Priority Development Project (PDP)
Storm Water Quality Management Plan (SWQMP)

All Peoples Church

PTS 636444

[Insert Drawing Number (if applicable) and Internal Order Number (if applicable)]

☐ **Check if electing for offsite alternative compliance**

Engineer of Work:

2/17/2021

William Gregg Mack, RCE 73620
Provide Wet Signature and Stamp Above Line

Prepared For:

All Peoples Church
5577 University Avenue
San Diego, CA 92105

[Insert Applicant Phone Number]

Prepared By:

PASCO LARET SUITER & ASSOCIATES
CIVIL ENGINEERING + LAND PLANNING + LAND SURVEYING

Pasco Laret Suiter & Associates
1911 San Diego Ave. Suite 100
San Diego, CA 92102
(858) 259-8212

Date:

February 11, 2020

Approved by: City of San Diego Date

The City of SAN DIEGO

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Project Name: All Peoples Church

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Project Name: All Peoples Church

Acronyms

APN	Assessor's Parcel Number
ASBS	Area of Special Biological Significance
BMP	Best Management Practice
CEQA	California Environmental Quality Act
CGP	Construction General Permit
DCV	Design Capture Volume
DMA	Drainage Management Areas
ESA	Environmentally Sensitive Area
GLU	Geomorphic Landscape Unit
GW	Ground Water
HMP	Hydromodification Management Plan
HSG	Hydrologic Soil Group
HU	Harvest and Use
INF	Infiltration
LID	Low Impact Development
LUP	Linear Underground/Overhead Projects
MS4	Municipal Separate Storm Sewer System
N/A	Not Applicable
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
PDP	Priority Development Project
PE	Professional Engineer
POC	Pollutant of Concern
SC	Source Control
SD	Site Design
SDRWQCB	San Diego Regional Water Quality Control Board
SIC	Standard Industrial Classification
SWPPP	Stormwater Pollutant Protection Plan
SWQMP	Storm Water Quality Management Plan
TMDL	Total Maximum Daily Load
WMAA	Watershed Management Area Analysis
WPCP	Water Pollution Control Program
WQIP	Water Quality Improvement Plan

Certification Page

Project Name:
Permit Application

I hereby declare that I am the Engineer in Responsible Charge of design of storm water BMPs for this project, and that I have exercised responsible charge over the design of the project as defined in Section 6703 of the Business and Professions Code, and that the design is consistent with the requirements of the Storm Water Standards, which is based on the requirements of SDRWQCB Order No. R9-2013-0001 as amended by R9-2015-0001 and R9-2015-0100 (MS4 Permit).

I have read and understand that the City Engineer has adopted minimum requirements for managing urban runoff, including storm water, from land development activities, as described in the Storm Water Standards. 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 source control and site design 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 the City Engineer is confined to a review and does not relieve me, as the Engineer in Responsible Charge of design of storm water BMPs for this project, of my responsibilities for project design.

Engineer of Work's Signature

73620

PE#

12/31/2022

Expiration Date

William Gregg Mack

Print Name

Pasco Laret Suiter & Associates

Company

2021-2-11

Date

Engineer's Stamp

Project Name: All Peoples Church

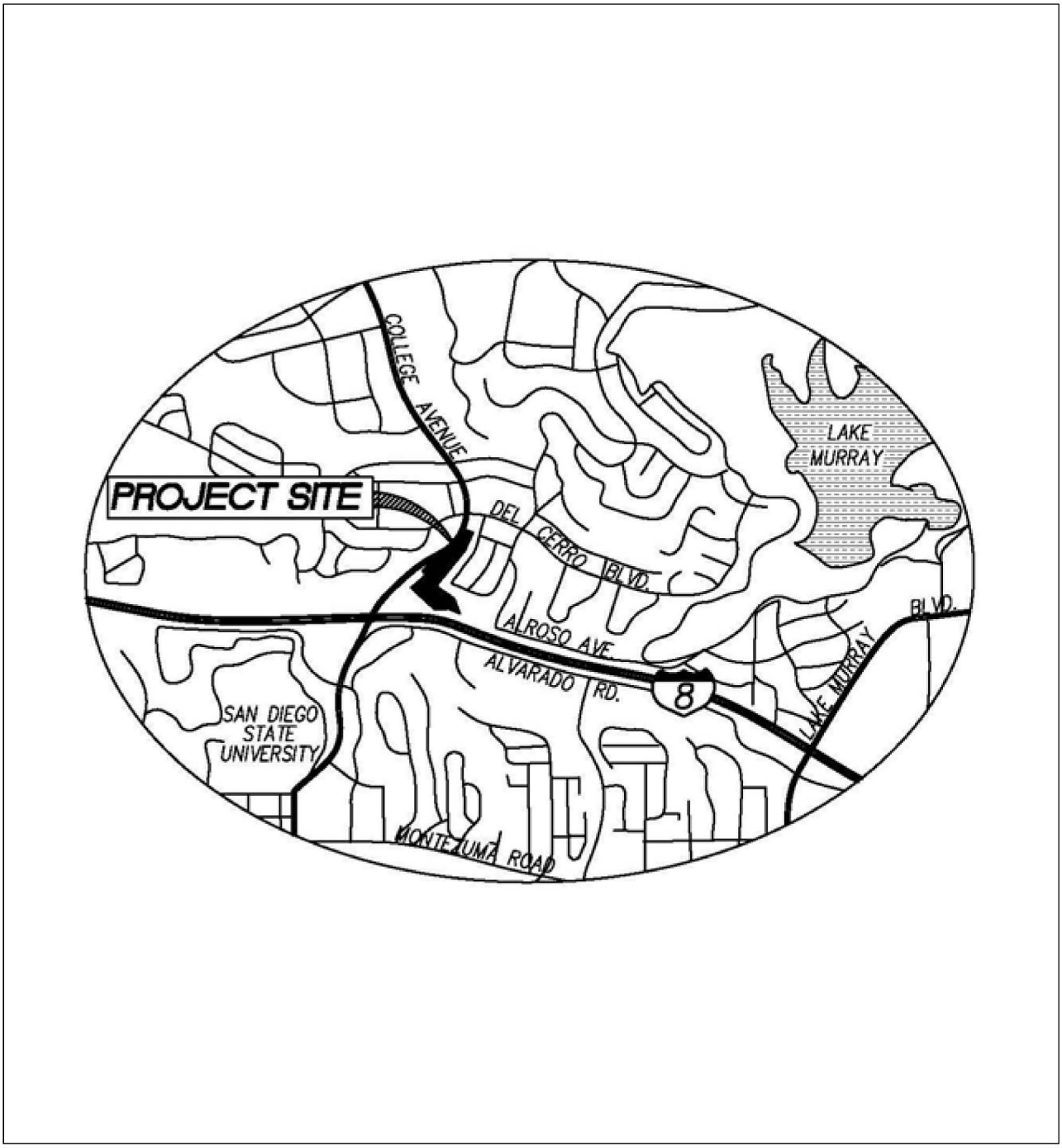
Submittal Record

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 last column indicate changes that have been made or indicate if response to plancheck comments is included. When applicable, insert response to plancheck comments.

Submittal Number	Date	Project Status	Changes
1	2020-8-25	☑ **Preliminary Design/Planning/CEQA** ☐ **Final Design**	**Initial Submittal**
2	2021-2-11	☑ **Preliminary Design/Planning/CEQA** ☐ **Final Design**	2nd Submittal Per City Cycle Issues
3		☐ **Preliminary Design/Planning/CEQA** ☐ **Final Design**	
4		☐ **Preliminary Design/Planning/CEQA** ☐ **Final Design**	

Project Vicinity Map

Project Name: All Peoples Church
Permit Application PTS 636444



City of San Diego Form DS-560 Storm Water Requirements Applicability Checklist

Attach DS-560 form.

City of San Diego
Development Services
1222 First Ave., MS-302
San Diego, CA 92101
(619) 446-5000

Storm Water Requirements Applicability Checklist

FORM
DS-560
November 2018

Project Address: College Ave, San Diego,CA (APN 463-010-10)	Project Number:

SECTION 1. Construction Storm Water BMP Requirements:

All construction sites are required to implement construction BMPs in accordance with the performance standards in the Storm Water Standards Manual. Some sites are additionally required to obtain coverage under the State Construction General Permit (CGP)[1] , which is administered by the State Regional Water Quality Control Board.

For all projects complete PART A: If project is required to submit a SWPPP or WPCP, continue to PART B.

PART A: Determine Construction Phase Storm Water Requirements.

1. Is the project subject to California's statewide General NPDES permit for Storm Water Discharges Associated with Construction Activities, also known as the State Construction General Permit (CGP)? (Typically projects with land disturbance greater than or equal to 1 acre.)

   ☒ Yes; SWPPP required, skip questions 2-4 ☐ No; next question

2. Does the project propose construction or demolition activity, including but not limited to, clearing, grading, grubbing, excavation, or any other activity resulting in ground disturbance and/or contact with storm water?

   ☐ Yes; WPCP required, skip questions 3-4 ☐ No; next question

3. Does the project propose routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of the facility? (Projects such as pipeline/utility replacement)

   ☐ Yes; WPCP required, skip question 4 ☐ No; next question

4. Does the project only include the following Permit types listed below?

   - Electrical Permit, Fire Alarm Permit, Fire Sprinkler Permit, Plumbing Permit, Sign Permit, Mechanical Permit, Spa Permit.
   - Individual Right of Way Permits that exclusively include only ONE of the following activities: water service, sewer lateral, or utility service.
   - Right of Way Permits with a project footprint less than 150 linear feet that exclusively include only ONE of the following activities: curb ramp, sidewalk and driveway apron replacement, pot holing, curb and gutter replacement, and retaining wall encroachments.

   ☐ Yes; no document required

Check one of the boxes below, and continue to PART B:

☒ If you checked "Yes" for question 1, **a SWPPP is REQUIRED. Continue to PART B**

☐ If you checked "No" for question 1, and checked "Yes" for question 2 or 3, **a WPCP is REQUIRED.** If the project proposes less than 5,000 square feet of ground disturbance AND has less than a 5-foot elevation change over the entire project area, a Minor WPCP may be required instead. **Continue to PART B.**

☐ If you checked "No" for all questions 1-3, and checked "Yes" for question 4 PART B **does not apply and no document is required. Continue to Section 2.**

1. More information on the City's construction BMP requirements as well as CGP requirements can be found at: www.sandiego.gov/stormwater/regulations/index.shtml

PART B: Determine Construction Site Priority

This prioritization must be completed within this form, noted on the plans, and included in the SWPPP or WPCP. The city reserves the right to adjust the priority of projects both before and after construction. Construction projects are assigned an inspection frequency based on if the project has a "high threat to water quality." The City has aligned the local definition of "high threat to water quality" to the risk determination approach of the State Construction General Permit (CGP). The CGP determines risk level based on project specific sediment risk and receiving water risk. Additional inspection is required for projects within the Areas of Special Biological Significance (ASBS) watershed. **NOTE:** The construction priority does **NOT** change construction BMP requirements that apply to projects; rather, it determines the frequency of inspections that will be conducted by city staff.

Complete PART B and continued to Section 2

1. ☐ **ASBS**

a. Projects located in the ASBS watershed.

2. ☐ **High Priority**

a. Projects that qualify as Risk Level 2 or Risk Level 3 per the Construction General Permit (CGP) and not located in the ASBS watershed.

b. Projects that qualify as LUP Type 2 or LUP Type 3 per the CGP and not located in the ASBS watershed.

3. ☐ **Medium Priority**

a. Projects that are not located in an ASBS watershed or designated as a High priority site.

b. Projects that qualify as Risk Level 1 or LUP Type 1 per the CGP and not located in an ASBS watershed.

c. WPCP projects (>5,000sf of ground disturbance) located within the Los Penasquitos watershed management area.

4. ☒ **Low Priority**

a. Projects not subject to a Medium or High site priority designation and are not located in an ASBS watershed.

SECTION 2. Permanent Storm Water BMP Requirements.

Additional information for determining the requirements is found in the Storm Water Standards Manual.

PART C: Determine if Not Subject to Permanent Storm Water Requirements.

Projects that are considered maintenance, or otherwise not categorized as "new development projects" or "redevelopment projects" according to the Storm Water Standards Manual are not subject to Permanent Storm Water BMPs.

If "yes" is checked for any number in Part C, proceed to Part F and check "Not Subject to Permanent Storm Water BMP Requirements".

If "no" is checked for all of the numbers in Part C continue to Part D.

1.	Does the project only include interior remodels and/or is the project entirely within an existing enclosed structure and does not have the potential to contact storm water?	☐ Yes ☒ No
2.	Does the project only include the construction of overhead or underground utilities without creating new impervious surfaces?	☐ Yes ☒ No
3.	Does the project fall under routine maintenance? Examples include, but are not limited to: roof or exterior structure surface replacement, resurfacing or reconfiguring surface parking lots or existing roadways without expanding the impervious footprint, and routine replacement of damaged pavement (grinding, overlay, and pothole repair).	☐ Yes ☒ No

Clear Page 2

PART D: PDP Exempt Requirements.

PDP Exempt projects are required to implement site design and source control BMPs.

If "yes" was checked for any questions in Part D, continue to Part F and check the box labeled "PDP Exempt."

If "no" was checked for all questions in Part D, continue to Part E.

1. **Does the project ONLY include new or retrofit sidewalks, bicycle lanes, or trails that:**
   - **Are designed and constructed to direct storm water runoff to adjacent vegetated areas, or other non-erodible permeable areas? Or;**
   - **Are designed and constructed to be hydraulically disconnected from paved streets and roads? Or;**
   - **Are designed and constructed with permeable pavements or surfaces in accordance with the Green Streets guidance in the City's Storm Water Standards manual?**

   ☐ Yes; PDP exempt requirements apply ☒ No; next question

2. Does the project ONLY include retrofitting or redeveloping existing paved alleys, streets or roads designed and constructed in accordance with the Green Streets guidance in the City's Storm Water Standards Manual?

   ☐ Yes; PDP exempt requirements apply ☒ No; project not exempt.

PART E: Determine if Project is a Priority Development Project (PDP).

Projects that match one of the definitions below are subject to additional requirements including preparation of a Storm Water Quality Management Plan (SWQMP).

If "yes" is checked for any number in PART E, continue to PART F and check the box labeled "Priority Development Project".

If "no" is checked for every number in PART E, continue to PART F and check the box labeled "Standard Development Project".

1.	**New Development that creates 10,000 square feet or more of impervious surfaces collectively over the project site.** This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land.	☒ Yes ☐ No
2.	**Redevelopment project that creates and/or replaces 5,000 square feet or more of impervious surfaces 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
3.	**New development or redevelopment of a restaurant.** Facilities that sell prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC 5812), and where the land development creates and/or replace 5,000 square feet or more of impervious surface.	☐ Yes ☒ No
4.	**New development or redevelopment on a hillside.** The project creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site) and where the development will grade on any natural slope that is twenty-five percent or greater.	☐ Yes ☒ No
5.	**New development or redevelopment of a parking lot that creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site).**	☐ Yes ☒ No
6.	**New development or redevelopment of streets, roads, highways, freeways, and driveways.** The project creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site).	☐ Yes ☒ No

Clear Page 3

7.	**New development or redevelopment discharging directly to an Environmentally Sensitive Area.** The project creates and/or replaces 2,500 square feet of impervious surface (collectively over project site), and discharges 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).	☐ Yes ☒ No
8.	**New development or redevelopment projects of a retail gasoline outlet (RGO) that create and/or replaces 5,000 square feet of impervious surface.** The development project meets the following criteria: (a) 5,000 square feet or more or (b) has a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.	☐ Yes ☒ No
9.	**New development or redevelopment projects of an automotive repair shops that creates and/or replaces 5,000 square feet or more of impervious surfaces.** Development projects categorized in any one of Standard Industrial Classification (SIC) codes 5013, 5014, 5541, 7532-7534, or 7536-7539.	☐ Yes ☒ No
10.	**Other Pollutant Generating Project.** The project is not covered in the categories above, results in the disturbance of one or more acres of land and is expected to generate pollutants post construction, such as fertilizers and pesticides. This does not include projects creating less than 5,000 sf of impervious surface and where added landscaping does not require regular use of pesticides and fertilizers, such as slope stabilization using native plants. Calculation of the square footage of impervious surface need not include linear pathways that are for infrequent vehicle use, such as emergency maintenance access or bicycle pedestrian use, if they are built with pervious surfaces of if they sheet flow to surrounding pervious surfaces.	☐ Yes ☒ No

PART F: Select the appropriate category based on the outcomes of PART C through PART E.

1.	The project is **NOT SUBJECT TO PERMANENT STORM WATER REQUIREMENTS.**	☐
2.	The project is a **STANDARD DEVELOPMENT PROJECT.** Site design and source control BMP requirements apply. See the Storm Water Standards Manual for guidance.	☐
3.	The project is **PDP EXEMPT.** Site design and source control BMP requirements apply. See the Storm Water Standards Manual for guidance.	☐
4.	The project is a **PRIORITY DEVELOPMENT PROJECT.** Site design, source control, and structural pollutant control BMP requirements apply. See the Storm Water Standards Manual for guidance on determining if project requires a hydromodification plan management	☒

Guido Knudson	Design Engineer-Civil
Name of Owner or Agent *(Please Print)*	Title
	03/19/2019
Signature	Date

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Project Name: All Peoples Church

Applicability of Permanent, Post-Construction Storm Water BMP Requirements	Form I-1
Project Identification	
Project Name: All Peoples Church	
Permit Application Number: PTS 636444	Date:2021-2-8

Determination of Requirements

The purpose of this form is to identify permanent, post-construction requirements that apply to the project. This form serves as a short summary of applicable requirements, in some cases referencing separate forms that will serve as the backup for the determination of requirements.

Answer each step below, starting with **Step 1** and progressing through each step until reaching "Stop". Refer to the manual sections and/or separate forms referenced in each step below.

Step	Answer	Progression
Step 1: Is the project a "development project"? See Section 1.3 of the manual (Part 1 of Storm Water Standards) for guidance.	☑ Yes	Go to **Step 2**.
	☐ No	**Stop**. Permanent BMP requirements do not apply. No SWQMP will be required. Provide discussion below.
Discussion / justification if the project is not a "development project" (e.g., the project includes *only* interior remodels within an existing building):		
Step 2: Is the project a Standard Project, PDP, or PDP Exempt? To answer this item, see Section 1.4 of the manual in its entirety for guidance AND complete Form DS-560, Storm Water Requirements Applicability Checklist.	☐ Standard Project	**Stop.** Standard Project requirements apply
	☑ PDP	PDP requirements apply, including PDP SWQMP. Go to **Step 3**.
	☐ PDP Exempt	**Stop.** Standard Project requirements apply. Provide discussion and list any additional requirements below.
Discussion / justification, and additional requirements for exceptions to PDP definitions, if applicable:		

Project Name: All Peoples Church

Form I-1 Page 2 of 2		
Step	**Answer**	**Progression**
Step 3. Is the project subject to earlier PDP requirements due to a prior lawful approval? See Section 1.10 of the manual (Part 1 of Storm Water Standards) for guidance.	☐ Yes	Consult the City Engineer to determine requirements. Provide discussion and identify requirements below. Go to **Step 4**.
	☑ No	BMP Design Manual PDP requirements apply. Go to **Step 4**.
Discussion / justification of prior lawful approval, and identify requirements (not required if prior lawful approval does not apply):		
Step 4. Do hydromodification control requirements apply? See Section 1.6 of the manual (Part 1 of Storm Water Standards) for guidance.	☑ Yes	PDP structural BMPs required for pollutant control (Chapter 5) and hydromodification control (Chapter 6). Go to **Step 5**.
	☐ No	**Stop**. PDP structural BMPs required for pollutant control (Chapter 5) only. Provide brief discussion of exemption to hydromodification control below.
Discussion / justification if hydromodification control requirements do not apply:		
Step 5. Does protection of critical coarse sediment yield areas apply? See Section 6.2 of the manual (Part 1 of Storm Water Standards) for guidance.	☐ Yes	Management measures required for protection of critical coarse sediment yield areas (Chapter 6.2). **Stop**.
	☑ No	Management measures not required for protection of critical coarse sediment yield areas. Provide brief discussion below. **Stop**.
Discussion / justification if protection of critical coarse sediment yield areas does not apply: There are no CCSYA areas on site or upstream of the site.		

HMP Exemption Exhibit

Attach a HMP Exemption Exhibit that shows direct storm water runoff discharge from the project site to HMP exempt area. Include project area, applicable underground storm drain line and/or concrete lined channels, outfall information and exempt waterbody.
Reference applicable drawing number(s).

Exhibit must be provided on 11"x17" or larger paper.

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Project Name: All Peoples Church

Site Information Checklist For PDPs	Form I-3B
Project Summary Information	
Project Name	All Peoples Church
Project Address	Northeast corner of Interstate 8 and College Avenue, San Diego, CA 92120
Assessor's Parcel Number(s) (APN(s))	463-010-10-00
Permit Application Number	PTS 636444
Project Watershed	Select One: ☐ San Dieguito River ☐ Penasquitos ☐ Mission Bay ☑ San Diego River ☐ San Diego Bay ☐ Tijuana River
Hydrologic subarea name with Numeric Identifier up to two decimal places (9XX.XX)	Mission San Diego 907.11
Project Area (total area of Assessor's Parcel(s) associated with the project or total area of the right-of-way)	5.99 Acres (260, 924 Square Feet)
Area to be disturbed by the project (Project Footprint)	5.99 Acres (260,924 Square Feet)
Project Proposed Impervious Area (subset of Project Footprint)	2.46 Acres (107,187 Square Feet)
Project Proposed Pervious Area (subset of Project Footprint)	3.53 Acres (153,737 Square Feet)
Note: Proposed Impervious Area + Proposed Pervious Area = Area to be Disturbed by the Project. This may be less than the Project Area.	
The proposed increase or decrease in impervious area in the proposed condition as compared to the pre-project condition	+41 %

Project Name: All Peoples Church

Form I-3B Page 2 of 11
Description of Existing Site Condition and Drainage Patterns
Current Status of the Site (select all that apply): ☐ Existing development ☐ Previously graded but not built out ☐ Agricultural or other non-impervious use ☑ Vacant, undeveloped/natural Description / Additional Information:
Existing Land Cover Includes (select all that apply): ☑ Vegetative Cover ☐ Non-Vegetated Pervious Areas ☐ Impervious Areas Description / Additional Information:
Underlying Soil belongs to Hydrologic Soil Group (select all that apply): ☐ NRCS Type A ☐ NRCS Type B ☑ NRCS Type C ☑ NRCS Type D
Approximate Depth to Groundwater: ☐ Groundwater Depth < 5 feet ☐ 5 feet < Groundwater Depth < 10 feet ☑ 10 feet < Groundwater Depth < 20 feet ☐ Groundwater Depth > 20 feet
Existing Natural Hydrologic Features (select all that apply): ☑ Watercourses ☐ Seeps ☐ Springs ☐ Wetlands ☐ None Description / Additional Information:

Form I-3B Page 3 of 11
Description of Existing Site Topography and Drainage
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. If runoff from offsite is conveyed through the site? If yes, quantification of 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 storm drains, concrete channels, swales, detention facilities, storm water treatment facilities, and natural and constructed channels; 4. Identify all discharge locations from the existing project along with a summary of the 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.
Descriptions/Additional Information
There are three locations where offsite run-on enters the project site: 1. An existing 36-inch reinforced concrete pipe (RCP) discharges storm water onto the project site at the northern boundary of the property. Runoff is conveyed in a southerly direction through the project site in an earthern drainage channel prior to discharging to an existing 48-inch RCP which conveys flow under the Interstate 8 offramp. The offsite drainage area to the existing 36-inch RCP is 28.8 acres. The 100-year storm event peak flow rate (Q100) at this location is 60.04 cubic feet per second (cfs). 2. An existing 18-inch RCP discharges storm water onto the project site at the eastern boundary of the project site. Runoff flows westerly, confluences with the earthen drainage channel and continues in a southerly direction. The offiste drainage area to the existing 18-inch RCP is 21.5 acres. The 100-year storm event peak flow rate (Q100) at this location is 40.5 cubic feet per second (cfs). 3. An existing 30-inch RCP discharges storm water onto the project site at the southwestern boundary of the project site. Runoff flows southeasterly and confluences with the earthen drainage channel which at this location begins flowing southeasterly prior to discharging to the existing 48-inch RCP which continues under the I-8 offramp. The offsite drainage area to the existing 30-inch RCP is 4.2 acres. The 100-year storm event peak flow rate (Q100) at this location is 11.32 cubic feet per second (cfs). The total drainage area to the existing 48-inch RCP that conveys flow under the I-8 offramp is 64 acres. Q100 at this location is 118.26 cfs.

