Appendix E –
City of Encinitas Stormwater Intake and Priority Development Project Stormwater Quality Management Plan for The Sanctuary Development

CITY OF ENCINITAS
STORMWATER INTAKE FORM AND PRIORITY DEVELOPMENT PROJECT STORMWATER QUALITY MANAGEMENT PLAN (SWQMP)

FOR:

THE SANCTUARY DEVELOPMENT

RANCH VIEW TERRACE
ENCINITAS, CA 92024
265-331-49

PREPARED BY:
BRIAN M. ARDOLINO, RCE 71651
PASCO LARET SUITER & ASSOCIATES
535 NORTH HIGHWAY 101, SUITE A
SOLANA BEACH, CA 92075
858-259-8212

PREPARED FOR:
OLIVENHAIN HILLS, LLC
745 COLE RANCH ROAD
ENCINITAS, CA 92024
760-299-3344

DATE OF SWQMP:
MARCH 2019
REVISED DECEMBER 2020

GRADING PLAN PREPARED BY:
BRIAN M. ARDOLINO, RCE 71651
PASCO LARET SUITER & ASSOCIATES
535 NORTH HIGHWAY 101, SUITE A
SOLANA BEACH, CA 92075
858-259-8212

TABLE OF CONTENTS

PREPARER'S CERTIFICATION

I hereby declare that I am the Engineer in Responsible Charge of design of storm water best management practices (BMPs) for this project, and that I have exercised responsible charge over the design of the BMPs as defined in Section 6703 of the Business and Professions Code, and that the design is consistent with the Priority Development Project (PDP) requirements of the City of Encinitas BMP Design Manual, which is a design manual for compliance with local City of Encinitas and regional MS4 Permit (California Regional Water Quality Control Board San Diego Region Order No. R9-2015-0100) requirements for storm water management.

I have read and understand that the City Engineer has adopted minimum requirements for managing urban runoff, including storm water, from land development activities, as described in the BMP Design Manual. I certify that this PDP SWQMP has been completed to the best of my ability and accurately reflects the project being proposed and the applicable BMPs proposed to minimize the potentially negative impacts of this project's land development activities on water quality. I understand and acknowledge that the plan check review of this PDP Storm Water Quality Management Plan (SWQMP) by the City Engineer is confined to a review and does not relieve me, as the Engineer in Responsible Charge of design of storm water BMPs for this project, of my responsibilities for project design.

Engineer of Work's Signature, PE Number

Brian M. Ardolino, RCE 71651
Print Name

Pasco, Laret, Suiter & Associates
Company

12/18/20
Date

Engineer's Seal

PROJECT OWNER'S CERTIFICATION

This PDP SWQMP has been prepared for Olivenhain Hills, LLC by Pasco Laret Suiter & Associates. The PDP SWQMP is intended to comply with the PDP requirements of the City of Encinitas BMP Design Manual, which is a design manual for compliance with local City of Encinitas and regional MS4 Permit (California Regional Water Quality Control Board San Diego Region Order No. R9-2015-0100) requirements for storm water management.

The undersigned, while it owns the subject property, is responsible for the implementation of the provisions of this plan. Once the undersigned transfers its interests in the property, its successor-in-interest shall bear the aforementioned responsibility to implement the best management practices (BMPs) described within this plan, including ensuring on-going operation and maintenance of structural BMPs. A signed copy of this document shall be available on the subject property into perpetuity.

_____
Project Owner's Signature

_____
Print Name

Olivenhain Hills, LLC
Company

_____
Date

SUBMITTAL RECORD

Use this table to keep a record of submittals of this PDP SWQMP. Each time the PDP SWQMP is re-submitted, provide the date and status of the project. In the fourth column, summarize the changes that have been made or indicate if response to plancheck comments is included. When applicable, insert response to plancheck comments behind this page.

Submittal Number	Date	Project Status	Summary of Changes
1	March 2019	☑ Preliminary Design / ☐ Planning/ CEQA ☐ Final Design	
2	January 2020	☑ Preliminary Design / Planning/ CEQA Final Design	
3	December 2020	☑ Preliminary Design / Planning/ CEQA Final Design	
4		Preliminary Design / Planning/ CEQA Final Design	

PROJECT IDENTIFICATION

Project/Applicant Name: Olivenhain Hills, LLC	
Permit/Application Number:	Date: December 2020
Site Address: Ranch View Terrace, Encinitas CA 92024	APN: 265-331-49
Scope of work/project description: The project proposes to develop the existing vacant lot into detached single-family residential lots including a private street, associated underground utilities, and Hydromodification (HMP) Biofiltration basins to meet the requirements for hydromodification management flow control and storm water pollutant control as well as mitigate the 100-year storm event peak discharge rate.	

DETERMINATION OF PROJECT STATUS AND REQUIREMENTS

This form will identify permanent, post construction BMP requirements. Refer to City of Encinitas Stormwater BMP Design Manual for guidance.

Step 1: Is the project a "development project"? Development projects are defined as "construction, rehabilitation, redevelopment, or reconstruction of any public or private projects". See Section 1.3 and Table 1-2 of the manual for guidance. For example, interior remodels, roof replacements, and electrical and plumbing work are not development projects.	☑Yes	***Go to Step 2.***
	□ No	***Stop.*** Permanent BMP requirements do not apply. No SWQMP will be required. Provide discussion below.

If "No", provide discussion / justification explaining why the project is not a "development project":

Step 2: Complete questions below for Project Type Determination.

The project is (select one): ☑ New Development □ Redevelopment

The total proposed, newly created and/or replaced impervious area is: 28,240 ft^2

Is the project in any of the following categories, (a) through (f) below?

Yes ☑	No □	(a)	New development projects or redevelopment projects that create and/or replaced 10,000 square feet or more of impervious surfaces (collectively over the entire project site). This includes commercial, industrial, residential, mixed-use, and public development projects.
Yes □	No ☑	(b)	Redevelopment projects that create and/or replace 5,000 square feet or more of impervious surface (collectively over the entire project site on an existing site of 10,000 square feet or more of impervious surfaces). This includes commercial, industrial, residential, mixed-use, and public development projects.

Yes ☑	No □	(c)	New and redevelopment projects that create and/or replace 5,000 square feet or more of impervious surface (collectively over the entire project site), and support one or more of the following uses: (i) Restaurants. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812). (ii) Hillside development projects. This category includes development on any natural slope that is twenty-five percent or greater. (iii) Parking lots. This category is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce. (iv) Streets, roads, highways, freeways, and driveways. This category is defined as any paved impervious surface used for the transportation of automobiles, trucks, motorcycles, and other vehicles.
Yes □	No ☑	(d)	New or redevelopment projects that create and/or replace 2,500 square feet or more of impervious surface (collectively over the entire project site), and discharge directly to an Environmentally Sensitive Area (ESA). "Discharge directly to" includes flow that is conveyed overland a distance of 200 feet or less from the project to the ESA, or conveyed in a pipe or open channel any distance as an isolated flow from the project to the ESA (i.e. not commingled with flows from adjacent lands). Note: ESAs are areas that include but are not limited to all Clean Water Act Section 303(d) impaired water bodies; areas designated as Areas of Special Biological Significance by the State Water Board and SDRWQCB; State Water Quality Protected Areas; water bodies designated with the RARE beneficial use by the State Water Board and SDRWQCB; and any other equivalent environmentally sensitive areas which have been identified by the Copermittees. See manual Section 1.4.2 for additional guidance.
Yes □	No ☑	(e)	New development projects, or redevelopment projects that create and/or replace 5,000 square feet or more of impervious surface, that support one or more of the following uses: (i) Automotive repair shops. This category is defined as a facility that is categorized in any one of the following SIC codes: 5013, 5014, 5541, 7532-7534, or 7536-7539. (ii) Retail gasoline outlets. This category includes retail gasoline outlets that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic of 100 or more vehicles per day.
Yes ☑	No □	(f)	New or redevelopment projects that result in the disturbance of one or more acres of land and are expected to generate pollutants post construction. *Note: See manual Section 1.4.2 for additional guidance.*

Does the project meet the definition of one or more of the PDP categories (a) through (f) listed above?

☑ Yes – **The project is a Priority Development Project, the applicant shall provide PDP Post Construction BMPs and *continue to Step 3*.**

□No – **The project is a Standard or Basic Project. *Stop here and complete the "City of Encinitas Stormwater Intake Form for All Developments and Standard Projects SWQMP".***

The following is for *redevelopment PDPs* only:

The area of existing (pre-project) impervious area at the project site is: _____ ft^2 (A)

The total proposed newly created or replaced impervious area is: _____ ft^2 (B)

Percent impervious surface created or replaced (B/A)*100: _____

The percent impervious surface created or replaced is (select one based on the above calculation):

□ Less than or equal to fifty percent (50%) – only new and/or replaced impervious areas are considered PDP subject to treatment and HMP criteria
OR

□ Greater than fifty percent (50%) – the entire site is a PDP; treatment and HMP criteria apply to entire site regardless of whether it is replaced

Step 3 (PDPs only): Do hydromodification control requirements apply? See Section 1.6 of the BMP Design Manual for guidance.	☑ Yes	PDP structural BMPs required for pollutant control (Chapter 5) and hydromodification control (Chapter 6). ***Go to Step 4.***
	□ No	PDP structural BMPs required for pollutant control (Chapter 5) only. Provide brief discussion of exemption to hydromodification control below. ***Go to "Site Information Checklist"***
Discussion / justification if hydromodification control requirements do not apply:		
Step 4 (PDPs subject to treatment and hydromodification controls): Does protection of critical coarse sediment yield areas apply based on review of City of Encinitas Potential Critical Coarse Sediment Yield Area Map? See Section 6.2 of the BMP Design Manual for guidance.	□ Yes	Management measures required for protection of critical coarse sediment yield areas (Chapter 6.2). ***Go to "Site Information Checklist"***
	☑ No	Management measures not required for protection of critical coarse sediment yield areas. Provide brief discussion below. ***Go to "Site Information Checklist"***
Discussion / justification if management measures not required for protection of critical coarse sediment yield areas: Pursuant to the City of Encinitas Potential Critical Coarse Sediment Yield Area GIS layer, there are no potential critical coarse sediment yield areas on or upstream of the project site. Refer to the exhibit located in Attachment 2b.		

SITE INFORMATION CHECKLIST

Project's Watershed (Complete Hydrologic Unit, Area, and Subarea Name with Numeric Identifier)	Carlsbad HU, Escondido Creek HA, San Elijo HSA, 904.61
Parcel Area (Total area of Assessor's Parcel(s) associated with the project)	8.23 Acres (358,293 Square Feet)
Area to be Disturbed by the Project (Project Area)	2.59 Acres (112,739 Square Feet)
Project Proposed Impervious Area (Subset of Project Area)	0.60 Acres (26,040 Square Feet)
Project Proposed Pervious Area (Subset of Project Area)	1.99 Acres (86,699 Square Feet)
Note: Proposed Impervious Area + Proposed Pervious Area = Area to be Disturbed by the Project. This may be less than the Parcel Area.	

Description of Existing Site Condition

Current status of the site (select all that apply):

□ Existing development
□ Previously graded but not built out
□ Demolition completed without new construction
□ Agricultural or other non-impervious use
☑ Vacant, undeveloped/natural

Description / Additional Information:

Existing Land Cover includes (select all that apply):

☑ Vegetative Cover
☑ Non-Vegetated Pervious Areas
□ Impervious Areas

Description / Additional Information:

Underlying soil belongs to Hydrologic Soil Group (select all that apply):

□ NRCS Type A
□ NRCS Type B
□ NRCS Type C
☑ NRCS Type D

Approximate Depth to Groundwater (GW):

□ GW Depth < 5 feet

□ 5 feet < GW Depth < 10 feet

□ 10 feet < GW Depth < 20 feet

☑ GW Depth > 20 feet

Existing Natural Hydrologic Features (select all that apply):

☑ Watercourses

□ Seeps

□ Springs

□ Wetlands

□ None

Description / Additional Information:

Description of Existing Site Drainage Patterns

How is storm water runoff conveyed from the site? At a minimum, this description should answer:

1) Is existing drainage conveyance natural or urban?
2) Is runoff from offsite conveyed through the site? If yes, quantify all offsite drainage areas, design flows, and locations where offsite flows enter the project site, and summarize how such flows are conveyed through the site.
3) Provide details regarding existing project site drainage conveyance network, including any existing storm drains, concrete channels, swales, detention facilities, storm water treatment facilities, natural or constructed channels. And
4) Identify all discharge locations from the existing project site along with a summary of conveyance system size and capacity for each of the discharge locations. Provide summary of the pre-project drainage areas and design flows to each of the existing runoff discharge locations.

Describe existing site drainage patterns:

In the existing condition, the property consists of a natural undeveloped area. Storm water runoff flows overland southeasterly across the property. Offsite storm water runs onto the site along the northwestern and northern property boundary. Storm water runoff discharges along the eastern and southeastern property boundary. The table below summarizes the existing condition 100-year storm event hydrologic analysis which includes the offsite areas.

Drainage Basin	Area (ac)	Q100 (cfs)
POC-1	9.5	22.44

Refer to the "Preliminary Hydrology Study for the Sanctuary, Olivenhain Hills" prepared by Pasco Laret Suiter & Associates dated January 2020.

Description of Proposed Site Development
Project Description / Proposed Land Use and/or Activities: The project proposes to develop the existing vacant lot into detached single-family residential lots including a private street, associated underground utilities, and Hydromodification (HMP) Biofiltration basins to meet the requirements for hydromodification management flow control and storm water pollutant control as well as mitigate the 100-year storm event peak discharge rate.
List/describe proposed impervious features of the project (e.g., buildings, roadways, parking lots, courtyards, athletic courts, other impervious features): Proposed impervious features include the buildings, sidewalk, private street, and patio areas.
List/describe proposed pervious features of the project (e.g., landscape areas): Proposed pervious features include pervious pavers, landscape areas and biofiltration basins.
Does the project include grading and changes to site topography? ☑ Yes ☐ No Description / Additional Information: The project site will be graded to create pads suitable for the construction of structures including new private streets, biofiltration basins, curb and pervious parking stalls, and associated underground utilities. Grading is proposed to honor the existing condition drainage basins.

Description of Proposed Site Drainage Patterns

Does the project include changes to site drainage (e.g., installation of new storm water conveyance systems)?

☑ Yes

□ No

If yes, provide details regarding the proposed project site drainage conveyance network, including storm drains, concrete channels, swales, detention facilities, storm water treatment facilities, natural or constructed channels, and the method for conveying offsite flows through or around the proposed project site. Identify all discharge locations from the proposed project site along with a summary of the conveyance system size and capacity for each of the discharge locations. Provide a summary of pre- and post-project drainage areas and design flows to each of the runoff discharge locations. Reference the drainage study for detailed calculations.

Describe proposed site drainage patterns:

The project site is located on the eastern half of the property. In the proposed condition, offsite run-on will be routed around the project site to the existing points of discharge. All onsite storm water will be collected and conveyed to two proposed Hydromodification Management (HMP) Biofiltration basins which will provide hydromodification management flow control and storm water pollutant control to meet the requirements the California Regional Water Quality Control Board San Diego Region municipal storm water permit (Order No. R9-2013-0001, referred to as MS4 Permit). The HMP Biofiltration basins will also provide mitigation for the 100-year storm event peak discharge. The table below summarizes the existing and proposed condition 100-year storm event hydrologic analyses which include the offsite areas.

Drainage Basin	Existing Condition		Proposed Detained Condition	
	Area (ac)	Q100 (cfs)	Area (ac)	Q100 (cfs)
POC-1	9.5	22.44	9.7	21.71

Refer to the “Preliminary Hydrology Study for the Sanctuary, Olivenhain Hills” prepared by Pasco Laret Suiter & Associates dated December 2020.

Identification and Narrative of Receiving Water and Pollutants of Concern

Describe flow path of storm water from the project site discharge location(s), through urban storm conveyance systems as applicable, to receiving creeks, rivers, and lagoons as applicable, and ultimate discharge to the Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable):

Storm water runoff discharges from the eastern and southeastern boundary of the project site to a small channel along Rancho Santa Fe Road, which flows southerly eventually discharging to Escondido Creek which flows southwesterly to San Elijo Lagoon and ultimately discharges to the Pacific Ocean.

List any 303(d) impaired water bodies within the path of storm water from the project site to the Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable), identify the pollutant(s)/stressor(s) causing impairment, and identify any TMDLs and/or Highest Priority Pollutants from the WQIP for the impaired water bodies:

303(d) Impaired Water Body	Pollutant(s)/Stressor(s)	TMDLs / WQIP Highest Priority Pollutant
Escondido Creek	Benthic community effects, bifenthrin, malathion, nitrogen, DDT, indicator bacteria, manganese, phosphate, selenium, sulfates, total dissolved solids, toxicity	TMDL
San Elijo Lagoon	Eutrophic, indicator bacteria sedimentation/siltation, toxicity	TMDL
Pacific Ocean Shoreline at Cardiff State Beach	indicator bacteria	TMDL

Identification of Project Site Pollutants*

***Identification of project site pollutants is only required if flow-thru treatment BMPs are implemented onsite in lieu of retention or biofiltration BMPs (note the project must also participate in an alternative compliance program unless prior lawful approval to meet earlier PDP requirements is demonstrated)**

Identify pollutants expected from the project site based on all proposed use(s) of the site (see BMP Design Manual Appendix B.6):

Pollutant	Not Applicable to the Project Site	Expected from the Project Site	Also a Receiving Water Pollutant of Concern
Sediment			
Nutrients			
Heavy Metals			
Organic Compounds			
Trash & Debris			
Oxygen Demanding Substances			
Oil & Grease			
Bacteria & Viruses			

Pesticides			

Hydromodification Management Requirements

Do hydromodification management requirements apply (see Section 1.6 of the BMP Design Manual)?

☑ Yes, hydromodification management flow control structural BMPs required.

☐ No, the project will discharge runoff directly to existing underground storm drains discharging directly to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean.

☐ No, the project will discharge runoff directly to conveyance channels whose bed and bank are concrete-lined all the way from the point of discharge to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean.

☐ No, the project will discharge runoff directly to an area identified as appropriate for an exemption by the WMAA for the watershed in which the project resides.

Description / Additional Information (to be provided if a 'No' answer has been selected above):

Critical Coarse Sediment Yield Areas*

*This section only required if hydromodification management requirements apply

Based on the maps provided within the City of Encinitas Engineering Design Manual dated January 2016, do potential critical coarse sediment yield areas exist within the project drainage boundaries?

□ Yes
☑ No, no critical coarse sediment yield areas to be protected based on WMAA maps

If yes, have any of the optional analyses presented in Section 6.2 of the BMP Design Manual been performed?

□ 6.2.1 Verification of Geomorphic Landscape Units (GLUs) Onsite
□ 6.2.2 Downstream Systems Sensitivity to Coarse Sediment
□ 6.2.3 Optional Additional Analysis of Potential Critical Coarse Sediment Yield Areas Onsite
□ No optional analyses performed, the project will avoid critical coarse sediment yield areas identified based on WMAA maps

If optional analyses were performed, what was the final result?

□ No critical coarse sediment yield areas to be protected based on verification of GLUs onsite
□ Critical coarse sediment yield areas exist but additional analysis has determined that protection is not required. Documentation attached in Attachment 2.b of the SWQMP.
□ Critical coarse sediment yield areas exist and require protection. The project will implement management measures described in Sections 6.2.4 and 6.2.5 as applicable, and the areas are identified on the SWQMP Exhibit.

Discussion / Additional Information:

Flow Control for Post-Project Runoff*

*This section only required if hydromodification management requirements apply

List and describe point(s) of compliance (POCs) for flow control for hydromodification management (see Section 6.3.1). For each POC, provide a POC identification name or number correlating to the project's HMP Exhibit and a receiving channel identification name or number correlating to the project's HMP Exhibit.

There are two (2) POCs for the project, POC-1 and POC-2. POC-1 is located near the northeastern corner of the project site. POC-2 is located near the southeastern corner of the project site. Refer the exhibit located in Attachment 2a for the POC locations.

Has a geomorphic assessment been performed for the receiving channel(s)?

☑ No, the low flow threshold is 0.1Q2 (default low flow threshold)
□ Yes, the result is low flow threshold 0.1Q2
□ Yes, the result is low flow threshold 0.3Q2
□ Yes, the result is low flow threshold 0.5Q2

If a geomorphic assessment has been performed, provide title, date, and preparer:

Discussion / Additional Information: (optional)

Other Site Requirements and Constraints
When applicable, list other site requirements or constraints that will influence storm water management design, such as zoning requirements including setbacks and open space, or local codes governing minimum street width, sidewalk construction, allowable pavement types, and drainage requirements.

SOURCE CONTROL BMP CHECKLIST

All development projects must implement source control BMPs SC-1 through SC-6 where applicable and feasible. See Chapter 4 and Appendix E of the manual for information to implement source control BMPs shown in this checklist.

