Post Construction Stormwater Control Plan

Sanctuary West

CITY OF NEWARK, ALAMEDA COUNTY, CALIFORNIA
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EXHIBITS

Exhibit 1 – Vicinity Map

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I. PROJECT SETTING

A. Project Name, Location and Description

This Stormwater Control Plan has been prepared for Sanctuary West (the project) located in the southwest corner of the intersection of Stevenson Boulevard and the U.P.R.R. tracks in the City of Newark, as shown on Exhibit 1 Vicinity Map. The project is part of the Area 3 & 4 Specific Plan Area. The project proposes to develop approximately 469 single family homes, along with 4.7 acres of park space. Proposed impervious surfaces will include roofs, concrete flatwork, and asphalt pavement. Pervious surfaces will consist of bio-retention areas, landscaping, and existing wetland areas. The project site is currently zoned RS-6000 Single Family Residential and is currently vacant.

This Preliminary Stormwater Control Plan is submitted to the City of Newark as a guideline for the selection of post construction Best Management Practices (BMPs) for the project. Technical requirements for the design and selection of BMPs are presented in the Alameda Countywide Clean Water Program C.3 Stormwater Technical Guidance Version 6 dated October 31, 2017.

B. Existing Site Conditions

The site is vacant and is surrounded by wetland and aquatic areas. The site is bordered by an Alameda County Flood Control Line D channel to the west, the U.P.R.R. tracks to the north, and Mowry Slough to the east and south. Exhibit 2 – Existing Site Aerial illustrates the existing project site.

A preliminary geotechnical investigation was performed by Engeo. Initial borings and site investigations indicate this site has shallow groundwater. The site soils were determined to be made up of Hydrologic Soil Classification Type D soils.

The site generally slopes to the southwest and currently drains to existing ditches on the inboard side of levees internal to the site and is then pumped over the levees and into Mowry Slough, which makes its way into the San Francisco Bay.

C. Compliance with Municipal Regional Permit (MRP) C.3 Guidelines

1. The "50% Rule" For Projects on Previously Developed Sites

All existing impervious areas on site will be removed and replaced. Therefore, all new impervious areas constructed at the site will require treatment, and the 50% rule does not apply in reducing required treatment areas.

2. Treatment

The project is subject to compliance with the treatment requirements set forth in the MRP. The proposed project will introduce approximately 2,418,564 square feet of impervious surfaces. Therefore, per section 2.3.2 of the County's C.3 Guidebook, this project is required to include treatment measures.

3. Flow Control

The project is not subject to flow control requirements set forth in the MRP. The site is located outside of designated susceptible areas due to hydromodification shown on the hydromodification management susceptibility map. A copy is included as Appendix E for reference. The Area 3 & 4 Specific Plan lists the Mowry Slough as tidally influenced and therefore exempt from Hydromodification requirements.

D. Constraints and Opportunities for Stormwater Control

The following are the site-specific underlying constraints and opportunities affecting the selection of treatment and flow control facilities for the project. Table 1 below illustrates the constraints and opportunities for each IMP. This table was used as a guideline for the selection of the IMP facilities that are proposed for the site.

Table 1 – Integrated Management Practices (IMPs) Matrix

Site Features/Issues	Pervious Pavement	Green Roof	Disperse Runoff to Landscape	Storage For Later Use	Bioretention Facility	Flow-Through Planter	Dry Well	Cistern + Bioretention	Bioretention + Vault
Clayey Native Soils		*X*	*X*	*X*	*X*	*X*		*X*	*X*
Shallow Depth to Groundwater		*X*		*X*		*X*			
Roof Drainage			*X*	*X*	*X*	*X*	*X*	*X*	
Parking Lots	*X*		*X*	*X*	*X*		*X*		*X*
Extensive Landscaping			*X*	*X*	*X*				

1. **Constraints**

   a. *Shallow Groundwater* – The shallow groundwater eliminates the ability to utilize infiltration to meet C.3 requirements.

   b. *Rain Cycle* – Opportunities for storage and reuse are hindered by the rain cycle of the Bay Area. The time periods between the rain season and the dry season are long enough to make storage of rain water for reuse infeasible.

   c. *Hydrologic Soil Classification* – The project site is underlain by soils classified as Hydrologic Soil Group D. The soils report by Engeo classifies the soil as stiff clayey silts which are relatively impermeable.

2. **Opportunities**

   a. *Existing Site Topography* – The project site is relatively flat, and fill will be required to meet city's minimum elevation criteria for newly developed sites.

   b. *Large Landscape Areas* – The proposed bioretention areas can be integrated into the sites landscaping theme.

   c. *Disconnected Impervious Areas* – Disconnected impervious areas have been incorporated into the site design to promote the dispersion of runoff and to promote infiltration.

Based on the completed Infiltration/Harvesting and Use Feasibility Worksheet included in Appendix C, it has been determined that the site will need biotreatment measures implemented since the project contains hydrologic Type D soils.

Multiple bioretention areas have been included throughout the site. Bioretention facilities can easily be incorporated into the sites landscape theme and provide significant freedom in the finished product appearance. This LID facility provides an opportunity to treat an area where runoff can collect some of the worst pollutants in high concentrations without impacting the usefulness of the limited open space areas. Details for the bioretention area have been included in Appendix D of this report for reference.

The bioretention areas will be lined and underdrain pipes will be utilized to collect treated runoff for discharge to adjacent wetland areas.

II. LOW IMPACT DEVELOPMENT DESIGN STRATEGIES

A. Optimization of Site Layout

1. Preservation of Natural Drainage Patterns

The site current sits at elevations below the minimum elevations per the city of Newark standards. The approximate location of the existing wetlands varies from -1 feet to 8 feet. Currently the site drains towards the southwestern edge of the project, adjacent to Mowry Slough. The proposed general drainage pattern will keep this theme and allow for overland release to the southwest corner of the project boundary. The existing drainage pattern collects runoff in ditches and deposits them in the wetlands, which makes it way to the drainage channel adjacent to the levees. This water is then pumped over and into Mowry Slough. The proposed storm system will treat the increase in stormwater runoff from the developed area before being piped to the adjacent wetland areas as shown on Exhibit 3 – Stormwater Control Plan Exhibit.

2. Setbacks from Creeks, Wetlands, and Riparian Habitats

The development footprint has been planned to avoid wetland and aquatic areas that are dispersed across the project boundary, as shown in Exhibit 3 – Stormwater Control Plan Exhibit.

3. Minimization of Imperviousness

The project consists of single-family development utilizing narrower streets, separated sidewalks and other impervious surfaces. This design results in a reduced amount of impervious area within the development.

4. Using Drainage as a Design Element

There are 14 proposed in-tract IMP areas to treat storm runoff. Site runoff from impervious areas will be directed to the designated IMP. The IMP will be a bioretention facility that is incorporated into the projects overall landscape theme. The treated stormwater will be routed through drainage pipe to the adjacent wetland areas.

B. Direct Runoff to Integrated Management Practices

The proposed project's grading and storm drainage plan is designed to direct site runoff from impervious areas to the designated IMP area. Once the stormwater has been treated using the bioretention facility, the treated water is piped through a storm drain system to the adjacent wetland areas. The water makes its way into drainage channels along the southern edge of the site. The water is then pumped over the levee and enters Mowry Slough. Corresponding with the IMP is a Drainage Management Area (DMA). The drainage area and treatment facility are shown on Exhibit 3 – Stormwater Control Plan Exhibit.

Roof drainage will be routed via roof leaders and drain pipes to the street where it will mix with runoff from vehicle and pedestrian surfaces and overland flow to the designated IMP area. A description of the proposed IMP facility and a breakdown of the impervious and pervious areas collected are provided in the next section.

III. DOCUMENTATION OF DRAINAGE DESIGN

The following outlines the stormwater management facilities within the project site necessary to comply with the applicable C.3 guidelines. The project site design and its stormwater features balance the constraints of the site, the land use planning objectives for the site, and the MRP C.3 requirements.

The stormwater management plan for compliance with treatment and flow control requirements are described below:

A. Drainage Management Areas (DMAs)

The proposed project has 14 in-tract DMA areas for the proposed site and drains to a designated area. The DMA areas have been sized as evenly as possible based upon the site grading. Impervious surface types include roads, roofs, driveways, sidewalks, and concrete flatwork. The only pervious surface type in the proposed project is landscaping. The impervious and pervious area of the DMA is tabulated in Table 2 below. Exhibit 3 – The Stormwater Control Plan illustrates the boundaries of the DMA.

Table 2 – In-Tract DMA Tabulation

DMA	*Impervious Area (SF)*	*Pervious Area (SF)*	*Total Area (SF)*
1	188,356	67,217	255,573
2	48,287	17,835	66,122
3	387,567	154,895	542,462
4	550,106	219,074	769,180
5	535,574	220,772	756,346
6	243,899	100,076	343,975
7	106,640	58,735	165,375
8	52,280	5,630	57,910
9	108,904	55,088	163,992
10	73,987	73,395	147,382
11	50,020	21,742	71,762
12	36,921	18,126	55,047
13	1,588	281	1,869
14	34,435	9,920	43,665
TOTAL	2,418,564	1,022,086	3,440,650

B. Integrated Management Practices (IMP)

The proposed project will utilize bioretention to treat stormwater runoff per the applicable C.3 guidelines. The project is proposing a total of 14 in-tract bioretention areas. The bioretention facilities was designed using the combination flow and volume calculation method described in Section 5.1 Hydraulic Sizing Criteria of the Alameda County C.3 manual. Calculations are provided in Appendix A for review. Exhibit 3 – Stormwater Control Plan Exhibit depicts the proposed locations of the bio-retention areas designated as an IMP and provides a detailed section of the proposed bioretention area. Each IMP is tabulated in Table 4 below.

Table 3 – In-Tract IMP Tabulation

IMP	*Proposed Area (SF)*	*Description*	*Collects DMA*
1	5,582	Bioretention Facility	1
2	1,502	Bioretention Facility	2
3	12,092	Bioretention Facility	*3*
4	17,160	Bioretention Facility	*4*
5	16,730	Bioretention Facility	*5*
6	7,618	Bioretention Facility	*6*
7	3,375	Bioretention Facility	*7*
8	1,585	Bioretention Facility	*8*
9	3,432	Bioretention Facility	*9*
10	2,440	Bioretention Facility	*10*
11	1,566	Bioretention Facility	*11*
12	1,162	Bioretention Facility	*12*
13	49	Bioretention Facility	*13*
14	1,061	Bioretention Facility	*14*

C. Hydromodification

This project is not subject to flow control requirements, also referred to as hydromodification. As stated above, the project is not subject to flow control requirements set forth in the MRP. Per the Area 3 & 4 Specific Plan, Mowry Slough is tidally influenced and not subject to hydromodification requirements.

IV. SOURCE CONTROL MEASURES

The proposed project will create few potential sources of stormwater pollution. Sources to be controlled include but are not limited to:

SOURCES AND SOURCE CONTROL BMP'S

Potential Source of Runoff Pollutants	Permanent Source Control BMP's	Operational Source Control BMP's
Onsite storm drain inlets	Mark all accessible onsite inlets with the words "No Dumping! Flows to Creek" or approved equivalent language. Detail location of all onsite storm drain inlets on Stormwater Control Plan Drawings.	Maintain and periodically replace inlet markings as needed. Provide stormwater pollution prevention information to new site owners, lessees, or operators. Include the following in lease agreement "Tenant shall not discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains." Inlets and pipes conveying stormwater to BMPs shall be inspected and maintained as part of the Project Operation and Maintenance Plan.
Interior floor drains	Interior floor drains shall be plumbed to drain directly to the sanitary sewer system.	Inspect and maintain drains to prevent blockages and overflows.
Need for future indoor or structural pest control	Project construction drawings shall incorporate features that discourage entry of pests.	Provide Integrated Pest Management (IPM) information to owners, lessees, and operators.

Potential Source of Runoff Pollutants	Permanent Source Control BMP's	Operational Source Control BMP's
Landscape/outdoor pesticide use	Final project landscape plans shall reflect the following: Design that minimizes need for irrigation; minimizes runoff; promotes surface infiltration where appropriate; and details the use of planting material that minimizes the amount of fertilizers and pesticides that are needed. Where landscaped areas are used to retain and detain stormwater, project landscape plans shall specify the use of plants that are tolerant of saturated soil conditions. Project landscape plans shall detail use of plantings appropriate to site soils, slopes, climate, sun, land use, air movement, ecological consistency, and plant interactions. Detail locations of stormwater treatment and hydrograph modification management BMPs on Stormwater Control Plan Drawings.	Maintain landscaping using minimum or no pesticides. Provide Integrated Pest Management information to new owners, lessees and operators. See applicable BMPs in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks www.babmphandbooks.com
Water features (fountains)	Where architectural water features are incorporated, plumb such features directly to the sanitary sewer system.	Inspect and maintain drains to prevent blockage and overflows.

Potential Source of Runoff Pollutants	Permanent Source Control BMP's	Operational Source Control BMP's
Roofing, gutters, and trim	Do not utilize roofing, gutter, or architectural trim materials made of copper or other unprotected metals that would leach into the storm water runoff.	
Plazas, sidewalks, and parking lots		Plazas, sidewalks, and parking lots shall be swept regularly to prevent the accumulation of litter and debris. Debris from pressure washing shall be collected to prevent entry into the storm drain system. Wash water containing any cleaning agent or degreaser shall be collected and discharged to the sanitary sewer and not discharged to a storm drain.
Fire Sprinkler Test Water	Provide means to drain fire sprinkler test water to sanitary sewer system.	See note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
Air Conditioning	Air conditioner condensation shall be directed to landscaped areas or plumbed to the sanitary sewer.	

V. FACILITIES MAINTENANCE REQUIREMENTS

A. Ownership and Responsibility for Maintenance in Perpetuity

As part of the C.3 stormwater requirements municipalities must verify stormwater treatment and flow-control facilities function and are maintained as intended by their design. Facilities on site will be maintained and the responsibility in their entirety of the Home Owner's Association (HOA).

The owner will prepare and provide a Storm Water Control Operation and Maintenance (O&M) Plan for review by the City of Newark Community Development Department, and record an Operation and Maintenance Agreement, including any necessary rights-of-entry, prior to issuance of a building permit.

B. Summary of Maintenance Requirements

Bioretention facilities require routine maintenance to prevent a loss in the rate of infiltration, ensure unobstructed flow, prevent erosion, keep plants healthy, and the engineered soil biologically active. Typical maintenance requirements of bioretention facilities will include:

- Inspection of inlets for channels, exposure of soils, and other evidence of erosion.
- Replenishment of all erosion control measures necessary.
- Inspect outlets to ensure that planter has not clogged or that excessive erosion has not inhibited flow.
- Inspection of facility side slopes for evidence of erosion.
- Observe percolation in treatment areas to verify design percolation rates are met (i.e., whether a 48 hour percolation window is exceeded).
- Till or replace engineered soil in treatment areas where design percolation rates are not met.
- Examine all vegetation to insure it is healthy and dense enough to provide filtering. Replenish mulch as necessary, remove fallen leaves and debris and prune large shrubs and trees. Replace dead plants and remove noxious and invasive vegetation.
- Confirm irrigation is adequate but not excessive.

- Remove any invasive plans that might be present.
- Abate any potential vectors by insuring there are no areas where water stands longer than 48 hours following a storm. If mosquito larvae are present and persistent, contact the Alameda Mosquito and Vector Control District for information and advice. Mosquito larvicides shall be applied only when absolutely necessary and then, only by a licensed individual or contractor.

VI. CONSTRUCTION PLAN C.3 CHECKLIST

Stormwater Control Plan Page No.	BMP Description	Construction Documents Sheet #
Section III, Page 6-7	IMP 1 – Collects DMA 1 *5,852 SF* *Bioretention Facility*	
Section III, Page 6-7	IMP 2 – Collects DMA 2 *1,502 SF* *Bioretention Facility*	
Section III, Page 6-7	IMP 3 – Collects DMA 3 *12,092 SF* *Bioretention Facility*	
Section III, Page 6-7	IMP 4 – Collects DMA 4 *17,160 SF* *Bioretention Facility*	
Section III, Page 6-7	IMP 5 – Collects DMA 5 *16,730 SF* *Bioretention Facility*	
Section III, Page 6-7	IMP 6 – Collects DMA 6 *7,618 SF* *Bioretention Facility*	
Section III, Page 6-7	IMP 7 – Collects DMA 7 *3,375 SF* *Bioretention Facility*	
Section III, Page 6-7	IMP 8 – Collects DMA 8 *1,585 SF* *Bioretention Facility*	
Section III, Page 6-7	IMP 9 – Collects DMA 9 *3,432 SF* *Bioretention Facility*	
Section III, Page 6-7	IMP 10 – Collects DMA 10 *2,440 SF* *Bioretention Facility*	
Section III, Page 6-7	IMP 11 – Collects DMA 11 *1,566 SF* *Bioretention Facility*	
Section III, Page 6-7	IMP 12 – Collects DMA 12 *1,162 SF* *Bioretention Facility*	

Section III, Page 6-7	IMP 13 – Collects DMA 13 *49 SF* *Bioretention Facility*	
Section III, Page 6-7	IMP 14 – Collects DMA 14 *1,061 SF* *Bioretention Facility*	
Section II, Page 4-5	Final drainage plan conforms to the delineation of drainage areas in the SWCP, i.e. drainage from impervious areas, including building roofs, is routed to bioretention areas, as shown in the SWCP.	

VII. CERTIFICATION

The selection, sizing, and preliminary design of stormwater treatment and other control measures in this plan meet the requirements of Regional Water Quality Control Board Order R2-2015-0049 and subsequent amendments.

Justin R. DeKnoblough, P.E., RCE# 79604 Expires 09/30/2020	Date

Appendix A
Sizing Calculations

Worksheet for Calculating the Combination Flow and Volume Method

Instructions: After completing Section 1, make a copy of this Excel file for each Drainage Management Area within the project. Enter information specific to the project and DMA in the cells shaded in yellow. Cells shaded in light blue contain formulas and values that will be automatically calculated.

1.0 Project Information

1-1	Project Name:	Sanctuary West	
1-2	City application ID:		
1-3	Site Address or APN:		
1-4	Tract or Parcel Map No:		
1-5	Site Mean Annual Precip. (MAP)[1]	14.0	Inches

The calculations presented here are based on the **combination flow and volume hydraulic sizing method** provided in the Clean Water Program Alameda County C.3 Technical Guidance, Version 4.0. The steps presented below are explained in Chapter 5, Section 5.1 of the guidance manual, applicable portions of which are included in this file, in the tab called "Guidance from Chapter 5".

Refer to the Mean Annual Precipitation Map in Appendix D of the C.3 Technical Guidance to determine the MAP, in inches, for the site. Click here for map

1-6 Applicable Rain Gauge[2] **San Jose**

Enter "Oakland Airport" if the site MAP is 16.4 inches or greater. Enter "San Jose" if the site MAP is less than 16.4 inches.

MAP adjustment factor is automatically calculated as: **0.97**

(The "Site Mean Annual Precipitation (MAP)" is divided by the MAP for the applicable rain gauge, showin in Table 5.2, below.)

2.0 Calculate Percentage of Impervious Surface for Drainage Management Area (DMA)

2-1 Name of DMA: **DMA 1**

For items 2-2 and 2-3, enter the areas in square feet for each type of surface within the DMA.

	Type of Surface	Area of surface type within DMA (Sq. Ft)	Adjust Pervious Surface	Effective Impervious Area
2-2	Impervious surface	188,356	1.0	188,356
2-3	Pervious service	67,217	0.1	6,722
	Total DMA Area (square feet) =	255,573		

2-4 ***Total Effective Impervious Area (EIA)*** **195,078** **Square feet**

3.0 Calculate Unit Basin Storage Volume in Inches

Table 5-2: Unit Basin Storage Volumes (in inches) for 80 Percent Capture Using 48-Hour Drawdowns		
		Unit Basin Storage Volume (in) for Applicable Runoff Coefficients
Applicable Rain Gauge	**Mean Annual Precipitation (in)**	**Coefficient of 1.00**
Oakland Airport	18.35	0.67
San Jose	14.4	0.56

3-1 ***Unit basin storage volume from Table 5.2:*** **0.56** **Inches**

(The coefficient for this method is 1.00, due to the conversion of any landscaping to effective impervious area)

3-2 ***Adjusted unit basin storage volume:*** **0.54** **Inches**

(The unit basin storage volume is adjusted by applying the MAP adjustment factor.)

