County of San Diego
PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

Fallbrook Oaks
PDS2016-TM-5449R

3918 Reche Road
Fallbrook, CA 92028

ASSESSOR'S PARCEL NUMBER(S):
107-070-03

ENGINEER OF WORK:

_____

William Lundstrom R.C.E. 61630

PREPARED FOR:

Crossroads Investors I, LLC
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San Diego, CA 92121

PDP SWQMP PREPARED BY:

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San Diego, CA 92108
619 814-1220

DATE OF SWQMP:
February 12, 2018

PLANS PREPARED BY:
Lundstrom Engineering & Surveying, Inc.

SWQMP APPROVED BY:

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Table of Contents

Attachments

Acronyms

ACP	Alternative Compliance Project
APN	Assessor's Parcel Number
BMP	Best Management Practice
BMP DM	Best Management Practice Design Manual
HMP	Hydromodification Management Plan
HSG	Hydrologic Soil Group
MS4	Municipal Separate Storm Sewer System
N/A	Not Applicable
NRCS	Natural Resources Conservation Service
PDCI	Private Development Construction Inspection Section
PDP	Priority Development Project
PDS	Planning and Development Services
PE	Professional Engineer
RPO	Resource Protection Ordinance
SC	Source Control
SD	Site Design
SDRWQCB	San Diego Regional Water Quality Control Board
SIC	Standard Industrial Classification
SWQMP	Storm Water Quality Management Plan
WMAA	Watershed Management Area Analysis
WPO	Watershed Protection Ordinance
WQIP	Water Quality Improvement Plan

PDP SWQMP Preparer's Certification Page

Project Name: Fallbrook Oaks
Permit Application Number: PDS2016-TM-5449R

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 PDP requirements of the County of San Diego BMP Design Manual, which is a design manual for compliance with local County of San Diego Watershed Protection Ordinance (Sections 67.801 et seq.) and regional MS4 Permit (California Regional Water Quality Control Board San Diego Region Order No. R9-2013-0001 as amended by R9-2015-0001 and R9-2015-0100) requirements for storm water management.

I have read and understand that the County of San Diego 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 SWQMP by County staff 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 & Expiration Date

William Lundstrom
Print Name

Lundstrom Engineering & Surveying, Inc.
Company

02-12-2018
Date

Engineer's Seal:

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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 column 4 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.

Preliminary Design / Planning / CEQA

Submittal Number	Date	Summary of Changes
1	02-12-2018	Initial Submittal
2		
3		
4		

Final Design

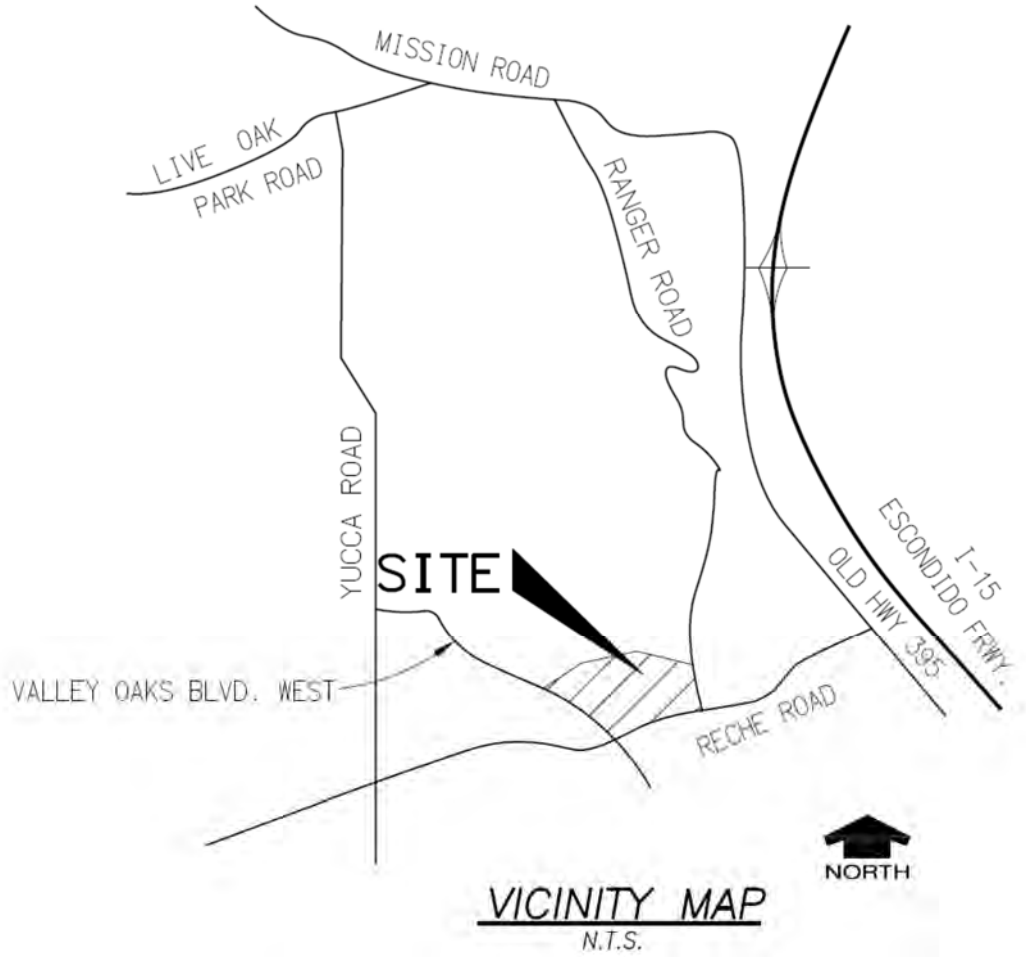
Submittal Number	Date	Summary of Changes
1		Initial Submittal
2		
3		
4		

Plan Changes

Submittal Number	Date	Summary of Changes
1		Initial Submittal
2		
3		
4		

Project Vicinity Map

Project Name: Fallbrook Oaks
Record ID: PDS2016-TM-5449R



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Step 1: Project type determination (Standard or Priority Development Project)

Is the project part of another Priority Development Project (PDP)? (☐ Yes ☒ No If so, a PDP SWQMP is required. Go to Step 2.			
The project is (select one): ☒ New Development ☐ Redevelopment[1]			
The total proposed newly created or replaced impervious area is: 135,472 ft^2			
The total existing (pre-project) impervious area is: 0 ft^2			
The total area disturbed by the project is: 365,904 ft^2			
If the total area disturbed by the project is 1 acre (43,560 sq. ft.) or more OR the project is part of a larger common plan of development disturbing 1 acre or more, a Waste Discharger Identification (WDID) number must be obtained from the State Water Resources Control Board. WDID: TBD at Final Engineering Stage			
Is the project in any of the following categories, (a) through (f)?[2]			
Yes ☒	No ☐	(a)	New development projects that create 10,000 square feet or more of impervious surfaces [3](collectively over the entire project site). This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land.
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 on public or private land.
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 (Standard Industrial Classification (SIC) code 5812).

[1] Redevelopment is defined as: The creation and/or replacement of impervious surface on an already developed site. Examples include the expansion of a building footprint, road widening, the addition to or replacement of a structure, and creation or addition of impervious surfaces. Replacement of impervious surfaces includes any activity that is not part of a routine maintenance activity where impervious material(s) are removed, exposing underlying soil during construction. Redevelopment does not include routine maintenance activities, such as trenching and resurfacing associated with utility work; pavement grinding; resurfacing existing roadways; new sidewalks construction; pedestrian ramps; or bike lanes on existing roads; and routine replacement of damaged pavement, such as pothole repair.

[2] Applicants should note that any development project that will create and/or replace 10,000 square feet or more of impervious surface (collectively over the entire project site) is considered a new development.

[3] For solar energy farm projects, the area of the solar panels does not count toward the total impervious area of the site.

			(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.

Project type determination (continued)

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 discharging directly to an Environmentally Sensitive Area (ESA). "Discharging 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 San Diego Water Board; State Water Quality Protected Areas; water bodies designated with the RARE beneficial use by the State Water Board and San Diego Water Board; and any other equivalent environmentally sensitive areas which have been identified by the Copermittees. See BMP Design 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 (RGOs). This category includes RGOs that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) 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 BMP Design Manual Section 1.4.2 for additional guidance.*

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

☐ No – the project is <u>not</u> a Priority Development Project (Standard Project).

☒ Yes – the project is a Priority Development Project (PDP).

Further guidance may be found in Chapter 1 and Table 1-2 of the BMP Design Manual.

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 newly created or replaced impervious areas are considered a PDP and subject to stormwater requirements**

OR

☐ greater than fifty percent (50%) – **the entire project site is considered a PDP and subject to stormwater requirements**

Step 1.1: Storm Water Quality Management Plan requirements

Step	Answer	Progression
Is the project a Standard Project, Priority Development Project (PDP), or exception to PDP definitions? To answer this item, complete Step 1 Project Type Determination Checklist on Pages 1 and 2, and see PDP exemption information below. For further guidance, see Section 1.4 of the BMP Design Manual *in its entirety*.	☐ Standard Project	Standard Project requirements apply, including Standard Project SWQMP. **Complete Standard Project SWQMP.**
	☒ PDP	Standard and PDP requirements apply, including PDP SWQMP. **Complete PDP SWQMP.**
	☐ PDP with ACP	If participating in offsite alternative compliance, **complete Step 6.3 and an ACP SWQMP.**
	☐ PDP Exemption	**Go to Step 1.2 below.**

Step 1.2: Exemption to PDP definitions

Is the project exempt from PDP definitions based on either of the following: ☐ Projects that are only new or retrofit paved sidewalks, bicycle lanes, or trails that meet the following criteria: (i) Designed and constructed to direct storm water runoff to adjacent vegetated areas, or other non-erodible permeable areas; OR (ii) Designed and constructed to be hydraulically disconnected from paved streets or roads [i.e., runoff from the new improvement does not drain directly onto paved streets or roads]; OR (iii) Designed and constructed with permeable pavements or surfaces in accordance with County of San Diego Guidance on Green Infrastructure;	If so: Standard Project requirements apply, AND any additional requirements specific to the type of project. County concurrence with the exemption is required. *Provide discussion and list any additional requirements below in this form.* **Complete Standard Project SWQMP**
☐ Projects that are only retrofitting or redeveloping existing paved alleys, streets or roads that are designed and constructed in accordance with the County of San Diego Guidance on Green Infrastructure.	**Complete Green Streets PDP Exempt SWQMP.**

Discussion / justification, and additional requirements for exceptions to PDP definitions, if applicable:

Step 2: Construction Storm Water BMP Checklist

Minimum Required Standard Construction Storm Water BMPs		
If you answer "Yes" to any of the questions below, your project is subject to Table 1 on the following page (Minimum Required Standard Construction Stormwater BMPs). As noted in Table 1, please select at least the minimum number of required BMPs, or as many as are feasible for your project. If no BMP is selected, an explanation must be given in the box provided. The following questions are intended to aid in determining construction BMP requirements for your project. **Note: All selected BMPs below must be included on the BMP plan incorporated into the construction plan sets.**		
1. Will there be soil disturbing activities that will result in exposed soil areas? (This includes minor grading and trenching.) **Reference Table 1 Items A, B, D, and E** Note: Soil disturbances NOT considered significant include, but are not limited to, change in use, mechanical/electrical/plumbing activities, signs, temporary trailers, interior remodeling, and minor tenant improvement.	☒Yes	☐No
2. Will there be asphalt paving, including patching? **Reference Table 1 Items D and F**	☒Yes	☐No
3. Will there be slurries from mortar mixing, coring, or concrete saw cutting? **Reference Table 1 Items D and F**	☒Yes	☐No
4. Will there be solid wastes from concrete demolition and removal, wall construction, or form work? **Reference Table 1 Items D and F**	☒Yes	☐No
5. Will there be stockpiling (soil, compost, asphalt, concrete, solid waste) for over 24 hours? **Reference Table 1 Items D and F**	☒Yes	☐No
6. Will there be dewatering operations? **Reference Table 1 Items C and D**	☐Yes	☒No
7. Will there be temporary on-site storage of construction materials, including mortar mix, raw landscaping and soil stabilization materials, treated lumber, rebar, and plated metal fencing materials? **Reference Table 1 Items E and F**	☒Yes	☐No
8. Will trash or solid waste product be generated from this project? **Reference Table 1 Item F**	☒Yes	☐No
9. Will construction equipment be stored on site (e.g.: fuels, oils, trucks, etc.?) **Reference Table 1 Item F**	☒Yes	☐No
10. Will Portable Sanitary Services ("Porta-potty") be used on the site? **Reference Table 1 Item F**	☒Yes	☐No

Table 1. Construction Storm Water BMP Checklist

Minimum Required Best Management Practices (BMPs)	CALTRANS SW Handbook[4] Detail or County Std. Detail	✔ BMP Selected	Reference sheet No.'s where each selected BMP is shown on the plans. If no BMP is selected, an explanation must be provided.
A. Select Erosion Control Method for Disturbed Slopes (choose at least one for the appropriate season)			
Vegetation Stabilization Planting[5] (Summer)	SS-2, SS-4	☐	
Hydraulic Stabilization Hydroseeding[2] (Summer)	SS-4	☐	
Bonded Fiber Matrix or Stabilized Fiber Matrix[6] (Winter)	SS-3	☒	
Physical Stabilization Erosion Control Blanket[3] (Winter)	SS-7	☐	
B. Select erosion control method for disturbed flat areas (slope < 5%) (choose at least one)			
County Standard Lot Perimeter Protection Detail	PDS 659[7], SC-2	☐	
Will use erosion control measures from Item A on flat areas also	SS-3, 4, 7	☒	
County Standard Desilting Basin (must treat all site runoff)	PDS 660[8], SC-2	☐	
Mulch, straw, wood chips, soil application	SS-6, SS-8	☐	

4 State of California Department of Transportation (Caltrans). 2003. Storm Water Quality Handbooks, Construction Site Best Management Practices (BMPs) Manual. March. Available online at: http://www.dot.ca.gov/hq/construc/stormwater/manuals.htm.

5 If Vegetation Stabilization (Planting or Hydroseeding) is proposed for erosion control it may be installed between May 1st and August 15th. Slope irrigation is in place and needs to be operable for slopes >3 feet. Vegetation must be watered and established prior to October 1st. The owner must implement a contingency physical BMP by August 15th if vegetation establishment does not occur by that date. If landscaping is proposed, erosion control measures must also be used while landscaping is being established. Established vegetation must have a subsurface mat of intertwined mature roots with a uniform vegetative coverage of 70 percent of the natural vegetative coverage or more on all disturbed areas.

6 All slopes over three feet must have established vegetative cover prior to final permit approval.

7 County of San Diego, Planning & Development Services. 2012. Standard Lot Perimeter Protection Design System. Building Division. PDS 659. Available online at http://www.sandiegocounty.gov/pds/docs/pds659.pdf.

8 County of San Diego, Planning & Development Services. 2012. County Standard Desilting Basin for Disturbed Areas of 1 Acre or Less Building Division. PDS 659. Available online at http://www.sandiegocounty.gov/pds/docs/pds660.pdf.

Table 1. Construction Storm Water BMP Checklist (continued)

Minimum Required Best Management Practices (BMPs)	CALTRANS SW Handbook Detail or County Std. Detail	✔ BMP Selected	Reference sheet No.'s where each selected BMP is shown on the plans. If no BMP is selected, an explanation must be provided.
C. If runoff or dewatering operation is concentrated, velocity must be controlled using an energy dissipater			
Energy Dissipater Outlet Protection[9]	SS-10	☒	
D. Select sediment control method for all disturbed areas (choose at least one)			
Silt Fence	SC-1	☒	
Fiber Rolls (Straw Wattles)	SC-5	☒	
Gravel & Sand Bags	SC-6 & 8	☒	
Dewatering Filtration	NS-2	☐	
Storm Drain Inlet Protection	SC-10	☒	
Engineered Desilting Basin (sized for 10-year flow)	SC-2	☐	
E. Select method for preventing offsite tracking of sediment (choose at least one)			
Stabilized Construction Entrance	TC-1	☒	
Construction Road Stabilization	TC-2	☐	
Entrance/Exit Tire Wash	TC-3	☐	
Entrance/Exit Inspection & Cleaning Facility	TC-1	☐	
Street Sweeping and Vacuuming	SC-7	☒	
F. Select the general site management BMPs			
F.1 Materials Management			
Material Delivery & Storage	WM-1	☒	
Spill Prevention and Control	WM-4	☒	
F.2 Waste Management[10]			
Waste Management Concrete Waste Management	WM-8	☒	
Solid Waste Management	WM-5	☒	
Sanitary Waste Management	WM-9	☒	
Hazardous Waste Management	WM-6	☒	

Note: The Construction General Permit (Order No. 2009-0009-DWQ) also requires all projects not subject to the BMP Design Manual to comply with runoff reduction requirements through the implementation of post-construction BMPs as described in Section XIII of the order.

[9] Regional Standard Drawing D-40 – Rip Rap Energy Dissipater is also acceptable for velocity reduction.

[10] Not all projects will have every waste identified. The applicant is responsible for identifying wastes that will be onsite and applying the appropriate BMP. For example, if concrete will be used, BMP WM-8 must be selected.

Step 3: County of San Diego PDP SWQMP Site Information Checklist

Step 3.1: Description of Existing Site Condition

Project Watershed (Complete Hydrologic Unit, Area, and Subarea Name with Numeric Identifier)	San Luis Rey, Lower San Luis, Bonsall 903.12

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 and provide each area on site):

- ☒ Vegetative Cover 27.0 Acres (_____ Square Feet)
- ☐ Non-Vegetated Pervious Areas _____ Acres (_____ Square Feet)
- ☐ Impervious Areas _____ Acres (_____ Square Feet)

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) (or N/A if no infiltration is used):

- ☐ 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
☐ Other

Description / Additional Information:

An existing watercourse flows from northwest to southeast along the northerly portion of the project site. This 5.5 acre portion of the site is environmentally sensitive.

Step 3.2: Description of Existing Site Drainage Patterns

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

(1) Whether existing drainage conveyance is 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:

The existing drainage conveyance system is natural overland flow.

The existing site is vegetated with annual grass, ribbons of oak trees along the watercourse, and orchard areas.

The topography gently slopes in westerly, easterly, and southerly directions, and the natural site runoff discharges into and though natural drainage courses which runs towards the south of the project site. The majority of the runoff from the existing conditions comes from the upstream tributary area to the north. This area consist of naturally vegetated land, and several small orchards, and single family dwellings.

The project area currently discharges into and through a natural drainage course which flows south towards Reche Road to existing storm drain culverts.

Step 3.3: Description of Proposed Site Development

Project Description / Proposed Land Use and/or Activities:

The proposed single family development will consists of 17 single-family homes within the 27.0 acre development. Additional activities proposed include construction of a street, bioretention basins, and storm drain

List/describe proposed impervious features of the project (e.g., buildings, roadways, parking lots, courtyards, athletic courts, other impervious features):

Proposed impervious areas will comprise of 17 single family homes with concrete paved driveways, asphalt paved private roads.

List/describe proposed pervious features of the project (e.g., landscape areas):

Proposed landscape areas will comprise of private yards and street parkways. Landscape areas will have drought tolerant plants

Does the project include grading and changes to site topography?

☒Yes
☐No

Description / Additional Information:

The post-project condition conforms to the existing topography and drainage patterns

Insert acreage or square feet for the different land cover types in the table below:

Change in Land Cover Type Summary			
Land Cover Type	Existing (acres or ft^2)	Proposed (acres or ft^2)	Percent Change
Vegetation	27.0	23.9	+12

Pervious (non-vegetated)	0	0	0
Impervious	0	3.1	300

Step 3.4: 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:

Runoff generated on-site will be collected any conveyed to privately maintained bioretention basins with hydromodification storage and flow control components.

Step 3.5: Potential Pollutant Source Areas

Identify whether any of the following features, activities, and/or pollutant source areas will be present (select all that apply). Select "Other" if the project is a phased development and provide a description:

☒ On-site storm drain inlets

☐ Interior floor drains and elevator shaft sump pumps

☐ Interior parking garages

☒ Need for future indoor & structural pest control

☒ Landscape/Outdoor Pesticide Use

☐ Pools, spas, ponds, decorative fountains, and other water features

☐ Food service

☐ Refuse areas

☐ Industrial processes

☐ Outdoor storage of equipment or materials

☐ Vehicle and Equipment Cleaning

☐ Vehicle/Equipment Repair and Maintenance

☐ Fuel Dispensing Areas

☐ Loading Docks

☐ Fire Sprinkler Test Water

☐ Miscellaneous Drain or Wash Water

☒ Plazas, sidewalks, and parking lots

☐ Other (provide description)

Description / Additional Information:

Step 3.6: 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):

Runoff from the site is conveyed downstream by an existing drainage course for approximately 3.5 miles to the San Luis Rey River, and then approximately 17 miles to the Pacific Ocean.

