County of San Diego
PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

ST. GREGORY OF NYSSA GREEK ORTHODOX CHURCH
MUP No. 05-010

1454 Jamacha Road
El Cajon, California 92019

ASSESSOR'S PARCEL NUMBER(S):
498-320-04 & 05

ENGINEER OF WORK:

David Caron, RCE #70066

PREPARED FOR:

St. Gregory of Nyssa, Greek Orthodox Church
1454 Jamacha Road
El Cajon, CA 92019

PDP SWQMP PREPARED BY:

Civil Landworks Corp.
110 Copperwood Way, Suite P
Oceanside, CA 92058
(760) 908-8745

DATE OF SWQMP:
7-21-17

PLANS PREPARED BY:
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SWQMP APPROVED BY:

APPROVAL DATE:

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Table of Contents

Attachments

Attachment 1: Backup for PDP Pollutant Control BMPs
- Attachment 1a: Storm Water Pollutant Control Worksheet Calculations
- Attachment 1b: DMA Exhibit
- Attachment 1c: Individual Structural BMP DMA Mapbook

Attachment 2: Backup for PDP Hydromodification Control Measures
- Attachment 2a: Flow Control Facility Design
- Attachment 2b: Hydromodification Management Exhibit
- Attachment 2c: Management of Critical Coarse Sediment Yield Areas
- Attachment 2d: Geomorphic Assessment of Receiving Channels (optional)
- Attachment 2e: Vector Control Plan (if applicable)

Attachment 3: Structural BMP Maintenance Plan
- Attachment 3a: Structural BMP Maintenance Thresholds and Actions
- Attachment 3b: Draft Maintenance Agreements / Notifications(when applicable)

Attachment 4: County of San Diego PDP Structural BMP Verification for DPW Permitted Land Development Projects

Attachment 5: Copy of Plan Sheets Showing Permanent Storm Water BMPs

Attachment 6: Copy of Project's Drainage Report

Attachment 7: Copy of Project's Geotechnical and Groundwater Investigation Report

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: St. Gregory of Nyssa Greek Orthodox Church
Permit Application Number: MUP No. 05-010

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

David Caron
Print Name

Civil Landworks Corp.
Company

7-7-17
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	4/11/17	Initial Submittal
2	7-21-17	2nd Submittal
3		
4		

Final Design

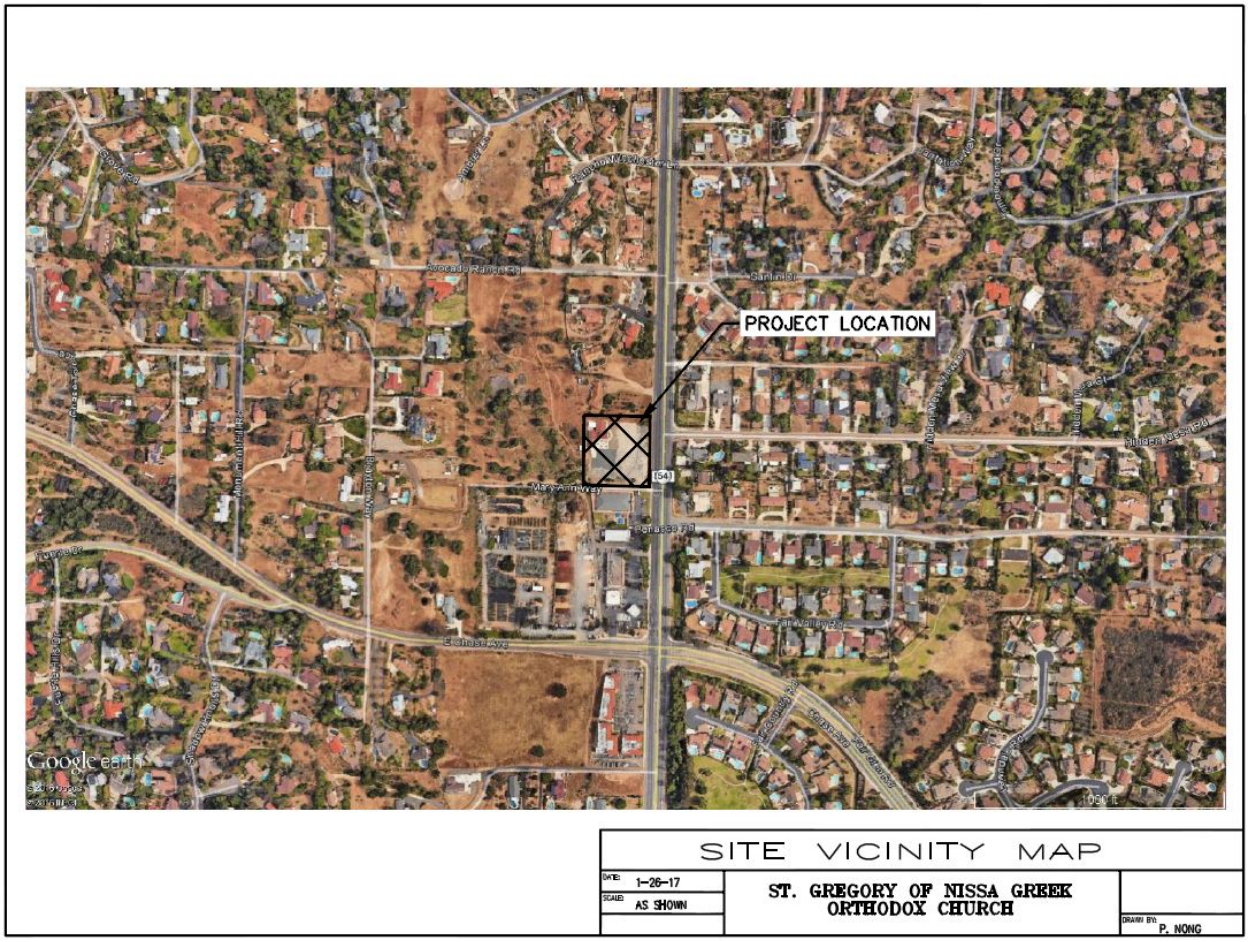
Submittal Number	Date	Summary of Changes
1		Initial Submittal
2		
3		
4		

Plan Changes

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

Project Vicinity Map

Project Name: St. Gregory of Nyssa Greek Orthodox Church
Record ID: MUP No. 05-010



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

Is the project part of another Priority Development Project (PDP)? If so, a PDP SWQMP is required. Go to Step 2.			(☐ Yes ☒ No
The project is (select one): ☐ New Development ☒ Redevelopment[1]			
The total proposed newly created or replaced impervious area is:			52,638 ft^2
The total existing (pre-project) impervious area is:			6,805 ft^2
The total area disturbed by the project is:			60,201 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: ___			
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). (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.

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.

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 not 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:	6,805 ft^2 (A)
The total proposed newly created or replaced impervious area is	52,638 ft^2 (B)
Percent impervious surface created or replaced (B/A)*100:	773 %

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	☐	The site is very flat, no stabilization bmp needed since no slope is exposed.
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	☐	All storm water sheet flow into biofiltration basins on site. Storm water discharges to an existing culvert.
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)	Sweetwater Hydrologic Unit, Middle Sweetwater Hydrologic Area, Hillsdale, HSA (909.22)

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 church sits on the proposed site, with minor pavement for the driveway.

Existing Land Cover Includes (select all that apply and provide each area on site):

- ☐ Vegetative Cover _____ Acres (_____ Square Feet)
- ☒ Non-Vegetated Pervious Areas 1.33 Acres (57,724 Square Feet)
- ☒ Impervious Areas 0.16 Acres (6,805 Square Feet)

Description / Additional Information:
The majority of the site consists of gravel areas.

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:
No existing natural hydrologic features on site.

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 site drains south to an existing pair of 12" PVC pipes which connect to an existing offsite 2'x6' box culvert. The offsite box culvert runs parallel to the southerly property line. An existing 42" RCP located at the southeast corner of the site, and runs along Jamacha Road, connects to the 2'x6' box culvert. (refer to hydrology maps)

Step 3.3: Description of Proposed Site Development

Project Description / Proposed Land Use and/or Activities:
The proposed Zoning C-3 and Land Use is Neighborhood Commercial. The proposed project will include construction of a church, meeting room, and parking lot.

List/describe proposed impervious features of the project (e.g., buildings, roadways, parking lots, courtyards, athletic courts, other impervious features):
Proposed impervious features of the project includes the church, meeting room and parking lot.

List/describe proposed pervious features of the project (e.g., landscape areas):
Proposed pervious features of the project includes landscape areas, and biofiltration basins.

Does the project include grading and changes to site topography?

☒Yes

☒No

Description / Additional Information:
Since the site is fairly flat, the pre and post topography will be maintained. Minor grading will be done to create a flat pad for the church and meeting room, and to direct storm water into biofiltration basins.

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	0	0 ft^2	0%
Pervious (non-vegetated)	70,251 ft^2	16,941	69%
Impervious	6,805 ft^2	60,116 ft^2	69%

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:
The proposed development includes installation of new storm water conveyance system to detain and transport storm water collected in the biofiltration basins offsite. The site is graded to sheet flow into their respective drainage basin area. The biofiltration basins in each drainage area will treat and detain storm water before conveying them south offsite. An Existing 2'x6' box culvert located south of Mary Ann Way. Mary Ann Way will also be treated using biofiltration basins. The addition of the proposed sidewalk will be mitigated in a proposed tree well then discharged to the existing channel.

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): The site discharges into an existing 2'x6' box culvert. Then continues to discharge into Sweetwater River (upper), then Sweetwater Reservoir, then Sweetwater River (lower), and eventually discharges into the San Diego Bay.

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
Sweetwater Reservoir, 909.21	*Oxygen, Dissolved*	
Sweetwater River (lower), 909.12	*Enterococcus, Fecal Coliform, Phosphorus, Selenium, Total Dissolved Solids, Total Nitrogen as N, Toxicity*	
San Diego Bay, 910.10	PCBs (Polychlorinated biphenyls)	*Bacteria, Dissolved Copper, Lead, Zinc*

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	☐	☒	☐
Nutrients	☐	☒	☒
Heavy Metals	☐	☒	☒
Organic Compounds	☒	☐	☐
Trash & Debris	☐	☒	☐
Oxygen Demanding Substances	☐	☒	☒

[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

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):

Hydromodificaiton flow control has been achieved by biofiltration basins and tree wells. The site will implement the biofiltration basins and the public ROW will utilize the tree wells.

Using Tree Wells sized to capture the first 1.5" of storm water runoff as advised by the County of San Diego Watershed Protection Program. Self-retaining areas designed to retain the first 1.5" of runoff have been determined to meet Hydromodification requirements. Refer to the BMP sizing Methodology for more information. http://www.prolectcleanwater.org/images/stories/Docs/LDS/SUSMP/SUSMP SDBMP Sizing Calculator Rpt Jan2012.pdf

[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. POC-1, existing 2'x6' box culvert
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.

The site is favorably sloped to an area that will be used as biofiltration basin. The biofiltration will be able to discharge to an existing storm drain system after treatment and hydromodification control. The proposed sidewalk will need to be mitigated in a tree well due to the constraints of the property.

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: No outdoor materials storage area proposed on project.			
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: No materials stored in outdoor work areas proposed on project.			

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. All items indicated “No” are not a component of the project			

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

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. All items indicated “No” are not a component of the project			

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: The project does not contain natural storage reservoirs, drainage corridors, and buffer ones for water bodies			
4.3.2 Conserve Natural Areas, Soils, and Vegetation	☐Yes	☐No	☒N/A
Discussion / justification if 4.3.2 not implemented: No scarcely any vegetation exist onsite.			
4.3.3 Minimize Impervious Area	☒Yes	☐No	☐N/A
Discussion / justification if 4.3.3 not implemented: Proposed development will minimize impervious area to the maximum extent practical.			
4.3.4 Minimize Soil Compaction	☒Yes	☐No	☐N/A
Discussion / justification if 4.3.4 not implemented: Soil compaction will be minimize in landscape area.			
4.3.5 Impervious Area Dispersion	☒Yes	☐No	☐N/A
Discussion / justification if 4.3.5 not implemented: Impervious areas will be graded to flow into landscape areas prior to discharging to biofiltration areas to the maximum extent possible.			

Site Design Requirement	Applied?		
4.3.6 Runoff Collection	☒Yes	☐No	☐N/A
Discussion / justification if 4.3.6 not implemented: All site storm water will be collected in the biofiltration basins.			
4.3.7 Landscaping with Native or Drought Tolerant Species	☒Yes	☐No	☐N/A
Discussion / justification if 4.3.7 not implemented: Landscape area will use native or drought tolerant vegetation.			
4.3.8 Harvesting and Using Precipitation	☒Yes	☐No	☐N/A
Discussion / justification if 4.3.8 not implemented: Rain barrels have been located where impervious area dispersion in not possible.			

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.

Harvest and use BMPs were considered, however, per worksheet B.3-1, harvest and use BMPs is considered to be infeasible. Refer to worksheet in Attachment 1 for additional information.

Hydromodification flow control has been achieved by biofiltration basins and tree wells. The site will implement the biofiltration basins and the public ROW will utilize the tree wells.

Using Tree Wells sized to capture the first 1.5" of storm water runoff as advised by the County of San Diego Watershed Protection Program. Self-retaining areas designed to retain the first 1.5" of runoff have been determined to meet Hydromodification requirements. Refer to the BMP sizing Methodology for more information.

http://www.prolectcleanwater.org/images/stories/Docs/LDS/SUSMP/SUSMP SDBMP Sizing Calculator Rpt Jan2012.pdf

(Continue on following page as necessary.)

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)

The following are factors when considering retention or infiltration. According to the USGS web survey, the proposed development sits on soil describe as Type “C” and “D” which have slow to very slow infiltration rates when thoroughly wet. Per infiltration report by GeoSoils, Inc dated January 10, 2017, the site being underlain at shallow depth by plutonic bedrock that is not conducive to infiltration. Report indicates that further infiltrated storm water could exacerbate expansive soil effects and damage underground utilities. Based on findings from online source and infiltration report, retention or infiltration BMPs are infeasible for the proposed development.

See Hydrology Report for information on drainage areas and flow rates.

Step 6.2: Structural BMP Checklist

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

Structural BMP ID No. IMP-1, 2, 3, 4

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)
- [X] 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
- [X] 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)	Civil Landworks
Who will be the final owner of this BMP?	☐ HOA [X] Property Owner ☐ County ☐ Other (describe)
Who will maintain this BMP into perpetuity?	☐ HOA [X] 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 2

Discussion (as needed): The biofiltration basin is sized to treat the 85th first flush, and storm drains will provide the volume required for hydromodification

(Continue on subsequent pages as necessary)

Step 6.2: Structural BMP Checklist

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

Structural BMP ID No. IMP-5

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)	County of San Diego
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 4

Discussion (as needed): hydromodification and DVC treatment using tree wells SD-A

(Continue on subsequent pages as necessary)

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 2
Discussion (as needed): The biofiltration basin is sized to treat the 85th first flush, and storm drains will provide the volume required for hydromodification. *(Continue on subsequent pages as necessary)*	

Step 6.3: Offsite Alternative Compliance Participation Form

PDP INFORMATION	
Record ID:	N/A
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? ☐ Yes ☐ No (PDP and/or ACP must be redesigned to account for all deficits generated by the PDP.	What is the difference between your PDP debits and ACP Credits? *(ACP Credits -Total PDP Debits = Total Earned Credits)

Attachment 1

BACKUP FOR PDP POLLUTANT CONTROL BMPS

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)

Attachment 1a

Storm Water Pollutant Control Worksheet
Calculations

Automated Worksheet B.3-1: Project-Scale BMP Feasibility Analysis (V1.2)

Category	#	Description	Value	Units
Capture & Use Inputs	0	Design Capture Volume for Entire Project Site	2,383	cubic-feet
	1	Proposed Development Type	Office	unitless
	2	Number of Residents or Employees at Proposed Development	1,000	#
	3	Total Planted Area within Development	11,891	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?	Yes	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?	Yes	yes/no
Calculations	9	36-Hour Toilet Use Per Resident or Employee	1.40	cubic-feet
	10	Subtotal: Anticipated 36 Hour Toilet Use	1,404	cubic-feet
	11	Anticipated 1 Acre Landscape Use Over 36 Hours	52.14	cubic-feet
	12	Subtotal: Anticipated Landscape Use Over 36 Hours	14	cubic-feet
	13	Total Anticipated Use Over 36 Hours	1,418	cubic-feet
	14	Total Anticipated Use / Design Capture Volume	0.60	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?	No	yes/no
Result	18	Feasibility Category	5	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 (V1.2)

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
Standard Drainage Basin Inputs	0	Drainage Basin ID or Name	IMP-1	IMP-2	IMP-3	IMP-4	IMP-5						unitless
	1	Basin Drains to the Following BMP Type	Biofiltration	Biofiltration	Biofiltration	Biofiltration	Retention						unitless
	2	85th Percentile 24-hr Storm Depth	0.50	0.50	0.50	0.50	1.25						inches
	3	Design Infiltration Rate Recommended by Geotechnical Engineer	0.000	0.000	0.000	0.000	0.000						in/hr
	4	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	11,936	15,497	25,124	5,852	1,474						sq-ft
	5	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)	0	0	0	0	0						sq-ft
	6	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)	0	0	0	0	0						sq-ft
	7	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)	0	0	0	0	0						sq-ft
	8	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)	0	0	0	0	0						sq-ft
	9	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)	2,394	0	2,284	0	454						sq-ft
	10	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)	1,142	4,206	1,949	4,515	0						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	Yes	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					1						#
	20	Average Mature Tree Canopy Diameter					20						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	15,472	19,703	29,357	10,367	1,928	0	0	0	0	0	sq-ft
	29	Initial Runoff Factor for Standard Drainage Areas	0.75	0.77	0.81	0.64	0.74	0.00	0.00	0.00	0.00	0.00	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	0.75	0.77	0.81	0.64	0.74	0.00	0.00	0.00	0.00	0.00	unitless
	32	Initial Design Capture Volume	484	632	991	276	149	0	0	0	0	0	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	0.75	0.77	0.81	0.64	0.74	n/a	n/a	n/a	n/a	n/a	unitless
	38	Design Capture Volume After Dispersion Techniques	484	632	991	276	149	0	0	0	0	0	cubic-feet
Tree & Barrel Adjustments	39	Total Tree Well Volume Reduction	0	0	0	0	180	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	0.75	0.77	0.81	0.64	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	42	Final Effective Tributary Area	11,604	15,171	23,779	6,635	0	0	0	0	0	0	sq-ft
	43	Initial Design Capture Volume Retained by Site Design Elements	0	0	0	0	180	0	0	0	0	0	cubic-feet
	44	Final Design Capture Volume Tributary to BMP	484	632	991	276	0	0	0	0	0	0	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.5-1: Sizing Lined or Unlined Biofiltration BMPs (V1.2)

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
BMP Inputs	0	Drainage Basin ID or Name	IMP-1	IMP-2	IMP-3	IMP-4	-	-	-	-	-	-	sq-ft
	1	Design Infiltration Rate Recommended by Geotechnical Engineer	0.000	0.000	0.000	0.000	-	-	-	-	-	-	in/hr
	2	Effective Tributary Area	11,604	15,171	23,779	6,635	-	-	-	-	-	-	sq-ft
	3	Minimum Biofiltration Footprint Sizing Factor	0.030	0.030	0.030	0.030	-	-	-	-	-	-	ratio
	4	Design Capture Volume Tributary to BMP	484	632	991	276	-	-	-	-	-	-	cubic-feet
	5	Is Biofiltration Basin Impermeably Lined or Unlined?	Lined	Lined	Lined	Lined							unitless
	6	Provided Biofiltration BMP Surface Area	600	560	840	300							sq-ft
	7	Provided Surface Ponding Depth	12	10	8	18							inches
	8	Provided Soil Media Thickness	18	18	18	18							inches
	9	Provided Depth of Gravel Above Underdrain Invert	27	21	27	9							inches
	10	Diameter of Underdrain or Hydromod Orifice (Select Smallest)	0.35	0.35	0.35	0.35							inches
	11	Provided Depth of Gravel Below the Underdrain	3	3	3	3							inches
Retention Calculations	12	Volume Infiltrated Over 6 Hour Storm	0	0	0	0	0	0	0	0	0	0	cubic-feet
	13	Soil Media Pore Space Available for Retention	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	unitless
	14	Gravel Pore Space Available for Retention	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	15	Effective Retention Depth	0.90	0.90	0.90	0.90	0.00	0.00	0.00	0.00	0.00	0.00	inches
	16	Calculated Retention Storage Drawdown (Including 6 Hr Storm)	120	120	120	120	0	0	0	0	0	0	hours
	17	Volume Retained by BMP	45	42	63	23	0	0	0	0	0	0	cubic-feet
	18	Fraction of DCV Retained	0.09	0.07	0.06	0.08	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	19	Portion of Retention Performance Standard Satisfied	0.11	0.08	0.07	0.10	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	20	Fraction of DCV Retained (normalized to 36-hr drawdown)	0.05	0.04	0.03	0.05	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	21	Design Capture Volume Remaining for Biofiltration	460	607	961	262	0	0	0	0	0	0	cubic-feet
Biofiltration Calculations	22	Max Hydromod Flow Rate through Underdrain	0.0070	0.0065	0.0067	0.0062	n/a	n/a	n/a	n/a	n/a	n/a	CFS
	23	Max Soil Filtration Rate Allowed by Underdrain Orifice	0.50	0.50	0.35	0.90	n/a	n/a	n/a	n/a	n/a	n/a	in/hr
	24	Soil Media Filtration Rate per Specifications	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	in/hr
	25	Soil Media Filtration Rate to be used for Sizing	0.50	0.50	0.35	0.90	5.00	5.00	5.00	5.00	5.00	5.00	in/hr
	26	Depth Biofiltered Over 6 Hour Storm	3.02	3.00	2.08	5.37	30.00	30.00	30.00	30.00	30.00	30.00	inches
	27	Soil Media Pore Space Available for Biofiltration	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	unitless
	28	Effective Depth of Biofiltration Storage	15.60	13.60	11.60	21.60	0.00	0.00	0.00	0.00	0.00	0.00	inches
	29	Drawdown Time for Surface Ponding	24	20	23	20	0	0	0	0	0	0	hours
	30	Drawdown Time for Effective Biofiltration Depth	31	27	33	24	0	0	0	0	0	0	hours
	31	Total Depth Biofiltered	18.62	16.60	13.68	26.97	30.00	30.00	30.00	30.00	30.00	30.00	inches
	32	Option 1 - Biofilter 1.50 DCV: Target Volume	690	911	1,442	393	0	0	0	0	0	0	cubic-feet
	33	Option 1 - Provided Biofiltration Volume	690	775	958	393	0	0	0	0	0	0	cubic-feet
	34	Option 2 - Store 0.75 DCV: Target Volume	345	455	721	197	0	0	0	0	0	0	cubic-feet
	35	Option 2 - Provided Storage Volume	345	455	721	197	0	0	0	0	0	0	cubic-feet
	36	Portion of Biofiltration Performance Standard Satisfied	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
Result	37	Do Site Design Elements and BMPs Satisfy Annual Retention Requirements?	Yes	Yes	Yes	Yes	-	-	-	-	-	-	yes/no
	38	Overall Portion of Performance Standard Satisfied	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	39	This BMP Overflows to the Following Drainage Basin	-	-	-	-	-	-	-	-	-	-	unitless
	40	**Deficit of Effectively Treated Stormwater**	**0**	**0**	**0**	**0**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	**n/a**	cubic-feet

Worksheet B.5-1 General Notes:

A. Applicants may use this worksheet to size Lined or Unlined Biofiltration BMPs (BF-1, PR-1) 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.