3-3 ***Required Capture Volume (in cubic feet):*** **8,851** **Cubic feet**

(The adjusted unit basin sizing volume [inches] is multiplied by the size of the DMA and converted to feet)

4.0 Calculate the Duration of the Rain Event

4-1	Rainfall intensity	0.2	Inches per hour
4-2	Divide Item 3-2 by Item 4-1	2.72	Hours of Rain Event Duration

5.0 Preliminary Estimate of Surface Area of Treatment Measure

5-1	4% of DMA impervious surface	7,803	Square feet
5-2	Area 25% smaller than item 5-1	5,852	Square feet
5-3	Volume of treated runoff for area in Item 5-2	6,638	Cubic feet (Item 5-2 * 5 inches per hour * 1/12 * Item 4-2)

6.0 Initial Adjustment of Depth of Surface Ponding Area

6-1	Subtract Item 5-3 from Item 3-3	2,213	Cubic feet (Amount of runoff to be stored in ponding area)
6-2	Divide Item 6-1 by Item 5-2	0.4	Feet (Depth of stored runoff in surface ponding area)
6-3	Convert Item 6-2 from ft to inches	4.5	Inches (Depth of stored runoff in surface ponding area)

6-4 If ponding depth in Item 6-3 meets your target depth, skip to Item 8-1. If not, continue to Step 7-1.

7.0 Optimize Size of Treatment Measure

7-1	Enter an area larger or smaller than Item 5-2	5,415	Sq.ft. (enter larger area if you need less ponding depth; smaller for more depth.)
7-2	Volume of treated runoff for area in Item 7-1	6,142	Cubic feet (Item 7-1 * 5 inches per hour * 1/12 * Item 4-2)
7-3	Subtract Item 7-2 from Item 3-3	2,709	Cubic feet (Amount of runoff to be stored in ponding area)
7-4	Divide Item 7-3 by Item 7-1	0.50	Feet (Depth of stored runoff in surface ponding area)
7-5	Convert Item 7-4 from feet to inches	6.00	Inches (Depth of stored runoff in surface ponding area)

7-6 If the ponding depth in Item 7-5 meets target, stop here. If not, repeat Steps 7-1 through 7-5 until you obtain target depth.

8.0 Surface Area of Treatment Measure for DMA

8-1 Final surface area of treatment* **5,415** **Square feet** (Either Item 5-2 or final amount in Item 7-1)

**Note: Check with the local jurisdiction as to its policy regarding the minimum biotreatment surface area allowed.*

Worksheet for Calculating the Combination Flow and Volume Method

Instructions: After completing Section 1, make a copy of this Excel file for each Drainage Management Area within the project. Enter information specific to the project and DMA in the cells shaded in yellow. Cells shaded in light blue contain formulas and values that will be automatically calculated.

1.0 Project Information

1-1	Project Name:	Sanctuary West	
1-2	City application ID:		
1-3	Site Address or APN:		
1-4	Tract or Parcel Map No:		
1-5	Site Mean Annual Precip. (MAP)[1]	14.0	Inches

The calculations presented here are based on the **combination flow and volume hydraulic sizing method** provided in the Clean Water Program Alameda County C.3 Technical Guidance, Version 4.0. The steps presented below are explained in Chapter 5, Section 5.1 of the guidance manual, applicable portions of which are included in this file, in the tab called "Guidance from Chapter 5".

Refer to the Mean Annual Precipitation Map in Appendix D of the C.3 Technical Guidance to determine the MAP, in inches, for the site. Click here for map

1-6 Applicable Rain Gauge[2]: San Jose

Enter "Oakland Airport" if the site MAP is 16.4 inches or greater. Enter "San Jose" if the site MAP is less than 16.4 inches.

MAP adjustment factor is automatically calculated as: 0.97

(The "Site Mean Annual Precipitation (MAP)" is divided by the MAP for the applicable rain gauge, showin in Table 5.2, below.)

2.0 Calculate Percentage of Impervious Surface for Drainage Management Area (DMA)

2-1 Name of DMA: DMA 2

For items 2-2 and 2-3, enter the areas in square feet for each type of surface within the DMA.

	Type of Surface	Area of surface type within DMA (Sq. Ft)	Adjust Pervious Surface	Effective Impervious Area
2-2	Impervious surface	48,287	1.0	48,287
2-3	Pervious service	17,835	0.1	1,784
	Total DMA Area (square feet) =	66,122		

2-4 ***Total Effective Impervious Area (EIA)*** 50,071 Square feet

3.0 Calculate Unit Basin Storage Volume in Inches

Table 5-2: Unit Basin Storage Volumes (in inches) for 80 Percent Capture Using 48-Hour Drawdowns

		Unit Basin Storage Volume (in) for Applicable Runoff Coefficients
Applicable Rain Gauge	**Mean Annual Precipitation (in)**	**Coefficient of 1.00**
Oakland Airport	18.35	0.67
San Jose	14.4	0.56

3-1 ***Unit basin storage volume from Table 5.2:*** 0.56 Inches

(The coefficient for this method is 1.00, due to the conversion of any landscaping to effective impervious area)

3-2 ***Adjusted unit basin storage volume:*** 0.54 Inches

(The unit basin storage volume is adjusted by applying the MAP adjustment factor.)

3-3 ***Required Capture Volume (in cubic feet):*** 2,272 Cubic feet

(The adjusted unit basin sizing volume [inches] is multiplied by the size of the DMA and converted to feet)

4.0 Calculate the Duration of the Rain Event

4-1	Rainfall intensity	0.2	Inches per hour
4-2	Divide Item 3-2 by Item 4-1	2.72	Hours of Rain Event Duration

5.0 Preliminary Estimate of Surface Area of Treatment Measure

5-1	4% of DMA impervious surface	2,003	Square feet
5-2	Area 25% smaller than item 5-1	1,502	Square feet
5-3	Volume of treated runoff for area in Item 5-2	1,704	Cubic feet (Item 5-2 * 5 inches per hour * 1/12 * Item 4-2)

6.0 Initial Adjustment of Depth of Surface Ponding Area

6-1	Subtract Item 5-3 from Item 3-3	568	Cubic feet (Amount of runoff to be stored in ponding area)
6-2	Divide Item 6-1 by Item 5-2	0.4	Feet (Depth of stored runoff in surface ponding area)
6-3	Convert Item 6-2 from ft to inches	4.5	Inches (Depth of stored runoff in surface ponding area)

6-4 If ponding depth in Item 6-3 meets your target depth, skip to Item 8-1. If not, continue to Step 7-1.

7.0 Optimize Size of Treatment Measure

7-1	Enter an area larger or smaller than Item 5-2	1,390	Sq.ft. (enter larger area if you need less ponding depth; smaller for more depth.)
7-2	Volume of treated runoff for area in Item 7-1	1,577	Cubic feet (Item 7-1 * 5 inches per hour * 1/12 * Item 4-2)
7-3	Subtract Item 7-2 from Item 3-3	695	Cubic feet (Amount of runoff to be stored in ponding area)
7-4	Divide Item 7-3 by Item 7-1	0.50	Feet (Depth of stored runoff in surface ponding area)
7-5	Convert Item 7-4 from feet to inches	6.00	Inches (Depth of stored runoff in surface ponding area)

7-6 If the ponding depth in Item 7-5 meets target, stop here. If not, repeat Steps 7-1 through 7-5 until you obtain target depth.

8.0 Surface Area of Treatment Measure for DMA

8-1 Final surface area of treatment* 1,390 Square feet (Either Item 5-2 or final amount in Item 7-1)

**Note: Check with the local jurisdiction as to its policy regarding the minimum biotreatment surface area allowed.*

Worksheet for Calculating the Combination Flow and Volume Method

Instructions: After completing Section 1, make a copy of this Excel file for each Drainage Management Area within the project. Enter information specific to the project and DMA in the cells shaded in yellow. Cells shaded in light blue contain formulas and values that will be automatically calculated.

1.0 Project Information

1-1	Project Name:	Sanctuary West	
1-2	City application ID:		
1-3	Site Address or APN:		
1-4	Tract or Parcel Map No:		
1-5	Site Mean Annual Precip. (MAP)[1]	14.0	Inches

The calculations presented here are based on the **combination flow and volume hydraulic sizing method** provided in the Clean Water Program Alameda County C.3 Technical Guidance, Version 4.0. The steps presented below are explained in Chapter 5, Section 5.1 of the guidance manual, applicable portions of which are included in this file, in the tab called "Guidance from Chapter 5".

Refer to the Mean Annual Precipitation Map in Appendix D of the C.3 Technical Guidance to determine the MAP, in inches, for the site. Click here for map

1-6 Applicable Rain Gauge[2]: San Jose

Enter "Oakland Airport" if the site MAP is 16.4 inches or greater. Enter "San Jose" if the site MAP is less than 16.4 inches.

MAP adjustment factor is automatically calculated as: 0.97

(The "Site Mean Annual Precipitation (MAP)" is divided by the MAP for the applicable rain gauge, showin in Table 5.2, below.)

2.0 Calculate Percentage of Impervious Surface for Drainage Management Area (DMA)

2-1 Name of DMA: DMA 3

For items 2-2 and 2-3, enter the areas in square feet for each type of surface within the DMA.

	Type of Surface	Area of surface type within DMA (Sq. Ft)	Adjust Pervious Surface	Effective Impervious Area
2-2	Impervious surface	387,567	1.0	387,567
2-3	Pervious service	154,895	0.1	15,490
	Total DMA Area (square feet) =	542,462		

2-4 ***Total Effective Impervious Area (EIA)*** 403,057 **Square feet**

3.0 Calculate Unit Basin Storage Volume in Inches

Table 5-2: Unit Basin Storage Volumes (in inches) for 80 Percent Capture Using 48-Hour Drawdowns

		Unit Basin Storage Volume (in) for Applicable Runoff Coefficients
Applicable Rain Gauge	**Mean Annual Precipitation (in)**	**Coefficient of 1.00**
Oakland Airport	18.35	0.67
San Jose	14.4	0.56

3-1 ***Unit basin storage volume from Table 5.2:*** 0.56 **Inches**

(The coefficient for this method is 1.00, due to the conversion of any landscaping to effective impervious area)

3-2 ***Adjusted unit basin storage volume:*** 0.54 **Inches**

(The unit basin storage volume is adjusted by applying the MAP adjustment factor.)

3-3 ***Required Capture Volume (in cubic feet):*** 18,287 **Cubic feet**

(The adjusted unit basin sizing volume [inches] is multiplied by the size of the DMA and converted to feet)

4.0 Calculate the Duration of the Rain Event

4-1	Rainfall intensity	0.2	Inches per hour
4-2	Divide Item 3-2 by Item 4-1	2.72	Hours of Rain Event Duration

5.0 Preliminary Estimate of Surface Area of Treatment Measure

5-1	4% of DMA impervious surface	16,122	Square feet
5-2	Area 25% smaller than item 5-1	12,092	Square feet
5-3	Volume of treated runoff for area in Item 5-2	13,715	Cubic feet (Item 5-2 * 5 inches per hour * 1/12 * Item 4-2)

6.0 Initial Adjustment of Depth of Surface Ponding Area

6-1	Subtract Item 5-3 from Item 3-3	4,572	Cubic feet (Amount of runoff to be stored in ponding area)
6-2	Divide Item 6-1 by Item 5-2	0.4	Feet (Depth of stored runoff in surface ponding area)
6-3	Convert Item 6-2 from ft to inches	4.5	Inches (Depth of stored runoff in surface ponding area)

6-4 If ponding depth in Item 6-3 meets your target depth, skip to Item 8-1. If not, continue to Step 7-1.

7.0 Optimize Size of Treatment Measure

7-1	Enter an area larger or smaller than Item 5-2	11,187	Sq.ft. (enter larger area if you need less ponding depth; smaller for more depth.)
7-2	Volume of treated runoff for area in Item 7-1	12,689	Cubic feet (Item 7-1 * 5 inches per hour * 1/12 * Item 4-2)
7-3	Subtract Item 7-2 from Item 3-3	5,598	Cubic feet (Amount of runoff to be stored in ponding area)
7-4	Divide Item 7-3 by Item 7-1	0.50	Feet (Depth of stored runoff in surface ponding area)
7-5	Convert Item 7-4 from feet to inches	6.00	Inches (Depth of stored runoff in surface ponding area)

7-6 If the ponding depth in Item 7-5 meets target, stop here. If not, repeat Steps 7-1 through 7-5 until you obtain target depth.

8.0 Surface Area of Treatment Measure for DMA

8-1 Final surface area of treatment* 11,187 **Square feet** (Either Item 5-2 or final amount in Item 7-1)

**Note: Check with the local jurisdiction as to its policy regarding the minimum biotreatment surface area allowed.*

Worksheet for Calculating the Combination Flow and Volume Method

Instructions: After completing Section 1, make a copy of this Excel file for each Drainage Management Area within the project. Enter information specific to the project and DMA in the cells shaded in yellow. Cells shaded in light blue contain formulas and values that will be automatically calculated.

1.0 Project Information

1-1	Project Name:	Sanctuary West	
1-2	City application ID:		
1-3	Site Address or APN:		
1-4	Tract or Parcel Map No:		
1-5	Site Mean Annual Precip. (MAP)[1]	14.0	Inches

The calculations presented here are based on the **combination flow and volume hydraulic sizing method** provided in the Clean Water Program Alameda County C.3 Technical Guidance, Version 4.0. The steps presented below are explained in Chapter 5, Section 5.1 of the guidance manual, applicable portions of which are included in this file, in the tab called "Guidance from Chapter 5".

Refer to the Mean Annual Precipitation Map in Appendix D of the C.3 Technical Guidance to determine the MAP, in inches, for the site. Click here for map

1-6 Applicable Rain Gauge[2]: San Jose

Enter "Oakland Airport" if the site MAP is 16.4 inches or greater. Enter "San Jose" if the site MAP is less than 16.4 inches.

MAP adjustment factor is automatically calculated as: 0.97

(The "Site Mean Annual Precipitation (MAP)" is divided by the MAP for the applicable rain gauge, showin in Table 5.2, below.)

2.0 Calculate Percentage of Impervious Surface for Drainage Management Area (DMA)

2-1 Name of DMA: DMA 4

For items 2-2 and 2-3, enter the areas in square feet for each type of surface within the DMA.

	Type of Surface	Area of surface type within DMA (Sq. Ft)	Adjust Pervious Surface	Effective Impervious Area
2-2	Impervious surface	550,106	1.0	550,106
2-3	Pervious service	219,074	0.1	21,907
	Total DMA Area (square feet) =	769,180		

2-4 ***Total Effective Impervious Area (EIA)*** 572,013 **Square feet**

3.0 Calculate Unit Basin Storage Volume in Inches

Table 5-2: Unit Basin Storage Volumes (in inches) for 80 Percent Capture Using 48-Hour Drawdowns		
		Unit Basin Storage Volume (in) for Applicable Runoff Coefficients
Applicable Rain Gauge	**Mean Annual Precipitation (in)**	**Coefficient of 1.00**
Oakland Airport	18.35	0.67
San Jose	14.4	0.56

3-1 ***Unit basin storage volume from Table 5.2:*** 0.56 **Inches**

(The coefficient for this method is 1.00, due to the conversion of any landscaping to effective impervious area)

3-2 ***Adjusted unit basin storage volume:*** 0.54 **Inches**

(The unit basin storage volume is adjusted by applying the MAP adjustment factor.)

3-3 ***Required Capture Volume (in cubic feet):*** 25,952 **Cubic feet**

(The adjusted unit basin sizing volume [inches] is multiplied by the size of the DMA and converted to feet)

4.0 Calculate the Duration of the Rain Event

4-1	Rainfall intensity	0.2	Inches per hour
4-2	Divide Item 3-2 by Item 4-1	2.72	Hours of Rain Event Duration

5.0 Preliminary Estimate of Surface Area of Treatment Measure

5-1	4% of DMA impervious surface	22,881	Square feet
5-2	Area 25% smaller than item 5-1	17,160	Square feet
5-3	Volume of treated runoff for area in Item 5-2	19,464	Cubic feet (Item 5-2 * 5 inches per hour * 1/12 * Item 4-2)

6.0 Initial Adjustment of Depth of Surface Ponding Area

6-1	Subtract Item 5-3 from Item 3-3	6,488	Cubic feet (Amount of runoff to be stored in ponding area)
6-2	Divide Item 6-1 by Item 5-2	0.4	Feet (Depth of stored runoff in surface ponding area)
6-3	Convert Item 6-2 from ft to inches	4.5	Inches (Depth of stored runoff in surface ponding area)

6-4 If ponding depth in Item 6-3 meets your target depth, skip to Item 8-1. If not, continue to Step 7-1.

7.0 Optimize Size of Treatment Measure

7-1	Enter an area larger or smaller than Item 5-2	15,880	Sq.ft. (enter larger area if you need less ponding depth; smaller for more depth.)
7-2	Volume of treated runoff for area in Item 7-1	18,012	Cubic feet (Item 7-1 * 5 inches per hour * 1/12 * Item 4-2)
7-3	Subtract Item 7-2 from Item 3-3	7,940	Cubic feet (Amount of runoff to be stored in ponding area)
7-4	Divide Item 7-3 by Item 7-1	0.50	Feet (Depth of stored runoff in surface ponding area)
7-5	Convert Item 7-4 from feet to inches	6.00	Inches (Depth of stored runoff in surface ponding area)

7-6 If the ponding depth in Item 7-5 meets target, stop here. If not, repeat Steps 7-1 through 7-5 until you obtain target depth.

8.0 Surface Area of Treatment Measure for DMA

8-1 Final surface area of treatment* 15,880 **Square feet** (Either Item 5-2 or final amount in Item 7-1)

**Note: Check with the local jurisdiction as to its policy regarding the minimum biotreatment surface area allowed.*

Worksheet for Calculating the Combination Flow and Volume Method

Instructions: After completing Section 1, make a copy of this Excel file for each Drainage Management Area within the project. Enter information specific to the project and DMA in the cells shaded in yellow. Cells shaded in light blue contain formulas and values that will be automatically calculated.

1.0 Project Information

1-1	Project Name:	Sanctuary West	
1-2	City application ID:		
1-3	Site Address or APN:		
1-4	Tract or Parcel Map No:		
1-5	Site Mean Annual Precip. (MAP)[1]	14.0	Inches

The calculations presented here are based on the **combination flow and volume hydraulic sizing method** provided in the Clean Water Program Alameda County C.3 Technical Guidance, Version 4.0. The steps presented below are explained in Chapter 5, Section 5.1 of the guidance manual, applicable portions of which are included in this file, in the tab called "Guidance from Chapter 5".

Refer to the Mean Annual Precipitation Map in Appendix D of the C.3 Technical Guidance to determine the MAP, in inches, for the site. Click here for map

1-6 Applicable Rain Gauge[2] **San Jose**

Enter "Oakland Airport" if the site MAP is 16.4 inches or greater. Enter "San Jose" if the site MAP is less than 16.4 inches.

MAP adjustment factor is automatically calculated as: **0.97**

(The "Site Mean Annual Precipitation (MAP)" is divided by the MAP for the applicable rain gauge, showin in Table 5.2, below.)

2.0 Calculate Percentage of Impervious Surface for Drainage Management Area (DMA)

2-1 Name of DMA: **DMA 5**

For items 2-2 and 2-3, enter the areas in square feet for each type of surface within the DMA.