Answer each category below pursuant to the following.

- "Yes" means the project will implement the source control BMP as described in Chapter 4 and/or Appendix E of the manual. Discussion / justification is not required.
- "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided.
- "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project has no outdoor materials storage areas). Discussion / justification may be provided.

Source Control Requirement	Applied?		
SC-1 Prevention of Illicit Discharges into the MS4	☑ Yes	□ No	□ N/A
SC-2 Storm Drain Stenciling or Signage	☑ Yes	□ No	□ N/A
SC-3 Protect Outdoor Materials Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	□ Yes	□ No	☑ N/A
SC-4 Protect Materials Stored in Outdoor Work Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	□ Yes	□ No	☑ N/A
SC-5 Protect Trash Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	□ Yes	□ No	☑ N/A
SC-6 Additional BMPs Based on Potential Sources of Runoff Pollutants (must answer for each source listed below)			
☑ Onsite storm drain inlets	☑ Yes	□ No	□ N/A
□ Interior floor drains and elevator shaft sump pumps drain to sewer	□ Yes	□ No	☑ N/A
□ Interior parking garages drain to sewer	□ Yes	□ No	☑ N/A
□ Need for future indoor & structural pest control	□ Yes	□ No	☑ N/A
☑ Landscape/outdoor pesticide use	☑ Yes	□ No	□ N/A
□ Pools, spas, ponds, decorative fountains, and other water features	□ Yes	□ No	☑ N/A
□ Food service	□ Yes	□ No	☑ N/A
□ Refuse/Trash areas must be covered	□ Yes	□ No	☑ N/A
□ Industrial processes	□ Yes	□ No	☑ N/A
□ Outdoor storage of equipment or materials must be covered	□ Yes	□ No	☑ N/A
□ Vehicle and equipment cleaning	□ Yes	□ No	☑ N/A
□ Vehicle/equipment repair and maintenance	□ Yes	□ No	☑ N/A
□ Fuel dispensing areas	□ Yes	□ No	☑ N/A
□ Loading docks	□ Yes	□ No	☑ N/A
□ Fire sprinkler test water	□ Yes	□ No	☑ N/A
□ Miscellaneous drain or wash water	□ Yes	□ No	☑ N/A
☑ Plazas, sidewalks, and parking lots	☑ Yes	□ No	□ N/A

Discussion / justification if SC-1 through SC-6 not implemented. Justification must be provided for ALL "No" answers shown above.

SITE DESIGN BMP CHECKLIST

All development projects must implement site design BMPs SD-1 through SD-8 where applicable and feasible. See Chapter 4 and Appendix E of the manual for information to implement site design BMPs shown in this checklist.

Answer each category below pursuant to the following.

- "Yes" means the project will implement the site design BMP as described in Chapter 4 and/or Appendix E of the manual. Discussion / justification is not required.
- "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided.
- "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project site has no existing natural areas to conserve). Discussion / justification may be provided.

Source Control Requirement	Applied?		
SD-1 Maintain Natural Drainage Pathways and Hydrologic Features	☑ Yes	□ No	□ N/A
SD-2 Conserve Natural Areas, Soils, and Vegetation	☑ Yes	□ No	□ N/A
SD-3 Minimize Impervious Area	☑ Yes	□ No	□ N/A
SD-4 Minimize Soil Compaction	☑ Yes	□ No	□ N/A
SD-5 Impervious Area Dispersion - Directly Connected Impervious Areas (e.g. roof downspouts connected to street) are not allowed	☑ Yes	□ No	□ N/A
SD-6 Runoff Collection	☑ Yes	□ No	□ N/A
SD-7 Landscaping with Native or Drought Tolerant Species	☑ Yes	□ No	□ N/A
SD-8 Harvesting and Using Precipitation	□ Yes	☑ No	□ N/A

Discussion / justification if SD-1 through SD-8 not implemented. Justification must be provided for ALL "No" answers shown above.

Harvesting and using precipitation is not a feasible BMP for this project. Refer to Attachment 1c.

PDP STRUCTURAL BMPS

All PDPs must implement structural BMPs for storm water pollutant control (see Chapter 5 of the BMP Design Manual). Selection of PDP structural BMPs for storm water pollutant control must be based on the selection process described in Chapter 5. PDPs subject to hydromodification management requirements must also implement structural BMPs for flow control for hydromodification management (see Chapter 6 of the BMP Design Manual). Both storm water pollutant control and flow control for hydromodification management can be achieved within the same structural BMP(s).

PDP structural BMPs must be verified by the local jurisdiction at the completion of construction. This may include requiring the project owner or project owner's representative and engineer of record to certify construction of the structural BMPs (see Section 1.12 of the BMP Design Manual). PDP structural BMPs must be maintained into perpetuity (see Section 7 of the BMP Design Manual). The local jurisdiction will confirm the maintenance annually.

Use this section to provide narrative description of the general strategy for structural BMP implementation at the project site in the box below. Then complete the PDP structural BMP summary information sheet (page 3 of this form) for each structural BMP within the project (copy the BMP summary information page as many times as needed to provide summary information for each individual structural BMP).

Describe the general strategy for structural BMP implementation at the site. This information must describe how the steps for selecting and designing storm water pollutant control BMPs presented in Section 5.1 of the BMP Design Manual were followed, and the results (type of BMPs selected). For projects requiring hydromodification flow control BMPs, indicate whether pollutant control and flow control BMPs are integrated or separate.

DMA-A

Step 1A: The DMA is not self-mitigating, de minimis, or self-retaining.

Step 1B: There are no site design BMPs proposed for the project for which the runoff factor can be adjusted.

Step 2: Harvest and use is not feasible. Refer to Attachment 1c.

Step 3: Partial Infiltration is feasible. Refer to Attachment 1d.

Step 3C: Biofiltration with Partial Retention BMP has been selected and sized per the design criteria to meet both pollutant control and hydromodification management flow control requirements.

DMA-B

Step 1A: The DMA is not self-mitigating, de minimis, or self-retaining.

Step 1B: There are no site design BMPs proposed for the project for which the runoff factor can be adjusted.

Step 2: Harvest and use is not feasible. Refer to Attachment 1c.

Step 3: Infiltration is not feasible. Refer to Attachment 1d.

Step 3C: Biofiltration BMP has been selected and sized per the design criteria to meet both pollutant control and hydromodification management flow control requirements.

STRUCTURAL BMP SUMMARY INFORMATION

Copy this page as necessary to provide information on each individual proposed structural BMP

Structural BMP ID No: BMP-A	DMA No: A
Construction Plan Sheet No:	
Type of structural BMP: □ Retention by harvest and use (HU-1) □ Retention by infiltration basin (INF-1) □ Retention by bioretention (INF-2) □ Retention by permeable pavement (INF-3) ☑ Partial retention by biofiltration with partial retention (PR-1) □ Biofiltration (BF-1) □ Biofiltration with Nutrient Sensitive Media Design (BF-2) □ Proprietary Biofiltration (BF-3) meeting all requirements of Appendix F □ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) □ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) □ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) □ Detention pond or vault for hydromodification management □ Other (describe in discussion section below)	
Purpose: □ Pollutant control only □ Hydromodification control only ☑ Combined pollutant control and hydromodification control □ Pre-treatment/forebay for another structural BMP □ Other (describe in discussion section below)	
Who will inspect and certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms required by the City Engineer (See Section 1.12 of the BMP Design Manual)	Brian M. Ardolino, RCE 71651 Pasco Laret Suiter & Associates 535 North Highway 101, Suite A Solana Beach, CA 92075 858-259-8212
Who will be the final owner of this BMP?	Olivenhain Hills, LLC
Who will maintain this BMP into perpetuity?	Olivenhain Hills, LLC
What is the funding mechanism for maintenance?	Olivenhain Hills, LLC

ATTACHMENT 1 - BACKUP FOR PDP POLLUTANT CONTROL BMPS

This is the cover sheet for Attachment 1.

Indicate which items are included behind this cover sheet:

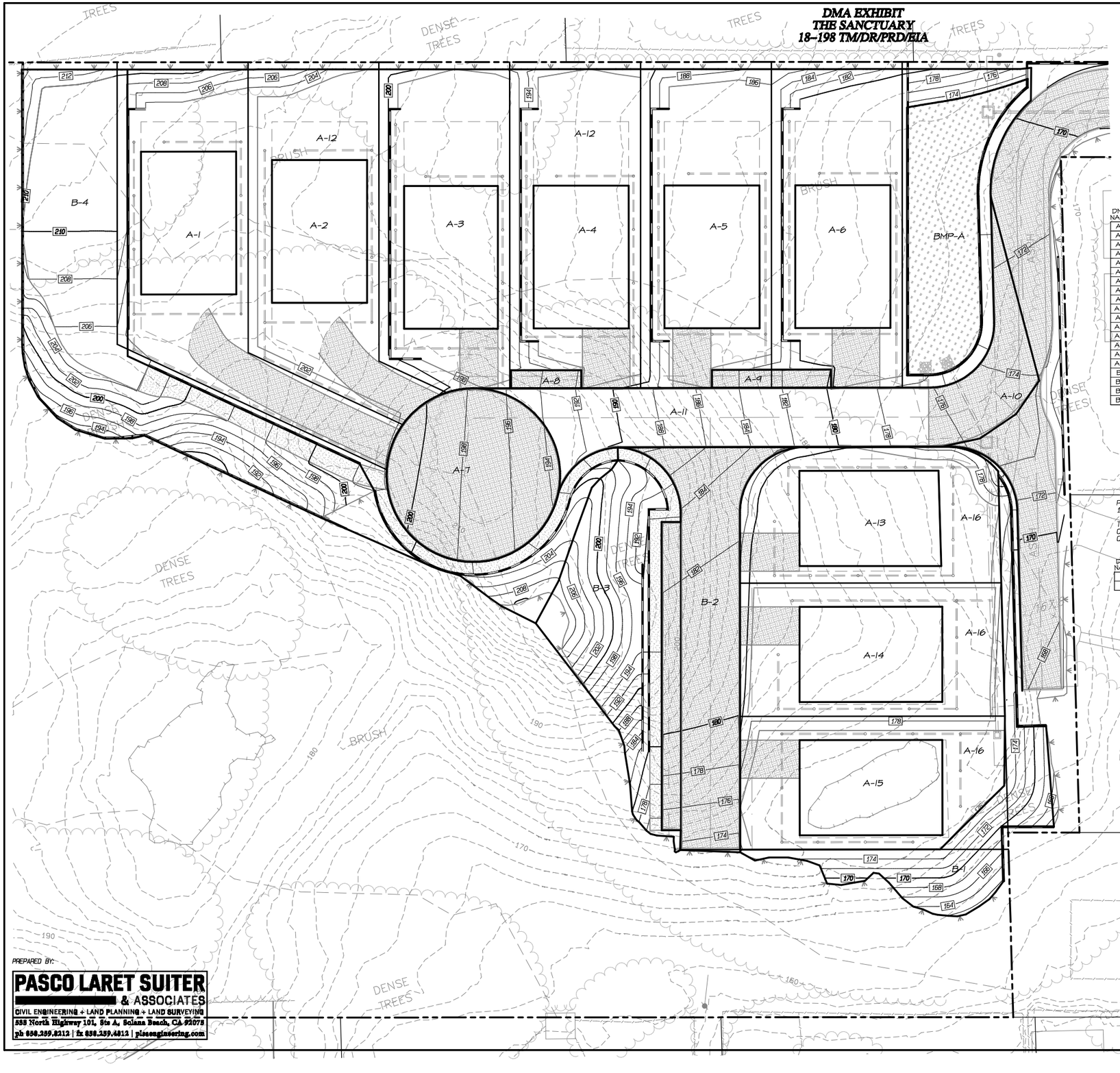
Attachment	Contents	Checklist
Attachment 1a	DMA Exhibit (Required) See DMA Exhibit Checklist on the back of this Attachment cover sheet.	☑ Included
Attachment 1b	Tabular Summary of DMAs Showing DMA ID matching DMA Exhibit, DMA Area, and DMA Type (Required)* *Provide table in this Attachment OR on DMA Exhibit in Attachment 1a	☑ Included on DMA Exhibit in Attachment 1a □ Included as Attachment 1b, separate from DMA Exhibit
Attachment 1c	Form I-7, Harvest and Use Feasibility Screening Checklist (Required unless the entire project will use infiltration BMPs) Refer to Appendix B.3-1 of the BMP Design Manual to complete Form I-7.	☑ Included □ Not included because the entire project will use infiltration BMPs
Attachment 1d	Form I-8, Categorization of Infiltration Feasibility Condition (Required unless the project will use harvest and use BMPs) Refer to Appendices C and D of the BMP Design Manual to complete Form I-8.	☑ Included □ Not included because the entire project will use harvest and use BMPs
Attachment 1e	Pollutant Control BMP Design Worksheets / Calculations (Required) Refer to Appendices B and E of the BMP Design Manual for structural pollutant control BMP design guidelines	☑ Included

Use this checklist to ensure the required information has been included on the DMA Exhibit:

The DMA Exhibit must identify:

- □ Underlying hydrologic soil group
- □ Approximate depth to groundwater
- □ Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
- □ Critical coarse sediment yield areas to be protected
- □ Existing topography and impervious areas
- □ Existing and proposed site drainage network and connections to drainage offsite
- □ Proposed demolition
- □ Proposed grading
- □ Proposed impervious features
- □ Proposed design features and surface treatments used to minimize imperviousness
- □ Drainage management area (DMA) boundaries, DMA ID numbers, and DMA areas (square footage or acreage), and DMA type (i.e., drains to BMP, self-retaining, or self-mitigating)
- □ Potential pollutant source areas and corresponding required source controls (see Chapter 4, Appendix E.1, and Form I-3B)
- □ Structural BMPs (identify location, type of BMP, and size/detail)

DMA EXHIBIT
THE SANCTUARY
18-198 TM/DR/PRD/EIA



BASIN A WQV SIZING

DMA NAME	DMA AREA	FPST	DMA RF	RF * AREA	SOIL TYPE D	IMP NAME BMP-A
A1	2,400	BLDG	0.9	2,160		
A2	2,400	BLDG	0.9	2,160		
A3	2,400	BLDG	0.9	2,160		
A4	2,400	BLDG	0.9	2,160		
A5	2,400	BLDG	0.9	2,160		
A6	2,400	BLDG	0.9	2,160		
A7	4,185	PP	0.1	419		
A8	221	PP	0.1	22		
A9	375	PP	0.1	38		
A10	1,593	PP	0.1	154		
A11	4,440	AC	0.9	3,996		
A12	33,434	L	0.3	10,032		
A13	2,400	BLDG	0.9	2,160		
A14	2,400	BLDG	0.9	2,160		
A15	2,400	BLDG	0.9	2,160		
A16	10,762	L	0.3	3,229		
B1	3,255	L	0.3	977		
B2	5,605	PP	0.1	561		
B3	4,927	L	0.3	1,478		
B4	9,765	L	0.3	2,930		
				43,281	0.03	1,298

IMP SF | MIN AREA | PROP AREA | IMP AREA: 2,731

BASIN A DCV SIZING

DMA NAME	DMA AREA	FPST	DMA RF	RF * AREA	SOIL TYPE D	IMP NAME BMP-A
A1	2,400	BLDG	1.0	2,400		
A2	2,400	BLDG	1.0	2,400		
A3	2,400	BLDG	1.0	2,400		
A4	2,400	BLDG	1.0	2,400		
A5	2,400	BLDG	1.0	2,400		
A6	2,400	BLDG	1.0	2,400		
A7	4,185	PP	0.2	837		
A8	221	PP	0.2	44		
A9	375	PP	0.2	75		
A10	1,593	PP	0.2	318		
A11	4,440	AC	1.0	4,440		
A12	33,434	L	0.1	3,344		
A13	2,400	BLDG	1.0	2,400		
A14	2,400	BLDG	1.0	2,400		
A15	2,400	BLDG	1.0	2,400		
A16	10,762	L	0.1	1,076		
B1	3,255	L	0.1	326		
B2	5,605	PP	0.2	1,121		
B3	4,927	L	0.1	493		
B4	9,765	L	0.1	977		
TOTAL				34,652	0.03	1,040

IMP SF | MIN AREA | PROP AREA | IMP AREA: 2,731

15% CONTINGENCY

PROPOSED IMPERVIOUS SURFACE AREA = 26,040 SF
15% CONTINGENCY = 3,906 SF

TOTAL TREATMENT AREA = 99,967 SF
CONTINGENCY IMPERVIOUS AREA = 29,946 SF
CONTINGENCY PERVIOUS AREA = 70,021 SF

DMA NAME	DMA AREA	FPST	DMA RF	RF * AREA	SOIL TYPE D	IMP NAME BMP-A
1	29,946	IMPV	0.9	29,946		
2	70,021	PERV	0.3	21,006		
TOTAL				50,952	0.03	1,529

IMP SF | MIN AREA | PROP AREA | IMP AREA: 2,731

15% CONTINGENCY

PROPOSED IMPERVIOUS SURFACE AREA = 26,040 SF
15% CONTINGENCY = 3,906 SF

TOTAL TREATMENT AREA = 99,967 SF
CONTINGENCY IMPERVIOUS AREA = 29,946 SF
CONTINGENCY PERVIOUS AREA = 70,021 SF

DMA NAME	DMA AREA	FPST	DMA RF	RF * AREA	SOIL TYPE D	IMP NAME BMP-A
1	29,946	IMPV	1.0	29,946		
2	70,021	PERV	0.1	7,002		
TOTAL				36,948	0.03	1,108

IMP SF | MIN AREA | PROP AREA | IMP AREA: 2,731

GRAPHIC SCALE 1"=20'

0 20 40 60

POTENTIAL POLLUTANT SOURCE	SOURCE CONTROL
ONSITE STORM DRAIN INLETS	MARK ALL INLETS WITH THE WORDS "NO DUMPING! FLOWS TO OCEAN" OR SIMILAR. MAINTAIN AND PERIODICALLY REPAINT OR REPLACE INLET MARKINGS. PROVIDE STORM WATER POLLUTION PREVENTION INFORMATION TO NEW SITE OWNERS, LESSEES, OR OPERATORS. INCLUDE THE FOLLOWING IN LEASE AGREEMENTS: "TENANT SHALL NOT ALLOW ANYONE TO DISCHARGE ANYTHING TO STORM DRAINS OR TO STORE OR DEPOSIT MATERIALS SO AS TO CREATE A POTENTIAL DISCHARG TO STORM DRAINS."
LANDSCAPE/OUTDOOR PESTICIDE USE	FINAL LANDSCAPE PLANS SHALL: PRESERVE EXISTING DROUGHT TOLERANT TREES, SHRUBS, AND GROUND COVER TO THE MAXIMUM EXTENT POSSIBLE. BE DESIGNED TO MINIMIZE IRRIGATION AND RUNOFF, PROMOTE SURFACE INFILTRATION WHERE APPROPRIATE, AND MINIMIZE THE USE OF FERTILIZERS AND PESTICIDES. SPECIFY PLANTS THAT ARE TOLERANT OF PERIODIC SATURATED SOIL CONDITIONS FOR AREAS TO RETAIN OR DETAIN STORMWATER. CONSIDER THE USE OF PEST-RESISTANT PLANTS, ESPECIALLY ADJACENT TO HARDSCAPE. SELECT PLANTS APPROPRIATE TO SITE SOILS, SLOPES, CLIMATE, SUN, WIND, RAIN, LAND USE, AIR MOVEMENT, ECOLOGICAL CONSISTENCY, AND PLANT INTERACTIONS. MAINTAIN LANDSCAPING USING MINIMUM OR NO PESTICIDES.
PLAZA, SIDEWALKS, AND PARKING LOTS	PLAZAS, SIDEWALKS, AND PARKING LOTS SHALL BE SWEPT REGULARLY TO PREVENT THE ACCUMULATIONS OF LITTER AND DEBRIS. DEBRIS FROM PRESSURE WASHING SHALL BE COLLECTED TO PREVENT ENTRY INTO THE STORM DRAIN SYSTEM. WASHWATER CONTAINING ANY CLEANING AGENT OR DEGREASER SHALL BE COLLECTED AND DISCHARGED TO THE SANITARY SEWER AND NOT DISCHARGED TO A STORM DRAIN.

PREPARED BY:
PASCO LARET SUITER & ASSOCIATES
CIVIL ENGINEERING + LAND PLANNING + LAND SURVEYING
535 North Highway 101, Ste A, Solana Beach, CA 92075
ph 858.259.8212 | fx 858.259.4812 | plsaengineering.com

ATTACHMENT 1c

Worksheet B.3-1. Harvest and Use Feasibility Screening

Harvest and Use Feasibility Screening	**Worksksheet B.3-1**

1. Is there a demand for harvested water (check all that apply) at the project site that is reliably present during the wet season?
✓Toilet and urinal flushing
✓ Landscape irrigation
Other:_____

2. If there is a demand; estimate the anticipated average wet season demand over a period of 36 hours. Guidance for planning level demand calculations for toilet/urinal flushing and landscape irrigation is provided in Section B.3.2.