Form I-3B Page 4 of 11

Description of Proposed Site Development and Drainage Patterns

Project Description / Proposed Land Use and/or Activities:

The project proposes to construct 1 church building, two private driveway entrances, drive aisles, paver parking, associated public and private utilities, and 4 biofiltration basins that will provide storm water quality treatment and hydromodification manangement for onsite runoff. A 36-inch RCP mainline storm drain is proposed to connect to the existing 36-inch RCP at the northern boundary and convey offsite storm water southerly through the project site. An 18-inch RCP is proposed to connect to the existing 18-inch RCP at the eastern boundary of the site and convey offsite storm water westerly before confluencing with the proposed mainline 48-inch RCP. Onsite storm water runoff will drain to 4 biofiltration basins for water quality treatment and hydromodification manangment prior to discharging to the mainline storm drain.

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

Church, parking garage, driveways/roadways, and associated hardscape.

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

Landscape areas, shade trees, biofiltration basins and pervious pavement

Does the project include grading and changes to site topography?

☑ Yes

☐ No

Description / Additional Information:

The site currently sits well below the adjacent College Avenue and Interstate 8 offramp to College Avenue and has relatively steep topography from one end to the other. In order to create a buildable PAD area and have reasonable road grades, the lower end of the site needs to be raised using proposed walls.

Form I-3B Page 5 of 11

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 and 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.

Description / Additional Information:

The site currently has 3 existing public stormdrains that outlet onto the site and then flow overland. The proposed project is going to add additional underground pipe to route two of these outlets further down the site, closer to POC-1. All new parking, garage and road surfacing will be collected via storm drain inlet structures and piped to different bioretention basins throughout the site for water quality treatment and hydromodification controls. The church structure itself will have the roof drains directed to Bioretention Basin #4. Concrete brow ditches will be used to convey off-site drainage, drainage along the property line and self-mitigating landscape areas. These ditches will be end at Type-F Catch Basins and routed amongst the main stormdrain line and routed to the south to POC-1. With the exception of DMA-4, the entire offsite and onsite drainage ends up in a 48" Public stormdrain that runs along Caltran R/W before it exits at a headwall into an engineered earthen channel (per SDD-109). This flows adjacent to the proposed retaining wall (adjacent to the proposed Church) before outletting at rip-rap and confluencing with the treated runoff from DMA-4 before flowing according to it's existing drainage path to the existing 48" Caltrans stomdrain (with headwall). This is approximately where POC-1 is located and where the runoff is picked up and routed South beneath Interstate-8.

Note: All offsite runoff that enters the property is being addressed using proposed underground (public) stormdrain infrastructure and private concrete brow ditches to convey the offsite runoff to POC-1.

Form I-3B Page 6 of 11

Identify whether any of the following features, activities, and/or pollutant source areas will be present (select all that apply):

- [x] Onsite storm drain inlets
- [ ] Interior floor drains and elevator shaft sump pumps
- [x] Interior parking garages
- [ ] Need for future indoor & structural pest control
- [x] 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
- [x] Plazas, sidewalks, and parking lots

Description/Additional Information:

Project Name: All Peoples Church

Form I-3B Page 7 of 11
Identification and Narrative of Receiving Water
Narrative describing flow path from discharge location(s), through urban storm conveyance system, to receiving creeks, rivers, and lagoons and ultimate discharge location to Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable) Site runoff discharges on the southwest corner of the site into an existing 48" concrete headwall that carries storm water under Interstate 8 and into Alvarado Creek. From Alvarado Creek, storm water flows and merges into San Diego River (Lower) which then flows into Famosa Slough and Channel. Storm water ultimately flows into the Pacific Ocean Shoreline, San Diego HU, at Stub Jetty, south of the San Diego River outlet, near Cape May Avenue.
Provide a summary of all beneficial uses of receiving waters downstream of the project discharge locations AGR, AQUA, BIOL, COLD, COMM, IND, MAR, MIGR, MUN, NAV, RARE, REC1, REC2, SHELL, SPWN, WARM, WILD
Identify all ASBS (areas of special biological significance) receiving waters downstream of the project discharge locations None
Provide distance from project outfall location to impaired or sensitive receiving waters 500 feet to Alvarado Creek
Summarize information regarding the proximity of the permanent, post-construction storm water BMPs to the City's Multi-Habitat Planning Area and environmentally sensitive lands N/A

Project Name: All Peoples Church

Form I-3B Page 8 of 11		
Identification of Receiving Water Pollutants of Concern		
List any 303(d) impaired water bodies within the path of storm water from the project site to the Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable), identify the pollutant(s)/stressor(s) causing impairment, and identify any TMDLs and/or Highest Priority Pollutants from the WQIP for the impaired water bodies:		
303(d) Impaired Water Body (Refer to Appendix K)	**Pollutant(s)/Stressor(s) (Refer to Appendix K)**	**TMDLs/WQIP Highest Priority Pollutant (Refer to Table 1-4 in Chapter 1)**
Alvarado Creek	Nitrogen	TMDL
Alvarado Creek	Selenium	TMDL
Famosa Slough and Channel	Eutrophic	TMDL
Pacific Ocean Shoreline, San Diego HU	Trash	TMDL
San Diego River (Lower)	Benthic Community Effects	TMDL
San Diego River (Lower)	Cadmium	TMDL
San Diego River (Lower)	Nitrogen	TMDL
San Diego River (Lower)	Oxygen, Dissolved	TMDL
San Diego River (Lower)	Phosphorus	TMDL
San Diego River (Lower)	Total Dissolved Solids	TMDL

Identification of Project Site Pollutants*

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

Identify pollutants anticipated from the project site based on all proposed use(s) of the site (see 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	☐	☐	☑
Oil & Grease	☐	☑	☐
Bacteria & Viruses	☑	☐	☐
Pesticides	☐	☑	☐

Project Name: All Peoples Church

Form I-3B Page 9 of 11

Hydromodification Management Requirements

Do hydromodification management requirements apply (see Section 1.6)?

☑ Yes, hydromodification management flow control structural BMPs required.

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

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

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

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

Note: If "No" answer has been selected the SWQMP must include an exhibit that shows the storm water conveyance system from the project site to an exempt water body. The exhibit should include details about the conveyance system and the outfall to the exempt water body.

Critical Coarse Sediment Yield Areas*

*This Section only required if hydromodification management requirements apply

Based on Section 6.2 and Appendix H does CCSYA exist on the project footprint or in the upstream area draining through the project footprint?

☐ Yes

☑ No

Discussion / Additional Information:

No CCSYA exist in the project footprint or upstream area. Please see CCSYA exhibit.

Form I-3B Page 10 of 11
Flow Control for Post-Project Runoff*   ***This Section only required if hydromodification management requirements apply**
List and describe point(s) of compliance (POCs) for flow control for hydromodification management (see Section 6.3.1). For each POC, provide a POC identification name or number correlating to the project's HMP Exhibit and a receiving channel identification name or number correlating to the project's HMP Exhibit.   There is 1 POC for the project. POC1 is located at the south edge of the project site. The downstream receiving channel is Alvarado Creek.
Has a geomorphic assessment been performed for the receiving channel(s)?   ☑ No, the low flow threshold is $0.1Q_2$ (default low flow threshold)   ☐ Yes, the result is the low flow threshold is $0.1Q_2$ ☐ Yes, the result is the low flow threshold is $0.3Q_2$ ☐ Yes, the result is the low flow threshold is $0.5Q_2$ If a geomorphic assessment has been performed, provide title, date, and preparer:
Discussion / Additional Information: (optional)

Project Name: All Peoples Church

Form I-3B Page 11 of 11
Other Site Requirements and Constraints
When applicable, list other site requirements or constraints that will influence storm water management design, such as zoning requirements including setbacks and open space, or local codes governing minimum street width, sidewalk construction, allowable pavement types, and drainage requirements.
Optional Additional Information or Continuation of Previous Sections As Needed
This space provided for additional information or continuation of information from previous sections as needed.

Project Name: All Peoples Church

Source Control BMP Checklist for PDPs	Form I-4B		
Source Control BMPs			
All development projects must implement source control BMPs where applicable and feasible. See Chapter 4 and Appendix E of the BMP Design Manual (Part 1 of the Storm Water Standards) for information to implement source control BMPs shown in this checklist. Answer each category below pursuant to the following. • "Yes" means the project will implement the source control BMP as described in Chapter 4 and/or Appendix E of the 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 may be provided.			
Source Control Requirement	**Applied?**		
4.2.1 Prevention of Illicit Discharges into the MS4	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.2.1 not implemented:			
4.2.2 Storm Drain Stenciling or Signage	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.2.2 not implemented:			
4.2.3 Protect Outdoor Materials Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.2.3 not implemented:			
4.2.4 Protect Materials Stored in Outdoor Work Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.2.4 not implemented:			
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:			

Project Name: All Peoples Church

Form I-4B Page 2 of 2			
Source Control Requirement	**Applied?**		
4.2.6 Additional BMPs Based on Potential Sources of Runoff Pollutants (must answer for each source listed below)			
On-site storm drain inlets	☑ Yes	☐ No	☐ N/A
Interior floor drains and elevator shaft sump pumps	☑ Yes	☐ No	☐ N/A
Interior parking garages	☑ Yes	☐ No	☐ N/A
Need for future indoor & structural pest control	☐ Yes	☐ No	☑ N/A
Landscape/Outdoor Pesticide Use	☑ Yes	☐ No	☐ N/A
Pools, spas, ponds, decorative fountains, and other water features	☐ Yes	☐ No	☑ N/A
Food service	☐ Yes	☐ No	☑ N/A
Refuse areas	☐ Yes	☐ No	☑ N/A
Industrial processes	☐ Yes	☐ No	☑ N/A
Outdoor storage of equipment or materials	☐ Yes	☐ No	☑ N/A
Vehicle/Equipment Repair and Maintenance	☐ Yes	☐ No	☑ N/A
Fuel Dispensing Areas	☐ Yes	☐ No	☑ N/A
Loading Docks	☐ Yes	☐ No	☑ N/A
Fire Sprinkler Test Water	☐ Yes	☐ No	☑ N/A
Miscellaneous Drain or Wash Water	☐ Yes	☐ No	☑ N/A
Plazas, sidewalks, and parking lots	☑ Yes	☐ No	☐ N/A
SC-6A: Large Trash Generating Facilities	☐ Yes	☐ No	☑ N/A
SC-6B: Animal Facilities	☐ Yes	☐ No	☑ N/A
SC-6C: Plant Nurseries and Garden Centers	☐ Yes	☐ No	☑ N/A
SC-6D: Automotive Facilities	☐ 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 all "No" answers shown above.			

Project Name: All Peoples Church

Site Design BMP Checklist for PDPs	Form I-5B

Site Design BMPs

All development projects must implement site design BMPs where applicable and feasible. See Chapter 4 and Appendix E of the BMP Design Manual (Part 1 of Storm Water Standards) for information to implement site design BMPs shown in this checklist.
Answer each category below pursuant to the following.

- "Yes" means the project will implement the site design BMP as described in Chapter 4 and/or Appendix E of the 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 may be provided.

A site map with implemented site design BMPs must be included at the end of this checklist.

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 site is located on a natural drainage channel which will be filled in to construct building pad, parking garage, and road; however the proposed condition honors the existing drainage patterns and utilizes biofiltration basins to mitigate for hydromodification management and the 100-year storm event peak flows.			
1-1 Are existing natural drainage pathways and hydrologic features mapped on the site map?	☑ Yes	☐ No	☐ N/A
1-2 Are trees implemented? If yes, are they shown on the site map?	☐ Yes	☐ No	☑ N/A
1-3 Implemented trees meet the design criteria in 4.3.1 Fact Sheet (e.g. soil volume, maximum credit, etc.)?	☐ Yes	☐ No	☑ N/A
1-4 Is tree credit volume calculated using Appendix B.2.2.1 and SD-1 Fact Sheet in Appendix E?	☐ Yes	☐ No	☑ N/A
4.3.2 Have natural areas, soils and vegetation been conserved?	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.2 not implemented:			

Project Name: All Peoples Church

Form I-5B Page 2 of 4			
Site Design Requirement	Applied?		
4.3.3 Minimize Impervious Area	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.3 not implemented:			
4.3.4 Minimize Soil Compaction	☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.4 not implemented:			
4.3.5 Impervious Area Dispersion	☐ Yes	☐ No	☑ N/A
Discussion / justification if 4.3.5 not implemented:			
5-1 Is the pervious area receiving runon from impervious area identified on the site map?	☐ Yes	☐ No	☑ N/A
5-2 Does the pervious area satisfy the design criteria in 4.3.5 Fact Sheet in Appendix E (e.g. maximum slope, minimum length, etc.)	☐ Yes	☐ No	☑ N/A
5-3 Is impervious area dispersion credit volume calculated using Appendix B.2.1.1 and 4.3.5 Fact Sheet in Appendix E?	☐ Yes	☐ No	☑ N/A

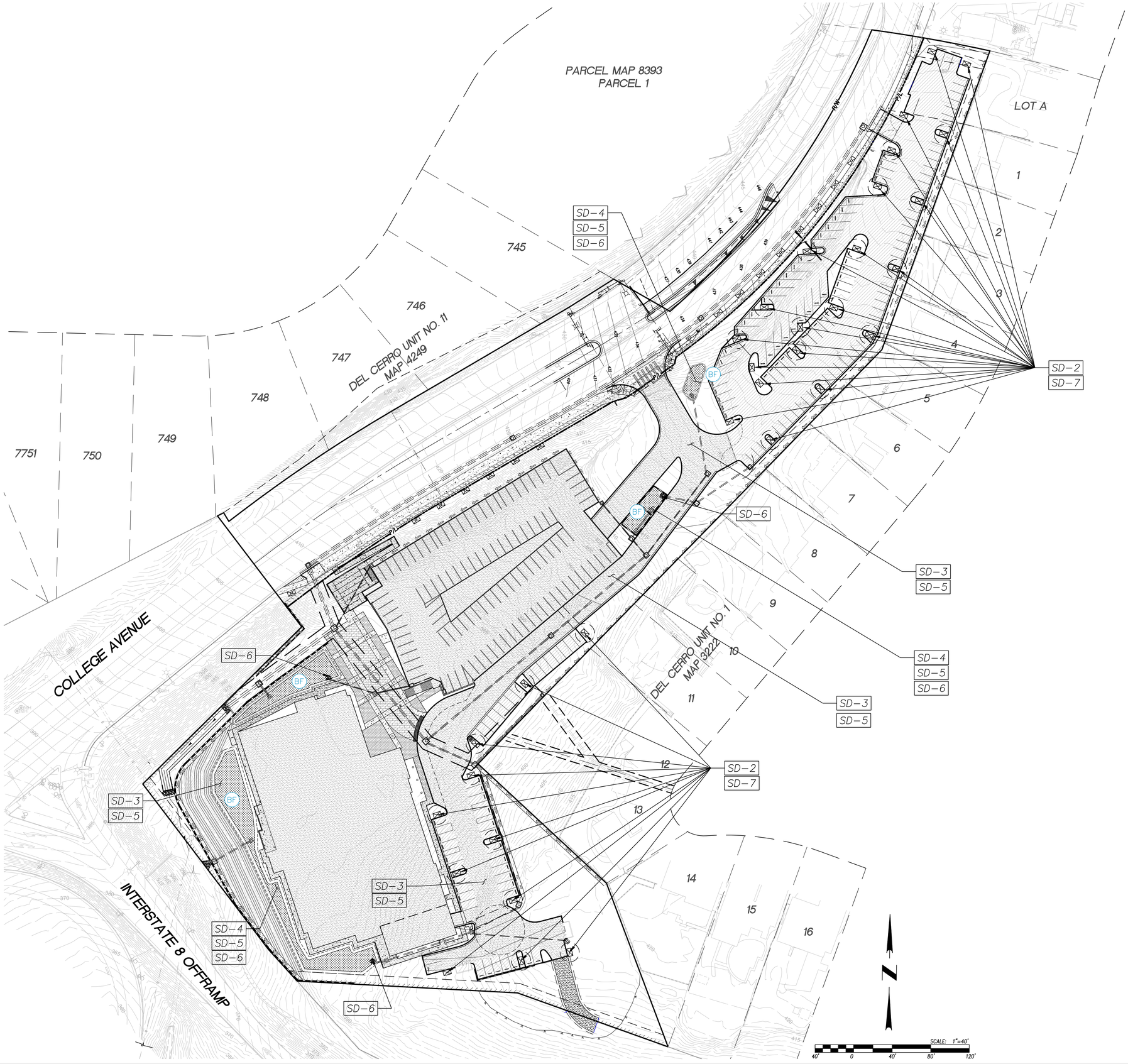
Project Name: All Peoples Church

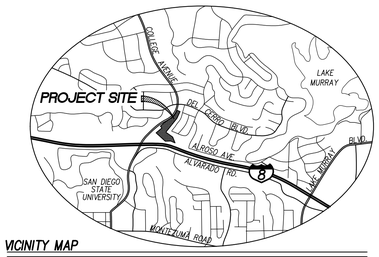
Form I-5B Page 3 of 4				
Site Design Requirement		Applied?		
4.3.6 Runoff Collection		☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.6 not implemented:				
6a-1	Are green roofs implemented in accordance with design criteria in 4.3.6A Fact Sheet? If yes, are they shown on the site map?	☐ Yes	☐ No	☑ N/A
6a-2	Is the green roof credit volume calculated using Appendix B.2.1.2 and 4.3.6A Fact Sheet in Appendix E?	☐ Yes	☐ No	☑ N/A
6b-1	Are permeable pavements implemented in accordance with design criteria in 4.3.6B Fact Sheet? If yes, are they shown on the site map?	☑ Yes	☐ No	☐ N/A
6b-2	Is the permeable pavement credit volume calculated using Appendix B.2.1.3 and 4.3.6B Fact Sheet in Appendix E?	☑ Yes	☐ No	☐ N/A
4.3.7 Landscaping with Native or Drought Tolerant Species		☑ Yes	☐ No	☐ N/A
Discussion / justification if 4.3.7 not implemented:				
4.3.8 Harvest and Use Precipitation		☐ Yes	☑ No	☐ N/A
Discussion / justification if 4.3.8 not implemented: Harvest and Use Precipitation is not feasible to implement per Form I-7.				
8-1	Are rain barrels implemented in accordance with design criteria in 4.3.8 Fact Sheet? If yes, are they shown on the site map?	☐ Yes	☐ No	☑ N/A
8-2	Is the rain barrel credit volume calculated using Appendix B.2.2.2 and 4.3.8 Fact Sheet in Appendix E?	☐ Yes	☐ No	☑ N/A

Project Name: All Peoples Church

Form I-5B Page 4 of 4
Insert Site Map with all site design BMPs identified:
SEE MAP ON NEXT PAGE

SWQMP SITE DESIGN MAP





VICINITY MAP

NOT TO SCALE

LEGEND

RIGHT-OF-WAY	R/W
DEDICATED PROPERTY LINE	P/L
LIMIT OF GRADING	
DRAINAGE DIRECTION	
RIP RAP ENERGY DISSIPATER	
PERMEABLE PAVEMENT	
IMPERVIOUS AREA (ROOF AND CONCRETE)	
BIOFILTRATION BASIN (BF-1)	BF

SITE DESIGN BMPS IMPLEMENTED

SD-2	CONSERVE NATURAL AREAS, SOILS, AND VEGETATION (4.3.2)
SD-3	MINIMIZE IMPERVIOUS AREA (4.3.3)
SD-4	MINIMIZE SOIL COMPACTION (4.3.4)
SD-5	IMPERVIOUS AREA DISPERSION (4.3.5)
SD-6	RUNOFF COLLECTION (4.3.6)
SD-7	LANDSCAPING WITH NATIVE OR DROUGHT TOLERANT SPECIES (4.3.7)

SITE DESIGN BMP NOTES

THE FOLLOWING SITE DESIGN ELEMENTS WERE IMPLEMENTED TO MEET THE REQUIREMENTS LAID OUT IN SECTION 4.3 OF THE STORMWATER STANDARDS MANUAL:

4.3.2: THIS PROJECT PROPOSES TO CONSERVE NATURAL AREAS, SOILS, AND VEGETATION BY PLANTING ADDITIONAL NATIVE OR DROUGHT TOLERANT TREES AND SHRUBS, AS WELL AS REPLACING THE TOPSOIL IN AREAS OF DISTURBANCE.

4.3.3: THE PROJECT PROPOSES TO MINIMIZE IMPERVIOUS AREA BY USING PERMEABLE PAVERS IN THE PRIVATE DRIVEWAYS AND SURFACE PARKING AREAS, AS WELL AS KEEPING THE DRIVE AISLES TO THE MINIMUM WIDTH NECESSARY.

4.3.4: ALL PROPOSED LANDSCAPE AND BIOFILTRATION AREAS MINIMIZE SOIL COMPACTION IN ORDER TO ALLOW MORE STORMWATER RUNOFF TO PERMEATE INTO THE SOIL AND SLOW DOWN THE FLOW.

4.3.5: THIS PROJECT SUCCESSFULLY DISPERSES ALL IMPERVIOUS AREAS THROUGH LANDSCAPING, BIOFILTRATION/STORMWATER TREATMENT, OR PERMEABLE PAVERS PRIOR TO DRAINING TO THE PUBLIC STORM SYSTEM.

4.3.6: THE PROJECT PROPOSED RUNOFF COLLECTION BY TREATING SITE RUNOFF IN PERMANENT POST-CONSTRUCTION BMPS PRIOR TO RELEASING FLOW OFFSITE. ALL RUNOFF FROM THE PROPOSED CHURCH IS COLLECTED IN ROOF DOWNSPOUTS AND DISCHARGES INTO THE BIOCLEAN MWS TREATMENT DEVICE AND THEN AN UNDERGROUND VAULT.

4.3.7: ALL PROPOSED LANDSCAPE ARES WILL BE PLANTED WITH NATIVE OR DROUGHT TOLERANT SPECIES.

SITE DESIGN MAP

ALL PEOPLES CHURCH, PTS# 636444
INTERSTATE 8 + COLLEGE AVENUE
SAN DIEGO, CALIFORNIA
PLSA JOB # 2936
SCALE: 1" = 40'
DATE: FEBRUARY 2021
SHEET 1 OF 1

PASCO LARET SUITER & ASSOCIATES
San Diego | Solana Beach | Orange County
Phone 858.259.8212 | www.plsaengineering.com

Project Name: All Peoples Church

Summary of PDP Structural BMPs	Form I-6

PDP Structural BMPs

All PDPs must implement structural BMPs for storm water pollutant control (see Chapter 5 of the BMP Design Manual, Part 1 of Storm Water Standards). 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 City at the completion of construction. This includes requiring the project owner or project owner's representative to certify construction of the structural BMPs (complete Form DS-563). PDP structural BMPs must be maintained into perpetuity (see Chapter 7 of the BMP Design Manual).

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

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

The type of structural BMP chosen for the project was based on the flow charts presented in Figures 5-1 and 5-2 of the City of San Diego Storm Water Standards Manual. Using Form I-7 (Worksheet B.3-1) to gauge the feasibility of implementing capture and use techniques for the project site, it was determined that Harvest and Use BMPs are considered infeasible. After determining Harvest and Use BMPs are infeasible, the infiltration feasibility analysis per Form I-8 resulted in a No Infiltration condition.
The project site is divided into five (5) DMAs, with DMAs 1-4 treated for water quality and hydromodification. DMA-5 is self-mitigating.

The project is proposing the use of permeable pavement as Site Design BMPs per BMP Design Fact Sheet SD-D.

The permanent structural BMP selection was Biofiltration (BF-1) for DMA-1 to DMA-4

(Continue on page 2 as necessary.)

Project Name: All Peoples Church

Form I-6 Page 2 of 8

(Continued from page 1)

Project Name: All Peoples Church

Form I-6 Page 1 of 8 (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. BMP-1	
Construction Plan Sheet No.	
Type of Structural BMP: ☐ Retention by harvest and use (e.g. HU-1, cistern) ☐ 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) ☐ 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 form DS-563	PASCO LARET SUITER & ASSOCIATES 1911 SAN DIEGO AVE, SUITE 100 SAN DIEGO, CA 92110
Who will be the final owner of this BMP?	ALL PEOPLES CHURCH
Who will maintain this BMP into perpetuity?	ALL PEOPLES CHURCH
What is the funding mechanism for maintenance?	ALL PEOPLES CHURCH

Project Name: All Peoples Church

Form I-6 Page 2 of 8 (Copy as many as needed)
Structural BMP ID No. BMP-1
Construction Plan Sheet No.
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs): 472 SF bioretention basin serves to meet water quality and hydromodification requirements. It includes an 18" by 18" overflow riser, with a 0.2188" orifice for hydromodification. It treats the western half of the limited-use parking area that utilizes permeable pavement throughout. Please see B-Forms for WQ calcs, and SWMM analysis for hydromodification calculations.

