FAIRFIELD-SUISUN
URBAN RUNOFF MANAGEMENT PROGRAM

STORMWATER C.3 GUIDEBOOK

OCTOBER 2012

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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 divide 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 *Urban Runoff Quality Management* (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, evapotransporation, 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.

<u>New Restrictions on Methods of Stormwater Treatment</u>

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 form 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.
- Water Environment Federation (WEF) Manual of Practice No. 23/American Society of Civil Engineers (ASCE) Manual and Report of Engineering Practice No. 87, 1998. Urban Runoff Quality Management.

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 from2,500 square feet to 10,000 square feet of impervious surface, and detached single-family home

projects[1] 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:

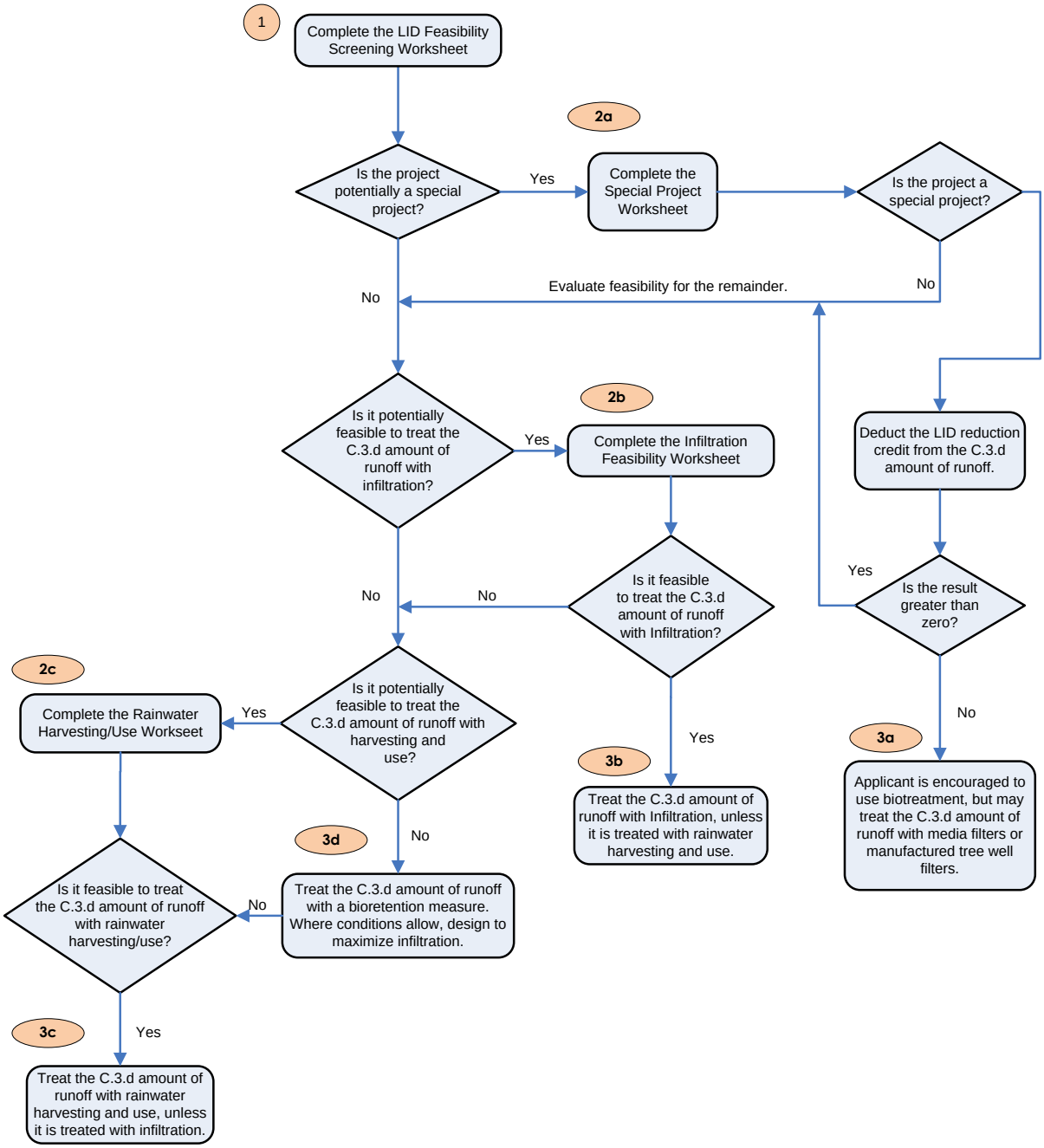
1. **Optimize the site layout** by preserving natural drainage features and designing buildings and circulation to minimize the amount of roofs, paving, and other impervious surfaces.
2. **Use pervious (self-treating/self-retaining) surfaces** such as turf, gravel, or pervious pavement, or use surfaces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