Toilet/Urinal Flushing
(9.3 gal/person-day) x (0.13368 cuft/gal) x (1.5 days) = 1.86 cuft/person-36hr
Assume (30 people) x (1.86 cuft/person-36 hr) = 56 cuft/36hr

Landscape Irrigation
(1.38 ac irrigated) x (390 gal/ac-36hr) x (0.13368 cuft/gal) = 72 cuft/36hr

Total = 56 cuft + 72 cuft = 128 cuft

3. Calculate the DCV using worksheet B-2.1.

DCV = 2,187 cuft

3a. Is the 36-hour demand greater than or equal to the DCV?	3b. Is the 36-hour demand greater than 0.25DCV but less than the full DCV?	3c. Is the 36-hour demand less than 0.25DCV?
Yes / ✓ No	Yes / ✓ No	✓ Yes
Harvest and use appears to be feasible. Conduct more detailed evaluation and sizing calculations to confirm that DCV can be used at an adequate rate to meet drawdown criteria.	Harvest and use may be feasible. Conduct more detailed evaluation and sizing calculations to determine feasibility. Harvest and use may only be able to be used for a portion of the site, or (optionally) the storage may need to be upsized to meet long term capture targets while draining in longer than 36 hours.	✓ Harvest and use is considered to be infeasible.

ATTACHMENT 1d

Worksheet C.4-1: Categorization of Infiltration Feasibility Condition

Categorization of Infiltration Feasibility Condition		Worksheet C.4-1	
Part 1 - Full Infiltration Feasibility Screening Criteria Would infiltration of the full design volume be feasible from a physical perspective without any undesirable consequences that cannot be reasonably mitigated?			
Criteria	Screening Question	Yes	No
1	Is the estimated reliable infiltration rate below proposed facility locations greater than 0.5 inches per hour? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.		X
Provide basis: The NRCS soils across the site are all Type D soils with very high surface runoff. The site soils are consistent with the NRCS mapped soil types based on site explorations and percolation testing. Three soil types were present in the area of the proposed stormwater BMPs, Quaternary Young Alluvium, Tertiary Torrey Sandstone, and Tertiary Del Mar Formation. Five percolation tests were completed within the Alluvium. The calculated infiltration rates (with an applied factor of safety of two) ranged from a low of 0.008 in Test P-6 (just above the underlying Torrey Sandstone Formation) to a high of 0.215 inches per hour in Test P-7. Two percolation tests were completed within the Del Mar Formation. The calculated infiltration rates (with an applied factor of safety of two) ranged from a low of 0.009 in Test P-3 to a high of 0.045 inches per hour in Test P-4. One percolation test was completed within the Torrey Sandstone. The calculated infiltration rate (with an applied factor of safety of two) was 0.039 in Test P-5. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
2	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.		X
Provide basis: Due to the general minimal permeability of the geologic units encountered at the site, surface water would likely migrate laterally or mound locally. This could result in the water migrating into utility trench backfill, building up behind proposed retaining walls, or saturating toes of slopes and down gradient and nearby foundations or other improvement areas. The potential adverse effects of mounding are anticipated to be minimized somewhat by installation of an impermeable liner on the sidewalls and bottom of the proposed basin where partial infiltration is proposed. Lining the sides and bottom of the BMP with impermeable liner is recommended to mitigate lateral migration of infiltrate. The lining should extend to the maximum depth of utility trench bottoms, toe of slope elevation (if slopes are proposed), and foundation excavations within 100 feet of the proposed basin. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			

Worksheet C.4-1 Page 2 of 4			
Criteria	Screening Question	Yes	No
3	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: Groundwater is anticipated to be deeper than at least 10 feet below the bottom of the planned basin bottoms. Infiltration at the site is not anticipated to increase the risk of groundwater contamination. According to Geotracker online (a State of California on line resource for listings of regulated contaminated sites), there are no open LUST cases in the site area that could impact the site. An enrolled DTSC site ("Irrigated Lands Regulatory Program") is located immediately southeast of the site. However, no information on cleanup status or remediation was available from Geotracker. The proposed development is not industrial and capture of surface waters is not anticipated to increase the risk of groundwater contamination. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
4	Can infiltration greater than 0.5 inches per hour be allowed without causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: Infiltration at the site is not anticipated to cause potential water balance issues and not anticipated to change the seasonality of ephemeral streams. The site and up-gradient properties are not known contaminated sites according to Geotracker, a State of California on line resource for listings of regulated contaminated sites and site development is not industrial. Lining the basins as recommended in Item 1 above is anticipated to minimize the lateral migration of infiltrate. Site discharge is not anticipated to be contaminated or affect surface waters. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
Part 1 Result*	If all answers to rows 1 - 4 are "Yes" a full infiltration design is potentially feasible. The feasibility screening category is Full Infiltration If any answer from row 1-4 is "No", infiltration may be possible to some extent but would not generally be feasible or desirable to achieve a "full infiltration" design. Proceed to Part 2		No Full

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings.

Worksheet C.4-1 Page 3 of 4			
Part 2 – Partial Infiltration vs. No Infiltration Feasibility Screening Criteria Would infiltration of water in any appreciable amount be physically feasible without any negative consequences that cannot be reasonably mitigated?			
Criteria	Screening Question	Yes	No
5	Do soil and geologic conditions allow for infiltration in any appreciable rate or volume? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.	X	
Provide basis: CTE understands an appreciable rate to be 0.05 inches per hour or greater. An infiltration rate (with FOS of 2 applied) of 0.136 in/hr was recorded for Test P-1 and 0.215 in/hr was recorded for Test P-7. Additionally, infiltration rates of 0.047 in/hr, 0.045 in/hr, and 0.039 in/hr were recorded for Tests P-2, P-4 and P-5, respectively. While these values are below 0.05 in/hr, some infiltration was observed. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			
6	Can Infiltration in any appreciable quantity be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.	X	
Provide basis: See Question 2, Part 1. Sidewalls of the proposed bio-retention BMP basin in the northeastern portion of the site should be lined with an impermeable liner to mitigate the potential for lateral migration of infiltrate and saturation. At a minimum the lining should extend to the maximum depth of utility trench bottoms, toe of slope elevation (if slopes are proposed), and foundation excavations within 100 feet of the proposed basin. If re-introduced, the currently-removed bio-retention BMP basin located along the southern PL of the site should be fully lined with an impermeable liner, and infiltrate collected via a subdrain and discharged to an appropriate offsite location, in order to minimize the risk of infiltrate migrating and detrimentally impacting offsite and down-gradient properties adjacent to the site. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			

Worksheet C.4-1 Page 4 of 4			
Criteria	Screening Question	Yes	No
7	Can Infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: Groundwater is anticipated to be deeper than at least 10 feet below the bottom of the planned basin bottoms. Infiltration at the site is not anticipated to increase the risk of groundwater contamination. According to Geotracker online (a State of California on line resource for listings of regulated contaminated sites), there are no open LUST cases in the site area that could impact the site. An enrolled DTSC site ("Irrigated Lands Regulatory Program") is located immediately southeast of the site. However, no information on cleanup status or remediation was available from Geotracker. The proposed development is not industrial and capture of surface waters is not anticipated to increase the risk of groundwater contamination. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			
8	Can infiltration be allowed without violating downstream water rights? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: Infiltration at the site is not anticipated to cause potential water balance issues and not anticipated to change the seasonality of ephemeral streams. The site and up-gradient properties are not known contaminated sites according to Geotracker, a State of California on line resource for listings of regulated contaminated sites and site development is not industrial. Lining the basins as recommended in Item 1 above is anticipated to minimize the lateral migration of infiltrate. Site discharge is not anticipated to be contaminated or affect surface waters. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			
Part 2 Result*	If all answers from row 1-4 are yes then partial infiltration design is potentially feasible. The feasibility screening category is Partial Infiltration. If any answer from row 5-8 is no, then infiltration of any volume is considered to be infeasible within the drainage area. The feasibility screening category is No Infiltration.		Partial

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings

ATTACHMENT 1e

3009 Melamed
12/20/2020

Appendix B: Stormwater Pollutant Control Hydrologic Calculations and Sizing Methods

Worksheet B.2-1. DCV

DMA-A

Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.54	inches
2	Area tributary to BMP (s)	A=	1.91	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1) * See calculation below	C=	0.48	unitless
4	Street trees volume reduction	TCV=	0	cubic-feet
5	Rain barrels volume reduction (1 cubic foot=7.48 gallons)	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	1797	cubic-feet

	Area (sq ft)	Runoff Factor	A x RF	Weighted RF
Impervious	26956	0.9	24260.4	
Pervious Pavers	6415	0.1	641.5	
Landscape	49829	0.3	14948.7	
Total	83200		39851	0.48

DMA A

Worksheet B.5-1: Simple Sizing Method for Biofiltration BMPs			
1	Remaining DCV After implementing retention BMPs	1797.0	cu-ft
Partial Retention			
2	Infiltration rate from Worksheet D.5-1 if partial infiltration is feasible	0.004	in/hr
3	Allowable drawdown time for aggregate storage below the underdrain	36	hours
4	Depth of runoff that can be infiltrated [Line 2 x Line 3]	0.14	inches
5	Aggregate pore space	0.40	in/in
6	Required depth of gravel below the underdrain [Line 4 / Line 5]	0.36	inches
7	Assumed surface area of the biofiltration BMP	3200.0	sq-ft
8	Media retained pore storage	0.1	in/in
9	Volume retained pore storage	518.40	cu-ft
10	DCV that requires biofiltration [Line 1 - Line 9]	1278.6	cu-ft
BMP Parameters			
11	Surface Poding [6 inch minimum, 12 inch maximum]	13.0	inches
12	Media Thickness [18 in Min], also add mulch layer thicknes to this line	18	inches
13	Aggregate Storage above underdrain inver (12 inches typical) - Use 0 inches for sizing if the aggregate is not over the entire bottom surface area	12	inches
14	Freely drained pore storage	0.2	in/in
15	Media filtration rate to be used for sizing (5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet, use the outlet controlled rate which will be less than 5 in/hr.)	1.496	in/hr
Baseline Calculations			
16	Allowable Routing Time for sizing	6	hours
17	Depth filtered during storm [Line 15 x Line 16]	9	inches
18	Depth of Detention Storage [Line 11 + (Line 12 x Line 14) + (Line 13 x Line 5)]	21.40	inches
19	Total Depth Treated [Line 17 + Line 18]	30.38	inches
Option 1 - Biofilter 1.5 times the DCV			
20	Required biofiltered volume [1.5 x Line 10]	1918	cu-ft
21	Required Footprint [Line 20 / Line 19] x 12	757.7	sq-ft
Option 2 - Store 0.75 of remaining DCV in pores and poding			
22	Required Storage (surface + pores) Volume [0.75 x Line 10]	959	cu-ft
23	Required Footprint [Line 22 / Line 18] x 12	538	sq-ft
Footprint of the BMP			
24	Area draining to the BMP	83200	sq-ft
25	Adjusted Runoff Factor for drainage area (Refer to Appendix B.1 and B.2)	0.48	
26	BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Worksheet B.5-2, Line 11)	0.03	
27	Minimum BMP Footprint [Line 24 x Line 25 x Line 26]	1198	sq-ft
28	Footprint of the BMP = Maximum (Minimum(Line 21, Line 23), Line 27)	1198	sq-ft

ATTACHMENT 2 - BACKUP FOR PDP HYDROMODIFICATION CONTROL MEASURES

This is the cover sheet for Attachment 2.

□ Mark this box if this attachment is not included because the project is exempt from PDP hydromodification management requirements.

Indicate which items are included behind this cover sheet:

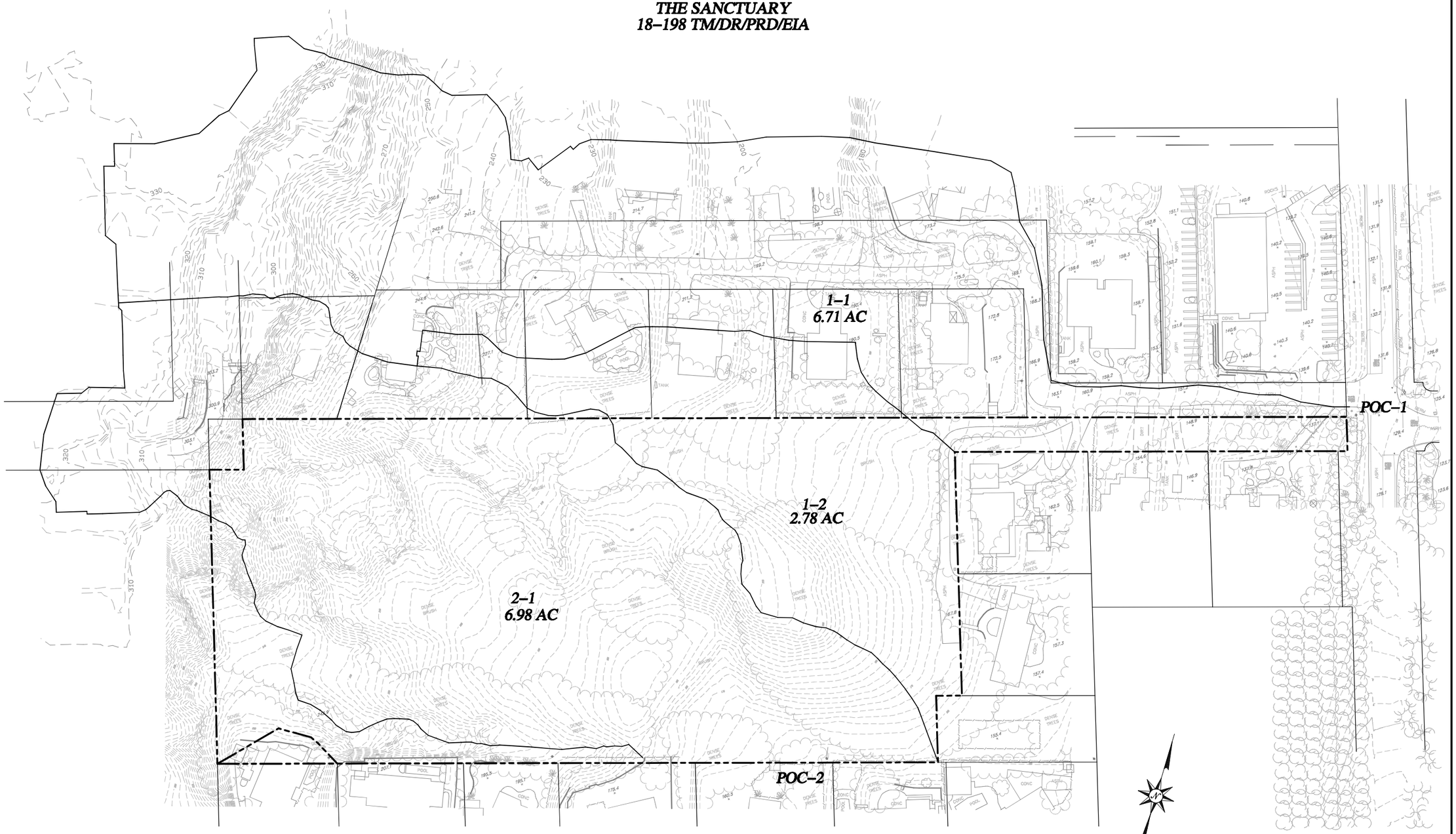
Attachment	Contents	Checklist
Attachment 2a	Hydromodification Management Exhibit (Required)	☑ Included See Hydromodification Management Exhibit Checklist on the back of this Attachment cover sheet.
Attachment 2b	Management of Critical Coarse Sediment Yield Areas (WMAA Exhibit is required, additional analyses are optional) See Section 6.2 of the BMP Design Manual.	☑ Exhibit showing project drainage boundaries marked on City of Encinitas Potential Critical Coarse Sediment Yield Area Map (Required) Optional analyses for Critical Coarse Sediment Yield Area Determination □ 6.2.1 Verification of Geomorphic Landscape Units Onsite □ 6.2.2 Downstream Systems Sensitivity to Coarse Sediment □ 6.2.3 Optional Additional Analysis of Potential Critical Coarse Sediment Yield Areas Onsite
Attachment 2c	Geomorphic Assessment of Receiving Channels (Optional) See Section 6.3.4 of the BMP Design Manual.	☑ Not performed □ Included □ Submitted as separate stand-alone document
Attachment 2d	Flow Control Facility Design, including Structural BMP Drawdown Calculations and Overflow Design Summary (Required) See Chapter 6 and Appendix G of the BMP Design Manual	☑ Included □ Submitted as separate stand-alone document
Attachment 2e	Vector Control Plan (Required when structural BMPs will not drain in 96 hours)	□ Included ☑ Not required because BMPs will drain in less than 96 hours

Use this checklist to ensure the required information has been included on the Hydromodification Management Exhibit:

The Hydromodification Management Exhibit must identify:

- □ Underlying hydrologic soil group
- □ Approximate depth to groundwater
- □ Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
- □ Critical coarse sediment yield areas to be protected
- □ Existing topography
- □ Existing and proposed site drainage network and connections to drainage offsite
- □ Proposed grading
- □ Proposed impervious features
- □ Proposed design features and surface treatments used to minimize imperviousness
- □ Point(s) of Compliance (POC) for Hydromodification Management
- □ Existing and proposed drainage boundary and drainage area to each POC (when necessary, create separate exhibits for pre-development and post-project conditions)
- □ Structural BMPs for hydromodification management (identify location, type of BMP, and size/detail)

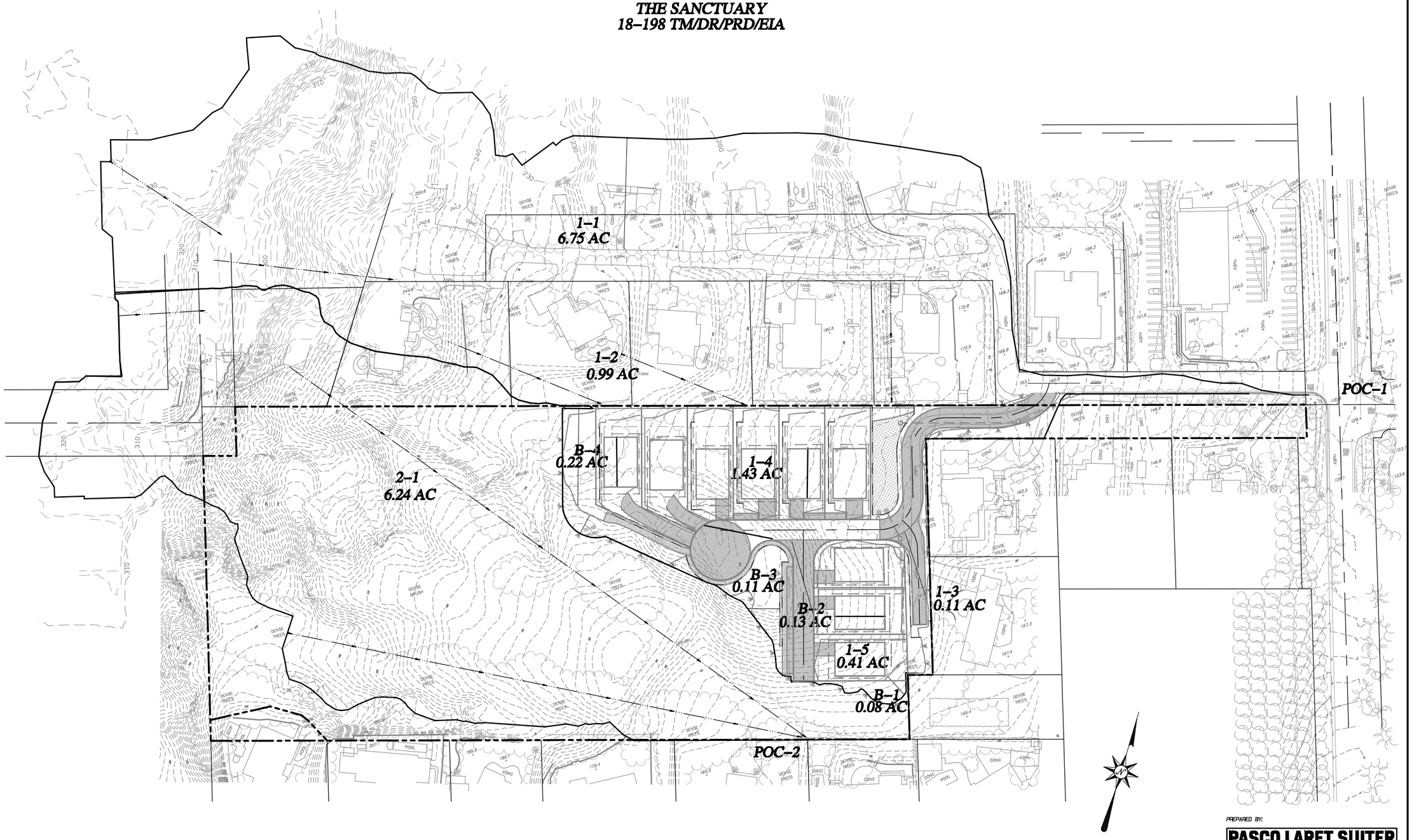
PREDEVELOPED HMP EXHIBIT
THE SANCTUARY
18–198 TM/DR/PRD/EIA



GRAPHIC SCALE 1"=50'
0 50 100 150

PREPARED BY:
PASCO LARET SUITER & ASSOCIATES
CIVIL ENGINEERING + LAND PLANNING + LAND SURVEYING
535 North Highway 101, Ste A, Solana Beach, CA 92075
ph 858.259.8212 | fx 858.259.4812 | plsaengineering.com