Project Name: All Peoples Church

Form I-6 Page 3 of 8 (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. BMP-2	
Construction Plan Sheet No.	
Type of Structural BMP: ☐ Retention by harvest and use (e.g. HU-1, cistern) ☐ 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) ☐ 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 form DS-563	PASCO LARET SUITER & ASSOCIATES 1911 SAN DIEGO AVE, SUITE 100 SAN DIEGO, CA 92110
Who will be the final owner of this BMP?	ALL PEOPLES CHURCH
Who will maintain this BMP into perpetuity?	ALL PEOPLES CHURCH
What is the funding mechanism for maintenance?	ALL PEOPLES CHURCH

Form I-6 Page 4 of 8 (Copy as many as needed)
Structural BMP ID No. BMP-2
Construction Plan Sheet No.
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs): 858 SF walled-in, tiered bioretention basin serves to meet water quality and hydromodification requirements. It includes an 18" by 18" overflow riser, with a 0.2969" orifice for hydromodification. It treats the eastern half of the northern limited-use parking area that utilizes permeable pavement almost entirely throughout, with some concrete in there. Please see B-Forms for WQ calcs, and SWMM analysis for hydromodification calculations.

Project Name: All Peoples Church

Form I-6 Page 5 of 8 (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. BMP-3	
Construction Plan Sheet No.	
Type of Structural BMP: ☐ Retention by harvest and use (e.g. HU-1, cistern) ☐ 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) ☐ 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 form DS-563	PASCO LARET SUITER & ASSOCIATES 1911 SAN DIEGO AVE, SUITE 100 SAN DIEGO, CA 92110
Who will be the final owner of this BMP?	ALL PEOPLES CHURCH
Who will maintain this BMP into perpetuity?	ALL PEOPLES CHURCH
What is the funding mechanism for maintenance?	ALL PEOPLES CHURCH

Project Name: All Peoples Church

Form I-6 Page 6 of 8 (Copy as many as needed)
Structural BMP ID No. BMP-3
Construction Plan Sheet No.
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs): 1725 SF standard bioretention basin serves to meet water quality and hydromodification requirements. It includes an 24" by 24" overflow riser, with a 3/4" orifice for hydromodification. It treats the parking garage, concrete downgrade approach to upper deck of garage, plaza area, concrete ADA switchback ramp and associated landscape and hardscape adjacent to the plaza. Please see B-Forms for WQ calcs, and SWMM analysis for hydromodification calculations.

Project Name: All Peoples Church

Form I-6 Page 7 of 8 (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. BMP-4	
Construction Plan Sheet No.	
Type of Structural BMP: ☐ Retention by harvest and use (e.g. HU-1, cistern) ☐ 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) ☐ 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 form DS-563	PASCO LARET SUITER & ASSOCIATES 1911 SAN DIEGO AVE, SUITE 100 SAN DIEGO, CA 92110
Who will be the final owner of this BMP?	ALL PEOPLES CHURCH
Who will maintain this BMP into perpetuity?	ALL PEOPLES CHURCH
What is the funding mechanism for maintenance?	ALL PEOPLES CHURCH

Project Name: All Peoples Church

Form I-6 Page 4 of 4 (Copy as many as needed)
Structural BMP ID No. BMP-4
Construction Plan Sheet No.
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs): 4252 SF standard bioretention basin serves to meet water quality and hydromodification requirements. It includes an 24" by 24" overflow riser, with a 3/4" orifice for hydromodification. It treats the entirety of the Church, the fire access road and turnaourd, permeable parking spots, graded slopes, concrete downgrade approach to lower deck of garage, and associated landscape and hardscape adjacent to the Church building. Please see B-Forms for WQ calcs, and SWMM analysis for hydromodification calculations.

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Attachment 1
Backup For PDP Pollutant Control BMPs

This is the cover sheet for Attachment 1.

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Project Name: All Peoples Church

Indicate which Items are Included:

Attachment Sequence	Contents	Checklist
Attachment 1a	DMA Exhibit (Required) See DMA Exhibit Checklist.	☑ Included
Attachment 1b	Tabular Summary of DMAs Showing DMA ID matching DMA Exhibit, DMA Area, and DMA Type (Required)* *Provide table in this Attachment OR on DMA Exhibit in Attachment 1a	☑ Included on DMA Exhibit in Attachment 1a ☐ Included as Attachment 1b, separate from DMA Exhibit
Attachment 1c	Form I-7, Harvest and Use Feasibility Screening Checklist (Required unless the entire project will use infiltration BMPs) Refer to Appendix B.3-1 of the BMP Design Manual to complete Form I-7.	☑ Included ☐ Not included because the entire project will use infiltration BMPs
Attachment 1d	Infiltration Feasibility Information. Contents of Attachment 1d depend on the infiltration condition: • No Infiltration Condition: ○ Infiltration Feasibility Condition Letter (***Note: must be stamped and signed by licensed geotechnical engineer***) ○ Form I-8A (optional) ○ Form I-8B (optional) • Partial Infiltration Condition: ○ Infiltration Feasibility Condition Letter (***Note: must be stamped and signed by licensed geotechnical engineer***) ○ Form I-8A ○ Form I-8B • Full Infiltration Condition: ○ Form I-8A ○ Form I-8B ○ Worksheet C.4-3 ○ Form I-9 Refer to Appendices C and D of the BMP Design Manual for guidance.	☑ Included ☐ Not included because the entire project will use harvest and use BMPs
Attachment 1e	Pollutant Control BMP Design Worksheets / Calculations (Required) Refer to Appendices B and E of the BMP Design Manual for structural pollutant control BMP design guidelines and site design credit calculations	☑ Included

Project Name: All Peoples Church

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 grading
- ☑ Proposed impervious features
- ☑ Proposed design features and surface treatments used to minimize imperviousness
- ☑ Drainage management area (DMA) boundaries, DMA ID numbers, and DMA areas (square footage or acreage), and DMA type (i.e., drains to BMP, self-retaining, or self-mitigating)
- ☑ Potential pollutant source areas and corresponding required source controls (see Chapter 4, Appendix E.1, and Form I-3B)
- ☑ Structural BMPs (identify location, type of BMP, size/detail, and include cross-section)

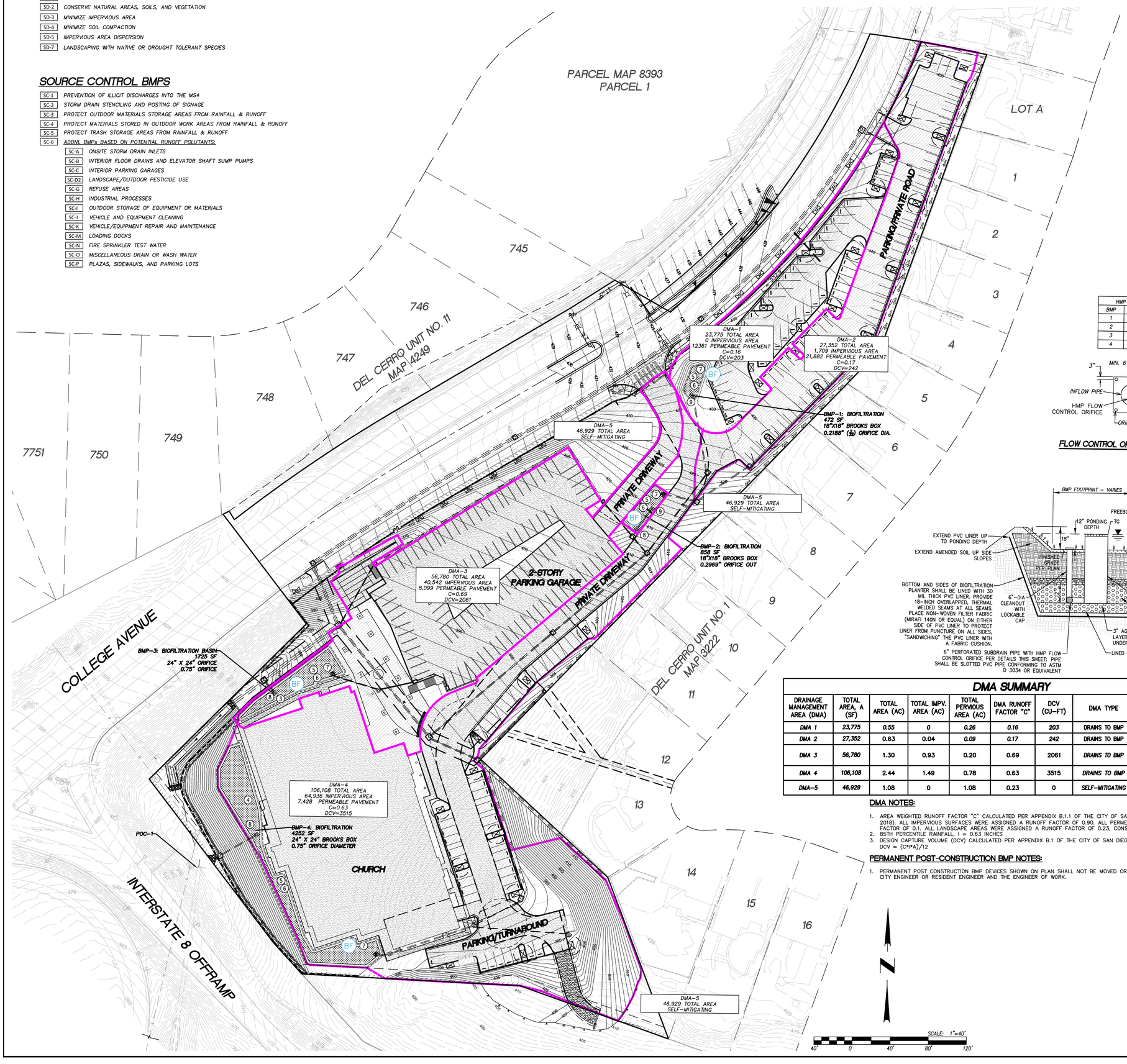
ONSITE WATER QUALITY AND HMP EXHIBIT

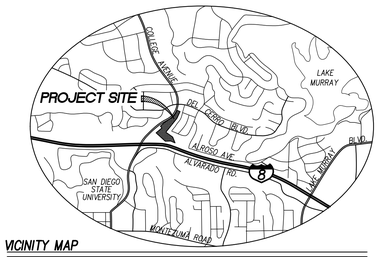
SITE DESIGN BMPS

- SD-1 MAINTAIN NATURAL DRAINAGE PATHWAYS AND HYDRAULIC FEATURES
- SD-2 CONSERVE NATURAL AREAS, SOILS, AND VEGETATION
- SD-3 MINIMIZE IMPERVIOUS AREA
- SD-4 MINIMIZE SOIL COMPACTION
- SD-5 IMPERVIOUS AREA DISPERSION
- SD-7 LANDSCAPING WITH NATIVE OR DROUGHT TOLERANT SPECIES

SOURCE CONTROL BMPS

- SC-1 PREVENTION OF ILLICIT DISCHARGES INTO THE MS4
- SC-2 STORM DRAIN STENCILING AND POSTING OF SIGNAGE
- SC-3 PROTECT OUTDOOR MATERIALS STORAGE AREAS FROM RAINFALL & RUNOFF
- SC-4 PROTECT MATERIALS STORED IN OUTDOOR WORK AREAS FROM RAINFALL & RUNOFF
- SC-5 PROTECT TRASH STORAGE AREAS FROM RAINFALL & RUNOFF
- SC-6 ADDNL BMPs BASED ON POTENTIAL RUNOFF POLUTANTS:
  - SC-A ONSITE STORM DRAIN INLETS
  - SC-B INTERIOR FLOOR DRAINS AND ELEVATOR SHAFT SUMP PUMPS
  - SC-C INTERIOR PARKING GARAGES
  - SC-D2 LANDSCAPE/OUTDOOR PESTICIDE USE
  - SC-G REFUSE AREAS
  - SC-H INDUSTRIAL PROCESSES
  - SC-I OUTDOOR STORAGE OF EQUIPMENT OR MATERIALS
  - SC-J VEHICLE AND EQUIPMENT CLEANING
  - SC-K VEHICLE/EQUIPMENT REPAIR AND MAINTENANCE
  - SC-M LOADING DOCKS
  - SC-N FIRE SPRINKLER TEST WATER
  - SC-O MISCELLANEOUS DRAIN OR WASH WATER
  - SC-P PLAZAS, SIDEWALKS, AND PARKING LOTS





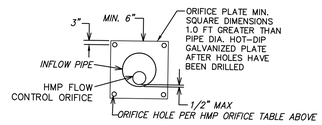
VICINITY MAP

NOT TO SCALE

LEGEND

- RIGHT-OF-WAY — R/W
- PROPERTY LINE — P/L
- DMA BOUNDARY
- LIMIT OF GRADING
- DRAINAGE DIRECTION
- RIP RAP ENERGY DISSIPATER
- PERMEABLE PAVEMENT
- IMPERVIOUS AREA (ROOF AND CONCRETE)
- BIOFILTRATION BASIN (BF-1) (BF)

HMP ORIFICE TABLE	
BMP	ORIFICE SIZE
1	0.2188"
2	0.2969"
3	0.75"
4	0.75"



FLOW CONTROL ORIFICE PLATE DETAIL

NOT TO SCALE

DMA SUMMARY

DRAINAGE MANAGEMENT AREA (DMA)	TOTAL AREA, A (SF)	TOTAL AREA (AC)	TOTAL IMPV. AREA (AC)	TOTAL PERVIOUS AREA (AC)	DMA RUNOFF FACTOR "C"	DCV (CU-FT)	DMA TYPE	STRUCTURAL BMP TYPE	STRUCT. BMP NAME
DMA 1	23,775	0.55	0	0.26	0.16	203	DRAINS TO BMP	BIOFILTRATION (BF-1)	BMP-1
DMA 2	27,352	0.63	0.04	0.09	0.17	242	DRAINS TO BMP	BIOFILTRATION (BF-1)	BMP-2
DMA 3	56,780	1.30	0.93	0.20	0.69	2061	DRAINS TO BMP	BIOFILTRATION (BF-1)	BMP-3
DMA 4	106,108	2.44	1.49	0.78	0.63	3515	DRAINS TO BMP	BIOFILTRATION (BF-1)	BMP-4
DMA-5	46,929	1.08	0	1.08	0.23	0	SELF-MITIGATING	SELF-MITIGATING	N/A

DMA NOTES:

1. AREA WEIGHTED RUNOFF FACTOR "C" CALCULATED PER APPENDIX B.1.1 OF THE CITY OF SAN DIEGO BMP DESIGN MANUAL (OCTOBER 2018). ALL IMPERVIOUS SURFACES WERE ASSIGNED A RUNOFF FACTOR OF 0.90. ALL PERMEABLE PAVEMENT WAS ASSIGNED A RUNOFF FACTOR OF 0.1. ALL LANDSCAPE AREAS WERE ASSIGNED A RUNOFF FACTOR OF 0.23, CONSISTENT WITH TYPE C SOILS.
2. 85TH PERCENTILE RAINFALL, I = 0.63 INCHES
3. DESIGN CAPTURE VOLUME (DCV) CALCULATED PER APPENDIX B.1 OF THE CITY OF SAN DIEGO BMP DESIGN MANUAL (OCTOBER 2018). DCV = (C*I*A)/12

PERMANENT POST-CONSTRUCTION BMP NOTES:

1. PERMANENT POST CONSTRUCTION BMP DEVICES SHOWN ON PLAN SHALL NOT BE MOVED OR MODIFIED WITHOUT THE APPROVAL OF THE CITY ENGINEER OR RESIDENT ENGINEER AND THE ENGINEER OF WORK.

CONSTRUCTION NOTES

1. PROPOSED PERMANENT BIOFILTRATION BASIN BMP-1 PER DETAIL THIS SHEET
2. PROPOSED PERMANENT BIOFILTRATION BASIN BMP-2 PER DETAIL THIS SHEET
3. PROPOSED PERMANENT BIOFILTRATION BASIN BMP-3 PER DETAIL THIS SHEET
4. PROPOSED PERMANENT BIOFILTRATION BASIN BMP-4 PER DETAIL THIS SHEET
5. 6" CLEANOUT WITH LOCKABLE CAP
6. PERFORATED 6" PVC UNDERDRAIN PIPE (ASTM D 3034 OR EQUIVALENT)
7. No. 2 BACKING RIP-RAP ENERGY DISSIPATER
8. 24" X 24" BROOKS CATCH BASIN. CATCH BASIN SHALL BE MARKED WITH THE WORDS "NO DUMPING- DRAINS TO RIVER" OR SIMILAR CITY APPROVED STORM DRAIN MARKER.
9. 18" X 18" BROOKS CATCH BASIN. CATCH BASIN SHALL BE MARKED WITH THE WORDS "NO DUMPING- DRAINS TO RIVER" OR SIMILAR CITY APPROVED STORM DRAIN MARKER.

PROJECT CHARACTERISTICS

TOTAL PROJECT OWNERSHIP: 5.99 ACRES

TOTAL DISTURBED AREA: 5.92 ACRES

TOTAL PROPOSED IMPERVIOUS AREA: 107,187 SF= 2.46 ACRES

TOTAL PERMEABLE PAVEMENT: 49,621 SF=1.14 ACRES

TOTAL PROPOSED LANDSCAPE AREA: 101,059 SF = 2.32 ACRES

EXISTING HYDROLOGIC FEATURES: N/A

SOIL INFORMATION

HYDROLOGIC SOIL GROUP: TYPE C

GROUNDWATER INFORMATION

GROUNDWATER WAS NO ENCOUNTERED DURING GEOTECHNICAL TESTING PER GEOTECHNICAL INVESTIGATION, "UPDATED PRELIMINARY GEOTECHNICAL INVESTIGATION AND DESIGN RECOMMENDATIONS, PROPOSED CHURCH FACILITY, APN 463-010-1000, SAN DIEGO, CALIFORNIA 90212" BY ADVANCED GEOTECHNICAL SOLUTIONS, INC DATED JANUARY 20, 2020.

CCYSAs

THE PROJECT IS ENTIRELY EXEMPT/NOT SUBJECT TO RPO REQUIREMENTS WITHOUT UTILIZATION OF RPO EXEMPTIONS AS THERE ARE NO AREAS ONSITE OR UPSTREAM TO PROTECT; THEREFORE THE PROJECT EFFECTIVELY AVOIDS AND BYPASSES SOURCES OF MAPPED CCYSAS PER APPROACHED OUTLINED IN APPENDIX H.2 AND H.3 AS NONE WERE IDENTIFIED.

REFER TO WMAA MAP INCLUDED IN THE "PRIORITY DVELOPMENT PROJECT (PDP) STORM WATER QUALITY MANAGEMENT PLAN (SWQMP) FOR THE ALL PEOPLES CHURCH"

PROPOSED CONDITION
DMA & HMP EXHIBIT

ALL PEOPLES CHURCH, PTS# 636444
INTERSTATE 8 + COLLEGE AVENUE
SAN DIEGO, CALIFORNIA
PLSA JOB # 2936
SCALE: 1" = 40'
DATE: FEBRUARY 2021
SHEET 1 OF 1

PASCO LARET SUITER & ASSOCIATES
San Diego | Solana Beach | Orange County
Phone 858.259.8212 | www.plsaengineering.com

BMP Sizing and DCV Summary Table

BMP Location	BMP Description	Total Area (sq-ft)	% Impervious	% Pervious	% Permeable Pavement	C Weighted Runoff Factor	DCV Req'd (Cu-ft)	Minimum 3% Treatment Area (sq-ft)	BMP Area Provided (sq-ft)	DCV Provided (Cu-Ft)			Modular Wetland Flow Design (cfs)
DMA-1	BIOFILTRATION PLANTER #1	23775.00	0%	48%	52%	0.16	202.7	116	472.0	660.8			
DMA-2	BIOFILTRATION PLANTER #2	27352.00	6%	14%	80%	0.17	241.9	138	858.0	1201.2			
DMA-3	BIOFILTRATION PLANTER #3	56780.00	71%	15%	14%	0.69	2061.1	1178	1725.0	2415.0			
DMA-4	BIOFILTRATION PLANTER #4	106108.00	61%	32%	7%	0.63	3514.7	2008	4252.0	5952.8			
DMA-5	SELF-TREATING	46929.00	0%	100%	0%	0.23	566.7	NA	0.0	0.0			
TOTAL DMA AREA:		**260944**	**41%**	**28%**	**31%**	**0.47**	**6587.01**	**3440.19**	**7307.00**	**10229.8**			
TOTAL BMP AREA:		**7307.00**											

NOTE: Weighted runoff factor based on percent of impervious, pervious, and paver area in each respective DMA

Runoff Factor (Table B.1.1 City of SD SW Manual)

Impervious	0.90	
Landscape	0.23	C Soils
Permeable Pavers	0.10	

P85th Parameters

Intensity:	0.20	in/hr
Precip:	0.63	in

B.1.2 Offline BMPs

Diversion flow rates for offline BMPs shall be sized to convey the maximum flow rate of runoff produced from a rainfall intensity of 0.2 inches of rainfall per hour, for each hour of every storm event. The following hydrologic method (Equation B.1-3) shall be used to calculate the diversion flow rate for off-line BMPs:

Equation B.1-1: Hydrologic Method

$$Q = C \times i \times A$$

where:

Q	=	Diversion flow rate in cubic feet per second
C	=	Runoff factor, area weighted estimate using Table B.1
i	=	Rainfall intensity of 0.2 in/hr.
A	=	Tributary area (acres) within the project footprint.

Drawdown Time for Biofiltration BMP-1

Outlet Q:	0.0026	cfs	0.234 in/hr
BMP Percolation Rate:	5	in/hr	0.0001 ft/sec
BMP Area:	472.0	sq-ft	
BMP Percolation Rate:	0.05	cfs	
Basin Volume:	661	cu-ft	
DCV/Average Q:	258125	secs	**71.70 Hours**

Drawdown Time for Biofiltration BMP-2

Outlet Q:	0.0048	cfs	0.241 in/hr
BMP Percolation Rate:	5	in/hr	0.0001 ft/sec
BMP Area:	858.0	sq-ft	
BMP Percolation Rate:	0.099	cfs	
Basin Volume:	1201	cu-ft	
DCV/Average Q:	251297	secs	**69.80 Hours**

Drawdown Time for Biofiltration BMP-3

Outlet Q:	0.0294	cfs	0.737 in/hr
BMP Percolation Rate:	5	in/hr	0.0001 ft/sec
BMP Area:	1725.0	sq-ft	
BMP Percolation Rate:	0.20	cfs	
Basin Volume:	2415	cu-ft	
DCV/Average Q:	82059	secs	**22.79 Hours**

Drawdown Time for Biofiltration BMP-4

Outlet Q:	0.0294	cfs	0.299 in/hr
BMP Percolation Rate:	5	in/hr	0.0001 ft/sec

B.1.1 Runoff Factor

Estimate the area weighted runoff factor for the tributary area to the BMP using runoff factor (from Table B.1-1) and area of each surface type in the tributary area and Equation B.1-2.

Equation B.1-2: Estimating Runoff Factor for Area

$$C = \frac{\sum C_x A_x}{\sum A_x}$$

where:

C_x	=	Runoff factor for area X
A_x	=	Tributary area X (acres)

These runoff factors apply to areas receiving direct rainfall only. For conditions in which runoff is routed onto a surface from an adjacent surface, see Section B.2 for determining composite runoff factors for these areas.