List any 303(d) impaired water bodies[11] 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
San Luis Rey River (west of I-15)	Chloride, Enterococcus, Fecal Coliform, Phosphorus, Total Dissolved Solids, Total Nitrogen as N, Toxicity, Total Nitrogen as N	Salinity, Pathogens, Nutrients Toxicity, Pesticides

Identification of Project Site Pollutants*

*Identification of project site pollutants below 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	Anticipated from the Project Site	Also a Receiving Water Pollutant of Concern
Sediment	☐	☒	☐

[11] The current list of Section 303(d) impaired water bodies can be found at http://www.waterboards.ca.gov/water_issues/programs/water_quality_assessment/#impaired

Nutrients	☐	☒	☒
Heavy Metals	☐	☒	☐
Organic Compounds	☐	☒	☒
Trash & Debris	☐	☒	☐
Oxygen Demanding Substances	☐	☒	☐
Oil & Grease	☐	☒	☐
Bacteria & Viruses	☐	☒	☒
Pesticides	☐	☒	☒

Step 3.7: Hydromodification Management Requirements

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

☒Yes, hydromodification management requirements for flow control and preservation of critical coarse sediment yield areas are applicable.

☐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[12] for the watershed in which the project resides.

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

[12] The Watershed Management Area Analysis (WMAA) is an optional element for inclusion in the Water Quality Improvement Plans (WQIPs) described in the 2013 MS4 Permit [Provision B.3.b.(4)]. It is available online at the

Project Clean Water website:
http://www.projectcleanwater.org/index.php?option=com_content&view=article&id=248

Step 3.7.1: Critical Coarse Sediment Yield Areas*

***This Section only required if hydromodification management requirements apply**

Projects must satisfy critical coarse sediment yield area (CCSYA) requirements by characterizing the project as one of the scenario-types presented below and satisfying associated criteria. Projects must appropriately satisfy all requirements for identification, avoidance, and bypass, OR may alternatively elect to demonstrate no net impact.

☐ **Scenario 1**: Project is subject to and in compliance with RPO requirements *(without utilization of RPO exemptions 86.604(e)(2)(cc) or 86.604(e)(3) that result in impacts to more than 15% of the project-scale CCSYAs)*.

- ☐ Identify: Project has identified both onsite and upstream CCSYAs as areas that are coarse, ≥25% slope, and ≥50' tall. *(Optional refinement methods may be performed per guidance in Section H.1.2). AND,*
- ☐ Avoid: Project has avoided onsite CCSYAs per existing RPO steep slope encroachment criteria. AND,
- ☐ Bypass: Project has demonstrated that both onsite and upstream CCSYAs are bypassed through or around the project site with a 2 year peak storm velocity of 3 feet per second or greater. OR,
- ☐ No Net Impact: Project does not satisfy all Scenario 1 criteria above and must alternatively demonstrate no net impact to the receiving water.

☒ **Scenario 2**: Project is entirely exempt/not subject to RPO requirements without utilization of RPO exemptions 86.604(e)(2)(cc) or 86.604(e)(3).

- ☒ Identify: Project has identified upstream CCSYAs that are coarse, ≥25% slope, and ≥50' tall. *(Optional refinement methods may be performed per guidance in Section H.1.2). AND,*
- ☒ Avoid: Project is not required to avoid onsite CCSYAs as none were identified in the previous step. AND,
- ☒ Bypass: Project has demonstrated that upstream CCSYAs are bypassed through or around the project site with a 2 year peak storm velocity of 3 feet per second or greater. OR,
- ☐ No Net Impact: Project does not satisfy all Scenario 2 criteria above and must alternatively demonstrate no net impact to the receiving water. *(Skip to next row).*

☐ **Scenario 3**: Project utilizes exemption(s) via RPO Section 86.604(e)(2)(cc) or 86.604(e)(3) and impacts more than 15% of the project-scale CCSYAs.

- ☐ No Net Impact: Project is not eligible for traditional methods of identification, avoidance, and bypass. Project must demonstrate no net impact to the receiving water.

Critical Coarse Sediment Yield Areas Continued
Demonstrate No Net Impact
If the project elects to satisfy CCSYA criteria through demonstration of no net impact to the receiving water. Applicants must identify the methods utilized from the list below and provide supporting documentation in Attachment 2c of the SWQMP. Check all that are applicable. ☒ N/A, the project appropriately identifies, avoids, and bypasses CCSYAs. ☐ Project has performed additional analysis to demonstrate that impacts to CCSYAs satisfy the no net impact standard of Ep/Sp≤1.1. ☐ Project has provided alternate mapping of CCSYAs. ☐ Project has implemented additional onsite hydromodification flow control measures. ☐ Project has implemented an offsite stream rehabilitation project to offset impacts. ☐ Project has implemented other applicant-proposed mitigation measures.

Step 3.7.2: 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.

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 the low flow threshold is 0.1Q2
☐ Yes, the result is the low flow threshold is 0.3Q2
☐ Yes, the result is the low flow threshold is 0.5Q2

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

Discussion / Additional Information: (optional)

Step 3.8: 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.

Optional Additional Information or Continuation of Previous Sections As Needed
This space provided for additional information or continuation of information from previous sections as needed.

Step 4: Source Control BMP Checklist

Source Control BMPs

All development projects must implement source control BMPs 4.2.1 through 4.2.6 where applicable and feasible. See Chapter 4.2 and Appendix E of the County BMP Design 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 4.2 and/or Appendix E of the County BMP Design 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 must be provided.

Source Control Requirement	Applied?		
4.2.1 Prevention of Illicit Discharges into the MS4	☒Yes	☐No	☐N/A
Discussion / justification if 4.2.1 not implemented:			
4.2.2 Storm Drain Stenciling or Signage	☒Yes	☐No	☐N/A
Discussion / justification if 4.2.2 not implemented:			
4.2.3 Protect Outdoor Materials Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐Yes	☐No	☒N/A
Discussion / justification if 4.2.3 not implemented:			
4.2.4 Protect Materials Stored in Outdoor Work Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐Yes	☐No	☒N/A
Discussion / justification if 4.2.4 not implemented:			

Source Control Requirement	Applied?		
4.2.5 Protect Trash Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☒Yes	☐No	☐N/A
Discussion / justification if 4.2.5 not implemented:			
4.2.6 Additional BMPs Based on Potential Sources of Runoff Pollutants (must answer for each source listed below):			
☐ A. On-site storm drain inlets	☒Yes	☐No	☐N/A
☐ B. Interior floor drains and elevator shaft sump pumps	☐Yes	☐No	☐N/A
☐ C. Interior parking garages	☐Yes	☐No	☐N/A
☐ D. Need for future indoor & structural pest control	☒Yes	☐No	☐N/A
☐ E. Landscape/outdoor pesticide use	☒Yes	☐No	☐N/A
☐ F. Pools, spas, ponds, fountains, and other water features	☐Yes	☐No	☐N/A
☐ G. Food service	☐Yes	☐No	☐N/A
☐ H. Refuse areas	☐Yes	☐No	☐N/A
☐ I. Industrial processes	☐Yes	☐No	☐N/A
☐ J. Outdoor storage of equipment or materials	☐Yes	☐No	☐N/A
☐ K. Vehicle and equipment cleaning	☐Yes	☐No	☐N/A
☐ L. Vehicle/equipment repair and maintenance	☐Yes	☐No	☐N/A
☐ M. Fuel dispensing areas	☐Yes	☐No	☐N/A
☐ N. Loading docks	☐Yes	☐No	☐N/A
☐ O. Fire sprinkler test water	☐Yes	☐No	☐N/A
☐ P. Miscellaneous drain or wash water	☐Yes	☐No	☐N/A
☐ Q. Plazas, sidewalks, and parking lots	☒Yes	☐No	☐N/A

Discussion / justification if 4.2.6 not implemented. Clearly identify which sources of runoff pollutants are discussed. Justification must be provided for <u>all</u> "No" answers shown above.

Note: Show all source control measures described above that are included in design capture volume calculations in the plan sheets of Attachment 5.

Step 5: Site Design BMP Checklist

Site Design BMPs
All development projects must implement site design BMPs SD-A through SD-H where applicable and feasible. See Chapter 4.3 and Appendix E of the County BMP Design 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 4.3 and/or Appendix E of the County BMP Design 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 must be provided.

Site Design Requirement	Applied?		
4.3.1 Maintain Natural Drainage Pathways and Hydrologic Features	☒Yes	☐No	☐N/A
Discussion / justification if 4.3.1 not implemented:			
4.3.2 Conserve Natural Areas, Soils, and Vegetation	☒Yes	☐No	☐N/A
Discussion / justification if 4.3.2 not implemented:			
4.3.3 Minimize Impervious Area	☒Yes	☐No	☐N/A
Discussion / justification if 4.3.3 not implemented:			
4.3.4 Minimize Soil Compaction	☒Yes	☐No	☐N/A
Discussion / justification if 4.3.4 not implemented:			

Site Design Requirement	Applied?		
4.3.5 Impervious Area Dispersion	☒Yes	☐No	☐N/A
Discussion / justification if 4.3.5 not implemented:			
4.3.6 Runoff Collection	☒Yes	☐No	☐N/A
Discussion / justification if 4.3.6 not implemented:			
4.3.7 Landscaping with Native or Drought Tolerant Species	☒Yes	☐No	☐N/A
Discussion / justification if 4.3.7 not implemented:			
4.3.8 Harvesting and Using Precipitation	☐Yes	☐No	☒N/A
Discussion / justification if 4.3.8 not implemented:			

Note: Show all site design measures described above that are included in design capture volume calculations in the plan sheets of Attachment 5.

Step 6: 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 County 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, and the County must confirm the maintenance (see Section 7 of the BMP Design Manual).

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 (Step 6.2) for each structural BMP within the project (copy the BMP summary information sheet [Step 6.2] as many times as needed to provide summary information for each individual structural BMP).

Step 6.1: Description of structural BMP strategy

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. At the end of this discussion provide a summary of all the structural BMPs within the project including the type and number.

The following structural BMP strategy is based on no harvesting per worksheet B3.-1 of County of San Diego BMP Design Manual.

Runoff generated on-site impervious areas will be collected any conveyed to privately maintained bioretention basins with hydromodification storage and flow control components. Soil report shows suitable infiltration rates throughout the site. Proposed bioretention basins will be designed for full infiltration of the DCV.

Description of structural BMP strategy continued **(Page reserved for continuation of description of general strategy for structural BMP implementation at the site)**
(Continued from previous page)

Step 6.2: Structural BMP Checklist

(Copy this page as needed to provide information for each individual proposed structural BMP)

Structural BMP ID No.

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 certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms (See Section 1.12 of the BMP Design Manual)	

Who will be the final owner of this BMP?	☒ HOA ☐ Property Owner ☐ County ☐ Other (describe)
Who will maintain this BMP into perpetuity?	☒ HOA ☐ Property Owner ☐ County ☐ Other (describe)
What Category (1-4) is the Structural BMP? Refer to the Category definitions in Section 7.3 of the BMP DM. Attach the appropriate maintenance agreement in Attachment 3.	Category 1
Discussion (as needed): *(Continue on subsequent pages as necessary)*	

Step 6.3: Offsite Alternative Compliance Participation Form

PDP INFORMATION	
Record ID:	
Assessor's Parcel Number(s) [APN(s)]	
What are your PDP Pollutant Control Debits? *See Attachment 1 of the PDP SWQMP	
What are your PDP HMP Debits? (if applicable) *See Attachment 2 of the PDP SWQMP	
ACP Information	
Record ID:	
Assessor's Parcel Number(s) [APN(s)]	
Project Owner/Address	
What are your ACP Pollutant Control Credits? *See Attachment 1 of the ACP SWQMP	
What are your ACP HMP Debits? (if applicable) *See Attachment 2 of the ACP SWQMP	
Is your ACP in the same watershed as your PDP? ☐ Yes ☐ No	Will your ACP project be completed prior to the completion of the PDP? ☐ Yes ☐ No
Does your ACP account for all Deficits generated by the PDP?	What is the difference between your PDP debits and ACP Credits?

☐ Yes ☐ No (PDP and/or ACP must be redesigned to account for all deficits generated by the PDP.	*(ACP Credits -Total PDP Debits = Total Earned Credits)

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 Sequence	**Contents**	**Checklist**
Attachment 1a	Storm Water Pollutant Control Worksheet Calculations -Worksheet B.3-1 (Required) -Worksheet B.1-1 (Required) -Worksheet B.4-1 (if applicable) -Worksheet B.4-2 (if applicable) -Worksheet B.5-1 (if applicable) -Worksheet B.5-2 (if applicable) -Worksheet B.5-3 (if applicable) -Worksheet B.6-1 (if applicable) -Summary Worksheet (optional)	☐ Included
Attachment 1b	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 1c	DMA Exhibit (Required) See DMA Exhibit Checklist on the back of this Attachment cover sheet.	☐ Included

Attachment 1d	Individual Structural BMP DMA Mapbook (Required) -Place each map on 8.5”x11” paper. -Show at a minimum the DMA, Structural BMP, and any existing hydrologic features within the DMA.	☐ 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 Step 3.5)
☐ Structural BMPs (identify location, structural BMP ID#, type of BMP, and size/detail)

Automated Worksheet B.3-1: Project-Scale BMP Feasibility Analysis (V1.3)

Category	#	Description	Value	Units
Capture & Use Inputs	0	Design Capture Volume for Entire Project Site	16,060	cubic-feet
	1	Proposed Development Type	Residential	unitless
	2	Number of Residents or Employees at Proposed Development	64	#
	3	Total Planted Area within Development	573,700	sq-ft
	4	Water Use Category for Proposed Planted Areas	Low	unitless
Infiltration Inputs	5	Is Average Site Design Infiltration Rate ≤0.500 Inches per Hour?	Yes	yes/no
	6	Is Average Site Design Infiltration Rate ≤0.010 Inches per Hour?	No	yes/no
	7	Is Infiltration of the Full DCV Anticipated to Produce Negative Impacts?	Yes	yes/no
	8	Is Infiltration of Any Volume Anticipated to Produce Negative Impacts?	No	yes/no
Calculations	9	36-Hour Toilet Use Per Resident or Employee	1.86	cubic-feet
	10	Subtotal: Anticipated 36 Hour Toilet Use	119	cubic-feet
	11	Anticipated 1 Acre Landscape Use Over 36 Hours	52.14	cubic-feet
	12	Subtotal: Anticipated Landscape Use Over 36 Hours	687	cubic-feet
	13	Total Anticipated Use Over 36 Hours	806	cubic-feet
	14	Total Anticipated Use / Design Capture Volume	0.05	cubic-feet
	15	Are Full Capture and Use Techniques Feasible for this Project?	No	unitless
	16	Is Full Retention Feasible for this Project?	No	yes/no
	17	Is Partial Retention Feasible for this Project?	Yes	yes/no
Result	18	Feasibility Category	4	1, 2, 3, 4, 5

Worksheet B.3-1 General Notes:

A. Applicants may use this worksheet to determine the types of structural BMPs that are acceptable for implementation at their project site (as required in Section 5 of the BMPDM). User input should be provided for yellow shaded cells, values for all other cells will be automatically generated. Projects demonstrating feasibility or potential feasibility via this worksheet are encouraged to incorporate capture and use features in their project.

B. Negative impacts associated with retention may include geotechnical, groundwater, water balance, or other issues identified by a geotechnical engineer and substantiated through completion of Form I-8.

C. Feasibility Category 1: Applicant must implement capture & use, retention, and/or infiltration elements for the entire DCV.

D. Feasibility Category 2: Applicant must implement capture & use elements for the entire DCV.

E. Feasibility Category 3: Applicant must implement retention and/or infiltration elements for all DMAs with Design Infiltration Rates greater than 0.50 in/hr.

F. Feasibility Category 4: Applicant must implement standard unlined biofiltration BMPs sized at ≥3% of the effective impervious tributary area for all DMAs with Design Infiltration Rates of 0.011 to 0.50 in/hr. Applicants may be permitted to implement lined BMPs, reduced size BMPs, and/or specialized biofiltration BMPs provided additional criteria identified in "Supplemental Retention Criteria for Non-Standard Biofiltration BMPs" are satisfied.

G. Feasibility Category 5: Applicant must implement standard lined biofiltration BMPs sized at ≥3% of the effective impervious tributary area for all DMAs with Design Infiltration Rates of 0.010 in/hr or less. Applicants may also be permitted to implement reduced size and/or specialized biofiltration BMPs provided additional criteria identified in "Supplemental Retention Criteria for Non-Standard Biofiltration BMPs" are satisfied.

H. PDPs participating in an offsite alternative compliance program are not held to the feasibility categories presented herein.

Automated Worksheet B.1-1: Calculation of Design Capture Volume (V1.3)

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
Standard Drainage Basin Inputs	0	Drainage Basin ID or Name	BMP #1	BMP#2	BMP #3	BMP #4	BMP #5	BMP #6	BMP #7	BMP #8	BMP #9	BMP #10	unitless
	1	Basin Drains to the Following BMP Type	Retention	Retention	Retention	Retention	Retention	Retention	Retention	Retention	Retention	Retention	unitless
	2	85th Percentile 24-hr Storm Depth	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	inches
	3	Design Infiltration Rate Recommended by Geotechnical Engineer	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	in/hr
	4	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	3,410	5,237	3,448	4,800	3,430	3,408	3,540	3,647	3,260	4,153	sq-ft
	5	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)											sq-ft
	6	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)											sq-ft
	7	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)											sq-ft
	8	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)											sq-ft
	9	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)											sq-ft
	10	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)											sq-ft
Dispersion Area, Tree Well & Rain Barrel Inputs (Optional)	11	Does Tributary Incorporate Dispersion, Tree Wells, and/or Rain Barrels?	No	No	No	No	No	No	No	No	No	No	yes/no
	12	Impervious Surfaces **Directed to Dispersion Area** per SD-B (Ci=0.90)											sq-ft
	13	Semi-Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.30)											sq-ft
	14	Engineered Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.10)											sq-ft
	15	Natural Type A Soil **Serving as Dispersion Area** per SD-B (Ci=0.10)											sq-ft
	16	Natural Type B Soil **Serving as Dispersion Area** per SD-B (Ci=0.14)											sq-ft
	17	Natural Type C Soil **Serving as Dispersion Area** per SD-B (Ci=0.23)											sq-ft
	18	Natural Type D Soil **Serving as Dispersion Area** per SD-B (Ci=0.30)											sq-ft
	19	Number of Tree Wells Proposed per SD-A											#
	20	Average Mature Tree Canopy Diameter											ft
	21	Number of Rain Barrels Proposed per SD-E											#
	22	Average Rain Barrel Size											gal
Treatment Train Inputs & Calculations	23	Does BMP Overflow to Stormwater Features in Downstream Drainage?	No	No	No	No	No	No	No	No	No	No	unitless
	24	Identify Downstream Drainage Basin Providing Treatment in Series											unitless
	25	Percent of Upstream Flows Directed to Downstream Dispersion Areas											percent
	26	Upstream Impervious Surfaces Directed to Dispersion Area (Ci=0.90)	0	0	0	0	0	0	0	0	0	0	cubic-feet
	27	Upstream Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	0	0	0	0	0	0	0	0	0	0	cubic-feet
Initial Runoff Factor Calculation	28	Total Tributary Area	3,410	5,237	3,448	4,800	3,430	3,408	3,540	3,647	3,260	4,153	sq-ft
	29	Initial Runoff Factor for Standard Drainage Areas	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	unitless
	30	Initial Runoff Factor for Dispersed & Dispersion Areas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	31	Initial Weighted Runoff Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	unitless
	32	Initial Design Capture Volume	217	334	220	306	219	217	226	232	208	265	cubic-feet
Dispersion Area Adjustments	33	Total Impervious Area Dispersed to Pervious Surface	0	0	0	0	0	0	0	0	0	0	sq-ft
	34	Total Pervious Dispersion Area	0	0	0	0	0	0	0	0	0	0	sq-ft
	35	Ratio of Dispersed Impervious Area to Pervious Dispersion Area	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	ratio
	36	Adjustment Factor for Dispersed & Dispersion Areas	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	ratio
	37	Runoff Factor After Dispersion Techniques	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	unitless
	38	Design Capture Volume After Dispersion Techniques	217	334	220	306	219	217	226	232	208	265	cubic-feet
Tree & Barrel Adjustments	39	Total Tree Well Volume Reduction	0	0	0	0	0	0	0	0	0	0	cubic-feet
	40	Total Rain Barrel Volume Reduction	0	0	0	0	0	0	0	0	0	0	cubic-feet
Results	41	Final Adjusted Runoff Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	unitless
	42	Final Effective Tributary Area	3,069	4,713	3,103	4,320	3,087	3,067	3,186	3,282	2,934	3,738	sq-ft
	43	Initial Design Capture Volume Retained by Site Design Elements	0	0	0	0	0	0	0	0	0	0	cubic-feet
	44	Final Design Capture Volume Tributary to BMP	217	334	220	306	219	217	226	232	208	265	cubic-feet

Worksheet B.1-1 General Notes:

A. Applicants may use this worksheet to calculate design capture volumes for up to 10 drainage areas User input must be provided for yellow shaded cells, values for all other cells will be automatically generated, errors/notifications will be highlighted in red and summarized below. Upon completion of this worksheet, proceed to the appropriate BMP Sizing worksheet(s).