POSTDEVELOPED HMP EXHIBIT
THE SANCTUARY
18–198 TM/DR/PRD/EIA



PREPARED BY:
PASCO LARET SUITER & ASSOCIATES
CIVIL ENGINEERING + LAND PLANNING + LAND SURVEYING
535 North Highway 101, Ste A, Solana Beach, CA 92075
ph 858.259.8212 | fx 858.259.4812 | plsengineering.com

ATTACHMENT 2b

3009 Melamed

February 1, 2019

1 inch = 200 feet

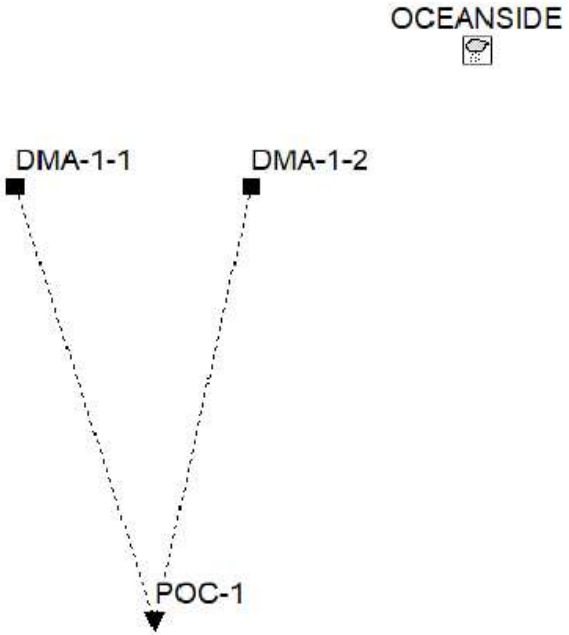
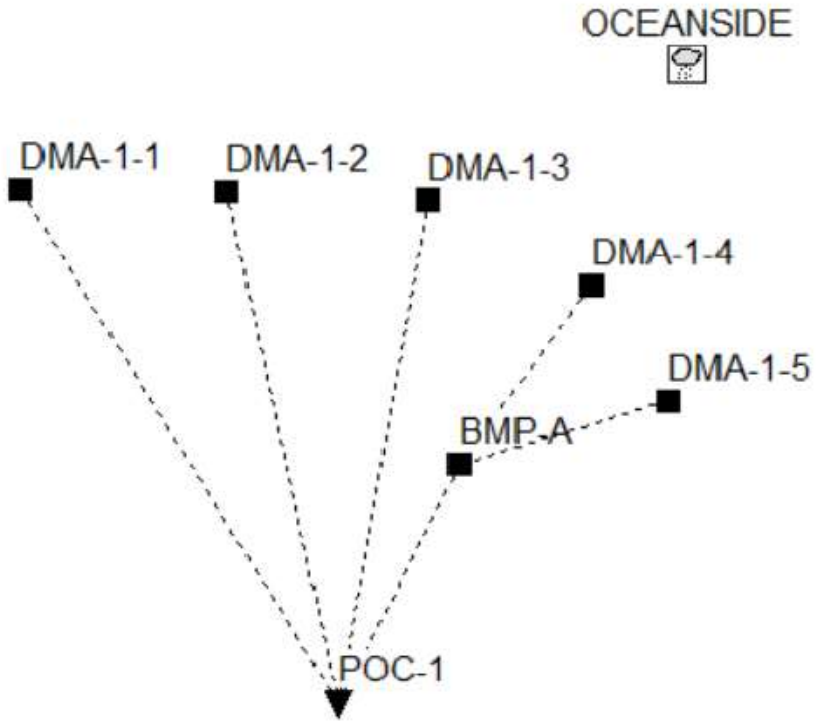
0 150 300 Feet

N

Every reasonable effort has been made to assure the accuracy of the data provided; nevertheless, some information may not be accurate. The City of Encinitas assumes no liability or responsibility arising from the use of or reliance upon this information.

ATTACHMENT 2d

SWMM MODEL SCHEMATICS

PRE-PROJECT MODEL	POST-PROJECT MODEL
	

```
[TITLE]
;;Project Title/Notes
3009 Melamed
Pre-Project Condition

[OPTIONS]
;;Option             Value
FLOW_UNITS           CFS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         KINWAVE
LINK_OFFSETS         DEPTH
MIN_SLOPE            0
ALLOW_PONDING        NO
SKIP_STEADY_STATE    NO

START_DATE           08/28/1951
START_TIME           05:00:00
REPORT_START_DATE    08/28/1951
REPORT_START_TIME    05:00:00
END_DATE             05/23/2008
END_TIME             23:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             00:15:00
DRY_STEP             04:00:00
ROUTING_STEP         0:01:00
RULE_STEP            00:00:00

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         12.557
MAX_TRIALS           8
HEAD_TOLERANCE       0.005
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              1

[EVAPORATION]
;;Data Source    Parameters
;;-------------- ----------------
MONTHLY          .06    .08    .11    .15    .17    .19    .19    .18    .15    .11    .08    .06
DRY_ONLY         NO

[RAINGAGES]
;;Name           Format    Interval SCF      Source
```

```
;;-------------- --------- ------ ------ ----------
OCEANSIDE        INTENSITY 1:00     1.0      TIMESERIES OCEANSIDE

[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv  Width    %Slope   CurbLen  SnowPack
;;-------------- ---------------- ---------------- -------- -------- -------- -------- -------- ----------------
DMA-1-1          OCEANSIDE        POC-1            6.71     21       1771     12       0
DMA-1-2          OCEANSIDE        POC-1            2.78     2        304      15       0
DMA-2-1          OCEANSIDE        POC-2            6.98     5.5      609      17       0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
DMA-1-1          0.012      0.08       0.05       0.1        25         OUTLET
DMA-1-2          0.012      0.08       0.05       0.1        25         OUTLET
DMA-2-1          0.012      0.08       0.05       0.1        25         OUTLET

[INFILTRATION]
;;Subcatchment   Suction    Ksat       IMD
;;-------------- ---------- ---------- ----------
DMA-1-1          9          0.025      0.33
DMA-1-2          9          0.025      0.33
DMA-2-1          9          0.025      0.33

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
;Basin 200
POC-1            0          FREE                        NO
POC-2            0          FREE                        NO

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
OCEANSIDE        FILE "J:\Active Jobs\3009 OLIVENHAIN HILLLS, LLC\CIVIL\REPORTS\SWMM\Rainfall_data\oceanside.dat"

[REPORT]
;;Reporting Options
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS 0.000 0.000 10000.000 10000.000
Units      None

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
```

```
POC-1             -915.842           2722.772
POC-2             2945.545           3032.178

[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ------------------

[Polygons]
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ------------------
DMA-1-1           -1955.446          6150.990
DMA-1-2           -198.020           6150.990
DMA-2-1           2908.416           6398.515

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
OCEANSIDE         1500.000           7200.000
```

```
[TITLE]
;;Project Title/Notes
3009 Melamed
Post-Project Condition

[OPTIONS]
;;Option             Value
FLOW_UNITS           CFS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         KINWAVE
LINK_OFFSETS         DEPTH
MIN_SLOPE            0
ALLOW_PONDING        NO
SKIP_STEADY_STATE    NO

START_DATE           08/28/1951
START_TIME           05:00:00
REPORT_START_DATE    08/28/1951
REPORT_START_TIME    05:00:00
END_DATE             05/23/2008
END_TIME             23:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             00:15:00
DRY_STEP             04:00:00
ROUTING_STEP         0:01:00
RULE_STEP            00:00:00

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         12.557
MAX_TRIALS           8
HEAD_TOLERANCE       0.005
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              1

[EVAPORATION]
;;Data Source    Parameters
;;-------------- ----------------
MONTHLY          .06    .08    .11    .15    .17    .19    .19    .18    .15    .11    .08    .06
DRY_ONLY         NO

[RAINGAGES]
;;Name           Format    Interval SCF      Source
```

```
;;-------------- --------- ------ ------ ----------
OCEANSIDE        INTENSITY 1:00     1.0      TIMESERIES OCEANSIDE

[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv  Width    %Slope   CurbLen  SnowPack
;;-------------- ---------------- ---------------- -------- -------- -------- -------- -------- ----------------
DMA-1-1          OCEANSIDE        POC-1            6.75     21       1782     12       0
DMA-1-2          OCEANSIDE        POC-1            0.99     6        240      11       0
DMA-2-1          OCEANSIDE        POC-2            6.24     6.2      545      17       0
DMA-1-3          OCEANSIDE        POC-1            .11      0        56       8        0
DMA-1-4          OCEANSIDE        BMP-A            1.34     32.2     862      9        0
BMP-A            OCEANSIDE        POC-1            0.08512  0        53       0        0
DMA-B-1          OCEANSIDE        DMA-2-1          .08      0        113      50       0
DMA-B-2          OCEANSIDE        POC-2            .13      0        61       7        0
DMA-1-5          OCEANSIDE        BMP-A            0.41     39.6     290      3        0
DMA-B-3          OCEANSIDE        POC-2            .11      0        133      50       0
DMA-B-4          OCEANSIDE        POC-2            .22      0        139      30       0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
DMA-1-1          0.012      0.08       0.05       0.1        25         OUTLET
DMA-1-2          0.012      0.08       0.05       0.1        25         OUTLET
DMA-2-1          0.012      0.08       0.05       0.1        25         OUTLET
DMA-1-3          0.012      0.017      0.05       0.1        25         OUTLET
DMA-1-4          0.012      0.06       0.05       0.1        25         OUTLET
BMP-A            0.012      0.06       0.05       0.1        25         OUTLET
DMA-B-1          0.012      0.06       0.05       0.1        25         OUTLET
DMA-B-2          0.012      0.017      0.05       0.1        25         OUTLET
DMA-1-5          0.012      0.06       0.05       0.1        25         OUTLET
DMA-B-3          0.012      0.06       0.05       0.1        25         OUTLET
DMA-B-4          0.012      0.06       0.05       0.1        25         OUTLET

[INFILTRATION]
;;Subcatchment   Suction    Ksat       IMD
;;-------------- ---------- ---------- ----------
DMA-1-1          9          0.025      0.33
DMA-1-2          9          0.025      0.33
DMA-2-1          9          0.025      0.33
DMA-1-3          9          0.019      0.33
DMA-1-4          9          0.019      0.33
BMP-A            9          0.025      0.33
DMA-B-1          9          0.019      0.33
DMA-B-2          9          0.019      0.33
DMA-1-5          9          0.019      0.33
DMA-B-3          9          0.019      0.33
DMA-B-4          9          0.019      0.33

[LID_CONTROLS]
;;Name           Type/Layer Parameters
;;-------------- ---------- ----------
```

```
BMP-A            BC
BMP-A            SURFACE    12         0          0          0          5
BMP-A            SOIL       18         0.4        0.2        0.1        5          5          1.5
BMP-A            STORAGE    12         0.67       0.004      0
BMP-A            DRAIN      0.1987     0.5        0          6          0          0

[LID_USAGE]
;;Subcatchment   LID Process      Number  Area       Width      InitSat    FromImp    ToPerv     RptFile                  DrainTo
FromPerv
;;-------------- ---------------- ------- ---------- ---------- ---------- ---------- ---------- ------------------------ ------------
---- ----------
BMP-A            BMP-A            1       3707.83    0          0          100        0          *                        *
0

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
POC-1            0          FREE                        NO
POC-2            0          FREE                        NO

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
OCEANSIDE        FILE "J:\Active Jobs\3009 OLIVENHAIN HILLLS, LLC\CIVIL\REPORTS\SWMM\Rainfall_data\oceanside.dat"

[REPORT]
;;Reporting Options
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS 0.000 0.000 10000.000 10000.000
Units      None

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
POC-1            -915.842           2722.772
POC-2            2945.545           3032.178

[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ------------------

[Polygons]
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ------------------
DMA-1-1          -3388.626          6018.957
```

```
DMA-1-2          -1683.168          6324.257
DMA-2-1          3317.536           4928.910
DMA-1-3          -297.030           6274.752
DMA-1-4          829.208            5668.317
BMP-A            -86.634            4405.941
DMA-B-1          4319.307           6386.139
DMA-B-2          5309.406           5829.208
DMA-1-5          1344.086           4854.071
DMA-B-3          5725.444           5014.319
DMA-B-3          5685.519           4987.702
DMA-B-4          5951.686           4215.820

[SYMBOLS]
;;Gage            X-Coord            Y-Coord
;;--------------- ------------------ ------------------
OCEANSIDE        3909.953           8530.806
```

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.013)
--------------------------------------------------------------

3009 Melamed
Pre-Project Condition


***********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
***********************************************************

****************
Analysis Options
****************
Flow Units ............... CFS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... NO
  Water Quality .......... NO
Infiltration Method ...... GREEN_AMPT
Starting Date ............ 08/28/1951 05:00:00
Ending Date .............. 05/23/2008 23:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 01:00:00
Wet Time Step ............ 00:15:00
Dry Time Step ............ 04:00:00


*************************        Volume         Depth
Runoff Quantity Continuity     acre-feet        inches
*************************     ---------       -------
Total Precipitation ......       926.561       675.090
Evaporation Loss .........        42.600        31.038
Infiltration Loss ........       632.719       460.997
Surface Runoff ...........       267.250       194.718
Final Storage ............         0.006         0.004
Continuity Error (%) .....        -1.728


*************************        Volume        Volume
Flow Routing Continuity        acre-feet      10^6 gal
*************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......       267.249        87.087
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.000
External Outflow .........       267.249        87.087
Flooding Loss ............         0.000         0.000
```

```
Evaporation Loss .........         0.000         0.000
Exfiltration Loss ........         0.000         0.000
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.000         0.000
Continuity Error (%) .....         0.000
```

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Imperv Runoff in	Perv Runoff in	Total Runoff in	Total Runoff 10^6 gal	Peak Runoff CFS	Runoff Coeff
DMA-1-1	675.09	0.00	38.35	407.54	123.65	118.25	241.90	44.07	7.63	0.358
DMA-1-2	675.09	0.00	24.04	510.16	11.84	140.09	151.92	11.47	3.11	0.225
DMA-2-1	675.09	0.00	26.80	492.81	32.43	133.97	166.40	31.54	7.84	0.246

```
Analysis begun on:  Wed Dec  9 11:42:24 2020
Analysis ended on:  Wed Dec  9 11:43:04 2020
Total elapsed time: 00:00:40
```

```
  EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.013)
  --------------------------------------------------------------

  3009 Melamed
  Post-Project Condition


  ***********************************************************
  NOTE: The summary statistics displayed in this report are
  based on results found at every computational time step,
  not just on results from each reporting time step.
  ***********************************************************

  ****************
  Analysis Options
  ****************
  Flow Units ............... CFS
  Process Models:
    Rainfall/Runoff ........ YES
    RDII ................... NO
    Snowmelt ............... NO
    Groundwater ............ NO
    Flow Routing ........... NO
    Water Quality .......... NO
  Infiltration Method ...... GREEN_AMPT
  Starting Date ............ 08/28/1951 05:00:00
  Ending Date .............. 05/23/2008 23:00:00
  Antecedent Dry Days ...... 0.0
  Report Time Step ......... 01:00:00
  Wet Time Step ............ 00:15:00
  Dry Time Step ............ 04:00:00


  *************************        Volume         Depth
  Runoff Quantity Continuity     acre-feet        inches
  *************************     ---------       -------
  Initial LID Storage ......         0.013         0.009
  Total Precipitation ......       926.286       675.090
  Evaporation Loss .........        47.020        34.269
  Infiltration Loss ........       593.278       432.389
  Surface Runoff ...........       250.697       182.711
  LID Drainage .............        43.878        31.979
  Final Storage ............         0.023         0.017
  Continuity Error (%) .....        -0.928