Table B.1-1: Runoff factors for surfaces draining to BMPs – Pollutant Control BMPs

Surface	Runoff Factor
Roofs[1]	0.90
Concrete or Asphalt[1]	0.90
Unit Pavers (grouted)[1]	0.90
Decomposed Granite	0.30
Cobbles or Crushed Aggregate	0.30
Amended, Mulched Soils or Landscape[2]	0.10
Compacted Soil (e.g., unpaved parking)	0.30
Natural (A Soil)	0.10
Natural (B Soil)	0.14
Natural (C Soil)	0.23
Natural (D Soil)	0.30

[1]Surface is considered impervious and could benefit from use of Site Design BMPs and adjustment of the runoff factor per Section B.2.1.
[2]Surface shall be designed in accordance with SD-F (Amended soils) fact sheet in Appendix E

BMP Area:	4252.0	sq-ft	
BMP Percolation Rate:	0.49	cfs	
Basin Volume:	5953	cu-ft	
DCV/Average Q:	202270	secs	**56.19 Hours**

San Diego County
85th Percentile Isopluvials
85th Percentile Rainfall in Inches
Freeway
Highway
Major Road
Street
Municipal Boundary
Water Body
Note:
The 85th percentile is a 24-hour rainfall total.
It represents a value such that 85% of the
observed 24-hour rainfall totals will be less
than that value.
PROJECT
LOCATION
SAN DIEGO BAY
MISSION BAY
0 1 2 3 4 Miles
LUEG GIS
Land Use & Environment Group
Geographic Information Service
SanGIS

City of San Diego Biofiltration BMP Sizing Worksheets (Appendix B.5) (Version 1.0 - January 2018)

Overview:

Priority development projects that will be implementing biofiltration BMPs to satisfy the pollutant control performance standard for the project may use these automated worksheets to size the biofiltration BMPs and document compliance with the performance standard. The City of San Diego (City) developed this tool to assist the applicant performing sizing calculations using worksheets in Appendix B.5 and to streamline the plan review process. The use of this tool is optional and the applicant may elect to provide their own calculations.

To use this tool applicants must navigate to the appropriate worksheet tab and populate the orange cells with project specific information, all other cells are locked for editing and will be automatically calculated.

In this tool each tab is independent of other tabs.

After completion of the calculations, the applicant must print a pdf of the tab for each BMP and attach it to the PDP SWQMP.

Disclaimer:

The applicant assumes responsibility for the selection and application of this tool and should verify all of the assumptions and computed results for reasonableness and accuracy. The City will not be held liable for any errors or other negative impacts associated with the use of this tool. In the event that the City performs updates to this tool, applicants that have not established reliance on previous versions of this tool via discretionary approval may be required to utilize the latest version of the tool.

The City of SAN DIEGO	Project Name	All Peoples Church	
	BMP ID	1	
Sizing Method for Pollutant Removal Criteria		**Worksheet B.5-1**	
1	Area draining to the BMP	23,775	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.16	
3	85th percentile 24-hour rainfall depth	0.63	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	200	cu. ft.
BMP Parameters			
5	Surface ponding [6 inch minimum, 12 inch maximum]	12	inches
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	18	inches
7	Aggregate storage (also add ASTM No 8 stone) above underdrain invert (12 inches typical) – use 0 inches if the aggregate is not over the entire bottom surface area	15	inches
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	3	inches
9	Freely drained pore storage of the media	0.2	in/in
10	Porosity of aggregate storage	0.4	in/in
11	Media filtration rate to be used for sizing (maximum filtration rate of 5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate (includes infiltration into the soil and flow rate through the outlet structure) which will be less than 5 in/hr.)	5	in/hr.
Baseline Calculations			
12	Allowable routing time for sizing	6	hours
13	Depth filtered during storm [Line 11 x Line 12]	30	inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	22.8	inches
15	Total Depth Treated [Line 13 + Line 14]	52.8	inches
Option 1 – Biofilter 1.5 times the DCV			
16	Required biofiltered volume [1.5 x Line 4]	300	cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	68	sq. ft.
Option 2 - Store 0.75 of remaining DCV in pores and ponding			
18	Required Storage (surface + pores) Volume [0.75 x Line 4]	150	cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	79	sq. ft.
Footprint of the BMP			
20	BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Line 11 in Worksheet B.5-4)	0.03	
21	Minimum BMP Footprint [Line 1 x Line 2 x Line 20]	114	sq. ft.
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	114	sq. ft.
23	Provided BMP Footprint	472	sq. ft.
24	Is Line 23 ≥ Line 22?	**Yes, Performance Standard is Met**	

The City of SAN DIEGO	Project Name	All Peoples Church	
	BMP ID	1	
Sizing Method for Volume Retention Criteria		**Worksheet B.5-2**	
1	Area draining to the BMP	23,775	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.16	
3	85th percentile 24-hour rainfall depth	0.63	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	200	cu. ft.
Volume Retention Requirement			
5	Measured infiltration rate in the DMA Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or enter 0.05	0.3	in/hr.
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0.15	in/hr.
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 +6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	31.7	%
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = $0.0000013 \times \text{Line } 8^3 - 0.000057 \times \text{Line } 8^2 + 0.0086 \times \text{Line } 8 - 0.014$ When Line 8 ≤ 8% = 0.023	0.242	
10	Target volume retention [Line 9 x Line 4]	48	cu. ft.

The City of SAN DIEGO	Project Name	All Peoples Church
	BMP ID	1

Volume Retention for No Infiltration Condition		Worksheet B.5-6	
1	Area draining to the biofiltration BMP	23,775	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.16	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]	3804	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]	114	sq. ft.
5	Biofiltration BMP Footprint	472	sq. ft.

Landscape Area (must be identified on DS-3247)

	Identification	1	2	3	4	5
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)					
7	Impervious area draining to the landscape area (sq. ft.)					
8	Impervious to Pervious Area ratio [Line 7/Line 6]	0.00	0.00	0.00	0.00	0.00
9	Effective Credit Area If (Line 8 >1.5, Line 6, Line 7/1.5]	0	0	0	0	0

10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]	0	sq. ft.
11	Provided footprint for evapotranspiration [Line 5 + Line 10]	472	sq. ft.

Volume Retention Performance Standard

12	Is Line 11 ≥ Line 4?	Volume Retention Performance Standard is Met	
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]	4.14	
14	Target Volume Retention [Line 10 from Worksheet B.5.2]	48	cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]	-151.7556348	cu. ft.

Site Design BMP

	Identification	Site Design Type	Credit	
16	1			cu. ft.
	2			cu. ft.
	3			cu. ft.
	4			cu. ft.
	5			cu. ft.
	Sum of volume retention benefits from other site design BMPs (e.g. trees; rain barrels etc.). [sum of Line 16 Credits for Id's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.		0	cu. ft.
17	Is Line 16 ≥ Line 15?	Volume Retention Performance Standard is Met		

City of San Diego Biofiltration BMP Sizing Worksheets (Appendix B.5) (Version 1.0 - January 2018)

Overview:

Priority development projects that will be implementing biofiltration BMPs to satisfy the pollutant control performance standard for the project may use these automated worksheets to size the biofiltration BMPs and document compliance with the performance standard. The City of San Diego (City) developed this tool to assist the applicant performing sizing calculations using worksheets in Appendix B.5 and to streamline the plan review process. The use of this tool is optional and the applicant may elect to provide their own calculations.

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The City of SAN DIEGO	Project Name	All Peoples Church	
	BMP ID	2	
Sizing Method for Pollutant Removal Criteria		**Worksheet B.5-1**	
1	Area draining to the BMP	27,352	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.17	
3	85th percentile 24-hour rainfall depth	0.63	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	244	cu. ft.
BMP Parameters			
5	Surface ponding [6 inch minimum, 12 inch maximum]	12	inches
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	18	inches
7	Aggregate storage (also add ASTM No 8 stone) above underdrain invert (12 inches typical) – use 0 inches if the aggregate is not over the entire bottom surface area	15	inches
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	3	inches
9	Freely drained pore storage of the media	0.2	in/in
10	Porosity of aggregate storage	0.4	in/in
11	Media filtration rate to be used for sizing (maximum filtration rate of 5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate (includes infiltration into the soil and flow rate through the outlet structure) which will be less than 5 in/hr.)	5	in/hr.
Baseline Calculations			
12	Allowable routing time for sizing	6	hours
13	Depth filtered during storm [Line 11 x Line 12]	30	inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	22.8	inches
15	Total Depth Treated [Line 13 + Line 14]	52.8	inches
Option 1 – Biofilter 1.5 times the DCV			
16	Required biofiltered volume [1.5 x Line 4]	366	cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	83	sq. ft.
Option 2 - Store 0.75 of remaining DCV in pores and ponding			
18	Required Storage (surface + pores) Volume [0.75 x Line 4]	183	cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	96	sq. ft.
Footprint of the BMP			
20	BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Line 11 in Worksheet B.5-4)	0.03	
21	Minimum BMP Footprint [Line 1 x Line 2 x Line 20]	139	sq. ft.
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	139	sq. ft.
23	Provided BMP Footprint	876	sq. ft.
24	Is Line 23 ≥ Line 22?	**Yes, Performance Standard is Met**	

The City of SAN DIEGO	Project Name	All Peoples Church	
	BMP ID	2	
Sizing Method for Volume Retention Criteria		**Worksheet B.5-2**	
1	Area draining to the BMP	27,352	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.17	
3	85th percentile 24-hour rainfall depth	0.63	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	244	cu. ft.
Volume Retention Requirement			
5	Measured infiltration rate in the DMA Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or enter 0.05	0.3	in/hr.
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0.15	in/hr.
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 +6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	31.7	%
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = $0.0000013 \times \text{Line } 8^3 - 0.000057 \times \text{Line } 8^2 + 0.0086 \times \text{Line } 8 - 0.014$ When Line 8 ≤ 8% = 0.023	0.242	
10	Target volume retention [Line 9 x Line 4]	59	cu. ft.

City of San Diego Biofiltration BMP Sizing Worksheets (Appendix B.5) (Version 1.0 - January 2018)

Overview:

Priority development projects that will be implementing biofiltration BMPs to satisfy the pollutant control performance standard for the project may use these automated worksheets to size the biofiltration BMPs and document compliance with the performance standard. The City of San Diego (City) developed this tool to assist the applicant performing sizing calculations using worksheets in Appendix B.5 and to streamline the plan review process. The use of this tool is optional and the applicant may elect to provide their own calculations.

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The City of SAN DIEGO	Project Name	All Peoples Church	
	BMP ID	3	
Sizing Method for Pollutant Removal Criteria		**Worksheet B.5-1**	
1	Area draining to the BMP	56,780	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.69	
3	85th percentile 24-hour rainfall depth	0.63	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	2057	cu. ft.
BMP Parameters			
5	Surface ponding [6 inch minimum, 12 inch maximum]	12	inches
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	18	inches
7	Aggregate storage (also add ASTM No 8 stone) above underdrain invert (12 inches typical) – use 0 inches if the aggregate is not over the entire bottom surface area	15	inches
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	3	inches
9	Freely drained pore storage of the media	0.2	in/in
10	Porosity of aggregate storage	0.4	in/in
11	Media filtration rate to be used for sizing (maximum filtration rate of 5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate (includes infiltration into the soil and flow rate through the outlet structure) which will be less than 5 in/hr.)	5	in/hr.
Baseline Calculations			
12	Allowable routing time for sizing	6	hours
13	Depth filtered during storm [Line 11 x Line 12]	30	inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	22.8	inches
15	Total Depth Treated [Line 13 + Line 14]	52.8	inches
Option 1 – Biofilter 1.5 times the DCV			
16	Required biofiltered volume [1.5 x Line 4]	3085	cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	701	sq. ft.
Option 2 - Store 0.75 of remaining DCV in pores and ponding			
18	Required Storage (surface + pores) Volume [0.75 x Line 4]	1543	cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	812	sq. ft.
Footprint of the BMP			
20	BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Line 11 in Worksheet B.5-4)	0.03	
21	Minimum BMP Footprint [Line 1 x Line 2 x Line 20]	1175	sq. ft.
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	1175	sq. ft.
23	Provided BMP Footprint	1725	sq. ft.
24	Is Line 23 ≥ Line 22?	**Yes, Performance Standard is Met**	

The City of SAN DIEGO	Project Name	All Peoples Church	
	BMP ID	3	
Sizing Method for Volume Retention Criteria		**Worksheet B.5-2**	
1	Area draining to the BMP	56,780	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.69	
3	85th percentile 24-hour rainfall depth	0.63	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	2057	cu. ft.
Volume Retention Requirement			
5	Measured infiltration rate in the DMA Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or enter 0.05	0.3	in/hr.
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0.15	in/hr.
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 +6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	31.7	%
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = $0.0000013 \times \text{Line } 8^3 - 0.000057 \times \text{Line } 8^2 + 0.0086 \times \text{Line } 8 - 0.014$ When Line 8 ≤ 8% = 0.023	0.242	
10	Target volume retention [Line 9 x Line 4]	498	cu. ft.

The City of SAN DIEGO	Project Name	All Peoples Church
	BMP ID	2

Volume Retention for No Infiltration Condition			Worksheet B.5-6	
1	Area draining to the biofiltration BMP		27,352	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)		0.17	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]		4650	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]		139	sq. ft.
5	Biofiltration BMP Footprint		876	sq. ft.

Landscape Area (must be identified on DS-3247)

		Identification	1	2	3	4	5
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)						
7	Impervious area draining to the landscape area (sq. ft.)						
8	Impervious to Pervious Area ratio [Line 7/Line 6]		0.00	0.00	0.00	0.00	0.00
9	Effective Credit Area If (Line 8 >1.5, Line 6, Line 7/1.5]		0	0	0	0	0

10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]	0	sq. ft.
11	Provided footprint for evapotranspiration [Line 5 + Line 10]	876	sq. ft.

Volume Retention Performance Standard

12	Is Line 11 ≥ Line 4?	Volume Retention Performance Standard is Met	
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]	6.28	
14	Target Volume Retention [Line 10 from Worksheet B.5.2]	59	cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]	-311.9224268	cu. ft.

Site Design BMP

	Identification	Site Design Type	Credit	
16	1			cu. ft.
	2			cu. ft.
	3			cu. ft.
	4			cu. ft.
	5			cu. ft.
	Sum of volume retention benefits from other site design BMPs (e.g. trees; rain barrels etc.). [sum of Line 16 Credits for Id's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.		0	cu. ft.
17	Is Line 16 ≥ Line 15?	Volume Retention Performance Standard is Met		

The City of SAN DIEGO	Project Name	All Peoples Church
	BMP ID	3

Volume Retention for No Infiltration Condition			Worksheet B.5-6	
1	Area draining to the biofiltration BMP		56,780	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)		0.69	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]		39178	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]		1175	sq. ft.
5	Biofiltration BMP Footprint		1,725	sq. ft.

Landscape Area (must be identified on DS-3247)

		Identification	1	2	3	4	5
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)						
7	Impervious area draining to the landscape area (sq. ft.)						
8	Impervious to Pervious Area ratio [Line 7/Line 6]		0.00	0.00	0.00	0.00	0.00
9	Effective Credit Area If (Line 8 >1.5, Line 6, Line 7/1.5]		0	0	0	0	0

10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]	0	sq. ft.
11	Provided footprint for evapotranspiration [Line 5 + Line 10]	1725	sq. ft.

Volume Retention Performance Standard

12	Is Line 11 ≥ Line 4?	Volume Retention Performance Standard is Met	
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]	1.47	
14	Target Volume Retention [Line 10 from Worksheet B.5.2]	498	cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]	-233.9467446	cu. ft.

Site Design BMP

	Identification	Site Design Type	Credit	
16	1			cu. ft.
	2			cu. ft.
	3			cu. ft.
	4			cu. ft.
	5			cu. ft.
	Sum of volume retention benefits from other site design BMPs (e.g. trees; rain barrels etc.). [sum of Line 16 Credits for Id's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.		0	cu. ft.
17	Is Line 16 ≥ Line 15?	Volume Retention Performance Standard is Met		

City of San Diego Biofiltration BMP Sizing Worksheets (Appendix B.5) (Version 1.0 - January 2018)

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The City of SAN DIEGO	Project Name	All Peoples Church	
	BMP ID	4	
Sizing Method for Pollutant Removal Criteria		**Worksheet B.5-1**	
1	Area draining to the BMP	106,108	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.63	
3	85th percentile 24-hour rainfall depth	0.63	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	3510	cu. ft.
BMP Parameters			
5	Surface ponding [6 inch minimum, 12 inch maximum]	12	inches
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	18	inches
7	Aggregate storage (also add ASTM No 8 stone) above underdrain invert (12 inches typical) – use 0 inches if the aggregate is not over the entire bottom surface area	15	inches
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	3	inches
9	Freely drained pore storage of the media	0.2	in/in
10	Porosity of aggregate storage	0.4	in/in
11	Media filtration rate to be used for sizing (maximum filtration rate of 5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate (includes infiltration into the soil and flow rate through the outlet structure) which will be less than 5 in/hr.)	5	in/hr.
Baseline Calculations			
12	Allowable routing time for sizing	6	hours
13	Depth filtered during storm [Line 11 x Line 12]	30	inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	22.8	inches
15	Total Depth Treated [Line 13 + Line 14]	52.8	inches
Option 1 – Biofilter 1.5 times the DCV			
16	Required biofiltered volume [1.5 x Line 4]	5264	cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	1196	sq. ft.
Option 2 - Store 0.75 of remaining DCV in pores and ponding			
18	Required Storage (surface + pores) Volume [0.75 x Line 4]	2632	cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	1385	sq. ft.
Footprint of the BMP			
20	BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Line 11 in Worksheet B.5-4)	0.03	
21	Minimum BMP Footprint [Line 1 x Line 2 x Line 20]	2005	sq. ft.
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	2005	sq. ft.
23	Provided BMP Footprint	4252	sq. ft.
24	Is Line 23 ≥ Line 22?	**Yes, Performance Standard is Met**	

The City of SAN DIEGO	Project Name	All Peoples Church	
	BMP ID	4	
Sizing Method for Volume Retention Criteria		**Worksheet B.5-2**	
1	Area draining to the BMP	106,108	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.63	
3	85th percentile 24-hour rainfall depth	0.63	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	3510	cu. ft.
Volume Retention Requirement			
5	Measured infiltration rate in the DMA Note: When mapped hydrologic soil groups are used enter 0.10 for NRCS Type D soils and for NRCS Type C soils enter 0.30 When in no infiltration condition and the actual measured infiltration rate is unknown enter 0.0 if there are geotechnical and/or groundwater hazards identified in Appendix C or enter 0.05	0.3	in/hr.
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0.15	in/hr.
8	Average annual volume reduction target (Figure B.5-2) When Line 7 > 0.01 in/hr. = Minimum (40, 166.9 x Line 7 +6.62) When Line 7 ≤ 0.01 in/hr. = 3.5%	31.7	%
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = $0.0000013 \times \text{Line } 8^3 - 0.000057 \times \text{Line } 8^2 + 0.0086 \times \text{Line } 8 - 0.014$ When Line 8 ≤ 8% = 0.023	0.242	
10	Target volume retention [Line 9 x Line 4]	849	cu. ft.

The City of SAN DIEGO	Project Name	All Peoples Church
	BMP ID	4

Volume Retention for No Infiltration Condition			Worksheet B.5-6	
1	Area draining to the biofiltration BMP		106,108	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)		0.63	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]		66848	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]		2005	sq. ft.
5	Biofiltration BMP Footprint		4,252	sq. ft.

Landscape Area (must be identified on DS-3247)

		Identification	1	2	3	4	5
6	Landscape area that meet the requirements in SD-B and SD-F Fact Sheet (sq. ft.)						
7	Impervious area draining to the landscape area (sq. ft.)						
8	Impervious to Pervious Area ratio [Line 7/Line 6]		0.00	0.00	0.00	0.00	0.00
9	Effective Credit Area If (Line 8 >1.5, Line 6, Line 7/1.5]		0	0	0	0	0

10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]	0	sq. ft.
11	Provided footprint for evapotranspiration [Line 5 + Line 10]	4252	sq. ft.

Volume Retention Performance Standard

12	Is Line 11 ≥ Line 4?	Volume Retention Performance Standard is Met	
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]	2.12	
14	Target Volume Retention [Line 10 from Worksheet B.5.2]	849	cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]	-951.22087	cu. ft.

Site Design BMP

	Identification	Site Design Type	Credit	
16	1			cu. ft.
	2			cu. ft.
	3			cu. ft.
	4			cu. ft.
	5			cu. ft.
	Sum of volume retention benefits from other site design BMPs (e.g. trees; rain barrels etc.). [sum of Line 16 Credits for Id's 1 to 5] Provide documentation of how the site design credit is calculated in the PDP SWQMP.		0	cu. ft.
17	Is Line 16 ≥ Line 15?	Volume Retention Performance Standard is Met		

Harvest and Use Feasibility Checklist	Worksheet B.3-1 : Form I-7

1. Is there a demand for harvested water (check all that apply) at the project site that is reliably present during the wet season?

☐ Toilet and urinal flushing
☐ Landscape irrigation
☑ Other: NO

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

3. Calculate the DCV using worksheet B-2.1.
DCV = 5,405.7 (cubic feet)
[Provide a summary of calculations here]
SUM OF DMAS 1-5 = 202.7 + 170.0 + 1927.4 + 2448.7 + 656.9

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

Is harvest and use feasible based on further evaluation?

☐ Yes, refer to Appendix E to select and size harvest and use BMPs.
☑ No, select alternate BMPs.

Map Scale: 1:2,120 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 30 60 120 180

Feet: 0 100 200 400 600

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

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

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

Soil Rating Lines

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

Soil Rating Points

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

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

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

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

Date(s) aerial images were photographed: 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

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
DcF	Diablo-Urban land complex, 15 to 50 percent slopes	D	1.1	18.4%
EsD2	Escondido very fine sandy loam, 9 to 15 percent slopes, eroded	C	4.9	80.5%
FxE	Friant rocky fine sandy loam, 9 to 30 percent slopes	D	0.1	1.1%
Totals for Area of Interest			**6.0**	**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

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, CA 92029
Telephone: (619) 867-0487

All Peoples Church
c/o Hamann Companies
1000 Pioneer Way
El Cajon, CA 92020

November 30, 2020
P/W 1805-05
Report No. 1805-05-B-5

Attention: **Mr. Greg Hamann**

Subject: **Infiltration Feasibility Condition Letter for Stormwater BMPs, All Peoples Church, APN 463-01-010-00, San Diego, California 92120**

References: Attached

Gentlemen:

In accordance with your request, Advanced Geotechnical Solutions, Inc. (AGS) has prepared this Infiltration Feasibility Condition Letter supporting a no infiltration condition for four (4) BMP Basins within the All Peoples Church Project located in the City of San Diego, California. This letter has been prepared in accordance with the guidance presented in Appendix C, Section C.1.1 – Infiltration Feasibility Condition Letter of the City of San Diego BMP Design Manual October 2018 Edition.

SITE DESCRIPTION AND PROPOSED DEVELOPMENT

The site is currently vacant, supporting a light growth of seasonal grasses, shrubs, and small trees. Access to the site is via College Avenue. Topography on site generally slopes down toward the southwest. Approximate elevations onsite range from 356 msl at the southwest corner to 450 msl at the northerly limits of the site. There are existing slopes up to approximately 25 feet high along the westerly/northwesterly property boundary that ascend to College Avenue. At the southwesterly corner of the site, there are existing slopes descending to a minor drainage.

Based on review of the 40-scale Preliminary Grading Plan, it is our understanding that the subject site will be graded to support a nearly 37,000 square foot church structure, associated paved parking areas, a two-level parking garage, four (4) bioretention basins, retaining walls and slopes. It is anticipated the church structure will be a concrete and/or steel frame structure, two to three stories in height and supported by a shallow slab on grade foundation system. The two-level parking garage is anticipated to be concrete and supported by a shallow slab on grade foundation system.

Existing onsite utilities include three water lines (12 inch, 42 inch, and 48 inch) in the northerly portion of the site and a storm drain outlet in the northwesterly portion of the site. At this time, AGS is unaware of specific septic system(s) or water well(s) that may exist on the property. If encountered, septic systems and water wells must be abandoned/mitigated in accordance with the specifications of the County of San Diego.

PREVIOUS GRADING

As part of our preliminary investigations several historic aerial photos and topographic maps of the project area were reviewed by representatives of AGS. Based on our review and subsurface explorations, it was determined that the site was previously graded to its current configuration. This grading was likely

accomplished in multiple phases. The first phase of grading appears to have occurred in the late 1950's to early 1960's in relation to the construction of the residential development superjacent to the east, College Avenue to the west and Interstate 8 (previously Highway 80) and associated College Avenue off ramp to the south and southwest. Pre-development photos show a moderate sized drainage trending southwest through the approximate central portion of the site. Minor modifications to this drainage course occurred during the first phase of grading activity at the site. Subsequently, a second phase of grading appears to have occurred in the mid- to late-1960's. During this phase, the drainage appears to have been filled and a level pad constructed in the southwest portion of the site with graded slopes descending the west and southwest. Based on our previous subsurface explorations and review of historic photos and topographic maps, fills on the order of 20 to 30 feet deep were placed in the southwesterly portion of the site. The fill materials placed during this second phase of grading may have been derived from the residential development to the southeast (Del Cerro Court).

