Appendix I1

Storm Water Quality Management Plan

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

Renzulli Estates

VTM#2474835 SDP#/NDP # (PTS-674401)

W.O. 3622-0002

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

Engineer of Work:

Alisa S. Vialpando

Alisa Vialpando, RCE # 47945
Provide Wet Signature and Stamp Above Line

Prepared For:

Green Phair Scripps Partners, LLC

945 East J Street

Chula Vista, CA 91910

619-253-4837

Prepared By:

Hunsaker & Associates San Diego, Inc.
9707 Waples Street
San Diego, CA 92121
858-558-4500

Date:

10-04-23

Approved by: City of San Diego Date

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Project Name: Renzulli Estates

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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: Renzulli Estates
Permit Application 674401

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.

Alisa S. Vialpando

Engineer of Work's Signature

47945

PE#

12-31-2023

Expiration Date

Alisa S. Vialpando

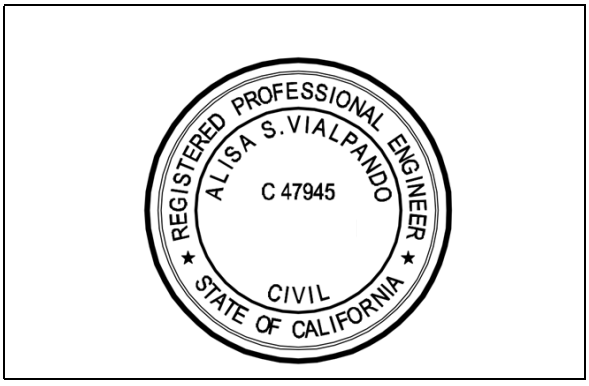
Print Name

Hunsaker & Associates San Diego, Inc.

Company

10/04/2023

Date



Project Name: Renzulli Estates

Submittal Record

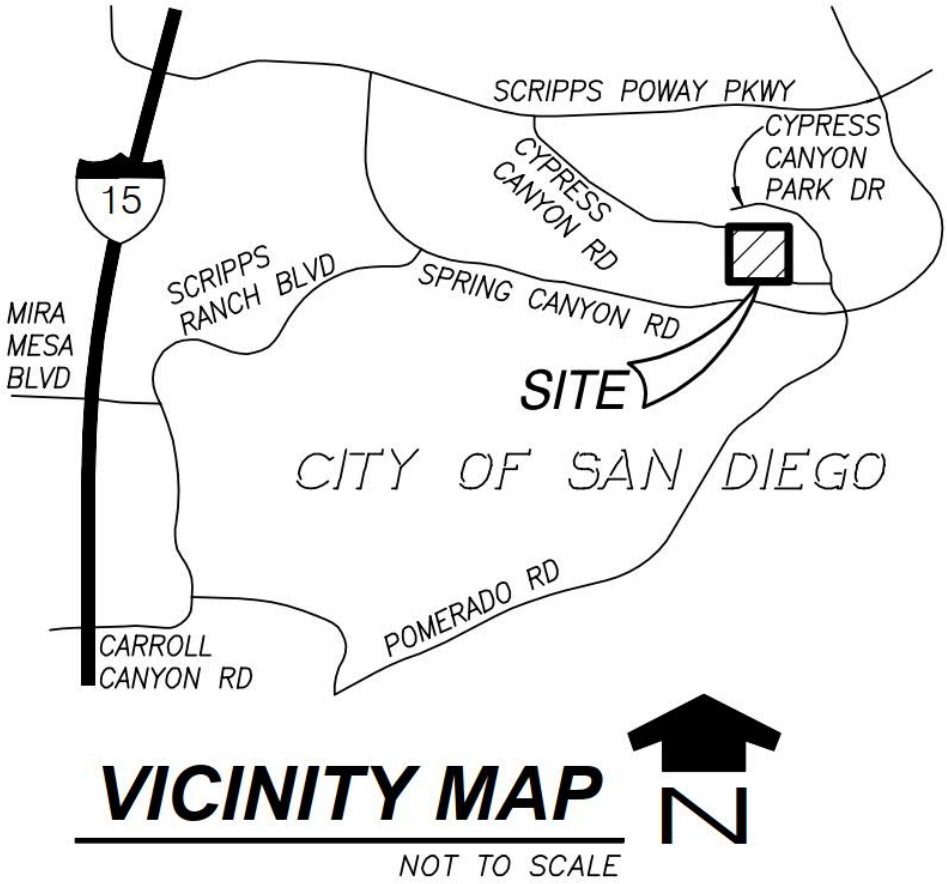
Use this Table to keep a record of submittals of this PDP SWQMP. Each time the PDP SWQMP is re-submitted, provide the date and status of the project. In last column indicate changes that have been made or indicate if response to plancheck comments is included. When applicable, insert response to plancheck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

Submittal Number	Date	Project Status	Changes
1	09/11/2020	☑ Preliminary Design/Planning/CEQA ☐ Final Design	**Initial Submittal**
2	04/01/2021	☑ Preliminary Design/Planning/CEQA ☐ Final Design	Address 1st plan check comments
3	10/22/2021	☑ Preliminary Design/Planning/CEQA ☐ Final Design	Address 2nd plan check comments
4	12/14/2021	☑ Preliminary Design/Planning/CEQA ☐ Final Design	Address 3rd plan check comments
5	05/27/2022	☑ Preliminary Design/Planning/CEQA ☐ Final Design	minor changes have been made to this plan
6	02/23/2023	☑ Preliminary Design/Planning/CEQA ☐ Final Design	Project re-design 1st submittal
7	10/04/23	☑ Preliminary Design/Planning/CEQA ☐ Final Design	Address City comments

Project Name: Renzulli Estates

Project Vicinity Map

Project Name: Renzulli Estates
Permit Application 674401



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

Attach DS-560 form.

FORM
DS-560
September 2021

Stormwater Requirements Applicability Checklist

Project Address: 11495 Cypress Canyon Road **Project Number:**

SECTION 1: Construction Stormwater Best Management Practices (BMP) Requirements

All construction sites are required to implement construction BMPs per the performance standards in the Stormwater Standards Manual. Some sites are also required to obtain coverage under the State Construction General Permit (CGP)[1], administered by the California State Water Resources Control Board.

For all projects, complete Part A - If the project is required to submit a Stormwater Pollution Prevention Plan (SWPPP) or Water Pollution Control Plan (WPCP), continue to Part B.

PART A – Determine Construction Phase Stormwater Requirements

1. Is the project subject to California's statewide General National Pollutant Discharge Elimination System (NPDES) permit for Stormwater 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 is required; skip questions 2-4. ○ No; proceed to the 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 stormwater?

   ○ Yes, WPCP is required; skip questions 3-4. ○ No; proceed to the next question.

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

   ○ Yes, WPCP is required; skip question 4. ◉ No; proceed to the 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, potholing, curb and gutter replacement, and retaining wall encroachments.

   ☐ Yes, no document is required.

Check one of the boxes below and continue to Part B

◉ **If you checked "Yes" for question 1**, an 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 check "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 http://www.sandiego.gov/stormwater/regulations/index.shtml

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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 continue 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 are not located in the ASBS watershed.
B. Projects that qualify as LUP Type 2 or LUP Type 3 per the CGP and are 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 are not located in an ASBS watershed.
C. WPCP projects (>5,000 square feet of ground disturbance) located within the Los Peñasquitos 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: Construction Stormwater BMP Requirements

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

PART C – Determine if Not Subject to Permanent Stormwater Requirements

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

- **If "yes" is checked for any number in Part C**: Proceed to Part F and check "Not Subject to Permanent Stormwater BMP Requirements."
- **If "no" is checked for all 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 stormwater?

   ○ 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

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PART D – PDP Exempt Requirements

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

- **If "yes" is checked for any questions in Part D**, continue to Part F and check the box labeled "PDP Exempt."
- **If "no" is 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 stormwater 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 Stormwater Standards manual?

   ○ Yes, PDP exempt requirements apply ◉ No, proceed to 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 Stormwater Standards Manual?

   ○ Yes, PDP exempt requirements apply ○ No, proceed to next question

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 Stormwater 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 beverages for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (Standard Industrial Classification (SIC) 5812), and where the land development creates and/or replaces 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

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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 the 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 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 shop 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.** These projects are not covered in any of the categories above but involve the disturbance of one or more acres of land and are expected to generate post-construction phase pollutants, including fertilizers and pesticides. This category does not include projects creating less than 5,000 square feet of impervious area and projects containing landscaping without a requirement for the regular use of fertilizers and pesticides (such as a slope stabilization project using native plants). Impervious area calculations need not include linear pathways for infrequent vehicle use, such as emergency maintenance access or bicycle and pedestrian paths if the linear pathways are built with pervious surfaces or if runoff from the pathway sheet flows to adjacent pervious areas. ○ 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 STORMWATER REQUIREMENTS** ○ Yes ○ No

2. The project is a **STANDARD DEVELOPMENT PROJECT**. Site design and source control BMP requirements apply. See the Stormwater Standards Manual for guidance. ○ Yes ○ No

3. The Project is **PDP EXEMPT**. Site design and source control BMP requirements apply. Refer to the Stormwater Standards Manual for guidance. ○ Yes ○ No

4. The project is a **PRIORITY DEVELOPMENT PROJECT**. Site design, source control and structural pollutant control BMP requirements apply. Refer to the Stormwater Standards Manual for guidance on determining if the project requires hydromodification plan management. ○ Yes ◉ No

Name of Owner or Agent GREEN PHAIR SCRIPPS PARTNERS LLC **Title** Manager

Signature [signature] **Date** 2-25-23

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Project Name: Renzulli Estates

Applicability of Permanent, Post-Construction Storm Water BMP Requirements	Form I-1

Project Identification

Project Name: Renzulli Estates	
Permit Application Number: 674401	Date: 02/22/2023

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: Renzulli Estates

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 is no critical coarse sediment yield areas within 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: Renzulli Estates

Site Information Checklist For PDPs	Form I-3B
Project Summary Information	
Project Name	Renzulli Estates
Project Address	11495 cypress canyon road
Assessor's Parcel Number(s) (APN(s))	319-020-01-00
Permit Application Number	674401
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)	906.2
Project Area (total area of Assessor's Parcel(s) associated with the project or total area of the right-of-way)	40.56 Acres (1766957.6 Square Feet)
Area to be disturbed by the project (Project Footprint)	27.46 Acres (1196090 Square Feet)
Project Proposed Impervious Area (subset of Project Footprint)	10.46 Acres (455434 Square Feet)
Project Proposed Pervious Area (subset of Project Footprint)	17.0 Acres (740656 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	100 %

Project Name: Renzulli Estates

Form I-3B Page 2 of 11

Description of Existing Site Condition and Drainage Patterns

Current Status of the Site (select all that apply):

- [x] Existing development
- [ ] Previously graded but not built out
- [ ] Agricultural or other non-impervious use
- [x] Vacant, undeveloped/natural

Description / Additional Information:

the primary portion of the site (39.5 ac) is undeveloped natural area except an existing building sitting in the center of the site.

Existing Land Cover Includes (select all that apply):

- [x] Vegetative Cover
- [x] Non-Vegetated Pervious Areas
- [x] Impervious Areas

Description / Additional Information:

the impervious areas are from the existing developed area (approx. 1 ac)

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

- [ ] NRCS Type A
- [ ] NRCS Type B
- [ ] NRCS Type C
- [x] NRCS Type D

Approximate Depth to Groundwater:

- [ ] Groundwater Depth < 5 feet
- [ ] 5 feet < Groundwater Depth < 10 feet
- [ ] 10 feet < Groundwater Depth < 20 feet
- [x] Groundwater Depth > 20 feet

Existing Natural Hydrologic Features (select all that apply):

- [ ] Watercourses
- [ ] Seeps
- [ ] Springs
- [x] Wetlands
- [ ] None

Description / Additional Information:

Two wetlands exist within the site, one is in the end of Mundial St, one is in the end of Cypress Valley Dr.

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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

The 40.56-acre hydrologic catchment primarily consists of natural grades and hills all covered by native vegetations and shrubs. The site is accessible from Cypress Canyon Rd (Northwest entry), Mundial St (North entry), and Cypress Canyon Rd (Southeast entry). In addition, the Cypress Valley Dr ends against the southwest site boundary from the west with an approx. 6' tall retaining wall growing from an existing natural channel bed (Cypress Canyon) at the southwest boundary. The flow in Cypress Canyon is ephemeral and is partially from our onsite runoff from the north of the canyon, it runs from east to west and drains into an existing storm drain headwall under Cypress Valley Dr.

The overall drainage area is bisected into north and south by a ridgeline running through the center of the site from northwest to southeast. In the south area, the primary portion of the total runoff drains to southeast storm drain headwall at Cypress Valley Dr. Another small drainage area drains to the east entry at Cypress Canyon Rd and continues to gutter flow to the inlet at Cypress Canyon Rd and Cypress Canyon Park Dr intersection. The north drainage area was further divided into 6 sub-catchbasins based on the topo and drains separately to the existing inlets and catchbasins located at Cypress Canyon Rd, Mundial St, and nearby basins which are all labeled in our drainage maps.

Project Name: Renzulli Estates

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 site is constituted by two major planning areas, single-family site (primarily in the center of the project site) and affordable site (northeast side of the site). The single-family site consists of 98 single-family residential dwellings in the central area and 2 more dwellings in northeast side adjacent to the affordable site. The affordable site has a 10-units single apartment building as well as associated parking spaces.

The development of the site will include adding the storm drains, curb inlets, cleanouts along the proposed onsite streets, roads and parking spaces to collect and convey the storm runoff to the two proposed detention and water quality control basins located at north part of the development area.

The project also proposed bypassing storm drains and ditches to collect and convey the sloped area runoff directly to downstream storm drains around the site. For all other undisturbed areas within the site, the drainage pattern was not modified and maintains its original condition.

After the majority of the onsite runoff is treated and detained by the biofiltration basins, the outflow will confluence with the bypass storm drain and discharge north into Mundial St. existing 24" storm drain and south into Cypress Canyon which has transformed into an underground storm drain at the end of Cypress Valley Dr. adjacent to our east side boundary.

The last portion of the onsite runoff at northwest corner is generated from a small section of the proposed road connecting with existing Cypress Canyon Rd. The existing drainage system at this entry consists of two concrete ditches on each side of the Cypress Canyon Rd. They accept the runoff from our site and discharge to two storm drain inlets on Cypress Canyon Rd and Angelique St. Our design doesn't propose any stormdrain at this street section but let the water sheet flows to these two ditches then to the downstream as it did in the existing condition. In order to meet the water quality requirement, the water quality control measurements are proposed, i.e., two Modular Wetland structures will be installed at the proposed storm drain on the northwest entry of the project, on Cypress Canyon Rd and Angelique St to control the water quality. The outflow from Modular Wetlands then discharges into Angelique St. without detention.

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

roofs
roads
driveways
sidewalks
parking lots

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

landscapes

Does the project include grading and changes to site topography?

☑ Yes
☐ No

Description / Additional Information:

the planned site will be rough graded for the housing construction.

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 development of the site will include adding the storm drains, curb inlets, cleanouts along the proposed onsite streets, roads and parking spaces to collect and convey the storm runoff to the two proposed detention and water quality control basins located at northwest part of the development area.

The project also proposed bypassing storm drains, ditches to collect and convey the sloped area runoff directly to downstream storm drains around the site. For most undisturbed areas within the site, the natural drainage pattern remains unchanged. However, there is a minor exception where approximately 2 acres of existing slopes, which used to drain southeast towards Cypress Canyon Rd., have been redirected northward through a proposed storm drain. This redirected flow is combined with on-site runoff and directed to a biofiltration/detention basin for treatment and mitigation. It's important to note that this diversion does not impact northward flow, and reducing southeastward flow does not affect existing channels, as the flow in its current condition reaches the downstream road. Additionally, a channel is being proposed to convey the run-on coming from the existing-undisturbed-slopes on the south west area of the project.

After the majority of the onsite runoff is treated and detained by the biofiltration basins, the outflow will confluence with the bypass storm drain and discharge north into Mundial St. existing 24" storm drain and. south into Cypress Canyon which has transformed into an underground storm drain at the end of Cypress Valley Dr. adjacent to our east side boundary.

The last portion of the onsite runoff at northwest corner is generated from a small section of the proposed road connecting with existing Cypress Canyon Rd. The existing drainage system at this entry consists of two concrete ditches on each side of the Cypress Canyon Rd. They accept the runoff from our site and discharge to two storm drain inlets on Cypress Canyon Road and Angelique Street. Two storm drain inlets are proposed at the end of the proposed street to capture the peak flow generated from it; In order to meet the water quality requirements, the water quality control measurements are proposed, i.e., two Filterra Unit structures (or equivalent) will be installed at these two inlets on Cypress Canyon Rd control the water quality. The outflow from Filterra Units then discharges, without detention, into the storm drain on Cypress Canyon Road, where it will be conveyed northerly via Angelique St. storm drain system, similar to existing conditions.

Project Name: Renzulli Estates

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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
- [ ] 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
- [x] Refuse areas
- [ ] Industrial processes
- [ ] Outdoor storage of equipment or materials
- [ ] Vehicle and equipment cleaning
- [ ] Vehicle/equipment repair and maintenance
- [ ] Fuel dispensing areas
- [ ] Loading docks
- [x] Fire sprinkler test water
- [x] Miscellaneous drain or wash water
- [x] Plazas, sidewalks, and parking lots

Description/Additional Information:

Project Name: Renzulli Estates

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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)

The northwest entry area discharges into the storm drain under Cypress Canyon Rd, turn right to Angelique St, turn right to Fantasia Ct, turn left to Fantasia Way, turn right to Evergold St, confluence with the north entry discharge at Evergold St.
The north entry (Basin 1) discharges into the storm drain under Mundial St, turn north to Libelle Ct, turn left to Evergold St, confluence with the northwest entry area into POC1 at Evergold St, continue to north and discharge into Los Penasquitos Creek.

POC2 discharges into existing 48" storm drain at Cypress Valley Dr, turn left to Cypress Canyon Rd, turn left to Scripps Poway Pkwy, turn left to Cypress Canyon, continue to Los Penasquitos Creek.

Provide a summary of all beneficial uses of receiving waters downstream of the project discharge locations

see attached below

Identify all ASBS (areas of special biological significance) receiving waters downstream of the project discharge locations

no ASBS downstream of the project discharge locations

Provide distance from project outfall location to impaired or sensitive receiving waters

NA

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

The BMPs are within the City's Multi-Habitat Planning Area.

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
San Dieguito River Watershed - continued																
San Dieguito Reservoir	5.21	See Reservoirs & Lakes – Table 2-4														
Warren Canyon	5.21	●	●	●	●				●	●	●	●	●	●		
San Bernardo Valley	5.21	●	●	●	●				●	●		●		●	●	
unnamed intermittent streams	5.24	●	●	●	●				●	●		●		●		
unnamed intermittent streams	5.23	●	●	●	●				●	●		●		●		
unnamed intermittent streams	5.22	●	●	●	●				●	●		●		●		
San Dieguito River	5.11	+	○	○					●	●		●	●	●		●
Lusardi Creek	5.12	+	○	○					●	●		●		●		
Lusardi Creek	5.11	+	○	○					●	●		●		●		
La Zanja Canyon	5.11	+	○	○					●	●		●		●		
Gonzales Canyon	5.11	+	○	○					●	●		●		●		
San Dieguito Lagoon	5.11	See Coastal Waters – Table 2-3														
Los Penasquitos Creek Watershed																
Los Penasquitos Lagoon	6.10	See Coastal Waters – Table 2-3														
Soledad Canyon	6.10	+	●	●					○	●		●	●	●		
Carol Canyon	6.10	+	●	●					○	●		●	●	●	●	

● Existing Beneficial Use

○ Potential Beneficial Use

\+ Excepted from MUN (See Text)

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE															
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Los Penasquitos Creek Watershed – continued																	
Miramar Reservoir	6.10	See Reservoirs & Lakes – Table 2-4															
Los Penasquitos Creek	6.20	+	●	○					●	●		●	●	●		
Rattlesnake Creek	6.20	+	●	○					●	●		●	●	●		
Poway Creek	6.20	+	●	○					●	●		●		●		
Beeler Creek	6.20	+	●	○					●	●		●		●		
Chicarita Creek	6.20	+	●	○					●	●		●		●		
Cypress Canyon	6.20	+	●	○					●	●		●		●		
Los Penasquitos Creek	6.10	+	●	●					○	●	●	●		●		
unnamed tributary	6.10	+	●	●					○	●		●		●	●	
Carmel Valley	6.10	+	●	●					○	●		●		●		
Deer Canyon	6.10	+	●	●					○	●		●		●		
McGonigle Canyon	6.10	+	●	●					○	●		●		●		
Bell Valley	6.10	+	●	●					○	●		●		●		
Shaw Valley	6.10	+	●	●					○	●		●		●		
San Diego County Coastal Streams																	
unnamed intermittent coastal streams	6.30	+							○	●		●		●		

● Existing Beneficial Use

○ Potential Beneficial Use

\+ Excepted from MUN (See Text)

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

Project Name: Renzulli Estates

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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)
Los Penasquitos Creek	Benthic Community Effects, Bifenthrin, Cyfluthrin,	Indicator Bacteria
	Cyhalothrin, Lambda, Cypermethrin, Indicator	
	Bacteria, Nitrogen, Permethrin, Phosphorus,	
	Pyrethroids, Total dissolved solids, Toxicity	
Los Penasquitos Lagoon	Sedimentation/Siltation/Toxicity	NA

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	☐	☐	☐

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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:

There is no CCSYA shown within the site.

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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.

POC1 is constituted by the flows from the northwest entry drainage area (BF-3-3 & BF-3-4), and north entry drainage area (BF-1-1) and drains to the Los Penasquitos Creek at north.

POC2 (BF-1-2) discharges into existing 48" storm drain at Cypress Valley Dr, turn left to Cypress Canyon Rd, turn left to Scripps Poway Pkwy, turn left to Cypress Canyon, continue to Los Penasquitos 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)

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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: Renzulli Estates

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: Renzulli Estates

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: Renzulli Estates

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:			
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: Renzulli Estates

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: Renzulli Estates

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: Not feasible.			
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: Renzulli Estates

Form I-5B Page 4 of 4

Insert Site Map with all site design BMPs identified:

Please see attached DMA map
on sheet 53

Project Name: Renzulli Estates

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.

STEP 1:
1a: After delineating the DMAs, break down pervious and impervious area.
1b: DCV for all other DMAs were calculated using worksheet B.2-1
STEP 2:
2a: Harvest and use is infeasible according to Form I-7.
STEP 3:
3a: Using Form I-8 to conduct a prelimary feasibility screening determined that no infiltration to be feasible.
3b: Biofiltration BMP and Proprietary Biofiltration BMPs chosen.
3c: Worksheets B.5-1 were used to size the Biofiltration BMPs.
3d: Worksheets B.6-1 were used to calculate treatment flow rates and size the Proprietary Biofiltration BMPs.
STEP 4:
4a: Proposed BMPs fit minimum footprint required. Project meets pollutant control standards.
STEP 5:
5a: N/A
STEP 6: SWQMP prepared as step 6.
STEP 7:Maintenance agreements associated with this project are also attached in this SWQMP.
(Continue on page 2 as necessary.)

Project Name: Renzulli Estates

Form I-6 Page 2 of 10

(Continued from page 1)

Project Name: Renzulli Estates

Form I-6 Page 3 of 10 (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. BF-1-1	
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	EOW for the project at the time of construction
Who will be the final owner of this BMP?	HOA (privately owned)
Who will maintain this BMP into perpetuity?	HOA (privately owned)
What is the funding mechanism for maintenance?	HOA dues

Form I-6 Page 4 of 10 (Copy as many as needed)
Structural BMP ID No. BF-1-1
Construction Plan Sheet No.
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs): See attachment 1e for sizing calcs.

Project Name: Renzulli Estates

Form I-6 Page 5 of 10 (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. BF-1-2	
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	EOW for the project at the time of construction
Who will be the final owner of this BMP?	HOA (privately owned)
Who will maintain this BMP into perpetuity?	HOA (privately maintained)
What is the funding mechanism for maintenance?	HOA dues

Form I-6 Page 6 of 10 (Copy as many as needed)
Structural BMP ID No. BF-1-2
Construction Plan Sheet No.
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs): See attachment 1e for sizing calcs.

Form I-6 Page 7 of 10 (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. BF-3-3	
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) Proprietary Biofiltration BF-3 ☐ 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	EOW for the project at the time of construction
Who will be the final owner of this BMP?	City of San Diego
Who will maintain this BMP into perpetuity?	City of San Diego
What is the funding mechanism for maintenance?	City of San Diego

Form I-6 Page 8 of 10 (Copy as many as needed)
Structural BMP ID No. BF-3-3
Construction Plan Sheet No.
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs): The project proposes Compact Proprietary Biofiltration Unit, i.e. Filterra Unit. See attachment 1e for sizing calcs and T.A.P.E. Certificates.

Form I-6 Page 9 of 10 (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. BF-3-4	
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) Proprietary Biofiltration BF-3) ☐ 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	EOW for the project at the time of construction
Who will be the final owner of this BMP?	City of San Diego
Who will maintain this BMP into perpetuity?	City of San Diego
What is the funding mechanism for maintenance?	City of San Diego

Form I-6 Page 10 of 10 (Copy as many as needed)
Structural BMP ID No. BF-3-4
Construction Plan Sheet No.
Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs): The project proposes Compact Proprietary Biofiltration Unit, i.e.Filterra Unit. See attachment 1e for sizing calcs and T.A.P.E. Certificates.

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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: Renzulli Estates

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: Renzulli Estates

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)



LEGEND: SYMBOL:

- PROJECT BOUNDARY
- DMA BOUNDARY
- DAYLIGHT
- PROPOSED STORM DRAIN
- EXISTING STORM DRAIN
- FLOW LINE
- SUBAREA ACREAGE — 00.00 ACRES
- DMA ICON — DMA 1
- IMPERVIOUS - ROAD/SIDEWALK
- IMPERVIOUS - ROOF
- PERVIOUS AREAS
- BASIN BOTTOM
- PROPOSED SELF MITIGATING SLOPE
- PROPOSED SELF MITIGATING SLOPE TO BE PUBLICLY MANTAINED)
- EXISTING SLOPE NOT TO BE DISTURBED (DRAINS TO BF-1-1)
- INLET
- HYDROLOGIC SOIL TYPE — D
- POINT OF COMPLIANCE — POC 1

STRUCTURAL BMPS
BIOFILTRATION BASIN

STRUCTURAL BMPS
COMPACT PROPRIETARY
BIOFILTRATION

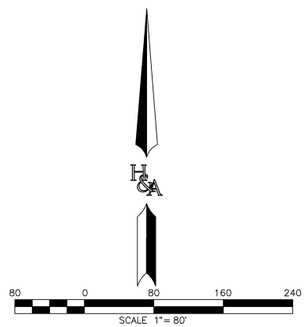
SITE DESIGN BMPs:

SD-1 MAINTAIN NATURAL HYDROLOGIC FEATURES
SD-2 CONSERVE NATURAL AREAS, SOILS, VEGETATION
SD-3 MINIMIZE IMPERVIOUS AREAS
SD-4 MINIMIZE SOIL COMPACTION
SD-5 IMPERVIOUS AREA DISPERSION
SD-6 RUNOFF COLLECTION
SD-7 LANDSCAPING WITH NATIVE OR DROUGHT TOLERANT SPECIES

SOURCE CONTROL BMPs:

SC-1 PREVENTION OF ILLICIT DISCHARGES TO MS4
SC-2 STORM DRAIN STENCILING OR SIGNAGE
SC-6 ADDITIONAL BMPS BASED ON POTENTIAL SOURCES OF RUNOFF POLLUTANTS
- SC-6A ON-SITE STORM DRAIN INLETS
- SC-6E LANDSCAPE/OUTDOOR PESTICIDE USE
- SC-6O FIRE SPRINKLER TEST WATER
- SC-6P MISCELLANEOUS DRAIN OR WASH WATER
- SC-6Q PLAZAS, SIDEWALKS, AND PARKING LOTS

UNDERLYING SOIL GROUP : D
APPROXIMATE DEPTH TO GROUNDWATER > 20'
NO CRITICAL COARSE AREAS REQUIRE PRESERVATION



PREPARED BY:

HUNSAKER & ASSOCIATES SAN DIEGO, INC
PLANNING 9707 Waples Street
ENGINEERING San Diego, Ca 92121
SURVEYING PH(858)558-4500 FX(858)558-1414

PROPOSED DMA MAP RENZULLI ESTATES

CITY OF SAN DIEGO, CALIFORNIA

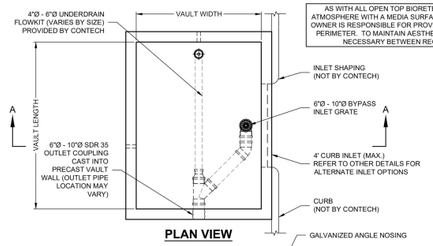
MAP 1 OF 2

W.O.# 5622-0002

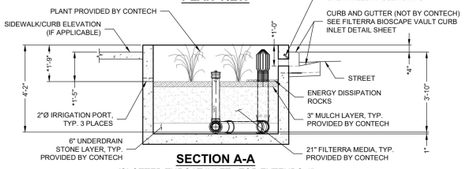
R:\1207\Hyd\SWMP\TM\ACAD\1207-DMA Map.dwg[]Oct-08-2023:10:57

DIMENSIONS PRECEDED BY " * " ARE CRITICAL AND MAY NOT BE MODIFIED WITHOUT CONSULTING CONTECH

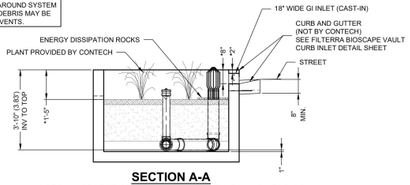
AS WITH ALL OPEN TOP BIORETENTION SYSTEMS, FILTERRA BIOSCAPE IS OPEN TO THE ATMOSPHERE WITH A MEDIA SURFACE RECESSED BELOW FINISHED GRADE. CONTRACTOR OR OWNER IS RESPONSIBLE FOR PROVIDING ANY REQUIRED SAFETY MEASURES AROUND SYSTEM PERIMETER. TO MAINTAIN AESTHETICS, REMOVAL OF HEAVY STORMWATER DEBRIS MAY BE NECESSARY BETWEEN REGULAR FILTERRA SYSTEM MAINTENANCE EVENTS.



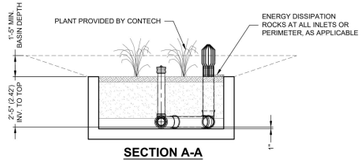
PLAN VIEW



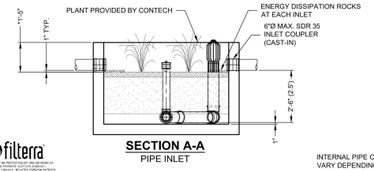
SECTION A-A
(SLOTTED THROAT INLET - TOP EXTENDS 4" ABOVE CURB FOR ADJACENT SIDEWALKS)



SECTION A-A
GREEN INFRASTRUCTURE INLET - TOP FLUSH WITH TOP OF CURB, NOT INTENDED FOR SIDEWALK APPLICATIONS



SECTION A-A
BASIN - CURB INLET OR PIPE INLETS OPTIONAL



SECTION A-A
PIPE INLET

INTERNAL PIPE CONFIGURATION MAY VARY DEPENDING ON VAULT SIZE.

FTBSVIB CONFIGURATION
(OPTIONS: BASIN "-B", GREEN INFRASTRUCTURE INLET "-I", PIPE INLET "-P", SLOTTED THROAT INLET "-T")

MEDIA BAY SIZE	VAULT SIZE (L x W)	LONG SIDE INLET DESIGNATION	SHORT SIDE INLET DESIGNATION	AVAILABILITY	MAX. OUTLET / BYPASS PIPE DIA.	MAX. BYPASS FLOW (CFS)	UNDERDRAIN PIPE DIA. (PERF)	MIN. NO. OF INLET PIPES (-P ONLY)
4 x 4	4 x 4	FTBSVIB0404	FTBSVIB0404	ALL	6" SDR 35	1.42	4" SDR 35	1
6 x 4	6 x 4	FTBSVIB0604	FTBSVIB0406	N/A CA	8" SDR 35	1.89	4" SDR 35	1
6.5 x 4	6.5 x 4	FTBSVIB06504	FTBSVIB04065	CA ONLY	8" SDR 35	1.89	4" SDR 35	1
7.83 x 4.5	7.83 x 4.5	FTBSVIB078045	FTBSVIB045078	DE,MD,NJ,PA,VA,WV ONLY	8" SDR 35	1.89	4" SDR 35	1
8 x 4	8 x 4	FTBSVIB0804	FTBSVIB0408	N/A DE,MD,NJ,PA,VA,WV	8" SDR 35	1.89	4" SDR 35	1
6 x 6	6 x 6	FTBSVIB0606	FTBSVIB0606	ALL	8" SDR 35	1.89	4" SDR 35	1
8 x 6	8 x 6	FTBSVIB0806	FTBSVIB0608	ALL	10" SDR 35	2.37	4" SDR 35	1
10 x 6	10 x 6	FTBSVIB1006	FTBSVIB0610	ALL	10" SDR 35	2.37	6" SDR 35	2
12 x 6	12 x 6	FTBSVIB1206	FTBSVIB0612	ALL	10" SDR 35	2.37	6" SDR 35	2
13 x 7	13 x 7	FTBSVIB1307	FTBSVIB0713	ALL	10" SDR 35	2.37	6" SDR 35	2
14 x 8	14 x 8	FTBSVIB1408[†]	N/A	ALL	10" SDR 35	2.37	6" SDR 35	3
16 x 8	16 x 8	FTBSVIB1608[†]	N/A	N/A OR, WA	10" SDR 35	2.37	6" SDR 35	3
15 x 9	15 x 9	FTBSVIB1509[†]	N/A	OR, WA ONLY	10" SDR 35	2.37	6" SDR 35	3
18 x 8	18 x 8	FTBSVIB1808[†]	N/A	CALL CONTECH	10" SDR 35	2.37	6" SDR 35	3
20 x 8	20 x 8	FTBSVIB2008[†]	N/A	CALL CONTECH	10" SDR 35	2.37	6" SDR 35	4
22 x 8	22 x 8	FTBSVIB2208[†]	N/A	CALL CONTECH	10" SDR 35	2.37	6" SDR 35	4

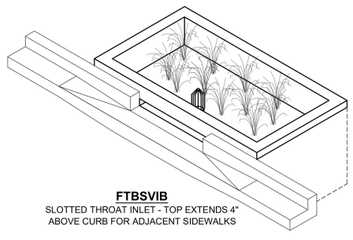
[†]UTILIZES (2) CURB OPENINGS WITH MIN 1" SPACING
N/A = NOT AVAILABLE

filterra
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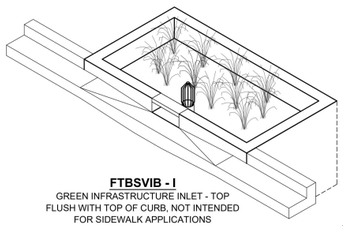
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800-338-1122 513-645-7000 513-645-7993 FAX

FILTERRA BIOSCAPE VAULT INTERNAL BYPASS (FTBSVIB) CONFIGURATION DETAIL

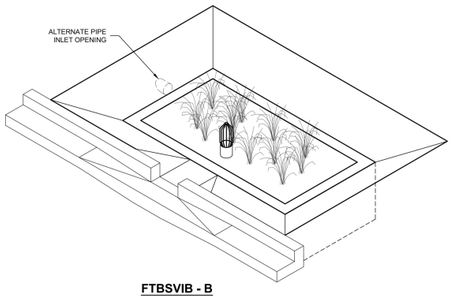
BF-3-3 FTBSIB-4-6 & BF-3-4 FTBSIB-4-4
NOT TO SCALE



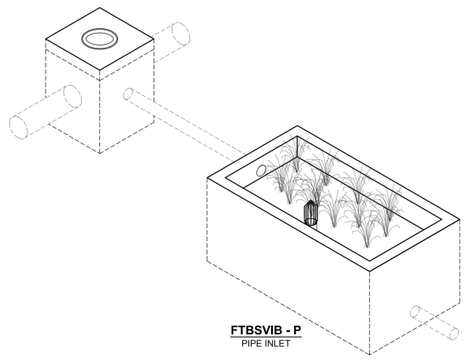
FTBSVIB
SLOTTED THROAT INLET - TOP EXTENDS 4" ABOVE CURB FOR ADJACENT SIDEWALKS



FTBSVIB - I
GREEN INFRASTRUCTURE INLET - TOP FLUSH WITH TOP OF CURB, NOT INTENDED FOR SIDEWALK APPLICATIONS



FTBSVIB - B
BASIN - CURB INLET OR PIPE INLET OPTIONAL



FTBSVIB - P
PIPE INLET

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FILTERRA BIOSCAPE VAULT INTERNAL BYPASS (FTBSVIB) SITE LAYOUTS

BF-3-3 FTBSIB-4-6 & BF-3-4 FTBSIB-4-4
NOT TO SCALE

RENZULLI ESTATES
DMA CALCULATIONS (AREA BREAKDOWN)

	Imp. RF	Pervious RF	% Imp	DMA1	Fraction of Total	Imp Area	Pervious Area	Summation RF x A	DMA-2	Fraction of Total	Imp Area	Pervious Area	Summation RF x A	DMA-3	Fraction of Total	Imp Area	Pervious Area	Summation RF x A
LANDSCAPE	0.90	0.10	0	105895	0.06	0	105895	10589	229568	0.08	0	229568	22957	9444	0.15	0	9444	944
SLOPE	0.90	0.30	0	101298	0.17	0	101298	30390	0	0.00	0	0	0	0	0.00	0	0	0
ROOF	0.90	0.10	100	66240	0.34	66240	0	59616	149040	0.46	149040	0	134136	0	0.00	0	0	0
ROAD	0.90	0.10	100	52568	0.27	52568	0	47311	85708	0.27	85708	0	77137	4293	0.62	4293	0	3863
DRIVEWAY	0.90	0.10	100	14911	0.08	14911	0	13420	37934	0.12	37934	0	34141	0	0.00	0	0	0
SIDEWALK	0.90	0.10	100	16124	0.08	16124	0	14511	23999	0.07	23999	0	21599	1566	0.23	1566	0	1409
				357035	1.00	149842	207193	175837	**526248**	1.00	296680	229568	289969	**15302**	1.00	5858	9444	6217
			%Imperv	70.34			Weighted C =	**0.49**	56.38			Weighted C =	**0.55**	38.29			Weighted C =	**0.41**
				8.20					12.08					0.35				

	Imp. RF	Pervious RF	% Imp	DMA 4	Fraction of Total	Imp Area	Pervious Area	Summation RF x A	SM-1	SM-2	SM-3
				SQFT		SQFT	SQFT		SQFT	SQFT	SQFT
LANDSCAPE	0.90	0.10	0	5837	0.12	0	5837	584			
SLOPE	0.90	0.30	0	0	0.00	0	0	0	3.19	0.61	5.18
ROOF	0.90	0.10	100	0	0.00	0	0	0			
ROAD	0.90	0.10	100	3842	0.69	3842	0	3457			
DRIVEWAY	0.90	0.10	100	0	0.00	0	0	0			
SIDEWALK	0.90	0.10	100	1050	0.19	1050	0	945			
				10729	1.00	4892	5837	4986			
			%Imperv	45.60			Weighted C =	**0.46**			

Note: And additional 15% of the ROOF AREA was added to each lot to account for the patios.

DMA SUMMARY (AREA BREAKDOWN)

RENZULLI ESTATES

DMA ID	Total Area (sft)	Runoff Coefficient	DCV	BMP ID (biofiltration basin)	Required Biofiltration area (sf)	Provided biofiltration area (sf)	WQ ponding Depth (inch)*	LID orifice (in)	HMP WSE (FT)*	100 year WSE (FT)*	Basin Depth (ft)*	FreeBoard (ft)*
DMA 1	357035.39	0.49	8,645	BF-1-1	5275.12	5600	6	1.00	4.00	4.22	6	1.78
DMA 2	526248.25	0.55	14,257	BF-1-2	8699.07	9200	6	1.50	3.45	3.98	6	2.02
DMA 3	15302.16	0.41	306	BF-3-3	FTBSIB-4-6				N/A			
DMA 4	10728.65	0.46	245	BF-3-4	FTBSIB-4-4				N/A			

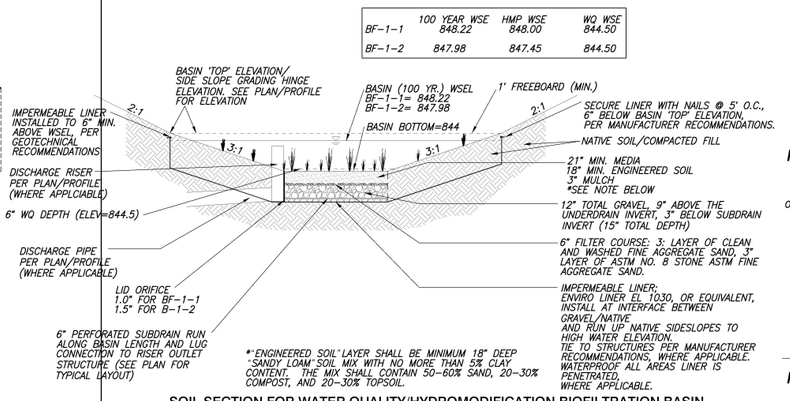
*Depth Measured from Basin bottom Elevation

HMP ID	Sub-Drain Orifice Diameter	Bottom Orifice	Mid Orifice	Top orifice	Emergency Weir (inside dimensions)
BF-1-1	6"	1" @ 0.50'	One 0.75" @ 1.75'	One 3" @ 2.5'	2'x3' @ 4.2'
BF-1-2	6"	1.5" @ 0.50'	One 1.5" @2.0'	One 3" @ 2.5'	2'x3'@ 3.6'

Note: DMA 3 & 4 meet the HMP flow control requirement when measured at POC-1
BF-1-1 has been sized to provide additional hydromodification flow control and mitigate impact from the DMA 3&4. Refer to HMP analysis

BIOFILTRATION BMP DMA & HMP SUMMARY

BF-1-1	100 YEAR WSE 848.22	HMP WSE 848.00	WQ WSE 844.50
BF-1-2	847.98	847.45	844.50



SOIL SECTION FOR WATER QUALITY/HYDROMODIFICATION BIOFILTRATION BASIN
NOT TO SCALE

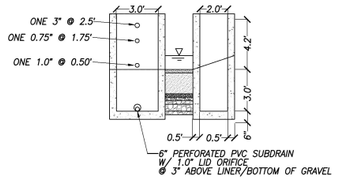
			DI 0.2	C 0.95	C 0.85	C 0.50
Available Filterra Box Sizes			Filterra	100%	Commercial	Residential
L (ft)	W (ft)	Filterra Surface Area (ft2)	Flow Rate, Q (ft3/sec)	Imperv. DA (acres)	max DA (acres)	max DA (acres)
4	4	16	0.0370	0.129	0.144	0.245
6	4	24	0.0556	0.193	0.216	0.367
6.5	4	26	0.0602	0.209	0.234	0.398
8	4	32	0.0741	0.258	0.288	0.490
10	4	40	0.0926	0.322	0.360	0.612
12	4	48	0.1111	0.387	0.432	0.735
6	6	36	0.0833	0.290	0.324	0.551
8	6	48	0.1111	0.387	0.432	0.735
10	6	60	0.1389	0.483	0.540	0.918
12	6	72	0.1667	0.580	0.648	1.102
13	7	91	0.2106	0.733	0.819	1.393
12	8	96	0.2222	0.773	0.864	1.469
14	8	112	0.2593	0.902	1.008	1.714
16	8	128	0.2963	1.031	1.152	1.959
18	8	144	0.3333	1.160	1.296	2.204
20	8	160	0.3704	1.289	1.440	2.449
22	8	176	0.4074	1.418	1.584	2.694

RENZULLI ESTATES

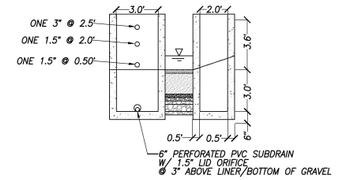
Description	Units	FILTERRA UNIT	FILTERRA UNIT
Drainage Basin ID or Name	Unitless	BF-3-3	BF-3-4
Total Tributary Area	ac	0.35	0.25
Total Tributary Area	sq ft	15302	10729
Final Adjusted Runoff Factor	unitless	0.41	0.46
85th Percentile Design Rainfall Depth	inches	0.59	0.59
85th Percentile Design Rainfall Intensity	in/hr	0.2	0.2
WQ Flow Rate	CFS	0.029	0.023
Flow Rate Safety Factor	unitless	1.5	1.5
Design Flow Rate	CFS	0.043	0.034
Filterra Unit Model	unitless	FTBSVIB (6X4)	FTBSVIB (4X4)
Filterra Unit Flow Rate	CFS	0.056	0.037
Is Flow-Thru BMP Adequately Sized?	unitless	Yes	Yes

FLOW-THRU BMP SUMMARY

PRIVATE BIOFILTRATION BASIN BF-1-1



PRIVATE BIOFILTRATION BASIN BF-1-2



BIOFILTRATION BASIN RISER DETAIL FOR BF-1-1 & BF-1-2
NOT TO SCALE

PREPARED BY:
HUNSAKER & ASSOCIATES SAN DIEGO, INC
PLANNING 9707 Waples Street
ENGINEERING San Diego, Ca 92121
SURVEYING PH(858)558-4500- FX(858)558-1414

PROPOSED DMA MAP
RENZULLI ESTATES
CITY OF SAN DIEGO, CALIFORNIA

MAP 2 OF 2

W.O.# 5622-0002

I:\COMMON_CAD\TRIB_ATMENT\54 FILTERRA\40 STANDARD DRAWINGS\8 PROCESS FTBSVIB - BIOSCAPE VAULT INTERNAL BYPASS\LAYOUT DETAILS\DWG\FTBSVIB - FILTERRA BIOSCAPE VAULT INTERNAL BYPASS CONFIG DTL.DWG 1/15/2020 10:41 AM

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Attachment 1c

Form I-7, Harvest and Use Feasibility Screening Checklist

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:_____

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]

36 hr toilet use per resident= 9.3 gal x 2.5 residents per unit x 106units x 1.5 days = 3696.75 gallons= 494.2 cf, 36 hour landscape use/acre= 390 gls/ac x 11.96 ac= 4664.6 gals= 623.5 cf
Total anticipated 36 hr use = 1136.3 cf

3. Calculate the DCV using worksheet B-2.1.
DCV = 23200 (cubic feet)
[Provide a summary of calculations here]
0.25DCV = 5800 cubic feet

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.

Attachment 1d
Infiltration Feasibility Condition Letter

Form I-8, Categorization of Infiltration Feasibility Condition

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

The Phair Company
3330 Bonita Road
Chula Vista, CA 91910

December 2, 2021
P/W 1902-06
Report No 1902-06-B-7

Attention: **Mr. Austin Dias**

Subject: **Infiltration Feasibility Condition Letter for Stormwater BMPs, Renzulli Estates, 11495 Cypress Canyon Road, San Diego, California**

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 two (2) BMP basins within the Renzulli Estates residential 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).

SITE DESCRIPTION AND PROPOSED DEVELOPMENT

The rectangular-shaped site is located at 11495 Cypress Canyon Road in the City of San Diego, California and encompasses approximately 39 acres. The site is bounded by vegetated open space associated with a canyon and intermittent creek to the south, by existing residences, streets and open space to the north and west, and by a park and open space to the east.

It is our understanding that a portion of the site was previously used as a disposal area for construction debris for several years. Mixed debris and soil materials were placed within the large canyon area along the north central portion of the site to create a flat pad. In general, the site is characterized by a central flat ridge area with steep descending slopes to the northern and southern canyons. Elevations onsite range from a high of 982 MSL at a hill on the eastern property boundary, to a low of 756 MSL at the existing canyon on the northern boundary. The site currently supports a large residence, several storage warehouses, a roofed mechanical shop, asphalt paved and unpaved driveways. The site is mostly vacant with vegetation consisting of grass, small shrubs and medium to large trees.

The current development plan indicates that the site will support 100 residential lots; appurtenant streets, cul-de-sacs and walkways; engineered slopes; conventional and mechanically stabilized earth retaining walls; two water quality basins (BF-1-1 and BF-1-2) associated with site BMP's; open-space areas and parks. Cut and fill grading techniques are planned to develop the site. Cuts are designed to extend to maximum depths of approximately 58 feet below natural ground, however, due the recommended removal of "dump" materials, the excavations are anticipated to extend to a maximum depth of approximately 100 feet in the north central portion of the site. The deepest design fill is approximately 81 feet in height, but higher fill sections will occur after removal of "dump" materials. The highest design fill slope is approximately 120 feet high at a slope ratio of 2:1 (horizontal to vertical) located in the north central area of the project. In addition, an approximately 58 feet high fill slope underlain by a two-tiered mechanically

stabilized earth (MSE) wall with a height of 36 feet is located in the south central area of project. The highest proposed cut slope is approximately 87 feet high at a slope ratio of 2:1 H:V, located in the eastern portion of the project.

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.

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.*

  A previous geotechnical investigation was conducted at the site by C. W. La Monte Company in 2004. As part of this geotechnical study, thirty trenches were excavated with a backhoe and two hollow-stem auger borings were advanced at the site.

  On March 2019, AGS retained Southwest Geophysics, Inc. to conduct a geophysical evaluation of the "dump" area which included two high-resolution electrical resistivity tomography (Sting) profiles and one seismic P-wave refraction profile. This information was used in the evaluation of the "dump" materials and to further define the geometry of the subsurface bedrock units onsite.

  AGS and SCS Environmental Engineers conducted subsurface exploration at the subject site in March and November 2019 which included seven hollowstem auger borings, three sonic (rotary-vibratory) borings and two tripod continuous flight auger borings extending to depths ranging from 10½ feet to 100 feet below existing ground surface (bgs). In addition, AGS advanced a hand-auger excavation to 3 feet depth in August 2020. Existing fill soils up to 98 feet in thickness were encountered within the large canyon area along the north central portion of the site.

- *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).*

  As indicated above, the property has been previously graded. Existing site improvements include a large residence, several storage warehouses, a roofed mechanical shop, asphalt paved and unpaved driveways. Mixed debris and soil materials were placed within the large canyon area along

the north central portion of the site to create a flat pad. The majority of the site is vacant with vegetation consisting of grass, small shrubs and medium to large trees.

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

  It is our understanding that C. W. La Monte Company began evaluating site development in 2004. Detailed grading plans were not available at that time. AGS began providing geotechnical consulting services in 2019 with the current design team.

- *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.*

  The preliminary geotechnical investigation report by AGS (2020a) included Section 9.2.4 Stormwater BMPs with the following findings and recommendations which have been revised to conform with the current DMA map:

  > The project site can generally be characterized as a northwest-southeast trending ridge that is moderately dissected and flanked with steep, descending slopes. Tertiary-age sedimentary bedrock units assigned to the Poway Group underlie the site and are locally exposed in canyon walls and topographic high areas. The formational materials generally consist of conglomerate and sandstone in a dense/moderately hard condition. Significant portions of the site are covered with pre-existing fill soils greater than 5 feet in thickness. Online soil mapping provided by the National Resources Conservation Service (NRCS), indicates the site is underlain by soil unit RtF - Redding cobbly loam, 15 to 50 percent slopes. The RtF soil unit is classified as Hydrologic Soil Group D with an estimated infiltration/saturated hydraulic conductivity (Ksat) rate of 0.00 to 0.06 inches/hour. The description of the RtF soil unit is consistent with the conglomeratic units (Stadium Conglomerate and Pomerado Formation) encountered during subsurface explorations onsite. Steep (>25 percent) design fill slopes up to 120 feet in height are planned in the north central portion of the site.
  >
  > The project site has been separated into six Drainage Management Areas (DMAs), DMA 1a, 1b, 2, 3, 4 and -5, each with an associated BMP. In consideration of the site's steep topography and the presence of deep pre-existing fill soils, the majority of the project site is not considered suitable for support of infiltration type BMPs. More specifically, BMP BF-1-1 for DMA-1b is located in an area underlain by deep pre-existing fill soils. BMPs BF-3-3 and -3-4 for DMA-3 and -4, respectively, cannot avoid placement within 50 feet of a natural slope steeper than 25 percent or within a distance of 1.5H from a fill slope where H is the height of the fill slope. BMP BF-1-2 for DMA-2 may be suitable for partial infiltration as it is located outside of the required slope setback area and is anticipated to be sited within the sandstone member of the Mission Valley Formation. BMP BF-1-2 is located in an area of significant proposed cut (~40 feet), therefore site specific infiltration testing has not been performed. For planning phase purposes, the City of San Diego default infiltration rate of 0.05 inches/hour for Hydrologic Soil Group D which can be used for BMP BF-1-2. Due to the presence of Mission Valley Formation materials consisting of hard, moderately cemented, silty sandstone, we anticipate a negligible infiltration rate in this area.

- *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 (Hunsaker & Associates San Diego, Inc.) regarding storm water BMP design:

  > DMA 1 and DMA 5 are single family development with public streets. DMA2 is a single family development and public streets with one lot occupied with multifamily buildings. DMA 3 and DMA 4 are public streets. We are proposing two biofiltration basins BF-1-1 and BF-1-2 to treat the runoff from DMA 1 and DMA 2, DMA 3, DMA 4 and DMA 5 will be treated using proprietary biofiltration BMPs (MWS unit BF-3-3, BF-3-4 and BF-3-5). Please refer to the attached DMA for the BMP locations.

- *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 above, AGS recommends a no infiltration condition for the proposed BMP's.

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

  Hunsaker and Associates prepared a Proposed DMA Map attached herewith as Plate 1 which shows the proposed BMP's distances to slopes, underground utilities, structures, and retaining walls. In addition, AGS prepared the attached Plate 2 which shows the existing and proposed grades, proposed development, depths of existing artificial fill designated as "Qaf(u)" 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.

ANDRES BERNAL, Sr. Geotechnical Engineer
PE 62366, GE 2715, Reg. Exp. 9-30-23

PAUL J. DERISI, Vice President
CEG 2536, Reg. Exp. 5-31-23

Distribution: (1) Addressee

Attachments: References
Map 1 - Proposed DMA Map
Plate 2 - Geologic Map and Exploration Location Plan

REFERENCES

Advanced Geotechnical Solutions, 2020a, Preliminary Geotechnical Investigation and 50-Scale Tentative Map Review, Renzulli Estates, 11495 Cypress Canyon Road, City of San Diego, California, dated September 15, 2020, Report No. 1902-06-B-5.

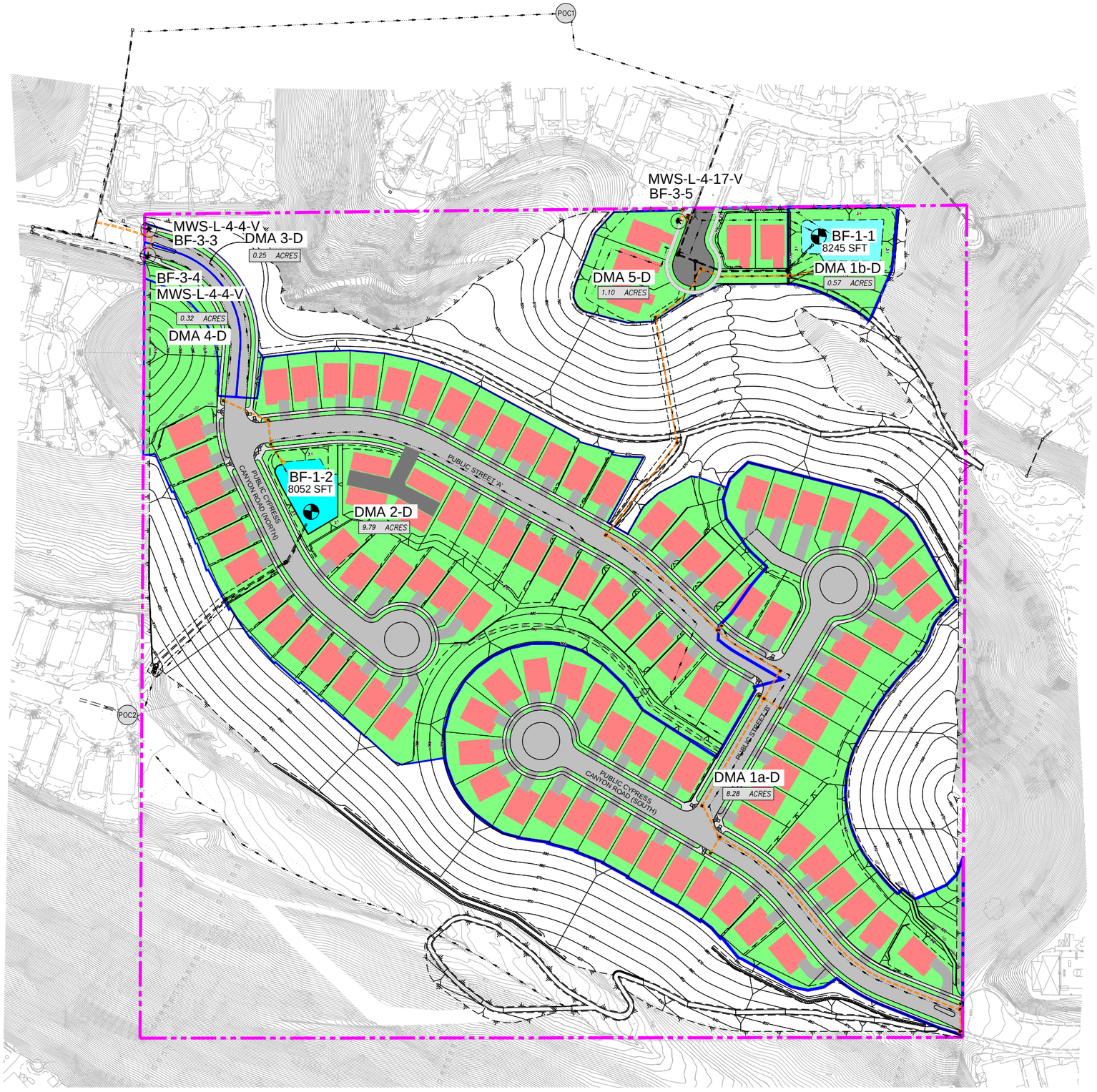
----, 2020b, Geotechnical Addendum and Response to LDR-Geology Cycle 1 Review, PTS # 674401, Renzulli Estates, 11495 Cypress Canyon Road, San Diego, California, dated December 9, 2020, Report No. 1902-06-B-6.

Hunsaker & Associates San Diego, Inc., 2021a, Vesting Tentative Map / Site Development Plan, Renzulli Estates, City of San Diego, California, plot dated September 15, 2021.

----, 2021b, Proposed DMA Map, Renzulli Estates, City of San Diego, California, plot dated November 29, 2021.

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.