Automated Worksheet B.4-1: Sizing Retention BMPs (V1.3)

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
BMP Inputs	0	Drainage Basin ID or Name	BMP #1	BMP#2	BMP #3	BMP #4	BMP #5	BMP #6	BMP #7	BMP #8	BMP #9	BMP #10	unitless
	1	Design Infiltration Rate Recommended by Geotechnical Engineer	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	in/hr
	2	Design Capture Volume Tributary to BMP	217	334	220	306	219	217	226	232	208	265	cubic-feet
	3	Is Retention BMP Vegetated or Non-Vegetated?	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	unitless
	4	Provided Surface Area	200	500	200	200	200	200	200	200	200	200	sq-ft
	5	Provided Surface Ponding Depth	12	12	12	12	12	12	12	12	12	12	inches
	6	Provided Soil Media Thickness	24	24	24	24	24	24	24	24	24	24	inches
	7	Provided Gravel Storage Thickness	48	48	48	48	48	48	48	48	48	48	inches
Infiltration Calculations	8	Volume Infiltrated Over 6 Hour Storm	50	125	50	50	50	50	50	50	50	50	cubic-feet
	9	Soil Media Pore Space	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	unitless
	10	Gravel Pore Space	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless
	11	Effective Depth of Retention Storage	37.2	37.2	37.2	37.2	37.2	37.2	37.2	37.2	37.2	37.2	inches
	12	Drawdown Time for Surface Ponding (Post-Storm)	24	24	24	24	24	24	24	24	24	24	hours
	13	Drawdown Time for Entire Basin (Including 6 Hour Storm)	80	80	80	80	80	80	80	80	80	80	hours
	14	Volume Retained by BMP	670	1,675	670	670	670	670	670	670	670	670	cubic-feet
	15	Fraction of DCV Retained	3.00	3.00	3.00	2.19	3.00	3.00	2.96	2.89	3.00	2.53	ratio
	16	Percentage of Performance Requirement Satisfied	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	ratio
	17	Fraction of DCV Retained (normalized to 36-hr drawdown)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	ratio
	18	This BMP Overflows to the Following Drainage Basin	-	-	-	-	-	-	-	-	-	-	unitless
Result	19	**Deficit of Effectively Treated Stormwater**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	cubic-feet

Worksheet B.4-1 General Notes:

A. Applicants may use this worksheet to size Infiltration, Bioretention, and/or Permeable Pavement BMPs (INF-1, INF-2, INF-3) for up to 10 basins. User input must be provided for yellow shaded cells, values for blue cells are automatically populated based on user inputs from previous worksheets, values for all other cells will be automatically generated, errors/notifications will be highlighted in red/orange and summarized below. BMPs fully satisfying the pollutant control performance standards will have a deficit treated volume of zero and be highlighted in green.

Summary of Stormwater Pollutant Control Calculations (V1.3)

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
General Info	0	Drainage Basin ID or Name	BMP #1	BMP#2	BMP #3	BMP #4	BMP #5	BMP #6	BMP #7	BMP #8	BMP #9	BMP #10	unitless
	1	85th Percentile Storm Depth	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	inches
	2	Design Infiltration Rate Recommended by Geotechnical Engineer	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	in/hr
	3	Total Tributary Area	3,410	5,237	3,448	4,800	3,430	3,408	3,540	3,647	3,260	4,153	sq-ft
	4	85th Percentile Storm Volume (Rainfall Volume)	242	371	244	340	243	241	251	258	231	294	cubic-feet
Initial DCV	5	Initial Weighted Runoff Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	unitless
	6	Initial Design Capture Volume	217	334	220	306	219	217	226	232	208	265	cubic-feet
Site Design Volume Reductions	7	Dispersion Area Reductions	0	0	0	0	0	0	0	0	0	0	cubic-feet
	8	Tree Well and Rain Barrel Reductions	0	0	0	0	0	0	0	0	0	0	cubic-feet
BMP Volume Reductions	9	Effective Area Tributary to BMP	3,069	4,713	3,103	4,320	3,087	3,067	3,186	3,282	2,934	3,738	square feet
	10	Final Design Capture Volume Tributary to BMP	217	334	220	306	219	217	226	232	208	265	cubic-feet
	11	Basin Drains to the Following BMP Type	Retention	Retention	Retention	Retention	Retention	Retention	Retention	Retention	Retention	Retention	unitless
	12	Volume Retained by BMP (normalized to 36 hour drawdown)	217	334	220	306	219	217	226	232	208	265.00	cubic-feet
Total Volume Reductions	13	Total Fraction of Initial DCV Retained within DMA	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	fraction
	14	Percent of Average Annual Runoff Retention Provided	80.4%	80.4%	80.4%	80.4%	80.4%	80.4%	80.4%	80.4%	80.4%	80.4%	%
	15	Percent of Average Annual Runoff Retention Required	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	%
Performance Standard	16	Percent of Pollution Control Standard Satisfied	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	%
Treatment Train	17	Discharges to Secondary Treatment in Drainage Basin	-	-	-	-	-	-	-	-	-	-	unitless
	18	Impervious Surface Area Still Requiring Treatment	0	0	0	0	0	0	0	0	0	0	square feet
	19	Impervious Surfaces Directed to Downstream Dispersion Area	-	-	-	-	-	-	-	-	-	-	square feet
	20	Impervious Surfaces Not Directed to Downstream Dispersion Area	-	-	-	-	-	-	-	-	-	-	square feet
Result	21	Deficit of Effectively Treated Stormwater	0	0	0	0	0	0	0	0	0	0	cubic-feet

Summary Notes:

All fields in this summary worksheet are populated based on previous user inputs. If applicable, drainage basin elements that require revisions and/or supplemental information outside the scope of these worksheets are highlighted in orange and summairzed in the red text below. If all drainage basins achieve full compliance without a need for supplemental information, a green message will appear below.

-Congratulations, all specified drainage basins and BMPs are in compliance with stormwater pollutant control requirements. Include 11x17 color prints of this summary sheet and supporting worksheet calculations as part of the SWQMP submittal package.

False

Automated Worksheet B.1-1: Calculation of Design Capture Volume (V1.3)

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
Standard Drainage Basin Inputs	0	Drainage Basin ID or Name	BMP #11	BMP#12	BMP #13	BMP #14	BMP #15	BMP #16	BMP #17	BMP #18	BMP #19	BMP #20	unitless
	1	Basin Drains to the Following BMP Type	Retention	Retention	Retention	Retention	Retention	Retention	Retention	Retention	Retention	Retention	unitless
	2	85th Percentile 24-hr Storm Depth	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	inches
	3	Design Infiltration Rate Recommended by Geotechnical Engineer	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	in/hr
	4	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	3,635	3,635	3,552	3,555	8,965	5,255	6,375	10,034	10,651	7,910	sq-ft
	5	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)											sq-ft
	6	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)											sq-ft
	7	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)											sq-ft
	8	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)											sq-ft
	9	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)											sq-ft
	10	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)											sq-ft
Dispersion Area, Tree Well & Rain Barrel Inputs (Optional)	11	Does Tributary Incorporate Dispersion, Tree Wells, and/or Rain Barrels?	No	No	No	No	No	No	No	No	No	No	yes/no
	12	Impervious Surfaces **Directed to Dispersion Area** per SD-B (Ci=0.90)											sq-ft
	13	Semi-Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.30)											sq-ft
	14	Engineered Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.10)											sq-ft
	15	Natural Type A Soil **Serving as Dispersion Area** per SD-B (Ci=0.10)											sq-ft
	16	Natural Type B Soil **Serving as Dispersion Area** per SD-B (Ci=0.14)											sq-ft
	17	Natural Type C Soil **Serving as Dispersion Area** per SD-B (Ci=0.23)					0						sq-ft
	18	Natural Type D Soil **Serving as Dispersion Area** per SD-B (Ci=0.30)											sq-ft
	19	Number of Tree Wells Proposed per SD-A											#
	20	Average Mature Tree Canopy Diameter											ft
	21	Number of Rain Barrels Proposed per SD-E											#
	22	Average Rain Barrel Size											gal
Treatment Train Inputs & Calculations	23	Does BMP Overflow to Stormwater Features in Downstream Drainage?	No	No	No	No	No	No	No	No	No	No	unitless
	24	Identify Downstream Drainage Basin Providing Treatment in Series											unitless
	25	Percent of Upstream Flows Directed to Downstream Dispersion Areas											percent
	26	Upstream Impervious Surfaces Directed to Dispersion Area (Ci=0.90)	0	0	0	0	0	0	0	0	0	0	cubic-feet
	27	Upstream Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	0	0	0	0	0	0	0	0	0	0	cubic-feet
Initial Runoff Factor Calculation	28	Total Tributary Area	3,635	3,635	3,552	3,555	8,965	5,255	6,375	10,034	10,651	7,910	sq-ft
	29	Initial Runoff Factor for Standard Drainage Areas	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	unitless
	30	Initial Runoff Factor for Dispersed & Dispersion Areas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	31	Initial Weighted Runoff Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	unitless
	32	Initial Design Capture Volume	232	232	226	227	572	335	406	640	679	504	cubic-feet
Dispersion Area Adjustments	33	Total Impervious Area Dispersed to Pervious Surface	0	0	0	0	0	0	0	0	0	0	sq-ft
	34	Total Pervious Dispersion Area	0	0	0	0	0	0	0	0	0	0	sq-ft
	35	Ratio of Dispersed Impervious Area to Pervious Dispersion Area	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	ratio
	36	Adjustment Factor for Dispersed & Dispersion Areas	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	ratio
	37	Runoff Factor After Dispersion Techniques	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	unitless
	38	Design Capture Volume After Dispersion Techniques	232	232	226	227	572	335	406	640	679	504	cubic-feet
Tree & Barrel Adjustments	39	Total Tree Well Volume Reduction	0	0	0	0	0	0	0	0	0	0	cubic-feet
	40	Total Rain Barrel Volume Reduction	0	0	0	0	0	0	0	0	0	0	cubic-feet
Results	41	Final Adjusted Runoff Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	unitless
	42	Final Effective Tributary Area	3,272	3,272	3,197	3,200	8,069	4,730	5,738	9,031	9,586	7,119	sq-ft
	43	Initial Design Capture Volume Retained by Site Design Elements	0	0	0	0	0	0	0	0	0	0	cubic-feet
	44	Final Design Capture Volume Tributary to BMP	232	232	226	227	572	335	406	640	679	504	cubic-feet

Worksheet B.1-1 General Notes:

A. Applicants may use this worksheet to calculate design capture volumes for up to 10 drainage areas User input must be provided for yellow shaded cells, values for all other cells will be automatically generated, errors/notifications will be highlighted in red and summarized below. Upon completion of this worksheet, proceed to the appropriate BMP Sizing worksheet(s).

Automated Worksheet B.4-1: Sizing Retention BMPs (V1.3)

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
BMP Inputs	0	Drainage Basin ID or Name	BMP #11	BMP#12	BMP #13	BMP #14	BMP #15	BMP #16	BMP #17	BMP #18	BMP #19	BMP #20	unitless
	1	Design Infiltration Rate Recommended by Geotechnical Engineer	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	in/hr
	2	Design Capture Volume Tributary to BMP	232	232	226	227	572	335	406	640	679	504	cubic-feet
	3	Is Retention BMP Vegetated or Non-Vegetated?	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	Vegetated	unitless
	4	Provided Surface Area	200	200	200	200	500	200	200	710	710	710	sq-ft
	5	Provided Surface Ponding Depth	12	12	12	12	12	12	12	12	12	12	inches
	6	Provided Soil Media Thickness	24	24	24	24	24	24	24	24	24	24	inches
	7	Provided Gravel Storage Thickness	48	48	48	48	48	48	48	48	48	48	inches
Infiltration Calculations	8	Volume Infiltrated Over 6 Hour Storm	50	50	50	50	125	50	50	178	178	178	cubic-feet
	9	Soil Media Pore Space	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	unitless
	10	Gravel Pore Space	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless
	11	Effective Depth of Retention Storage	37.2	37.2	37.2	37.2	37.2	37.2	37.2	37.2	37.2	37.2	inches
	12	Drawdown Time for Surface Ponding (Post-Storm)	24	24	24	24	24	24	24	24	24	24	hours
	13	Drawdown Time for Entire Basin (Including 6 Hour Storm)	80	80	80	80	80	80	80	80	80	80	hours
	14	Volume Retained by BMP	670	670	670	670	1,675	670	670	2,379	2,379	2,379	cubic-feet
	15	Fraction of DCV Retained	2.89	2.89	2.96	2.95	2.93	2.00	1.65	3.00	3.00	3.00	ratio
	16	Percentage of Performance Requirement Satisfied	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	ratio
	17	Fraction of DCV Retained (normalized to 36-hr drawdown)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	ratio
	18	This BMP Overflows to the Following Drainage Basin	-	-	-	-	-	-	-	-	-	-	unitless
Result	19	**Deficit of Effectively Treated Stormwater**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	cubic-feet

Worksheet B.4-1 General Notes:

A. Applicants may use this worksheet to size Infiltration, Bioretention, and/or Permeable Pavement BMPs (INF-1, INF-2, INF-3) for up to 10 basins. User input must be provided for yellow shaded cells, values for blue cells are automatically populated based on user inputs from previous worksheets, values for all other cells will be automatically generated, errors/notifications will be highlighted in red/orange and summarized below. BMPs fully satisfying the pollutant control performance standards will have a deficit treated volume of zero and be highlighted in green.

Summary of Stormwater Pollutant Control Calculations (V1.3)

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
General Info	0	Drainage Basin ID or Name	BMP #11	BMP#12	BMP #13	BMP #14	BMP #15	BMP #16	BMP #17	BMP #18	BMP #19	BMP #20	unitless
	1	85th Percentile Storm Depth	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	inches
	2	Design Infiltration Rate Recommended by Geotechnical Engineer	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	in/hr
	3	Total Tributary Area	3,635	3,635	3,552	3,555	8,965	5,255	6,375	10,034	10,651	7,910	sq-ft
	4	85th Percentile Storm Volume (Rainfall Volume)	257	257	252	252	635	372	452	711	754	560	cubic-feet
Initial DCV	5	Initial Weighted Runoff Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	unitless
	6	Initial Design Capture Volume	232	232	226	227	572	335	406	640	679	504	cubic-feet
Site Design Volume Reductions	7	Dispersion Area Reductions	0	0	0	0	0	0	0	0	0	0	cubic-feet
	8	Tree Well and Rain Barrel Reductions	0	0	0	0	0	0	0	0	0	0	cubic-feet
BMP Volume Reductions	9	Effective Area Tributary to BMP	3,272	3,272	3,197	3,200	8,069	4,730	5,738	9,031	9,586	7,119	square feet
	10	Final Design Capture Volume Tributary to BMP	232	232	226	227	572	335	406	640	679	504	cubic-feet
	11	Basin Drains to the Following BMP Type	Retention	Retention	Retention	Retention	Retention	Retention	Retention	Retention	Retention	Retention	unitless
	12	Volume Retained by BMP (normalized to 36 hour drawdown)	232	232	226	227	572	335	406	640	679	504.00	cubic-feet
Total Volume Reductions	13	Total Fraction of Initial DCV Retained within DMA	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	fraction
	14	Percent of Average Annual Runoff Retention Provided	80.4%	80.4%	80.4%	80.4%	80.4%	80.4%	80.4%	80.4%	80.4%	80.4%	%
	15	Percent of Average Annual Runoff Retention Required	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	%
Performance Standard	16	Percent of Pollution Control Standard Satisfied	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	%
Treatment Train	17	Discharges to Secondary Treatment in Drainage Basin	-	-	-	-	-	-	-	-	-	-	unitless
	18	Impervious Surface Area Still Requiring Treatment	0	0	0	0	0	0	0	0	0	0	square feet
	19	Impervious Surfaces Directed to Downstream Dispersion Area	-	-	-	-	-	-	-	-	-	-	square feet
	20	Impervious Surfaces Not Directed to Downstream Dispersion Area	-	-	-	-	-	-	-	-	-	-	square feet
Result	21	Deficit of Effectively Treated Stormwater	0	0	0	0	0	0	0	0	0	0	cubic-feet

Summary Notes:

All fields in this summary worksheet are populated based on previous user inputs. If applicable, drainage basin elements that require revisions and/or supplemental information outside the scope of these worksheets are highlighted in orange and summairzed in the red text below. If all drainage basins achieve full compliance without a need for supplemental information, a green message will appear below.

-Congratulations, all specified drainage basins and BMPs are in compliance with stormwater pollutant control requirements. Include 11x17 color prints of this summary sheet and supporting worksheet calculations as part of the SWQMP submittal package.

False

Automated Worksheet B.4-1: Sizing Retention BMPs (V1.3)

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
BMP Inputs	0	Drainage Basin ID or Name	BMP #21	BMP#22	BMP #23	-	-	-	-	-	-	-	unitless
	1	Design Infiltration Rate Recommended by Geotechnical Engineer	0.500	0.500	0.500	-	-	-	-	-	-	-	in/hr
	2	Design Capture Volume Tributary to BMP	813	1,609	2,220	-	-	-	-	-	-	-	cubic-feet
	3	Is Retention BMP Vegetated or Non-Vegetated?	Vegetated	Vegetated	Vegetated								unitless
	4	Provided Surface Area	710	1,400	1,900								sq-ft
	5	Provided Surface Ponding Depth	12	12	12								inches
	6	Provided Soil Media Thickness	24	24	24								inches
	7	Provided Gravel Storage Thickness	48	48	48								inches
Infiltration Calculations	8	Volume Infiltrated Over 6 Hour Storm	178	350	475	0	0	0	0	0	0	0	cubic-feet
	9	Soil Media Pore Space	0.25	0.25	0.25	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless
	10	Gravel Pore Space	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	unitless
	11	Effective Depth of Retention Storage	37.2	37.2	37.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	inches
	12	Drawdown Time for Surface Ponding (Post-Storm)	24	24	24	0	0	0	0	0	0	0	hours
	13	Drawdown Time for Entire Basin (Including 6 Hour Storm)	80	80	80	0	0	0	0	0	0	0	hours
	14	Volume Retained by BMP	2,379	4,690	6,365	0	0	0	0	0	0	0	cubic-feet
	15	Fraction of DCV Retained	2.93	2.91	2.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	16	Percentage of Performance Requirement Satisfied	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	17	Fraction of DCV Retained (normalized to 36-hr drawdown)	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	18	This BMP Overflows to the Following Drainage Basin	-	-	-	-	-	-	-	-	-	-	unitless
Result	19	**Deficit of Effectively Treated Stormwater**	**0**	**0**	**0**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	cubic-feet

Worksheet B.4-1 General Notes:

A. Applicants may use this worksheet to size Infiltration, Bioretention, and/or Permeable Pavement BMPs (INF-1, INF-2, INF-3) for up to 10 basins. User input must be provided for yellow shaded cells, values for blue cells are automatically populated based on user inputs from previous worksheets, values for all other cells will be automatically generated, errors/notifications will be highlighted in red/orange and summarized below. BMPs fully satisfying the pollutant control performance standards will have a deficit treated volume of zero and be highlighted in green.