STORM WATER MANAGEMENT DISCUSSION

We understand storm water management devices are being proposed in accordance with the 2018 City of San Diego Storm Water Standards Manual. If not properly constructed, there is a potential for distress to improvements and properties located hydrologically down gradient or adjacent to these devices. Factors such as the amount of water to be detained, its residence time, and soil permeability have an important effect on seepage transmission and the potential adverse impacts that may occur if the storm water management features are not properly designed and constructed. If infiltration of storm water runoff occurs, downstream properties may be subjected to seeps, springs, slope instability, raised groundwater, movement of foundations and slabs, or other undesirable impacts as a result of water infiltration.

Presented below is a discussion for each item requested in Appendix C.1.1 of the 2018 City of San Diego Storm Water Standards.

- *The phase of the project in which the geotechnical engineer first analyzed the site for infiltration feasibility.*

  The site was first analyzed for infiltration feasibility in the planning phase.

- *Results of previous geotechnical analysis conducted in the project area, if any.*

  AGS prepared a Preliminary Geotechnical Investigation for the previously proposed residential development at the site in 2015 (AGS 2015), which involved excavating, logging, and sampling of ten (10) tracked excavator tests pits extending to a maximum depth of 27 feet below existing grade. Existing fill soils up to 22 feet in thickness were encountered during site exploration. Based on our review of historic topographic maps and aerial photos, it is anticipated that fill soil up to approximately 30 feet in thickness exists onsite. In addition, an Infiltration Feasibility Study, which involved excavating and testing four (4) 12-inch diameter borehole percolation test holes, was prepared in May 2016 (AGS, 2016a) and recommended a 'No Infiltration' condition due to the depth of pre-existing fill soils, the steeply sloping (>25%) nature of the site, and negligible permeability of the underlying bedrock units.

- *The development status of the site prior to the project application (i.e., new development with raw ungraded land, or redevelopment with existing graded conditions).*

  The property has been previously graded. Existing site improvements include multiple underground utilities.

- *The history of design discussions for the project footprint, resulting in the final design determination.*

  It is our understanding that the design team began evaluating site development in 2014 and AGS began providing geotechnical consulting services in 2014 as well. Originally, the site was planned for a 26-lot single-family residential development. Subsequent to issuance of the Infiltration Feasibility Study, there were several meetings with the design team and City of San Diego review staff. The City of San Diego review staff concluded that partial/passive infiltration must be allowed regardless of the scope and cost of the mitigations. In December 2016, AGS prepared a response to review comments and an updated Worksheet C.4-1 (AGS 2016b) indicating a partial infiltration condition with mitigation. The proposed mitigations included deep removals and replacement with highly permeable imported/manufactured materials up to 30 feet deep to act as a conduit to a more suitable infiltration surface, lining the sides of the basins with impermeable membranes, and deepened foundation systems. In 2018, the City of San Diego BMP Design Manual was updated and provided clarification of the lower bound infiltration rate and what mitigations are considered reasonable and unreasonable. The mitigations proposed in December 2016 were now considered unreasonable and the site would be considered to have a 'No Infiltration' condition; however, the project site was sold to the current owner in 2018.

  In 2018 plans changed from a single-family residential development to its currently proposed church facility. AGS began by updating the previous studies to address the new plans beginning with a Preliminary Geotechnical Investigation (AGS 2018) and an Updated Preliminary Geotechnical Investigation (AGS 2020a) which were desktop studies utilizing previous subsurface investigations.

- *Full/partial infiltration BMP standard setbacks to underground utilities, structures, retaining walls, fill slopes, and natural slopes applicable to the DMA that prevent full/partial infiltration.*

  Steep (>25 percent) existing fill slopes up to 20 feet in height flank the westerly side of the site. After development, graded fill slopes will be present in close proximity to the proposed southwesterly BMP in addition to deep fills present. Due to the top of slope and proposed church structure constraints, establishing a BMP set back from top of slope is not feasible.

  A storm drain is proposed downgradient of the southerly basin where it is anticipated that stormwater allowed to infiltrate will likely flow along the bedrock/fill contact, flow into the storm drain trench, and pipe along the proposed storm drain line potentially leading to settlement and distress above.

- *Physical impairments (i.e., fire road egress, public safety considerations, etc.) that prevent full/partial infiltration.*

  Physical impairments are not anticipated to prevent full/partial infiltration.

- *The consideration of site design alternatives to achieve partial/full infiltration within the DMA.*

  Due to the existing sloping topography of the site descending down gradient to deep fills, negligible infiltration capacity within the bedrock/formational materials, and structural or steep (>25%) sloping terrain constraints AGS considered that there were no locations on the property which would support full or partial infiltration.

  It may be possible to import or manufacture select permeable soils to be utilized beneath the basin as a 'conduit' to the native infiltration surface at depth; however, this option is highly cost prohibitive and not considered a reasonable mitigation in accordance with the current BMP Design Manual.

- *The extent site design BMPs requirements were included in the overall design.*

  The following narrative is from the Civil Engineer (Pasco, Laret, Suiter & Associates) regarding storm water BMP design:

  > The development consists of construction of one church building, one two-story parking garage, parking and drive aisles, associated hardscape, and a permeable pavement plaza area with four biofiltration basins to meet water quality and hydromodification requirements. In general, runoff from the project will be directed via sheet flow, gutter flow, stormdrain structures and underground PVC drainage pipes into the proposed biofiltration basins. After stormwater is treated and mitigated it will ultimately be conveyed to the POC at the southern edge of the project site and follow existing drainage patterns into the existing 48" public stormdrain in Caltrans ROW, where it flows under Interstate-8 to the south.
  >
  > In general, the site's runoff will be conveyed to the biofiltration basins, where it will be treated and flow-restricted, before entering the MS4 where it is received by the headwall and 48" public stormdrain in Caltrans ROW. The proposed biofiltration basins are designed according to the Storm Water Standards BMP Design Manual Section 5.5 and in Appendix B.5.1 (for standard biofiltration BMP sizing) and Appendix F. Appendix G.2.4 was used in combination with site specific continuous simulation modeling (EPA SWMM) to meet hydromodification management requirements.
  >
  > The proposed development is divided into four basins: 1, 2, 3 and 4. Each basin connects to the public stormdrain via pipe connection underground or is released at-grade to the existing drainage pathways before ultimately being conveyed to the single POC at the headwall and 48" underground stormdrain in Caltrans ROW, adjacent to the southern edge of the project site.
  >
  > Basin 1 collects and treats runoff from the permeable parking and landscape areas on the western side of the northerly parking area. Storm water sheet flows across the parking area, into the gutter, and is conveyed to the basin via curb openings; Basin 2 collects and treats the runoff from the easterly side of the northerly parking area, the drive aisle, and associated landscape. Stormwater sheet flows across the drive aisle and parking spaces before becoming gutter flow, where it is picked up by a curb inlet and piped over to the biofiltration basin; Basin 3 captures and treats runoff from the parking garage, main drive aisle, associated landscape, permeable plaza area, and miscellaneous hardscape via overland sheet flow, Type-I inlets, area drains, and is piped over to the biofiltration basin; Basin 4 captures the southern portion of the main drive aisle, associated parking, graded slopes, church structure, and associated hardscape

before sheet flowing or being underground piped to the biofiltration basin adjacent to the Church structure.

The four bioretention basins were sized to meet the requirements for water quality treatment and hydromodification flow-control before they enter the existing point-of-compliance (POC) at the 48" underground drainage pipe in Caltrans ROW, adjacent to the southern boundary of the site. The drainage then flows beneath Interstate 8 to the south.

- *Conclusion or recommendation from the geotechnical engineer regarding the DMA's infiltration condition.*

  The hazards associated with infiltrating stormwater in the proposed BMP's as currently planned cannot be reasonably mitigated and should be avoided. Based on the presence of deep existing fill soils, the potential for slope instability, and potential soil volumetric change as discussed in sections above, AGS recommends a no infiltration condition for the proposed BMP's.

- *An Exhibit for all applicable DMA's that clearly labels:*

  AGS prepared an Infiltration Feasibility Exhibit attached herewith as Plate 1. The Exhibit shows the existing and proposed grades, proposed development, depths of existing artificial fill designated as "afu", and proposed BMP's distances to slopes, underground utilities, structures, and retaining walls.

Advanced Geotechnical Solutions, Inc., appreciates the opportunity to provide you with geotechnical consulting services and professional opinions. If you have any questions, please contact the undersigned at (619) 867-0487.

Respectfully Submitted,
Advanced Geotechnical Solutions, Inc.

Prepared by:

SHANE P. SMITH
Staff Engineer

Reviewed by:

ANDRES BERNAL, Sr. Geotechnical Engineer
PE 62366, GE 2715, Reg. Exp. 9-30-21

PAUL J. DERISI, Vice President
CEG 2536, Reg. Exp. 5-31-21

REGISTERED PROFESSIONAL ENGINEER
ANDRES BERNAL
No. 2715
Exp. 9/30/21
GEOTECHNICAL
STATE OF CALIFORNIA

PROFESSIONAL GEOLOGIST
PAUL J. DERISI
No. 2536
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

Distribution: (5) Addressee

Attachments: References
Plate 1 – Infiltration Feasibility Exhibit

REFERENCES

Advanced Geotechnical Solutions, Inc. (2015). "Preliminary Geotechnical Investigation, Del Cerro Residential Development, College Avenue and Interstate 8, San Diego, California," dated July 20, 2015, Report No. 1411-02-B-4.

---. (2016a). "Geotechnical Addendum, Infiltration Testing for Proposed Storm Water BMP Basins, Proposed Del Cerro Single-Family Residential Development, City of San Diego, California," dated May 21, 2016, Report No. 1411-02-B-6.

---. (2016b). "Geotechnical Addendum, Response to Cycle 13 Review Comments, LDR-Geology, Del Cerro Residential Development, College Avenue and Interstate 8, City of San Diego, California," dated December 21, 2016, Report No. 1411-02-B-7.

---. (2018). "Preliminary Geotechnical Investigation and Design Recommendations, Proposed Church Facility, APN 463-01-010-00, San Diego, California 902120," dated November 20, 2018, Report No. 1805-05-B-2.

---. (2020a). "Updated Preliminary Geotechnical Investigation and Design Recommendations, Proposed Church Facility, APN 463-01-010-00, San Diego, California 902120," dated January 7, 2020, Report No. 1805-05-B-3.

---. (2020b). "Geotechnical Addendum and Response to Cycle 2 LDR-Geology Review Comments, All Peoples Church, Northeast of College Avenue and Interstate 8, San Diego, California," dated January 20, 2020, Report No. 1805-05-B-4.

California Building Standards Commission, 2019, California Building Code, Title 24, Part 2, Volumes 1 and 2.

City of San Diego, 2018, Transportation & Storm Water, Storm Water Standard – BMP Design Manual, October 2018 Edition.

Kennedy, M.P., and Tan, S.S., 2008, Geologic Map of the San Diego 30' x 60' Quadrangle, California Regional Geologic Map Series, Scale = 1:100,000, Map No. 3, Sheet 1 of 2.

State of California Water Boards, September 23, 2016, *http://geotracker.waterboards.ca.gov/*

Pasco, Laret, Suiter, & Associates, 2020, Preliminary Grading Plan, Site Development Permit No. 92338, Planned Development Permit No. 92339, And Easement Vacation No. 92340 All Peoples Church, 40-Scale, original date April 22, 2019, plot revised March 17, 2020.

PRELIMINARY GRADING PLAN

SITE DEVELOPMENT PERMIT NO. 92338, PLANNED DEVELOPMENT PERMIT NO. 92339, EASEMENT VACATION NO. 92340, AND TENTATIVE MAP NO. ______

ALL PEOPLES CHURCH

SEE SHEET 6 FOR CONTINUATION OF OFFSITE WATER LINE EXTENSION

TOPOGRAPHY:

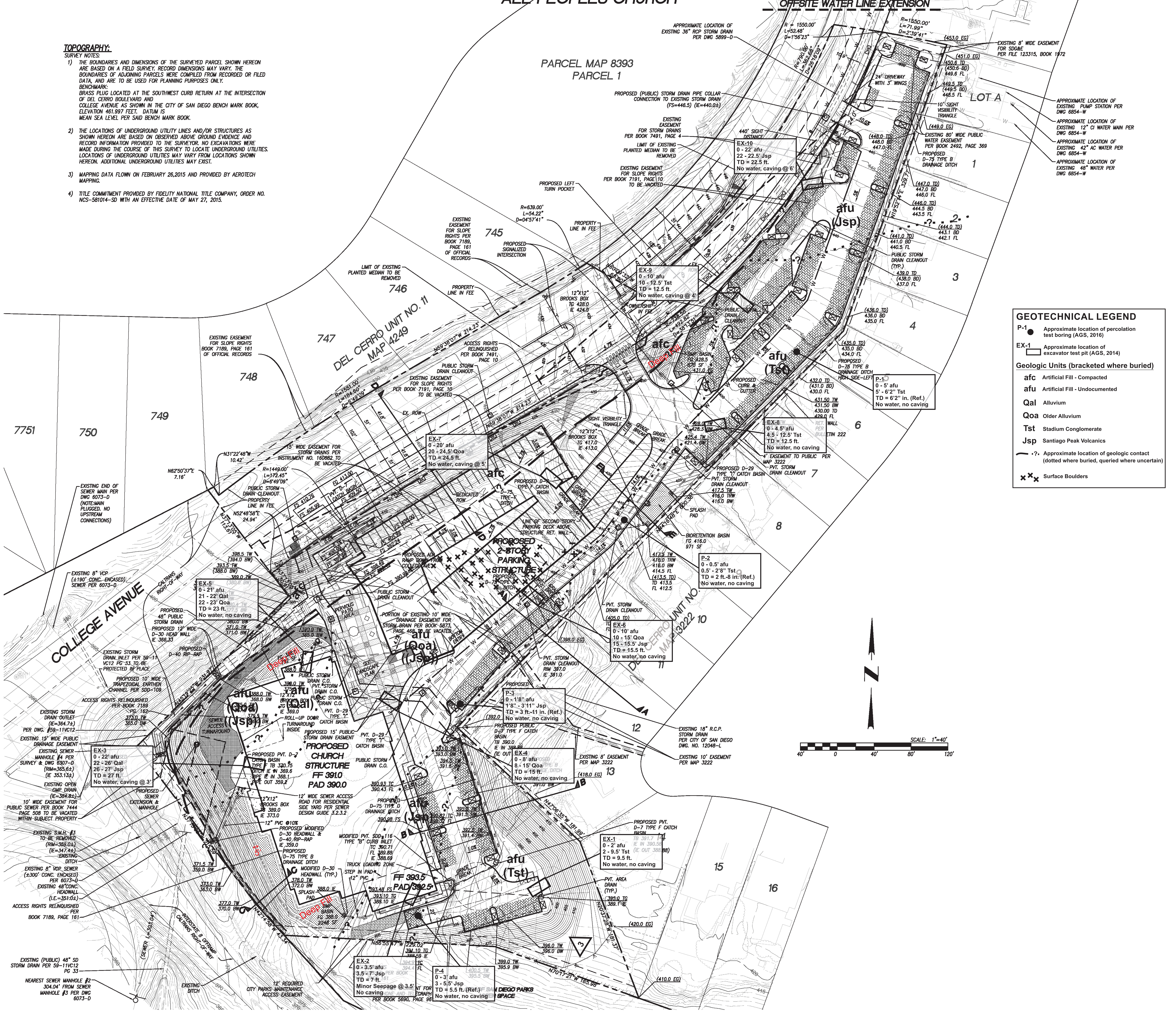
SURVEY NOTES:

1) THE BOUNDARIES AND DIMENSIONS OF THE SURVEYED PARCEL SHOWN HEREON ARE BASED ON A FIELD SURVEY. RECORD DIMENSIONS MAY VARY. THE BOUNDARIES OF ADJOINING PARCELS WERE COMPILED FROM RECORDED OR FILED DATA, AND ARE TO BE USED FOR PLANNING PURPOSES ONLY.
BENCHMARK:
BRASS PLUG LOCATED AT THE SOUTHWEST CURB RETURN AT THE INTERSECTION OF DEL CERRO BOULEVARD AND COLLEGE AVENUE AS SHOWN IN THE CITY OF SAN DIEGO BENCH MARK BOOK, ELEVATION 461.997 FEET. DATUM IS MEAN SEA LEVEL PER SAID BENCH MARK BOOK.

2) THE LOCATIONS OF UNDERGROUND UTILITY LINES AND/OR STRUCTURES AS SHOWN HEREON ARE BASED ON OBSERVED ABOVE GROUND EVIDENCE AND RECORD INFORMATION PROVIDED TO THE SURVEYOR. NO EXCAVATIONS WERE MADE DURING THE COURSE OF THIS SURVEY TO LOCATE UNDERGROUND UTILITIES. LOCATIONS OF UNDERGROUND UTILITIES MAY VARY FROM LOCATIONS SHOWN HEREON. ADDITIONAL UNDERGROUND UTILITIES MAY EXIST.

3) MAPPING DATA FLOWN ON FEBRUARY 26,2015 AND PROVIDED BY AEROTECH MAPPING.

4) TITLE COMMITMENT PROVIDED BY FIDELITY NATIONAL TITLE COMPANY, ORDER NO. NCS-581014-SD WITH AN EFFECTIVE DATE OF MAY 27, 2015.



GEOTECHNICAL LEGEND

P-1 ● Approximate location of percolation test boring (AGS, 2016)

EX-1 ▭ Approximate location of excavator test pit (AGS, 2014)

Geologic Units (bracketed where buried)

afc	Artificial Fill - Compacted
afu	Artificial Fill - Undocumented
Qal	Alluvium
Qoa	Older Alluvium
Tst	Stadium Conglomerate
Jsp	Santiago Peak Volcanics

—?— Approximate location of geologic contact (dotted where buried, queried where uncertain)

××× Surface Boulders

LEGEND

BOUNDARY LINE
ADJACENT PROPERTY LINE
EASEMENT LINE
RIGHT OF WAY
EXISTING STREET CENTERLINE

EXISTING IMPROVEMENTS

EXISTING CONTOUR
EXISTING CURB & GUTTER
EXISTING SEWER MAIN
EXISTING STORM DRAIN MAIN
EXISTING CURB INLET
EXISTING WATER MAIN
EXISTING WATER VALVE
EXISTING FIRE HYDRANT
EXISTING STREET LIGHT
EXISTING STRUCTURE
EXISTING VEGETATION

PROPOSED IMPROVEMENTS

PROPOSED ROAD CENTERLINE
LIMIT OF WORK LINE
CURB AND GUTTER
24' RESIDENTIAL DRIVEWAY
PROPOSED CONTOURS
PROPOSED SPOT ELEVATION
RETAINING WALL
SDRSD D-75 BROW DITCH
BIORETENTION BASIN
STORM DRAIN HEADWALL
STORM DRAIN CLEANOUT
AREA DRAIN
STORM DRAIN INLET
TYPE F CATCH BASIN
RIP RAP ENERGY DISSIPATOR PER SDD-104
PVC STORM DRAIN (SIZE VARIES)
WATER SERVICE
TRAFFIC SIGNAL
PARKING GARAGE WALL
CUT/FILL SLOPE
PERMEABLE PAVERS
PROPOSED RIP-RAP
TREE PER LANDSCAPE PLANS

PREPARED BY:

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

REGISTERED PROFESSIONAL ENGINEER WILLIAM GREGG MACK No. 73620 Exp. 12/31/20 CIVIL STATE OF CALIFORNIA

WILLIAM GREGG MACK R.C.E. 73620
EXPIRATION: 12/31/2020

DATE

PROJECT NAME: ALL PEOPLES CHURCH

PROJECT ADDRESS: NORTHEAST CORNER OF COLLEGE AVENUE & INTERSTATE 8, SAN DIEGO, CALIFORNIA 92120

PROJECT TRACKING SYSTEM NUMBER: 636444

INTERNAL ORDER NUMBER: PENDING

SHEET TITLE: PRELIMINARY GRADING PLAN

SHEET NUMBER: C 2.0 OF 7

DRAWN BY: GJK
CHECKED BY: W. MACK
ORIGINAL DATE: 04-22-2019

REVISIONS:
1. 03-17-2020
2. ______
11. ______
12. ______

PLATE 1
Infiltration Feasibility Exhibit

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

Project:	Report:	Date:
P/W 1805-05	1805-05-B-5	Nov. 2020

3-17-2020

PLSA 2936

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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.

Project Name: All Peoples Church

Indicate which Items are Included:

Attachment Sequence	Contents	Checklist
Attachment 2a	Hydromodification Management Exhibit (Required)	☑ Included See Hydromodification Management Exhibit Checklist.
Attachment 2b	Management of Critical Coarse Sediment Yield Areas (WMAA Exhibit is required, additional analyses are optional) See Section 6.2 of the BMP Design Manual.	☑ Exhibit showing project drainage boundaries marked on WMAA Critical Coarse Sediment Yield Area Map (Required) Optional analyses for Critical Coarse Sediment Yield Area Determination ☐ 6.2.1 Verification of Geomorphic Landscape Units Onsite ☐ 6.2.2 Downstream Systems Sensitivity to Coarse Sediment ☐ 6.2.3 Optional Additional Analysis of Potential Critical Coarse Sediment Yield Areas Onsite
Attachment 2c	Geomorphic Assessment of Receiving Channels (Optional) See Section 6.3.4 of the BMP Design Manual.	☑ Not Performed ☐ Included ☐ Submitted as separate stand-alone document
Attachment 2d	Flow Control Facility Design and Structural BMP Drawdown Calculations (Required) Overflow Design Summary for each structural BMP See Chapter 6 and Appendix G of the BMP Design Manual	☑ Included ☐ Submitted as separate stand-alone document

Project Name: All Peoples Church

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 OR provide a separate map showing that the project site is outside of any critical coarse sediment yield areas
- ☑ 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).