	Type of Surface	Area of surface type within DMA (Sq. Ft)	Adjust Pervious Surface	Effective Impervious Area
2-2	Impervious surface	535,574	1.0	535,574
2-3	Pervious service	220,772	0.1	22,077
	Total DMA Area (square feet) =	756,346		

2-4 ***Total Effective Impervious Area (EIA)*** **557,651** **Square feet**

3.0 Calculate Unit Basin Storage Volume in Inches

Table 5-2: Unit Basin Storage Volumes (in inches) for 80 Percent Capture Using 48-Hour Drawdowns

		Unit Basin Storage Volume (in) for Applicable Runoff Coefficients
Applicable Rain Gauge	**Mean Annual Precipitation (in)**	**Coefficient of 1.00**
Oakland Airport	18.35	0.67
San Jose	14.4	0.56

3-1 ***Unit basin storage volume from Table 5.2:*** **0.56** **Inches**

(The coefficient for this method is 1.00, due to the conversion of any landscaping to effective impervious area)

3-2 ***Adjusted unit basin storage volume:*** **0.54** **Inches**

(The unit basin storage volume is adjusted by applying the MAP adjustment factor.)

3-3 ***Required Capture Volume (in cubic feet):*** **25,301** **Cubic feet**

(The adjusted unit basin sizing volume [inches] is multiplied by the size of the DMA and converted to feet)

4.0 Calculate the Duration of the Rain Event

4-1	Rainfall intensity	0.2	Inches per hour
4-2	Divide Item 3-2 by Item 4-1	2.72	Hours of Rain Event Duration

5.0 Preliminary Estimate of Surface Area of Treatment Measure

5-1	4% of DMA impervious surface	22,306	Square feet
5-2	Area 25% smaller than item 5-1	16,730	Square feet
5-3	Volume of treated runoff for area in Item 5-2	18,976	Cubic feet (Item 5-2 * 5 inches per hour * 1/12 * Item 4-2)

6.0 Initial Adjustment of Depth of Surface Ponding Area

6-1	Subtract Item 5-3 from Item 3-3	6,325	Cubic feet (Amount of runoff to be stored in ponding area)
6-2	Divide Item 6-1 by Item 5-2	0.4	Feet (Depth of stored runoff in surface ponding area)
6-3	Convert Item 6-2 from ft to inches	4.5	Inches (Depth of stored runoff in surface ponding area)

6-4 If ponding depth in Item 6-3 meets your target depth, skip to Item 8-1. If not, continue to Step 7-1.

7.0 Optimize Size of Treatment Measure

7-1	Enter an area larger or smaller than Item 5-2	14,403	Sq.ft. (enter larger area if you need less ponding depth; smaller for more depth.)
7-2	Volume of treated runoff for area in Item 7-1	16,337	Cubic feet (Item 7-1 * 5 inches per hour * 1/12 * Item 4-2)
7-3	Subtract Item 7-2 from Item 3-3	8,964	Cubic feet (Amount of runoff to be stored in ponding area)
7-4	Divide Item 7-3 by Item 7-1	0.62	Feet (Depth of stored runoff in surface ponding area)
7-5	Convert Item 7-4 from feet to inches	7.47	Inches (Depth of stored runoff in surface ponding area)

7-6 If the ponding depth in Item 7-5 meets target, stop here. If not, repeat Steps 7-1 through 7-5 until you obtain target depth.

8.0 Surface Area of Treatment Measure for DMA

8-1 Final surface area of treatment* **14,403** **Square feet** (Either Item 5-2 or final amount in Item 7-1)

**Note: Check with the local jurisdiction as to its policy regarding the minimum biotreatment surface area allowed.*

Worksheet for Calculating the Combination Flow and Volume Method

Instructions: After completing Section 1, make a copy of this Excel file for each Drainage Management Area within the project. Enter information specific to the project and DMA in the cells shaded in yellow. Cells shaded in light blue contain formulas and values that will be automatically calculated.

1.0 Project Information

1-1	Project Name:	Sanctuary West	
1-2	City application ID:		
1-3	Site Address or APN:		
1-4	Tract or Parcel Map No:		
1-5	Site Mean Annual Precip. (MAP)[1]	14.0	Inches

The calculations presented here are based on the **combination flow and volume hydraulic sizing method** provided in the Clean Water Program Alameda County C.3 Technical Guidance, Version 4.0. The steps presented below are explained in Chapter 5, Section 5.1 of the guidance manual, applicable portions of which are included in this file, in the tab called "Guidance from Chapter 5".

Refer to the Mean Annual Precipitation Map in Appendix D of the C.3 Technical Guidance to determine the MAP, in inches, for the site. Click here for map

1-6 Applicable Rain Gauge[2]: San Jose

Enter "Oakland Airport" if the site MAP is 16.4 inches or greater. Enter "San Jose" if the site MAP is less than 16.4 inches.

MAP adjustment factor is automatically calculated as: 0.97

(The "Site Mean Annual Precipitation (MAP)" is divided by the MAP for the applicable rain gauge, showin in Table 5.2, below.)

2.0 Calculate Percentage of Impervious Surface for Drainage Management Area (DMA)

2-1 Name of DMA: DMA 6

For items 2-2 and 2-3, enter the areas in square feet for each type of surface within the DMA.

	Type of Surface	Area of surface type within DMA (Sq. Ft)	Adjust Pervious Surface	Effective Impervious Area
2-2	Impervious surface	243,899	1.0	243,899
2-3	Pervious service	100,076	0.1	10,008
	Total DMA Area (square feet) =	343,975		

2-4 ***Total Effective Impervious Area (EIA)*** 253,907 **Square feet**

3.0 Calculate Unit Basin Storage Volume in Inches

Table 5-2: Unit Basin Storage Volumes (in inches) for 80 Percent Capture Using 48-Hour Drawdowns		
		Unit Basin Storage Volume (in) for Applicable Runoff Coefficients
Applicable Rain Gauge	**Mean Annual Precipitation (in)**	**Coefficient of 1.00**
Oakland Airport	18.35	0.67
San Jose	14.4	0.56

3-1 ***Unit basin storage volume from Table 5.2:*** 0.56 **Inches**

(The coefficient for this method is 1.00, due to the conversion of any landscaping to effective impervious area)

3-2 ***Adjusted unit basin storage volume:*** 0.54 **Inches**

(The unit basin storage volume is adjusted by applying the MAP adjustment factor.)

3-3 ***Required Capture Volume (in cubic feet):*** 11,520 **Cubic feet**

(The adjusted unit basin sizing volume [inches] is multiplied by the size of the DMA and converted to feet)

4.0 Calculate the Duration of the Rain Event

4-1	Rainfall intensity	0.2	**Inches per hour**
4-2	Divide Item 3-2 by Item 4-1	2.72	**Hours of Rain Event Duration**

5.0 Preliminary Estimate of Surface Area of Treatment Measure

5-1	4% of DMA impervious surface	10,156	**Square feet**
5-2	Area 25% smaller than item 5-1	7,617	**Square feet**
5-3	Volume of treated runoff for area in Item 5-2	8,640	**Cubic feet** (Item 5-2 * 5 inches per hour * 1/12 * Item 4-2)

6.0 Initial Adjustment of Depth of Surface Ponding Area

6-1	Subtract Item 5-3 from Item 3-3	2,880	**Cubic feet** (Amount of runoff to be stored in ponding area)
6-2	Divide Item 6-1 by Item 5-2	0.4	**Feet** (Depth of stored runoff in surface ponding area)
6-3	Convert Item 6-2 from ft to inches	4.5	**Inches** (Depth of stored runoff in surface ponding area)

6-4 If ponding depth in Item 6-3 meets your target depth, skip to Item 8-1. If not, continue to Step 7-1.

7.0 Optimize Size of Treatment Measure

7-1	Enter an area larger or smaller than Item 5-2	7,048	**Sq.ft.** (enter larger area if you need less ponding depth; smaller for more depth.)
7-2	Volume of treated runoff for area in Item 7-1	7,994	**Cubic feet** (Item 7-1 * 5 inches per hour * 1/12 * Item 4-2)
7-3	Subtract Item 7-2 from Item 3-3	3,526	**Cubic feet** (Amount of runoff to be stored in ponding area)
7-4	Divide Item 7-3 by Item 7-1	0.50	**Feet** (Depth of stored runoff in surface ponding area)
7-5	Convert Item 7-4 from feet to inches	6.00	**Inches** (Depth of stored runoff in surface ponding area)

7-6 If the ponding depth in Item 7-5 meets target, stop here. If not, repeat Steps 7-1 through 7-5 until you obtain target depth.

8.0 Surface Area of Treatment Measure for DMA

8-1 Final surface area of treatment* 7,048 **Square feet** (Either Item 5-2 or final amount in Item 7-1)

**Note: Check with the local jurisdiction as to its policy regarding the minimum biotreatment surface area allowed.*

Worksheet for Calculating the Combination Flow and Volume Method

Instructions: After completing Section 1, make a copy of this Excel file for each Drainage Management Area within the project. Enter information specific to the project and DMA in the cells shaded in yellow. Cells shaded in light blue contain formulas and values that will be automatically calculated.

1.0 Project Information

1-1	Project Name:	Sanctuary West	
1-2	City application ID:		
1-3	Site Address or APN:		
1-4	Tract or Parcel Map No:		
1-5	Site Mean Annual Precip. (MAP)[1]	14.0	Inches

The calculations presented here are based on the **combination flow and volume hydraulic sizing method** provided in the Clean Water Program Alameda County C.3 Technical Guidance, Version 4.0. The steps presented below are explained in Chapter 5, Section 5.1 of the guidance manual, applicable portions of which are included in this file, in the tab called "Guidance from Chapter 5".

Refer to the Mean Annual Precipitation Map in Appendix D of the C.3 Technical Guidance to determine the MAP, in inches, for the site. Click here for map

1-6 Applicable Rain Gauge[2]: San Jose

Enter "Oakland Airport" if the site MAP is 16.4 inches or greater. Enter "San Jose" if the site MAP is less than 16.4 inches.

MAP adjustment factor is automatically calculated as: 0.97

(The "Site Mean Annual Precipitation (MAP)" is divided by the MAP for the applicable rain gauge, showin in Table 5.2, below.)

2.0 Calculate Percentage of Impervious Surface for Drainage Management Area (DMA)

2-1 Name of DMA: DMA 7

For items 2-2 and 2-3, enter the areas in square feet for each type of surface within the DMA.

	Type of Surface	Area of surface type within DMA (Sq. Ft)	Adjust Pervious Surface	Effective Impervious Area
2-2	Impervious surface	106,640	1.0	106,640
2-3	Pervious service	58,735	0.1	5,874
	Total DMA Area (square feet) =	165,375		

2-4 ***Total Effective Impervious Area (EIA)*** 112,514 Square feet

3.0 Calculate Unit Basin Storage Volume in Inches

Table 5-2: Unit Basin Storage Volumes (in inches) for 80 Percent Capture Using 48-Hour Drawdowns		
		Unit Basin Storage Volume (in) for Applicable Runoff Coefficients
Applicable Rain Gauge	**Mean Annual Precipitation (in)**	**Coefficient of 1.00**
Oakland Airport	18.35	0.67
San Jose	14.4	0.56

3-1 ***Unit basin storage volume from Table 5.2:*** 0.56 Inches

(The coefficient for this method is 1.00, due to the conversion of any landscaping to effective impervious area)

3-2 ***Adjusted unit basin storage volume:*** 0.54 Inches

(The unit basin storage volume is adjusted by applying the MAP adjustment factor.)

3-3 ***Required Capture Volume (in cubic feet):*** 5,105 Cubic feet

(The adjusted unit basin sizing volume [inches] is multiplied by the size of the DMA and converted to feet)

4.0 Calculate the Duration of the Rain Event

4-1	Rainfall intensity	0.2	Inches per hour
4-2	Divide Item 3-2 by Item 4-1	2.72	Hours of Rain Event Duration

5.0 Preliminary Estimate of Surface Area of Treatment Measure

5-1	4% of DMA impervious surface	4,501	Square feet
5-2	Area 25% smaller than item 5-1	3,375	Square feet
5-3	Volume of treated runoff for area in Item 5-2	3,829	Cubic feet (Item 5-2 * 5 inches per hour * 1/12 * Item 4-2)

6.0 Initial Adjustment of Depth of Surface Ponding Area

6-1	Subtract Item 5-3 from Item 3-3	1,276	Cubic feet (Amount of runoff to be stored in ponding area)
6-2	Divide Item 6-1 by Item 5-2	0.4	Feet (Depth of stored runoff in surface ponding area)
6-3	Convert Item 6-2 from ft to inches	4.5	Inches (Depth of stored runoff in surface ponding area)

6-4 If ponding depth in Item 6-3 meets your target depth, skip to Item 8-1. If not, continue to Step 7-1.

7.0 Optimize Size of Treatment Measure

7-1	Enter an area larger or smaller than Item 5-2	3,124	Sq.ft. (enter larger area if you need less ponding depth; smaller for more depth.)
7-2	Volume of treated runoff for area in Item 7-1	3,543	Cubic feet (Item 7-1 * 5 inches per hour * 1/12 * Item 4-2)
7-3	Subtract Item 7-2 from Item 3-3	1,561	Cubic feet (Amount of runoff to be stored in ponding area)
7-4	Divide Item 7-3 by Item 7-1	0.50	Feet (Depth of stored runoff in surface ponding area)
7-5	Convert Item 7-4 from feet to inches	6.00	Inches (Depth of stored runoff in surface ponding area)

7-6 If the ponding depth in Item 7-5 meets target, stop here. If not, repeat Steps 7-1 through 7-5 until you obtain target depth.

8.0 Surface Area of Treatment Measure for DMA

8-1 Final surface area of treatment* 3,124 Square feet (Either Item 5-2 or final amount in Item 7-1)

**Note: Check with the local jurisdiction as to its policy regarding the minimum biotreatment surface area allowed.*

Worksheet for Calculating the Combination Flow and Volume Method

Instructions: After completing Section 1, make a copy of this Excel file for each Drainage Management Area within the project. Enter information specific to the project and DMA in the cells shaded in yellow. Cells shaded in light blue contain formulas and values that will be automatically calculated.

1.0 Project Information

1-1	Project Name:	Sanctuary West	
1-2	City application ID:		
1-3	Site Address or APN:		
1-4	Tract or Parcel Map No:		
1-5	Site Mean Annual Precip. (MAP)[1]	14.0	Inches

The calculations presented here are based on the **combination flow and volume hydraulic sizing method** provided in the Clean Water Program Alameda County C.3 Technical Guidance, Version 4.0. The steps presented below are explained in Chapter 5, Section 5.1 of the guidance manual, applicable portions of which are included in this file, in the tab called "Guidance from Chapter 5".

Refer to the Mean Annual Precipitation Map in Appendix D of the C.3 Technical Guidance to determine the MAP, in inches, for the site. Click here for map

1-6 Applicable Rain Gauge[2]: San Jose

Enter "Oakland Airport" if the site MAP is 16.4 inches or greater. Enter "San Jose" if the site MAP is less than 16.4 inches.

MAP adjustment factor is automatically calculated as: 0.97

(The "Site Mean Annual Precipitation (MAP)" is divided by the MAP for the applicable rain gauge, showin in Table 5.2, below.)

2.0 Calculate Percentage of Impervious Surface for Drainage Management Area (DMA)

2-1 Name of DMA: DMA 8

For items 2-2 and 2-3, enter the areas in square feet for each type of surface within the DMA.

	Type of Surface	Area of surface type within DMA (Sq. Ft)	Adjust Pervious Surface	Effective Impervious Area
2-2	Impervious surface	52,280	1.0	52,280
2-3	Pervious service	5,630	0.1	563
	Total DMA Area (square feet) =	57,910		

2-4 ***Total Effective Impervious Area (EIA)*** 52,843 Square feet

3.0 Calculate Unit Basin Storage Volume in Inches

Table 5-2: Unit Basin Storage Volumes (in inches) for 80 Percent Capture Using 48-Hour Drawdowns

		Unit Basin Storage Volume (in) for Applicable Runoff Coefficients
Applicable Rain Gauge	**Mean Annual Precipitation (in)**	**Coefficient of 1.00**
Oakland Airport	18.35	0.67
San Jose	14.4	0.56

3-1 ***Unit basin storage volume from Table 5.2:*** 0.56 Inches

(The coefficient for this method is 1.00, due to the conversion of any landscaping to effective impervious area)

3-2 ***Adjusted unit basin storage volume:*** 0.54 Inches

(The unit basin storage volume is adjusted by applying the MAP adjustment factor.)

3-3 ***Required Capture Volume (in cubic feet):*** 2,398 Cubic feet

(The adjusted unit basin sizing volume [inches] is multiplied by the size of the DMA and converted to feet)

4.0 Calculate the Duration of the Rain Event

4-1	Rainfall intensity	0.2	Inches per hour
4-2	Divide Item 3-2 by Item 4-1	2.72	Hours of Rain Event Duration

5.0 Preliminary Estimate of Surface Area of Treatment Measure

5-1	4% of DMA impervious surface	2,114	Square feet
5-2	Area 25% smaller than item 5-1	1,585	Square feet
5-3	Volume of treated runoff for area in Item 5-2	1,798	Cubic feet (Item 5-2 * 5 inches per hour * 1/12 * Item 4-2)

6.0 Initial Adjustment of Depth of Surface Ponding Area

6-1	Subtract Item 5-3 from Item 3-3	599	Cubic feet (Amount of runoff to be stored in ponding area)
6-2	Divide Item 6-1 by Item 5-2	0.4	Feet (Depth of stored runoff in surface ponding area)
6-3	Convert Item 6-2 from ft to inches	4.5	Inches (Depth of stored runoff in surface ponding area)

6-4 If ponding depth in Item 6-3 meets your target depth, skip to Item 8-1. If not, continue to Step 7-1.

7.0 Optimize Size of Treatment Measure

7-1	Enter an area larger or smaller than Item 5-2	1,467	Sq.ft. (enter larger area if you need less ponding depth; smaller for more depth.)
7-2	Volume of treated runoff for area in Item 7-1	1,664	Cubic feet (Item 7-1 * 5 inches per hour * 1/12 * Item 4-2)
7-3	Subtract Item 7-2 from Item 3-3	734	Cubic feet (Amount of runoff to be stored in ponding area)
7-4	Divide Item 7-3 by Item 7-1	0.50	Feet (Depth of stored runoff in surface ponding area)
7-5	Convert Item 7-4 from feet to inches	6.00	Inches (Depth of stored runoff in surface ponding area)

7-6 If the ponding depth in Item 7-5 meets target, stop here. If not, repeat Steps 7-1 through 7-5 until you obtain target depth.

8.0 Surface Area of Treatment Measure for DMA

8-1 Final surface area of treatment* 1,467 Square feet (Either Item 5-2 or final amount in Item 7-1)

**Note: Check with the local jurisdiction as to its policy regarding the minimum biotreatment surface area allowed.*

Worksheet for Calculating the Combination Flow and Volume Method

Instructions: After completing Section 1, make a copy of this Excel file for each Drainage Management Area within the project. Enter information specific to the project and DMA in the cells shaded in yellow. Cells shaded in light blue contain formulas and values that will be automatically calculated.

1.0 Project Information

1-1	Project Name:	Sanctuary West	
1-2	City application ID:		
1-3	Site Address or APN:		
1-4	Tract or Parcel Map No:		
1-5	Site Mean Annual Precip. (MAP)[1]	14.0	Inches

The calculations presented here are based on the **combination flow and volume hydraulic sizing method** provided in the Clean Water Program Alameda County C.3 Technical Guidance, Version 4.0. The steps presented below are explained in Chapter 5, Section 5.1 of the guidance manual, applicable portions of which are included in this file, in the tab called "Guidance from Chapter 5".

Refer to the Mean Annual Precipitation Map in Appendix D of the C.3 Technical Guidance to determine the MAP, in inches, for the site. Click here for map

1-6 Applicable Rain Gauge[2]: San Jose

Enter "Oakland Airport" if the site MAP is 16.4 inches or greater. Enter "San Jose" if the site MAP is less than 16.4 inches.