LEGEND

- PROJECT BOUNDARY
- DMA BOUNDARY
- FLOW DIRECTION SHOWING DMA1, 3, 4 SHARE COMMON POC1
- 00.00 ACRES — SUBAREA ACREAGE
- DMA1-D — DMA # + SOIL TYPE
- IMPERVIOUS - ROAD/SIDEWALK/DRIVEWAY
- IMPERVIOUS- ROOF/BUILDING
- PERVIOUS - LANDSCAPE
- BASIN BOTTOM
- (D) — HYDROLOGIC SOIL TYPE
- (1) — POINT OF COMPLIANCE
- STRUCTURAL BMPS (PRIVATELY MAINTAINED)
  BIOFILTRATION BASIN
  BIOFILTRATION WITH PARTIAL RETENTION
- STRUCTURAL BMPS (PRIVATELY MAINTAINED)
  COMPACT PROPRIETARY
  BIOFILTRATION

80 0 80 160 240
SCALE 1" = 80'

SOURCE CONTROL BMPs (APPLY TO THE ENTIRE PROJECT)

SC-1 PREVENTION OF ILLICIT DISCHARGES TO MS4
SC-2 STORM DRAIN STENCILING OR SIGNAGE
SC-5 PROTECT TRASH STORAGE AREAS
SC-6 ADDITIONAL BMPS BASED ON POTENTIAL SOURCES OF RUNOFF POLLUTANTS
SC-A ON-SITE STORM DRAIN INLETS
SC-C INTERIOR PARKING GARAGES
SC-D1 NEED FOR FUTURE INDOOR & STRUCTURAL PEST CONTROL
SC-D2 LANDSCAPE/OUTDOOR PESTICIDE USE
SC-G REFUSE AREA
SC-N FIRE SPRINKLER TEST WATER
SC-O MISCELLANEOUS DRAIN OR WASH WATER
SC-P PLAZAS, SIDEWALKS, AND PARKING LOTS

SITE DESIGN BMPs (APPLY TO THE ENTIRE PROJECT)

SD-1 MAINTAIN NATURE DRAINAGE PATHWAYS AND HYDROLOGIC FEATURES.
SD-2 CONSERVE NATURAL AREAS, SOILS, VEGETATION
SD-3 MINIMIZE IMPERVIOUS AREAS
SD-4 MINIMIZE SOIL COMPACTION
SD-5 IMPERVIOUS AREA DISPERSION
SD-6 RUNOFF COLLECTION
SD-7 LANDSCAPING WITH NATIVE OR DROUGHT TOLERANT SPECIES

NOTE: FOR STRUCTURAL BMP DETAILS SEE DMA MAP 2 Of 2

PREPARED BY:
HUNSAKER & ASSOCIATES SAN DIEGO, INC
PLANNING 9707 Waples Street
ENGINEERING San Diego, Ca 92121
SURVEYING PH(858)558-4500 FX(858)558-1414

PROPOSED
DMA MAP

RENZULLI ESTATES

CITY OF SAN DIEGO, CALIFORNIA

MAP 1 OF 1

W.O.# 3622-0002

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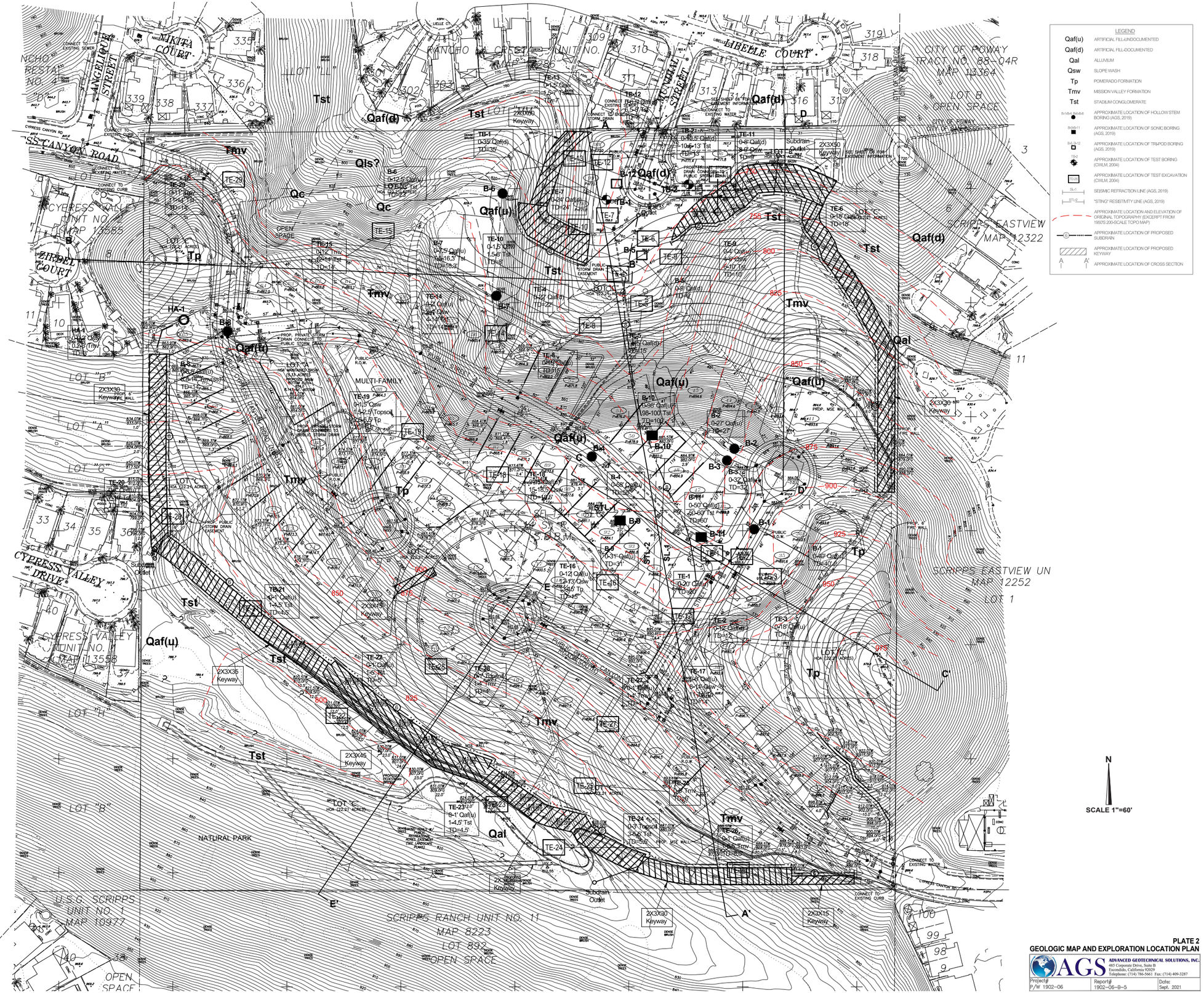


PLATE 2

GEOLOGIC MAP AND EXPLORATION LOCATION PLAN

AGS ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 1902-06	1902-06-8-5	Sept. 2021

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions[1]		Worksheet C.4-1: Form I-8A[2]
Part 1 - Full Infiltration Feasibility Screening Criteria		
DMA(s) Being Analyzed:		Project Phase:
DMA1,2,3 & 4		Planning
Criteria 1: Infiltration Rate Screening		
1A	Is the mapped hydrologic soil group according to the NRCS Web Soil Survey or UC Davis Soil Web Mapper Type A or B and corroborated by available site soil data[3]? ○ Yes; the DMA may feasibly support full infiltration. Answer "Yes" to Criteria 1 Result or continue to Step 1B if the applicant elects to perform infiltration testing. ○ No; the mapped soil types are A or B but is not corroborated by available site soil data (continue to Step 1B). ◉ No; the mapped soil types are C, D, or "urban/unclassified" and is corroborated by available site soil data. Answer "No" to Criteria 1 Result. ○ No; the mapped soil types are C, D, or "urban/unclassified" but is not corroborated by available site soil data (continue to Step 1B).	
1B	Is the reliable infiltration rate calculated using planning phase methods from Table D.3-1? ○ Yes; Continue to Step 1C. ○ No; Skip to Step 1D.	
1C	Is the reliable infiltration rate calculated using planning phase methods from Table D.3-1 greater than 0.5 inches per hour? ○ Yes; the DMA may feasibly support full infiltration. Answer "Yes" to Criteria 1 Result. ○ No; full infiltration is not required. Answer "No" to Criteria 1 Result.	
1D	**Infiltration Testing Method.** Is the selected infiltration testing method suitable during the design phase (see Appendix D.3)? Note: Alternative testing standards may be allowed with appropriate rationales and documentation. ○ Yes; continue to Step 1E. ○ No; select an appropriate infiltration testing method.	

[1] Note that it is not required to investigate each and every criterion in the worksheet, a single "no" answer in Part 1, Part 2, Part 3, or Part 4 determines a full, partial, or no infiltration condition.

[2] This form must be completed each time there is a change to the site layout that would affect the infiltration feasibility condition. Previously completed forms shall be retained to document the evolution of the site storm water design.

[3] Available data includes site-specific sampling or observation of soil types or texture classes, such as obtained from borings or test pits necessary to support other design elements.

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions	Worksheet C.4-1: Form I-8A[2]
1E	**Number of Percolation/Infiltration Tests.** Does the infiltration testing method performed satisfy the minimum number of tests specified in Table D.3-2? ◯ Yes; continue to Step 1F. ◯ No; conduct appropriate number of tests.
IF	**Factor of Safety.** Is the suitable Factor of Safety selected for full infiltration design? See guidance in D.5; Tables D.5-1 and D.5-2; and Worksheet D.5-1 (Form I-9). ◯ Yes; continue to Step 1G. ◯ No; select appropriate factor of safety.
1G	**Full Infiltration Feasibility.** Is the average measured infiltration rate divided by the Factor of Safety greater than 0.5 inches per hour? ◯ Yes; answer "Yes" to Criteria 1 Result. ◯ No; answer "No" to Criteria 1 Result.
Criteria 1 Result	Is the estimated reliable infiltration rate greater than 0.5 inches per hour within the DMA where runoff can reasonably be routed to a BMP? ◯ Yes; the DMA may feasibly support full infiltration. Continue to Criteria 2. ◉ No; full infiltration is not required. Skip to Part 1 Result.
Summarize infiltration testing methods, testing locations, replicates, and results and summarize estimates of reliable infiltration rates according to procedures outlined in D.5. Documentation should be included in project geotechnical report.	

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[2]	
Criteria 2: Geologic/Geotechnical Screening			
2A	If all questions in Step 2A are answered "Yes," continue to Step 2B. For any "No" answer in Step 2A answer "No" to Criteria 2, and submit an "Infiltration Feasibility Condition Letter" that meets the requirements in Appendix C.1.1. The geologic/geotechnical analyses listed in Appendix C.2.1 do not apply to the DMA because one of the following setbacks cannot be avoided and therefore result in the DMA being in a no infiltration condition. The setbacks must be the closest horizontal radial distance from the surface edge (at the overflow elevation) of the BMP.		
2A-1	Can the proposed full infiltration BMP(s) avoid areas with existing fill materials greater than 5 feet thick below the infiltrating surface?	○ Yes	◉ No
2A-2	Can the proposed full infiltration BMP(s) avoid placement within 10 feet of existing underground utilities, structures, or retaining walls?	○ Yes	◉ No
2A-3	Can the proposed full infiltration BMP(s) avoid placement within 50 feet of a natural slope (>25%) or within a distance of 1.5H from fill slopes where H is the height of the fill slope?	○ Yes	◉ No
2B	When full infiltration is determined to be feasible, a geotechnical investigation report must be prepared that considers the relevant factors identified in Appendix C.2.1. If all questions in Step 2B are answered "Yes," then answer "Yes" to Criteria 2 Result. If there are "No" answers continue to Step 2C.		
2B-1	**Hydroconsolidation.** Analyze hydroconsolidation potential per approved ASTM standard due to a proposed full infiltration BMP. Can full infiltration BMPs be proposed within the DMA without increasing hydroconsolidation risks?	◉ Yes	○ No
2B-2	**Expansive Soils.** Identify expansive soils (soils with an expansion index greater than 20) and the extent of such soils due to proposed full infiltration BMPs. Can full infiltration BMPs be proposed within the DMA without increasing expansive soil risks?	◉ Yes	○ No

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[2]	
2B-3	**Liquefaction**. If applicable, identify mapped liquefaction areas. Evaluate liquefaction hazards in accordance with Section 6.4.2 of the City of San Diego's Guidelines for Geotechnical Reports (2011 or most recent edition). Liquefaction hazard assessment shall take into account any increase in groundwater elevation or groundwater mounding that could occur as a result of proposed infiltration or percolation facilities. Can full infiltration BMPs be proposed within the DMA without increasing liquefaction risks?	◯ Yes	◯ No
2B-4	**Slope Stability**. If applicable, perform a slope stability analysis in accordance with the ASCE and Southern California Earthquake Center (2002) Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Landslide Hazards in California to determine minimum slope setbacks for full infiltration BMPs. See the City of San Diego's Guidelines for Geotechnical Reports (2011) to determine which type of slope stability analysis is required. Can full infiltration BMPs be proposed within the DMA without increasing slope stability risks?	◯ Yes	◯ No
2B-5	**Other Geotechnical Hazards.** Identify site-specific geotechnical hazards not already mentioned (refer to Appendix C.2.1). Can full infiltration BMPs be proposed within the DMA without increasing risk of geologic or geotechnical hazards not already mentioned?	◯ Yes	◯ No
2B-6	**Setbacks.** Establish setbacks from underground utilities, structures, and/or retaining walls. Reference applicable ASTM or other recognized standard in the geotechnical report. Can full infiltration BMPs be proposed within the DMA using established setbacks from underground utilities, structures, and/or retaining walls?	◯ Yes	◯ No

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[2]	
2C	**Mitigation Measures.** Propose mitigation measures for each geologic/geotechnical hazard identified in Step 2B. Provide a discussion of geologic/geotechnical hazards that would prevent full infiltration BMPs that cannot be reasonably mitigated in the geotechnical report. See Appendix C.2.1.8 for a list of typically reasonable and typically unreasonable mitigation measures. Can mitigation measures be proposed to allow for full infiltration BMPs? If the question in Step 2 is answered "Yes," then answer "Yes" to Criteria 2 Result. If the question in Step 2C is answered "No," then answer "No" to Criteria 2 Result.	○ Yes	◉ No
Criteria 2 Result	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geologic or geotechnical hazards that cannot be reasonably mitigated to an acceptable level?	◉ Yes	○ No
Summarize findings and basis; provide references to related reports or exhibits.			

Part 1 Result – Full Infiltration Geotechnical Screening [4]	Result
If answers to both Criteria 1 and Criteria 2 are "Yes", a full infiltration design is potentially feasible based on Geotechnical conditions only. If either answer to Criteria 1 or Criteria 2 is "No", a full infiltration design is not required.	○ Full infiltration Condition ◉ Complete Part 2

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

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions	Worksheet C.4-1: Form I-8A[2]
Part 2 – Partial vs. No Infiltration Feasibility Screening Criteria	
DMA(s) Being Analyzed:	Project Phase:
DMA 1,2,3,4 & 5	Planning
Criteria 3 : Infiltration Rate Screening	
3A	**NRCS Type C, D, or "urban/unclassified":** Is the mapped hydrologic soil group according to the NRCS Web Soil Survey or UC Davis Soil Web Mapper is Type C, D, or "urban/unclassified" and corroborated by available site soil data? ○ Yes; the site is mapped as C soils and a reliable infiltration rate of 0.15 in/hr. is used to size partial infiltration BMPS. Answer "Yes" to Criteria 3 Result. ◉ Yes; the site is mapped as D soils or "urban/unclassified" and a reliable infiltration rate of 0.05 in/hr. is used to size partial infiltration BMPS. Answer "Yes" to Criteria 3 Result. ○ No; infiltration testing is conducted (refer to Table D.3-1), continue to Step 3B.
3B	**Infiltration Testing Result:** Is the reliable infiltration rate (i.e. average measured infiltration rate/2) greater than 0.05 in/hr. and less than or equal to 0.5 in/hr? ○ Yes; the site may support partial infiltration. Answer "Yes" to Criteria 3 Result. ○ No; the reliable infiltration rate (i.e. average measured rate/2) is less than 0.05 in/hr., partial infiltration is not required. Answer "No" to Criteria 3 Result.
Criteria 3 Result	Is the estimated reliable infiltration rate (i.e., average measured infiltration rate/2) greater than or equal to 0.05 inches/hour and less than or equal to 0.5 inches/hour at any location within each DMA where runoff can reasonably be routed to a BMP? ◉ Yes; Continue to Criteria 4. ○ No: Skip to Part 2 Result.
Summarize infiltration testing and/or mapping results (i.e. soil maps and series description used for infiltration rate). Utilizing soil mapping provided by National Resources Conservation Service (NRCS), the project site is underlain by soil unit RfF - Redding cobbly loam, dissected, 15 to 50 percent slopes. The RfF soil unit is classified as Hydrologic Soil Group D with an estimated infiltration rate (Ksat) of 0.00 to 0.06 in./hr. The RtF soil description is consistent with the conglomerate formational materials (Stadium Conglomerate and Pomerado Formation) observed and encountered during onsite subsurface explorations.	

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[2]	
Criteria 4: Geologic/Geotechnical Screening			
4A	If all questions in Step 4A are answered "Yes," continue to Step 2B. For any "No" answer in Step 4A answer "No" to Criteria 4 Result, and submit an "Infiltration Feasibility Condition Letter" that meets the requirements in Appendix C.1.1. The geologic/geotechnical analyses listed in Appendix C.2.1 do not apply to the DMA because one of the following setbacks cannot be avoided and therefore result in the DMA being in a no infiltration condition. The setbacks must be the closest horizontal radial distance from the surface edge (at the overflow elevation) of the BMP.		
4A-1	Can the proposed partial infiltration BMP(s) avoid areas with existing fill materials greater than 5 feet thick?	○ Yes	◉ No
4A-2	Can the proposed partial infiltration BMP(s) avoid placement within 10 feet of existing underground utilities, structures, or retaining walls?	◉ Yes	○ No
4A-3	Can the proposed partial infiltration BMP(s) avoid placement within 50 feet of a natural slope (>25%) or within a distance of 1.5H from fill slopes where H is the height of the fill slope?	◉ Yes	○ No
4B	When full infiltration is determined to be feasible, a geotechnical investigation report must be prepared that considers the relevant factors identified in Appendix C.2.1. If all questions in Step 4B are answered "Yes," then answer "Yes" to Criteria 4 Result. If there are any "No" answers continue to Step 4C.		
4B-1	**Hydroconsolidation.** Analyze hydroconsolidation potential per approved ASTM standard due to a proposed full infiltration BMP. Can partial infiltration BMPs be proposed within the DMA without increasing hydroconsolidation risks?	◉ Yes	○ No
4B-2	**Expansive Soils.** Identify expansive soils (soils with an expansion index greater than 20) and the extent of such soils due to proposed full infiltration BMPs. Can partial infiltration BMPs be proposed within the DMA without increasing expansive soil risks?	◉ Yes	○ No
4B-3	**Liquefaction**. If applicable, identify mapped liquefaction areas. Evaluate liquefaction hazards in accordance with Section 6.4.2 of the City of San Diego's Guidelines for Geotechnical Reports (2011). Liquefaction hazard assessment shall take into account any increase in groundwater elevation or groundwater mounding that could occur as a result of proposed infiltration or percolation facilities. Can partial infiltration BMPs be proposed within the DMA without increasing liquefaction risks?	◉ Yes	○ No

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions		Worksheet C.4-1: Form I-8A[2]	
4B-4	**Slope Stability**. If applicable, perform a slope stability analysis in accordance with the ASCE and Southern California Earthquake Center (2002) Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Landslide Hazards in California to determine minimum slope setbacks for full infiltration BMPs. See the City of San Diego's Guidelines for Geotechnical Reports (2011) to determine which type of slope stability analysis is required. Can partial infiltration BMPs be proposed within the DMA without increasing slope stability risks?	○ Yes	◉ No
4B-5	**Other Geotechnical Hazards.** Identify site-specific geotechnical hazards not already mentioned (refer to Appendix C.2.1). Can partial infiltration BMPs be proposed within the DMA without increasing risk of geologic or geotechnical hazards not already mentioned?	○ Yes	◉ No
4B-6	**Setbacks.** Establish setbacks from underground utilities, structures, and/or retaining walls. Reference applicable ASTM or other recognized standard in the geotechnical report. Can partial infiltration BMPs be proposed within the DMA using recommended setbacks from underground utilities, structures, and/or retaining walls?	○ Yes	◉ No
4C	**Mitigation Measures.** Propose mitigation measures for each geologic/geotechnical hazard identified in Step 4B. Provide a discussion on geologic/geotechnical hazards that would prevent partial infiltration BMPs that cannot be reasonably mitigated in the geotechnical report. See Appendix C.2.1.8 for a list of typically reasonable and typically unreasonable mitigation measures. Can mitigation measures be proposed to allow for partial infiltration BMPs? If the question in Step 4C is answered "Yes," then answer "Yes" to Criteria 4 Result. If the question in Step 4C is answered "No," then answer "No" to Criteria 4 Result.	○ Yes	◉ No
Criteria 4 Result	Can infiltration of greater than or equal to 0.05 inches/hour and less than or equal to 0.5 inches/hour be allowed without increasing the risk of geologic or geotechnical hazards that cannot be reasonably mitigated to an acceptable level?	○ Yes	◉ No

Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions	Worksheet C.4-1: Form I-8A[2]

Summarize findings and basis; provide references to related reports or exhibits.

Utilizing soil mapping provided by National Resources Conservation Service (NRCS), the project site is underlain by soil unit RfF - Redding cobbly loam, dissected, 15 to 50 percent slopes. The RfF soil unit is classified as Hydrologic Soil Group D with an estimated infiltration rate (Ksat) of 0.00 to 0.06 in./hr. The RtF soil description is consistent with the conglomerate formational materials (Stadium Conglomerate and Pomerado Formation) observed and encountered during onsite subsurface explorations. Proposed BMP Basin BF-1-1 for DMA-1a & 1b is located in the northeasterly portion of the site. The proposed basin location is underlain by pre-existing fill soils on the order of 10 to 20 feet thick. The fill soil was placed in the mid-1990's as part of development of the northerly adjacent property and reported by Pacific Soils Engineering (1996). More detailed discussion is provided in the project geotechnical report (Preliminary Geotechnical Investigation and 50-Scale Tentative Map Review, Renzulli Estates, 11495 Cypress Canyon Road, San Diego, California, Report No. 1902-06-B-5, dated September 15, 2020).

For DMA 2,3,4 and 5

Utilizing soil mapping provided by National Resources Conservation Service (NRCS), the project site is underlain by soil unit RfF - Redding cobbly loam, dissected, 15 to 50 percent slopes. The RfF soil unit is classified as Hydrologic Soil Group D with an estimated infiltration rate (Ksat) of 0.00 to 0.06 in./hr. The RtF soil description is consistent with the conglomerate formational materials (Stadium Conglomerate and Pomerado Formation) observed and encountered during onsite subsurface explorations.

Therefore, infiltration , full or partial, is not feasible

Part 2 – Partial Infiltration Geotechnical Screening Result[5]	Result
If answers to both Criteria 3 and Criteria 4 are "Yes", a partial infiltration design is potentially feasible based on geotechnical conditions only. If answers to either Criteria 3 or Criteria 4 is "No", then infiltration of any volume is considered to be infeasible within the site.	◯ Partial Infiltration Condition ◉ No Infiltration Condition

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

Attachment 1e

Pollutant Control BMP Design Worksheets/Calculations

RENZULLI
DMA CALCULATIONS

	Imp. RF	Pervious RF	% Imp	DMA1	Fraction of Total	Imp Area	Pervious Area	Summation RF x A	DMA-2	Fraction of Total	Imp Area	Pervious Area	Summation RF x A	DMA-3	Fraction of Total	Imp Area	Pervious Area	Summation RF x A
LANDSCAPE	0.90	0.10	0	105895	0.06	0	105895	10589	229568	0.08	0	229568	22957	9444	0.15	0	9444	944
SLOPE	0.90	0.30	0	101298	0.17	0	101298	30390	0	0.00	0	0	0	0	0.00	0	0	0
ROOF	0.90	0.10	100	66240	0.34	66240	0	59616	149040	0.46	149040	0	134136	0	0.00	0	0	0
ROAD	0.90	0.10	100	52568	0.27	52568	0	47311	85708	0.27	85708	0	77137	4293	0.62	4293	0	3863
DRIVEWAY	0.90	0.10	100	14911	0.08	14911	0	13420	37934	0.12	37934	0	34141	0	0.00	0	0	0
SIDEWALK	0.90	0.10	100	16124	0.08	16124	0	14511	23999	0.07	23999	0	21599	1566	0.23	1566	0	1409
				357035	1.00	149842	207193	175837	526248	1.00	296680	229568	289969	15302	1.00	5858	9444	6217
			%Imperv	70.34			Weighted C =	0.49	56.38			Weighted C =	0.55	38.29			Weighted C =	0.41
				8.20					12.08					0.35				

	Imp. RF	Pervious RF	% Imp	DMA 4	Fraction of Total	Imp Area	Pervious Area	Summation RF x A	SM-1	SM-2	SM-3
				SQFT		SQFT	SQFT		SQFT	SQFT	SQFT
LANDSCAPE	0.90	0.10	0	5837	0.12	0	5837	584			
SLOPE	0.90	0.30	0	0	0.00	0	0	0	3.19	0.61	5.18
ROOF	0.90	0.10	100	0	0.00	0	0	0			
ROAD	0.90	0.10	100	3842	0.69	3842	0	3457			
DRIVEWAY	0.90	0.10	100	0	0.00	0	0	0			
SIDEWALK	0.90	0.10	100	1050	0.19	1050	0	945			
				10729	1.00	4892	5837	4986			
			%Imperv	45.60			Weighted C =	0.46			

Note: And additional 15% of the ROOF AREA was added to each lot to account for the patios.

RENZULLI ESTATES												
DMA ID	Total Area (sft)	Runoff Coefficient	DCV	BMP ID (biofiltration basin)	Required Biofiltration area (sf)	Provided biofiltration area (sf)	WQ ponding Depth (inch)*	LID orifice (in)	HMP WSE (FT)*	100 year WSE (FT)*	Basin Depth (ft)*	FreeBoard (ft)*
DMA 1	357035.39	0.49	8,645	BF-1-1	5275.12	5600	6	1.00	4.00	4.22	6	1.78
DMA 2	526248.25	0.55	14,257	BF-1-2	8699.07	9200	6	1.50	3.45	3.98	6	2.02
DMA 3	15302.16	0.41	306	BF-3-3	FTBSIB-4-6	N/A						
DMA 4	10728.65	0.46	245	BF-3-4	FTBSIB-4-4	N/A						

*Depth Measured from Basin bottom Elevation

HMP ID	Sub-Drain Orifice Diameter	Bottom Orifice	Mid Orifice	Top orifice	Emergency Weir (inside dimensions)
BF-1-1	6"	1" @ 0.50'	One 0.75" @ 1.75'	One 3" @ 2.5'	2'x3' @ 4.2'
BF-1-2	6"	1.5" @ 0.50'	One 1.5" @2.0'	One 3" @ 2.5'	2'x3 '@ 3.6'

Note: DMA 3 & 4 meet the HMP flow control requirement when measured at POC-1
BF-1-1 has been sized to provide additional hydromodification flow control and mitigate impact from the DMA 3&4. Refer to HMP analysis

RENZULLI ESTATES			
Description	Units	FILTERRA UNIT	FILTERRA UNIT
Drainage Basin ID or Name	Unitless	BF-3-3	BF-3-4
Total Tributary Area	ac	0.35	0.25
Total Tributary Area	sq ft	15302	10729
Final Adjusted Runoff Factor	unitless	0.41	0.46
85th Percentile Design Rainfall Depth	inches	0.59	0.59
85th Percentile Design Rainfall Intensity	in/hr	0.2	0.2

RENZULLI ESTATES
DCV CALCULATION

DMA 1: Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.59	inches
2	Area tributary to BMP (s)	A=	8.196	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.49	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	8,645	cubic-feet

DMA 2: Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.59	inches
2	Area tributary to BMP (s)	A=	12.08	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.55	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	14,257	cubic-feet

DMA 3: Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.59	inches
2	Area tributary to BMP (s)	A=	0.351	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.41	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	306	cubic-feet

DMA 4: Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.59	inches
2	Area tributary to BMP (s)	A=	0.25	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.46	unitless
4	Street trees volume reduction	TCV=	0.00	cubic-feet
5	Rain barrels volume reduction	RCV=	0.00	cubic-feet
6	Calculate DCV= (3630 x C x d x A) - TCV - RCV	DCV=	245	cubic-feet

The City of SAN DIEGO	Project Name	Renzulli Estates	
	BMP ID	BF-1-1	
Sizing Method for Pollutant Removal Criteria		**Worksheet B.5-1**	
1	Area draining to the BMP	357035	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.49	
3	85th percentile 24-hour rainfall depth	0.59	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	8645	cu. ft.
BMP Parameters			
5	Surface ponding [6 inch minimum, 12 inch maximum]	6	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	24	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	12	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.)	0.377	in/hr.
Baseline Calculations			
12	Allowable routing time for sizing	6	hours
13	Depth filtered during storm [Line 11 x Line 12]	2.262	inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	16.8	inches
15	Total Depth Treated [Line 13 + Line 14]	19.062	inches
Option 1 – Biofilter 1.5 times the DCV			
16	Required biofiltered volume [1.5 x Line 4]	12968	cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	8164	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]	6484	cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	4631	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]	5275	sq. ft.
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	5275	sq. ft.
23	Provided BMP Footprint	5600	sq. ft.
24	Is Line 23 ≥ Line 22?	**Yes, Performance Standard is Met**	

The City of SAN DIEGO	Project Name	Renzulli Estates	
	BMP ID	BF-1-1	
Sizing Method for Volume Retention Criteria		**Worksheet B.5-2**	
1	Area draining to the BMP	357035	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.49	
3	85th percentile 24-hour rainfall depth	0.59	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	8645	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	0	in/hr.
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0	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%	3.5	%
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = 0.0000013 x Line 8^3 - 0.000057 x Line 8^2 + 0.0086 x Line 8 - 0.014 When Line 8 ≤ 8% = 0.023	0.023	
10	Target volume retention [Line 9 x Line 4]	199	cu. ft.

The City of SAN DIEGO	Project Name	Renzulli Estates
	BMP ID	BF-1-1

Volume Retention for No Infiltration Condition			Worksheet B.5-6	
1	Area draining to the biofiltration BMP	357035	sq. ft.	
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.49		
3	Effective impervious area draining to the BMP [Line 1 x Line 2]	175837	sq. ft.	
4	Required area for Evapotranspiration [Line 3 x 0.03]	5275	sq. ft.	
5	Biofiltration BMP Footprint	5600	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]	5600	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]	1.06	
14	Target Volume Retention [Line 10 from Worksheet B.5.2]	199	cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]	-11.93055192	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		

Additional bottom area was added to account for bf-3-3 & bf-3-4 required minimum retention volume (6cfs & 5cfs respectively)

The City of SAN DIEGO	Project Name	Renzulli Estates	
	BMP ID	BF-1-2	
Sizing Method for Pollutant Removal Criteria		**Worksheet B.5-1**	
1	Area draining to the BMP	526248	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.55	
3	85th percentile 24-hour rainfall depth	0.59	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	14257	cu. ft.
BMP Parameters			
5	Surface ponding [6 inch minimum, 12 inch maximum]	6	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	24	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	12	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.)	0.514	in/hr.
Baseline Calculations			
12	Allowable routing time for sizing	6	hours
13	Depth filtered during storm [Line 11 x Line 12]	3.084	inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	16.8	inches
15	Total Depth Treated [Line 13 + Line 14]	19.884	inches
Option 1 – Biofilter 1.5 times the DCV			
16	Required biofiltered volume [1.5 x Line 4]	21385	cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	12906	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]	10693	cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	7638	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]	8699	sq. ft.
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	8699	sq. ft.
23	Provided BMP Footprint	9200	sq. ft.
24	Is Line 23 ≥ Line 22?	**Yes, Performance Standard is Met**	

The City of SAN DIEGO	Project Name	Renzulli Estates	
	BMP ID	BF-1-2	
Sizing Method for Volume Retention Criteria		**Worksheet B.5-2**	
1	Area draining to the BMP	526248	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.55	
3	85th percentile 24-hour rainfall depth	0.59	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	14257	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	0	in/hr.
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0	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%	3.5	%
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = 0.0000013 x Line 8^3 - 0.000057 x Line 8^2 + 0.0086 x Line 8 - 0.014 When Line 8 ≤ 8% = 0.023	0.023	
10	Target volume retention [Line 9 x Line 4]	328	cu. ft.

The City of SAN DIEGO	Project Name	Renzulli Estates
	BMP ID	BF-1-2

Volume Retention for No Infiltration Condition		Worksheet B.5-6	
1	Area draining to the biofiltration BMP	526248	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.55	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]	289969	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]	8699	sq. ft.
5	Biofiltration BMP Footprint	9200	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]	9200	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]	1.06	
14	Target Volume Retention [Line 10 from Worksheet B.5.2]		cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]	0	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		

PROPRIETARY BIOFILTRATION FLOW-THRU SIZING CALCULATION

DMA 3: Flow-thru Design Flows		Worksheet B.6-1		
1	DCV	DCV	306	cubic-feet
2	DCV Retained	DCV Retained	0.00	cubic-feet
3	DCV Biofiltered	DCV Biofiltered	0.00	cubic-feet
4	1.5 DCV requiring flow-thru (Line 1 - Line 2 - 0.67*Line 3)	DCV flow-thru	306	cubic-feet
5	Adjustment Factor (Line 4 / Line1)	AF=	1.00	unitless
6	Design rainfall intensity	i=	0.2	in/hr
7	Area tributary to BMP(s)	A=	0.35	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.41	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.029	cfs
10	Treamtent Flow Rate = 1.5 X Q	Q=	0.043	cfs

1) Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of flow-thru BMPs. That is, if the flow-thru BMP is upstream of the project's retention and biofiltration BMPs then the flow-thru BMP shall be sized using an adjustment factor of 1.
2) Volume based (e.g., dry extended detention basin) flow-thru treatment control BMPs shall be sized to the volume in Line 4 and dlow based)e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed by either volume in :ie 4 or flow
3) Propietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the calculated flow rate in Line 9; certified treatment capacity per unit shall be consistent with third party certifications.

The City of SAN DIEGO	Project Name	Renzulli Estates	
	BMP ID	BF-3-3	
Sizing Method for Volume Retention Criteria		**Worksheet B.5-2**	
1	Area draining to the BMP	15302	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.41	
3	85th percentile 24-hour rainfall depth	0.59	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	306	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	0	in/hr.
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0	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%	3.5	%
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = 0.0000013 x Line 8^3 - 0.000057 x Line 8^2 + 0.0086 x Line 8 - 0.014 When Line 8 ≤ 8% = 0.023	0.023	
10	Target volume retention [Line 9 x Line 4]	7	cu. ft.

The City of SAN DIEGO	Project Name	Renzulli Estates
	BMP ID	BF-3-3

Volume Retention for No Infiltration Condition							Worksheet B.5-6	
1	Area draining to the biofiltration BMP						15302	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)						0.41	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]						6217	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]						187	sq. ft.
5	Biofiltration BMP Footprint						0	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]						0	sq. ft.
Volume Retention Performance Standard								
12	Is Line 11 ≥ Line 4?				No, Proceed to Line 13			
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]						0	
14	Target Volume Retention [Line 10 from Worksheet B.5.2]						6	cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]						6	cu. ft.
Site Design BMP								
	Identification	**Site Design Type**					**Credit**	
16	**1**	Additional basin bottom area was added to BF-1-1*					6	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.						6	cu. ft.
17	Is Line 16 ≥ Line 15?				Volume Retention Performance Standard is Met			

PROPRIETARY BIOFILTRATION FLOW-THRU SIZING CALCULATION

DMA 4: Flow-thru Design Flows		Worksheet B.6-1		
1	DCV	DCV	245	cubic-feet
2	DCV Retained	DCV Retained	0.00	cubic-feet
3	DCV Biofiltered	DCV Biofiltered	0.00	cubic-feet
4	1.5 DCV requiring flow-thru (Line 1 - Line 2 - 0.67*Line 3)	DCV flow-thru	245	cubic-feet
5	Adjustment Factor (Line 4 / Line1)	AF=	1.00	unitless
6	Design rainfall intensity	i=	0.2	in/hr
7	Area tributary to BMP(s)	A=	0.25	acres
8	Area-weighted runoff factor (estimate using Appendix B.2)	C=	0.46	unitless
9	Calculate Flow Rate = AF x (C x i x A)	Q=	0.023	cfs
10	Treamtent Flow Rate = 1.5 X Q	Q=	0.034	cfs

1) Adjustment factor shall be estimated considering only retention and biofiltration BMPs located upstream of flow-thru BMPs. That is, if the flow-thru BMP is upstream of the project's retention and biofiltration BMPs then the flow-thru BMP shall be sized using an adjustment factor of 1.
2) Volume based (e.g., dry extended detention basin) flow-thru treatment control BMPs shall be sized to the volume in Line 4 and dlow based)e.g., vegetated swales) shall be sized to flow rate in Line 9. Sand filter and media filter can be designed by either volume in :ie 4 or flow
3) Propietary BMPs, if used, shall provide certified treatment capacity equal to or greater than the calculated flow rate in Line 9; certified treatment capacity per unit shall be consistent with third party certifications.

The City of SAN DIEGO	Project Name	Renzulli Estates	
	BMP ID	BF-3-4	
Sizing Method for Volume Retention Criteria		**Worksheet B.5-2**	
1	Area draining to the BMP	10729	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.46	
3	85th percentile 24-hour rainfall depth	0.59	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	245	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	0	in/hr.
6	Factor of safety	2	
7	Reliable infiltration rate, for biofiltration BMP sizing [Line 5 / Line 6]	0	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%	3.5	%
9	Fraction of DCV to be retained (Figure B.5-3) When Line 8 > 8% = 0.0000013 x Line 8^3 - 0.000057 x Line 8^2 + 0.0086 x Line 8 - 0.014 When Line 8 ≤ 8% = 0.023	0.023	
10	Target volume retention [Line 9 x Line 4]	6	cu. ft.

The City of SAN DIEGO	Project Name	Renzulli Estates
	BMP ID	BF-3-4

Volume Retention for No Infiltration Condition							Worksheet B.5-6
1	Area draining to the biofiltration BMP					10729	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)					0.46	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]					4986	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]					150	sq. ft.
5	Biofiltration BMP Footprint					0	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]					0	sq. ft.
Volume Retention Performance Standard							
12	Is Line 11 ≥ Line 4?		No, Proceed to Line 13				
13	Fraction of the performance standard met through the BMP footprint and/or landscaping [Line 11/Line 4]					0	
14	Target Volume Retention [Line 10 from Worksheet B.5.2]						cu. ft.
15	Volume retention required from other site design BMPs [(1-Line 13) x Line 14]					0	cu. ft.
Site Design BMP							
	Identification	**Site Design Type**				**Credit**	
16	**1**	Additional basin bottom area was added to BF-1-1*				5	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.					5	cu. ft.
17	Is Line 16 ≥ Line 15?		Volume Retention Performance Standard is Met				

For BF-3-3 and BF-3-4

Compact (high rate) Biofiltration BMP Checklist	Form I-10

Compact (high rate) biofiltration BMPs have a media filtration rate greater than 5 in/hr. and a media surface area smaller than 3% of contributing area times adjusted runoff factor. Compact biofiltration BMPs are typically proprietary BMPs that may qualify as biofiltration.

A compact biofiltration BMP may satisfy the pollutant control requirements for a DMA onsite in some cases. This depends on the characteristics of the DMA **and** the performance certification/data of the BMP. If the pollutant control requirements for a DMA are met onsite, then the DMA is not required to participate in an offsite storm water alternative compliance program to meet its pollutant control obligations.

An applicant using a compact biofiltration BMP to meet the pollutant control requirements onsite must complete Section 1 of this form and include it in the PDP SWQMP. A separate form must be completed for each DMA. In instances where the City Engineer does not agree with the applicant's determination, Section 2 of this form will be completed by the City and returned to the applicant.

Section 1: Biofiltration Criteria Checklist (Appendix F)

Refer to Part 1 of the Storm Water Standards to complete this section. When separate forms/worksheets are referenced below, the applicant must also complete these separate forms/worksheets (as applicable) and include in the PDP SWQMP. The criteria numbers below correspond to the criteria numbers in Appendix F.

Criteria	Answer	Progression
Criteria 1 and 3: What is the infiltration condition of the DMA? Refer to Section 5.4.2 and Appendix C of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance. Applicant must complete and include the following in the PDP SWQMP submittal to support the feasibility determination: • Infiltration Feasibility Condition Letter; or • Worksheet C.4-1: Form I-8A and Worksheet C.4-2: Form I-8B. Applicant must complete and include all applicable sizing worksheets in the SWQMP submittal	○ Full Infiltration Condition	**Stop**. Compact biofiltration BMP is not allowed.
	○ Partial Infiltration Condition	Compact biofiltration BMP is only allowed, if the target volume retention is met onsite (Refer to Table B.5-1 in Appendix B.5). Use Worksheet B.5-2 in Appendix B.5 to estimate the target volume retention (Note: retention in this context means reduction). If the required volume reduction is achieved **proceed to Criteria 2**. If the required volume reduction is not achieved, compact biofiltration BMP is not allowed. **Stop**.
	◉ No Infiltration Condition	Compact biofiltration BMP is allowed if volume retention criteria in Table B.5-1 in Appendix B.5 for the no infiltration condition is met. Compliance with this criterion must be documented in the PDP SWQMP. If the criteria in Table B.5-1 is met **proceed to Criteria 2**. If the criteria in Table B.5-1 is not met, compact biofiltration BMP is not allowed. **Stop**.

Compact (high rate) Biofiltration BMP Checklist	Form I-10

Provide basis for Criteria 1 and 3:

Feasibility Analysis:

Summarize findings and include either infiltration feasibility condition letter or Worksheet C.4-1: Form I-8A and Worksheet C.4-2: Form I-8B in the PDP SWQMP submittal.

If Partial Infiltration Condition:

Provide documentation that target volume retention is met (include Worksheet B.5-2 in the PDP SWQMP submittal). Worksheet B.5-7 in Appendix B.5 can be used to estimate volume retention benefits from landscape areas.

If No Infiltration Condition:

Provide documentation that the volume retention performance standard is met (include Worksheet B.5-2 in the PDP SWQMP submittal) in the PDP SWQMP submittal. Worksheet B.5-6 in Appendix B.5 can be used to document that the performance standard is met.

Criteria	Answer	Progression
Criteria 2: Is the compact biofiltration BMP sized to meet the performance standard from the MS4 Permit? Refer to Appendix B.5 and Appendix F.2 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	◉ Meets Flow based Criteria	Use guidance from **Appendix F.2.2** to size the compact biofiltration BMP to meet the flow based criteria. Include the calculations in the PDP SWQMP. Use parameters for sizing consistent with manufacturer guidelines and conditions of its third party certifications (i.e. a BMP certified at a loading rate of 1 gpm/sq. ft. cannot be designed using a loading rate of 1.5 gpm/sq. ft.) **Proceed to Criteria 4.**
	○ Meets Volume based Criteria	Provide documentation that the compact biofiltration BMP has a total static (i.e. non-routed) storage volume, including pore-spaces and pre-filter detention volume (Refer to Appendix B.5 for a schematic) of at least 0.75 times the portion of the DCV not reliably retained onsite. **Proceed to Criteria 4.**
	○ Does not Meet either criteria	**Stop**. Compact biofiltration BMP is not allowed.

Compact (high rate) Biofiltration BMP Checklist	Form I-10

Provide basis for Criteria 2:

Provide documentation that the BMP meets the numeric criteria and is designed consistent with the manufacturer guidelines and conditions of its third-party certification (i.e., loading rate, etc., as applicable).

Criteria	Answer	Progression
Criteria 4: Does the compact biofiltration BMP meet the pollutant treatment performance standard for the projects most significant pollutants of concern? Refer to Appendix B.6 and Appendix F.1 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	◉ Yes, meets the TAPE certification.	Provide documentation that the compact BMP has an appropriate TAPE certification for the projects most significant pollutants of concern. **Proceed to Criteria 5.**
	○ Yes, through other third-party documentation	Acceptance of third-party documentation is at the discretion of the City Engineer. The City engineer will consider, (a) the data submitted; (b) representativeness of the data submitted; and (c) consistency of the BMP performance claims with pollutant control objectives in Table F.1-2 and Table F.1-1 while making this determination. If a compact biofiltration BMP is not accepted, a written explanation/ reason will be provided in Section 2. **Proceed to Criteria 5.**
	○ No	**Stop**. Compact biofiltration BMP is not allowed.

Provide basis for Criteria 4:

Provide documentation that identifies the projects most significant pollutants of concern and TAPE certification or other third party documentation that shows that the compact biofiltration BMP meets the pollutant treatment performance standard for the projects most significant pollutants of concern.

Please see attached.

Compact (high rate) Biofiltration BMP Checklist		Form I-10
Criteria	**Answer**	**Progression**
Criteria 5: Is the compact biofiltration BMP designed to promote appropriate biological activity to support and maintain treatment process? Refer to Appendix F of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	◉ Yes	Provide documentation that the compact biofiltration BMP support appropriate biological activity. Refer to Appendix F for guidance. **Proceed to Criteria 6.**
	○ No	**Stop**. Compact biofiltration BMP is not allowed.

Provide basis for Criteria 5:

Provide documentation that appropriate biological activity is supported by the compact biofiltration BMP to maintain treatment process.

Stormwater enters the Filterra through a pipe, curb inlet, or sheet flow and ponds over the retreatment mulch layer, capturing heavy sediment and debris. Organics and microorganisms within the mulch trap and degrade metals and hydrocarbons. The mulch also provides water retention for the system's vegetation. Stormwater flows through engineered Filterra media which filters fine pollutants and nutrients. Organic material in the media removes dissolved metals and acts as a food source for root-zone microorganisms. Treated water exits through an underdrain pipe. Rootzone microorganisms digest and transform pollutants into forms easily absorbed by plants. Plant roots absorb stormwater and pollutants that were transformed by microorganisms, regenerating the media's pollutant removal capacity. The roots grow, provide a hospitable environment for the rootzone microorganisms and penetrate the media, maintaining hydraulic conductivity.The plant trunk and foliage utilize nutrients such as Nitrogen and Phosphorus for plant health, sequester heavy metals into the biomass, and provide evapotranspiration of residual water within the system.

Criteria	Answer	Progression
Criteria 6: Is the compact biofiltration BMP designed with a hydraulic loading rate to prevent erosion, scour and channeling within the BMP?	◉ Yes	Provide documentation that the compact biofiltration BMP is used in a manner consistent with manufacturer guidelines and conditions of its third-party certification. **Proceed to Criteria 7.**
	○ No	**Stop**. Compact biofiltration BMP is not allowed.

Provide basis for Criteria 6:

Provide documentation that the BMP meets the numeric criteria and is designed consistent with the manufacturer guidelines and conditions of its third-party certification (i.e., maximum tributary area, maximum inflow velocities, etc., as applicable).

Compact (high rate) Biofiltration BMP Checklist		Form I-10
Criteria	**Answer**	**Progression**
Criteria 7: Is the compact biofiltration BMP maintenance plan consistent with manufacturer guidelines and conditions of its third-party certification (i.e., maintenance activities, frequencies)?	○ Yes, and the compact BMP is privately owned, operated and not in the public right of way.	Submit a maintenance agreement that will also include a statement that the BMP will be maintained in accordance with manufacturer guidelines and conditions of third-party certification. **Stop**. The compact biofiltration BMP meets the required criteria.
	○ Yes, and the BMP is either owned or operated by the City or in the public right of way.	Approval is at the discretion of the City Engineer. The city engineer will consider maintenance requirements, cost of maintenance activities, relevant previous local experience with operation and maintenance of the BMP type, ability to continue to operate the system in event that the vending company is no longer operating as a business or other relevant factors while making the determination. **Stop**. Consult the City Engineer for a determination.
	○ No	**Stop**. Compact biofiltration BMP is not allowed.

Provide basis for Criteria 7:

Include copy of manufacturer guidelines and conditions of third-party certification in the maintenance agreement. PDP SWQMP must include a statement that the compact BMP will be maintained in accordance with manufacturer guidelines and conditions of third-party certification.

WASHINGTON STATE DEPARTMENT OF ECOLOGY

September 2019

GENERAL USE LEVEL DESIGNATION FOR BASIC (TSS), ENHANCED, PHOSPHORUS & OIL TREATMENT

For

CONTECH Engineered Solutions Filterra®

Ecology's Decision:

Based on Contech's submissions, including the Final Technical Evaluation Reports, dated August 2019, March 2014, December 2009, and additional information provided to Ecology dated October 9, 2009, Ecology hereby issues the following use level designations:

1. A General Use Level Designation for Basic, Enhanced, Phosphorus, and Oil Treatment for the Filterra® system constructed with a minimum media thickness of 21 inches (1.75 feet), at the following water quality design hydraulic loading rates:

Treatment	Infiltration Rate (in/hr) for use in Sizing
Basic	175
Phosphorus	100
Oil	50
Enhanced	175

2. The Filterra is not appropriate for oil spill-control purposes.
3. Ecology approves Filterra systems for treatment at the hydraulic loading rates listed above, to achieve the maximum water quality design flow rate. Calculate the water quality design flow rates using the following procedures:

- Western Washington: for treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using the latest version of the Western Washington Hydrology Model or other Ecology-approved continuous runoff model.
- Eastern Washington: For treatment installed upstream of detention or retention, the water quality design flow rate is the peak 15-minute flow rate as calculated using one of the three flow rate based methods described in Chapter 2.2.5 of the Stormwater Management Manual for Eastern Washington (SWMMEW) or local manual.
- Entire State: For treatment installed downstream of detention, the water quality design flow rate is the full 2-year release rate of the detention facility.

4. This General Use Level Designation has no expiration date, but Ecology may revoke or amend the designation, and is subject to the conditions specified below.

Ecology's Conditions of Use:

Filterra systems shall comply with these conditions shall comply with the following conditions:

1. Design, assemble, install, operate, and maintain the Filterra systems in accordance with applicable Contech Filterra manuals and this Ecology Decision.
2. The minimum size filter surface-area for use in Washington is determined by using the design water quality flow rate (as determined in this Ecology Decision, Item 3, above) and the Infiltration Rate from the table above (use the lowest applicable Infiltration Rate depending on the level of treatment required). Calculate the required area by dividing the water quality design flow rate (cu-ft/sec) by the Infiltration Rate (converted to ft/sec) to obtain required surface area (sq-ft) of the Filterra unit.
3. Each site plan must undergo Contech Filterra review before Ecology can approve the unit for site installation. This will ensure that design parameters including site grading and slope are appropriate for use of a Filterra unit.
4. Filterra media shall conform to the specifications submitted to and approved by Ecology and shall be sourced from Contech Engineered Solutions, LLC with no substitutions.
5. Maintenance includes removing trash, degraded mulch, and accumulated debris from the filter surface and replacing the mulch layer. Use inspections to determine the site-specific maintenance schedules and requirements. Follow maintenance procedures given in the most recent version of the Filterra Operation and Maintenance Manual.
6. Maintenance: The required maintenance interval for stormwater treatment devices is often dependent upon the degree of pollutant loading from a particular drainage basin. Therefore, Ecology does not endorse or recommend a "one size fits all" maintenance cycle for a particular model/size of manufactured treatment device.

    - Contech designs Filterra systems for a target maintenance interval of 6 months in the Pacific Northwest. Maintenance includes removing and replacing the mulch layer above the media along with accumulated sediment, trash, and captured organic materials therein, evaluating plant health, and pruning the plant if deemed necessary.
    - Conduct maintenance following manufacturer's guidelines.

7. Filterra systems come in standard sizes.

8. Install the Filterra in such a manner that flows exceeding the maximum Filterra operating rate are conveyed around the Filterra mulch and media and will not resuspend captured sediment.
9. Discharges from the Filterra units shall not cause or contribute to water quality standards violations in receiving waters.

Approved Alternate Configurations

Filterra Internal Bypass - Pipe (FTIB-P)

1. The Filterra® Internal Bypass – Pipe allows for piped-in flow from area drains, grated inlets, trench drains, and/or roof drains. Design capture flows and peak flows enter the structure through an internal slotted pipe. Filterra® inverted the slotted pipe to allow design flows to drop through to a series of splash plates that then disperse the design flows over the top surface of the Filterra® planter area. Higher flows continue to bypass the slotted pipe and convey out the structure.
2. To select a FTIB-P unit, the designer must determine the size of the standard unit using the sizing guidance described above.

Filterra Internal Bypass – Curb (FTIB-C)

1. The Filterra® Internal Bypass –Curb model (FTIB-C) incorporates a curb inlet, biofiltration treatment chamber, and internal high flow bypass in one single structure. Filterra® designed the FTIB-C model for use in a "Sag" or "Sump" condition and will accept flows from both directions along a gutter line. An internal flume tray weir component directs treatment flows entering the unit through the curb inlet to the biofiltration treatment chamber. Flows in excess of the water quality treatment flow rise above the flume tray weir and discharge through a standpipe orifice; providing bypass of untreated peak flows. Americast manufactures the FTIB-C model in a variety of sizes and configurations and you may use the unit on a continuous grade when a single structure providing both treatment and high flow bypass is preferred. The FTIB-C model can also incorporate a separate junction box chamber to allow larger diameter discharge pipe connections to the structure.
2. To select a FTIB-C unit, the designer must determine the size of the standard unit using the sizing guidance described above.

Filterra® Shallow

1. The Filterra Shallow provides additional flexibility for design engineers and designers in situations where various elevation constraints prevent application of a standard Filterra configuration. Engineers can design this system up to six inches shallower than any of the previous Filterra unit configurations noted above.
2. Ecology requires that the Filterra Shallow provide a media contact time equivalent to that of the standard unit. This means that with a smaller depth of media, the surface area must increase.
3. To select a Filterra Shallow System unit, the designer must first identify the size of the standard unit using the modeling guidance described above.
4. Once the size of the standard Filterra unit is established using the sizing technique described above, use information from the following table to select the appropriate size Filterra Shallow System unit.

Shallow Unit Basic, Enhanced, and Oil Treatment Sizing

Standard Depth	Equivalent Shallow Depth
4x4	4x6 or 6x4
4x6 or 6x4	6x6
4x8 or 8x4	6x8 or 8x6
6x6	6x10 or 10x6
6x8 or 8x6	6x12 or 12x6
6x10 or 10x6	13x7

Notes:
1. Shallow Depth Boxes are less than the standard depth of 3.5 feet but no less than 3.0 feet deep (TC to INV).

Applicant: Contech Engineered Solutions, LLC.

Applicant's Address: 11815 NE Glenn Widing Drive
Portland, OR 97220

Application Documents:

- State of Washington Department of Ecology Application for Conditional Use Designation, Americast (September 2006)
- Quality Assurance Project Plan Filterra® Bioretention Filtration System Performance Monitoring, Americast (April 2008)
- Quality Assurance Project Plan Addendum Filterra® Bioretention Filtration System Performance Monitoring, Americast (June 2008)
- Draft Technical Evaluation Report Filterra® Bioretention Filtration System Performance Monitoring, Americast (August 2009)
- Final Technical Evaluation Report Filterra® Bioretention Filtration System Performance Monitoring, Americast (December 2009)
- Technical Evaluation Report Appendices Filterra® Bioretention Filtration System Performance Monitoring, Americast, (August 2009)
- Memorandum to Department of Ecology Dated October 9, 2009 from Americast, Inc. and Herrera Environmental Consultants
- Quality Assurance Project Plan Filterra® Bioretention System Phosphorus treatment and Supplemental Basic and Enhanced Treatment Performance Monitoring, Americast (November 2011)
- Filterra® letter August 24, 2012 regarding sizing for the Filterra® Shallow System.
- University of Virginia Engineering Department Memo by Joanna Crowe Curran, Ph. D dated March 16, 2013 concerning capacity analysis of Filterra® internal weir inlet tray.
- Terraphase Engineering letter to Jodi Mills, P.E. dated April 2, 2013 regarding Terraflume Hydraulic Test, Filterra® Bioretention System and attachments.
- Technical Evaluation Report, Filterra® System Phosphorus Treatment and Supplemental Basic Treatment Performance Monitoring. March 27th, 2014.
- State of Washington Department of Ecology Application for Conditional Use Level Designation, Contech Engineered Solutions (May 2015)

- Quality Assurance Project Plan Filterra® Bioretention System, Contech Engineered Solutions (May 2015)
- Filterra Bioretention System Armco Avenue General Use Level Designation Technical Evaluation Report, Contech Engineered Solutions (August 2019)

Applicant's Use Level Request:

General Level Use Designation for Basic (175 in/hr), Enhanced (175 in/hr), Phosphorus (100 in/hr), and Oil Treatment (50 in/hr).

Applicant's Performance Claims:

Field-testing and laboratory testing show that the Filterra® unit is promising as a stormwater treatment best management practice and can meet Ecology's performance goals for basic, enhanced, phosphorus, and oil treatment.

Findings of Fact:

Field Testing 2015-2019

1. Contech completed field testing of a 4 ft. x 4 ft. Filterra® unit at one site in Hillsboro, Oregon from September 2015 to July 2019. Throughout the monitoring period a total of 24 individual storm events were sampled, of which 23 qualified for TAPE sampling criteria.
2. Contech encountered several unanticipated events and challenges that prevented them from collecting continuous flow and rainfall data. An analysis of the flow data from the sampled events, including both the qualifying and non-qualifying events, demonstrated the system treated over 99 % of the influent flows. Peak flows during these events ranged from 25 % to 250 % of the design flow rate of 29 gallons per minute.
3. Of the 23 TAPE qualified sample events, 13 met requirements for TSS analysis. Influent concentrations ranged from 20.8 mg/L to 83 mg/L, with a mean concentration of 46.3 mg/L. The UCL95 mean effluent concentration was 15.9 mg/L, meeting the 20 mg/L performance goal for Basic Treatment.
4. All 23 TAPE qualified sample events met requirements for dissolved zinc analysis. Influent concentrations range from 0.0384 mg/L to 0.2680 mg/L, with a mean concentration of 0.0807 mg/L. The LCL 95 mean percent removal was 62.9 %, meeting the 60 % performance goal for Enhanced Treatment.
5. Thirteen of the 23 TAPE qualified sample events met requirements for dissolved copper analysis. Influent concentrations ranged from 0.00543 mg/L to 0.01660 mg/L, with a mean concentration of 0.0103 mg/L. The LCL 95 mean percent removal was 41.2 %, meeting the 30 % performance goal for Enhanced Treatment.
6. Total zinc concentrations were analyzed for all 24 sample events. Influent EMCs for total zinc ranged from 0.048 mg/L to 5.290 mg/L with a median of 0.162 mg/L. Corresponding effluent EMCs for total zinc ranged from 0.015 mg/L to 0.067 mg/L with a median of

0.029 mg/L. Total event loadings for the study for total zinc were 316.85 g at the influent and 12.92 g at the effluent sampling location, resulting in a summation of loads removal efficiency of 95.9 %.

7. Total copper concentrations were analyzed for all 24 sample events. Influent EMCs for total copper ranged from 0.003 mg/L to 35.600 mg/L with a median value of 0.043 mg/L. Corresponding effluent EMCs for total copper ranged from 0.002 mg/L to 0.015 mg/L with a median of 0.004 mg/L. Total event loadings for total copper for the study were 1,810.06 g at the influent and 1.90 g at the effluent sampling location, resulting in a summation of loads removal efficiency of 99.9 %.

Field Testing 2013

1. Filterra completed field-testing of a 6.5 ft x 4 ft. unit at one site in Bellingham, Washington. Continuous flow and rainfall data collected from January 1, 2013 through July 23, 2013 indicated that 59 storm events occurred. Water quality data was obtained from 22 storm events. Not all the sampled storms produced information that met TAPE criteria for storm and/or water quality data.
2. The system treated 98.9 % of the total 8-month runoff volume during the testing period. Consequently, the system achieved the goal of treating 91 % of the volume from the site. Stormwater runoff bypassed Filterra treatment during four of the 59 storm events.
3. Of the 22 sampled events, 18 qualified for TSS analysis (influent TSS concentrations ranged from 25 to 138 mg/L). The data were segregated into sample pairs with influent concentration greater than and less than 100 mg/L. The UCL95 mean effluent concentration for the data with influent less than 100 mg/L was 5.2 mg/L, below the 20-mg/L threshold. Although the TAPE guidelines do not require an evaluation of TSS removal efficiency for influent concentrations below 100 mg/L, the mean TSS removal for these samples was 90.1 %. Average removal of influent TSS concentrations greater than 100 mg/L (three events) was 85 %. In addition, the system consistently exhibited TSS removal greater than 80 % at flow rates equivalent to a 100 in/hr infiltration rate and was observed at 150 in/hr.
4. Ten of the 22 sampled events qualified for TP analysis. Americast augmented the dataset using two sample pairs from previous monitoring at the site. Influent TP concentrations ranged from 0.11 to 0.52 mg/L. The mean TP removal for these twelve events was 72.6 %. The LCL95 mean percent removal was 66.0, well above the TAPE requirement of 50 %. Treatment above 50 % was evident at 100 in/hr infiltration rate and as high as 150 in/hr. Consequently, the Filterra test system met the TAPE Phosphorus Treatment goal at 100 in/hr. Influent ortho-P concentrations ranged from 0.005 to 0.012 mg/L; effluent ortho-P concentrations ranged from 0.005 to 0.013 mg/L. The reporting limit/resolution for the ortho-P test method is 0.01 mg/L, therefore the influent and effluent ortho-P concentrations were both at and near non-detect concentrations.

Field Testing 2008-2009

1. Filterra completed field-testing at two sites at the Port of Tacoma. Continuous flow and rainfall data collected during the 2008-2009 monitoring period indicated that 89 storm events occurred. The monitoring obtained water quality data from 27 storm events. Not all the sampled storms produced information that met TAPE criteria for storm and/or water quality data.
2. During the testing at the Port of Tacoma, 98.96 to 99.89 % of the annual influent runoff volume passed through the POT1 and POT2 test systems respectively. Stormwater runoff bypassed the POT1 test system during nine storm events and bypassed the POT2 test system during one storm event. Bypass volumes ranged from 0.13 % to 15.3% of the influent storm volume. Both test systems achieved the 91 % water quality treatment-goal over the 1-year monitoring period.
3. Consultants observed infiltration rates as high as 133 in/hr during the various storms. Filterra did not provide any paired data that identified percent removal of TSS, metals, oil, or phosphorus at an instantaneous observed flow rate.
4. The maximum storm average hydraulic loading rate associated with water quality data is <40 in/hr, with the majority of flow rates < 25 in/hr. The average instantaneous hydraulic loading rate ranged from 8.6 to 53 in/hr.
5. The field data showed a removal rate greater than 80 % for TSS with an influent concentration greater than 20 mg/L at an average instantaneous hydraulic loading rate up to 53 in/hr (average influent concentration of 28.8 mg/L, average effluent concentration of 4.3 mg/L).
6. The field data showed a removal rate generally greater than 54 % for dissolved zinc at an average instantaneous hydraulic loading rate up to 60 in/hr and an average influent concentration of 0.266 mg/L (average effluent concentration of 0.115 mg/L).
7. The field data showed a removal rate generally greater than 40 % for dissolved copper at an average instantaneous hydraulic loading rate up to 35 in/hr and an average influent concentration of 0.0070 mg/L (average effluent concentration of 0.0036 mg/L).
8. The field data showed an average removal rate of 93 % for total petroleum hydrocarbon (TPH) at an average instantaneous hydraulic loading rate up to 53 in/hr and an average influent concentration of 52 mg/L (average effluent concentration of 2.3 mg/L). The data also shows achievement of less than 15 mg/L TPH for grab samples. Filterra provided limited visible sheen data due to access limitations at the outlet monitoring location.
9. The field data showed low percentage removals of total phosphorus at all storm flows at an average influent concentration of 0.189 mg/L (average effluent concentration of 0.171 mg/L). We may relate the relatively poor treatment performance of the Filterra system at this location to influent characteristics for total phosphorus that are unique to the Port of Tacoma site. It appears that the Filterra system will not meet the 50 % removal performance goal when the majority of phosphorus in the runoff is expected to be in the dissolved form.