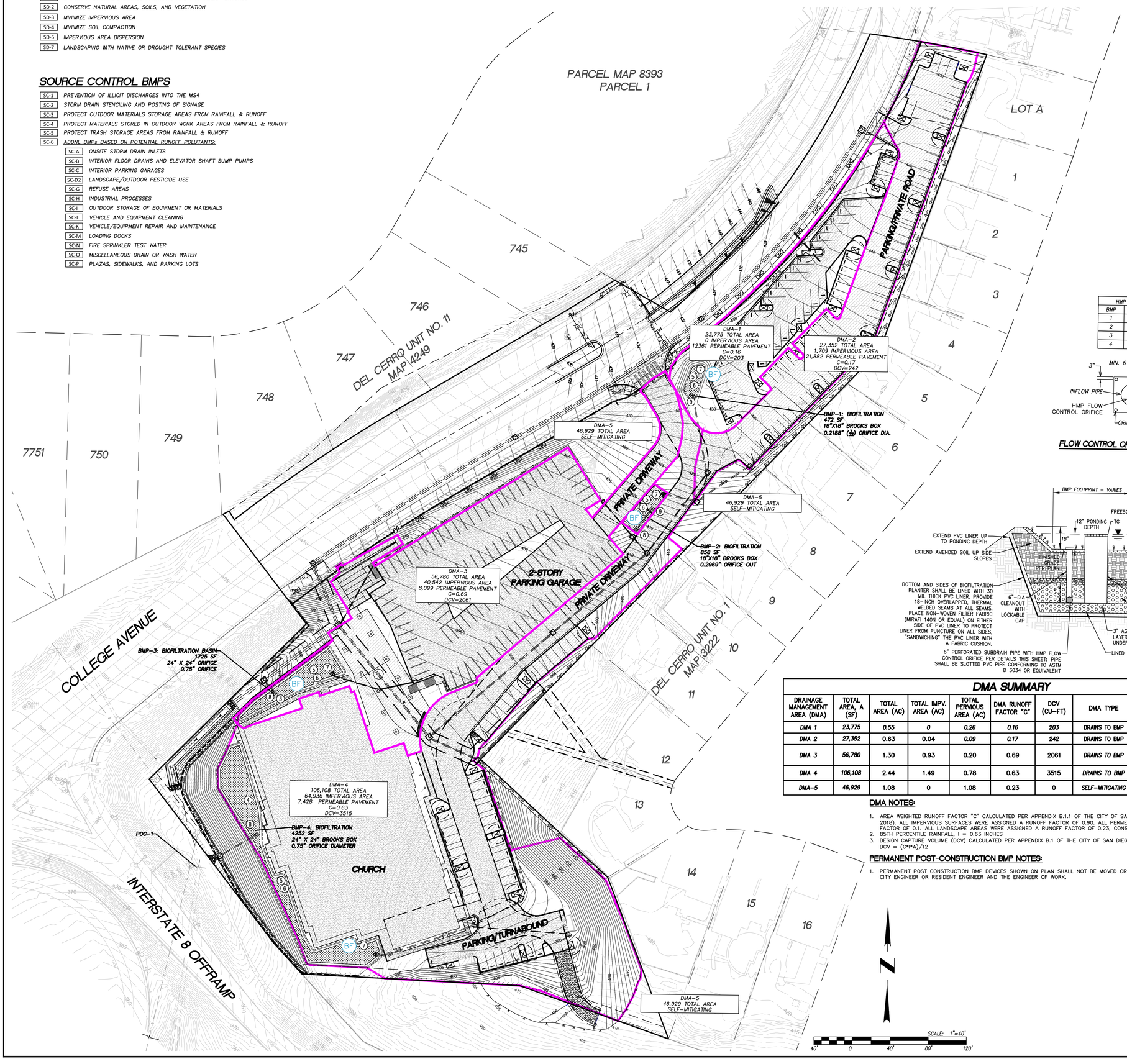
ONSITE WATER QUALITY AND HMP EXHIBIT

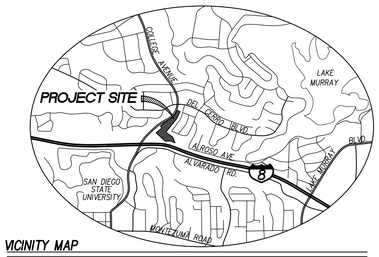
SITE DESIGN BMPS

- SD-1 MAINTAIN NATURAL DRAINAGE PATHWAYS AND HYDRAULIC FEATURES
- SD-2 CONSERVE NATURAL AREAS, SOILS, AND VEGETATION
- SD-3 MINIMIZE IMPERVIOUS AREA
- SD-4 MINIMIZE SOIL COMPACTION
- SD-5 IMPERVIOUS AREA DISPERSION
- SD-7 LANDSCAPING WITH NATIVE OR DROUGHT TOLERANT SPECIES

SOURCE CONTROL BMPS

- SC-1 PREVENTION OF ILLICIT DISCHARGES INTO THE MS4
- SC-2 STORM DRAIN STENCILING AND POSTING OF SIGNAGE
- SC-3 PROTECT OUTDOOR MATERIALS STORAGE AREAS FROM RAINFALL & RUNOFF
- SC-4 PROTECT MATERIALS STORED IN OUTDOOR WORK AREAS FROM RAINFALL & RUNOFF
- SC-5 PROTECT TRASH STORAGE AREAS FROM RAINFALL & RUNOFF
- SC-6 ADDNL BMPs BASED ON POTENTIAL RUNOFF POLUTANTS:
  - SC-A ONSITE STORM DRAIN INLETS
  - SC-B INTERIOR FLOOR DRAINS AND ELEVATOR SHAFT SUMP PUMPS
  - SC-C INTERIOR PARKING GARAGES
  - SC-D2 LANDSCAPE/OUTDOOR PESTICIDE USE
  - SC-G REFUSE AREAS
  - SC-H INDUSTRIAL PROCESSES
  - SC-I OUTDOOR STORAGE OF EQUIPMENT OR MATERIALS
  - SC-J VEHICLE AND EQUIPMENT CLEANING
  - SC-K VEHICLE/EQUIPMENT REPAIR AND MAINTENANCE
  - SC-M LOADING DOCKS
  - SC-N FIRE SPRINKLER TEST WATER
  - SC-O MISCELLANEOUS DRAIN OR WASH WATER
  - SC-P PLAZAS, SIDEWALKS, AND PARKING LOTS





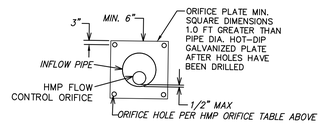
VICINITY MAP

NOT TO SCALE

LEGEND

- RIGHT-OF-WAY — R/W
- PROPERTY LINE — P/L
- DMA BOUNDARY
- LIMIT OF GRADING
- DRAINAGE DIRECTION
- RIP RAP ENERGY DISSIPATER
- PERMEABLE PAVEMENT
- IMPERVIOUS AREA (ROOF AND CONCRETE)
- BIOFILTRATION BASIN (BF-1) (BF)

HMP ORIFICE TABLE	
BMP	ORIFICE SIZE
1	0.2188"
2	0.2969"
3	0.75"
4	0.75"



FLOW CONTROL ORIFICE PLATE DETAIL

NOT TO SCALE

DMA SUMMARY

DRAINAGE MANAGEMENT AREA (DMA)	TOTAL AREA, A (SF)	TOTAL AREA (AC)	TOTAL IMPV. AREA (AC)	TOTAL PERVIOUS AREA (AC)	DMA RUNOFF FACTOR "C"	DCV (CU-FT)	DMA TYPE	STRUCTURAL BMP TYPE	STRUCT. BMP NAME
DMA 1	23,775	0.55	0	0.26	0.16	203	DRAINS TO BMP	BIOFILTRATION (BF-1)	BMP-1
DMA 2	27,352	0.63	0.04	0.09	0.17	242	DRAINS TO BMP	BIOFILTRATION (BF-1)	BMP-2
DMA 3	56,780	1.30	0.93	0.20	0.69	2061	DRAINS TO BMP	BIOFILTRATION (BF-1)	BMP-3
DMA 4	106,108	2.44	1.49	0.78	0.63	3515	DRAINS TO BMP	BIOFILTRATION (BF-1)	BMP-4
DMA-5	46,929	1.08	0	1.08	0.23	0	SELF-MITIGATING	SELF-MITIGATING	N/A

DMA NOTES:

1. AREA WEIGHTED RUNOFF FACTOR "C" CALCULATED PER APPENDIX B.1.1 OF THE CITY OF SAN DIEGO BMP DESIGN MANUAL (OCTOBER 2018). ALL IMPERVIOUS SURFACES WERE ASSIGNED A RUNOFF FACTOR OF 0.90. ALL PERMEABLE PAVEMENT WAS ASSIGNED A RUNOFF FACTOR OF 0.1. ALL LANDSCAPE AREAS WERE ASSIGNED A RUNOFF FACTOR OF 0.23, CONSISTENT WITH TYPE C SOILS.
2. 85TH PERCENTILE RAINFALL, I = 0.63 INCHES
3. DESIGN CAPTURE VOLUME (DCV) CALCULATED PER APPENDIX B.1 OF THE CITY OF SAN DIEGO BMP DESIGN MANUAL (OCTOBER 2018). DCV = (C*I*A)/12

PERMANENT POST-CONSTRUCTION BMP NOTES:

1. PERMANENT POST CONSTRUCTION BMP DEVICES SHOWN ON PLAN SHALL NOT BE MOVED OR MODIFIED WITHOUT THE APPROVAL OF THE CITY ENGINEER OR RESIDENT ENGINEER AND THE ENGINEER OF WORK.

CONSTRUCTION NOTES

1. PROPOSED PERMANENT BIOFILTRATION BASIN BMP-1 PER DETAIL THIS SHEET
2. PROPOSED PERMANENT BIOFILTRATION BASIN BMP-2 PER DETAIL THIS SHEET
3. PROPOSED PERMANENT BIOFILTRATION BASIN BMP-3 PER DETAIL THIS SHEET
4. PROPOSED PERMANENT BIOFILTRATION BASIN BMP-4 PER DETAIL THIS SHEET
5. 6" CLEANOUT WITH LOCKABLE CAP
6. PERFORATED 6" PVC UNDERDRAIN PIPE (ASTM D 3034 OR EQUIVALENT)
7. No. 2 BACKING RIP-RAP ENERGY DISSIPATER
8. 24" X 24" BROOKS CATCH BASIN. CATCH BASIN SHALL BE MARKED WITH THE WORDS "NO DUMPING- DRAINS TO RIVER" OR SIMILAR CITY APPROVED STORM DRAIN MARKER.
9. 18" X 18" BROOKS CATCH BASIN. CATCH BASIN SHALL BE MARKED WITH THE WORDS "NO DUMPING- DRAINS TO RIVER" OR SIMILAR CITY APPROVED STORM DRAIN MARKER.

PROJECT CHARACTERISTICS

TOTAL PROJECT OWNERSHIP: 5.99 ACRES

TOTAL DISTURBED AREA: 5.92 ACRES

TOTAL PROPOSED IMPERVIOUS AREA: 107,187 SF= 2.46 ACRES

TOTAL PERMEABLE PAVEMENT: 49,621 SF=1.14 ACRES

TOTAL PROPOSED LANDSCAPE AREA: 101,059 SF = 2.32 ACRES

EXISTING HYDROLOGIC FEATURES: N/A

SOIL INFORMATION

HYDROLOGIC SOIL GROUP: TYPE C

GROUNDWATER INFORMATION

GROUNDWATER WAS NO ENCOUNTERED DURING GEOTECHNICAL TESTING PER GEOTECHNICAL INVESTIGATION, "UPDATED PRELIMINARY GEOTECHNICAL INVESTIGATION AND DESIGN RECOMMENDATIONS, PROPOSED CHURCH FACILITY, APN 463-010-1000, SAN DIEGO, CALIFORNIA 90212" BY ADVANCED GEOTECHNICAL SOLUTIONS, INC DATED JANUARY 20, 2020.

CCYSAs

THE PROJECT IS ENTIRELY EXEMPT/NOT SUBJECT TO RPO REQUIREMENTS WITHOUT UTILIZATION OF RPO EXEMPTIONS AS THERE ARE NO AREAS ONSITE OR UPSTREAM TO PROTECT; THEREFORE THE PROJECT EFFECTIVELY AVOIDS AND BYPASSES SOURCES OF MAPPED CCYSAS PER APPROACHED OUTLINED IN APPENDIX H.2 AND H.3 AS NONE WERE IDENTIFIED.

REFER TO WMAA MAP INCLUDED IN THE "PRIORITY DVELOPMENT PROJECT (PDP) STORM WATER QUALITY MANAGEMENT PLAN (SWQMP) FOR THE ALL PEOPLES CHURCH"

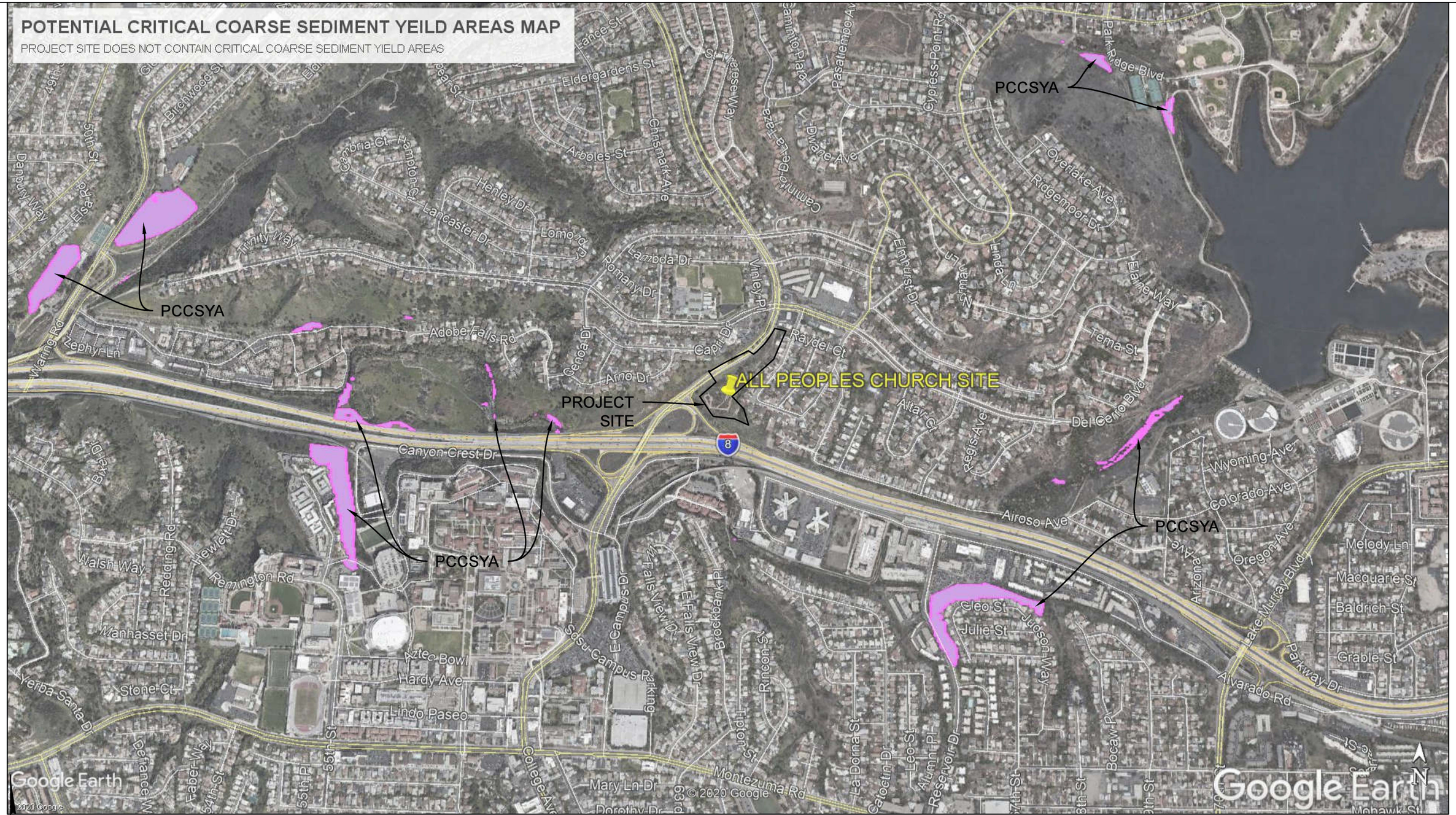
PROPOSED CONDITION
DMA & HMP EXHIBIT

ALL PEOPLES CHURCH, PTS# 636444
INTERSTATE 8 + COLLEGE AVENUE
SAN DIEGO, CALIFORNIA
PLSA JOB # 2936
SCALE: 1" = 40'
DATE: FEBRUARY 2021
SHEET 1 OF 1

PASCO LARET SUITER & ASSOCIATES
San Diego | Solana Beach | Orange County
Phone 858.259.8212 | www.plsaengineering.com

POTENTIAL CRITICAL COARSE SEDIMENT YEILD AREAS MAP

PROJECT SITE DOES NOT CONTAIN CRITICAL COARSE SEDIMENT YIELD AREAS



ALL PEOPLES CHURCH

LOCATED NORTHEAST CORNER OF I-8 & COLLEGE AVE
SAN DIEGO, CA 92120
SCALE: NTS
PREPARED: 8/25/2020

PASCO LARET SUITER & ASSOCIATES

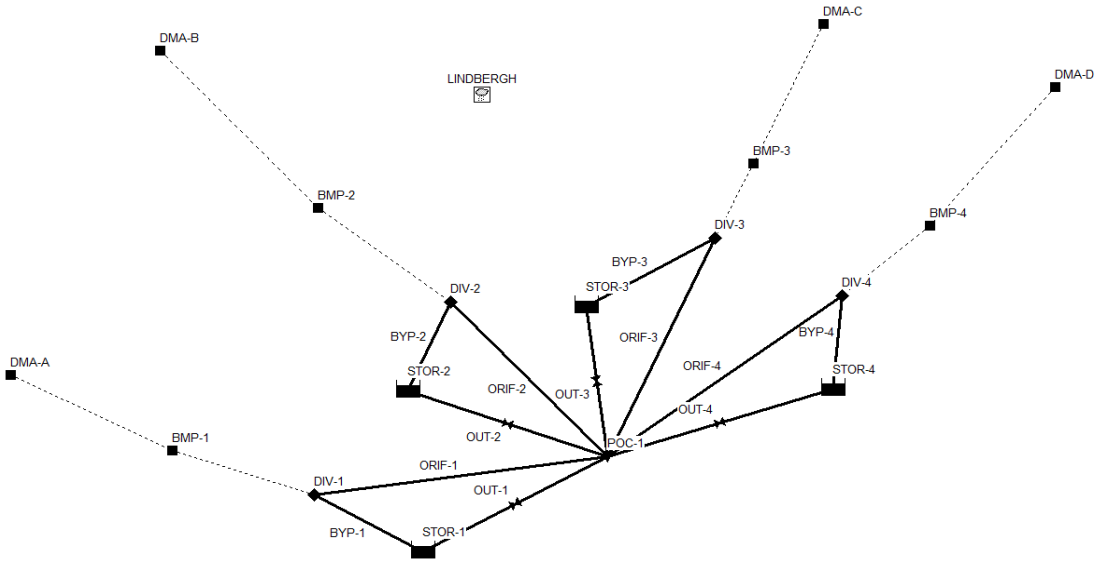
San Diego | Solana Beach | Orange County
Phone 858.259.8212 | www.plsaengineering.com

ALL PEOPLES CHURCH
J-2936
2/9/2021

SWMM MODEL SCHEMATICS FOR ALL PEOPLES CHURCH

PRE-PROJECT MODEL

POST-PROJECT MODEL



SWMM Input Parameters

SWMM PRE-DEV INPUT PARAMETERS FOR POC-1

DMA	Tributary Area, A (ac)	Tributary Area, A (sf)	Overland Flow Length, L	Overland Flow Width, W=A/L	% Slope, S_o	Imp. Area (sf)	% Imperv	N-Imperv	N-Perv	Suction Head	Conductivity	Initial Deficit	Total Inflow	Separation Time
EX-1	4.913108	214,015	1248	171	8.2	0.0	0.0%	0.012	0.100	6.0	0.100	0.31	0.00983	24

SWMM POST-DEV INPUT PARAMETERS FOR POC-1

DMA	Tributary Area, A (ac)	Tributary Area, A (sf)	Overland Flow Length, L	Overland Flow Width, W=A/L	% Slope, S_o	Imp. Area (sf)	% Imperv	N-Imperv	N-Perv	Suction Head	Conductivity	Initial Deficit	Total Inflow	Separation Time
DMA-A	0.534963	23,303	389.5	60	5.3	0	0.0%	0.012	0.10	6.0	0.07500	0.31		
BMP-1	0.010835	472	37.8	12	0.1	0	0.0%	0.012	0.10	6.0	0.07500	0.31		
DMA-B	0.608219	26,494	602.9	44	5.9	1,709	6.5%	0.012	0.10	6.0	0.07500	0.31		
BMP-2	0.019697	858	52	16	0.1	0	0.0%	0.012	0.10	6.0	0.07500	0.31		
DMA-C	1.263889	55,055	549.3	100	8.4	40,543	73.6%	0.012	0.10	6.0	0.07500	0.31		
BMP-3	0.039601	1,725	62.3	28	0.1	0	0.0%	0.012	0.10	6.0	0.07500	0.31		
DMA-D	2.338292	101,856	783.9	130	5.6	64,943	63.8%	0.012	0.10	6.0	0.07500	0.31		
BMP-4	0.097612	4,252	210	20	0.1	0	0.0%	0.012	0.10	6.0	0.07500	0.31		
TOTAL	4.913108	214,015	335.9625	637	3.2	107,195	50.1%	0.012	0.10	6.0	0.07500	0.31	0.00983	24

```
ALL PEOPLES CHURCH
J-2936
PRE-DEVELOPMENT CONDITION

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

START_DATE           10/17/1948
START_TIME           08:00:00
REPORT_START_DATE    10/17/1948
REPORT_START_TIME    08:00:00
END_DATE             12/31/2005
END_TIME             23:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             00:15:00
DRY_STEP             04:00:00
ROUTING_STEP         0:01:00
RULE_STEP            00:00:00

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

[EVAPORATION]
;;Data Source    Parameters
;;-------------- ----------------
MONTHLY          0.06   0.08   .11    0.16   .18    .21    .21    .2     .16    .12
  0.08   0.06
DRY_ONLY         NO
```

```
[RAINGAGES]
;;Name           Format    Interval SCF      Source
;;-------------- --------- ------ ------ ----------
LINDBERGH        INTENSITY 1:00     1.0      TIMESERIES LINDBERGH

[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv  Width    %Slope
  CurbLen  SnowPack
;;-------------- ---------------- ---------------- -------- -------- --------
-------- -------- ----------------
EX-1             LINDBERGH        POC-1            4.913108 0        171      8.2
  0

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

[INFILTRATION]
;;Subcatchment   Param1     Param2     Param3     Param4     Param5
;;-------------- ---------- ---------- ---------- ---------- ----------
EX-1             6          0.1        0.31

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
;Node 1075
POC-1            0          FREE                        NO

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
LINDBERGH        FILE "J:\Active Jobs\3417 The
Grove\CIVIL\REPORTS\SWQMP\SWMM\ELECTRONIC FILES\Rainfall_data\lindbergh.txt"

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

[TAGS]

[MAP]
DIMENSIONS 0.000 0.000 10000.000 10000.000
Units      None

[COORDINATES]
```

```
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
POC-1            1100.000           3500.000

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

[Polygons]
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ------------------
EX-1             1066.897           5940.023

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
LINDBERGH        1908.881           6482.122
```

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)
--------------------------------------------------------------

ALL PEOPLES CHURCH
J-2936
PRE-DEVELOPMENT CONDITION


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

****************
Analysis Options
****************
Flow Units ............... CFS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... NO
  Water Quality .......... NO
Infiltration Method ...... GREEN_AMPT
Starting Date ............ 10/17/1948 08:00:00
Ending Date .............. 12/31/2005 23:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 01:00:00
Wet Time Step ............ 00:15:00
Dry Time Step ............ 04:00:00


**************************        Volume         Depth
Runoff Quantity Continuity     acre-feet        inches
**************************     ---------       -------
Total Precipitation ......       230.851       563.840
Evaporation Loss .........         2.020         4.935
Infiltration Loss ........       220.084       537.543
Surface Runoff ...........         9.591        23.425
Final Storage ............         0.000         0.000
Continuity Error (%) .....        -0.366


**************************        Volume        Volume
Flow Routing Continuity        acre-feet      10^6 gal
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         9.591         3.125
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
```

External Inflow	0.000	0.000
External Outflow	9.591	3.125
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

****
Analysis begun on: Thu Feb 4 13:29:58 2021
Analysis ended on: Thu Feb 4 13:30:31 2021
Total elapsed time: 00:00:33

```
ALL PEOPLES CHURCH
J-2936
POST-DEVELOPMENT CONDITION

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

START_DATE           10/17/1948
START_TIME           08:00:00
REPORT_START_DATE    10/17/1948
REPORT_START_TIME    08:00:00
END_DATE             12/31/2005
END_TIME             23:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             00:15:00
DRY_STEP             04:00:00
ROUTING_STEP         0:01:00
RULE_STEP            00:00:00

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

[EVAPORATION]
;;Data Source    Parameters
;;-------------- ----------------
MONTHLY          0.06   0.08   .11    0.16   .18    .21    .21    .2     .16    .12
  0.08   0.06
DRY_ONLY         NO
```

```
[RAINGAGES]
;;Name           Format    Interval SCF      Source
;;-------------- --------- ------ ------ ----------
LINDBERGH        INTENSITY 1:00     1.0      TIMESERIES LINDBERGH

[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv  Width    %Slope
  CurbLen  SnowPack
;;-------------- ---------------- ---------------- -------- -------- --------
-------- -------- ----------------
DMA-A            LINDBERGH        BMP-1            .534963  0        60       5.3
  0
BMP-1            LINDBERGH        DIV-1            0.010835 0        12       .1
  0
DMA-B            LINDBERGH        BMP-2            .608219  6.5      44       5.9
  0
DMA-C            LINDBERGH        BMP-3            1.263889 73.6     100      8.4
  0
DMA-D            LINDBERGH        BMP-4            2.338292 63.8     130      5.6
  0
BMP-2            LINDBERGH        DIV-2            .019697  0        16       .1
  0
BMP-3            LINDBERGH        DIV-3            0.039601 0        28       .1
  0
BMP-4            LINDBERGH        DIV-4            0.097612 0        20       0.1
  0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo
PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ----------
----------
DMA-A            0.012      .1         0.05       0.1        25         OUTLET
BMP-1            0.012      .1         0.05       0.1        25         OUTLET
DMA-B            .012       .1         0.05       .1         25         OUTLET
DMA-C            .012       .1         0.05       .1         25         OUTLET
DMA-D            .012       .1         0.05       .1         25         OUTLET
BMP-2            .012       .1         0.05       .1         25         OUTLET
BMP-3            .012       .1         0.05       .1         25         OUTLET
BMP-4            .012       .1         0.05       .1         25         OUTLET