  *************************        Volume        Volume
  Flow Routing Continuity        acre-feet      10^6 gal
  *************************     ---------     ---------
  Dry Weather Inflow .......         0.000         0.000
  Wet Weather Inflow .......       294.575        95.992
  Groundwater Inflow .......         0.000         0.000
  RDII Inflow ..............         0.000         0.000
  External Inflow ..........         0.000         0.000
```

External Outflow	294.575	95.992
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Imperv Runoff in	Perv Runoff in	Total Runoff in	Total Runoff 10^6 gal	Peak Runoff CFS	Runoff Coeff
DMA-1-1	675.09	0.00	34.54	405.58	123.67	118.26	241.93	44.34	7.68	0.358
DMA-1-2	675.09	0.00	22.31	484.04	35.50	138.68	174.18	4.68	1.11	0.258
DMA-2-1	675.09	2.46	23.09	486.66	36.69	135.20	171.89	29.12	7.10	0.254
DMA-1-3	675.09	0.00	21.76	476.43	0.00	187.91	187.91	0.56	0.13	0.278
DMA-1-4	675.09	0.00	46.58	322.99	189.94	126.01	315.95	11.50	1.55	0.468
BMP-A	675.09	6629.64	784.50	62.94	0.00	0.00	6456.91	14.92	2.13	0.884
DMA-B-1	675.09	0.00	21.92	474.20	0.00	191.99	191.99	0.42	0.09	0.284
DMA-B-2	675.09	0.00	21.78	476.58	0.00	187.35	187.35	0.66	0.15	0.278
DMA-1-5	675.09	0.00	52.50	288.51	232.88	110.90	343.78	3.83	0.48	0.509
DMA-B-3	675.09	0.00	21.84	473.60	0.00	192.30	192.30	0.57	0.13	0.285
DMA-B-4	675.09	0.00	21.86	476.56	0.00	186.57	186.57	1.11	0.25	0.276

****
LID Performance Summary
****

Subcatchment	LID Control	Total Inflow in	Evap Loss in	Infil Loss in	Surface Outflow in	Drain Outflow in	Initial Storage in	Final Storage in	Continuity Error %
BMP-A	BMP-A	7304.73	784.53	62.94	271.04	6186.09	1.80	2.13	-0.00

Analysis begun on: Wed Dec 9 12:05:35 2020
Analysis ended on: Wed Dec 9 12:06:17 2020
Total elapsed time: 00:00:42

3009 Melamed
12/9/2020

POC-1

SWMM INPUT

PRE-PROJECT											
DMA	Basin	Area (ac)	Width (Area/Flow Length) (ft)	% Slope	% Impervious	% "B" Soils	% "C" Soils	% "D" Soils	Weighted Infiltration (in/hr):	Weighted Suction Head (in):	Weighted Initial Deficit:
1-1		6.71	1771	12.0%	21%	0%	0%	100%	0.025	9.000	0.330
1-2		2.78	304	15.0%	2%	0%	0%	100%	0.025	9.000	0.330
	Total:	**9.49**									

POST-PROJECT											
DMA	BMP	Area (ac)	Width (Area/Flow Length) (ft)	% Impervious	% Slope	% "B" Soils	% "C" Soils	% "D" Soils	Weighted Infiltration (in/hr):	Weighted Suction Head (in):	Weighted Initial Deficit:
1-1	N/A	6.75	1782	21.0%	12.0%	0%	0.0%	100%	0.025	9.000	0.330
1-2	N/A	0.99	240	6.0%	11.0%	0%	0.0%	100%	0.025	9.000	0.330
1-3	N/A	0.11	56	0.0%	8.0%	0%	0.0%	100%	0.019	9.000	0.330
1-4	A	1.34	862	32.2%	9.0%	0%	0.0%	100%	0.019	9.000	0.330
1-5	A	0.41	290	39.6%	3.0%	0%	0.0%	100%	0.019	9.000	0.330
BMP-A	A	0.08512	53	0.0%	0.0%	0%	0.0%	100%	0.025	9.000	0.330
	Total:	**9.69**									

D:	0.025	in/hr	D:	9	in	D:	0.33	

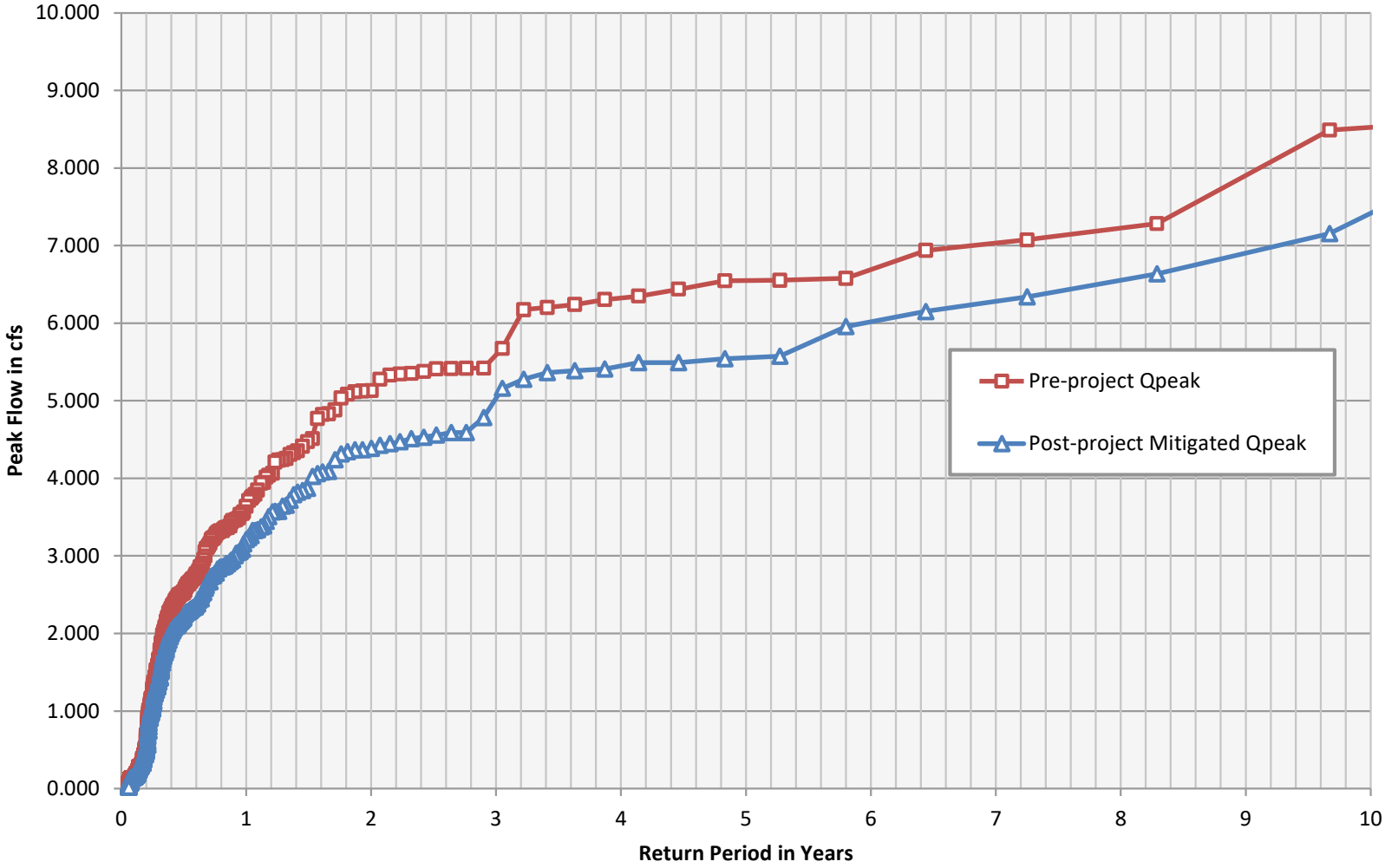
POC-1

Peak Flow Frequency Summary

Return Period	Pre-project Qpeak (cfs)	Post-project - Mitigated Q (cfs)
LF = 0.1xQ2	0.513	0.439
2-year	5.132	4.389
5-year	6.549	5.554
10-year	8.525	7.417

Peak Flow Frequency Curves

POC-1



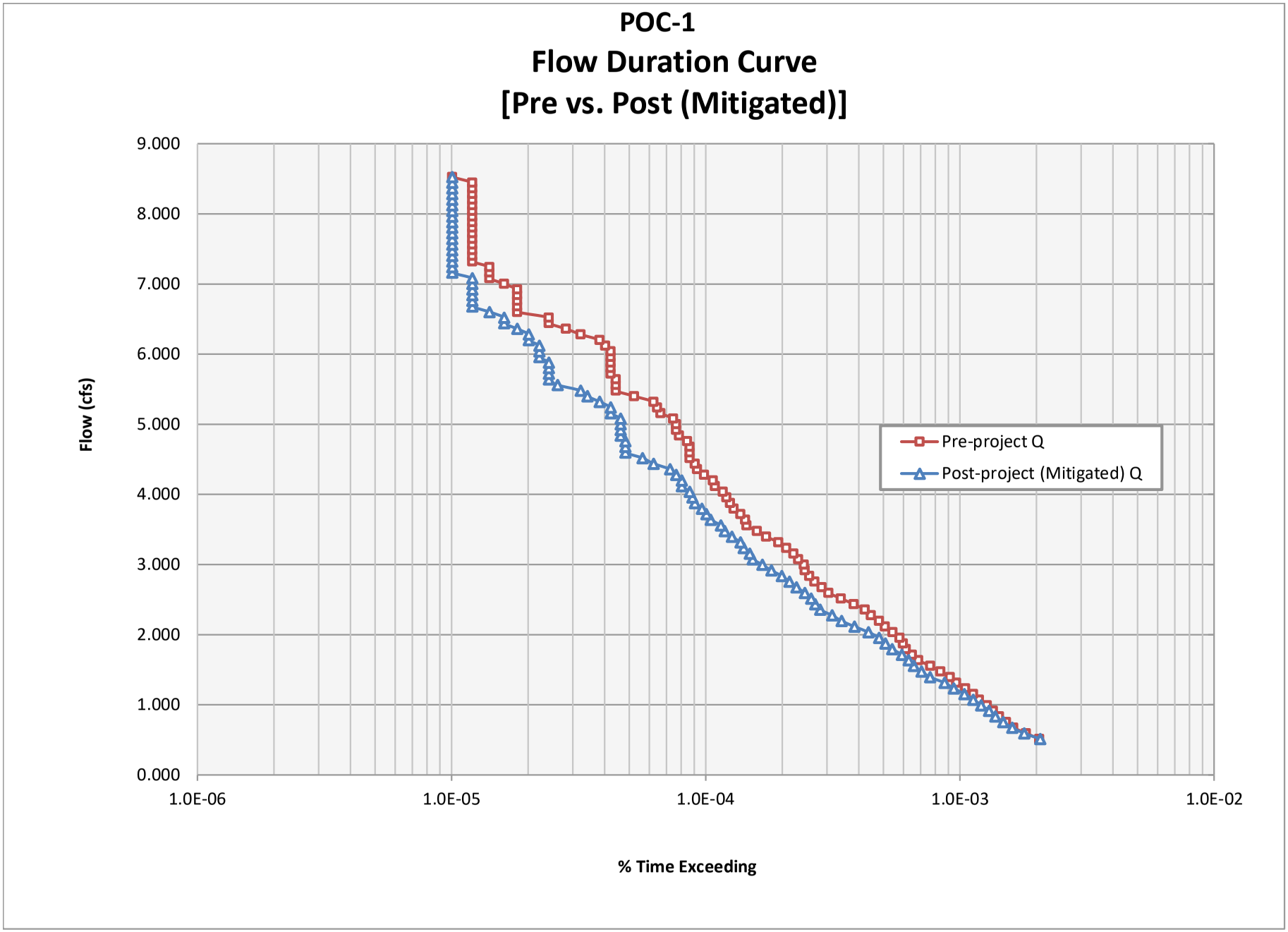
POC-1

Low-flow Threshold:	10%	
0.1xQ2 (Pre):	0.513	cfs
Q10 (Pre):	8.525	cfs
Ordinate #:	100	
Incremental Q (Pre):	0.08012	cfs
Total Hourly Data:	497370	hours

The proposed BMP: PASSED

Interval	Pre-project Flow (cfs)	Pre-project Hours	Pre-project % Time Exceeding	Post-project Hours	Post-project % Time Exceeding	Percentage	Pass/Fail
0	0.513	1020	2.05E-03	1028	2.07E-03	101%	Pass
1	0.593	905	1.82E-03	890	1.79E-03	98%	Pass
2	0.673	807	1.62E-03	799	1.61E-03	99%	Pass
3	0.754	755	1.52E-03	736	1.48E-03	97%	Pass
4	0.834	709	1.43E-03	685	1.38E-03	97%	Pass
5	0.914	671	1.35E-03	647	1.30E-03	96%	Pass
6	0.994	635	1.28E-03	602	1.21E-03	95%	Pass
7	1.074	591	1.19E-03	561	1.13E-03	95%	Pass
8	1.154	560	1.13E-03	518	1.04E-03	93%	Pass
9	1.234	522	1.05E-03	470	9.45E-04	90%	Pass
10	1.314	481	9.67E-04	432	8.69E-04	90%	Pass
11	1.395	454	9.13E-04	379	7.62E-04	83%	Pass
12	1.475	417	8.38E-04	351	7.06E-04	84%	Pass
13	1.555	380	7.64E-04	327	6.57E-04	86%	Pass
14	1.635	341	6.86E-04	312	6.27E-04	91%	Pass
15	1.715	322	6.47E-04	294	5.91E-04	91%	Pass
16	1.795	305	6.13E-04	269	5.41E-04	88%	Pass
17	1.875	297	5.97E-04	253	5.09E-04	85%	Pass
18	1.955	288	5.79E-04	239	4.81E-04	83%	Pass
19	2.035	270	5.43E-04	217	4.36E-04	80%	Pass
20	2.116	252	5.07E-04	191	3.84E-04	76%	Pass
21	2.196	239	4.81E-04	170	3.42E-04	71%	Pass
22	2.276	222	4.46E-04	156	3.14E-04	70%	Pass
23	2.356	210	4.22E-04	140	2.81E-04	67%	Pass
24	2.436	190	3.82E-04	134	2.69E-04	71%	Pass
25	2.516	169	3.40E-04	129	2.59E-04	76%	Pass
26	2.596	151	3.04E-04	122	2.45E-04	81%	Pass
27	2.676	142	2.86E-04	113	2.27E-04	80%	Pass
28	2.757	133	2.67E-04	106	2.13E-04	80%	Pass
29	2.837	127	2.55E-04	99	1.99E-04	78%	Pass
30	2.917	122	2.45E-04	90	1.81E-04	74%	Pass
31	2.997	121	2.43E-04	83	1.67E-04	69%	Pass
32	3.077	115	2.31E-04	76	1.53E-04	66%	Pass
33	3.157	110	2.21E-04	74	1.49E-04	67%	Pass
34	3.237	103	2.07E-04	70	1.41E-04	68%	Pass
35	3.317	96	1.93E-04	68	1.37E-04	71%	Pass
36	3.397	86	1.73E-04	63	1.27E-04	73%	Pass
37	3.478	79	1.59E-04	59	1.19E-04	75%	Pass
38	3.558	72	1.45E-04	57	1.15E-04	79%	Pass
39	3.638	71	1.43E-04	52	1.05E-04	73%	Pass
40	3.718	68	1.37E-04	50	1.01E-04	74%	Pass
41	3.798	64	1.29E-04	48	9.65E-05	75%	Pass
42	3.878	62	1.25E-04	45	9.05E-05	73%	Pass
43	3.958	60	1.21E-04	44	8.85E-05	73%	Pass
44	4.038	58	1.17E-04	43	8.65E-05	74%	Pass
45	4.119	54	1.09E-04	40	8.04E-05	74%	Pass
46	4.199	53	1.07E-04	40	8.04E-05	75%	Pass
47	4.279	49	9.85E-05	38	7.64E-05	78%	Pass
48	4.359	46	9.25E-05	36	7.24E-05	78%	Pass
49	4.439	45	9.05E-05	31	6.23E-05	69%	Pass
50	4.519	43	8.65E-05	28	5.63E-05	65%	Pass

Interval	Pre-project Flow (cfs)	Pre-project Hours	Pre-project % Time Exceeding	Post-project Hours	Post-project % Time Exceeding	Percentage	Pass/Fail
51	4.599	43	8.65E-05	24	4.83E-05	56%	Pass
52	4.679	43	8.65E-05	24	4.83E-05	56%	Pass
53	4.759	42	8.44E-05	24	4.83E-05	57%	Pass
54	4.840	39	7.84E-05	23	4.62E-05	59%	Pass
55	4.920	38	7.64E-05	23	4.62E-05	61%	Pass
56	5.000	38	7.64E-05	23	4.62E-05	61%	Pass
57	5.080	37	7.44E-05	23	4.62E-05	62%	Pass
58	5.160	33	6.63E-05	21	4.22E-05	64%	Pass
59	5.240	32	6.43E-05	21	4.22E-05	66%	Pass
60	5.320	31	6.23E-05	19	3.82E-05	61%	Pass
61	5.400	26	5.23E-05	17	3.42E-05	65%	Pass
62	5.481	22	4.42E-05	16	3.22E-05	73%	Pass
63	5.561	22	4.42E-05	13	2.61E-05	59%	Pass
64	5.641	22	4.42E-05	12	2.41E-05	55%	Pass
65	5.721	21	4.22E-05	12	2.41E-05	57%	Pass
66	5.801	21	4.22E-05	12	2.41E-05	57%	Pass
67	5.881	21	4.22E-05	12	2.41E-05	57%	Pass
68	5.961	21	4.22E-05	11	2.21E-05	52%	Pass
69	6.041	21	4.22E-05	11	2.21E-05	52%	Pass
70	6.121	20	4.02E-05	11	2.21E-05	55%	Pass
71	6.202	19	3.82E-05	10	2.01E-05	53%	Pass
72	6.282	16	3.22E-05	10	2.01E-05	63%	Pass
73	6.362	14	2.81E-05	9	1.81E-05	64%	Pass
74	6.442	12	2.41E-05	8	1.61E-05	67%	Pass
75	6.522	12	2.41E-05	8	1.61E-05	67%	Pass
76	6.602	9	1.81E-05	7	1.41E-05	78%	Pass
77	6.682	9	1.81E-05	6	1.21E-05	67%	Pass
78	6.762	9	1.81E-05	6	1.21E-05	67%	Pass
79	6.843	9	1.81E-05	6	1.21E-05	67%	Pass
80	6.923	9	1.81E-05	6	1.21E-05	67%	Pass
81	7.003	8	1.61E-05	6	1.21E-05	75%	Pass
82	7.083	7	1.41E-05	6	1.21E-05	86%	Pass
83	7.163	7	1.41E-05	5	1.01E-05	71%	Pass
84	7.243	7	1.41E-05	5	1.01E-05	71%	Pass
85	7.323	6	1.21E-05	5	1.01E-05	83%	Pass
86	7.403	6	1.21E-05	5	1.01E-05	83%	Pass
87	7.484	6	1.21E-05	5	1.01E-05	83%	Pass
88	7.564	6	1.21E-05	5	1.01E-05	83%	Pass
89	7.644	6	1.21E-05	5	1.01E-05	83%	Pass
90	7.724	6	1.21E-05	5	1.01E-05	83%	Pass
91	7.804	6	1.21E-05	5	1.01E-05	83%	Pass
92	7.884	6	1.21E-05	5	1.01E-05	83%	Pass
93	7.964	6	1.21E-05	5	1.01E-05	83%	Pass
94	8.044	6	1.21E-05	5	1.01E-05	83%	Pass
95	8.124	6	1.21E-05	5	1.01E-05	83%	Pass
96	8.205	6	1.21E-05	5	1.01E-05	83%	Pass
97	8.285	6	1.21E-05	5	1.01E-05	83%	Pass
98	8.365	6	1.21E-05	5	1.01E-05	83%	Pass
99	8.445	6	1.21E-05	5	1.01E-05	83%	Pass
100	8.525	5	1.01E-05	5	1.01E-05	100%	Pass


POC-1
Flow Duration Curve
[Pre vs. Post (Mitigated)]
9.000
8.000
7.000
6.000
5.000
4.000
3.000
2.000
1.000
0.000
Flow (cfs)
1.0E-06
1.0E-05
1.0E-04
1.0E-03
1.0E-02
% Time Exceeding
Pre-project Q
Post-project (Mitigated) Q

BMP-A

SWMM Model Flow Coefficient Calculation

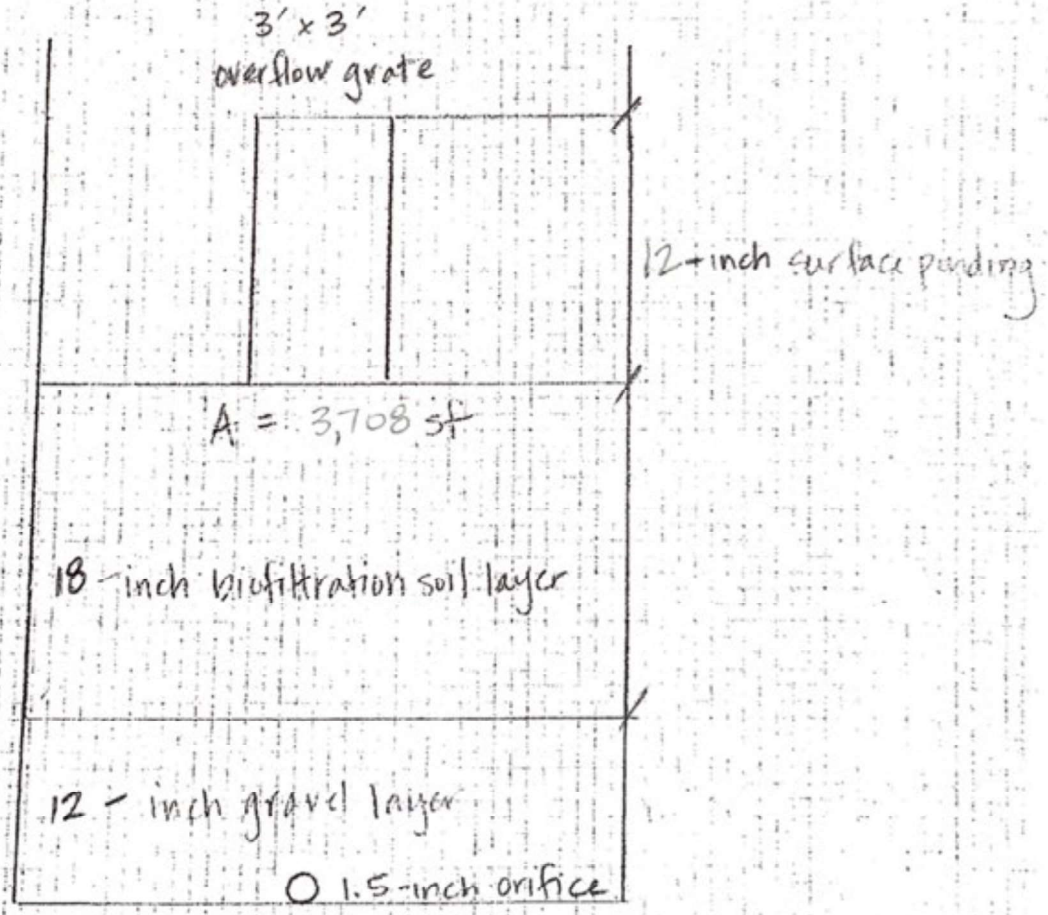
PARAMETER	ABBREV.	Bio-Retention Cell LID BMP	
Ponding Depth	PD	12	in
Bioretention Soil Layer	S	18	in
Gravel Layer	G	12	in
TOTAL		3.5	ft
		42	in
Orifice Coefficient	c_g	0.6	--
Low Flow Orifice Diameter	D	1.5	in
Drain exponent	n	0.5	--
Flow Rate (volumetric)	Q	0.110	cfs
Ponding Depth Surface Area	A_{PD}	3708	ft^2
Bioretention Surface Area	A_S, A_G	3708	ft^2
	A_S, A_G	0.0851	ac
Porosity of Bioretention Soil	n	1.00	-
Flow Rate (per unit area)	q	1.276	in/hr
Effective Ponding Depth	PD_{eff}	**12.00**	in
Flow Coefficient	C	**0.1987**	--

PASCO LARET SUITER & ASSOCIATES

Melamed

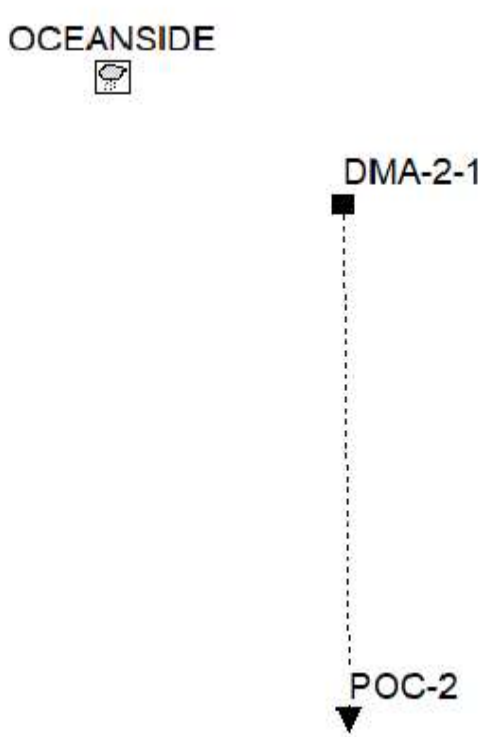
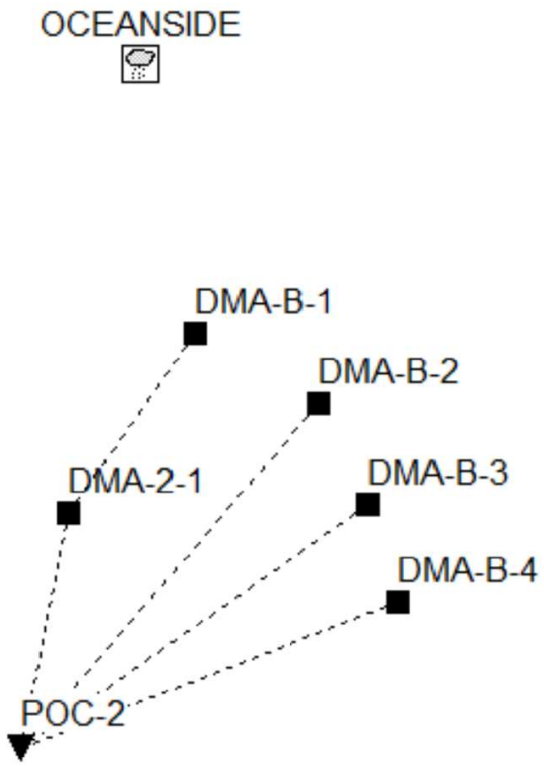
Date 12/9/2020 Job# 3009

HMP. Partial Infiltration Basin BMP-A



not to scale

SWMM MODEL SCHEMATICS

PRE-PROJECT MODEL	POST-PROJECT MODEL
	

3009 Melamed
12/9/2020

POC-2

SWMM INPUT

PRE-PROJECT

DMA	Basin	Area (ac)	Width (Area/Flow Length) (ft)	% Slope	% Impervious	% "B" Soils	% "C" Soils	% "D" Soils	Weighted Infiltration (in/hr):	Weighted Suction Head (in):	Weighted Initial Deficit:
2-1		6.98	609	17.0%	5.5%	0%	0%	100%	0.025	9.000	0.330
	Total:	**6.98**									

POST-PROJECT

DMA	BMP	Area (ac)	Width (Area/Flow Length) (ft)	% Impervious	% Slope	% "B" Soils	% "C" Soils	% "D" Soils	Weighted Infiltration (in/hr):	Weighted Suction Head (in):	Weighted Initial Deficit:
2-1	N/A	6.24	545	6.2%	17.0%	0%	0.0%	100%	0.025	9.000	0.330
B-1	N/A	0.08	113	0.0%	50.0%	0%	0.0%	100%	0.019	9.000	0.330
B-2	N/A	0.13	61	0.0%	7.0%	0%	0.0%	100%	0.019	9.000	0.330
B-3	N/A	0.11	133	0.0%	50.0%	0%	0.0%	100%	0.019	9.000	0.330
B-4	N/A	0.22	139	0.0%	30.0%	0%	0.0%	100%	0.019	9.000	0.330
	Total:	**6.78**									

Infiltration:		
D:	0.025	in/hr

Suction Head:		
D:	9	in

Initial Deficit	
D:	0.33

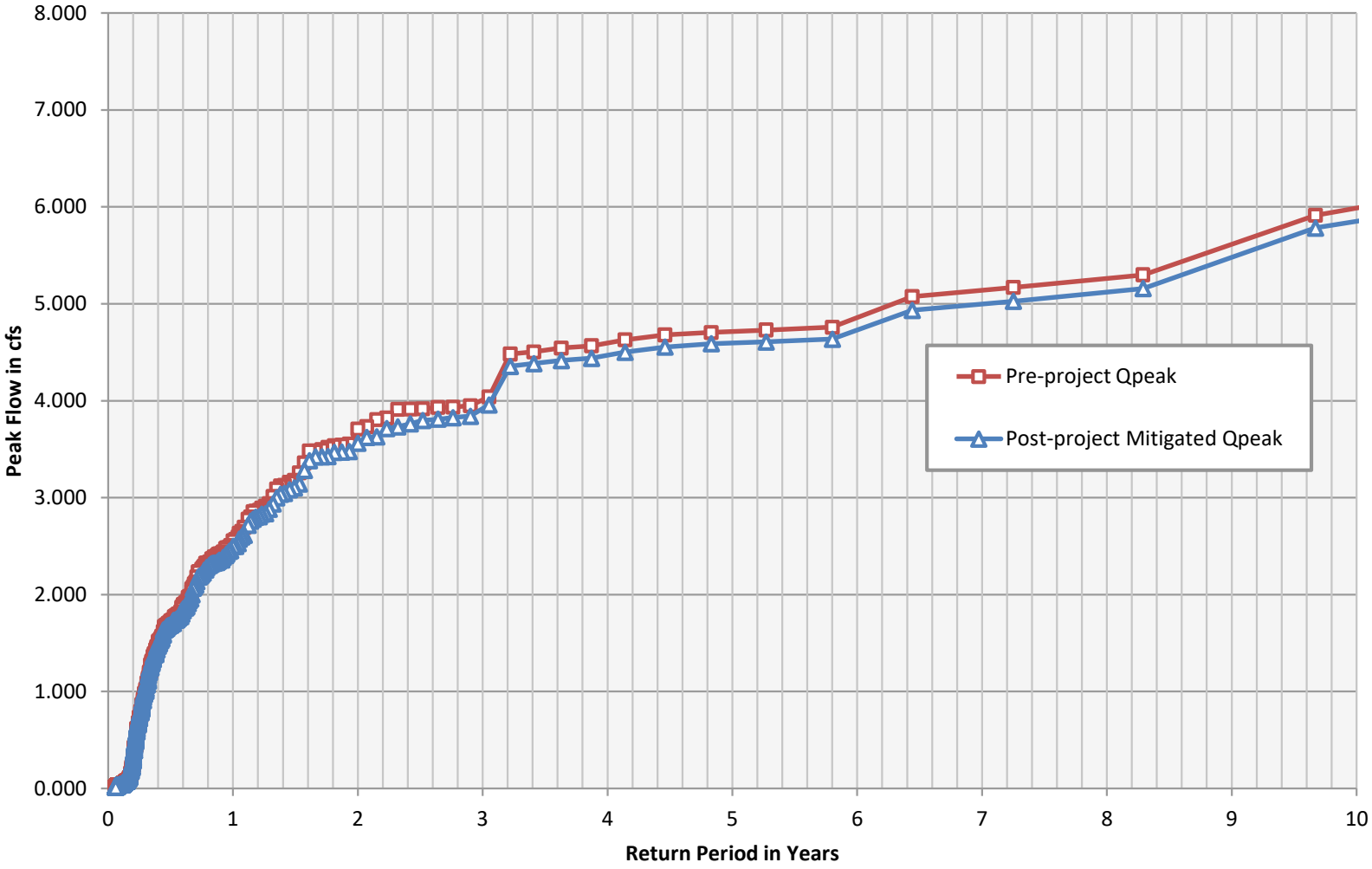
POC-2

Peak Flow Frequency Summary

Return Period	Pre-project Qpeak (cfs)	Post-project - Mitigated Q (cfs)
LF = 0.1xQ2	0.371	0.356
2-year	3.705	3.562
5-year	4.714	4.595
10-year	5.987	5.850

Peak Flow Frequency Curves

POC-2



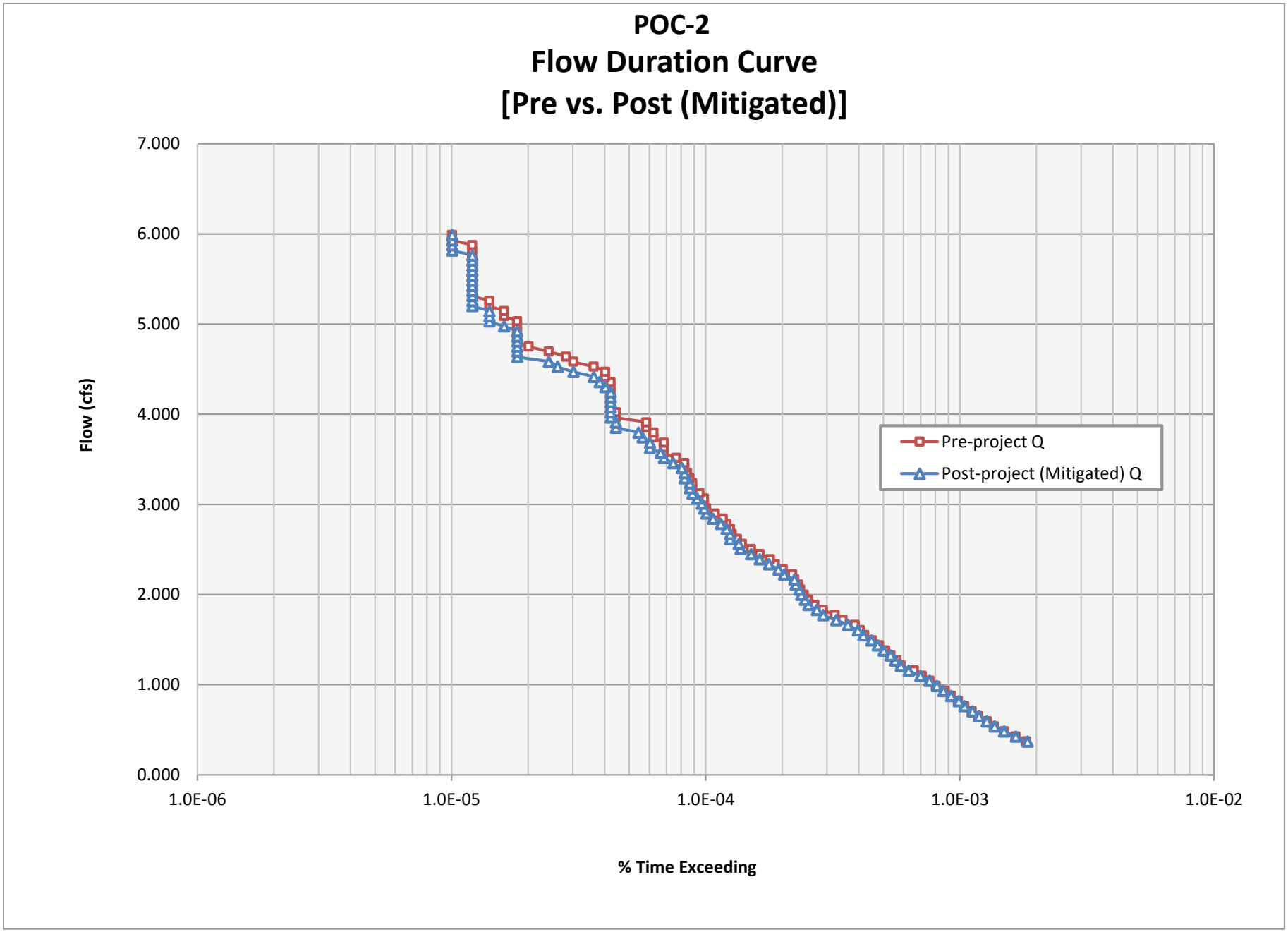
POC-2

Low-flow Threshold:	10%	
0.1xQ2 (Pre):	0.371	cfs
Q10 (Pre):	5.987	cfs
Ordinate #:	100	
Incremental Q (Pre):	0.05617	cfs
Total Hourly Data:	497370	hours

The proposed BMP: PASSED

Interval	Pre-project Flow (cfs)	Pre-project Hours	Pre-project % Time Exceeding	Post-project Hours	Post-project % Time Exceeding	Percentage	Pass/Fail
0	0.371	906	1.82E-03	917	1.84E-03	101%	Pass
1	0.427	824	1.66E-03	825	1.66E-03	100%	Pass
2	0.483	741	1.49E-03	742	1.49E-03	100%	Pass
3	0.539	676	1.36E-03	681	1.37E-03	101%	Pass
4	0.595	636	1.28E-03	633	1.27E-03	100%	Pass
5	0.651	587	1.18E-03	591	1.19E-03	101%	Pass
6	0.708	554	1.11E-03	557	1.12E-03	101%	Pass
7	0.764	517	1.04E-03	518	1.04E-03	100%	Pass
8	0.820	489	9.83E-04	492	9.89E-04	101%	Pass
9	0.876	459	9.23E-04	459	9.23E-04	100%	Pass
10	0.932	434	8.73E-04	428	8.61E-04	99%	Pass
11	0.988	400	8.04E-04	403	8.10E-04	101%	Pass
12	1.045	378	7.60E-04	377	7.58E-04	100%	Pass
13	1.101	352	7.08E-04	347	6.98E-04	99%	Pass
14	1.157	328	6.59E-04	312	6.27E-04	95%	Pass
15	1.213	291	5.85E-04	291	5.85E-04	100%	Pass
16	1.269	280	5.63E-04	276	5.55E-04	99%	Pass
17	1.325	265	5.33E-04	265	5.33E-04	100%	Pass
18	1.382	253	5.09E-04	249	5.01E-04	98%	Pass
19	1.438	239	4.81E-04	236	4.74E-04	99%	Pass
20	1.494	224	4.50E-04	223	4.48E-04	100%	Pass
21	1.550	209	4.20E-04	207	4.16E-04	99%	Pass
22	1.606	201	4.04E-04	197	3.96E-04	98%	Pass
23	1.662	192	3.86E-04	180	3.62E-04	94%	Pass
24	1.719	172	3.46E-04	162	3.26E-04	94%	Pass
25	1.775	160	3.22E-04	144	2.90E-04	90%	Pass
26	1.831	144	2.90E-04	136	2.73E-04	94%	Pass
27	1.887	133	2.67E-04	126	2.53E-04	95%	Pass
28	1.943	126	2.53E-04	122	2.45E-04	97%	Pass
29	1.999	121	2.43E-04	118	2.37E-04	98%	Pass
30	2.056	117	2.35E-04	116	2.33E-04	99%	Pass
31	2.112	115	2.31E-04	112	2.25E-04	97%	Pass
32	2.168	111	2.23E-04	111	2.23E-04	100%	Pass
33	2.224	109	2.19E-04	101	2.03E-04	93%	Pass
34	2.280	100	2.01E-04	96	1.93E-04	96%	Pass
35	2.336	93	1.87E-04	88	1.77E-04	95%	Pass
36	2.393	89	1.79E-04	81	1.63E-04	91%	Pass
37	2.449	81	1.63E-04	75	1.51E-04	93%	Pass
38	2.505	75	1.51E-04	68	1.37E-04	91%	Pass
39	2.561	69	1.39E-04	67	1.35E-04	97%	Pass
40	2.617	66	1.33E-04	62	1.25E-04	94%	Pass
41	2.673	63	1.27E-04	62	1.25E-04	98%	Pass
42	2.730	62	1.25E-04	60	1.21E-04	97%	Pass
43	2.786	60	1.21E-04	57	1.15E-04	95%	Pass
44	2.842	58	1.17E-04	53	1.07E-04	91%	Pass
45	2.898	54	1.09E-04	50	1.01E-04	93%	Pass
46	2.954	50	1.01E-04	49	9.85E-05	98%	Pass
47	3.010	49	9.85E-05	48	9.65E-05	98%	Pass
48	3.067	49	9.85E-05	46	9.25E-05	94%	Pass
49	3.123	47	9.45E-05	44	8.85E-05	94%	Pass
50	3.179	44	8.85E-05	43	8.65E-05	98%	Pass

Interval	Pre-project Flow (cfs)	Pre-project Hours	Pre-project % Time Exceeding	Post-project Hours	Post-project % Time Exceeding	Percentage	Pass/Fail
51	3.235	44	8.85E-05	43	8.65E-05	98%	Pass
52	3.291	43	8.65E-05	41	8.24E-05	95%	Pass
53	3.347	42	8.44E-05	41	8.24E-05	98%	Pass
54	3.404	41	8.24E-05	40	8.04E-05	98%	Pass
55	3.460	41	8.24E-05	37	7.44E-05	90%	Pass
56	3.516	38	7.64E-05	34	6.84E-05	89%	Pass
57	3.572	34	6.84E-05	33	6.63E-05	97%	Pass
58	3.628	34	6.84E-05	30	6.03E-05	88%	Pass
59	3.684	34	6.84E-05	30	6.03E-05	88%	Pass
60	3.741	31	6.23E-05	28	5.63E-05	90%	Pass
61	3.797	31	6.23E-05	27	5.43E-05	87%	Pass
62	3.853	29	5.83E-05	22	4.42E-05	76%	Pass
63	3.909	29	5.83E-05	22	4.42E-05	76%	Pass
64	3.965	22	4.42E-05	21	4.22E-05	95%	Pass
65	4.021	22	4.42E-05	21	4.22E-05	95%	Pass
66	4.078	21	4.22E-05	21	4.22E-05	100%	Pass
67	4.134	21	4.22E-05	21	4.22E-05	100%	Pass
68	4.190	21	4.22E-05	21	4.22E-05	100%	Pass
69	4.246	21	4.22E-05	21	4.22E-05	100%	Pass
70	4.302	21	4.22E-05	20	4.02E-05	95%	Pass
71	4.359	21	4.22E-05	19	3.82E-05	90%	Pass
72	4.415	20	4.02E-05	18	3.62E-05	90%	Pass
73	4.471	20	4.02E-05	15	3.02E-05	75%	Pass
74	4.527	18	3.62E-05	13	2.61E-05	72%	Pass
75	4.583	15	3.02E-05	12	2.41E-05	80%	Pass
76	4.639	14	2.81E-05	9	1.81E-05	64%	Pass
77	4.696	12	2.41E-05	9	1.81E-05	75%	Pass
78	4.752	10	2.01E-05	9	1.81E-05	90%	Pass
79	4.808	9	1.81E-05	9	1.81E-05	100%	Pass
80	4.864	9	1.81E-05	9	1.81E-05	100%	Pass
81	4.920	9	1.81E-05	9	1.81E-05	100%	Pass
82	4.976	9	1.81E-05	8	1.61E-05	89%	Pass
83	5.033	9	1.81E-05	7	1.41E-05	78%	Pass
84	5.089	8	1.61E-05	7	1.41E-05	88%	Pass
85	5.145	8	1.61E-05	7	1.41E-05	88%	Pass
86	5.201	7	1.41E-05	6	1.21E-05	86%	Pass
87	5.257	7	1.41E-05	6	1.21E-05	86%	Pass
