Gauge ³	Required Demand (gal/day/IA) ⁴	Residential		Office/Retail ⁵		Schools ⁶	
		No. of residents per IA ⁷	Dwelling Units per IA ⁸	Employees per IA ⁹	Interior Floor Area (sq.ft./IA) ¹⁰	Employees ¹¹ per IA	Interior Floor Area (sq.ft./IA) ¹²
Berkeley	5,900	690	254	860	172,000	170	51,000
Brentwood	4,200	490	180	610	122,000	120	36,000
Dublin	4,100	480	176	590	118,000	120	36,000
Martinez	5,900	690	254	860	172,000	170	51,000

Table 5 – Solano County:

Rain Gauge ³	Required Demand (gal/day/IA) ⁴	Residential		Office/Retail ⁵		Schools ⁶	
		No. of residents per IA ⁷	Dwelling Units per IA ⁸	Employees per IA ⁹	Interior Floor Area (sq.ft./IA) ¹⁰	Employees ¹¹ per IA	Interior Floor Area (sq.ft./IA) ¹²
Lake Solano	9,000	1,050	362	1,300	260,000	270	81,000
Martinez	5,900	690	238	860	172,000	170	51,000

Notes:

1. Demand thresholds obtained from the “Harvest and Use, Infiltration and Evapotranspiration Feasibility/Infeasibility Criteria Report” (LID Feasibility Report) submitted to the Regional Water Board on May 1, 2011.
2. Toilet flushing demands assume use of low flow toilets per the California Green Building Code.
3. See Attachment 3 to identify the rain gauge that corresponds to the project site.
4. Required demand per acre of impervious area to achieve 80% capture of the C.3.d runoff volume with the maximum allowable drawdown time for cistern of 50,000 gallons or less, from Table 9 of the LID Feasibility Report.
5. “Office/Retail” includes the following land uses: office or public buildings, hospitals, health care facilities, retail or wholesale stores, and congregate residences.
6. “Schools” includes day care, elementary and secondary schools, colleges, universities, and adult centers.
7. Residential toilet flushing demand identified in Table 10 of the LID Feasibility Report.
8. Residential toilet flushing demand divided by the countywide average number of persons per household (US Census data reported on www.abag.org), as follows: Alameda County: 2.71 persons per household; Santa Clara County: 2.92; San Mateo County: 2.74; Contra Costa County: 2.72; Solano County: 2.90.
9. Office/retail employee toilet flushing demand identified in Table 10 of the LID Feasibility Report.
10. Interior floor area required for rainwater harvest and use feasibility per acre of impervious area is based on the number of employees in Column 5 multiplied by an occupant load factor of 200 square feet per employee (reference: 2010 California Plumbing Code, Chapter 4, Plumbing Fixtures and Fitting Fixtures, Table A, page 62.)
11. School employee toilet flushing demand identified in Table 10 of the LID Feasibility Report. Each school employee represents 1 employee and 5 “visitors” (students and others).
12. Interior floor area required for rainwater harvest and use feasibility per acre of impervious area is based on the number of employees in Column 7 multiplied by 6 to account for visitors, then multiplied by an occupant load factor of 50 square feet per employee (reference: 2010 California Plumbing Code).



Saturated Hydraulic Conductivity (Ksat) and Precipitation Polygons
Solano County, CA

Geosyntec
consultants

Oakland Office

February 2011

Figure
A-10

APPENDIX F: DESIGN SHEETS FOR LID

Bioretention Facilities



Bioretention facilities can rectangular, linear, or nearly any shape.
Photo by Scott Wikstrom

Bioretention detains runoff in a surface reservoir, filters it through plant roots and a biologically active soil mix, and then infiltrates it into the ground. Where native soils are less permeable, an underdrain conveys treated runoff that does not infiltrate to a storm drain or to surface drainage.

Bioretention facilities can be configured as in-ground or above-ground planter boxes, with the bottom open to allow infiltration to native soils underneath or the inclusion of an underdrain.

► CRITERIA

For development projects subject only to runoff treatment requirements, the following criteria apply:

Parameter	Criterion
Soil mix depth	18 inches minimum
Soil mix requirements	See Appendix H
Soil mix surface area	0.04 times tributary impervious area (or equivalent)
Surface reservoir depth	6 inches minimum; may be sloped to 4 inches adjacent to walkways.
Underdrain	Perforated pipe (PVC SDR 35 or approved equivalent) embedded in gravel (“Class 2 permeable” recommended), connected to storm drain or other accepted discharge point. Include a cleanout.

Best Uses

- Commercial areas
- Residential subdivisions
- Industrial developments
- Roadways
- Parking lots
- Fit in setbacks, medians, and other landscaped areas

Advantages

- Can be any shape
- Low maintenance
- Can be landscaped

Limitations

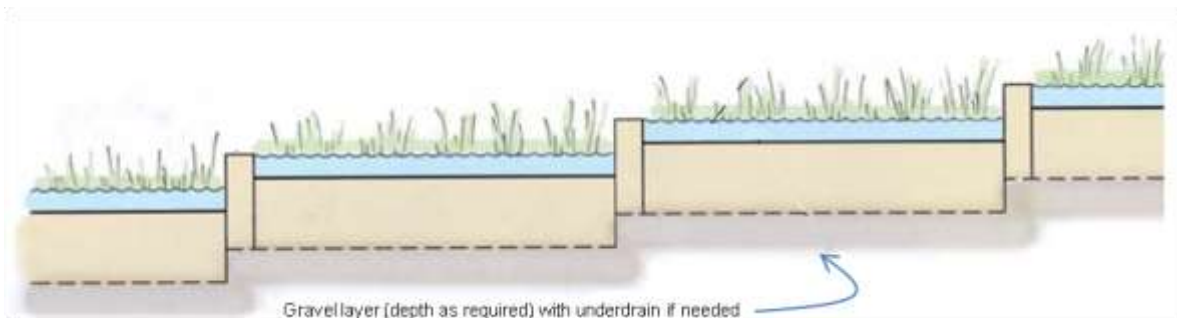
- Require 4%-15% of tributary impervious square footage
- Typically require 3-4 feet of head
- Irrigation may be required

► **DETAILS**

Plan and Profile. On the surface, a bioretention facility should be one level, shallow basin—or a series of basins. As runoff enters each basin, it should flood and fill throughout before runoff overflows to the outlet or to the next downstream basin. This will help prevent movement of surface mulch and soil mix.



Swale with check dams. Provides limited storage; not suitable for slopes 6% and greater.

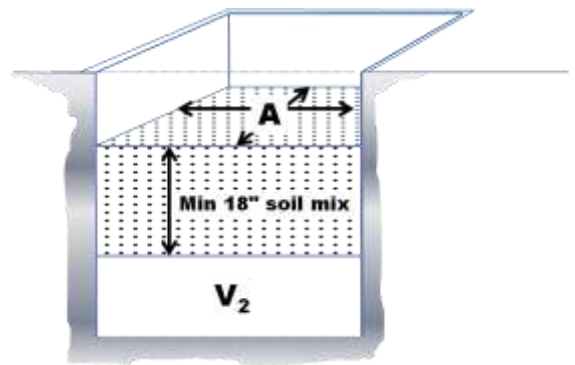


Planter on slope provides more storage. Check dams should be keyed into planter sides. (USEPA 2009b)

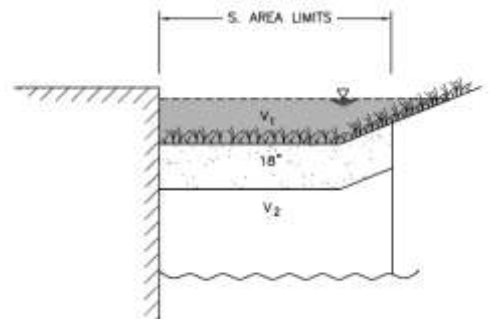
In a linear swale, check dams should be placed for every 4 to 6 inches of elevation change and so that the lip of each dam is at least as high as the toe of the next upstream dam. A similar principle applies to bioretention facilities built as terraced roadway shoulders.

Minimum Surface Volume. Alternatives include:

- Increasing the facility area and reducing the surface depth accordingly.
- Sloping the soil mix surface to be deeper than 12" at the middle, but less deep at the edges, so the average 12" depth is achieved (works best on larger facilities).
- Sloping or stepping back the wall as shown in (b) and (c) (requires additional area).
- Allowing shallow flooding on a portion of adjacent landscape or paving when the facility



(a) A and V_2



(b) Sloped side wall

is at peak capacity as shown in (d) (rare and relatively brief events).

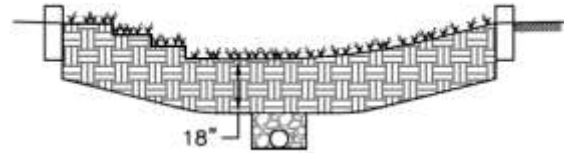
Soil mix. The required soil mix is similar to a loamy sand. It must maintain a minimum percolation rate of 5" per hour throughout the life of the facility, and it must be suitable for maintaining plant life with a minimum of fertilizer use. See Appendix H and check with local staff for further guidance.

Storage and drainage layer. "Class 2 permeable," Caltrans specification 68-1.025, is preferred. Open-graded crushed rock, washed, may be used, but requires 4"-6" washed pea gravel be substituted at the top of the crushed rock layer. **Do not use filter fabric** to separate the soil mix from the gravel drainage layer or the gravel drainage layer from the native soil.

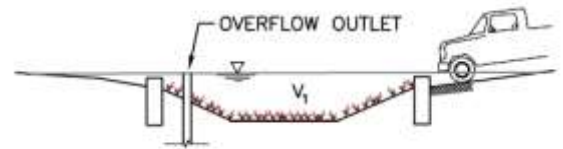
Minimum subsurface volume. No minimum subsurface volume is required for treatment-only facilities. The gravel layer must be extensive enough and deep enough to ensure the soil mix is well-drained. For treatment-and-flow-control facilities where the native soils are Hydrologic Soil Group C or D, the minimum subsurface volume V_2 specified in Table 4-8 is equivalent to the minimum area times a 30" deep layer of gravel of **40% porosity** (V_2 is the void space, not the entire volume of gravel.) Note that if the facility area is increased, the required depth is correspondingly decreased. If desired, voids created by buried structures such as pipes or arches may be substituted, as long as the voids are hydraulically interconnected and the minimum subsurface volume calculated by Equation 4-5 is achieved.

Inlets. Paved areas draining to the facility should be graded, and inlets should be placed, so that runoff remains as sheet flow or as dispersed as possible. Curb cuts should be wide (12" is recommended) to avoid clogging with leaves or debris. Allow for a minimum reveal of 4"-6" between the inlet and soil mix elevations to ensure turf or mulch buildup does not block the inlet. In addition, place an apron of stone or concrete, a foot square or larger, inside each inlet to prevent vegetation from growing up and blocking the inlet.

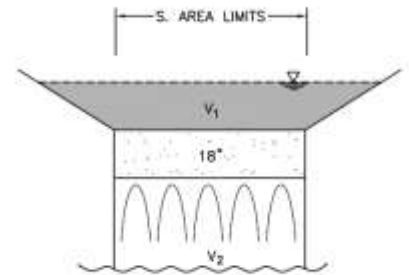
Where runoff is collected in pipes or gutters and conveyed to the facility, protect the landscaping from high-velocity flows with energy-dissipating rocks. In larger installations, provide cobble-lined channels to better distribute flows throughout the facility.



(c) Stepped back side wall



(d) Allowing occasional flooding of adjacent landscaping and pavement.



Buried pipes or arches may be used to achieve the required subsurface volume V_2

“Bubble ups” can be used to dissipate energy when runoff is piped from roofs and upgradient paved areas.

Underdrains. Perforated pipe must be bedded **near the top of the gravel layer** and must terminate at a storm drain or other approved discharge point. Underdrains must be constructed of rigid pipe (SDR 35 or equivalent, holes facing down) and provided with a cleanout. In locations where native soils beneath the facility are Hydrologic Soil Group A or B, underdrains are optional but municipal reviewers may require them as a preventative against poor drainage.

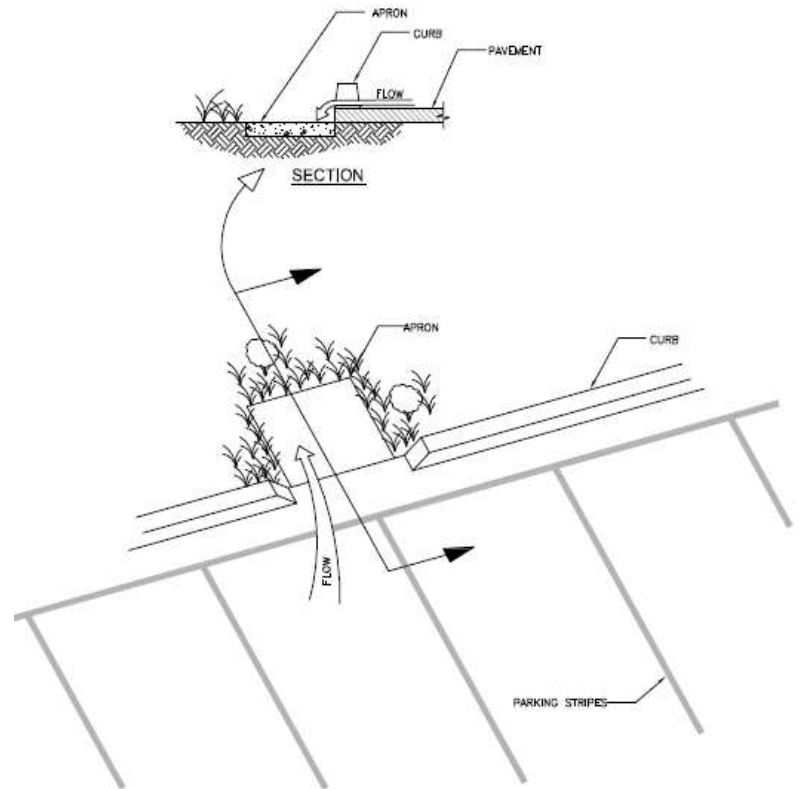
Flow-control orifice. For treatment-and-flow-control facilities, the underdrain must be routed through a device designed to limit flows to that specified in Equation 4-10 or 4-11.

Overflow outlets. In treatment-only facilities, overflow outlets must be set high enough to ensure the surface reservoir fills and the entire surface area of soil mix is flooded before the outlet elevation is reached. In swales, this can be achieved with appropriately placed check dams.

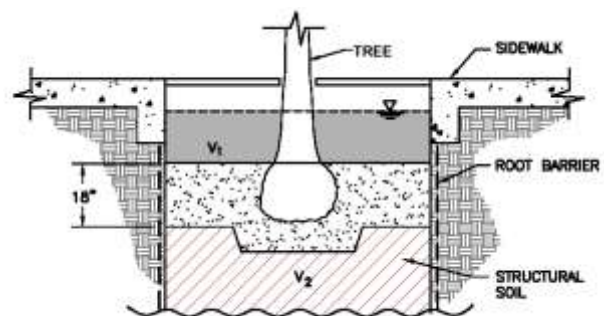
In treatment-and-flow-control facilities, the outlet elevation must be set to achieve the minimum surface storage volume calculated using Equation 4-3 and the V_1 sizing factor.

The outlet should be designed to exclude floating mulch and debris.

Vaults, utility boxes and light standards. It is best to locate utilities outside the bioretention facility—in adjacent walkways or in a separate area set aside for this purpose. If utility structures are to be placed within the facility, the locations should be anticipated and adjustments made to ensure the minimum bioretention surface area and volumes are achieved. Leaving the final locations to each individual utility can produce a haphazard,



Recommended design details for bioretention facility inlets (see text).



Bioretention facility configured as a tree well. The root barrier is optional.

unaesthetic appearance and make the bioretention facility more difficult to maintain.

Emergency overflow. The site grading plan should anticipate extreme events and potential clogging of the overflow and route emergency overflows safely.

Trees. Bioretention areas can accommodate small or large trees within the minimum areas and volumes calculated by Equation 4-5. Tree canopies intercept rain, and extensive tree roots maintain soil permeability and help retain runoff. Normal maintenance of a bioretention facility should not affect tree lifespan.



Bioretention facility configured and planted as a lawn/ play area.

The bioretention facility can be integrated with a tree pit of the required depth and filled with structural soil. If a root barrier is used, it can be located to allow tree roots to spread throughout the bioretention facility while protecting adjacent pavement. Locations and planting elevations should be selected to avoid blocking the facility's inlets and outlets as trees mature.

► **APPLICATIONS**

Multi-purpose landscaped areas. Bioretention facilities are easily adapted to serve multiple purposes. The loamy sand soil mix will support turf or a plant palette suitable to the location and a well-drained soil. See Appendix B for additional guidance on soil, plant selection, and irrigation.

Example landscape treatments:

- Lawn with sloped transition to adjacent landscaping.
- Swale in setback area
- Swale in parking median
- Lawn with hardscaped edge treatment
- Decorative garden with formal or informal plantings
- Traffic island with low-maintenance landscaping
- Raised planter with seating
- Bioretention on a terraced slope

Residential subdivisions. In the design of many subdivisions, it has proven easiest and most effective to drain roofs and driveways to the streets (in the conventional manner)

and then drain the streets to bioretention areas, with one bioretention area for each 1 to 6 lots, depending on subdivision layout and topography.

Bioretention areas can be placed on one or more separate, dedicated parcels with joint ownership.

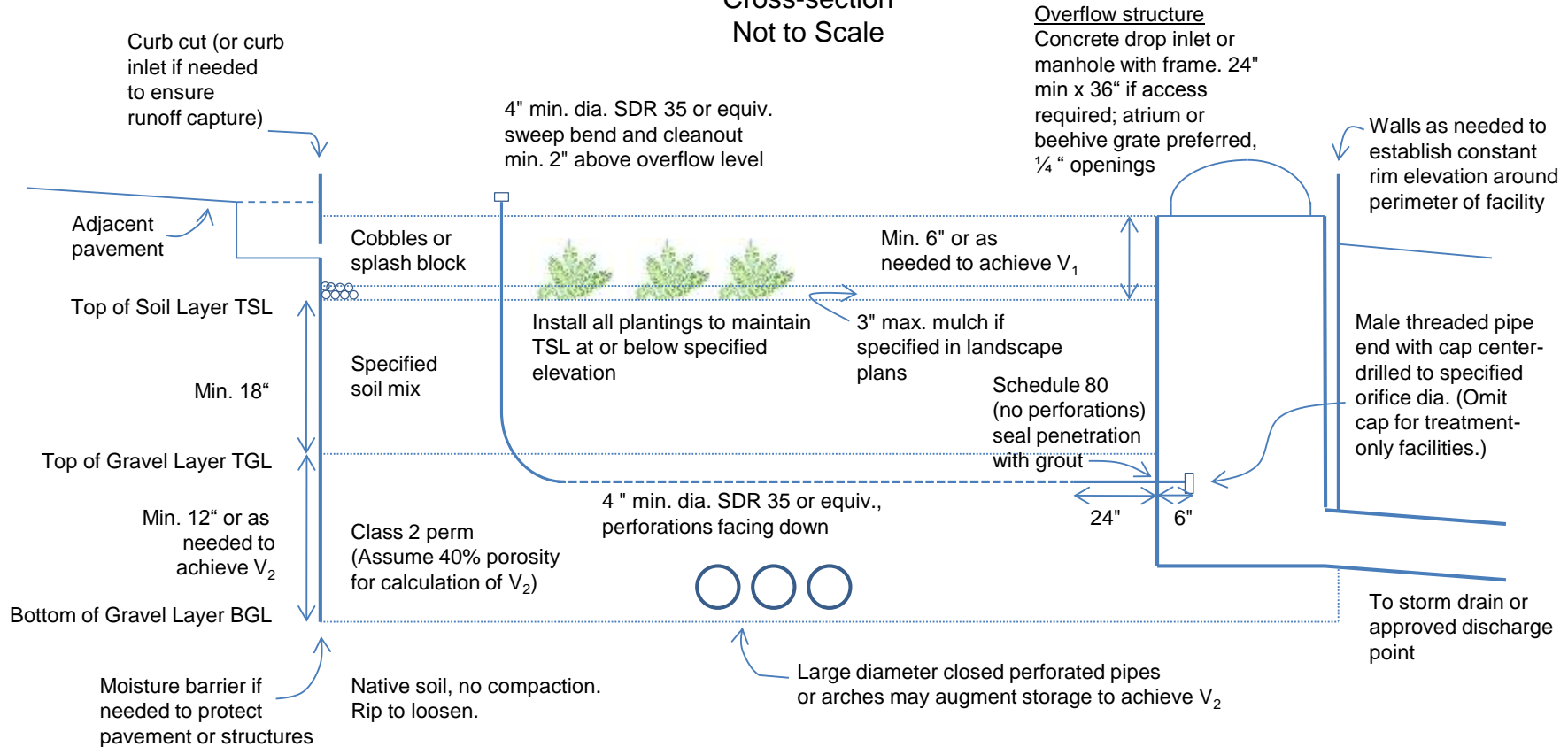
Sloped sites. Bioretention facilities must be constructed as a basin or series of basins, with the circumference of each basin level. It may be necessary to add curbs or low retaining walls during final grading if elevations have not been determined with sufficient precision during design.