[INFILTRATION]
;;Subcatchment   Suction    Ksat       IMD
;;-------------- ---------- ---------- ----------
DMA-A            6          .075       .31
BMP-1            6          .075       .31
DMA-B            6          .075       .31
DMA-C            6          .075       .31
DMA-D            6          .075       .31
BMP-2            6          .075       .31
```

```
BMP-3            6          .075       .31
BMP-4            6          .075       .3

[LID_CONTROLS]
;;Name           Type/Layer Parameters
;;-------------- ---------- ----------
BMP1             BC
BMP1             SURFACE    14.47      0.0        0          0          5
BMP1             SOIL       18         0.4        0.2        0.1        5          5
         1.5
BMP1             STORAGE    18         0.67       0.0        0
BMP1             DRAIN      .0338      0.5        3          6          0          0


BMP2             BC
BMP2             SURFACE    12         0.0        0          0          5
BMP2             SOIL       18         0.4        0.2        0.1        5          5
         1.5
BMP2             STORAGE    18         0.67       0          0
BMP2             DRAIN      .0348      0.5        6          6          0          0


BMP3             BC
BMP3             SURFACE    13.9       0.0        0          0          5
BMP3             SOIL       18         0.4        0.2        0.1        5          5
         1.5
BMP3             STORAGE    18         .67        0          0
BMP3             DRAIN      .1064      0.5        3          6          0          0


BMP4             BC
BMP4             SURFACE    13.9       0.0        0          0          5
BMP4             SOIL       18         0.4        0.2        0.1        5          5
         1.5
BMP4             STORAGE    18         0.67       0          0
BMP4             DRAIN      .0432      0.5        3          6          0          0


[LID_USAGE]
;;Subcatchment   LID Process      Number  Area       Width      InitSat    FromImp
 ToPerv     RptFile                  DrainTo          FromPerv
;;-------------- ---------------- ------- ---------- ---------- ----------
---------- ---------- ------------------------ ---------------- ----------
BMP-1            BMP1             1       471.97     0          0          100
 0          *                        *                100
BMP-2            BMP2             1       858.00     0          0          100
 0          *                        *                100
BMP-3            BMP3             1       1725.02    0          0          100
 0          *                        *                100
BMP-4            BMP4             1       4251.98    0          0          100
```

```
 0          *                       *               100

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
;Node 1075
POC-1            0          FREE                        NO

[DIVIDERS]
;;Name           Elevation  Diverted Link    Type       Parameters
;;-------------- ---------- ---------------- ---------- ----------
DIV-1            0          BYP-1            CUTOFF     0.00251    0          0
    0          0
DIV-2            0          BYP-2            CUTOFF     0.00478    0          0
    0          0
DIV-3            0          BYP-3            CUTOFF     0.02943    0          0
    0          0
DIV-4            0          BYP-4            CUTOFF     0.02943    0          0
    0          0

[STORAGE]
;;Name           Elev.    MaxDepth   InitDepth  Shape      Curve Name/Params
   N/A      Fevap    Psi      Ksat     IMD
;;-------------- -------- ---------- ----------- ----------
---------------------------- -------- --------           -------- --------
STOR-1           0        0.5        0          TABULAR    STOR-1
   0        0
STOR-2           0        0.5        0          TABULAR    STOR-2
   0        0
STOR-3           0        0.5        0          TABULAR    STOR-3
   0        0
STOR-4           0        0.5        0          TABULAR    STOR-4
   0        0

[CONDUITS]
;;Name           From Node        To Node          Length     Roughness  InOffset
OutOffset  InitFlow   MaxFlow
;;-------------- ---------------- ---------------- ---------- ---------- ----------
---------- ---------- ----------
BYP-1            DIV-1            STOR-1           10         0.01       0
0          0          0
ORIF-1           DIV-1            POC-1            10         0.01       0
0          0          0
BYP-2            DIV-2            STOR-2           10         0.01       0
0          0          0
ORIF-2           DIV-2            POC-1            10         0.01       0
0          0          0
BYP-3            DIV-3            STOR-3           10         0.01       0
0          0          0
ORIF-3           DIV-3            POC-1            10         0.01       0
```

```
0          0          0
BYP-4            DIV-4            STOR-4           10         0.01       0
0          0          0
ORIF-4           DIV-4            POC-1            10         0.01       0
0          0          0

[OUTLETS]
;;Name           From Node        To Node          Offset     Type
QTable/Qcoeff    Qexpon     Gated
;;-------------- ---------------- ---------------- ---------- ---------------
---------------- ---------- --------
OUT-1            STOR-1           POC-1            0          TABULAR/DEPTH   OUT-1
                     NO
OUT-2            STOR-2           POC-1            0          TABULAR/DEPTH   OUT-2
                     NO
OUT-3            STOR-3           POC-1            0          TABULAR/DEPTH   OUT-3
                     NO
OUT-4            STOR-4           POC-1            0          TABULAR/DEPTH   OUT-4
                     NO

[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4
Barrels    Culvert
;;-------------- ------------ ---------------- ---------- ---------- ----------
---------- ----------
BYP-1            CIRCULAR     1                0          0          0          1

ORIF-1           DUMMY        0                0          0          0          1

BYP-2            CIRCULAR     1                0          0          0          1

ORIF-2           DUMMY        0                0          0          0          1

BYP-3            CIRCULAR     1                0          0          0          1

ORIF-3           CIRCULAR     1                0          0          0          1

BYP-4            CIRCULAR     1                0          0          0          1

ORIF-4           CIRCULAR     1                0          0          0          1


[CURVES]
;;Name           Type       X-Value    Y-Value
;;-------------- ---------- ---------- ----------
OUT-1            Rating     0.000      0.602
OUT-1                       0.083      1.074
OUT-1                       0.167      1.916
OUT-1                       0.250      2.998
OUT-1                       0.333      4.275
```

```
OUT-1                       0.417      5.719
OUT-1                       0.500      7.313
;
;Qtotal from Top of Riser to Top of Berm
OUT-2            Rating     0.000      1.204
OUT-2                       0.083      1.700
OUT-2                       0.167      2.566
OUT-2                       0.250      3.671
OUT-2                       0.333      4.970
OUT-2                       0.417      6.435
OUT-2                       0.500      8.050
;
;Qtotal Outlet Structure Discharge- Top Riser to TB
OUT-3            Rating     0.000      1.505
OUT-3                       0.083      2.163
OUT-3                       .167       3.313
OUT-3                       .250       4.782
OUT-3                       0.333      6.510
OUT-3                       0.417      8.461
OUT-3                       0.500      10.611
;
;Qtotal from Riser to TB
OUT-4            Rating     0.000      6.019
OUT-4                       .083       6.861
OUT-4                       .167       8.188
OUT-4                       .25        9.829
OUT-4                       .333       11.723
OUT-4                       .417       13.834
OUT-4                       .5         16.140
;
;GRATE TO TOP OF BERM
STOR-1           Storage    0.000      668
STOR-1                      0.083      685
STOR-1                      0.167      702
STOR-1                      0.25       719
STOR-1                      0.333      736
STOR-1                      0.417      753
STOR-1                      0.5        770
;
;TOP OF GRATE TO TOP OF BERM
STOR-2           Storage    0.000      858
STOR-2                      .083       858
STOR-2                      0.167      858
STOR-2                      0.250      858
STOR-2                      0.333      858
STOR-2                      0.417      858
STOR-2                      0.500      858
;
;TOP OF GRATE TO TOP OF BERM
STOR-3           Storage    0.000      2265
```

```
STOR-3                     0.083      2310
STOR-3                     .167       2355
STOR-3                     .250       2400
STOR-3                     .333       2445
STOR-3                     .417       2490
STOR-3                     .500       2535
;
;TG TO TB
STOR-4           Storage   0.000      5591
STOR-4                     0.083      5703
STOR-4                     .167       5815
STOR-4                     .250       5927
STOR-4                     0.333      6039
STOR-4                     0.417      6151
STOR-4                     0.500      6263

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
LINDBERGH        FILE "J:\Active Jobs\3417 The
Grove\CIVIL\REPORTS\SWQMP\SWMM\ELECTRONIC FILES\Rainfall_data\lindbergh.txt"

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

[TAGS]

[MAP]
DIMENSIONS 0.000 0.000 10000.000 10000.000
Units      None

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
POC-1            3443.449           1802.912
DIV-1            -178.777           1303.345
DIV-2            1505.190           3806.228
DIV-3            4769.319           4636.678
DIV-4            6337.947           3886.967
STOR-1           1159.170           565.167
STOR-2           974.625            2652.826
STOR-3           3177.624           3748.558
STOR-4           6222.607           2675.894

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

```
[Polygons]
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ------------------
DMA-A            -3927.336          2860.438
BMP-1            -1931.949          1880.046
DMA-B            -2081.892          7070.358
DMA-C            6107.266           7416.378
DMA-D            8967.705           6597.463
BMP-2            -132.641           5028.835
BMP-3            5242.215           5605.536
BMP-4            7422.145           4798.155

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
LINDBERGH        1908.881           6482.122
```

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

  ALL PEOPLES CHURCH
  J-2936
  POST-DEVELOPMENT CONDITION

  WARNING 04: minimum elevation drop used for Conduit BYP-1
  WARNING 04: minimum elevation drop used for Conduit ORIF-1
  WARNING 04: minimum elevation drop used for Conduit BYP-2
  WARNING 04: minimum elevation drop used for Conduit ORIF-2
  WARNING 04: minimum elevation drop used for Conduit BYP-3
  WARNING 04: minimum elevation drop used for Conduit ORIF-3
  WARNING 04: minimum elevation drop used for Conduit BYP-4
  WARNING 04: minimum elevation drop used for Conduit ORIF-4

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

  ****************
  Analysis Options
  ****************
  Flow Units ............... CFS
  Process Models:
    Rainfall/Runoff ........ YES
    RDII ................... NO
    Snowmelt ............... NO
    Groundwater ............ NO
    Flow Routing ........... YES
    Ponding Allowed ........ NO
    Water Quality .......... NO
  Infiltration Method ...... GREEN_AMPT
  Flow Routing Method ...... KINWAVE
  Starting Date ............ 10/17/1948 08:00:00
  Ending Date .............. 12/31/2005 23:00:00
  Antecedent Dry Days ...... 0.0
  Report Time Step ......... 01:00:00
  Wet Time Step ............ 00:15:00
  Dry Time Step ............ 04:00:00
  Routing Time Step ........ 60.00 sec


  *************************        Volume         Depth
  Runoff Quantity Continuity     acre-feet        inches
  *************************     ---------       -------
  Initial LID Storage ......         0.025         0.061
  Total Precipitation ......       230.851       563.840
  Evaporation Loss .........        37.117        90.657
  Infiltration Loss ........        98.720       241.118
  Surface Runoff ...........         7.680        18.757
```

```
  LID Drainage .............        88.864       217.045
  Final Storage ............         0.056         0.137
  Continuity Error (%) .....        -0.676

  **************************        Volume        Volume
  Flow Routing Continuity        acre-feet      10^6 gal
  **************************     ---------     ---------
  Dry Weather Inflow .......         0.000         0.000
  Wet Weather Inflow .......        96.543        31.460
  Groundwater Inflow .......         0.000         0.000
  RDII Inflow ..............         0.000         0.000
  External Inflow ..........         0.000         0.000
  External Outflow .........        96.170        31.338
  Flooding Loss ............         0.827         0.269
  Evaporation Loss .........         0.000         0.000
  Exfiltration Loss ........         0.000         0.000
  Initial Stored Volume ....         0.000         0.000
  Final Stored Volume ......         0.000         0.000
  Continuity Error (%) .....        -0.469

  *******************************
  Highest Flow Instability Indexes
  *******************************
  All links are stable.

  ************************
  Routing Time Step Summary
  ************************
  Minimum Time Step           :    60.00 sec
  Average Time Step           :    60.00 sec
  Maximum Time Step           :    60.00 sec
  Percent in Steady State     :     0.00
  Average Iterations per Step :     1.00
  Percent Not Converging      :     0.00