MAP adjustment factor is automatically calculated as: 0.97

(The "Site Mean Annual Precipitation (MAP)" is divided by the MAP for the applicable rain gauge, showin in Table 5.2, below.)

2.0 Calculate Percentage of Impervious Surface for Drainage Management Area (DMA)

2-1 Name of DMA: DMA 9

For items 2-2 and 2-3, enter the areas in square feet for each type of surface within the DMA.

	Type of Surface	Area of surface type within DMA (Sq. Ft)	Adjust Pervious Surface	Effective Impervious Area
2-2	Impervious surface	108,904	1.0	108,904
2-3	Pervious service	55,088	0.1	5,509
	Total DMA Area (square feet) =	163,992		

2-4 ***Total Effective Impervious Area (EIA)*** 114,413 **Square feet**

3.0 Calculate Unit Basin Storage Volume in Inches

Table 5-2: Unit Basin Storage Volumes (in inches) for 80 Percent Capture Using 48-Hour Drawdowns		
		Unit Basin Storage Volume (in) for Applicable Runoff Coefficients
Applicable Rain Gauge	**Mean Annual Precipitation (in)**	**Coefficient of 1.00**
Oakland Airport	18.35	0.67
San Jose	14.4	0.56

3-1 ***Unit basin storage volume from Table 5.2:*** 0.56 **Inches**

(The coefficient for this method is 1.00, due to the conversion of any landscaping to effective impervious area)

3-2 ***Adjusted unit basin storage volume:*** 0.54 **Inches**

(The unit basin storage volume is adjusted by applying the MAP adjustment factor.)

3-3 ***Required Capture Volume (in cubic feet):*** 5,191 **Cubic feet**

(The adjusted unit basin sizing volume [inches] is multiplied by the size of the DMA and converted to feet)

4.0 Calculate the Duration of the Rain Event

4-1	Rainfall intensity	0.2	Inches per hour
4-2	Divide Item 3-2 by Item 4-1	2.72	Hours of Rain Event Duration

5.0 Preliminary Estimate of Surface Area of Treatment Measure

5-1	4% of DMA impervious surface	4,577	Square feet
5-2	Area 25% smaller than item 5-1	3,432	Square feet
5-3	Volume of treated runoff for area in Item 5-2	3,893	Cubic feet (Item 5-2 * 5 inches per hour * 1/12 * Item 4-2)

6.0 Initial Adjustment of Depth of Surface Ponding Area

6-1	Subtract Item 5-3 from Item 3-3	1,298	Cubic feet (Amount of runoff to be stored in ponding area)
6-2	Divide Item 6-1 by Item 5-2	0.4	Feet (Depth of stored runoff in surface ponding area)
6-3	Convert Item 6-2 from ft to inches	4.5	Inches (Depth of stored runoff in surface ponding area)

6-4 If ponding depth in Item 6-3 meets your target depth, skip to Item 8-1. If not, continue to Step 7-1.

7.0 Optimize Size of Treatment Measure

7-1	Enter an area larger or smaller than Item 5-2	3,176	Sq.ft. (enter larger area if you need less ponding depth; smaller for more depth.)
7-2	Volume of treated runoff for area in Item 7-1	3,602	Cubic feet (Item 7-1 * 5 inches per hour * 1/12 * Item 4-2)
7-3	Subtract Item 7-2 from Item 3-3	1,589	Cubic feet (Amount of runoff to be stored in ponding area)
7-4	Divide Item 7-3 by Item 7-1	0.50	Feet (Depth of stored runoff in surface ponding area)
7-5	Convert Item 7-4 from feet to inches	6.00	Inches (Depth of stored runoff in surface ponding area)

7-6 If the ponding depth in Item 7-5 meets target, stop here. If not, repeat Steps 7-1 through 7-5 until you obtain target depth.

8.0 Surface Area of Treatment Measure for DMA

8-1 Final surface area of treatment* 3,176 **Square feet** (Either Item 5-2 or final amount in Item 7-1)

**Note: Check with the local jurisdiction as to its policy regarding the minimum biotreatment surface area allowed.*

Worksheet for Calculating the Combination Flow and Volume Method

Instructions: After completing Section 1, make a copy of this Excel file for each Drainage Management Area within the project. Enter information specific to the project and DMA in the cells shaded in yellow. Cells shaded in light blue contain formulas and values that will be automatically calculated.

1.0 Project Information

1-1	Project Name:	Sanctuary West	
1-2	City application ID:		
1-3	Site Address or APN:		
1-4	Tract or Parcel Map No:		
1-5	Site Mean Annual Precip. (MAP)[1]	14.0	Inches

The calculations presented here are based on the **combination flow and volume hydraulic sizing method** provided in the Clean Water Program Alameda County C.3 Technical Guidance, Version 4.0. The steps presented below are explained in Chapter 5, Section 5.1 of the guidance manual, applicable portions of which are included in this file, in the tab called "Guidance from Chapter 5".

Refer to the Mean Annual Precipitation Map in Appendix D of the C.3 Technical Guidance to determine the MAP, in inches, for the site. Click here for map

1-6 Applicable Rain Gauge[2]: San Jose

Enter "Oakland Airport" if the site MAP is 16.4 inches or greater. Enter "San Jose" if the site MAP is less than 16.4 inches.

MAP adjustment factor is automatically calculated as: 0.97

(The "Site Mean Annual Precipitation (MAP)" is divided by the MAP for the applicable rain gauge, showin in Table 5.2, below.)

2.0 Calculate Percentage of Impervious Surface for Drainage Management Area (DMA)

2-1 Name of DMA: DMA 10

For items 2-2 and 2-3, enter the areas in square feet for each type of surface within the DMA.

	Type of Surface	Area of surface type within DMA (Sq. Ft)	Adjust Pervious Surface	Effective Impervious Area
2-2	Impervious surface	73,987	1.0	73,987
2-3	Pervious service	73,395	0.1	7,340
	Total DMA Area (square feet) =	147,382		

2-4 ***Total Effective Impervious Area (EIA)*** 81,327 **Square feet**

3.0 Calculate Unit Basin Storage Volume in Inches

Table 5-2: Unit Basin Storage Volumes (in inches) for 80 Percent Capture Using 48-Hour Drawdowns

		Unit Basin Storage Volume (in) for Applicable Runoff Coefficients
Applicable Rain Gauge	**Mean Annual Precipitation (in)**	**Coefficient of 1.00**
Oakland Airport	18.35	0.67
San Jose	14.4	0.56

3-1 ***Unit basin storage volume from Table 5.2:*** 0.56 **Inches**

(The coefficient for this method is 1.00, due to the conversion of any landscaping to effective impervious area)

3-2 ***Adjusted unit basin storage volume:*** 0.54 **Inches**

(The unit basin storage volume is adjusted by applying the MAP adjustment factor.)

3-3 ***Required Capture Volume (in cubic feet):*** 3,690 **Cubic feet**

(The adjusted unit basin sizing volume [inches] is multiplied by the size of the DMA and converted to feet)

4.0 Calculate the Duration of the Rain Event

4-1	Rainfall intensity	0.2	Inches per hour
4-2	Divide Item 3-2 by Item 4-1	2.72	Hours of Rain Event Duration

5.0 Preliminary Estimate of Surface Area of Treatment Measure

5-1	4% of DMA impervious surface	3,253	Square feet
5-2	Area 25% smaller than item 5-1	2,440	Square feet
5-3	Volume of treated runoff for area in Item 5-2	2,767	Cubic feet (Item 5-2 * 5 inches per hour * 1/12 * Item 4-2)

6.0 Initial Adjustment of Depth of Surface Ponding Area

6-1	Subtract Item 5-3 from Item 3-3	922	Cubic feet (Amount of runoff to be stored in ponding area)
6-2	Divide Item 6-1 by Item 5-2	0.4	Feet (Depth of stored runoff in surface ponding area)
6-3	Convert Item 6-2 from ft to inches	4.5	Inches (Depth of stored runoff in surface ponding area)

6-4 If ponding depth in Item 6-3 meets your target depth, skip to Item 8-1. If not, continue to Step 7-1.

7.0 Optimize Size of Treatment Measure

7-1	Enter an area larger or smaller than Item 5-2	2,258	Sq.ft. (enter larger area if you need less ponding depth; smaller for more depth.)
7-2	Volume of treated runoff for area in Item 7-1	2,561	Cubic feet (Item 7-1 * 5 inches per hour * 1/12 * Item 4-2)
7-3	Subtract Item 7-2 from Item 3-3	1,129	Cubic feet (Amount of runoff to be stored in ponding area)
7-4	Divide Item 7-3 by Item 7-1	0.50	Feet (Depth of stored runoff in surface ponding area)
7-5	Convert Item 7-4 from feet to inches	6.00	Inches (Depth of stored runoff in surface ponding area)

7-6 If the ponding depth in Item 7-5 meets target, stop here. If not, repeat Steps 7-1 through 7-5 until you obtain target depth.

8.0 Surface Area of Treatment Measure for DMA

8-1 Final surface area of treatment* 2,258 **Square feet** (Either Item 5-2 or final amount in Item 7-1)

**Note: Check with the local jurisdiction as to its policy regarding the minimum biotreatment surface area allowed.*

Worksheet for Calculating the Combination Flow and Volume Method

Instructions: After completing Section 1, make a copy of this Excel file for each Drainage Management Area within the project. Enter information specific to the project and DMA in the cells shaded in yellow. Cells shaded in light blue contain formulas and values that will be automatically calculated.

1.0 Project Information

1-1	Project Name:	Sanctuary West	
1-2	City application ID:		
1-3	Site Address or APN:		
1-4	Tract or Parcel Map No:		
1-5	Site Mean Annual Precip. (MAP)[1]	14.0	Inches

The calculations presented here are based on the **combination flow and volume hydraulic sizing method** provided in the Clean Water Program Alameda County C.3 Technical Guidance, Version 4.0. The steps presented below are explained in Chapter 5, Section 5.1 of the guidance manual, applicable portions of which are included in this file, in the tab called "Guidance from Chapter 5".

Refer to the Mean Annual Precipitation Map in Appendix D of the C.3 Technical Guidance to determine the MAP, in inches, for the site. Click here for map

1-6 Applicable Rain Gauge[2]: San Jose

Enter "Oakland Airport" if the site MAP is 16.4 inches or greater. Enter "San Jose" if the site MAP is less than 16.4 inches.

MAP adjustment factor is automatically calculated as: 0.97

(The "Site Mean Annual Precipitation (MAP)" is divided by the MAP for the applicable rain gauge, showin in Table 5.2, below.)

2.0 Calculate Percentage of Impervious Surface for Drainage Management Area (DMA)

2-1 Name of DMA: DMA 11

For items 2-2 and 2-3, enter the areas in square feet for each type of surface within the DMA.

	Type of Surface	Area of surface type within DMA (Sq. Ft)	Adjust Pervious Surface	Effective Impervious Area
2-2	Impervious surface	50,020	1.0	50,020
2-3	Pervious service	21,742	0.1	2,174
	Total DMA Area (square feet) =	71,762		

2-4 ***Total Effective Impervious Area (EIA)*** 52,194 **Square feet**

3.0 Calculate Unit Basin Storage Volume in Inches

Table 5-2: Unit Basin Storage Volumes (in inches) for 80 Percent Capture Using 48-Hour Drawdowns		
		Unit Basin Storage Volume (in) for Applicable Runoff Coefficients
Applicable Rain Gauge	**Mean Annual Precipitation (in)**	**Coefficient of 1.00**
Oakland Airport	18.35	0.67
San Jose	14.4	0.56

3-1 ***Unit basin storage volume from Table 5.2:*** 0.56 **Inches**

(The coefficient for this method is 1.00, due to the conversion of any landscaping to effective impervious area)

3-2 ***Adjusted unit basin storage volume:*** 0.54 **Inches**

(The unit basin storage volume is adjusted by applying the MAP adjustment factor.)

3-3 ***Required Capture Volume (in cubic feet):*** 2,368 **Cubic feet**

(The adjusted unit basin sizing volume [inches] is multiplied by the size of the DMA and converted to feet)

4.0 Calculate the Duration of the Rain Event

4-1	Rainfall intensity	0.2	Inches per hour
4-2	Divide Item 3-2 by Item 4-1	2.72	Hours of Rain Event Duration

5.0 Preliminary Estimate of Surface Area of Treatment Measure

5-1	4% of DMA impervious surface	2,088	Square feet
5-2	Area 25% smaller than item 5-1	1,566	Square feet
5-3	Volume of treated runoff for area in Item 5-2	1,776	Cubic feet (Item 5-2 * 5 inches per hour * 1/12 * Item 4-2)

6.0 Initial Adjustment of Depth of Surface Ponding Area

6-1	Subtract Item 5-3 from Item 3-3	592	Cubic feet (Amount of runoff to be stored in ponding area)
6-2	Divide Item 6-1 by Item 5-2	0.4	Feet (Depth of stored runoff in surface ponding area)
6-3	Convert Item 6-2 from ft to inches	4.5	Inches (Depth of stored runoff in surface ponding area)

6-4 If ponding depth in Item 6-3 meets your target depth, skip to Item 8-1. If not, continue to Step 7-1.

7.0 Optimize Size of Treatment Measure

7-1	Enter an area larger or smaller than Item 5-2	1,449	Sq.ft. (enter larger area if you need less ponding depth; smaller for more depth.)
7-2	Volume of treated runoff for area in Item 7-1	1,644	Cubic feet (Item 7-1 * 5 inches per hour * 1/12 * Item 4-2)
7-3	Subtract Item 7-2 from Item 3-3	725	Cubic feet (Amount of runoff to be stored in ponding area)
7-4	Divide Item 7-3 by Item 7-1	0.50	Feet (Depth of stored runoff in surface ponding area)
7-5	Convert Item 7-4 from feet to inches	6.00	Inches (Depth of stored runoff in surface ponding area)

7-6 If the ponding depth in Item 7-5 meets target, stop here. If not, repeat Steps 7-1 through 7-5 until you obtain target depth.

8.0 Surface Area of Treatment Measure for DMA

8-1 Final surface area of treatment* 1,449 **Square feet** (Either Item 5-2 or final amount in Item 7-1)

**Note: Check with the local jurisdiction as to its policy regarding the minimum biotreatment surface area allowed.*

Worksheet for Calculating the Combination Flow and Volume Method

Instructions: After completing Section 1, make a copy of this Excel file for each Drainage Management Area within the project. Enter information specific to the project and DMA in the cells shaded in yellow. Cells shaded in light blue contain formulas and values that will be automatically calculated.

1.0 Project Information

1-1	Project Name:	Sanctuary West	
1-2	City application ID:		
1-3	Site Address or APN:		
1-4	Tract or Parcel Map No:		
1-5	Site Mean Annual Precip. (MAP)[1]	14.0	Inches

The calculations presented here are based on the **combination flow and volume hydraulic sizing method** provided in the Clean Water Program Alameda County C.3 Technical Guidance, Version 4.0. The steps presented below are explained in Chapter 5, Section 5.1 of the guidance manual, applicable portions of which are included in this file, in the tab called "Guidance from Chapter 5".

Refer to the Mean Annual Precipitation Map in Appendix D of the C.3 Technical Guidance to determine the MAP, in inches, for the site. Click here for map

1-6 Applicable Rain Gauge[2] **San Jose**

Enter "Oakland Airport" if the site MAP is 16.4 inches or greater. Enter "San Jose" if the site MAP is less than 16.4 inches.

MAP adjustment factor is automatically calculated as: **0.97**

(The "Site Mean Annual Precipitation (MAP)" is divided by the MAP for the applicable rain gauge, showin in Table 5.2, below.)

2.0 Calculate Percentage of Impervious Surface for Drainage Management Area (DMA)

2-1 Name of DMA: **DMA 12**

For items 2-2 and 2-3, enter the areas in square feet for each type of surface within the DMA.

	Type of Surface	Area of surface type within DMA (Sq. Ft)	Adjust Pervious Surface	Effective Impervious Area
2-2	Impervious surface	36,921	1.0	36,921
2-3	Pervious service	18,126	0.1	1,813
	Total DMA Area (square feet) =	55,047		

2-4 ***Total Effective Impervious Area (EIA)*** **38,734** **Square feet**

3.0 Calculate Unit Basin Storage Volume in Inches

Table 5-2: Unit Basin Storage Volumes (in inches) for 80 Percent Capture Using 48-Hour Drawdowns		
		Unit Basin Storage Volume (in) for Applicable Runoff Coefficients
Applicable Rain Gauge	**Mean Annual Precipitation (in)**	**Coefficient of 1.00**
Oakland Airport	18.35	0.67
San Jose	14.4	0.56

3-1 ***Unit basin storage volume from Table 5.2:*** **0.56** **Inches**

(The coefficient for this method is 1.00, due to the conversion of any landscaping to effective impervious area)

3-2 ***Adjusted unit basin storage volume:*** **0.54** **Inches**

(The unit basin storage volume is adjusted by applying the MAP adjustment factor.)

3-3 ***Required Capture Volume (in cubic feet):*** **1,757** **Cubic feet**

(The adjusted unit basin sizing volume [inches] is multiplied by the size of the DMA and converted to feet)

4.0 Calculate the Duration of the Rain Event

4-1	Rainfall intensity	0.2	Inches per hour
4-2	Divide Item 3-2 by Item 4-1	2.72	Hours of Rain Event Duration

5.0 Preliminary Estimate of Surface Area of Treatment Measure

5-1	4% of DMA impervious surface	1,549	Square feet
5-2	Area 25% smaller than item 5-1	1,162	Square feet
5-3	Volume of treated runoff for area in Item 5-2	1,318	Cubic feet (Item 5-2 * 5 inches per hour * 1/12 * Item 4-2)

6.0 Initial Adjustment of Depth of Surface Ponding Area

6-1	Subtract Item 5-3 from Item 3-3	439	Cubic feet (Amount of runoff to be stored in ponding area)
6-2	Divide Item 6-1 by Item 5-2	0.4	Feet (Depth of stored runoff in surface ponding area)
6-3	Convert Item 6-2 from ft to inches	4.5	Inches (Depth of stored runoff in surface ponding area)

6-4 If ponding depth in Item 6-3 meets your target depth, skip to Item 8-1. If not, continue to Step 7-1.

7.0 Optimize Size of Treatment Measure

7-1	Enter an area larger or smaller than Item 5-2	1,075	Sq.ft. (enter larger area if you need less ponding depth; smaller for more depth.)
7-2	Volume of treated runoff for area in Item 7-1	1,220	Cubic feet (Item 7-1 * 5 inches per hour * 1/12 * Item 4-2)
7-3	Subtract Item 7-2 from Item 3-3	538	Cubic feet (Amount of runoff to be stored in ponding area)
7-4	Divide Item 7-3 by Item 7-1	0.50	Feet (Depth of stored runoff in surface ponding area)
7-5	Convert Item 7-4 from feet to inches	6.00	Inches (Depth of stored runoff in surface ponding area)

7-6 If the ponding depth in Item 7-5 meets target, stop here. If not, repeat Steps 7-1 through 7-5 until you obtain target depth.

8.0 Surface Area of Treatment Measure for DMA

8-1 Final surface area of treatment* **1,075** **Square feet** (Either Item 5-2 or final amount in Item 7-1)

**Note: Check with the local jurisdiction as to its policy regarding the minimum biotreatment surface area allowed.*

Worksheet for Calculating the Combination Flow and Volume Method

Instructions: After completing Section 1, make a copy of this Excel file for each Drainage Management Area within the project. Enter information specific to the project and DMA in the cells shaded in yellow. Cells shaded in light blue contain formulas and values that will be automatically calculated.