1
Complete the LID Feasibility Screening Worksheet
2a
Is the project potentially a special project?
Yes
Complete the Special Project Worksheet
Is the project a special project?
No
Evaluate feasibility for the remainder.
No
No
Is it potentially feasible to treat the C.3.d amount of runoff with infiltration?
2b
Yes
Complete the Infiltration Feasibility Worksheet
Deduct the LID reduction credit from the C.3.d amount of runoff.
Yes
Is the result greater than zero?
No
3a
Applicant is encouraged to use biotreatment, but may treat the C.3.d amount of runoff with media filters or manufactured tree well filters.
No
No
Is it feasible to treat the C.3.d amount of runoff with Infiltration?
Yes
3b
Treat the C.3.d amount of runoff with Infiltration, unless it is treated with rainwater harvesting and use.
2c
Complete the Rainwater Harvesting/Use Workseet
Yes
Is it potentially feasible to treat the C.3.d amount of runoff with harvesting and use?
No
3d
Treat the C.3.d amount of runoff with a bioretention measure. Where conditions allow, design to maximize infiltration.
No
Is it feasible to treat the C.3.d amount of runoff with rainwater harvesting/use?
3c
Yes
Treat the C.3.d amount of runoff with rainwater harvesting and use, unless it is treated with infiltration.

DIRECTING RUNOFF TO INTEGRATED MANAGEMENT PRACTICES

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)

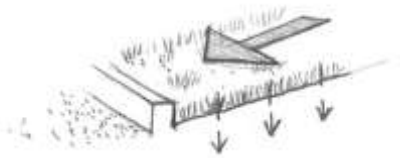


FIGURE 4-1. Self-treating areas are entirely pervious and drain directly off-site or to the storm drain system.

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.

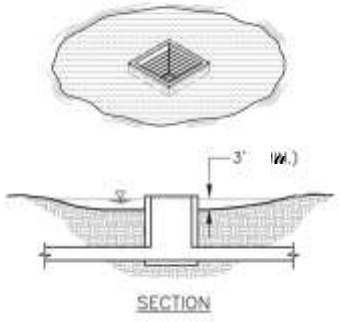


FIGURE 4-2. Self-retaining areas. Berm or depress the grade to retain at least an inch of rainfall and set inlets of any area drains at least 3 inches above low point to allow ponding.

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.

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

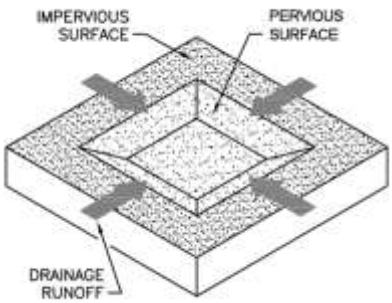


FIGURE 4-3. Relationship of impervious to pervious area for self-retaining areas.
pervious ≥ ½ impervious

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:

$$(Runoff\ factor) * (tributary\ area) \leq 2 * (self retaining\ area)$$

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.

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

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:

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

Areas draining to IMPs (repeat for each IMP):