  ***************************
  Analysis begun on:  Tue Feb  9 12:36:03 2021
  Analysis ended on:  Tue Feb  9 12:37:25 2021
  Total elapsed time: 00:01:22
```

ALL PEOPLES CHURCH
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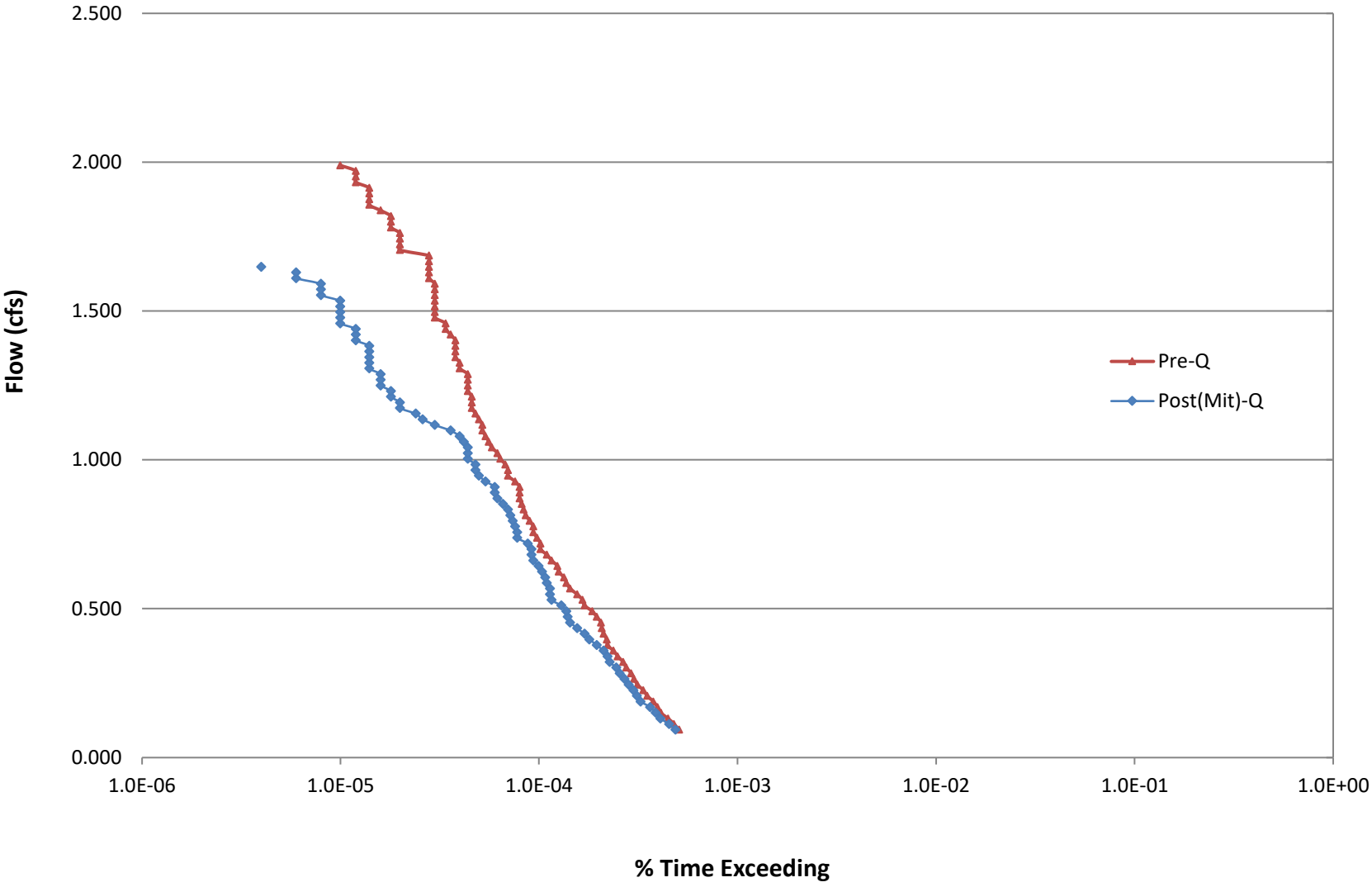
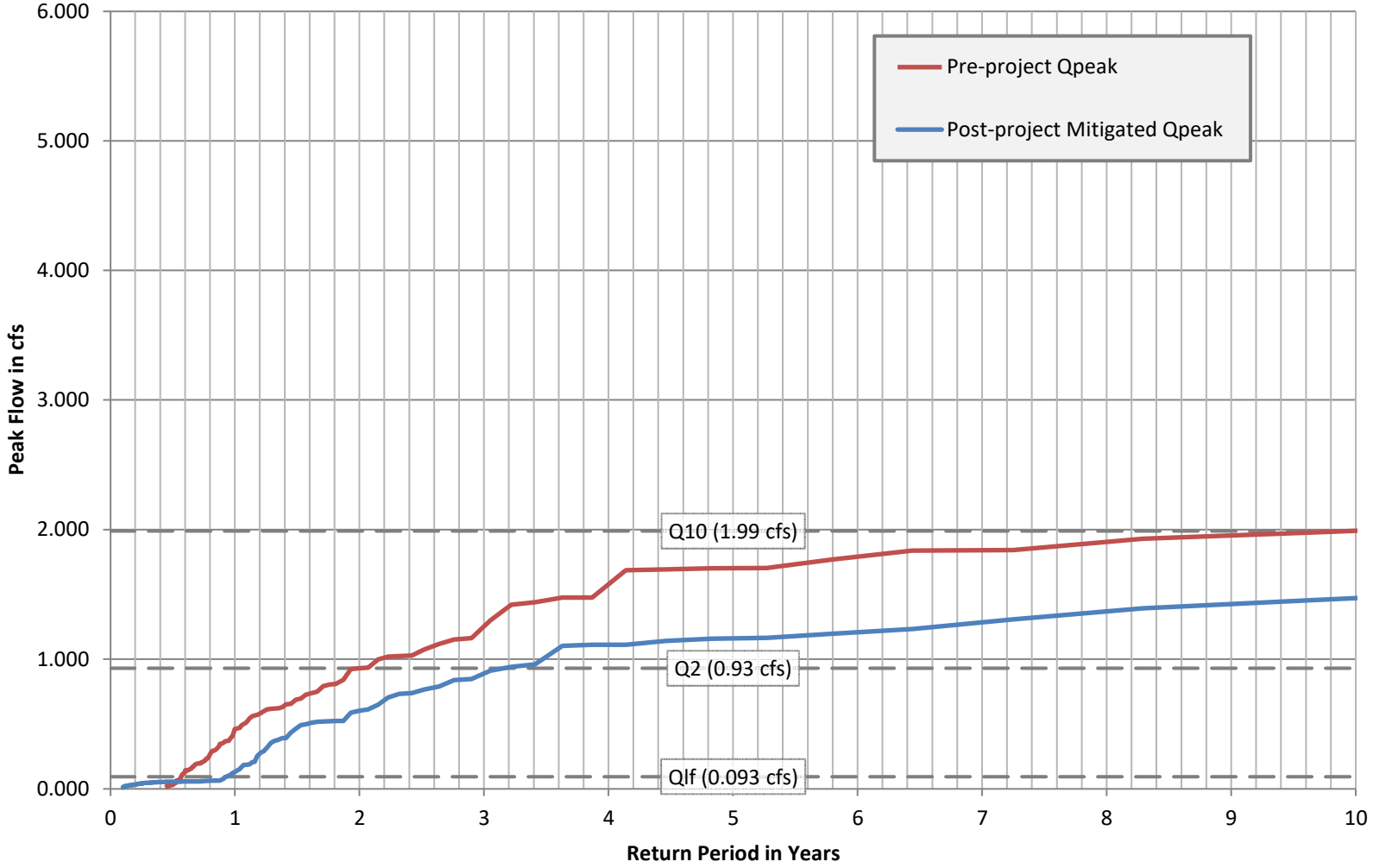
Peak Flow Frequency Summary

Return Period	Pre-project Q (cfs)	Post-project - Mitigated Q (cfs)
LF = 0.1*Q2	0.093	0.060
2-year	0.930	0.601
3-year	1.253	0.889
4-year	1.578	1.110
5-year	1.702	1.160
6-year	1.790	1.207
7-year	1.840	1.283
8-year	1.905	1.368
9-year	1.954	1.424
10-year	1.990	1.470

Flow Duration Curve [Pre vs. Post (Mitigated)]



Peak Flow Frequency Curves



BMP Sizing and DCV Summary Table

BMP Location	BMP Description	Total Area (sq-ft)	% Impervious	% Pervious	% Permeable Pavement	C Weighted Runoff Factor	DCV Req'd (Cu-ft)	Minimum 3% Treatment Area (sq-ft)	BMP Area Provided (sq-ft)	DCV Provided (Cu-Ft)			Modular Wetland Flow Design (cfs)
DMA-1	BIOFILTRATION PLANTER #1	23775.00	0%	48%	52%	0.16	202.7	116	472.0	660.8			
DMA-2	BIOFILTRATION PLANTER #2	27352.00	6%	14%	80%	0.17	241.9	138	858.0	1201.2			
DMA-3	BIOFILTRATION PLANTER #3	56780.00	71%	15%	14%	0.69	2061.1	1178	1725.0	2415.0			
DMA-4	BIOFILTRATION PLANTER #4	106108.00	61%	32%	7%	0.63	3514.7	2008	4252.0	5952.8			
DMA-5	SELF-TREATING	46929.00	0%	100%	0%	0.23	566.7	NA	0.0	0.0			
TOTAL DMA AREA:		**260944**	**41%**	**28%**	**31%**	**0.47**	**6587.01**	**3440.19**	**7307.00**	**10229.8**			
TOTAL BMP AREA:		**7307.00**											

NOTE: Weighted runoff factor based on percent of impervious, pervious, and paver area in each respective DMA

Runoff Factor (Table B.1.1 City of SD SW Manual)

Impervious	0.90	
Landscape	0.23	C Soils
Permeable Pavers	0.10	

P85th Parameters

Intensity:	0.20	in/hr
Precip:	0.63	in

B.1.2 Offline BMPs

Diversion flow rates for offline BMPs shall be sized to convey the maximum flow rate of runoff produced from a rainfall intensity of 0.2 inches of rainfall per hour, for each hour of every storm event. The following hydrologic method (Equation B.1-3) shall be used to calculate the diversion flow rate for off-line BMPs:

Equation B.1-1: Hydrologic Method

$$Q = C \times i \times A$$

where:

Q	=	Diversion flow rate in cubic feet per second
C	=	Runoff factor, area weighted estimate using Table B.1
i	=	Rainfall intensity of 0.2 in/hr.
A	=	Tributary area (acres) within the project footprint.

Drawdown Time for Biofiltration BMP-1

Outlet Q:	0.0026	cfs	0.234 in/hr
BMP Percolation Rate:	5	in/hr	0.0001 ft/sec
BMP Area:	472.0	sq-ft	
BMP Percolation Rate:	0.05	cfs	
Basin Volume:	661	cu-ft	
DCV/Average Q:	258125	secs	**71.70 Hours**

Drawdown Time for Biofiltration BMP-2

Outlet Q:	0.0048	cfs	0.241 in/hr
BMP Percolation Rate:	5	in/hr	0.0001 ft/sec
BMP Area:	858.0	sq-ft	
BMP Percolation Rate:	0.099	cfs	
Basin Volume:	1201	cu-ft	
DCV/Average Q:	251297	secs	**69.80 Hours**

Drawdown Time for Biofiltration BMP-3

Outlet Q:	0.0294	cfs	0.737 in/hr
BMP Percolation Rate:	5	in/hr	0.0001 ft/sec
BMP Area:	1725.0	sq-ft	
BMP Percolation Rate:	0.20	cfs	
Basin Volume:	2415	cu-ft	
DCV/Average Q:	82059	secs	**22.79 Hours**

Drawdown Time for Biofiltration BMP-4

Outlet Q:	0.0294	cfs	0.299 in/hr
BMP Percolation Rate:	5	in/hr	0.0001 ft/sec

B.1.1 Runoff Factor

Estimate the area weighted runoff factor for the tributary area to the BMP using runoff factor (from Table B.1-1) and area of each surface type in the tributary area and Equation B.1-2.

Equation B.1-2: Estimating Runoff Factor for Area

$$C = \frac{\sum C_x A_x}{\sum A_x}$$

where:

C_x	=	Runoff factor for area X
A_x	=	Tributary area X (acres)

These runoff factors apply to areas receiving direct rainfall only. For conditions in which runoff is routed onto a surface from an adjacent surface, see Section B.2 for determining composite runoff factors for these areas.

Table B.1-1: Runoff factors for surfaces draining to BMPs – Pollutant Control BMPs

Surface	Runoff Factor
Roofs[1]	0.90
Concrete or Asphalt[1]	0.90
Unit Pavers (grouted)[1]	0.90
Decomposed Granite	0.30
Cobbles or Crushed Aggregate	0.30
Amended, Mulched Soils or Landscape[2]	0.10
Compacted Soil (e.g., unpaved parking)	0.30
Natural (A Soil)	0.10
Natural (B Soil)	0.14
Natural (C Soil)	0.23
Natural (D Soil)	0.30

[1]Surface is considered impervious and could benefit from use of Site Design BMPs and adjustment of the runoff factor per Section B.2.1.
[2]Surface shall be designed in accordance with SD-F (Amended soils) fact sheet in Appendix E

BMP Area:	4252.0	sq-ft	
BMP Percolation Rate:	0.49	cfs	
Basin Volume:	5953	cu-ft	
DCV/Average Q:	202270	secs	**56.19 Hours**

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BMP-1

SWMM Model Drain Coefficient Calculation

PARAMETER	ABBREV.	Basin 1	
Ponding Depth	PD	12	in
Bioretention Soil Layer	S	18	in
Gravel Layer	G	18	in
TOTAL		4.0 48	ft in
Orifice Coefficient	c_g	0.6	--
Low Flow Orifice Diameter	D	0.2188	in
Drain exponent	n	0.5	--
Flow Rate (volumetric)	Q	0.003	cfs
Ponding Depth Surface Area	A_{PD}	668	ft^2
Bioretention Surface Area	A_S, A_G	473	ft^2
	A_S, A_G	0.0109	ac
Flow Rate (per unit area)	q	0.229	in/hr
Effective Ponding Depth	PD_{eff}	**14.47**	in
Drain Coefficient	C	**0.0331**	--

Cutoff Flow	Q_{cutoff}	**0.00251**	cfs

Outlet Structure for Discharge of BMP-1

Discharge vs. Elevation Table

Lower slot orifice			Emergency Weir	
No. of orif:	1		Invert:	0.50 ft
Invert:	0 ft		L:	6.0 ft
Slot height	0.25 ft		C_w:	3.1
Slot width	0.5 ft			
A	0.125	0.125		
C_o:	0.60			

***Note: h = head above the invert of the lowest surface discharge opening.**

H (ft)	h* (ft)	$Q_{slot-low}$ (cfs)	Q_{emerg} (cfs)	Q_{tot} (cfs)	
0.500	0.000	0.000	0.000	0.000	LOWER OUTLET ORIFICE
0.583	0.083	0.037	0.000	0.037	
0.667	0.167	0.105	0.000	0.105	
0.750	0.250	0.194	0.000	0.194	
0.833	0.333	0.549	0.000	0.549	
0.917	0.417	0.576	0.000	0.576	
1.000	0.500	0.602	0.000	0.602	RISER STRUCTURE
1.083	0.583	0.626	0.447	1.074	
1.167	0.667	0.650	1.266	1.916	
1.250	0.750	0.673	2.325	2.998	
1.333	0.833	0.695	3.580	4.275	
1.417	0.917	0.716	5.003	5.719	
1.500	1.000	0.737	6.576	7.313	
1.583	1.083	0.757	8.287	9.044	
1.667	1.167	0.777	10.125	10.902	
1.750	1.250	0.796	12.081	12.877	
1.833	1.333	0.815	14.149	14.964	
1.917	1.417	0.833	16.324	17.157	
2.000	1.500	0.851	18.600	19.451	

Note:

1. Weir equation, $Q=C_wL_e(h)^{3/2}$
2. Orifice equation, $Q=C_oA_e(2gh)^{1/2}$
3. Slot orifice acts as a weir when $h^* < h_{slot}$; slot orifice acts as an orifice when $h^* \geq h_{slot}$

Stage Area for BMP-1

Elevation (ft)	Area (ft^2)	Volume (ft^3)
0.000	473	0
0.083	488	40
0.167	504	83
0.250	519	128
0.333	535	176
0.417	551	226
0.500	567	280
0.583	584	336
0.667	600	395
0.750	617	456
0.833	634	521
0.917	651	589
1.000	668	660
1.083	685	733
1.167	702	809
1.250	719	888
1.333	736	970
1.417	753	1055
1.500	770	1142

Stage-Storage-Discharge of BMP-1

Elevation (ft)	Storage (ac-ft)	Discharge (cfs)
0.000	0.0064	0.000
0.083	0.0077	0.037
0.167	0.0091	0.105
0.250	0.0105	0.194
0.333	0.0120	0.549
0.417	0.0135	0.576
0.500	0.0151	0.602
0.583	0.0168	1.074
0.667	0.0186	1.916
0.750	0.0204	2.998
0.833	0.0223	4.275
0.917	0.0242	5.719
1.000	0.0262	7.313

ALL PEOPLES CHURCH
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BMP-2

SWMM Model Drain Coefficient Calculation

PARAMETER	ABBREV.	Basin 1	
Ponding Depth	PD	12	in
Bioretention Soil Layer	S	18	in
Gravel Layer	G	18	in
TOTAL		4.0 48	ft in
Orifice Coefficient	c_g	0.6	--
Low Flow Orifice Diameter	D	0.2969	in
Drain exponent	n	0.5	--
Flow Rate (volumetric)	Q	0.005	cfs
Ponding Depth Surface Area	A_{PD}	858	ft^2
Bioretention Surface Area	A_S, A_G	858	ft^2
	A_S, A_G	0.0197	ac
Flow Rate (per unit area)	q	0.233	in/hr
Effective Ponding Depth	PD_{eff}	**12.00**	in
Drain Coefficient	C	**0.0336**	--

Cutoff Flow	Q_{cutoff}	**0.00462**	cfs

Outlet Structure for Discharge of BMP-2

Discharge vs. Elevation Table

Lower slot orifice			Emergency Weir	
No. of orif:	1		Invert:	0.50 ft
Invert:	0 ft		L:	6.0 ft
Slot height	0.25 ft		C_w:	3.1
Slot width	1 ft			
A	0.250	0.25		
C_o:	0.60			

***Note: h = head above the invert of the lowest surface discharge opening.**

H (ft)	h* (ft)	$Q_{slot-low}$ (cfs)	Q_{emerg} (cfs)	Q_{tot} (cfs)	
0.500	0.000	0.000	0.000	0.000	LOWER OUTLET ORIFICE
0.583	0.083	0.075	0.000	0.075	
0.667	0.167	0.211	0.000	0.211	
0.750	0.250	0.388	0.000	0.388	
0.833	0.333	1.099	0.000	1.099	
0.917	0.417	1.152	0.000	1.152	
1.000	0.500	1.204	0.000	1.204	RISER STRUCTURE
1.083	0.583	1.253	0.447	1.700	
1.167	0.667	1.300	1.266	2.566	
1.250	0.750	1.346	2.325	3.671	
1.333	0.833	1.390	3.580	4.970	
1.417	0.917	1.433	5.003	6.435	
1.500	1.000	1.474	6.576	8.050	
1.583	1.083	1.515	8.287	9.802	
1.667	1.167	1.554	10.125	11.679	
1.750	1.250	1.592	12.081	13.673	
1.833	1.333	1.630	14.149	15.779	
1.917	1.417	1.667	16.324	17.991	
2.000	1.500	1.702	18.600	20.302	

Note:

1. Weir equation, $Q=C_wL_e(h)^{3/2}$
2. Orifice equation, $Q=C_oA_e(2gh)^{1/2}$
3. Slot orifice acts as a weir when $h^* < h_{slot}$; slot orifice acts as an orifice when $h^* \geq h_{slot}$

Stage Area for BMP-2

Elevation (ft)	Area (ft^2)	Volume (ft^3)
0.000	858	0
0.083	858	72
0.167	858	143
0.250	858	215
0.333	858	286
0.417	858	358
0.500	858	429
0.583	858	501
0.667	858	572
0.750	858	644
0.833	858	715
0.917	858	787
1.000	858	858
1.083	858	930
1.167	858	1001
1.250	858	1073
1.333	858	1144
1.417	858	1216
1.500	858	1287

Stage-Storage-Discharge of BMP-2

Elevation (ft)	Storage (ac-ft)	Discharge (cfs)
0.000	0.0098	0.000
0.083	0.0115	0.075
0.167	0.0131	0.211
0.250	0.0148	0.388
0.333	0.0164	1.099
0.417	0.0181	1.152
0.500	0.0197	1.204
0.583	0.0213	1.700
0.667	0.0230	2.566
0.750	0.0246	3.671
0.833	0.0263	4.970
0.917	0.0279	6.435
1.000	0.0295	8.050

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BMP-3

SWMM Model Drain Coefficient Calculation

PARAMETER	ABBREV.	Basin 1	
Ponding Depth	PD	12	in
Bioretention Soil Layer	S	18	in
Gravel Layer	G	18	in
TOTAL		4.0 48	ft in
Orifice Coefficient	c_g	0.6	--
Low Flow Orifice Diameter	D	0.75	in
Drain exponent	n	0.5	--
Flow Rate (volumetric)	Q	0.029	cfs
Ponding Depth Surface Area	A_{PD}	2271	ft^2
Bioretention Surface Area	A_S, A_G	1725	ft^2
	A_S, A_G	0.0396	ac
Flow Rate (per unit area)	q	0.737	in/hr
Effective Ponding Depth	PD_{eff}	**13.90**	0
Drain Coefficient	C	**0.1064**	--

Cutoff Flow	Q_{cutoff}	**0.02943**	cfs

Outlet Structure for Discharge of BMP-3

Discharge vs. Elevation Table

Lower slot orifice			Emergency Weir	
No. of orif:	1		Invert:	0.50 ft
Invert:	0 ft		L:	8.0 ft
Slot height	0.25 ft		C_w:	3.1
Slot width	1.25 ft			
A	0.313	0.3125		
C_o:	0.60			

***Note: h = head above the invert of the lowest surface discharge opening.**

H (ft)	h* (ft)	$Q_{slot-low}$ (cfs)	Q_{emerg} (cfs)	Q_{tot} (cfs)	
0.500	0.000	0.000	0.000	0.000	LOWER OUTLET ORIFICE
0.583	0.083	0.093	0.000	0.093	
0.667	0.167	0.264	0.000	0.264	
0.750	0.250	0.484	0.000	0.484	
0.833	0.333	1.374	0.000	1.374	
0.917	0.417	1.441	0.000	1.441	
1.000	0.500	1.505	0.000	1.505	RISER STRUCTURE
1.083	0.583	1.566	0.597	2.163	
1.167	0.667	1.625	1.687	3.313	
1.250	0.750	1.682	3.100	4.782	
1.333	0.833	1.737	4.773	6.510	
1.417	0.917	1.791	6.670	8.461	
1.500	1.000	1.843	8.768	10.611	
1.583	1.083	1.893	11.049	12.942	
1.667	1.167	1.943	13.499	15.442	
1.750	1.250	1.991	16.108	18.099	
1.833	1.333	2.037	18.866	20.903	
1.917	1.417	2.083	21.766	23.849	
2.000	1.500	2.128	24.800	26.928	

Note:

1. Weir equation, $Q=C_wL_e(h)^{3/2}$
2. Orifice equation, $Q=C_oA_e(2gh)^{1/2}$
3. Slot orifice acts as a weir when $h^* < h_{slot}$; slot orifice acts as an orifice when $h^* \geq h_{slot}$

Stage Area for BMP-3

Elevation (ft)	Area (ft^2)	Volume (ft^3)
0.000	1725	0
0.083	1770	146
0.167	1815	299
0.250	1860	459
0.333	1905	628
0.417	1950	803
0.500	1995	986
0.583	2040	1177
0.667	2085	1375
0.750	2130	1581
0.833	2175	1794
0.917	2220	2014
1.000	2265	2243
1.083	2310	2478
1.167	2355	2721
1.250	2400	2972
1.333	2445	3230
1.417	2490	3496
1.500	2535	3769

Stage-Storage-Discharge of BMP-3

Elevation (ft)	Storage (ac-ft)	Discharge (cfs)
0.000	0.0226	0.000
0.083	0.0270	0.093
0.167	0.0316	0.264
0.250	0.0363	0.484
0.333	0.0412	1.374
0.417	0.0462	1.441
0.500	0.0515	1.505
0.583	0.0569	2.163
0.667	0.0625	3.313
0.750	0.0682	4.782
0.833	0.0742	6.510
0.917	0.0802	8.461
1.000	0.0865	10.611

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BMP-4

SWMM Model Drain Coefficient Calculation

PARAMETER	ABBREV.	Basin 1	
Ponding Depth	PD	12	in
Bioretention Soil Layer	S	18	in
Gravel Layer	G	18	in
TOTAL		4.0 48	ft in
Orifice Coefficient	c_g	0.6	--
Low Flow Orifice Diameter	D	0.75	in
Drain exponent	n	0.5	--
Flow Rate (volumetric)	Q	0.029	cfs
Ponding Depth Surface Area	A_{PD}	5597	ft^2
Bioretention Surface Area	A_S, A_G	4252	ft^2
	A_S, A_G	0.0976	ac
Flow Rate (per unit area)	q	0.299	in/hr
Effective Ponding Depth	PD_{eff}	**13.90**	0
Drain Coefficient	C	**0.0432**	--

Cutoff Flow	Q_{cutoff}	**0.02943**	cfs

Outlet Structure for Discharge of BMP-4

Discharge vs. Elevation Table

Lower slot orifice			Emergency Weir	
No. of orif:	4		Invert:	0.50 ft
Invert:	0 ft		L:	8.0 ft
Slot height	0.25 ft		C_w:	3.1
Slot width	1.25 ft			
A	0.313	0.3125		
C_o:	0.60			

***Note: h = head above the invert of the lowest surface discharge opening.**

H (ft)	h* (ft)	$Q_{slot-low}$ (cfs)	Q_{emerg} (cfs)	Q_{tot} (cfs)	
0.500	0.000	0.000	0.000	0.000	LOWER OUTLET ORIFICE
0.583	0.083	0.373	0.000	0.373	
0.667	0.167	1.055	0.000	1.055	
0.750	0.250	1.938	0.000	1.938	
0.833	0.333	5.494	0.000	5.494	
0.917	0.417	5.762	0.000	5.762	
1.000	0.500	6.019	0.000	6.019	RISER STRUCTURE
1.083	0.583	6.264	0.597	6.861	
1.167	0.667	6.501	1.687	8.188	
1.250	0.750	6.729	3.100	9.829	
1.333	0.833	6.950	4.773	11.723	
1.417	0.917	7.164	6.670	13.834	
1.500	1.000	7.371	8.768	16.140	
1.583	1.083	7.573	11.049	18.622	
1.667	1.167	7.770	13.499	21.270	
1.750	1.250	7.962	16.108	24.070	
1.833	1.333	8.149	18.866	27.015	
1.917	1.417	8.333	21.766	30.098	
2.000	1.500	8.512	24.800	33.312	

Note:

1. Weir equation, $Q=C_wL_e(h)^{3/2}$
2. Orifice equation, $Q=C_oA_e(2gh)^{1/2}$
3. Slot orifice acts as a weir when $h^* < h_{slot}$; slot orifice acts as an orifice when $h^* \geq h_{slot}$

Stage Area for BMP-4

Elevation (ft)	Area (ft^2)	Volume (ft^3)
0.000	4252	0
0.083	4363	359
0.167	4472	736
0.250	4586	1132
0.333	4698	1547
0.417	4810	1981
0.500	4921	2433
0.583	5032.714286	2903
0.667	5144.392857	3392
0.750	5256.071429	3900
0.833	5367.75	4427
0.917	5479.428571	4972
1.000	5591	5535
1.083	5703	6118
1.167	5815	6719
1.250	5927	7339
1.333	6039	7977
1.417	6151	8635
1.500	6263	9311

Stage-Storage-Discharge of BMP-4

Elevation (ft)	Storage (ac-ft)	Discharge (cfs)
0.000	0.0558	0.000
0.083	0.0666	0.373
0.167	0.0779	1.055
0.250	0.0895	1.938
0.333	0.1016	5.494
0.417	0.1141	5.762
0.500	0.1271	6.019
0.583	0.1404	6.861
0.667	0.1542	8.188
0.750	0.1685	9.829
0.833	0.1831	11.723
0.917	0.1982	13.834
1.000	0.2137	16.140

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Low-flow Threshold:	10%	
0.1xQ2 (Pre):	0.093	cfs
Q10 (Pre):	1.990	cfs
Ordinate #:	100	
Incremental Q (Pre):	0.01897	cfs
Total Hourly Data:	501471	hours

The proposed BMP: **PASSED**

Interval	Pre-project Flow (cfs)	Pre-project Hours	Pre-project % Time Exceeding	Post-project Hours	Post-project % Time Exceeding	Percentage	Pass/Fail
0	0.093	255	5.09E-04	244	4.87E-04	96%	Pass
1	0.112	240	4.79E-04	227	4.53E-04	95%	Pass
2	0.131	224	4.47E-04	205	4.09E-04	92%	Pass
3	0.150	206	4.11E-04	194	3.87E-04	94%	Pass
4	0.169	198	3.95E-04	182	3.63E-04	92%	Pass
5	0.188	189	3.77E-04	163	3.25E-04	86%	Pass
6	0.207	176	3.51E-04	156	3.11E-04	89%	Pass
7	0.226	168	3.35E-04	150	2.99E-04	89%	Pass
8	0.245	157	3.13E-04	142	2.83E-04	90%	Pass
9	0.264	151	3.01E-04	135	2.69E-04	89%	Pass
10	0.283	146	2.91E-04	128	2.55E-04	88%	Pass
11	0.302	138	2.75E-04	123	2.45E-04	89%	Pass
12	0.321	133	2.65E-04	114	2.27E-04	86%	Pass
13	0.340	125	2.49E-04	111	2.21E-04	89%	Pass
14	0.359	119	2.37E-04	106	2.11E-04	89%	Pass
15	0.377	111	2.21E-04	98	1.95E-04	88%	Pass
16	0.396	110	2.19E-04	90	1.79E-04	82%	Pass
17	0.415	106	2.11E-04	85	1.70E-04	80%	Pass
18	0.434	104	2.07E-04	78	1.56E-04	75%	Pass
19	0.453	103	2.05E-04	72	1.44E-04	70%	Pass
20	0.472	98	1.95E-04	70	1.40E-04	71%	Pass
21	0.491	93	1.85E-04	69	1.38E-04	74%	Pass
22	0.510	85	1.70E-04	65	1.30E-04	76%	Pass
23	0.529	83	1.66E-04	58	1.16E-04	70%	Pass
24	0.548	78	1.56E-04	57	1.14E-04	73%	Pass
25	0.567	72	1.44E-04	57	1.14E-04	79%	Pass
26	0.586	69	1.38E-04	55	1.10E-04	80%	Pass
27	0.605	67	1.34E-04	54	1.08E-04	81%	Pass
28	0.624	63	1.26E-04	52	1.04E-04	83%	Pass
29	0.643	62	1.24E-04	50	9.97E-05	81%	Pass
30	0.662	58	1.16E-04	47	9.37E-05	81%	Pass
31	0.681	55	1.10E-04	46	9.17E-05	84%	Pass
32	0.700	51	1.02E-04	46	9.17E-05	90%	Pass
33	0.719	51	1.02E-04	44	8.77E-05	86%	Pass
34	0.738	49	9.77E-05	39	7.78E-05	80%	Pass
35	0.757	47	9.37E-05	39	7.78E-05	83%	Pass
36	0.776	47	9.37E-05	38	7.58E-05	81%	Pass
37	0.795	45	8.97E-05	37	7.38E-05	82%	Pass
38	0.814	43	8.57E-05	36	7.18E-05	84%	Pass
39	0.833	42	8.38E-05	35	6.98E-05	83%	Pass
40	0.852	41	8.18E-05	33	6.58E-05	80%	Pass
41	0.871	40	7.98E-05	31	6.18E-05	78%	Pass

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Interval	Pre-project Flow (cfs)	Pre-project Hours	Pre-project % Time Exceeding	Post-project Hours	Post-project % Time Exceeding	Percentage	Pass/Fail
42	0.890	40	7.98E-05	30	5.98E-05	75%	Pass
43	0.909	40	7.98E-05	30	5.98E-05	75%	Pass
44	0.928	38	7.58E-05	27	5.38E-05	71%	Pass
45	0.946	35	6.98E-05	25	4.99E-05	71%	Pass
46	0.965	35	6.98E-05	24	4.79E-05	69%	Pass
47	0.984	34	6.78E-05	24	4.79E-05	71%	Pass
48	1.003	32	6.38E-05	22	4.39E-05	69%	Pass
49	1.022	31	6.18E-05	22	4.39E-05	71%	Pass
50	1.041	29	5.78E-05	22	4.39E-05	76%	Pass
51	1.060	28	5.58E-05	21	4.19E-05	75%	Pass
52	1.079	27	5.38E-05	20	3.99E-05	74%	Pass
53	1.098	26	5.18E-05	18	3.59E-05	69%	Pass
54	1.117	26	5.18E-05	15	2.99E-05	58%	Pass
55	1.136	25	4.99E-05	13	2.59E-05	52%	Pass
56	1.155	24	4.79E-05	12	2.39E-05	50%	Pass
57	1.174	23	4.59E-05	10	1.99E-05	43%	Pass
58	1.193	23	4.59E-05	10	1.99E-05	43%	Pass
59	1.212	23	4.59E-05	9	1.79E-05	39%	Pass
60	1.231	22	4.39E-05	9	1.79E-05	41%	Pass
61	1.250	22	4.39E-05	8	1.60E-05	36%	Pass
62	1.269	22	4.39E-05	8	1.60E-05	36%	Pass
63	1.288	22	4.39E-05	8	1.60E-05	36%	Pass
64	1.307	20	3.99E-05	7	1.40E-05	35%	Pass
65	1.326	20	3.99E-05	7	1.40E-05	35%	Pass
66	1.345	19	3.79E-05	7	1.40E-05	37%	Pass
67	1.364	19	3.79E-05	7	1.40E-05	37%	Pass
68	1.383	19	3.79E-05	7	1.40E-05	37%	Pass
69	1.402	19	3.79E-05	6	1.20E-05	32%	Pass
70	1.421	18	3.59E-05	6	1.20E-05	33%	Pass
71	1.440	17	3.39E-05	6	1.20E-05	35%	Pass
72	1.459	17	3.39E-05	5	9.97E-06	29%	Pass
73	1.478	15	2.99E-05	5	9.97E-06	33%	Pass
74	1.497	15	2.99E-05	5	9.97E-06	33%	Pass
75	1.515	15	2.99E-05	5	9.97E-06	33%	Pass
76	1.534	15	2.99E-05	5	9.97E-06	33%	Pass
77	1.553	15	2.99E-05	4	7.98E-06	27%	Pass
78	1.572	15	2.99E-05	4	7.98E-06	27%	Pass
79	1.591	15	2.99E-05	4	7.98E-06	27%	Pass
80	1.610	14	2.79E-05	3	5.98E-06	21%	Pass
81	1.629	14	2.79E-05	3	5.98E-06	21%	Pass
82	1.648	14	2.79E-05	2	3.99E-06	14%	Pass
83	1.667	14	2.79E-05	0	0.00E+00	0%	Pass
84	1.686	14	2.79E-05	0	0.00E+00	0%	Pass
85	1.705	10	1.99E-05	0	0.00E+00	0%	Pass
86	1.724	10	1.99E-05	0	0.00E+00	0%	Pass
87	1.743	10	1.99E-05	0	0.00E+00	0%	Pass
88	1.762	10	1.99E-05	0	0.00E+00	0%	Pass
89	1.781	9	1.79E-05	0	0.00E+00	0%	Pass

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Interval	Pre-project Flow (cfs)	Pre-project Hours	Pre-project % Time Exceeding	Post-project Hours	Post-project % Time Exceeding	Percentage	Pass/Fail
90	1.800	9	1.79E-05	0	0.00E+00	0%	Pass
91	1.819	9	1.79E-05	0	0.00E+00	0%	Pass
92	1.838	8	1.60E-05	0	0.00E+00	0%	Pass
93	1.857	7	1.40E-05	0	0.00E+00	0%	Pass
94	1.876	7	1.40E-05	0	0.00E+00	0%	Pass
95	1.895	7	1.40E-05	0	0.00E+00	0%	Pass
96	1.914	7	1.40E-05	0	0.00E+00	0%	Pass
97	1.933	6	1.20E-05	0	0.00E+00	0%	Pass
98	1.952	6	1.20E-05	0	0.00E+00	0%	Pass
99	1.971	6	1.20E-05	0	0.00E+00	0%	Pass
100	1.990	5	9.97E-06	0	0.00E+00	0%	Pass

TOTAL WORK:

EROSION POTENTIAL (EP):

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