1.0 Project Information

1-1	Project Name:	Sanctuary West	
1-2	City application ID:		
1-3	Site Address or APN:		
1-4	Tract or Parcel Map No:		
1-5	Site Mean Annual Precip. (MAP)[1]	14.0	Inches

The calculations presented here are based on the **combination flow and volume hydraulic sizing method** provided in the Clean Water Program Alameda County C.3 Technical Guidance, Version 4.0. The steps presented below are explained in Chapter 5, Section 5.1 of the guidance manual, applicable portions of which are included in this file, in the tab called "Guidance from Chapter 5".

Refer to the Mean Annual Precipitation Map in Appendix D of the C.3 Technical Guidance to determine the MAP, in inches, for the site. Click here for map

1-6 Applicable Rain Gauge[2]: San Jose

Enter "Oakland Airport" if the site MAP is 16.4 inches or greater. Enter "San Jose" if the site MAP is less than 16.4 inches.

MAP adjustment factor is automatically calculated as: 0.97

(The "Site Mean Annual Precipitation (MAP)" is divided by the MAP for the applicable rain gauge, showin in Table 5.2, below.)

2.0 Calculate Percentage of Impervious Surface for Drainage Management Area (DMA)

2-1 Name of DMA: DMA 13

For items 2-2 and 2-3, enter the areas in square feet for each type of surface within the DMA.

	Type of Surface	Area of surface type within DMA (Sq. Ft)	Adjust Pervious Surface	Effective Impervious Area
2-2	Impervious surface	1,588	1.0	1,588
2-3	Pervious service	281	0.1	28
	Total DMA Area (square feet) =	1,869		

2-4 ***Total Effective Impervious Area (EIA)*** 1,616 Square feet

3.0 Calculate Unit Basin Storage Volume in Inches

Table 5-2: Unit Basin Storage Volumes (in inches) for 80 Percent Capture Using 48-Hour Drawdowns

		Unit Basin Storage Volume (in) for Applicable Runoff Coefficients
Applicable Rain Gauge	**Mean Annual Precipitation (in)**	**Coefficient of 1.00**
Oakland Airport	18.35	0.67
San Jose	14.4	0.56

3-1 ***Unit basin storage volume from Table 5.2:*** 0.56 Inches

(The coefficient for this method is 1.00, due to the conversion of any landscaping to effective impervious area)

3-2 ***Adjusted unit basin storage volume:*** 0.54 Inches

(The unit basin storage volume is adjusted by applying the MAP adjustment factor.)

3-3 ***Required Capture Volume (in cubic feet):*** 73 Cubic feet

(The adjusted unit basin sizing volume [inches] is multiplied by the size of the DMA and converted to feet)

4.0 Calculate the Duration of the Rain Event

4-1	Rainfall intensity	0.2	Inches per hour
4-2	Divide Item 3-2 by Item 4-1	2.72	Hours of Rain Event Duration

5.0 Preliminary Estimate of Surface Area of Treatment Measure

5-1	4% of DMA impervious surface	65	Square feet
5-2	Area 25% smaller than item 5-1	48	Square feet
5-3	Volume of treated runoff for area in Item 5-2	55	Cubic feet (Item 5-2 * 5 inches per hour * 1/12 * Item 4-2)

6.0 Initial Adjustment of Depth of Surface Ponding Area

6-1	Subtract Item 5-3 from Item 3-3	18	Cubic feet (Amount of runoff to be stored in ponding area)
6-2	Divide Item 6-1 by Item 5-2	0.4	Feet (Depth of stored runoff in surface ponding area)
6-3	Convert Item 6-2 from ft to inches	4.5	Inches (Depth of stored runoff in surface ponding area)

6-4 If ponding depth in Item 6-3 meets your target depth, skip to Item 8-1. If not, continue to Step 7-1.

7.0 Optimize Size of Treatment Measure

7-1	Enter an area larger or smaller than Item 5-2	45	Sq.ft. (enter larger area if you need less ponding depth; smaller for more depth.)
7-2	Volume of treated runoff for area in Item 7-1	51	Cubic feet (Item 7-1 * 5 inches per hour * 1/12 * Item 4-2)
7-3	Subtract Item 7-2 from Item 3-3	22	Cubic feet (Amount of runoff to be stored in ponding area)
7-4	Divide Item 7-3 by Item 7-1	0.50	Feet (Depth of stored runoff in surface ponding area)
7-5	Convert Item 7-4 from feet to inches	6.00	Inches (Depth of stored runoff in surface ponding area)

7-6 If the ponding depth in Item 7-5 meets target, stop here. If not, repeat Steps 7-1 through 7-5 until you obtain target depth.

8.0 Surface Area of Treatment Measure for DMA

8-1 Final surface area of treatment* 45 Square feet (Either Item 5-2 or final amount in Item 7-1)

**Note: Check with the local jurisdiction as to its policy regarding the minimum biotreatment surface area allowed.*

Worksheet for Calculating the Combination Flow and Volume Method

Instructions: After completing Section 1, make a copy of this Excel file for each Drainage Management Area within the project. Enter information specific to the project and DMA in the cells shaded in yellow. Cells shaded in light blue contain formulas and values that will be automatically calculated.

1.0 Project Information

1-1	Project Name:	Sanctuary West	
1-2	City application ID:		
1-3	Site Address or APN:		
1-4	Tract or Parcel Map No:		
1-5	Site Mean Annual Precip. (MAP)[1]	14.0	Inches

The calculations presented here are based on the **combination flow and volume hydraulic sizing method** provided in the Clean Water Program Alameda County C.3 Technical Guidance, Version 4.0. The steps presented below are explained in Chapter 5, Section 5.1 of the guidance manual, applicable portions of which are included in this file, in the tab called "Guidance from Chapter 5".

Refer to the Mean Annual Precipitation Map in Appendix D of the C.3 Technical Guidance to determine the MAP, in inches, for the site. Click here for map

1-6 Applicable Rain Gauge[2] **San Jose**

Enter "Oakland Airport" if the site MAP is 16.4 inches or greater. Enter "San Jose" if the site MAP is less than 16.4 inches.

MAP adjustment factor is automatically calculated as: **0.97**

(The "Site Mean Annual Precipitation (MAP)" is divided by the MAP for the applicable rain gauge, showin in Table 5.2, below.)

2.0 Calculate Percentage of Impervious Surface for Drainage Management Area (DMA)

2-1 Name of DMA: **DMA 14**

For items 2-2 and 2-3, enter the areas in square feet for each type of surface within the DMA.

	Type of Surface	Area of surface type within DMA (Sq. Ft)	Adjust Pervious Surface	Effective Impervious Area
2-2	Impervious surface	34,435	1.0	34,435
2-3	Pervious service	9,220	0.1	922
	Total DMA Area (square feet) =	43,655		

2-4 ***Total Effective Impervious Area (EIA)*** **35,357** **Square feet**

3.0 Calculate Unit Basin Storage Volume in Inches

Table 5-2: Unit Basin Storage Volumes (in inches) for 80 Percent Capture Using 48-Hour Drawdowns		
		Unit Basin Storage Volume (in) for Applicable Runoff Coefficients
Applicable Rain Gauge	**Mean Annual Precipitation (in)**	**Coefficient of 1.00**
Oakland Airport	18.35	0.67
San Jose	14.4	0.56

3-1 ***Unit basin storage volume from Table 5.2:*** **0.56** **Inches**

(The coefficient for this method is 1.00, due to the conversion of any landscaping to effective impervious area)

3-2 ***Adjusted unit basin storage volume:*** **0.54** **Inches**

(The unit basin storage volume is adjusted by applying the MAP adjustment factor.)

3-3 ***Required Capture Volume (in cubic feet):*** **1,604** **Cubic feet**

(The adjusted unit basin sizing volume [inches] is multiplied by the size of the DMA and converted to feet)

4.0 Calculate the Duration of the Rain Event

4-1	Rainfall intensity	0.2	Inches per hour
4-2	Divide Item 3-2 by Item 4-1	2.72	Hours of Rain Event Duration

5.0 Preliminary Estimate of Surface Area of Treatment Measure

5-1	4% of DMA impervious surface	1,414	Square feet
5-2	Area 25% smaller than item 5-1	1,061	Square feet
5-3	Volume of treated runoff for area in Item 5-2	1,203	Cubic feet (Item 5-2 * 5 inches per hour * 1/12 * Item 4-2)

6.0 Initial Adjustment of Depth of Surface Ponding Area

6-1	Subtract Item 5-3 from Item 3-3	401	Cubic feet (Amount of runoff to be stored in ponding area)
6-2	Divide Item 6-1 by Item 5-2	0.4	Feet (Depth of stored runoff in surface ponding area)
6-3	Convert Item 6-2 from ft to inches	4.5	Inches (Depth of stored runoff in surface ponding area)

6-4 If ponding depth in Item 6-3 meets your target depth, skip to Item 8-1. If not, continue to Step 7-1.

7.0 Optimize Size of Treatment Measure

7-1	Enter an area larger or smaller than Item 5-2	982	Sq.ft. (enter larger area if you need less ponding depth; smaller for more depth.)
7-2	Volume of treated runoff for area in Item 7-1	1,113	Cubic feet (Item 7-1 * 5 inches per hour * 1/12 * Item 4-2)
7-3	Subtract Item 7-2 from Item 3-3	491	Cubic feet (Amount of runoff to be stored in ponding area)
7-4	Divide Item 7-3 by Item 7-1	0.50	Feet (Depth of stored runoff in surface ponding area)
7-5	Convert Item 7-4 from feet to inches	6.00	Inches (Depth of stored runoff in surface ponding area)

7-6 If the ponding depth in Item 7-5 meets target, stop here. If not, repeat Steps 7-1 through 7-5 until you obtain target depth.

8.0 Surface Area of Treatment Measure for DMA

8-1 Final surface area of treatment* **982** **Square feet** (Either Item 5-2 or final amount in Item 7-1)

**Note: Check with the local jurisdiction as to its policy regarding the minimum biotreatment surface area allowed.*

Appendix B
Infiltration / Harvesting and Use Feasibility Screening Worksheets

Stormwater Requirements Checklist

Municipal Regional Stormwater Permit (MRP 2.0)
Stormwater Controls for Development Projects

CITY OF NEWARK
37101 NEWARK BOULEVARD
PHONE (510) 578-4000
FAX (510) 578-4306
www.ci.newark.ca.us

I. Applicability of C.3 and C.6 Stormwater Requirements

I.A. Enter Project Data *(For "C.3 Regulated Projects," data will be reported in the municipality's stormwater Annual Report.)*

I.A.1 Project Name: Sanctuary West

I.A.2 Project Address (include cross street): Stevenson Boulevard, Newark, CA

I.A.3 Project APN: 537-0801-002-06, 537-0850-007-02 537-0850-011-01, 537-0850-011-04 537-0850-011-09

I.A.4 Project Watershed[1]: Alameda County Line D to Mowry Slough to San Francisco Bay.

I.A.5 Applicant Name: SI XVIII LLC/SOBRATO INTERESTS I

I.A.6 Date Submitted: 7/11/2019

I.A.7 Applicant Address: 599 CASTRO STREET, SUITE 400, MOUNTAIN VIEW, CA 94041

I.A.8 Applicant Phone: (650) 876-7010

I.A.9 Applicant Email Address: rtersini@sobrato.com

I.A.10 Development type: (check all that apply)

☒ Residential ☐ Commercial ☐ Industrial ☐ Mixed-Use ☐ Streets, Roads, etc.

☐ 'Redevelopment' as defined by MRP: creating, adding and/or replacing exterior existing impervious surface on a site where past development has occurred[2]

☐ 'Special land use categories' as defined by MRP: (1) auto service facilities[3], (2) retail gasoline outlets, (3) restaurants[3], (4) uncovered parking area (stand-alone or part of a larger project)

I.A.11 Project Description[4]: (Also note any past or future phases of the project.)

Project consists of 469 single family units, park space, multi-use trail & associated road & infrastructure improvements.

I.A.12 Total Area of Site: 111.30 ± acres

I.A.13 Slope on Site: %

I.A.14 Total Area of land disturbed during construction (include clearing, grading, excavating and stockpile area:181.42± acres.

I.B. Is the project a "C.3 Regulated Project" per MRP Provision C.3.b?

I.B.1 Enter the amount of impervious surface[4] created and/or replaced by the project (if the total amount is 5,000 sq.ft. or more):

Table of Impervious and Pervious Surfaces

Type of Impervious Surface	a Pre-Project Impervious Surface (sq.ft.)	b Existing Impervious Surface to be Replaced[7] (sq.ft.)	C New Impervious Surface to be Created[7] (sq.ft.)	d Post-project pervious surface (sq.ft.)
Roof area(s) – excluding any portion of the roof that is vegetated ("green roof")	0	0	1,040,389±	2,429,664±
Impervious[5] sidewalks, patios, paths, driveways	0	0	360,742 ±	
Impervious[5] uncovered parking[6]				
Streets (Private)			1,017,433±	
Totals:	0	**0**	**2,418,564 ±**	
Area of Existing Impervious Surface to remain in place	0	N/A		
Total New Impervious Surface *(sum of totals for columns b and c):*		**2,418,564 ±**		

[1] Watershed is defined by the maps from the Alameda County Flood Control District at http://acfloodcontrol.org/resources/explore-watersheds
[2] Roadway projects that replace existing impervious surface are subject to C.3 requirements only if one or more lanes of travel are added.
[3] Standard Industrial Classification (SIC) codes are in Section 2.3 of the C.3 Technical Guidance (download at www.cleanwaterprogram.org)
[4] Project description examples: 5-story office building, industrial warehouse, residential with five 4-story buildings for 200 condominiums, etc.
[5] Per the MRP, pavement that meets the following definition of pervious pavement is NOT an impervious surface. Pervious pavement is defined as pavement that stores and infiltrates rainfall at a rate equal to immediately surrounding unpaved, landscaped areas, or that stores and infiltrates the rainfall runoff volume described in Provision C.3.d.
[6] Uncovered parking includes top level of a parking structure.

[7] "Replace" means to install new impervious surface where existing impervious surface is removed. "Create" means to install new impervious surface where there is currently no impervious surface.

I.B. Is the project a "C.3 Regulated Project" per MRP 2.0 Provision C.3.b? (continued)

		Yes	No	NA
I.B.2	In Item I.B.1, does the Total New Impervious Surface equal 10,000 sq.ft. or more? *If YES, skip to Item I.B.5 and check "Yes." If NO, continue to Item I.B.3.*	☒	☐	☐
I.B.3	Does the Item I.B.1 Total New Impervious Surface equal 5,000 sq.ft. or more, but less than 10,000 sq.ft? *If YES, continue to Item I.B.4. If NO, skip to Item I.B.5 and check "No."*	☐	☐	☐
I.B.4	Is the project a "Special Land Use Category" per Item I.A.10? For uncovered parking, check YES only if there is 5,000 sq.ft or more uncovered parking. *If NO, go to Item I.B.5 and check "No." If YES, go to Item I.B.5 and check "Yes."*	☐	☐	☐
I.B.5	Is the project a C.3 Regulated Project? *If YES, go to Item I.B.6; if NO, continue to Item I.C.*	☒	☐	☐
I.B.6	Does the total amount of Replaced impervious surface equal 50 percent or more of the Pre-Project Impervious Surface? *If YES, stormwater treatment requirements apply to the whole site; if NO, these requirements apply only to the impervious surface created and/or replaced.*	☒	☐	☐
I.B.7	Is the project installing a total of 3,000 sq.ft. or more (excluding private-use patios in single family homes, townhomes, or condominiums) of new pervious pavement systems? (Pervious pavement systems include pervious concrete, pervious asphalt, pervious pavers and grid pavers etc. and are described in the C3 Technical Guidance at www.cleanwaterprogram.org) If YES, stormwater treatment system inspection requirements (C.3.h) apply; (Municipal staff – add this site to your list of sites needing a final inspection at the end of construction and on-going O&M inspections.) If NO, inspection requirements only apply if there are other treatment systems installed on the project.	☐	☒	☐

I.C. Projects that are NOT C.3 Regulated Projects

If you answered NO to Item I.B.5, or the project creates/replaces less than 5,000 sq. ft. of impervious surface, then the project is NOT a C.3 Regulated Project, and stormwater treatment is not required, BUT the municipality may determine that source controls and site design measures are required. Skip to Section II.

I.D. Projects that ARE C.3 Regulated Projects

If you answered YES to Item I.B.5, then the project is a C.3 Regulated Project. The project must include appropriate site design measures and source controls AND hydraulically-sized stormwater treatment measures. Hydromodification management may also be required; refer to Section II to make this determination. If final discretionary approval was granted on or after **DECEMBER 1, 2011**, Low Impact Development (LID) requirements apply, except for "Special Projects." See Section II.

I.E. Identify C.6 Construction-Phase Stormwater Requirements

		Yes	No
I.E.1	Does the project disturb 1.0 acre (43,560 sq.ft.) or more of land? (See Item I.A.14). *If Yes, obtain coverage under the state's Construction General Permit at https://smarts.waterboards.ca.gov/smarts/faces/SwSmartsLogin.jsp. Submit to the municipality a copy of your Notice of Intent and Storm Water Pollution Prevention Plan (SWPPP) before a grading or building permit is issued.*	☒	☐
I.E.2	Is the site a "High Priority Site" that disturbs less than 1.0 acre (43,560 sq.ft.) of land? (Municipal staff will make the final determination.) "High Priority Sites" are sites having any of the following criteria: ▪ that require a grading permit, ▪ are adjacent to a creek, ▪ or are otherwise high priority for stormwater protection during construction (see MRP 2.0 Provision C.6.e.ii.(2)(c))	☐	☒
I.E.3	Is the site a "Hillside Site" that disturbs 5,000 sq.ft. or more, but less than 1.0 acre (43,560 sq.ft.) of land? (Municipal staff will make the final determination.) ▪ "Hillside Sites" are located on hillsides, as indicated on a jurisdictional map of hillside development areas or as indicated by meeting jurisdictional hillside development criteria. ▪ If no map or criteria exist, then Hillside Sites are sites with a slope of 15% or more (see I.A.13 above and MRP 2.0 Provision C.6.e.ii.(2)(b)).	☐	☒

➢ NOTE TO APPLICANT: All projects require appropriate stormwater best management practices (BMPs) during construction. Refer to the Section II to identify appropriate construction BMPs.

- NOTE TO MUNICIPAL STAFF: If the answer is “Yes” to I.E.1, I.E.2, OR I.E.3, refer this project to construction site inspection staff to be added to their list of projects that require stormwater inspections at least monthly during the wet season (October 1 through April 30) and other times of the year as appropriate.

II. Implementation of Stormwater Requirements

II.A. Complete the appropriate sections for the project. For non-C.3 Regulated Projects, Sections II.B, II.C, and II.D apply. For C.3 Regulated Projects, all sections of Section II apply.

II.B. Select Appropriate Site Design Measures

- *Required for C.3 Regulated Projects.*
- *Starting December 1, 2012, projects that create and/or replace 2,500 - 10,000 sq.ft. of impervious surface, and stand-alone single family homes that create/replace 2,500 sq.ft. or more of impervious surface, must include one of Site Design Measures a through f.*[8]
- *All other projects are encouraged to implement site design measures, which may be required at municipality discretion.*
- *Consult with municipal staff about requirements for your project.*

II.B.1 Is the site design measure included in the project plans?