Laboratory Testing

1. Filterra performed laboratory testing on a scaled down version of the Filterra unit. The lab data showed an average removal from 83-91 % for TSS with influents ranging from 21 to 320 mg/L, 82-84 % for total copper with influents ranging from 0.94 to 2.3 mg/L, and 50-61 % for orthophosphate with influents ranging from 2.46 to 14.37 mg/L.
2. Filterra conducted permeability tests on the soil media.
3. Lab scale testing using Sil-Co-Sil 106 showed removals ranging from 70.1 % to 95.5 % with a median removal of 90.7 %, for influent concentrations ranging from 8.3 to 260 mg/L. Filterra ran these laboratory tests at an infiltration rate of 50 in/hr.
4. Supplemental lab testing conducted in September 2009 using Sil-Co-Sil 106 showed an average removal of 90.6 %. These laboratory tests were run at infiltration rates ranging from 25 to 150 in/hr for influent concentrations ranging from 41.6 to 252.5 mg/L. Regression analysis results indicate that the Filterra system's TSS removal performance is independent of influent concentration in the concentration rage evaluated at hydraulic loading rates of up to 150 in/hr.

Contact Information:

Applicant:
Jeremiah Lehman
Contech Engineered Solutions, LLC.
11815 Glenn Widing Dr
Portland, OR 97220
(503) 258-3136
jlehman@conteches.com

Applicant's Website: http://www.conteches.com

Ecology web link: http://www.ecy.wa.gov/programs/wq/stormwater/newtech/index.html

Ecology:
Douglas C. Howie, P.E.
Department of Ecology
Water Quality Program
(360) 407-6444
douglas.howie@ecy.wa.gov

Date	**Revision**
December 2009	GULD for Basic, Enhanced, and Oil granted, CULD for Phosphorus
September 2011	Extended CULD for Phosphorus Treatment
September 2012	Revised design storm discussion, added Shallow System.
January 2013	Revised format to match Ecology standards, changed Filterra contact information
February 2013	Added FTIB-P system
March 2013	Added FTIB-C system
April 2013	Modified requirements for identifying appropriate size of unit

June 2013	Modified description of FTIB-C alternate configuration
March 2014	GULD awarded for Phosphorus Treatment. GULD updated for a higher flow-rate for Basic Treatment.
June 2014	Revised sizing calculation methods
March 2015	Revised Contact Information
June 2015	CULD for Basic and Enhanced at 100 in/hr infiltration rate
September 2019	GULD for Basic and Enhanced at 175 in/hr infiltration rate

CONTECH®
ENGINEERED SOLUTIONS

Filterra®
High Performance Bioretention



The experts you need to solve your stormwater challenges



Contech is the leader in stormwater solutions, helping engineers, contractors and owners with infrastructure and land development projects throughout North America.

With our responsive team of stormwater experts, local regulatory expertise and flexible solutions, Contech is the trusted partner you can count on for stormwater management solutions.

Your Contech Team



STORMWATER CONSULTANT

It's my job to recommend the best solution to meet permitting requirements.



STORMWATER DESIGN ENGINEER

I work with consultants to design the best approved solution to meet your project's needs.



REGULATORY MANAGER

I understand the local stormwater regulations and what solutions will be approved.



SALES ENGINEER

I make sure our solutions meet the needs of the contractor during construction.

Contech is your partner in stormwater management solutions



Low Impact Development in a Small Footprint – Filterra®

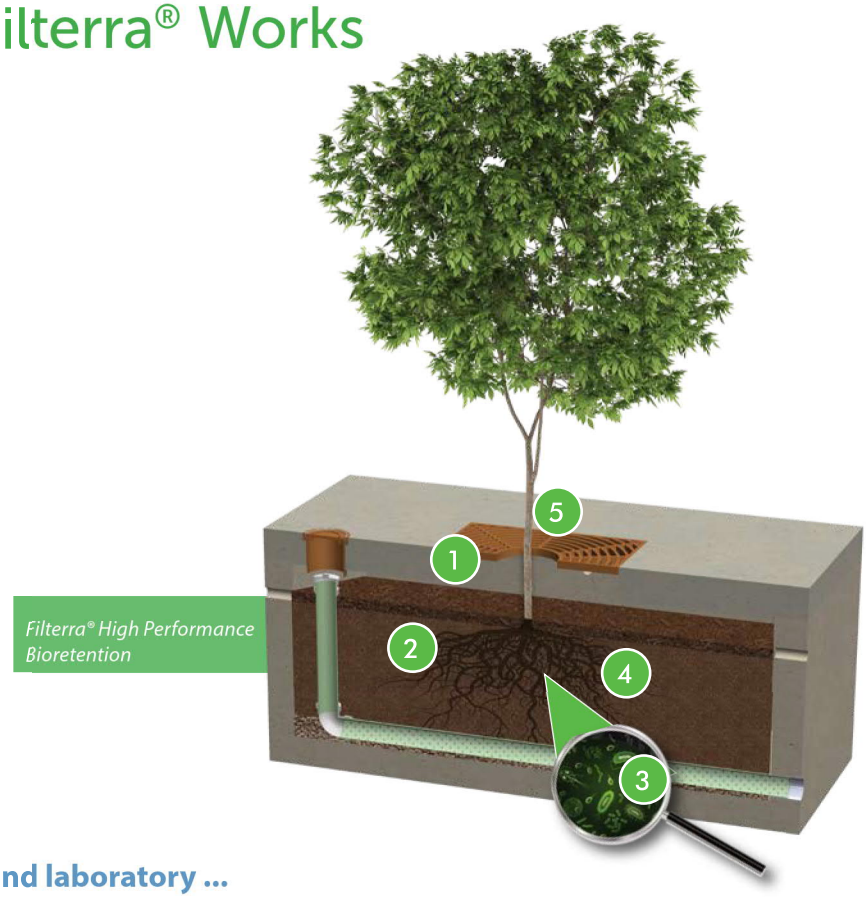
Filterra is an engineered high-performance bioretention system. While it operates similar to traditional bioretention, its high flow media allows for a reduction in footprint of up to 95% versus traditional bioretention practices. Filterra provides a Low Impact Development (LID) solution for tight, highly developed sites such as urban development projects, commercial parking lots, residential streets, and streetscapes. Its small footprint also reduces installation and life cycle costs versus traditional bioretention. Filterra can be configured in many different ways to enhance site aesthetics, integrate with other LID practices, or increase runoff reduction through infiltration below or downstream of the system.

At the Manchester Stormwater Park seen above, the Filterra systems surrounding the central courtyard allowed for the creation of a community space with parking, sidewalks, and benches in a quaint downtown area. A traditional bioretention system treating the same drainage area would have occupied the entire park area leaving no room for these amenities.

filterra® Bioretention Systems

filterra® Bioscape®

How the Filterra® Works



Tested in the field and laboratory ...

1. Stormwater enters the Filterra through a pipe, curb inlet, or sheet flow and ponds over the pretreatment mulch layer, capturing heavy sediment and debris. Organics and microorganisms within the mulch trap and degrade metals and hydrocarbons. The mulch also provides water retention for the system's vegetation.

2. Stormwater flows through engineered Filterra media which filters fine pollutants and nutrients. Organic material in the media removes dissolved metals and acts as a food source for root-zone microorganisms. Treated water exits through an underdrain pipe or infiltrates (if designed accordingly).

3. Rootzone microorganisms digest and transform pollutants into forms easily absorbed by plants.

4. Plant roots absorb stormwater and pollutants that were transformed by microorganisms, regenerating the media's pollutant removal capacity. The roots grow, provide a hospitable environment for the rootzone microorganisms and penetrate the media, maintaining hydraulic conductivity.

5. The plant trunk and foliage utilize nutrients such as Nitrogen and Phosphorus for plant health, sequester heavy metals into the biomass, and provide evapotranspiration of residual water within the system.



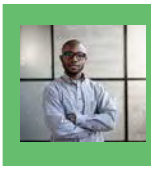
Plants and organic material are vital to the long term performance of bioretention systems

Using nature to facilitate Stormwater Management



Filterra® Features and Benefits

FEATURE	BENEFITS
High biofiltration media flow rate (up to 175"/hr+)	Greatly reduced footprint versus traditional bioretention and LID solutions
Filterra system is packaged, including all components necessary for system performance	Quality control for easy, fast and successful installation
Quick and easy maintenance	Low lifecycle costs
Variety of configurations and aesthetic options	Integrates easily into any site or landscape plan
Natural stormwater management processes featuring organics and vegetation	Meets Low Impact Development requirements and ensures long-term performance



The Filterra system can be configured with many different aesthetic options

Select Filterra® Approvals

Filterra is approved through numerous local, state and federal verification programs, including:

- New Jersey Department of Environmental Protection (NJ DEP)
- Washington Department of Ecology (GULD) – Basic, Enhanced, Phosphorus, and Oil
- Maryland Department of the Environment - Environmental Site Design (ESD)
- Texas Commission on Environmental Quality (TCEQ)
- Virginia Department of Environmental Quality (VA DEQ)
- Maine Department of Environmental Protection (ME DEP)
- Atlanta, GA Regional Commission
- Los Angeles County, CA - Alternate to Attachment H
- City of Portland, Oregon Bureau of Environmental Services
- North Carolina Department of Environmental Quality (NC DEQ)

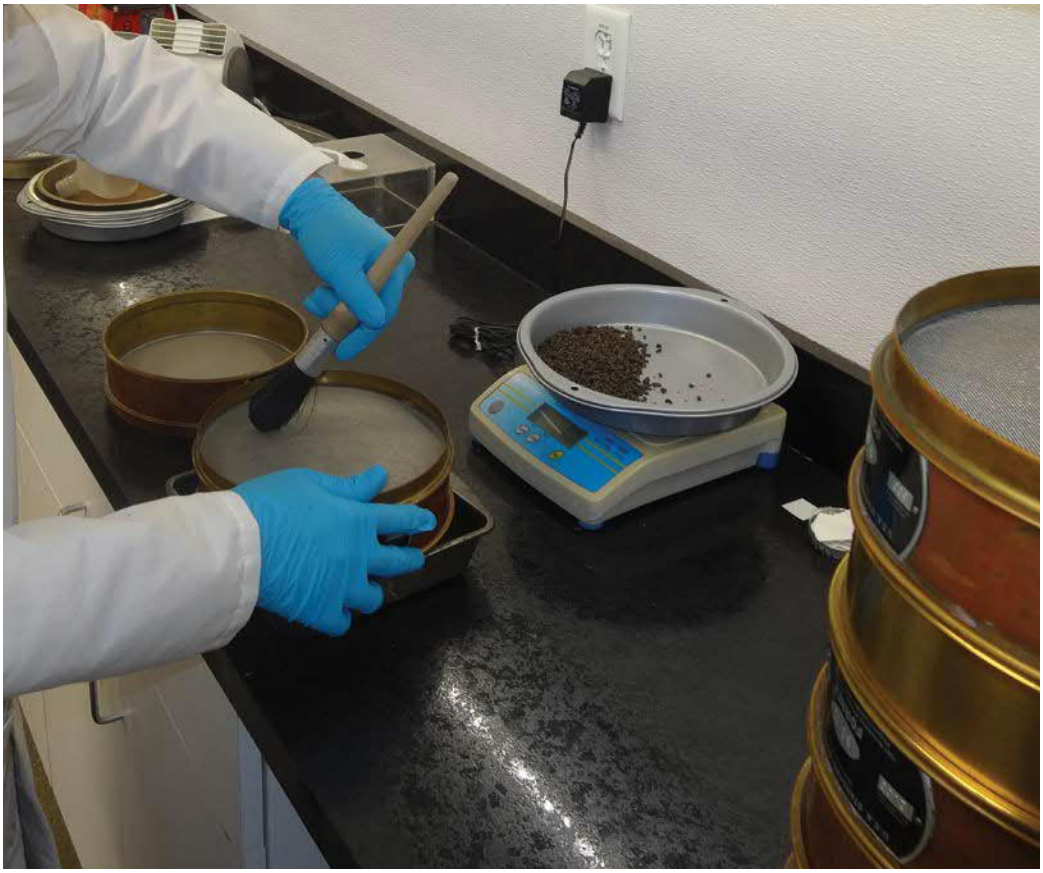


Filterra® Performance Testing Results



APPLICATION TIPS

- The Filterra system has been tested under industry standard protocols and has proven its pollutant removal performance and system longevity.
- Contech invests significant resources in media blending calibration and product testing to ensure our media meets our strict performance specifications every time.
- Keep regulators and owners happy by selecting a product with predictable and proven maintenance longevity.



POLLUTANT OF CONCERN	MEDIAN REMOVAL EFFICIENCY	MEDIAN EFFLUENT CONCENTRATION (MG/L)
Total Suspended Solids (TSS)	86%	3.3
Total Phosphorus - TAPE (TP)	70%	0.05
Total Nitrogen (TN)	34%	0.54
Total Copper (TCu)	55%	0.004
Total Dissolved Copper	43%	0.003
Total Zinc (TZn)	56%	0.04
Total Dissolved Zinc	54%	0.1
Total Petroleum Hydrocarbons	87%	0.71

Each batch of Filterra® media has been extensively tested to ensure consistent performance every time.

Sources:
UVA (TARP) Field Study - 2006
Herrera (TAPE) Study - 2009
Herrera (TAPE) Study - 2014
NC State Study - 2015

Note: Some jurisdictions recognize higher removal rates. Contact your Contech Stormwater Consultant for performance expectations.

Field tested and performance verified

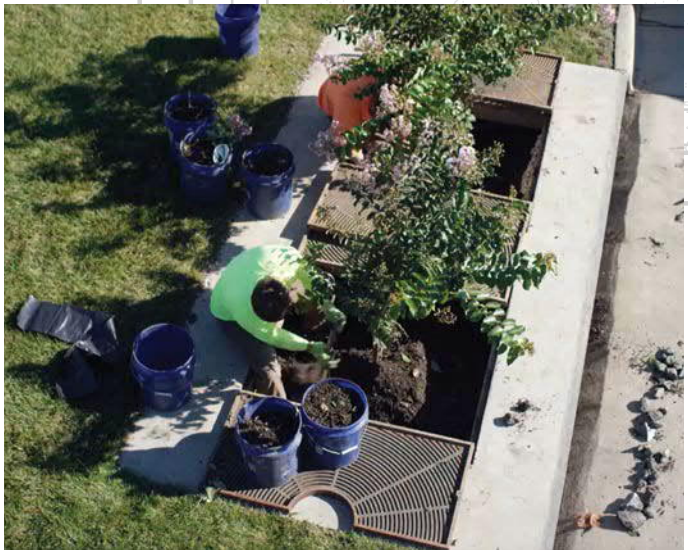
Filterra® Maintenance

Activation and vegetation selection guidance is included with every system.

With proper routine maintenance, the engineered media within the Filterra system should last as long as traditional bioretention media.

Maintenance is low-cost, low-tech and simple:

- Remove trash, sediment, and mulch
- Replace with a fresh 3" layer of mulch
- No confined space entry or special tools
- Easily performed by landscape contractor or facilities maintenance provider



Filterra offers high performance bioretention for advanced pollutant removal with easy maintenance.



Watch the Filterra Maintenance video at www.ContechES.com/filterra



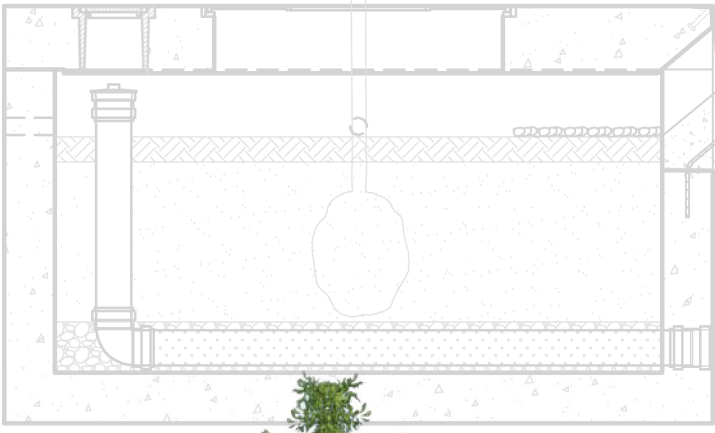
Plant health evaluation and pruning is important to encourage growth.

All stormwater treatment systems require maintenance for effective operation.

Filterra® Configurations

Multiple system configurations integrate with site hydraulic design and layout ...

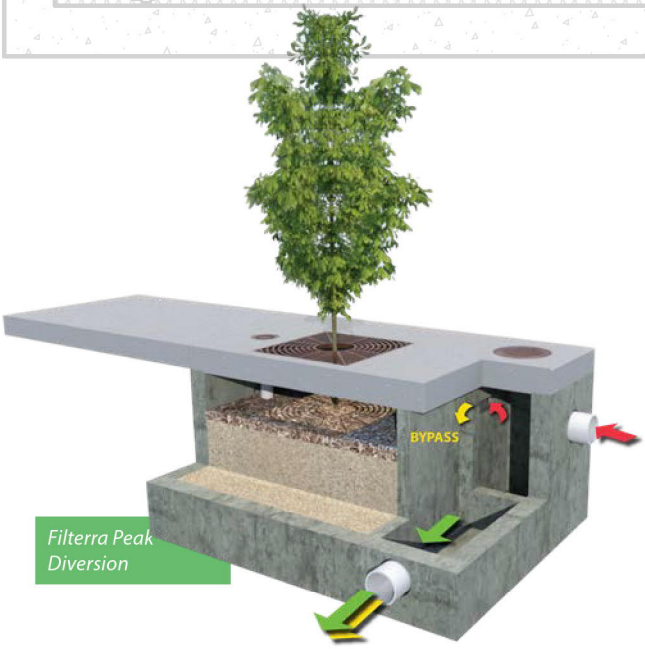
The Filterra is available in a variety of precast configurations as well as Filterra Bioscape, which can be installed directly into an excavated basin.



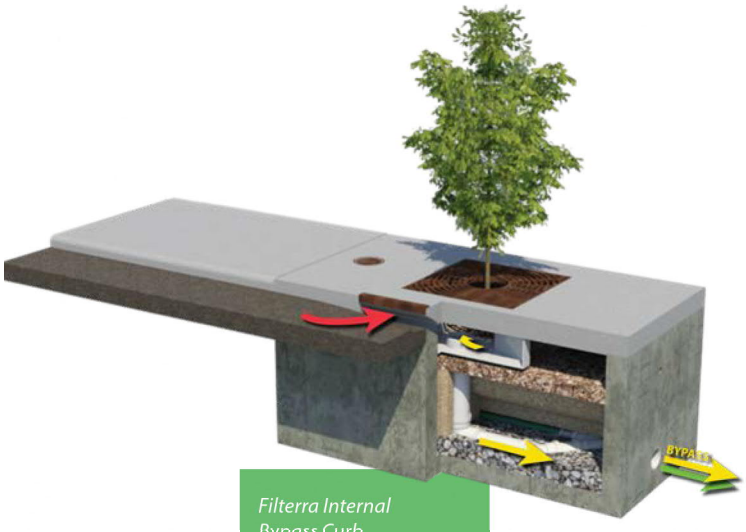


Filterra Offline

Bypass via downstream catch basin.



Filterra Peak Diversion



Filterra Internal Bypass Curb



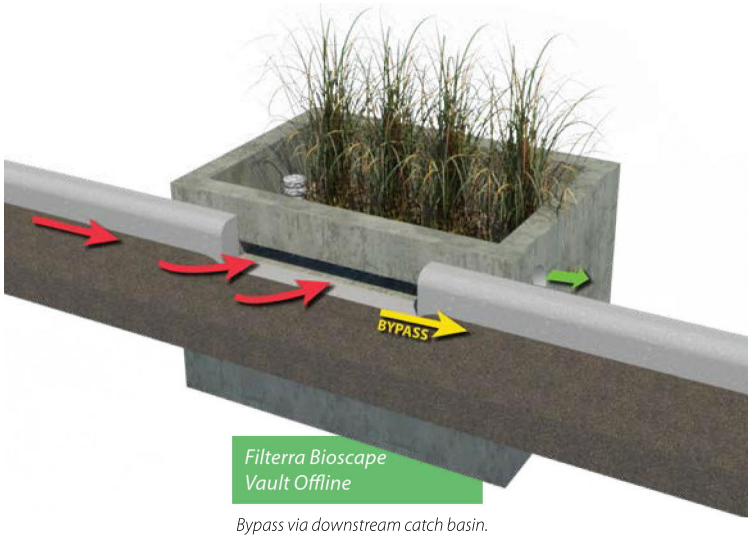
Filterra Sedimentation Chamber (Maryland Only)

Bypass via downstream catch basin.

**Additional configurations available, including offline - pipe, peak diversion - grate, and internal bypass curb-chamber.*

Multiple configurations allow for easy site integration

Filterra® Bioscape® Configurations



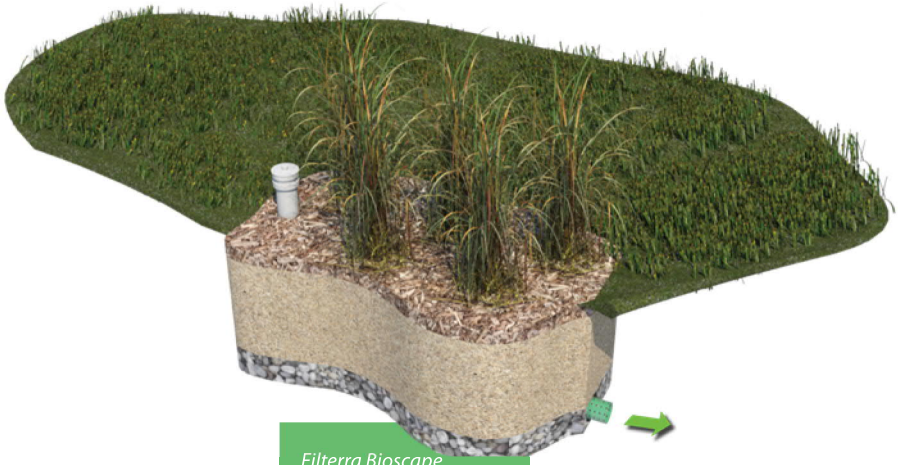
Filterra Bioscape Vault Offline

Bypass via downstream catch basin.



Filterra Bioscape Vault Basin

Bypass via upstream structure.
Multiple inlet options.



Filterra Bioscape

Bypass via upstream structure.
Multiple inlet options.

**Additional configurations available, including bioscape vault offline pipe.*

Filterra® Aesthetic Options

Multiple aesthetic options to enhance the appearance and integrate with landscaping ...



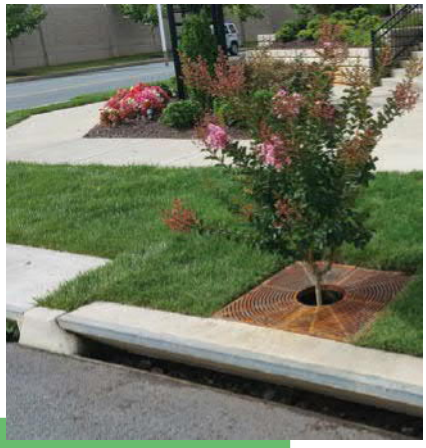
Standard Tree Grate



Custom/Decorative Tree Grate



Full Grate with Grasses



Recessed Top Slab



Open Top Planter - Filterra Bioscape



Street Tree

An aesthetic solution to meet your bioretention needs

Filterra® Bioscape®







Large-scale Filterra that can be customized to your site ...

- Ideal for Filterra systems greater than 300 square feet
- Design with or without containment structure
- Incorporate infiltration directly below the system, where required
- Combine with upstream storage or downstream infiltration
- Use as an alternative to larger regional traditional bioretention systems
- Easily add pretreatment Hydrodynamic Separator for large-scale or heavy pollutant loading applications



A partner you can rely on



STORMWATER SOLUTIONS

PIPE SOLUTIONS

STRUCTURES SOLUTIONS

Few companies offer the wide range of high-quality stormwater resources you can find with us — state-of-the-art products, decades of expertise, and all the maintenance support you need to operate your system cost-effectively.

THE CONTECH WAY

Contech® Engineered Solutions provides innovative, cost-effective site solutions to engineers, contractors, and developers on projects across North America. Our portfolio includes bridges, drainage, erosion control, retaining wall, sanitary sewer and stormwater management products.

TAKE THE NEXT STEP

For more information: www.ContechES.com

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FILTERRA® BIOSCAPE® ACTIVATION PACKAGE

(No Precast Vaults Provided)

CONTECH ENGINEERED SOLUTIONS

It is the purchaser's responsibility to Activate the Filterra Bioscape System and provide adequate measures to prevent construction related runoff from entering the Filterra Bioscape system.

Included with your purchase is Supervised Activation of the Filterra system by the manufacturer as well as a 1-year warranty from delivery of the system. The purchaser must ensure that the site is acceptable for Filterra Bioscape Activation. A checklist (included as page 2 of this document must be completed and submitted to the Contech Activation Coordinator. The minimum requirements for Filterra Bioscape Activation are as follows:

1. The purchaser must have sourced vegetation meeting the requirements outlined in "Plant Selection for Filterra Systems" below.
2. A pre-construction meeting is required to discuss site requirements, logistics planning and activation FAQ and red flags.
3. The site landscaping must be fully stabilized, i.e. full landscaping installed and some grass cover (not just straw and seed) is required to reduce sediment transport. Construction debris and materials should be removed from surrounding area.
4. Final paving must be completed. Final paving ensures that paving materials will not enter and contaminate the Filterra system during the paving process, and that the plant will receive runoff from the drainage area, assisting with plant survival for the Filterra system.
5. All immediate upstream and downstream structures should be placed with piping into the system already installed for connection during activation.



Plant Selection for Filterra® Bioscape® Systems

All Filterra systems require vegetation for proper long-term performance. As indicated in the Filterra Bioscape Activation Package, the Contractor is responsible for sourcing the proper vegetation prior to Supervised Activation. Contech or a Contech representative will supervise installation the vegetation during the Activation process.

Contractors must ensure the vegetation meets the following 3 requirements:

1. Select plant(s) as specified in the engineering plans and specifications AND that are listed on Contech's Configuration Specific Plant Lists.
2. All plants MUST be container-grown in nursery containers no larger than 15 gallons. Crated and/or Ball/Burlap plants are NOT permitted.
3. Quantities should be selected based on plant palette options found starting on page 3 of this document.

If Contech or Contech's representative shows up for Supervised Activation and any of the 3 requirements above are not met, Activation cannot be performed and the Contractor will be billed a $1,500 Unprepared Site fee*.

* *UNPREPARED SITE FEE NOTE: A charge of $1500.00 will be invoiced for each activation visit requested by customer where Contech determines that the site does not meet the conditions required for Activation AND/OR acceptable plants are not provided by the contractor.*

Filterra® Contractor Activation Checklist

Requested Activation Date: _____ System Designation: _____

Project Name: _____

Site Contact Name: _____ Site Contact Phone/Email: _____

Site Owner/End User Name: _____ Site Owner/End User Phone/Email: _____

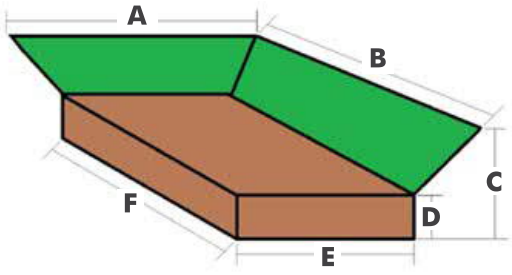
Please complete the following checklist, sign, date, and submit with your activation request to your Contech Project Consultant. Along with the checklist, fill out the as-built dimensions of the Filterra Bioscape system excavation(s), and attach photos of the Filterra Bioscape excavation(s). This information is essential to ensure the proper amount of material is provided.

Checklist:

- ☐ Upstream drainage area to Filterra Bioscape system is stabilized.
- ☐ Filterra Bioscape excavated per plan dimensions to bottom of Filterra underdrain stone depth. Surface area of media area must match order quantities.
- ☐ If additional depth of drain rock is required per site plans, additional drain rock is installed to the Filterra Bioscape underdrain pipe elevation.
- ☐ Excavation sides vertical from bottom of excavation to top of mulch (Approximately 34" when 6" underdrain is utilized).
- ☐ Excavation sides maximum slope 3:1 from top of mulch to finished grade.
- ☐ Side slopes above top of mulch elevation stabilized with sod or other slope stabilization.
- ☐ Bioscape Inlet (BSI) structure or other inlet/bypass structure installed and properly backfilled with maximum 3:1 slopes to top of mulch elevation.
- ☐ Inflow pipe(s) connected from BSI or other inlet structure to edge of Filterra Bioscape system excavation.
- ☐ Outflow pipe(s) connected from edge of Filterra Bioscape system excavation to downstream structure.
- ☐ Outflow pipe(s) are SDR35, properly sized per site plan underdrain pipe size(s).
- ☐ Excavation is dry and free from construction related sediment and debris.
- ☐ Bottom of excavation is properly scarified.
- ☐ Excavation is accessible by standard construction equipment.
- ☐ Plants have been purchased in accordance with the guidance in "Plant Selection for Filterra Bioscape Systems"
- ☐ Photos attached.

NOTE: Please ensure that all of the above conditions have been met prior to activation request. A mobilization fee (minimum $1000.00) applies for each activation visit requested by Customer where Contech determines that the site does not meet the above conditions suitable for activation.

As-Built Dimensions



A.	OVERALL EXCAVATION WIDTH:	_____FT
B.	OVERALL EXCAVATION LENGTH:	_____FT
C.	OVERALL EXCAVATION HEIGHT:	_____FT
D.	FILTERRA BED HEIGHT:	_____FT
E.	FILTERRA MEDIA BED WIDTH:	_____FT
F.	FILTERRA MEDIA BED LENGTH:	_____FT

Signature _____ Date _____

* *UNPREPARED SITE FEE NOTE: A charge of $1500.00 will be invoiced for each activation visit requested by customer where Contech determines that the site does not meet the conditions required for Activation AND/OR acceptable plants are not provided by the contractor.*

Filterra® Bioscape Plant Palettes

KEY: (refer to plant lists for species sizing)



A. EXTRA SMALL GRASS
- Up to 2′ mature spread
- 1-2 gallon typical (1 gal. minimum)

B. SMALL GRASS/SHRUB
- 2′-4′ mature spread
- 1-7 gallon typical

C. MEDIUM SHRUB
- 4′-6′ mature spread
- 1-7 gallon typical

D. LARGE SHRUB OR EXTRA LARGE SHRUB OR TREE
- 6′ mature spread and greater, 30′ max. mature height
- Up to 15 gallon maximum

NOTE: *For larger vaults and in-ground Filterra Bioscape systems, palettes can be scaled (i.e. Qty 6 of the 175 SF Palette can be used for a 1056 SF Filterra Bioscape).*

MIX & MATCH SUBSTITUTION OPTIONS:

1 Large Shrub or Extra Large Shrub or Tree
- 2 Medium Shrubs
- 4 Small Grass/SHrubs
- 12 Extra Small Grasses

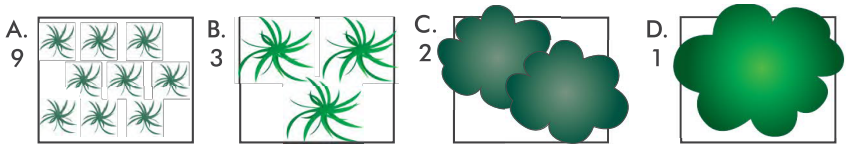
1 Medium Shrub
- 2 Small Grass/Shrubs
- 6 Extra Small Grasses

1 Small Grass/Shrub
- 3 Extra Small Grasses

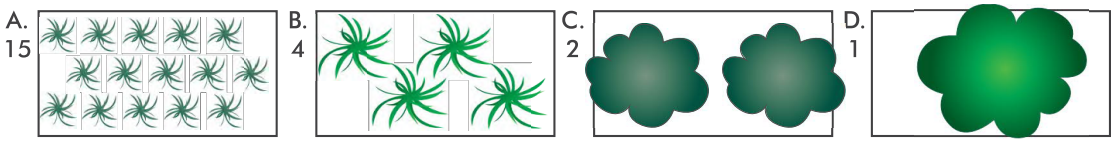
25 SF example



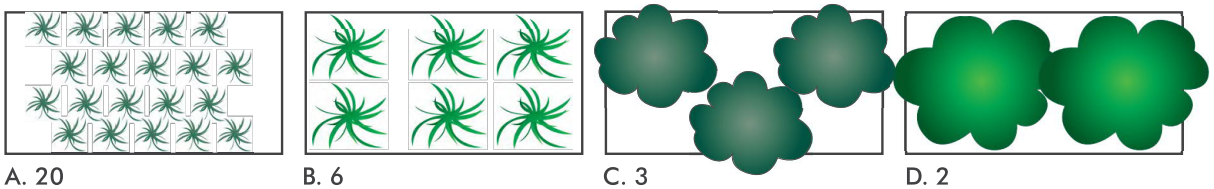
50 SF example



75 SF example

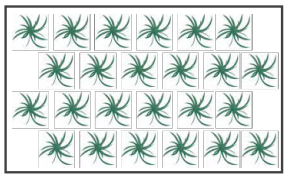


100 SF example

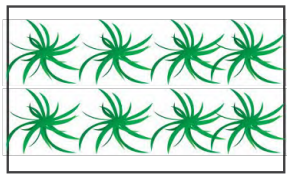


* *UNPREPARED SITE FEE NOTE: A charge of $1500.00 will be invoiced for each activation visit requested by customer where Contech determines that the site does not meet the conditions required for Activation AND/OR acceptable plants are not provided by the contractor.*

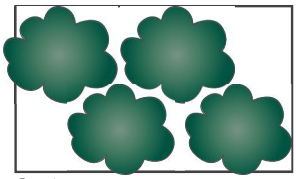
125 SF example



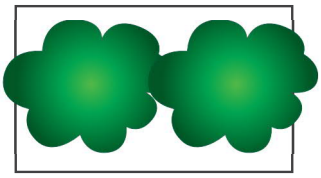
A. 24



B. 8

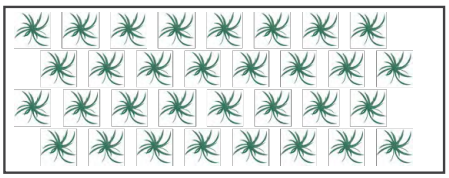


C. 4

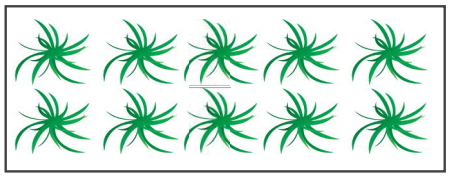


D. 2

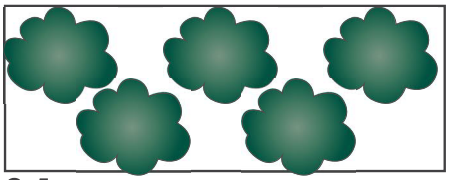
150 SF example



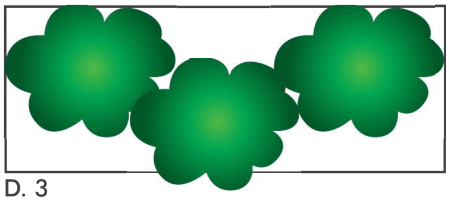
A. 32



B. 10

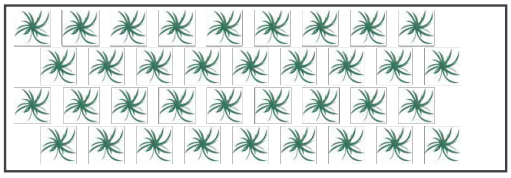


C. 5

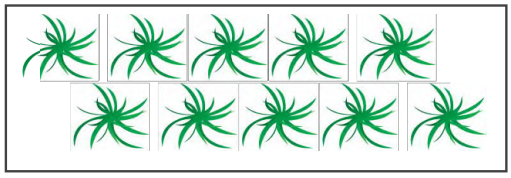


D. 3

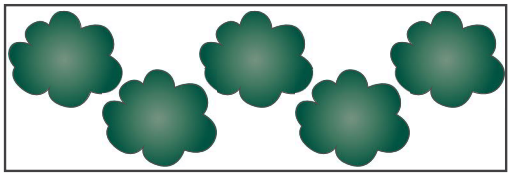
175 SF example



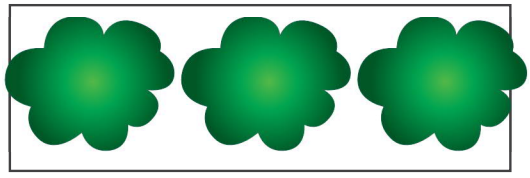
A. 36



B. 10



C. 5



D. 3

In some cases, Contech may consider alternate plant species as approved by the Product Manager. Please list the plant name in the space below and submit this sheet to your Contech Activation Coordinator. If the plant species is approved, either the Product Manager or the Activation Coordinator will sign the form and return to you for inclusion with your Activation Checklist.

Requested Plant Species: _____ Approved: _____

Date: _____

* *UNPREPARED SITE FEE NOTE: A charge of $1500.00 will be invoiced for each activation visit requested by customer where Contech determines that the site does not meet the conditions required for Activation AND/OR acceptable plants are not provided by the contractor.*

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CONTECH® ENGINEERED SOLUTIONS

filterra® Bioretention Systems
A Growing Idea in Stormwater Filtration

Filterra® Maintenance Steps



1. Inspection of Filterra and surrounding area



2. Removal of tree grate and erosion control stones



3. Removal of debris, trash and mulch



4. Mulch replacement



5. Clean area around Filterra



6. Complete paperwork and record plant height and width

Contech has created a network of Certified Maintenance Providers (CCMP's) to provide maintenance on Filterra systems. To find a CCMP in your area please visit www.conteches.com/maintenance

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Compact (high rate) Biofiltration BMP Checklist	Form I-10
Section 2: Verification (For City Use Only)	
Is the proposed compact BMP accepted by the City Engineer for onsite pollutant control compliance for the DMA?	○ Yes ○ No, See explanation below
Explanation/reason if the compact BMP is not accepted by the City for onsite pollutant control compliance:	

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: Renzulli Estates

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

Attachment 2A

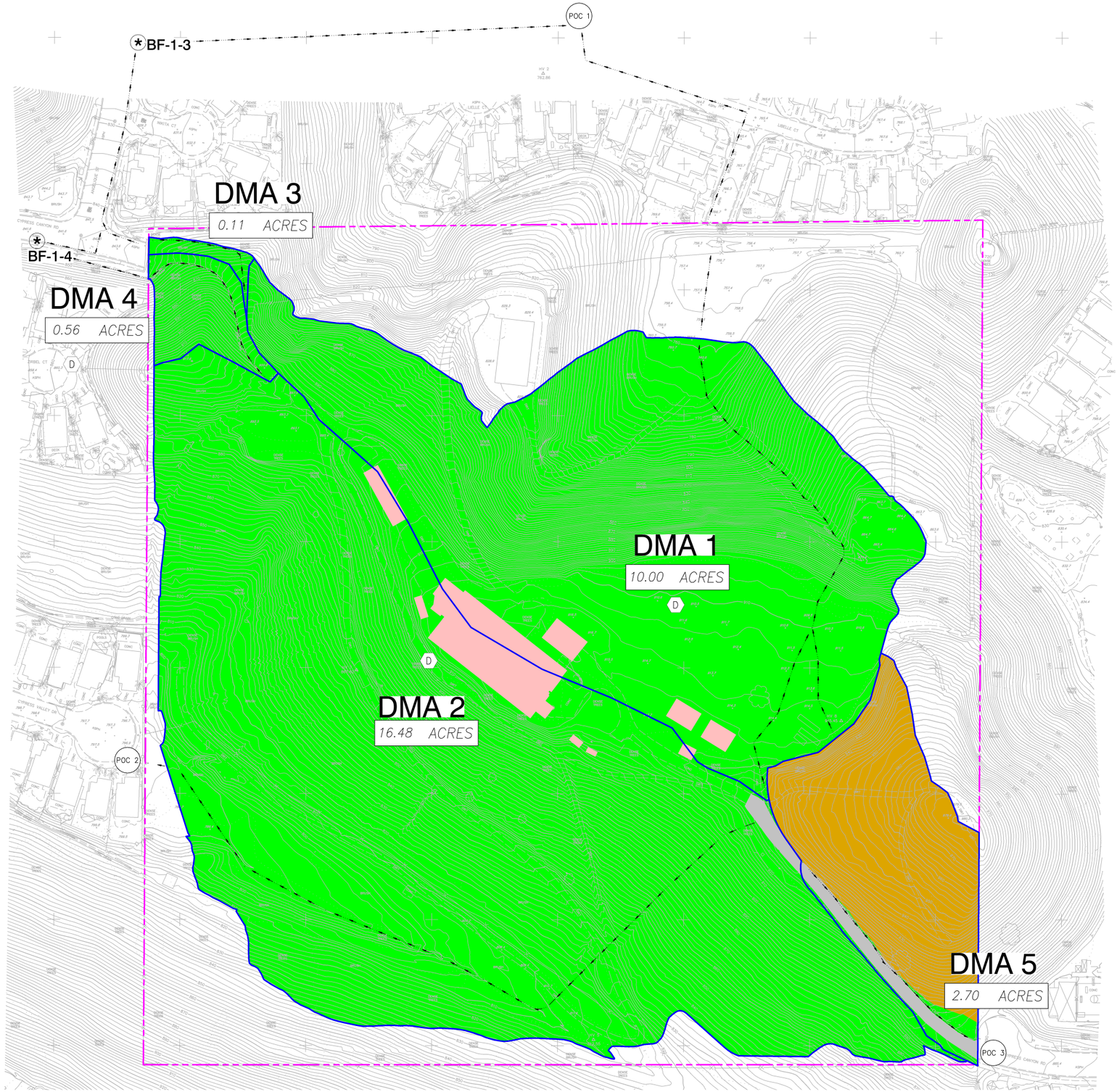
HMP EXHIBIT

Project Name: Renzulli Estates

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).



LEGEND

- PROJECT BOUNDARY
- HMP BOUNDARY
- FLOW DIRECTION SHOWING DMA1, 3, 4 SHARE COMMON POC1
- 00.00 ACRES — SUBAREA ACREAGE
- DMA1-D — DMA # + SOIL TYPE
- PERVIOUS - LANDSCAPE
- IMPERVIOUS - ROOF
- IMPERVIOUS - ROAD
- D — HYDROLOGIC SOIL TYPE
- 1 — POINT OF COMPLIANCE

Note: Impervious area were modeld as pervious in the pre-developed models

80 0 80 160 240
SCALE 1" = 80'

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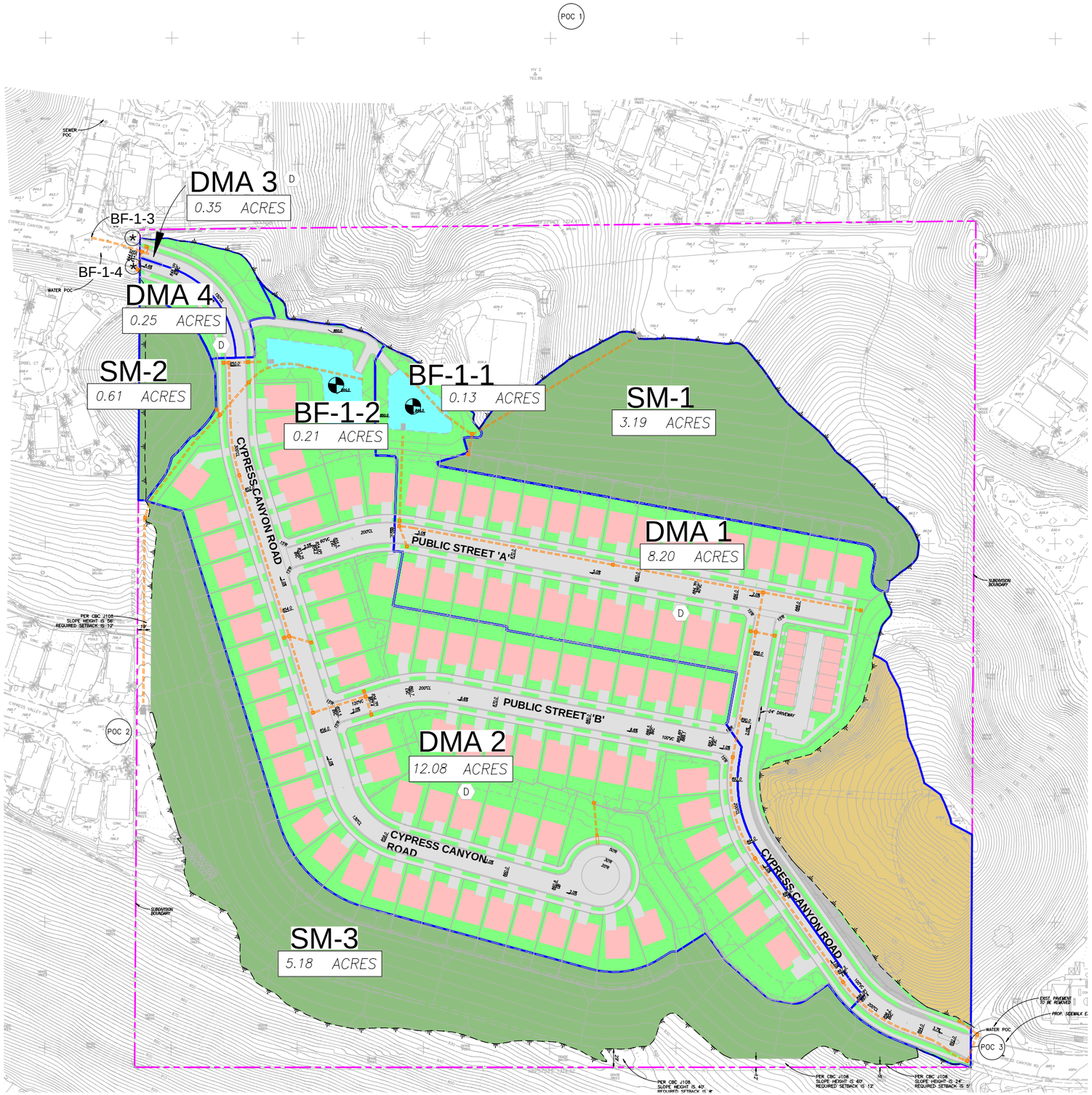
PREDEVELOPED CONDITION HYDROMODIFICATION MAP
RENZULLI ESTATES

CITY OF SAN DIEGO, CALIFORNIA

MAP 1 OF 1

W.O.# 3622-0002

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LEGEND

- PROJECT BOUNDARY
- DMA BOUNDARY
- FLOW DIRECTION SHOWING DMA1, 3, 4 SHARE COMMON POC1
- 00.00 ACRES — SUBAREA ACREAGE
- DMA-1 — DMA #
- IMPERVIOUS - ROAD/SIDEWALK/DRIVEWAY
- IMPERVIOUS- ROOF/BUILDING
- PERVIOUS - LANDSCAPE
- PERVIOUS - SLOPES
- BASIN BOTTOM
- D — HYDROLOGIC SOIL TYPE
- 1 — POINT OF COMPLIANCE
- STRUCTURAL BMPS BIOFILTRATION BASIN
- STRUCTURAL BMPS COMPACT PROPRIETARY BIOFILTRATION

H&A

80 0 80 160 240

SCALE 1"= 80'

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DEVELOPED CONDITION HYDROMODIFICATION MAP RENZULLI ESTATES

CITY OF SAN DIEGO, CALIFORNIA

MAP 1 OF 2

W.O.#5622-0002

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RENZULLI ESTATES
DMA CALCULATIONS (AREA BREAKDOWN)

	Imp. RF	Pervious RF	% Imp	**DMA1**	Fraction of Total	Imp Area	Pervious Area	Summation RF x A	**DMA-2**	Fraction of Total	Imp Area	Pervious Area	Summation RF x A	**DMA-3**	Fraction of Total	Imp Area	Pervious Area	Summation RF x A
LANDSCAPE	0.90	0.10	0	105895	0.06	0	105895	10589	229568	0.08	0	229568	22957	9444	0.15	0	9444	944
SLOPE	0.90	0.30	0	101298	0.17	0	101298	30390	0	0.00	0	0	0	0	0.00	0	0	0
ROOF	0.90	0.10	100	66240	0.34	66240	0	59616	149040	0.46	149040	0	134136	0	0.00	0	0	0
ROAD	0.90	0.10	100	52568	0.27	52568	0	47311	85708	0.27	85708	0	77137	4293	0.62	4293	0	3863
DRIVEWAY	0.90	0.10	100	14911	0.08	14911	0	13420	37934	0.12	37934	0	34141	0	0.00	0	0	0
SIDEWALK	0.90	0.10	100	16124	0.08	16124	0	14511	23999	0.07	23999	0	21599	1566	0.23	1566	0	1409
				357035	1.00	149842	207193	175837	**526248**	1.00	296680	229568	289969	**15302**	1.00	5858	9444	6217
			%Imperv	70.34			Weighted C =	**0.49**	56.38			Weighted C =	**0.55**	38.29			Weighted C =	**0.41**
				8.20					12.08					0.35				

	Imp. RF	Pervious RF	% Imp	**DMA 4**	Fraction of Total	Imp Area	Pervious Area	Summation RF x A	**SM-1**	**SM-2**	**SM-3**
				SQFT		SQFT	SQFT		SQFT	SQFT	SQFT
LANDSCAPE	0.90	0.10	0	5837	0.12	0	5837	584			
SLOPE	0.90	0.30	0	0	0.00	0	0	0	3.19	0.61	5.18
ROOF	0.90	0.10	100	0	0.00	0	0	0			
ROAD	0.90	0.10	100	3842	0.69	3842	0	3457			
DRIVEWAY	0.90	0.10	100	0	0.00	0	0	0			
SIDEWALK	0.90	0.10	100	1050	0.19	1050	0	945			
				10729	1.00	4892	5837	4986			
			%Imperv	45.60			Weighted C =	**0.46**			

Note: And additional 15% of the ROOF AREA was added to each lot to account for the patios.

DMA SUMMARY (AREA BREAKDOWN)

RENZULLI ESTATES												
DMA ID	**Total Area (sft)**	**Runoff Coefficient**	**DCV**	**BMP ID (biofiltration basin)**	**Required Biofiltration area (sf)**	**Provided biofiltration area (sf)**	**WQ ponding Depth (inch)***	**LID orifice (in)**	**HMP WSE (FT)***	**100 year WSE (FT)***	**Basin Depth (ft)***	**FreeBoard (ft)***
DMA 1	357035.39	0.49	8,645	BF-1-1	5275.12	5600	6	1.00	4.00	4.22	6	1.78
DMA 2	526248.25	0.55	14,257	BF-1-2	8699.07	9200	6	1.50	3.45	3.98	6	2.02
DMA 3	15302.16	0.41	306	BF-3-3	FTBSIB-4-6	N/A						
DMA 4	10728.65	0.46	245	BF-3-4	FTBSIB-4-4	N/A						

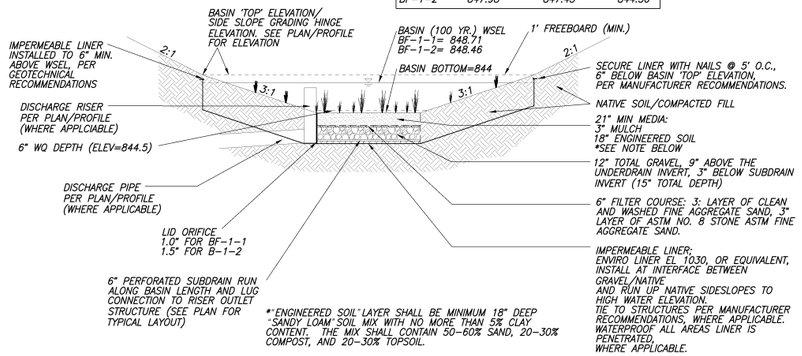
*Depth Measured from Basin bottom Elevation

HMP ID	**Sub-Drain Orifice Diameter**	**Bottom Orifice**	**Mid Orifice**	**Top orifice**	**Emergency Weir (inside dimensions)**
BF-1-1	6"	1" @ 0.50'	One 0.75" @ 1.75'	One 3" @ 2.5'	2'x3' @ 4.2'
BF-1-2	6"	1.5" @ 0.50'	One 1.5" @2.00'	One 3" @ 2.5'	2'x3 '@ 3.6'

Note: DMA 3 & 4 meet the HMP flow control requirement when measured at POC-1
BF-1-1 has been sized to provide additional hydromodification flow control and mitigate impact from the DMA 3&4. Refer to HMP analysis

BIOFILTRATION BMP DMA & HMP SUMMARY

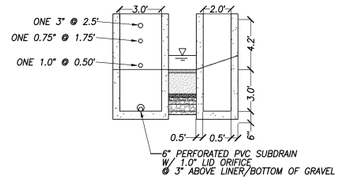
	100 YEAR WSE	HMP WSE	WQ WSE
BF-1-1	848.22	848.00	844.50
BF-1-2	847.98	847.45	844.50



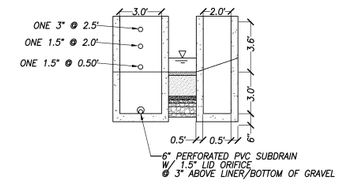
SOIL SECTION FOR WATER QUALITY/HYDROMODIFICATION BIOFILTRATION BASIN

NOT TO SCALE

PRIVATE BIOFILTRATION BASIN BF-1-1



PRIVATE BIOFILTRATION BASIN BF-1-2



BIOFILTRATION BASIN RISER DETAIL FOR BF-1-1 & BF-1-2

NOT TO SCALE

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DEVELOPED CONDITION HYDROMODIFICATION MAP RENZULLI ESTATES

CITY OF SAN DIEGO, CALIFORNIA

MAP 2 OF 2

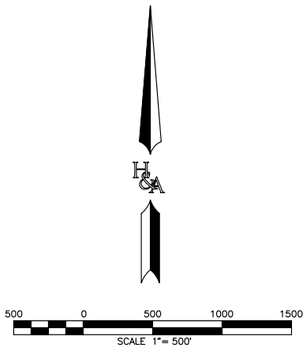
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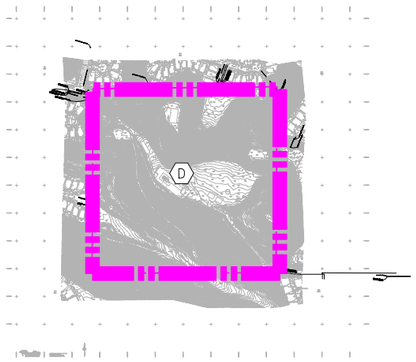
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Attachment 2B

CCSYA MAP

Downstream System Sensitivity to Coarse Sediment
(Preliminary Threshold Channel Analysis for Poggi Creek)





LEGEND

PROJECT BOUNDARY

POTENTIAL CRITICAL COARSE SEDIMENT AREAS PER WMAA

D SOIL TYPE

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DEVELOPED CONDITION
CCSYA MAP

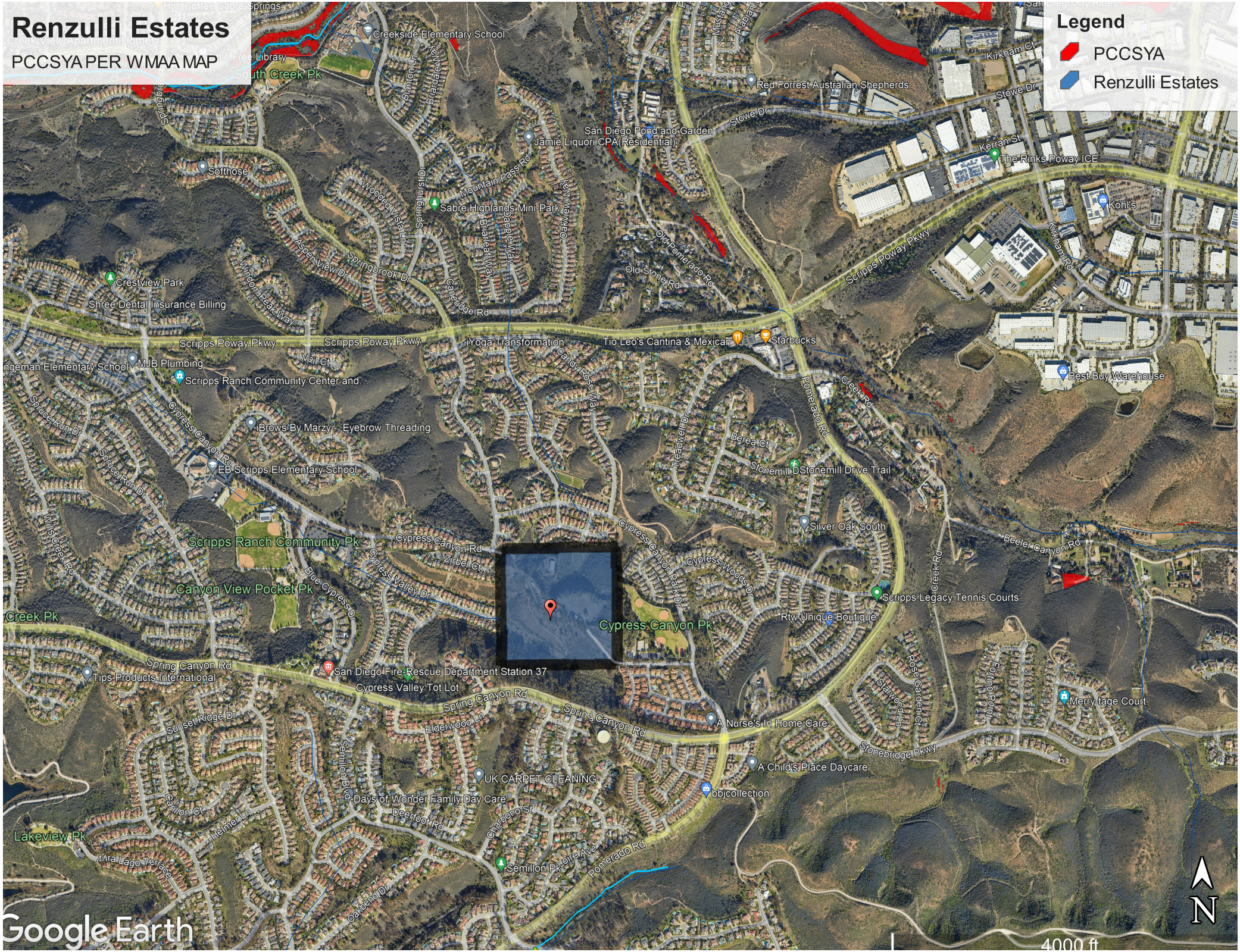
RENZULLI ESTATES

CITY OF SAN DIEGO, CALIFORNIA

MAP 1 OF 1

W.O.# 3622-0002

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Renzulli Estates
PCCSYA PER WMAA MAP
Legend
PCCSYA
Renzulli Estates
Creekside Elementary School
South Creek Pk
Red Forrest Australian Shepherds
San Diego Pond and Garden
Jamie Liquori CPA(Residential)
Softhose
Sabre Highlands Mini-Park
Mountain Pass Rd
Old Pomerado Rd
Old Stone Rd
Scripps Poway Pkwy
The Rinks Poway ICE
Kohl's
Crestview Park
Shree Dental Insurance Billing
Yoga Transformation
Tio Leo's Cantina & Mexican
Starbucks
MJB Plumbing
Scripps Ranch Community Center and...
Best Buy Warehouse
Brows By Marzy - Eyebrow Threading
EB Scripps Elementary School
Stonemill Drive Trail
Silver Oak South
Scripps Ranch Community Pk
Cypress Canyon Rd
Canyon View Pocket Pk
Cypress Canyon Pk
Scripps Legacy Tennis Courts
Rtw Unique Boutique
San Diego Fire-Rescue Department Station 37
Cypress Valley Tot Lot
Tips Products International
A Nurse's In Home Care
A Child's Place Daycare
UK CARPET CLEANING
bbjcollection
Days of Wonder Family Day Care
Merry-tage Court
Lakeview Pk
Semillon Pk
Google Earth
N
4000 ft

Attachment 2D

FLOW CONTROL FACILITY DESIGN AND STRUCTURAL BMP DRAWDOWN CALCULATIONS

Hydromodification Management Plan (HMP)
-Flow Control Facility Design

This HMP report has been prepared in place of Attachment 2a of the *Priority Development Project (PDP) SWQMP for Renzulli Estates* (February, 2023) and has been prepared to be submitted concurrently with the SWQMP.

SECTIONS

1. Introduction/Summary
2. Flow Duration Curve Analysis
3. Elevation vs. Discharge, Elevation vs Area Curves, Drawdown, SWMM Input Calculations
4. Biofiltration Details
5. SWMM Input Data (Existing and Proposed Models)
6. Hydromodification Watershed Maps

I. INTRODUCTION/SUMMARY

This HMP report summarizes the approach used to model the Proposed Renzulli Estates site within City of San Diego, California using the Environmental Protection Agency (EPA) Storm Water Management Model 5.1 (SWMM). SWMM models were prepared for pre- and post- developed conditions at each of the project designated Point of Compliances (POC) in order to demonstrate that the proposed biofiltration basin facilities have sufficient footprints and volumes to meet the current HMP requirements from the Regional Water Quality Control Board (RWQCB).

The project area in pre-developed conditions is divided into three watersheds with each draining to their respective POC. In the proposed condition, the area that drains to POC3 was routed to the proposed biofiltration basin in DMA 1 to address water quality and detention requirements before reaching POC1. See Section 6 of this Report for HMP-related maps.