Design Checklist for Bioretention

- Volume or depth of surface reservoir meets or exceeds minimum.
- 18" depth "loamy sand" soil mix with minimum long-term percolation rate of 5"/hour. See Appendix B.
- Area of soil mix meets or exceeds minimum.
- Perforated pipe (PVC SDR 35 or approved equivalent) underdrain bedded **near the top** of the "Class 2 perm" layer with holes facing downward. Connection and sufficient head to storm drain or approved discharge point (except in "A" or "B" soils).
- No filter fabric.
- Underdrain has a clean-out port consisting of a vertical, rigid, non-perforated PVC pipe, with a minimum diameter of 4 inches and a watertight cap.
- Location and footprint of facility are shown on site plan, landscaping plan, and grading plan.
- Bioretention area is designed as a basin (level edges) or a series of basins, and grading plan is consistent with these elevations. If facility is designed as a swale, check dams are set so the lip or weir of each dam is at least as high as the toe of the next upstream dam.
- Curb inlets are 12" wide, have 4"-6" reveal and an apron or other provision to prevent blockage when vegetation grows in, and energy dissipation as needed.
- Overflow connected to a downstream storm drain or approved discharge point.
- Emergency spillage will be safely conveyed overland.
- Plantings are suitable to the climate, exposure, and a well-drained soil, and occasional inundation during large storm events.
- Irrigation system with connection to water supply, on a separate zone.
- Vaults, utility boxes, and light standards are located outside the minimum soil mix surface area.
- When excavating, avoid smearing of the soils on bottom and side slopes. Minimize compaction of native soils and "rip" soils if clayey and/or compacted. Protect the area from construction site runoff.

Bioretention Facility

Cross-section
Not to Scale

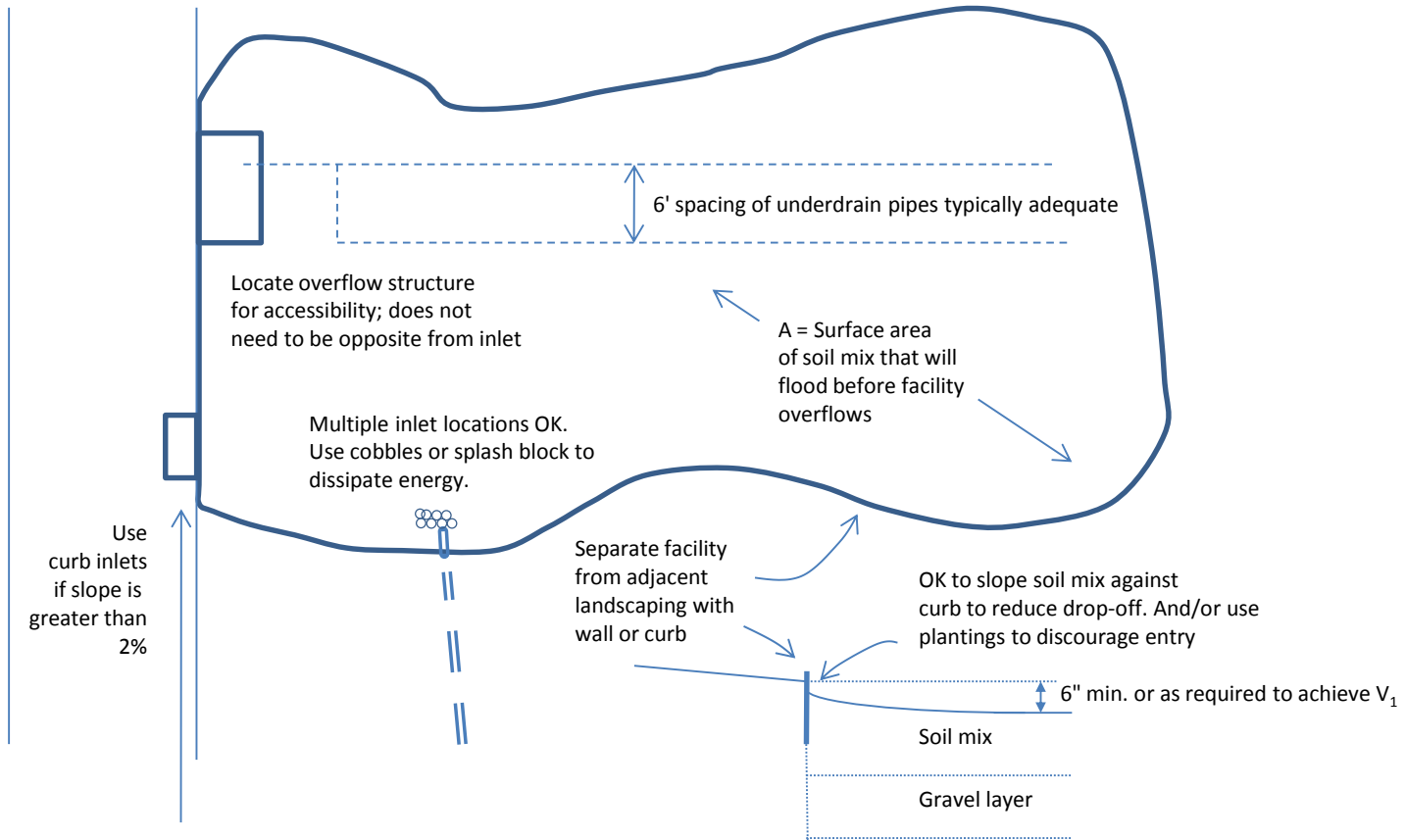


Notes:

- No liner, no filter fabric, no landscape cloth.
- Maintain BGL, TGL, TSL throughout facility area at elevations to be specified in plan.
- Class 2 perm layer may extend below and underneath drop inlet.
- Elevation of perforated pipe underdrain is near top of gravel layer, except when zero infiltration is expected.
- See Appendix B for soil mix specification, planting and irrigation guidance.
- See Chapter 4 for factors and equations used to calculate V_1 , V_2 , and orifice diameter.

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.

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Flow-through Planter



Flow-through planters treat and detain runoff without allowing seepage into the underlying soil. They can be used next to buildings and on slopes where stability might be affected by adding soil moisture.

Flow-through planters typically receive runoff via downspouts leading from the roofs of adjacent buildings. However, they can also be set in-ground or fit into terraces and receive sheet flow from adjacent paved areas.

Flow-through planters may be used where facilities are located on upper-story plazas, adjacent to building foundations, where seasonal high groundwater would be within 10 feet of the facility, where mobilization of pollutants in soil or groundwater is a concern, and where potential geotechnical hazards are associated with infiltration.

Pollutants are removed as runoff passes through the soil layer and is collected in an underlying layer of gravel or drain rock. A perforated-pipe underdrain must be connected to a storm drain or other discharge point. An overflow outlet conveys flows which exceed the capacity of the planter.

Best Uses

- Management of roof runoff
- Next to buildings or on building plazas
- Dense urban areas
- Where infiltration is not desired

Advantages

- Can be used on or next to structures and on slopes
- Versatile
- Can be any shape
- Low maintenance

Limitations

- Can be used only on sites with “C” and “D” soils
- Requires underdrain
- Requires 3-4 feet of head

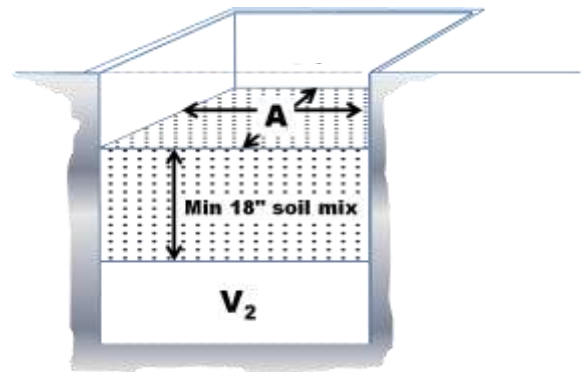
► **CRITERIA**

The following criteria apply:

Parameter	Criterion
Soil mix depth	18 inches minimum
Soil mix	See Appendix B
Soil mix surface area	0.04 times tributary impervious area (or equivalent)
Surface reservoir depth	6" minimum; may be sloped to 4" where adjoining walkways.
Underdrain	Required. Perforated pipe (PVC SDR 35 or approved equivalent) embedded in gravel ("Class 2 permeable" recommended), connected to storm drain or other accepted discharge point.

► **DETAILS**

Configuration. In a vertical-sided box-like planter for treatment-and-flow-control with the minimum surface area A , the minimum surface volume V_1 can be achieved with an overflow height of 10" (12" total height of walls with 2" of freeboard). The minimum subsurface volume V_2 can be achieved with a gravel (Class 2 permeable) depth of 30". This combination results in a planter approximately 5' high. The planter height can be reduced by incorporating void-creating structures into a shallower Class 2 permeable layer or by increasing the planter area so that the minimum V_2 is achieved.



Parameters for flow-through planters for treatment: A and V_2 .

The planter must be level. To avoid standing water in the subsurface layer, set the perforated pipe underdrain and orifice as nearly flush with the planter bottom as possible.

Inlets. Protect plantings from high-velocity flows by adding rocks or other energy-dissipating structures at downspouts and other inlets.

Soil mix. The required soil mix is similar to a loamy sand. It must maintain a minimum percolation rate of 5" per hour throughout the life of the facility, and it must be suitable for maintaining plant life. Typically, on-site soils will not be suitable due to clay content. Various local suppliers have identified mixes which meet these criteria. Check with local staff regarding acceptable soil mixes.

Gravel storage and drainage layer. "Class 2 permeable," Caltrans specification 68-1.025, is recommended. Open-graded crushed rock, washed, may be used, but requires 4"-6" of

washed pea gravel be substituted at the top of the crushed rock layer. **Do not use filter fabric** to separate the soil mix from the gravel drainage layer.

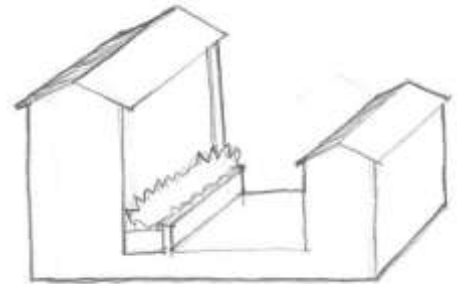
Emergency overflow. The planter design and installation should anticipate extreme events and potential clogging of the overflow and route emergency overflows safely.

► **APPLICATIONS**

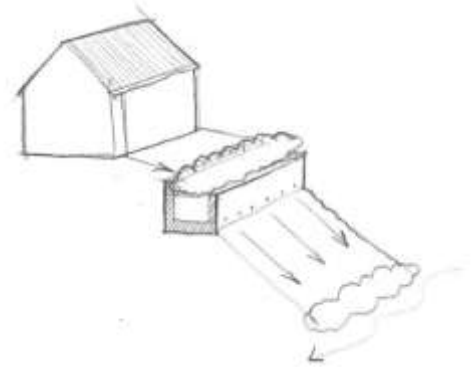
Adjacent to buildings. Flow-through planters may be located adjacent to buildings, where the planter vegetation can soften the visual effect of the building wall. A setback with a raised planter box may be appropriate even in some neo-traditional pedestrian-oriented urban streetscapes.

At plaza level. Flow-through planters have been successfully incorporated into podium-style developments, with the planters placed on the plaza level and receiving runoff from the tower roofs above. Runoff from the plaza level is typically managed separately by additional flow-through planters or bioretention facilities located at street level.

Steep slopes. Flow-through planters provide a means to detain and treat runoff on slopes that cannot accept infiltration from a bioretention facility. The planter can be built into the slope similar to a retaining wall. The design should consider the need to access the planter for periodic maintenance. Flows from the planter underdrain and overflow must be directed in accordance with local requirements. It is sometimes possible to disperse these flows to the downgradient hillside.



Flow-through planter on the plaza level of a podium-style development.



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

Design Checklist for Flow-through Planter

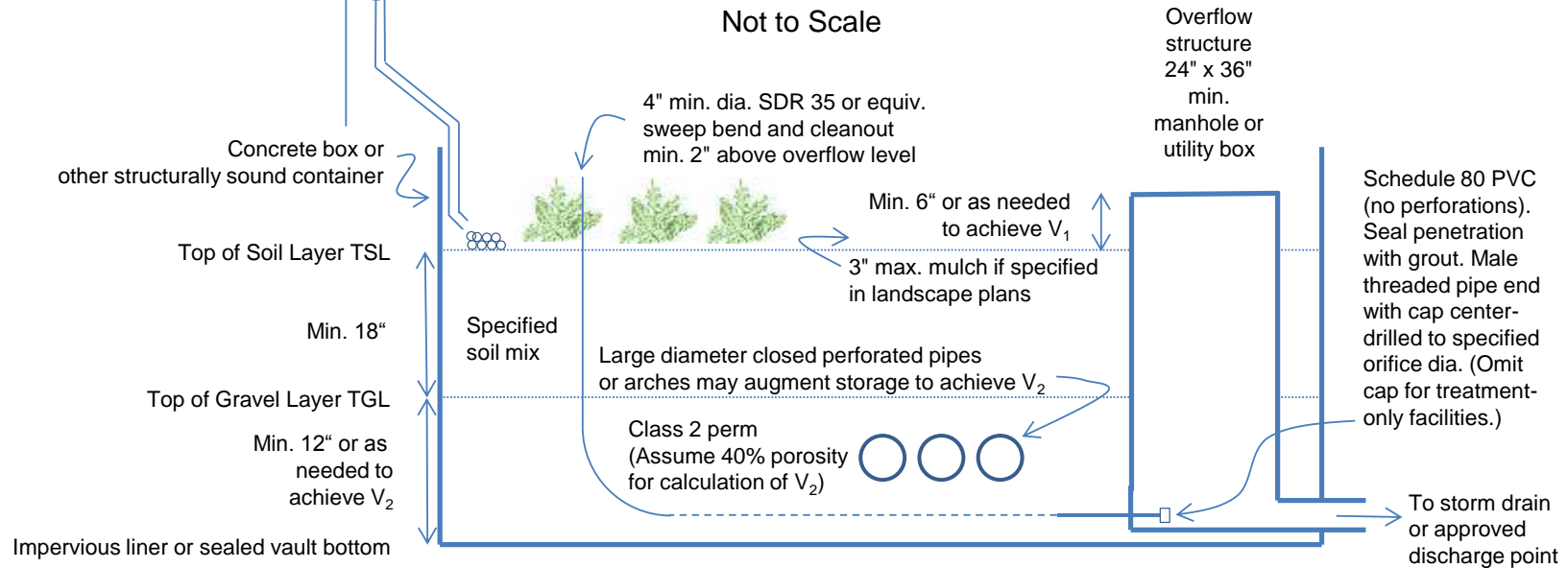
- Location is on an upper-story plaza, adjacent to a building foundation, where seasonal high groundwater would be within 10 feet of the facility, where mobilization of pollutants in soil or groundwater is a concern, or where potential geotechnical hazards are associated with infiltration
- Reservoir depth is 4"-6" minimum.
- 18" depth "loamy sand" soil mix with minimum long-term infiltration rate of 5"/hour.
- Surface area of soil mix meets or exceeds minimum.
- "Class 2 perm" drainage layer.
- No filter fabric.
- Perforated pipe (PVC SDR 35 or approved equivalent) underdrain with outlet located flush or nearly flush with planter bottom.
- Connection with sufficient head to storm drain or discharge point.
- Underdrain has a clean-out port consisting of a vertical, rigid, non-perforated PVC pipe, with a minimum diameter of 4" and a watertight cap.
- Overflow outlet connected to a downstream storm drain or approved discharge point.
- Location and footprint of facility are shown on site plan and landscaping plan.
- Planter is set level.
- Emergency spillage will be safely conveyed overland.
- Plantings are suitable to the climate, exposure, and a well-drained soil.
- Irrigation system with connection to water supply, on a separate zone.

For treatment-and-flow-control flow-through planters only

- Volume of surface storage meets or exceeds minimum.
- Volume of subsurface storage meets or exceeds minimum.
- Underdrain is connected via an appropriately sized orifice or other flow-limiting device.

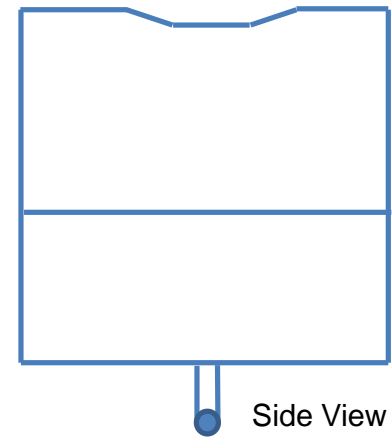
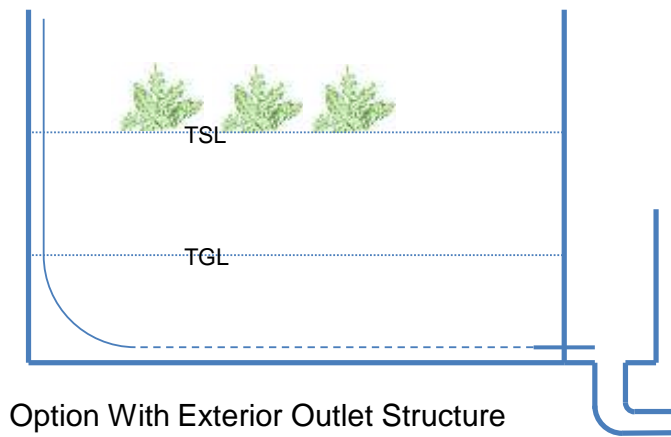
Flow-Through Planter

Cross-section
Not to Scale



Notes:

- Underdrain to be min. 4" PVC SDR 35 or equiv. with holes facing down.
- Locate underdrain as close as possible to bottom.
- No filter fabric, no landscape cloth.
- See Appendix B for soil specification and planting guidance.
- See Chapter 4 for factors and equations used to calculate V_1 , V_2 and orifice diameter



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APPENDIX G: STORMWATER TREATMENT MEASURES MAINTENANCE AGREEMENT

STORMWATER TREATMENT MEASURES MAINTENANCE AGREEMENT

RECITALS

This Stormwater Treatment Measures Maintenance Agreement (“Agreement”) is entered into this _____ by and between the City of _____ (the “City”, and for indexing purposes “Grantee”) and _____ (the “Covenantor”, and for indexing purposes “Grantor”).

WHEREAS, On October 14, 2009, the Regional Water Quality Control Board, San Francisco Bay Region, adopted Order R2-2009-0074, CAS612008 issuing the Municipal Regional Stormwater NPDES permit to the San Francisco Bay Region, including the Cities of Fairfield and Suisun City which have joined together to form the Fairfield-Suisun Urban Runoff Management Program; and

WHEREAS, Provision C.3. of this NPDES permit, and as it may be amended or reissued, requires the permittee public agencies to provide minimum verification and access assurances that all treatment measures shall be adequately operated and maintained by entities responsible for the stormwater treatment measures; and

WHEREAS, the Covenantor means any individual, partnership, firm, association, joint venture, public or private corporation, trust, estate, commission, board, public or private institution, utility, cooperative, city, county or other political subdivision of the State, any interstate body or any other legal entity.