Attachment 1b

Form I-8, Categorization of Infiltration Feasibility Condition

LIMITED GEOTECHNICAL EVALUATION OF STORM WATER INFILTRATION FEASIBILITY
SAINT GREGORY OF NYASSA GREEK ORTHODOX CHURCH
1454 JAMACHA ROAD
EL CAJON, SAN DIEGO COUNTY, CALIFORNIA 92019
ASSESSOR'S PARCEL NUMBER (APN) 498-320-56-00

FOR

SAINT GREGORY OF NYASSA GREEK ORTHODOX CHURCH
1454 JAMACHA ROAD
EL CAJON, CALIFORNIA 92019

W.O. 7220-A-SC JANUARY 10, 2017

GeoSoils, Inc.

Geotechnical • Geologic • Coastal • Environmental

5741 Palmer Way • Carlsbad, California 92010 • (760) 438-3155 • FAX (760) 931-0915 • www.geosoilsinc.com

January 10, 2017

W.O. 7220-A-SC

Saint Gregory of Nyassa Greek Orthodox Church
1454 Jamacha Road
El Cajon, California 92019

Attention: Mr. Peter Shenas

Subject: Limited Geotechnical Evaluation of Storm Water Infiltration Feasibility, Saint Gregory of Nyassa Greek Orthodox Church, 1454 Jamacha Road, El Cajon, San Diego County, California 92019, APN 498-320-56-00

Dear Mr. Shenas:

In accordance with your request and authorization, GeoSoils, Inc. (GSI) is providing this summary of our limited geotechnical evaluation of storm water infiltration feasibility at the subject site. The purpose of our study was to evaluate the onsite geologic and geotechnical conditions relative to the feasibility of storm water infiltration for permanent storm water best management practices (BMPs).

SCOPE OF SERVICES

The scope of services performed for this study included:

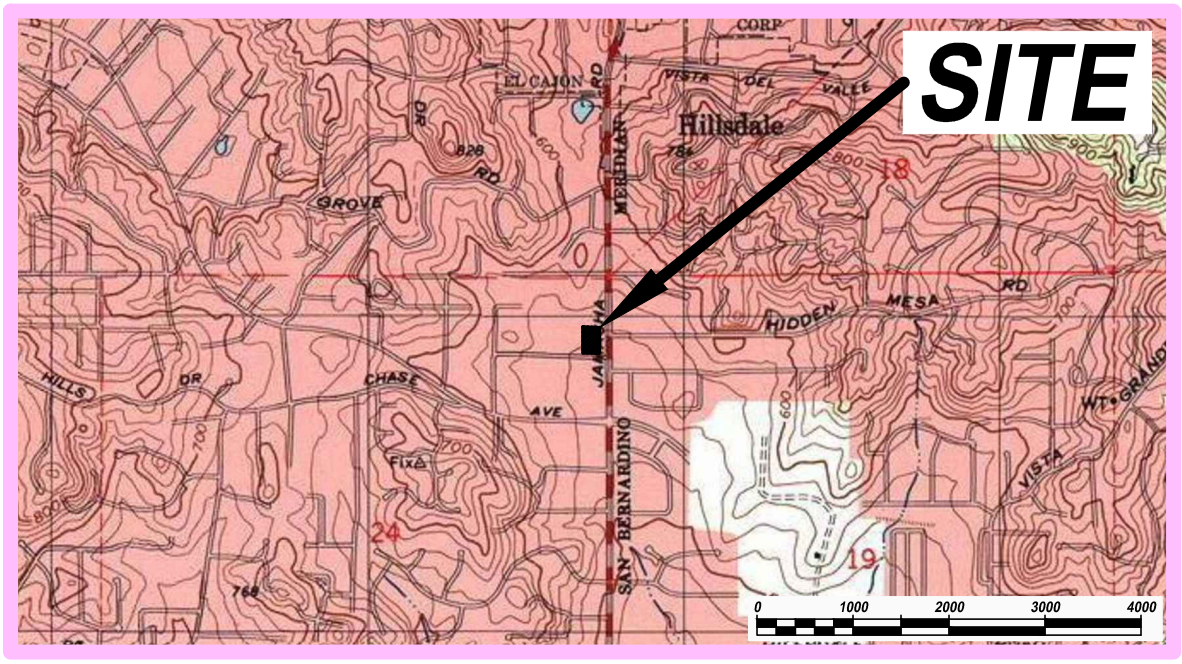
- A review of in-house geologic maps and literature, and readily available soils, groundwater, and environmental data for the subject site and near-vicinity, including United States Department of Agriculture - Natural Resources Conservation Service (USDA-NRCS) soils infiltration data.

- Analysis of information collected; and

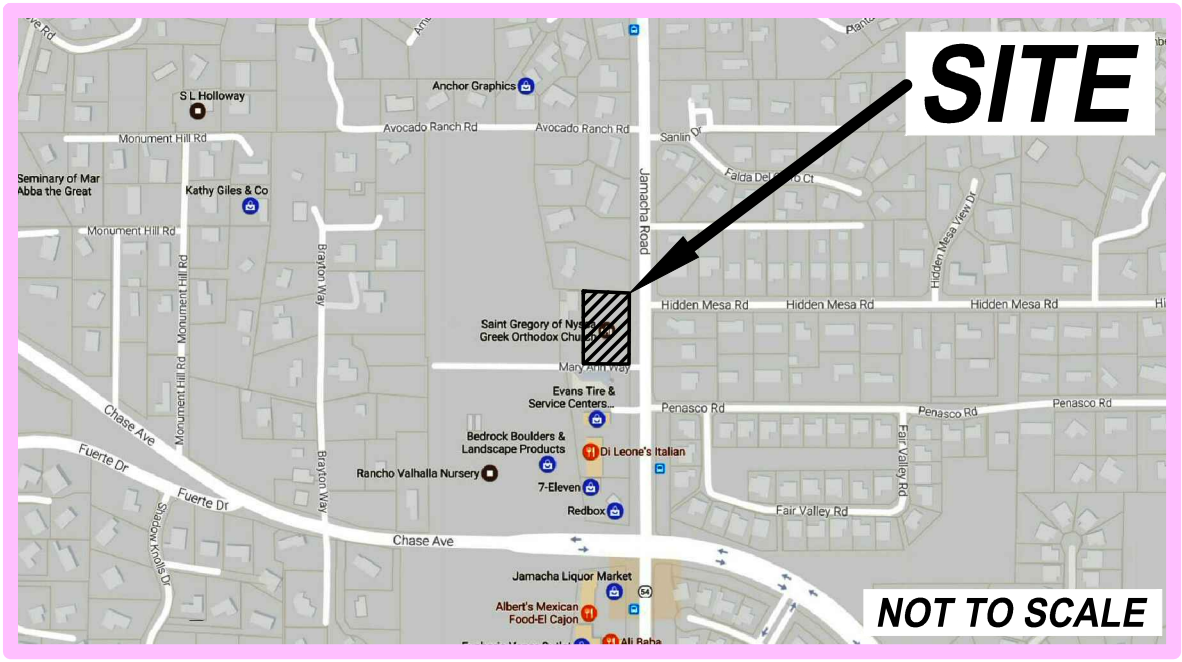
- The preparation of this summary report.

SITE CONDITIONS

The subject site consists of a roughly rectangular-shaped parcel of land located at 1454 Jamacha Road in El Cajon, San Diego County, California (see Figure 1, Site Location Map). The property is bounded by Jamacha Road (State Route 54) to the east, by existing residential development to the north, by relatively vacant land to the west, and by existing commercial/retail development and a nursery/landscape retailer to the south. Topographically, the site is relatively flat-lying to gently sloping to the south.



Base Map: TOPO!® ©2003 National Geographic, U.S.G.S. El Cajon Quadrangle, California -- San Diego Co., 7.5 Minute, dated 1996, current, 2000.



Base Map: Google Maps, Copyright 2017 Google, Map Data Copyright 2017 Google

GeoSoils, Inc.

W.O. 7220-A-SC

SITE LOCATION MAP

Figure 1

The property is located near the axis of a low relief, southerly-flowing natural drainage; considered a tributary within the Sweetwater River watershed. According to Google Earth satellite imagery, site elevations range between approximately 534 and 545 feet (unknown datum), for an overall relief of about 11 feet. With the exception of a relatively newly constructed church building and associated Portland Cement Concrete (PCC) flatwork, near the northwesterly property corner, the site is relatively undeveloped. Site drainage appears to be controlled by sheet-flow runoff, directed to the south. Site vegetation consists of sparse trees and shrubbery.

SITE GEOLOGIC/LITHOLOGIC CONDITIONS

According to regional geologic mapping by Tan (2002), the subject site is underlain by Cretaceous-age plutonic bedrock, consisting of medium-grained, severely weathered tonalite with lesser granodiorite and quartz diorite composition. Based on geomorphology, GSI surmises that the bedrock is mantled by undifferentiated, stream-deposited alluvium and colluvium (topsoil), and locally by artificial fill. Our experience has shown that similar plutonic bedrock has low hydraulic conductivity and is typically a limiting factor in regard to storm water infiltration feasibility.

SOILS

According to soil survey mapping by the United States Department of Agriculture - Natural Resources Conservation Service (USDA-NRCS), the westerly, approximately two-thirds of the site is mantled by soils belonging to the Placentia sandy loam, 2 to 9 percent slopes. Whereas, the easterly, approximately one-third of the site is mantled by the Ramona sandy loam, 2 to 5 percent slopes. The USDA-NRCS indicates that the infiltration rate of the most limiting layer, within the Placentia sandy loam, 2 to 9 percent slopes, ranges from 0.0 to 0.06 inches per hour (in/hr). The USDA-NRCS reports that the infiltration rate of the most limiting layer, within the Ramona sandy loam, 2 to 5 percent slopes, varies from 0.20 to 0.57 in/hr. Thus, the USDA-NRCS assigns the Placentia sandy loam, 2 to 9 percent slopes to Hydrologic Soil Group (HSG) “D,” and the Ramona sandy loam, 2 to 5 percent slopes to HSG “C.” Such soil conditions, suggest that infiltration for permanent storm water BMPs at the subject site is typically infeasible.

GROUNDWATER

According to the State of California Department of Water Resources ([CDWR],1967), groundwater was measured and inferred at depths less than 25 feet below the surface in the general site vicinity. A review of an environmental study, performed at 2249 Jamacha Road, El Cajon, California by Avocet Environmental, Inc. ([AEI], 2013), indicated groundwater depths ranging between 25 and 35 feet below the surface of that property. It is the opinion of GSI that the groundwater conditions described by

CDWR (1967) and AEI (2013) are consistent with a perched water table; whereby, the groundwater is resting or perched upon relatively fresh (i.e., less weathered), impermeable bedrock, or contained in fractures, and is not the regional groundwater table (typically not present in crystalline plutonic rock). GSI estimates that the elevation of the regional groundwater table is roughly consistent with sea level.

The subject site is located within the Hillsdale Hydrologic Subarea of the Middle Sweetwater Hydrologic Area of the Sweetwater Hydrologic Unit. According to the California Regional Water Quality Control Board - San Diego Region (1994), beneficial groundwater use within the Middle Sweetwater Hydrologic Area include municipal and domestic supply, agricultural supply, and industrial service supply. Thus, if shallow groundwater conditions do exist at the property, as reported in CDWR (1967) and AEI (2013), insufficient vertical separation, between the permanent storm water BMP and the groundwater table could lead to groundwater contamination because of inadequate filtering of potential contaminants.

ADDITIONAL GEOTECHNICAL CONCERNS

Expansive Soils

Although the scope of this study did not include an evaluation of expansive soils, within the subject property, it is well documented that residual soils, formed through weathering and alteration of plutonic bedrock, can be detrimentally expansive. The shrink/swell effects of expansive soils can damage improvements such as foundations, slab-on-grade floors, pavements, walls, etc. The introduction of infiltrated storm water, if not properly contained, could initiate swelling of expansive soils, especially during the wet season. Conversely, during the dry season, when storm water infiltration would be of limited volume, the drying of expansive soils would lead to shrinking effects. Cyclical shrinking and swelling soils may have damaging repercussions to existing improvements and future improvements.

Perched Water Conditions

As previously indicated, the dense nature of plutonic bedrock, shown to underlie the subject site (Tan, 2002), is not conducive to infiltration. Thus, infiltrated storm water would most likely perch upon the bedrock and begin to mound and migrate laterally, potentially adversely affecting onsite improvements as well as existing improvements on adjoining properties.

Underground Utilities

Given the likelihood for perched water conditions to develop in the event of storm water infiltration, perched water entering into underground utility trenches has the potential to induce settlement of backfill, lead to the migration of fines into open-graded gravels used in the pipe zone (i.e., piping), and cause corrosion of any metal components used in underground utility construction.

CONCLUSIONS

Owing to the above-described factors and concerns, the site is not well suited for storm water infiltration for permanent storm water BMPs; and therefore, is not recommended from a geotechnical perspective, owing to the likelihood of potential adverse effects.

RECOMMENDATIONS

GSI recommends that storm water treatment occur within lined bioretention basins or swales, or subsurface infiltration chambers/galleries. More specifically, we recommend:

- 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): 30 (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 used in bioretention basins 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.

- Areas adjacent to, or within, the bioretention basins 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.

- Infiltrations basins/swales should not be installed within ±8 feet of building foundations utility trenches, and walls, or a 1:1 (h:v) slope (down and away) from the bottom elements of these improvements. Alternatively, deepened foundations and/or pile/pier supported improvements may be used.

- Infiltrations basins/swales should not be installed adjacent to pavement and/or hardscape improvements. Alternatively, deepened/thickened edges and curbs may be utilized in areas adjoining the basin/swale.

- Infiltration systems should be designed using a suitable factor-of-safety (FOS) to account for uncertainties in the known infiltration rates (as generally required by the controlling authorities), and reduction in performance over time. Any designed system will require regular and periodic maintenance, which may include rehabilitation and/or complete replacement of the filter media (e.g., sand, gravel, filter fabrics, topsoils, mulch, etc.) or other components utilized in construction, so that the design life exceeds 15 years.

- Due to the potential for piping and adverse seepage conditions, a burrowing rodent control program should also be implemented onsite.

- All or portions of these systems may be considered attractive nuisances. Thus, consideration of the effects of, or potential for, vandalism should be addressed.

- The potential for surface flooding, in the case of system blockage, should be evaluated by the design engineer.

- Any proposed utility backfill materials (i.e., inlet/outlet piping and/or other subsurface utilities) located within or near the proposed area of the storm water treatment BMP may become saturated. This is due to the potential for piping, water migration, and/or seepage along the utility trench line backfill. Slurry backfill is recommended in the area proposed for storm water treatment.

- If utility trenches cross and/or are proposed near the BMP, cut-off walls or other water barriers will need to be installed to mitigate the potential for piping and excess water entering the utility backfill materials.

- Planned or existing utilities may also be subject to piping of fines into open-graded gravel backfill layers unless separated from overlying or adjoining BMPs by geotextiles and/or slurry backfill.

- The use of storm water treatment BMPs above existing utilities that might degrade/corrode with the introduction of water/seepage should be avoided.

- A vector control program may be necessary as stagnant water contained in storm water treatment BMPs may attract mammals, birds, and insects that carry pathogens.

LIMITATIONS

The conclusions and recommendations are professional opinions. These opinions have been derived in accordance with current standards of practice, and no warranty, either express or implied, is given. 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.

If you have any questions or comments regarding this letter, please do not hesitate to contact the undersigned.

Respectfully submitted,

GeoSoils, Inc.

John P. Franklin
Engineering Geologist, CEG 1340

David W. Skelly
Civil Engineer, RCE 47857

Ryan B. Boehmer
Project Geologist

RBB/JPF/DWS/jh

Attachments: Appendix A - References
Appendix B - County of San Diego Worksheet C.4-1

Distribution: (1) Addressee (via email)
(2) JG Consulting and Engineering, Attn: Mr. Jerry Gaughan (via email and US mail)

APPENDIX A

REFERENCES

APPENDIX A

REFERENCES

Avocet Environmental, Inc., 2013, Interim remedial action report, Monte Vista Forest Fire Station, 2249 Jamacha Road, El Cajon, California (SAM Case No. H05241-002), Project No. 1338.005, dated August 26.

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APPENDIX B

COUNTY OF SAN DIEGO WORKSHEET C.4-1

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

Categorization of Infiltration Condition			**Worksheet C.4-1**
Part 1 - Full Infiltration Feasibility Screening Criteria **Would infiltration of the full design volume be feasible from a physical perspective without any undesirable consequences that cannot be reasonably mitigated?** Note that it is not necessary to investigate each and every criterion in the worksheet if infiltration is precluded. Instead a letter of justification from a geotechnical professional familiar with the local conditions substantiating any geotechnical issues will be required.			
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: Infiltration rates were not evaluated because it is our opinion that full storm water infiltration at the subject site is infeasible owing to the site being underlain at shallow depth by plutonic bedrock that is not conducive to infiltration. In addition, soil survey mapping by the USDA - NRCS indicate that low permeability soils occur within the property. Please refer to the report text for further explanation. 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.		
Provide basis: Not applicable. See response to Criterion No. 1 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.		
Provide basis: Not applicable. See response to Criterion No. 1 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.		
Provide basis: Not applicable. See response to Criterion No. 1 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		**NO**

* 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:

As previously stated in our response to Criterion No. 1, the subject site is underlain at shallow depth by plutonic bedrock and soils that are not conducive to infiltration. Thus, it is our opinion that the soil and geologic conditions at the subject site do not allow for infiltration in any appreciable rate or volume. Please refer to the report text for further explanation.

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:

Groundwater mounding cannot be precluded due to the occurrence of shallow, impermeable bedrock. This condition cannot be mitigated because the movement of subsurface water cannot be accurately predicted. Infiltrated storm water could also exacerbate expansive soil effects and damage underground utilities.

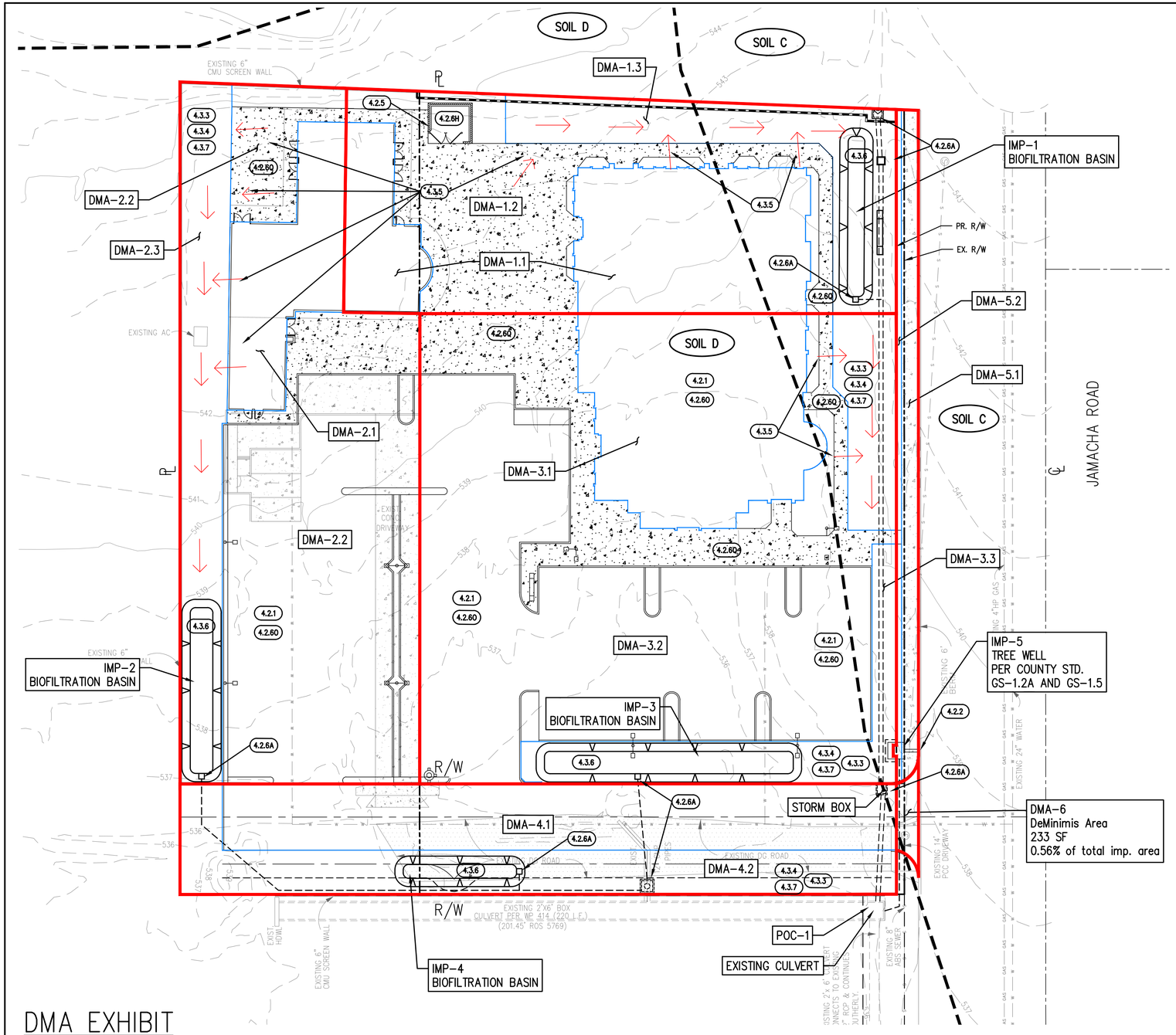
Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.