Following are brief descriptions of each POC:

POC 1:

POC 1 is located to the north of the project area, where runoff from DMA 1 combines with that from DMA 3 and DMA 4, flowing through public storm drains on Mundial St, Li-belle Ct, Angelique St, and Evergold St. POC 1 covers a total area of 10.67 acres before development and 11.98 acres after development.

The increase in area is attributed to the redirection of most of the watershed that drains to POC3 in predeveloped condition (labeled as DMA5) to POC-1 in post developed condition. This redirected flow is combined with on-site runoff (DMA-1) and directed towards a biofiltration/detention basin (BF1-1) for water quality treatment, hydromdification and 100-year peak flow mitigation. It's important to note that this diversion does not impact northward flow, and reducing southeastward flow does not affect existing channels, as the flow in its current condition reaches the downstream road not a sensitive channel.

Runoff from DMA 1 will be routed through the BF-1-1 basin to provide pollutant control and hydromodification control, while DMA 3 and DMA 4 are routed through Filterra units to address water quality requirements. These three DMAs confluences at POC 1. The proposed biofiltration basin BF-1-1 provides additional storage volume and flow control to meet hydromodification requirements for DMAs 1, 2, and 3, as measured at POC 1

POC 2:

POC 2 is located southwest of site at existing 48" headwall under Cypress Valley Dr. In proposed condition, POC2 accepts a total area of 16.48 acres. The design flow routing in POC 2 with a proposed area of 17.87 acres also resembles to that of in POC 1, the flows from DMA 2 will be

routed through the proposed biofiltration basin BF-1-2 basin to meet water quality and hydromodification requirements.

POC 3:

POC 3 is situated in the southeast corner of the site, adjacent to the existing Cypress Canyon Road. In the pre-developed conditions, an existing slope, and an existing asphalt road drain towards POC3. However, in the proposed condition, we've altered the flow pattern minimally, redirecting the flows from this area to POC-1 after it combines with DMA-1. This redirected flow undergoes treatment and mitigation within basins BF-1-1 before reaching POC-1.

As previously mentioned, we've accounted for this area diversion within basin BF1-1 to ensure that the increased area to POC1 won't increase the flows or negatively impact downstream drainage facilities or water bodies. Additionally, reducing the area directed to POC3 does not have any adverse effects because, in the pre-developed conditions, this flow used to drain onto a street. The area to POC-3 in the proposed condition is 0; therefore, no continuous simulation was prepared for this POC.

SWMM MODEL DEVELOPMENT

Since each POC is similar in terms of model development, the following will outline the typical model development. Two (2) SWMM models are prepared for two POCs; one represents existing conditions and another represents proposed condition.

The existing condition analysis was prepared by defining the area to the respective POC. Similarly, the proposed condition analysis was prepared by defining the areas to the respective POC. However, since not all the tributary areas are routed through each respective HMP basin, i.e., some of the DMAs are routed to the proprietary biofiltration units (Filterra units) and then directly to the POC, and some of the DMAs consist of more than one hydrologic soil group, further subdivision of the overall tributary area was required. The areas were divided as follows:

1-Areas receive water quality treatment only. These areas were modeled as sub-catchments connecting directly to the POC.
2-Newly developed areas where runoff is directed to hydromodification and water quality biofiltration basins (excluding the basin area, as it is modeled as an individual sub-catchment). These areas are further divided based on hydrologic soil groups and connect to the biofiltration basin before reaching their respective POCs.
3-Water quality basin bottom area.
4-Self Mitigating areas consisting of graded slopes that drain directly to the POC.

For all SWMM models, flow duration curves were prepared to demonstrate that the proposed biofiltration basin footprints and proposed outlet structures will be sufficient to meet the current

HMP requirements when measured at the respective POCs and mitigated for the DMAs that drain directly to the POCs.

The inputs required to develop SWMM models include rainfall, watershed characteristics, and BMP configurations. The Poway Rain Gage from the Project Clean Water website was used for this study since it is the most representative of the project site precipitation.

Evaporation for the site was modeled using average monthly values from the San Diego County hourly dataset. The site was modeled with hydrologic group D soils as determined from both the San Diego County Hydrology Manual soil map and the United States Geological Survey (USGS) web-based Soil Survey Map. Other SWMM inputs for the subareas are discussed in the following sections of this document where the selection of parameters is further explained in detail.

BIOFILTRATION MODELING

For each respective POC, part of developed area storm water runoff is routed through a bio-filtration basin located at the downstream end of each respective POC drainage area as shown on the Developed Condition HMP map in Section 6 of this report. The analysis was modeled using the bio-retention cell LID module within SWMM. The bio-retention cell module can model the underground gravel storage layer, underdrain with an orifice plate, amended soil layer, and a surface storage pond up to the elevation of the invert of the bottom orifice. Separate diversion and detention basin calculations were prepared to model the portion of the storage pond between the base orifice invert elevations and the spillway elevation from the bio-filtration basin, according to the assumptions explained in the Section 2 of this report. Once runoff has been routed through the respective basin outlet structure, it is conveyed via a storm drain pipe to the respective POC.

Basin Discussion: Flow control at each basin is achieved using multiple orifices along the height of a concrete riser structure which may be square or circular. The size, number and location of the orifices along its height are presented in the Basin Table below.

RENZULLI ESTATES BF 1-1

Discharge vs Elevation Table

Bottom orifice diameter:	1	"	Top orifice diameter:	3	"
Number:	1		Number:	1	
Cg-low:	0.61		Cg-low:	0.61	
invert elev:	0.50	ft	invert elev:	2.50	ft
Middle orifice diameter:	0.75	"	Emergency weir:		
number of orif:	1		Invert:	4.20	ft
Cg-middle:	0.61		Weir Length (ft)	10.00	ft
invert elev:	1.75	ft	Riser Box LxW	2x3	

RENZULLI ESTATES BF 1-2

Discharge vs Elevation Table

Bottom orifice diameter:	1.5	"	Top orifice diameter:	3	"
Number:	1		Number:	1	
Cg-low:	0.61		Cg-low:	0.61	
invert elev:	0.50	ft	invert elev:	2.50	ft
Middle orifice diameter:	1.5	"	Emergency weir:		
number of orif:	1		Invert:	3.60	ft
Cg-middle:	0.61		Weir Length (ft)	10.00	ft
invert elev:	2.00	ft	Riser Box LxW	2x3	

FLOW DURATION CURVE COMPARISON

The Flow Duration Curves (FDC) for the site were compared at each POC by exporting the hourly runoff time series results from SWMM to a spreadsheet. The FDC for each POC was compared between 10% of the existing condition Q2 up to the existing condition Q10. The Q2 and Q10 were determined using a partial duration statistical analysis of the runoff time series in an Excel spreadsheet. As the SWMM Model is a statistical analysis based on the Weibull Plotting Position Method, the Weibull Method was also used within the spreadsheet to ensure that the results were similar to those obtained by the SWMM Model.

The range between 10% of Q_2 and Q_{10} was divided into 100 equal time intervals; the number of hours that each flow rate was exceeded was counted from the hourly series. Additionally, the intermediate peaks with a return period "i" were obtained (Q_i with i=3 to 9). For the purpose of the plot, the values were presented as a percentage of time that exceeded for each flow rate.

Section 6 of this HMP Study provides detailed drainage exhibit for the post-developed conditions. As shown in Figures 4-16 in the succeeding section, the FDC for the proposed condition for each basin is within 110% of the curve for the existing condition. The additional runoff volume generated from developing the site will be released to the downstream storm drain at a flow rate below the 10% Q_2 lower threshold. Additionally, the Developed Project will not increase peak flow rates between the Q_2 and the Q_{10}, as shown in the graphics in Figures 4-15 and also in the Tables 15-26 included in Section 1. Similar FDC comparison curves also were generated for each POC and included in the following Section 1 of this report.

SUMMARY & CONCLUSION

A summary of existing and proposed conditions draining to each POC is shown in the Tables 7-8 below. The proposed bio-filtration basins are proposed to mitigate increased flow frequencies as a result of development

Area Summary		
	Existitng (AC)	Proposed (AC)
POC1	10.67	11.98
POC2	16.48	17.87
POC3	2.7	0
Total	29.85	29.85

This study has demonstrated that the proposed bio-filtration basin footprints for the project site is sufficient to meet the current HMP criteria if the bio-filtration cross-section area and volume recommended within this report are incorporated at the project site.

Renzulli POC 1 HMP Calculations

Pre-Developed Condition

POC	Type	% Imperviousness	Total Area	Pervious Area	Impervious Area	Length	Elev Up	Elev Down	Slope	Width
DMA 1	To Be Dev	0.0%	10.0000	10.00	0.00	740	920	760	21.62%	589
DMA 3	To Be Dev	0.0%	0.1100	0.02	0.00	217	880	848	14.77%	22
DMA 4	To Be Dev	0.0%	0.5600	0.59	0.00	310	900	848	16.77%	79
Total POC-1-EX		0.0%	10.6700	10.61	0.00					

Post-Developed Condition

POC	Type	% Imperviousness	Total Area	Pervious Area	Impervious Area	Length	Elev Up	Elev Down	Slope	Width
DMA 1	Roof-Roadway	42.6%	8.0678	4.63	3.44	1436	978	860	8.22%	245
DMA 3	Roof-Roadway	38.3%	0.3513	0.22	0.13	257	850	845	1.98%	60
DMA 4	Roof-Roadway	45.6%	0.2463	0.13	0.11	214	850	845	2.34%	50
SM-1	Slope	0.0%	3.1900	3.19	0.00	354	860	760	28.25%	393
BF-1-1	Biofiltration Basin	0.0%	0.1286	0.13	0.00	93	845	844	1.07%	60
TOTAL AREA TO POC-1-PR			11.98	8.30	3.69					

Renzulli POC 2 HMP Calculations

Pre-Developed Condition

POC	Type	% Imperviousness	Total Area	Pervious Area	Impervious Area	Length	Elev Up	Elev Down	Slope	Width
DMA 2	To Be Dev	0.0%	16.4800	16.48	0.00	1214	926	788	11.36%	591
Total POC-2-EX		0.0%	16.4800	16.48	0.00					

Post-Developed Condition

POC	Type	% Imperviousness	Total Area	Pervious Area	Impervious Area	Length	Elev Up	Elev Down	Slope	Width
DMA-2	Roof-Roadway	57.4%	11.8698	5.06	6.81	1630	896	850	2.83%	317
SM-2	Slope	0.0%	0.6100	0.61	0.00	298	906	855	17.11%	89
SM-3	Slope	0.0%	5.1800	5.18	0.00	1238	890	790	8.08%	182
BF-1-2	Biofiltration Basin	0.0%	0.2112	0.21	0.00	152	845	844	0.66%	61
TOTAL AREA TO POC-2-PR			17.87	11.06	6.81					

Renzulli POC 3 HMP Calculations

Pre-Developed Condition

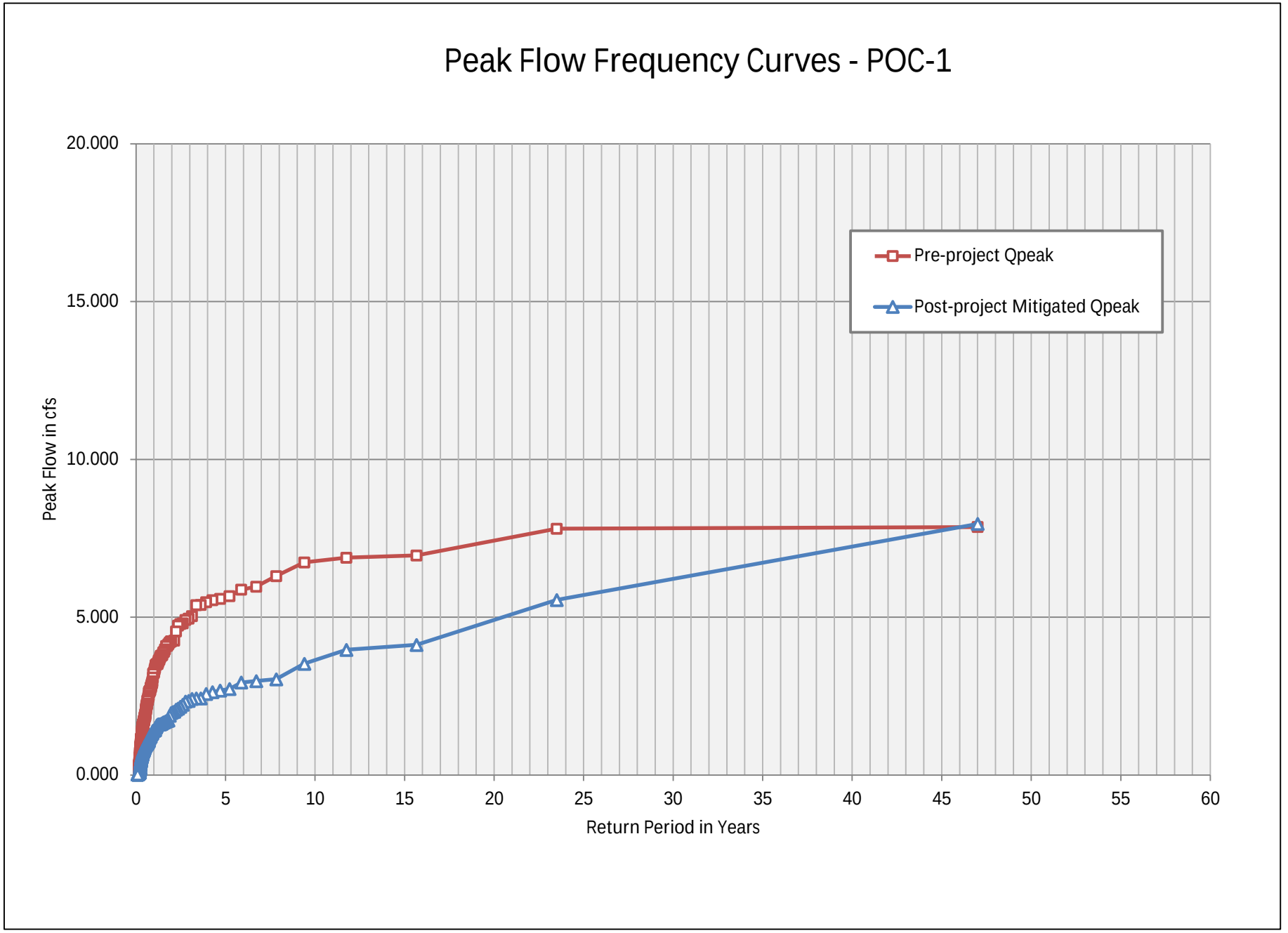
POC	Type	% Imperviousness	Total Area	Pervious Area	Impervious Area	Length	Elev Up	Elev Down	Slope	Width
DMA 5	To Be Dev	0.0%	2.7000	2.70	0.00	399	928	890	9.53%	295
Total POC-1-EX		0.0%	2.7000	2.70	0.00					

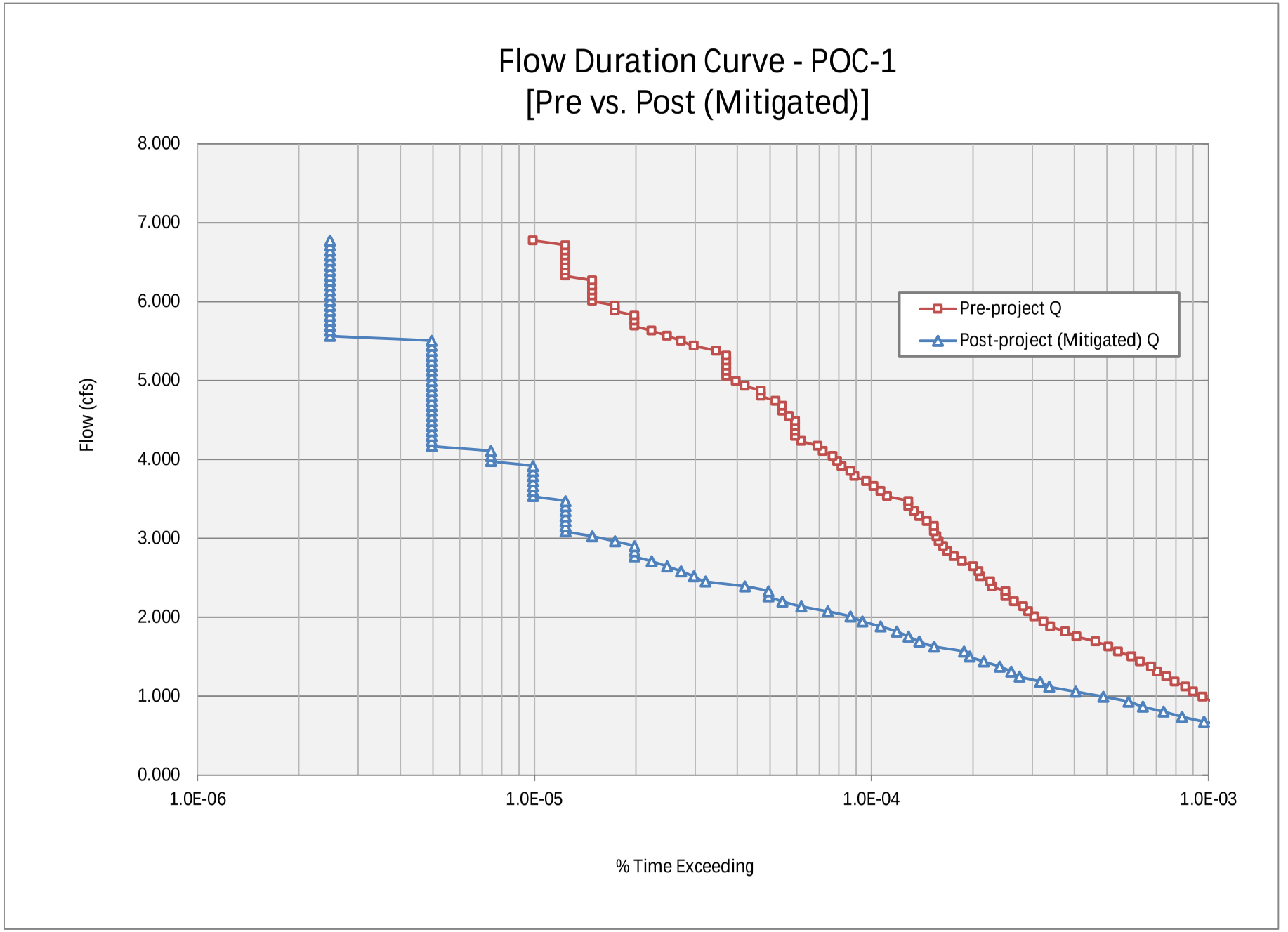
Post-Developed Condition

POC	Type	% Imperviousness	Total Area	Pervious Area	Impervious Area	Length	Elev Up	Elev Down	Slope	Width
DMA-5	IN PROPOSED CONDITIONS DMA-5 IS DIVERT IT TO BF-1-1 AND IT'S PART OF DMA 1									
TOTAL AREA TO POC-PR			0.00	0.00	0.00					

Renzulli
POC 1 Peak Flow Frequency Summary

Return Period	Pre-project Qpeak (cfs)	Post-project - Mitigated Q (cfs)	Reduction (cfs)
LF = 0.1xQ2	0.423	0.198	0.226
2-year	4.233	1.977	2.257
5-year	5.629	2.705	2.924
10-year	6.775	3.637	3.138


Peak Flow Frequency Curves - POC-1
20.000
15.000
10.000
5.000
0.000
Peak Flow in cfs
0
5
10
15
20
25
30
35
40
45
50
55
60
Return Period in Years
Pre-project Qpeak
Post-project Mitigated Qpeak


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

Renzulli	POC-1

Low-flow Threshold: 10%
0.1xQ2 (Pre): 0.423 cfs
Q10 (Pre): 6.775 cfs
Ordinate #: 100
Incremental Q (Pre): 0.06352 cfs
Total Hourly Data: 404280 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	0.423	828	2.05E-03	764	1.89E-03	92%	Pass
1	0.487	755	1.87E-03	664	1.64E-03	88%	Pass
2	0.550	683	1.69E-03	557	1.38E-03	82%	Pass
3	0.614	633	1.57E-03	470	1.16E-03	74%	Pass
4	0.677	587	1.45E-03	392	9.70E-04	67%	Pass
5	0.741	534	1.32E-03	337	8.34E-04	63%	Pass
6	0.804	491	1.21E-03	297	7.35E-04	60%	Pass
7	0.868	447	1.11E-03	258	6.38E-04	58%	Pass
8	0.931	415	1.03E-03	234	5.79E-04	56%	Pass
9	0.995	388	9.60E-04	197	4.87E-04	51%	Pass
10	1.058	364	9.00E-04	163	4.03E-04	45%	Pass
11	1.122	345	8.53E-04	136	3.36E-04	39%	Pass
12	1.186	321	7.94E-04	128	3.17E-04	40%	Pass
13	1.249	303	7.49E-04	111	2.75E-04	37%	Pass
14	1.313	285	7.05E-04	105	2.60E-04	37%	Pass
15	1.376	273	6.75E-04	97	2.40E-04	36%	Pass
16	1.440	253	6.26E-04	87	2.15E-04	34%	Pass
17	1.503	239	5.91E-04	79	1.95E-04	33%	Pass
18	1.567	218	5.39E-04	76	1.88E-04	35%	Pass
19	1.630	204	5.05E-04	62	1.53E-04	30%	Pass
20	1.694	187	4.63E-04	56	1.39E-04	30%	Pass
21	1.757	164	4.06E-04	52	1.29E-04	32%	Pass
22	1.821	152	3.76E-04	48	1.19E-04	32%	Pass
23	1.884	137	3.39E-04	43	1.06E-04	31%	Pass
24	1.948	131	3.24E-04	38	9.40E-05	29%	Pass
25	2.011	123	3.04E-04	35	8.66E-05	28%	Pass
26	2.075	118	2.92E-04	30	7.42E-05	25%	Pass
27	2.138	114	2.82E-04	25	6.18E-05	22%	Pass
28	2.202	107	2.65E-04	22	5.44E-05	21%	Pass
29	2.265	101	2.50E-04	20	4.95E-05	20%	Pass
30	2.329	101	2.50E-04	20	4.95E-05	20%	Pass
31	2.392	92	2.28E-04	17	4.21E-05	18%	Pass
32	2.456	91	2.25E-04	13	3.22E-05	14%	Pass
33	2.519	85	2.10E-04	12	2.97E-05	14%	Pass
34	2.583	84	2.08E-04	11	2.72E-05	13%	Pass
35	2.646	81	2.00E-04	10	2.47E-05	12%	Pass
36	2.710	75	1.86E-04	9	2.23E-05	12%	Pass
37	2.773	71	1.76E-04	8	1.98E-05	11%	Pass
38	2.837	68	1.68E-04	8	1.98E-05	12%	Pass
39	2.900	66	1.63E-04	8	1.98E-05	12%	Pass
40	2.964	64	1.58E-04	7	1.73E-05	11%	Pass
41	3.028	63	1.56E-04	6	1.48E-05	10%	Pass
42	3.091	62	1.53E-04	5	1.24E-05	8%	Pass
43	3.155	62	1.53E-04	5	1.24E-05	8%	Pass
44	3.218	59	1.46E-04	5	1.24E-05	8%	Pass
45	3.282	56	1.39E-04	5	1.24E-05	9%	Pass
46	3.345	54	1.34E-04	5	1.24E-05	9%	Pass
47	3.409	52	1.29E-04	5	1.24E-05	10%	Pass
48	3.472	52	1.29E-04	5	1.24E-05	10%	Pass

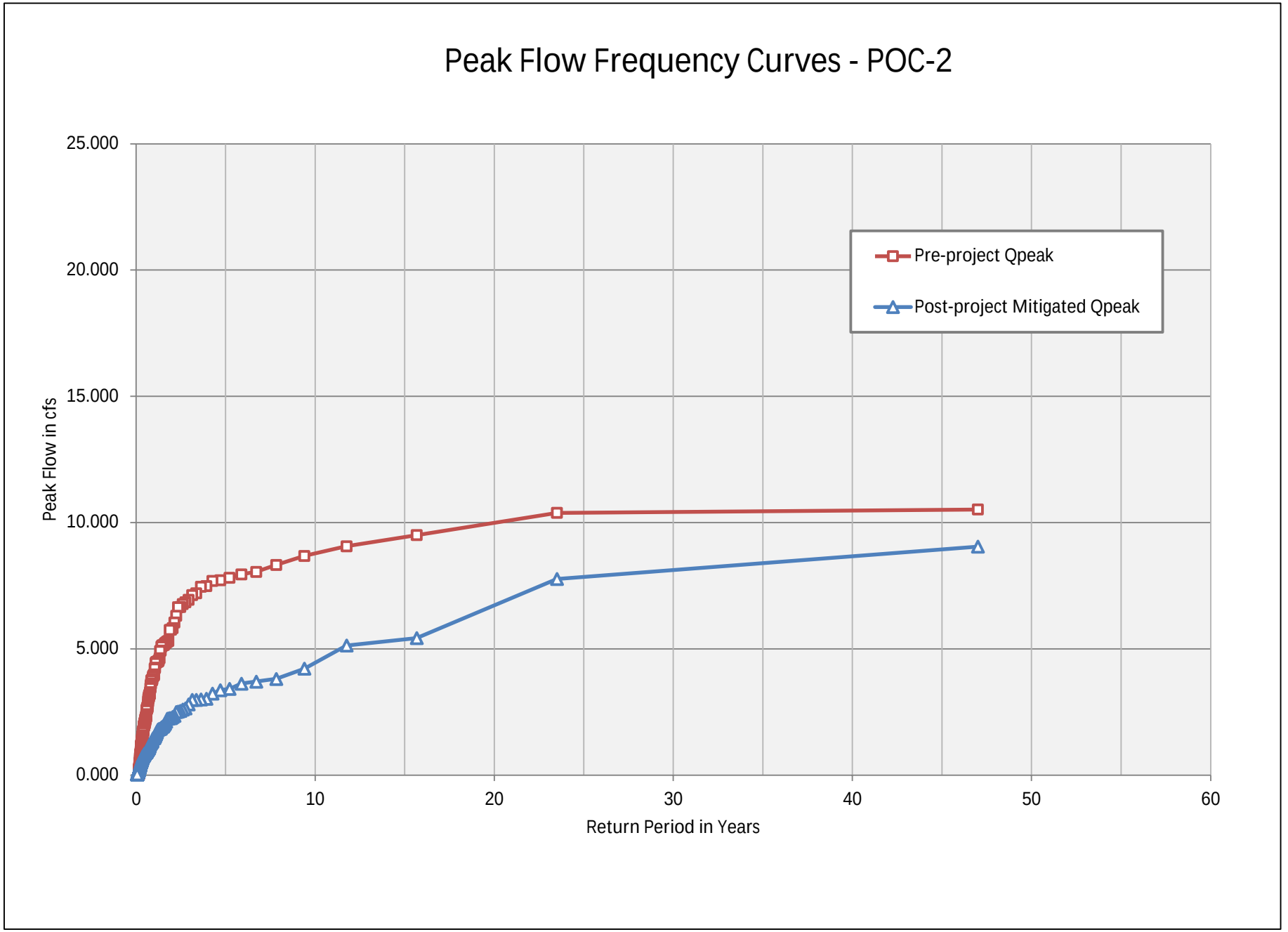
Interval	Pre-project Flow (cfs)	Pre-project Hours	Pre-project % Time Exceeding	Post-project Hours	Post-project % Time Exceeding	Percentage	Pass/Fail
49	3.536	45	1.11E-04	4	9.89E-06	9%	Pass
50	3.599	43	1.06E-04	4	9.89E-06	9%	Pass
51	3.663	41	1.01E-04	4	9.89E-06	10%	Pass
52	3.726	39	9.65E-05	4	9.89E-06	10%	Pass
53	3.790	36	8.90E-05	4	9.89E-06	11%	Pass
54	3.853	35	8.66E-05	4	9.89E-06	11%	Pass
55	3.917	33	8.16E-05	4	9.89E-06	12%	Pass
56	3.980	32	7.92E-05	3	7.42E-06	9%	Pass
57	4.044	31	7.67E-05	3	7.42E-06	10%	Pass
58	4.107	29	7.17E-05	3	7.42E-06	10%	Pass
59	4.171	28	6.93E-05	2	4.95E-06	7%	Pass
60	4.234	25	6.18E-05	2	4.95E-06	8%	Pass
61	4.298	24	5.94E-05	2	4.95E-06	8%	Pass
62	4.361	24	5.94E-05	2	4.95E-06	8%	Pass
63	4.425	24	5.94E-05	2	4.95E-06	8%	Pass
64	4.488	24	5.94E-05	2	4.95E-06	8%	Pass
65	4.552	23	5.69E-05	2	4.95E-06	9%	Pass
66	4.615	22	5.44E-05	2	4.95E-06	9%	Pass
67	4.679	22	5.44E-05	2	4.95E-06	9%	Pass
68	4.742	21	5.19E-05	2	4.95E-06	10%	Pass
69	4.806	19	4.70E-05	2	4.95E-06	11%	Pass
70	4.870	19	4.70E-05	2	4.95E-06	11%	Pass
71	4.933	17	4.21E-05	2	4.95E-06	12%	Pass
72	4.997	16	3.96E-05	2	4.95E-06	13%	Pass
73	5.060	15	3.71E-05	2	4.95E-06	13%	Pass
74	5.124	15	3.71E-05	2	4.95E-06	13%	Pass
75	5.187	15	3.71E-05	2	4.95E-06	13%	Pass
76	5.251	15	3.71E-05	2	4.95E-06	13%	Pass
77	5.314	15	3.71E-05	2	4.95E-06	13%	Pass
78	5.378	14	3.46E-05	2	4.95E-06	14%	Pass
79	5.441	12	2.97E-05	2	4.95E-06	17%	Pass
80	5.505	11	2.72E-05	2	4.95E-06	18%	Pass
81	5.568	10	2.47E-05	1	2.47E-06	10%	Pass
82	5.632	9	2.23E-05	1	2.47E-06	11%	Pass
83	5.695	8	1.98E-05	1	2.47E-06	13%	Pass
84	5.759	8	1.98E-05	1	2.47E-06	13%	Pass
85	5.822	8	1.98E-05	1	2.47E-06	13%	Pass
86	5.886	7	1.73E-05	1	2.47E-06	14%	Pass
87	5.949	7	1.73E-05	1	2.47E-06	14%	Pass
88	6.013	6	1.48E-05	1	2.47E-06	17%	Pass
89	6.076	6	1.48E-05	1	2.47E-06	17%	Pass
90	6.140	6	1.48E-05	1	2.47E-06	17%	Pass
91	6.203	6	1.48E-05	1	2.47E-06	17%	Pass
92	6.267	6	1.48E-05	1	2.47E-06	17%	Pass
93	6.330	5	1.24E-05	1	2.47E-06	20%	Pass
94	6.394	5	1.24E-05	1	2.47E-06	20%	Pass
95	6.457	5	1.24E-05	1	2.47E-06	20%	Pass
96	6.521	5	1.24E-05	1	2.47E-06	20%	Pass
97	6.584	5	1.24E-05	1	2.47E-06	20%	Pass
98	6.648	5	1.24E-05	1	2.47E-06	20%	Pass
99	6.712	5	1.24E-05	1	2.47E-06	20%	Pass
100	6.775	4	9.89E-06	1	2.47E-06	25%	Pass

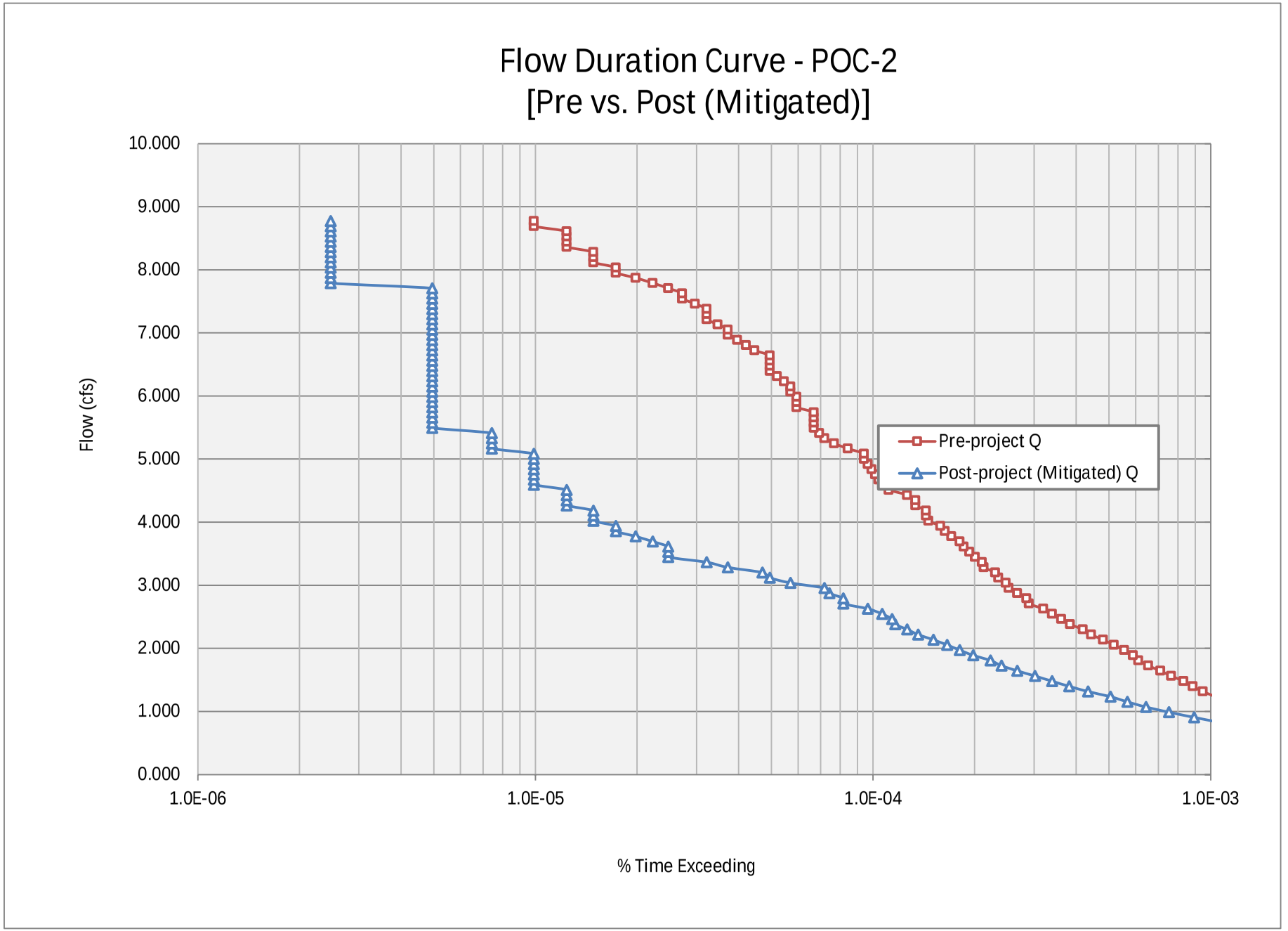
Flow Duration Curve Analysis, Plot & Table

Figure 5 – POC 2 Flow Duration Curve

Renzulli POC2
Peak Flow Frequency Summary

Return Period	Pre-project Qpeak (cfs)	Post-project - Mitigated Q (cfs)	Reduction (cfs)
LF = 0.5xQ2	0.579	0.374	0.205
2-year	5.790	3.744	2.046
5-year	7.772	3.395	4.377
10-year	8.775	4.449	4.326


Peak Flow Frequency Curves - POC-2
25.000
20.000
15.000
10.000
5.000
0.000
Peak Flow in cfs
0
10
20
30
40
50
60
Return Period in Years
Pre-project Qpeak
Post-project Mitigated Qpeak


Flow Duration Curve - POC-2
[Pre vs. Post (Mitigated)]
10.000
9.000
8.000
7.000
6.000
5.000
4.000
3.000
2.000
1.000
0.000
Flow (cfs)
1.0E-06
1.0E-05
1.0E-04
1.0E-03
% Time Exceeding
Pre-project Q
Post-project (Mitigated) Q

Renzulli	POC-2

Low-flow Threshold: 10%
0.1xQ2 (Pre): 0.579 cfs
Q10 (Pre): 8.775 cfs
Ordinate #: 100
Incremental Q (Pre): 0.08196 cfs
Total Hourly Data: 404280 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	0.579	807	2.00E-03	821	2.03E-03	102%	Pass
1	0.661	751	1.86E-03	648	1.60E-03	86%	Pass
2	0.743	688	1.70E-03	528	1.31E-03	77%	Pass
3	0.825	630	1.56E-03	433	1.07E-03	69%	Pass
4	0.907	584	1.44E-03	361	8.93E-04	62%	Pass
5	0.989	546	1.35E-03	304	7.52E-04	56%	Pass
6	1.071	510	1.26E-03	260	6.43E-04	51%	Pass
7	1.153	466	1.15E-03	229	5.66E-04	49%	Pass
8	1.235	419	1.04E-03	204	5.05E-04	49%	Pass
9	1.317	383	9.47E-04	175	4.33E-04	46%	Pass
10	1.399	358	8.86E-04	154	3.81E-04	43%	Pass
11	1.481	336	8.31E-04	137	3.39E-04	41%	Pass
12	1.563	309	7.64E-04	122	3.02E-04	39%	Pass
13	1.644	287	7.10E-04	108	2.67E-04	38%	Pass
14	1.726	264	6.53E-04	97	2.40E-04	37%	Pass
15	1.808	247	6.11E-04	90	2.23E-04	36%	Pass
16	1.890	238	5.89E-04	80	1.98E-04	34%	Pass
17	1.972	224	5.54E-04	73	1.81E-04	33%	Pass
18	2.054	209	5.17E-04	67	1.66E-04	32%	Pass
19	2.136	194	4.80E-04	61	1.51E-04	31%	Pass
20	2.218	179	4.43E-04	55	1.36E-04	31%	Pass
21	2.300	169	4.18E-04	51	1.26E-04	30%	Pass
22	2.382	155	3.83E-04	47	1.16E-04	30%	Pass
23	2.464	146	3.61E-04	46	1.14E-04	32%	Pass
24	2.546	137	3.39E-04	43	1.06E-04	31%	Pass
25	2.628	129	3.19E-04	39	9.65E-05	30%	Pass
26	2.710	117	2.89E-04	33	8.16E-05	28%	Pass
27	2.792	115	2.84E-04	33	8.16E-05	29%	Pass
28	2.874	108	2.67E-04	30	7.42E-05	28%	Pass
29	2.956	102	2.52E-04	29	7.17E-05	28%	Pass
30	3.038	100	2.47E-04	23	5.69E-05	23%	Pass
31	3.120	95	2.35E-04	20	4.95E-05	21%	Pass
32	3.202	93	2.30E-04	19	4.70E-05	20%	Pass
33	3.284	86	2.13E-04	15	3.71E-05	17%	Pass
34	3.366	85	2.10E-04	13	3.22E-05	15%	Pass
35	3.448	81	2.00E-04	10	2.47E-05	12%	Pass
36	3.530	78	1.93E-04	10	2.47E-05	13%	Pass
37	3.612	75	1.86E-04	10	2.47E-05	13%	Pass
38	3.694	73	1.81E-04	9	2.23E-05	12%	Pass
39	3.776	69	1.71E-04	8	1.98E-05	12%	Pass
40	3.857	66	1.63E-04	7	1.73E-05	11%	Pass
41	3.939	64	1.58E-04	7	1.73E-05	11%	Pass
42	4.021	59	1.46E-04	6	1.48E-05	10%	Pass
43	4.103	58	1.43E-04	6	1.48E-05	10%	Pass
44	4.185	58	1.43E-04	6	1.48E-05	10%	Pass
45	4.267	54	1.34E-04	5	1.24E-05	9%	Pass
46	4.349	54	1.34E-04	5	1.24E-05	9%	Pass
47	4.431	51	1.26E-04	5	1.24E-05	10%	Pass
48	4.513	45	1.11E-04	5	1.24E-05	11%	Pass

Interval	Pre-project Flow (cfs)	Pre-project Hours	Pre-project % Time Exceeding	Post-project Hours	Post-project % Time Exceeding	Percentage	Pass/Fail
49	4.595	43	1.06E-04	4	9.89E-06	9%	Pass
50	4.677	42	1.04E-04	4	9.89E-06	10%	Pass
51	4.759	41	1.01E-04	4	9.89E-06	10%	Pass
52	4.841	40	9.89E-05	4	9.89E-06	10%	Pass
53	4.923	39	9.65E-05	4	9.89E-06	10%	Pass
54	5.005	38	9.40E-05	4	9.89E-06	11%	Pass
55	5.087	38	9.40E-05	4	9.89E-06	11%	Pass
56	5.169	34	8.41E-05	3	7.42E-06	9%	Pass
57	5.251	31	7.67E-05	3	7.42E-06	10%	Pass
58	5.333	29	7.17E-05	3	7.42E-06	10%	Pass
59	5.415	28	6.93E-05	3	7.42E-06	11%	Pass
60	5.497	27	6.68E-05	2	4.95E-06	7%	Pass
61	5.579	27	6.68E-05	2	4.95E-06	7%	Pass
62	5.661	27	6.68E-05	2	4.95E-06	7%	Pass
63	5.743	27	6.68E-05	2	4.95E-06	7%	Pass
64	5.825	24	5.94E-05	2	4.95E-06	8%	Pass
65	5.907	24	5.94E-05	2	4.95E-06	8%	Pass
66	5.989	24	5.94E-05	2	4.95E-06	8%	Pass
67	6.071	23	5.69E-05	2	4.95E-06	9%	Pass
68	6.152	23	5.69E-05	2	4.95E-06	9%	Pass
69	6.234	22	5.44E-05	2	4.95E-06	9%	Pass
70	6.316	21	5.19E-05	2	4.95E-06	10%	Pass
71	6.398	20	4.95E-05	2	4.95E-06	10%	Pass
72	6.480	20	4.95E-05	2	4.95E-06	10%	Pass
73	6.562	20	4.95E-05	2	4.95E-06	10%	Pass
74	6.644	20	4.95E-05	2	4.95E-06	10%	Pass
75	6.726	18	4.45E-05	2	4.95E-06	11%	Pass
76	6.808	17	4.21E-05	2	4.95E-06	12%	Pass
77	6.890	16	3.96E-05	2	4.95E-06	13%	Pass
78	6.972	15	3.71E-05	2	4.95E-06	13%	Pass
79	7.054	15	3.71E-05	2	4.95E-06	13%	Pass
80	7.136	14	3.46E-05	2	4.95E-06	14%	Pass
81	7.218	13	3.22E-05	2	4.95E-06	15%	Pass
82	7.300	13	3.22E-05	2	4.95E-06	15%	Pass
83	7.382	13	3.22E-05	2	4.95E-06	15%	Pass
84	7.464	12	2.97E-05	2	4.95E-06	17%	Pass
85	7.546	11	2.72E-05	2	4.95E-06	18%	Pass
86	7.628	11	2.72E-05	2	4.95E-06	18%	Pass
87	7.710	10	2.47E-05	2	4.95E-06	20%	Pass
88	7.792	9	2.23E-05	1	2.47E-06	11%	Pass
89	7.874	8	1.98E-05	1	2.47E-06	13%	Pass
90	7.956	7	1.73E-05	1	2.47E-06	14%	Pass
91	8.038	7	1.73E-05	1	2.47E-06	14%	Pass
92	8.120	6	1.48E-05	1	2.47E-06	17%	Pass
93	8.202	6	1.48E-05	1	2.47E-06	17%	Pass
94	8.284	6	1.48E-05	1	2.47E-06	17%	Pass
95	8.365	5	1.24E-05	1	2.47E-06	20%	Pass
96	8.447	5	1.24E-05	1	2.47E-06	20%	Pass
97	8.529	5	1.24E-05	1	2.47E-06	20%	Pass
98	8.611	5	1.24E-05	1	2.47E-06	20%	Pass
99	8.693	4	9.89E-06	1	2.47E-06	25%	Pass
100	8.775	4	9.89E-06	1	2.47E-06	25%	Pass

III. ELEVATION VS DISCHARGE, ELEVATION VS AREA, DRAWDOWN, SWMM INPUT PARAMETER CALCULATIONS

Elevation vs. Area

For the flow diverted each respective receiving detention basin, a pond is used to route the hydrographs. The elevation vs area curve in the model is calculated in Excel and imported into the model at a 0.05- 1 ft. interval range.

Elevation vs Discharge

The total discharge peak flow data is imported from an Excel spreadsheet that calculated the elevation vs discharge of the multiple outlet system for each basin.

The orifices have been selected to maximize their size while still restricting flows to conform to the required 10% of the Q2 event flow. While we acknowledge that these orifices may be small, increasing the size of these outlets would impact the ability of the basins to restrict flows beneath the HMP thresholds, thus preventing the BMP from conforming with the HMP requirements.

In order to prevent blockage of the orifices, a debris screen will be fitted to the base invert of the lower orifices located within each basin. Regular maintenance of the riser and orifices will be performed to ensure potential blockages are minimized. A detail of the orifice and riser structure is provided in Section 3 of this attachment. The stage-storage and stage-discharge calculations have been provided on the following pages.

RENZULLI ESTATES Stage Storage					
BF-1-1					
depth	area	area (ac)	elevation	volume (cf)	volume (acft)
0.00	5600	0.129	718.9	0	
0.05	5645	0.130	718.95	281.1	0.006454
0.10	5690	0.131	719	564.5	0.012959
0.15	5735	0.132	719.05	850.1	0.019516
0.20	5780	0.133	719.1	1138.0	0.026125
0.25	5825	0.134	719.15	1428.2	0.032786
0.30	5870	0.135	719.2	1720.5	0.039498
0.35	5915	0.136	719.25	2015.2	0.046262
0.40	5960	0.137	719.3	2312.1	0.053078
0.45	6005	0.138	719.35	2611.2	0.059946
0.50	6051	0.139	719.4	2912.6	0.066865
0.55	6096	0.140	719.45	3216.3	0.073836
0.60	6141	0.141	719.5	3522.2	0.080858
0.65	6186	0.142	719.55	3830.3	0.087932
0.70	6231	0.143	719.6	4140.7	0.095058
0.75	6276	0.144	719.65	4453.4	0.102236
0.80	6321	0.145	719.7	4768.3	0.109466
0.85	6366	0.146	719.75	5085.5	0.116747
0.90	6411	0.147	719.8	5404.9	0.12408
0.95	6456	0.148	719.85	5726.6	0.131464
1.00	6501	0.149	719.9	6050.5	0.1389
1.05	6549	0.150	719.95	6376.7	0.14639
1.10	6597	0.151	720	6705.4	0.153935
1.15	6645	0.153	720.05	7036.4	0.161534
1.20	6693	0.154	720.1	7369.9	0.169189
1.25	6741	0.155	720.15	7705.7	0.176899
1.30	6789	0.156	720.2	8044.0	0.184664
1.35	6837	0.157	720.25	8384.6	0.192484
1.40	6885	0.158	720.3	8727.6	0.200359
1.45	6933	0.159	720.35	9073.0	0.208289
1.50	6981	0.160	720.4	9420.9	0.216274
1.55	7028	0.161	720.45	9771.1	0.224314
1.60	7076	0.162	720.5	10123.7	0.232409
1.65	7124	0.164	720.55	10478.7	0.240559
1.70	7172	0.165	720.6	10836.2	0.248764
1.75	7220	0.166	720.65	11196.0	0.257024
1.80	7268	0.167	720.7	11558.2	0.265339
1.85	7316	0.168	720.75	11922.8	0.27371
1.90	7364	0.169	720.8	12289.8	0.282135
1.95	7412	0.170	720.85	12659.2	0.290615
2.00	7460	0.171	720.9	13031.0	0.299151
2.05	7511	0.172	720.95	13405.3	0.307743
2.10	7562	0.174	721	13782.1	0.316393
2.15	7612	0.175	721.05	14161.4	0.325101
2.20	7663	0.176	721.1	14543.3	0.333868
2.25	7714	0.177	721.15	14927.7	0.342693
2.30	7765	0.178	721.2	15314.7	0.351577
2.35	7815	0.179	721.25	15704.2	0.360518
2.40	7866	0.181	721.3	16096.2	0.369518
2.45	7917	0.182	721.35	16490.8	0.378576
2.50	7968	0.183	721.4	16887.9	0.387692
2.55	8018	0.184	721.45	17287.5	0.396867
2.60	8069	0.185	721.5	17689.7	0.4061
2.65	8120	0.186	721.55	18094.4	0.415391
2.70	8171	0.188	721.6	18501.7	0.42474
2.75	8221	0.189	721.65	18911.5	0.434148
2.80	8272	0.190	721.7	19323.8	0.443613
2.85	8323	0.191	721.75	19738.7	0.453137
2.90	8374	0.192	721.8	20156.1	0.46272
2.95	8424	0.193	721.85	20576.0	0.47236
3.00	8475	0.195	721.9	20998.5	0.482059
3.05	8529	0.196	721.9	21423.6	0.491818

depth	area	area (ac)	elevation	volume (cf)	volume (acft)
3.10	8582	0.197	722.0	21851.4	0.501638
3.15	8636	0.198	722.0	22281.8	0.51152
3.20	8689	0.199	722.1	22714.9	0.521463
3.25	8743	0.201	722.1	23150.7	0.531468
3.30	8797	0.202	722.2	23589.2	0.541534
3.35	8850	0.203	722.2	24030.4	0.551662
3.40	8904	0.204	722.3	24474.3	0.561852
3.45	8957	0.206	722.3	24920.8	0.572103
3.50	9011	0.207	722.4	25370.0	0.582415
3.55	9065	0.208	722.4	25821.9	0.592789
3.60	9118	0.209	722.5	26276.5	0.603225
3.65	9172	0.211	722.5	26733.7	0.613722
3.70	9225	0.212	722.6	27193.6	0.62428
3.75	9279	0.213	722.6	27656.2	0.6349
3.80	9333	0.214	722.7	28121.5	0.645582
3.85	9386	0.215	722.7	28589.5	0.656325
3.90	9440	0.217	722.8	29060.2	0.667129
3.95	9493	0.218	722.8	29533.5	0.677996
4.00	9547	0.219	722.9	30009.5	0.688923
4.05	9603	0.220	722.9	30488.3	0.699914
4.10	9660	0.222	723.0	30969.8	0.71097
4.15	9716	0.223	723.0	31454.2	0.72209
4.20	9773	0.224	723.1	31941.5	0.733275
4.25	9829	0.226	723.1	32431.5	0.744525
4.30	9885	0.227	723.2	32924.4	0.755839
4.35	9942	0.228	723.2	33420.0	0.767219
4.40	9998	0.230	723.3	33918.5	0.778663
4.45	10055	0.231	723.3	34419.9	0.790171
4.50	10111	0.232	723.4	34924.0	0.801745
4.55	10167	0.233	723.4	35431.0	0.813383
4.60	10224	0.235	723.5	35940.7	0.825086
4.65	10280	0.236	723.5	36453.3	0.836854
4.70	10337	0.237	723.6	36968.8	0.848686
4.75	10393	0.239	723.6	37487.0	0.860583
4.80	10449	0.240	723.7	38008.1	0.872545
4.85	10506	0.241	723.7	38531.9	0.884572
4.90	10562	0.242	723.8	39058.6	0.896663
4.95	10619	0.244	723.8	39588.2	0.908819
5.00	10675	0.245	723.9	40120.5	0.92104
5.05	10734	0.246	723.9	40655.7	0.933327
5.10	10793	0.248	724.0	41193.9	0.945682
5.15	10853	0.249	724.0	41735.1	0.958105
5.20	10912	0.251	724.1	42279.2	0.970596
5.25	10971	0.252	724.1	42826.3	0.983155
5.30	11030	0.253	724.2	43376.3	0.995782
5.35	11089	0.255	724.2	43929.3	1.008477
5.40	11149	0.256	724.3	44485.2	1.02124
5.45	11208	0.257	724.3	45044.1	1.034071
5.50	11267	0.259	724	45606	1
5.55	11326	0.260	724.4	46170.8	1.059936
5.60	11385	0.261	724.5	46738.6	1.072971
5.65	11445	0.263	724.5	47309.4	1.086074
5.70	11504	0.264	724.6	47883.1	1.099244
5.75	11563	0.265	724.6	48459.8	1.112483
5.80	11622	0.267	724.7	49039.4	1.125789
5.85	11681	0.268	724.7	49622.0	1.139164
5.90	11741	0.270	724.8	50207.5	1.152606
5.95	11800	0.271	724.8	50796.0	1.166116
6.00	11859	0.272	725	51388	1

RENZULLI ESTATES BF 1-1

Discharge vs Elevation Table

Bottom orifice diameter:	1 "	Top orifice diameter:	3 "
Number:	1	Number:	1
Cg-low:	0.61	Cg-low:	0.61
invert elev:	0.50 ft	invert elev:	2.50 ft
Middle orifice diameter:	0.75 "	Emergency weir:	
number of orif:	1	Invert:	4.20 ft
Cg-middle:	0.61	Weir Length (ft)	10.00 ft
invert elev:	1.75 ft	Riser Box LxW	2x3

h	H/D-low	H/D-mid	H/D-top	H/D-peak	Qlow-orif	Qlow-weir	Qtot-low	Qmid-orif	Qmid-weir	Qtot-med	Qtop-orif	Qtop-weir	Qtot-top	Qpeak-top	Qtot
(ft)	-	-	-	-	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
0.55	0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.002
0.60	1.20	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.006
0.65	1.80	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.009
0.70	2.40	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.011
0.75	3.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.012
0.80	3.60	0.00	0.00	0.00	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.014
0.85	4.20	0.00	0.00	0.00	0.01	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.015
0.90	4.80	0.00	0.00	0.00	0.02	0.07	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.016
0.95	5.40	0.00	0.00	0.00	0.02	0.16	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.017
1.00	6.00	0.00	0.00	0.00	0.02	0.34	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.018
1.05	6.60	0.00	0.00	0.00	0.02	0.65	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.019
1.10	7.20	0.00	0.00	0.00	0.02	1.15	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.020
1.15	7.80	0.00	0.00	0.00	0.02	1.92	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.021
1.20	8.40	0.00	0.00	0.00	0.02	3.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.022
1.25	9.00	0.00	0.00	0.00	0.02	4.60	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.022
1.30	9.60	0.00	0.00	0.00	0.02	6.74	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.023
1.35	10.20	0.00	0.00	0.00	0.02	9.61	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.024
1.40	10.80	0.00	0.00	0.00	0.02	13.38	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.025
1.45	11.40	0.00	0.00	0.00	0.03	18.22	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.025
1.50	12.00	0.00	0.00	0.00	0.03	24.36	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.026
1.55	12.60	0.00	0.00	0.00	0.03	32.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.027
1.60	13.20	0.00	0.00	0.00	0.03	41.50	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.027
1.65	13.80	0.00	0.00	0.00	0.03	53.07	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.028
1.70	14.40	0.00	0.00	0.00	0.03	67.08	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.029
1.75	15.00	0.00	0.00	0.00	0.03	83.87	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.029
1.80	15.60	0.80	0.00	0.00	0.03	103.84	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.032
1.85	16.20	1.60	0.00	0.00	0.03	127.43	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.034
1.90	16.80	2.40	0.00	0.00	0.03	155.09	0.03	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.036
1.95	17.40	3.20	0.00	0.00	0.03	187.34	0.03	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.038
2.00	18.00	4.00	0.00	0.00	0.03	224.72	0.03	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.039
2.05	18.60	4.80	0.00	0.00	0.03	267.80	0.03	0.01	0.03	0.01	0.00	0.00	0.00	0.00	0.041
2.10	19.20	5.60	0.00	0.00	0.03	317.23	0.03	0.01	0.10	0.01	0.00	0.00	0.00	0.00	0.042
2.15	19.80	6.40	0.00	0.00	0.03	373.67	0.03	0.01	0.26	0.01	0.00	0.00	0.00	0.00	0.043
2.20	20.40	7.20	0.00	0.00	0.03	437.84	0.03	0.01	0.56	0.01	0.00	0.00	0.00	0.00	0.044
2.25	21.00	8.00	0.00	0.00	0.03	510.51	0.03	0.01	1.09	0.01	0.00	0.00	0.00	0.00	0.045
2.30	21.60	8.80	0.00	0.00	0.04	592.48	0.04	0.01	1.96	0.01	0.00	0.00	0.00	0.00	0.046
2.35	22.20	9.60	0.00	0.00	0.04	684.63	0.04	0.01	3.28	0.01	0.00	0.00	0.00	0.00	0.047
2.40	22.80	10.40	0.00	0.00	0.04	787.87	0.04	0.01	5.24	0.01	0.00	0.00	0.00	0.00	0.048
2.45	23.40	11.20	0.00	0.00	0.04	903.17	0.04	0.01	8.02	0.01	0.00	0.00	0.00	0.00	0.049
2.50	24.00	12.00	0.00	0.00	0.04	1031.55	0.04	0.01	11.86	0.01	0.00	0.00	0.00	0.00	0.050
2.55	24.60	12.80	0.20	0.00	0.04	1174.09	0.04	0.01	17.03	0.01	0.00	0.00	0.00	0.00	0.055
2.60	25.20	13.60	0.40	0.00	0.04	1331.93	0.04	0.01	23.85	0.01	0.00	0.02	0.02	0.00	0.068
2.65	25.80	14.40	0.60	0.00	0.04	1506.26	0.04	0.01	32.68	0.01	0.04	0.03	0.03	0.00	0.086
2.70	26.40	15.20	0.80	0.00	0.04	1698.35	0.04	0.01	43.92	0.01	0.07	0.06	0.06	0.00	0.109
2.75	27.00	16.00	1.00	0.00	0.04	1909.52	0.04	0.01	58.04	0.01	0.08	0.08	0.08	0.00	0.136
2.80	27.60	16.80	1.20	0.00	0.04	2141.14	0.04	0.02	75.55	0.02	0.10	0.11	0.10	0.00	0.156
2.85	28.20	17.60	1.40	0.00	0.04	2394.66	0.04	0.02	97.04	0.02	0.11	0.13	0.11	0.00	0.170
2.90	28.80	18.40	1.60	0.00	0.04	2671.61	0.04	0.02	123.13	0.02	0.13	0.16	0.13	0.00	0.183
2.95	29.40	19.20	1.80	0.00	0.04	2973.56	0.04	0.02	154.54	0.02	0.14	0.18	0.14	0.00	0.195
3.00	30.00	20.00	2.00	0.00	0.04	3302.17	0.04	0.02	192.01	0.02	0.15	0.20	0.15	0.00	0.206
3.05	30.60	20.80	2.20	0.00	0.04	3659.16	0.04	0.02	236.40	0.02	0.16	0.21	0.16	0.00	0.216
3.10	31.20	21.60	2.40	0.00	0.04	4046.33	0.04	0.02	288.62	0.02	0.17	0.22	0.17	0.00	0.226
3.15	31.80	22.40	2.60	0.00	0.04	4465.55	0.04	0.02	349.65	0.02	0.17	0.22	0.17	0.00	0.235
3.20	32.40	23.20	2.80	0.00	0.04	4918.76	0.04	0.02	420.56	0.02	0.18	0.22	0.18	0.00	0.244
3.25	33.00	24.00	3.00	0.00	0.04	5408.00	0.04	0.02	502.51	0.02	0.19	0.22	0.19	0.00	0.252
3.30	33.60	24.80	3.20	0.00	0.04	5935.36	0.04	0.02	596.72	0.02	0.20	0.22	0.20	0.00	0.260
3.35	34.20	25.60	3.40	0.00	0.04	6503.02	0.04	0.02	704.52	0.02	0.20	0.24	0.20	0.00	0.268
3.40	34.80	26.40	3.60	0.00	0.05	7113.25	0.05	0.02	827.33	0.02	0.21	0.26	0.21	0.00	0.276
3.45	35.40	27.20	3.80	0.00	0.05	7768.41	0.05	0.02	966.67	0.02	0.22	0.30	0.22	0.00	0.283
3.50	36.00	28.00	4.00	0.00	0.05	8470.91	0.05	0.02	1124.14	0.02	0.22	0.37	0.22	0.00	0.290
3.55	36.60	28.80	4.20	0.00	0.05	9223.28	0.05	0.02	1301.45	0.02	0.23	0.47	0.23	0.00	0.297
3.60	37.20	29.60	4.40	0.00	0.05	10028.13	0.05	0.02	1500.42	0.02	0.24	0.62	0.24	0.00	0.304
3.65	37.80	30.40	4.60	0.00	0.05	10888.14	0.05	0.02	1722.96	0.02	0.24	0.83	0.24	0.00	0.311
3.70	38.40	31.20	4.80	0.00	0.05	11806.11	0.05	0.02	1971.13	0.02	0.25	1.12	0.25	0.00	0.317
3.75	39.00	32.00	5.00	0.00	0.05	12784.92	0.05	0.02	2247.05	0.02	0.25	1.49	0.25	0.00	0.324
3.80	39.60	32.80	5.20	0.00	0.05	13827.53	0.05	0.02	2552.99	0.02	0.26	1.96	0.26	0.00	0.330
3.85	40.20	33.60	5.40	0.00	0.05	14937.02	0.05	0.02	2891.34	0.02	0.27	2.57	0.27	0.00	0.336
3.90	40.80	34.40	5.60	0.00	0.05	16116.54	0.05	0.02	3264.61	0.02	0.27	3.32	0.27	0.00	0.342
3.95	41.40	35.20	5.80	0.00	0.05	17369.36	0.05	0.02	3675.41	0.02	0.28	4.24	0.28	0.00	0.348
4.00	42.00	36.00	6.00	0.00	0.05	18698.83	0.05	0.02	4126.51	0.02	0.28	5.36	0.28	0.00	0.354
4.05	42.60	36.80	6.20	0.00	0.05	20108.43	0.05	0.02	4620.81	0.02	0.29	6.70	0.29	0.00	0.359
4.10	43.20	37.60	6.40	0.00	0.05	21601.72	0.05	0.02	5161.32	0.02	0.29	8.31	0.29	0.00	0.365
4.15	43.80	38.40	6.60	0.00	0.05	23182.36	0.05	0.02	5751.22	0.02	0.30	10.20	0.30	0.00	0.371

h (ft)	H/D-low -	H/D-mid -	H/D-top -	H/D-peak -	Qlow-orif (cfs)	Qlow-weir (cfs)	Qtot-low (cfs)	Qmid-orif (cfs)	Qmid-weir (cfs)	Qtot-med (cfs)	Qtop-orif (cfs)	Qtop-weir (cfs)	Qtot-top (cfs)	Qpeak-top (cfs)	Qtot (cfs)
4.20	44.40	39.20	6.80	0.00	0.05	24854.13	0.05	0.02	6393.81	0.02	0.30	12.42	0.30	0.00	0.376
4.25	45.00	40.00	7.00	0.06	0.05	26620.91	0.05	0.02	7092.54	0.02	0.31	15.00	0.31	0.37	0.754
4.30	45.60	40.80	7.20	0.12	0.05	28486.69	0.05	0.02	7851.00	0.02	0.31	17.99	0.31	1.05	1.440
4.35	46.20	41.60	7.40	0.18	0.05	30455.58	0.05	0.02	8672.94	0.02	0.32	21.43	0.32	1.93	2.326
4.40	46.80	42.40	7.60	0.24	0.05	32531.79	0.05	0.02	9562.27	0.02	0.32	25.37	0.32	2.98	3.375
4.45	47.40	43.20	7.80	0.30	0.05	34719.63	0.05	0.02	10523.04	0.02	0.32	29.87	0.32	4.16	4.564
4.50	48.00	44.00	8.00	0.36	0.05	37023.56	0.05	0.02	11559.47	0.02	0.33	34.96	0.33	5.47	5.879
4.55	48.60	44.80	8.20	0.42	0.05	39448.12	0.05	0.02	12675.94	0.02	0.33	40.72	0.33	6.90	7.307
4.60	49.20	45.60	8.40	0.48	0.05	41997.99	0.05	0.03	13876.99	0.03	0.34	47.20	0.34	8.42	8.841
4.65	49.80	46.40	8.60	0.54	0.05	44677.97	0.05	0.03	15167.33	0.03	0.34	54.47	0.34	10.05	10.474
4.70	50.40	47.20	8.80	0.60	0.05	47492.96	0.05	0.03	16551.86	0.03	0.35	62.59	0.35	11.77	12.200
4.75	51.00	48.00	9.00	0.66	0.05	50448.01	0.05	0.03	18035.63	0.03	0.35	71.64	0.35	13.58	14.014
4.80	51.60	48.80	9.20	0.72	0.06	53548.26	0.06	0.03	19623.88	0.03	0.35	81.69	0.35	15.48	15.912
4.85	52.20	49.60	9.40	0.78	0.06	56799.02	0.06	0.03	21322.03	0.03	0.36	92.82	0.36	17.45	17.891
4.90	52.80	50.40	9.60	0.84	0.06	60205.68	0.06	0.03	23135.69	0.03	0.36	105.11	0.36	19.50	19.947
4.95	53.40	51.20	9.80	0.90	0.06	63773.78	0.06	0.03	25070.64	0.03	0.37	118.66	0.37	21.63	22.078
5.00	54.00	52.00	10.00	0.96	0.06	67509.00	0.06	0.03	27132.87	0.03	0.37	133.55	0.37	23.83	24.281
5.05	54.60	52.80	10.20	1.02	0.06	71417.13	0.06	0.03	29328.55	0.03	0.37	149.88	0.37	26.10	26.554
5.10	55.20	53.60	10.40	1.08	0.06	75504.11	0.06	0.03	31664.05	0.03	0.38	167.75	0.38	28.43	28.894
5.15	55.80	54.40	10.60	1.14	0.06	79776.00	0.06	0.03	34145.95	0.03	0.38	187.26	0.38	30.83	31.301
5.20	56.40	55.20	10.80	1.20	0.06	84239.00	0.06	0.03	36781.02	0.03	0.39	208.52	0.39	33.30	33.771
5.25	57.00	56.00	11.00	1.26	0.06	88899.46	0.06	0.03	39576.23	0.03	0.39	231.66	0.39	35.83	36.304
5.30	57.60	56.80	11.20	1.32	0.06	93763.84	0.06	0.03	42538.77	0.03	0.39	256.77	0.39	38.42	38.897
5.35	58.20	57.60	11.40	1.38	0.06	98838.78	0.06	0.03	45676.05	0.03	0.40	284.00	0.40	41.07	41.550
5.40	58.80	58.40	11.60	1.44	0.06	104131.02	0.06	0.03	48995.68	0.03	0.40	313.47	0.40	43.77	44.262
5.45	59.40	59.20	11.80	1.50	0.06	109647.47	0.06	0.03	52505.48	0.03	0.40	345.31	0.40	46.54	47.030
5.50	60.00	60.00	12.00	1.56	0.06	115395.17	0.06	0.03	56213.52	0.03	0.41	379.66	0.41	49.36	49.854
5.55	60.60	60.80	12.20	1.62	0.06	121381.33	0.06	0.03	60128.07	0.03	0.41	416.66	0.41	52.23	52.733
5.60	61.20	61.60	12.40	1.68	0.06	127613.27	0.06	0.03	64257.64	0.03	0.41	456.47	0.41	55.16	55.665
5.65	61.80	62.40	12.60	1.74	0.06	134098.49	0.06	0.03	68610.95	0.03	0.42	499.23	0.42	58.14	58.651
5.70	62.40	63.20	12.80	1.80	0.06	140844.63	0.06	0.03	73196.99	0.03	0.42	545.12	0.42	61.18	61.688
5.75	63.00	64.00	13.00	1.86	0.06	147859.48	0.06	0.03	78024.94	0.03	0.42	594.29	0.42	64.26	64.776
5.80	63.60	64.80	13.20	1.92	0.06	155150.98	0.06	0.03	83104.27	0.03	0.43	646.91	0.43	67.39	67.914
5.85	64.20	65.60	13.40	1.98	0.06	162727.25	0.06	0.03	88444.65	0.03	0.43	703.17	0.43	70.58	71.101
5.90	64.80	66.40	13.60	2.04	0.06	170596.52	0.06	0.03	94056.02	0.03	0.43	763.25	0.43	73.81	74.338
5.95	65.40	67.20	13.80	2.10	0.06	178767.23	0.06	0.03	99948.55	0.03	0.44	827.33	0.44	77.09	77.621
6.00	66.00	68.00	14.00	2.16	0.06	187247.94	0.06	0.03	106132.69	0.03	0.44	895.62	0.44	80.42	80.953