Yes	No	Plan Sheet No.	
☐	☒		a. Direct roof runoff into cisterns or rain barrels and use rainwater for irrigation or other non-potable use.
☒	☐		b. Direct roof runoff onto vegetated areas.
☒	☐		c. Direct runoff from sidewalks, walkways, and/or patios onto vegetated areas.
☒	☐		d. Direct runoff from driveways and/or uncovered parking lots onto vegetated areas.
☐	☒		e. Construct sidewalks, walkways, and/or patios with pervious surfaces. Use the specifications in the C3 Technical Guidance (Version 4.1) or for small projects see the BASMAA Pervious Paving Factsheet. For these documents and others go to www.cleanwaterprogram.org and click on "Resources."
☐	☒		f. Construct bike lanes, driveways, and/or uncovered parking lots with pervious surfaces. Use the specifications in the C3 Technical Guidance (Version 4.1) or for small projects see the BASMAA Pervious Paving Factsheet. For these documents and others go to the program website at: www.cleanwaterprogram.org and click on "Resources."
☒	☐		g. Minimize land disturbance and impervious surface (especially parking lots).
☒	☐		h. Maximize permeability by clustering development and preserving open space.
☐	☒		i. Use micro-detention, including distributed landscape-based detention.
☒	☐		j. Protect sensitive areas, including wetland and riparian areas, and minimize changes to the natural topography.
☐	☒		k. Self-treating area (see Section 4.1 of the C.3 Technical Guidance)
☒	☐		l. Self-retaining area (see Section 4.2 of the C.3 Technical Guidance)
☒	☐		m. Plant or preserve interceptor trees (Section 4.5, C.3 Technical Guidance)

[8] See MRP Provision C.3.a.i(6) for non-C.3 Regulated Projects, C.3.c.i(2)(a) for Regulated Projects, C.3.i for projects that create/replace 2,500 to 10,000 sq.ft. of impervious surface and stand-alone single family homes that create/replace 2,500 sq.ft. or more of impervious surface.

II.C. Select appropriate source controls *(Applies to C.3 Regulated Projects; encouraged for other projects. Consult municipal staff.[9])*

Are these features in project?		Features that require source control measures	Source control measures (Refer to Local Source Control List for detailed requirements)	Is source control measure included in project plans?		
Yes	**No**			**Yes**	**No**	Plan Sheet No.
☒	☐	Storm Drain	Mark on-site inlets with the words "No Dumping! Flows to Bay" or equivalent.	☐	☐	
☐	☒	Floor Drains	Plumb interior floor drains to sanitary sewer[10] [or prohibit].	☐	☐	
☐	☒	Parking garage	Plumb interior parking garage floor drains to sanitary sewer.[9]	☐	☐	
☒	☐	Landscaping	▪ Retain existing vegetation as practicable. ▪ Select diverse species appropriate to the site. Include plants that are pest- and/or disease-resistant, drought-tolerant, and/or attract beneficial insects. ▪ Minimize use of pesticides and quick-release fertilizers. ▪ Use efficient irrigation system; design to minimize runoff.	☐	☐	
☐	☒	Pool/Spa/Fountain	Provide connection to the sanitary sewer to facilitate draining.[9]	☐	☐	
☐	☒	Food Service Equipment (non-residential)	Provide sink or other area for equipment cleaning, which is: ▪ Connected to a grease interceptor prior to sanitary sewer discharge. [9] ▪ Large enough for the largest mat or piece of equipment to be cleaned. ▪ Indoors or in an outdoor roofed area designed to prevent stormwater run-on and run-off, and signed to require equipment washing in this area.	☐	☐	
☐	☒	Refuse Areas	▪ Provide a roofed and enclosed area for dumpsters, recycling containers, etc., designed to prevent stormwater run-on and runoff. ▪ Connect any drains in or beneath dumpsters, compactors, and tallow bin areas serving food service facilities to the sanitary sewer.[9]	☐	☐	
☐	☒	Outdoor Process Activities [11]	Perform process activities either indoors or in roofed outdoor area, designed to prevent stormwater run-on and runoff, and to drain to the sanitary sewer.[9]	☐	☐	
☐	☒	Outdoor Equipment/ Materials Storage	▪ Cover the area or design to avoid pollutant contact with stormwater runoff. ▪ Locate area only on paved and contained areas. ▪ Roof storage areas that will contain non-hazardous liquids, drain to sanitary sewer[9], and contain by berms or similar.	☐	☐	
☐	☒	Vehicle/ Equipment Cleaning	▪ Roofed, pave and berm wash area to prevent stormwater run-on and runoff, plumb to the sanitary sewer[9], and sign as a designated wash area. ▪ Commercial car wash facilities shall discharge to the sanitary sewer.[9]	☐	☐	
☐	☒	Vehicle/ Equipment Repair and Maintenance	▪ Designate repair/maintenance area indoors, or an outdoors area designed to prevent stormwater run-on and runoff and provide secondary containment. Do not install drains in the secondary containment areas. ▪ No floor drains unless pretreated prior to discharge to the sanitary sewer. [9] ▪ Connect containers or sinks used for parts cleaning to the sanitary sewer. [9]	☐	☐	
☐	☒	Fuel Dispensing Areas	▪ Fueling areas shall have impermeable surface that is a) minimally graded to prevent ponding and b) separated from the rest of the site by a grade break. ▪ Canopy shall extend at least 10 ft in each direction from each pump and drain away from fueling area.	☐	☐	
☐	☒	Loading Docks	▪ Cover and/or grade to minimize run-on to and runoff from the loading area. ▪ Position downspouts to direct stormwater away from the loading area. ▪ Drain water from loading dock areas to the sanitary sewer.[9] ▪ Install door skirts between the trailers and the building.	☐	☐	
☒	☐	Fire Sprinklers	Design for discharge of fire sprinkler test water to landscape or sanitary sewer.[9]	☐	☐	
☒	☐	Miscellaneous Drain or Wash Water	▪ Drain condensate of air conditioning units to landscaping. Large air conditioning units may connect to the sanitary sewer.[9] ▪ Roof drains shall drain to unpaved area where practicable. ▪ Drain boiler drain lines, roof top equipment, all washwater to sanitary sewer [9].	☐	☐	
☐	☒	Architectural Copper	▪ Discharge rinse water to sanitary sewer [9], or collect and dispose properly offsite. See flyer "Requirements for Architectural Copper."	☐	☐	

[9] See MRP Provision C.3.a.i(7) for non-C.3 Regulated Projects and Provision C.3.c.i(1) for C.3 Regulated Projects.
[10] Any connection to the sanitary sewer system is subject to sanitary district approval.
[11] Businesses that may have outdoor process activities/equipment include machine shops, auto repair, industries with pretreatment facilities.

II.D. Implement Construction Best Management Practices (BMPs) *(Applies to all projects – see Provision C.6 for more details.)*

Yes	No	Best Management Practice (BMP)
☒	☐	Attach the municipality's construction BMP plan sheet to project plans and require contractor to implement the applicable BMPs on the plan sheet.
☒	☐	Temporary erosion controls to stabilize all denuded areas until permanent erosion controls are established.
☒	☐	Delineate with field markers clearing limits, easements, setbacks, sensitive or critical areas, buffer zones, trees, and drainage courses.
☒	☐	Provide notes, specifications, or attachments describing the following: ▪ Construction, operation and maintenance of erosion and sediment controls, include inspection frequency; ▪ Methods and schedule for grading, excavation, filling, clearing of vegetation, and storage and disposal of excavated or cleared material; ▪ Specifications for vegetative cover & mulch, include methods and schedules for planting and fertilization; ▪ Provisions for temporary and/or permanent irrigation.
☒	☐	Perform clearing and earth moving activities only during dry weather.
☒	☐	Use sediment controls or filtration to remove sediment when dewatering and obtain all necessary permits.
☒	☐	Protect all storm drain inlets in vicinity of site using sediment controls such as berms, fiber rolls, or filters.
☒	☐	Trap sediment on-site, using BMPs such as sediment basins or traps, earthen dikes or berms, silt fences, check dams, soil blankets or mats, covers for soil stock piles, etc.
☒	☐	Divert on-site runoff around exposed areas; divert off-site runoff around the site (e.g., swales and dikes).
☒	☐	Protect adjacent properties and undisturbed areas from construction impacts using vegetative buffer strips, sediment barriers or filters, dikes, mulching, or other measures as appropriate.
☒	☐	Limit construction access routes and stabilize designated access points.
☒	☐	No cleaning, fueling, or maintaining vehicles on-site, except in a designated area where washwater is contained and treated.
☒	☐	Store, handle, and dispose of construction materials/wastes properly to prevent contact with stormwater.
☒	☐	Contractor shall train and provide instruction to all employees/subcontractors re: construction BMPs.
☒	☐	Control and prevent the discharge of all potential pollutants, including pavement cutting wastes, paints, concrete, petroleum products, chemicals, washwater or sediments, rinse water from architectural copper, and non-stormwater discharges to storm drains and watercourses.

PROJECTS THAT ARE <u>NOT</u> C.3 REGULATED PROJECTS STOP HERE!

II.E. Biotreatment, Infiltration and Rain Water Harvesting and Use.

MRP 2.0 no longer requires that a feasibility analysis of infilration and rainwater harvesting be conducted. However, applicants using biotreatment are encouraged to maximize infiltration of stormwater if site conditions allow. If feasible and desired, infiltration and rainwater harvesting may be cost effective solutions depending on the project.

II.F. Stormwater Treatment Measures (Applies to C.3 Regulated Projects)

II.F.1 Check the applicable box and indicate the treatment measures to be included in the project.

Yes	No	
☐	☒	Is the project a Special Project? (See Appendix K of the C.3 Technical Guidance for criteria.) If Yes, complete the Special Projects Worksheet (go to the program website at: www.cleanwaterprogram.org and click on "Resources") and consult with municipal staff about the need to prepare a discussion of the feasibility and infeasibility of 100% LID treatment. Indicate the type of non-LID treatment to be used, the hydraulic sizing method*, and percentage of the amount of runoff specified in Provision C.3.d that is treated: Non-LID Treatment — Hydraulic sizing method* — % of C.3.d amount of runoff treated ☐ Media filter ☐ Tree well filter
☒	☐	Is the project using biotreatment to treat the C.3.d amount of runoff? For more information on infiltration and rainwater harvesting and use of stormwater, refer to the C3 Technical Guidance downloadable at the program website: www.cleanwaterprogram.org If Yes, indicate the biotreatment measures to be used, and the hydraulic sizing method: Biotreatment Measures — Hydraulic sizing method* ☒ Bioretention area — Combination Flow and Volume ☐ Flow-through planter — 80% Capture Approach ☐ Other (specify): — 0.2-inch-per-hour intensity approach
☐	☒	Is the project using infiltration or rainwater harvesting/use? For more information on infiltration and rainwater harvesting and use of stormwater, refer to the C3 Technical Guidance downloadable at the program website: www.cleanwaterprogram.org If Yes, indicate the measures to be used, and hydraulic sizing method: LID Treatment Measure (non-biotreatment) — Hydraulic sizing method* ☐ Rainwater harvesting and use ☐ Bioinfiltration[12] ☐ Infiltration trench ☐ Other (specify):_____

***Hydraulic Sizing Method:** Indicate which of the following Provision C.3.d.i hydraulic sizing methods were used:

1. Volume based approaches – Refer to Provision C.3.d.i.(1):
   1(a) Urban Runoff Quality Management approach, or
   1(b) 80% capture approach (recommended volume-based approach).

2. Flow-based approaches – Refer to Provision C.3.d.i.(2):
   2(a) 10% of 50-year peak flow approach,
   2(b) Percentile rainfall intensity approach, or
   2(c) 0.2-Inch-per-hour intensity approach (this is recommended flow-based approach AND the basis for the 4% rule of thumb described in Section 5.1 of the C.3 Technical Guidance).

3. Combination hydraulic sizing approach -- Refer to Provision C.3.d.i.(3):
   If a combination flow and volume design basis was used, indicate which flow-based and volume-based criteria were used.

[12] See Section 6.1 of the C.3 Technical Guidance for conditions in which bioretention areas provide bioinfiltration.

II.G. Is the project a Hydromodification Management[13] (HM) Project? (Complete this section for C.3 Regulated Projects)

II.G.1 Does the project create and/or replace 1 acre (43,560 sq. ft.) or more of impervious surface? (Refer to Item I.B.1.)

☒ Yes. *Continue to Item II.G.2.*

☐ No. *The project is NOT required to incorporate HM measures. Skip to Item II.G.6 and check "No."*

II.G.2 Is the total impervious area increased over the pre-project condition? (Refer to Item I.B.1.)

☒ Yes. *Continue to Item II.G.3.*

☐ No. *The project is NOT required to incorporate HM measures. Skip to Item II.G.6 and check "No."*

II.G.3 Is the site located in a tidally influenced/depositional area, or in the extreme eastern portion of the county that is not subject to HM requirements? *(See HMP Susceptibility Map in Appendix I of the C.3 Technical Guidance.)*

☒ Yes. *Project is exempt from HM requirements. Attach map indicating project location. Skip to II.G.6 and check "No".*

☐ No. *Continue to II.G.4.*

II.G.4 Is the site located in a high slope zone or special consideration watershed, as shown on the HMP Susceptibility Map?

☐ Yes. *Project is subject to HM requirements. Attach map indicating project location. Skip to II.G.6 and check "Yes."*

☐ No. *Continue to II.G.5.*

II.G.5 For sites located in a white area on the HMP Susceptibility Map, has an engineer or qualified environmental professional determined that runoff from the project flows only through a hardened channel or enclosed pipe along its entire length before emptying into a waterway in the exempt area?

☐ Yes. *Project is exempt from HM requirements. Attach signed statement by qualified professional. Go to II.G.6 and check "No."*

☐ No. *Project is subject to HM requirements. Attach map indicating project location. Go to Item G.6 and check "Yes."*

II.G.6 Is the project a Hydromodification Management Project?

☐ Yes. *The project is subject to HM requirements in Provision C.3.g of the Municipal Regional Stormwater Permit.*

☒ No. *The project is EXEMPT from HM requirements.*

☐ HM requirements are impracticable. *(Attach documentation needed to comply with the impracticability provision in MRP Attachment B.)*

- *If the project is subject to the HM requirements, incorporate in the project flow duration stormwater control measures designed such that post-project stormwater discharge rates and durations match pre-project discharge rates and durations. The Bay Area Hydrology Model (BAHM) has been developed to size flow duration controls. See www.bayareahydrologymodel.org. Guidance is provided in Chapter 7 of the C.3 Technical Guidance.*

II.H Stormwater Treatment Measure and/HM Control Owner or Operator's Information:

Name: SI XVIII LLC/SOBRATO INTERESTS I

Address: 599 CASTRO STREET, SUITE 400, MOUNTAIN VIEW, CA 94041

Phone: (650) 876-7010 Email: rtersini@sobrato.com

- *Applicant must call for inspection and receive inspection within 45 days of installation of treatment measures and/or hydromodification management controls.*

Name of applicant completing the form: Justin DeKnoblough

Signature: _____ Date: 7/11/2019

[13] Hydromodification is the modification of a stream's hydrograph, caused in general by increases in flows and durations that result when land is developed (made more impervious). The effects of hydromodification include, but are not limited to, increased bed and bank erosion, loss of habitat, increased sediment transport and deposition, and increased flooding. Hydromodification management control measures are designed to reduce these effects.

III. For Completion By Municipal Staff

III.1 Alternative Certification: Was the treatment system sizing and design reviewed by a qualified third-party professional that is not a member of the project team or agency staff?

☐ Yes ☐ No Name of Reviewer_____

III.2. Confirm Operations and Maintenance (O&M) Submittal:

The following questions apply to C.3 Regulated Projects and Hydromodification Management Projects.

		Yes	No	N/A
III.2.a	Was maintenance plan submitted?	☐	☐	☐
III.2.b	Was maintenance plan approved?	☐	☐	☐
III.2.c	Was maintenance agreement submitted? (Date executed:_____)	☐	☐	☐

- *Attach the executed maintenance agreement as an appendix to this checklist.*

III.3 Incorporate HM Controls (if required)

Are the applicable items for HM compliance included in the plan submittal?

Yes	No	NA	Documentation for HM Compliance
☐	☐	☐	Site plans with pre- and post-project impervious surface areas, surface flow directions of entire site, locations of flow duration controls and site design measures per HM site design requirement
☐	☐	☐	Soils report or other site-specific document showing soil types at all parts of site
☐	☐	☐	If project uses the Bay Area Hydrology Model (BAHM), a list of model inputs.
☐	☐	☐	If project uses custom modeling, a summary of the modeling calculations with corresponding graph showing curve matching (existing, post-project, and post-project with HM controls curves), goodness of fit, and (allowable) low flow rate.
☐	☐	☐	If project uses 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).
☐	☐	☐	If the project uses alternatives to the default BAHM approach or settings, a written description and rationale.

- *Municipal staff: Refer to the "Flow Duration Control Review Worksheet for HM Submittals" to review the documentation submitted for HM compliance.*

III.4 Annual Operations and Maintenance (O&M) Submittals:

For C.3 Regulated Projects and Hydromodification Management Projects, indicate the dates on which the Applicant submitted annual reports for project O&M: _____

_____

III.5 Comments:

_____

_____

_____

_____

III.6 Notes:

Section I Notes:_____

Section II Notes:_____

Section III Notes:_____

III.7 Project Close-Out:

III.7.a	Were final Conditions of Approval met?	☐	☐	
III.7.b	Was initial inspection of the completed treatment/HM measure(s) conducted? (Date of inspection:_____)	☐	☐	☐
III.7.c	Was maintenance plan submitted? (Date executed:_____)	☐	☐	☐
III.7.d	Was project information provided to staff responsible for O&M verification inspections? (Date provided to inspection staff:_____)	☐	☐	☐

Name of staff confirming project is closed out:_____

Signature:_____ Date:_____

Name of O&M staff receiving information:_____

Signature:_____ Date:_____

Appendices

Appendix A: O&M Agreement
Appendix B: O&M Annual Report Form

Appendix C
Alameda County C.3 Manual
Bioretention Area Detail

6.1 Bioretention Area

Figure 6-1: Bioretention area, Fremont

Best uses
- Any type of development
- Drainage area up to 2 acres
- Landscape design element

Advantages
- Detains low flows
- Landscape feature
- Low maintenance
- Reliable once established

Limitations
- Not appropriate where soil is unstable
- Requires irrigation
- Susceptible to clogging – especially if installed prior to construction site soil stabilization.

Bioretention[1] areas, or "rain gardens," function as soil and plant-based filtration devices that remove pollutants through a variety of physical, biological, and chemical treatment processes. These facilities normally consist of a ponding area, organic layer or mulch layer, planting soil, and plants. Bioretention areas are designed to distribute stormwater runoff evenly along a ponding area. Percolation of stored water in the bioretention area's engineered planting soil with a high rate of infiltration will enter an underlying rock layer, from which water will either percolate into the underlying soil or enter the underdrain, so that the bioretention area empties over two days. Unless the geotechnical engineer identifies conditions, such as steep slope or a high groundwater table, that would make infiltration unsafe, bioretention areas should be designed to maximize infiltration by raising the underdrain toward the top of the rock layer. Bioretention areas can be any shape, including a linear treatment measure. The guidelines listed below apply to bioretention areas.

Design and Sizing Guidelines

DRAINAGE AREA AND SETBACK REQUIREMENTS

- Set back from structures 10' or as required by structural or geotechnical engineer, or local jurisdiction.
- If the treatment measure is designed to infiltrate stormwater to underlying soils, a minimum 50-foot setback is needed from septic system leach fields. (Check with the local water district or health department for additional setback requirements.)

[1] A bioretention area that is unlined and has a raised underdrain in the underlying rock layer to promote infiltration may also be called a "bioinfiltration area".