Summary of Stormwater Pollutant Control Calculations (V1.3)

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
General Info	0	Drainage Basin ID or Name	BMP #21	BMP#22	BMP #23	-	-	-	-	-	-	-	unitless
	1	85th Percentile Storm Depth	0.85	0.85	0.85	-	-	-	-	-	-	-	inches
	2	Design Infiltration Rate Recommended by Geotechnical Engineer	0.500	0.500	0.500	-	-	-	-	-	-	-	in/hr
	3	Total Tributary Area	12,755	25,240	34,830	-	-	-	-	-	-	-	sq-ft
	4	85th Percentile Storm Volume (Rainfall Volume)	903	1,788	2,467	-	-	-	-	-	-	-	cubic-feet
Initial DCV	5	Initial Weighted Runoff Factor	0.90	0.90	0.90	-	-	-	-	-	-	-	unitless
	6	Initial Design Capture Volume	813	1,609	2,220	-	-	-	-	-	-	-	cubic-feet
Site Design Volume Reductions	7	Dispersion Area Reductions	0	0	0	-	-	-	-	-	-	-	cubic-feet
	8	Tree Well and Rain Barrel Reductions	0	0	0	-	-	-	-	-	-	-	cubic-feet
BMP Volume Reductions	9	Effective Area Tributary to BMP	11,480	22,716	31,347	-	-	-	-	-	-	-	square feet
	10	Final Design Capture Volume Tributary to BMP	813	1,609	2,220	-	-	-	-	-	-	-	cubic-feet
	11	Basin Drains to the Following BMP Type	Retention	Retention	Retention	-	-	-	-	-	-	-	unitless
	12	Volume Retained by BMP (normalized to 36 hour drawdown)	813	1,609	2,220	-	-	-	-	-	-	-	cubic-feet
Total Volume Reductions	13	Total Fraction of Initial DCV Retained within DMA	1.00	1.00	1.00	-	-	-	-	-	-	-	fraction
	14	Percent of Average Annual Runoff Retention Provided	80.4%	80.4%	80.4%	-	-	-	-	-	-	-	%
	15	Percent of Average Annual Runoff Retention Required	40.0%	40.0%	40.0%	-	-	-	-	-	-	-	%
Performance Standard	16	Percent of Pollution Control Standard Satisfied	100.0%	100.0%	100.0%	-	-	-	-	-	-	-	%
Treatment Train	17	Discharges to Secondary Treatment in Drainage Basin	-	-	-	-	-	-	-	-	-	-	unitless
	18	Impervious Surface Area Still Requiring Treatment	0	0	0	-	-	-	-	-	-	-	square feet
	19	Impervious Surfaces Directed to Downstream Dispersion Area	-	-	-	-	-	-	-	-	-	-	square feet
	20	Impervious Surfaces Not Directed to Downstream Dispersion Area	-	-	-	-	-	-	-	-	-	-	square feet
Result	21	Deficit of Effectively Treated Stormwater	0	0	0	-	-	-	-	-	-	-	cubic-feet

Summary Notes:

All fields in this summary worksheet are populated based on previous user inputs. If applicable, drainage basin elements that require revisions and/or supplemental information outside the scope of these worksheets are highlighted in orange and summairzed in the red text below. If all drainage basins achieve full compliance without a need for supplemental information, a green message will appear below.

-Congratulations, all specified drainage basins and BMPs are in compliance with stormwater pollutant control requirements. Include 11x17 color prints of this summary sheet and supporting worksheet calculations as part of the SWQMP submittal package.

False

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July 14, 2016

W.O. 7106-A-SC

Crossroads, LLC
c/o **Lundstrom Engineering and Surveying**
5333 Mission Center Road, Suite 115
San Diego, California 92108

Attention: Mr. Jeff Lundstrom

Subject: Storm Water Infiltration Rate Evaluation, Reche Road and Ranger Road, Fallbrook, TM 5449, San Diego County, California

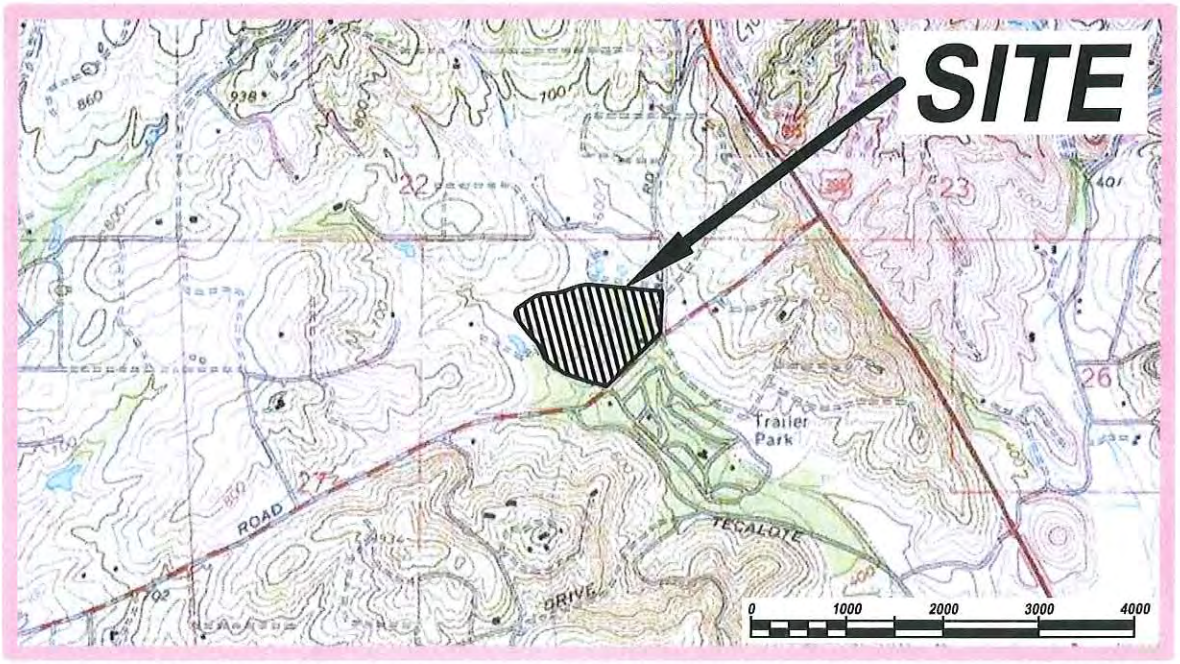
Dear Mr. Lundstrom:

In accordance with your request and authorization, GeoSoils, Inc. (GSI) has prepared the following report regarding storm water infiltration at the subject site, located in the Fallbrook area of San Diego County (see Figure 1), as part of an overall geotechnical update of the site. GSI's scope of services included a review of the referenced reports/plans (see Appendix A), onsite infiltration testing, engineering and geologic analysis, and preparation of this report.

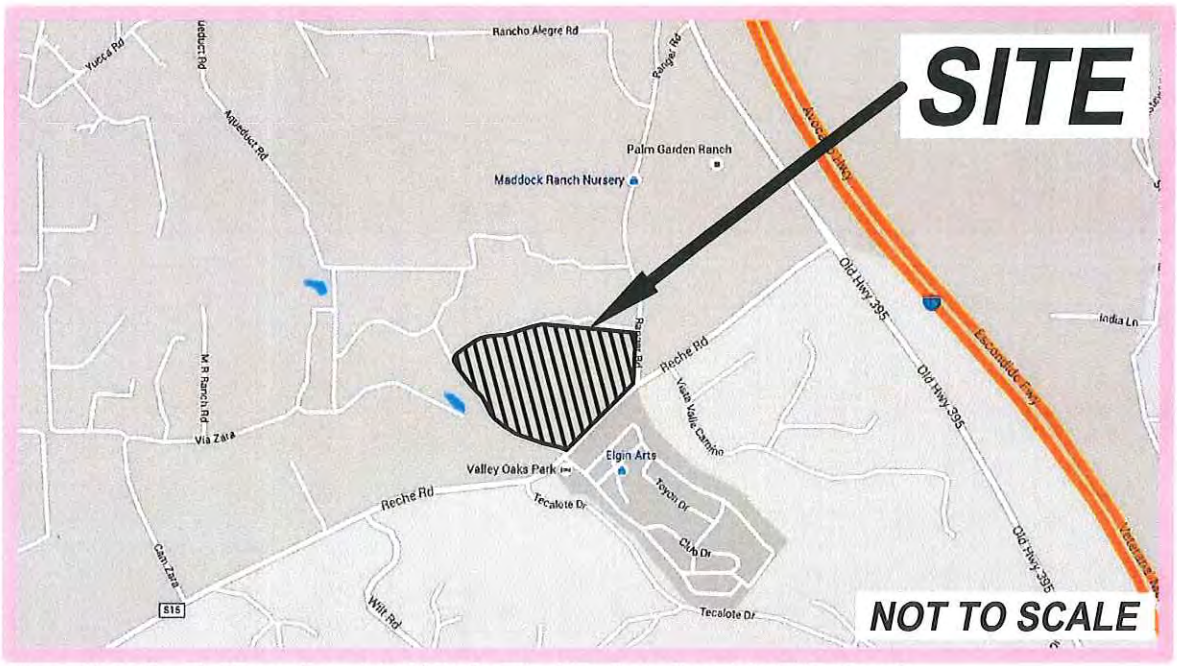
STORM WATER TREATMENT AND HYDROMODIFICATION MANAGEMENT

Infiltration Feasibility

In accordance with the BMP Design Manual (County, 2016), the infiltration feasibility for this site was evaluated. An evaluation of the soils hydraulic conductivity, or (*K*) was performed in accordance with the Porchet, or inverse auger hole method (Van Hoorm, 1979; USBR, 1984). Based on the testing performed, *K* values of 1.60 inches/hour (Test Hole T-1), 0.44 inches/hour (Test Hole T-2), 0.90 inches/hour (test hole T-3), and 0.46 inches/hour (Test Hole T-4) were evaluated. The approximate location of the testing sites is shown on Figure 2, which uses a preliminary grading plan, prepared by Lundstom Engineering and Surveying (LES) 2016, as a base. These values are generally both below, and above the recommended feasibility threshold of 0.52 inches per hour per the EPA (Clar, et al., 2004), and 0.50 inches per hour per the County (County, 2016) for full infiltration. It should be noted that a review of the United States Department of Agriculture database (USDA; 1973, 2015) indicates surficial soils were evaluated with infiltration rates on the order of 0.20 to 5.98 inches/hour across the site (see Figure 2); however, these rates are evaluated for surficial soils that would be removed and exported, or recompacted during mass grading, and as such, are not considered representative of "as-built" site conditions, or



Base Map: TOPO!® ©2003 National Geographic, U.S.G.S. Bonsall Quadrangle, California -- San Diego Co., 7.5 Minute, dated 1975, current, 1975.



Base Map: Google Maps, Copyright 2016 Google, Map Data Copyright 2016 Google

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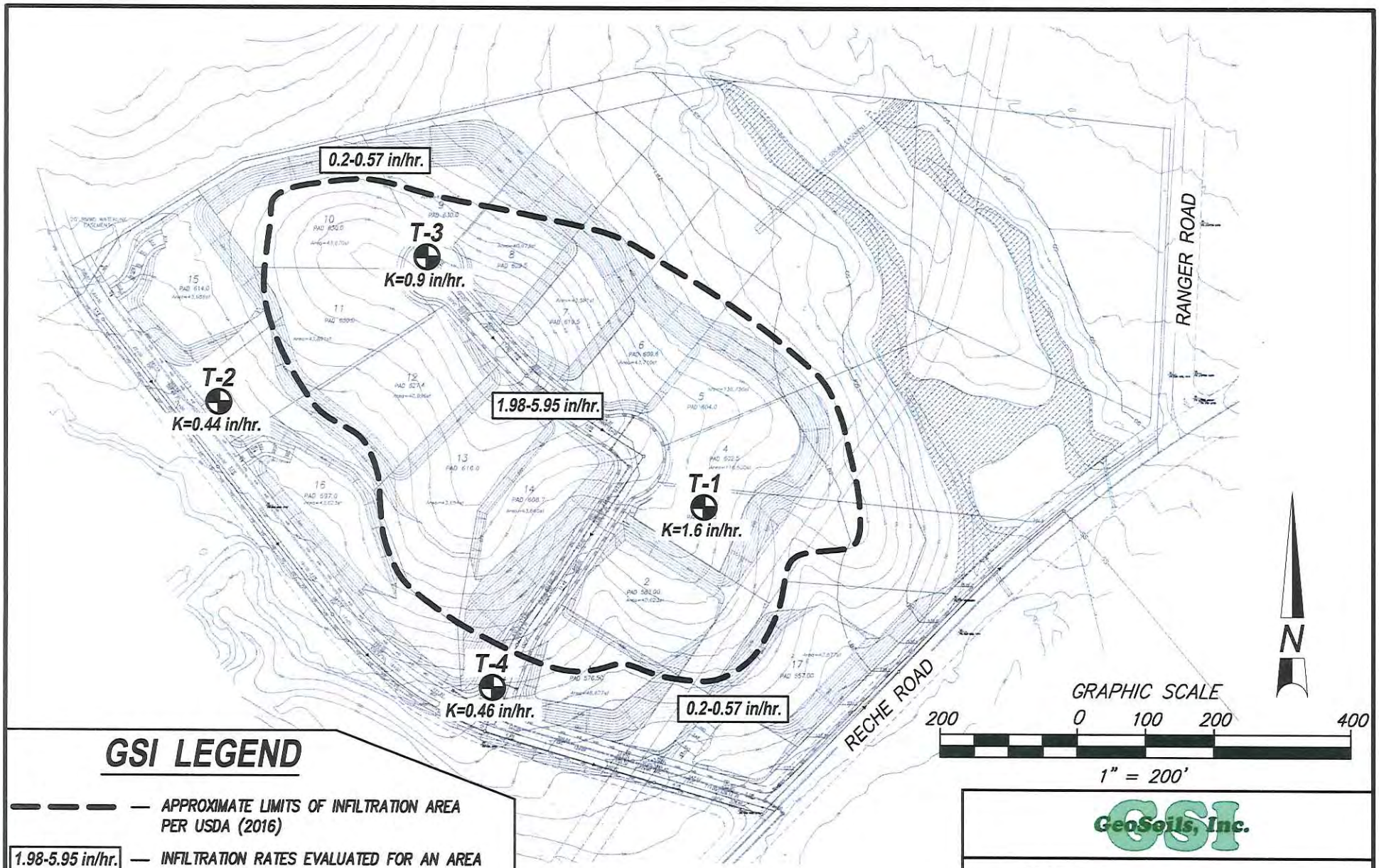
W.O. 7106-A-SC

SITE LOCATION MAP

Figure 1



GSI LEGEND

- — — — APPROXIMATE LIMITS OF INFILTRATION AREA PER USDA (2016)
- 1.98-5.95 in/hr. — INFILTRATION RATES EVALUATED FOR AN AREA PER USDA (2016)
- T-4 / K=1.6 in/hr. — APPROXIMATE LOCATION OF INFILTRATION TEST WITH INFILTRATION RATE "K" IN INCHES PER HOUR (THIS STUDY)

ALL LOCATIONS ARE APPROXIMATE

This document or efile is not a part of the Construction Documents and should not be relied upon as being an accurate depiction of design.

GeoSoils, Inc.

INFILTRATION TEST LOCATION MAP

Figure 2

W.O. 7106-A-SC	DATE: 07/16	SCALE: 1" = 200'

representative of rates for the relatively denser and less permeable soils at depth, that were evaluated as part of this report.

Based on our review and engineering analysis, areas suitable for either full, or partial infiltration occur onsite. However, it should be noted that the infiltration rates evaluated are for undisturbed, near surface native soils. Infiltration rates for compacted fills, and for native earth materials exposed within deeper cuts, will be substantially less. Compacted fills are considered as belonging to Hydrologic Soil Group "D" (no infiltration). For hydromodification structures located within 10 feet of a residential structure, storm water treatment and hydromodification management should be designed for no infiltration. An additional discussion of infiltration feasibility is presented in Appendix B, which contains a Categorization of infiltration feasibility condition, Worksheet C.4.1, provided by the County (2016).

Onsite Infiltration-Runoff Retention Systems

General design criteria regarding the use of onsite infiltration-runoff retention systems (OIRRS) are presented below.

Should onsite infiltration-runoff retention systems (OIRRS) be planned for Best Management Practices (BMP's) or Low Impact Development (LID) principles for the project, some guidelines should/must be followed in the planning, design, and construction of such systems. Such facilities, if improperly designed or implemented without consideration of the geotechnical aspects of site conditions, can contribute to flooding, saturation of bearing materials beneath site improvements, slope instability, and possible concentration and contribution of pollutants into the groundwater or storm drain and/or utility trench systems.

A key factor in these systems is the infiltration rate (sometimes referred to as the percolation rate) which can be ascribed to, or determined for, the earth materials within which these systems are installed. Additionally, the infiltration rate of the designed system (which may include gravel, sand, mulch/topsoil, or other amendments, etc.) will need to be considered. The project infiltration testing is very site specific, any changes to the location of the proposed OIRRS and/or estimated size of the OIRRS, may require additional infiltration testing. Locally, relatively impermeable formations include the underlying formational (granitic) bedrock, which is anticipated to have relatively very low vertical infiltration rate.

Some of the methods which are utilized for onsite infiltration include percolation basins, dry wells, bio-swale/bio-retention, permeable pavers/pavement, infiltration trenches, filter boxes and subsurface infiltration galleries/chambers. Some of these systems are constructed using native and import soils, perforated piping, and filter fabrics while others employ structural components such as stormwater infiltration chambers and filters/separators. Every site will have characteristics which should lend themselves to one or more of these methods, but not every site is suitable for OIRRS. In practice, OIRRS are

usually initially designed by the project design civil engineer. Selection of methods should include (but should not be limited to) review by licensed professionals including the geotechnical engineer, hydrogeologist, engineering geologist, project civil engineer, landscape architect, environmental professional, and industrial hygienist. Applicable governing agency requirements should be reviewed and included in design considerations. The following geotechnical guidelines should be considered when designing onsite infiltration-runoff retention systems:

- It is not good engineering practice to allow water to saturate soils, especially near slopes or improvements; however, the controlling agency/authority is now requiring this for OIRRS purposes on many projects.

- Wherever possible, infiltration systems should not be installed within ±50 feet of the tops of slopes steeper than 15 percent or within H/3 from the tops of slopes (where H equals the height of slope).

- Wherever possible, infiltrations systems should not be placed within a distance of H/2 from the toes of slopes (where H equals the height of slope).

- Wherever possible, infiltration systems should not be installed within 10 feet of a residential structure.

- The landscape architect should be notified of the location of the proposed OIRRS. If landscaping is proposed within the OIRRS, consideration should be given to the type of vegetation chosen and their potential effect upon subsurface improvements (i.e., some trees/shrubs will have an effect on subsurface improvements with their extensive root systems). Over-watering landscape areas above, or adjacent to, the proposed OIRRS could adversely affect performance of the system. Soil chemical amendment could alter soil chemistry, which may affect soil corrosion and permeability.

- Areas adjacent to, or within, the OIRRS that are subject to inundation should be properly protected against scouring, undermining, and erosion, in accordance with the recommendations of the design engineer.

- If subsurface infiltration galleries/chambers are proposed, the appropriate size, depth interval, and ultimate placement of the detention/infiltration system should be evaluated by the design engineer, and be of sufficient width/depth to achieve optimum performance, based on the infiltration rates provided. In addition, proper debris filter systems will need to be utilized for the infiltration galleries/chambers. Debris filter systems will need to be self cleaning and periodically and regularly maintained on a regular basis. Provisions for the regular and periodic maintenance of any debris filter system is recommended and this condition should be disclosed to all interested/affected parties.

- Where infiltration systems are located within setback areas noted above, impermeable liners and subdrains should be used along the bottom of bioretention swales/basins located within the influence of slopes and structures. Impermeable liners used in conjunction with bioretention basins should consist of a 30-mil polyvinyl chloride (PVC) membrane that is covered by a minimum of 12 inches of clean soil, free from rocks and debris, with a maximum 4:1 (h:v) slope inclination, or flatter, and meets the following minimum specifications:

  Specific Gravity (ASTM D792): 1.2 (g/cc, min.); Tensile (ASTM D882): 73 (lb/in-width, min); Elongation at Break (ASTM D882): 380 (%, min); Modulus (ASTM D882): 32 (lb/in-width, min.); and Tear Strength (ASTM D1004): 8 (lb/in, min); Seam Shear Strength (ASTM D882) 58.4 (lb/in, min); Seam Peel Strength (ASTM D882) 15 (lb/in, min).

- Subdrains should consist of at least 4-inch diameter Schedule 40 or SDR 35 drain pipe with perforations oriented down. The drain pipe should be sleeved with a filter sock.

Final project plans (grading, precise grading, foundation, retaining wall, landscaping, etc.), should be reviewed by this office prior to construction, so that construction is in accordance with the conclusions and recommendations of this report. Based on our review, supplemental recommendations and/or further geotechnical studies may be warranted. It should be noted that structural and landscape plans were not available for review at this time.