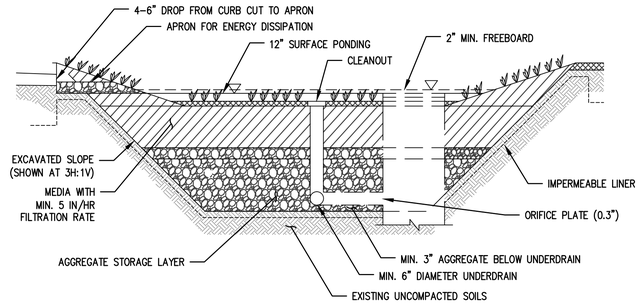
Worksheet C.4.1 Page 4 of 4			
Criteria	**Screening Question**	**Yes**	**No**
7	**Can Infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.		X
Provide basis: If there is less than 10 feet of vertical separation between the bottom of the permanent storm water BMP and the phreatic surface, there would be insufficient filtering and the introduction of contaminants into the groundwater supply, which has beneficial uses. Please refer to the report text for further explanation. 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: Downstream water rights are generally not studied in geotechnical practice. However, if infiltration were to capture surface waters directed into the Sweetwater River watershed, there would be slightly less water entering the Sweetwater River, which may lead the downstream water rights issues, if such rights exist. 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.**		**No 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.

Attachment 1c

DMA Exhibit





BIOFILTRATION BMP
N.T.S.

BMP TABLE

ID#	TYPE	AREA(SF)	SOIL MEDIA (IN)	STORAGE LAYER (IN)	ORRIFICE OPENING (IN)
IMP-1	BIOFILTRATION	354	18	24	0.3
IMP-2	BIOFILTRATION	480	18	18	0.3
IMP-3	BIOFILTRATION	720	18	30	0.3
IMP-4	BIOFILTRATION	200	18	12	0.3
IMP-5	STREET TREE	1 TREE	30	N/A	N/A

DMA AREA SUMMARY

DMA ID 1	Type	Total Area SF	Total Area Acres
DMA-1.1	Roof	6,017	0.14
DMA-1.2	Impervious Pavement	5,919	0.14
DMA-1.3	Landscape (Soil C)	2,394	0.05
DMA-1.4	Landscape (Soil D)	1,142	0.03
TOTAL Drains to BMP IMP-1		15,472	0.36

DMA ID 2	Type	Total Area SF	Total Area Acres
DMA-2.1	Roof	2,742	0.06
DMA-2.2	Impervious Pavement	12,755	0.29
DMA-2.3	Landscape (Soil D)	4,206	0.10
TOTAL Drains to BMP IMP-2		19,703	0.45

DMA ID 3	Type	Total Area SF	Total Area Acres
DMA-3.1	Roof	5,798	0.13
DMA-3.2	Impervious Pavement	19,326	0.44
DMA-3.3	Landscape (Soil C)	2,284	0.05
DMA-3.4	Landscape (Soil D)	1,946	0.04
TOTAL Drains to BMP IMP-3		29,354	0.67

DMA ID 4	Type	Total Area SF	Total Area Acres
DMA-4.1	Landscape (Soil D)	4,515	0.10
DMA-4.2	Impervious Pavement	5,852	0.13
TOTAL Drains to BMP IMP-4		10,366	0.24

DMA ID 5	Type	Total Area SF	Total Area Acres
DMA-5.1	Landscape (Soil C)	454	0.01
DMA-5.2	Sidewalk	1,474	0.03
TOTAL Drains to BMP IMP-5		1,928	0.04

DMA ID 6	Type	Total Area SF	Total Area Acres
DMA-6.1	driveway apron	233	0.01
TOTAL DeMinimus		233	0.01

20 0 20 40
GRAPHIC SCALE
SCALE: 1"= 20'

DMA EXHIBIT

LEGEND

ITEM	SYMBOL
SUBDIVISION BOUNDARY	
SOIL BOUNDARY	
DMA BOUNDARY	
DMA SUB-BOUNDARY	
BIOFILTRATION FACILITY	
FLOW DIRECTION	

NOTE

1. GROUNDWATER DEPTH RANGING BETWEEN 25 TO 35 FEET PER ENVIRONMENTAL STUDY BY AVOCET ENVIRONMENTAL, INC.
2. CRITICAL COARSE SEDIMENT YIELD AREAS NOT LOCATED ON SITE.

SOURCE CONTROL BMPS

- 4.2.1 PREVENTION OF ILLICIT DISCHARGES INTO THE MS4
- 4.2.2 STORM DRAIN STENCILING OR SIGNAGE
- 4.2.5 PROTECT TRASH STORAGE AREAS FROM RAINFALL, RUN-ON RUNOFF, AND WIND DISPERSAL
- 4.2.6A ONSITE STORM DRAIN INLETS
- 4.2.6H REFUSE AREAS
- 4.2.6O FIRE SPRINKLER TEST WATER
- 4.2.6Q PLAZAS, SIDEWALKS, AND PARKING LOTS

SITE DESIGN BMP

- 4.3.3 MINIMIZE IMPERVIOUS AREA
- 4.3.4 MINIMIZE SOIL COMPACTION
- 4.3.5 IMPERVIOUS AREA DISPERSION
- 4.3.6 RUNOFF COLLECTION
- 4.3.7 LANDSCAPING WITH NATIVE OR DROUGHT TOLERANT SPECIES

Civil Landworks
110 COPPERWOOD WAY, SUITE P, OCEANSIDE, CA 92058
PH: 760-908-8745 • info@civillandworks.com

DMA EXHIBIT

SHEET 1 OF 1

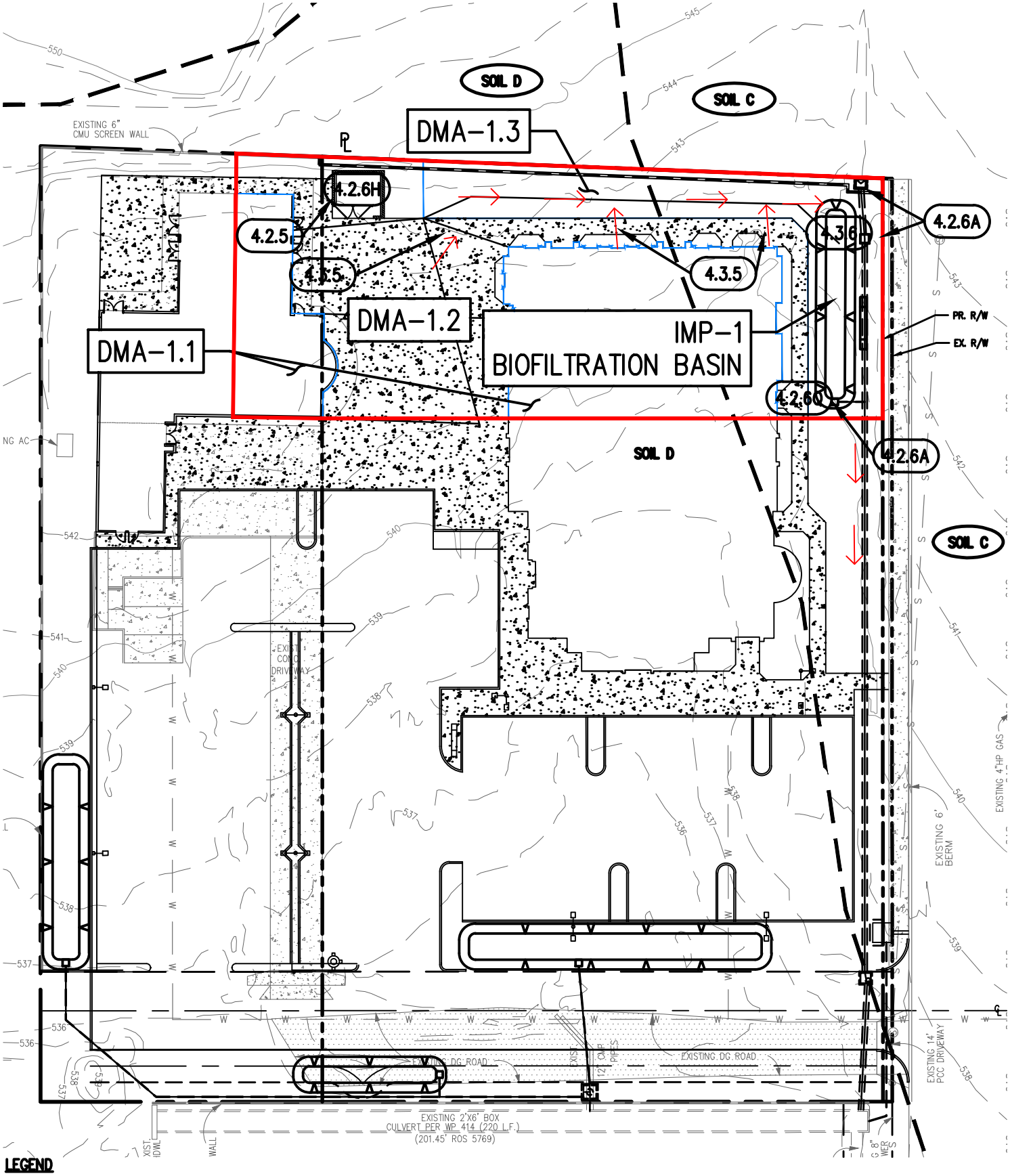
ST. GREGORY OF NYSSA GREEK ORTHODOX CHURCH
EL CAJON, CALIFORNIA

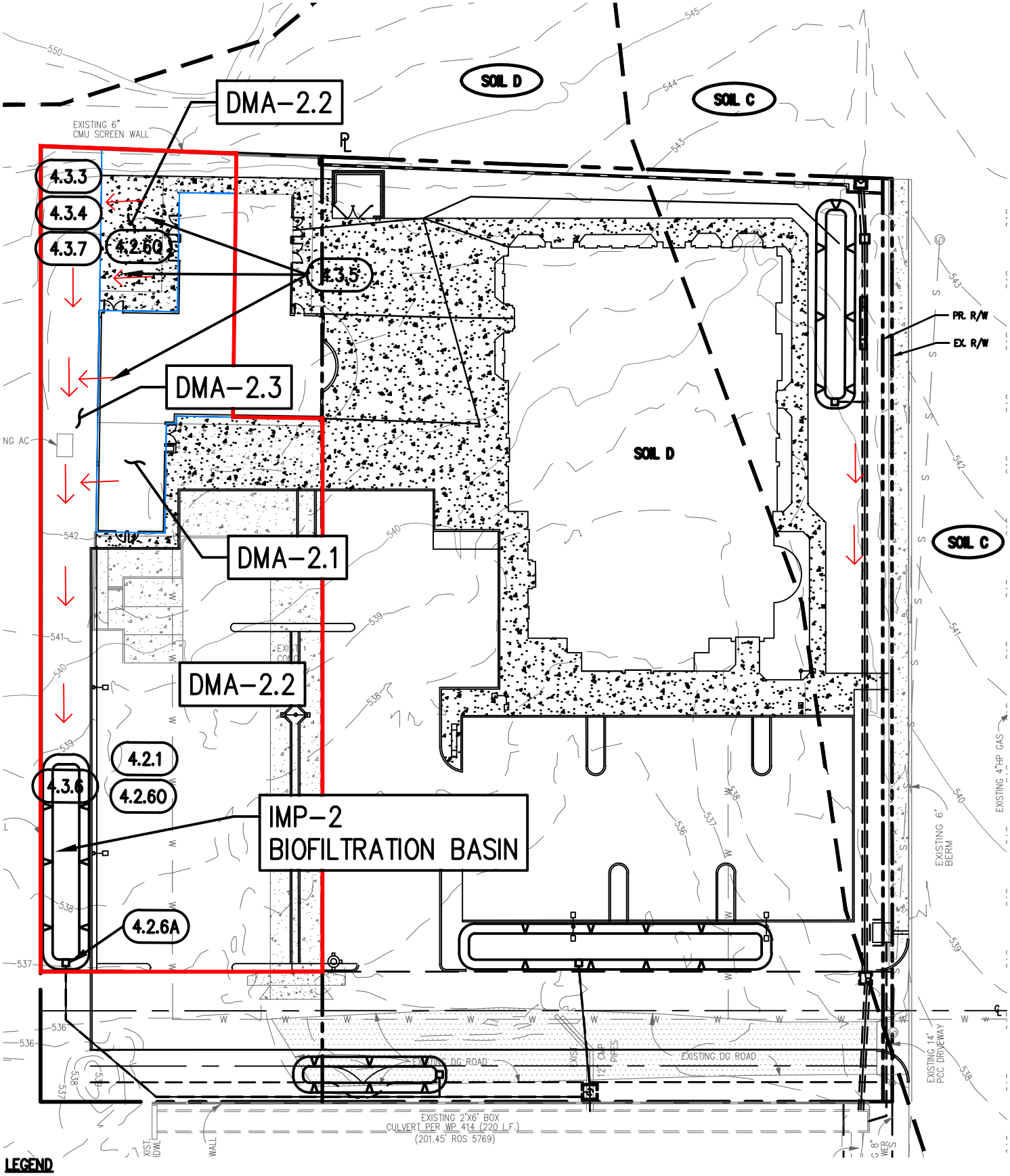
CLW JOB NO. 12010
SCALE: 1"=20'
DATE: 7/18/17
ATTACHMENT: 1

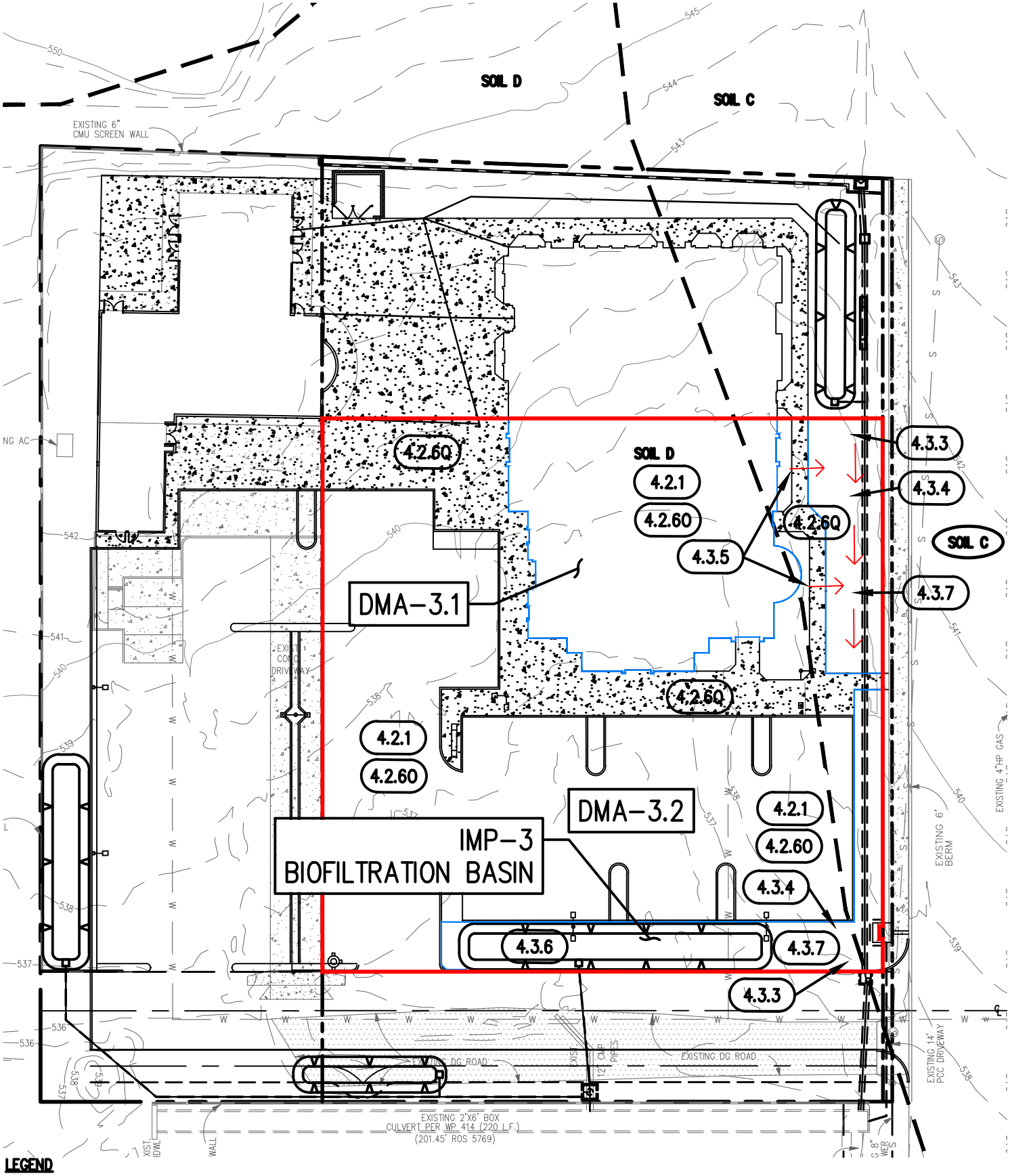
7/20/17

Attachment 1d

Individual Structural BMP DMA Mapbook


SOIL D
SOIL C
DMA-1.3
EXISTING 6" CMU SCREEN WALL
4.2.6H
4.2.5
4.3.5
4.3.6
4.2.6A
4.3.5
DMA-1.2
DMA-1.1
IMP-1
BIOFILTRATION BASIN
PR. R/W
EX. R/W
4.2.6C
4.2.6A
SOIL D
SOIL C
NG AC
EXISTING 14' CONC DRIVEWAY
EXISTING 6' BERM
EXISTING 4"HP GAS
EXISTING DG ROAD
EXISTING DG ROAD
EXISTING 12" CMP PIPES
EXISTING 2'X6' BOX CULVERT PER WP 414 (220 L.F.) (201.45' ROS 5769)
EXISTING 14' PCC DRIVEWAY
EXIST. IDWL
WALL
EXISTING 8" WATER
LEGEND
ITEM
SYMBOL
SUBDIVISION BOUNDARY
SOIL BOUNDARY
DMA BOUNDARY
DMA SUB-BOUNDARY
BIOFILTRATION FACILITY
FLOW DIRECTION
SCALE: 1"=20'
DMA-1


DMA-2.2
SOIL D
SOIL C
EXISTING 6" CMU SCREEN WALL
4.3.3
4.3.4
4.3.7
4.2.60
4.3.5
DMA-2.3
PR. R/W
EX. R/W
NG AC
SOIL D
SOIL C
DMA-2.1
DMA-2.2
4.2.1
4.3.6
4.2.60
IMP-2
BIOFILTRATION BASIN
4.2.6A
EXISTING 4"HP GAS
EXISTING 6' BERM
EXISTING DG ROAD
EXISTING DG ROAD
EXISTING 14' PCC DRIVEWAY
EXISTING 2'X6' BOX CULVERT PER WP 414 (220 L.F.) (201.45' ROS 5769)
EXIST. IDWL
WALL
G 8" WER
LEGEND
ITEM
SYMBOL
SUBDIVISION BOUNDARY
SOIL BOUNDARY
DMA BOUNDARY
DMA SUB-BOUNDARY
BIOFILTRATION FACILITY
FLOW DIRECTION
SCALE: 1"=20'
DMA-2