WHEREAS, the Covenantor recognizes that real property commonly known as _____ (the “Property”), and more particularly described in the attached legible reduced-scale copy of the Site Plan or comparable document (Exhibit 1) is subject to the installation of storm water treatment measures ; and

WHEREAS, the City is the permittee public agency with jurisdiction over the Property.

WHEREAS, the Covenantor, its successors and assigns, including any homeowner association recognizes that the storm water treatment measure(s) more particularly described and shown on Exhibit 1, of which full-scale plans and any amendments thereto are on file with the [Planning] Department of the _____, must be installed and privately maintained as indicated in this Agreement and as required by the NPDES permit.

WHEREAS, the City and the Covenantor, its successors and assigns agree that the health, safety and welfare of the citizens of the City require that the stormwater treatment measure(s) detailed in the Site Plan or comparable document be constructed and maintained on the Property; and

WHEREAS, the City’s Stormwater Management Ordinance, guidelines, criteria and other written directions require that the stormwater treatment measure(s), as shown on the approved Site Plan or comparable document, be constructed and maintained by the Covenantor or its successors and assigns.

THEREFORE, in consideration of the benefit received by the Property Owner as a result of the City's approval of the Site Plan, the Covenantor, its successors and assigns hereby covenants and agrees with the City as follows:

SECTION 1: CONSTRUCTION OF TREATMENT MEASURES

The on-site stormwater treatment measure(s) shown on the Site Plan or comparable document shall be constructed by the Covenantor, its successors and assigns in strict accordance with the approved plans and specifications identified for the development and any other requirements thereto which have been approved by the City in conformance with appropriate City ordinances, guidelines, criteria and other written direction.

SECTION 2: OPERATION & MAINTENANCE RESPONSIBILITY

This agreement shall serve as the signed statement by the Covenantor, its successors and assigns accepting responsibility for operation and maintenance of stormwater treatment measures as set forth in this Agreement until the responsibility is legally transferred to another entity. Before the Property is legally transferred to another entity, the Covenantor, its successors and assigns shall provide to the City at least one of the following:

- 1) A signed statement from the public entity assuming post-construction responsibility for treatment measure maintenance and that the treatment measures meet all local agency design standards; or
- 2) Written conditions in the sales or lease agreement requiring the buyer or lessee to assume responsibility for operation and maintenance (O&M) consistent with this provision, which conditions, in the case of purchase and sale agreements, shall be written to survive beyond the close of escrow; or
- 3) Written text in project conditions, covenants and restrictions (CCRs) for residential properties assigning O&M responsibilities to the home owners association for O&M of the treatment measures; or
- 4) Any other legally enforceable agreement or mechanism that assigns responsibility for the maintenance of treatment measures.

Upon transfer to a subsequent property owner, the transferee accepts the responsibility for operation and maintenance provided by this agreement.

SECTION 3: MAINTENANCE OF TREATMENT MEASURES

The Covenantor, its successors and assigns shall not destroy or remove the stormwater treatment measures from the Property nor modify the stormwater treatment system in a manner that lessens its effectiveness, and shall, at its sole expense, adequately maintain the stormwater treatment measure(s) in good working order acceptable to the City and in accordance with the maintenance plan agreed hereto and attached as Exhibit 2. This includes all pipes, channels or other

conveyances built to convey stormwater to the treatment measure(s), as well as all structures, improvements, and vegetation provided to control the quantity and quality of the stormwater. Adequate maintenance is herein defined as maintaining the described facilities in good working condition so that these facilities continue to operate as originally designed and approved. The maintenance plan shall include a detailed description of and schedule for long-term maintenance activities.

SECTION 4: SEDIMENT MANAGEMENT

Sediment accumulation resulting from the normal operation of the stormwater treatment measure(s) will be managed appropriately by the Covenantor or its successors and assigns. The Covenantor or its successors and assigns will provide for the removal and disposal of accumulated sediments. Disposal of accumulated sediments shall not occur on the Property, unless provided for in the maintenance plan. Any disposal or removal of accumulated sediments or debris shall be in compliance with all federal, state and local law and regulations.

SECTION 5: ANNUAL INSPECTION AND REPORT

The Covenantor or its successors and assigns shall, on an annual basis, complete the Treatment Measure Operation and Maintenance Inspection Report (annual report), attached to this agreement as Exhibit 3. The annual report shall include all completed Inspection and Maintenance Checklists for the reporting period and shall be submitted to the District in order to verify that inspection and maintenance of the applicable stormwater treatment measure(s) have been conducted pursuant to this agreement. The annual report shall be submitted no later than December 31 of each year, under penalty of perjury, to the Urban Runoff Program Manager, Fairfield-Suisun Sewer District, 1010 Chadbourne Road, Fairfield, CA 94534. The Covenantor or its successors and assigns shall provide a record of the volume of all accumulated sediment removed from the treatment measure(s) in the annual report. The Covenantor or its successors and assigns shall conduct a minimum of one annual inspection of the stormwater treatment measure(s) before the wet season. This inspection shall occur between August 1st and October 1st each year. More frequent inspections may be required by the maintenance plan (Exhibit 2). The results of inspections shall be recorded on the Inspection and Maintenance Checklist(s) attached as Exhibit 3.

SECTION 6: NECESSARY CHANGES AND MODIFICATIONS

At its sole expense, the Covenantor, its successors and assigns shall make changes or modifications to the stormwater treatment measure(s) and/or the long-term maintenance plan (Exhibit 2) as may be determined as reasonably necessary by the City to ensure that treatment measures are properly maintained and continue to operate as originally designed and approved.

SECTION 7: ACCESS TO THE PROPERTY

The Covenantor, its successors and assigns hereby grants permission to the City; the District: the San Francisco Bay Regional Water Quality Control Board (RWQCB); the Solano County Mosquito Abatement District (SCMAD); and their authorized agents and employees to enter upon the Property at reasonable times and in a reasonable manner to inspect, assess or observe the stormwater treatment measure(s) in order to ensure that treatment measures are being properly maintained and are continuing to perform in an adequate manner to protect water quality and the public health and safety. This includes the right to enter upon the Property when it has a reasonable basis to believe that a violation of this Agreement, the City's stormwater management ordinance, guidelines, criteria, other written direction, or the Fairfield-Suisun Urban Management Program's NPDES municipal stormwater permit (Regional Board Order R2-2009-0074, and any amendments or reissuances of this permit) is occurring, has occurred or threatens to occur. The above listed agencies also have a right to enter the Property when necessary for abatement of a public nuisance or correction of a violation of the ordinance guideline, criteria or other written direction. Whenever possible, the City, RWQCB, or the Mosquito Abatement District shall provide reasonable notice to the Covenantor, its successors and assigns before entering the property.

SECTION 8: FAILURE TO MAINTAIN TREATMENT MEASURES

In the event either the Covenantor or its successors and assigns pursuant to Section 2 fails to maintain the stormwater treatment measure(s) as shown on the approved Site Plan or comparable document in good working order acceptable to the City and in accordance with the maintenance plan incorporated in the Agreement, the City, and its authorized agents and employees with reasonable notice, may enter the Property and take whatever steps it deems necessary and appropriate to return the treatment measure(s) to good working order. Such notice will not be necessary if emergency conditions require immediate remedial action. This provision shall not be construed to allow the City to erect any structure of a permanent nature on the Property. It is expressly understood and agreed that the City is under no obligation to maintain or repair the treatment measure(s) and in no event shall this Agreement be construed to impose any such obligation on the City.

SECTION 9: REIMBURSEMENT OF CITY EXPENDITURES

In the event the City, pursuant to the Agreement, performs work of any nature (direct or indirect), including any reinspections or any actions it deems necessary or appropriate to return the treatment measure(s) in good working order as indicated in Section 8, or expends any funds in the performance of said work for labor, use of equipment, supplies, materials, and the like, either the Covenantor or its successors and assigns pursuant to Section 2 shall reimburse the City, or shall forfeit any required bond upon demand within thirty (30) days of receipt thereof for the costs incurred by the City hereunder. If these costs are not paid within the prescribed time period, the City may assess the Covenantor or its successors and assigns the cost of the work, both direct and indirect, and applicable penalties. Said assessment shall be a lien against the Property, or prorated against the beneficial users of the Property or may be placed on the property tax bill and collected

as ordinary taxes by the City. The actions described in this section are in addition to and not in lieu of any and all legal remedies as provided by law, available to the City as a result of the Covenantor's or its successors' and assigns' failure to maintain the treatment measure(s).

SECTION 10: INDEMNIFICATION

The Covenantor, its successors and assigns shall indemnify, hold harmless and defend the City, the District and their authorized agents, officers, officials and employees from and against any and all claims, demands, suits, damages, liabilities, losses, accidents, casualties, occurrences, claims and payments, including attorney fees claimed or which might arise or be asserted against the City or the District that are alleged or proven to result or arise from the construction, presence, existence or maintenance of the treatment measure(s) by the Covenantor, its successors and assigns, the City or the District. In the event a claim is asserted against the City, the District or its authorized agents, officers, officials or employees, the City shall promptly notify the Covenantor, its successors and assigns and the Covenantor, its successors and assigns shall defend at its own expense any suit based on such claim. If any judgment or claims against the City, the District or their authorized agents, officers, officials or employees shall be allowed, the Covenantor, its successors and assigns shall pay for all costs and expenses in connection herewith. This section shall not apply to any claims, demands, suits, damages, liabilities, losses, accidents, casualties, occurrences, claims and payments, including attorney fees claimed which arise due solely to the negligence or willful misconduct of the City or the District.

SECTION 11: NO ADDITIONAL LIABILITY

It is the intent of this agreement to insure the proper maintenance of the treatment measure(s) by the Covenantor or its successors and assigns; provided, however, that this Agreement shall not be deemed to create or effect any additional liability not otherwise provided by law of any party for damage alleged to result from or caused by storm water runoff.

SECTION 12: PERFORMANCE FINANCIAL ASSURANCE

The City may request the Covenantor, its successors and assigns provide a performance bond, security or other appropriate financial assurance providing for the maintenance of the stormwater treatment measure(s) pursuant to the City's ordinances, guidelines, criteria or written direction.

SECTION 13: TRANSFER OF PROPERTY

13.1 Agreement Runs with the Land

This Agreement shall run with the title to the land. The Covenantor hereby subjects its interest in the Property and the Project to the covenants and restrictions set forth in this Agreement. The City and Covenantor hereby declare their express intent that the covenants and restrictions set forth herein shall be deemed covenants running with the land and shall be binding upon and inure to the

benefit of the heirs, administrators, executors, successors in interest, transferees, and assigns of the Covenantor and City, regardless of any assignment, conveyance or transfer of the Property or any part thereof or interest therein. Any successor-in-interest to the Covenantor including without limitation any purchaser, transferee or lessee of the Property shall be subject to all of the duties and obligations imposed hereby for the full term of this Agreement. Each and every contract, deed, ground lease or other instrument affecting or conveying the Property shall conclusively be held to have been executed, delivered and accepted subject to the covenants, restrictions, duties and obligations set forth herein, regardless of whether such covenants, restrictions, duties and obligations are set forth in such contract, deed, ground lease or other instrument. If any such contract, deed, ground lease or other instrument has been executed prior to the date hereof, the Covenantor hereby covenants to obtain and deliver to City an instrument in recordable form signed by the parties to such contract, deed, ground lease or other instrument pursuant to which such parties acknowledge and accept this Agreement and agree to be bound hereby.

13.2 Equitable Servitudes

Covenantor agrees for itself and for its successors that in the event that a court of competent jurisdiction determines that the covenants herein do not run with the land, such covenants shall be enforced as equitable servitudes against the Property and in favor of City.

13.3 Touches and Concerns

The Parties hereby declare that it is their understanding and intent that the burden of the covenants set forth herein touch and concern the land in that they restrict the use of the Property. The Parties further declare that it is their understanding that the benefit of such covenants touch and concern the land by guaranteeing the health, safety, and welfare of the citizens of the City. The covenants, conditions and restrictions hereof shall apply uniformly to the Property in order to establish and carry out a common plan for the use, development and improvement of the Property.

SECTION 14: SEVERABILITY

The provisions of this Agreement shall be severable and if any phrase, clause, section, subsection, paragraph, subdivision, sentence or provision is adjudged invalid or unconstitutional by a court of competent jurisdiction, or the applicability to any Covenantor, its successors and assigns is held invalid, this shall not affect or invalidate the remainder of any phrase, clause, section, subsection, paragraph, subdivision, sentence or provision of this Agreement.

SECTION 15: RECORDATION

This Agreement shall be recorded by the Covenantor, its successors and/or assigns or by the City by mutual agreement, within thirty (30) days after the execution date of this Agreement as stated above among the deed records of the County Recorder's Office of the County of Solano, California at the Covenantor's, its successors' and/or assigns' expense.

SECTION 16: RELEASE OF AGREEMENT

In the event that the City determines that the storm water treatment measures located on the Property are no longer required, then the City, at the request of the Covenantor, its successors and/or assigns shall execute a release of this Inspection and Maintenance Agreement, which the Covenantor, its successors and/or assigns, or the City by mutual agreement, shall record in the County Recorder's Office at the Covenantor's, its successors' and/or assigns' expense. The storm water treatment measure(s) shall not be removed from the Property unless such a release is so executed and recorded.

SECTION 17: EFFECTIVE DATE AND MODIFICATION

This Agreement is effective upon the date of execution as stated at the beginning of this Agreement. This Agreement shall not be modified except by written instrument executed by the City and owner(s) of the Property at the time of modification. Such modifications shall be effective upon the date of execution and shall be recorded.

Signature for the City

Date

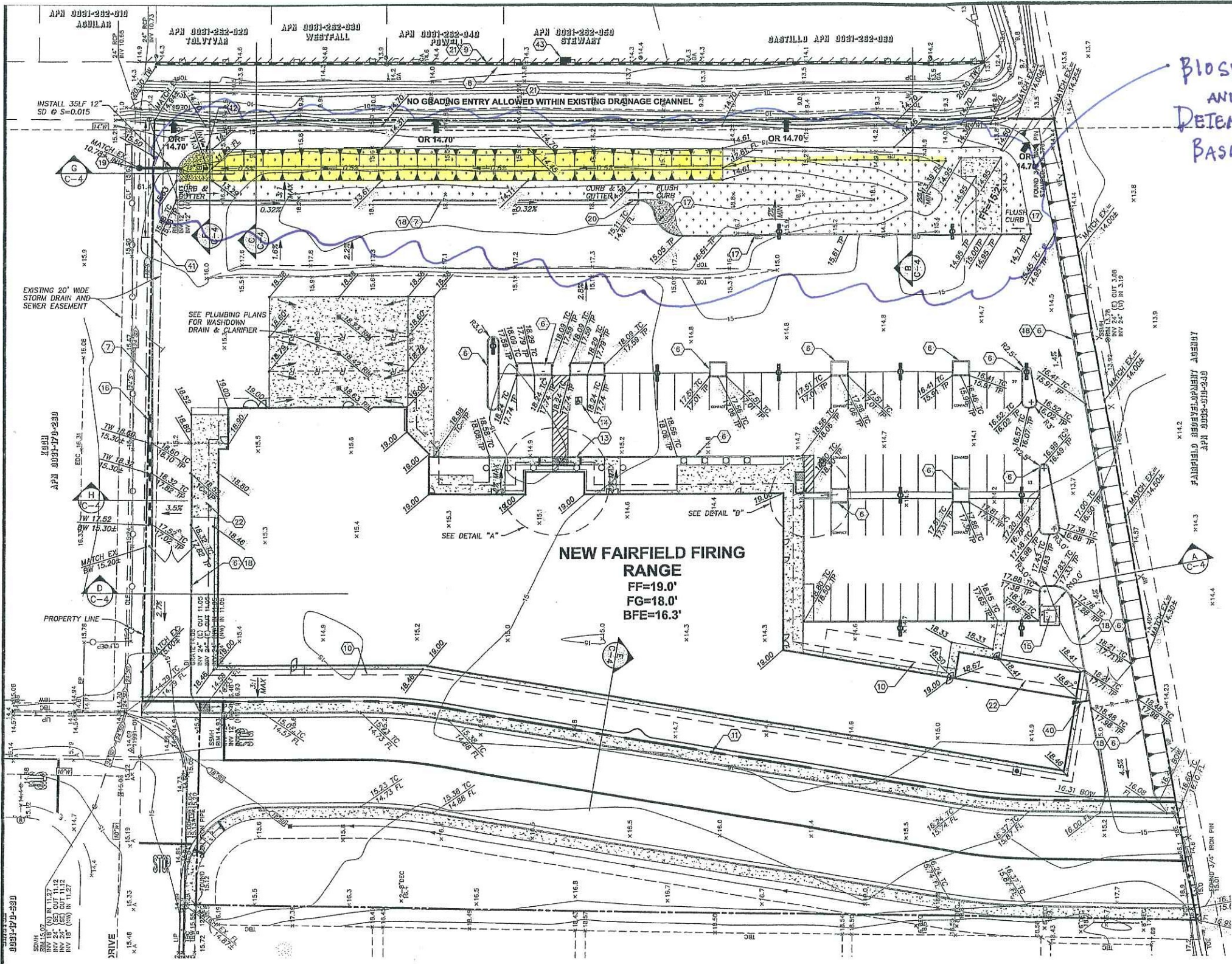
Type or print name and title

Covenantor's Signature

Date

Type or print Covenantor's name and address

EXHIBIT 1

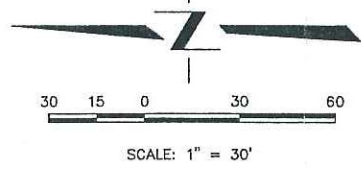


KEYNOTES:

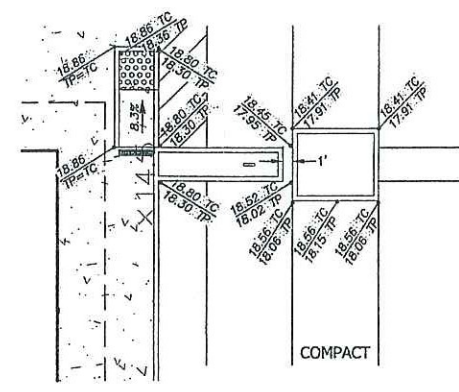
- 6) CONSTRUCT TYPE A CONCRETE CURB PER CITY STD. DETAIL 5.
- 7) CONSTRUCT CURB AND GUTTER PER CITY STANDARD DETAIL 5.
- 8) SEE ARCHITECTURAL DRAWINGS FOR NEW 6" MASONRY WALL.
- 9) REMOVE AND DISPOSE OF EXISTING WOOD FENCE TO LIMITS SHOWN ON PLAN. A TEMPORARY CONSTRUCTION FENCE SHALL BE INSTALLED DURING THE CONSTRUCTION OF THE WALL.
- 10) OVER EXCAVATE AND IMPORT SOIL FOR BUILDING 5 FEET BEYOND FOOTPRINT. IMPORT MATERIAL SHALL BE NON-EXPANSIVE MATERIAL AND HAVE A MINIMUM THICKNESS OF 12 INCHES.
- 11) LIMITS OF IMPROVEMENTS THIS PLAN SET. SEE CLIFT LANE IMPROVEMENT PLANS FOR OFF-SITE IMPROVEMENTS.
- 12) PLACE 1" TO 3" SMOOTH RIVER COBBLES OVER FILTER FABRIC AS SHOWN.
- 13) SEE ARCHITECTURAL PLANS FOR HANDICAP RAMP DETAILS.
- 14) SEE ARCHITECTURAL PLANS FOR HANDICAP PARKING DETAILS.
- 15) SEE ELECTRICAL PLANS FOR TRANSFORMER PAD SECTION.
- 16) INSTALL "NEAR VERTICAL WALL" USING COMPAC KEYSTONE UNITS OR EQUAL PER MANUFACTURER'S RECOMMENDATIONS AND DETAIL ON SHEET C-4.
- 17) INSTALL FLUSH CURB. EXTEND CURB 4" BELOW SUBGRADE. SEE DETAIL ON SHEET C-4.
- 18) CONTINUE CURB 4" BELOW SUBGRADE. SEE BARRIER CURB DETAIL ON SHEET C-4.
- 19) INSTALL STORM DRAIN MANHOLE PER CITY OF FAIRFIELD STANDARD DETAIL NO. 22.
- 20) 5' TRANSITION FROM 6" CONCRETE CURB TO FLUSH CONCRETE CURB.
- 21) SEE SPECIFICATION SECTION 00700, PARAGRAPH 4.6.1 FOR CONTRACTOR'S METHOD OF TRANSPORTING MATERIAL ACROSS EXISTING DRAINAGE CHANNEL AND THE CONSTRUCTION OF THE 6" HIGH MASONRY WALL.
- 22) SEE MECHANICAL PLANS FOR EQUIPMENT PADS.
- 40) SEE ARCHITECTURAL PLANS FOR CURB-O-LET AND DRAIN PIPE LOCATION. RIDGE LINE TO BE PLACED A MINIMUM OF 4" WEST OF CURB-O-LET.
- 41) CURB PARALLELS BUILDING UNTIL REACHING NORTH PROPERTY LINE. FROM THIS ANGLE POINT APPROXIMATELY 61.4' FROM EAST PROPERTY LINE THE BACK OF CURB RUNS ADJACENT TO PROPERTY LINE.
- 43) REMOVE RED STORAGE SHED APPROXIMATELY 2'x5'x4" AND UNDERLYING CONCRETE SLAB APPROXIMATELY 3'x5'x4" THICK TO ALLOW FOR CONSTRUCTION OF MASONRY WALL. POUR NEW SLAB IN SAME LOCATION AND REINSTALL EXISTING SHED.