LIMITATIONS

The conclusions and recommendations presented herein are professional opinions. These opinions have been derived in accordance with current standards of practice, and no warranty is express or implied. Standards of practice are subject to change with time. GSI assumes no responsibility or liability for work or testing performed by others, or their inaction; or work performed when GSI is not requested to be onsite, to evaluate if our recommendations have been properly implemented. Use of this report constitutes an agreement and consent by the user to all the limitations outlined above, notwithstanding any other agreements that may be in place. In addition, this report may be subject to review by the controlling authorities. Thus, this report brings to completion our scope of services for this portion of the project.

The opportunity to be of service is greatly appreciated. If you have any questions concerning this report, or if we may be of further assistance, please do not hesitate to contact any of the undersigned.

Respectfully submitted,

GeoSoils, Inc.

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RGC/DWS/JPF/jh

Attachments: Appendix A - References
Appendix B - Infiltration Worksheet and Test Data

Distribution: (2) Addressee

APPENDIX A

REFERENCES

APPENDIX A

REFERENCES

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APPENDIX B

INFILTRATION WORKSHEET AND TEST DATA

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

Categorization of Infiltration Condition — Worksheet 3.4-1

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:

Onsite testing using the inverse auger hole, or "Porchet" method evaluated infiltration rates ranging between 0.44 to 1.6 inches per hour for native site soil. It should also be noted that any artificial fill, created through removal/recompaction of onsite soils, or infiltration within deeper levels of bedrock exposed in cut areas, would likely possess an infiltration rate below the 0.5 inch/hour threshold. See GSI report dated July 14, 2016 for other related discussions and references.

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:

Basins located within 10 feet of any residential structure or settlement sensitive improvement (walls, pavements, etc.) can adversely affect the performance of the improvement by: 1.) facilitating heave of expansive soil; 2.) Increasing soil moisture transmission rates through concrete flooring; and 3.) Increase the potential for a loss in bearing strength of soil, due to saturation. Mitigative grading for the support of structures generally involves the removal and recompaction of near surface soils. This is anticipated to create a permeability contrast, and the potential for the development of a shallow "perched" water table, which can be anticipated to migrate laterally, beneath the structure(s). Planned utilities in the vicinity would act as "french drains" and also be adversely affected. Graded slopes would be subject to an increased potential for instability due to the lateral migration of water from a potential infiltration area located up gradient from, or near the slope. See GSI report dated June 21, 2016 for other related discussions and references.

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 comprehensible evaluation of the factors presented in Appendix C.3.	X	
Provide basis: This is a hillside development. However, a perched groundwater table was encountered at a depth of about 14 feet below the existing ground surface, along the western side of the project (i.e., vicinity of test hole T-2 and T-4), and should be considered in BMP design. 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 a 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: This is a hillside development. Perched groundwater was evaluated at a depth of about 14 feet below existing grade along the west side of the site, and may be very near the surface in the vicinity of existing drainage courses during the rainy season. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
Part 1 Result*	In the 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		**proceed to part 2**

* To be completed using gathered site information and best professional judgement 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 an 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: Site specific infiltration testing evaluated infiltration rates ranging between 0.44 and 1.6 inches per hour for onsite native soils. However, it should be noted that any artificial fill, created through removal/recompaction of onsite soils would likely possess a further reduced infiltration rate, and basins located within 10 feet of a residential structure, utility trench, or other improvement, would likely be adversely affected. See GSI report dated July 14, 2016 for other related discussions and references. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
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: Yes with exceptions and prescribed setbacks (see Report). Basins located within 10 feet of any residential structure can adversely affect the performance of the structures foundation system by: 1.) Increasing soil moisture transmission rates through concrete flooring; and 2.) Increase the potential for a loss in bearing strength of soil, due to saturation. Mitigative grading for the support of structures generally involves the removal and recompaction of near surface soils. This is anticipated to create a permeability contrast, and the potential for the development of a shallow "perched" water table, which can be anticipated to migrate laterally, beneath the structure(s), or offsite onsite adjacent property. Planned utilities in the vicinity would potentially act as "french drains" and also be adversely affected. Adjacent, offsite slopes are generally steeper than 3:1 (horizontal to vertical) and would be subject to an increased potential for instability due to the lateral migration of water from a potential infiltration area located up gradient. See GSI report dated July 14, 2016 for other related discussions and references. 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 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: This is a hillside development. Groundwater was evaluated at a depth of greater than 50 feet below existing grades onsite. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
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: This is a hillside development. The site currently drains offsite to the west and south, and no runoff appears to be retained onsite. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
Part 2 Result*	If all answers from row 5-8 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 Infiltration**	

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

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INVERSED AUGER HOLE (PORCHET) METHOD - DATA SHEET

PROJECT: TM 5449, Fallbrook DATE: July, 2016

CLIENT: Crossroads Investors I, LLC WORK ORDER: 7106-A-SC

HOLE NUMBER T-1

USCS SOIL CLASSIFICATION SM/SW

DEPTH (D') OF TEST HOLE (in) 51 ½ inches

HOLE DIAMETER (in) 4.5 inches

HOLE RADIUS (r) (in) 2.25 inches

INITIAL WATER LEVEL (in) 25.0 inches (trial 1), 28.5 inches (trial 2)

Time	Δt (min)	t (min)	Ht (in)	ht (in)	ht + ½ r
1:45	0	0	25.0	16.0	27.625
2:25	40	40	46.50	12.5	6.125
2:31	0	0	28.5	23.0	24.125
2:48	17	17	36.0	15.5	16.625
3:02	14	31	40.75	10.75	11.875
3:22	20	51	45.25	6.25	7.5

$K = 1.15\ r \tan \alpha$

where $\tan \alpha = [\log (h_0 + ½\ r) - \log (h_t + ½\ r)] / t\text{-}t_0$

K = about 1.60 inches/hour

NOTES:

Colluvium within upper 24 inches, decomposed granite 24 to 51.5 inches.

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INVERSED AUGER HOLE (PORCHET) METHOD - DATA SHEET

PROJECT: TM 5449, Fallbrook DATE: July, 2016

CLIENT: Crossroads Investors I, LLC WORK ORDER: 7106-A-SC

HOLE NUMBER T-2

USCS SOIL CLASSIFICATION SM

DEPTH (D') OF TEST HOLE (in) 24.5 inches

HOLE DIAMETER (in) 4.5 inches

HOLE RADIUS (r) (in) 2.25 inches

INITIAL WATER LEVEL (in) 5.5 inches

Time	Δt (min)	t (min)	Ht (in)	ht (in)	ht + ½ r
2:19	0	0	5.5	19.0	20.125
2:38	29	29	14.5	10.0	11.125
3:08	30	59	16.5	8.0	9.125
3:38	30	89	18.125	6.37	7.5

$K = 1.15\ r \tan \alpha$

where $\tan \alpha = [\log (h_0 + ½\ r) - \log (h_t + ½\ r)] / t\text{-}t_0$

K = about 0.44 inches/hour

NOTES:

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INVERSED AUGER HOLE (PORCHET) METHOD - DATA SHEET

PROJECT: TM 5449, Fallbrook DATE: July, 2016

CLIENT: Crossroads Investors I, LLC WORK ORDER: 7106-A-SC

HOLE NUMBER T-3

USCS SOIL CLASSIFICATION SM/SW

DEPTH (D') OF TEST HOLE (in) 36.0 inches

HOLE DIAMETER (in) 8 inches

HOLE RADIUS (r) (in) 4 inches

INITIAL WATER LEVEL (in) 12 inches

Time	Δt (min)	t (min)	Ht (in)	ht (in)	ht + ½ r
9:00	0	0	12	24	26
9:30	30	30	18	18	20
10:00	30	60	22	14	16
10:30	30	90	25	11	13
11:00	30	120	27.75	8.25	10.25

$K = 1.15\ r \tan \alpha$

where $\tan \alpha = [\log (h_0 + ½\ r) - \log (h_t + ½\ r)] / t\text{-}t_0$

K = about 0.9 inches/hour

NOTES:

GeoSoils, Inc.

Geotechnical • Geologic • Environmental

5741 Palmer Way • Carlsbad, California 92008 • (760)438-3155 • FAX(760)931-0915

INVERSED AUGER HOLE (PORCHET) METHOD - DATA SHEET

PROJECT: TM 5449, Fallbrook DATE: July, 2016

CLIENT: Crossroads Investors I, LLC WORK ORDER: 7106-A-SC

HOLE NUMBER T-4

USCS SOIL CLASSIFICATION SM

DEPTH (D') OF TEST HOLE (in) 36.0 inches

HOLE DIAMETER (in) 8 inches

HOLE RADIUS (r) (in) 4 inches

INITIAL WATER LEVEL (in) 18 inches

Time	Δt (min)	t (min)	Ht (in)	ht (in)	ht + ½ r
10:15	0	0	18	18	20
10:45	30	30	21	15	17
11:15	30	60	23	13	15
11:45	30	90	24.25	11.75	13.75
12:15	30	120	25.75	10.25	12.25

$K = 1.15\ r \tan \alpha$

where $\tan \alpha = [\log (h_0 + ½\ r) - \log (h_t + ½\ r)] / t\text{-}t_0$

K = about 0.46 inches/hour

NOTES:

DMA	DMA Area (SF)	Post-project Surface Type	Runoff Factor
1	12755	Paved AC Road	1.0
2	7910	Paved AC Road	1.0
3	10651	Paved AC Road	1.0
4	10034	Paved AC Road	1.0
5	574	Paved PCC Driveway	1.0
6	2835	Roof	1.0
7	13635	Pad	0.1
8	1748	Landscaped Slope (self-treating)	0.1
9	161701	Landscaped Slope (self-treating)	0.1
10	1507	Paved PCC Driveway	1.0
11	3730	Roof	1.0
12	25352	Pad	1.0
13	10053	Landscaped Slope (self-treating)	1.0
14	613	Paved PCC Driveway	1.0
15	2835	Roof	1.0
16	10382	Pad	1.0
17	47092	Landscaped Slope (self-treating)	1.0
18	1070	Paved PCC Driveway	1.0
19	3730	Roof	1.0
20	13635	Pad	0.1
21	100068	Landscaped Slope (self-treating)	1.0
22	595	Paved PCC Driveway	1.0
23	2835	Roof	1.0
24	11970	Pad	1.0
25	121375	Landscaped Slope (self-treating)	0.1
26	573	Paved PCC Driveway	1.0
27	2835	Roof	1.0
28	13694	Pad	0.1
29	1610	Landscaped Slope (self-treating)	0.1
30	24938	Landscaped Slope (self-treating)	0.1
31	705	Paved PCC Driveway	1.0
32	2835	Roof	1.0
33	14072	Pad	0.1
34	1475	Landscaped Slope (self-treating)	0.1
35	24516	Landscaped Slope (self-treating)	0.1
36	812	Paved PCC Driveway	1.0
37	2835	Roof	1.0
38	10455	Pad	0.1
39	1780	Landscaped Slope (self-treating)	0.1
40	23955	Landscaped Slope (self-treating)	0.1
41	425	Paved PCC Driveway	1.0
42	2835	Roof	1.0
43	9995	Pad	0.1
44	30616	Landscaped Slope (self-treating)	0.1
45	1318	Paved PCC Driveway	1.0
46	2835	Roof	1.0
47	26662	Pad	0.1
48	11515	Landscaped Slope (self-treating)	0.1
49	800	Paved PCC Driveway	1.0
50	2835	Roof	1.0
51	23195	Pad	0.1
52	17060	Landscaped Slope (self-treating)	0.1
53	800	Paved PCC Driveway	1.0
54	2835	Roof	1.0
55	26223	Pad	0.1
56	11180	Landscaped Slope (self-treating)	0.1
57	717	Paved PCC Driveway	1.0
58	2835	Roof	1.0
59	28126	Pad	0.1
60	12070	Landscaped Slope (self-treating)	0.1
61	720	Paved PCC Driveway	1.0
62	2835	Roof	1.0
63	16444	Pad	0.1
64	23662	Landscaped Slope (self-treating)	0.1
65	2420	Paved PCC Driveway	1.0
66	2835	Roof	1.0
67	20325	Pad	0.1
68	17940	Landscaped Slope (self-treating)	0.1
69	4835	Paved PCC Driveway	1.0
70	4130	Roof	1.0
71	18950	Pad	0.1
72	10740	Landscaped Slope (self-treating)	0.1
73	5100	Landscaped Slope (self-treating)	0.1
74	3540	Paved PCC Driveway	1.0
75	2835	Roof	1.0
76	20650	Pad	0.1
77	11500	Landscaped Slope (self-treating)	0.1
78	9365	Landscaped Slope (self-treating)	0.1
79	9760	Landscaped Slope (self-treating)	0.1
80	132415	Landscaped Slope (self-treating)	0.1

BIORETENTION

NOT TO SCALE

SOURCE CONTROL BMPs (TABLE 4.2.6 SWQMP)

SOURCE CONTROL BMPS	PROJECT IMPLEMENTATION
1 STORM DRAIN INLETS	MARK ALL INLETS WITH THE WORDS "NO DUMPING! DRAINS TO WATERWAYS" IN ENGLISH AND "NO CONTAMINE" IN SPANISH. MAINTAIN AND PERIODICALLY REPLACE INLET MARKINGS. SEE APPLICABLE OPERATIONAL BMPS IN CASQA FACT SHEET SC-44, "DRAINAGE SYSTEM MAINTENANCE."
LANDSCAPE/OUTDOOR PESTICIDE USE	LANDSCAPE HAS BEEN DESIGNED PER CITY OF SAN SAN DIEGO LANDSCAPE STANDARDS TO MINIMIZE IRRIGATION AND RUNOFF, AND TO MINIMIZE THE USE OF FERTILIZERS AND PESTICIDES THAT CAN CONTRIBUTE TO STORMWATER POLLUTION. SEE APPLICABLE BMPS IN CASQA FACT SHEETS SC-41, "BUILDING AND GROUNDS MAINTENANCE."
DRIVEWAYS, SIDEWALKS, ROADS	DRIVEWAYS SIDEWALKS, AND ROADS SHALL BE SWEPT REGULARLY AND ONCE PRIOR TO OCTOBER 1ST TO PREVENT THE ACCUMULATION OF LITTER AND DEBRIS. SEE CASQA FACT SHEET SC-41, "BUILDING AND GROUNDS MAINTENANCE."

SITE DESIGN BMPs (4.3.1 TRHOUGH 4.3.8 SWQMP)

CONSERVE NATURAL DRAINAGE FEATURES & VEGETATION: DRAINAGE COURSE AND VEGETATION WILL BE PRESERVED.

MINIMIZE IMPERVIOUS AREA: RESIDENTIAL STREETS ARE AT THE MINIMUM REQUIRED WIDTH PER COUNTY STANDARDS.

MINIMIZE SOIL COMPACTION: RE-TILL SOILS COMPACTED BY CONSTRUCTION VEHICLES. COLLECT AND RE-USE UPPER SOIL LAYERS DEVELOPMENT SITE CONTAINING ORGANIC MATERIALS.

RUNOFF FROM WALKS AND ROOF DRAIN DOWNSPOUTS SHALL DISCHARGE ONTO SPLASH BLOCKS AND FLOW THROUGH ADJACENT LANDSCAPE AREA BEFORE ENTERING BIORETENTION BASINS

LANDSCAPING WITH DROUGHT TOLERANT SPECIES

HYDROLOGIC SOIL GROUP C

GROUND WATER DEPTH > 20FT

50 0 50 100 150

SCALE: 1"=50'

Lundstrom
Engineering and Surveying, Inc.
5333 Mission Center Road, #390 • San Diego, CA 92108
Phone (619) 814-1220 • Fax (619) 641-5910

ATTACHMENT 1C
DRAINAGE MANAGEMENT AREA MAP
HMP AREA MAP

ATTACHMENT 2

BACKUP FOR PDP HYDROMODIFICATION CONTROL MEASURES

This is the cover sheet for Attachment 2.

☐ Mark this box if this attachment is empty because the project is exempt from PDP hydromodification management requirements.

Indicate which Items are Included behind this cover sheet:

Attachment Sequence	Contents	Checklist
Attachment 2a	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 2b	Hydromodification Management Exhibit (Required)	☐ Included See Hydromodification Management Exhibit Checklist on the back of this Attachment cover sheet.
Attachment 2c	Management of Critical Coarse Sediment Yield Areas See Section 6.2 and Appendix H of the BMP Design Manual.	☐ Exhibit depicting onsite and/or upstream sources of critical coarse sediment as mapped by Regional or Jurisdictional approaches outlined in Appendix H.1 AND, ☐ Demonstration that the project effectively avoids and bypasses sources of mapped critical coarse sediment per approaches outlined in Appendix H.2 and H.3. OR, ☐ Demonstration that project does not generate a net impact on the receiving water per approaches outlined in Appendix H.4.
Attachment 2d	Geomorphic Assessment of Receiving Channels (Optional)	☐ Not performed ☐ Included

	See Section 6.3.4 of the BMP Design Manual.	☐ 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)

SDHM 3.1

PROJECT REPORT

General Model Information

Project Name:	FALLBROOK OAKS
Site Name:	Fallbrook Oaks
Site Address:	Reche Road
City:	Fallbrook
Report Date:	4/11/2018
Gage:	FALLBROO
Data Start:	10/01/1959
Data End:	09/30/2004
Timestep:	Hourly
Precip Scale:	1.000
Version Date:	2018/01/19

POC Thresholds

Low Flow Threshold for POC1:	10 Percent of the 2 Year
High Flow Threshold for POC1:	10 Year

Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C,NatVeg,Moderate	0.2126951
Pervious Total	0.2126951
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.2126951

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
IMPERVIOUS-FLAT	0.205808
Impervious Total	0.205808
Basin Total	0.205808

Element Flows To:

Surface	Interflow	Groundwater
Surface Biofilter 1	Surface Biofilter 1	

Routing Elements
Predeveloped Routing

Mitigated Routing

Biofilter 1

Bottom Length:	50.00 ft.
Bottom Width:	10.00 ft.
Material thickness of first layer:	2
Material type for first layer:	ESM
Material thickness of second layer:	4
Material type for second layer:	GRAVEL
Material thickness of third layer:	0
Material type for third layer:	GRAVEL
Infiltration On	
Infiltration rate:	0.5
Infiltration safety factor:	1
Total Volume Infiltrated (ac-ft.):	8.855
Total Volume Through Riser (ac-ft.):	0.989
Total Volume Through Facility (ac-ft.):	9.844
Percent Infiltrated:	89.95
Total Precip Applied to Facility:	0.414
Total Evap From Facility:	0.302

Underdrain not used

Discharge Structure

Riser Height:	1 ft.
Riser Diameter:	12 in.