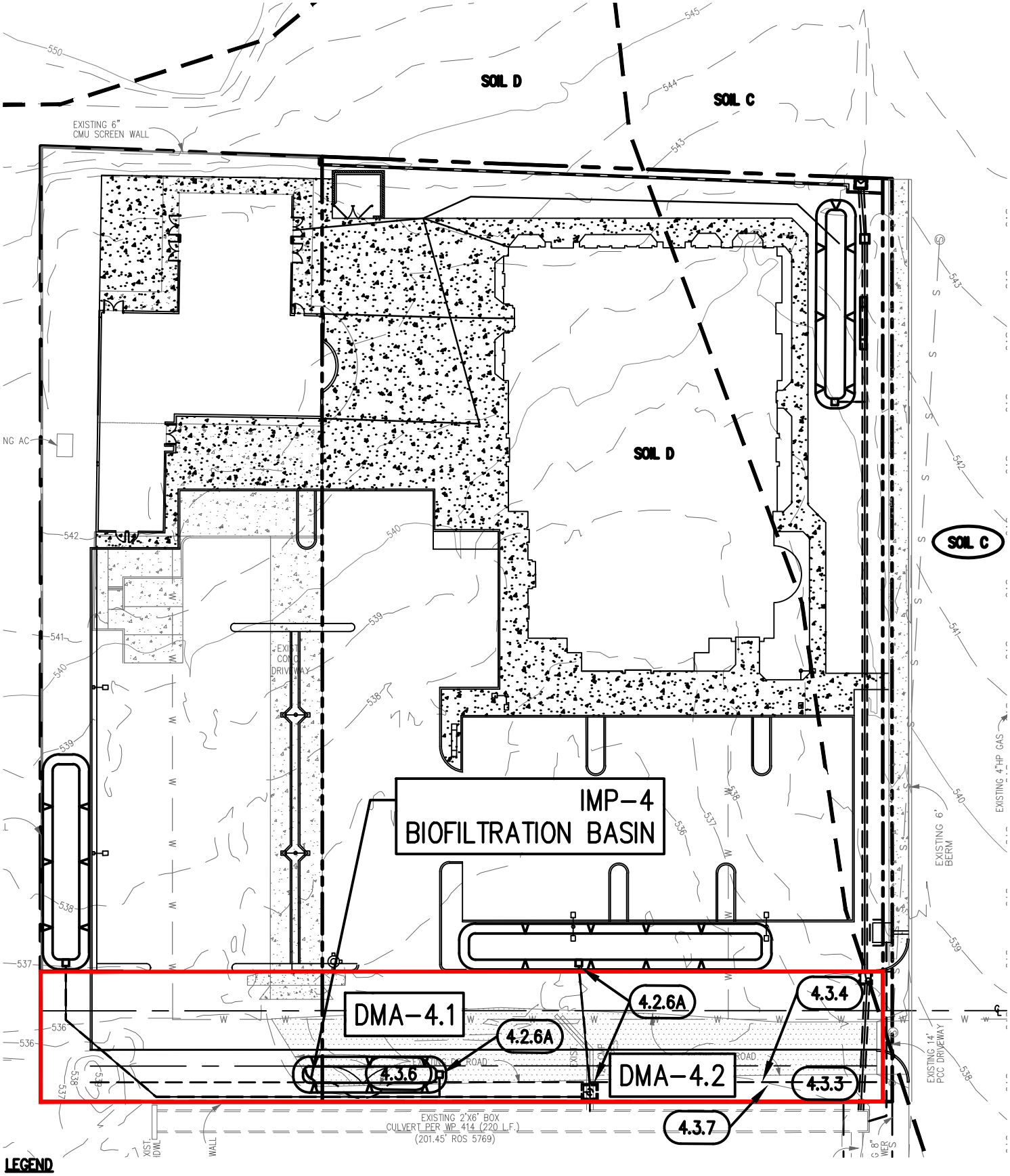


LEGEND

ITEM	SYMBOL
SUBDIVISION BOUNDARY	
SOIL BOUNDARY	
DMA BOUNDARY	
DMA SUB-BOUNDARY	
BIOFILTRATION FACILITY	
FLOW DIRECTION	

SCALE: 1"=20'

DMA-3



LEGEND

ITEM	SYMBOL
SUBDIVISION BOUNDARY	
SOIL BOUNDARY	
DMA BOUNDARY	
DMA SUB-BOUNDARY	
BIOFILTRATION FACILITY	
FLOW DIRECTION	

SCALE: 1"=20'

DMA-4

Attachment 2

BACKUP FOR PDP

HYDROMODIFICATION CONTROL MEASURES

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) See Section 6.3.4 of the BMP Design Manual.	☒ Not performed ☐ Included ☐ Submitted as separate stand-alone document
Attachment 2e	Vector Control Plan (Required when structural BMPs will not drain in 96 hours)	☐ Included ☒ Not required because BMPs will drain in less than 96 hours

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

The Hydromodification Management Exhibit must identify:

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

Attachment 2a

Calculations

Flow Control Facility Design

Attachment 2b

Hydromodification Management Exhibit

Hydromodification Management Plan

St. Gregory of NYSSA Greek Orthodox Church
El Cajon, CA
APN: 498-320-04 and 498-320-05
PDS2005-3300-05-010

Prepared For:

St. Gregory of NYSSA Greek Orthodox Church
1454 Jamacha Road
El Cajon, CA 92019

Prepared By:

David Caron, R.C.E. 70066, Exp. 9-30-18
Civil Landworks Corp.
110 Copperwood Way, Suite P
Oceanside, CA 92058
760-908-8745

Civil Landworks

July 10, 2017

TABLE OF CONTENTS

SECTION

APPENDICES

1.0 PROJECT DESCRIPTION

The proposed site development consists of preparing the site for construction of a multipurpose building, new chapel, parking and roadway. Incidental underground storm drain utilities, retaining walls, hardscape, and site landscaping are also proposed with this development. The project site is disturbed land with site elevations ranging from 545 to 537 feet above mean sea level (msl). The existing site has stormwater runons from the existing single family residence located north of the property.

See Attachment 1 for the site location and vicinity maps.

2. SITE ANALYSIS

2.1 Geotechnical Conditions

There are two (2) different site soil classification on the proposed development, soil type "D" and "C". Type "C" has low infiltration rate when thoroughly wet.
A review of the infiltration study of the infiltration test by GeoSoil, Inc. on 1-10-17 indicates that there would be adverse effects from infiltration, thus infiltration will not be utilized in the calculations for stormwater management. The project will be using biofiltration basins for treatment and hydromodification management.
See Attachment 2 for USDA Soils Map, and SWQMP Attachment 1b for the infiltration study.

2.2 Drainage Patterns

The existing site is partially developed and comprises of two hydrologic basin (one for offsite run-on and one for the site). The stormwater sheet flows southeasterly on the site.

The proposed conditions will consists of 2 phases. Phase 1 will propose a concrete driveway approach, DG roadway, DG parking, proposed sidewalk, and retaining wall. Phase 1 will consist 3 total basins, see Attachment 6A for proposed drainage patterns for phase 1. Phase 1 will keep the same drainage pattern as existing and discharge into the existing storm drain system located at the south of the property.

The Phase II proposed conditions include 4 basins and DMAs. Each basin will drain into their respective biofiltration basins and overflow into the existing culvert along the southern portion of the property. Offsite drainage to the north will be collected and drained directly to the existing culvert to the south. This runoff will not be co-mingled with the onsite drainage.

See Attachment 3 and 4 for existing and proposed hydromodification maps.

2.3 Design Assumptions

The following are design criteria and assumption for the hydromodification calculations.

- Fashion Valley. According to BMPDM Figure G.1-1 Rainfall Station Map, the site is closest to La Mesa rain gauge, however SDHM 3.1, does did not have that option available, therefore Fashion Valley was the most appropriate rain gauge as it was in the located in the same general basin and close proximity to the river it was draining into.
- Hydrologic Soil Type "C" and "D"
- The existing area was modelled as undeveloped – "Natural Vegetated"

3. CALCULATIONS AND RESULTS

The calculations resulted in biofiltration basins is included in Appendixes 5. The Q2 and Q10 frequency values were compared with the USGS regional values and it was concluded that the Q2 and Q10 values will be used. See

Draw down calculations were also included in the report with the minimum drawdown times complying with the Department of Environmental Health (DEH) guidelines is 96 hours. This project complies with the DEH guidelines, therefore a separate vector control maintenance plan is not required. See Attachment 5 for drawdown time.

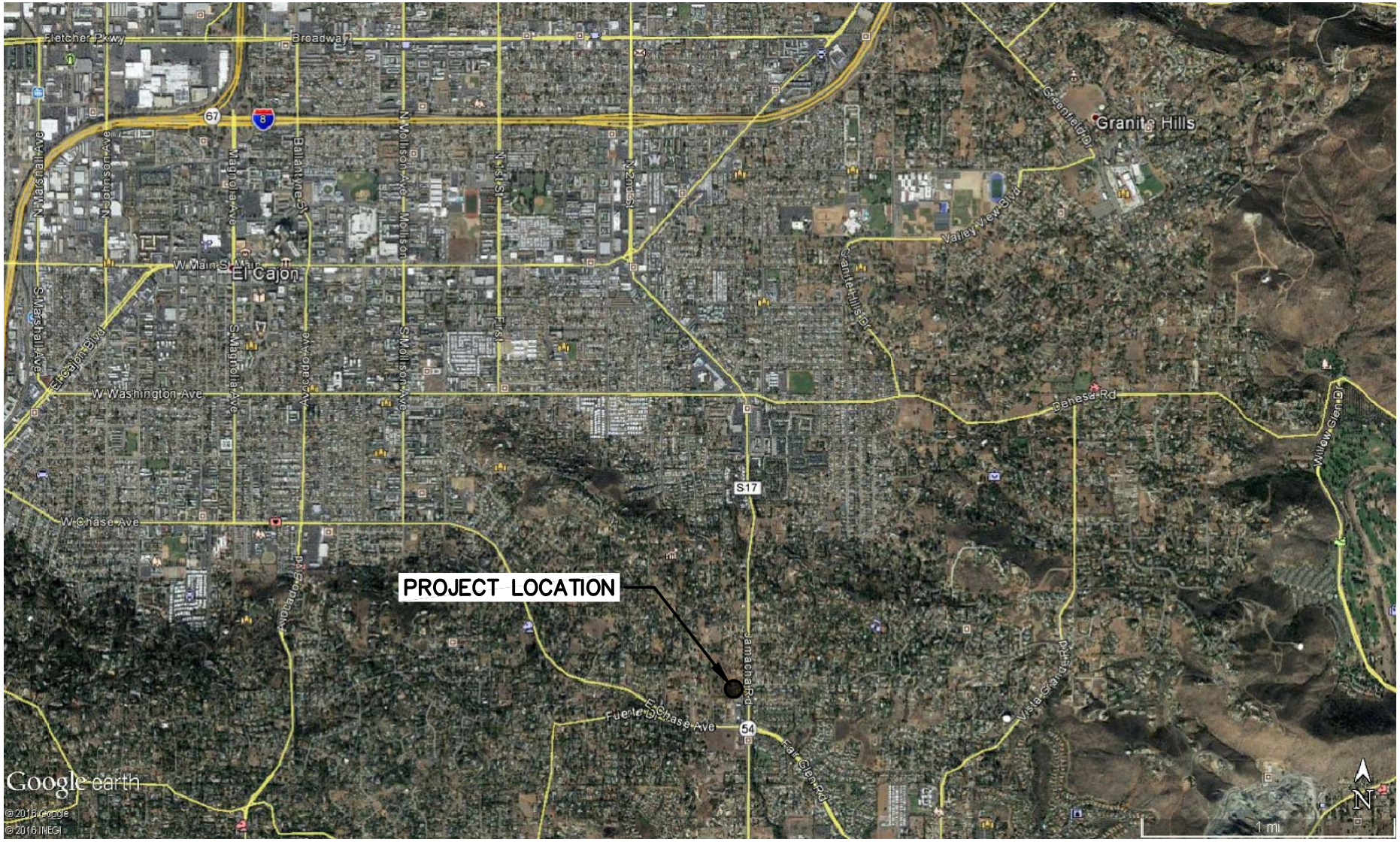
Based on the output from the SDHM program, the biofiltration basins and orifice flow control were sized to treat low flows and reduce peak flows. An internal high-flow bypass will be provided to allow for flows above 10-year storm to safely pass.

4. SUMMARY AND CONCLUSIONS

This Hydromodification Management report show the proposed project design complies with the hydromodification requirements, as outlined in the County requirements. Also, the treatment facilities meet the DEH drawdown guidelines for vector control. The calculations and results in this report indicated that run-off rates and time of concentration are controlled to reduce project downstream flows, mitigating downstream erosion possibility and protect downstream habitat.

ATTACHMENT 1

Location Map



SITE LOCATION MAP

DATE: 3-30-17	SAINT GREGORY	
SCALE: AS SHOWN		DRAWN BY: J. FONG

SITE VICINITY MAP

DATE: 3-30-17	SAINT GREGORY	
SCALE: AS SHOWN		DRAWN BY: J. FONG

ATTACHMENT 2

SOIL MAP

And Rainfall Station Map

Map Scale: 1:977 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 10 20 40 60

Feet: 0 45 90 180 270

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

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 10, Sep 12, 2016

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

Date(s) aerial images were photographed: Dec 7, 2014—Jan 4, 2015

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

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — San Diego County Area, California (CA638)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
PfC	Placentia sandy loam, thick surface, 2 to 9 percent slo pes	D	2.8	68.9%
RaB	Ramona sandy loam, 2 to 5 percent slopes	C	1.1	27.7%
VsD	Vista coarse sandy loam, 9 to 15 percent slopes	B	0.1	3.4%
Totals for Area of Interest			**4.1**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

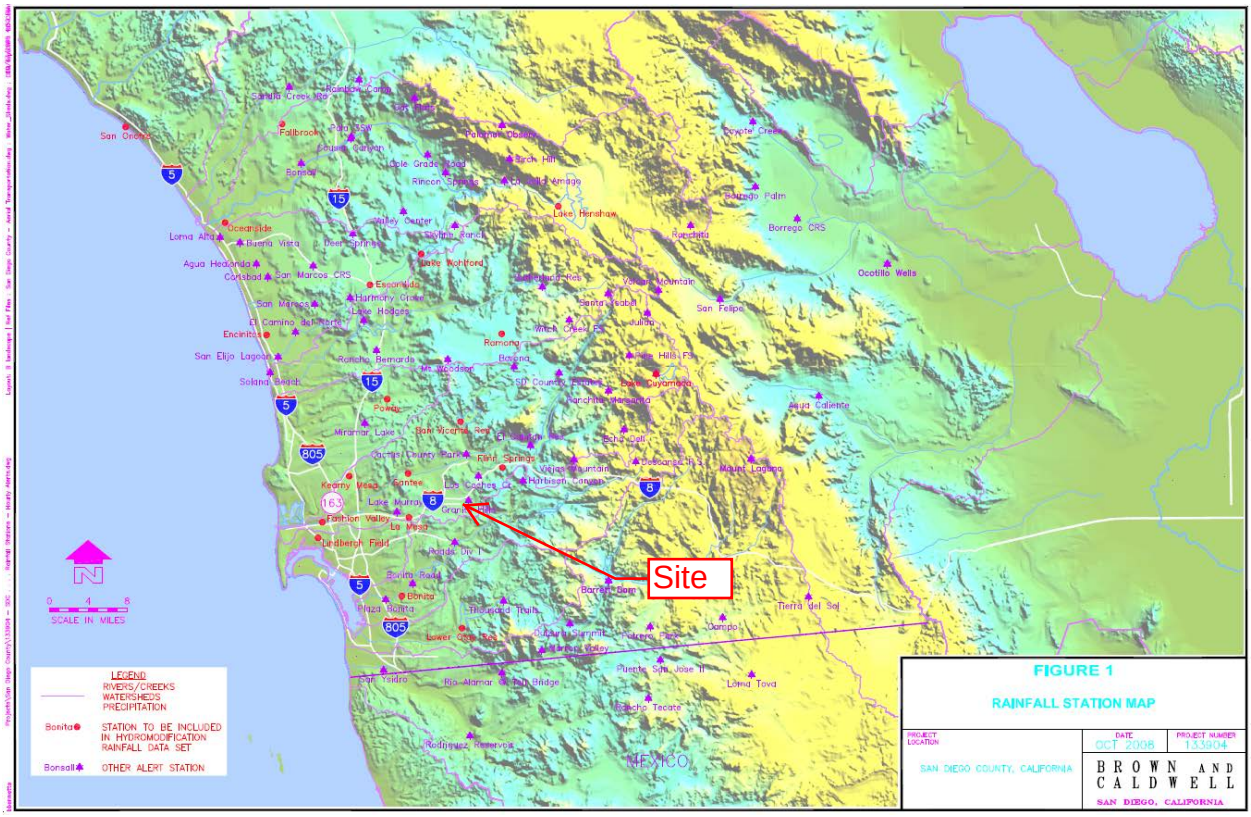


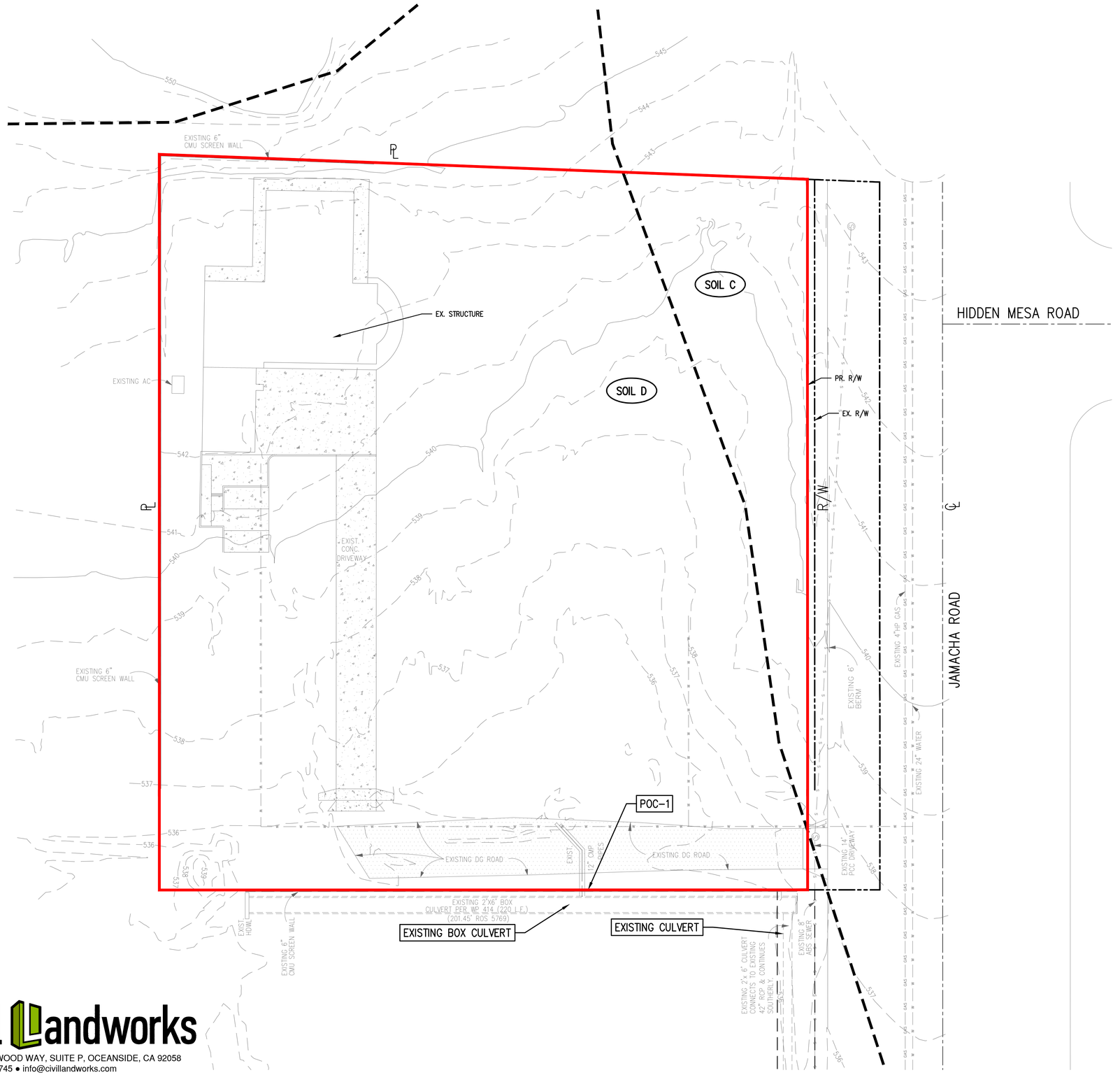
Figure G.1-1: Rainfall Station Map

Project applicants preparing continuous simulation models must select the most appropriate rainfall data set from the rainfall record files provided on the Project Clean Water website. For a given project location, the following factors should be considered in the selection of the appropriate rainfall data set:

- In most cases, the rainfall data set in closest proximity to the project site will be the appropriate choice (refer to the rainfall station map).
- In some cases, the rainfall data set in closest proximity to the project site may not be the most applicable data set. Such a scenario could involve a data set with an elevation significantly different from the project site. In addition to a simple elevation comparison, the project proponent may also consult with the San Diego County's average annual precipitation isopluvial map, which is provided in the San Diego County Hydrology Manual (2003). Review of this map could provide an initial estimate as to whether the project site is in a similar rainfall zone as compared to the rainfall stations. Generally, precipitation totals in San Diego County increase with increasing elevation.
- Where possible, rainfall data sets should be chosen so that the data set and the project location are both located in the same topographic zone (coastal, foothill, mountain) and

ATTACHMENT 3

Existing Hydromodification POC Plan



LEGEND

ITEM	SYMBOL
SUBDIVISION BOUNDARY	
SOIL BOUNDARY	
EXISTING CONTOUR (MAJOR)	540
EXISTING CONTOUR (MINOR)	
HYDROLOGIC BASIN BOUNDARY	
HYDROLOGIC FLOW PATH	

20 0 20 40

GRAPHIC SCALE
SCALE: 1"= 20'

EXISTING HMP EXHIBIT

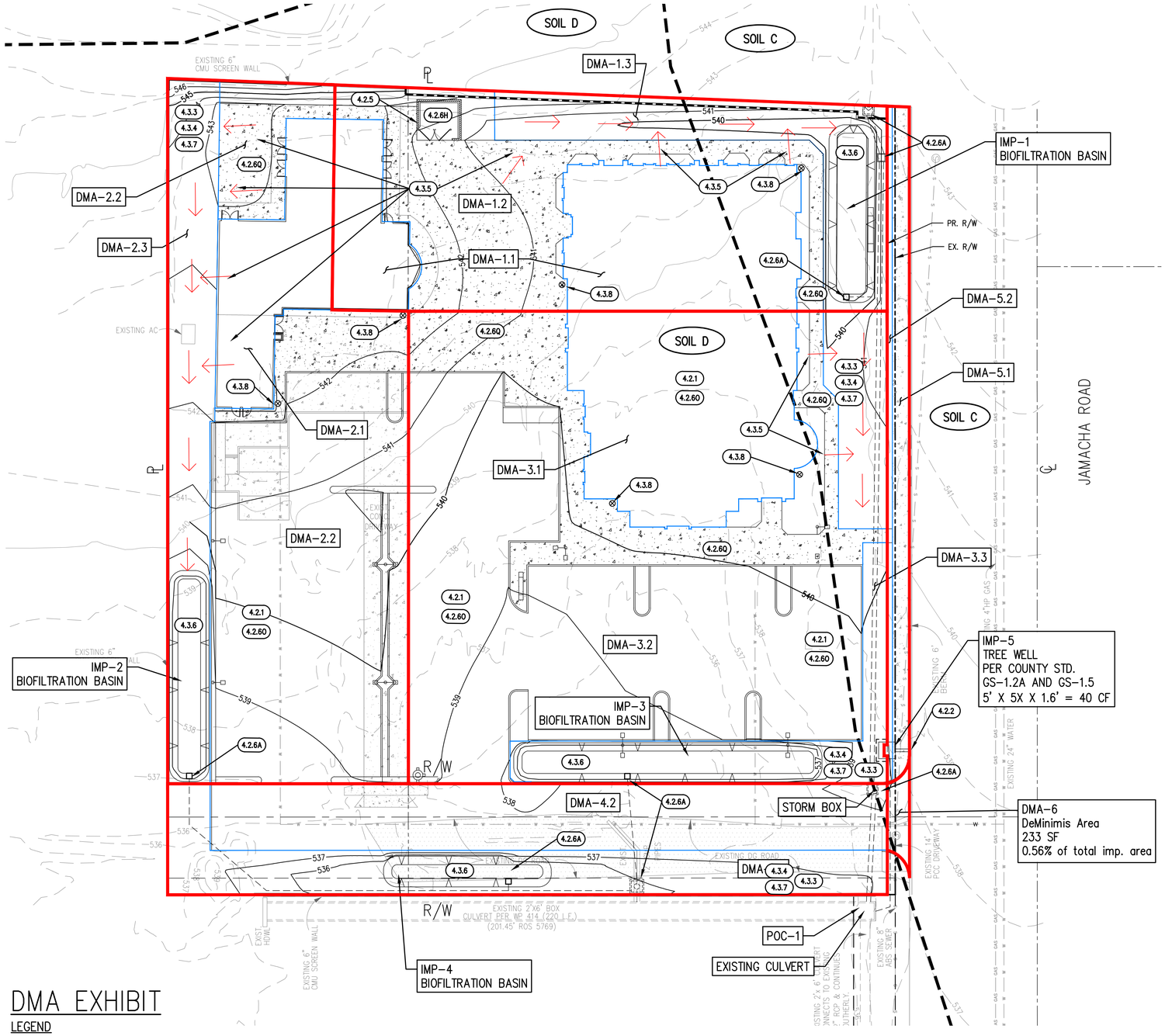
ST. GREGORY OF NYSSA GREEK ORTHODOX CHURCH
EL CAJON, CALIFORNIA

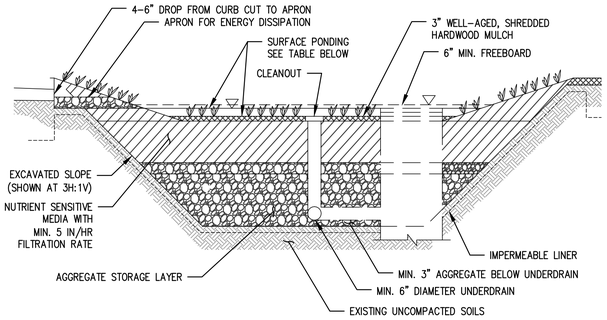
Civil Landworks
110 COPPERWOOD WAY, SUITE P, OCEANSIDE, CA 92058
PH: 760-908-8745 • info@civillandworks.com

7/3/17

ATTACHMENT 4

Proposed Hydromodification POC Plan





BIOFILTRATION BMP
N.T.S.