NOTES:

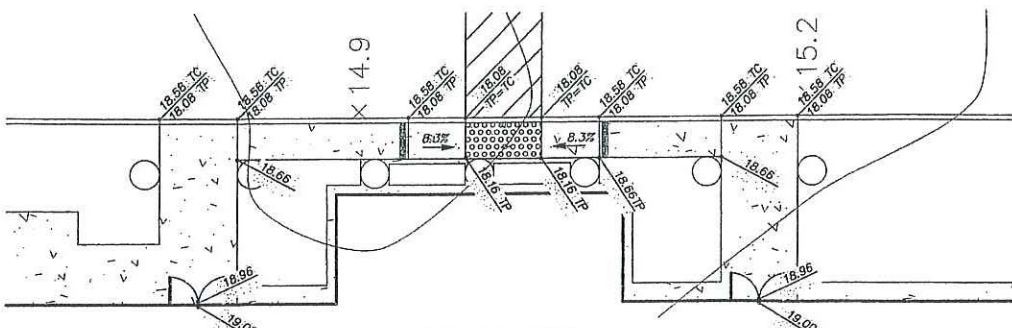
- 1. SEE ARCHITECT'S PLAN FOR SITE FLATWORK, WALLS, AND ACCESS RAMP DETAILS, AND SIGNAGE AND STRIPING.
- 2. ACCESSIBLE ROUTE, COORDINATE CURB GEOMETRY WITH ARCHITECT AT ALL RAMP LOCATIONS
- 3. SEE SHEET C-2 FOR PAVEMENT SECTION LEGEND.



REDUCED



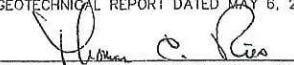
DETAIL "B"
SCALE 1"=10'



DETAIL "A"
SCALE 1"=10'

GEOTECHNICAL ENGINEER

GEOTECHNICAL ASPECTS OF THESE PLANS HAVE BEEN PREPARED IN GENERAL ACCORDANCE WITH THE RECOMMENDATION OF THE GEOTECHNICAL REPORT DATED MAY 6, 2004 BY KLEINFELDER


 THOMAS C. RIES, C.E. 30809, C.E.G. 1253 11-12-05
 DATE



DATE SIGNED: 12/9/05

THESE DRAWINGS ARE NOT CONSIDERED FINAL UNTIL THE ENGINEER'S SEAL ABOVE HAS BEEN SIGNED AND DATED.


DESIGNED BY: AL DRAWN BY: AL CHECKED BY: SC SCALE: AS NOTED	APP'D: _____ BY: _____ REVISIONS: _____ DATE: _____ NO.: _____	<p style="text-align: center;">CUNNINGHAM ENGINEERING</p> <p style="text-align: center;">CIVIL ENGINEERS/PROJECT MANAGERS</p> <p style="text-align: center;">2940 SPAFFORD STREET, DAVIS, CA 95616 Phone: (530) 758-2026 Fax: (530) 758-2066 E-mail: cec@cedavis.com</p> <div style="text-align: center;">  CUNNINGHAM ENGINEERS CIVIL ENGINEERS </div> <p style="text-align: center;">GILLIS & ASSOCIATES ARCHITECTS, INC.</p> <p style="text-align: center;">2000 BRISTOL STREET COSTA MESA, CALIFORNIA 92626 FAX (714) 668-4385 SUITE G-205 TEL (714) 668-4360</p> <p style="text-align: center;">FAIRFIELD POLICE TRAINING FACILITY AND INDOOR FIRING RANGE GRADING AND DRAINAGE</p> <p style="text-align: center;">FAIRFIELD CALIFORNIA</p>
DATE: 12/09/05 SHEET: C-3 Sheet 5 of 147 Project No: 742.03		S:\work\04\07042 Fairfield Firing Range\04-03 FIRE AND RANGE IMPROVEMENT PLANS\SHEET\04-03_C-3.dwg - C-3 12/09/2005 - 11:23AM Plotted By: Andy

EXHIBIT 2

Fairfield-Suisun Urban Runoff Program LONG TERM MAINTENANCE PLAN DEVELOPMENT

FOR POST DEVELOPMENT STORMWATER CONTROLS IN THE CITY OF FAIRFIELD AND SUISUN CITY

(Exhibit 2 of Operation and Maintenance Agreement)

In a **separate document (Long Term Maintenance Plan)**: include a description of techniques and schedules for inspections and regular maintenance and the stormwater systems and who will be responsible:

Items addressed shall be:

- . • Description and locations of stormwater systems to be inspected: include “as-built” drawings when they are finished.
- . • Schedule of inspections and the techniques used to inspect and maintain the systems to ensure that they are functioning properly as designed. The Long Term Maintenance Plan will include an inspection schedule, times of inspection, remedial actions taken to repair, modify or reconstruct the system and the state of control measures and reporting requirements.
- . • Where and how the trash, sediment and other pollutants will be disposed.
- . • Person(s) and phone number(s) of who will be responsible for inspection and maintenance.
- . • Provisions for appropriate access and maintenance easements.
- . • If the organization that will be responsible is yet to be organized, list the interim name, address and phone number of who is currently responsible.

A copy of the **INSPECTION AND MAINTENANCE AGREEMENT OF PRIVATE STORMWATER MANAGEMENT FACILITIES** that has been completed, notarized and recorded in the Land Records of the County of Solano will be kept on site.

THIS IS AN EXAMPLE:

Post Construction Long Term Maintenance Plan for *Forrest Mountain Commons*

System Description

The site consists of a series of stormwater conveyances both open channel and piped, detention / retention and water quality ponds.

- . • There is one stormwater detention pond sized to detain through the 100 year peak event. The orifice is designed to contain the first flush, 1 inch, for 72 hour.
- . • 150 ft of grassy swales.
- . • 200 ft of 6 inch pipe
- . • 4 storm drains
- . • 105 feet of water quality buffer 50 ft wide in next to Slop Creek. It will remain undisturbed. No trees will be disturbed in this area except under extenuating circumstances: diseased or dying trees in accordance with applicable city of Fairfield/Suisun City regulations.
- . • Upon completion of the site construction, 'as-built' drawings in electronic format of the stormwater controls will be provided to the city of Fairfield/Suisun City for verification.
- . • A copy of the **INSPECTION AND MAINTENANCE AGREEMENT OF PRIVATE STORMWATER MANAGEMENT FACILITIES** that has been completed, notarized and recorded in the County Assessor's office of the County of Solano, California will be kept on site with this document.

Maintenance:

STORMWATER PONDS

- . • The outlet structure filter shall be checked regularly for clogging and shall be cleaned and repaired as necessary---monthly after it is first built then a regular sequence should be established or at least quarterly or after a large rain event.
- . • Check banks and bottom surface of basin for erosion and correct as necessary.
- . • Check at least quarterly and after each extreme storm event, the facility should be cleaned of accumulated debris. The banks of surface ponds should be checked and areas of erosion repaired. Remove nuisance wetland species and take appropriate measures to control mosquitoes.
- . • This maintenance typically includes sediment, floatable, and debris removal from inlets, outlets and skimmers
- . • Pond vegetation needs to be trimmed or harvested as appropriate, grassy areas frequently mowed. Grass should be mowed so that it does not get over 6 inches.
- . • Remove sediment when accumulation reached 6 inches, or if re-suspension is observed or probable.
- . • Some sediment may contain contaminants which the Solano County

Department of Resource Management (SCDRM) requires special disposal procedure. If there is any uncertainty about what the sediment contains or it is known to contain contaminants, then SCDRM should be consulted and their disposal recommendations followed. The SCDRM should be contacted at (707) 784-6765. Generally, special attention or sampling should be given to sediment accumulated in facilities serving industrial, manufacturing or heavy commercial sites, fueling cents or automotive maintenance areas, large parking areas, or other areas where pollutants (other than clean soil) are suspected to accumulate and be conveyed by storm runoff.

- Some sediment collected may be innocuous (free of pollutants) and can be used as fill material, cover or land spreading. It is important that this material not be placed in any way that will promote or allow re-suspension in storm runoff.

Streamside Water quality Buffer:

- 105 feet of streamside water quality buffer, 50 ft wide on both sides of Clear Blue Creek, will remain undisturbed. No vegetation will be disturbed in this area except under extenuating circumstances: diseased or dying trees in accordance with applicable city of Franklin regulations. See Franklin Streamside Water Quality Buffer Policy for further information. Streamside water quality buffer will be set aside in conservation easement and recorded Williamson County Deed office.

Swale Maintenance:

- The facility should be checked annually for signs of erosion, vegetation loss, and channelization of the flow.

- The grass should be mowed when it reaches a height of 8 inches (20.3 cm) and no shorter than 3 inches (7.6 cm). Allowing the grass to grow taller may cause it to thin and become less effective. The clippings should be bagged and removed.

- Keep all level spreaders even (level) and free of debris.

- Mow grass covered biofilters regularly to promote growth and pollutant uptake.

- Remove cuttings and dispose of properly (preferably through composting).

- Remove sediment by hand with a flat-bottomed shovel during dry periods.

- Remove only the amount of sediment necessary to restore hydraulic capacity, leaving as much of the vegetation in place as possible. Reseed or plug any damaged turf or vegetation.

- Eventually, sufficient sediment will be trapped that the entire biofilter will need to be removed with sediment and reconstructed to begin a new cycle of stormwater quality control.

- The Property Owner shall, on an annual basis, complete the Treatment Measure Operation and Maintenance Inspection Report (annual report), attached to this agreement as Exhibit 3. The annual report shall be submitted no later than December 31 of each year, under penalty of perjury, to the Urban Runoff Program Manager, Fairfield-Suisun Sewer District, 1010 Chadbourne Road, Fairfield, CA 94534.

EXHIBIT 3

Inspection and Maintenance Report and Checklist Detention Basin

Property Address: _____

Property Owner: _____

Treatment Measure No: _____

Date of Inspection: _____

Type of Inspection: Pre-rainy season Monthly Quarterly
 Annual Re-inspection¹

Inspector(s): _____

Defect	Conditions When Maintenance Is Needed	Maintenance Needed? (Y/N)	Comments (Describe maintenance completed; and if any needed maintenance was not conducted, note what is needed and when it will be done)	Results Expected When Maintenance Is Performed
General				
Trash & Debris	<ul style="list-style-type: none"> • Trash and debris accumulated in basin. • Visual evidence of dumping. 			Trash and debris cleared from site.
Poisonous Vegetation and Noxious Weeds	Poisonous or nuisance vegetation or noxious weeds, (e.g., morning glory, English ivy, reed canary grass, Japanese knotweed, purple loosestrife, blackberry, Scotch broom, poison oak, stinging nettles, star thistle, or devil's club.)			Management of poisonous or noxious vegetation. Use Integrated Pest Management techniques to control noxious weeds or invasive species.
Contaminants and Pollution	Any evidence of oil, gasoline, contaminants or other pollutants.			No contaminants or pollutants present.
Rodent Holes	If facility acts as a dam or berm, any evidence of rodent holes, or any evidence of water piping through dam or berm via rodent holes.			<p>The design specifications are not compromised by holes.</p> <p>Any rodent control activities are in accordance with applicable laws and do not affect any protected species.</p>

¹ Re-inspection of a previously-noted maintenance issue

Detention Basin Inspection Checklist

Inspection Date: _____

Property Address: _____

Treatment Measure No.: _____

Defect	Conditions When Maintenance Is Needed	Maintenance Needed? (Y/N)	Comments (Describe maintenance completed; and if any needed maintenance was not conducted, note what is needed and when it will be done)	Results Expected When Maintenance Is Performed
Insects	Insects such as wasps and hornets interfere with maintenance activities.			Insects do not interfere with maintenance activities. Use IPM techniques to control (e.g., traps, etc.)
Mosquito Vector Breeding	Suitable habitats exist for mosquito production (e.g., standing water for more than 72 hours in areas accessible to mosquitoes; overgrowth of cattails).			Water drainage rates are restored to design standards. Standing water no longer exists or is inaccessible to mosquitoes. Cattails removed or shaded out by nearby trees.
Tree/Brush Growth and Hazard Trees	<ul style="list-style-type: none"> • Growth does not allow maintenance access or interferes with maintenance activity. • Dead, diseased, or dying trees. 			<ul style="list-style-type: none"> • Trees do not hinder maintenance activities. • Remove hazard trees as approved by the City. (Use a certified Arborist to determine health of tree or removal requirements)
Side Slopes				
Erosion	<ul style="list-style-type: none"> • Eroded over 2 in. deep where cause of damage is still present or where there is potential for continued erosion. • Any erosion on a compacted berm embankment. 			Cause of erosion is managed appropriately. Side slopes or berm are restored to design specifications, as needed.
Storage Area				
Sediment	Accumulated sediment >10% of designed basin depth or affects inletting or outletting condition of the facility.			Sediment cleaned out to designed basin shape and depth; basin reseeded if necessary to control erosion.
Liner (If Applicable)	Liner is visible and has more than three 1/4-inch holes in it.			Liner repaired or replaced. Liner is fully covered.
Emergency Overflow/ Spillway and Berms				

Detention Basin Inspection Checklist

Inspection Date: _____

Property Address: _____

Treatment Measure No.: _____

Defect	Conditions When Maintenance Is Needed	Maintenance Needed? (Y/N)	Comments (Describe maintenance completed; and if any needed maintenance was not conducted, note what is needed and when it will be done)	Results Expected When Maintenance Is Performed
Settlement	Berm settlement 4 inches lower than the design elevation.			Dike is built back to the design elevation.
Tree Growth	Tree growth on berms or emergency spillway >4 ft in height or covering more than 10% of spillway.			<ul style="list-style-type: none"> Trees should be removed. If root system is small (base less than 4 inches) the root system may be left in place. Otherwise the roots should be removed and the berm restored. A civil engineer should be consulted for proper berm/spillway restoration.
Emergency Overflow/ Spillway	Rock is missing and soil is exposed at top of spillway or outside slope.			Rocks and pad depth are restored to design standards.
Debris Barriers (e.g., Trash Racks)				
Trash and Debris	Trash or debris is plugging openings in the barrier.			Trash or debris is removed.
Damaged/ Missing Bars	Bars are missing, loose, bent out of shape, or deteriorating due to excessive rust.			Bars are repaired or replaced to allow proper functioning of trash rack.
Inlet/Outlet Pipe	Debris barrier is missing or not attached to pipe.			Debris barrier is repaired or replaced to allow proper functioning of trash rack.
Fencing and Gates				
Missing or broken parts	Any defect in or damage to the fence or gate that permits easy entry to a facility.			Fencing and gate are restored to design specifications.
Deteriorating Paint or Protective Coating	Part or parts that have a rusting or scaling condition that has affected structural adequacy.			Paint or protective coating is sufficient to protect structural adequacy of fence or gate.

APPENDIX H: MRP AMENDMENT

**California Regional Water Quality Control Board
San Francisco Bay Region
Municipal Regional Stormwater NPDES Permit**

**ORDER NO. R2-2011-0083
NPDES PERMIT NO. CAS612008**

AMENDMENT REVISING ORDER NO. R2-2009-0074 for the following jurisdictions and entities:

The cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City, Alameda County, the Alameda County Flood Control and Water Conservation District, and Zone 7 of the Alameda County Flood Control and Water Conservation District, which have joined together to form the Alameda Countywide Clean Water Program (Alameda Permittees)

The cities of Clayton, Concord, El Cerrito, Hercules, Lafayette, Martinez, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, and Walnut Creek, the towns of Danville and Moraga, Contra Costa County, the Contra Costa County Flood Control and Water Conservation District, which have joined together to form the Contra Costa Clean Water Program (Contra Costa Permittees)

The cities of Campbell, Cupertino, Los Altos, Milpitas, Monte Sereno, Mountain View, Palo Alto, San Jose, Santa Clara, Saratoga, and Sunnyvale, the towns of Los Altos Hills and Los Gatos, the Santa Clara Valley Water District, and Santa Clara County, which have joined together to form the Santa Clara Valley Urban Runoff Pollution Prevention Program (Santa Clara Permittees)

The cities of Belmont, Brisbane, Burlingame, Daly City, East Palo Alto, Foster City, Half Moon Bay, Menlo Park, Millbrae, Pacifica, Redwood City, San Bruno, San Carlos, San Mateo, and South San Francisco, the towns of Atherton, Colma, Hillsborough, Portola Valley, and Woodside, the San Mateo County Flood Control District, and San Mateo County, which have joined together to form the San Mateo Countywide Water Pollution Prevention Program (San Mateo Permittees)

The cities of Fairfield and Suisun City, which have joined together to form the Fairfield-Suisun Urban Runoff Management Program (Fairfield-Suisun Permittees)

The City of Vallejo and the Vallejo Sanitation and Flood Control District (Vallejo Permittees)

The California Regional Water Quality Control Board, San Francisco Bay Region, (hereinafter referred to as the Water Board) finds that:

Findings:

1. On October 14, 2009, the Water Board adopted Order No. R2-2009-0074, NPDES No. CAS612008, prescribing Waste Discharge Requirements under the San Francisco Bay Municipal Regional Stormwater Permit for the discharge of stormwater runoff from the municipal separate storm sewer systems (MS4s) of the named Permittees.
2. Provision C.3.b. of Order No. R2-2009-0074 establishes the scope of development projects that must implement post-construction stormwater treatment and defines them as Regulated Projects.
3. Provision C.3.c. of Order No. R2-2009-0074 requires Permittees to implement Low Impact Development (LID) requirements by December 1, 2011. Under Provision C.3.c., Permittees must require all Regulated Projects to implement source control and site design measures and to treat 100% of the amount of runoff identified in Provision C.3.d. for the Regulated Project's drainage area with LID treatment measures onsite or at a joint stormwater treatment facility.
4. Provision C.3.e.ii.(1) of Order No. R2-2009-0074 acknowledges that certain types of smart growth, high density, and transit-oriented development can either reduce existing impervious surfaces, or create less "accessory" impervious areas and auto-related pollutant impacts. This Provision further states that incentive LID Treatment Reduction Credits approved by the Water Board may be applied to these types of Regulated Projects that are considered "Special Projects."
5. Provision C.3.e.ii.(2) of Order No. R2-2009-0074 requires the Permittees to submit a proposal by December 1, 2010, to the Water Board identifying the types of projects proposed as Special Projects and therefore eligible for LID Treatment Reduction Credit. The proposal was required to include specific criteria for each type of Special Project proposed, including size, location, minimum densities, minimum floor area ratios, other appropriate limitations, and the proposed LID Treatment Reduction Credit.
6. On December 1, 2010, the Bay Area Stormwater Management Agencies Association (BASMAA) submitted a Special Projects proposal on behalf of the Permittees, which defined the types of Special Project Categories and their corresponding LID Treatment Reduction Credits.
7. BASMAA's stormwater proposal was posted on the Water Board's website and circulated for public comment on December 10, 2010. Comments on the proposal were received from USEPA, NRDC, San Francisco Baykeeper, the Building Industry Association, other building industry groups, and developers.
8. Water Board staff has met on a regular basis with representatives of BASMAA and within these negotiations, revisions of the December 10, 2010, proposal have been made and considered. Representatives of USEPA, the Metropolitan Transportation Commission (MTC) and the Association of Bay Area Governments (ABAG) have participated in some of these meetings. Water Board staff has also met separately with representatives of NRDC and San Francisco Baykeeper.