Element Flows To:

Outlet 1 Outlet 2

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.0115	0.0000	0.0000	0.0000
0.0879	0.0115	0.0003	0.0000	0.0000
0.1758	0.0115	0.0006	0.0000	0.0000
0.2637	0.0115	0.0009	0.0000	0.0002
0.3516	0.0115	0.0012	0.0000	0.0004
0.4396	0.0115	0.0015	0.0000	0.0007
0.5275	0.0115	0.0018	0.0000	0.0008
0.6154	0.0115	0.0021	0.0000	0.0014
0.7033	0.0115	0.0024	0.0000	0.0021
0.7912	0.0115	0.0027	0.0000	0.0031
0.8791	0.0115	0.0030	0.0000	0.0031
0.9670	0.0115	0.0033	0.0000	0.0043
1.0549	0.0115	0.0036	0.0000	0.0058
1.1429	0.0115	0.0039	0.0000	0.0058
1.2308	0.0115	0.0042	0.0000	0.0058
1.3187	0.0115	0.0045	0.0000	0.0058
1.4066	0.0115	0.0048	0.0000	0.0058
1.4945	0.0115	0.0051	0.0000	0.0058
1.5824	0.0115	0.0054	0.0000	0.0058
1.6703	0.0115	0.0058	0.0000	0.0058
1.7582	0.0115	0.0061	0.0000	0.0058
1.8462	0.0115	0.0064	0.0000	0.0058
1.9341	0.0115	0.0067	0.0000	0.0058
2.0220	0.0115	0.0071	0.0000	0.0058
2.1099	0.0115	0.0075	0.0000	0.0058
2.1978	0.0115	0.0079	0.0000	0.0058

2.2857	0.0115	0.0083	0.0000	0.0058
2.3736	0.0115	0.0088	0.0000	0.0058
2.4615	0.0115	0.0092	0.0000	0.0058
2.5495	0.0115	0.0096	0.0000	0.0058
2.6374	0.0115	0.0100	0.0000	0.0058
2.7253	0.0115	0.0104	0.0000	0.0058
2.8132	0.0115	0.0108	0.0000	0.0058
2.9011	0.0115	0.0113	0.0000	0.0058
2.9890	0.0115	0.0117	0.0000	0.0058
3.0769	0.0115	0.0121	0.0000	0.0058
3.1648	0.0115	0.0125	0.0000	0.0058
3.2527	0.0115	0.0129	0.0000	0.0058
3.3407	0.0115	0.0134	0.0000	0.0058
3.4286	0.0115	0.0138	0.0000	0.0058
3.5165	0.0115	0.0142	0.0000	0.0058
3.6044	0.0115	0.0146	0.0000	0.0058
3.6923	0.0115	0.0150	0.0000	0.0058
3.7802	0.0115	0.0155	0.0000	0.0058
3.8681	0.0115	0.0159	0.0000	0.0058
3.9560	0.0115	0.0163	0.0000	0.0058
4.0440	0.0115	0.0167	0.0000	0.0058
4.1319	0.0115	0.0171	0.0000	0.0058
4.2198	0.0115	0.0175	0.0000	0.0058
4.3077	0.0115	0.0180	0.0000	0.0058
4.3956	0.0115	0.0184	0.0000	0.0058
4.4835	0.0115	0.0188	0.0000	0.0058
4.5714	0.0115	0.0192	0.0000	0.0058
4.6593	0.0115	0.0196	0.0000	0.0058
4.7473	0.0115	0.0201	0.0000	0.0058
4.8352	0.0115	0.0205	0.0000	0.0058
4.9231	0.0115	0.0209	0.0000	0.0058
5.0110	0.0115	0.0213	0.0000	0.0058
5.0989	0.0115	0.0217	0.0000	0.0058
5.1868	0.0115	0.0222	0.0000	0.0058
5.2747	0.0115	0.0226	0.0000	0.0058
5.3626	0.0115	0.0230	0.0000	0.0058
5.4505	0.0115	0.0234	0.0000	0.0058
5.5385	0.0115	0.0238	0.0000	0.0058
5.6264	0.0115	0.0242	0.0000	0.0058
5.7143	0.0115	0.0247	0.0000	0.0058
5.8022	0.0115	0.0251	0.0000	0.0058
5.8901	0.0115	0.0255	0.0000	0.0058
5.9780	0.0115	0.0259	0.0000	0.0058
6.0000	0.0115	0.0260	0.0000	0.0058

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
6.0000	0.0115	0.0260	0.0000	0.0604	0.0000
6.0879	0.0115	0.0270	0.0000	0.0604	0.0000
6.1758	0.0115	0.0280	0.0000	0.0630	0.0000
6.2637	0.0115	0.0291	0.0000	0.0655	0.0000
6.3516	0.0115	0.0301	0.0000	0.0680	0.0000
6.4396	0.0115	0.0311	0.0000	0.0706	0.0000
6.5275	0.0115	0.0321	0.0000	0.0731	0.0000
6.6154	0.0115	0.0331	0.0000	0.0757	0.0000
6.7033	0.0115	0.0341	0.0000	0.0782	0.0000
6.7912	0.0115	0.0351	0.0000	0.0808	0.0000
6.8791	0.0115	0.0361	0.0000	0.0833	0.0000

6.9670	0.0115	0.0371	0.0000	0.0859	0.0000
7.0549	0.0115	0.0381	0.1365	0.0884	0.0000
7.1429	0.0115	0.0391	0.5635	0.0909	0.0000
7.2308	0.0115	0.0402	1.0991	0.0935	0.0000
7.3187	0.0115	0.0412	1.6096	0.0960	0.0000
7.4066	0.0115	0.0422	1.9818	0.0986	0.0000
7.4945	0.0115	0.0432	2.1930	0.1011	0.0000
7.5824	0.0115	0.0442	2.4037	0.1037	0.0000
7.6703	0.0115	0.0452	2.5787	0.1062	0.0000
7.7582	0.0115	0.0462	2.7426	0.1087	0.0000
7.8462	0.0115	0.0472	2.8972	0.1113	0.0000
7.9341	0.0115	0.0482	3.0440	0.1138	0.0000
8.0000	0.0115	0.0490	3.1841	0.1157	0.0000

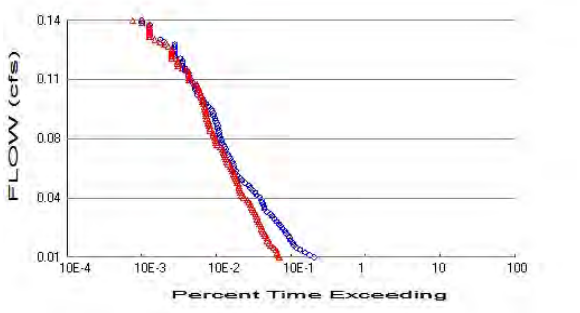
Surface Biofilter 1

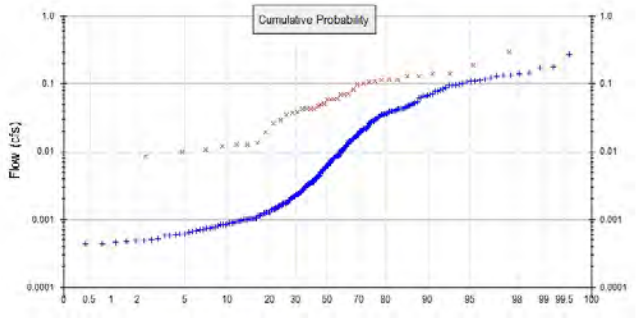
Element Flows To:

Outlet 1	Outlet 2
	Biofilter 1

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.2126951
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0
Total Impervious Area: 0.205808

Flow Frequency Method: Weibull

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.078426
5 year	0.121215
10 year	0.143738
25 year	0.187377

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.050365
5 year	0.112794
10 year	0.134644
25 year	0.198149

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0078	818	277	33	Pass
0.0092	708	270	38	Pass
0.0106	614	260	42	Pass
0.0120	529	250	47	Pass
0.0133	466	231	49	Pass
0.0147	439	213	48	Pass
0.0161	423	205	48	Pass
0.0175	396	194	48	Pass
0.0188	377	190	50	Pass
0.0202	362	179	49	Pass
0.0216	345	173	50	Pass
0.0229	328	169	51	Pass
0.0243	309	161	52	Pass
0.0257	289	158	54	Pass
0.0271	272	152	55	Pass
0.0284	256	147	57	Pass
0.0298	238	140	58	Pass
0.0312	223	136	60	Pass
0.0326	209	133	63	Pass
0.0339	188	127	67	Pass
0.0353	179	124	69	Pass
0.0367	174	118	67	Pass
0.0380	168	114	67	Pass
0.0394	163	109	66	Pass
0.0408	159	102	64	Pass
0.0422	151	94	62	Pass
0.0435	138	87	63	Pass
0.0449	132	84	63	Pass
0.0463	120	81	67	Pass
0.0477	113	80	70	Pass
0.0490	109	80	73	Pass
0.0504	95	76	80	Pass
0.0518	87	74	85	Pass
0.0531	82	72	87	Pass
0.0545	77	71	92	Pass
0.0559	73	67	91	Pass
0.0573	72	66	91	Pass
0.0586	67	64	95	Pass
0.0600	67	61	91	Pass
0.0614	67	58	86	Pass
0.0627	65	56	86	Pass
0.0641	61	54	88	Pass
0.0655	59	52	88	Pass
0.0669	57	51	89	Pass
0.0682	53	50	94	Pass
0.0696	53	48	90	Pass
0.0710	51	45	88	Pass
0.0724	49	41	83	Pass
0.0737	47	39	82	Pass
0.0751	46	39	84	Pass
0.0765	45	38	84	Pass
0.0778	44	36	81	Pass
0.0792	43	36	83	Pass

0.0806	43	33	76	Pass
0.0820	42	33	78	Pass
0.0833	42	32	76	Pass
0.0847	40	31	77	Pass
0.0861	39	31	79	Pass
0.0875	38	30	78	Pass
0.0888	36	29	80	Pass
0.0902	36	29	80	Pass
0.0916	35	29	82	Pass
0.0929	34	28	82	Pass
0.0943	31	28	90	Pass
0.0957	29	27	93	Pass
0.0971	27	26	96	Pass
0.0984	26	26	100	Pass
0.0998	25	25	100	Pass
0.1012	22	24	109	Pass
0.1026	22	24	109	Pass
0.1039	21	23	109	Pass
0.1053	21	23	109	Pass
0.1067	21	22	104	Pass
0.1080	19	20	105	Pass
0.1094	18	17	94	Pass
0.1108	17	17	100	Pass
0.1122	17	17	100	Pass
0.1135	17	17	100	Pass
0.1149	15	16	106	Pass
0.1163	15	14	93	Pass
0.1177	14	12	85	Pass
0.1190	14	12	85	Pass
0.1204	14	12	85	Pass
0.1218	13	10	76	Pass
0.1231	11	10	90	Pass
0.1245	11	10	90	Pass
0.1259	11	10	90	Pass
0.1273	11	10	90	Pass
0.1286	11	9	81	Pass
0.1300	11	8	72	Pass
0.1314	8	7	87	Pass
0.1328	7	6	85	Pass
0.1341	5	5	100	Pass
0.1355	5	5	100	Pass
0.1369	5	5	100	Pass
0.1382	5	5	100	Pass
0.1396	5	5	100	Pass
0.1410	5	5	100	Pass
0.1424	4	4	100	Pass
0.1437	4	3	75	Pass

Water Quality

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic

Mitigated Schematic

Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1959 10 01        END    2004 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   FALLBROOK OAKS.wdm
MESSU       25   PreFALLBROOK OAKS.MES
            27   PreFALLBROOK OAKS.L61
            28   PreFALLBROOK OAKS.L62
            30   POCFALLBROOK OAKS1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:60
      PERLND      20
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Basin  1                   MAX                     1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                         User  t-series Engl Metr ***
                                      in  out           ***
   20      C,NatVeg,Moderate      1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   20         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags **************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   20         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO
```

```
  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   20         0    1    1    1    0    0    0    0    1    1    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   20              0       3.5     0.033        80       0.1       2.5     0.915
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   20             0         0         2         2         0      0.05      0.05
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   20             0       0.6      0.04         1       0.3         0
  END PWAT-PARM4
  MON-LZETPARM
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   20       0.4  0.4  0.4  0.4  0.6  0.6  0.6  0.6  0.6  0.4  0.4  0.4
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   20       0.1  0.1  0.1  0.1 0.06 0.06 0.06 0.06 0.06  0.1  0.1  0.1
  END MON-INTERCEP

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   20             0         0      0.01         0       0.4      0.01         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
  END IWAT-PARM2
```

```
  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND  20                   0.2126951     COPY   501     12
PERLND  20                   0.2126951     COPY   501     13

******Routing******
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   12.1        DISPLY   1     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                 ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG            ***
                                           in  out                           ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                      ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *         ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                         ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit       for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES
```

```
SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY   501 OUTPUT MEAN   1 1     12.1      WDM    501 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1959 10 01        END    2004 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   FALLBROOK OAKS.wdm
MESSU       25   MitFALLBROOK OAKS.MES
            27   MitFALLBROOK OAKS.L61
            28   MitFALLBROOK OAKS.L62
            30   POCFALLBROOK OAKS1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:60
      IMPLND       1
      GENER        2
      RCHRES       1
      RCHRES       2
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Surface Biofilter  1        MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
    2        24
  END OPCODE
  PARM
    #    #         K ***
    2             0.
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
```

```
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
  END PWAT-PARM4
  MON-LZETPARM
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
  END MON-INTERCEP

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS       IFWS       LZS       AGWS      GWVS
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                    in  out           ***
    1      IMPERVIOUS-FLAT        1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections ******************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    1         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    1         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    1         0    0    0    0    1
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    1            100      0.05     0.011       0.1
  END IWAT-PARM2
```

```
  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    1             0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    1             0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
IMPLND   1                      0.2058     RCHRES   1      5

******Routing******
IMPLND   1                    0.205808     COPY     1     15
RCHRES   1                           1     RCHRES   2      8
RCHRES   2                           1     COPY   501     17
RCHRES   1                           1     COPY   501     17
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   12.1        DISPLY   1     INPUT  TIMSER 1
GENER    2 OUTPUT TIMSER      .0002778     RCHRES   1     EXTNL  OUTDGT 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG           ***
                                       in  out                              ***
    1     Surface Biofilte-009    3    1    1    1   28    0    1
    2     Biofilter  1            2    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
    2         1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
    1         4    0    0    0    0    0    0    0    0    0    1    9
    2         4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                  ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
          FG FG FG FG  possible  exit  *** possible  exit      possible  exit
           *  *  *  *    *  *  *  *  *       *  *  *  *  *         ***
    1      0  1  0  0    4  5  6  0  0       0  1  0  0  0       2  1  2  2  2
```

```
    2        0  1  0  0    4  5  0  0  0       0  0  0  0  0       2  2  2  2  2
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><--------><-------> ***
    1              1      0.01       0.0       0.0       0.5       0.0
    2              2      0.01       0.0       0.0       0.5       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                          ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
    1            0         4.0  5.0  6.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    2            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
*** User-Defined Variable Quantity Lines
***                            addr
***                           <------>
*** kwd  varnam optyp  opn  vari  s1 s2 s3 tp multiply  lc ls ac as agfn ***
  <****> <----> <----> <-> <----><-><-><-><-><--------> <><-> <><-> <--> ***
  UVQUAN vol2   RCHRES   2 VOL              4
  UVQUAN v2m2   GLOBAL     WORKSP  1        3
  UVQUAN vpo2   GLOBAL     WORKSP  2        3
  UVQUAN v2d2   GENER    2 K       1        3
*** User-Defined Target Variable Names
***                  addr or                        addr or
***                 <------>                       <------>
*** kwd   varnam ct  vari  s1 s2 s3  frac oper     vari  s1 s2 s3  frac oper
  <****>  <----><-> <----><-><-><-> <---> <-->    <----><-><-><-> <---> <-->
  UVNAME  v2m2    1 WORKSP  1         1.0 QUAN
  UVNAME  vpo2    1 WORKSP  2         1.0 QUAN
  UVNAME  v2d2    1 K       1         1.0 QUAN
*** opt foplop dcdts  yr mo dy hr mn d t   vnam  s1 s2 s3 ac quantity  tc  ts rp
  <****><-><--><><-><--> <> <> <> <><><>  <----><-><-><-><-><--------> <> <-><->
  GENER   2                               v2m2            =  1073.
*** Compute remaining available pore space
  GENER   2                               vpo2            =  v2m2
  GENER   2                               vpo2           -=  vol2
*** Check to see if VPORA goes negative; if so set VPORA = 0.0
IF (vpo2 < 0.0) THEN
  GENER   2                               vpo2            =  0.0
END IF
*** Infiltration volume
  GENER   2                               v2d2            =  vpo2
END SPEC-ACTIONS
FTABLES
  FTABLE      2
   70    5
     Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)     (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.011478  0.000000  0.000000  0.000000
  0.087912  0.011478  0.000303  0.000000  0.000000
  0.175824  0.011478  0.000605  0.000000  0.000041
  0.263736  0.011478  0.000908  0.000000  0.000160
  0.351648  0.011478  0.001211  0.000000  0.000401
  0.439560  0.011478  0.001514  0.000000  0.000704
  0.527473  0.011478  0.001816  0.000000  0.000793
  0.615385  0.011478  0.002119  0.000000  0.001359
  0.703297  0.011478  0.002422  0.000000  0.002121
  0.791209  0.011478  0.002725  0.000000  0.003091
  0.879121  0.011478  0.003027  0.000000  0.003098
  0.967033  0.011478  0.003330  0.000000  0.004307
  1.054945  0.011478  0.003633  0.000000  0.005764
  1.142857  0.011478  0.003935  0.000000  0.005787
  1.230769  0.011478  0.004238  0.000000  0.005787
```

```
  1.318681  0.011478  0.004541  0.000000  0.005787
  1.406593  0.011478  0.004844  0.000000  0.005787
  1.494505  0.011478  0.005146  0.000000  0.005787
  1.582418  0.011478  0.005449  0.000000  0.005787
  1.670330  0.011478  0.005752  0.000000  0.005787
  1.758242  0.011478  0.006055  0.000000  0.005787
  1.846154  0.011478  0.006357  0.000000  0.005787
  1.934066  0.011478  0.006660  0.000000  0.005787
  2.021978  0.011478  0.007079  0.000000  0.005787
  2.109890  0.011478  0.007498  0.000000  0.005787
  2.197802  0.011478  0.007916  0.000000  0.005787
  2.285714  0.011478  0.008335  0.000000  0.005787
  2.373626  0.011478  0.008754  0.000000  0.005787
  2.461538  0.011478  0.009173  0.000000  0.005787
  2.549451  0.011478  0.009591  0.000000  0.005787
  2.637363  0.011478  0.010010  0.000000  0.005787
  2.725275  0.011478  0.010429  0.000000  0.005787
  2.813187  0.011478  0.010848  0.000000  0.005787
  2.901099  0.011478  0.011267  0.000000  0.005787
  2.989011  0.011478  0.011685  0.000000  0.005787
  3.076923  0.011478  0.012104  0.000000  0.005787
  3.164835  0.011478  0.012523  0.000000  0.005787
  3.252747  0.011478  0.012942  0.000000  0.005787
  3.340659  0.011478  0.013360  0.000000  0.005787
  3.428571  0.011478  0.013779  0.000000  0.005787
  3.516484  0.011478  0.014198  0.000000  0.005787
  3.604396  0.011478  0.014617  0.000000  0.005787
  3.692308  0.011478  0.015035  0.000000  0.005787
  3.780220  0.011478  0.015454  0.000000  0.005787
  3.868132  0.011478  0.015873  0.000000  0.005787
  3.956044  0.011478  0.016292  0.000000  0.005787
  4.043956  0.011478  0.016711  0.000000  0.005787
  4.131868  0.011478  0.017129  0.000000  0.005787
  4.219780  0.011478  0.017548  0.000000  0.005787
  4.307692  0.011478  0.017967  0.000000  0.005787
  4.395604  0.011478  0.018386  0.000000  0.005787
  4.483516  0.011478  0.018804  0.000000  0.005787
  4.571429  0.011478  0.019223  0.000000  0.005787
  4.659341  0.011478  0.019642  0.000000  0.005787
  4.747253  0.011478  0.020061  0.000000  0.005787
  4.835165  0.011478  0.020480  0.000000  0.005787
  4.923077  0.011478  0.020898  0.000000  0.005787
  5.010989  0.011478  0.021317  0.000000  0.005787
  5.098901  0.011478  0.021736  0.000000  0.005787
  5.186813  0.011478  0.022155  0.000000  0.005787
  5.274725  0.011478  0.022573  0.000000  0.005787
  5.362637  0.011478  0.022992  0.000000  0.005787
  5.450549  0.011478  0.023411  0.000000  0.005787
  5.538462  0.011478  0.023830  0.000000  0.005787
  5.626374  0.011478  0.024248  0.000000  0.005787
  5.714286  0.011478  0.024667  0.000000  0.005787
  5.802198  0.011478  0.025086  0.000000  0.005787
  5.890110  0.011478  0.025505  0.000000  0.005787
  5.978022  0.011478  0.025924  0.000000  0.005787
  6.000000  0.011478  0.054659  0.000000  0.005787
  END FTABLE  2
  FTABLE      1
   24    6
     Depth      Area    Volume  Outflow1  Outflow2  outflow 3 Velocity  Travel
Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)     (cfs)   (ft/sec)
(Minutes)***
  0.000000  0.011478  0.000000  0.000000  0.000000  0.000000
  0.087912  0.011478  0.001009  0.000000  0.060414  0.000000
  0.175824  0.011478  0.002018  0.000000  0.062958  0.000000
  0.263736  0.011478  0.003027  0.000000  0.065502  0.000000
  0.351648  0.011478  0.004036  0.000000  0.068045  0.000000
  0.439560  0.011478  0.005045  0.000000  0.070589  0.000000
  0.527473  0.011478  0.006055  0.000000  0.073133  0.000000
  0.615385  0.011478  0.007064  0.000000  0.075677  0.000000
```