BMP TABLE

ID#	TYPE	AREA(SF)	SOIL MEDIA (IN)	STORAGE LAYER (IN)	PONDING / RISER HEIGHT (IN)
IMP-1	BIOFILTRATION	600	18	30	12
IMP-2	BIOFILTRATION	560	18	24	10
IMP-3	BIOFILTRATION	840	18	30	8
IMP-4	BIOFILTRATION	300	18	12	18
IMP-5	STREET TREE	1 TREE	30	N/A	N/A

DMA AREA SUMMARY

PR

DMA ID 1	Type	Total Area SF	Total Area Acres
DMA-1.1	Roof	6,017	0.138
DMA-1.2	Impervious Pavement	5,919	0.136
DMA-1.3	Landscape (Soil C)	1,794	0.041
DMA-1.4	Landscape (Soil D)	1,142	0.026
IMP	bioretention basins	600	0.014
TOTAL		15,472	0.355
Drains to BMP IMP-1			

DMA ID 2	Type	Total Area SF	Total Area Acres
DMA-2.1	Roof	2,742	0.063
DMA-2.2	Impervious Pavement	12,755	0.293
DMA-2.3	Landscape (Soil D)	3,566	0.082
IMP	bioretention basins	640	0.015
TOTAL		19,703	0.452
Drains to BMP IMP-2			

DMA ID 3	Type	Total Area SF	Total Area Acres
DMA-3.1	Roof	5,798	0.133
DMA-3.2	Impervious Pavement	19,326	0.444
DMA-3.3	Landscape (Soil C)	1,444	0.033
DMA-3.4	Landscape (Soil D)	1,946	0.045
IMP	bioretention basins	840	0.019
TOTAL		29,354	0.674
Drains to BMP IMP-3			

DMA ID 4	Type	Total Area SF	Total Area Acres
DMA-4.1	Landscape (Soil D)	4,515	0.104
DMA-4.2	Impervious Pavement	5,552	0.127
IMP	bioretention basins	300	0.007
TOTAL		10,366	0.238
Drains to BMP IMP-4			

DMA ID 5	Type	Total Area SF	Total Area Acres
DMA-5.1	Landscape (Soil C)	454	0.010
DMA-5.2	Sidewalk	1,474	0.034
TOTAL		1,928	0.044
Drains to BMP IMP-5			

DMA ID 6	Type	Total Area SF	Total Area Acres
DMA-6.1	driveway apron	233	0.005
TOTAL		233	0.005
DeMinimus			

DMA EXHIBIT

LEGEND

ITEM	SYMBOL
SUBDIVISION BOUNDARY	
SOIL BOUNDARY	
DMA BOUNDARY	
DMA SUB-BOUNDARY	
BIOFILTRATION FACILITY	
FLOW DIRECTION	
PCC HARDSCAPE	
RAIN BARRELS	⊗

NOTE

1. GROUNDWATER DEPTH RANGING BETWEEN 25 TO 35 FEET PER ENVIRONMENTAL STUDY BY AVOCET ENVIRONMENTAL, INC.
2. CRITICAL COARSE SEDIMENT YIELD AREAS NOT LOCATED ON SITE.

SOURCE CONTROL BMPS

- (4.2.1) PREVENTION OF ILLICIT DISCHARGES INTO THE MS4
- (4.2.2) STORM DRAIN STENCILING OR SIGNAGE
- (4.2.5) PROTECT TRASH STORAGE AREAS FROM RAINFALL, RUN-ON RUNOFF, AND WIND DISPERSAL
- (4.2.6A) ONSITE STORM DRAIN INLETS
- (4.2.6H) REFUSE AREAS
- (4.2.6O) FIRE SPRINKLER TEST WATER
- (4.2.6Q) PLAZAS, SIDEWALKS, AND PARKING LOTS

SITE DESIGN BMP

- (4.3.3) MINIMIZE IMPERVIOUS AREA
- (4.3.4) MINIMIZE SOIL COMPACTION
- (4.3.5) IMPERVIOUS AREA DISPERSION
- (4.3.6) RUNOFF COLLECTION
- (4.3.7) LANDSCAPING WITH NATIVE OR DROUGHT TOLERANT SPECIES
- (4.3.8) RAIN BARRELS

20 0 20 40

GRAPHIC SCALE
SCALE: 1"= 20'

Civil Landworks
110 COPPERWOOD WAY, SUITE P, OCEANSIDE, CA 92058
PH: 760-908-8745 • info@civillandworks.com

DMA EXHIBIT

ST. GREGORY OF NYSSA GREEK ORTHODOX CHURCH
EL CAJON, CALIFORNIA

CLW JOB NO: 1201D
SCALE: 1"=20'
DATE: 11/30/17
SHEET 1 OF 1

11/30/17

ATTACHMENT 5

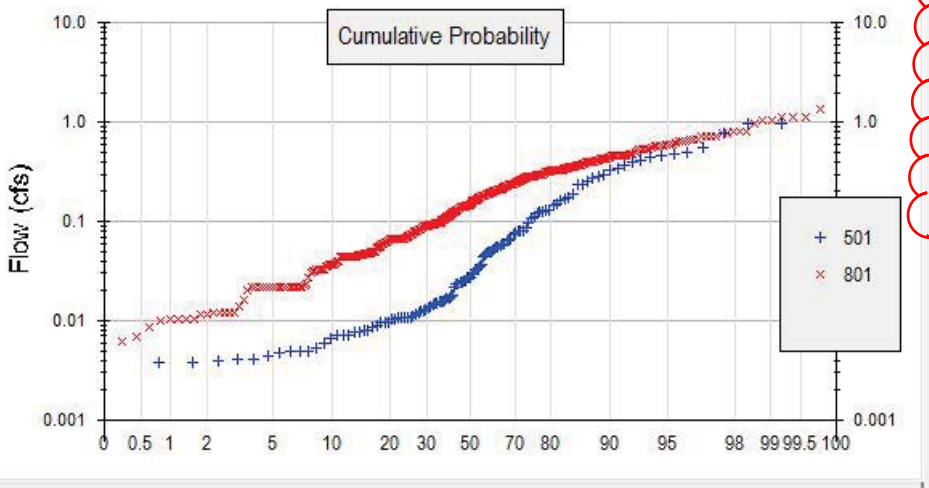
SDHM Output

SDHM31 SG

File Edit View Help Summary Report

Analysis Help

Analysis



Durations | Flow Frequency | Drawdown | Hydrograph

Analyze datasets | Compact WDM | Delete Selected | Monthly FF

501 POC 1 Predeveloped flow
801 POC 1 Mitigated flow

All Datasets | Flow | Stage | Precip | Evap | POC 1

Flow Frequency

Flow(cfs)	Predeveloped	Mitigated
2 Year =	0.2399	0.6634
5 Year =	0.4541	0.9092
10 Year =	0.6013	1.1226
25 Year =	0.9710	1.2222

Peaks

1	0.0248	0.0470
2	0.0268	0.1445
3	0.0768	0.5418
4	0.0629	0.1912
5	0.1209	0.2593
6	0.0256	0.6070
7	0.0813	0.2589
8	0.0295	0.2184
9	0.0183	0.1750
10	0.0108	0.0964
11	0.0060	0.0707
12	0.0299	0.1064
13	0.0127	0.0103
14	0.0090	0.1262
15	0.0054	0.0365
16	0.1102	0.1088
17	0.0081	0.0604
18	0.0037	0.1219
19	0.0109	0.2036
20	0.0041	1.0423
21	0.2800	0.2672
22	0.0115	0.2898
23	0.0079	0.3130
24	0.0322	0.0895
25	0.0373	0.0453
26	0.1249	0.3346
27	0.1090	0.0103
28	0.2402	0.0444
29	0.4187	0.6653
30	0.0112	0.1143

X 0
Y 0

Fri 10:27a - SG - Finish Mitigated

Deselect Zero | Select By: | GO

San...

USGS Regional Values

acre	Drainage area A (sq. mi.)	Mean Annual Precipitation (in.)
1.719	0.002685936	10.4

Q2 =	0.39308
Q10 =	0.78003

Q2 @ 10% =	0.03931
Q10 @ 10% =	0.07800

Mean Annual Precipitation (inches)	
Bonita	9.1
Descanso	20.5
Encinitas	9.3
Fallbrook	13.9
Fashion Valley	10.4
Granite Hills	12.8
Kearny Mesa	10.8
Lake Henshaw	22.6
Lake Wolford	16.8
Morena Lake	16.6
Oceanside	11.3
Poway	11.6
Ramona	13.0
Santa Ysabel	21.1

SDHM 3.1

PROJECT REPORT

General Model Information

Project Name: SG
Site Name:
Site Address:
City:
Report Date: 11/30/2017
Gage: SANTEE
Data Start: 10/01/1973
Data End: 09/30/2004
Timestep: Hourly
Precip Scale: 1.000
Version Date: 2017/05/30

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,Flat	0.193
D,NatVeg,Flat	1.527
Pervious Total	1.72
Impervious Land Use	acre
Impervious Total	0
Basin Total	1.72

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C,UrbNoIrr,Flat	0.041
D,UrbNoIrr,Flat	0.026
Pervious Total	0.067

Impervious Land Use	acre
IMPERVIOUS-FLAT	0.274
Impervious Total	0.274
Basin Total	0.341

Element Flows To:

Surface	Interflow	Groundwater
Surface iltration 1	Surface iltration 1	

Basin 2

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
D,UrbNoIrr,Flat	0.082
Pervious Total	0.082

Impervious Land Use	acre
IMPERVIOUS-FLAT	0.356
Impervious Total	0.356
Basin Total	0.438

Element Flows To:

Surface	Interflow	Groundwater
Surface iltration 2	Surface iltration 2	

Basin 3

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C,UrbNoIrr,Flat	0.033
D,UrbNoIrr,Flat	0.045
Pervious Total	0.078

Impervious Land Use	acre
IMPERVIOUS-FLAT	0.577
Impervious Total	0.577
Basin Total	0.655

Element Flows To:

Surface	Interflow	Groundwater
Surface iltration 3	Surface iltration 3	

Basin 4

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
D,UrbNoIrr,Flat	0.104
Pervious Total	0.104

Impervious Land Use	acre
IMPERVIOUS-FLAT	0.127
Impervious Total	0.127
Basin Total	0.231

Element Flows To:

Surface	Interflow	Groundwater
Surface iltration 4	Surface iltration 4	

Routing Elements
Predeveloped Routing

Mitigated Routing

Biofiltration 1

Bottom Length:	60.00 ft.
Bottom Width:	10.00 ft.
Material thickness of first layer:	0.25
Material type for first layer:	Mulch
Material thickness of second layer:	1.5
Material type for second layer:	ESM
Material thickness of third layer:	2.5
Material type for third layer:	GRAVEL
Underdrain used	
Underdrain Diameter (feet):	0.5
Orifice Diameter (in.):	0.35
Offset (in.):	3
Flow Through Underdrain (ac-ft.):	7.258
Total Outflow (ac-ft.):	7.655
Percent Through Underdrain:	94.81
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	0.0593	0.0000	0.0000	0.0000
0.0632	0.0591	0.0001	0.0000	0.0000
0.1264	0.0583	0.0003	0.0000	0.0000
0.1896	0.0575	0.0004	0.0000	0.0000
0.2527	0.0567	0.0006	0.0000	0.0000
0.3159	0.0560	0.0007	0.0000	0.0000
0.3791	0.0552	0.0009	0.0000	0.0000
0.4423	0.0544	0.0010	0.0000	0.0000
0.5055	0.0537	0.0012	0.0000	0.0000
0.5687	0.0529	0.0014	0.0000	0.0000
0.6319	0.0521	0.0016	0.0000	0.0000
0.6951	0.0514	0.0018	0.0000	0.0000
0.7582	0.0506	0.0020	0.0000	0.0000
0.8214	0.0499	0.0022	0.0000	0.0000
0.8846	0.0491	0.0024	0.0000	0.0000
0.9478	0.0484	0.0026	0.0000	0.0000
1.0110	0.0477	0.0028	0.0000	0.0000
1.0742	0.0469	0.0030	0.0000	0.0000
1.1374	0.0462	0.0032	0.0000	0.0000
1.2005	0.0455	0.0035	0.0000	0.0000
1.2637	0.0447	0.0037	0.0002	0.0000
1.3269	0.0440	0.0040	0.0003	0.0000
1.3901	0.0433	0.0042	0.0005	0.0000
1.4533	0.0426	0.0045	0.0006	0.0000
1.5165	0.0419	0.0047	0.0008	0.0000
1.5797	0.0412	0.0050	0.0009	0.0000
1.6429	0.0404	0.0053	0.0010	0.0000
1.7060	0.0397	0.0056	0.0010	0.0000
1.7692	0.0390	0.0060	0.0012	0.0000

1.8324	0.0383	0.0064	0.0012	0.0000
1.8956	0.0377	0.0068	0.0013	0.0000
1.9588	0.0370	0.0072	0.0013	0.0000
2.0220	0.0363	0.0077	0.0014	0.0000
2.0852	0.0356	0.0081	0.0015	0.0000
2.1484	0.0349	0.0086	0.0015	0.0000
2.2115	0.0342	0.0090	0.0015	0.0000
2.2747	0.0336	0.0095	0.0016	0.0000
2.3379	0.0329	0.0100	0.0017	0.0000
2.4011	0.0322	0.0105	0.0018	0.0000
2.4643	0.0316	0.0110	0.0020	0.0000
2.5275	0.0309	0.0115	0.0021	0.0000
2.5907	0.0303	0.0120	0.0023	0.0000
2.6538	0.0296	0.0125	0.0024	0.0000
2.7170	0.0289	0.0131	0.0026	0.0000
2.7802	0.0283	0.0136	0.0027	0.0000
2.8434	0.0277	0.0142	0.0028	0.0000
2.9066	0.0270	0.0147	0.0030	0.0000
2.9698	0.0264	0.0153	0.0031	0.0000
3.0330	0.0257	0.0159	0.0032	0.0000
3.0962	0.0251	0.0165	0.0033	0.0000
3.1593	0.0245	0.0171	0.0034	0.0000
3.2225	0.0239	0.0177	0.0035	0.0000
3.2857	0.0232	0.0183	0.0036	0.0000
3.3489	0.0226	0.0189	0.0037	0.0000
3.4121	0.0220	0.0196	0.0038	0.0000
3.4753	0.0214	0.0202	0.0039	0.0000
3.5385	0.0208	0.0209	0.0040	0.0000
3.6016	0.0202	0.0215	0.0041	0.0000
3.6648	0.0196	0.0222	0.0042	0.0000
3.7280	0.0190	0.0229	0.0042	0.0000
3.7912	0.0184	0.0236	0.0043	0.0000
3.8544	0.0178	0.0243	0.0044	0.0000
3.9176	0.0172	0.0250	0.0045	0.0000
3.9808	0.0166	0.0258	0.0046	0.0000
4.0440	0.0161	0.0265	0.0046	0.0000
4.1071	0.0155	0.0272	0.0047	0.0000
4.1703	0.0149	0.0280	0.0048	0.0000
4.2335	0.0143	0.0288	0.0049	0.0000
4.2500	0.0138	0.0290	0.0066	0.0000

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
4.2500	0.0593	0.0290	0.0000	0.0720	0.0000
4.3132	0.0601	0.0328	0.0000	0.0720	0.0000
4.3764	0.0609	0.0366	0.0000	0.0745	0.0000
4.4396	0.0617	0.0404	0.0000	0.0770	0.0000
4.5027	0.0625	0.0444	0.0000	0.0795	0.0000
4.5659	0.0633	0.0483	0.0000	0.0820	0.0000
4.6291	0.0641	0.0524	0.0000	0.0845	0.0000
4.6923	0.0649	0.0564	0.0000	0.0870	0.0000
4.7555	0.0657	0.0606	0.0000	0.0895	0.0000
4.8187	0.0665	0.0647	0.0000	0.0920	0.0000
4.8819	0.0673	0.0690	0.0000	0.0945	0.0000
4.9451	0.0682	0.0732	0.0000	0.0970	0.0000
5.0082	0.0690	0.0776	0.0000	0.0995	0.0000
5.0714	0.0698	0.0820	0.0000	0.1020	0.0000
5.1346	0.0706	0.0864	0.0000	0.1045	0.0000

5.1978	0.0715	0.0909	0.0000	0.1071	0.0000
5.2610	0.0723	0.0954	0.0122	0.1096	0.0000
5.3242	0.0732	0.1000	0.2137	0.1121	0.0000
5.3874	0.0740	0.1047	0.5323	0.1146	0.0000
5.4505	0.0749	0.1094	0.9111	0.1171	0.0000
5.5137	0.0757	0.1141	1.3006	0.1196	0.0000
5.5769	0.0766	0.1189	1.6517	0.1221	0.0000
5.6401	0.0774	0.1238	1.9255	0.1246	0.0000
5.7033	0.0783	0.1287	2.1091	0.1271	0.0000
5.7500	0.0789	0.1324	2.2635	0.1290	0.0000

Surface iltration 1

Element Flows To:

Outlet 1	Outlet 2
	Biofiltration 1

Biofiltration 2

Bottom Length:	70.00 ft.
Bottom Width:	8.00 ft.
Material thickness of first layer:	0.25
Material type for first layer:	Mulch
Material thickness of second layer:	1.5
Material type for second layer:	ESM
Material thickness of third layer:	2
Material type for third layer:	GRAVEL
Underdrain used	
Underdrain Diameter (feet):	0.5
Orifice Diameter (in.):	0.35
Offset (in.):	3
Flow Through Underdrain (ac-ft.):	8.726
Total Outflow (ac-ft.):	10.108
Percent Through Underdrain:	86.33
Discharge Structure	
Riser Height:	0.83 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	0.0569	0.0000	0.0000	0.0000
0.0558	0.0568	0.0001	0.0000	0.0000
0.1116	0.0560	0.0002	0.0000	0.0000
0.1675	0.0553	0.0003	0.0000	0.0000
0.2233	0.0545	0.0005	0.0000	0.0000
0.2791	0.0538	0.0006	0.0000	0.0000
0.3349	0.0531	0.0007	0.0000	0.0000
0.3908	0.0524	0.0009	0.0000	0.0000
0.4466	0.0516	0.0010	0.0000	0.0000
0.5024	0.0509	0.0012	0.0000	0.0000
0.5582	0.0502	0.0013	0.0000	0.0000
0.6141	0.0495	0.0015	0.0000	0.0000
0.6699	0.0488	0.0016	0.0000	0.0000
0.7257	0.0480	0.0018	0.0000	0.0000
0.7815	0.0473	0.0020	0.0000	0.0000
0.8374	0.0466	0.0022	0.0000	0.0000
0.8932	0.0459	0.0023	0.0000	0.0000
0.9490	0.0452	0.0025	0.0000	0.0000
1.0048	0.0445	0.0027	0.0000	0.0000
1.0607	0.0438	0.0029	0.0001	0.0000
1.1165	0.0431	0.0031	0.0002	0.0000
1.1723	0.0424	0.0033	0.0004	0.0000
1.2281	0.0418	0.0036	0.0005	0.0000
1.2840	0.0411	0.0038	0.0007	0.0000
1.3398	0.0404	0.0040	0.0008	0.0000
1.3956	0.0397	0.0042	0.0009	0.0000
1.4514	0.0390	0.0045	0.0009	0.0000
1.5073	0.0383	0.0047	0.0011	0.0000
1.5631	0.0377	0.0050	0.0011	0.0000
1.6189	0.0370	0.0052	0.0012	0.0000
1.6747	0.0363	0.0055	0.0012	0.0000