9. This Order amends Order No. R2-2009-0074 to add criteria for determining which types of Regulated Projects may be considered Special Projects. This Order establishes different categories of Special Projects based on size, land use type, and density.
10. For each category of Special Projects, this Order establishes corresponding LID Treatment Reduction Credits that may be used to reduce the amount of stormwater runoff that must be treated with LID stormwater treatment systems.
11. This Order requires that when LID Treatment Reduction Credits are applied, the percentage of stormwater runoff not treated by LID treatment systems to be treated with specific non-LID treatment systems.
12. Provisions C.3.c.i.(2)(vi) and C.3.c.iii.(3) of Order No. R2-2009-0074 require Permittees to submit to the Water Board by May 1, 2011, a proposed set of model biotreatment soil media specifications and soil infiltration testing methods to verify a long-term infiltration rate of 5 to 10 inches/hour.
13. The Permittees submitted a proposal for the soil media specifications and soil infiltration testing methods on December 1, 2010, which was distributed for public comment on December 15, 2010. Comments were received on January 28, 2011, from Roger James of Resources Management and from the Natural Resources Defense Council.
14. Provisions C.3.c.i.(2)(vii) C.3.c.iii.(4) of Order No. R2-2009-0074 require Permittees to submit to the Water Board by December 1, 2011, proposed minimum specifications for green roofs to be considered biotreatment systems.
15. The Permittees submitted a proposal for the minimum green roof specifications on April 29, 2011, which was distributed for public comment on May 4, 2011. No comments were received.
16. This Order approves the model biotreatment soil media specifications, soil infiltration testing methods, and minimum green roof specifications submitted by the Permittees.
17. Provision C.3.g.ii.(5) of Order No. R2-2009-0074 requires the Santa Clara Permittees to comply with all the requirements in Attachment F of the same Order. Requirement 4. of Attachment F (pages F-3 and F-4 of Order No. R2-2009-0074) defines geographical areas where applicable Regulated Projects are required to meet the HM Standard and associated requirements. These areas of HM applicability described in Requirement 4. are shown in the Santa Clara Permittees' HM Map [available at http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/muni/mrp/Final%20TO%20HM%20Maps.pdf](http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/muni/mrp/Final%20TO%20HM%20Maps.pdf).
18. Requirement 4.c. of Attachment F states that Pink areas on the HM Map are under review by the Permittees for accuracy of the imperviousness data. The HM Standard and associated requirements apply to projects in areas designated as pink on the map until such time as a Permittee presents new data that indicates that the actual level of imperviousness of a particular area is greater than or equal to 65% impervious. Any new data is to be submitted to the Water Board in one coordinated submittal within one year of permit adoption.
19. The Santa Clara Permittees submitted new impervious data and a revised HM Map that reflects the new data to the Water Board on October 14, 2010. On March 11, 2011, the Santa Clara Permittees submitted a revised HM Map to correct a small error in the October 2010 HM Map, and to provide additional information per Water Board staff request. The revised HM Map shows that in the majority of the Pink area of the original, approved, Santa Clara Permittees' HM

Map, the HM Standard and associated requirements do apply. In the revised HM Map, these areas are now shown in green to represent the applicability of the HM Standard and associated requirements. The remaining small portion of the Pink area in the original HM Map is now shown in red to represent areas where the HM Standard and associated requirements do not apply.

20. This Order approves the revised Santa Clara Permittees' HM Map and replaces the HM Map originally adopted by Order No. R2-2009-0074.
21. The Fact Sheet attached to this Order as Appendix III contains background information and rationale for this Order's requirements. It is hereby incorporated into this Order and therefore constitutes part of the findings for this Order
22. This Order is exempt from the provisions of the California Environmental Quality Act pursuant to California Water Code Section 13389
23. The Water Board notified the Permittees named in this Order and interested agencies and persons of its intent to consider adoption of this Order, and provided an opportunity to submit written comments.
24. In a public meeting, the Water Board heard and considered all comments pertaining to this Order.

IT IS HEREBY ORDERED, pursuant to the provisions of California Water Code Division 7 and regulations adopted thereunder, and the provisions of the federal Clean Water Act and regulations and guidelines adopted thereunder, that the Permittees shall comply with the following:

1. Provision C.3. and Attachment F of Order No. R2-2009-0074, are hereby modified and amended as shown in Appendix I. Additions to Provision C.3. and Attachment F are displayed as underlined type and deletions of text are displayed as ~~strikeout~~ format.
2. Attachments L and M as shown in Appendix II are hereby added to Order No. R2-2009-0074.
3. This Order shall become effective on December 1, 2011.

I, Bruce H. Wolfe, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on November 28, 2011.

Bruce H. Wolfe
Executive Officer

Appendix I: Revisions to Provision C.3. and Attachment F of Order No. R2-2009-0074
Appendix II: Attachments L and M to be added to Order No. R2-2009-0074
Appendix III: Fact Sheet

APPENDIX I

Revisions to Provision C.3. and Attachment F of Water Board Order No. R2-2009-0074

C.3. New Development and Redevelopment

C.3.c. Low Impact Development (LID)

The goal of LID is to reduce runoff and mimic a site's predevelopment hydrology by minimizing disturbed areas and impervious cover and then infiltrating, storing, detaining, evapotranspiring, and/or biotreating stormwater runoff close to its source. LID employs principles such as preserving and recreating natural landscape features and minimizing imperviousness to create functional and appealing site drainage that treats stormwater as a resource, rather than a waste product. Practices used to adhere to these LID principles include measures such as rain barrels and cisterns, green roofs, permeable pavement, preserving undeveloped open space, and biotreatment through rain gardens, bioretention units, bioswales, and planter/tree boxes.

Task Description

i. The Permittees shall, at a minimum, implement the following LID requirements:

(1) Source Control Requirements

Require all Regulated Projects to implement source control measures onsite that at a minimum, shall include the following:

- (a) Minimization of stormwater pollutants of concern in urban runoff through measures that may include plumbing of the following discharges to the sanitary sewer, subject to the local sanitary sewer agency's authority and standards:
 - Discharges from indoor floor mat/equipment/hood filter wash racks or covered outdoor wash racks for restaurants;
 - Dumpster drips from covered trash, food waste and compactor enclosures;
 - Discharges from covered outdoor wash areas for vehicles, equipment, and accessories;
 - Swimming pool water, if discharge to onsite vegetated areas is not a feasible option; and
 - Fire sprinkler test water, if discharge to onsite vegetated areas is not a feasible option;
- (b) Properly designed covers, drains, and storage precautions for outdoor material storage areas, loading docks, repair/maintenance bays, and fueling areas;
- (c) Properly designed trash storage areas;
- (d) Landscaping that minimizes irrigation and runoff, promotes surface infiltration, minimizes the use of pesticides and fertilizers, and incorporates other appropriate sustainable landscaping practices and programs such as Bay-Friendly Landscaping;
- (e) Efficient irrigation systems; and
- (f) Storm drain system stenciling or signage.

(2) **Site Design and Stormwater Treatment Requirements**

- (a) Require each Regulated Project to implement at least the following design strategies onsite:
- (i) Limit disturbance of natural water bodies and drainage systems; minimize compaction of highly permeable soils; protect slopes and channels; and minimize impacts from stormwater and urban runoff on the biological integrity of natural drainage systems and water bodies;
 - (ii) Conserve natural areas, including existing trees, other vegetation, and soils;
 - (iii) Minimize impervious surfaces;
 - (iv) Minimize disturbances to natural drainages; and
 - (v) Minimize stormwater runoff by implementing one or more of the following site design measures:
 - Direct roof runoff into cisterns or rain barrels for reuse.
 - Direct roof runoff onto vegetated areas.
 - Direct runoff from sidewalks, walkways, and/or patios onto vegetated areas.
 - Direct runoff from driveways and/or uncovered parking lots onto vegetated areas.
 - Construct sidewalks, walkways, and/or patios with permeable surfaces.³
 - Construct driveways, bike lanes, and/or uncovered parking lots with permeable surfaces.³
- (b) Require each Regulated Project to treat 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility.
- (i) LID treatment measures are harvesting and re-use, infiltration, evapotranspiration, or biotreatment.
 - (ii) A properly engineered and maintained biotreatment system may be considered only if it is infeasible to implement harvesting and re-use, infiltration, or evapotranspiration at a project site.
 - (iii) Infeasibility to implement harvesting and re-use, infiltration, or evapotranspiration at a project site may result from conditions including the following:
 - Locations where seasonal high groundwater would be within 10 feet of the base of the LID treatment measure.
 - Locations within 100 feet of a groundwater well used for drinking water.

- Development sites where pollutant mobilization in the soil or groundwater is a documented concern.
 - Locations with potential geotechnical hazards.
 - Smart growth and infill or redevelopment sites where the density and/or nature of the project would create significant difficulty for compliance with the onsite volume retention requirement.
 - Locations with tight clay soils that significantly limit the infiltration of stormwater.
- (iv) By May 1, 2011, the Permittees, collaboratively or individually, shall submit a report on the criteria and procedures the Permittees shall employ to determine when harvesting and re-use, infiltration, or evapotranspiration is feasible and infeasible at a Regulated Project site. This report shall, at a minimum, contain the information required in Provision C.3.c.iii.(1).
- (v) By December 1, 2013, the Permittees, collaboratively or individually, shall submit a report on their experience with determining infeasibility of harvesting and re-use, infiltration, or evapotranspiration at Regulated Project sites. This report shall, at a minimum, contain the information required in Provision C.3.iii.(2).
- (vi) Biotreatment (or bioretention) systems shall be designed to have a surface area no smaller than what is required to accommodate a 5 inches/hour stormwater runoff surface loading rate, and infiltrate runoff at a minimum of 5 inches per hour during the life of the facility. The ~~planting and~~ soil media for biotreatment (or bioretention) systems shall be designed to sustain healthy, vigorous plant growth and maximize stormwater runoff retention and pollutant removal. Permittees shall ensure that Regulated Projects use biotreatment soil media that meet the minimum specifications set forth in Attachment L.
~~By December 1, 2010, the Permittees, working collaboratively or individually, shall submit for Water Board approval, a proposed set of model biotreatment soil media specifications and soil infiltration testing methods to verify a long-term infiltration rate of 5 to 10 inches/hour. This submittal to the Water Board shall, at a minimum, contain the information required in Provision C.3.c.iii.(3). Once the Water Board approves biotreatment soil media specifications and soil infiltration testing methods, the Permittees shall ensure that biotreatment systems installed to meet the requirements of Provision C.3.c and d comply with the Water Board approved minimum specifications and soil infiltration testing methods.~~
- (vii) Green roofs may be considered biotreatment systems that treat roof runoff only if they meet certain minimum specifications. ~~By May 1, 2011, the Permittees shall submit for Water Board~~

~~approval, proposed minimum specifications for green roofs. This submittal to the Water Board shall, at a minimum, contain the information required in Provision C.3.c.iii.(4). Once the Water Board approves green roof minimum specifications, the~~
Permittees shall ensure that green roofs installed at Regulated Projects ~~to~~ meet the following requirements of Provision C.3.c and d ~~and d~~ comply with the Water Board approved minimum specifications.:

- The green roof system planting media shall be sufficiently deep to provide capacity within the pore space of the media for the required runoff volume specified by Provision C.3.d.i.(1).
- The green roof system planting media shall be sufficiently deep to support the long term health of the vegetation selected for the green roof, as specified by a landscape architect or other knowledgeable professional.

(c) Require any Regulated Project that does not comply with Provision C.3.c.i.(2)(b) above to meet the requirements established in Provision C.3.e for alternative compliance.

ii. **Implementation Level** – All elements of the tasks described in Provision C.3.c.i shall be fully implemented.

Due Date for Full Implementation – December 1, 2011

- (1) For any private development project for which a planning application has been deemed complete by a Permittee on or before the Permit effective date, Provision C.3.c.i shall not apply so long as the project applicant is diligently pursuing the project. Diligent pursuance may be demonstrated by the project applicant's submittal of supplemental information to the original application, plans, or other documents required for any necessary approvals of the project by the Permittee. If during the time period between the Permit effective date and the required implementation date of December 1, 2011, the project applicant has not taken any action to obtain the necessary approvals from the Permittee, the project will then be subject to the requirements of Provision C.3.c.i.
- (2) For any private development project with an application deemed complete after the Permit effective date, the requirements of Provision C.3.c.i shall not apply if the project applicant has received final discretionary approval for the project before the required implementation date of December 1, 2011.
- (3) For public projects for which funding has been committed and construction is scheduled to begin by December 1, 2012, the requirements of Provision C.3.c.i shall not apply.

iii. Reporting

- (1) Feasibility/Infeasibility Criteria Report - By May 1, 2011, the Permittees, collaboratively or individually, shall submit a report to the Water Board containing the following information:
 - Literature review and discussion of documented cases/sites, particularly in the Bay Area and California, where infiltration, harvesting and reuse, or evapotranspiration have been demonstrated to be feasible and/or infeasible.
 - Discussion of proposed feasibility and infeasibility criteria and procedures the Permittees shall employ to make a determination of when biotreatment will be allowed at a Regulated Project site.
- (2) Status Report on Application of Feasibility/Infeasibility Criteria – By December 1, 2013, the Permittees shall submit a report to the Water Board containing the following information:
 - Discussion of the most common feasibility and infeasibility criteria employed since implementation of Provision C.3.c requirements, including site-specific examples;
 - Discussion of barriers, including institutional and technical site specific constraints, to implementation of harvesting and reuse, infiltration, or evapotranspiration, and proposed strategies for removing these identified barriers;
 - If applicable, discussion of proposed changes to feasibility and infeasibility criteria and rationale for the changes; and
 - Guidance for the Permittees to make a consistent and appropriate determination of the feasibility of harvesting and reuse, infiltration, or evapotranspiration for each Regulated Project.
- ~~(3) Model Biotreatment Soil Media Specifications – By December 1, 2010, the Permittees, collaboratively or individually, shall submit a report to the Water Board containing the following information:
 - Proposed soil media specifications for biotreatment systems;
 - Proposed soil testing methods to verify a long term infiltration rate of 5-10 inches/hour;
 - Relevant literature and field data showing the feasibility of the minimum design specifications;
 - Relevant literature, field, and analytical data showing adequate pollutant removal and compliance with the Provision C.3.d hydraulic sizing criteria; and
 - Guidance for the Permittees to apply the minimum specifications in a consistent and appropriate manner.~~
- ~~(4) Green Roof Minimum Specifications – By May 1, 2011, the Permittees, collaboratively or individually, shall submit a report to the Water Board containing the following information:
 - Proposed minimum design specifications for green roofs;~~

- ~~• Relevant literature and field data showing the feasibility of the minimum design specifications;~~
- ~~• Relevant literature, field, and analytical data showing adequate pollutant removal and compliance with the Provision C.3.d hydraulic sizing criteria;~~
- ~~• Discussion of data and lessons learned from already installed green roofs;~~
- ~~• Discussion of barriers, including institutional and technical site specific constraints, to installation of green roofs and proposed strategies for removing these identified barriers; and~~
- ~~• Guidance for the Permittees to apply the minimum specifications in a consistent and appropriate manner.~~

- (3) Report the method(s) of implementation of Provisions C.3.c.i above in the 2012 Annual Report. For specific tasks listed above that are reported using the reporting tables required for Provision C.3.b.v, a reference to those tables will suffice.

C.3.d. Numeric Sizing Criteria for Stormwater Treatment Systems

- i. Task Description** – The Permittees shall require that stormwater treatment systems constructed for Regulated Projects meet at least one of the following hydraulic sizing design criteria:

- (1) **Volume Hydraulic Design Basis** – Treatment systems whose primary mode of action depends on volume capacity shall be designed to treat stormwater runoff equal to:
- (a) The maximized stormwater capture volume for the area, on the basis of historical rainfall records, determined using the formula and volume capture coefficients set forth in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998), pages 175–178 (e.g., approximately the 85th percentile 24-hour storm runoff event); or
 - (b) The volume of annual runoff required to achieve 80 percent or more capture, determined in accordance with the methodology set forth in Section 5 of the California Stormwater Quality Association’s Stormwater Best Management Practice Handbook, New Development and Redevelopment (2003), using local rainfall data.
- (2) **Flow Hydraulic Design Basis** – Treatment systems whose primary mode of action depends on flow capacity shall be sized to treat:
- (a) 10 percent of the 50-year peak flowrate;
 - (b) The flow of runoff produced by a rain event equal to at least two times the 85th percentile hourly rainfall intensity for the applicable area, based on historical records of hourly rainfall depths; or
 - (c) The flow of runoff resulting from a rain event equal to at least 0.2 inches per hour intensity.

- (3) **Combination Flow and Volume Design Basis** – Treatment systems that use a combination of flow and volume capacity shall be sized to treat at least 80 percent of the total runoff over the life of the project, using local rainfall data.
- ii. **Implementation Level** – The Permittees shall immediately require the controls in this task.
- Due Date for Full Implementation** – Immediate, except December 1, 2010, for Vallejo Permittees.
- iii. **Reporting** – Permittees shall use the reporting tables required in Provision C.3.b.v.
- iv. **Limitations on Use of Infiltration Devices in Stormwater Treatment Systems**
- (1) For Regulated Projects, each Permittee shall review planned land use and proposed treatment design to verify that installed stormwater treatment systems with no under-drain, and that function primarily as infiltration devices, should not cause or contribute to the degradation of groundwater quality at project sites. An infiltration device is any structure that is deeper than wide and designed to infiltrate stormwater into the subsurface and, as designed, bypass the natural groundwater protection afforded by surface soil. Infiltration devices include dry wells, injection wells, and infiltration trenches (includes french drains).
- (2) For any Regulated Project that includes plans to install stormwater treatment systems which function primarily as infiltration devices, the Permittee shall require that:
- (a) Appropriate pollution prevention and source control measures are implemented to protect groundwater at the project site, including the inclusion of a minimum of two feet of suitable soil to achieve a maximum 5 inches/hour infiltration rate for the infiltration system;
- (b) Adequate maintenance is provided to maximize pollutant removal capabilities;
- (c) The vertical distance from the base of any infiltration device to the seasonal high groundwater mark is at least 10 feet. (Note that some locations within the Permittees' jurisdictions are characterized by highly porous soils and/or high groundwater tables. In these areas, a greater vertical distance from the base of the infiltration device to the seasonal high groundwater mark may be appropriate, and treatment system approvals should be subject to a higher level of analysis that considers the potential for pollutants (such as from onsite chemical use), the level of pretreatment to be achieved, and other similar factors in the overall analysis of groundwater safety);
- (d) Unless stormwater is first treated by a method other than infiltration, infiltration devices are not approved as treatment measures for runoff from areas of industrial or light industrial activity; areas subject to high vehicular traffic (i.e., 25,000 or greater average daily traffic on a

main roadway or 15,000 or more average daily traffic on any intersecting roadway); automotive repair shops; car washes; fleet storage areas (e.g., bus, truck); nurseries; and other land uses that pose a high threat to water quality;

- (e) Infiltration devices are not placed in the vicinity of known contamination sites unless it has been demonstrated that increased infiltration will not increase leaching of contaminants from soil, alter groundwater flow conditions affecting contaminant migration in groundwater, or adversely affect remedial activities; and
- (f) Infiltration devices are located a minimum of 100 feet horizontally away from any known water supply wells, septic systems, and underground storage tanks with hazardous materials. (Note that some locations within the Permittees' jurisdictions are characterized by highly porous soils and/or high groundwater tables. In these areas, a greater horizontal distance from the infiltration device to known water supply wells, septic systems, or underground storage tanks with hazardous materials may be appropriate, and treatment system approvals should be subject to a higher level of analysis that considers the potential for pollutants (such as from onsite chemical use), the level of pretreatment to be achieved, and other similar factors in the overall analysis of groundwater safety).