```
  0.703297  0.011478  0.008073  0.000000  0.078220  0.000000
  0.791209  0.011478  0.009082  0.000000  0.080764  0.000000
  0.879121  0.011478  0.010091  0.000000  0.083308  0.000000
  0.967033  0.011478  0.011100  0.000000  0.085852  0.000000
  1.054945  0.011478  0.012109  0.136453  0.088395  0.000000
  1.142857  0.011478  0.013118  0.563536  0.090939  0.000000
  1.230769  0.011478  0.014127  1.099144  0.093483  0.000000
  1.318681  0.011478  0.015136  1.609623  0.096027  0.000000
  1.406593  0.011478  0.016145  1.981777  0.098570  0.000000
  1.494505  0.011478  0.017155  2.193018  0.101114  0.000000
  1.582418  0.011478  0.018164  2.403681  0.103658  0.000000
  1.670330  0.011478  0.019173  2.578717  0.106202  0.000000
  1.758242  0.011478  0.020182  2.742606  0.108746  0.000000
  1.846154  0.011478  0.021191  2.897238  0.111289  0.000000
  1.934066  0.011478  0.022200  3.044026  0.113833  0.000000
  2.000000  0.011478  0.022957  3.184053  0.115741  0.000000
  END FTABLE  1
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP
WDM      2 PREC     ENGL    1              RCHRES   1     EXTNL  PREC
WDM      1 EVAP     ENGL    0.5            RCHRES   1     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.7            RCHRES   2     EXTNL  POTEV

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
RCHRES   2 HYDR   RO     1 1        1      WDM   1006 FLOW     ENGL      REPL
RCHRES   2 HYDR   O      1 1        1      WDM   1010 FLOW     ENGL      REPL
RCHRES   2 HYDR   O      2 1        1      WDM   1011 FLOW     ENGL      REPL
RCHRES   2 HYDR   STAGE  1 1        1      WDM   1007 STAG     ENGL      REPL
RCHRES   1 HYDR   STAGE  1 1        1      WDM   1008 STAG     ENGL      REPL
RCHRES   1 HYDR   O      1 1        1      WDM   1009 FLOW     ENGL      REPL
COPY     1 OUTPUT MEAN   1 1     12.1      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     12.1      WDM    801 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>             <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK        5
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    5

  MASS-LINK        8
RCHRES     OFLOW  OVOL   2                 RCHRES         INFLOW IVOL
  END MASS-LINK    8

  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15

  MASS-LINK       17
RCHRES     OFLOW  OVOL   1                 COPY           INPUT  MEAN
  END MASS-LINK   17


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

Disclaimer

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SDHM 3.1

PROJECT REPORT

General Model Information

Project Name:	FALLBROOK OAKS BMP 18-21
Site Name:	Fallbrook Oaks
Site Address:	Reche Road
City:	Fallbrook
Report Date:	4/11/2018
Gage:	FALLBROO
Data Start:	10/01/1959
Data End:	09/30/2004
Timestep:	Hourly
Precip Scale:	1.000
Version Date:	2018/01/19

POC Thresholds

Low Flow Threshold for POC1:	10 Percent of the 2 Year
High Flow Threshold for POC1:	10 Year

Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C,NatVeg,Moderate	0.308884
Pervious Total	0.308884
Impervious Land Use	acre
Impervious Total	0
Basin Total	0.308884

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
IMPERVIOUS-FLAT	0.2928145
Impervious Total	0.2928145
Basin Total	0.2928145

Element Flows To:

Surface	Interflow	Groundwater
Surface Biofilter 1	Surface Biofilter 1	

Routing Elements
Predeveloped Routing

Mitigated Routing

Biofilter 1

Bottom Length:	71.00 ft.
Bottom Width:	10.00 ft.
Material thickness of first layer:	2
Material type for first layer:	ESM
Material thickness of second layer:	4
Material type for second layer:	GRAVEL
Material thickness of third layer:	0
Material type for third layer:	GRAVEL
Infiltration On	
Infiltration rate:	0.5
Infiltration safety factor:	1
Total Volume Infiltrated (ac-ft.):	12.6
Total Volume Through Riser (ac-ft.):	1.405
Total Volume Through Facility (ac-ft.):	14.005
Percent Infiltrated:	89.97
Total Precip Applied to Facility:	0.588
Total Evap From Facility:	0.43
Underdrain not used	
Discharge Structure	
Riser Height:	1 ft.
Riser Diameter:	12 in.
Element Flows To:	
Outlet 1	Outlet 2

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.0163	0.0000	0.0000	0.0000
0.0879	0.0163	0.0004	0.0000	0.0000
0.1758	0.0163	0.0009	0.0000	0.0001
0.2637	0.0163	0.0013	0.0000	0.0002
0.3516	0.0163	0.0017	0.0000	0.0006
0.4396	0.0163	0.0021	0.0000	0.0010
0.5275	0.0163	0.0026	0.0000	0.0011
0.6154	0.0163	0.0030	0.0000	0.0019
0.7033	0.0163	0.0034	0.0000	0.0030
0.7912	0.0163	0.0039	0.0000	0.0044
0.8791	0.0163	0.0043	0.0000	0.0044
0.9670	0.0163	0.0047	0.0000	0.0061
1.0549	0.0163	0.0052	0.0000	0.0082
1.1429	0.0163	0.0056	0.0000	0.0082
1.2308	0.0163	0.0060	0.0000	0.0082
1.3187	0.0163	0.0064	0.0000	0.0082
1.4066	0.0163	0.0069	0.0000	0.0082
1.4945	0.0163	0.0073	0.0000	0.0082
1.5824	0.0163	0.0077	0.0000	0.0082
1.6703	0.0163	0.0082	0.0000	0.0082
1.7582	0.0163	0.0086	0.0000	0.0082
1.8462	0.0163	0.0090	0.0000	0.0082
1.9341	0.0163	0.0095	0.0000	0.0082
2.0220	0.0163	0.0101	0.0000	0.0082
2.1099	0.0163	0.0106	0.0000	0.0082
2.1978	0.0163	0.0112	0.0000	0.0082

2.2857	0.0163	0.0118	0.0000	0.0082
2.3736	0.0163	0.0124	0.0000	0.0082
2.4615	0.0163	0.0130	0.0000	0.0082
2.5495	0.0163	0.0136	0.0000	0.0082
2.6374	0.0163	0.0142	0.0000	0.0082
2.7253	0.0163	0.0148	0.0000	0.0082
2.8132	0.0163	0.0154	0.0000	0.0082
2.9011	0.0163	0.0160	0.0000	0.0082
2.9890	0.0163	0.0166	0.0000	0.0082
3.0769	0.0163	0.0172	0.0000	0.0082
3.1648	0.0163	0.0178	0.0000	0.0082
3.2527	0.0163	0.0184	0.0000	0.0082
3.3407	0.0163	0.0190	0.0000	0.0082
3.4286	0.0163	0.0196	0.0000	0.0082
3.5165	0.0163	0.0202	0.0000	0.0082
3.6044	0.0163	0.0208	0.0000	0.0082
3.6923	0.0163	0.0214	0.0000	0.0082
3.7802	0.0163	0.0219	0.0000	0.0082
3.8681	0.0163	0.0225	0.0000	0.0082
3.9560	0.0163	0.0231	0.0000	0.0082
4.0440	0.0163	0.0237	0.0000	0.0082
4.1319	0.0163	0.0243	0.0000	0.0082
4.2198	0.0163	0.0249	0.0000	0.0082
4.3077	0.0163	0.0255	0.0000	0.0082
4.3956	0.0163	0.0261	0.0000	0.0082
4.4835	0.0163	0.0267	0.0000	0.0082
4.5714	0.0163	0.0273	0.0000	0.0082
4.6593	0.0163	0.0279	0.0000	0.0082
4.7473	0.0163	0.0285	0.0000	0.0082
4.8352	0.0163	0.0291	0.0000	0.0082
4.9231	0.0163	0.0297	0.0000	0.0082
5.0110	0.0163	0.0303	0.0000	0.0082
5.0989	0.0163	0.0309	0.0000	0.0082
5.1868	0.0163	0.0315	0.0000	0.0082
5.2747	0.0163	0.0321	0.0000	0.0082
5.3626	0.0163	0.0326	0.0000	0.0082
5.4505	0.0163	0.0332	0.0000	0.0082
5.5385	0.0163	0.0338	0.0000	0.0082
5.6264	0.0163	0.0344	0.0000	0.0082
5.7143	0.0163	0.0350	0.0000	0.0082
5.8022	0.0163	0.0356	0.0000	0.0082
5.8901	0.0163	0.0362	0.0000	0.0082
5.9780	0.0163	0.0368	0.0000	0.0082
6.0000	0.0163	0.0370	0.0000	0.0082

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
6.0000	0.0163	0.0370	0.0000	0.0858	0.0000
6.0879	0.0163	0.0384	0.0000	0.0858	0.0000
6.1758	0.0163	0.0398	0.0000	0.0894	0.0000
6.2637	0.0163	0.0413	0.0000	0.0930	0.0000
6.3516	0.0163	0.0427	0.0000	0.0966	0.0000
6.4396	0.0163	0.0441	0.0000	0.1002	0.0000
6.5275	0.0163	0.0456	0.0000	0.1038	0.0000
6.6154	0.0163	0.0470	0.0000	0.1075	0.0000
6.7033	0.0163	0.0484	0.0000	0.1111	0.0000
6.7912	0.0163	0.0499	0.0000	0.1147	0.0000
6.8791	0.0163	0.0513	0.0000	0.1183	0.0000

6.9670	0.0163	0.0527	0.0000	0.1219	0.0000
7.0549	0.0163	0.0542	0.1365	0.1255	0.0000
7.1429	0.0163	0.0556	0.5635	0.1291	0.0000
7.2308	0.0163	0.0570	1.0991	0.1327	0.0000
7.3187	0.0163	0.0585	1.6096	0.1364	0.0000
7.4066	0.0163	0.0599	1.9818	0.1400	0.0000
7.4945	0.0163	0.0613	2.1930	0.1436	0.0000
7.5824	0.0163	0.0628	2.4037	0.1472	0.0000
7.6703	0.0163	0.0642	2.5787	0.1508	0.0000
7.7582	0.0163	0.0656	2.7426	0.1544	0.0000
7.8462	0.0163	0.0671	2.8972	0.1580	0.0000
7.9341	0.0163	0.0685	3.0440	0.1616	0.0000
8.0000	0.0163	0.0696	3.1841	0.1644	0.0000

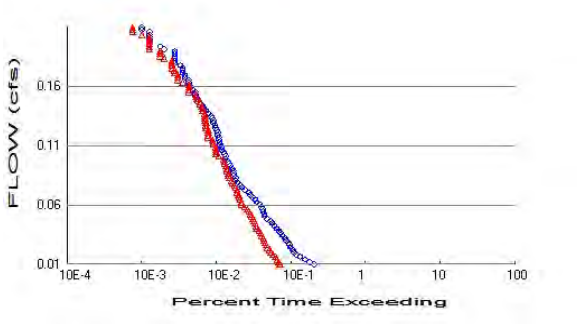
Surface Biofilter 1

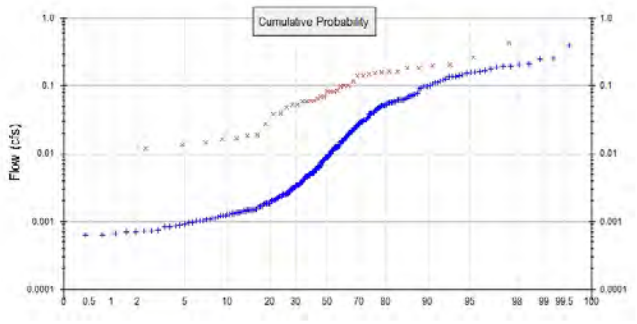
Element Flows To:

Outlet 1	Outlet 2
	Biofilter 1

Analysis Results

POC 1





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.308884
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0
Total Impervious Area: 0.2928145

Flow Frequency Method: Weibull

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.113893
5 year	0.176033
10 year	0.208742
25 year	0.272116

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.069242
5 year	0.159172
10 year	0.189668
25 year	0.280883

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0114	818	281	34	Pass
0.0134	708	271	38	Pass
0.0154	614	259	42	Pass
0.0174	529	245	46	Pass
0.0194	466	226	48	Pass
0.0214	439	215	48	Pass
0.0234	423	205	48	Pass
0.0253	396	194	48	Pass
0.0273	377	185	49	Pass
0.0293	362	178	49	Pass
0.0313	345	173	50	Pass
0.0333	328	170	51	Pass
0.0353	309	161	52	Pass
0.0373	289	156	53	Pass
0.0393	272	148	54	Pass
0.0413	256	137	53	Pass
0.0433	238	136	57	Pass
0.0453	223	131	58	Pass
0.0473	209	128	61	Pass
0.0493	188	122	64	Pass
0.0513	179	119	66	Pass
0.0533	174	112	64	Pass
0.0552	168	109	64	Pass
0.0572	164	102	62	Pass
0.0592	159	95	59	Pass
0.0612	151	87	57	Pass
0.0632	138	86	62	Pass
0.0652	132	82	62	Pass
0.0672	120	80	66	Pass
0.0692	113	79	69	Pass
0.0712	109	75	68	Pass
0.0732	95	75	78	Pass
0.0752	87	72	82	Pass
0.0772	82	69	84	Pass
0.0792	77	66	85	Pass
0.0812	73	64	87	Pass
0.0832	72	60	83	Pass
0.0851	67	58	86	Pass
0.0871	67	57	85	Pass
0.0891	67	56	83	Pass
0.0911	65	55	84	Pass
0.0931	61	53	86	Pass
0.0951	59	51	86	Pass
0.0971	57	51	89	Pass
0.0991	53	49	92	Pass
0.1011	53	43	81	Pass
0.1031	51	39	76	Pass
0.1051	49	39	79	Pass
0.1071	47	39	82	Pass
0.1091	46	39	84	Pass
0.1111	45	36	80	Pass
0.1131	44	36	81	Pass
0.1150	43	35	81	Pass

0.1170	43	31	72	Pass
0.1190	42	31	73	Pass
0.1210	42	31	73	Pass
0.1230	40	31	77	Pass
0.1250	39	29	74	Pass
0.1270	38	29	76	Pass
0.1290	36	29	80	Pass
0.1310	36	28	77	Pass
0.1330	35	28	80	Pass
0.1350	34	28	82	Pass
0.1370	31	28	90	Pass
0.1390	29	26	89	Pass
0.1410	27	26	96	Pass
0.1430	26	25	96	Pass
0.1450	25	24	96	Pass
0.1469	22	24	109	Pass
0.1489	22	22	100	Pass
0.1509	21	21	100	Pass
0.1529	21	21	100	Pass
0.1549	21	17	80	Pass
0.1569	19	17	89	Pass
0.1589	18	17	94	Pass
0.1609	17	17	100	Pass
0.1629	17	14	82	Pass
0.1649	17	12	70	Pass
0.1669	15	12	80	Pass
0.1689	15	12	80	Pass
0.1709	14	11	78	Pass
0.1729	14	11	78	Pass
0.1749	14	10	71	Pass
0.1768	13	10	76	Pass
0.1788	11	10	90	Pass
0.1808	11	10	90	Pass
0.1828	11	8	72	Pass
0.1848	11	7	63	Pass
0.1868	11	7	63	Pass
0.1888	11	7	63	Pass
0.1908	8	5	62	Pass
0.1928	7	5	71	Pass
0.1948	5	5	100	Pass
0.1968	5	5	100	Pass
0.1988	5	5	100	Pass
0.2008	5	5	100	Pass
0.2028	5	4	80	Pass
0.2048	5	3	60	Pass
0.2067	4	3	75	Pass
0.2087	4	3	75	Pass

Water Quality

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic

Mitigated Schematic

Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1959 10 01        END    2004 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   FALLBROOK OAKS BMP 18-21.wdm
MESSU       25   PreFALLBROOK OAKS BMP 18-21.MES
            27   PreFALLBROOK OAKS BMP 18-21.L61
            28   PreFALLBROOK OAKS BMP 18-21.L62
            30   POCFALLBROOK OAKS BMP 18-211.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:60
      PERLND      20
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Basin  1                   MAX                     1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                         User  t-series Engl Metr ***
                                      in  out           ***
   20      C,NatVeg,Moderate      1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   20         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags **************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   20         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO
```

```
  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   20         0    1    1    1    0    0    0    0    1    1    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   20              0       3.5     0.033        80       0.1       2.5     0.915
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   20             0         0         2         2         0      0.05      0.05
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   20             0       0.6      0.04         1       0.3         0
  END PWAT-PARM4
  MON-LZETPARM
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   20       0.4  0.4  0.4  0.4  0.6  0.6  0.6  0.6  0.6  0.4  0.4  0.4
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   20       0.1  0.1  0.1  0.1 0.06 0.06 0.06 0.06 0.06  0.1  0.1  0.1
  END MON-INTERCEP

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   20             0         0      0.01         0       0.4      0.01         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
  END IWAT-PARM2
```

```
  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                    <--Area-->     <-Target->   MBLK   ***
<Name>   #                    <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND  20                      0.308884     COPY   501     12
PERLND  20                      0.308884     COPY   501     13

******Routing******
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   12.1        DISPLY   1     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                 ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG            ***
                                         in  out                             ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                      ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *         ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                         ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit       for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES
```

```
SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY   501 OUTPUT MEAN   1 1     12.1      WDM    501 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1959 10 01        END    2004 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   FALLBROOK OAKS BMP 18-21.wdm
MESSU       25   MitFALLBROOK OAKS BMP 18-21.MES
            27   MitFALLBROOK OAKS BMP 18-21.L61
            28   MitFALLBROOK OAKS BMP 18-21.L62
            30   POCFALLBROOK OAKS BMP 18-211.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:60
      IMPLND       1
      GENER        2
      RCHRES       1
      RCHRES       2
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Surface Biofilter  1        MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
    2        24
  END OPCODE
  PARM
    #    #         K ***
    2             0.
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
```

```
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
  END PWAT-PARM4
  MON-LZETPARM
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
  END MON-INTERCEP

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS       IFWS       LZS       AGWS      GWVS
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                    in  out           ***
    1      IMPERVIOUS-FLAT        1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    1         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    1         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    1         0    0    0    0    1
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    1            100      0.05     0.011       0.1
  END IWAT-PARM2
```

```
  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    1             0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    1             0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
IMPLND   1                      0.2928     RCHRES   1      5

******Routing******
IMPLND   1                   0.2928145     COPY     1     15
RCHRES   1                           1     RCHRES   2      8
RCHRES   2                           1     COPY   501     17
RCHRES   1                           1     COPY   501     17
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   12.1        DISPLY   1     INPUT  TIMSER 1
GENER    2 OUTPUT TIMSER      .0002778     RCHRES   1     EXTNL  OUTDGT 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG           ***
                                       in  out                              ***
    1     Surface Biofilte-004    3    1    1    1   28    0    1
    2     Biofilter  1            2    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
    2         1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
    1         4    0    0    0    0    0    0    0    0    0    1    9
    2         4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                  ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
          FG FG FG FG  possible  exit  *** possible  exit      possible  exit
           *  *  *  *    *  *  *  *  *       *  *  *  *  *         ***
    1      0  1  0  0    4  5  6  0  0       0  1  0  0  0       2  1  2  2  2
```

```
    2        0  1  0  0    4  5  0  0  0       0  0  0  0  0       2  2  2  2  2
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><--------><-------> ***
    1              1      0.01       0.0       0.0       0.5       0.0
    2              2      0.01       0.0       0.0       0.5       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                          ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
    1            0         4.0  5.0  6.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    2            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
*** User-Defined Variable Quantity Lines
***                           addr
***                          <------>
*** kwd  varnam optyp  opn  vari  s1 s2 s3 tp multiply  lc ls ac as agfn ***
  <****> <----> <----> <-> <----><-><-><-><-><--------> <><-> <><-> <--> ***
  UVQUAN vol2   RCHRES   2 VOL              4
  UVQUAN v2m2   GLOBAL     WORKSP  1        3
  UVQUAN vpo2   GLOBAL     WORKSP  2        3
  UVQUAN v2d2   GENER    2 K       1        3
*** User-Defined Target Variable Names
***                  addr or                       addr or
***                 <------>                      <------>
*** kwd   varnam ct  vari  s1 s2 s3  frac oper     vari  s1 s2 s3  frac oper
  <****>  <----><-> <----><-><-><-> <---> <-->    <----><-><-><-> <---> <-->
  UVNAME  v2m2    1 WORKSP  1         1.0 QUAN
  UVNAME  vpo2    1 WORKSP  2         1.0 QUAN
  UVNAME  v2d2    1 K       1         1.0 QUAN
*** opt foplop dcdts  yr mo dy hr mn d t   vnam  s1 s2 s3 ac quantity  tc  ts rp
  <****><-><--><><-><--> <> <> <> <><><>  <----><-><-><-><-><--------> <> <-><->
  GENER   2                               v2m2            =  1523.
*** Compute remaining available pore space
  GENER   2                               vpo2            =  v2m2
  GENER   2                               vpo2           -=  vol2
*** Check to see if VPORA goes negative; if so set VPORA = 0.0
IF (vpo2 < 0.0) THEN
  GENER   2                               vpo2            =  0.0
END IF
*** Infiltration volume
  GENER   2                               v2d2            =  vpo2
END SPEC-ACTIONS
FTABLES
  FTABLE      2
   70    5
     Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)     (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.016299  0.000000  0.000000  0.000000
  0.087912  0.016299  0.000430  0.000000  0.000000
  0.175824  0.016299  0.000860  0.000000  0.000058
  0.263736  0.016299  0.001290  0.000000  0.000227
  0.351648  0.016299  0.001719  0.000000  0.000569
  0.439560  0.016299  0.002149  0.000000  0.000999
  0.527473  0.016299  0.002579  0.000000  0.001125
  0.615385  0.016299  0.003009  0.000000  0.001930
  0.703297  0.016299  0.003439  0.000000  0.003013
  0.791209  0.016299  0.003869  0.000000  0.004389
  0.879121  0.016299  0.004299  0.000000  0.004400
  0.967033  0.016299  0.004729  0.000000  0.006116
  1.054945  0.016299  0.005158  0.000000  0.008185
  1.142857  0.016299  0.005588  0.000000  0.008218
  1.230769  0.016299  0.006018  0.000000  0.008218
```