BF-1-1		$Q_{Sub\ Drain}$=	0.0488	cfs
Elevation	Q_{AVG} (CFS)	DV (CF)	DT (HR)	Total T
0.00	0.049	281.1	1.600	84.94
0.05	0.049	283.4	1.613	83.34
0.10	0.049	285.6	1.626	81.73
0.15	0.049	287.9	1.639	80.11
0.20	0.049	290.1	1.652	78.47
0.25	0.049	292.4	1.664	76.82
0.30	0.049	294.6	1.677	75.15
0.35	0.049	296.9	1.690	73.47
0.40	0.049	299.1	1.703	71.78
0.45	0.049	301.4	1.716	70.08
0.50	0.049	303.7	1.691	68.37
0.55	0.051	305.9	1.600	66.67
0.60	0.055	308.2	1.517	65.07
0.65	0.058	310.4	1.474	63.56
0.70	0.059	312.7	1.443	62.08
0.75	0.061	314.9	1.418	60.64
0.80	0.062	317.2	1.398	59.22
0.85	0.064	319.4	1.382	57.82
0.90	0.065	321.7	1.368	56.44
0.95	0.066	323.9	1.356	55.07
1.00	0.067	326.2	1.345	53.72
1.05	0.068	328.6	1.337	52.37
1.10	0.069	331.0	1.329	51.04
1.15	0.070	333.4	1.322	49.71
1.20	0.070	335.8	1.316	48.38
1.25	0.071	338.2	1.311	47.07
1.30	0.072	340.6	1.306	45.76
1.35	0.073	343.0	1.302	44.45
1.40	0.074	345.4	1.299	43.15
1.45	0.074	347.8	1.295	41.85
1.50	0.075	350.2	1.292	40.55
1.55	0.076	352.6	1.290	39.26
1.60	0.076	355.0	1.288	37.97
1.65	0.077	357.4	1.286	36.68
1.70	0.078	359.8	1.284	35.40
1.75	0.078	362.2	1.268	34.11
1.80	0.080	364.6	1.237	32.85
1.85	0.083	367.0	1.211	31.61
1.90	0.085	369.4	1.195	30.40
1.95	0.087	371.8	1.182	29.20
2.00	0.088	374.3	1.172	28.02
2.05	0.089	376.8	1.163	26.85
2.10	0.091	379.3	1.155	25.69
2.15	0.092	381.9	1.149	24.53
2.20	0.093	384.4	1.143	23.38
2.25	0.094	387.0	1.137	22.24
2.30	0.095	389.5	1.133	21.10
2.35	0.096	392.0	1.128	19.97
2.40	0.097	394.6	1.124	18.84
2.45	0.098	397.1	1.121	17.72
2.50	0.099	399.6	1.095	16.60
2.55	0.104	402.2	1.014	15.50

BF-1-1		$Q_{Sub\ Drain}$=	0.0488	cfs
Elevation	Q_{AVG} (CFS)	DV (CF)	DT (HR)	Total T
2.60	0.116	404.7	0.894	14.49
2.65	0.135	407.3	0.771	13.59
2.70	0.158	409.8	0.664	12.82
2.75	0.184	412.3	0.589	12.16
2.80	0.205	414.9	0.544	11.57
2.85	0.219	417.4	0.515	11.03
2.90	0.232	419.9	0.491	10.51
2.95	0.243	422.5	0.471	10.02
3.00	0.254	425.1	0.455	9.55
3.05	0.265	427.8	0.441	9.09
3.10	0.274	430.4	0.429	8.65
3.15	0.284	433.1	0.418	8.22
3.20	0.292	435.8	0.408	7.81
3.25	0.301	438.5	0.399	7.40
3.30	0.309	441.2	0.392	7.00
3.35	0.317	443.8	0.384	6.61
3.40	0.325	446.5	0.378	6.22
3.45	0.332	449.2	0.372	5.84
3.50	0.339	451.9	0.366	5.47
3.55	0.346	454.6	0.361	5.11
3.60	0.353	457.2	0.356	4.75
3.65	0.360	459.9	0.352	4.39
3.70	0.366	462.6	0.348	4.04
3.75	0.373	465.3	0.344	3.69
3.80	0.379	468.0	0.340	3.35
3.85	0.385	470.6	0.337	3.00
3.90	0.391	473.3	0.334	2.67
3.95	0.397	476.0	0.331	2.33
4.00	0.403	478.8	0.328	2.00
4.05	0.408	481.6	0.325	1.68
4.10	0.414	484.4	0.323	1.35
4.15	0.419	487.2	0.321	1.03
4.20	0.425	490.0	0.222	0.71
4.25	0.802	492.9	0.120	0.48
4.30	1.488	495.7	0.071	0.36
4.35	2.375	498.5	0.048	0.29
4.40	3.424	501.3	0.035	0.25
4.45	4.613	504.1	0.027	0.21
4.50	5.927	507.0	0.021	0.18
4.55	7.356	509.8	0.017	0.16
4.60	8.890	512.6	0.015	0.15
4.65	10.523	515.4	0.013	0.13
4.70	12.248	518.2	0.011	0.12
4.75	14.063	521.1	0.010	0.11
4.80	15.961	523.9	0.009	0.10
4.85	17.940	526.7	0.008	0.09
4.90	19.996	529.5	0.007	0.08
4.95	22.127	532.3	0.006	0.07
5.00	24.330	535.2	0.006	0.07
5.05	26.603	538.2	0.005	0.06
5.10	28.943	541.2	0.005	0.06
5.15	31.349	544.1	0.005	0.05
5.20	33.820	547.1	0.004	0.05
5.25	36.352	550.0	0.004	0.04
5.30	38.946	553.0	0.004	0.04

BF-1-1		$Q_{Sub\ Drain}$=	0.0488	cfs
Elevation	Q_{AVG} (CFS)	DV (CF)	DT (HR)	Total T
5.35	41.599	556.0	0.004	0.04
5.40	44.310	558.9	0.003	0.03
5.45	47.079	561.9	0.003	0.03
5.50	49.903	564.8	0.003	0.03
5.55	52.782	567.8	0.003	0.02
5.60	55.714	570.8	0.003	0.02
5.65	58.699	573.7	0.003	0.02
5.70	61.737	576.7	0.003	0.01
5.75	64.825	579.6	0.002	0.01
5.80	67.963	582.6	0.002	0.01
5.85	71.150	585.6	0.002	0.01
5.90	74.386	588.5	0.002	0.00
5.95	77.670	591.5	0.002	0.00
6.00	81.001			

Basin BF-1-1

PARAMETER	ABBREV.	Bio-Retention	
WQ Ponding Depth	PD	6	in
Bioretention Soil Layer	S	24	in
Gravel Layer	G	12	in
TOTAL		3.5	ft
		42	in
Orifice Coefficient	c_g	0.6	--
Low Flow Orifice Diameter	D	1	in
Drain (Flow) exponent	n	0.5	--
Ponding Depth Surface Area	A_{PD}	6051	ft^2
Bioretention Surface Area	A_S, A_G	5600	ft^2
Modelled LID Surface @ Basin Bottom	A_{LID}	0.12856	ac
Effective Ponding Depth	PD_{eff}	6.24	in
Flow Coefficient	C	0.0585	--
Flow Rate (per unit area)	q	0.377	in/hr
Max. Flow Rate thru Low Flow Orifice(volumetric)	$Q_{LF,Max.}$	0.04884	cfs
Bioretention Soil Media Design Percolation Rate		5	in\hr
Max. Flow Rate Thru BSM	$Q_{BSM,max}$	0.64815	CFS
Storage Unit: Cutoff Flow	Q_{Cutoff}	0.0488	CFS

Max. Flow Rate thru Low F

governs

B.5.1 Line 11= 0.377 in\hr

* Biofiltration Soil Layer = 18"media+3" sand ASTM 33+ 3" Mulch

**Gravel Layer = 3" ASTM#8 + 9" Gravel above the invert

RENZULLI ESTATES Stage Storage			
BF-1-2			
depth	area	volume (cf)	volume (acft)
0.00	9200	0	
0.05	9274	461.8	0.010602
0.10	9347	927.4	0.021289
0.15	9421	1396.6	0.032061
0.20	9495	1869.5	0.042917
0.25	9569	2346.1	0.053858
0.30	9642	2826.3	0.064884
0.35	9716	3310.3	0.075994
0.40	9790	3797.9	0.087188
0.45	9863	4289.2	0.098467
0.50	9937	4784.2	0.109831
0.55	10011	5282.9	0.12128
0.60	10084	5785.3	0.132813
0.65	10158	6291.4	0.14443
0.70	10232	6801.1	0.156132
0.75	10306	7314.6	0.167919
0.80	10379	7831.7	0.179791
0.85	10453	8352.5	0.191747
0.90	10527	8877.0	0.203787
0.95	10600	9405.1	0.215912
1.00	10674	9937.0	0.228122
1.05	10751	10472.6	0.240418
1.10	10827	11012.1	0.252802
1.15	10904	11555.3	0.265274
1.20	10980	12102.4	0.277833
1.25	11057	12653.3	0.290481
1.30	11133	13208.1	0.303216
1.35	11210	13766.7	0.316039
1.40	11286	14329.1	0.32895
1.45	11363	14895.3	0.341949
1.50	11440	15465.4	0.355036
1.55	11516	16039.3	0.368211
1.60	11593	16617.0	0.381473
1.65	11669	17198.5	0.394824
1.70	11746	17783.9	0.408262
1.75	11822	18373.1	0.421788
1.80	11899	18966.1	0.435402
1.85	11975	19563.0	0.449104
1.90	12052	20163.7	0.462894
1.95	12128	20768.2	0.476771
2.00	12205	21376.5	0.490737
2.05	12284	21988.7	0.504792
2.10	12364	22604.9	0.518938
2.15	12443	23225.1	0.533175
2.20	12523	23849.3	0.547504
2.25	12602	24477.4	0.561923
2.30	12681	25109.5	0.576434
2.35	12761	25745.5	0.591036
2.40	12840	26385.5	0.605729
2.45	12920	27029.5	0.620513
2.50	12999	27677.5	0.635388
2.55	13078	28329.4	0.650354
2.60	13158	28985.3	0.665412
2.65	13237	29645.2	0.68056
2.70	13317	30309.1	0.6958
2.75	13396	30976.9	0.711131
2.80	13475	31648.7	0.726553
2.85	13555	32324.4	0.742066
2.90	13634	33004.1	0.757671
2.95	13714	33687.8	0.773366
3.00	13793	34375.5	0.789153
3.05	13875	35067.2	0.805032

depth	area	volume (cf)	volume (acft)
3.10	13957	35763.0	0.821006
3.15	14040	36462.9	0.837074
3.20	14122	37167.0	0.853236
3.25	14204	37875.1	0.869493
3.30	14286	38587.4	0.885844
3.35	14368	39303.7	0.90229
3.40	14451	40024.2	0.91883
3.45	14533	40748.8	0.935464
3.50	14615	41477.5	0.952192
3.55	14697	42210.3	0.969015
3.60	14779	42947.2	0.985933
3.65	14862	43688.2	1.002944
3.70	14944	44433.4	1.02005
3.75	15026	45182.6	1.03725
3.80	15108	45936.0	1.054545
3.85	15190	46693.4	1.071934
3.90	15273	47455.0	1.089417
3.95	15355	48220.7	1.106995
4.00	15437	48990.5	1.124667
4.05	15522	49764.5	1.142435
4.10	15607	50542.7	1.160301
4.15	15692	51325.2	1.178264
4.20	15777	52111.9	1.196325
4.25	15862	52902.9	1.214484
4.30	15947	53698.1	1.23274
4.35	16032	54497.6	1.251094
4.40	16117	55301.4	1.269545
4.45	16202	56109.4	1.288094
4.50	16288	56921.6	1.306741
4.55	16373	57738.1	1.325485
4.60	16458	58558.9	1.344327
4.65	16543	59383.9	1.363266
4.70	16628	60213.1	1.382304
4.75	16713	61046.7	1.401438
4.80	16798	61884.4	1.420671
4.85	16883	62726.4	1.440001
4.90	16968	63572.7	1.459428
4.95	17053	64423.2	1.478954
5.00	17138	65278.0	1.498577
5.05	17226	66137.1	1.518299
5.10	17314	67000.6	1.538122
5.15	17402	67868.5	1.558046
5.20	17489	68740.7	1.57807
5.25	17577	69617.4	1.598196
5.30	17665	70498.5	1.618422
5.35	17753	71383.9	1.638749
5.40	17841	72273.8	1.659177
5.45	17929	73168.0	1.679706
5.50	18017	74067	2
5.55	18104	74969.6	1.721066
5.60	18192	75877.1	1.741898
5.65	18280	76788.9	1.76283
5.70	18368	77705.1	1.783863
5.75	18456	78625.7	1.804997
5.80	18544	79550.6	1.826231
5.85	18631	80480.0	1.847567
5.90	18719	81413.8	1.869003
5.95	18807	82351.9	1.890541
6.00	18895	83295	2

RENZULLI ESTATES BF 1-2

Discharge vs Elevation Table

Bottom orifice diameter:	1.5 "	Top orifice diameter:	3 "
Number:	1	Number:	1
Cg-low:	0.61	Cg-low:	0.61
invert elev:	0.50 ft	invert elev:	2.50 ft
Middle orifice diameter:	1.5 "	Emergency weir:	
number of orif:	1	Invert:	3.60 ft
Cg-middle:	0.61	Weir Length (ft)	10.00 ft
invert elev:	2.00 ft	Riser Box LxW	2x3

h (ft)	H/D-low -	H/D-mid -	H/D-top -	H/D-peak -	Qlow-orif (cfs)	Qlow-weir (cfs)	Qtot-low (cfs)	Qmid-orif (cfs)	Qmid-weir (cfs)	Qtot-med (cfs)	Qtop-orif (cfs)	Qtop-weir (cfs)	Qtot-top (cfs)	Qpeak-top (cfs)	Qtot (cfs)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000
0.55	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.003
0.60	0.80	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.010
0.65	1.20	0.00	0.00	0.00	0.02	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.018
0.70	1.60	0.00	0.00	0.00	0.02	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.022
0.75	2.00	0.00	0.00	0.00	0.03	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.026
0.80	2.40	0.00	0.00	0.00	0.03	0.04	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.029
0.85	2.80	0.00	0.00	0.00	0.03	0.04	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.032
0.90	3.20	0.00	0.00	0.00	0.03	0.04	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.035
0.95	3.60	0.00	0.00	0.00	0.04	0.05	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.037
1.00	4.00	0.00	0.00	0.00	0.04	0.07	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.040
1.05	4.40	0.00	0.00	0.00	0.04	0.11	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.042
1.10	4.80	0.00	0.00	0.00	0.04	0.20	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.044
1.15	5.20	0.00	0.00	0.00	0.05	0.35	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.046
1.20	5.60	0.00	0.00	0.00	0.05	0.59	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.048
1.25	6.00	0.00	0.00	0.00	0.05	0.95	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.050
1.30	6.40	0.00	0.00	0.00	0.05	1.47	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.052
1.35	6.80	0.00	0.00	0.00	0.05	2.19	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.053
1.40	7.20	0.00	0.00	0.00	0.05	3.18	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.055
1.45	7.60	0.00	0.00	0.00	0.06	4.49	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.057
1.50	8.00	0.00	0.00	0.00	0.06	6.18	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.058
1.55	8.40	0.00	0.00	0.00	0.06	8.34	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.060
1.60	8.80	0.00	0.00	0.00	0.06	11.06	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.061
1.65	9.20	0.00	0.00	0.00	0.06	14.44	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.063
1.70	9.60	0.00	0.00	0.00	0.06	18.58	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.064
1.75	10.00	0.00	0.00	0.00	0.07	23.61	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.065
1.80	10.40	0.00	0.00	0.00	0.07	29.65	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.067
1.85	10.80	0.00	0.00	0.00	0.07	36.86	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.068
1.90	11.20	0.00	0.00	0.00	0.07	45.39	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.069
1.95	11.60	0.00	0.00	0.00	0.07	55.41	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.071
2.00	12.00	0.00	0.00	0.00	0.07	67.11	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.072
2.05	12.40	0.40	0.00	0.00	0.07	80.69	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.076
2.10	12.80	0.80	0.00	0.00	0.07	96.36	0.07	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.084
2.15	13.20	1.20	0.00	0.00	0.08	114.36	0.08	0.02	0.02	0.02	0.00	0.00	0.00	0.00	0.093
2.20	13.60	1.60	0.00	0.00	0.08	134.92	0.08	0.02	0.03	0.02	0.00	0.00	0.00	0.00	0.099
2.25	14.00	2.00	0.00	0.00	0.08	158.32	0.08	0.03	0.03	0.03	0.00	0.00	0.00	0.00	0.104
2.30	14.40	2.40	0.00	0.00	0.08	184.84	0.08	0.03	0.04	0.03	0.00	0.00	0.00	0.00	0.108
2.35	14.80	2.80	0.00	0.00	0.08	214.77	0.08	0.03	0.04	0.03	0.00	0.00	0.00	0.00	0.113
2.40	15.20	3.20	0.00	0.00	0.08	248.43	0.08	0.03	0.04	0.03	0.00	0.00	0.00	0.00	0.116
2.45	15.60	3.60	0.00	0.00	0.08	286.15	0.08	0.04	0.05	0.04	0.00	0.00	0.00	0.00	0.120
2.50	16.00	4.00	0.00	0.00	0.08	328.30	0.08	0.04	0.07	0.04	0.00	0.00	0.00	0.00	0.123
2.55	16.40	4.40	0.20	0.00	0.08	375.25	0.08	0.04	0.11	0.04	0.00	0.00	0.00	0.00	0.131
2.60	16.80	4.80	0.40	0.00	0.09	427.39	0.09	0.04	0.20	0.04	0.00	0.02	0.02	0.00	0.146
2.65	17.20	5.20	0.60	0.00	0.09	485.14	0.09	0.05	0.35	0.05	0.04	0.03	0.03	0.00	0.166
2.70	17.60	5.60	0.80	0.00	0.09	548.94	0.09	0.05	0.59	0.05	0.07	0.06	0.06	0.00	0.192
2.75	18.00	6.00	1.00	0.00	0.09	619.25	0.09	0.05	0.95	0.05	0.08	0.08	0.08	0.00	0.220
2.80	18.40	6.40	1.20	0.00	0.09	696.55	0.09	0.05	1.47	0.05	0.10	0.11	0.10	0.00	0.242
2.85	18.80	6.80	1.40	0.00	0.09	781.35	0.09	0.05	2.19	0.05	0.11	0.13	0.11	0.00	0.258
2.90	19.20	7.20	1.60	0.00	0.09	874.19	0.09	0.05	3.18	0.05	0.13	0.16	0.13	0.00	0.273
2.95	19.60	7.60	1.80	0.00	0.09	975.61	0.09	0.06	4.49	0.06	0.14	0.18	0.14	0.00	0.286
3.00	20.00	8.00	2.00	0.00	0.09	1086.19	0.09	0.06	6.18	0.06	0.15	0.20	0.15	0.00	0.299
3.05	20.40	8.40	2.20	0.00	0.09	1206.55	0.09	0.06	8.34	0.06	0.16	0.21	0.16	0.00	0.311
3.10	20.80	8.80	2.40	0.00	0.10	1337.31	0.10	0.06	11.06	0.06	0.17	0.22	0.17	0.00	0.322
3.15	21.20	9.20	2.60	0.00	0.10	1479.13	0.10	0.06	14.44	0.06	0.17	0.22	0.17	0.00	0.333
3.20	21.60	9.60	2.80	0.00	0.10	1632.69	0.10	0.06	18.58	0.06	0.18	0.22	0.18	0.00	0.344
3.25	22.00	10.00	3.00	0.00	0.10	1798.71	0.10	0.07	23.61	0.07	0.19	0.22	0.19	0.00	0.354
3.30	22.40	10.40	3.20	0.00	0.10	1977.93	0.10	0.07	29.65	0.07	0.20	0.22	0.20	0.00	0.364
3.35	22.80	10.80	3.40	0.00	0.10	2171.11	0.10	0.07	36.86	0.07	0.20	0.24	0.20	0.00	0.373
3.40	23.20	11.20	3.60	0.00	0.10	2379.06	0.10	0.07	45.39	0.07	0.21	0.26	0.21	0.00	0.382
3.45	23.60	11.60	3.80	0.00	0.10	2602.61	0.10	0.07	55.41	0.07	0.22	0.30	0.22	0.00	0.391
3.50	24.00	12.00	4.00	0.00	0.10	2842.60	0.10	0.07	67.11	0.07	0.22	0.37	0.22	0.00	0.400
3.55	24.40	12.40	4.20	0.00	0.10	3099.94	0.10	0.07	80.69	0.07	0.23	0.47	0.23	0.00	0.408
3.60	24.80	12.80	4.40	0.00	0.10	3375.54	0.10	0.07	96.36	0.07	0.24	0.62	0.24	0.00	0.416
3.65	25.20	13.20	4.60	0.06	0.11	3670.36	0.11	0.08	114.36	0.08	0.24	0.83	0.24	0.37	0.797
3.70	25.60	13.60	4.80	0.12	0.11	3985.37	0.11	0.08	134.92	0.08	0.25	1.12	0.25	1.05	1.485
3.75	26.00	14.00	5.00	0.18	0.11	4321.61	0.11	0.08	158.32	0.08	0.25	1.49	0.25	1.93	2.375
3.80	26.40	14.40	5.20	0.24	0.11	4680.11	0.11	0.08	184.84	0.08	0.26	1.96	0.26	2.98	3.426
3.85	26.80	14.80	5.40	0.30	0.11	5061.97	0.11	0.08	214.77	0.08	0.27	2.57	0.27	4.16	4.618
3.90	27.20	15.20	5.60	0.36	0.11	5468.31	0.11	0.08	248.43	0.08	0.27	3.32	0.27	5.47	5.934
3.95	27.60	15.60	5.80	0.42	0.11	5900.28	0.11	0.08	286.15	0.08	0.28	4.24	0.28	6.90	7.365
4.00	28.00	16.00	6.00	0.48	0.11	6359.08	0.11	0.08	328.30	0.08	0.28	5.36	0.28	8.42	8.901
4.05	28.40	16.40	6.20	0.54	0.11	6845.93	0.11	0.08	375.25	0.08	0.29	6.70	0.29	10.05	10.536
4.10	28.80	16.80	6.40	0.60	0.11	7362.10	0.11	0.09	427.39	0.09	0.29	8.31	0.29	11.77	12.264
4.15	29.20	17.20	6.60	0.66	0.11	7908.88	0.11	0.09	485.14	0.09	0.30	10.20	0.30	13.58	14.080

h (ft)	H/D-low -	H/D-mid -	H/D-top -	H/D-peak -	Qlow-orif (cfs)	Qlow-weir (cfs)	Qtot-low (cfs)	Qmid-orif (cfs)	Qmid-weir (cfs)	Qtot-med (cfs)	Qtop-orif (cfs)	Qtop-weir (cfs)	Qtot-top (cfs)	Qpeak-top (cfs)	Qtot (cfs)
4.20	29.60	17.60	6.80	0.72	0.11	8487.63	0.11	0.09	548.94	0.09	0.30	12.42	0.30	15.48	15.980
4.25	30.00	18.00	7.00	0.78	0.12	9099.71	0.12	0.09	619.25	0.09	0.31	15.00	0.31	17.45	17.961
4.30	30.40	18.40	7.20	0.84	0.12	9746.55	0.12	0.09	696.55	0.09	0.31	17.99	0.31	19.50	20.020
4.35	30.80	18.80	7.40	0.90	0.12	10429.61	0.12	0.09	781.35	0.09	0.32	21.43	0.32	21.63	22.152
4.40	31.20	19.20	7.60	0.96	0.12	11150.37	0.12	0.09	874.19	0.09	0.32	25.37	0.32	23.83	24.357
4.45	31.60	19.60	7.80	1.02	0.12	11910.39	0.12	0.09	975.61	0.09	0.32	29.87	0.32	26.10	26.632
4.50	32.00	20.00	8.00	1.08	0.12	12711.23	0.12	0.09	1086.19	0.09	0.33	34.96	0.33	28.43	28.974
4.55	32.40	20.40	8.20	1.14	0.12	13554.52	0.12	0.09	1206.55	0.09	0.33	40.72	0.33	30.83	31.382
4.60	32.80	20.80	8.40	1.20	0.12	14441.92	0.12	0.10	1337.31	0.10	0.34	47.20	0.34	33.30	33.854
4.65	33.20	21.20	8.60	1.26	0.12	15375.13	0.12	0.10	1479.13	0.10	0.34	54.47	0.34	35.83	36.388
4.70	33.60	21.60	8.80	1.32	0.12	16355.92	0.12	0.10	1632.69	0.10	0.35	62.59	0.35	38.42	38.984
4.75	34.00	22.00	9.00	1.38	0.12	17386.06	0.12	0.10	1798.71	0.10	0.35	71.64	0.35	41.07	41.639
4.80	34.40	22.40	9.20	1.44	0.12	18467.40	0.12	0.10	1977.93	0.10	0.35	81.69	0.35	43.77	44.351
4.85	34.80	22.80	9.40	1.50	0.12	19601.82	0.12	0.10	2171.11	0.10	0.36	92.82	0.36	46.54	47.121
4.90	35.20	23.20	9.60	1.56	0.13	20791.25	0.13	0.10	2379.06	0.10	0.36	105.11	0.36	49.36	49.947
4.95	35.60	23.60	9.80	1.62	0.13	22037.66	0.13	0.10	2602.61	0.10	0.37	118.66	0.37	52.23	52.827
5.00	36.00	24.00	10.00	1.68	0.13	23343.08	0.13	0.10	2842.60	0.10	0.37	133.55	0.37	55.16	55.761
5.05	36.40	24.40	10.20	1.74	0.13	24709.57	0.13	0.10	3099.94	0.10	0.37	149.88	0.37	58.14	58.748
5.10	36.80	24.80	10.40	1.80	0.13	26139.24	0.13	0.10	3375.54	0.10	0.38	167.75	0.38	61.18	61.787
5.15	37.20	25.20	10.60	1.86	0.13	27634.27	0.13	0.11	3670.36	0.11	0.38	187.26	0.38	64.26	64.876
5.20	37.60	25.60	10.80	1.92	0.13	29196.86	0.13	0.11	3985.37	0.11	0.39	208.52	0.39	67.39	68.016
5.25	38.00	26.00	11.00	1.98	0.13	30829.27	0.13	0.11	4321.61	0.11	0.39	231.66	0.39	70.58	71.205
5.30	38.40	26.40	11.20	2.04	0.13	32533.83	0.13	0.11	4680.11	0.11	0.39	256.77	0.39	73.81	74.442
5.35	38.80	26.80	11.40	2.10	0.13	34312.88	0.13	0.11	5061.97	0.11	0.40	284.00	0.40	77.09	77.728
5.40	39.20	27.20	11.60	2.16	0.13	36168.85	0.13	0.11	5468.31	0.11	0.40	313.47	0.40	80.42	81.060
5.45	39.60	27.60	11.80	2.22	0.13	38104.20	0.13	0.11	5900.28	0.11	0.40	345.31	0.40	83.79	84.439
5.50	40.00	28.00	12.00	2.28	0.13	40121.45	0.13	0.11	6359.08	0.11	0.41	379.66	0.41	87.21	87.864
5.55	40.40	28.40	12.20	2.34	0.13	42223.16	0.13	0.11	6845.93	0.11	0.41	416.66	0.41	90.68	91.334
5.60	40.80	28.80	12.40	2.40	0.13	44411.96	0.13	0.11	7362.10	0.11	0.41	456.47	0.41	94.19	94.849
5.65	41.20	29.20	12.60	2.46	0.14	46690.52	0.14	0.11	7908.88	0.11	0.42	499.23	0.42	97.74	98.408
5.70	41.60	29.60	12.80	2.52	0.14	49061.58	0.14	0.11	8487.63	0.11	0.42	545.12	0.42	101.34	102.010
5.75	42.00	30.00	13.00	2.58	0.14	51527.93	0.14	0.12	9099.71	0.12	0.42	594.29	0.42	104.98	105.656
5.80	42.40	30.40	13.20	2.64	0.14	54092.39	0.14	0.12	9746.55	0.12	0.43	646.91	0.43	108.66	109.344
5.85	42.80	30.80	13.40	2.70	0.14	56757.87	0.14	0.12	10429.61	0.12	0.43	703.17	0.43	112.39	113.074
5.90	43.20	31.20	13.60	2.76	0.14	59527.33	0.14	0.12	11150.37	0.12	0.43	763.25	0.43	116.15	116.846
5.95	43.60	31.60	13.80	2.82	0.14	62403.77	0.14	0.12	11910.39	0.12	0.44	827.33	0.44	119.96	120.659
6.00	44.00	32.00	14.00	2.88	0.14	65390.26	0.14	0.12	12711.23	0.12	0.44	895.62	0.44	123.81	124.512

BF-1-2		$Q_{Sub\ Drain}$=	0.1096	cfs
Elevation	Q_{AVG} (CFS)	DV (CF)	DT (HR)	Total T
0.00	0.110	-7135139.3	1.500	151.56
-717.90	0.110	533.9	1.353	150.06
-717.85	0.110	10142.9	25.707	148.71
-716.90	0.110	533.8	1.353	123.00
-716.85	0.110	533.8	1.353	121.65
-716.80	0.110	533.8	1.000	120.30
-716.75	0.110	533.8	1.353	119.30
-716.70	0.110	533.8	2.000	117.94
-716.65	0.110	533.8	1.353	115.94
-716.60	0.110	533.8	1.353	114.59
-716.55	0.110	533.7	1.336	113.24
-716.50	0.112	533.7	1.279	111.90
-716.45	0.119	533.7	1.201	110.62
-716.40	0.127	533.7	1.144	109.42
-716.35	0.132	533.7	1.109	108.28
-716.30	0.136	533.7	1.080	107.17
-716.25	0.139	533.7	1.056	106.09
-716.20	0.142	533.7	1.036	105.03
-716.15	0.144	533.7	1.017	104.00
-716.10	0.147	533.7	1.001	102.98
-716.05	0.149	535.6	0.989	101.98
-716.00	0.152	539.4	0.982	100.99
-715.95	0.154	543.3	0.976	100.01
-715.90	0.156	547.1	0.970	99.03
-715.85	0.158	550.9	0.966	98.06
-715.80	0.159	554.8	0.961	97.10
-715.75	0.161	558.6	0.957	96.14
-715.70	0.163	562.4	0.954	95.18
-715.65	0.165	566.2	0.951	94.23
-715.60	0.166	570.1	0.948	93.27
-715.55	0.168	573.9	0.946	92.33
-715.50	0.169	577.7	0.944	91.38
-715.45	0.171	581.5	0.942	90.44
-715.40	0.172	585.4	0.940	89.49
-715.35	0.174	589.2	0.939	88.55
-715.30	0.175	593.0	0.937	87.62
-715.25	0.176	596.9	0.936	86.68
-715.20	0.178	600.7	0.935	85.74
-715.15	0.179	604.5	0.934	84.81
-715.10	0.180	608.3	0.934	83.87
-715.05	0.182	612.2	0.926	82.94
-715.00	0.186	616.2	0.902	82.01
-714.95	0.194	620.2	0.868	81.11
-714.90	0.203	624.1	0.842	80.24
-714.85	0.209	628.1	0.826	79.40
-714.80	0.214	632.1	0.813	78.58
-714.75	0.218	636.1	0.803	77.76
-714.70	0.222	640.0	0.794	76.96
-714.65	0.226	644.0	0.786	76.17
-714.60	0.230	648.0	0.778	75.38
-714.55	0.233	651.9	0.765	74.60

BF-1-2		$Q_{Sub\ Drain}$=	0.1096	cfs
Elevation	Q_{AVG} (CFS)	DV (CF)	DT (HR)	Total T
-714.50	0.240	655.9	0.735	73.84
-714.45	0.255	659.9	0.690	73.10
-714.40	0.276	663.8	0.639	72.41
-714.35	0.301	667.8	0.588	71.77
-714.30	0.329	671.8	0.548	71.18
-714.25	0.352	675.8	0.522	70.64
-714.20	0.368	679.7	0.503	70.11
-714.15	0.382	683.7	0.488	69.61
-714.10	0.396	687.7	0.475	69.12
-714.05	0.409	691.7	0.463	68.65
-714.00	0.421	695.8	0.453	68.18
-713.95	0.432	699.9	0.444	67.73
-713.90	0.443	704.0	0.436	67.29
-713.85	0.453	708.1	0.429	66.85
-713.80	0.464	712.3	0.422	66.42
-713.75	0.473	716.4	0.416	66.00
-713.70	0.483	720.5	0.411	65.58
-713.65	0.492	724.6	0.406	65.17
-713.60	0.501	728.7	0.401	64.77
-713.55	0.509	732.8	0.396	64.37
-713.50	0.518	736.9	0.392	63.97
-713.45	0.526	741.0	0.287	63.58
-713.40	0.906	745.1	0.165	63.29
-713.35	1.595	749.2	0.102	63.12
-713.30	2.484	753.4	0.070	63.02
-713.25	3.536	757.5	0.051	62.95
-713.20	4.727	761.6	0.039	62.90
-713.15	6.044	765.7	0.031	62.86
-713.10	7.474	769.8	0.026	62.83
-713.05	9.011	774.0	0.022	62.80
-713.00	10.646	778.2	0.019	62.78
-712.95	12.374	782.5	0.016	62.76
-712.90	14.190	786.7	0.014	62.75
-712.85	16.090	791.0	0.013	62.73
-712.80	18.071	795.2	0.012	62.72
-712.75	20.129	799.5	0.010	62.71
-712.70	22.262	803.7	0.010	62.70
-712.65	24.467	808.0	0.009	62.69
-712.60	26.741	812.2	0.008	62.68
-712.55	29.084	816.5	0.007	62.67
-712.50	31.492	820.8	0.007	62.66
-712.45	33.964	825.0	0.007	62.66
-712.40	36.498	829.3	0.006	62.65
-712.35	39.093	833.5	0.006	62.65
-712.30	41.748	837.8	0.005	62.64
-712.25	44.461	842.0	0.005	62.63
-712.20	47.231	846.3	0.005	62.63
-712.15	50.057	850.5	0.005	62.62
-712.10	52.937	854.8	0.004	62.62
-712.05	55.871	12918798.7	62.557	62.62
5.05	58.858	944.6	0.004	0.06

BF-1-2		$Q_{Sub\ Drain}$=	0.1096	cfs
Elevation	Q_{AVG} (CFS)	DV (CF)	DT (HR)	Total T
5.10	61.896	944.6	0.004	0.05
5.15	64.986	944.6	0.004	0.05
5.20	68.125	944.7	0.004	0.05
5.25	71.314	944.7	0.004	0.04
5.30	74.552	944.7	0.003	0.04
5.35	77.837	944.7	0.003	0.03
5.40	81.170	944.7	0.003	0.03
5.45	84.549	944.7	0.003	0.03
5.50	87.974	944.7	0.003	0.03
5.55	91.444	944.7	0.003	0.02
5.60	94.959	944.7	0.003	0.02
5.65	98.517	944.7	0.003	0.02
5.70	102.120	944.7	0.003	0.01
5.75	105.765	944.7	0.002	0.01
5.80	109.454	944.7	0.002	0.01
5.85	113.184	944.7	0.002	0.01
5.90	116.955	944.7	0.002	0.00
5.95	120.768	944.7	0.002	0.00
6.00	124.622			

Basin BF-1-2

PARAMETER	ABBREV.	Bio-Retention	
WQ Ponding Depth	PD	6	in
Bioretention Soil Layer	S	24	in
Gravel Layer	G	12	in
TOTAL		3.5	ft
		42	in
Orifice Coefficient	c_g	0.6	--
Low Flow Orifice Diameter	D	1.5	in
Drain (Flow) exponent	n	0.5	--
Ponding Depth Surface Area	A_{PD}	9937	ft^2
Bioretention Surface Area	A_S, A_G	9200	ft^2
Modelled LID Surface @ Basin Bottom	A_{LID}	0.21120	ac
Effective Ponding Depth	PD_{eff}	6.24	in
Flow Coefficient	C	0.0801	--
Flow Rate (per unit area)	q	0.514	in/hr
Max. Flow Rate thru Low Flow Orifice(volumetric)	$Q_{LF,Max.}$	0.10955	cfs
Bioretention Soil Media Design Percolation Rate		5	in\hr
Max. Flow Rate Thru BSM	$Q_{BSM,max}$	1.06481	CFS
Storage Unit: Cutoff Flow	Q_{Cutoff}	0.1096	CFS

Max. Flow Rate thru Low

governs

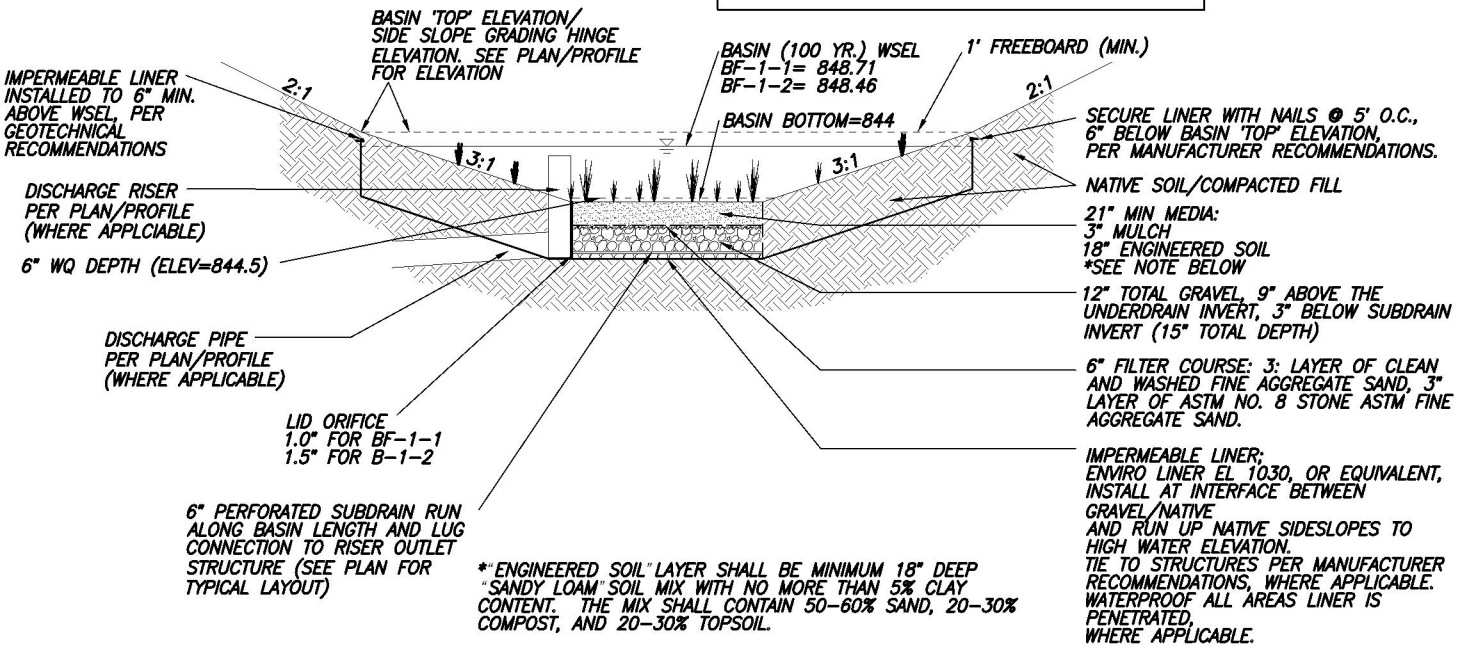
B.5.1 Line 11= 0.514 in\hr

* Biofiltration Soil Layer = 18"media+3" sand ASTM 33+ 3" Mulch

**Gravel Layer = 3" ASTM#8 + 9" Gravel above the invert

Biofiltration Details

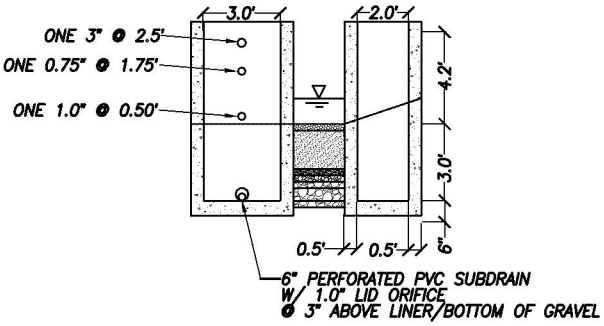
	100 YEAR WSE	HMP WSE	WQ WSE
BF-1-1	848.22	848.00	844.50
BF-1-2	847.98	847.45	844.50



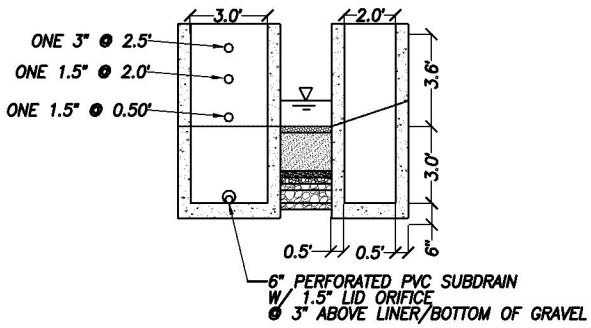
SOIL SECTION FOR WATER QUALITY/HYDROMODIFICATION BIOFILTRATION BASIN

NOT TO SCALE

PRIVATE BIOFILTRATION BASIN BF-1-1



PRIVATE BIOFILTRATION BASIN BF-1-2



BIOFILTRATION BASIN RISER DETAIL FOR BF-1-1 & BF-1-2

NOT TO SCALE

V. SWMM INPUT DATA (EXISTING AND PROPOSED MODELS)

Attached are the EPA-SWMM Model outputs for pre-development and post-development conditions for each POC. Similar modeling was used for analyzing the remaining POC locations using the input data found in the previous section. Each area, i.e., sub-catchments, outfalls, storage units, LID controls for the biofiltration cells, ponding on top of the biofiltration (modeled as a storage unit), weir as a discharge, and outfalls (point of compliance), also are shown, as applicable.

Variables in the modeling are associated with typical recommended values by the EPA-SWMM model and typical values found in technical literature (such as Maidment's Handbook of Hydrology). Recommended values for the SWMM model have been obtained from the San Diego County HMP permit criteria established for SWMM calibration.

Soil characteristics of the existing soils were determined based on data provided by Geotechnical Engineer/Geologist. KEY ASSUMPTIONS: Group D soils is representative of the existing conditions for the site.

Some values incorporated within the SWMM model have been determined from the professional experience of H&A using conservative assumptions that tend to increase the size of the needed BMP and also generate a long-term runoff as a percentage of rainfall similar to those measured in gage stations in Southern California by the USGS.

Description of model parameters and assumptions:

N-Imperv – Manning's N for impervious surfaces
0.012 (typical)

N-Perv – Manning's N for pervious surfaces
0.035 (Natural) & 0.10 (Developed Landscape)

Dstore-Imperv – Depth of depression storage on impervious area (in)
0.05 (typical)

Dstore-Perv – Depth of depression storage on pervious area (in)
0.10 (typical)

%Zero-Imperv – Percentage of impervious area with no depression storage (%)
25 (typical)

Suction Head – Soil capillary suction head (in)

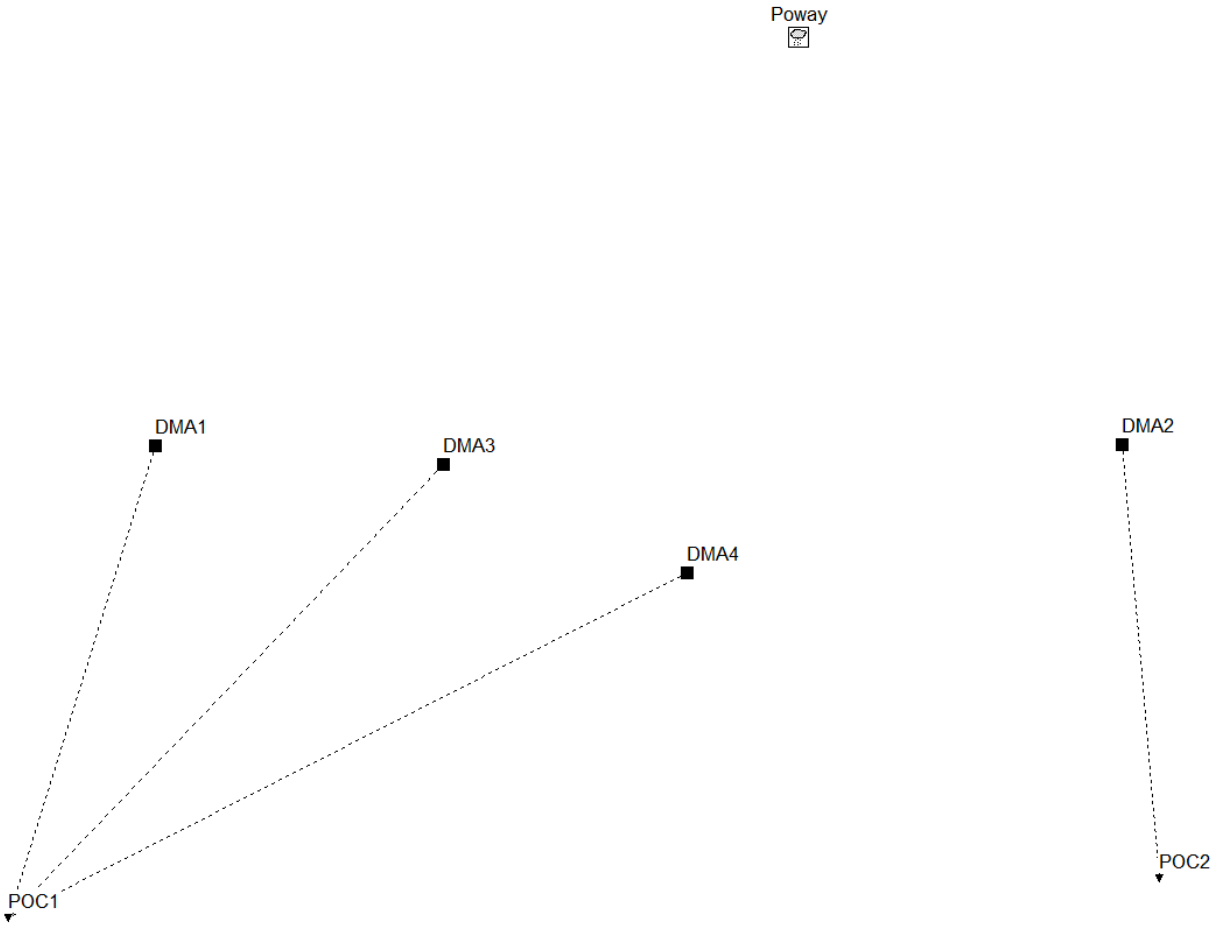
Conductivity – Soil saturated hydraulic conductivity (in/hr)
-75% of these values if subcatchment is graded/compacted

Initial Deficit – Initial moisture deficit (fraction)

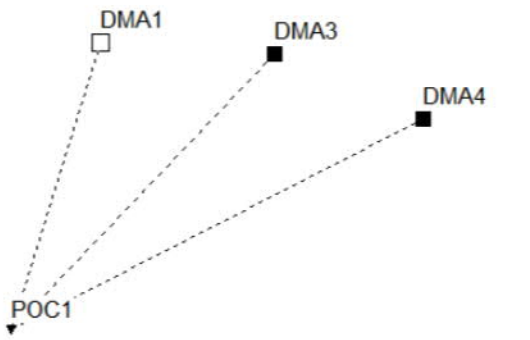
Soil Type	Suction Head	Conductivity	Initial Deficit
A	1.5	0.3	0.33
B	3	0.2	0.32
C	6	0.1	0.31
D	9	0.025	0.30

POC 1 & 2 – Pre-Developed Condition

Renzulli Estates



EX- DMA 1



Subcatchment DMA1

Property	Value
Name	DMA1
X-Coordinate	1043.441
Y-Coordinate	5749.574
Description	
Tag	
Rain Gage	Poway
Outlet	POC1
Area	10.00
Width	589
% Slope	21.62
% Imperv	0
N-Imperv	0.012
N-Perv	0.10
Dstore-Imperv	0.05
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration Data	GREEN_AMPT ...
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0
N-Perv Pattern	
Dstore Pattern	
Infil. Pattern	

Infiltration Editor

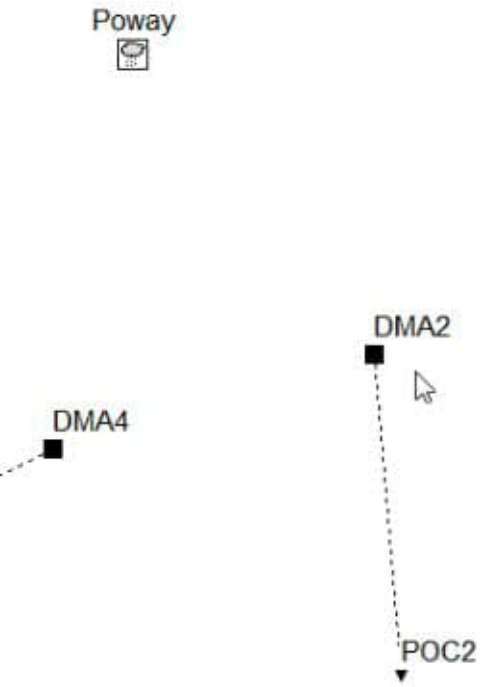
Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9
Conductivity	0.025
Initial Deficit	0.3

Soil capillary suction head (inches or mm)

OK Cancel Help

EX- DMA 2



Subcatchment DMA2

Property	Value
Name	DMA2
X-Coordinate	4610.116
Y-Coordinate	5753.425
Description	
Tag	
Rain Gage	Poway
Outlet	POC2
Area	16.48
Width	591
% Slope	11.36
% Imperv	0
N-Imperv	0.012
N-Perv	0.10
Dstore-Imperv	0.05
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration Data	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

Infiltration Editor

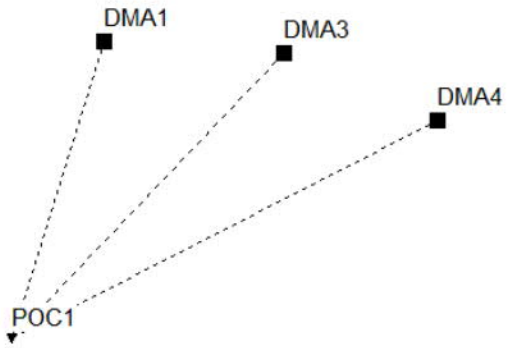
Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9
Conductivity	0.025
Initial Deficit	0.3

Soil capillary suction head (inches or mm)

OK Cancel Help

EX- DMA 3



Poway

Subcatchment DMA3

Property	Value
Name	DMA3
X-Coordinate	2102.213
Y-Coordinate	5679.663
Description	
Tag	
Rain Gage	Poway
Outlet	POC1
Area	0.02
Width	22
% Slope	14.77
% Imperv	0
N-Imperv	0.012
N-Perv	0.10
Dstore-Imperv	0.05
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration Data	GREEN_AMPT ...
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0
N-Perv Pattern	
Dstore Pattern	
Infil. Pattern	

Infiltration Editor

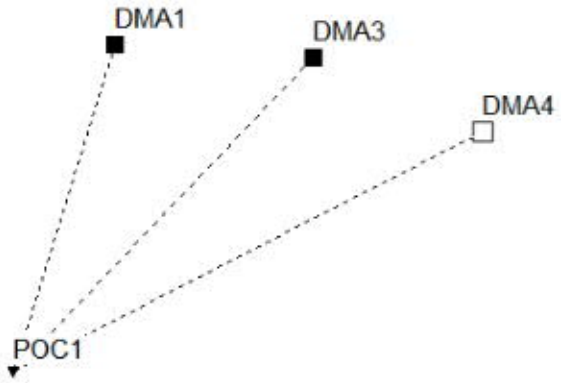
Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9
Conductivity	0.025
Initial Deficit	0.3

Soil capillary suction head (inches or mm)

OK Cancel Help

EX- DMA 4



Poway

Subcatchment DMA4

Property	Value
Name	DMA4
X-Coordinate	3002.555
Y-Coordinate	5281.090
Description	
Tag	
Rain Gage	Poway
Outlet	POC1
Area	0.59
Width	79
% Slope	16.77
% Imperv	0
N-Imperv	0.012
N-Perv	0.10
Dstore-Imperv	0.05
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration Data	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0
N-Perv Pattern	
Dstore Pattern	
Infil. Pattern	

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9
Conductivity	0.025
Initial Deficit	0.3

Soil capillary suction head (inches or mm)

OK Cancel He

```
[TITLE]
;;Project Title/Notes
Renzulli Estates
HMP Modeling
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           04/10/1962
START_TIME           15:00:00
REPORT_START_DATE    04/10/1962
REPORT_START_TIME    15:00:00
END_DATE             05/23/2008
END_TIME             15:00:00
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          0.05   0.09   0.13   0.19   0.25   0.29   0.3    0.27   0.21   0.14
  0.08   0.05
DRY_ONLY         NO
```

```
[RAINGAGES]
;;Name           Format    Interval SCF      Source
;;-------------- --------- ------ ------ ----------
;Renzulli Estates
Poway            VOLUME    1:00     1.0      TIMESERIES TS-Poway

[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv  Width    %Slope
  CurbLen  SnowPack
;;-------------- ---------------- ---------------- -------- -------- --------
-------- -------- -----------------
DMA4             Poway            POC1             0.59     0        79       16.77
  0
DMA1             Poway            POC1             10.00    0        589      21.62
  0
DMA3             Poway            POC1             0.02     0        22       14.77
  0
DMA2             Poway            POC2             16.48    0        591      11.36
  0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo
PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ----------
----------
DMA4             0.012      0.10       0.05       0.1        25         OUTLET
DMA1             0.012      0.10       0.05       0.1        25         OUTLET
DMA3             0.012      0.10       0.05       0.1        25         OUTLET
DMA2             0.012      0.10       0.05       0.1        25         OUTLET

[INFILTRATION]
;;Subcatchment   Suction    Ksat       IMD
;;-------------- ---------- ---------- ----------
DMA4             9          0.025      0.3
DMA1             9          0.025      0.3
DMA3             9          0.025      0.3
DMA2             9          0.025      0.3

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
POC1             0          FREE                        NO
POC2             0          FREE                        NO

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
TS-Poway         FILE "R:\1207\Hyd\SWMP\TM\ARCHIVE\CALCS\HMP\poway.dat"

[REPORT]
;;Reporting Options
```

```
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS 0.000 0.000 10000.000 10000.000
Units      None

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
POC1             500.527            4004.215
POC2             4747.102           4151.739

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

[Polygons]
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ------------------
DMA4             3002.555           5281.090
DMA1             1043.441           5749.574
DMA3             2102.213           5679.663
DMA2             4610.116           5753.425

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
Poway            3419.389           7249.737
```

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.014)

Renzulli Estates
HMP Modeling
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 04/10/1962 15:00:00
Ending Date 05/23/2008 15:00:00
Antecedent Dry Days 0.0
Report Time Step 01:00:00
Wet Time Step 00:15:00
Dry Time Step 04:00:00

Runoff Quantity Continuity	Volume acre-feet	Depth inches
Total Precipitation	1260.091	558.180
Evaporation Loss	57.207	25.341
Infiltration Loss	1013.173	448.803
Surface Runoff	213.230	94.454
Final Storage	0.000	0.000
Continuity Error (%)	-1.866	

Flow Routing Continuity	Volume acre-feet	Volume 10^6 gal
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	213.230	69.484

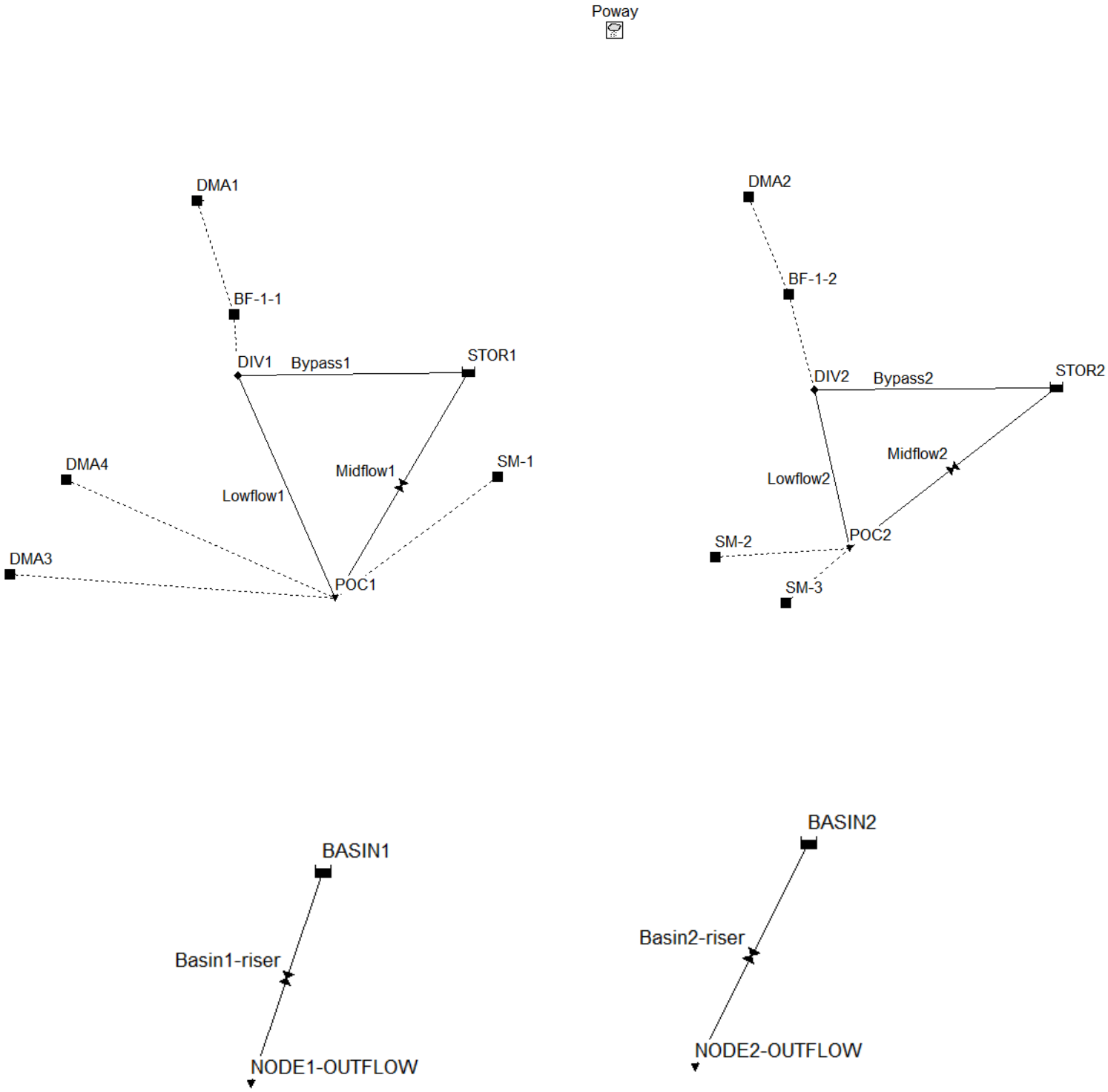
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	213.230	69.484
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Imperv Runoff in	Perv Runoff in	Total Runoff in	Total Runoff 10^6 gal	Peak Runoff CFS	Runoff Coeff
DMA4	558.18	0.00	24.85	440.84	0.00	103.94	103.94	1.67	0.45	0.186
DMA1	558.18	0.00	25.11	444.81	0.00	98.99	98.99	26.88	7.42	0.177
DMA3	558.18	0.00	24.31	434.74	0.00	113.89	113.89	0.06	0.02	0.204
DMA2	558.18	0.00	25.50	451.53	0.00	91.34	91.34	40.87	10.64	0.164

Analysis begun on: Tue Oct 3 14:23:57 2023
Analysis ended on: Tue Oct 3 14:24:23 2023
Total elapsed time: 00:00:26

POC 1 & 2– Developed Condition

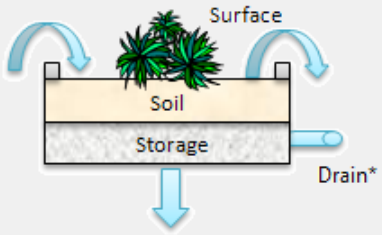


BF-1-1 LID

LID Control Editor

Control Name: BF-1-1

LID Type: Bio-Retention Cell



*Optional

OK Cancel Help

Surface | Soil | Storage | Drain

Berm Height (in. or mm)	6.24
Vegetation Volume Fraction	0.0
Surface Roughness (Mannings n)	0.0
Surface Slope (percent)	0

Surface | Soil | Storage | Drain

Thickness (in. or mm)	24
Porosity (volume fraction)	0.4
Field Capacity (volume fraction)	0.2
Wilting Point (volume fraction)	0.1
Conductivity (in/hr or mm/hr)	5
Conductivity Slope	5
Suction Head (in. or mm)	1.5

Surface | Soil | Storage | Drain

Thickness (in. or mm)	15
Void Ratio (Voids / Solids)	0.67
Seepage Rate (in/hr or mm/hr)	0
Clogging Factor	0

Surface | Soil | Storage | Drain

Flow Coefficient*	0.0585
Flow Exponent	0.5
Offset (in or mm)	3
Open Level (in or mm)	0
Closed Level (in or mm)	0
Control Curve	

Drain Advisor

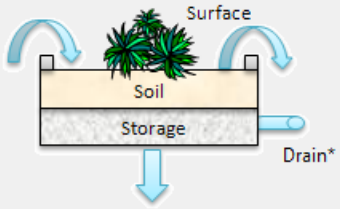
*Flow is in in/hr or mm/hr; use 0 if there is no drain.