1.7305	0.0357	0.0057	0.0013	0.0000
1.7864	0.0350	0.0061	0.0014	0.0000
1.8422	0.0343	0.0065	0.0014	0.0000
1.8980	0.0337	0.0069	0.0015	0.0000
1.9538	0.0330	0.0073	0.0015	0.0000
2.0097	0.0324	0.0077	0.0016	0.0000
2.0655	0.0317	0.0081	0.0016	0.0000
2.1213	0.0311	0.0085	0.0017	0.0000
2.1771	0.0304	0.0089	0.0017	0.0000
2.2330	0.0298	0.0093	0.0017	0.0000
2.2888	0.0292	0.0098	0.0017	0.0000
2.3446	0.0285	0.0102	0.0018	0.0000
2.4004	0.0279	0.0107	0.0019	0.0000
2.4563	0.0273	0.0112	0.0020	0.0000
2.5121	0.0266	0.0116	0.0021	0.0000
2.5679	0.0260	0.0121	0.0023	0.0000
2.6237	0.0254	0.0126	0.0024	0.0000
2.6796	0.0248	0.0131	0.0025	0.0000
2.7354	0.0241	0.0136	0.0026	0.0000
2.7912	0.0235	0.0141	0.0028	0.0000
2.8470	0.0229	0.0146	0.0029	0.0000
2.9029	0.0223	0.0152	0.0030	0.0000
2.9587	0.0217	0.0157	0.0031	0.0000
3.0145	0.0211	0.0162	0.0032	0.0000
3.0703	0.0205	0.0168	0.0033	0.0000
3.1262	0.0199	0.0173	0.0034	0.0000
3.1820	0.0193	0.0179	0.0035	0.0000
3.2378	0.0187	0.0185	0.0036	0.0000
3.2936	0.0181	0.0191	0.0036	0.0000
3.3495	0.0175	0.0197	0.0037	0.0000
3.4053	0.0169	0.0203	0.0038	0.0000
3.4611	0.0163	0.0209	0.0039	0.0000
3.5169	0.0157	0.0215	0.0040	0.0000
3.5727	0.0152	0.0221	0.0040	0.0000
3.6286	0.0146	0.0228	0.0041	0.0000
3.6844	0.0140	0.0234	0.0042	0.0000
3.7402	0.0134	0.0241	0.0043	0.0000
3.7500	0.0129	0.0242	0.0062	0.0000

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
3.7500	0.0569	0.0242	0.0000	0.0669	0.0000
3.8058	0.0576	0.0274	0.0000	0.0669	0.0000
3.8616	0.0584	0.0306	0.0000	0.0689	0.0000
3.9175	0.0591	0.0339	0.0000	0.0710	0.0000
3.9733	0.0599	0.0372	0.0000	0.0731	0.0000
4.0291	0.0606	0.0406	0.0000	0.0752	0.0000
4.0849	0.0614	0.0440	0.0000	0.0772	0.0000
4.1408	0.0621	0.0474	0.0000	0.0793	0.0000
4.1966	0.0629	0.0509	0.0000	0.0814	0.0000
4.2524	0.0637	0.0545	0.0000	0.0834	0.0000
4.3082	0.0644	0.0580	0.0000	0.0855	0.0000
4.3641	0.0652	0.0617	0.0000	0.0876	0.0000
4.4199	0.0660	0.0653	0.0000	0.0896	0.0000
4.4757	0.0668	0.0690	0.0000	0.0917	0.0000
4.5315	0.0675	0.0728	0.0000	0.0938	0.0000
4.5874	0.0683	0.0766	0.0067	0.0958	0.0000
4.6432	0.0691	0.0804	0.1682	0.0979	0.0000

4.6990	0.0699	0.0843	0.4314	0.1000	0.0000
4.7548	0.0707	0.0882	0.7528	0.1020	0.0000
4.8107	0.0715	0.0922	1.0985	0.1041	0.0000
4.8665	0.0722	0.0962	1.4338	0.1062	0.0000
4.9223	0.0730	0.1002	1.7265	0.1082	0.0000
4.9781	0.0738	0.1043	1.9537	0.1103	0.0000
5.0340	0.0746	0.1085	2.1106	0.1124	0.0000
5.0800	0.0753	0.1119	2.2488	0.1141	0.0000

Surface iltration 2

Element Flows To:

Outlet 1	Outlet 2
	Biofiltration 2

Biofiltration 3

Bottom Length:	105.00 ft.
Bottom Width:	8.00 ft.
Material thickness of first layer:	0.25
Material type for first layer:	Mulch
Material thickness of second layer:	1.5
Material type for second layer:	ESM
Material thickness of third layer:	2.5
Material type for third layer:	GRAVEL
Underdrain used	
Underdrain Diameter (feet):	0.5
Orifice Diameter (in.):	0.35
Offset (in.):	3
Flow Through Underdrain (ac-ft.):	13.08
Total Outflow (ac-ft.):	16.039
Percent Through Underdrain:	81.55
Discharge Structure	
Riser Height:	0.67 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	0.0906	0.0000	0.0000	0.0000
0.0596	0.0902	0.0002	0.0000	0.0000
0.1191	0.0891	0.0004	0.0000	0.0000
0.1787	0.0880	0.0006	0.0000	0.0000
0.2382	0.0869	0.0008	0.0000	0.0000
0.2978	0.0858	0.0010	0.0000	0.0000
0.3574	0.0847	0.0012	0.0000	0.0000
0.4169	0.0836	0.0014	0.0000	0.0000
0.4765	0.0825	0.0016	0.0000	0.0000
0.5360	0.0814	0.0019	0.0000	0.0000
0.5956	0.0804	0.0021	0.0000	0.0000
0.6552	0.0793	0.0024	0.0000	0.0000
0.7147	0.0782	0.0027	0.0000	0.0000
0.7743	0.0771	0.0029	0.0000	0.0000
0.8338	0.0761	0.0032	0.0000	0.0000
0.8934	0.0750	0.0035	0.0000	0.0000
0.9530	0.0740	0.0038	0.0000	0.0000
1.0125	0.0729	0.0041	0.0000	0.0000
1.0721	0.0718	0.0044	0.0000	0.0000
1.1316	0.0708	0.0047	0.0003	0.0000
1.1912	0.0697	0.0051	0.0004	0.0000
1.2508	0.0687	0.0054	0.0006	0.0000
1.3103	0.0677	0.0058	0.0007	0.0000
1.3699	0.0666	0.0061	0.0008	0.0000
1.4295	0.0656	0.0065	0.0009	0.0000
1.4890	0.0646	0.0069	0.0010	0.0000
1.5486	0.0635	0.0073	0.0011	0.0000
1.6081	0.0625	0.0076	0.0012	0.0000
1.6677	0.0615	0.0081	0.0012	0.0000
1.7273	0.0604	0.0085	0.0013	0.0000
1.7868	0.0594	0.0090	0.0014	0.0000

1.8464	0.0584	0.0096	0.0014	0.0000
1.9059	0.0574	0.0102	0.0015	0.0000
1.9655	0.0564	0.0109	0.0016	0.0000
2.0251	0.0554	0.0115	0.0016	0.0000
2.0846	0.0544	0.0121	0.0017	0.0000
2.1442	0.0534	0.0128	0.0017	0.0000
2.2037	0.0524	0.0134	0.0018	0.0000
2.2633	0.0514	0.0141	0.0018	0.0000
2.3229	0.0504	0.0148	0.0018	0.0000
2.3824	0.0494	0.0155	0.0019	0.0000
2.4420	0.0484	0.0162	0.0020	0.0000
2.5015	0.0474	0.0170	0.0021	0.0000
2.5611	0.0464	0.0177	0.0023	0.0000
2.6207	0.0455	0.0185	0.0024	0.0000
2.6802	0.0445	0.0192	0.0025	0.0000
2.7398	0.0435	0.0200	0.0026	0.0000
2.7993	0.0426	0.0208	0.0028	0.0000
2.8589	0.0416	0.0216	0.0029	0.0000
2.9185	0.0406	0.0224	0.0030	0.0000
2.9780	0.0397	0.0232	0.0031	0.0000
3.0376	0.0387	0.0241	0.0032	0.0000
3.0971	0.0378	0.0249	0.0033	0.0000
3.1567	0.0368	0.0258	0.0034	0.0000
3.2163	0.0359	0.0267	0.0035	0.0000
3.2758	0.0349	0.0276	0.0036	0.0000
3.3354	0.0340	0.0285	0.0037	0.0000
3.3949	0.0330	0.0294	0.0038	0.0000
3.4545	0.0321	0.0303	0.0039	0.0000
3.5141	0.0312	0.0313	0.0040	0.0000
3.5736	0.0302	0.0323	0.0040	0.0000
3.6332	0.0293	0.0332	0.0041	0.0000
3.6927	0.0284	0.0342	0.0042	0.0000
3.7523	0.0275	0.0352	0.0043	0.0000
3.8119	0.0265	0.0362	0.0044	0.0000
3.8714	0.0256	0.0373	0.0044	0.0000
3.9310	0.0247	0.0383	0.0045	0.0000
3.9905	0.0238	0.0393	0.0046	0.0000
4.0501	0.0229	0.0404	0.0046	0.0000
4.1097	0.0220	0.0415	0.0047	0.0000
4.1692	0.0211	0.0426	0.0048	0.0000
4.2288	0.0202	0.0437	0.0049	0.0000
4.2500	0.0193	0.0441	0.0066	0.0000

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
4.2500	0.0906	0.0441	0.0000	0.1005	0.0000
4.3096	0.0917	0.0495	0.0000	0.1005	0.0000
4.3691	0.0928	0.0550	0.0000	0.1038	0.0000
4.4287	0.0939	0.0606	0.0000	0.1071	0.0000
4.4882	0.0950	0.0662	0.0000	0.1105	0.0000
4.5478	0.0961	0.0719	0.0000	0.1138	0.0000
4.6074	0.0972	0.0776	0.0000	0.1171	0.0000
4.6669	0.0984	0.0835	0.0000	0.1204	0.0000
4.7265	0.0995	0.0894	0.0000	0.1237	0.0000
4.7860	0.1006	0.0953	0.0000	0.1270	0.0000
4.8456	0.1017	0.1013	0.0000	0.1303	0.0000
4.9052	0.1029	0.1074	0.0000	0.1336	0.0000
4.9647	0.1040	0.1136	0.1003	0.1369	0.0000

5.0243	0.1051	0.1198	0.3549	0.1402	0.0000
5.0838	0.1063	0.1261	0.6865	0.1435	0.0000
5.1434	0.1074	0.1325	1.0534	0.1469	0.0000
5.2030	0.1086	0.1389	1.4136	0.1502	0.0000
5.2625	0.1097	0.1454	1.7276	0.1535	0.0000
5.3221	0.1109	0.1520	1.9670	0.1568	0.0000
5.3816	0.1121	0.1586	2.1277	0.1601	0.0000
5.4200	0.1128	0.1629	2.2739	0.1622	0.0000

Surface iltration 3

Element Flows To:

Outlet 1	Outlet 2
	Biofiltration 3

Biofiltration 4

Bottom Length:	60.00 ft.
Bottom Width:	5.00 ft.
Material thickness of first layer:	0.25
Material type for first layer:	Mulch
Material thickness of second layer:	1.5
Material type for second layer:	ESM
Material thickness of third layer:	1
Material type for third layer:	GRAVEL
Underdrain used	
Underdrain Diameter (feet):	0.5
Orifice Diameter (in.):	0.35
Offset (in.):	3
Flow Through Underdrain (ac-ft.):	3.897
Total Outflow (ac-ft.):	4.046
Percent Through Underdrain:	96.32
Discharge Structure	
Riser Height:	1.5 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	0.0337	0.0000	0.0000	0.0000
0.0522	0.0333	0.0001	0.0000	0.0000
0.1044	0.0327	0.0001	0.0000	0.0000
0.1566	0.0322	0.0002	0.0000	0.0000
0.2088	0.0316	0.0002	0.0000	0.0000
0.2610	0.0311	0.0003	0.0000	0.0000
0.3132	0.0305	0.0004	0.0000	0.0000
0.3654	0.0299	0.0005	0.0000	0.0000
0.4176	0.0294	0.0005	0.0000	0.0000
0.4698	0.0288	0.0006	0.0000	0.0000
0.5220	0.0283	0.0007	0.0000	0.0000
0.5742	0.0277	0.0008	0.0000	0.0000
0.6264	0.0272	0.0009	0.0000	0.0000
0.6786	0.0267	0.0010	0.0000	0.0000
0.7308	0.0261	0.0011	0.0000	0.0000
0.7830	0.0256	0.0012	0.0000	0.0000
0.8352	0.0251	0.0013	0.0000	0.0000
0.8874	0.0245	0.0014	0.0000	0.0000
0.9396	0.0240	0.0016	0.0000	0.0000
0.9918	0.0235	0.0017	0.0000	0.0000
1.0440	0.0229	0.0018	0.0000	0.0000
1.0962	0.0224	0.0019	0.0002	0.0000
1.1484	0.0219	0.0021	0.0003	0.0000
1.2005	0.0214	0.0022	0.0005	0.0000
1.2527	0.0209	0.0023	0.0006	0.0000
1.3049	0.0204	0.0025	0.0007	0.0000
1.3571	0.0198	0.0026	0.0008	0.0000
1.4093	0.0193	0.0028	0.0009	0.0000
1.4615	0.0188	0.0030	0.0010	0.0000
1.5137	0.0183	0.0031	0.0011	0.0000
1.5659	0.0178	0.0033	0.0011	0.0000

1.6181	0.0173	0.0034	0.0012	0.0000
1.6703	0.0168	0.0036	0.0013	0.0000
1.7225	0.0163	0.0038	0.0013	0.0000
1.7747	0.0158	0.0041	0.0014	0.0000
1.8269	0.0153	0.0043	0.0014	0.0000
1.8791	0.0149	0.0046	0.0015	0.0000
1.9313	0.0144	0.0048	0.0015	0.0000
1.9835	0.0139	0.0051	0.0016	0.0000
2.0357	0.0134	0.0054	0.0016	0.0000
2.0879	0.0129	0.0057	0.0016	0.0000
2.1401	0.0124	0.0060	0.0016	0.0000
2.1923	0.0120	0.0063	0.0016	0.0000
2.2445	0.0115	0.0066	0.0016	0.0000
2.2967	0.0110	0.0069	0.0017	0.0000
2.3489	0.0106	0.0072	0.0018	0.0000
2.4011	0.0101	0.0075	0.0019	0.0000
2.4533	0.0096	0.0078	0.0020	0.0000
2.5055	0.0092	0.0082	0.0021	0.0000
2.5577	0.0087	0.0085	0.0023	0.0000
2.6099	0.0082	0.0089	0.0024	0.0000
2.6621	0.0078	0.0092	0.0025	0.0000
2.7143	0.0073	0.0096	0.0026	0.0000
2.7500	0.0069	0.0098	0.0053	0.0000

Biofilter Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
2.7500	0.0337	0.0098	0.0000	0.0358	0.0000
2.8022	0.0343	0.0116	0.0000	0.0358	0.0000
2.8544	0.0348	0.0134	0.0000	0.0368	0.0000
2.9066	0.0354	0.0152	0.0000	0.0378	0.0000
2.9588	0.0360	0.0171	0.0000	0.0389	0.0000
3.0110	0.0366	0.0190	0.0000	0.0399	0.0000
3.0632	0.0371	0.0209	0.0000	0.0409	0.0000
3.1154	0.0377	0.0229	0.0000	0.0420	0.0000
3.1676	0.0383	0.0248	0.0000	0.0430	0.0000
3.2198	0.0389	0.0269	0.0000	0.0440	0.0000
3.2720	0.0395	0.0289	0.0000	0.0451	0.0000
3.3242	0.0401	0.0310	0.0000	0.0461	0.0000
3.3764	0.0407	0.0331	0.0000	0.0472	0.0000
3.4286	0.0413	0.0352	0.0000	0.0482	0.0000
3.4808	0.0419	0.0374	0.0000	0.0492	0.0000
3.5330	0.0425	0.0396	0.0000	0.0503	0.0000
3.5852	0.0431	0.0418	0.0000	0.0513	0.0000
3.6374	0.0437	0.0441	0.0000	0.0523	0.0000
3.6896	0.0443	0.0464	0.0000	0.0534	0.0000
3.7418	0.0449	0.0487	0.0000	0.0544	0.0000
3.7940	0.0455	0.0511	0.0000	0.0554	0.0000
3.8462	0.0461	0.0535	0.0000	0.0565	0.0000
3.8984	0.0467	0.0559	0.0000	0.0575	0.0000
3.9505	0.0473	0.0583	0.0000	0.0585	0.0000
4.0027	0.0480	0.0608	0.0000	0.0596	0.0000
4.0549	0.0486	0.0634	0.0000	0.0606	0.0000
4.1071	0.0492	0.0659	0.0000	0.0616	0.0000
4.1593	0.0498	0.0685	0.0000	0.0627	0.0000
4.2115	0.0505	0.0711	0.0000	0.0637	0.0000
4.2637	0.0511	0.0738	0.0171	0.0648	0.0000
4.3159	0.0517	0.0764	0.1792	0.0658	0.0000
4.3681	0.0524	0.0792	0.4267	0.0668	0.0000

4.4203	0.0530	0.0819	0.7255	0.0679	0.0000
4.4725	0.0537	0.0847	1.0479	0.0689	0.0000
4.5247	0.0543	0.0875	1.3657	0.0699	0.0000
4.5769	0.0549	0.0904	1.6517	0.0710	0.0000
4.6291	0.0556	0.0932	1.8845	0.0720	0.0000
4.6813	0.0562	0.0962	2.0547	0.0730	0.0000
4.7335	0.0569	0.0991	2.1721	0.0741	0.0000
4.7500	0.0571	0.1001	2.3053	0.0744	0.0000

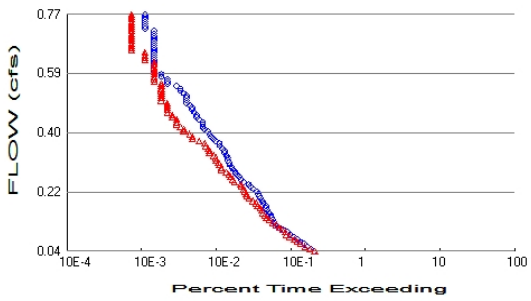
Surface iltration 4

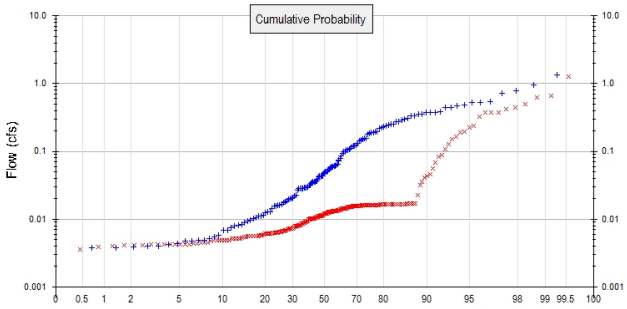
Element Flows To:

Outlet 1	Outlet 2
	Biofiltration 4

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 1.72
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.331
Total Impervious Area: 1.334

Flow Frequency Method: Weibull

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.356751
5 year	0.526175
10 year	0.768514
25 year	1.168676

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.15193
5 year	0.404631
10 year	0.589292
25 year	0.999928

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0357	563	571	101	Pass
0.0431	508	487	95	Pass
0.0505	452	423	93	Pass
0.0579	408	366	89	Pass
0.0653	361	331	91	Pass
0.0727	332	302	90	Pass
0.0801	303	266	87	Pass
0.0875	265	240	90	Pass
0.0949	243	229	94	Pass
0.1023	215	212	98	Pass
0.1097	187	191	102	Pass
0.1171	173	175	101	Pass
0.1245	164	155	94	Pass
0.1319	156	139	89	Pass
0.1393	149	128	85	Pass
0.1467	148	122	82	Pass
0.1541	139	114	82	Pass
0.1615	132	111	84	Pass
0.1689	127	106	83	Pass
0.1763	125	98	78	Pass
0.1837	119	93	78	Pass
0.1911	113	84	74	Pass
0.1985	107	75	70	Pass
0.2059	103	70	67	Pass
0.2133	100	69	69	Pass
0.2207	96	67	69	Pass
0.2281	87	63	72	Pass
0.2355	78	59	75	Pass
0.2429	74	58	78	Pass
0.2503	63	48	76	Pass
0.2577	58	45	77	Pass
0.2651	55	42	76	Pass
0.2726	51	40	78	Pass
0.2800	49	37	75	Pass
0.2874	46	32	69	Pass
0.2948	44	32	72	Pass
0.3022	41	30	73	Pass
0.3096	40	29	72	Pass
0.3170	39	27	69	Pass
0.3244	39	27	69	Pass
0.3318	38	25	65	Pass
0.3392	35	22	62	Pass
0.3466	35	22	62	Pass
0.3540	33	21	63	Pass
0.3614	31	20	64	Pass
0.3688	30	19	63	Pass
0.3762	27	16	59	Pass
0.3836	25	13	52	Pass
0.3910	23	13	56	Pass
0.3984	22	12	54	Pass
0.4058	21	10	47	Pass
0.4132	19	10	52	Pass
0.4206	18	9	50	Pass