C.3.e. Alternative or In-Lieu Compliance with Provision C.3.c.

- i. The Permittees may allow a Regulated Project to provide alternative compliance with Provision C.3.c in accordance with one of the two options listed below:
 - (1) **Option 1: LID Treatment at an Offsite Location**

Treat a portion of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility **and** treat the remaining portion of the Provision C.3.d runoff with LID treatment measures at an offsite project in the same watershed. The offsite LID treatment measures must provide hydraulically-sized treatment (in accordance with Provision C.3.d) of an equivalent quantity of both stormwater runoff and pollutant loading and achieve a net environmental benefit.
 - (2) **Option 2: Payment of In-Lieu Fees**

Treat a portion of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility **and** pay equivalent in-lieu fees⁵ to treat the remaining portion of the Provision

⁵ **In-lieu fees** – Monetary amount necessary to provide both hydraulically-sized treatment (in accordance with Provision C.3.d) with LID treatment measures of an equivalent quantity of stormwater runoff and pollutant loading, and a proportional share of the operation and maintenance costs of the Regional Project.

C.3.d runoff with LID treatment measures at a Regional Project.⁶ The Regional Project must achieve a net environmental benefit.

- (3) For the alternative compliance options described in Provision C.3.e.i.(1) and (2) above, offsite projects must be constructed by the end of construction of the Regulated Project. If more time is needed to construct the offsite project, for each additional year, up to three years, after the construction of the Regulated Project, the offsite project must provide an additional 10% of the calculated equivalent quantity of both stormwater runoff and pollutant loading. Regional Projects must be completed within three years after the end of construction of the Regulated Project. However, the timeline for completion of the Regional Project may be extended, up to five years after the completion of the Regulated Project, with prior Executive Officer approval. Executive Officer approval will be granted contingent upon a demonstration of good faith efforts to implement the Regional Project, such as having funds encumbered and applying for the appropriate regulatory permits.

ii. Special Projects

- (1) When considered at the watershed scale, certain land development projects characterized as ~~types of~~ smart growth, high density, ~~and or~~ transit-oriented development can either reduce existing impervious surfaces, or create less “accessory” impervious areas and automobile-related pollutant impacts. Incentive LID ~~T~~treatment ~~R~~reduction ~~C~~redits approved by the Water Board may be applied to these ~~types of~~ Special Projects, which are Regulated Projects that meet the specific criteria listed below in Provisions C.3.e.ii.(2),(3)&(4). For any Special Project, the allowable incentive LID Treatment Reduction Credit is the maximum percentage of the amount of runoff identified in Provision C.3.d. for the Special Project’s drainage area, that may be treated with one or a combination of the following two types of non-LID treatment systems:

- Tree-box-type high flowrate biofilters
- Vault-based high flowrate media filters

The allowed LID Treatment Reduction Credit recognizes that density and space limitations for the Special Projects identified herein may make 100% LID treatment infeasible. Under Provision C.3.e.vi, each Permittee is required to report on the infeasibility of LID treatment for each of the Special Projects for which LID Treatment Reduction Credit was applied.

- (2) Category A Special Project Criteria
 - (a) To be considered a Category A Special Project, a Regulated Project must meet all of the following criteria:

⁶ **Regional Project** – A regional or municipal stormwater treatment facility that discharges into the same watershed that the Regulated Project does.

- (i) Be built as part of a Permittee's stated objective to preserve or enhance a pedestrian-oriented type of urban design.
 - (ii) Be located in a Permittee's designated central business district, downtown core area or downtown core zoning district, neighborhood business district or comparable pedestrian-oriented commercial district, or historic preservation site and/or district.
 - (iii) Create and/or replace one half acre or less of impervious surface area.
 - (iv) Include no surface parking, except for incidental surface parking. Incidental surface parking is allowed only for emergency vehicle access, Americans with Disabilities Act (ADA) accessibility, and passenger and freight loading zones.
 - (v) Have at least 85% coverage for the entire project site by permanent structures. The remaining 15% portion of the site is to be used for safety access, parking structure entrances, trash and recycling service, utility access, pedestrian connections, public uses, landscaping, and stormwater treatment.
- (b) Any Category A Special Project may qualify for 100% LID Treatment Reduction Credit, which would allow the Category A Special Project to treat up to 100% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.
- (3) Category B Special Project Criteria
- (a) To be considered a Category B Special Project, a Regulated Project must meet all of the following criteria:
 - (i) Be built as part of a Permittee's stated objective to preserve or enhance a pedestrian-oriented type of urban design.
 - (ii) Be located in a Permittee's designated central business district, downtown core area or downtown core zoning district, neighborhood business district or comparable pedestrian-oriented commercial district, or historic preservation site and/or district.
 - (iii) Create and/or replace greater than one-half acre but no more than 2 acres of impervious surface area.
 - (iv) Include no surface parking, except for incidental surface parking. Incidental surface parking is allowed only for emergency vehicle access, ADA accessibility, and passenger and freight loading zones.
 - (v) Have at least 85% coverage for the entire project site by permanent structures. The remaining 15% portion of the site is to be used for safety access, parking structure entrances, trash

- and recycling service, utility access, pedestrian connections, public uses, landscaping, and stormwater treatment.
- (b) For any Category B Special Project, the maximum LID Treatment Reduction Credit allowed is determined based on the density achieved by the Project in accordance with the criteria listed below. Density is expressed in Floor Area Ratios (FARs) for commercial and mixed-use development projects and in Dwelling Units per Acre (DU/Ac) for residential development projects.
- (i) 50% Maximum LID Treatment Reduction Credit
- For any commercial or mixed use Category B Special Project with a FAR of at least 2:1, up to 50% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.
 - For any residential Category B Special Project with a density of at least 50 DU/Ac, up to 50% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.
- (ii) 75% Maximum LID Treatment Reduction Credit
- For any commercial or mixed use Category B Special Project with a FAR of at least 3:1, up to 75% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.
 - For any residential Category B Special Project with a density of at least 75 DU/Ac, up to 75% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.
- (iii) 100% Maximum LID Treatment Reduction Credit
- For any commercial or mixed use Category B Special Project with a FAR of at least 4:1, up to 100% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.
 - For any residential Category B Special Project with a density of at least 100 DU/Ac, up to 100% of the amount of runoff identified in Provision C.3.d. for the Project's drainage area may be treated with either one or a combination of the two types of non-LID treatment systems listed in Provision C.3.e.ii.(1) above.
- (4) Category C Special Project Criteria (Transit-Oriented Development)
- (a) Transit-Oriented Development refers to the clustering of homes, jobs, shops and services in close proximity to rail stations, ferry terminals

or bus stops offering access to frequent, high-quality transit services. This pattern typically involves compact development and a mixing of different land uses, along with amenities like pedestrian-friendly streets. To be considered a Category C Special Project, a Regulated Project must meet all of the following criteria:

- (i) Be characterized as a non auto-related land use project. That is, Category C specifically excludes any Regulated Project that is a stand-alone surface parking lot; car dealership; auto and truck rental facility with onsite surface storage; fast-food restaurant, bank or pharmacy with drive-through lanes; gas station, car wash, auto repair and service facility; or other auto-related project unrelated to the concept of Transit-Oriented Development.
 - (ii) If a commercial or mixed-use development project, achieve at least an FAR of 2:1.
 - (iii) If a residential development project, achieve at least a density of 25 DU/Ac.
- (b) For any Category C Special Project, the total maximum LID Treatment Reduction Credit allowed is the sum of three different types of credits that the Category C Special Project may qualify for, namely: Location, Density and Minimized Surface Parking Credits.
- (c) Location Credits
- (i) A Category C Special Project may qualify for the following Location Credits:
 - 50% Location Credit: Located within a ¼ mile radius of an existing or planned transit hub.
 - 25% Location Credit: Located within a ½ mile radius of an existing or planned transit hub.
 - 25% Location Credit: Located within a planned Priority Development Area (PDA), which is an infill development area formally designated by the Association of Bay Area Government's / Metropolitan Transportation Commission's FOCUS regional planning program. FOCUS is a regional incentive-based development and conservation strategy for the San Francisco Bay Area.
 - (ii) Only one Location Credit may be used by an individual Category C Special Project, even if the project qualifies for multiple Location Credits.
 - (iii) At least 50% or more of a Category C Special Project's site must be located within the ¼ or ½ mile radius of an existing or planned transit hub to qualify for the corresponding Location Credits listed above. One hundred percent of a Category C Special Project's site must be located within a PDA to qualify for the corresponding Location Credit listed above.

- (iv) Transit hub is defined as a rail, light rail, or commuter rail station, ferry terminal, or bus transfer station served by three or more bus routes (i.e., a bus stop with no supporting services does not qualify). A planned transit hub is a station on the MTC's Regional Transit Expansion Program list, per MTC's Resolution 3434 (revised April 2006), which is a regional priority funding plan for future transit stations in the San Francisco Bay Area.
- (d) Density Credits: To qualify for any Density Credits, a Category C Special Project must first qualify for one of the Location Credits listed in Provision C.3.e.ii.(4)(c) above.
- (i) A Category C Special Project that is a commercial or mixed-use development project may qualify for the following Density Credits:
- 10% Density Credit: Achieve an FAR of at least 2:1.
 - 20% Density Credit: Achieve an FAR of at least 4:1.
 - 30% Density Credit: Achieve an FAR of at least 6:1.
- (ii) A Category C Special Project that is a residential development project may qualify for the following Density Credits:
- 10% Density Credit: Achieve a density of at least 30 DU/Ac.
 - 20% Density Credit: Achieve a density of at least 60 DU/Ac.
 - 30% Density Credit: Achieve a density of at least 100 DU/Ac.
- (iii) Commercial and mixed-use Category C Projects do not qualify for Density Credits based on DU/Ac and residential Category C Projects do not qualify for Density Credits based on FAR.
- (iv) Only one Density Credit may be used by an individual Category C Special Project, even if the project qualifies for multiple Density Credits.
- (e) Minimized Surface Parking Credits: To qualify for any Minimized Surface Parking Credits, a Category C Special Project must first qualify for one of the Location Credits listed in Provision C.3.e.ii.(4)(c) above.
- (i) A Category C Special Project may qualify for the following Minimized Surface Parking Credits:
- 10% Minimized Surface Parking Credit: Have 10% or less of the total post-project impervious surface area dedicated to at-grade surface parking. The at-grade surface parking must be treated with LID treatment measures.
 - 20% Minimized Surface Parking Credit: Have no surface parking except for incidental surface parking. Incidental surface parking is allowed only for emergency vehicle access, ADA accessibility, and passenger and freight loading zones.

- (ii) Only one Minimized Surface Parking Credit may be used by an individual Category C Special Project, even if the project qualifies for multiple Minimized Surface Parking Credits.
- (5) Any Regulated Project that meets all the criteria for multiple Special Projects Categories (i.e., a Regulated Project that may be characterized as a Category B or C Special Project) may only use the LID Treatment Reduction Credit allowed under one of the Special Projects Categories (i.e., a Regulated Project that may be characterized as a Category B or C Special Project may use the LID Treatment Reduction Credit allowed under Category B or Category C, but not the sum of both.)
- ~~(2) By December 1, 2010, the Permittees shall submit a proposal to the Water Board containing the following information:~~
- ~~• Identification of the types of projects proposed for consideration of LID treatment reduction credits and an estimate of the number and cumulative area of potential projects during the remaining term of this Permit for each type of project;~~
 - ~~• Identification of institutional barriers and/or technical site specific constraints to providing 100% LID treatment onsite that justify the allowance for non-LID treatment measures onsite;~~
 - ~~• Specific criteria for each type of Special Project proposed, including size, location, minimum densities, minimum floor area ratios, or other appropriate limitations;~~
 - ~~• Identification of specific water quality and environmental benefits provided by these types of projects that justify the allowance for non-LID treatment measures onsite;~~
 - ~~• Proposed LID treatment reduction credit for each type of Special Project and justification for the proposed credits. The justification shall include identification and an estimate of the specific water quality benefit provided by each type of Special Project proposed for LID treatment reduction credit; and~~
 - ~~• Proposed total treatment reduction credit for Special Projects that may be characterized by more than one category and justification for the proposed total credit.~~

iii. **Effective Date** – December 1, 2011.

iv. **Implementation Level**

- (1) For any private development project for which a planning application has been deemed complete by a Permittee on or before the Permit effective date, Provisions C.3.e.i-ii shall not apply so long as the project applicant is diligently pursuing the project. Diligent pursuance may be demonstrated by the project applicant's submittal of supplemental information to the original application, plans, or other documents required for any necessary approvals of the project by the Permittee. If during the time period between the Permit effective date and the required implementation date of December 1, 2011, the project applicant has not taken any action to obtain

the necessary approvals from the Permittee, the project will then be subject to the requirements of Provision C.3.e.i-ii.

- (2) For public projects for which funding has been committed and construction is scheduled to begin by December 1, 2012, the requirements of Provisions C.3.e.i-ii shall not apply.
 - (3) Provisions C.3.e.i-ii supersede any Alternative Compliance Policies previously approved by the Executive Officer
 - (4) For all offsite projects and Regional Projects installed in accordance with Provision C.3.e.i-ii, the Permittees shall meet the Operation & Maintenance (O&M) requirements of Provision C.3.h.
- v. **Reporting** –The Permittees shall submit the ordinance/legal authority and procedural changes made, if any, to implement Provision C.3.e with their 2012 Annual Report. Annual reporting thereafter shall be done in conjunction with reporting requirements under Provision C.3.b.v.

Any Permittee choosing to require 100% LID treatment onsite for all Regulated Projects and not allow alternative compliance under Provision C.3.e, shall include a statement to that effect in the 2012 Annual Report and all subsequent Annual Reports.

vi. Reporting on Special Projects

- (1) Beginning December 1, 2011, Permittees shall track any identified potential Special Projects that have submitted planning applications but that have not received final discretionary approval.
- (2) By March 15 and September 15 of each year, Permittees shall report to the Water Board on these tracked potential Special Projects using Table 3.1 found at the end of Provision C.3. All the required column entry information listed in Table 3.1 shall be reported for each potential Special Project. Any Permittee with no potential Special Projects shall so state.

For each Special Project listed in Table 3.1, Permittees shall include a narrative discussion of the feasibility or infeasibility of 100% LID treatment, onsite and offsite. Both technical and economic feasibility or infeasibility shall be discussed, as applicable. The discussion shall also contain enough technical and/or economic detail to document the basis of infeasibility used.

- (3) Once a Special Project has final discretionary approval, it shall be reported in the Provision C.3.b. Reporting Table in the same reporting year that the project was approved. In addition to the column entries contained in the Provision C.3.b. Reporting Table, the Permittees shall provide the following supplemental information for each approved Special Project:
 - (a) Submittal Date: Date that a planning application for the Special Project was submitted.
 - (b) Description: Type of project, number of floors, number of units (commercial, mixed-use, residential), type of parking, and other relevant information.

- (c) Site Acreage: Total site area in acres.
- (d) Density in DU/Ac: Number of dwelling units per acre.
- (e) Density in FAR: Floor Area Ratio
- (f) Special Project Category: For each applicable Special Project Category, list the specific criteria applied to determine applicability. For each non-applicable Special Project Category, indicate n/a.
- (g) LID Treatment Reduction Credit Available: For each applicable Special Project Category, state the maximum total LID Treatment Reduction Credit applied. For Category C Special Projects also list the individual Location, Density, and Minimized Surface Parking Credits applied.
- (h) List of Stormwater Treatment Systems: List all LID stormwater treatment systems approved. For each type of LID treatment system, indicate the percentage of the total amount of runoff identified in Provision C.3.d. for the Special Project's drainage area that will be treated.
- (i) List of Non-LID Stormwater Treatment Systems: List all non-LID stormwater treatment systems approved. For each type of non-LID treatment system, indicate: (1) the percentage of the total amount of runoff identified in Provision C.3.d. for the Special Project's drainage area, and (2) whether the treatment system either meets minimum design criteria published by a government agency or received certification issued by a government agency, and reference the applicable criteria or certification.

Table 3.1 Standard Tracking and Reporting Form for Potential Special Projects

<u>Project Name and No.</u>	<u>Permittee</u>	<u>Address</u>	<u>Application Submittal Date</u>	<u>Description</u>	<u>Site Total Acreage</u>	<u>Density DU/Ac</u>	<u>Density FAR</u>	<u>Special Project Category</u>	<u>LID Treatment Reduction Credit Available</u>	<u>List of LID Stormwater Treatment Systems</u>	<u>List of Non-LID Stormwater Treatment Systems</u>
								<u>Category A:</u> <u>Category B:</u> <u>Category C:</u> <u>Location:</u> <u>Density:</u> <u>Parking:</u>	<u>Category A:</u> <u>Category B:</u> <u>Category C:</u> <u>Location:</u> <u>Density:</u> <u>Parking:</u>	<u>Indicate each type of LID treatment system and the percentage of total runoff treated.</u>	<u>Indicate each type of non-LID treatment system and the percentage of total runoff treated. Indicate whether minimum design criteria met or certification received (see footnotes).</u>

Project Name and No: Name of the Special Project and Project No. (if applicable)

Permittee: Name of the Permittee in whose jurisdiction the Special Project will be built.

Address: Address of the Special Project; if no street address, state the cross streets.

Submittal Date: Date that a planning application for the Special Project was submitted; if a planning application has not been submitted, include a projected application submittal date.

Description: Type of project (commercial, mixed-use, residential), number of floors, number of units, type of parking, and other relevant information.

Site Acreage: Total site area in acres.

Density in DU/Ac: Number of dwelling units per acre.

Density in FAR: Floor Area Ratio

Special Project Category: For each applicable Special Project Category, list the specific criteria applied to determine applicability. For each non-applicable Special Project Category, indicate n/a.

LID Treatment Reduction Credit Available: For each applicable Special Project Category, state the maximum total LID Treatment Reduction Credit available. For Category C Special Projects also list the individual Location, Density, and Minimized Surface Parking Credits available.

List of LID Stormwater Treatment Systems: List all LID stormwater treatment systems proposed. For each type, indicate the percentage of the total amount of runoff identified in Provision C.3.d. for the Special Project's drainage area.

List of Non-LID Stormwater Treatment Systems: List all non-LID stormwater treatment systems proposed. For each type, indicate the percentage of the total amount of runoff identified in Provision C.3.d. for the Special Project's drainage area. For each type of non-LID treatment system, indicate: (1) the percentage of the total amount of runoff identified in Provision C.3.d. for the Special Project's drainage area, and (2) whether the treatment system either meets minimum design criteria published by a government agency or received certification issued by a government agency, and reference the applicable criteria or certification.