88	5.313	6	1.21E-05	6	1.21E-05	100%	Pass
89	5.370	6	1.21E-05	6	1.21E-05	100%	Pass
90	5.426	6	1.21E-05	6	1.21E-05	100%	Pass
91	5.482	6	1.21E-05	6	1.21E-05	100%	Pass
92	5.538	6	1.21E-05	6	1.21E-05	100%	Pass
93	5.594	6	1.21E-05	6	1.21E-05	100%	Pass
94	5.650	6	1.21E-05	6	1.21E-05	100%	Pass
95	5.707	6	1.21E-05	6	1.21E-05	100%	Pass
96	5.763	6	1.21E-05	6	1.21E-05	100%	Pass
97	5.819	6	1.21E-05	5	1.01E-05	83%	Pass
98	5.875	6	1.21E-05	5	1.01E-05	83%	Pass
99	5.931	5	1.01E-05	5	1.01E-05	100%	Pass
100	5.987	5	1.01E-05	5	1.01E-05	100%	Pass


POC-2
Flow Duration Curve
[Pre vs. Post (Mitigated)]
7.000
6.000
5.000
4.000
3.000
2.000
1.000
0.000
Flow (cfs)
1.0E-06
1.0E-05
1.0E-04
1.0E-03
1.0E-02
% Time Exceeding
Pre-project Q
Post-project (Mitigated) Q

Drawdown Calculation for BMP-A

Project Name Melamed

Project No 3009

Surface Drawdown Time:	9.4	**hr**
Surface Area	**3708**	**sq ft**
Underdrain Orifice Diameter: in	**1.5**	in
C:	**0.6**	
Surface Ponding (to invert of lowest surface discharge opening in outlet structure):	**1**	ft
Amended Soil Depth:	**1.5**	ft
Gravel Depth:	**1**	ft
Orifice Q =	**0.109**	cfs
Effective Depth	20.4	in
Infiltration controlled by orifice	1.276	in/hr

Manning's *n* Values for Overland Flow[1]

The BMP Design Manuals within the County of San Diego allow for a land surface description other than short prairie grass to be used for hydromodification BMP design only if documentation provided is consistent with Table A.6 of the SWMM 5 User's Manual.

In January 2016, the EPA released the SWMM Reference Manual Volume I – Hydrology (SWMM Hydrology Reference Manual). The SWMM Hydrology Reference Manual complements the SWMM 5 User's Manual by providing an in-depth description of the program's hydrologic components. Table 3-5 of the SWMM Hydrology Reference Manual expounds upon Table A.6 of the SWMM 5 User's Manual by providing Manning's *n* values for additional overland flow surfaces. Therefore, in order to provide SWMM users with a wider range of land surfaces suitable for local application and to provide Copermittees with confidence in the design parameters, we recommend using the values published by Yen and Chow in Table 3-5 of the EPA SWMM Reference Manual Volume I – Hydrology. The values are provided in the table below:

Overland Surface	**Manning value (*n*)**
Smooth asphalt pavement	0.010
Smooth impervious surface	0.011
Tar and sand pavement	0.012
Concrete pavement	0.014
Rough impervious surface	0.015
Smooth bare packed soil	0.017
Moderate bare packed soil	0.025
Rough bare packed soil	0.032
Gravel soil	0.025
Mowed poor grass	0.030
Average grass, closely clipped sod	0.040
Pasture	0.040
Timberland	0.060
Dense grass	0.060
Shrubs and bushes	0.080
Land Use	
Business	0.014
Semibusiness	0.022
Industrial	0.020
Dense residential	0.025
Suburban residential	0.030
Parks and lawns	0.040

[1]Content summarized from *Improving Accuracy in Continuous Simulation Modeling: Guidance for Selecting Pervious Overland Flow Manning's n Values in the San Diego Region* (TRWE, 2016).

Map Scale: 1:1,720 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 25 50 100 150

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 13, Sep 12, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 3, 2014—Nov 22, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
AtD2	Altamont clay, 9 to 15 percent slopes, eroded	D	1.0	11.9%
AtE2	Altamont clay, 15 to 30 percent slopes, eroded	D	1.0	12.1%
RuG	Rough broken land	D	6.5	76.0%
Totals for Area of Interest			**8.5**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

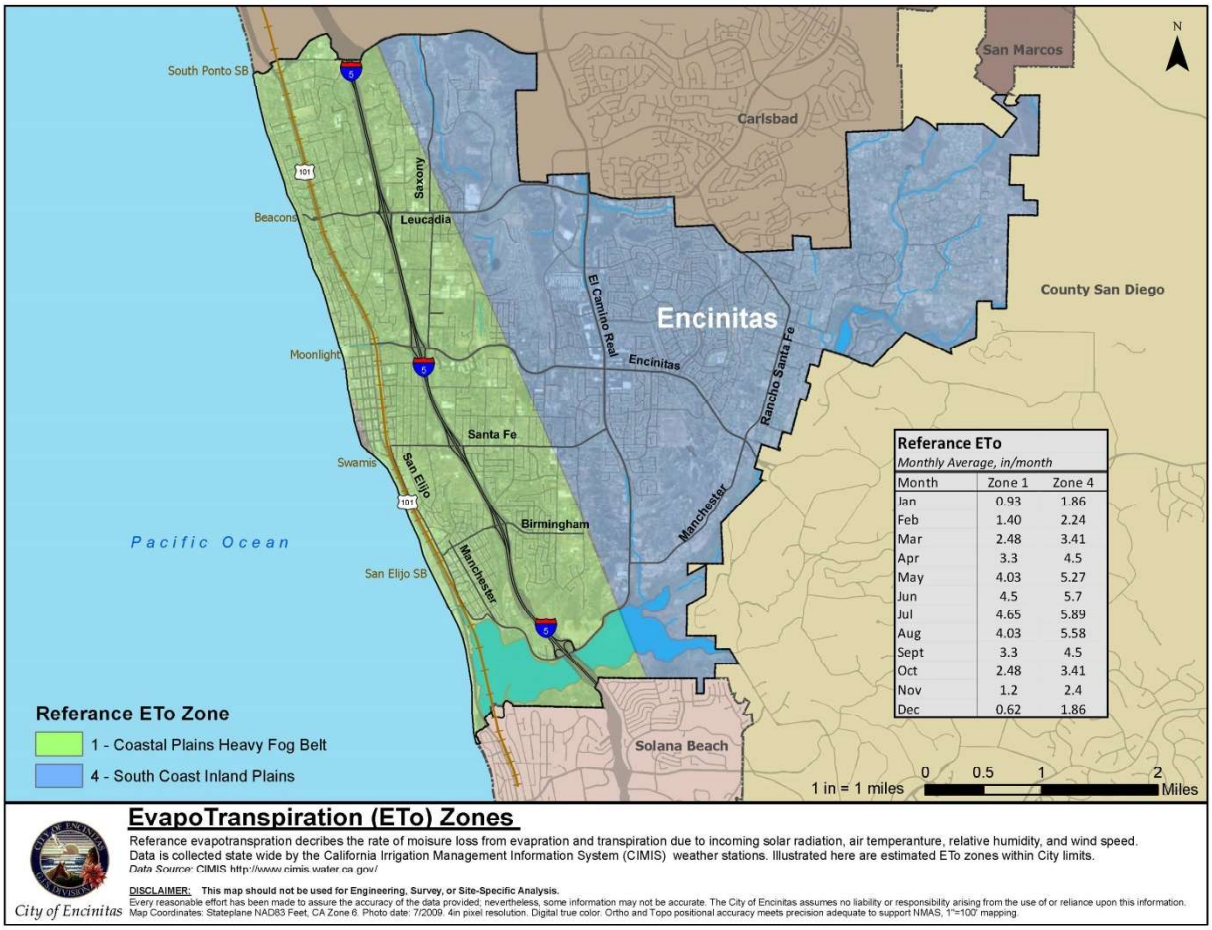


Figure G.1-2: California Irrigation Management Information System "Reference Evapotranspiration Zones"

Table G.1-1: Monthly Average Reference Evapotranspiration by ETo Zone (inches/month and inches/day) for use in SWMM Models for Hydromodification Management Studies in San Diego County CIMIS Zones 1, 4, 6, 9, and 16 (See CIMIS ETo Zone Map)

	January	February	March	April	May	June	July	August	September	October	November	December
Zone	in/month	in/month	in/month	in/month	in/month	in/month	in/month	in/month	in/month	in/month	in/month	in/month
1	0.93	1.4	2.48	3.3	4.03	4.5	4.65	4.03	3.3	2.48	1.2	0.62
4	1.86	2.24	3.41	4.5	5.27	5.7	5.89	5.58	4.5	3.41	2.4	1.86
6	1.86	2.24	3.41	4.8	5.58	6.3	6.51	6.2	4.8	3.72	2.4	1.86
9	2.17	2.8	4.03	5.1	5.89	6.6	7.44	6.82	5.7	4.03	2.7	1.86
16	1.55	2.52	4.03	5.7	7.75	8.7	9.3	8.37	6.3	4.34	2.4	1.55
	January	**February**	**March**	**April**	**May**	**June**	**July**	**August**	**September**	**October**	**November**	**December**
Days	31	28	31	30	31	30	31	31	30	31	30	31
Zone	in/day	in/day	in/day	in/day	in/day	in/day	in/day	in/day	in/day	in/day	in/day	in/day
1	0.030	0.050	0.080	0.110	0.130	0.150	0.150	0.130	0.110	0.080	0.040	0.020
4	0.060	0.080	0.110	0.150	0.170	0.190	0.190	0.180	0.150	0.110	0.080	0.060
6	0.060	0.080	0.110	0.160	0.180	0.210	0.210	0.200	0.160	0.120	0.080	0.060
9	0.070	0.100	0.130	0.170	0.190	0.220	0.240	0.220	0.190	0.130	0.090	0.060
16	0.050	0.090	0.130	0.190	0.250	0.290	0.300	0.270	0.210	0.140	0.080	0.050

ATTACHMENT 3 - STRUCTURAL BMP MAINTENANCE INFORMATION

This is the cover sheet for Attachment 3.

Indicate which items are included behind this cover sheet:

Attachment	Contents	Checklist
Attachment 3a	Structural BMP Maintenance Thresholds and Actions (Required)	☑ Included See Structural BMP Maintenance Information Checklist on the back of this Attachment cover sheet.
Attachment 3b	Draft Maintenance Agreement (when applicable)	□ Included □ Not Applicable

Use this checklist to ensure the required information has been included in the Structural BMP Maintenance Information Attachment:

□ **Preliminary Design / Planning / CEQA level submittal:**

Attachment 3a must identify:

□ Typical maintenance indicators and actions for proposed structural BMP(s) based on Section 7.7 of the BMP Design Manual

Attachment 3b is not required for preliminary design / planning / CEQA level submittal.

□ **Final Design level submittal:**

Attachment 3a must identify:

□ Specific maintenance indicators and actions for proposed structural BMP(s). This shall be based on Section 7.7 of the BMP Design Manual and enhanced to reflect actual proposed components of the structural BMP(s)

□ How to access the structural BMP(s) to inspect and perform maintenance

□ Features that are provided to facilitate inspection (e.g., observation ports, cleanouts, silt posts, or other features that allow the inspector to view necessary components of the structural BMP and compare to maintenance thresholds)

□ Manufacturer and part number for proprietary parts of structural BMP(s) when applicable

□ Maintenance thresholds specific to the structural BMP(s), with a location-specific frame of reference (e.g., level of accumulated materials that triggers removal of the materials, to be identified based on viewing marks on silt posts or measured with a survey rod with respect to a fixed benchmark within the BMP)

□ Recommended equipment to perform maintenance

□ When applicable, necessary special training or certification requirements for inspection and maintenance personnel such as confined space entry or hazardous waste management

Attachment 3b: For private entity operation and maintenance, Attachment 3b shall include a draft maintenance agreement in the local jurisdiction's standard format (PDP applicant to contact the City Engineer to obtain the current maintenance agreement forms).

Attachment 3a: Structural BMP Maintenance Thresholds and Actions

Inspection and Maintenance Activities for Treatment Control BMPs (TC-BMPs)

The structural treatment control BMPs for the proposed project consist of two (2) biofiltration basins, including one with partial retention. The discussions below provide inspection frequency, maintenance indicators and maintenance activities for the proposed structural BMPs. The proposed biofiltration basins should be inspected and maintained to ensure proper functionality over time. The following tables provide recommendations for inspection and maintenance for the biofiltration basins in order to ensure their lasting effectiveness.

Biofiltration Basin

During inspection, the inspector shall check for the maintenance indicators given below and take the appropriate maintenance action:

Typical Maintenance Indicator(s) for Vegetated BMPs	Maintenance Actions
Accumulation of sediment, litter, or debris	Remove and properly dispose of accumulated materials, without damage to the vegetation.
Poor vegetation establishment	Re-seed, re-plant, or re-establish vegetation per original plans.
Overgrown vegetation	Mow or trim as appropriate, but not less than the design height of the vegetation per original plans when applicable
Erosion due to concentrated irrigation flow	Repair/re-seed/re-plant eroded areas and adjust the irrigation system.
Erosion due to concentrated storm water runoff flow	Repair/re-seed/re-plant eroded areas, and make appropriate corrective measures such as adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan. If the issue is not corrected by restoring the BMP to the original plan and grade, the City Engineer shall be contacted prior to any additional repairs or reconstruction.
Standing water in or biofiltration basin for longer than 96 hours following a storm event*	Make appropriate corrective measures such as adjusting irrigation system, removing obstructions of debris or invasive vegetation, clearing underdrains (where applicable), or repairing/replacing clogged or compacted soils.
Obstructed inlet or outlet structure	Clear obstructions.
Damage to structural componentssuch as weirs,	Repair or replace as applicable.
*These BMPs typically include a surface ponding layer as part of their function which may take 96 hours to drain following a storm event.	

Inspection and Maintenance Frequency

The Table below lists the TC-BMPs to be inspected and maintained and the minimum frequency of inspection and maintenance activities.

Summary Table of Inspection and Maintenance Frequency

BMP	Inspection Frequency	Maintenance Frequency
Biofiltration Basin	At a minimum: annually, and after major storm events	Routine maintenance to remove accumulated materials at the inlets and outlets: annually, on or before September 30th. As-needed maintenance based on maintenance indicators

The frequencies given in the Summary Table of Inspection and Maintenance Frequency are minimum recommended frequencies for inspection and maintenance activities for the project. Typically, the frequency of maintenance required for structural BMPs is site and drainage area specific. If it is determined during the regularly scheduled inspection and/or routine maintenance that a structural BMP requires more frequent maintenance (e.g., to remove accumulated trash) it may be necessary to increase the frequency of inspection and/or routine maintenance.

Recordkeeping Requirements

The party responsible to ensure implementation and funding of maintenance of structural BMPs shall maintain records documenting the inspection and maintenance activities. The records must be kept a minimum of 5 years and shall be made available to the City of Encinitas for inspection upon request at any time.

PR-1

Biofiltration with Partial Retention

BMP MAINTENANCE FACT SHEET
FOR
STRUCTURAL BMP PR-1 BIOFILTRATION WITH PARTIAL RETENTION

Biofiltration with partial retention facilities are vegetated surface water systems that filter water through vegetation and soil or engineered media prior to infiltrating into native soils, discharge via underdrain, or overflow to the downstream conveyance system. These BMPs have an elevated underdrain discharge point that creates storage capacity in the aggregate storage layer. Typical biofiltration with partial retention components include:

- Inflow distribution mechanisms (e.g., perimeter flow spreader or filter strips)
- Energy dissipation mechanism for concentrated inflows (e.g., splash blocks or riprap)
- Shallow surface ponding for captured flows
- Side slope and basin bottom vegetation selected based on climate and ponding depth
- Non-floating mulch layer
- Media layer (planting mix or engineered media) capable of supporting vegetation growth
- Filter course layer consisting of aggregate to prevent the migration of fines into uncompacted native soils or the aggregate storage layer
- Aggregate storage layer with underdrain(s)
- Uncompacted native soils at the bottom of the facility
- Overflow structure

Normal Expected Maintenance

Biofiltration with partial retention requires routine maintenance to: remove accumulated materials such as sediment, trash or debris; maintain vegetation health; maintain infiltration capacity of the media layer; replenish mulch; and maintain integrity of side slopes, inlets, energy dissipators, and outlets. A summary table of standard inspection and maintenance indicators is provided within this Fact Sheet.

Non-Standard Maintenance or BMP Failure

If any of the following scenarios are observed, the BMP is not performing as intended to protect downstream waterways from pollution and/or erosion. Corrective maintenance, increased inspection and maintenance, BMP replacement, or a different BMP type will be required.

- The BMP is not drained between storm events. Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health, and surface ponding longer than approximately 96 hours following a storm event poses a risk of vector (mosquito) breeding. Poor drainage can result from clogging of the media layer, filter course, aggregate storage layer, underdrain, or outlet structure. The specific cause of the drainage issue must be determined and corrected.
- Sediment, trash, or debris accumulation greater than 25% of the surface ponding volume within one month. This means the load from the tributary drainage area is too high, reducing BMP function or clogging the BMP. This would require pretreatment measures within the tributary area draining to the BMP to intercept the materials. Pretreatment components, especially for sediment, will extend the life of components that are more expensive to replace such as media, filter course, and aggregate layers.

- Erosion due to concentrated storm water runoff flow that is not readily corrected by adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan. If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.

Other Special Considerations