0.4280	18	8	44	Pass
0.4354	18	8	44	Pass
0.4428	16	8	50	Pass
0.4502	15	7	46	Pass
0.4576	15	7	46	Pass
0.4650	14	6	42	Pass
0.4724	13	6	46	Pass
0.4798	13	6	46	Pass
0.4872	12	6	50	Pass
0.4946	11	6	54	Pass
0.5020	11	5	45	Pass
0.5094	11	5	45	Pass
0.5168	11	5	45	Pass
0.5242	10	5	50	Pass
0.5316	9	5	55	Pass
0.5390	9	5	55	Pass
0.5464	8	5	62	Pass
0.5538	6	5	83	Pass
0.5612	6	4	66	Pass
0.5686	6	4	66	Pass
0.5761	5	4	80	Pass
0.5835	5	4	80	Pass
0.5909	4	4	100	Pass
0.5983	4	4	100	Pass
0.6057	4	4	100	Pass
0.6131	4	4	100	Pass
0.6205	4	4	100	Pass
0.6279	4	3	75	Pass
0.6353	4	3	75	Pass
0.6427	4	3	75	Pass
0.6501	4	3	75	Pass
0.6575	4	2	50	Pass
0.6649	4	2	50	Pass
0.6723	4	2	50	Pass
0.6797	4	2	50	Pass
0.6871	4	2	50	Pass
0.6945	4	2	50	Pass
0.7019	4	2	50	Pass
0.7093	4	2	50	Pass
0.7167	4	2	50	Pass
0.7241	3	2	66	Pass
0.7315	3	2	66	Pass
0.7389	3	2	66	Pass
0.7463	3	2	66	Pass
0.7537	3	2	66	Pass
0.7611	3	2	66	Pass
0.7685	3	2	66	Pass

Water Quality

Drawdown Time Results

Pond: Surface iltration 1

Days	Stage(feet)	Percent of Total Run Time
1	N/A	N/A
2	N/A	N/A
3	N/A	N/A
4	N/A	N/A
5	N/A	N/A

Maximum Stage: 1.000 Drawdown Time: Less than 1 day

Pond: Surface iltration 2

Days	Stage(feet)	Percent of Total Run Time
1	N/A	N/A
2	N/A	N/A
3	N/A	N/A
4	N/A	N/A
5	N/A	N/A

Maximum Stage: 0.830 Drawdown Time: Less than 1 day

Pond: Surface iltration 3

Days	Stage(feet)	Percent of Total Run Time
1	N/A	N/A
2	N/A	N/A
3	N/A	N/A
4	N/A	N/A
5	N/A	N/A

Maximum Stage: 0.670 Drawdown Time: Less than 1 day

Pond: Surface iltration 4

Days	Stage(feet)	Percent of Total Run Time
1	N/A	N/A
2	N/A	N/A
3	N/A	N/A
4	N/A	N/A
5	N/A	N/A

Maximum Stage: 1.500 Drawdown Time: Less than 1 day

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

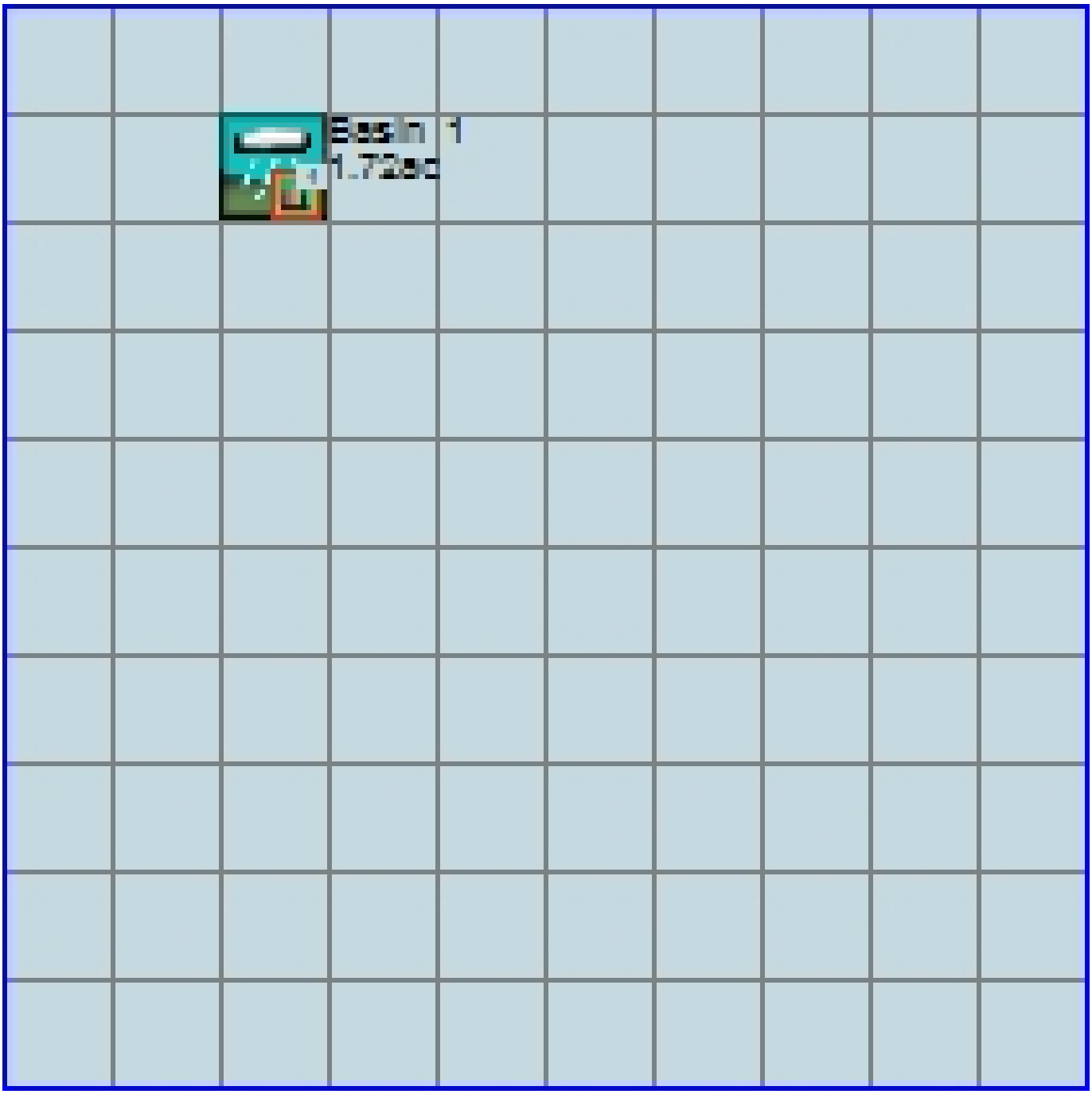
No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

Appendix

Predeveloped Schematic



Mitigated Schematic

Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1973 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   SG.wdm
MESSU       25   PreSG.MES
            27   PreSG.L61
            28   PreSG.L62
            30   POCSG1.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:60
      PERLND      19
      PERLND      28
      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           ***
   19      C,NatVeg,Flat          1    1    1    1   27    0
   28      D,NatVeg,Flat          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 ***
   19         0    0    1    0    0    0    0    0    0    0    0    0
   28         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  *********
```

```
 19         0    0    4    0    0    0    0    0    0    0    0    0    1    9
 28         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 ***
 19         0    1    1    1    0    0    0    0    1    1    0
 28         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
 19              0       3.8     0.035       100      0.05       2.5     0.915
 28              0       3.3      0.03       100      0.05       2.5     0.915
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
 19              0         0         2         2         0      0.05      0.05
 28              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 ***
 19              0       0.6      0.04         1       0.3         0
 28              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  ***
 19       0.4  0.4  0.4  0.4  0.6  0.6  0.6  0.6  0.6  0.4  0.4  0.4
 28       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  ***
 19       0.1  0.1  0.1  0.1 0.06 0.06 0.06 0.06 0.06  0.1  0.1  0.1
 28       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
 19              0         0      0.01          0       0.4       0.01          0
 28              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  19                       0.193     COPY   501     12
PERLND  19                       0.193     COPY   501     13
PERLND  28                       1.527     COPY   501     12
PERLND  28                       1.527     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       1973 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   SG.wdm
MESSU       25   MitSG.MES
            27   MitSG.L61
            28   MitSG.L62
            30   POCSG1.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:60
      PERLND      55
      PERLND      58
      IMPLND       1
      GENER        2
      RCHRES       1
      RCHRES       2
      GENER        4
      RCHRES       3
      RCHRES       4
      GENER        6
      RCHRES       5
      RCHRES       6
      GENER        8
      RCHRES       7
      RCHRES       8
      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 iltration  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
    4        24
    6        24
    8        24
  END OPCODE
  PARM
    #    #         K ***
    2             0.
    4             0.
    6             0.
    8             0.
```

```
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                       in  out           ***
   55      C,UrbNoIrr,Flat        1    1    1    1   27    0
   58      D,UrbNoIrr,Flat        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 ***
   55         0    0    1    0    0    0    0    0    0    0    0    0
   58         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  *********
   55         0    0    4    0    0    0    0    0    0    0    0    0    1    9
   58         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 ***
   55         0    1    1    1    0    0    0    0    1    1    0
   58         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
   55              0       3.8      0.04        50      0.05       2.5     0.915
   58              0       3.8      0.03        50      0.05       2.5     0.915
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   55              0         0         2         2         0      0.05      0.05
   58              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 ***
   55              0       0.6      0.03         1       0.3         0
   58              0       0.6      0.03         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  ***
   55       0.4  0.4  0.4  0.4  0.7  0.7  0.7  0.7  0.7  0.4  0.4  0.4
   58       0.4  0.4  0.4  0.4  0.7  0.7  0.7  0.7  0.7  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  ***
   55       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1
   58       0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  0.1  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
   55              0         0      0.01         0       0.4      0.01         0
```

```
   58              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           ***
    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***
PERLND  55                      0.041     RCHRES   1      2
PERLND  55                      0.041     RCHRES   1      3
PERLND  58                      0.026     RCHRES   1      2
PERLND  58                      0.026     RCHRES   1      3
IMPLND   1                      0.274     RCHRES   1      5
Basin  2***
PERLND  58                      0.082     RCHRES   3      2
PERLND  58                      0.082     RCHRES   3      3
IMPLND   1                      0.356     RCHRES   3      5
Basin  3***
PERLND  55                      0.033     RCHRES   5      2
PERLND  55                      0.033     RCHRES   5      3
PERLND  58                      0.045     RCHRES   5      2
PERLND  58                      0.045     RCHRES   5      3
```

```
IMPLND   1                      0.577     RCHRES   5      5
Basin  4***
PERLND  58                      0.104     RCHRES   7      2
PERLND  58                      0.104     RCHRES   7      3
IMPLND   1                      0.127     RCHRES   7      5

******Routing******
PERLND  55                      0.041     COPY     1     12
PERLND  58                      0.026     COPY     1     12
IMPLND   1                      0.274     COPY     1     15
PERLND  55                      0.041     COPY     1     13
PERLND  58                      0.026     COPY     1     13
PERLND  58                      0.082     COPY     1     12
IMPLND   1                      0.356     COPY     1     15
PERLND  58                      0.082     COPY     1     13
PERLND  55                      0.033     COPY     1     12
PERLND  58                      0.045     COPY     1     12
IMPLND   1                      0.577     COPY     1     15
PERLND  55                      0.033     COPY     1     13
PERLND  58                      0.045     COPY     1     13
PERLND  58                      0.104     COPY     1     12
IMPLND   1                      0.127     COPY     1     15
PERLND  58                      0.104     COPY     1     13
RCHRES   1                          1     RCHRES   2      8
RCHRES   3                          1     RCHRES   4      8
RCHRES   5                          1     RCHRES   6      8
RCHRES   7                          1     RCHRES   8      8
RCHRES   2                          1     COPY   501     16
RCHRES   1                          1     COPY   501     17
RCHRES   4                          1     COPY   501     16
RCHRES   3                          1     COPY   501     17
RCHRES   6                          1     COPY   501     16
RCHRES   5                          1     COPY   501     17
RCHRES   8                          1     COPY   501     16
RCHRES   7                          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
GENER    4 OUTPUT TIMSER      .0002778     RCHRES   3     EXTNL  OUTDGT 1
GENER    6 OUTPUT TIMSER      .0002778     RCHRES   5     EXTNL  OUTDGT 1
GENER    8 OUTPUT TIMSER      .0002778     RCHRES   7     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 iltratio-008    3    1    1    1   28    0    1
    2     Biofiltration  1-007    1    1    1    1   28    0    1
    3     Surface iltratio-010    3    1    1    1   28    0    1
    4     Biofiltration  2-009    1    1    1    1   28    0    1
    5     Surface iltratio-012    3    1    1    1   28    0    1
    6     Biofiltration  3-011    1    1    1    1   28    0    1
    7     Surface iltratio-014    3    1    1    1   28    0    1
    8     Biofiltration  4-013    1    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
    3         1    0    0    0    0    0    0    0    0    0
    4         1    0    0    0    0    0    0    0    0    0
    5         1    0    0    0    0    0    0    0    0    0
    6         1    0    0    0    0    0    0    0    0    0
    7         1    0    0    0    0    0    0    0    0    0
    8         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
    3         4    0    0    0    0    0    0    0    0    0    1    9
    4         4    0    0    0    0    0    0    0    0    0    1    9
    5         4    0    0    0    0    0    0    0    0    0    1    9
    6         4    0    0    0    0    0    0    0    0    0    1    9
    7         4    0    0    0    0    0    0    0    0    0    1    9
    8         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  0  0  0  0       0  0  0  0  0       2  2  2  2  2
    3       0  1  0  0    4  5  6  0  0       0  1  0  0  0       2  1  2  2  2
    4       0  1  0  0    4  0  0  0  0       0  0  0  0  0       2  2  2  2  2
    5       0  1  0  0    4  5  6  0  0       0  1  0  0  0       2  1  2  2  2
    6       0  1  0  0    4  0  0  0  0       0  0  0  0  0       2  2  2  2  2
    7       0  1  0  0    4  5  6  0  0       0  1  0  0  0       2  1  2  2  2
    8       0  1  0  0    4  0  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
    3              3      0.01       0.0       0.0       0.5       0.0
    4              4      0.01       0.0       0.0       0.5       0.0
    5              5      0.01       0.0       0.0       0.5       0.0
    6              6      0.02       0.0       0.0       0.5       0.0
    7              7      0.01       0.0       0.0       0.5       0.0
    8              8      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  0.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    3            0         4.0  5.0  6.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    4            0         4.0  0.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    5            0         4.0  5.0  6.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    6            0         4.0  0.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    7            0         4.0  5.0  6.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    8            0         4.0  0.0  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 Variable Quantity Lines
***                            addr
***                          <------>
*** kwd  varnam optyp  opn  vari  s1 s2 s3 tp multiply  lc ls ac as agfn ***
  <****> <----> <----> <-> <----><-><-><-><-><--------> <><-> <><-> <--> ***
  UVQUAN vol4   RCHRES   4 VOL              4
  UVQUAN v2m4   GLOBAL     WORKSP  3        3
  UVQUAN vpo4   GLOBAL     WORKSP  4        3
  UVQUAN v2d4   GENER    4 K       1        3
*** User-Defined Variable Quantity Lines
***                            addr
***                          <------>
*** kwd  varnam optyp  opn  vari  s1 s2 s3 tp multiply  lc ls ac as agfn ***
  <****> <----> <----> <-> <----><-><-><-><-><--------> <><-> <><-> <--> ***
  UVQUAN vol6   RCHRES   6 VOL              4
  UVQUAN v2m6   GLOBAL     WORKSP  5        3
  UVQUAN vpo6   GLOBAL     WORKSP  6        3
  UVQUAN v2d6   GENER    6 K       1        3
*** User-Defined Variable Quantity Lines
***                            addr
***                          <------>
*** kwd  varnam optyp  opn  vari  s1 s2 s3 tp multiply  lc ls ac as agfn ***
  <****> <----> <----> <-> <----><-><-><-><-><--------> <><-> <><-> <--> ***
  UVQUAN vol8   RCHRES   8 VOL              4
  UVQUAN v2m8   GLOBAL     WORKSP  7        3
  UVQUAN vpo8   GLOBAL     WORKSP  8        3
  UVQUAN v2d8   GENER    8 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
*** 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  v2m4    1 WORKSP  3         1.0 QUAN
  UVNAME  vpo4    1 WORKSP  4         1.0 QUAN
  UVNAME  v2d4    1 K       1         1.0 QUAN
*** 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  v2m6    1 WORKSP  5         1.0 QUAN
  UVNAME  vpo6    1 WORKSP  6         1.0 QUAN
  UVNAME  v2d6    1 K       1         1.0 QUAN
*** 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  v2m8    1 WORKSP  7         1.0 QUAN
  UVNAME  vpo8    1 WORKSP  8         1.0 QUAN
  UVNAME  v2d8    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           =  1190.
*** 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
*** opt foplop dcdts  yr mo dy hr mn d t   vnam  s1 s2 s3 ac quantity  tc  ts rp
  <****><-><--><><-><--> <> <> <> <><><>  <----><-><-><-><-><--------> <> <-><->
  GENER   4                                 v2m4           =  996.
*** Compute remaining available pore space
  GENER   4                                 vpo4           =  v2m4
  GENER   4                                 vpo4          -=  vol4
*** Check to see if VPORA goes negative; if so set VPORA = 0.0
IF (vpo4 < 0.0) THEN
  GENER   4                                 vpo4           =  0.0
END IF
*** Infiltration volume
  GENER   4                                 v2d4           =  vpo4
*** opt foplop dcdts  yr mo dy hr mn d t   vnam  s1 s2 s3 ac quantity  tc  ts rp
  <****><-><--><><-><--> <> <> <> <><><>  <----><-><-><-><-><--------> <> <-><->
  GENER   6                                 v2m6           =  1808.
*** Compute remaining available pore space
  GENER   6                                 vpo6           =  v2m6
  GENER   6                                 vpo6          -=  vol6
*** Check to see if VPORA goes negative; if so set VPORA = 0.0
IF (vpo6 < 0.0) THEN
  GENER   6                                 vpo6           =  0.0
END IF
*** Infiltration volume
  GENER   6                                 v2d6           =  vpo6
*** opt foplop dcdts  yr mo dy hr mn d t   vnam  s1 s2 s3 ac quantity  tc  ts rp
  <****><-><--><><-><--> <> <> <> <><><>  <----><-><-><-><-><--------> <> <-><->
  GENER   8                                 v2m8           =  396.
*** Compute remaining available pore space
  GENER   8                                 vpo8           =  v2m8
  GENER   8                                 vpo8          -=  vol8
*** Check to see if VPORA goes negative; if so set VPORA = 0.0
IF (vpo8 < 0.0) THEN
  GENER   8                                 vpo8           =  0.0
END IF
*** Infiltration volume
  GENER   8                                 v2d8           =  vpo8
END SPEC-ACTIONS
FTABLES
  FTABLE      2
   69    4
     Depth      Area    Volume  Outflow1 Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.059289  0.000000  0.000000
  0.063187  0.059084  0.000133  0.000000
  0.126374  0.058298  0.000272  0.000000
  0.189560  0.057517  0.000416  0.000000
  0.252747  0.056738  0.000565  0.000000
  0.315934  0.055963  0.000720  0.000000
  0.379121  0.055191  0.000881  0.000000
  0.442308  0.054422  0.001047  0.000000
  0.505495  0.053657  0.001219  0.000000
  0.568681  0.052895  0.001396  0.000000
  0.631868  0.052136  0.001579  0.000000
  0.695055  0.051381  0.001767  0.000000
  0.758242  0.050628  0.001962  0.000000
  0.821429  0.049880  0.002162  0.000000
  0.884615  0.049134  0.002368  0.000000
  0.947802  0.048392  0.002579  0.000000
  1.010989  0.047653  0.002797  0.000000
  1.074176  0.046917  0.003020  0.000000
  1.137363  0.046185  0.003249  0.000000
  1.200549  0.045456  0.003484  0.000000
```

```
  1.263736  0.044730  0.003725  0.000203
  1.326923  0.044008  0.003972  0.000304
  1.390110  0.043288  0.004225  0.000513
  1.453297  0.042572  0.004484  0.000617
  1.516484  0.041860  0.004750  0.000776
  1.579670  0.041151  0.005021  0.000856
  1.642857  0.040445  0.005298  0.000982
  1.706044  0.039742  0.005582  0.001046
  1.769231  0.039043  0.005983  0.001152
  1.832418  0.038347  0.006392  0.001205
  1.895604  0.037654  0.006811  0.001299
  1.958791  0.036964  0.007238  0.001346
  2.021978  0.036278  0.007673  0.001430
  2.085165  0.035595  0.008118  0.001472
  2.148352  0.034916  0.008571  0.001498
  2.211538  0.034240  0.009033  0.001511
  2.274725  0.033567  0.009505  0.001573
  2.337912  0.032897  0.009985  0.001683
  2.401099  0.032231  0.010474  0.001831
  2.464286  0.031568  0.010972  0.001991
  2.527473  0.030908  0.011480  0.002150
  2.590659  0.030251  0.011996  0.002303
  2.653846  0.029598  0.012522  0.002449
  2.717033  0.028948  0.013057  0.002589
  2.780220  0.028302  0.013601  0.002721
  2.843407  0.027658  0.014154  0.002848
  2.906593  0.027019  0.014717  0.002969
  2.969780  0.026382  0.015289  0.003086
  3.032967  0.025748  0.015871  0.003198
  3.096154  0.025118  0.016462  0.003306
  3.159341  0.024492  0.017063  0.003411
  3.222527  0.023868  0.017674  0.003513
  3.285714  0.023248  0.018293  0.003612
  3.348901  0.022631  0.018923  0.003708
  3.412088  0.022018  0.019562  0.003802
  3.475275  0.021407  0.020212  0.003893
  3.538462  0.020800  0.020870  0.003983
  3.601648  0.020197  0.021539  0.004070
  3.664835  0.019596  0.022218  0.004156
  3.728022  0.018999  0.022906  0.004240
  3.791209  0.018405  0.023605  0.004322
  3.854396  0.017815  0.024313  0.004403
  3.917582  0.017228  0.025032  0.004482
  3.980769  0.016644  0.025761  0.004561
  4.043956  0.016063  0.026499  0.004638
  4.107143  0.015486  0.027248  0.004714
  4.170330  0.014912  0.028008  0.004789
  4.233516  0.014341  0.028777  0.004864
  4.250000  0.013774  0.060857  0.006649
  END FTABLE  2
  FTABLE      1
   25    6
     Depth      Area    Volume  Outflow1  Outflow2  outflow 3 Velocity  Travel
Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)     (cfs)   (ft/sec)
(Minutes)***
  0.000000  0.013774  0.000000  0.000000  0.000000  0.000000
  0.063187  0.060078  0.003771  0.000000  0.071952  0.000000
  0.126374  0.060871  0.007592  0.000000  0.074459  0.000000
  0.189560  0.061667  0.011464  0.000000  0.076967  0.000000
  0.252747  0.062466  0.015386  0.000000  0.079474  0.000000
  0.315934  0.063268  0.019358  0.000000  0.081982  0.000000
  0.379121  0.064074  0.023381  0.000000  0.084489  0.000000
  0.442308  0.064883  0.027455  0.000000  0.086996  0.000000
  0.505495  0.065696  0.031581  0.000000  0.089504  0.000000
  0.568681  0.066511  0.035758  0.000000  0.092011  0.000000
  0.631868  0.067330  0.039986  0.000000  0.094519  0.000000
  0.695055  0.068153  0.044267  0.000000  0.097026  0.000000
  0.758242  0.068978  0.048599  0.000000  0.099533  0.000000
  0.821429  0.069807  0.052984  0.000000  0.102041  0.000000
```