ATTACHMENT F

Provision C.3.g. Santa Clara Permittees Hydromodification Management Requirements

Santa Clara Permittees Hydromodification Management Requirements

1. On-site and Regional Hydromodification Management (HM) Control Design Criteria

- a. *Range of flows to control:* Flow duration controls shall be designed such that post-project stormwater discharge rates and durations match pre-project discharge rates and durations from 10 percent of the pre-project 2-year peak flow⁴ up to the pre-project 10-year peak flow, except where the lower endpoint of this range is modified as described in Section 5 of this Attachment.
- b. *Goodness of fit criteria:* The post-project flow duration curve shall not deviate above the pre-project flow duration curve by more than 10 percent over more than 10 percent of the length of the curve corresponding to the range of flows to control.
- c. *Allowable low flow rate:* Flow control structures may be designed to discharge stormwater at a very low rate that does not threaten to erode the receiving waterbody. This flow rate (also called Q_{cp} ⁵) shall be no greater than 10 percent of the pre-project 2-year peak flow unless a modified value is substantiated by analysis of actual channel resistance in accordance with an approved User Guide as described in Section 5 of this Attachment.
- d. *Standard HM modeling:* On-site and regional HM controls designed using the Bay Area Hydrology Model (BAHM⁶) and site-specific input data shall be considered to meet the HM Standard. Such use must be consistent with directions and options set forth in the most current BAHM User Manual.⁷ Permittees shall demonstrate to the satisfaction of the Executive Officer that any modifications of the BAHM made are consistent with this attachment and Provision C.3.g.

⁴ Where referred to in this Order, the 2-year peak flow is determined using a flood flow frequency analysis procedure based on USGS Bulletin 17B to obtain the peak flow statistically expected to occur at a 2-year recurrence interval. In this analysis, the appropriate record of hourly rainfall data (e.g., 35–50 years of data) is run through a continuous simulation hydrologic model, the annual peak flows are identified, rank ordered, and the 2-year peak flow is estimated. Such models include USEPA's Hydrologic Simulation Program—Fortran (HSPF), U.S. Army Corps of Engineers' Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS), and USEPA's Storm Water Management Model (SWMM).

⁵ Q_{cp} is the allowable low flow discharge from a flow control structure on a project site. It is a means of apportioning the critical flow in a stream to individual projects that discharge to that stream, such that cumulative discharges do not exceed the critical flow in the stream.

⁶ See www.bayareahydrologymodel.org, Resources.

⁷ The Bay Area Hydrology Model User Manual is available at <http://www.bayareahydrologymodel.org/downloads.html>.

- e. *Alternate HM modeling and design:* The project proponent may use a continuous simulation hydrologic computer model⁸ to simulate pre-project and post-project runoff and to design HM controls. To use this method, the project proponent shall compare the pre-project and post-project model output for a rainfall record of at least 30 years, and shall show that all applicable performance criteria in 1.a. – c. above are met.

2. Impracticability Provision

Where conditions (e.g., extreme space limitations) prevent a project from meeting the HM Standard for a reasonable cost, *and* where the project's runoff cannot be directed to a Regional HM control⁹ within a reasonable time frame, *and* where an in-stream measure is not practicable, the project shall use (1) site design for hydrologic source control, *and* (2) stormwater treatment measures that collectively minimize, slow, and detain¹⁰ runoff to the maximum extent practicable. In addition, if the cost of providing site design for hydrologic source control and treatment measures to the maximum extent practicable does not exceed 2% of the project cost (as defined in "2.a." below), the project shall contribute financially to an alternative HM project as set forth below:

- a. *Reasonable cost:* To show that the HM Standard cannot be met at a reasonable cost, the project proponent must demonstrate that the total cost to comply with both the HM Standard and the Provision C.3.d treatment requirement exceeds 2 percent of the project construction cost, excluding land costs. Costs of HM and treatment control measures shall not include land costs, soil disposal fees, hauling, contaminated soil testing, mitigation, disposal, or other normal site enhancement costs such as landscaping or grading that are required for other development purposes.
- b. *Regional HM control:* A regional HM control shall be considered available if there is a planned location for the regional HM control and if an appropriate funding mechanism for a regional control is in place by the time of project construction.
- c. *In-stream measures practicability:* In-stream measures shall be considered practicable when an in-stream measure for the project's watershed is planned and an appropriate funding mechanism for an in-stream measure is in place by the time of project construction.
- d. *Financial contribution to an alternative HM project:* The difference between 2 percent of the project construction costs and the cost of the treatment measures at the site (both costs as described in Section 2.a of this Attachment) shall be contributed to an alternative HM project, such as a stormwater treatment retrofit, HM retrofit, regional HM control, or in-stream measure. Preference shall be given to projects discharging, in this order, to the same tributary, mainstem, watershed, then in the same municipality or county.

3. Record Keeping

⁸ Such models include USEPA's Hydrologic Simulation Program—Fortran (HSPF), U.S. Army Corps of Engineers Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS), and USEPA's Storm Water Management Model (SWMM).

⁹ *Regional HM controls* are flow duration control structures that collect stormwater runoff discharge from multiple projects (each of which should incorporate hydrologic source control measures as well) and are designed such that the HM Standard is met for all the projects at the point where the regional control measure discharges.

¹⁰ Stormwater treatment measures that detain runoff are generally those that filter runoff through soil or other media, and include bioretention units, bioswales, basins, planter boxes, sand filters, and green roofs.

Permittees shall collect and retain the following information for all projects subject to HM requirements:

- a. Site plans identifying impervious areas, surface flow directions for the entire site, and location(s) of HM measures;
- b. For projects using standard sizing charts, a summary of sizing calculations used;
- c. For projects using the BAHM, a listing of model inputs;
- d. For projects using custom modeling, a summary of the modeling calculations with corresponding graph showing curve matching (existing, post-project, and post-project with HM controls curves);
- e. For projects using the Impracticability Provision, a listing of all applicable costs and a brief description of the alternative HM project (name, location, date of start up, entity responsible for maintenance); and
- f. A listing, summary, and date of modifications made to the BAHM, including technical rationale. Permittees shall submit this list and explanation annually with the Annual Report. This may be prepared at the Countywide Program level and submitted on behalf of participating Permittees.

4. HM Control Areas

Applicable projects shall be required to meet the HM Standard when such projects are located in areas of HM applicability as described below and shown in the [revised Santa Clara Permittees' HM Map \(see Attachment M\)](http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/muni/mrp/Final%20TO%20HM%20Maps.pdf). ~~the Santa Clara Permittees' HM Map (available at http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/muni/mrp/Final%20TO%20HM%20Maps.pdf).~~

- a. **Purple areas:** These areas represent catchments that drain to hardened channels that extend continuously to the Bay or to tidally influenced sections of creeks. The HM Standard and associated requirements do not apply to projects in the areas designated in purple on the map.

Plans to restore a creek reach may reintroduce the applicability of HM requirements, unless the creek restoration project is designed to accommodate the potential hydromodification impacts of future development; if this is not the case, in these instances, Permittees may add, but shall not delete, areas of applicability accordingly.

- b. **Red areas:** These areas represent catchments and subwatersheds that are greater than or equal to 65% impervious, based on existing imperviousness data sources. The HM Standard and associated requirements do not apply to projects in the areas designated in red on the map.

~~c. **Pink areas:** These are areas that are under review by the Permittees for accuracy of the imperviousness data. The HM Standard and associated requirements apply to projects in areas designated as pink on the map until such time as a Permittee presents new data that indicate that the actual level of imperviousness of a particular area is greater than or equal to 65% impervious. Any new data will be submitted to the Water Board in one coordinated submittal within one year of permit adoption.~~

- c. **Green area:** These areas represent catchments and subwatersheds that are less than 65% impervious ~~and are not under review by the Permittees~~. The HM Standard and associated requirements apply to projects in areas designated as green on the map.

5. Potential Exceptions to Map Designations

The Program may choose to prepare a User Guide¹¹ to be used for evaluating individual receiving waterbodies using detailed methods to assess channel stability and watercourse critical flow. This User Guide would reiterate and collate established stream stability assessment methods that have been presented in the Program's HMP.¹² After the Program has collated its methods into User Guide format, received approval of the User Guide from the Executive Officer,¹³ and informed the public through such process as an electronic mailing list, the Permittees may use the User Guide to guide preparation of technical reports for the following: implementing the HM Standard using in-stream or regional controls; determining whether certain projects are discharging to a watercourse that is less susceptible (from point of discharge to the Bay) to hydromodification (e.g., would have a lower potential for erosion than set forth in these requirements); and/or determining if a watercourse has a higher critical flow and project(s) discharging to it are eligible for an alternative Qcp for the purpose of designing on-site or regional measures to control flows draining to these channels (i.e., the actual threshold of erosion-causing critical flow is higher than 10 percent of the 2-year pre-project flow). In no case shall the design value of Qcp exceed 50 percent of the 2-year pre-project flow.

¹¹ The User Guide may be offered under a different title.

¹² The Program's HMP has undergone Water Board staff review and been subject to public notice and comment.

¹³ The User Guide will not introduce a new concept, but rather reformat existing methods; therefore, Executive Officer approval is appropriate.

APPENDIX II

**Attachments L and M
to be added to
Water Board Order No. R2-2009-0074**

ATTACHMENT L

Provision C.3.c.i.(1)(b)(vi)

Specification of soils for Biotreatment or Bioretention Facilities

Soils for biotreatment or bioretention areas shall meet two objectives:

- Be sufficiently permeable to infiltrate runoff at a minimum rate of 5" per hour during the life of the facility, and
- Have sufficient moisture retention to support healthy vegetation.

Achieving both objectives with an engineered soil mix requires careful specification of soil gradations and a substantial component of organic material (typically compost).

Local soil products suppliers have expressed interest in developing 'brand-name' mixes that meet these specifications. At their sole discretion, municipal construction inspectors may choose to accept test results and certification for a 'brand-name' mix from a soil supplier.

Tests must be conducted within 120 days prior to the delivery date of the bioretention soil to the project site.

Batch-specific test results and certification shall be required for projects installing more than 100 cubic yards of bioretention soil.

SOIL SPECIFICATIONS

Bioretention soils shall meet the following criteria. "Applicant" refers to the entity proposing the soil mixture for approval by a Permittee.

1. General Requirements – Bioretention soil shall:
 - a. Achieve a long-term, in-place infiltration rate of at least 5 inches per hour.
 - b. Support vigorous plant growth.
 - c. Consist of the following mixture of fine sand and compost, measured on a volume basis:
 - 60%-70% Sand
 - 30%-40% Compost
2. Submittal Requirements – The applicant shall submit to the Permittee for approval:
 - a. A sample of mixed bioretention soil.
 - b. Certification from the soil supplier or an accredited laboratory that the Bioretention Soil meets the requirements of this guideline specification.
 - c. Grain size analysis results of the fine sand component performed in accordance with ASTM D 422, Standard Test Method for Particle Size Analysis of Soils.
 - d. Quality analysis results for compost performed in accordance with Seal of Testing Assurance (STA) standards, as specified in 4.

- e. Organic content test results of mixed Bioretention Soil. Organic content test shall be performed in accordance with by Testing Methods for the Examination of Compost and Composting (TMECC) 05.07A, “Loss-On-Ignition Organic Matter Method”.
- f. Grain size analysis results of compost component performed in accordance with ASTM D 422, Standard Test Method for Particle Size Analysis of Soils.
- g. A description of the equipment and methods used to mix the sand and compost to produce Bioretention Soil.
- h. Provide the name of the testing laboratory(s) and the following information:
 - (1) Contact person(s)
 - (2) Address(s)
 - (3) Phone contact(s)
 - (4) E-mail address(s)
 - (5) Qualifications of laboratory(s), and personnel including date of current certification by STA, ASTM, or approved equal

3. Sand for Bioretention Soil

- a. Sand shall be free of wood, waste, coating such as clay, stone dust, carbonate, etc., or any other deleterious material. All aggregate passing the No. 200 sieve size shall be non-plastic.
- b. Sand for Bioretention Soils shall be analyzed by an accredited lab using #200, #100, #40, #30, #16, #8, #4, and 3/8 inch sieves (ASTM D 422 or as approved by municipality), and meet the following gradation:

Sieve Size	Percent Passing (by weight)	
	<i>Min</i>	<i>Max</i>
3/8 inch	100	100
No. 4	90	100
No. 8	70	100
No. 16	40	95
No. 30	15	70
No. 40	5	55
No. 100	0	15
No. 200	0	5

Note: all sands complying with ASTM C33 for fine aggregate comply with the above gradation requirements.

4. Composted Material

Compost shall be a well decomposed, stable, weed free organic matter source derived from waste materials including yard debris, wood wastes or other organic materials not including manure or biosolids meeting the standards developed by the US Composting Council (USCC). The product shall be certified through the USCC Seal of Testing Assurance (STA) Program (a compost testing and information disclosure program).

a. Compost Quality Analysis – Before delivery of the soil, the supplier shall submit a copy of lab analysis performed by a laboratory that is enrolled in the US Composting Council's Compost Analysis Proficiency (CAP) program and using approved Test Methods for the Evaluation of Composting and Compost (TMECC). The lab report shall verify:

- (1) Feedstock Materials shall be specified and include one or more of the following: landscape/yard trimmings, grass clippings, food scraps, and agricultural crop residues.
- (2) Organic Matter Content: 35% - 75% by dry wt.
- (3) Carbon and Nitrogen Ratio: C:N < 25:1 and C:N >15:1
- (4) Maturity/Stability: shall have a dark brown color and a soil-like odor. Compost exhibiting a sour or putrid smell, containing recognizable grass or leaves, or is hot (120F) upon delivery or rewetting is not acceptable. In addition any one of the following is required to indicate stability:
 - (i) Oxygen Test < 1.3 O₂ /unit TS /hr
 - (ii) Specific oxy. Test < 1.5 O₂ / unit BVS /
 - (iii) Respiration test < 8 C / unit VS / day
 - (iv) Dewar test < 20 Temp. rise (°C) e.
 - (v) Solvita® > 5 Index value
- (5) Toxicity: any one of the following measures is sufficient to indicate non-toxicity.
 - (i) NH₄⁻ : NO₃-N < 3
 - (ii) Ammonium < 500 ppm, dry basis
 - (iii) Seed Germination > 80 % of control
 - (iv) Plant Trials > 80% of control
 - (v) Solvita® > 5 Index value
- (6) Nutrient Content: provide analysis detailing nutrient content including N-P-K, Ca, Na, Mg, S, and B.
 - (i) Total Nitrogen content 0.9% or above preferred.
 - (ii) Boron: Total shall be <80 ppm; Soluble shall be <2.5 ppm
- (7) Salinity: Must be reported; < 6.0 mmhos/cm
- (8) pH shall be between 6.5 and 8. May vary with plant species.

- b. Compost for Bioretention Soil Texture – Compost for bioretention soils shall be analyzed by an accredited lab using #200, 1/4 inch, 1/2 inch, and 1 inch sieves (ASTM D 422 or as approved by municipality), and meet the following gradation:

Sieve Size	Percent Passing (by weight)	
	<i>Min</i>	<i>Max</i>
1 inch	99	100
1/2 inch	90	100
1/4 inch	40	90
No. 200	2	10

- c. Bulk density shall be between 500 and 1100 dry lbs/cubic yard
- d. Moisture content shall be between 30% - 55% of dry solids.
- e. Inerts – compost shall be relatively free of inert ingredients, including glass, plastic and paper, < 1 % by weight or volume.
- f. Weed seed/pathogen destruction – provide proof of process to further reduce pathogens (PFRP). For example, turned windrows must reach min. 55C for 15 days with at least 5 turnings during that period.
- g. Select Pathogens – Salmonella <3 MPN/4grams of TS, or Coliform Bacteria <10000 MPN/gram.
- h. Trace Contaminants Metals (Lead, Mercury, Etc.) – Product must meet US EPA, 40 CFR 503 regulations.
- i. Compost Testing – The compost supplier will test all compost products within 120 calendar days prior to application. Samples will be taken using the STA sample collection protocol. (The sample collection protocol can be obtained from the U.S. Composting Council, 4250 Veterans Memorial Highway, Suite 275, Holbrook, NY 11741 Phone: 631-737-4931, www.compostingcouncil.org). The sample shall be sent to an independent STA Program approved lab. The compost supplier will pay for the test.

VERIFICATION OF ALTERNATIVE BIORETENTION SOIL MIXES

Bioretention soils not meeting the above criteria shall be evaluated on a case by case basis. Alternative bioretention soil shall meet the following specification: “Soils for bioretention facilities shall be sufficiently permeable to infiltrate runoff at a minimum rate of 5 inches per hour during the life of the facility, and provide sufficient retention of moisture and nutrients to support healthy vegetation.”

The following steps shall be followed by municipalities to verify that alternative soil mixes meet the specification:

1. **General Requirements** – Bioretention soil shall achieve a long-term, in-place infiltration rate of at least 5 inches per hour. Bioretention soil shall also support vigorous plant growth. The applicant refers to the entity proposing the soil mixture for approval.
 - a. **Submittals** – The applicant must submit to the municipality for approval:
 - (1) A sample of mixed bioretention soil.
 - (2) Certification from the soil supplier or an accredited laboratory that the Bioretention Soil meets the requirements of this guideline specification.
 - (3) Certification from an accredited geotechnical testing laboratory that the Bioretention Soil has an infiltration rate between 5 and 12 inches per hour as tested according to Section 1.b.(2)(ii).
 - (4) Organic content test results of mixed Bioretention Soil. Organic content test shall be performed in accordance with by Testing Methods for the Examination of Compost and Composting (TMECC) 05.07A, “Loss-On-Ignition Organic Matter Method”.
 - (5) Grain size analysis results of mixed bioretention soil performed in accordance with ASTM D 422, Standard Test Method for Particle Size Analysis of Soils.
 - (6) A description of the equipment and methods used to mix the sand and compost to produce Bioretention Soil.
 - (7) The name of the testing laboratory(s) and the following information:
 - (i) contact person(s)
 - (ii) address(s)
 - (iii) phone contact(s)
 - (iv) e-mail address(s)
 - (v) qualifications of laboratory(s), and personnel including date of current certification by STA, ASTM, or approved equal

b. Bioretention Soil

(1) Bioretention Soil Texture

Bioretention Soils shall be analyzed by an accredited lab using #200, and 1/2” inch sieves (ASTM D 422 or as approved by municipality), and meet the following gradation:

Sieve Size	Percent Passing (by weight)	
	<i>Min</i>	<i>Max</i>
1/2 inch	97	100
No. 200	2	5

(2) Bioretention Soil Permeability testing

Bioretention Soils shall be analyzed by an accredited geotechnical lab for the following tests:

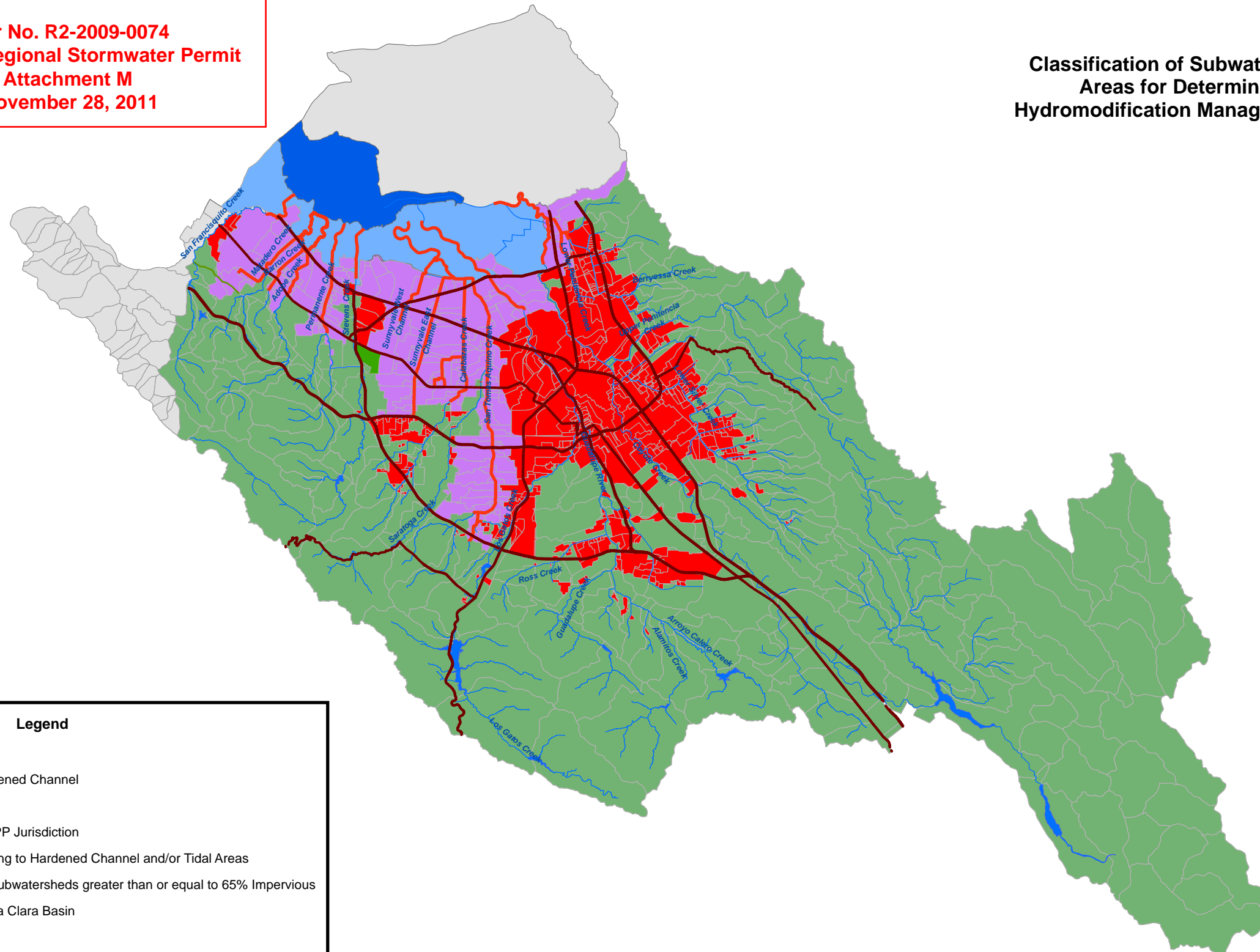
- (i) Moisture – density relationships (compaction tests) shall be conducted on bioretention soil. Bioretention soil for the permeability test shall be compacted to 85 to 90 percent of the maximum dry density (ASTM D1557).
- (ii) Constant head permeability testing in accordance with ASTM D2434 shall be conducted on a minimum of two samples with a 6-inch mold and vacuum saturation.