LID BF-1-2

LID Control Editor

Control Name: BF-1-2

LID Type: Bio-Retention Cell



*Optional

OK | Cancel | Help

Surface | Soil | Storage | Drain

Berm Height (in. or mm)	6.24
Vegetation Volume Fraction	0.0
Surface Roughness (Mannings n)	0
Surface Slope (percent)	1.0

Surface | Soil | Storage | Drain

Thickness (in. or mm)	24
Porosity (volume fraction)	0.4
Field Capacity (volume fraction)	0.2
Wilting Point (volume fraction)	0.1
Conductivity (in/hr or mm/hr)	5
Conductivity Slope	5
Suction Head (in. or mm)	1.5

Surface | Soil | Storage | Drain

Thickness (in. or mm)	15
Void Ratio (Voids / Solids)	0.67
Seepage Rate (in/hr or mm/hr)	0.05
Clogging Factor	0

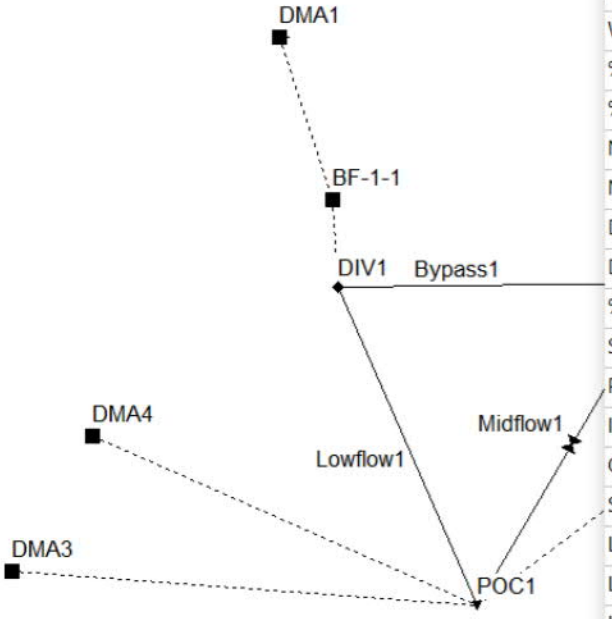
Surface | Soil | Storage | Drain

Flow Coefficient*	0.0801
Flow Exponent	0.5
Offset (in or mm)	3
Open Level (in or mm)	0
Closed Level (in or mm)	0
Control Curve	

Drain Advisor

*Flow is in in/hr or mm/hr; use 0 if there is no drain.

BF-1-1



Subcatchment BF-1-1

Property	Value
Name	BF-1-1
X-Coordinate	-26.344
Y-Coordinate	4699.684
Description	
Tag	
Rain Gage	Poway
Outlet	DIV1
Area	0.1286
Width	60
% Slope	0.01
% Imperv	0
N-Imperv	0.012
N-Perv	0.10
Dstore-Imperv	0.05
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration Data	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	1
Land Uses	0
Initial Buildup	NONE
Curb Length	0
N-Perv Pattern	
Dstore Pattern	
Infil. Pattern	

DMA2

Infiltration Editor

Infiltration Method: GREEN_AMPT

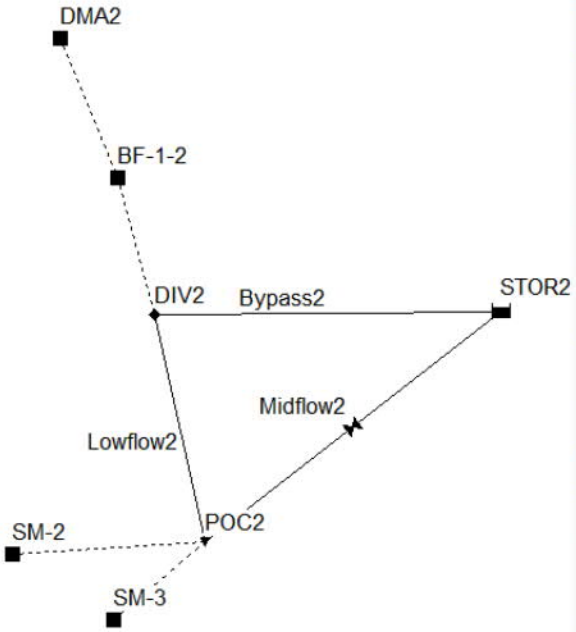
Property	Value
Suction Head	1.5
Conductivity	0.3
Initial Deficit	0.33

Soil capillary suction head (inches or mm)

OK Cancel Help

SM-3

BF-1-2



Subcatchment BF-1-2

Property	Value
Name	BF-1-2
X-Coordinate	4974.182
Y-Coordinate	4879.518
Description	
Tag	
Rain Gage	Poway
Outlet	DIV2
Area	.2112
Width	61
% Slope	0.01
% Imperv	0
N-Imperv	0.012
N-Perv	0.10
Dstore-Imperv	0.05
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration Data	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	1
Land Uses	0
Initial Buildup	NONE
Curb Length	0
N-Perv Pattern	
Dstore Pattern	
Infil. Pattern	

Infiltration Editor

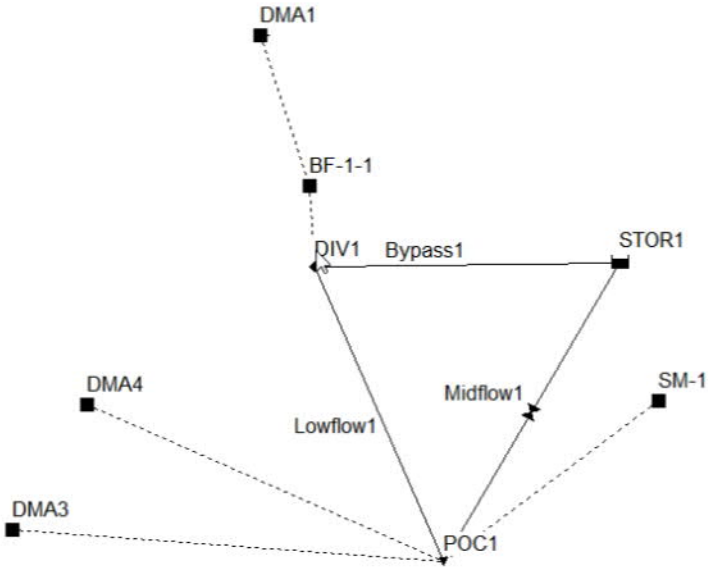
Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	1.5
Conductivity	0.3
Initial Deficit	0.33

Soil capillary suction head (inches or mm)

OK Cancel Help

PR- DMA 1



Subcatchment DMA1

Property	Value
Name	DMA1
X-Coordinate	-362.011
Y-Coordinate	5724.020
Description	
Tag	
Rain Gage	Poway
Outlet	BF-1-1
Area	8.07
Width	245
% Slope	8.22
% Imperv	42.6
N-Imperv	0.012
N-Perv	0.10
Dstore-Imperv	0.05
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration Data	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0
N-Perv Pattern	
Dstore Pattern	
Infil. Pattern	

Infiltration Editor

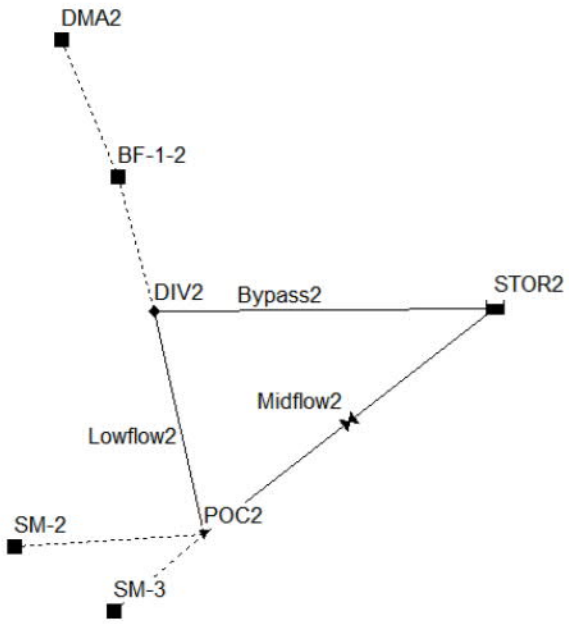
Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9
Conductivity	0.01875
Initial Deficit	0.3

Soil capillary suction head (inches or mm)

OK Cancel Help

PR- DMA 2



Subcatchment DMA2

Property	Value
Name	DMA2
X-Coordinate	4610.116
Y-Coordinate	5753.425
Description	
Tag	
Rain Gage	Poway
Outlet	BF-1-2
Area	11.87
Width	150
% Slope	2.83
% Imperv	56.5
N-Imperv	0.012
N-Perv	0.10
Dstore-Imperv	0.05
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration Data	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0
N-Perv Pattern	
Dstore Pattern	
Infil. Pattern	

Infiltration Editor

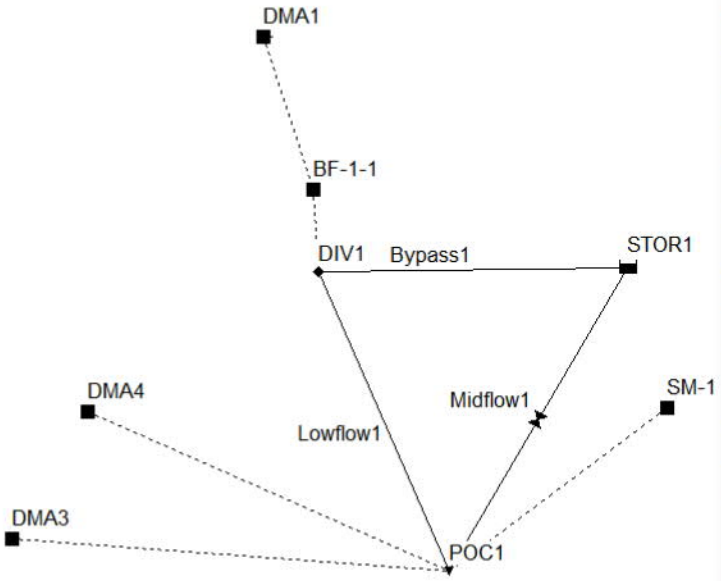
Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9
Conductivity	0.01875
Initial Deficit	0.3

Soil capillary suction head (inches or mm)

OK Cancel Help

PR- DMA 3



Subcatchment DMA3

Property	Value
Name	DMA3
X-Coordinate	-2049.526
Y-Coordinate	2360.379
Description	
Tag	
Rain Gage	Poway
Outlet	POC1
Area	.35
Width	60
% Slope	1.98
% Imperv	38.3
N-Imperv	0.012
N-Perv	0.10
Dstore-Imperv	0.05
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration Data	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0
N-Perv Pattern	
Dstore Pattern	

Infiltration Editor

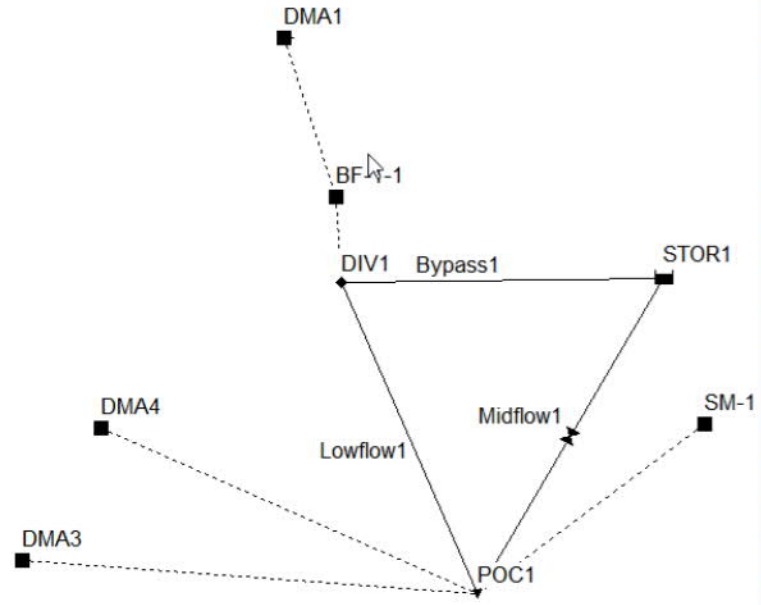
Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9
Conductivity	0.01875
Initial Deficit	0.3

Soil capillary suction head (inches or mm)

OK Cancel Help

PR- DMA 4



Subcatchment DMA4

Property	Value
Name	DMA4
X-Coordinate	-1543.730
Y-Coordinate	3213.909
Description	
Tag	
Rain Gage	Poway
Outlet	POC1
Area	0.2463
Width	50
% Slope	2.34
% Imperv	45.6
N-Imperv	0.012
N-Perv	0.10
Dstore-Imperv	0.05
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration Data	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0
N-Perv Pattern	
Dstore Pattern	

Infiltration Editor

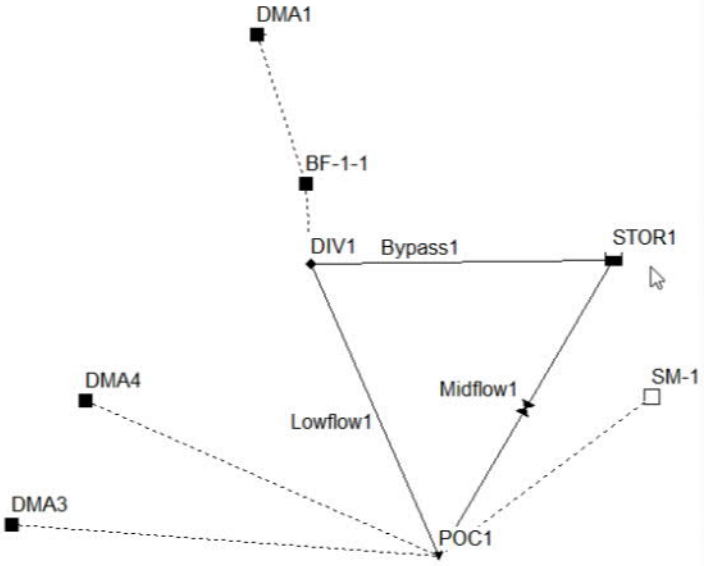
Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9
Conductivity	0.01875
Initial Deficit	0.3

Soil capillary suction head (inches or mm)

OK Cancel Help

SM-1



Subcatchment SM-1

Property	Value
Name	SM-1
X-Coordinate	2349.676
Y-Coordinate	3237.743
Description	
Tag	
Rain Gage	Poway
Outlet	POC1
Area	3.19
Width	393
% Slope	50
% Imperv	0
N-Imperv	0.012
N-Perv	0.10
Dstore-Imperv	0.05
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration Data	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0
N-Perv Pattern	

Infiltration Editor

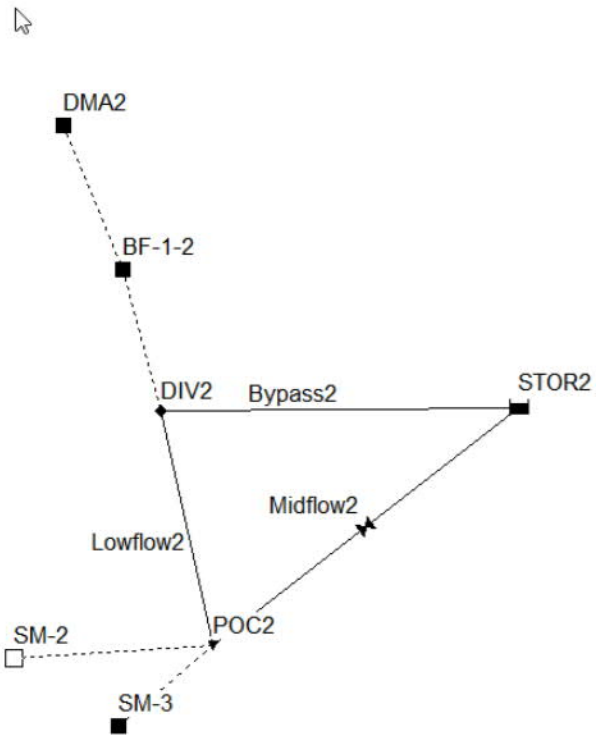
Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9
Conductivity	0.01875
Initial Deficit	0.3

Soil capillary suction head (inches or mm)

OK Cancel Help

SM-2



Subcatchment SM-2

Property	Value
Name	SM-2
X-Coordinate	4311.532
Y-Coordinate	2512.909
Description	
Tag	
Rain Gage	Poway
Outlet	POC2
Area	0.61
Width	89
% Slope	50
% Imperv	25
N-Imperv	0.012
N-Perv	0.10
Dstore-Imperv	0.05
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration Data	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0
N-Perv Pattern	
Dstore Pattern	
Infil. Pattern	

Infiltration Editor

Infiltration Method: GREEN_AMPT

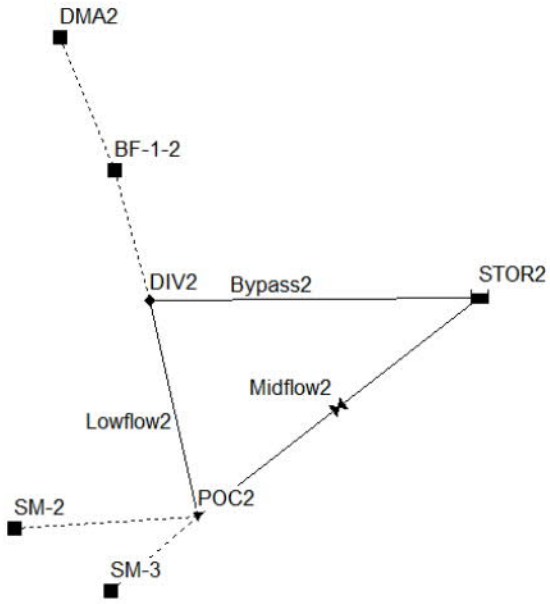
Property	Value
Suction Head	9
Conductivity	.01875
Initial Deficit	0.3

Soil capillary suction head (inches or mm)

OK Cancel Help

SM-3

oway



Subcatchment SM-3

Property	Value
Name	SM-3
X-Coordinate	4948.365
Y-Coordinate	2099.828
Description	
Tag	
Rain Gage	Poway
Outlet	POC2
Area	5.18
Width	61
% Slope	8.08
% Imperv	25
N-Imperv	0.012
N-Perv	0.10
Dstore-Imperv	0.05
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration Data	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0
N-Perv Pattern	
Dstore Pattern	
Infil. Pattern	

Infiltration Editor

Infiltration Method: GREEN_AMPT

Property	Value
Suction Head	9
Conductivity	0.01875
Initial Deficit	0.3

Soil capillary suction head (inches or mm)

OK Cancel Help

```
[TITLE]
;;Project Title/Notes
Renzulli Estates
HMP Modeling
Post-development Condition
Jing Liu

[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           04/10/1962
START_TIME           15:00:00
REPORT_START_DATE    04/10/1962
REPORT_START_TIME    15:00:00
END_DATE             05/23/2008
END_TIME             15:00:00
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          0.05   0.09   0.13   0.19   0.25   0.29   0.3    0.27   0.21   0.14   0.08   0.05
DRY_ONLY         NO

[RAINGAGES]
;;Name           Format    Interval SCF      Source
;;-------------- --------- ------ ------ ----------
;Renzulli Estates
Poway            VOLUME    1:00     1.0      TIMESERIES TS-Poway

[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv  Width    %Slope   CurbLen  SnowPack

;;-------------- ---------------- ---------------- -------- -------- -------- -------- --------
----------------
DMA1             Poway            BF-1-1           8.07     42.6     245      8.22     0

DMA4             Poway            POC1             0.2463   45.6     50       2.34     0

DMA3             Poway            POC1             .35      38.3     60       1.98     0

DMA2             Poway            BF-1-2           11.87    56.5     150      2.83     0

BF-1-1           Poway            DIV1             0.1286   0        60       0.01     0

BF-1-2           Poway            DIV2             .2112    0        61       0.01     0

SM-1             Poway            POC1             3.19     0        393      50       0

SM-2             Poway            POC2             0.61     25       89       50       0

SM-3             Poway            POC2             5.18     25       61       8.08     0
```

```
[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
DMA1             0.012      0.10       0.05       0.1        25         OUTLET
DMA4             0.012      0.10       0.05       0.1        25         OUTLET
DMA3             0.012      0.10       0.05       0.1        25         OUTLET
DMA2             0.012      0.10       0.05       0.1        25         OUTLET
BF-1-1           0.012      0.10       0.05       0.1        25         OUTLET
BF-1-2           0.012      0.10       0.05       0.1        25         OUTLET
SM-1             0.012      0.10       0.05       0.1        25         OUTLET
SM-2             0.012      0.10       0.05       0.1        25         OUTLET
SM-3             0.012      0.10       0.05       0.1        25         OUTLET

[INFILTRATION]
;;Subcatchment   Suction    Ksat       IMD
;;-------------- ---------- ---------- ----------
DMA1             9          0.01875    0.3
DMA4             9          0.01875    0.3
DMA3             9          0.01875    0.3
DMA2             9          0.01875    0.3
BF-1-1           1.5        0.3        0.33
BF-1-2           1.5        0.3        0.33
SM-1             9          0.01875    0.3
SM-2             9          .01875     0.3
SM-3             9          0.01875    0.3

[LID_CONTROLS]
;;Name           Type/Layer Parameters
;;-------------- ---------- ----------
BF-1-1           BC
BF-1-1           SURFACE    6.24       0.0        0.0        0          5
BF-1-1           SOIL       24         0.4        0.2        0.1        5          5          1.5
BF-1-1           STORAGE    15         0.67       0          0
BF-1-1           DRAIN      0.0585     0.5        3          6          0          0

BF-1-2           BC
BF-1-2           SURFACE    6.24       0.0        0          1.0        5
BF-1-2           SOIL       24         0.4        0.2        0.1        5          5          1.5
BF-1-2           STORAGE    15         0.67       0.05       0
```

```
BF-1-2           DRAIN      0.0801     0.5        3          6          0          0

[LID_USAGE]
;;Subcatchment   LID Process      Number  Area       Width      InitSat    FromImp    ToPerv     RptFile
             DrainTo          FromPerv
;;-------------- ---------------- ------- ---------- ---------- ---------- ---------- ----------
----------------------- --------------- ----------
BF-1-1           BF-1-1           1       5600       0          0          100        0          *
             *                100
BF-1-2           BF-1-2           1       9200       0          0          100        0          *
             *                0

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
POC1             0          FREE                        NO
POC2             0          FREE                        NO
NODE1-OUTFLOW    0          FREE                        NO
NODE2-OUTFLOW    0          FREE                        NO

[DIVIDERS]
;;Name           Elevation  Diverted Link    Type       Parameters
;;-------------- ---------- ---------------- ---------- ----------
DIV1             0          ByPASS1          CUTOFF     0.0488     0          0          0          0

DIV2             0          Bypass2          CUTOFF     0.1096     0          0          0          0


[STORAGE]
;;Name           Elev.    MaxDepth   InitDepth  Shape      Curve Name/Params            N/A      Fevap
Psi      Ksat     IMD
;;-------------- -------- ---------- ---------- ---------- ---------------------------- -------- --------
       -------- --------
STOR1            0        5.5        0          TABULAR    HMP-1                        0        0
STOR2            0        5          0          TABULAR    HMP-2                        0        0
BASIN1           0        5.5        0          TABULAR    HMP-1                        0        0
BASIN2           0        5          0          TABULAR    HMP-2                        0        0

[CONDUITS]
;;Name           From Node        To Node          Length     Roughness  InOffset   OutOffset  InitFlow
```

```
MaxFlow
;;-------------- ---------------- --------------- ---------- ---------- ---------- ---------- ----------
----------
Bypass1          DIV1             STOR1            400        0.01       0          0          0          0

Lowflow1         DIV1             POC1             100        0.013      0          0          0          0

Bypass2          DIV2             STOR2            400        0.01       0          0          0          0

Lowflow2         DIV2             POC2             100        0.013      0          0          0          0


[OUTLETS]
;;Name           From Node        To Node          Offset     Type            QTable/Qcoeff    Qexpon
Gated
;;-------------- ---------------- --------------- ---------- --------------- ---------------- ----------
--------
Midflow1         STOR1            POC1             0          TABULAR/DEPTH   BF-1-1-Riser                NO

Midflow2         STOR2            POC2             0          TABULAR/DEPTH   BF-1-2-Riser                NO

Basin1-riser     BASIN1           NODE1-OUTFLOW    0          TABULAR/DEPTH   BF-1-1-Riser                NO

Basin2-riser     BASIN2           NODE2-OUTFLOW    0          TABULAR/DEPTH   BF-1-2-Riser                NO


[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4      Barrels    Culvert
;;-------------- ------------ ---------------- ---------- ---------- ---------- ---------- ----------
Bypass1          DUMMY        0                0          0          0          1
Lowflow1         DUMMY        0                0          0          0          1
Bypass2          DUMMY        0                0          0          0          1
Lowflow2         DUMMY        0                0          0          0          1

[INFLOWS]
;;Node           Constituent      Time Series      Type     Mfactor  Sfactor  Baseline Pattern
;;-------------- ---------------- ---------------- -------- -------- -------- -------- --------
BASIN1           FLOW             Basin1-Hydrograph FLOW     1.0      1.0
BASIN2           FLOW             Basin2-Hydrograph FLOW     1.0      1.0
```

```
[CURVES]
;;Name           Type       X-Value    Y-Value
;;-------------- ---------- ---------- ----------
BF-1-1-Riser     Rating     0.00       0.000
BF-1-1-Riser                0.05       0.002
BF-1-1-Riser                0.10       0.006
BF-1-1-Riser                0.15       0.009
BF-1-1-Riser                0.20       0.011
BF-1-1-Riser                0.25       0.012
BF-1-1-Riser                0.30       0.014
BF-1-1-Riser                0.35       0.015
BF-1-1-Riser                0.40       0.016
BF-1-1-Riser                0.45       0.017
BF-1-1-Riser                0.50       0.018
BF-1-1-Riser                0.55       0.019
BF-1-1-Riser                0.60       0.020
BF-1-1-Riser                0.65       0.021
BF-1-1-Riser                0.70       0.022
BF-1-1-Riser                0.75       0.022
BF-1-1-Riser                0.80       0.023
BF-1-1-Riser                0.85       0.024
BF-1-1-Riser                0.90       0.025
BF-1-1-Riser                0.95       0.025
BF-1-1-Riser                1.00       0.026
BF-1-1-Riser                1.05       0.027
BF-1-1-Riser                1.10       0.027
BF-1-1-Riser                1.15       0.028
BF-1-1-Riser                1.20       0.029
BF-1-1-Riser                1.25       0.029
BF-1-1-Riser                1.30       0.032
BF-1-1-Riser                1.35       0.034
BF-1-1-Riser                1.40       0.036
BF-1-1-Riser                1.45       0.038
BF-1-1-Riser                1.50       0.039
BF-1-1-Riser                1.55       0.041
BF-1-1-Riser                1.60       0.042
BF-1-1-Riser                1.65       0.043
BF-1-1-Riser                1.70       0.044
BF-1-1-Riser                1.75       0.045
BF-1-1-Riser                1.80       0.046
```

BF-1-1-Riser	1.85	0.047
BF-1-1-Riser	1.90	0.048
BF-1-1-Riser	1.95	0.049
BF-1-1-Riser	2.00	0.050
BF-1-1-Riser	2.05	0.055
BF-1-1-Riser	2.10	0.068
BF-1-1-Riser	2.15	0.086
BF-1-1-Riser	2.20	0.109
BF-1-1-Riser	2.25	0.136
BF-1-1-Riser	2.30	0.156
BF-1-1-Riser	2.35	0.170
BF-1-1-Riser	2.40	0.183
BF-1-1-Riser	2.45	0.195
BF-1-1-Riser	2.50	0.206
BF-1-1-Riser	2.55	0.216
BF-1-1-Riser	2.60	0.226
BF-1-1-Riser	2.65	0.235
BF-1-1-Riser	2.70	0.244
BF-1-1-Riser	2.75	0.252
BF-1-1-Riser	2.80	0.260
BF-1-1-Riser	2.85	0.268
BF-1-1-Riser	2.90	0.276
BF-1-1-Riser	2.95	0.283
BF-1-1-Riser	3.00	0.290
BF-1-1-Riser	3.05	0.297
BF-1-1-Riser	3.10	0.304
BF-1-1-Riser	3.15	0.311
BF-1-1-Riser	3.20	0.317
BF-1-1-Riser	3.25	0.324
BF-1-1-Riser	3.30	0.330
BF-1-1-Riser	3.35	0.336
BF-1-1-Riser	3.40	0.342
BF-1-1-Riser	3.45	0.348
BF-1-1-Riser	3.50	0.354
BF-1-1-Riser	3.55	0.359
BF-1-1-Riser	3.60	0.365
BF-1-1-Riser	3.65	0.371
BF-1-1-Riser	3.70	0.376
BF-1-1-Riser	3.75	0.754
BF-1-1-Riser	3.80	1.440

```
BF-1-1-Riser                3.85       2.326
BF-1-1-Riser                3.90       3.375
BF-1-1-Riser                3.95       4.564
BF-1-1-Riser                4.00       5.879
BF-1-1-Riser                4.05       7.307
BF-1-1-Riser                4.10       8.841
BF-1-1-Riser                4.15       10.474
BF-1-1-Riser                4.20       12.200
BF-1-1-Riser                4.25       14.014
BF-1-1-Riser                4.30       15.912
BF-1-1-Riser                4.35       17.891
BF-1-1-Riser                4.40       19.947
BF-1-1-Riser                4.45       22.078
BF-1-1-Riser                4.50       24.281
BF-1-1-Riser                4.55       26.554
BF-1-1-Riser                4.60       28.894
BF-1-1-Riser                4.65       31.301
BF-1-1-Riser                4.70       33.771
BF-1-1-Riser                4.75       36.304
BF-1-1-Riser                4.80       38.897
BF-1-1-Riser                4.85       41.550
BF-1-1-Riser                4.90       44.262
BF-1-1-Riser                4.95       47.030
BF-1-1-Riser                5.00       49.854
BF-1-1-Riser                5.05       52.733
BF-1-1-Riser                5.10       55.665
BF-1-1-Riser                5.15       58.651
BF-1-1-Riser                5.20       61.688
BF-1-1-Riser                5.25       64.776
BF-1-1-Riser                5.30       67.914
BF-1-1-Riser                5.35       71.101
BF-1-1-Riser                5.40       74.338
BF-1-1-Riser                5.45       77.621
BF-1-1-Riser                5.50       80.953
;
BF-1-2-Riser     Rating     0.00       0.000
BF-1-2-Riser                0.05       0.003
BF-1-2-Riser                0.10       0.010
BF-1-2-Riser                0.15       0.018
BF-1-2-Riser                0.20       0.022
```

BF-1-2-Riser	0.25	0.026
BF-1-2-Riser	0.30	0.029
BF-1-2-Riser	0.35	0.032
BF-1-2-Riser	0.40	0.035
BF-1-2-Riser	0.45	0.037
BF-1-2-Riser	0.50	0.040
BF-1-2-Riser	0.55	0.042
BF-1-2-Riser	0.60	0.044
BF-1-2-Riser	0.65	0.046
BF-1-2-Riser	0.70	0.048
BF-1-2-Riser	0.75	0.050
BF-1-2-Riser	0.80	0.052
BF-1-2-Riser	0.85	0.053
BF-1-2-Riser	0.90	0.055
BF-1-2-Riser	0.95	0.057
BF-1-2-Riser	1.00	0.058
BF-1-2-Riser	1.05	0.060
BF-1-2-Riser	1.10	0.061
BF-1-2-Riser	1.15	0.063
BF-1-2-Riser	1.20	0.064
BF-1-2-Riser	1.25	0.065
BF-1-2-Riser	1.30	0.067
BF-1-2-Riser	1.35	0.068
BF-1-2-Riser	1.40	0.069
BF-1-2-Riser	1.45	0.071
BF-1-2-Riser	1.50	0.072
BF-1-2-Riser	1.55	0.076
BF-1-2-Riser	1.60	0.084
BF-1-2-Riser	1.65	0.093
BF-1-2-Riser	1.70	0.099
BF-1-2-Riser	1.75	0.104
BF-1-2-Riser	1.80	0.108
BF-1-2-Riser	1.85	0.113
BF-1-2-Riser	1.90	0.116
BF-1-2-Riser	1.95	0.120
BF-1-2-Riser	2.00	0.123
BF-1-2-Riser	2.05	0.131
BF-1-2-Riser	2.10	0.146
BF-1-2-Riser	2.15	0.166
BF-1-2-Riser	2.20	0.192

BF-1-2-Riser	2.25	0.220
BF-1-2-Riser	2.30	0.242
BF-1-2-Riser	2.35	0.258
BF-1-2-Riser	2.40	0.273
BF-1-2-Riser	2.45	0.286
BF-1-2-Riser	2.50	0.299
BF-1-2-Riser	2.55	0.311
BF-1-2-Riser	2.60	0.322
BF-1-2-Riser	2.65	0.333
BF-1-2-Riser	2.70	0.344
BF-1-2-Riser	2.75	0.354
BF-1-2-Riser	2.80	0.364
BF-1-2-Riser	2.85	0.373
BF-1-2-Riser	2.90	0.382
BF-1-2-Riser	2.95	0.391
BF-1-2-Riser	3.00	0.400
BF-1-2-Riser	3.05	0.408
BF-1-2-Riser	3.10	0.416
BF-1-2-Riser	3.15	0.797
BF-1-2-Riser	3.20	1.485
BF-1-2-Riser	3.25	2.375
BF-1-2-Riser	3.30	3.426
BF-1-2-Riser	3.35	4.618
BF-1-2-Riser	3.40	5.934
BF-1-2-Riser	3.45	7.365
BF-1-2-Riser	3.50	8.901
BF-1-2-Riser	3.55	10.536
BF-1-2-Riser	3.60	12.264
BF-1-2-Riser	3.65	14.080
BF-1-2-Riser	3.70	15.980
BF-1-2-Riser	3.75	17.961
BF-1-2-Riser	3.80	20.020
BF-1-2-Riser	3.85	22.152
BF-1-2-Riser	3.90	24.357
BF-1-2-Riser	3.95	26.632
BF-1-2-Riser	4.00	28.974
BF-1-2-Riser	4.05	31.382
BF-1-2-Riser	4.10	33.854
BF-1-2-Riser	4.15	36.388
BF-1-2-Riser	4.20	38.984

```
BF-1-2-Riser                4.25       41.639
BF-1-2-Riser                4.30       44.351
BF-1-2-Riser                4.35       47.121
BF-1-2-Riser                4.40       49.947
BF-1-2-Riser                4.45       52.827
BF-1-2-Riser                4.50       55.761
BF-1-2-Riser                4.55       58.748
BF-1-2-Riser                4.60       61.787
BF-1-2-Riser                4.65       64.876
BF-1-2-Riser                4.70       68.016
BF-1-2-Riser                4.75       71.205
BF-1-2-Riser                4.80       74.442
BF-1-2-Riser                4.85       77.728
BF-1-2-Riser                4.90       81.060
BF-1-2-Riser                4.95       84.439
BF-1-2-Riser                5.00       87.864
BF-1-2-Riser                5.05       91.334
BF-1-2-Riser                5.10       94.849
BF-1-2-Riser                5.15       98.408
BF-1-2-Riser                5.20       102.010
BF-1-2-Riser                5.25       105.656
BF-1-2-Riser                5.30       109.344
BF-1-2-Riser                5.35       113.074
BF-1-2-Riser                5.40       116.846
BF-1-2-Riser                5.45       120.659
BF-1-2-Riser                5.50       124.512
;
;BF-1-1 Storage Curve
HMP-1            Storage    0.00       6051
HMP-1                       0.05       6096
HMP-1                       0.10       6141
HMP-1                       0.15       6186
HMP-1                       0.20       6231
HMP-1                       0.25       6276
HMP-1                       0.30       6321
HMP-1                       0.35       6366
HMP-1                       0.40       6411
HMP-1                       0.45       6456
HMP-1                       0.50       6501
HMP-1                       0.55       6549
```

HMP-1	0.60	6597
HMP-1	0.65	6645
HMP-1	0.70	6693
HMP-1	0.75	6741
HMP-1	0.80	6789
HMP-1	0.85	6837
HMP-1	0.90	6885
HMP-1	0.95	6933
HMP-1	1.00	6981
HMP-1	1.05	7028
HMP-1	1.10	7076
HMP-1	1.15	7124
HMP-1	1.20	7172
HMP-1	1.25	7220
HMP-1	1.30	7268
HMP-1	1.35	7316
HMP-1	1.40	7364
HMP-1	1.45	7412
HMP-1	1.50	7460
HMP-1	1.55	7511
HMP-1	1.60	7562
HMP-1	1.65	7612
HMP-1	1.70	7663
HMP-1	1.75	7714
HMP-1	1.80	7765
HMP-1	1.85	7815
HMP-1	1.90	7866
HMP-1	1.95	7917
HMP-1	2.00	7968
HMP-1	2.05	8018
HMP-1	2.10	8069
HMP-1	2.15	8120
HMP-1	2.20	8171
HMP-1	2.25	8221
HMP-1	2.30	8272
HMP-1	2.35	8323
HMP-1	2.40	8374
HMP-1	2.45	8424
HMP-1	2.50	8475
HMP-1	2.55	8529

HMP-1	2.60	8582
HMP-1	2.65	8636
HMP-1	2.70	8689
HMP-1	2.75	8743
HMP-1	2.80	8797
HMP-1	2.85	8850
HMP-1	2.90	8904
HMP-1	2.95	8957
HMP-1	3.00	9011
HMP-1	3.05	9065
HMP-1	3.10	9118
HMP-1	3.15	9172
HMP-1	3.20	9225
HMP-1	3.25	9279
HMP-1	3.30	9333
HMP-1	3.35	9386
HMP-1	3.40	9440
HMP-1	3.45	9493
HMP-1	3.50	9547
HMP-1	3.55	9603
HMP-1	3.60	9660
HMP-1	3.65	9716
HMP-1	3.70	9773
HMP-1	3.75	9829
HMP-1	3.80	9885
HMP-1	3.85	9942
HMP-1	3.90	9998
HMP-1	3.95	10055
HMP-1	4.00	10111
HMP-1	4.05	10167
HMP-1	4.10	10224
HMP-1	4.15	10280
HMP-1	4.20	10337
HMP-1	4.25	10393
HMP-1	4.30	10449
HMP-1	4.35	10506
HMP-1	4.40	10562
HMP-1	4.45	10619
HMP-1	4.50	10675
HMP-1	4.55	10734

```
HMP-1                       4.60       10793
HMP-1                       4.65       10853
HMP-1                       4.70       10912
HMP-1                       4.75       10971
HMP-1                       4.80       11030
HMP-1                       4.85       11089
HMP-1                       4.90       11149
HMP-1                       4.95       11208
HMP-1                       5.00       11267
HMP-1                       5.05       11326
HMP-1                       5.10       11385
HMP-1                       5.15       11445
HMP-1                       5.20       11504
HMP-1                       5.25       11563
HMP-1                       5.30       11622
HMP-1                       5.35       11681
HMP-1                       5.40       11741
HMP-1                       5.45       11800
HMP-1                       5.50       11859
;
;BF-1-2 Storage Curve
HMP-2             Storage   0.00       9937
HMP-2                       0.05       10011
HMP-2                       0.10       10084
HMP-2                       0.15       10158
HMP-2                       0.20       10232
HMP-2                       0.25       10306
HMP-2                       0.30       10379
HMP-2                       0.35       10453
HMP-2                       0.40       10527
HMP-2                       0.45       10600
HMP-2                       0.50       10674
HMP-2                       0.55       10751
HMP-2                       0.60       10827
HMP-2                       0.65       10904
HMP-2                       0.70       10980
HMP-2                       0.75       11057
HMP-2                       0.80       11133
HMP-2                       0.85       11210
HMP-2                       0.90       11286
```

HMP-2	0.95	11363
HMP-2	1.00	11440
HMP-2	1.05	11516
HMP-2	1.10	11593
HMP-2	1.15	11669
HMP-2	1.20	11746
HMP-2	1.25	11822
HMP-2	1.30	11899
HMP-2	1.35	11975
HMP-2	1.40	12052
HMP-2	1.45	12128
HMP-2	1.50	12205
HMP-2	1.55	12284
HMP-2	1.60	12364
HMP-2	1.65	12443
HMP-2	1.70	12523
HMP-2	1.75	12602
HMP-2	1.80	12681
HMP-2	1.85	12761
HMP-2	1.90	12840
HMP-2	1.95	12920
HMP-2	2.00	12999
HMP-2	2.05	13078
HMP-2	2.10	13158
HMP-2	2.15	13237
HMP-2	2.20	13317
HMP-2	2.25	13396
HMP-2	2.30	13475
HMP-2	2.35	13555
HMP-2	2.40	13634
HMP-2	2.45	13714
HMP-2	2.50	13793
HMP-2	2.55	13875
HMP-2	2.60	13957
HMP-2	2.65	14040
HMP-2	2.70	14122
HMP-2	2.75	14204
HMP-2	2.80	14286
HMP-2	2.85	14368
HMP-2	2.90	14451

HMP-2	2.95	14533
HMP-2	3.00	14615
HMP-2	3.05	14697
HMP-2	3.10	14779
HMP-2	3.15	14862
HMP-2	3.20	14944
HMP-2	3.25	15026
HMP-2	3.30	15108
HMP-2	3.35	15190
HMP-2	3.40	15273
HMP-2	3.45	15355
HMP-2	3.50	15437
HMP-2	3.55	15522
HMP-2	3.60	15607
HMP-2	3.65	15692
HMP-2	3.70	15777
HMP-2	3.75	15862
HMP-2	3.80	15947
HMP-2	3.85	16032
HMP-2	3.90	16117
HMP-2	3.95	16202
HMP-2	4.00	16288
HMP-2	4.05	16373
HMP-2	4.10	16458
HMP-2	4.15	16543
HMP-2	4.20	16628
HMP-2	4.25	16713
HMP-2	4.30	16798
HMP-2	4.35	16883
HMP-2	4.40	16968
HMP-2	4.45	17053
HMP-2	4.50	17138
HMP-2	4.55	17226
HMP-2	4.60	17314
HMP-2	4.65	17402
HMP-2	4.70	17489
HMP-2	4.75	17577
HMP-2	4.80	17665
HMP-2	4.85	17753
HMP-2	4.90	17841

```
HMP-2                      4.95       17929
HMP-2                      5.00       18017
HMP-2                      5.05       18104
HMP-2                      5.10       18192
HMP-2                      5.15       18280
HMP-2                      5.20       18368
HMP-2                      5.25       18456
HMP-2                      5.30       18544
HMP-2                      5.35       18631
HMP-2                      5.40       18719
HMP-2                      5.45       18807
HMP-2                      5.50       18895

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
Basin1-Hydrograph 4/10/1962  15:00      0
Basin1-Hydrograph 4/10/1962  15:09      0
Basin1-Hydrograph 4/10/1962  15:18      0.8
Basin1-Hydrograph 4/10/1962  15:27      0.9
Basin1-Hydrograph 4/10/1962  15:36      0.9
Basin1-Hydrograph 4/10/1962  15:45      0.9
Basin1-Hydrograph 4/10/1962  15:54      0.9
Basin1-Hydrograph 4/10/1962  16:03      1
Basin1-Hydrograph 4/10/1962  16:12      1
Basin1-Hydrograph 4/10/1962  16:21      1
Basin1-Hydrograph 4/10/1962  16:30      1.1
Basin1-Hydrograph 4/10/1962  16:39      1.1
Basin1-Hydrograph 4/10/1962  16:48      1.2
Basin1-Hydrograph 4/10/1962  16:57      1.2
Basin1-Hydrograph 4/10/1962  17:06      1.3
Basin1-Hydrograph 4/10/1962  17:15      1.3
Basin1-Hydrograph 4/10/1962  17:24      1.4
Basin1-Hydrograph 4/10/1962  17:33      1.5
Basin1-Hydrograph 4/10/1962  17:42      1.6
Basin1-Hydrograph 4/10/1962  17:51      1.7
Basin1-Hydrograph 4/10/1962  18:00      1.8
Basin1-Hydrograph 4/10/1962  18:09      1.9
Basin1-Hydrograph 4/10/1962  18:18      2.2
Basin1-Hydrograph 4/10/1962  18:27      2.4
```

```
Basin1-Hydrograph 4/10/1962  18:36      2.9
Basin1-Hydrograph 4/10/1962  18:45      3.4
Basin1-Hydrograph 4/10/1962  18:54      4.9
Basin1-Hydrograph 4/10/1962  19:03      6.4
Basin1-Hydrograph 4/10/1962  19:12      25.48
Basin1-Hydrograph 4/10/1962  19:21      4
Basin1-Hydrograph 4/10/1962  19:30      2.6
Basin1-Hydrograph 4/10/1962  19:39      2.1
Basin1-Hydrograph 4/10/1962  19:48      1.7
Basin1-Hydrograph 4/10/1962  19:57      1.5
Basin1-Hydrograph 4/10/1962  20:06      1.3
Basin1-Hydrograph 4/10/1962  20:15      1.2
Basin1-Hydrograph 4/10/1962  20:24      1.1
Basin1-Hydrograph 4/10/1962  20:33      1
Basin1-Hydrograph 4/10/1962  20:42      1
Basin1-Hydrograph 4/10/1962  20:51      0.9
Basin1-Hydrograph 4/10/1962  21:00      0.9
Basin1-Hydrograph 4/10/1962  21:09      0
;
TS-Poway         FILE "R:\1207\Hyd\SWMP\TM\ARCHIVE\CALCS\HMP\poway.dat"
;
Basin2-Hydrograph 4/10/1962  15:00      0
Basin2-Hydrograph 4/10/1962  15:09      0
Basin2-Hydrograph 4/10/1962  15:18      1.4
Basin2-Hydrograph 4/10/1962  15:27      1.5
Basin2-Hydrograph 4/10/1962  15:36      1.5
Basin2-Hydrograph 4/10/1962  15:45      1.5
Basin2-Hydrograph 4/10/1962  15:54      1.6
Basin2-Hydrograph 4/10/1962  16:03      1.6
Basin2-Hydrograph 4/10/1962  16:12      1.7
Basin2-Hydrograph 4/10/1962  16:21      1.7
Basin2-Hydrograph 4/10/1962  16:30      1.8
Basin2-Hydrograph 4/10/1962  16:39      1.9
Basin2-Hydrograph 4/10/1962  16:48      2
Basin2-Hydrograph 4/10/1962  16:57      2
Basin2-Hydrograph 4/10/1962  17:06      2.2
Basin2-Hydrograph 4/10/1962  17:15      2.2
Basin2-Hydrograph 4/10/1962  17:24      2.4
Basin2-Hydrograph 4/10/1962  17:33      2.5
Basin2-Hydrograph 4/10/1962  17:42      2.7
```

```
Basin2-Hydrograph 4/10/1962  17:51      2.8
Basin2-Hydrograph 4/10/1962  18:00      3.1
Basin2-Hydrograph 4/10/1962  18:09      3.3
Basin2-Hydrograph 4/10/1962  18:18      3.8
Basin2-Hydrograph 4/10/1962  18:27      4.1
Basin2-Hydrograph 4/10/1962  18:36      5.1
Basin2-Hydrograph 4/10/1962  18:45      5.8
Basin2-Hydrograph 4/10/1962  18:54      8.5
Basin2-Hydrograph 4/10/1962  19:03      12.4
Basin2-Hydrograph 4/10/1962  19:12      42.19
Basin2-Hydrograph 4/10/1962  19:21      6.8
Basin2-Hydrograph 4/10/1962  19:30      4.5
Basin2-Hydrograph 4/10/1962  19:39      3.6
Basin2-Hydrograph 4/10/1962  19:48      3
Basin2-Hydrograph 4/10/1962  19:57      2.6
Basin2-Hydrograph 4/10/1962  20:06      2.3
Basin2-Hydrograph 4/10/1962  20:15      2.1
Basin2-Hydrograph 4/10/1962  20:24      1.9
Basin2-Hydrograph 4/10/1962  20:33      1.8
Basin2-Hydrograph 4/10/1962  20:42      1.7
Basin2-Hydrograph 4/10/1962  20:51      1.6
Basin2-Hydrograph 4/10/1962  21:00      1.5
Basin2-Hydrograph 4/10/1962  21:09      0

[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
;;-------------- ------------------ ------------------
POC1             890.411            2139.094
```

```
POC2             5526.870           2592.202
NODE1-OUTFLOW    1981.114           -1712.386
NODE2-OUTFLOW    5200.170           -1592.845
DIV1             5.269              4151.739
DIV2             5210.748           4014.752
STOR1            2081.138           4172.813
STOR2            7381.454           4035.827
BASIN1           2495.697           -180.723
BASIN2           6016.797           23.896

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

[Polygons]
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ------------------
DMA1             -305.109           5724.020
DMA1             -305.109           5724.020
DMA1             -399.945           5724.020
DMA1             -399.945           5724.020
DMA1             -399.945           5724.020
DMA4             -1543.730          3213.909
DMA3             -2049.526          2360.379
DMA2             4610.116           5753.425
BF-1-1           -26.344            4699.684
BF-1-2           4974.182           4879.518
SM-1             2349.676           3237.743
SM-2             4311.532           2512.909
SM-3             4948.365           2099.828

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
Poway            3419.389           7249.737
```

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.014)
-------------------------------------------------------------

Renzulli Estates
HMP Modeling
Post-development Condition

WARNING 04: minimum elevation drop used for Conduit Bypass1
WARNING 04: minimum elevation drop used for Conduit Lowflow1
WARNING 04: minimum elevation drop used for Conduit Bypass2
WARNING 04: minimum elevation drop used for Conduit Lowflow2

***********************************************************
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 ............ 04/10/1962 15:00:00
Ending Date .............. 05/23/2008 15:00:00
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
```

Runoff Quantity Continuity	Volume acre-feet	Depth inches
Initial LID Storage	0.068	0.027
Total Precipitation	1388.756	558.180
Evaporation Loss	168.499	67.725
Infiltration Loss	661.935	266.050
Surface Runoff	323.901	130.185
LID Drainage	241.323	96.994
Final Storage	0.156	0.063
Continuity Error (%)	-0.503	

Flow Routing Continuity	Volume acre-feet	Volume 10^6 gal
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	565.222	184.186
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	3.076	1.002
External Outflow	568.252	185.173
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 (%)	0.008	

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


  *************************
  Subcatchment Runoff Summary
  *************************


-----------------------------------------------------------------------------------------------------
------------------
                            Total      Total      Total      Total     Imperv       Perv      Total
Total     Peak  Runoff
                           Precip      Runon       Evap      Infil     Runoff     Runoff     Runoff
Runoff   Runoff   Coeff
  Subcatchment                in         in         in         in         in         in         in    10^6
gal      CFS

-----------------------------------------------------------------------------------------------------
------------------
  DMA1                     558.18       0.00      57.75     240.49     197.00      66.67     263.67
57.78     5.98   0.472
  DMA4                     558.18       0.00      57.54     222.77     214.00      69.82     283.83
1.90     0.19   0.508
  DMA3                     558.18       0.00      52.38     253.62     179.61      77.73     257.34
2.45     0.27   0.461
  DMA2                     558.18       0.00      74.99     187.62     253.30      44.14     297.44
95.87     7.84   0.533
  BF-1-1                   558.18   16545.30     961.53       0.00       0.00       0.00   16135.22
56.34     5.99   0.943
  BF-1-2                   558.18   16716.59     804.40    2210.68       0.00       0.00   14259.23
81.77     7.85   0.825
  SM-1                     558.18       0.00      23.42     407.78       0.00     130.97     130.97
11.34     2.48   0.235
  SM-2                     558.18       0.00      40.98     305.08     118.66      99.87     218.53
```

3.62 0.48 0.392
SM-3 558.18 0.00 46.34 323.94 114.85 75.32 190.17
26.75 2.88 0.341

****
LID Performance Summary
****

Subcatchment	LID Control	Total Inflow in	Evap Loss in	Infil Loss in	Surface Outflow in	Drain Outflow in	Initial Storage in	Final Storage in	Continuity Error %
BF-1-1	BF-1-1	17103.48	961.88	0.00	7328.79	8812.26	2.40	2.83	0.00
BF-1-2	BF-1-2	17274.77	804.42	2210.73	5911.70	8347.85	2.40	2.63	-0.00

****
Node Depth Summary
****

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min	Reported Max Depth Feet
POC1	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
POC2	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
NODE1-OUTFLOW	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
NODE2-OUTFLOW	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
DIV1	DIVIDER	0.00	0.00	0.00	0 00:00	0.00

DIV2	DIVIDER	0.00	0.00	0.00	0	00:00	0.00
STOR1	STORAGE	0.06	4.00	4.00	6525	09:17	3.97
STOR2	STORAGE	0.04	3.45	3.45	6525	09:19	3.39
BASIN1	STORAGE	0.00	4.21	4.21	0	04:19	3.82
BASIN2	STORAGE	0.00	3.96	3.96	0	04:17	3.29

100 year peak flow detention
Max. detention depth, 0.5' WQ ponding excluded

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
POC1	OUTFALL	2.95	8.06	6525	09:01	15.7	72	0.000
POC2	OUTFALL	3.36	9.35	6525	09:07	30.4	112	0.000
NODE1-OUTFLOW	OUTFALL	0.00	12.54	0	04:19	0	0.369	0.000
NODE2-OUTFLOW	OUTFALL	0.00	26.92	0	04:17	0	0.632	0.000
DIV1	DIVIDER	5.99	5.99	6525	09:16	56.3	56.3	0.000
DIV2	DIVIDER	7.85	7.85	6525	09:16	81.8	81.8	0.000
STOR1	STORAGE	0.00	5.94	6525	09:16	0	25.6	0.023
STOR2	STORAGE	0.00	7.74	6525	09:16	0	33.9	0.020
BASIN1	STORAGE	25.48	25.48	0	04:13	0.37	0.37	0.242
BASIN2	STORAGE	42.19	42.19	0	04:13	0.633	0.633	0.217

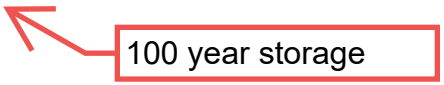
100 year storage

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 ft3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 ft3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS
STOR1	0.373	1	0	0	31.987	66	6525 09:17	5.80
STOR2	0.416	1	0	0	43.424	63	6525 09:18	7.32
BASIN1	0.004	0	0	0	34.174	70	0 04:18	12.54
BASIN2	0.005	0	0	0	51.488	74	0 04:17	26.92



****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
POC1	14.58	0.05	8.06	72.026
POC2	11.63	0.09	9.35	112.134
NODE1-OUTFLOW	0.06	0.06	12.54	0.369
NODE2-OUTFLOW	0.05	0.11	26.92	0.632
System	6.58	0.30	26.92	185.160



****
Link Flow Summary
****

Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth
Bypass1	DUMMY	5.94	6525 09:16			
Lowflow1	DUMMY	0.05	305 04:03			
Bypass2	DUMMY	7.74	6525 09:16			

Lowflow2	DUMMY	0.11	2881	04:21
Midflow1	DUMMY	5.80	6525	09:17
Midflow2	DUMMY	7.32	6525	09:19
Basin1-riser	DUMMY	12.54	0	04:19
Basin2-riser	DUMMY	26.92	0	04:17



****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Wed Oct 4 11:26:36 2023
Analysis ended on: Wed Oct 4 11:27:42 2023
Total elapsed time: 00:01:06

EXPLANATION OF SELECTED VARIABLES

Parameters for the pre- and post-development models include soil type group D in accordance with the San Diego County Hydrology Manual and the USGS Soil Survey. Suction head, conductivity and initial deficit corresponds to average values expected for the soil types, according to sources consulted, professional experience, and approximate values obtained by the interim Orange County modeling approach.