- The "drainage management area" (DMA) that drains to the bioretention area typically should not exceed 2 acres. If used for a DMA larger than 2 acres, divert high flows away from the facility (see Section 5.6), use pretreatment (vegetated filter) to reduce input of sediment, and evaluate the need for a flow spreader to distribute flows throughout the facility.
- The DMA should not contain a significant source of soil erosion, such as high velocity flows along slopes not stabilized with vegetation or hardscape.
- Areas immediately adjacent to bioretention area should have slopes more than 0.5% for pavement and more than 1% for vegetated areas.
- Bioretention facilities work best as one level, shallow basin—or a series of basins. As shown in Figure 6-1.1, runoff enters each basin, and 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.[2]

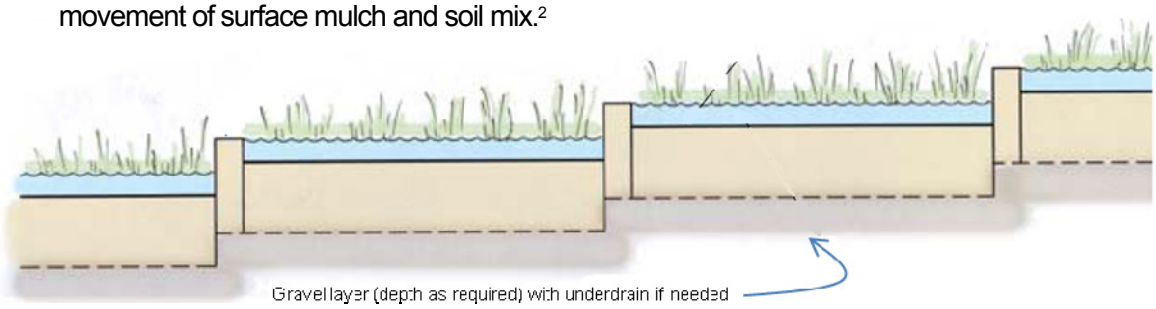


Figure 6-1.1: Planter on slope provides more storage. Check dams should be keyed into planter sides.[2]

- If the bioretention cells cannot be level they can be designed as in Figure 6-1.2 below. Slopes within cells over 4% are not recommended. Consultation with a geotechnical engineer is recommended when the slope of the total facility is over 6%. Key check dams into the slopes as shown in Figure 6-1.3.

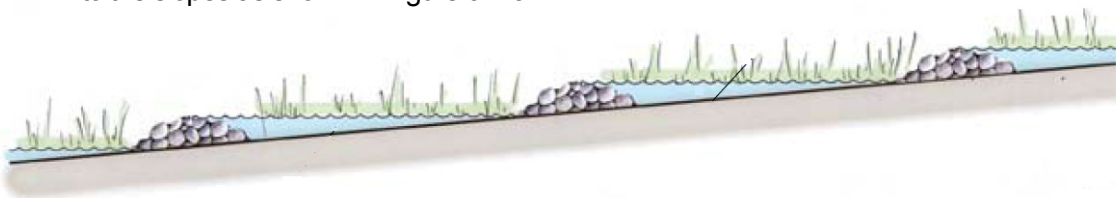


Figure 6-1.2: Bioretention cells with check dams. Provides limited storage.[2]

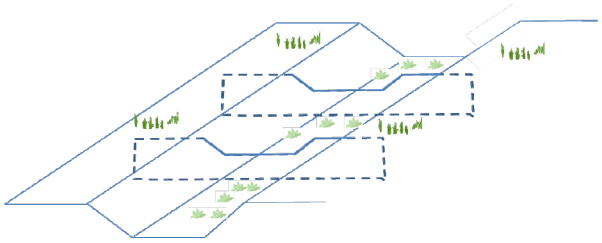


Figure 6-1.3: Key check dams into bottom and side slopes.[2]

- In a linear bioretention area, 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.[2]

[2] Graphics and related guidance on this page are from the Contra Costa Clean Water Program. February 2012. C.3 Stormwater Guidebook, 6th Edition and the Stormwater Management Handbook: Implementing Green Infrastructure in Northern Kentucky Communities, 2009. www.epa.gov/smartgrowth/publications.htm)

TREATMENT DIMENSIONS AND SIZING

- The surface area of bioretention areas should be equal to 4% of the effective impervious area of the drainage management area (DMA). The effective impervious area multiplied by 0.04 sizing factor will equal the footprint of the bioretention area. For sizing purposes, the footprint of the bioretention area is defined as the area that achieves the required ponding depth and that is underlain with 18 inches of the Bioretention Soil Mix (see the note in the box in each of the Figures 6.2-6.6 below.) Instructions for calculating the effective impervious area are provided in Section 5.1. Where allowed by the municipality for redevelopment or infill sites, bioretention facilities may be sized using the combination flow- and volume-based method described in Section 5.1.
- The elevation of the surface area should be level, in order to distribute stormwater flows throughout the surface area.
- Side slopes of the bioretention area should not exceed 3:1.
- The surface ponding depth may range from 6 to 12 inches. The landscape architect should select a planting palette for the desired depth. The surface of the biotreatment soil is assumed to be the bottom of the ponding area; there is no adjustment for depth of mulch. Check with your local agency for the maximum ponding depth allowed.
- The inlet to the overflow catch basin should be at least 6 inches above the low point of the bioretention planting area.
- If the native soil has a KSAT > 1.6 in/hr, a bioinfiltration area may be sized as described above without an underdrain. Otherwise use of an underdrain is recommended.

INLETS TO TREATMENT MEASURE

Flow may enter the treatment measure (see example drawings in Section 5.10):

  - As overland flow from landscaping (no special requirements)
  - As overland flow from pavement (cutoff wall required)
  - Through a curb opening (minimum 18 inches)
  - Through a curb drain
  - With drop structure through a stepped manhole (refer to Figure 5-2 in Chapter 5)
  - Through a bubble-up manhole or storm drain emitter
  - Through roof leader or other conveyance from building roof

- Where flows enter the biotreatment measure, allow a change in elevation of 4 to 6 inches between the paved surface and biotreatment soil elevation, so that vegetation or mulch build-up does not obstruct flow.
- A concrete pad, cobbles or rocks should be installed to dissipate flow energy where runoff enters the treatment measure. The use of a concrete pad may facilitate removal of accumulated sediment, which may become trapped between cobbles.
- Install overflow drains as far as possible from inlets to treatment measure.

VEGETATION

- Plant species should be suitable to well-drained soil and occasional inundation. See planting guidance in Appendix B.
- Shrubs and small trees should be placed to anchor the bioretention area cover.
- Tree planting should be as required by the municipality. If larger trees are selected, plant them at the periphery of bioretention area.

- Underdrain trench should be offset at edge of tree planting zone, as needed, to maximize distance between tree roots and underdrain. Consider installing solid pipe for underdrains in the vicinity of trees, to avoid root intrusion into perforations of the underdrain pipe.
- Use integrated pest management (IPM) and/or Bay-Friendly Landscaping principles in the landscape design to help avoid or minimize any use of synthetic pesticides and quick-release fertilizer. Check with the local jurisdiction for any local policies regarding the use of pesticides and fertilizers.
- Drought tolerant plants are preferred. Provide sufficient irrigation to maintain plant life.
- Trees and vegetation do not block inflow, create traffic or safety issues, or obstruct utilities.

SOIL AND DRAINAGE CONSIDERATIONS FOR ALL BIOTREATMENT SYSTEMS

- Soils in the facility should meet biotreatment soil specifications approved by the Regional Water Board (Appendix K). A long term minimum infiltration rate of 5 inches per hour is required (initial infiltration rate may exceed this to allow for tendency of infiltration rate to reduce over time). Planting soil layer should be at least 18 inches deep.
- An underdrain system is generally required. Depending on infiltration rate of in situ soils, the local jurisdiction may allow installation without an underdrain on a case-by-case basis.
- Consideration of groundwater level and placement of the underdrain:
  - If there is less than a 5 foot separation between the bottom of the facility and the seasonal high groundwater level, or infiltration is not allowed due to other site constraints, an impermeable liner should be placed between the drain rock and the bottom of the facility and the underdrain placed on top of that liner.
  - If there is at least a 5-foot separation between the bottom of the facility and the seasonal high groundwater level, and geotechnical conditions allow infiltration, the facility should be unlined and the underdrain should be raised at least 6 inches above the bottom of the drain rock to allow storage and infiltration of treated water.
  - Check with your local water district to determine if a greater separation from the seasonal high groundwater level is required.
- Filter fabric should not be used in or around underdrain trench.
- The underdrain should include a minimum 4-inch diameter perforated pipe (perforations facing downward) with cleanouts and connection to a storm drain or discharge point. To help prevent clogging, two rows of perforation may be used. Clean-out should consist of a vertical, rigid, non-perforated PVC pipe, with a minimum diameter of 4 inches and a watertight cap fit flush with the ground, or as required by municipality.
- There should be adequate fall from the underdrain to the storm drain or discharge point.
- Underdrain trench should include a 12-inch thick layer of Caltrans Standard Section 68-1.025 permeable material Class 2.
- Install and maintain a 3-inch layer of “arbor”, “aged” or “composted” mulch on any exposed soil areas between plantings. Washed and clean pea gravel, rock, cobble, or other mulches that resist floating may also be used. Bark and “gorilla hair” mulches are not recommended.
- When using the combination flow and volume method, the surface of the biotreatment soil is assumed to be the bottom of the ponding area; there is no adjustment for depth of mulch.

CONSTRUCTION REQUIREMENTS FOR ALL BIOTREATMENT SYSTEMS

- When excavating, avoid spreading fines of the soils on bottom and side slopes. Remove any smeared soiled surfaces and provide a natural soil interface into which water may percolate.
- Minimize compaction of existing soils. Protect from construction traffic.
- Protect the area from construction site runoff. Runoff from unstabilized areas should be diverted away from biotreatment facility.

MAINTENANCE CONSIDERATIONS FOR ALL TREATMENT MEASURES

- A Maintenance Agreement should be provided.
- Maintenance Agreement should state the parties' responsibility for maintenance and upkeep.
- Prepare a maintenance plan and submit with Maintenance Agreement. Maintenance plan templates are in Appendix H.

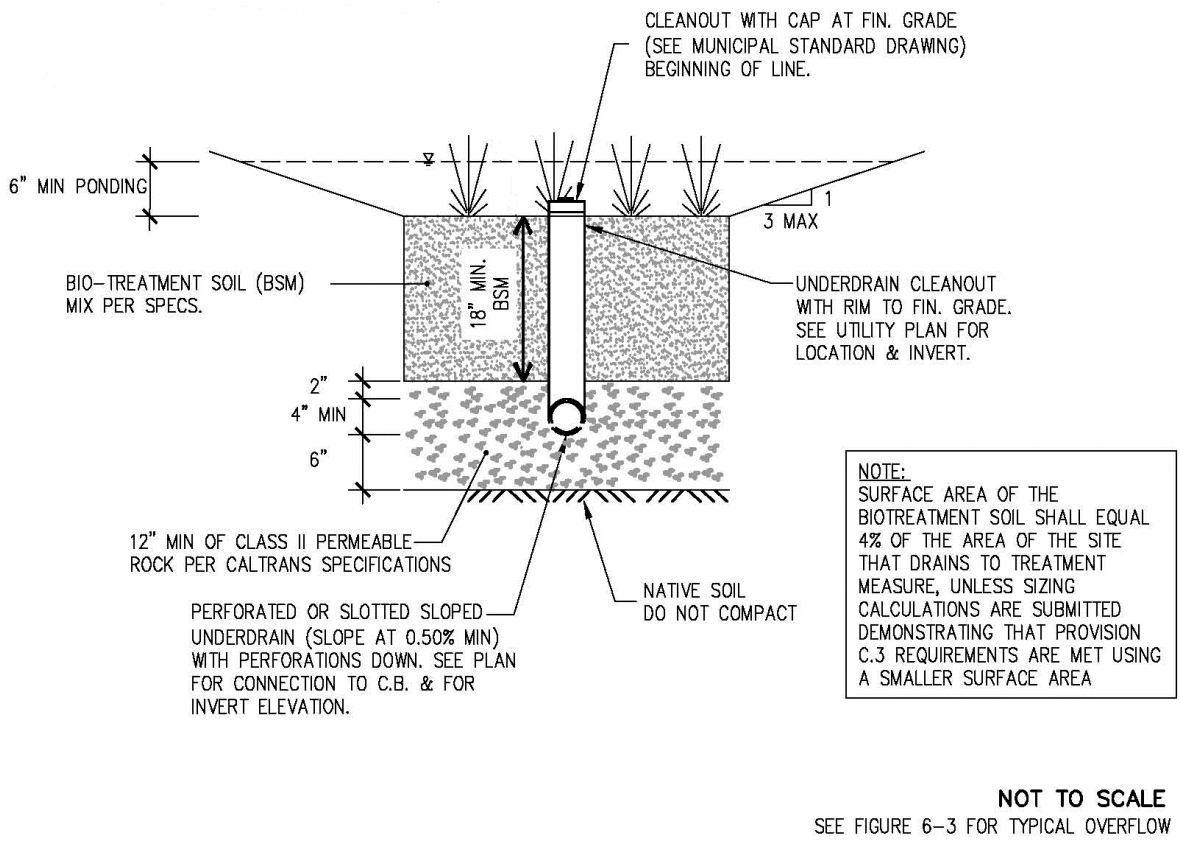


Figure 6-2: Cross Section, Bioretention Area

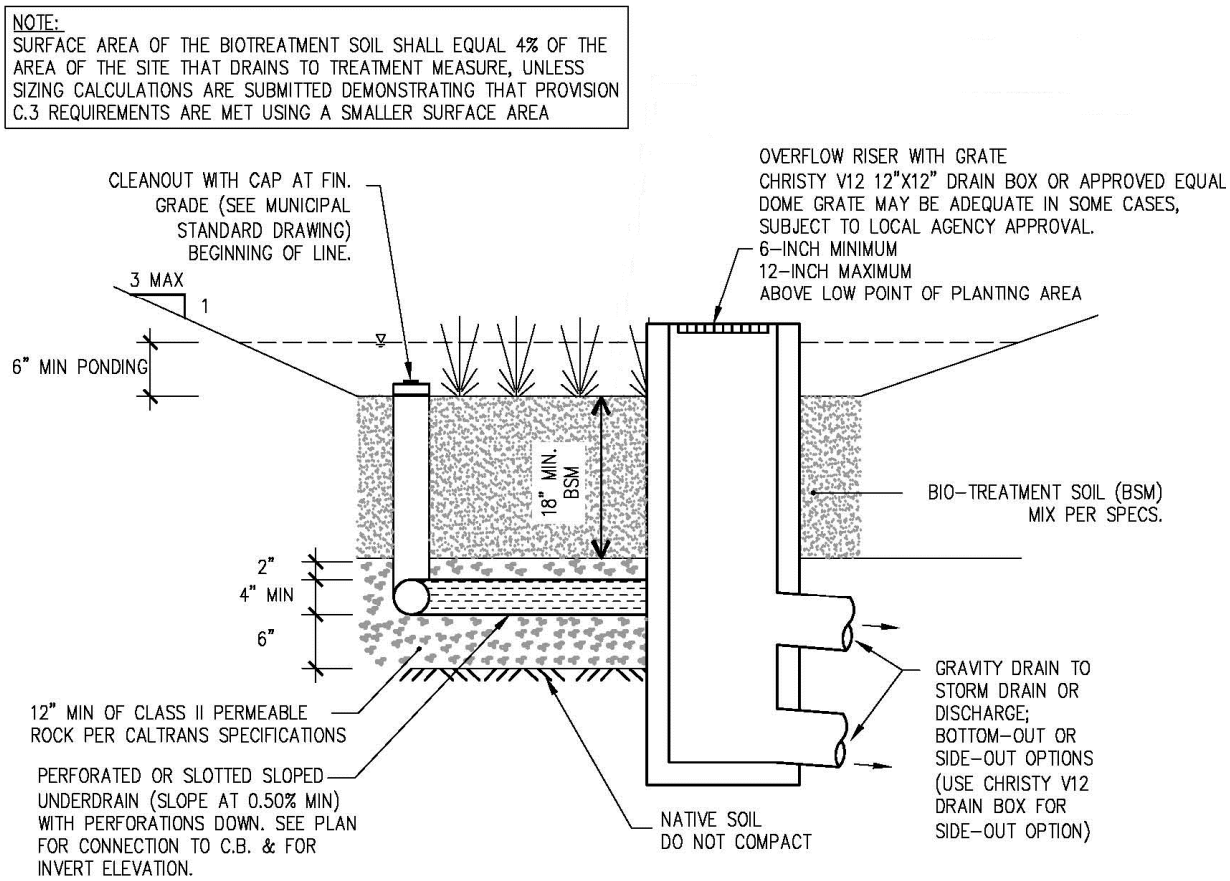


Figure 6-3: Cross Section, Bioretention Area (side view – Not to Scale)

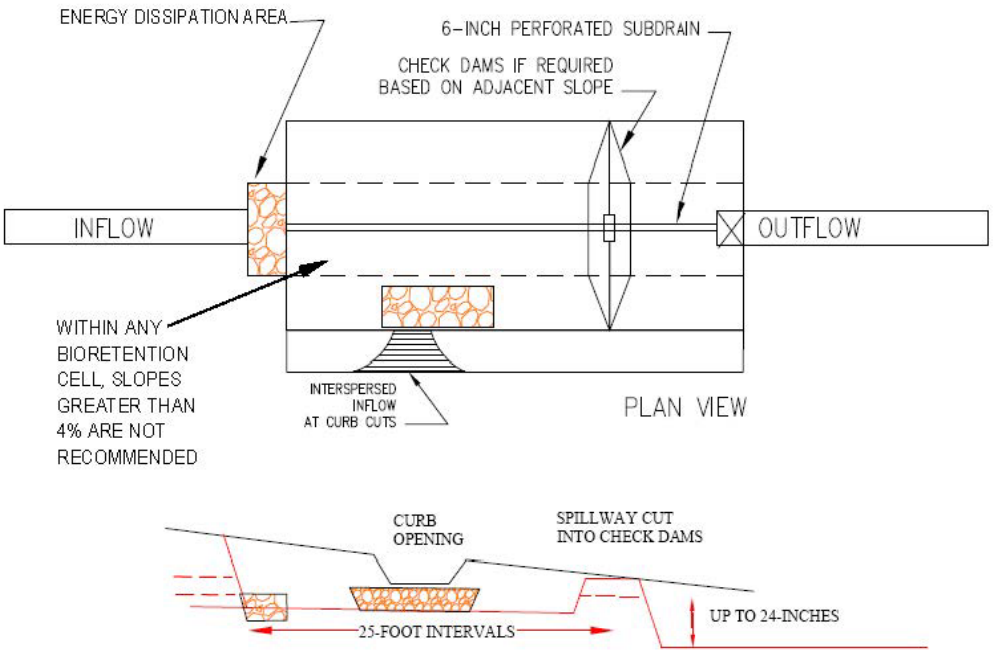


Figure 6-4: Check dam (plan view and profile) for installing a series of linear bioretention cells in sloped area

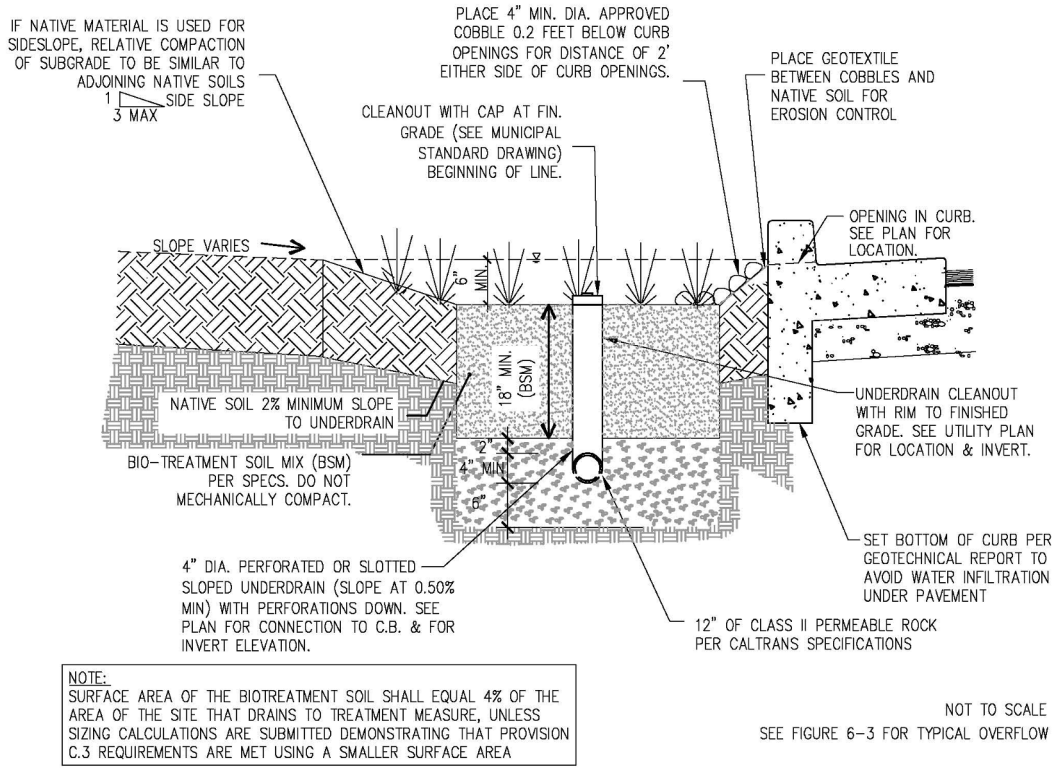


Figure 6-5: Cross-section of bioretention area showing inlet from pavement.