```
  1.318681  0.016299  0.006448  0.000000  0.008218
  1.406593  0.016299  0.006878  0.000000  0.008218
  1.494505  0.016299  0.007308  0.000000  0.008218
  1.582418  0.016299  0.007738  0.000000  0.008218
  1.670330  0.016299  0.008168  0.000000  0.008218
  1.758242  0.016299  0.008597  0.000000  0.008218
  1.846154  0.016299  0.009027  0.000000  0.008218
  1.934066  0.016299  0.009457  0.000000  0.008218
  2.021978  0.016299  0.010052  0.000000  0.008218
  2.109890  0.016299  0.010647  0.000000  0.008218
  2.197802  0.016299  0.011241  0.000000  0.008218
  2.285714  0.016299  0.011836  0.000000  0.008218
  2.373626  0.016299  0.012430  0.000000  0.008218
  2.461538  0.016299  0.013025  0.000000  0.008218
  2.549451  0.016299  0.013620  0.000000  0.008218
  2.637363  0.016299  0.014214  0.000000  0.008218
  2.725275  0.016299  0.014809  0.000000  0.008218
  2.813187  0.016299  0.015404  0.000000  0.008218
  2.901099  0.016299  0.015998  0.000000  0.008218
  2.989011  0.016299  0.016593  0.000000  0.008218
  3.076923  0.016299  0.017188  0.000000  0.008218
  3.164835  0.016299  0.017782  0.000000  0.008218
  3.252747  0.016299  0.018377  0.000000  0.008218
  3.340659  0.016299  0.018972  0.000000  0.008218
  3.428571  0.016299  0.019566  0.000000  0.008218
  3.516484  0.016299  0.020161  0.000000  0.008218
  3.604396  0.016299  0.020756  0.000000  0.008218
  3.692308  0.016299  0.021350  0.000000  0.008218
  3.780220  0.016299  0.021945  0.000000  0.008218
  3.868132  0.016299  0.022540  0.000000  0.008218
  3.956044  0.016299  0.023134  0.000000  0.008218
  4.043956  0.016299  0.023729  0.000000  0.008218
  4.131868  0.016299  0.024324  0.000000  0.008218
  4.219780  0.016299  0.024918  0.000000  0.008218
  4.307692  0.016299  0.025513  0.000000  0.008218
  4.395604  0.016299  0.026108  0.000000  0.008218
  4.483516  0.016299  0.026702  0.000000  0.008218
  4.571429  0.016299  0.027297  0.000000  0.008218
  4.659341  0.016299  0.027892  0.000000  0.008218
  4.747253  0.016299  0.028486  0.000000  0.008218
  4.835165  0.016299  0.029081  0.000000  0.008218
  4.923077  0.016299  0.029676  0.000000  0.008218
  5.010989  0.016299  0.030270  0.000000  0.008218
  5.098901  0.016299  0.030865  0.000000  0.008218
  5.186813  0.016299  0.031460  0.000000  0.008218
  5.274725  0.016299  0.032054  0.000000  0.008218
  5.362637  0.016299  0.032649  0.000000  0.008218
  5.450549  0.016299  0.033244  0.000000  0.008218
  5.538462  0.016299  0.033838  0.000000  0.008218
  5.626374  0.016299  0.034433  0.000000  0.008218
  5.714286  0.016299  0.035027  0.000000  0.008218
  5.802198  0.016299  0.035622  0.000000  0.008218
  5.890110  0.016299  0.036217  0.000000  0.008218
  5.978022  0.016299  0.036811  0.000000  0.008218
  6.000000  0.016299  0.077616  0.000000  0.008218
  END FTABLE  2
  FTABLE      1
   24    6
     Depth      Area    Volume  Outflow1  Outflow2  outflow 3 Velocity  Travel
Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)     (cfs)   (ft/sec)
(Minutes)***
  0.000000  0.016299  0.000000  0.000000  0.000000  0.000000
  0.087912  0.016299  0.001433  0.000000  0.085788  0.000000
  0.175824  0.016299  0.002866  0.000000  0.089400  0.000000
  0.263736  0.016299  0.004299  0.000000  0.093012  0.000000
  0.351648  0.016299  0.005732  0.000000  0.096625  0.000000
  0.439560  0.016299  0.007165  0.000000  0.100237  0.000000
  0.527473  0.016299  0.008597  0.000000  0.103849  0.000000
  0.615385  0.016299  0.010030  0.000000  0.107461  0.000000
```

```
  0.703297  0.016299  0.011463  0.000000  0.111073  0.000000
  0.791209  0.016299  0.012896  0.000000  0.114685  0.000000
  0.879121  0.016299  0.014329  0.000000  0.118297  0.000000
  0.967033  0.016299  0.015762  0.000000  0.121909  0.000000
  1.054945  0.016299  0.017195  0.136453  0.125522  0.000000
  1.142857  0.016299  0.018628  0.563536  0.129134  0.000000
  1.230769  0.016299  0.020061  1.099144  0.132746  0.000000
  1.318681  0.016299  0.021494  1.609623  0.136358  0.000000
  1.406593  0.016299  0.022927  1.981777  0.139970  0.000000
  1.494505  0.016299  0.024359  2.193018  0.143582  0.000000
  1.582418  0.016299  0.025792  2.403681  0.147194  0.000000
  1.670330  0.016299  0.027225  2.578717  0.150806  0.000000
  1.758242  0.016299  0.028658  2.742606  0.154419  0.000000
  1.846154  0.016299  0.030091  2.897238  0.158031  0.000000
  1.934066  0.016299  0.031524  3.044026  0.161643  0.000000
  2.000000  0.016299  0.032599  3.184053  0.164352  0.000000
  END FTABLE  1
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP
WDM      2 PREC     ENGL    1              RCHRES   1     EXTNL  PREC
WDM      1 EVAP     ENGL    0.5            RCHRES   1     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.7            RCHRES   2     EXTNL  POTEV

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
RCHRES   2 HYDR   RO     1 1        1      WDM   1000 FLOW     ENGL      REPL
RCHRES   2 HYDR   O      1 1        1      WDM   1001 FLOW     ENGL      REPL
RCHRES   2 HYDR   O      2 1        1      WDM   1002 FLOW     ENGL      REPL
RCHRES   2 HYDR   STAGE  1 1        1      WDM   1003 STAG     ENGL      REPL
RCHRES   1 HYDR   STAGE  1 1        1      WDM   1004 STAG     ENGL      REPL
RCHRES   1 HYDR   O      1 1        1      WDM   1005 FLOW     ENGL      REPL
COPY     1 OUTPUT MEAN   1 1     12.1      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     12.1      WDM    801 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>             <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK        5
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    5

  MASS-LINK        8
RCHRES     OFLOW  OVOL   2                 RCHRES         INFLOW IVOL
  END MASS-LINK    8

  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15

  MASS-LINK       17
RCHRES     OFLOW  OVOL   1                 COPY           INPUT  MEAN
  END MASS-LINK   17


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

Disclaimer

Legal Notice

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ATTACHMENT 3

Structural BMP Maintenance Information

This is the cover sheet for Attachment 3.

Indicate which Items are Included behind this cover sheet:

Attachment Sequence	Contents	Checklist
Attachment 3a	Structural BMP Maintenance Plan (Required)	☐ Included See Structural BMP Maintenance Information Checklist on the back of this Attachment cover sheet.
Attachment 3b	Draft Stormwater Maintenance Notification / Agreement (when applicable)	☐ Included ☐ Not Applicable

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

Attachment 3a must identify:

- ☐ Specific maintenance indicators and actions for proposed structural BMP(s). This must 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 all Structural BMPs, Attachment 3b must include a draft maintenance agreement in the County's standard format depending on the Category (PDP applicant to contact County staff to obtain the current maintenance agreement forms). Refer to Section 7.3 in the BMP Design Manual for a description of the different categories.

ATTACHMENT 4

County of San Diego PDP Structural BMP Verification for Permitted Land Development Projects

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County of San Diego PDP-IVF:

Installation Verification Form for Priority Development Projects (PDPs)

This form must be accepted by the County prior to the release of construction permits or granting of occupancy for applicable portions of a Priority Development Project (PDP). Applicants are responsible for providing all requested information. Do not leave any fields blank; indicate *N/A* for any requested item that is not applicable.

PART 1 General Project and Applicant Information

Table 1: Project and Applicant Information

A. Project Summary Information	**ID No. IVF-20__-____** **To be assigned by DPW-WPP**
Project Name	Click here to enter text.
Record ID (e.g., grading/improvement plan number, building permit)	Click here to enter text.
Project Address	Click here to enter text.
Assessor's Parcel Number(s) APN(s))	Click here to enter text.
Project Watershed (complete Hydrologic Unit, Area, and Subarea Name with Numeric Identifier)	Click here to enter text.
B. Owner Information	
Name	Click here to enter text.
Address	Click here to enter text.
Email Address	Click here to enter text.
Phone Number	Click here to enter text.

Document previously verified BMPs for the PDP in **Table 2**. Include the Verification Form ID No. from **Page 1** if one was issued.

****** DO NOT INCLUDE THIS PAGE UNLESS THIS IS A PARTIAL RECORD PLAN VERIFICATION ******

Table 2: Information on Verifications for Partial Record Plans Only

A: Previous Submittals

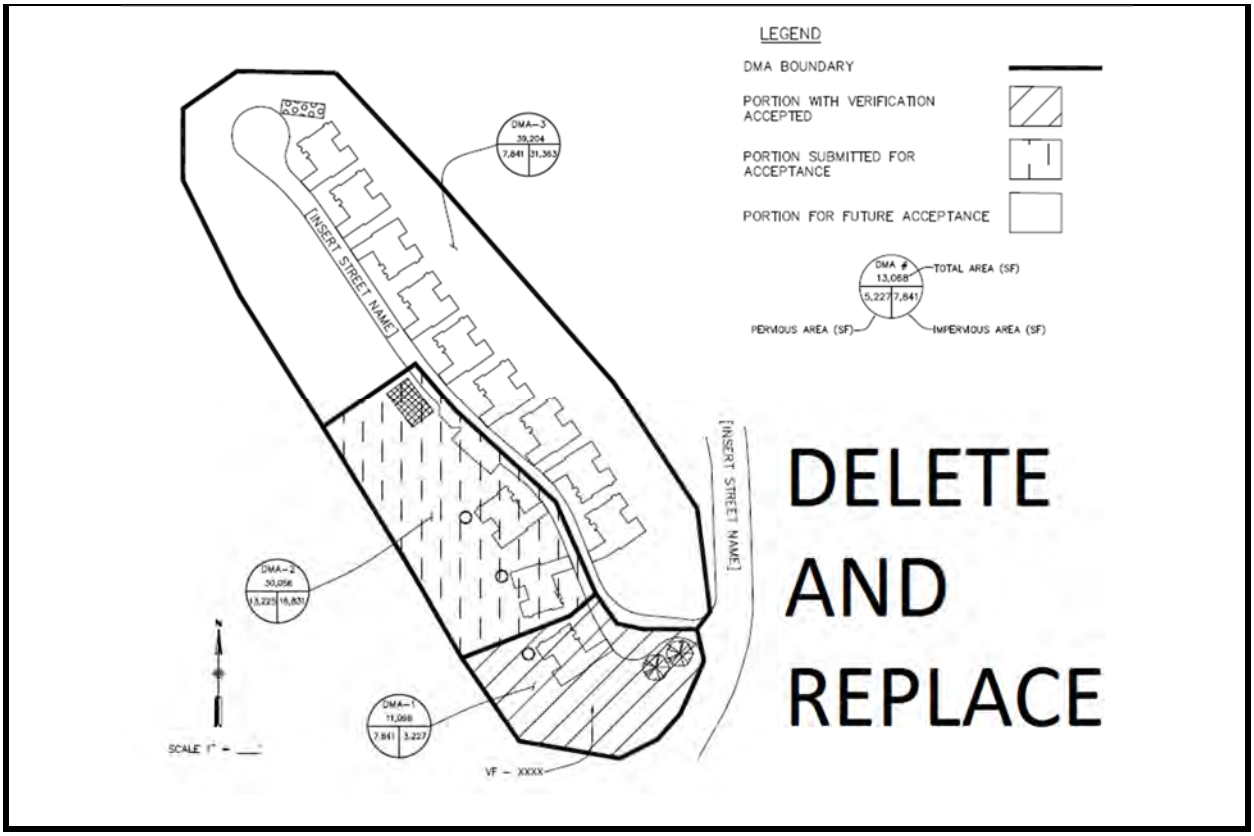
Previous Submittals	Submittal Date	Installation Verification Form ID No. if applicable (e.g., 2016-001)
1	Enter date.	Click here to enter text.
2	Enter date.	Click here to enter text.
3	Enter date.	Click here to enter text.
4	Enter date.	Click here to enter text.
5	Enter date.	Click here to enter text.

Add rows as needed

B: DMA and BMP Map

Please attach a map showing (1) all DMAs for the project site, (2) the DMAs and/or lots accepted under previous Verification Forms, and (3) the locations of Structural BMPs and Significant Site Design BMPs previously accepted OR listed in **Table 3** of this Verification Form.

SAMPLE DMA MAP


LEGEND
DMA BOUNDARY
PORTION WITH VERIFICATION ACCEPTED
PORTION SUBMITTED FOR ACCEPTANCE
PORTION FOR FUTURE ACCEPTANCE
DMA #
13,068
5,227
7,841
TOTAL AREA (SF)
PERVIOUS AREA (SF)
IMPERVIOUS AREA (SF)
DMA-3
39,204
7,841
31,363
DMA-2
30,056
13,221
16,835
DMA-1
11,068
7,841
3,227
[INSERT STREET NAME]
[INSERT STREET NAME]
SCALE 1" = ___'
VF – XXXX
DELETE AND REPLACE

PART 2 DMA and BMP Inventory Information

Use this table to document Structural BMPs (S-BMPs) and Significant Site Design BMPs (SSD-BMPs) for the PDP. All DMAs are required to have at least one Structural BMP or Significant Site Design BMP.

- In **Part A**, list all Structural BMPs (including both Pollutant Control and/or Hydromodification as applicable) by DMA.
- Complete **Part B** for all DMAs that contain only Significant Site Design BMPs. SSD-BMPs are Site Design BMPs credited in **Worksheet B-1.1** of the BMP Design Manual for Design Capture Volume (DCV) reductions. Only Tree Wells and Dispersion Areas should be included in this inventory.
- For any DMA that contains both S-BMPs and SD-BMPs, document only the S-BMPs; you do not need to include the SD-BMPs.
- The information provided for each BMP in the table must match that provided in the Stormwater Quality Management Plan (SWQMP), construction plans, maintenance agreements, and other relevant project documentation.

Table 3: Required Information for Structural BMPs and Significant Site Design BMPs

DMA #	BMP Information			Maintenance Category	Maintenance Agreement or Maintenance Notification Recorded Doc. #	Construction Plan Sheet #	Landscape Plan # & Sheet # (For Vegetated BMPs Only)	FOR DPW-WPP USE ONLY *Reviewer concurs that the BMP(s) may be accepted into inventory (date and initial)*
	Quantity	Description/Type of Structural BMP	BMP ID #(s)					
Part A Structural BMPs								
Add rows as needed								
Part B Significant Site Design BMPs								

		Choose an item.						
		Choose an item.						
		Choose an item.						
Add rows as needed								

PART 3 Required Attachments for All BMPs Listed in Table 3

For ALL projects, submit the following to the County inspector (check all that are attached):

☐ Photographs: A photograph of each fully constructed S-BMP or SSD-BMP (or group of BMPs).

☐ Maintenance Agreements: Copies of all approved and recorded Storm Water Maintenance Agreer (SWMAs) or Maintenance Notifications (MNs) for all S-BMPs.

Note: All BMPs proposed for County ownership will remain the responsibility of the owner listed on **Page** a signed Letter of Acceptance of Completion is received by the DPW Watershed Protection Program.

For Grading and Improvement projects only, ALSO submit:

☐ Landscape Plans: An 11" X 17" copy of the most current applicable Landscape Plan sheets whe BMPs are required to be vegetated, including:

- ☐ The Certification of Completion (Form 407), AND
- ☐ The Certificate of Approval from PDS Landscape Architect

Note: For each Landscape Plan, the sheets submitted must show the location of each verified as-built

☐ Construction Plans: An 11" X 17" copy of the most current applicable approved Construction Plan sheets:

- ☐ Grading Plans, AND/OR
- ☐ Improvement Plans, AND/OR
- ☐ Precise Grading Plan(s) (only for residential subdivisions with tract homes), AND/OR
- ☐ Other (Please specify) Click here to enter text.

Note: For each Construction Plan, the sheets submitted must incorporate all of the following:

- ☐ A BMP Table, AND
- ☐ A plan/cross-section of each verified as-built BMP, AND
- ☐ The location of each verified as-built BMP

Required only for Verifications for Partial Record Plans

☐ If this is a partial record plan verification, please include the following:

- ☐ A list of previously submitted Verification Forms (**Table 2, part A**)
- ☐ A map of DMAs and BMPs (**Table 2, part B**)

PART 4 Engineer of Work Certification

By signing below, I certify that the BMP(s) listed in Table 3 of this Verification Form have been constructed and all are in substantial conformance with the approved plans and applicable regulations. I understand the County reserves the right to inspect the above BMPs to verify compliance with the approved plans and Watershed Protection Ordinance (WPO). Should it be determined that the BMPs were not constructed to plan or code, corrective actions may be necessary before permits can be closed.

Please sign and provide your seal below.

[SEAL]

Professional Engineer's Printed Name:

Click here to enter text.

Email: Click here to enter text.

Phone Number: Click here to enter text.

Professional Engineer's Signed Name:

_____

Date: _Click here to enter text._____

COUNTY - OFFICIAL USE ONLY:

For County Inspectors

County Department: _____

Date verification received from EOW: _____

By signing below, County Inspector concurs that every noted BMP has been installed per plan.

Inspector Name: _____

Inspector's Signature: _____ Date: _____

For Building Division Only

Inspection Supervisor Name: _____

Inspector Supervisor's Signature: _____ Date: _____

PDCI & Building, along with the rest of this package, please provide to DPW WPP:

☐ A copy of the final accepted SWQMP and any accepted addendum

For Watershed Protection Program Only

Date Received: _____

WPP Submittal Reviewer: _____

WPP Reviewer concurs that the BMPs accepted in **Part 2** above may be entered into inventory.

WPP Reviewer's Signature: _____ Date: _____

ATTACHMENT 5

Copy of Plan Sheets Showing Permanent Storm Water BMPs, Source Control, and Site Design

This is the cover sheet for Attachment 5.

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 Step 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 County staff
- ☐ 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 must be provided. Photocopies of general brochures are not acceptable.
- ☐ Include all source control and site design measures described in Steps 4 and 5 of the SWQMP. Can be included as a separate exhibit as necessary.

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ATTACHMENT 6

Copy of Project's Drainage Report

This is the cover sheet for Attachment 6.

If hardcopy or CD is not attached, the following information should be provided:

Title:
Prepared By:
Date:

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ATTACHMENT 7

Copy of Project's Geotechnical and Groundwater Investigation Report

This is the cover sheet for Attachment 7.

If hardcopy or CD is not attached, the following information should be provided:

Title:
Prepared By:
Date:

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