H&A selected infiltration values, such that the percentage of total precipitation that becomes runoff, is realistic for soil type group D and slightly smaller than measured values for Southern California watersheds.

Selection of a Kinematic Approach: As the continuous model is based on hourly rainfall, and the time of concentration for the pre-development and post-development conditions is significantly smaller than 60 minutes, precise routing of the flows through the impervious surfaces, the underdrain pipe system, and the discharge pipe was considered unnecessary. The truncation error of the precipitation into hourly steps is much more significant than the precise routing in a system where the time of concentration is much smaller than 1 hour.

The area of 'POC1PRDevArea' + POC1PRBasin must be equal to the area of the development tributary to that particular biofiltration facility. Five (5) decimal places were given regarding the areas of the bio-retention to insure that the area used by the program for the LID subroutine corresponds exactly with these tributaries.

LID Control Editor: Explanation of Significant Variables

INFILTRATION

Height:

The storage depth variable within the SWMM model is representative of the storage volume provided in the vault.

Seepage Rate:

The seepage rate is directly input from the geotechnical report.

Clogging factor:

A clogging factor was not used (0 indicates that there is no clogging assumed within the model). The reason for this is related to the fairness of a comparison with the SDHM model and the HMP sizing tables: a clogging factor was not considered, and instead, a conservative value of infiltration was recommended.

Storage Depth:

The storage depth variable within the SWMM model is representative of the storage volume provided beneath the engineered soil and mulch components of the biofiltration facility. This

storage volume is comprised of a gravel located bed beneath a layer of engineered soil and a 0.25 foot (3-inch) layer of landscaping mulch.

Porosity:
A porosity value of 0.4 has been selected for the model. The amended soil is to be highly sandy in content in order to have a saturated hydraulic conductivity of approximately 5 in/hr.

H&A considers this value to be slightly high; however, in order to comply with the HMP Permit, the value recommended by the Copermittees for the porosity of amended soil is 0.4, per Appendix A of the Final Hydromodification Management Plan by Brown & Caldwell, dated March 2011.

Void Ratio:
The ratio of the void volume divided by the soil volume is directly related to porosity as n/(1-n). As the underdrain layer is composed of gravel, a porosity value of 0.4 has been selected, which results in a void ratio of 0.4/ (1-0.4) = 0.67 for the gravel detention layer.

Clogging factor:
A clogging factor was not used (0 indicates that there is not clogging assumed within the model). The reason for this is related to the fairness of a comparison with the SDHM model and the HMP sizing tables: a clogging factor was not considered, and instead, a conservative value of infiltration was recommended.

Drain (Flow) coefficient:
The flow coefficient in the SWMM Model is the coefficient needed to transform the orifice equation into a general power law equation of the form:

$$q = C(H - H_D)^n \qquad (1)$$

where q is the peak flow in in/hr., n is the exponent (typically 0.5 for orifice equation), H D is the elevation of the centroid of the orifice in inches (assumed equal to the invert of the orifice for small orifices and in our design equal to 0) and H is the depth of the water in inches.

The general orifice equation can be expressed as:

$$Q = \frac{\pi}{4} c_g \frac{D^2}{144} \sqrt{2g \frac{(H - H_D)}{12}} \qquad (2)$$

where Q is the peak flow in cfs, D is the diameter in inches, c g is the typical discharge coefficient for orifices (0.61-0.63 for thin walls and around 0.75-0.8 for thick walls), g is the acceleration of gravity in ft./s^2, and H and H D are defined above and are also used in inches in Equation (2).

Cutoff Flow:

This is the only significant variable in the diversion, as the type of diversion is defined by this value. Any excess of flow over this value will be diverted into a pond subroutine (the surface stage of the bio-retention basin) and routed there. The determination of this value equates to the value obtained with equation (2) above, plus 1%, when H = depth of gravel layer and H_D=0 (orifice situated at the datum). Thus, once flows exceed the maximum discharge the LID orifice experiences a head of the storage depth, ponding occurs within the biofiltration basin, routing these additional flows via the pond riser.

Note:

The complete storage and rating curves and the respective explanation is shown at the end of this appendix. A variable area vs. elevation storage curve was used for the final model, and a discharge that is a function of the outlet structure in the surface was used also.

VI. HYDROMODIFICATION WATERSHED MAPS

See Attachment 2a of this report

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Attachment 3
Structural BMP Maintenance Information

This is the cover sheet for Attachment 3.

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Project Name: Renzulli Estates

Indicate which Items are Included:

Attachment Sequence	Contents	Checklist
Attachment 3	Maintenance Agreement (Form DS-3247) (when applicable)	☑ Included ☐ Not applicable

Project Name: Renzulli Estates

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

Attachment 3: For private entity operation and maintenance, Attachment 3 must include a Storm Water Management and Discharge Control Maintenance Agreement (Form DS-3247). The following information must be included in the exhibits attached to the maintenance agreement:

- [x] Vicinity map
- [ ] Site design BMPs for which DCV reduction is claimed for meeting the pollutant control obligations.
- [x] BMP and HMP location and dimensions
- [x] BMP and HMP specifications/cross section/model
- [x] Maintenance recommendations and frequency
- [ ] LID features such as (permeable paver and LS location, dim, SF).

The City of SAN DIEGO

RECORDING REQUESTED BY:
THE CITY OF SAN DIEGO AND
WHEN RECORDED MAIL TO:

(THIS SPACE IS FOR RECORDER'S USE ONLY)

STORM WATER MANAGEMENT AND DISCHARGE CONTROL MAINTENANCE AGREEMENT

APPROVAL NUMBER:	ASSESSORS PARCEL NUMBER:	PROJECT NUMBER:
	319-020-01-00	

This agreement is made by and between the City of San Diego, a municipal corporation [City] and Green Phair Scripps Partners, LLC, the owner or duly authorized representative of the owner [Property Owner] of property located at 945 East J Street, Chula Vista, CA 91910 (PROPERTY ADDRESS) and more particularly described as: THE NORTHEAST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 27, TOWNSHIP 14 SOUTH, RANGE 2 WEST OF THE SAN BERNADINO BASE AND MERIDRAN (LEGAL DESCRIPTION OF PROPERTY) in the City of San Diego, County of San Diego, State of California.

Property Owner is required pursuant to the City of San Diego Municipal Code, Chapter 4, Article 3, Division 3, Chapter 14, Article 2, Division 2, and the Land Development Manual, Storm Water Standards to enter into a Storm Water Management and Discharge Control Maintenance Agreement [Maintenance Agreement] for the installation and maintenance of Permanent Storm Water Best Management Practices [Permanent Storm Water BMP's] prior to the issuance of construction permits. The Maintenance Agreement is intended to ensure the establishment and maintenance of Permanent Storm Water BMP's onsite, as described in the attached exhibit(s), the project's Storm Water Quality Management Plan [SWQMP] and Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s): TBD.

Property Owner wishes to obtain a building or engineering permit according to the Grading and/or Improvement Plan Drawing No(s) or Building Plan Project No(s): TBD.

Continued on Page 2

NOW, THEREFORE, the parties agree as follows:

1. Property Owner shall have prepared, or if qualified, shall prepare an Operation and Maintenance Procedure [OMP] for Permanent Storm Water BMP's, satisfactory to the City, according to the attached exhibit(s), consistent with the Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s): _____.

2. Property Owner shall install, maintain and repair or replace all Permanent Storm Water BMP's within their property, according to the OMP guidelines as described in the attached exhibit(s), the project's SWQMP and Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s) _____.

3. Property Owner shall maintain operation and maintenance records for at least five (5) years. These records shall be made available to the City for inspection upon request at any time.

This Maintenance Agreement shall commence upon execution of this document by all parties named hereon, and shall run with the land.

Executed by the City of San Diego and by Property Owner in San Diego, California.

See Attached Exhibit(s): _____

_____
(Owner Signature)

_____
(Print Name and Title)

_____
(Company/Organization Name)

_____
(Date)

THE CITY OF SAN DIEGO

APPROVED:

_____
(City Control Engineer Signature)

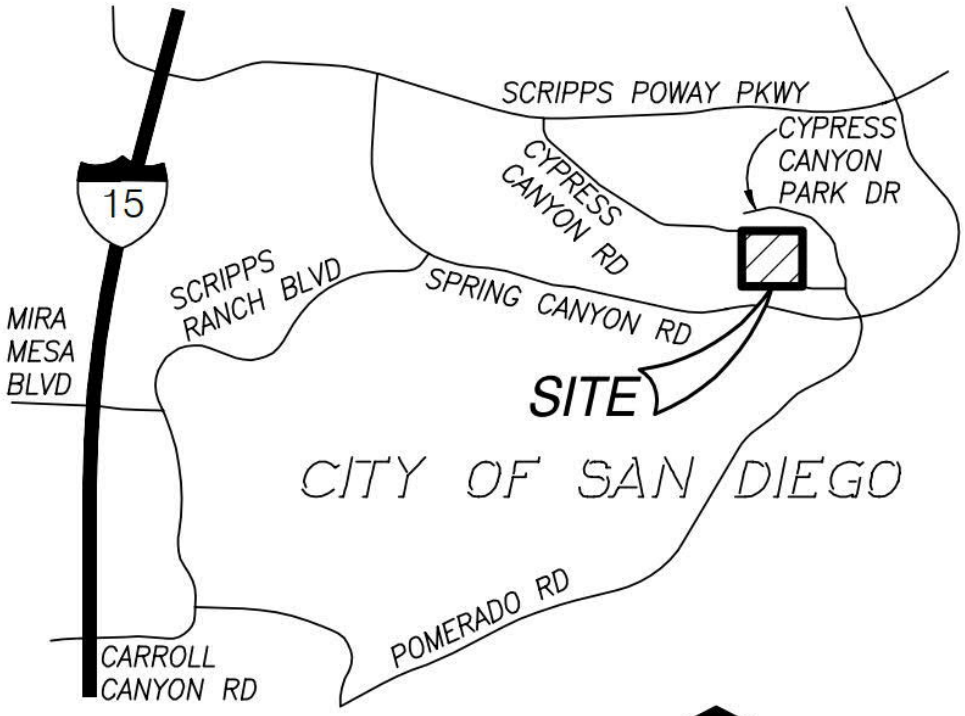
_____
(Print Name)

_____
(Date)

NOTE: ALL SIGNATURES MUST INCLUDE NOTARY ACKNOWLEDGMENTS PER CIVIL CODE SEC. 1180 ET.SEQ.

EXHIBIT 'A'

RENZULLI ESTATES VICINITY MAP

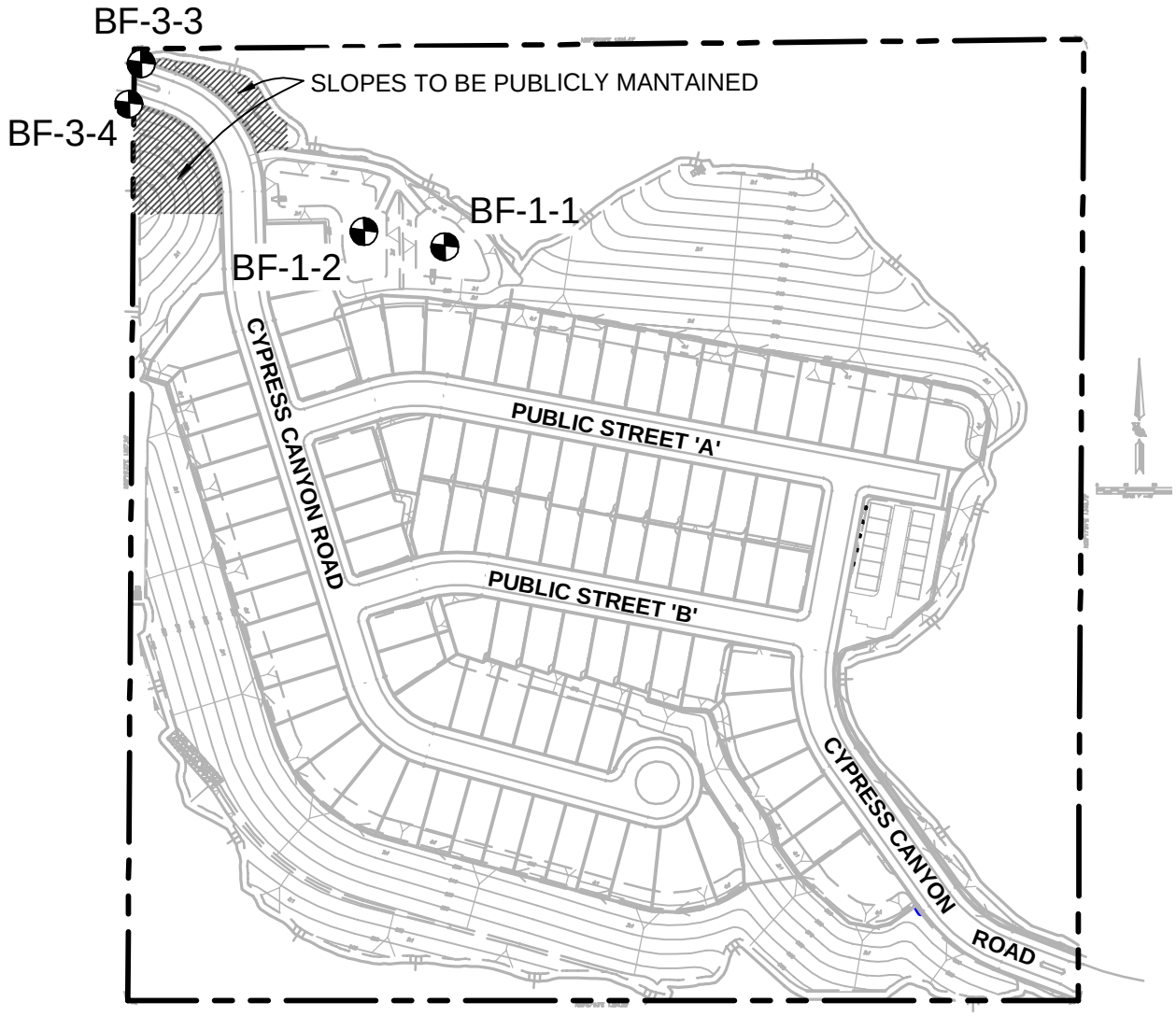


VICINITY MAP

NOT TO SCALE

EXHIBIT 'B'

RENZULLI ESTATES BMP & HMP LOCATION AND DIMENSIONS



BF-1-1 BIOFILTRATION BMP
MODEL: BIOFILTRATION BASIN (NO INFILTRATION), PRIVATELY MANTAINED FOR DETENTION AND WATER QUALITY CONTROL
BOTTOM AREA: 5600 sqft BASIN DEPTH: 6 ft

BF-1-2 BIOFILTRATION BMP
MODEL: BIOFILTRATION BASIN (NO INFILTRATION), PRIVATELY MANTAINED FOR DETENTION AND WATER QUALITY CONTROL
BOTTOM AREA: 9200 sqft BASIN DEPTH: 6 ft

BF-3-3 FLOW BASED COMPACT BIOFILTRATION BMP
MODEL: FTBSVIB-4-6, PUBLICLY MANTAINED
TREATMENT FLOW 0.039 CFS
DIMENSION LxWxH: 4'X6'

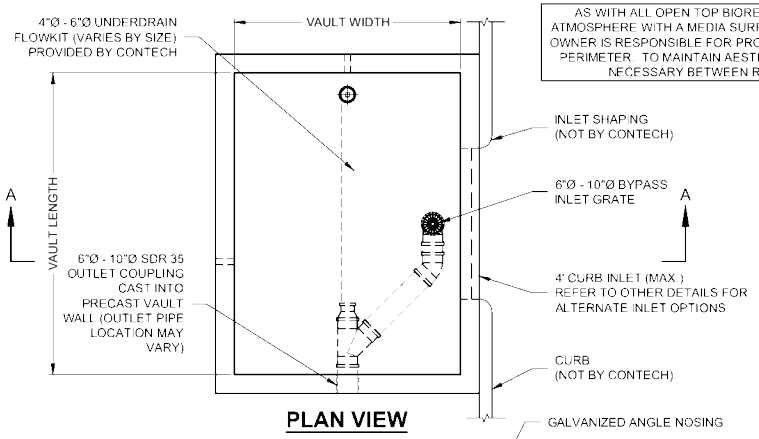
BF-3-4 FLOW BASED COMPACT BIOFILTRATION BMP
MODEL: FTBSVIB-4-4, PUBLICLY MANTAINED
TREATMENT FLOW 0.0556 CFS
DIMENSION LxWxH: 4'X4'

SLOPES AND CHANNEL TO BE PRIVATELY MANTAINED UNLESS OTHERWISE NOTED.

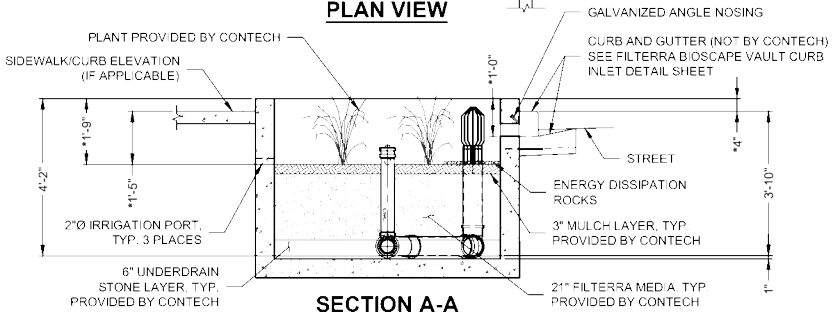
EXHIBIT 'C'
RENZULLI ESTATES BMP & HMP LOCATION AND DIMENSIONS

DIMENSIONS PRECEDED BY " * " ARE CRITICAL AND MAY NOT BE MODIFIED WITHOUT CONSULTING CONTECH

AS WITH ALL OPEN TOP BIORETENTION SYSTEMS, FILTERRA BIOSCAPE IS OPEN TO THE ATMOSPHERE WITH A MEDIA SURFACE RECESSED BELOW FINISHED GRADE. CONTRACTOR OR OWNER IS RESPONSIBLE FOR PROVIDING ANY REQUIRED SAFETY MEASURES AROUND SYSTEM PERIMETER. TO MAINTAIN AESTHETICS, REMOVAL OF HEAVY STORMWATER DEBRIS MAY BE NECESSARY BETWEEN REGULAR FILTERRA SYSTEM MAINTENANCE EVENTS.

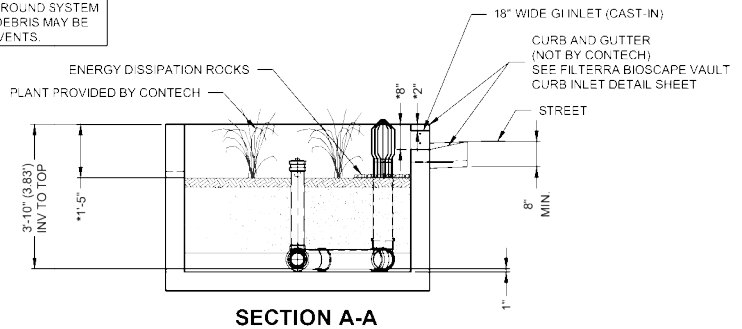


PLAN VIEW



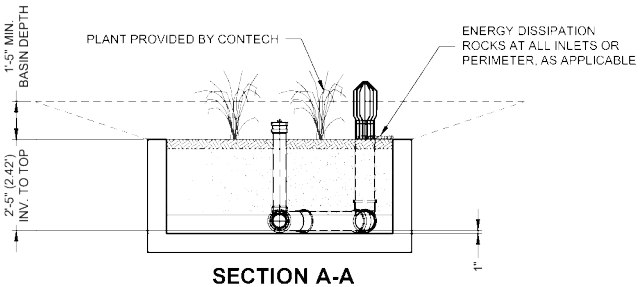
SECTION A-A

(SLOTTED THROAT INLET - TOP EXTENDS 4" ABOVE CURB FOR ADJACENT SIDEWALKS)



SECTION A-A

GREEN INFRASTRUCTURE INLET - TOP FLUSH WITH TOP OF CURB, NOT INTENDED FOR SIDEWALK APPLICATIONS



SECTION A-A

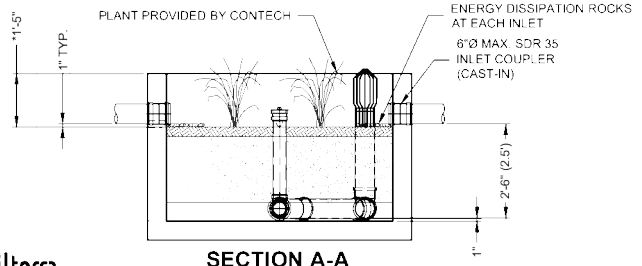
BASIN - CURB INLET OR PIPE INLETS OPTIONAL

FTBSVIB CONFIGURATION

(OPTIONS: BASIN "-B", GREEN INFRASTRUCTURE INLET "-I", PIPE INLET "-P", SLOTTED THROAT INLET "-T")

MEDIA BAY SIZE	VAULT SIZE (L x W)	LONG SIDE INLET DESIGNATION	SHORT SIDE INLET DESIGNATION	AVAILABILITY	MAX. OUTLET / BYPASS PIPE DIA.	MAX. BYPASS FLOW (CFS)	UNDERDRAIN PIPE DIA. (PERF)	MIN. NO. OF INLET PIPES (-P ONLY)
4 x 4	4 x 4	FTBSVIB0404	FTBSVIB0404	ALL	6" SDR 35	1.42	4" SDR 35	1
6 x 4	6 x 4	FTBSVIB0604	FTBSVIB0406	N/A CA	8" SDR 35	1.89	4" SDR 35	1
6.5 x 4	6.5 x 4	FTBSVIB06504	FTBSVIB04065	CA ONLY	8" SDR 35	1.89	4" SDR 35	1
7.83 x 4.5	7.83 x 4.5	FTBSVIB078045	FTBSVIB045078	DE,MD,NJ,PA,VA,WV ONLY	8" SDR 35	1.89	4" SDR 35	1
8 x 4	8 x 4	FTBSVIB0804	FTBSVIB0408	N/A DE,MD,NJ,PA,VA,WV	8" SDR 35	1.89	4" SDR 35	1
6 x 6	6 x 6	FTBSVIB0606	FTBSVIB0606	ALL	8" SDR 35	1.89	4" SDR 35	1
8 x 6	8 x 6	FTBSVIB0806	FTBSVIB0608	ALL	10" SDR 35	2.37	4" SDR 35	1
10 x 6	10 x 6	FTBSVIB1006	FTBSVIB0610	ALL	10" SDR 35	2.37	6" SDR 35	2
12 x 6	12 x 6	FTBSVIB1206	FTBSVIB0612	ALL	10" SDR 35	2.37	6" SDR 35	2
13 x 7	13 x 7	FTBSVIB1307	FTBSVIB0713	ALL	10" SDR 35	2.37	6" SDR 35	2
14 x 8	14 x 8	FTBSVIB1408†	N/A	ALL	10" SDR 35	2.37	6" SDR 35	3
16 x 8	16 x 8	FTBSVIB1608†	N/A	N/A OR, WA	10" SDR 35	2.37	6" SDR 35	3
15 x 9	15 x 9	FTBSVIB1509†	N/A	OR, WA ONLY	10" SDR 35	2.37	6" SDR 35	3
18 x 8	18 x 8	FTBSVIB1808†	N/A	CALL CONTECH	10" SDR 35	2.37	6" SDR 35	3
20 x 8	20 x 8	FTBSVIB2008†	N/A	CALL CONTECH	10" SDR 35	2.37	6" SDR 35	4
22 x 8	22 x 8	FTBSVIB2208†	N/A	CALL CONTECH	10" SDR 35	2.37	6" SDR 35	4

†UTILIZES (2) CURB OPENINGS WITH MIN 1' SPACING N/A = NOT AVAILABLE



SECTION A-A

PIPE INLET

INTERNAL PIPE CONFIGURATION MAY VARY DEPENDING ON VAULT SIZE.

filterra

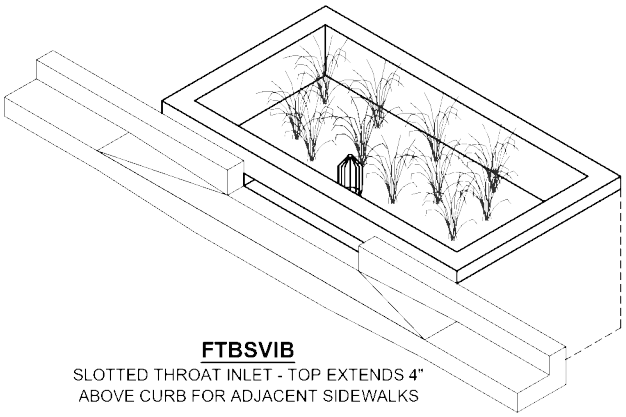
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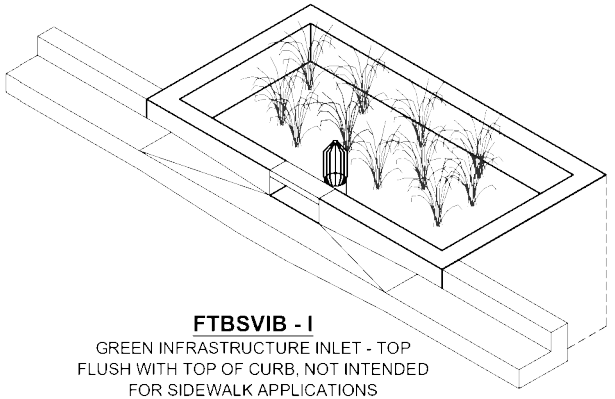
FILTERRA BIOSCAPE VAULT INTERNAL BYPASS (FTBSVIB) CONFIGURATION DETAIL

I:\STORMWATER\COMMOPS\54 FILTERRA\40 STANDARD DRAWINGS\FTBSVIB - FILTERRA BIOSCAPE VAULT INTERNAL BYPASS\LAYOUT\DETAILS\DWG\FTBSVIB - FILTERRA BIOSCAPE VAULT INTERNAL BYPASS CONFIG DTL UPD.DWG 12/22/2020 2:45 PM

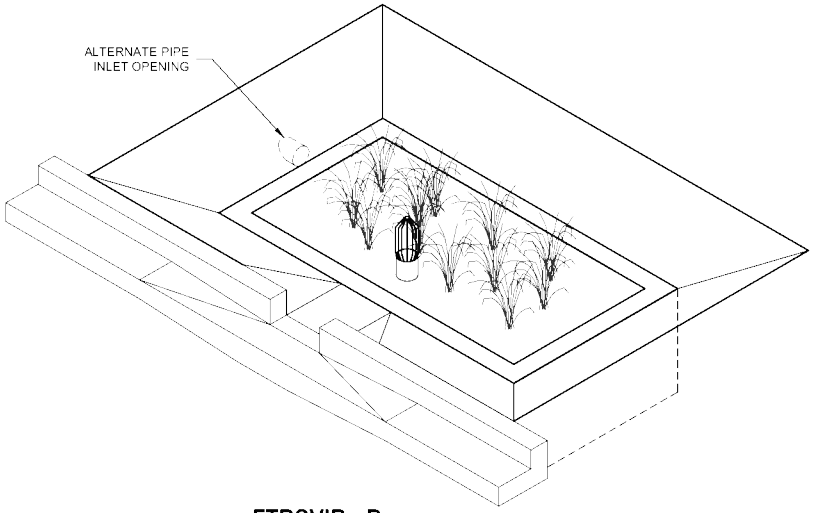
EXHIBIT 'C'
RENZULLI ESTATES BMP & HMP LOCATION AND DIMENSIONS



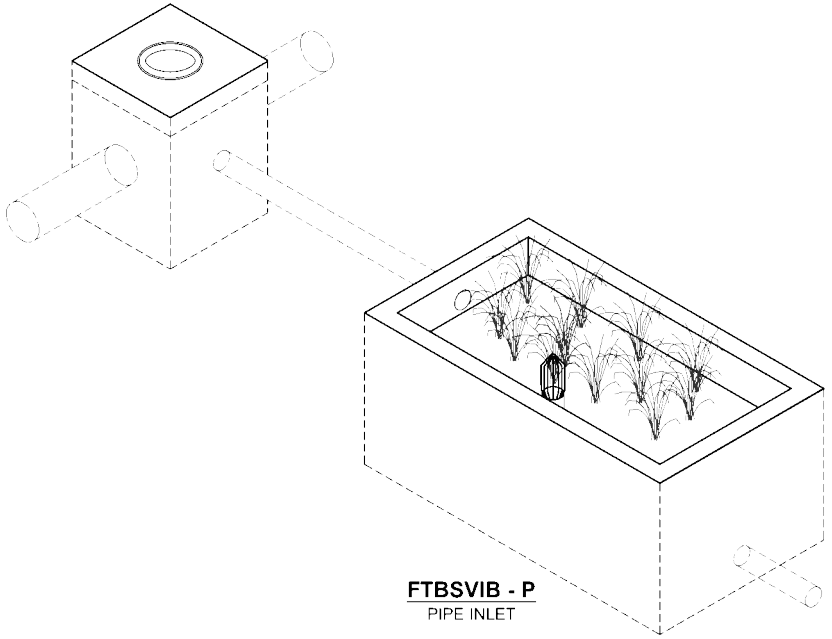
FTBSVIB
SLOTTED THROAT INLET - TOP EXTENDS 4" ABOVE CURB FOR ADJACENT SIDEWALKS



FTBSVIB - I
GREEN INFRASTRUCTURE INLET - TOP FLUSH WITH TOP OF CURB, NOT INTENDED FOR SIDEWALK APPLICATIONS



FTBSVIB - B
BASIN - CURB INLET OR PIPE INLET OPTIONAL



FTBSVIB - P
PIPE INLET

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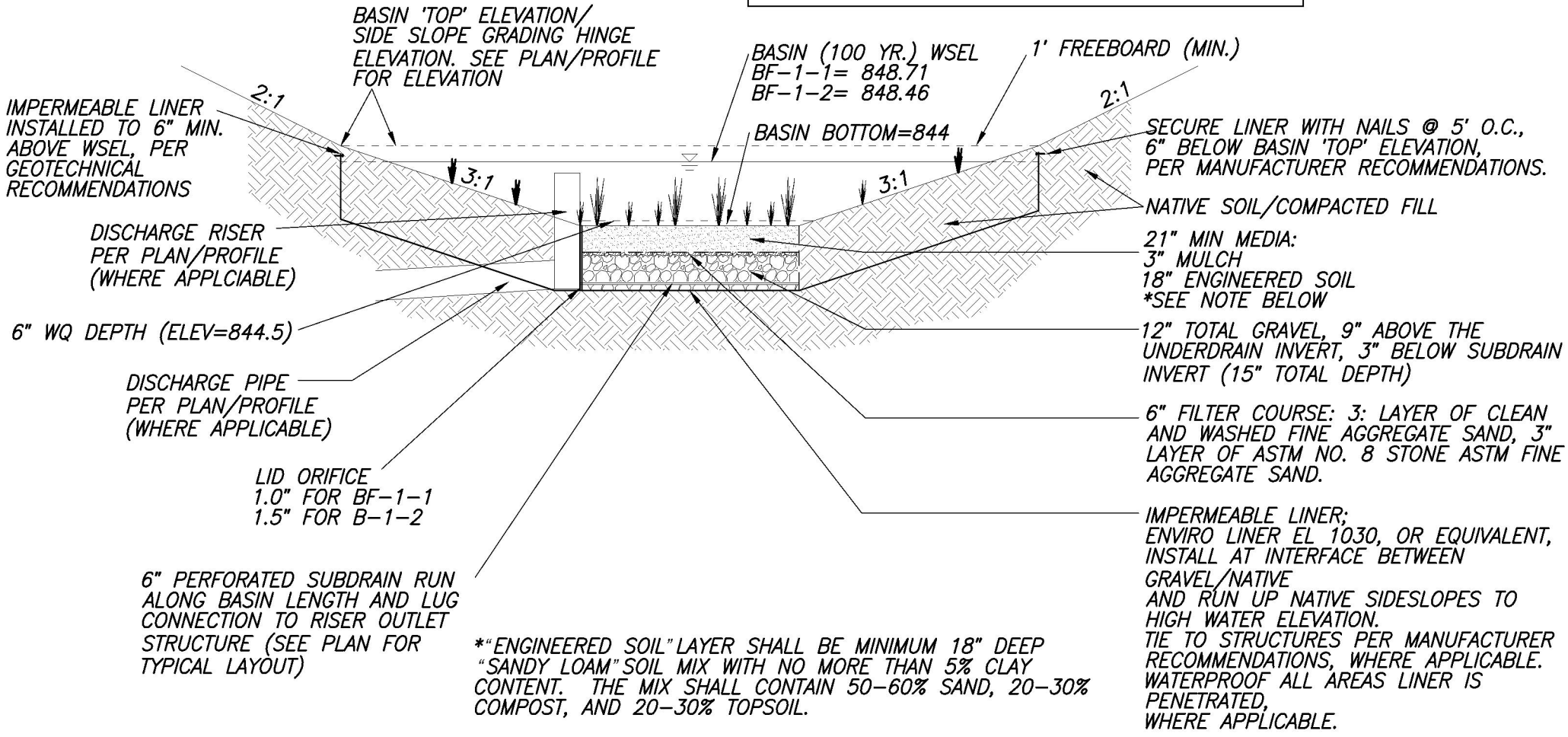
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800-338-1122 513-645-7000 513-645-7993 FAX

FILTERRA BIOSCAPE VAULT INTERNAL BYPASS
(FTBSVIB)
SITE LAYOUTS

I:\COMMON\CAD\TREATMENT\54 FILTERRA\40 STANDARD DRAWINGS\IN PROCESS\FTBSVIB - BIOSCAPE VAULT INTERNAL BYPASS\LAYOUT DETAILS\DWG\FTBSVIB - FILTERRA BIOSCAPE VAULT INTERNAL BYPASS CONFIG DTL.DWG 11/3/2020 10:41 AM

EXHIBIT 'C'
RENZULLI ESTATES BMP & HMP LOCATION AND DIMENSIONS

	100 YEAR WSE	HMP WSE	WQ WSE
BF-1-1	848.22	848.00	844.50
BF-1-2	847.98	847.45	844.50



SOIL SECTION FOR WATER QUALITY/HYDROMODIFICATION BIOFILTRATION BASIN

NOT TO SCALE

EXHIBIT 'D'
RENZULLI ESTATES
MAINTENANCE RECOMMENDATIONS AND FREQUENCY

MODULAR WETLAND

SITE DESIGN, SOURCE CONTROL AND POLLUTANT CONTROL BMP OPERATION + MAINTENANCE PROCEDURE							
STORM WATER MANAGEMENT AND DISCHARGE CONTROL MAINTENANCE AGREEMENT APPROVAL NO.: TBD							
O&M RESPONSIBLE PARTY DESIGNEE: PROPERTY OWNDER: RYAN COMPANIES US, INC.							
BMP DESCRIPTION	**INSPECTION FREQUENCY**	**MAINTENANCE FREQUENCY**	**MAINTENANCE METHOD**	**QUANTITY**	**INCLUDED IN O&M MANUAL**		**SHEET NUMBERS**
POLLUTANT CONTROL BMP(S)							
DESCRIPTION: PROPRIETARY BIOFILTRATION UNIT	BI-ANNUAL	6-12 MONTHS AS NEEDED	REPLCMNT OF SOIL MATERIAL REMOVE DEBRIS AS NEEDED	2	YES		
DESCRIPTION: PROPRIETARY BIOFILTRATION UNIT	SEE TABLE BELOW			2	YES		

BIOFILTRATION

Threshold/Indicator	Maintenance Action	Typical Maintenance Frequency
Accumulation of sediment, litter, or debris	Remove and properly dispose of accumulated materials, without damage to the vegetation or compaction of the media layer.	• Inspect monthly. If the BMP is 25% full* or more in one month, increase inspection frequency to monthly plus after every 0.1-inch or larger storm event. • Remove any accumulated materials found at each inspection.
Obstructed inlet or outlet structure	Clear blockage.	• Inspect monthly and after every 0.5-inch or larger storm event. • Remove any accumulated materials found at each inspection.
Damage to structural components such as weirs, inlet or outlet structures	Repair or replace as applicable	• Inspect annually. • Maintain when needed.
Poor vegetation establishment	Re-seed, re-plant, or re-establish vegetation per original plans.	• Inspect monthly. • Maintain when needed.
Dead or diseased vegetation	Remove dead or diseased vegetation, re-seed, re-plant, or re-establish vegetation per original plans.	• Inspect monthly. • Maintain when needed.
Overgrown vegetation	Mow or trim as appropriate.	• Inspect monthly. • Maintain when needed.
2/3 of mulch has decomposed, or mulch has been removed	Remove decomposed fraction and top off with fresh mulch to a total depth of 3 inches.	• Inspect monthly.

EXHIBIT 'D'
RENZULLI ESTATES
MAINTENANCE RECOMMENDATIONS AND FREQUENCY

BIOFILTRATION

Threshold/Indicator	Maintenance Action	Typical Maintenance Frequency
		• Replenish mulch annually, or more frequently when needed based on inspection.
Erosion due to concentrated irrigation flow	Repair/re-seed/re-plant eroded areas and adjust the irrigation system.	• Inspect monthly. • Maintain when needed.
Erosion due to concentrated storm water runoff flow	Repair/re-seed/re-plant eroded areas, and make appropriate corrective measures such as adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan. If the issue is not corrected by restoring the BMP to the original plan and grade, the City Engineer shall be contacted prior to any additional repairs or reconstruction.	• Inspect after every 0.5-inch or larger storm event. If erosion due to storm water flow has been observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintain when needed. If the issue is not corrected by restoring the BMP to the original plan and grade, the City Engineer shall be contacted prior to any additional repairs or reconstruction.
Standing water in BMP for longer than 24 hours following a storm event Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health	Make appropriate corrective measures such as adjusting irrigation system, removing obstructions of debris or invasive vegetation, clearing underdrains, or repairing/replacing clogged or compacted soils.	• Inspect monthly and after every 0.5-inch or larger storm event. If standing water is observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintain when needed.
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology	If mosquitos/larvae are observed: first, immediately remove any standing water by dispersing to nearby landscaping; second, make corrective measures as applicable to restore BMP drainage to prevent standing water. If mosquitos persist following corrective measures to remove standing water, or if the BMP design does not meet the 96-	• Inspect monthly and after every 0.5-inch or larger storm event. If mosquitos are observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintain when needed.

The following inspection and maintenance activities shall be performed and completed as indicated.

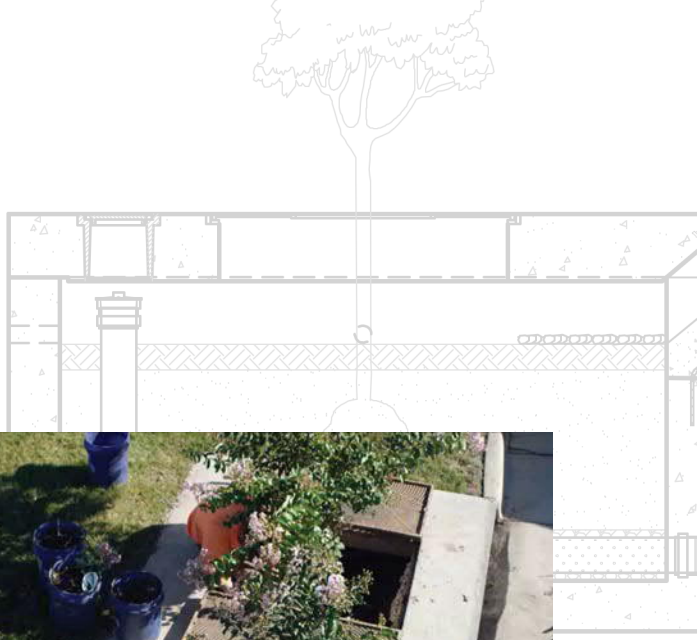
Maintenance Program for Inlet Stenciling

Inspection Frequency/Indications:	Regular Maintenance Inspections ❑ Before wet season begins (September); ❑ After wet season (April).
Maintenance Indications	**Maintenance Activities**
❑ Inlet stenciling/signage begins to weather or fade	❑ Re-stamp signage
❑ Broken or damaged structure	❑ Repair or replace signage structure

Maintenance Program for Modular Filterra Biofiltration Units

Inspection Frequency/Indications:	Regular Maintenance Inspections ❑ Monthly during wet season ❑ Annually before wet season (September) Performance Inspection ❑ 72 hrs after rainfall events greater than 0.5 in.
Maintenance Indications	**Maintenance Activities**
❑ Excessive trash, debris, or sediment in unit. (i.e., sump is 85 percent full or sump is 50 percent full during two consecutive monthly inspections)	❑ Remove trash and debris within 15 days. Empty unit when the unit is 85 percent full or 50 percent full during two consecutive monthly inspections, or annually in May.
❑ Presence of trash and debris in weir box.	❑ Remove trash and debris while onsite conducting inspection
❑ When standing water in sump is observed during annual and performance inspection.	❑ If standing water cannot be removed or remains through the wet season, notify vector control.
❑ Minor structural damage (i.e., screen becomes clogged, damaged or loose)	❑ Clean screen, re-fasten screen if appropriate.
❑ Cracked or fatigued neoprene vector seals	❑ Replace damaged seal
❑ Major damage to structures (i.e., holes in screen, large debris, damage to housing or weir box)	❑ Immediately consult with engineer and manufacturer=s representative to develop a course of action and effect repairs prior to the wet season.
Waste Disposal	Sediment, other pollutants, and all other waste shall be properly disposed of in a licensed landfill or by another appropriate disposal method in accordance with local, state, and federal regulations.

Filterra® Maintenance

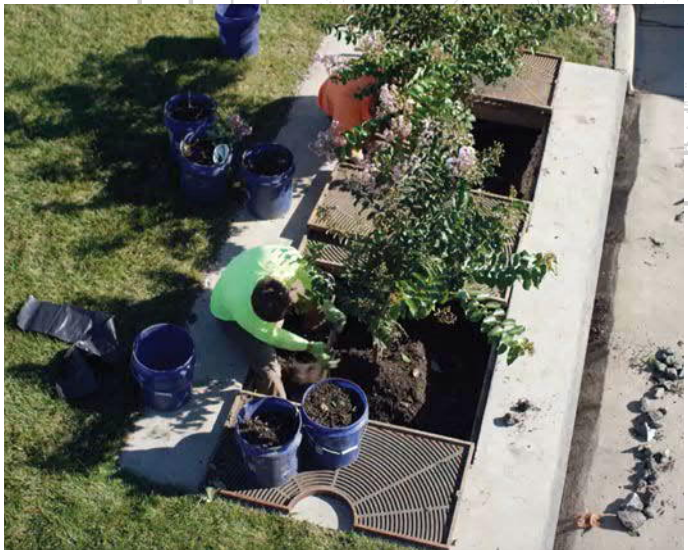


Activation and vegetation selection guidance is included with every system.

With proper routine maintenance, the engineered media within the Filterra system should last as long as traditional bioretention media.

Maintenance is low-cost, low-tech and simple:

- Remove trash, sediment, and mulch
- Replace with a fresh 3" layer of mulch
- No confined space entry or special tools
- Easily performed by landscape contractor or facilities maintenance provider



Filterra offers high performance bioretention for advanced pollutant removal with easy maintenance.



Watch the Filterra Maintenance video at www.ContechES.com/filterra



Plant health evaluation and pruning is important to encourage growth.

All stormwater treatment systems require maintenance for effective operation.

Why Maintain?

All stormwater treatment systems require maintenance for effective operation. This necessity is often incorporated in your property's permitting process as a legally binding BMP maintenance agreement. Other reasons to maintain are:

- Avoiding legal challenges from your jurisdiction's maintenance enforcement program.
- Prolonging the expected lifespan of your Filterra® media.
- Avoiding more costly media replacement.
- Helping reduce pollutant loads leaving your property.

Simple maintenance of the Filterra® Bioscape® is required to continue effective pollutant removal from stormwater runoff before discharge into downstream waters. This procedure will also extend the longevity of the living biofilter system. The unit will recycle and accumulate pollutants within the biomass, but is also subjected to other materials entering the inlet. This may include trash, silt and leaves etc. which will be contained above the mulch layer. Too much silt may inhibit the Filterra's flow rate, which is the reason for site stabilization before activation. Regular replacement of the mulch stops accumulation of such sediment.

When to Maintain?

Maintenance visits are typically scheduled seasonally; the spring visit aims to clean up after winter loads including salts and sands while the fall visit helps the system by removing excessive leaf litter.

It has been found that in regions which receive between 30-50 inches of annual rainfall, (2) two visits are generally recommended; In regions with less rainfall often only (1) one visit per annum is sufficient. Varying land uses can affect maintenance frequency; e.g. some fast food restaurants require more frequent trash removal. Contributing drainage areas which are subject to new development wherein the recommended erosion and sediment control measures have not been implemented may require additional maintenance visits.

Some sites may be subjected to extreme sediment or trash loads, requiring more frequent maintenance visits. This is the reason for detailed notes of maintenance actions per unit, helping the Manufacturer and Owner predict future maintenance frequencies, reflecting individual site conditions.

Owners must promptly notify the maintenance provider of any damage to the plant(s), which constitute(s) an integral part of the bioretention technology.

Exclusion of Services

Clean up due to major contamination such as oils, chemicals, toxic spills, etc. will result in additional costs and are not included as part of the Final Site Assessment (if applicable). Should a major contamination event occur the Owner must block off the outlet pipe of the Filterra® (where the cleaned runoff drains to, such as drop inlet) and block off the throat of the Filterra®. The Supplier should be informed immediately.

Maintainenance Visit Summary

Maintenance visits are typically scheduled seasonally; the spring visit aims to clean up after winter loads including salts and sands while the fall visit helps the system by removing excessive leaf litter.

1. Inspection of Filterra® Bioscape® and surrounding area
2. Removal of erosion control stones
3. Removal of debris, trash and mulch
4. Removal and disposal of erosion control sock from system perimeter (should be completed at 6 month or 12 month maintenance depending upon site characteristics). A new erosion control sock is no longer needed after the first year.
5. Mulch replacement
6. Plant health evaluation and pruning or replacement as necessary
7. Clean area around Filterra®
8. Complete paperwork

Plant Care for Filterra® Systems

After Activation, the Contractor is responsible for proper care of the vegetation until the site is handed over to the Owner. After that, it is the Site Owner's responsibility to care for the vegetation. Contech recommends the following care for the plants:

1. To prevent transplant shock (especially if planting takes place in the hot season), it may be necessary to prune some of the foliage to compensate for reduced root uptake capacity. This is accomplished by pruning away some of the smaller secondary branches or a main scaffold branch if there are too many. Too much foliage relative to the root ball can dehydrate and damage the plant.
2. Plant staking may be required.
3. With all trees/shrubs, remove dead, diseased, crossed/rubbing, sharply crotched branches or branches growing excessively long or in wrong direction compared to majority of branches.
4. Contech recommends irrigation of the Filterra® Vegetation. The following guidance will help to ensure the vegetation is properly irrigated.

Irrigation Recommendations:

- Each Filterra® system must receive adequate irrigation to ensure survival of the living system during periods of drier weather.
- Irrigation sources include rainfall runoff from downspouts and/or gutter flow, applied water through the tree grate or in some cases from an irrigation system with emitters installed during construction.
- At Activation: Apply about one (cool climates) to two (warm climates) gallons of water per inch of trunk diameter over the root ball.
- During Establishment: In common with all plants, each Filterra® plant will require more frequent watering during the establishment period. One inch of applied water per week for the first three months is recommended for cooler climates (2 to 3 inches for warmer climates). If the system is receiving rainfall runoff from the drainage area, then irrigation may not be needed. Inspection of the soil moisture content can be evaluated by gently brushing aside the mulch layer and feeling the soil. Be sure to replace the mulch when the assessment is complete. Irrigate as needed**.
- Established Plants: Established plants have fully developed root systems and can access the entire water column in the media. Therefore irrigation is less frequent but requires more applied water when performed. For a mature system assume 3.5 inches of available water within the media matrix. Irrigation demand can be estimated as 1" of irrigation demand per week. Therefore if dry periods exceed 3 weeks, irrigation may be required.

*** Five gallons per square yard approximates 1 inch of water. Therefore for a 6' x 6 foot Filterra® approximately 20-60 gallons of applied water is needed. To ensure even distribution of water it needs to be evenly sprinkled over the entire surface of the filter bed, with special attention to make sure the root ball is completely wetted. NOTE: if needed, measure the time it takes to fill a five gallon bucket to estimate the applied water flow rate. Then calculate the time needed to irrigate the Filterra®, For example is the flow rate of the sprinkler is 5 gallons/minute then it would take 12 minutes to irrigate a 6'x6' filter.*

Plant Replacement:

In some cases, plants will require replacement. Please follow the procedures below to ensure a properly functioning Filterra® system.

1. Remove the existing plant, and leave as much of the Filterra® media in place as possible.
2. Select a replacement per the Filterra® Bioscape® Activation Package.
3. Prior to removing the plant from the container, ensure the soil moisture is sufficient to maintain the integrity of the root ball. If needed, pre-wet the container plant.
4. Cut away any roots which are growing out of the container drain holes.
5. Plant(s) should be carefully removed from the pot by gently pounding on the sides of the container with the fist to loosen root ball. Then carefully slide out. Do not lift plant(s) by trunk as this can break roots and cause soil to fall off. Extract the root ball in a horizontal position and support it to prevent it from breaking apart. Alternatively, the pot can be cut away to minimize root ball disturbance.
6. Excavate a hole with a diameter 4" greater than the root ball, gently place the plant(s).
7. Plant the tree/shrub/grass with the top of the root ball 1" above surrounding media to allow for settling.
8. All plants should have the main stem centered in the tree grate (where applicable) upon completion of installation.
9. Reinstall or add mulch to a depth of 3" per Contech's mulch specifications for Filterra® systems.

Maintenance Visit Procedure

Keep sufficient documentation of maintenance actions to predict location specific maintenance frequencies and needs. An example Maintenance Report is included in this manual.

1. Inspection of Filterra and surrounding area

- Record individual unit before maintenance with photograph (numbered). Record on Maintenance Report (see example in this document) the following:

Record on Maintenance Report the following:

Standing Water	yes | no
Is Bypass Clear	yes | no

If yes answered to any of these observations, record with close-up photograph (numbered).

2. Removal of erosion control stones

- Set aside erosion control stones for reuse after mulch has been replaced.
- Dig out silt (if any) and mulch and remove trash & foreign items.

Record on Maintenance Report the following:

Is scour present around the inlet areas? yes | no

If answering yes, consider adding additional erosion control stone.

3. Removal of debris, trash and mulch

- After removal of mulch and debris, measure distance from the top of the Filterra engineered media soil to the top of the top slab. Compare the measured distance to the distance shown on the approved Contract Drawings for the system. Add Filterra media (not top soil or other) to bring media up as needed to distance indicated on drawings.

Record on Maintenance Report the following:

Silt/Clay	yes | no
Bypass Clear	yes | no
Leaves	yes | no
# of Buckets Removed	_____

4. Removal and Disposal of Erosion Control Sock

- Remove and dispose of erosion control sock if site conditions allow (site should be fully stabilized). Erosion control sock is no longer needed after 1-year post activation.

5. Mulch Replacement

- Add mulch evenly across entire system to a depth of three inches.

6. Vegetation health evaluation and pruning

- Examine the vegetation health and replace if necessary. Prune vegetation to encourage growth in the correct directions. Since Filterra® Bioscape® systems can contain many plants, only notation of individual damaged or unhealthy plants is necessary.
  - » Record on Maintenance Report the following:
  - » Vegetation Health
  - » Vegetation Damage

Document damaged or unhealthy plants with photographs.

7. Clean side slopes and area around the Filterra Bioscape system

- Remove all trash and debris to be disposed of appropriately.

8. Complete paperwork

- Complete Maintenance Report. Some jurisdictions require submission of maintenance reports in accordance with approvals. It is the responsibility of the owner to comply with local regulations.



Maintenance Tools, Safety Equipment and Supplies

Ideal tools include: camera, bucket, shovel, broom, pruners, hoe/rake, and tape measure. Appropriate Personal Protective Equipment (PPE) should be used in accordance with local or company procedures. This may include impervious gloves where the type of trash is unknown, high visibility clothing, barricades when working in close proximity to traffic and safety hats, glasses, and shoes.

Most visits require minor trash removal and a full replacement of mulch. Mulch should be a double shredded, hardwood variety.

Maintenance Checklist

Drainage System Failure	Problem	Conditions to Check	Condition that Should Exist	Actions
Inlet	Excessive sediment or trash accumulation.	Accumulated sediments or trash impair free flow of water into Filterra.	Inlet should be free of obstructions allowing free distributed flow of water into Filterra.	Sediments and/or trash should be removed.
Mulch Cover	Trash and floatable debris accumulation.	Excessive trash and/or debris accumulation.	Minimal trash or other debris on mulch cover.	Trash and debris should be removed and mulch cover raked level. Ensure bark nugget mulch is not used.
Mulch Cover	"Ponding" of water on mulch cover.	"Ponding" in unit could be indicative of clogging due to excessive fine sediment accumulation or spill of petroleum oils.	Stormwater should drain freely and evenly through mulch cover.	Recommend contact manufacturer and replace mulch as a minimum.
Vegetation	Plants not growing or in poor condition.	Soil/mulch too wet, evidence of spill. Incorrect plant selection. Pest infestation. Vandalism to plants.	Plants should be healthy and pest free.	Contact manufacturer for advice.
Vegetation	Plant growth excessive.	Plants should be appropriate to the species and location of Filterra.		Trim/prune plants in accordance with typical landscaping and safety needs.
Maintenance is ideally to be performed twice annually.				

Filterra Inspection & Maintenance Log

Filterra System Size/Model: _____ Location: _____

Date	Mulch & Debris Removed	Depth of Mulch Added	Mulch Brand	Vegetation Species	Issues with System	Comments
1/1/17	*5 – 5 gal Buckets*	*3"*	*Lowe's Premium Brown Mulch*	*Galaxy Magnolia*	*- Standing water in downstream structure*	*- Removed blockage in downstream structure*

CONTECH® ENGINEERED SOLUTIONS

filterra® Bioretention Systems
A Growing Idea in Stormwater Filtration

Filterra® Maintenance Steps



1. Inspection of Filterra and surrounding area



2. Removal of tree grate and erosion control stones



3. Removal of debris, trash and mulch



4. Mulch replacement



5. Clean area around Filterra



6. Complete paperwork and record plant height and width

Contech has created a network of Certified Maintenance Providers (CCMP's) to provide maintenance on Filterra systems. To find a CCMP in your area please visit www.conteches.com/maintenance

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Attachment 4
Copy of Plan Sheets Showing Permanent Storm Water BMPs

This is the cover sheet for Attachment 4.