Biofiltration with partial retention is a vegetated structural BMP. Vegetated structural BMPs that are constructed in the vicinity of, or connected to, an existing jurisdictional water or wetland could inadvertently result in creation of expanded waters or wetlands. As such, vegetated structural BMPs have the potential to come under the jurisdiction of the United States Army Corps of Engineers, SDRWQCB, California Department of Fish and Wildlife, or the United States Fish and Wildlife Service. This could result in the need for specific resource agency permits and costly mitigation to perform maintenance of the structural BMP. Along with proper placement of a structural BMP, **routine maintenance is key to preventing this scenario**.

PR-1
Biofiltration with Partial Retention

SUMMARY OF STANDARD INSPECTION AND MAINTENANCE FOR PR-1 BIOFILTRATION WITH PARTIAL RETENTION		
The property owner is responsible to ensure inspection, operation and maintenance of permanent BMPs on their property unless responsibility has been formally transferred to an agency, community facilities district, homeowners association, property owners association, or other special district. Maintenance frequencies listed in this table are average/typical frequencies. Actual maintenance needs are site-specific, and maintenance may be required more frequently. Maintenance must be performed whenever needed, based on maintenance indicators presented in this table. The BMP owner is responsible for conducting regular inspections to see when maintenance is needed based on the maintenance indicators. During the first year of operation of a structural BMP, inspection is recommended at least once prior to August 31 and then monthly from September through May. Inspection during a storm event is also recommended. After the initial period of frequent inspections, the minimum inspection and maintenance frequency can be determined based on the results of the first year inspections.		
Threshold/Indicator	**Maintenance Action**	**Typical Maintenance Frequency**
Accumulation of sediment, litter, or debris	Remove and properly dispose of accumulated materials, without damage to the vegetation or compaction of the media layer.	• Inspect monthly. If the BMP is 25% full* or more in one month, increase inspection frequency to monthly plus after every 0.1-inch or larger storm event. • Remove any accumulated materials found at each inspection.
Obstructed inlet or outlet structure	Clear blockage.	• Inspect monthly and after every 0.5-inch or larger storm event. • Remove any accumulated materials found at each inspection.
Damage to structural components such as weirs, inlet or outlet structures	Repair or replace as applicable.	• Inspect annually. • Maintenance when needed.
Poor vegetation establishment	Re-seed, re-plant, or re-establish vegetation per original plans.	• Inspect monthly. • Maintenance when needed.
Dead or diseased vegetation	Remove dead or diseased vegetation, re-seed, re-plant, or re-establish vegetation per original plans.	• Inspect monthly. • Maintenance when needed.
Overgrown vegetation	Mow or trim as appropriate.	• Inspect monthly. • Maintenance when needed.
2/3 of mulch has decomposed, or mulch has been removed	Remove decomposed fraction and top off with fresh mulch to a total depth of 3 inches.	• Inspect monthly. • Replenish mulch annually, or more frequently when needed based on inspection.

*"25% full" is defined as ¼ of the depth from the design bottom elevation to the crest of the outflow structure (e.g., if the height to the outflow opening is 12 inches from the bottom elevation, then the materials must be removed when there is 3 inches of accumulation – this should be marked on the outflow structure).

SUMMARY OF STANDARD INSPECTION AND MAINTENANCE FOR PR-1 BIOFILTRATION WITH PARTIAL RETENTION (Continued from previous page)		
Threshold/Indicator	**Maintenance Action**	**Typical Maintenance Frequency**
Erosion due to concentrated irrigation flow	Repair/re-seed/re-plant eroded areas and adjust the irrigation system.	• Inspect monthly. • Maintenance when needed.
Erosion due to concentrated storm water runoff flow	Repair/re-seed/re-plant eroded areas, and make appropriate corrective measures such as adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan. If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.	• Inspect after every 0.5-inch or larger storm event. If erosion due to storm water flow has been observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintenance when needed. If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.
Standing water in BMP for longer than 24 hours following a storm event Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health	Make appropriate corrective measures such as adjusting irrigation system, removing obstructions of debris or invasive vegetation, clearing underdrains, or repairing/replacing clogged or compacted soils.	• Inspect monthly and after every 0.5-inch or larger storm event. If standing water is observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintenance when needed.
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology	If mosquitos/larvae are observed: first, immediately remove any standing water by dispersing to nearby landscaping; second, make corrective measures as applicable to restore BMP drainage to prevent standing water. If mosquitos persist following corrective measures to remove standing water, or if the BMP design does not meet the 96-hour drawdown criteria due to release rates controlled by an orifice installed on the underdrain, the [City Engineer] shall be contacted to determine a solution. A different BMP type, or a Vector Management Plan prepared with concurrence from the County of San Diego Department of Environmental Health, may be required.	• Inspect monthly and after every 0.5-inch or larger storm event. If mosquitos are observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintenance when needed.
Underdrain clogged	Clear blockage.	• Inspect if standing water is observed for longer than 24-96 hours following a storm event. • Maintenance when needed.

References

American Mosquito Control Association.
http://www.mosquito.org/
California Storm Water Quality Association (CASQA). 2003. Municipal BMP Handbook.
https://www.casqa.org/resources/bmp-handbooks/municipal-bmp-handbook
County of San Diego. 2014. Low Impact Development Handbook.
http://www.sandiegocounty.gov/content/sdc/dpw/watersheds/susmp/lid.html
San Diego County Copermittees. 2016. Model BMP Design Manual, Appendix E, Fact Sheet PR-1.
http://www.projectcleanwater.org/index.php?option=com_content&view=article&id=250&Itemid=220

Page Intentionally Blank for Double-Sided Printing

PR-1

Biofiltration with Partial Retention

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	
Property / Development Name:	Responsible Party Name and Phone Number:	
Property Address of BMP:	Responsible Party Address:	

INSPECTION AND MAINTENANCE CHECKLIST FOR PR-1 BIOFILTRATION WITH PARTIAL RETENTION PAGE 1 of 5			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Accumulation of sediment, litter, or debris Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Remove and properly dispose of accumulated materials, without damage to the vegetation ☐ If sediment, litter, or debris accumulation exceeds 25% of the surface ponding volume within one month (25% full*), add a forebay or other pre-treatment measures within the tributary area draining to the BMP to intercept the materials. ☐ Other / Comments:		
Poor vegetation establishment Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Re-seed, re-plant, or re-establish vegetation per original plans ☐ Other / Comments:		

*"25% full" is defined as ¼ of the depth from the design bottom elevation to the crest of the outflow structure (e.g., if the height to the outflow opening is 12 inches from the bottom elevation, then the materials must be removed when there is 3 inches of accumulation – this should be marked on the outflow structure).

PR-1

Biofiltration with Partial Retention

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR PR-1 BIOFILTRATION WITH PARTIAL RETENTION PAGE 2 of 5			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Dead or diseased vegetation Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Remove dead or diseased vegetation, re-seed, re-plant, or re-establish vegetation per original plans ☐ Other / Comments:		
Overgrown vegetation Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Mow or trim as appropriate ☐ Other / Comments:		
2/3 of mulch has decomposed, or mulch has been removed Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Remove decomposed fraction and top off with fresh mulch to a total depth of 3 inches ☐ Other / Comments:		

PR-1

Biofiltration with Partial Retention

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR PR-1 BIOFILTRATION WITH PARTIAL RETENTION PAGE 3 of 5			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Erosion due to concentrated irrigation flow Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Repair/re-seed/re-plant eroded areas and adjust the irrigation system ☐ Other / Comments:		
Erosion due to concentrated storm water runoff flow Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Repair/re-seed/re-plant eroded areas, and make appropriate corrective measures such as adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan ☐ If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction ☐ Other / Comments:		

PR-1

Biofiltration with Partial Retention

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR PR-1 BIOFILTRATION WITH PARTIAL RETENTION PAGE 4 of 5			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Obstructed inlet or outlet structure Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Clear blockage ☐ Other / Comments:		
Underdrain clogged (inspect underdrain if standing water is observed for longer than 24-96 hours following a storm event) Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Clear blockage ☐ Other / Comments:		
Damage to structural components such as weirs, inlet or outlet structures Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Repair or replace as applicable ☐ Other / Comments:		

PR-1

Biofiltration with Partial Retention

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR PR-1 BIOFILTRATION WITH PARTIAL RETENTION PAGE 5 of 5			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Standing water in BMP for longer than 24 hours following a storm event* Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Make appropriate corrective measures such as adjusting irrigation system, removing obstructions of debris or invasive vegetation, clearing underdrains, or repairing/replacing clogged or compacted soils ☐ Other / Comments:		
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Apply corrective measures to remove standing water in BMP when standing water occurs for longer than 24-96 hours following a storm event.** ☐ Other / Comments:		

*Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health, and surface ponding longer than approximately 96 hours following a storm event poses a risk of vector (mosquito) breeding. Poor drainage can result from clogging of the media layer, filter course, aggregate storage layer, underdrain, or outlet structure. The specific cause of the drainage issue must be determined and corrected.

**If mosquitos persist following corrective measures to remove standing water, or if the BMP design does not meet the 96-hour drawdown criteria due to release rates controlled by an orifice installed on the underdrain, the [City Engineer] shall be contacted to determine a solution. A different BMP type, or a Vector Management Plan prepared with concurrence from the County of San Diego Department of Environmental Health, may be required.

BF-1
Biofiltration

BMP MAINTENANCE FACT SHEET
FOR
STRUCTURAL BMP BF-1 BIOFILTRATION

Biofiltration facilities are vegetated surface water systems that filter water through vegetation, and soil or engineered media prior to discharge via underdrain or overflow to the downstream conveyance system. Biofiltration facilities have limited or no infiltration. They are typically designed to provide enough hydraulic head to move flows through the underdrain connection to the storm drain system. Typical biofiltration components include:

- Inflow distribution mechanisms (e.g., perimeter flow spreader or filter strips)
- Energy dissipation mechanism for concentrated inflows (e.g., splash blocks or riprap)
- Shallow surface ponding for captured flows
- Side slope and basin bottom vegetation selected based on climate and ponding depth
- Non-floating mulch layer
- Media layer (planting mix or engineered media) capable of supporting vegetation growth
- Filter course layer consisting of aggregate to prevent the migration of fines into uncompacted native soils or the aggregate storage layer
- Aggregate storage layer with underdrain(s)
- Impermeable liner or uncompacted native soils at the bottom of the facility
- Overflow structure

Normal Expected Maintenance

Biofiltration requires routine maintenance to: remove accumulated materials such as sediment, trash or debris; maintain vegetation health; maintain infiltration capacity of the media layer; replenish mulch; and maintain integrity of side slopes, inlets, energy dissipators, and outlets. A summary table of standard inspection and maintenance indicators is provided within this Fact Sheet.

Non-Standard Maintenance or BMP Failure

If any of the following scenarios are observed, the BMP is not performing as intended to protect downstream waterways from pollution and/or erosion. Corrective maintenance, increased inspection and maintenance, BMP replacement, or a different BMP type will be required.

- The BMP is not drained between storm events. Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health, and surface ponding longer than approximately 96 hours following a storm event poses a risk of vector (mosquito) breeding. Poor drainage can result from clogging of the media layer, filter course, aggregate storage layer, underdrain, or outlet structure. The specific cause of the drainage issue must be determined and corrected.