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

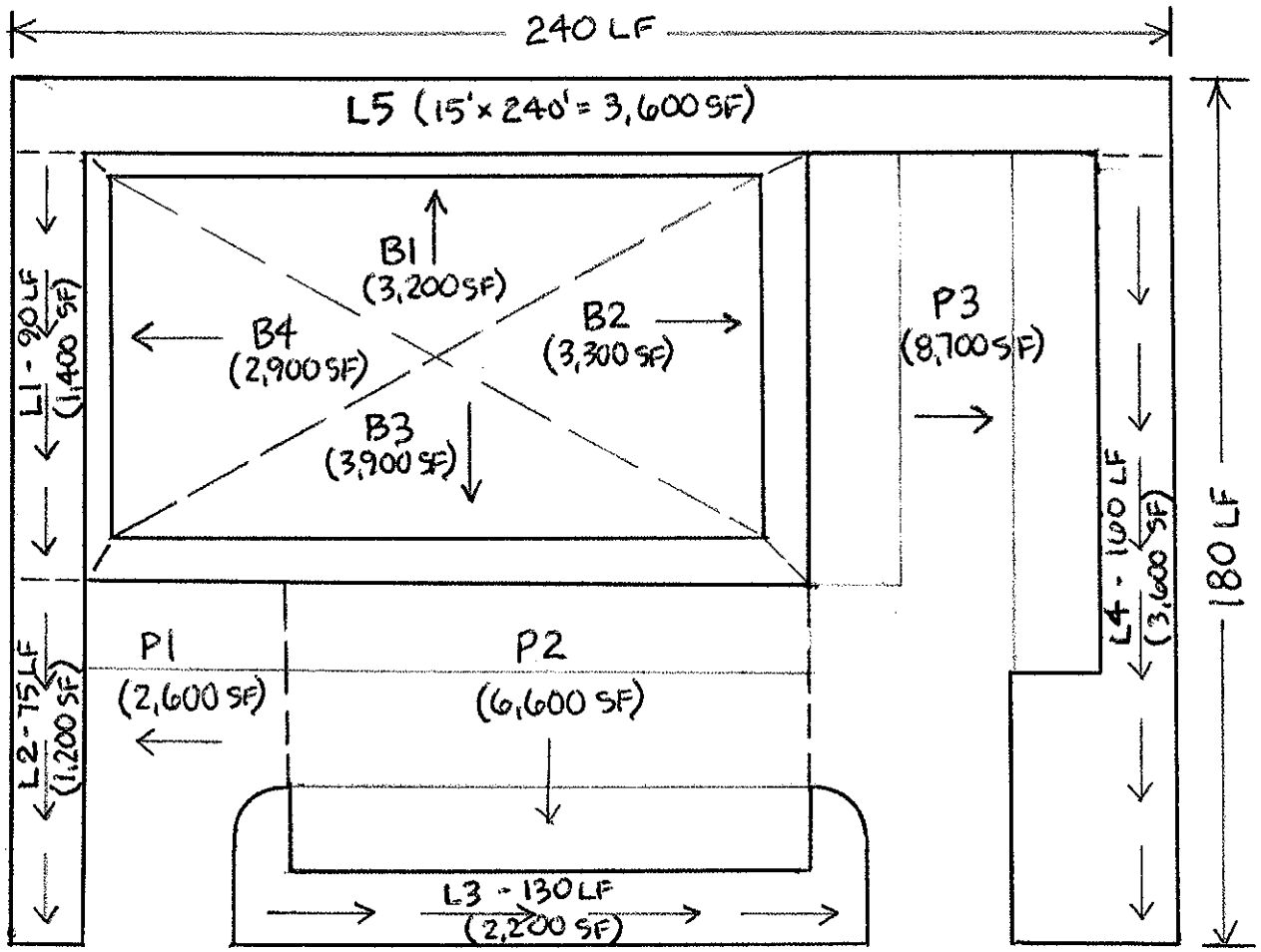
For all alternative designs, the applicant must submit an exhibit showing the entire site divided into discrete Drainage Management Areas, text and tables showing how drainage is routed from each DMA to a treatment facility, and calculations demonstrating the design achieves the applicable design criteria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

IMP EXAMPLE PROJECT

The Project:

1. Approximate 10,000 SF Commercial Building on 1 acre (see attached drawing)
2. 10-foot wide sidewalks along building where there is parking; 5-foot elsewhere (sidewalks are covered by building)
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)	Post-project surface type	Runoff (RO) Factor	Product Area X RO Factor (SF) [A]	Receiving Self-retaining DMA	Self-retaining DMA Area (SF) [B]	Ratio Sum of [A] divided by [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	3600	12000/3600	NO (>1:1)
B3	3900	Building Roof	1.0	3900	L3	2200	10500/2200	NO (>1:1)
B4	2900	Building Roof	1.0	2900	L1	1400	2900/1400	NO (>1:1)
P1	2600	Parking Lot	1.0	2600	L2	1200	2600/1200	NO (>1:1)
P2	6600	Parking Lot	1.0	6600	L3	2200	10500/2200	NO (>1:1)
P3	8700	Parking Lot	1.0	8700	L4	3600	12000/3600	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-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

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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 shal 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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