MULCH FOR BIORETENTION FACILITIES

Mulch is recommended for the purpose of retaining moisture, preventing erosion and minimizing weed growth. Projects subject to the State's Model Water Efficiency Landscaping Ordinance (or comparable local ordinance) will be required to provide at least two inches of mulch. Aged mulch, also called compost mulch, reduces the ability of weeds to establish, keeps soil moist, and replenishes soil nutrients. Aged mulch can be obtained through soil suppliers or directly from commercial recycling yards. It is recommended to apply 1" to 2" of composted mulch, once a year, preferably in June following weeding.

**Order No. R2-2009-0074
Municipal Regional Stormwater Permit
Attachment M
November 28, 2011**

**Classification of Subwatersheds and Catchment
Areas for Determining Applicability of
Hydromodification Management (HM) Requirements**



Legend

- Major Roads
- Continuously Hardened Channel
- Major Creeks
- Outside SCVURPPP Jurisdiction
- Catchments Draining to Hardened Channel and/or Tidal Areas
- Catchments and Subwatersheds greater than or equal to 65% Impervious
- Reservoirs in Santa Clara Basin
- Baylands
- Subwatersheds less than 65% Impervious

Revision Date: November 2010

This map contains revisions to the March 2009 version to reflect updated impervious surface data and/or catchment boundaries in the Cities of San Jose, Sunnyvale, Mountain View, and Milpitas, as described in the report to the Water Board dated October 14, 2010, consistent with the HM applicability criteria set forth in Attachment F, Section 4 of the MRP.

N

0 0.5 1 2 3 4 5 Miles

APPENDIX III

Fact Sheet

This Fact Sheet describes the legal requirements and technical rationale that serve as the basis for this Order's requirements. This Fact Sheet constitutes a portion of the findings for the Order.

Purpose

The purpose of the Order is to amend Water Board Order No. R2-2009-0074, the San Francisco Bay Municipal Regional Stormwater Permit, to add criteria for determining which types of Regulated Projects may be considered Special Projects and to allow these Special Projects to reduce the amount of stormwater runoff that must be treated with Low Impact Development (LID) stormwater treatment systems.

Background and Summary of Existing Requirements

On October 14, 2009, the Water Board adopted Order No. R2-2009-0074, NPDES No. CAS612008, prescribing Waste Discharge Requirements under the San Francisco Bay Municipal Regional Stormwater Permit for the discharge of stormwater runoff from the municipal separate storm sewer systems (MS4s) of the named Permittees.

Provision C.3. of Order No. R2-2009-0074 requires the Permittees to use their planning authorities to include appropriate source control, site design, and stormwater treatment measures in new development and redevelopment projects to address both soluble and insoluble stormwater runoff pollutant discharges and prevent increases in runoff flows from new development and redevelopment projects. Provision C.3. requires that the source control, site design, and stormwater treatment measures be LID measures.

Provision C.3.b. of Order No. R2-2009-0074 defines Regulated Projects as the different categories of new development and redevelopment projects that Permittees must regulate under Provision C.3. These categories are defined on the basis of the land use and the amount of impervious surface created and/or replaced by the project because all impervious surfaces contribute pollutants to stormwater runoff and certain land uses contribute more pollutants. Impervious surfaces can neither absorb water nor remove pollutants as the natural, vegetated soil they replaced can. Also, urban development creates new pollution by bringing higher levels of car emissions that are aerially deposited, car maintenance wastes, pesticides, household hazardous wastes, pet wastes, and trash, which can all be washed into the storm sewer.

Provision C.3.c. of Order No. R2-2009-0074 recognizes LID as a cost-effective, beneficial, holistic, integrated stormwater management strategy¹. The goal of LID is to reduce runoff and mimic a site's predevelopment hydrology by minimizing disturbed areas and impervious cover and then infiltrating, storing, detaining, evapotranspiring, and/or biotreating stormwater runoff close to its source. LID employs principles such as preserving and recreating natural landscape features and minimizing imperviousness to create functional and appealing site drainage that treat stormwater as a resource, rather than a waste product. Practices used to adhere to these LID principles include measures such as preserving undeveloped open space, rain barrels and cisterns, green roofs, permeable pavement, and biotreatment through rain gardens, bioretention units, bioswales, and planter/tree boxes.

¹ USEPA, *Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices* (Publication Number EPA 841-F-07-006, December 2007) <http://www.epa.gov/owow/nps/lid/costs07>

This Provision sets forth a three-pronged approach to LID with source control, site design, and stormwater treatment requirements. The concepts and techniques for incorporating LID into development projects, particularly for site design, have been extensively discussed in BASMAA's Start at the Source manual (1999) and its companion document, Using Site Design Techniques to Meet Development Standards for Stormwater Quality (May 2003), as well as in various other LID reference documents.

Provision C.3.c.i.(2)(b) requires each Regulated Project to treat 100% of the Provision C.3.d. runoff with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility. LID treatment measures are harvesting and re-use, infiltration, evapotranspiration, or biotreatment. A properly engineered and maintained biotreatment system may be considered only if it is infeasible to implement harvesting and re-use, infiltration, or evapotranspiration at a project site.

Provision C.3.c.i.(2)(b)(vi) requires the Permittees to propose specifications for soil installed in all biotreatment or bioretention facilities built under the provisions of this permit. These minimum specifications are contained in Attachment L. These specifications were proposed by the Permittees pursuant to Provision C.3.c.iii.(3) after research performed under their direction.^{2, 3, 4}

Provision C.3.c.i.(2)(b)(vii) requires minimum specifications for green roofs which are installed as treatment measures under this permit. The Permittees proposed green roof minimum specifications pursuant to Provision C.3.c.iii.(4) and submitted a brief report in support of their proposal.⁵

Special Projects

Provision C.3.e.ii.(1) of Order No. R2-2009-0074 was included based on the Permittees' and building industry stakeholders' comments and testimony during order adoption that certain types of smart growth, high density, and transit-oriented development projects cannot practicably implement LID treatment including biotreatment. LID treatment measures, including infiltration, harvest for use, evapotranspiration and green roofs can be infeasible to implement in a dense urban context in some cases, from a physical or cost basis. The urban centers in this region are often underlain by tight clay soils that make infiltration difficult, requiring storage at possibly prohibitive cost. Stormwater harvest for internal, non-potable use still meets regulatory obstacles from implementation of the plumbing code and lack of winter water demand. Green roofs continue to be very expensive, and evapotranspiration is lowest in the cold winter when rains fall. Many dense, central business district developments lack room for planted areas for biotreatment.

Moreover, these projects have various environmental benefits, including either reducing existing impervious surfaces associated with commercial or residential development due to increased

² Technical Memorandum – Regional Bioretention Soil Guidance & Model Specification, Bay Area Stormwater Management Agencies Association – WRA Environmental Consultants, November 12, 2010

³ Technical Memorandum – Regional Bioretention Installation Guidance, Bay Area Stormwater Management Agencies Association – WRA Environmental Consultants, November 12, 2010

⁴ Annotated Bibliography – Regional Biotreatment Soil Guidance, Bay Area Stormwater Management Agencies Association – WRA Environmental Consultants, November 12, 2010

⁵ Green Roof Minimum Specifications, Bay Area Stormwater Management Agencies Association, April 29, 2011.

density, or creating less “accessory” impervious areas and less auto-related pollutant impacts. Auto use in general and its associated pollution is reduced because residential areas are closer to commercial areas for jobs and services, and closer to transit hubs. In addition, concentrating development in urban centers should reduce pressure to develop green fields on the urban perimeter.

Incentive LID treatment reduction credits approved by the Water Board may be applied to these types of Regulated Projects that are considered “Special Projects.”

Provision C.3.e.ii.(2) of Order No. R2-2009-0074 required the Permittees to submit by December 1, 2010, a proposal to the Water Board identifying the types of projects proposed as Special Projects and therefore eligible for LID Treatment Reduction Credit. The proposal was required to include specific criteria for each type of Special Project proposed, including size, location, minimum densities, minimum floor area ratios, other appropriate limitations, and the proposed LID Treatment Reduction Credit. Specifically, the Provision required the proposal to contain the following:

- Identification of the types of projects proposed for consideration of LID treatment reduction credits and an estimate of the number and cumulative area of potential projects during the remaining term of this permit for each type of project.
- Identification of institutional barriers and/or technical site specific constraints to providing 100% LID treatment onsite that justify the allowance for non-LID treatment measures onsite.
- Specific criteria for each type of Special Project proposed, including size, location, minimum densities, minimum floor area ratios, or other appropriate limitations.
- Identification of specific water quality and environmental benefits provided by these types of projects that justify the allowance for non-LID treatment measures onsite.
- Proposed LID Treatment Reduction Credit for each type of Special Project and justification for the proposed Credits. The justification shall include identification and an estimate of the specific water quality benefit provided by each type of Special Project proposed for LID treatment reduction credit.
- Proposed total treatment reduction credit for Special Projects that may be characterized by more than one category and justification for the proposed total Credit.

On December 1, 2010, the Bay Area Stormwater Management Agencies Association (BASMAA) submitted a Special Projects proposal on behalf of the Permittees, which defined the types of Special Project Categories and their corresponding LID Treatment Reduction Credits.

BASMAA’s stormwater proposal was posted on the Water Board’s website and circulated for public comment on December 10, 2010. Comments on the proposal were received from U.S. EPA, the Natural Resources Defense Council (NRDC), San Francisco Baykeeper, the Building Industry Association, other building industry groups, and developers.

Water Board staff has met on a regular basis with representatives of BASMAA and, within these meetings, revisions of the December 10, 2010, proposal have been made and publicly circulated. Representatives of U.S. EPA, the Metropolitan Transportation Commission (MTC) and the

Association of Bay Area Governments (ABAG), among other stakeholders, have participated in some of these meetings. Water Board staff has also met separately with representatives of NRDC and San Francisco Baykeeper.

In the Permittees' original submittal and at subsequent meetings, the Permittees' have provided Water Board staff with estimates of the number and type of projects that may potentially qualify as Special Projects and the percentage of LID Treatment Reduction Credit that may be applied for the various projects.

The proposed revision to Provision C.3.e.ii. of Order No. R2-2009-0074 establishes specific criteria for determining which types of Regulated Projects may be considered Special Projects, which are more stringent than originally proposed by the Permittees. The proposed revision establishes three categories of Special Projects, with different amounts of maximum allowable non-LID treatment, based on size, land use type, and density. Projects that are the most dense and would have the greatest infeasibility problems with LID implementation are allowed to use the most non-LID treatment. Category A projects (Provision C.3.e.ii), which represents the smallest Special Projects, must be under a half acre, built in a pedestrian-oriented business district and have 85% lot coverage. Category B projects (Provision C.3.e.iii) must also have 85% lot coverage, a minimum density, and be between a half acre and 2 acres. Category C, transit-oriented development projects (Provision C.3.e.iv), have no size limitation, but must have a minimum density, and are allowed an additional non-LID treatment percentage based on proximity to transit, density, and parking criteria to establish a tiered approach for determining the total LID Treatment Reduction available. The amount of Provision C.3.d. design stormwater runoff not treated with LID measures, must be treated with one or a combination of the following two specific non-LID treatment systems:

- Tree-box-type high flowrate biofilters
- Vault-based high flowrate media filters

If LID treatment measures are not feasible, these are the best controls for qualifying Special Projects to reduce pollutants in stormwater discharges to the maximum extent practicable.

Provision C.3.e.ii.(2) of Board Order No. R2-2009-0074 is now superseded by a new Provision C.3.e.ii.(2) and Provisions C.3.e.ii.(3) and C.3.e.ii.(4), which specify criteria in three categories for determining which types of Regulated Projects may be considered Special Projects and which are more stringent than originally proposed by the Permittees.

Qualifying Special Projects are dense urban development projects that will reduce development pressure on the greenfield suburban fringe by concentrating residences and commercial development in urban centers. These projects have many more commercial square feet and dwelling units per square foot of impervious surface. Dense urban "smart growth" tends to be more pedestrian-friendly, allowing reduced auto use and reduction of associated pollution.

Transit-oriented developments are designed to reduce automobile use and will reduce associated urban runoff pollution. Typically, high density residential developments are designed to be within ½ mile of a major transit hub, with commercial development also included in the developments so that shops and jobs are all clustered in a central location, with easy transit access. These elements add up to fewer automobile trips and more use of transit.

Page 6 of *New Places, New Choices: Transit-Oriented Development in the San Francisco Bay Area*, November 2006, by the MTC, states:

In 2002, the Bay Area's "Smart Growth Strategy" —a landmark, long-range regional visioning effort —found that promoting transit-oriented development and focusing housing, jobs and retail along transit corridors would preserve as much as 66,000 acres of open space by 2020, compared with current development trends. Such a strategy also would reduce average weekday driving by as much as 3.6 million vehicle miles in 2020, conserving 150,000 gallons of gasoline a day and reducing daily carbon dioxide emissions (the principal greenhouse gas) by 2.9 million pounds per day. Already, Bay Area households located close to transit stations make fewer driving trips than do others in the region. Households within a half-mile of train stations and ferry stops log only 20 vehicle miles of travel per day, just 56 percent of the regional average. The fewer trips people make, the fewer the pollution-producing "cold starts" of their cars. These factors combine to result in lower fuel use and lower tailpipe emissions by those households living close to transit — and they also add up to powerfully persuasive evidence of the environmental benefits of TOD in the Bay Area.

Page 8 of the same MTC report also states:

...Proximity Matters - Bay Area residents who live within a half-mile of rail or ferry stops are four times as likely to use transit, three times as likely to bike, and twice as likely to walk as are those who live at greater distances.

The proposed reporting requirements (Provision C.3.e.vi) provides Water Board staff with early notice of the Special Projects that are being considered by the Permittees prior to the Permittees granting final planning approval. This allows Water Board staff to validate the Permittees' analysis of the number and size of potential Special Projects that may be approved during the remainder of the MRP's permit term. The reporting requirements also require the Permittees to describe in detail the basis for infeasibility of implementing LID treatment when non-LID treatment is used. Also, the Permittees must describe the types of filter vaults or tree filters used, and the certification these systems have achieved. Water Board staff intends to use the data collected in the proposed reporting requirements to revise the Special Projects criteria as appropriate for the next MRP permit term.

Biotreatment Soil Media and Green Roof Minimum Specifications

Provisions C.3.c.i.(2)(vi) and C.3.c.iii.(3) of Order No. R2-2009-0074 required the Permittees to submit to the Water Board by May 1, 2011, a proposed set of model biotreatment soil media specifications and soil infiltration testing methods to verify a long-term infiltration rate of 5 to 10 inches/hour.

The Permittees submitted a proposal for the soil media specifications and soil infiltration testing methods on December 1, 2010, which was distributed for public comment on December 15, 2010. Comments were received on January 28, 2011, from Roger James of Resources Management and from NRDC.

Provisions C.3.c.i.(2)(vii) and C.3.c.iii.(4) of Order No. R2-2009-0074 require the Permittees to submit to the Water Board by December 1, 2011, proposed minimum specifications for green roofs to be considered biotreatment systems.

The Permittees submitted a proposal for the minimum green roof specifications on April 29, 2011, which was distributed for public comment on May 4, 2011. No comments were received.

This Order approves the model biotreatment soil media specifications, soil infiltration testing methods, and minimum green roof specifications submitted by the Permittees.

Hydromodification Management (HM) – Santa Clara Permittees

Provision C.3.g. of Order No. R2-2009-0074 requires that certain new development projects manage increases in stormwater runoff flow and volume so that post-project runoff shall not exceed estimated pre-project runoff rates and durations, where such increased flow and/or volume is likely to cause increased potential for erosion of creek beds and banks, silt pollutant generation, or other adverse impacts on beneficial uses due to increased erosive force.

Based on Hydrograph Modification Management Plans that were developed for the Permittees on a countywide basis, the Water Board adopted HM requirements specific to the Permittees in each county, prior to the 2009 adoption of the MRP. Provision C.3.g. of Order No. R2-2009-0074 restates the major common elements of the specific HM requirements for all Permittees. Within Provision C.3.g., Attachment F contains the specific HM requirements for the Santa Clara Permittees.

Provision C.3.g.ii.(5) of Order No. R2-2009-0074 requires the Santa Clara Permittees to comply with all the requirements in Attachment F of the same Order. Requirement 4. of Attachment F (pages F-3 and F-4 of Order No. R2-2009-0074) defines geographical areas where applicable Regulated Projects are required to meet the HM Standard and associated requirements. These areas of HM applicability described in Requirement 4. are shown in the Santa Clara Permittees' HM Map available at http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/muni/mrp/Final%20TO%20HM%20Maps.pdf.

Requirement 4.c. of Attachment F states that pink areas on the HM Map are under review by the Permittees for accuracy of the imperviousness data. The HM Standard and associated requirements apply to projects in areas designated as pink on the map until such time as a Permittee presents new data that indicates that the actual level of imperviousness of a particular area is greater than or equal to 65% impervious. Any new data is to be submitted to the Water Board in one coordinated submittal within one year of permit adoption.

The Santa Clara Permittees submitted new impervious data and a revised HM Map that reflects the new data to the Water Board on October 14, 2010. On March 11, 2011, the Santa Clara Permittees submitted a revised HM Map to correct a small error in the October 2010 HM Map, and to provide additional information per Water Board staff request. The revised HM Map shows that in the majority of the pink area of the originally-approved Santa Clara Permittees' HM Map, the HM Standard and associated requirements do apply. In the revised HM Map, these areas are now shown in green to represent the applicability of the HM Standard and associated

requirements. The remaining small portion of the pink area in the original HM Map is now shown in red to represent areas where the HM Standard and associated requirements do not apply.

This Order approves the revised Santa Clara Permittees' HM Map and replaces the HM Map originally adopted by Order No. R2-2009-0074.