- Sediment, trash, or debris accumulation greater than 25% of the surface ponding volume within one month. This means the load from the tributary drainage area is too high, reducing BMP function or clogging the BMP. This would require pretreatment measures within the tributary area draining to the BMP to intercept the materials. Pretreatment components, especially for sediment, will extend the life of components that are more expensive to replace such as media, filter course, and aggregate layers.
- Erosion due to concentrated storm water runoff flow that is not readily corrected by adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan. If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.

Other Special Considerations

Biofiltration is a vegetated structural BMP. Vegetated structural BMPs that are constructed in the vicinity of, or connected to, an existing jurisdictional water or wetland could inadvertently result in creation of expanded waters or wetlands. As such, vegetated structural BMPs have the potential to come under the jurisdiction of the United States Army Corps of Engineers, SDRWQCB, California Department of Fish and Wildlife, or the United States Fish and Wildlife Service. This could result in the need for specific resource agency permits and costly mitigation to perform maintenance of the structural BMP. Along with proper placement of a structural BMP, **routine maintenance is key to preventing this scenario**.

BF-1
Biofiltration

SUMMARY OF STANDARD INSPECTION AND MAINTENANCE FOR BF-1 BIOFILTRATION		
The property owner is responsible to ensure inspection, operation and maintenance of permanent BMPs on their property unless responsibility has been formally transferred to an agency, community facilities district, homeowners association, property owners association, or other special district. Maintenance frequencies listed in this table are average/typical frequencies. Actual maintenance needs are site-specific, and maintenance may be required more frequently. Maintenance must be performed whenever needed, based on maintenance indicators presented in this table. The BMP owner is responsible for conducting regular inspections to see when maintenance is needed based on the maintenance indicators. During the first year of operation of a structural BMP, inspection is recommended at least once prior to August 31 and then monthly from September through May. Inspection during a storm event is also recommended. After the initial period of frequent inspections, the minimum inspection and maintenance frequency can be determined based on the results of the first year inspections.		
Threshold/Indicator	**Maintenance Action**	**Typical Maintenance Frequency**
Accumulation of sediment, litter, or debris	Remove and properly dispose of accumulated materials, without damage to the vegetation or compaction of the media layer.	• Inspect monthly. If the BMP is 25% full* or more in one month, increase inspection frequency to monthly plus after every 0.1-inch or larger storm event. • Remove any accumulated materials found at each inspection.
Obstructed inlet or outlet structure	Clear blockage.	• Inspect monthly and after every 0.5-inch or larger storm event. • Remove any accumulated materials found at each inspection.
Damage to structural components such as weirs, inlet or outlet structures	Repair or replace as applicable	• Inspect annually. • Maintenance when needed.
Poor vegetation establishment	Re-seed, re-plant, or re-establish vegetation per original plans.	• Inspect monthly. • Maintenance when needed.
Dead or diseased vegetation	Remove dead or diseased vegetation, re-seed, re-plant, or re-establish vegetation per original plans.	• Inspect monthly. • Maintenance when needed.
Overgrown vegetation	Mow or trim as appropriate.	• Inspect monthly. • Maintenance when needed.
2/3 of mulch has decomposed, or mulch has been removed	Remove decomposed fraction and top off with fresh mulch to a total depth of 3 inches.	• Inspect monthly. • Replenish mulch annually, or more frequently when needed based on inspection.

*"25% full" is defined as ¼ of the depth from the design bottom elevation to the crest of the outflow structure (e.g., if the height to the outflow opening is 12 inches from the bottom elevation, then the materials must be removed when there is 3 inches of accumulation – this should be marked on the outflow structure).

SUMMARY OF STANDARD INSPECTION AND MAINTENANCE FOR BF-1 BIOFILTRATION (Continued from previous page)		
Threshold/Indicator	**Maintenance Action**	**Typical Maintenance Frequency**
Erosion due to concentrated irrigation flow	Repair/re-seed/re-plant eroded areas and adjust the irrigation system.	• Inspect monthly. • Maintenance when needed.
Erosion due to concentrated storm water runoff flow	Repair/re-seed/re-plant eroded areas, and make appropriate corrective measures such as adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan. If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.	• Inspect after every 0.5-inch or larger storm event. If erosion due to storm water flow has been observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintenance when needed. If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.
Standing water in BMP for longer than 24 hours following a storm event Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health	Make appropriate corrective measures such as adjusting irrigation system, removing obstructions of debris or invasive vegetation, clearing underdrains, or repairing/replacing clogged or compacted soils.	• Inspect monthly and after every 0.5-inch or larger storm event. If standing water is observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintenance when needed.
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology	If mosquitos/larvae are observed: first, immediately remove any standing water by dispersing to nearby landscaping; second, make corrective measures as applicable to restore BMP drainage to prevent standing water. If mosquitos persist following corrective measures to remove standing water, or if the BMP design does not meet the 96-hour drawdown criteria due to release rates controlled by an orifice installed on the underdrain, the [City Engineer] shall be contacted to determine a solution. A different BMP type, or a Vector Management Plan prepared with concurrence from the County of San Diego Department of Environmental Health, may be required.	• Inspect monthly and after every 0.5-inch or larger storm event. If mosquitos are observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintenance when needed.
Underdrain clogged	Clear blockage.	• Inspect if standing water is observed for longer than 24-96 hours following a storm event. • Maintenance when needed.

References

American Mosquito Control Association.
http://www.mosquito.org/
California Storm Water Quality Association (CASQA). 2003. Municipal BMP Handbook.
https://www.casqa.org/resources/bmp-handbooks/municipal-bmp-handbook
County of San Diego. 2014. Low Impact Development Handbook.
http://www.sandiegocounty.gov/content/sdc/dpw/watersheds/susmp/lid.html
San Diego County Copermittees. 2016. Model BMP Design Manual, Appendix E, Fact Sheet BF-1.
http://www.projectcleanwater.org/index.php?option=com_content&view=article&id=250&Itemid=220

Page Intentionally Blank for Double-Sided Printing

BF-1
Biofiltration

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	
Property / Development Name:	Responsible Party Name and Phone Number:	
Property Address of BMP:	Responsible Party Address:	

INSPECTION AND MAINTENANCE CHECKLIST FOR BF-1 BIOFILTRATION PAGE 1 of 5			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Accumulation of sediment, litter, or debris Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Remove and properly dispose of accumulated materials, without damage to the vegetation ☐ If sediment, litter, or debris accumulation exceeds 25% of the surface ponding volume within one month (25% full*), add a forebay or other pre-treatment measures within the tributary area draining to the BMP to intercept the materials. ☐ Other / Comments:		
Poor vegetation establishment Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Re-seed, re-plant, or re-establish vegetation per original plans ☐ Other / Comments:		

*"25% full" is defined as ¼ of the depth from the design bottom elevation to the crest of the outflow structure (e.g., if the height to the outflow opening is 12 inches from the bottom elevation, then the materials must be removed when there is 3 inches of accumulation – this should be marked on the outflow structure).

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR BF-1 BIOFILTRATION PAGE 2 of 5			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Dead or diseased vegetation Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Remove dead or diseased vegetation, re-seed, re-plant, or re-establish vegetation per original plans ☐ Other / Comments:		
Overgrown vegetation Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Mow or trim as appropriate ☐ Other / Comments:		
2/3 of mulch has decomposed, or mulch has been removed Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Remove decomposed fraction and top off with fresh mulch to a total depth of 3 inches ☐ Other / Comments:		

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR BF-1 BIOFILTRATION PAGE 3 of 5			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Erosion due to concentrated irrigation flow Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Repair/re-seed/re-plant eroded areas and adjust the irrigation system ☐ Other / Comments:		
Erosion due to concentrated storm water runoff flow Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Repair/re-seed/re-plant eroded areas, and make appropriate corrective measures such as adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan ☐ If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction ☐ Other / Comments:		

BF-1
Biofiltration

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR BF-1 BIOFILTRATION PAGE 4 of 5			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Obstructed inlet or outlet structure Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Clear blockage ☐ Other / Comments:		
Underdrain clogged (inspect underdrain if standing water is observed for longer than 24-96 hours following a storm event) Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Clear blockage ☐ Other / Comments:		
Damage to structural components such as weirs, inlet or outlet structures Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Repair or replace as applicable ☐ Other / Comments:		

BF-1
Biofiltration

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR BF-1 BIOFILTRATION PAGE 5 of 5			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Standing water in BMP for longer than 24-96 hours following a storm event* Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Make appropriate corrective measures such as adjusting irrigation system, removing obstructions of debris or invasive vegetation, clearing underdrains, or repairing/replacing clogged or compacted soils ☐ Other / Comments:		
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Apply corrective measures to remove standing water in BMP when standing water occurs for longer than 24-96 hours following a storm event.** ☐ Other / Comments:		

*Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health, and surface ponding longer than approximately 96 hours following a storm event poses a risk of vector (mosquito) breeding. Poor drainage can result from clogging of the media layer, filter course, aggregate storage layer, underdrain, or outlet structure. The specific cause of the drainage issue must be determined and corrected.

**If mosquitos persist following corrective measures to remove standing water, or if the BMP design does not meet the 96-hour drawdown criteria due to release rates controlled by an orifice installed on the underdrain, the [City Engineer] shall be contacted to determine a solution. A different BMP type, or a Vector Management Plan prepared with concurrence from the County of San Diego Department of Environmental Health, may be required.

ATTACHMENT 4 - COPY OF PLAN SHEETS SHOWING PERMANENT STORM WATER BMPS

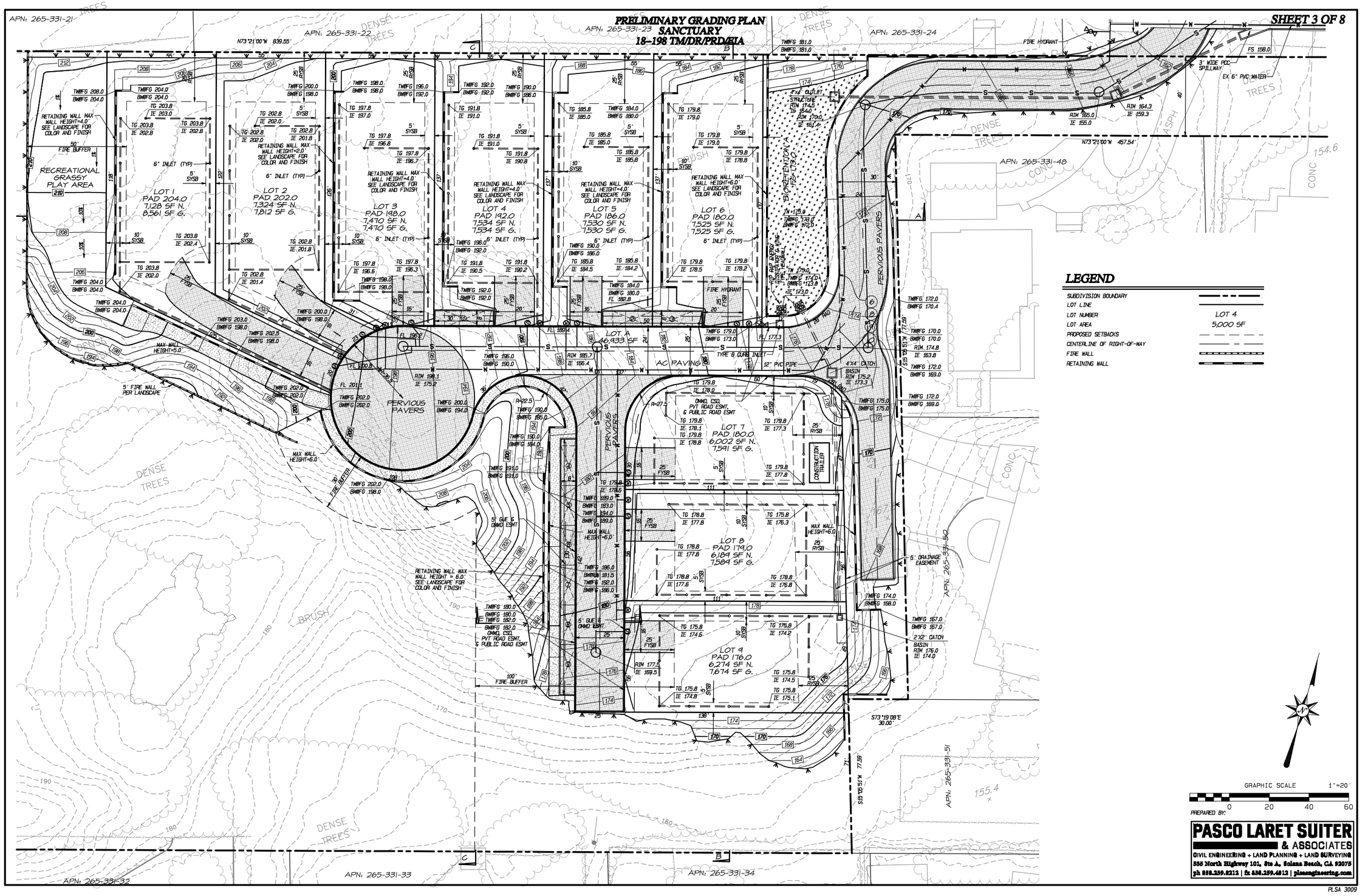
This is the cover sheet for Attachment 4.

Use this checklist to ensure the required information has been included on the plans:

The plans must identify:

- □ Structural BMP(s) with ID numbers matching Form I-6 Summary of PDP Structural BMPs
- □ The grading and drainage design shown on the plans must be consistent with the delineation of DMAs shown on the DMA exhibit
- □ Details and specifications for construction of structural BMP(s)
- □ Signage indicating the location and boundary of structural BMP(s) as required by the [City Engineer]
- □ How to access the structural BMP(s) to inspect and perform maintenance
- □ Features that are provided to facilitate inspection (e.g., observation ports, cleanouts, silt posts, or other features that allow the inspector to view necessary components of the structural BMP and compare to maintenance thresholds)
- □ Manufacturer and part number for proprietary parts of structural BMP(s) when applicable
- □ Maintenance thresholds specific to the structural BMP(s), with a location-specific frame of reference (e.g., level of accumulated materials that triggers removal of the materials, to be identified based on viewing marks on silt posts or measured with a survey rod with respect to a fixed benchmark within the BMP)
- □ Recommended equipment to perform maintenance
- □ When applicable, necessary special training or certification requirements for inspection and maintenance personnel such as confined space entry or hazardous waste management
- □ Include landscaping plan sheets showing vegetation requirements for vegetated structural BMP(s)
- □ All BMPs must be fully dimensioned on the plans
- □ When proprietary BMPs are used, site-specific cross section with outflow, inflow, and model number shall be provided. Photocopies of general brochures are not acceptable.

PRELIMINARY GRADING PLAN
SANCTUARY
18-198 TM/DR/PRD#1A



LEGEND

- SUBDIVISION BOUNDARY
- LOT LINE
- LOT NUMBER — LOT 4
- LOT AREA — 5,000 SF
- PROPOSED SETBACKS
- CENTERLINE OF RIGHT-OF-WAY
- FIRE WALL
- RETAINING WALL

GRAPHIC SCALE 1"=20'

0 20 40 60

PREPARED BY:

PASCO LARET SUITER & ASSOCIATES

CIVIL ENGINEERING + LAND PLANNING + LAND SURVEYING
535 North Highway 101, Ste A, Solana Beach, CA 92075
ph 858.259.8212 | fx 858.259.4812 | planeng@sbcglobal.net

PLSA 3009