```
0.884615  0.070640  0.057421  0.000000  0.104548  0.000000
0.947802  0.071475  0.061911  0.000000  0.107056  0.000000
1.010989  0.072314  0.066454  0.012228  0.109563  0.000000
1.074176  0.073156  0.071049  0.213745  0.112071  0.000000
1.137363  0.074001  0.075699  0.532289  0.114578  0.000000
1.200549  0.074850  0.080401  0.911089  0.117085  0.000000
1.263736  0.075702  0.085158  1.300589  0.119593  0.000000
1.326923  0.076557  0.089968  1.651684  0.122100  0.000000
1.390110  0.077416  0.094833  1.925525  0.124608  0.000000
1.453297  0.078278  0.099752  2.109107  0.127115  0.000000
1.500000  0.078917  0.103422  2.263538  0.128968  0.000000
END FTABLE  1
FTABLE      4
 69    4
   Depth      Area    Volume  Outflow1 Velocity  Travel Time***
    (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
0.000000  0.056890  0.000000  0.000000
0.055824  0.056760  0.000110  0.000000
0.111648  0.056020  0.000225  0.000000
0.167473  0.055282  0.000344  0.000000
0.223297  0.054547  0.000469  0.000000
0.279121  0.053814  0.000598  0.000000
0.334945  0.053084  0.000732  0.000000
0.390769  0.052357  0.000872  0.000000
0.446593  0.051632  0.001016  0.000000
0.502418  0.050910  0.001164  0.000000
0.558242  0.050190  0.001318  0.000000
0.614066  0.049473  0.001477  0.000000
0.669890  0.048759  0.001641  0.000000
0.725714  0.048047  0.001810  0.000000
0.781538  0.047337  0.001984  0.000000
0.837363  0.046630  0.002163  0.000000
0.893187  0.045926  0.002347  0.000000
0.949011  0.045225  0.002536  0.000000
1.004835  0.044526  0.002731  0.000000
1.060659  0.043829  0.002930  0.000141
1.116484  0.043135  0.003135  0.000212
1.172308  0.042444  0.003345  0.000420
1.228132  0.041755  0.003560  0.000524
1.283956  0.041069  0.003780  0.000683
1.339780  0.040385  0.004006  0.000762
1.395604  0.039704  0.004236  0.000886
1.451429  0.039026  0.004473  0.000949
1.507253  0.038350  0.004714  0.001052
1.563077  0.037676  0.004961  0.001104
1.618901  0.037006  0.005213  0.001194
1.674725  0.036338  0.005471  0.001239
1.730549  0.035672  0.005734  0.001320
1.786374  0.035009  0.006105  0.001360
1.842198  0.034349  0.006484  0.001434
1.898022  0.033691  0.006870  0.001471
1.953846  0.033035  0.007264  0.001540
2.009670  0.032383  0.007666  0.001574
2.065495  0.031733  0.008076  0.001638
2.121319  0.031085  0.008493  0.001670
2.177143  0.030440  0.008917  0.001731
2.232967  0.029798  0.009350  0.001719
2.288791  0.029158  0.009790  0.001713
2.344615  0.028521  0.010238  0.001765
2.400440  0.027886  0.010694  0.001874
2.456264  0.027254  0.011158  0.002004
2.512088  0.026624  0.011630  0.002139
2.567912  0.025997  0.012110  0.002274
2.623736  0.025373  0.012597  0.002404
2.679560  0.024751  0.013093  0.002529
2.735385  0.024132  0.013597  0.002649
2.791209  0.023515  0.014108  0.002764
2.847033  0.022901  0.014628  0.002874
2.902857  0.022290  0.015156  0.002981
2.958681  0.021681  0.015692  0.003084
```

```
  3.014505  0.021074  0.016236  0.003183
  3.070330  0.020471  0.016789  0.003280
  3.126154  0.019869  0.017350  0.003373
  3.181978  0.019271  0.017918  0.003465
  3.237802  0.018675  0.018496  0.003553
  3.293626  0.018081  0.019081  0.003640
  3.349451  0.017490  0.019675  0.003725
  3.405275  0.016902  0.020277  0.003808
  3.461099  0.016316  0.020888  0.003889
  3.516923  0.015733  0.021507  0.003969
  3.572747  0.015152  0.022135  0.004047
  3.628571  0.014574  0.022771  0.004124
  3.684396  0.013999  0.023416  0.004200
  3.740220  0.013426  0.024069  0.004277
  3.750000  0.012856  0.050787  0.006219
  END FTABLE  4
  FTABLE      3
   25    6
     Depth      Area    Volume  Outflow1  Outflow2  outflow 3 Velocity  Travel
Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)     (cfs)   (ft/sec)
(Minutes)***
  0.000000  0.012856  0.000000  0.000000  0.000000  0.000000
  0.055824  0.057633  0.003197  0.000000  0.066882  0.000000
  0.111648  0.058379  0.006435  0.000000  0.068950  0.000000
  0.167473  0.059128  0.009715  0.000000  0.071018  0.000000
  0.223297  0.059879  0.013036  0.000000  0.073085  0.000000
  0.279121  0.060632  0.016400  0.000000  0.075153  0.000000
  0.334945  0.061388  0.019806  0.000000  0.077220  0.000000
  0.390769  0.062147  0.023254  0.000000  0.079288  0.000000
  0.446593  0.062908  0.026745  0.000000  0.081355  0.000000
  0.502418  0.063672  0.030278  0.000000  0.083423  0.000000
  0.558242  0.064439  0.033854  0.000000  0.085491  0.000000
  0.614066  0.065208  0.037472  0.000000  0.087558  0.000000
  0.669890  0.065980  0.041134  0.000000  0.089626  0.000000
  0.725714  0.066754  0.044839  0.000000  0.091693  0.000000
  0.781538  0.067531  0.048587  0.000000  0.093761  0.000000
  0.837363  0.068310  0.052379  0.006707  0.095828  0.000000
  0.893187  0.069092  0.056214  0.168195  0.097896  0.000000
  0.949011  0.069876  0.060093  0.431407  0.099963  0.000000
  1.004835  0.070663  0.064015  0.752793  0.102031  0.000000
  1.060659  0.071453  0.067982  1.098462  0.104099  0.000000
  1.116484  0.072245  0.071993  1.433794  0.106166  0.000000
  1.172308  0.073040  0.076048  1.726537  0.108234  0.000000
  1.228132  0.073838  0.080148  1.953691  0.110301  0.000000
  1.283956  0.074637  0.084292  2.110610  0.112369  0.000000
  1.330000  0.075299  0.087744  2.248801  0.114074  0.000000
  END FTABLE  3
  FTABLE      6
   73    4
     Depth      Area    Volume  Outflow1 Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.090556  0.000000  0.000000
  0.059560  0.090163  0.000176  0.000000
  0.119121  0.089062  0.000361  0.000000
  0.178681  0.087964  0.000553  0.000000
  0.238242  0.086869  0.000753  0.000000
  0.297802  0.085777  0.000962  0.000000
  0.357363  0.084688  0.001178  0.000000
  0.416923  0.083602  0.001403  0.000000
  0.476484  0.082519  0.001636  0.000000
  0.536044  0.081438  0.001877  0.000000
  0.595604  0.080361  0.002127  0.000000
  0.655165  0.079286  0.002384  0.000000
  0.714725  0.078215  0.002650  0.000000
  0.774286  0.077146  0.002924  0.000000
  0.833846  0.076080  0.003207  0.000000
  0.893407  0.075017  0.003498  0.000000
  0.952967  0.073957  0.003797  0.000000
  1.012527  0.072901  0.004105  0.000000
```

```
  1.072088  0.071847  0.004421  0.000000
  1.131648  0.070795  0.004745  0.000272
  1.191209  0.069747  0.005078  0.000408
  1.250769  0.068702  0.005420  0.000601
  1.310330  0.067660  0.005770  0.000698
  1.369890  0.066620  0.006129  0.000840
  1.429451  0.065584  0.006496  0.000911
  1.489011  0.064551  0.006872  0.001026
  1.548571  0.063520  0.007256  0.001083
  1.608132  0.062492  0.007650  0.001180
  1.667692  0.061468  0.008052  0.001229
  1.727253  0.060446  0.008462  0.001316
  1.786813  0.059427  0.009042  0.001359
  1.846374  0.058411  0.009634  0.001438
  1.905934  0.057398  0.010239  0.001477
  1.965495  0.056388  0.010856  0.001550
  2.025055  0.055381  0.011484  0.001587
  2.084615  0.054377  0.012126  0.001654
  2.144176  0.053376  0.012779  0.001688
  2.203736  0.052377  0.013445  0.001752
  2.263297  0.051382  0.014123  0.001784
  2.322857  0.050390  0.014814  0.001845
  2.382418  0.049400  0.015517  0.001886
  2.441978  0.048414  0.016233  0.001989
  2.501538  0.047430  0.016961  0.002117
  2.561099  0.046449  0.017702  0.002253
  2.620659  0.045471  0.018455  0.002388
  2.680220  0.044497  0.019221  0.002520
  2.739780  0.043525  0.020000  0.002647
  2.799341  0.042556  0.020791  0.002769
  2.858901  0.041590  0.021595  0.002886
  2.918462  0.040626  0.022412  0.002999
  2.978022  0.039666  0.023242  0.003108
  3.037582  0.038709  0.024084  0.003213
  3.097143  0.037755  0.024940  0.003315
  3.156703  0.036803  0.025808  0.003413
  3.216264  0.035855  0.026690  0.003509
  3.275824  0.034909  0.027584  0.003603
  3.335385  0.033967  0.028492  0.003694
  3.394945  0.033027  0.029412  0.003782
  3.454505  0.032090  0.030346  0.003869
  3.514066  0.031156  0.031293  0.003954
  3.573626  0.030226  0.032253  0.004037
  3.633187  0.029298  0.033226  0.004118
  3.692747  0.028373  0.034213  0.004198
  3.752308  0.027451  0.035213  0.004277
  3.811868  0.026531  0.036226  0.004354
  3.871429  0.025615  0.037252  0.004429
  3.930989  0.024702  0.038292  0.004504
  3.990549  0.023792  0.039346  0.004577
  4.050110  0.022884  0.040412  0.004650
  4.109670  0.021980  0.041493  0.004721
  4.169231  0.021078  0.042587  0.004792
  4.228791  0.020179  0.043694  0.004863
  4.250000  0.019284  0.092593  0.006649
  END FTABLE  6
  FTABLE      5
   21    6
     Depth      Area    Volume  Outflow1  Outflow2  outflow 3 Velocity  Travel
Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)     (cfs)   (ft/sec)
(Minutes)***
  0.000000  0.019284  0.000000  0.000000  0.000000  0.000000
  0.059560  0.091661  0.005426  0.000000  0.100531  0.000000
  0.119121  0.092769  0.010919  0.000000  0.103840  0.000000
  0.178681  0.093880  0.016477  0.000000  0.107149  0.000000
  0.238242  0.094993  0.022102  0.000000  0.110458  0.000000
  0.297802  0.096110  0.027793  0.000000  0.113767  0.000000
  0.357363  0.097229  0.033551  0.000000  0.117076  0.000000
  0.416923  0.098352  0.039375  0.000000  0.120385  0.000000
```

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0.476484  0.099477  0.045267  0.000000  0.123694  0.000000
0.536044  0.100606  0.051225  0.000000  0.127003  0.000000
0.595604  0.101737  0.057251  0.000000  0.130311  0.000000
0.655165  0.102871  0.063344  0.000000  0.133620  0.000000
0.714725  0.104008  0.069505  0.100262  0.136929  0.000000
0.774286  0.105148  0.075734  0.354932  0.140238  0.000000
0.833846  0.106291  0.082031  0.686529  0.143547  0.000000
0.893407  0.107437  0.088395  1.053400  0.146856  0.000000
0.952967  0.108586  0.094829  1.413620  0.150165  0.000000
1.012527  0.109738  0.101330  1.727570  0.153474  0.000000
1.072088  0.110893  0.107901  1.967028  0.156783  0.000000
1.131648  0.112050  0.114540  2.127654  0.160092  0.000000
1.170000  0.112797  0.118852  2.273869  0.162222  0.000000
END FTABLE  5
FTABLE      8
 54    4
   Depth      Area    Volume  Outflow1 Velocity  Travel Time***
    (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
0.000000  0.033686  0.000000  0.000000
0.052198  0.033298  0.000056  0.000000
0.104396  0.032733  0.000115  0.000000
0.156593  0.032170  0.000178  0.000000
0.208791  0.031609  0.000244  0.000000
0.260989  0.031050  0.000314  0.000000
0.313187  0.030494  0.000388  0.000000
0.365385  0.029940  0.000465  0.000000
0.417582  0.029388  0.000545  0.000000
0.469780  0.028839  0.000630  0.000000
0.521978  0.028291  0.000718  0.000000
0.574176  0.027746  0.000810  0.000000
0.626374  0.027203  0.000905  0.000000
0.678571  0.026663  0.001005  0.000000
0.730769  0.026125  0.001108  0.000000
0.782967  0.025589  0.001215  0.000000
0.835165  0.025055  0.001325  0.000000
0.887363  0.024523  0.001440  0.000000
0.939560  0.023994  0.001558  0.000000
0.991758  0.023467  0.001680  0.000000
1.043956  0.022942  0.001806  0.000000
1.096154  0.022420  0.001935  0.000223
1.148352  0.021899  0.002069  0.000335
1.200549  0.021381  0.002207  0.000519
1.252747  0.020865  0.002348  0.000611
1.304945  0.020352  0.002494  0.000749
1.357143  0.019841  0.002643  0.000818
1.409341  0.019332  0.002796  0.000929
1.461538  0.018825  0.002954  0.000985
1.513736  0.018320  0.003115  0.001079
1.565934  0.017818  0.003280  0.001126
1.618132  0.017318  0.003450  0.001209
1.670330  0.016820  0.003623  0.001251
1.722527  0.016325  0.003801  0.001326
1.774725  0.015831  0.004052  0.001363
1.826923  0.015340  0.004309  0.001433
1.879121  0.014852  0.004572  0.001467
1.931319  0.014365  0.004840  0.001532
1.983516  0.013881  0.005115  0.001564
2.035714  0.013399  0.005395  0.001625
2.087912  0.012919  0.005681  0.001584
2.140110  0.012442  0.005972  0.001590
2.192308  0.011966  0.006270  0.001613
2.244505  0.011493  0.006573  0.001649
2.296703  0.011022  0.006883  0.001686
2.348901  0.010554  0.007198  0.001767
2.401099  0.010088  0.007519  0.001884
2.453297  0.009624  0.007847  0.002013
2.505495  0.009162  0.008180  0.002144
2.557692  0.008703  0.008519  0.002273
2.609890  0.008245  0.008865  0.002397
2.662088  0.007790  0.009216  0.002517
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  2.714286  0.007338  0.009574  0.002634
  2.750000  0.006887  0.020626  0.005256
  END FTABLE  8
  FTABLE      7
   40    6
     Depth      Area    Volume  Outflow1  Outflow2  outflow 3 Velocity  Travel
Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)     (cfs)   (ft/sec)
(Minutes)***
  0.000000  0.006887  0.000000  0.000000  0.000000  0.000000
  0.052198  0.034255  0.001773  0.000000  0.035758  0.000000
  0.104396  0.034827  0.003576  0.000000  0.036794  0.000000
  0.156593  0.035400  0.005409  0.000000  0.037829  0.000000
  0.208791  0.035976  0.007272  0.000000  0.038865  0.000000
  0.260989  0.036554  0.009165  0.000000  0.039901  0.000000
  0.313187  0.037135  0.011088  0.000000  0.040936  0.000000
  0.365385  0.037717  0.013042  0.000000  0.041972  0.000000
  0.417582  0.038302  0.015026  0.000000  0.043008  0.000000
  0.469780  0.038889  0.017040  0.000000  0.044043  0.000000
  0.521978  0.039479  0.019086  0.000000  0.045079  0.000000
  0.574176  0.040070  0.021162  0.000000  0.046115  0.000000
  0.626374  0.040664  0.023269  0.000000  0.047150  0.000000
  0.678571  0.041260  0.025407  0.000000  0.048186  0.000000
  0.730769  0.041859  0.027576  0.000000  0.049222  0.000000
  0.782967  0.042460  0.029777  0.000000  0.050257  0.000000
  0.835165  0.043062  0.032009  0.000000  0.051293  0.000000
  0.887363  0.043668  0.034272  0.000000  0.052329  0.000000
  0.939560  0.044275  0.036568  0.000000  0.053364  0.000000
  0.991758  0.044885  0.038895  0.000000  0.054400  0.000000
  1.043956  0.045496  0.041254  0.000000  0.055436  0.000000
  1.096154  0.046111  0.043644  0.000000  0.056471  0.000000
  1.148352  0.046727  0.046067  0.000000  0.057507  0.000000
  1.200549  0.047346  0.048523  0.000000  0.058543  0.000000
  1.252747  0.047967  0.051010  0.000000  0.059578  0.000000
  1.304945  0.048590  0.053530  0.000000  0.060614  0.000000
  1.357143  0.049215  0.056083  0.000000  0.061650  0.000000
  1.409341  0.049843  0.058668  0.000000  0.062685  0.000000
  1.461538  0.050473  0.061286  0.000000  0.063721  0.000000
  1.513736  0.051105  0.063937  0.017087  0.064757  0.000000
  1.565934  0.051739  0.066621  0.179248  0.065792  0.000000
  1.618132  0.052376  0.069339  0.426722  0.066828  0.000000
  1.670330  0.053015  0.072089  0.725495  0.067864  0.000000
  1.722527  0.053656  0.074873  1.047930  0.068899  0.000000
  1.774725  0.054300  0.077691  1.365707  0.069935  0.000000
  1.826923  0.054945  0.080542  1.651684  0.070971  0.000000
  1.879121  0.055593  0.083427  1.884482  0.072006  0.000000
  1.931319  0.056243  0.086346  2.054667  0.073042  0.000000
  1.983516  0.056896  0.089298  2.172110  0.074078  0.000000
  2.000000  0.057102  0.090238  2.305293  0.074405  0.000000
  END FTABLE  7
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      2 PREC     ENGL    1              RCHRES   3     EXTNL  PREC
WDM      2 PREC     ENGL    1              RCHRES   5     EXTNL  PREC
WDM      2 PREC     ENGL    1              RCHRES   7     EXTNL  PREC
WDM      1 EVAP     ENGL    0.5            RCHRES   1     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.7            RCHRES   2     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.5            RCHRES   3     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.7            RCHRES   4     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.5            RCHRES   5     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.7            RCHRES   6     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.5            RCHRES   7     EXTNL  POTEV
```

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WDM      1 EVAP     ENGL    0.7            RCHRES   8     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   STAGE  1 1        1      WDM   1001 STAG     ENGL       REPL
RCHRES   1 HYDR   STAGE  1 1        1      WDM   1002 STAG     ENGL       REPL
RCHRES   1 HYDR   O      1 1        1      WDM   1003 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
RCHRES   4 HYDR   RO     1 1        1      WDM   1004 FLOW     ENGL       REPL
RCHRES   4 HYDR   STAGE  1 1        1      WDM   1005 STAG     ENGL       REPL
RCHRES   3 HYDR   STAGE  1 1        1      WDM   1006 STAG     ENGL       REPL
RCHRES   3 HYDR   O      1 1        1      WDM   1007 FLOW     ENGL       REPL
RCHRES   6 HYDR   RO     1 1        1      WDM   1008 FLOW     ENGL       REPL
RCHRES   6 HYDR   STAGE  1 1        1      WDM   1009 STAG     ENGL       REPL
RCHRES   5 HYDR   STAGE  1 1        1      WDM   1010 STAG     ENGL       REPL
RCHRES   5 HYDR   O      1 1        1      WDM   1011 FLOW     ENGL       REPL
RCHRES   8 HYDR   RO     1 1        1      WDM   1012 FLOW     ENGL       REPL
RCHRES   8 HYDR   STAGE  1 1        1      WDM   1013 STAG     ENGL       REPL
RCHRES   7 HYDR   STAGE  1 1        1      WDM   1014 STAG     ENGL       REPL
RCHRES   7 HYDR   O      1 1        1      WDM   1015 FLOW     ENGL       REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>             <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK        2
PERLND     PWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    2

  MASS-LINK        3
PERLND     PWATER IFWO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    3

  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       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

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

  MASS-LINK       16
RCHRES     ROFLOW                          COPY           INPUT  MEAN
  END MASS-LINK   16

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


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

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Attachment 2c

Management of Critical Coarse Sediment Yield Areas