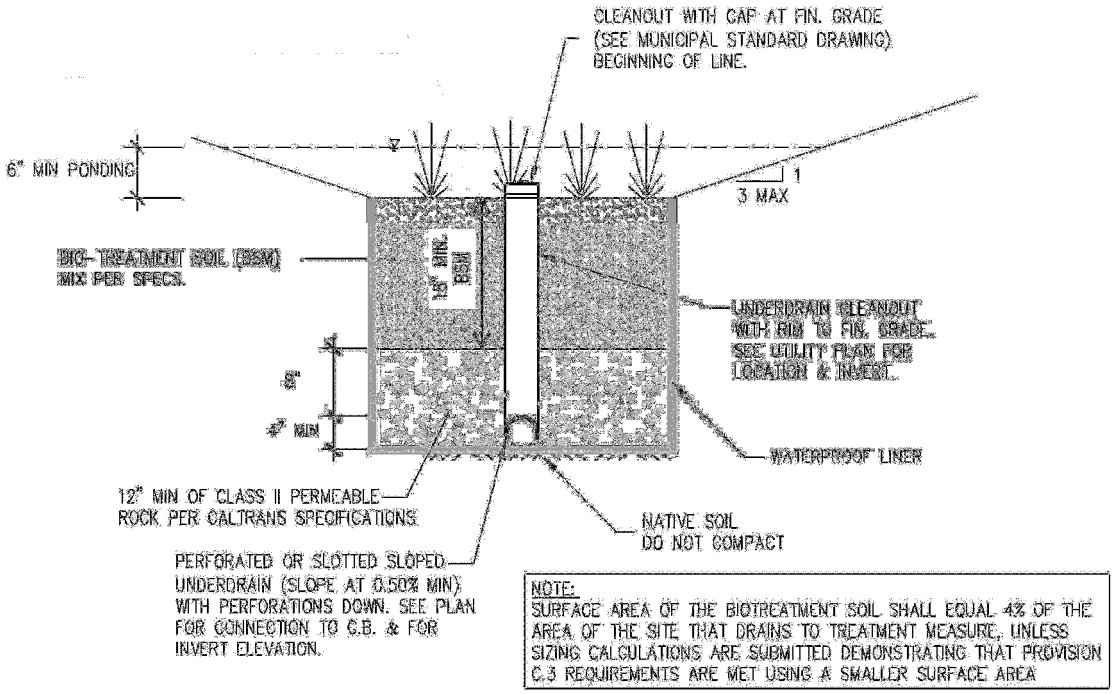
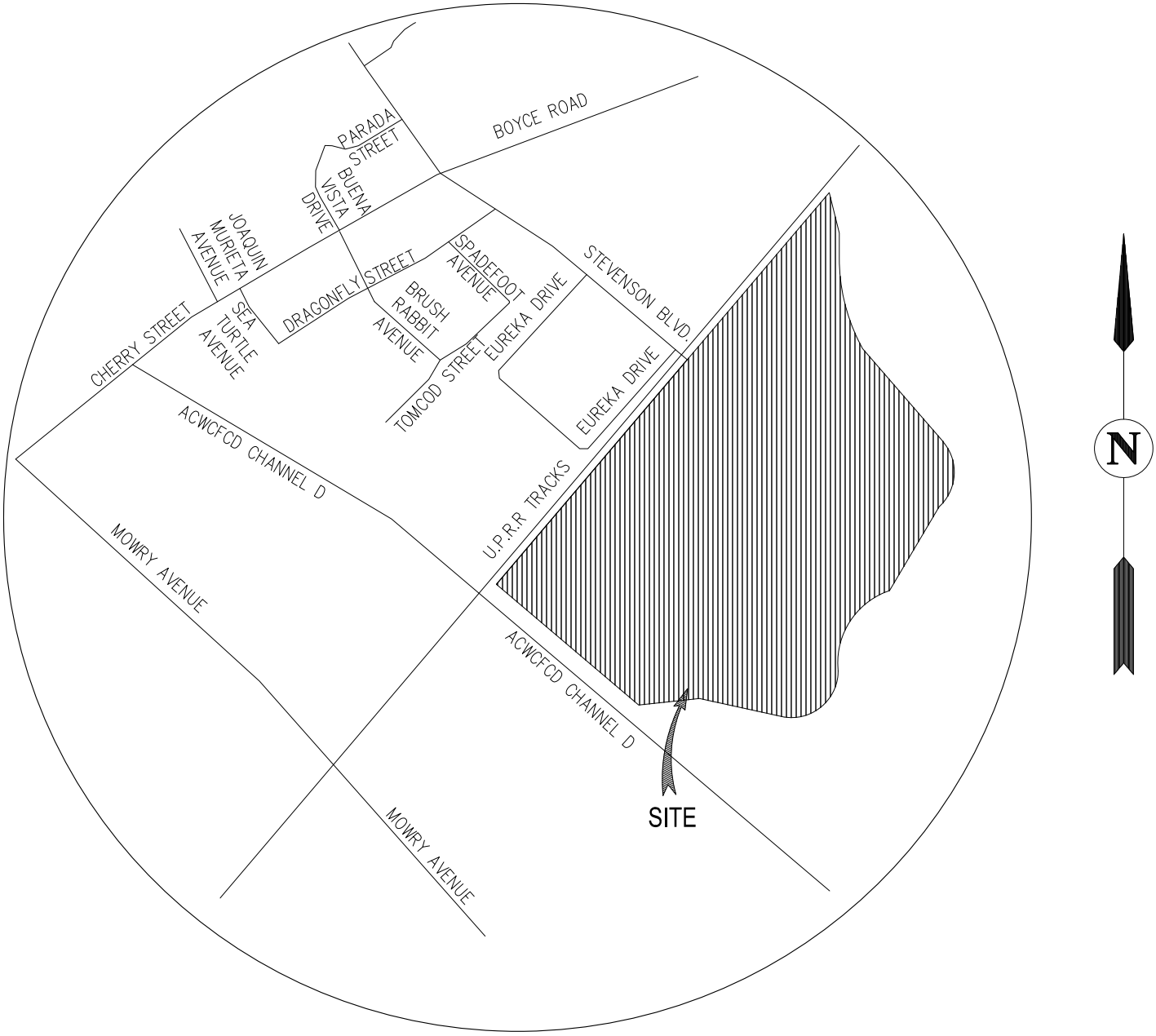


Figure 6-6: Cross section of lined bioretention area (Not to Scale)

Appendix D
Site Exhibits



VICINITY MAP

NOT TO SCALE

VICINITY MAP

AREA 4

CITY OF NEWARK ALAMEDA COUNTY CALIFORNIA

DATE: SEPTEMBER 18, 2018

cbg
SAN RAMON (925) 866-0322
SACRAMENTO (916) 375-1877
WWW.CBANDG.COM
CIVIL ENGINEERS ▪ SURVEYORS ▪ PLANNERS

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AERIAL BASE MAP

AREA 4

CITY OF NEWARK ALAMEDA COUNTY CALIFORNIA

0' 200' 600' 800'

SCALE: 1" = 200' DATE: SEPTEMBER 18, 2018

cbg CIVIL ENGINEERS

SAN RAMON • (925) 866-0322
SACRAMENTO • (916) 375-1877
WWW.CBANDG.COM
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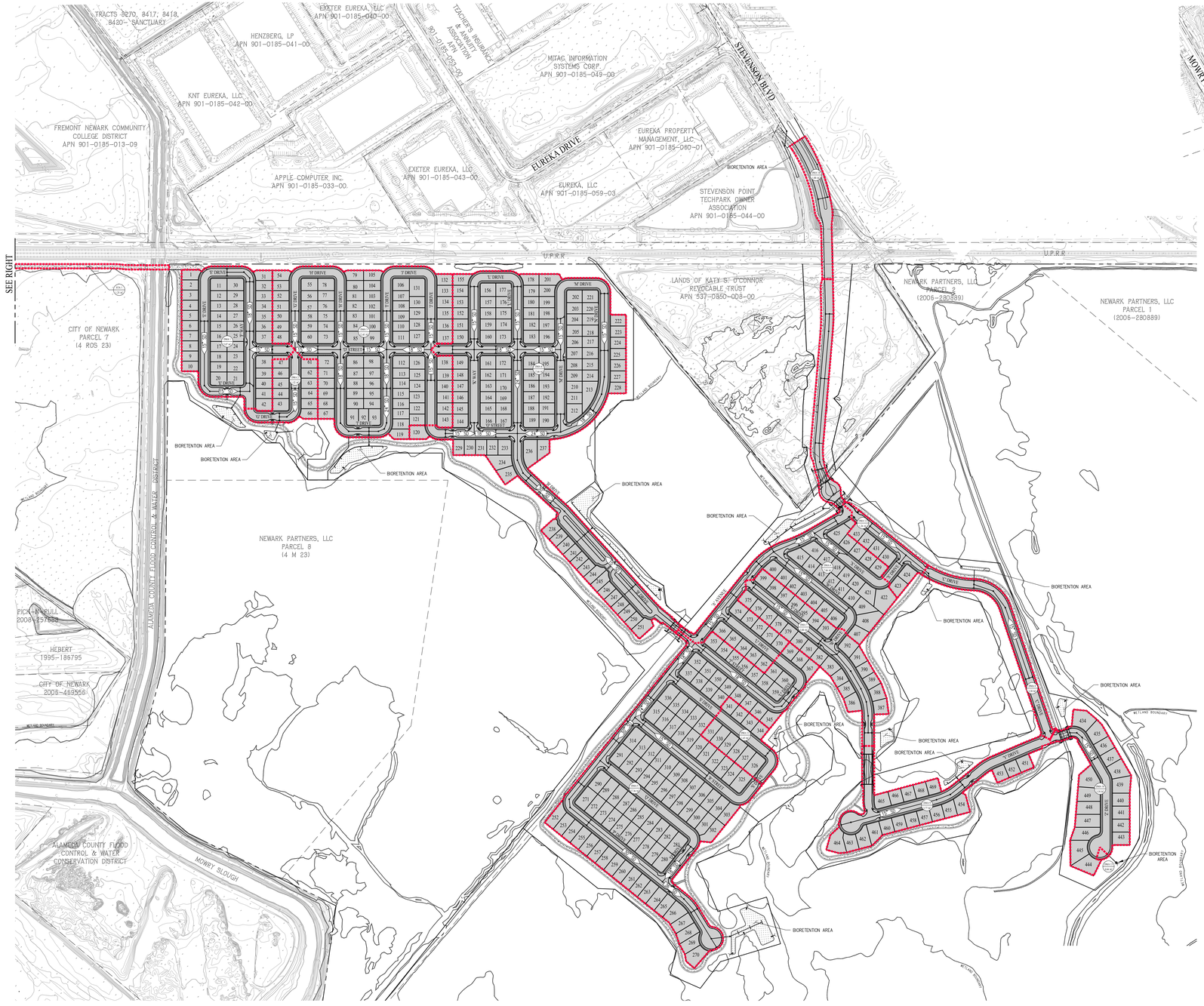
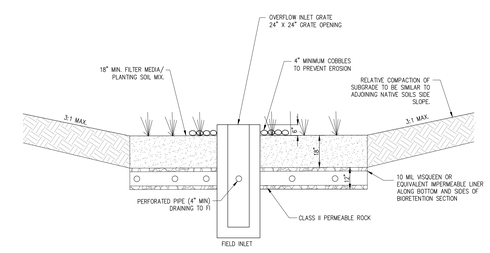


EVA ROAD TREATMENT

DRAINAGE MANAGEMENT SUMMARY TABLE							
DRAINAGE MANAGEMENT AREA	TOTAL AREA (SF)	TOTAL IMPERVIOUS AREA (SF)	TOTAL PERVIOUS AREA (SF)	TOTAL EFFECTIVE IMPERVIOUS AREA (SF)	REQUIRED TREATMENT AREA (SF)	BIORETENTION TREATMENT AREA (SF)	DESIGN BIORETENTION PONDING DEPTH (IN)
DMA 1	255,573	188,356	67,217	195,078	5,852	5,852	6
DMA 2	66,122	48,287	17,835	50,071	1,502	1,502	6
DMA 3	542,462	387,567	154,895	403,057	12,092	12,092	6
DMA 4	769,180	550,106	219,074	572,013	17,160	17,160	6
DMA 5	756,346	535,574	220,772	557,651	16,730	16,730	6
DMA 6	343,975	243,899	100,076	253,907	7,618	7,618	6
DMA 7	165,375	106,640	58,735	112,514	3,375	3,375	6
DMA 8	57,910	52,280	5,630	52,843	1,585	1,585	6
DMA 9	163,992	108,904	55,088	114,413	3,432	3,432	6
DMA 10	147,382	73,987	73,395	81,327	2,440	2,440	6
DMA 11	71,762	50,020	21,742	52,194	1,566	1,566	6
DMA 12	55,047	36,921	18,126	38,734	1,162	1,162	6
DMA 13	1,869	1,588	281	1,616	49	49	6
DMA 14	43,655	34,435	9,220	35,357	1,061	1,061	6
TOTAL	**3,440,650**	2,418,564	1,022,086	2,520,775	75,624	75,624	



BIORETENTION SECTION

NOT TO SCALE

LEGEND

- PROJECT BOUNDARY
- PROPOSED STORM DRAIN PIPE
- PROPOSED FIELD INLET
- PROPOSED STORM DRAIN MANHOLE
- PROPOSED CATCH BASIN
- BIORETENTION AREA
- ROADWAYS & LOTS
- SIDEWALKS
- DMA BOUNDARY
- DMA 1 / 15.55 AC — DRAINAGE MANAGEMENT AREA
- STA 1 / 1.84 AC — SELF-TREATING AREA

SANCTUARY WEST TRACT 8495

STORM WATER CONTROL PLAN

VESTING TENTATIVE MAP

CITY OF NEWARK ALAMEDA COUNTY CALIFORNIA

0' 150' 450' 600'

SCALE: 1" = 150'

DATE: JULY 11, 2019

cbg
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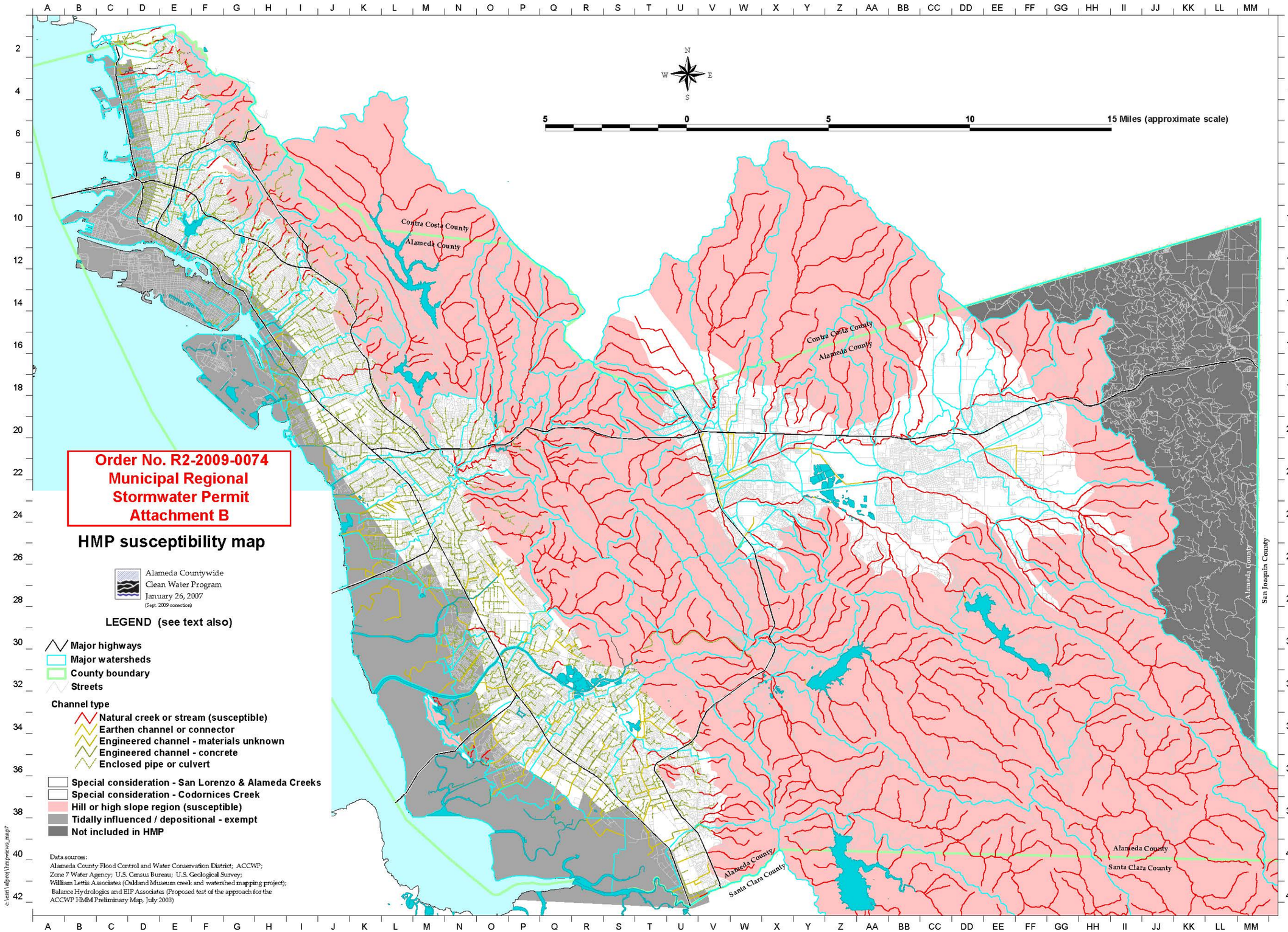
Appendix E
HMP Susceptibility Map


Order No. R2-2009-0074
Municipal Regional
Stormwater Permit
Attachment B
HMP susceptibility map
Alameda Countywide
Clean Water Program
January 26, 2007
(Sept. 2009 correction)
LEGEND (see text also)
Major highways
Major watersheds
County boundary
Streets
Channel type
Natural creek or stream (susceptible)
Earthen channel or connector
Engineered channel - materials unknown
Engineered channel - concrete
Enclosed pipe or culvert
Special consideration - San Lorenzo & Alameda Creeks
Special consideration - Codornices Creek
Hill or high slope region (susceptible)
Tidally influenced / depositional - exempt
Not included in HMP
Data sources:
Alameda County Flood Control and Water Conservation District; ACCWP;
Zone 7 Water Agency; U.S. Census Bureau; U.S. Geological Survey;
William Lettis Associates (Oakland Museum creek and watershed mapping project);
Balance Hydrologics and EIP Associates (Proposed test of the approach for the
ACCWP HMM Preliminary Map, July 2003)
N
S
E
W
5
0
5
10
15 Miles (approximate scale)
Contra Costa County
Alameda County
Contra Costa County
Alameda County
Alameda County
San Joaquin County
Alameda County
Santa Clara County
Alameda County
Santa Clara County