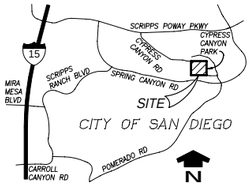
Project Name: Renzulli Estates

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

The plans must identify:

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

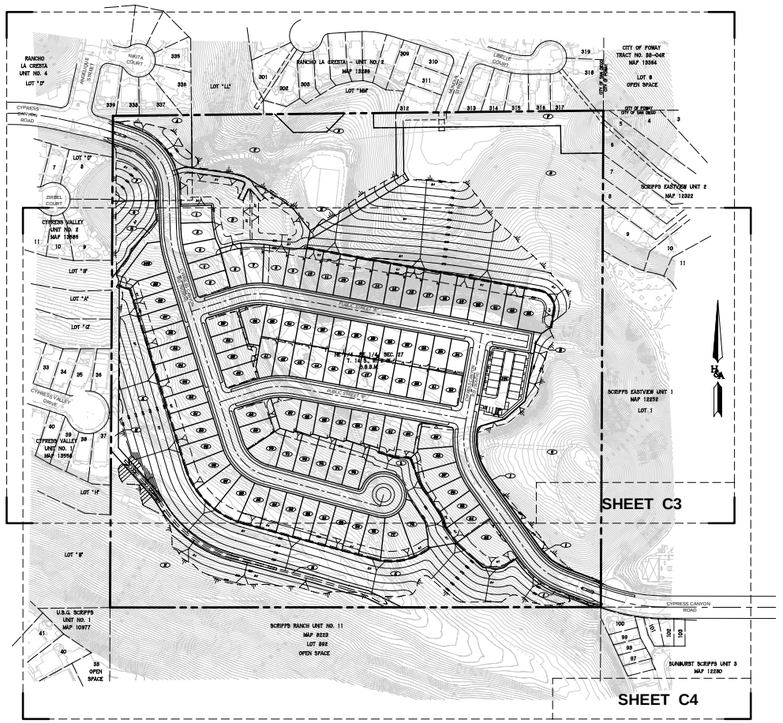
VESTING TENTATIVE MAP/SITE DEVELOPMENT PERMIT
NEIGHBOHOOD DEVELOPMENT PERMIT
RENZULLI ESTATES
CITY OF SAN DIEGO, CALIFORNIA



VICINITY MAP
NOT TO SCALE

LEGEND

SUBDIVISION BOUNDARY	
EXISTING PROPERTY DATA	LOT 270
PROPOSED LOT LINE WITH DIMENSION	46'
PROPOSED EASEMENT LINE	
PROPOSED LOT NUMBER WITH PAD ELEVATION	26 P=885.9
PROPOSED CENTERLINE STREET ELEVATION	886.0
PROPOSED STREET GRADE	2.5%
PROPOSED SPOT ELEVATION	844.0
EXISTING CONTOURS	840
PROPOSED CONTOURS	870
PROPOSED SLOPE BANK (2:1 MAX)	2:1
LIMITS OF PROPOSED GRADING	
PROPOSED RETAINING WALL	
PROPOSED BROW DITCH	
PROPOSED PUBLIC SEWER MAIN WITH MANHOLE	
EXISTING PUBLIC SEWER MAIN WITH MANHOLE	
PROPOSED PUBLIC WATER MAIN	
PROPOSED FIRE HYDRANT	
EXISTING PUBLIC WATER MAIN W/ FIRE HYDRANT	
PROPOSED PUBLIC STORM DRAIN	
PROPOSED PRIVATE STORM DRAIN	
EXISTING PUBLIC STORM DRAIN	
PROPOSED STREET LIGHT	
EXISTING STREET LIGHT	
ADA PATH OF TRAVEL	
EXISTING EASEMENT LABEL	B



KEY MAP
NOT TO SCALE

GENERAL DESIGN NOTES

1. CUT/FILL SLOPES ARE 2 :1 OR FLATTER UNLESS OTHERWISE SPECIFIED.
2. GRADING SHOWN HEREON IS PRELIMINARY AND MAY BE SUBJECT TO MINOR REFINEMENTS IN FINAL DESIGN. FINAL GRADING PLANS WILL CONFORM TO THE APPROVED PERMIT AND EXHIBITS.
3. DRAINAGE FACILITIES TO BE CONSTRUCTED PER CITY OF SAN DIEGO STANDARDS.
4. DRAINAGE EASEMENTS SHALL BE PROVIDED AS REQUIRED.
5. ALL LENGTHS, DISTANCES, LOT DIMENSIONS AND CURVE RADII ARE APPROXIMATE.
6. ALL UTILITIES SHALL BE UNDERGROUND AND EASEMENTS PROVIDED AS NECESSARY.
7. ALL ON-SITE WATER AND SEWER FACILITIES SHOWN ON THIS DRAWING ARE PUBLIC AND SHALL BE DESIGNED TO MEET THE REQUIREMENTS OF THE CURRENT CITY WATER & SEWER FACILITY DESIGN GUIDELINES SHALL BE REVIEWED AS PART OF THE BUILDING PERMIT PLAN CHECK.
8. ANY EXISTING WATER SERVICES TO BE KILLED AT THE MAIN UNLESS OTHERWISE NOTED.
9. ANY EXISTING SEWER SERVICES TO BE ABANDONED AT THE PROPERTY LINE.
10. THERE ARE NO PROPOSED OR EXISTING BUS/TRANSIT STATIONS OR STOPS.
11. INDIVIDUAL TRASH PICKUP IS PROPOSED AS PART OF THIS PROJECT.
12. BUILDING ADDRESS NUMBERS SHALL BE VISIBLE AND LEGIBLE FROM THE STREET OR ROAD FRONTING THE PROPERTY. (PER UFC 901.4.4).
13. IMPROVEMENTS SUCH AS DRIVEWAYS, UTILITIES, DRAINS AND WATER AND SEWER LATERALS SHALL BE DESIGNED SO AS TO NOT PROHIBIT THE PLACEMENT OF STREET TREES, ALL TO THE SATISFACTION OF THE CITY MANAGER.
14. CALIFORNIA BUILDING CODE CONSTRUCTION TYPE: V-B.
FIRE SPRINKLERS: FULL NFPA-13 FIRE SPRINKLER SYSTEM.
NUMBER OF STORIES: 2-STORY.
15. CALIFORNIA BUILDING CODE OCCUPANCY GROUP: R-3.
16. MINIMUM 24 INCH OR 36 INCH BOX SIZE TREES SHALL BE INSTALLED WITHIN 10' OF THE FACE OF CURB AND IN OPENINGS BEING A MINIMUM 40 SQUARE FEET OF AIR AND WATER – PERMEABLE AREA AS INDICATED ON THE LANDSCAPE PLAN (SEE LANDSCAPE PLANS FOR DETAILS).
17. IMPROVEMENT PLANS SHALL SHOW, LABEL, AND DIMENSION A 40 SQUARE FOOT AREA FOR EACH STREET TREE WHICH IS UNENCUMBERED BY HARDSCAPE AND UTILITIES.
18. NO TREES OR SHRUBS EXCEEDING THREE FEET IN HEIGHT AT MATURITY SHALL BE INSTALLED WITHIN TEN FEET OF ANY SEWER FACILITY AND FIVE FEET OF ANY WATER.
19. FIRE ACCESS ROADWAY SIGNS OR RED CURBS WILL BE PROVIDED IN ACCORDANCE WITH BFLS POLICY A-96-1. TEMPORARY STREET SIGNS WILL BE PROVIDED IN ACCORDANCE WITH UFC 901.4.5
20. ALL DRAIN SYSTEMS NOT LOCATED IN A PUBLIC STREET OR PUBLIC DRAINAGE EASEMENTS SHALL BE PRIVATE.
21. WATER EASEMENTS WILL BE PROVIDED ADJACENT TO ALL ONSITE PUBLIC FIRE HYDRANTS, WATER METERS, BLOWOFFS AND VALVES, UPON FINAL LOCATION REVIEW BY THE CITY OF SAN DIEGO ENGINEERING AND FIRE DEPARTMENTS.
22. ADEQUATE NOISE ATTENUATION WILL BE PROVIDED TO ENSURE AN INTERIOR NOISE LEVEL OF 45 dB CNEL FOR ALL SLEEPING ROOMS AND AN INTERIOR NOISE LEVEL OF 50dB FOR ALL OTHER INDOOR AREAS.
23. NO OBSTRUCTION INCLUDING SOLID WALLS IN THE VISIBILITY AREA SHALL EXCEED 3 FEET IN HEIGHT. PLANT MATERIAL, OTHER THAN TREES, WITHIN THE PUBLIC RIGHT-OF-WAY THAT IS LOCATED WITHIN VISIBILITY AREAS SHALL NOT EXCEED 24 INCHES IN HEIGHT
24. PRIOR TO THE ISSUANCE OF ANY CONSTRUCTION PERMIT, THE OWNER/PERMITTEE SHALL ENTER INTO A MAINTENANCE AGREEMENT FOR THE ONGOING PERMANENT BMP MAINTENANCE SATISFACTORY TO THE CITY ENGINEER.
25. PRIOR TO THE ISSUANCE OF ANY CONSTRUCTION PERMIT, THE OWNER/PERMITTEES SHALL INCORPORATE ANY CONSTRUCTION BEST MANAGEMENT PRACTICES NECESSARY TO COMPLY WITH CHAPTER 14, ARTICLE 2, DIVISION 1 (GRADING REGULATIONS) OF THE SAN DIEGO MUNICIPAL CODE, INTO THE CONSTRUCTION PLANS OR SPECIFICATIONS.
26. PRIOR TO THE ISSUANCE OF ANY CONSTRUCTION PERMIT, THE APPLICANT SHALL SUBMIT A TECHNICAL REPORT THAT WILL BE SUBJECT TO FINAL REVIEW AND APPROVAL BY THE CITY ENGINEER, BASED ON THE STORM WATER STANDARDS IN EFFECT AT THE TIME OF THE CONSTRUCTION PERMIT ISSUANCE
27. DEVELOPMENT OF THIS PROJECT SHALL COMPLY WITH ALL STORM WATER CONSTRUCTION REQUIREMENTS OF THE STATE CONSTRUCTION GENERAL PERMIT, ORDER NO. 2009-0090WQ, OR SUBSEQUENT ORDER, AND THE MUNICIPAL STORM WATER PERMIT, ORDER NO. R9-2013-0001, OR SUBSEQUENT ORDER. IN ACCORDANCE WITH ORDER NO. 2009-0090WQ, OR SUBSEQUENT ORDER, A RISK LEVEL DETERMINATION SHALL BE CALCULATED FOR THE SITE AND A STORM WATER POLLUTION PREVENTION PLAN (SWPPP) SHALL BE IMPLEMENTED CONCURRENTLY WITH THE COMMENCEMENT OF GRADING ACTIVITIES.
28. PRIOR TO THE ISSUANCE OF A GRADING OR A CONSTRUCTION PERMIT, A COPY OF THE NOTICE OF INTENT (NOI) WITH A VALID WASTE DISCHARGE ID NUMBER (WDID#) SHALL BE SUBMITTED TO THE CITY OF SAN DIEGO AS A PROOF OF THE ENROLLMENT UNDER THE CONSTRUCTION GENERAL PERMIT. WHEN OWNERSHIP OF THE ENTIRE SITE OR PORTIONS OF THE SITE CHANGES PRIOR TO FILING OF THE NOTICE OF TERMINATION (NOT) A REVISED NOI SHALL BE SUBMITTED ELECTRONICALLY TO THE STATE WATER RESOURCES BOARD IN ACCORDANCE WITH THE PROVISIONS AS SET FORTH IN SECTION II.C OF ORDER NO 2009-0009-DWQ AND A COPY SHALL BE SUBMITTED TO THE CITY.
29. ALL BEARINGS AND DISTANCES ARE LOCATED AND SHOWN ON C6.
35. NO PRIVATE IMPROVEMENTS (INCLUDING LANDSCAPING, ENHANCED PAVING, PRIVATE UTILITIES, OR STRUCTURES OF ANY KIND) THAT COULD INHIBIT THE MAINTENANCE, REPAIR, OR REPLACEMENT OF PUBLIC UTILITIES, MAY BE INSTALLED, CONSTRUCTED, OR LOCATED WITHIN THE LIMITS OF A PUBLIC WATER, SEWER OR GENERAL UTILITY EASEMENT WITHOUT A CITY APPROVED AND COUNTY RECORDED ENCROACHMENT AND MAINTENANCE REMOVAL AGREEMENT (EMRA).
30. ALL WATER LINES SERVING THIS DEVELOPMENT (INCLUDING DOMESTIC, IRRIGATION, AND FIRE) MUST PASS THROUGH A PERMITTED, PRIVATE, ABOVE GROUND, BACKFLOW PREVENTION DEVICE (BPPD).
31. THE OWNER/PERMITTEE SHALL BE RESPONSIBLE FOR ANY DAMAGE CAUSED TO CITY OF SAN DIEGO WATER AND SEWER FACILITIES IN THE VICINITY OF THE PROJECT SITE, DUE TO THE CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS PROJECT, IN ACCORDANCE WITH MUNICIPAL CODE SECTION 142.0607. IN THE EVENT ANY SUCH FACILITY LOSES INTEGRITY THEN, THE OWNER/PERMITTEE SHALL REPAIR OR RECONSTRUCT ANY DAMAGED PUBLIC WATER AND SEWER FACILITY IN A MANNER SATISFACTORY TO THE PUBLIC UTILITIES DIRECTOR AND CITY ENGINEER.
32. NO PUBLIC WATER, SEWER OR GENERAL UTILITY EASEMENTS CURRENTLY EXIST ON THE SUBJECT PROPERTY.
33. THIS PROJECT IS A MULTIPLE "UNIT" SUBDIVISION. IT IS THE INTENT THAT MULTIPLE FINAL MAPS BE FILED PURSUANT TO SECTION 66456.1 OF THE SUBDIVISION MAP ACT. THE FINAL MAP MAY CONSIST OF ONE OR MORE MULTIPLE LOTS AS SHOWN ON THIS TENATIVE MAP.
34. A FINAL MAP SHALL BE FILED AT THE COUNTY RECORDER'S OFFICE PRIOR TO THE EXPIRATION OF THE TENTATIVE MAP, IF APPROVED. A DETAILED PROCEDURE OF SURVEY SHALL BE SHOWN ON THE FINAL MAP AND ALL PROPERTY CORNERS SHALL BE MARKED WITH DURABLE SURVEY MONUMENTS.
35. ALL ONSITE SEWER LINES ARE 8" AT GREATER THAN OR EQUAL TO 1% GRADE.
36. NO OBSTRUCTION INCLUDING SOLID WALLS IN THE VISIBILITY AREA SHALL EXCEED 3 FEET IN HEIGHT. PER SDMC SECTION 142.0409 (B)(2), PLANT MATERIAL, OTHER THAN TREES, LOCATED WITHIN VISIBILITY AREAS OR THE ADJACENT PUBLIC RIGHT-OF-WAY SHALL NOT EXCEED 36 INCHES IN HEIGHT, MEASURED FROM THE LOWEST GRADE ABUTTING THE PLANT MATERIAL TO THE TOP OF THE PLANT MATERIAL.

DEVELOPMENT SUMMARY

THE PROPOSED 40.56 ACRE DEVELOPMENT SITE IS LOCATED AT 11495 CYPRESS CANYON ROAD IN THE SCRIPPS MIRAMAR RANCH COMMUNITY PLANNING AREA. THE PROPERTY IS PRESENTLY OCCUPIED BY AN EXISTING SINGLE-FAMILY RESIDENCE AND SEVERAL OUTBUILDINGS. THE CURRENT DEVELOPMENT PROPOSAL CONSISTS OF THE CONSTRUCTION OF 100 SINGLE-FAMILY HOMES AND 12 MULTI-FAMILY AFFORDABLE INCOME RENTAL UNITS, ALONG WITH PUBLIC ROAD AND PUBLIC & PRIVATE UTILITY IMPROVEMENTS AND BOTH PUBLIC & PRIVATE HOA OPEN SPACES. ALL EXISTING BUILDINGS ON SITE WILL BE REMOVED AS PART OF THE DEVELOPMENT PROPOSAL. THE CURRENT PROJECT REQUIRES A VESTING TENTATIVE MAP (VTM), A SITE DEVELOPMENT PERMIT (SDP) FOR ENVIRONMENTALLY SENSITIVE LANDS AND A NEIGHBORHOOD DEVELOPMENT PERMIT (NDP) TO ALLOW DEVIATIONS TO THREE ZONING CODE DEVELOPMENT STANDARDS (SEE BELOW). IN ADDITION TO THE VTM, SDP, & NDP, THE PROJECT ALSO REQUIRES A LAND USE PLAN AMENDMENT TO CHANGE THE EXISTING RESIDENTIAL DESIGNATION OF 1.1 DU/AC TO 2.8 DU/AC AND A REZONE TO CHANGE THE EXISTING ZONING FROM AR-1-1 TO RX-1-2 (SINGLE FAMILY AREA), RM-2-4 (MULTI-FAMILY AREA), AND OR-1-2 (OPEN SPACE). THE PROJECT IS ALSO LOCATED IN A HIGH FIRE SEVERITY OVERLAY ZONE. FINALLY, THE PROJECT REQUIRES AN MHPA BOUNDARY ADJUSTMENT AS PART OF THE DEVELOPMENT PROPOSAL.

GENERAL NOTES

1. SITE AREA DATA:
GROSS SITE AREA: 40.56 ACRES
NET SITE AREA: 35.32 ACRES (GROSS AREA – ROW DEDICATIONS)
2. TOTAL NUMBER OF EXISTING/PROPOSED LOTS:
EXISTING LOTS: 1
PROPOSED LOTS: 108 (101 RESIDENTIAL + 5 HOA OPEN SPACE LOTS + 2 MHPA OPEN SPACE LOTS)
3. TOTAL NUMBER OF PROPOSED UNITS: 100 SINGLE FAMILY + 12 MULTI-FAMILY (AFFORDABLE)
4. COMMUNITY PLAN: SCRIPPS MIRAMAR RANCH
5. COMMUNITY PLAN LAND USE DESIGNATION:
EXISTING: RESIDENTIAL 1.1 DU/AC
PROPOSED: RESIDENTIAL 2.8 DU/AC (COMMUNITY PLAN AMENDMENT REQUIRED)
6. ZONING:
EXISTING: AR-1-1
PROPOSED: RX-1-2 (SINGLE-FAMILY AREA), RM-2-4 (MULTI-FAMILY LOT 101) & OR-1-2 (OPEN SPACE)
SITE IS ALSO WITHIN MHPA OVERLAY, THE HIGH FIRE SEVERITY OVERLAY ZONE, AND CONTAINS ENVIRONMENTALLY SENSITIVE LANDS.
7. DENSITY PROPOSED:
GROSS SITE DENSITY: 3.2 DUS/AC (112 UNITS/35.32 AC)
8. APN #: 319-020-04-00
9. AVERAGE DAILY TRIPS: 1096 (100 UNITS X 10 TRIPS + 12 UNITS X 8 TRIPS)
10. GEO HAZARD ZONE: 53
11. LAMBERT COORDINATES: 276-1747
NAD 83: 1916-6307

PROJECT TEAM

ENGINEER
HUNSAKER & ASSOCIATES SD,INC.
9707 WAPLES STREET
SAN DIEGO, CA 92121
(858) 558-4500

PLANNING CONSULTANT
DR PLANNING CONSULTANTS
817 W. UPAS STREET
SAN DIEGO, CA 92103
(619) 997-8172

LANDSCAPE ARCHITECT
GMP LANDSCAPE ARCHITECTURE
4010 SORRENTO VALLEY BLVD
SUITE 200
SAN DIEGO, CA 92121
(858) 558-8977

ENVIRONMENTAL ENGINEER
SCS ENGINEERS, SAN DIEGO
8799 BALBOA AVE
SAN DIEGO, CA 92123
(858) 571-5500

SOILS ENGINEER
ADVANCED GEOTECHNICAL SOLUTIONS
485 CORPORATE DR.
SUITE B
ESCONDIDO, CA 92029
(619) 708-1649

TRAFFIC ENGINEER
LLG, ENGINEERS
4542 RUFFNER STREET
SUITE 100
SAN DIEGO, CA 92111
(858) 300-8800

BIOLOGY CONSULTANT
DUDEK & ASSOCIATES
725 SECOND STREET
ENCINITAS, CA. 92024
(760) 942 – 5147

FIRE CONSULTANT
DUDEK & ASSOCIATES
725 SECOND STREET
ENCINITAS, CA 92024
(760) 942 – 5147

ARCHITECT
STARCK ARCHITECTURE & PLANNING
2045 KETTNER BLVD.
SUITE 100
SAN DIEGO, CA 92101
(619) 299-7070

OWNER
RENZULLI PROPERTIES, LLC
3383 LA JUNTA AVENUE
SAN DIEGO, CA 92117

APPLICANT
GREEN PHAIR SCRIPPS PARTNERS, LLC
C/O THE PHAIR COMPANY
945 EAST 1 STREET
CHULA VISTA, CA 91910
(619) 253-4837

ENGINEER

ALISA S. VIALPANDO R.C.E. 47945 DATE

EARTHWORK NOTES

TOTAL GRADING VOLUME
AMOUNT OF CUT: 558,043 CUBIC YARDS.
AMOUNT OF FILL: 539,543 CUBIC YARDS.
AMOUNT OF EXPORT: 18,500 CUBIC YARDS.

EARTHWORK NOTES:
1. MAXIMUM DEPTH OF CUT AREAS = 59 FEET
MAXIMUM DEPTH OF FILL AREAS = 69 FEET
2. QUANTITIES SHOWN ABOVE ARE RAW CUT & FILL

LEGAL DESCRIPTION

THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE CITY OF SAN DIEGO, IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, AND IS DESCRIBED AS FOLLOWS: THE NORTHEAST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 27, TOWNSHIP 14 SOUTH, RANGE 2 WEST OF THE SAN BERNANDINO BASE AND MERIDRAN IN THE CITY OF SAN DIEGO, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO THE UNITED STATES GOVERNMENT SURVEY.

APN: 319-020-04-00

TOPOGRAPHY SOURCE

THE TOPOGRAPHIC MAPPING USED FOR THIS MAP IS BASED ON AERIAL TOPOGRAPHY PRODUCED BY PHOTOGEODETIC CORP. PER FLIGHT OF 4-7-19.

BENCHMARK

CITY OF SAN DIEGO BENCHMARK AT THE NORTHWEST CORNER OF THE INTERSECTION OF POMERADO ROAD AND SEMILLON BLVD.
M.S.L.D ELEV. 781.635'
DATUM: NGVD 29'

BASIS OF BEARINGS

THE BASIS OF BEARINGS FOR THIS SURVEY IS IN TERMS OF THE CALIFORNIA COORDINATE SYSTEM 83(CCS83), ZONE 6, AS DETERMINED LOCALLY BY THE LINE BETWEEN PT. NO 126 & PT. NO.610 PER ROS 14492, AND HAVING A BEARING OF: N83 09'29" E. UNLESS NOTED OTHERWISE, THE DISTANCES SHOWN HEREON ARE GROUND DISTANCE.

EXISTING EASEMENTS

REFER TO SHEET C6 (BOUNDARY AND ENCUMBRANCES)

UTILITIES & SERVICES

ONSITE WATER .....CITY OF SAN DIEGO (PUBLIC)
OFFSITE WATER .....CITY OF SAN DIEGO (PUBLIC)
ONSITE SEWER.....CITY OF SAN DIEGO (PUBLIC)
OFFSITE SEWER.....CITY OF SAN DIEGO (PUBLIC)
FIRE AND POLICE.....CITY OF SAN DIEGO
GAS & ELECTRICITY...SDG&E
SCHOOL DISTRICT.....SAN DIEGO UNIFIED SCHOOL DIST.

DEVELOPMENT SUMMARY TABLE

RX - 1 - 2 (SINGLE FAMILY)	REQUIRED	PROPOSED
MIN. LOT AREA	3,000 SF	3,000 SF
MIN. LOT DIMENSIONS		
LOT WIDTH	35'	35'
STREET FRONTAGE	35'	35'
LOT DEPTH	50'	50'
SETBACKS		
FRONT	15'	15'
SIDE/STREET SIDE	3'	3'
REAR	10'	10'
MAX. HEIGHT	30'	35' *
MAX. FAR	.80	.80

** A WAIVER IS REQUESTED, WITH NDP FINDINGS, TO ALLOW A 35-FOOT BUILDING HEIGHT WHERE SDMC SEC. 131.0431(c), TABLE 131-04E ALLOWS A 30-FOOT MAXIMUM.*

RM - 2 - 4 (MULTI FAMILY)	REQUIRED	PROPOSED
MIN. LOT AREA	6,000 SF	6,000 SF
MIN. LOT DIMENSIONS		
LOT WIDTH	50'	50'
STREET FRONTAGE	50'	50'
LOT DEPTH	90'	90'
SETBACKS		
FRONT	15'	15'
SIDE/STREET SIDE	5'	5'
REAR	15'	15'
MAX. HEIGHT	40'	40'
MAX. FAR	1.20	1.20

PARKING SUMMARY

SINGLE FAMILY (MARKET RATE)

REQUIRED		
NO. UNITS	SPACES REQ'D / UNIT (PER SDMC TABLE 142-05B)	TOTAL SPACES
100	2 space/unit	200
PROVIDED		
100	2 (GARAGE)	200

MULTI-FAMILY (AFFORDABLE)

REQUIRED		
NO. UNITS	SPACES REQ'D / UNIT (PER SDMC TABLE 142-05D)	TOTAL SPACES
12 (3-BR)	1.75	21
VISITOR	0.15	2
MOTORCYCLE	0.1	1
TOTAL		24

PROVIDED	SPACES
GARAGE	24
VISITOR	3
ACCESSIBLE	1
MOTORCYCLE	3
TOTAL	32

NOTE: REQUIRED BICYCLE SPACES WILL BE PROVIDED WITH GARAGES.

NDP DEVIATION REQUESTS	
EXISTING REGULATION	PROPOSED DEVIATION
SDMC SEC. 131.0431, TABLE 131-04E PERMITS A MAXIMUM HEIGHT OF 30-FEET IN THE RX-1-2 ZONE.	PROJECT PROPOSES A DEVIATION TO ALLOW A BUILDING HEIGHT OF UP TO 35-FEET, WHERE SDMC SEC. 131.0431, TABLE 131-04E PERMITS A MAXIMUM HEIGHT OF 30-FEET IN THE RX-1-2 ZONE.
SDMC SEC.142.0340(E) LIMITS WALLS LOCATED OUTSIDE OF REQUIRED YARDS TO A MAXIMUM OF 12-FEET IN HEIGHT.	PROJECT PROPOSES A DEVIATION TO ALLOW A RETAINING WALL HEIGHT OF UP TO 36-FEET, WHERE SDMC SEC. 142.0340(E) LIMITS WALLS LOCATED OUTSIDE OF REQUIRED YARDS TO A MAXIMUM OF 12-FEET IN HEIGHT.
SDMC SEC. 113.0273(B)(1) REQUIRES VISIBILITY AREA TRIANGLES TO HAVE 25-FOOT LEGS.	PROJECT PROPOSES A VISIBILITY AREA TRIANGLE WITH 20-FOOT LEGS AT THE SE CORNER OF THE INTERSECTION OF STREET "A" (DEAD-END STUB STREET) AND CYPRESS CANYON ROAD (SOUTH) WHERE SDMC SEC. 113.0273(B)(1) REQUIRES 25-FOOT LEGS.

SHEET INDEX

C1 TITLE SHEET
C2 STREET SECTIONS & DETAILS
C3 PROJECT DESIGN
C4 PROJECT DESIGN
C5 PROJECT DESIGN
C6 FIRE PROTECTION PLAN
C7 BOUNDARY & ENCUMBRANCE, & EXISTING TOPO
C8 SLOPE ANAYLSIS & STEEP SLOPES
C9 ESL EXHIBIT (SENSITIVE BIOLOGY & MHPA)
C10 DMA MAP

PREPARED BY:	#	REVISIONS	DATE	BY
HUNSAKER & ASSOCIATES SAN DIEGO, INC.	1.	1st SUBMITTAL	09/17/2020	H&A
PLANNING 9707 Waples Street	2.	2nd SUBMITTAL	10/29/2021	H&A
ENGINEERING San Diego, Ca 92121	3.	3rd SUBMITTAL	01/31/2022	H&A
SURVEYING (858)558-4500 FAX(858)558-1414	4.	4th SUBMITTAL	04/29/2022	H&A
PROJECT ADDRESS: 11495 CYPRESS CANYON RD SAN DIEGO, CA 92131	5.	5th SUBMITTAL	04/24/2023	H&A
PROJECT #: PTS – 674401	6.	REVISED PER CITY COMMENTS	10/10/2023	H&A

VESTING TENTATIVE MAP/ SITE DEVELOPMENT PERMIT/ NEIGHBORHOOD DEVELOPMENT PERMIT
RENZULLI ESTATES
CITY OF SAN DIEGO, CALIFORNIA

SHEET C1 OF C11

W.O. 3622-0002

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RANCHO LA CRESTA UNIT NO. 4 LOT "D"

ANGELIQUE STREET

NIKITA COURT

APN: 319-642-82-00 CHONG VICTORIA T

APN: 319-642-81-00 BANG EDUARDO PERUM & BANG ELSA

APN: 319-642-80-00 JACOBSEN FAMILY TRUST

APN: 319-642-79-00 H D REVOCABLE LIVING TRUST

RANCHO LA CRESTA - UNIT NO. 2 MAP 13286

LOT "LL" APN: 319-642-84-00 SAN DIEGO RANCHO LA CRESTA HOA

LOT "MM" APN: 319-642-85-00 KB HOME COASTAL INC

APN: 319-642 PENDERGRASS VIRGINIA TRUST

APN: 319-642-90 PENDERGRASS THE TRACY REVOCABLE

MUNDIAL STREET

LIBELLE COURT

SHALDEEN WILLIAM B & DARLENE A FAMILY TRUST APN: 319-642-55-00

KIDANE YONAS S APN: 319-642-57-00

WONG TRUST APN: 319-642-58-00

BICKEL FAMILY TRUST APN: 319-642-59-00

THIRUPATHI RENGARAJ & DHARMARAJ VISHNUPRIYA APN: 319-642-60-00

APN: 319-642-61-00 PARTNERSHIP L P

CITY OF SAN DIEGO / CITY OF POWAY

CITY OF POWAY TRACT NO. 88-04R MAP 13364 LOT B OPEN SPACE APN: 320-201-23-00 CITY OF POWAY

CITY OF POWAY / CITY OF SAN DIEGO

APN: 320-141-04-00 MOHAN NISHAL MOHAN INDIRA ELIZABETH

APN: 320-141-05-00 CERENE STEVEN C & CAROLIN C

APN: 320-141-06-00 NGUYEN TANG TRUST

APN: 320-141-07-00 DING YING & FAN WENJUN

APN: 320-141-08-00 DEMCHAK TRUST

APN: 320-141-09-00 SMITH FAMILY TRUST

SCRIPPS EASTVIEW UNIT 2 MAP 12322

CYPRESS CANYON ROAD

ZIRBEL COURT

CYPRESS VALLEY UNIT NO. 2 MAP 13585

LOT "D" APN: 319-730-08-00 GOODRICH JOHN Q III & ST CLAIRE- GOODRICH CHARITY

LOT "B" APN: 319-730-29-00 CYPRESS VALLEY HOA

LOT "A" APN: 319-710-64-00 CYPRESS VALLEY HOA

LOT "G" APN: 319-710-67-00 CYPRESS VALLEY HOA

LOT "H" APN: 319-711-35-00 CYPRESS VALLEY HOA

APN: 319-730-09-00 KAVANAGH JOHN M KAVANAGH TIFFANNIE M

APN: 319-711-15-00 WANN FAMILY TRUST

APN: 319-711-16-00 PINKOWSKI PETER H & KATHLEEN

CYPRESS VALLEY DRIVE

CYPRESS CANYON RD (NORTH)

CYPRESS CANYON RD (SOUTH)

PUBLIC STREET "A"

PUBLIC STREET "B"

NE 1/4 OF 1/4 SEC. 27 T. 14 S. R. 2 W. S.B.B.M.

APN: 320-010-33-00 CITY OF SAN DIEGO

SCRIPPS EASTVIEW UNIT 1 MAP 12252 LOT 1

SUBDIVISION BOUNDARY

HOA OPEN SPACE

MHPA OPEN SPACE

BRUSH MGMT. TO REMAIN

LANDSCAPE MAINTENANCE TO REMAIN

PARCEL A TO REMAIN

PARCEL B TO REMAIN

EXIST. HEADWALL PER DWG 28014-13-D

EXIST. CATCH BASIN

EXIST. 24" HEADWALL @BASIN BOTTOM CITY OF POWAY / CITY OF SAN DIEGO

EXIST. 8" PVC SEWER PER DWG 28014-9-D

EXIST. 8" PVC WATER 1020 PRESSURE ZONE PER DWG. 28014-13-D

EXIST. 12" PVC WATER PER DWG 28015-4-D

EXIST. 16" PVC WATER 1020 PRESSURE ZONE PER DWG 28015-4-D

EXIST. 18" RCP STORM DRAIN PER DWG 28015-4-D

EXIST. BROW DITCH PER DWG 28015-9-D

EXIST. CURB OUTLET PER DWG 28015-4-D

EXIST. 48" RCP STORM DRAIN PER DWG 28014-4-D

SEWER POC

WATER POC

STORM DRAIN POC

PER CBC J108 SLOPE HEIGHT IS 56' REQUIRED SETBACK IS 12'

DESIGN NOTES

1. PROP. 8" PVC PUBLIC WATER MAIN PRESSURE ZONE 1020
2. PROP. 16" PVC PUBLIC WATER MAIN PRESSURE ZONE 1020
3. PROP. 8" PVC PUBLIC SEWER MAIN
4. PROP. 18" RCP PUBLIC STORM DRAIN
5. PROP. 24" RCP PUBLIC STORM DRAIN
6. PROP. 30" RCP PUBLIC STORM DRAIN
7. PROP. 18" PRIVATE STORM DRAIN
8. PROP. 24" PRIVATE STORM DRAIN
9. PROP. 30" PRIVATE STORM DRAIN
10. PROP. FILTERRA UNIT BMP MAINTAINED BY THE CITY
11. PROP. 10' MOUNTABLE APRON
12. PROP. PLANTABLE AREA
13. PROP. CURB OUTLET (D-25)
14. 12' ACCESS ROAD DG PAVING
15. ADA PATH OF TRAVEL
16. PROP. SOIL NAIL WALL
17. PROP. ROLLED CURB
18. VISIBILITY AREA, SEE GENERAL NOTE #36
19. PROP. WATER LATERAL STUB
20. PROP. SEWER LATERAL STUB

PROPOSED EASEMENTS

1. 15' PRIVATE STORM
2. 5' PRIVATE CROSS LOT DRAINAGE
3. PUBLIC MAINTENANCE ACCESS

SCALE 1" = 50'

FOR CONTINUATION SEE SHEET 4

PROJECT DESIGN

PREPARED BY:
HUNSAKER & ASSOCIATES SAN DIEGO, INC
PLANNING 9707 Waples Street, San Diego, CA 92121
ENGINEERING
SURVEYING

VESTING TENTATIVE MAP/ SITE DEVELOPMENT PERMIT/ NEIGHBORHOOD DEVELOPMENT PERMIT

RENZULLI ESTATES

CITY OF SAN DIEGO, CALIFORNIA

SHEET C3 OF C11

W.O. 3622-0002

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FOR CONTINUATION SEE SHEET 3

DESIGN NOTES

1. PROP. 8" PVC PUBLIC WATER MAIN PRESSURE ZONE 1020
2. PROP. 16" PVC PUBLIC WATER MAIN PRESSURE ZONE 1020
3. PROP. 8" PVC PUBLIC SEWER MAIN
4. PROP. 18" RCP PUBLIC STORM DRAIN
5. PROP. 24" RCP PUBLIC STORM DRAIN
6. PROP. 30" RCP PUBLIC STORM DRAIN
7. PROP. 18" PRIVATE STORM DRAIN
8. PROP. 24" PRIVATE STORM DRAIN
9. PROP. 30" PRIVATE STORM DRAIN
10. PROP. FILTERRA UNIT BMP MAINTAINED BY THE CITY
11. PROP. 10' MOUNTABLE APRON
12. PROP. PLANTABLE AREA
13. PROP. CURB OUTLET (0-25)
14. 12' ACCESS ROAD DG PAVING
15. ADA PATH OF TRAVEL
16. PROP. SOIL NAIL WALL
17. PROP. ROLLED CURB
18. VISIBILITY AREA, SEE GENERAL NOTE #36
19. PROP. WATER LATERAL STUB
20. PROP. SEWER LATERAL STUB

PROPOSED EASEMENTS

1. 15' PRIVATE STORM
2. 5' PRIVATE CROSS LOT DRAINAGE
3. PUBLIC MAINTENANCE ACCESS

SCALE 1" = 50'

PROJECT DESIGN

PREPARED BY:
HUNSAKER & ASSOCIATES SAN DIEGO, INC
PLANNING ENGINEERING SURVEYING
9707 Waples Street San Diego, Ca 92121

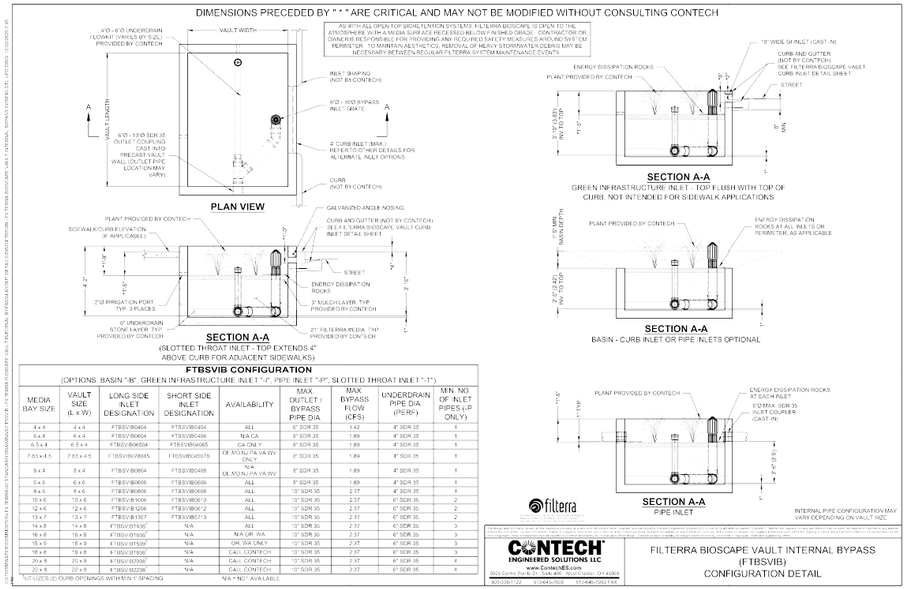
VESTING TENTATIVE MAP/ SITE DEVELOPMENT PERMIT/ NEIGHBORHOOD DEVELOPMENT PERMIT
RENZULLI ESTATES
CITY OF SAN DIEGO, CALIFORNIA

SHEET C4 OF C11

W.O. 3622-0002

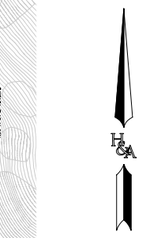
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MEDIA BAY SIZE	VAULT SIZE (L x W)	LONG SIDE INLET DESIGNATION	SHORT SIDE INLET DESIGNATION	AVAILABILITY	MAX OUTLET / BYPASS PIPE DIA	MAX BYPASS FLOW (CFS)	UNDERDRAIN PIPE DIA (HDPE)	MIN. NO. OF INLET PIPES (-P ONLY)
4 x 4	4 x 4	FTBSVIB0404	FTBSVIB0404	ALL	6" SDR 35	1.62	4" SDR 35	1
6 x 4	6 x 4	FTBSVIB0604	FTBSVIB0406	N/A CA	8" SDR 35	1.89	4" SDR 35	1
6.5 x 4	6.5 x 4	FTBSVIB06504	FTBSVIB04065	CA ONLY	8" SDR 35	1.89	4" SDR 35	1
7.63 x 4.5	7.63 x 4.5	FTBSVIB07645	FTBSVIB04575	DE,MD,NJ,PA,VA,WV ONLY	8" SDR 35	1.89	4" SDR 35	1
8 x 4	8 x 4	FTBSVIB0804	FTBSVIB0408	N/A DE,MD,NJ,PA,VA,WV	8" SDR 35	1.89	4" SDR 35	1
6 x 6	6 x 6	FTBSVIB0606	FTBSVIB0606	ALL	8" SDR 35	1.89	4" SDR 35	1
8 x 6	8 x 6	FTBSVIB0806	FTBSVIB0608	ALL	10" SDR 35	2.37	4" SDR 35	1
10 x 6	10 x 6	FTBSVIB1006	FTBSVIB0613	ALL	10" SDR 35	2.37	6" SDR 35	2
12 x 6	12 x 6	FTBSVIB1206	FTBSVIB0612	ALL	10" SDR 35	2.37	6" SDR 35	2
13 x 7	13 x 7	FTBSVIB1307	FTBSVIB0713	ALL	10" SDR 35	2.37	6" SDR 35	2
14 x 8	14 x 8	FTBSVIB1408	N/A	ALL	10" SDR 35	2.37	6" SDR 35	3
16 x 8	16 x 8	FTBSVIB1608	N/A	N/A OR WA	10" SDR 35	2.37	6" SDR 35	3
15 x 9	15 x 9	FTBSVIB1509	N/A	OR, WA ONLY	10" SDR 35	2.37	6" SDR 35	3
18 x 8	18 x 8	FTBSVIB1808	N/A	CALL CONTECH	10" SDR 35	2.37	6" SDR 35	3
20 x 8	20 x 8	FTBSVIB2008	N/A	CALL CONTECH	10" SDR 35	2.37	6" SDR 35	4
22 x 8	22 x 8	FTBSVIB2208	N/A	CALL CONTECH	10" SDR 35	2.37	6" SDR 35	4

*LIT-LIZES (2) CURB OPTIONS WITH MIN 1" SPACING
N/A = NOT AVAILABLE



LEGEND: SYMBOL:

- PROJECT BOUNDARY
- DMA BOUNDARY
- DAYLIGHT
- PROPOSED STORM DRAIN
- EXISTING STORM DRAIN
- FLOW LINE — 00.00 ACRES
- SUBAREA ACREAGE
- DMA ICON — DMA 1
- IMPERVIOUS - ROAD/SIDEWALK
- IMPERVIOUS - ROOF
- PERVIOUS AREAS
- BASIN BOTTOM
- PROPOSED SELF MITIGATING SLOPE
- PROPOSED SELF MITIGATING SLOPE TO BE PUBLICLY MANTAINED)
- EXISTING SLOPE NOT TO BE DISTURBED (DRAINS TO BF-1-1)
- INLET
- HYDROLOGIC SOIL TYPE — D
- POINT OF COMPLIANCE — POC 1

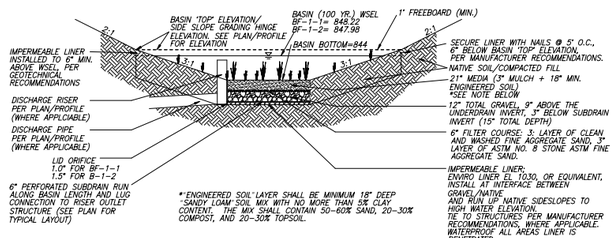
STRUCTURAL BMPS
BIOFILTRATION BASIN

STRUCTURAL BMPS
COMPACT PROPRIETARY BIOFILTRATION

SITE DESIGN BMPs:
- SD-1 MAINTAIN NATURAL HYDROLOGIC FEATURES
- SD-2 CONSERVE NATURAL AREAS, SOILS, VEGETATION
- SD-3 MINIMIZE IMPERVIOUS AREAS
- SD-4 MINIMIZE SOIL COMPACTION
- SD-5 IMPERVIOUS AREA DISPERSION
- SD-6 RUNOFF COLLECTION
- SD-7 LANDSCAPING WITH NATIVE OR DROUGHT TOLERANT SPECIES

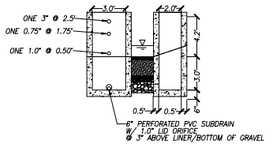
SOURCE CONTROL BMPs:
- SC-1 PREVENTION OF ILLICIT DISCHARGES TO MS4
- SC-2 STORM DRAIN STENCILING OR SIGNAGE
- SC-6 ADDITIONAL BMPS BASED ON POTENTIAL SOURCES OF RUNOFF POLLUTANTS
  - SC-6A ON-SITE STORM DRAIN INLETS
  - SC-6E LANDSCAPE/OUTDOOR PESTICIDE USE
  - SC-6G FIRE SPRINKLER TEST WATER
  - SC-6P MISCELLANEOUS DRAIN OR WASH WATER
  - SC-6Q PLAZAS, SIDEWALKS, AND PARKING LOTS

UNDERLYING SOIL GROUP : D
APPROXIMATE DEPTH TO GROUNDWATER > 20'
NO CRITICAL COARSE AREAS REQUIRE PRESERVATION

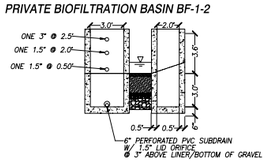


SOIL SECTION FOR WATER QUALITY/HYDROMODIFICATION BIOFILTRATION BASIN
NOT TO SCALE

PRIVATE BIOFILTRATION BASIN BF-1



PRIVATE BIOFILTRATION BASIN BF-1-2



BIOFILTRATION BASIN RISER DETAIL FOR BF-1-1 & BF-1-2
NOT TO SCALE

DMA MAP

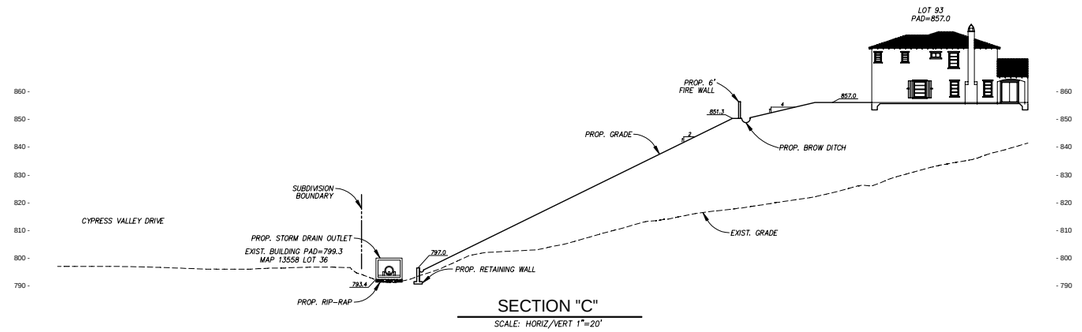
PREPARED BY:
HUNSAKER & ASSOCIATES SAN DIEGO, INC
PLANNING ENGINEERING SURVEYING
9707 Waples Street San Diego, Ca 92121 T:(858)558-4500 F:(858)558-1414

VESTING TENTATIVE MAP/ SITE DEVELOPMENT PERMIT/ NEIGHBORHOOD DEVELOPMENT PERMIT
RENZULLI ESTATES
CITY OF SAN DIEGO, CALIFORNIA

SHEET C10 OF C11

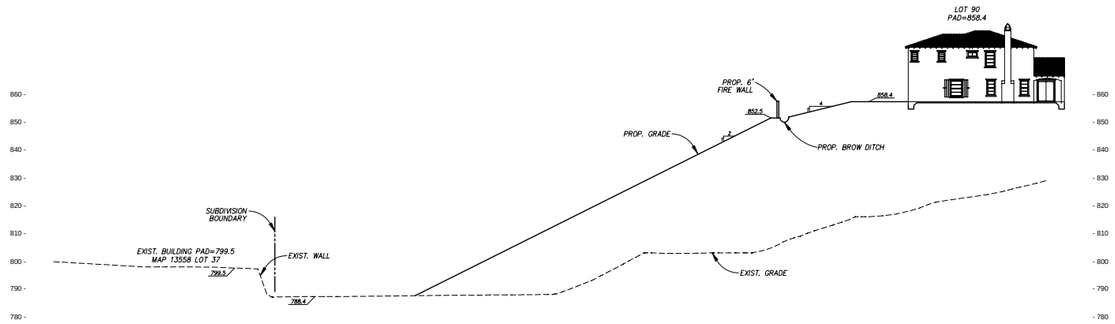
W.O. 3622-0002

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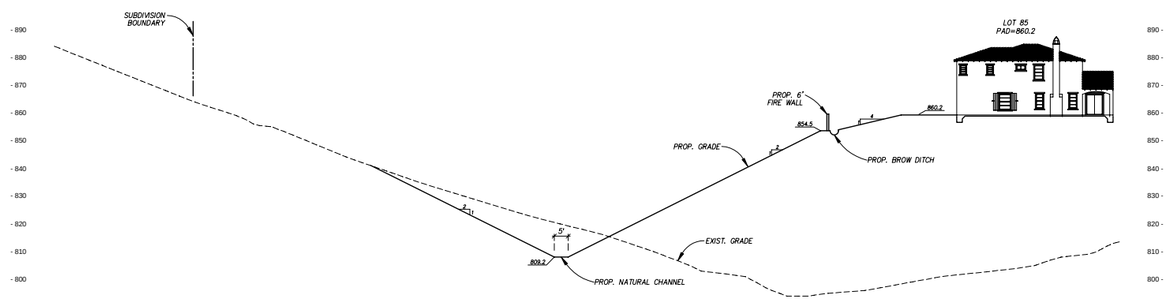
SECTION "C"

SCALE: HORIZ/VERT 1"=20'



SECTION "D"

SCALE: HORIZ/VERT 1"=20'



SECTION "E"

SCALE: HORIZ/VERT 1"=20'

SITE SECTIONS

PREPARED BY:

HUNSAKER & ASSOCIATES SAN DIEGO, INC

PLANNING ENGINEERING SURVEYING

6962 Mission Gorge San Diego, Ca 92120

VESTING TENTATIVE MAP/ SITE DEVELOPMENT PERMIT/ NEIGHBORHOOD DEVELOPMENT PERMIT

RENZULLI ESTATES

CITY OF SAN DIEGO, CALIFORNIA

SHEET C11 OF C11

W.O. 3622-0002

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Attachment 5
Drainage Report

Attach project's drainage report. Refer to Drainage Design Manual to determine the reporting requirements.

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DRAINAGE STUDY
for
RENZULLI ESTATES (TM)

APN: 319-020-01-00

Prepared for:

Green Phair Scripps Partners, LLC
945 East J Street
Chula Vista, CA 91910

W.O. 3622-0002

October 04, 2023



Alisa S. Vialpando 2/23/23

Alisa Vialpando, RCE # 47945 Date
President
Hunsaker & Associates
San Diego, Inc.

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CHAPTER 1

EXECUTIVE SUMMARY

CHAPTER 1 - EXECUTIVE SUMMARY

1.1 - Introduction

The proposed 40.56 acre development site is located at 11495 cypress canyon road in the scripps miramar ranch community planning area. The property is presently occupied by an existing single-family residence and several outbuildings. (See the Vicinity Map below).

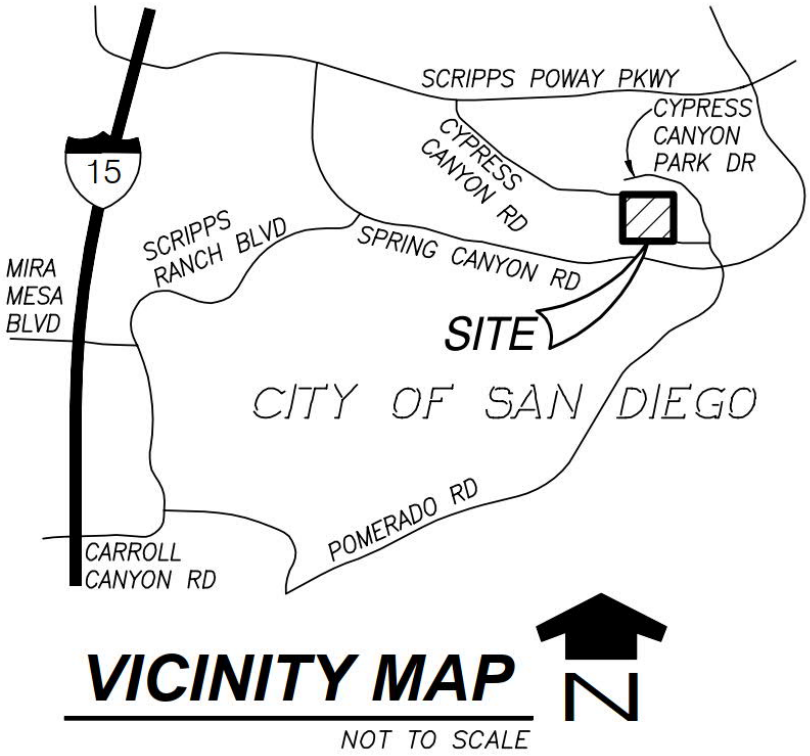
The current development proposal consists of the construction of 100 single-family homes and 12 multi-family affordable income rental units, along with public road and public & private utility improvements and both public & private hoa open spaces. All existing buildings on site will be removed as part of the development proposal. The storm drain and storm water quality control facilities are proposed to meet the City requirements. This study will quantify runoff for the 100-year storm event and assess the detention basin's capacity to mitigate the proposed development's impact. It will also conduct hydraulic analysis for the proposed channel, the steep storm drain, and the impact basin.

The total drainage area of the project is 58.14 acres, the site is receiving run-on from undeveloped slopes on the southern edge; The total project area is 40.56 acres which are constituted by a nearly 1330 ft. x 1330 ft. square. Since the site locates deep inside of a developed area, it is generally surrounded by mature residential neighborhoods in all four directions with complete drainage utilities to which our onsite runoff will ultimately connect and discharge.

Direct impacts to non-wetland waters of the state and wetlands subject to regulation by the RWQCB and CDFW, including direct, permanent impacts ephemeral stream channel and herbaceous wetland habitat, will occur due to project implementation. State law regulates impacts to non-wetland waters of the State. The project is expected to be required to obtain a Waste Discharge Requirement authorization from the RWQCB and a Section 1602 Lake and Streambed Alteration Agreement from CDFW prior to construction. Based on recent federal guidance from the U.S. Environmental Protection Agency (i.e., Navigable Waters Protection Rule), these areas are not expected to fall under the jurisdiction of the U.S. Army Corps of Engineers and an Approved Jurisdictional Determination will be request from U.S. Army Corps of Engineer staff to confirm this assumption.

Treatment of storm water runoff from the site has been addressed in a separate report – ‘The Priority Development Project Storm Water Quality Management Plan (SWQMP) for Renzulli Estates’ dated October, 2023, prepared by Hunsaker & Associates San Diego Inc.

Per City’s drainage criteria, the onsite hydrology calculation will be based on 100-year storm event.



Per County of San Diego drainage criteria, the Modified Rational Method should be used to determine peak design flowrates when the contributing drainage area is less than 1.0 square mile. Since the total watershed area discharging from the site is less than 1.0 square mile, the AES-2015 computer software was used to model the runoff response per the Modified Rational Method. Methodology used for the computation of design rainfall events, runoff coefficients, and rainfall intensity values are consistent with criteria set forth in the "County of San Diego 2003 Hydrology Manual." A more detailed explanation of methodology used for this analysis is listed in Chapter 2 of this report.

A hydraulic analysis is included in Chapter 6 to provide preliminary sizing for the proposed steep pipe located to the north of the development area, along with the necessary energy dissipation feature – an impact basin (or equivalent such as D-41) at the outlet of this pipeline. Additionally, an HEC-RAS analysis has been conducted to calculate parameters including water surface elevation, the extent of the 100-year inundation area, and flow velocity within the proposed channel running south of the project site. This analysis also evaluates the effectiveness of the planned drop structures along the channel.

Detailed calculations such as on-site storm drain hydraulics, inlet calculations, and street capacity calculations will be addressed during final engineering.

The 100-yr P6 and P24 rainfall depth are provided in Chapter 2.

1.2 – Summary of Existing Conditions

The 40.56-acre hydrologic catchment primarily consists of natural grades and hills all covered by native vegetation and shrubs. The site is accessible from Cypress Canyon Rd (Northwest entry), Mundial St (North entry), and Cypress Canyon Rd (Southeast entry). In addition, the Cypress Valley Dr ends against the southwest site boundary from the west with an approx. 6' tall retaining wall growing from an existing natural channel bed (Cypress Canyon) at the southwest boundary. The flow in Cypress Canyon is ephemeral and is partially from our onsite runoff from the north of the canyon, it runs from east to west and drains into an existing storm drain headwall under Cypress Valley Dr.

The overall drainage area is bisected into north and south by a ridgeline running through the center of the site from northwest to southeast. In the south area, the primary portion of the total runoff drains to southeast storm drain headwall at Cypress Valley Dr, in addition to these flows, there is offsite run-on of approximately 19.19 acres; the incoming drainage area is delineated by Spring Canyon Road, Elderwood Lane and Caminito Dulce. Another small drainage area drains to the east entry at Cypress Canyon Rd and continues to gutter flow to the inlet at Cypress Canyon Rd and Cypress Canyon Park Dr intersection. The north drainage area was further divided into 6 sub-catch basins based on the topo and drains separately to the existing inlets and catch basins located at Cypress Canyon Rd, Mundial St, and nearby basins which are all labeled in our drainage maps.

1.3 – Summary of Developed Condition

The project site is constituted by two major planning areas, single-family site (primarily in the center of the project site) and affordable site (East side of the site). The single-family site consists of 100 single-family residential dwellings in the central area. The affordable site has two 6-units apartment building as well as associated parking spaces. The traffic of the site is organized by proposed streets and two entries located at northwest corner, and southeast corner of the site boundary.

The development of the site will include adding the storm drains, curb inlets, cleanouts along the proposed onsite streets, roads and parking spaces to collect and convey the storm runoff to the two proposed detention and water quality control basins located at northwest part of the development area.

The project also proposed bypassing storm drains, ditches to collect and convey the sloped area runoff directly to downstream storm drains around the site. For most undisturbed areas within the site, the natural drainage pattern remains unchanged. However, there is a minor exception where approximately 2 acres of existing slopes, which used to drain southeast towards Cypress Canyon Rd., have been redirected northward through a proposed storm drain. This redirected flow is combined with on-site runoff and directed to a biofiltration/detention basin for treatment and mitigation. It's important to note that this diversion does not impact northward flow, and reducing southeastward flow does not affect existing channels, as the flow in its

current condition reaches the downstream road. Additionally, a channel is being proposed to convey the run-on coming from the existing-undisturbed-slopes on the south west area of the project.

After the majority of the onsite runoff is treated and detained by the biofiltration basins, the outflow will confluence with the bypass storm drain and discharge north into Mundial St. existing 24" storm drain and south into Cypress Canyon which has transformed into an underground storm drain at the end of Cypress Valley Dr. adjacent to our east side boundary.

The last portion of the onsite runoff at northwest corner is generated from a small section of the proposed road connecting with existing Cypress Canyon Rd. The existing drainage system at this entry consists of two concrete ditches on each side of the Cypress Canyon Rd. They accept the runoff from our site and discharge to two storm drain inlets on Cypress Canyon Road and Angelique Street. Two storm drain inlets are proposed at the end of the proposed street to capture the peak flow generated from it; In order to meet the water quality requirements, the water quality control measurements are proposed, i.e., two Filterra Unit structures (or equivalent) will be installed at these two inlets on Cypress Canyon Rd control the water quality. The outflow from Filterra Units then discharges, without detention, into the storm drain on Cypress Canyon Road, where it will be conveyed northerly via Angelique St. storm drain system, similar to existing conditions.

Multiple calculation nodes were defined around our site boundary based on the existing and proposed condition drainage pattern and the hydrology results were labeled at each node for both existing conditions and proposed conditions. These results from PR and EX condition will be compared to ensure no overall impact exists after implementing attenuation measurements.

Pollution Control and Hydromodification Flow Control of the overall site will be addressed in the separate report 'The Priority Development Project Storm Water Quality Management Plan (SWQMP) for Renzulli Estates' dated October, 2023 prepared by Hunsaker & Associates San Diego Inc.

1.4 – Results and Recommendations

Table 1 below summarizes the existing and proposed peak flows from the site. The developed peak flows consider the flow attenuation from the proposed detention basin. Per the San Diego County rainfall isolpluvial maps, the design rainfall depth for 100-year flow event at the project site area is 3.0-inches.

Table 1 - Summary of 100 Year Peak Flows

	Existing Condition			Developed Condition				Flow difference between PR(ATT) and EX
	EX NODEs	AREA (acres)	Q100 (cfs)	PR NODEs	AREA (acres)	Q100 (cfs) Unattenuated	Q100 (cfs) Attenuated**	
	104	3.0	5.69	104	2.90	5.75	5.75	0.06
	200	1.66	3.90	N/A	0	0	0	-3.9
	300	12.72	24.63	300	14.79	37.64	22.33	-3.30
	306	2.84	6.64	306	1.58	3.83	3.83	-2.81
	600	37.1	92.06	600	38.14	88.44	64.13	-27.93
	702	0.59	1.41	702	0.25	1.72	1.72	0.31
	708	0.23	1.45	708	0.48	2.11	2.11	0.66
Total	-	58.14	135.78	-	58.14	139.49	99.87	-36.91

** Design flows used for storm drain design.

Since the proposed development will increase runoff generated by the project site, the project will utilize onsite detention facilities to mitigate the increase in peak flow. As a result, although at node 104, 708 & 702 the proposed condition generates a slightly higer flow than existing condition, in all other nodes the mitigated Q100 of proposed condition all demonstrated flow rate decreases as well as an overall 36.91 cfs flow rate reduction in compare to that of the existing condition. Runoff generated by the project will not exceed pre-project peak flow rates, and therefore the project creats no negative impacts to any adjacent properties.

The runoff velocities will be dissipated by rock riprap at storm drain outfalls. Refer to Chapter 6 for preliminary impact basin and riprap design. A more detailed riprap design (per SDRSD D-40) will be provided with hydraulics during the final engineering stage.

The project has been designed to honor pre-project watershed basins and outfall locations. Considering the limitations which result from subdivision layout and design, minor exchanges in watershed areas occur but are minimized to the maximum extent practicable.

Since the project site is located outside any FEMA floodplain zones, there is no requirement for a Letter of Map Revision (per FEMA MAP #06073C1362G).

For the detention calculation, refer to the calculations in Chapter 5.

The above results show there is no adverse impact from the proposed development after the attenuation because there is reduction in flows.

Peak flow rates listed above were generated based on the criteria set forth in the "*2003 San Diego County Hydrology Manual*" (methodology presented in Chapter 2 of this report). The Modified Rational Method output is located in Chapter 3.

1.5 - References

"San Diego County Hydrology Manual"; Department of Public Works – Flood Control Division; County of San Diego, California; Revised June 2003.

"*The Priority Development Project Storm Water Quality Management Plan (SWQMP) for Renzulli Estates*" dated October, 2023 prepared by Hunsaker & Associates San Diego Inc.

Attachment 6
Geotechnical and Groundwater Investigation Report

Attach project's geotechnical and groundwater investigation report. Refer to Appendix C.4 to determine the reporting requirements.

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

LM Summit Partners, LLC
3330 Bonita Road
Chula Vista, CA 91910

January 11, 2020
P/W 1902-06
Report No. 1902-06-B-4

Attention: Austin Dias

Subject: **Summary of Preliminary Geotechnical Information & General Grading Recommendations for the Cypress Point Project, San Diego, California**

References: *Report Of Limited Geotechnical Investigation Scripps Cypress Point, Cypress Canyon Road San Diego, Ca Job No. 04-4744 February 16, 2005 as prepared by C W La Monte Company, Inc*

Gentlemen,

Based upon our recent discussions Advanced Geotechnical Solutions, Inc. (AGS) has prepared this summary report summarizing the geologic units encountered during our recent studies and the previous studies conducted by C W La Monte Company (reference). Utilizing the onsite and a geologic map with general grading recommendations for the Cypress Point Project, City of San Diego, California. This preliminary report is intended to summarize the anticipated removal depths of the unsuitable soils onsite and provide a general description of the various geologic units which will be encountered during the grading of the site.

As you are aware the site was used as a "dump" site for inert construction debris for several decades. It is our understanding that the "dump" site filled the large canyon fill along the northern portion of the project. Recently, AGS obtained the referenced Geotechnical Investigation Prepared by C. W. Lamont (2/16/2005). AGS has utilized the Geologic Map and Exploration Plan from the original report to depict the recent locations of the *Environmental* boring locations (SCS Environmental Engineers) and AGS's recent subsurface exploration locations. In addition, AGS retained Southwest Geophysics to conduct seismic refraction studies and high-resolution electrical resistivity tomographic modeling. This map also depicts C. W. La Montes mapped geologic units, locations of their previous subsurface exploration locations and topography. AGS and SCS conducted eight (8) Continuous Flight Auger borings, three (3) Sonic borings and four (4) Tri-Pod continuous flight auger. AGS has put the most recent abbreviated test pit logs and borings logs on this base map. Available subsurface data and logs is presented in Appendix B with subsurface exploration locations presented on Plate 1.

1.0 GEOLOGIC UNITS

The project is situated in the coastal section of the Peninsular Ranges Geomorphic Province. The site is underlain with Tertiary-aged sedimentary bedrock of the Poway Group with associated residual soils. Other surficial deposits encountered at the site include slope wash, colluvium and alluvium. Two major episodes of grading have resulting in the filling of the northerly canyon. The major soil types are described individually below in order of increasing age. Refer to the attached Geologic Reconnaissance report for a more detailed description of the individual geologic units.

Undocumented Fills (Qafu) : The undocumented fill soils form a level pad, which has filled the area of the north central canyon, easterly of the existing residence. These fills were placed intermittently over a 3 to 5 year period and included miscellaneous export material from nearby grading projects in the Scripps Ranch and surrounding areas. Our site reconnaissance and investigation indicates the fills may exceed 85 feet in maximum vertical thickness. The fills encountered in our test excavations and borings typically consisted of loosely "end-dumped" material including silty sands and clayey sands and sandy clays with some gravel, cobble and rock fragments, concrete and over-size rock debris, and occasional pockets of construction demolition debris, brush material and timber. Other minor undocumented fills are scattered over the site and were used to construct building pads and roads. These other fills are typically derived from on- site excavations into the native materials. The undocumented fill soils are not suitable to support proposed structures and improvements in their present loose condition and require removal and/or recompaction from areas to receive improvements. A significant screening operation will be necessary during excavation operations to remove and segregate unsuitable debris and over-size material from the central fill mass. It should be assumed that all of the documented fills will be unsuitable for support of settlement sensitive structures and will removal and require recompaction

Documented Fill (Map symbol: Qafd): The north end of the canyon was filled with documented fills placed under the observation and testing of Pacific Soils Engineering. These fills are estimated to obtain a maximum thickness of 45 feet at the north central end of the property and may exceed 20 feet in maximum thickness were the controlled canyon fill abuts the toe of the undocumented fill slope near the center of the property. The upper 20 of these fills typically consist of tan, medium dense to dense, clayey sands with some gravel and cobble. At depth these materials are interlayered with stiff, dark brown and clays. In-place surficial deposits were encountered underlying the fill along the walls of the filled canyon. Minimally, it should be assumed that the upper 3 to 5 feet of the documented fills will be unsuitable for support of settlement sensitive structures and will require recompaction

Colluvium (no map symbol): Colluvium occurs in localized areas on mid- to lower canyon slopes as depicted on Figure 2. Colluvial soils are derived from erosion of the adjacent formational units and subsequent deposition by sheet flow and gravitational processes. Colluvium generally consists of relatively loose clayey sands, silts ands, and clays that are subject to creep and excessive settlement under fill or foundation loads. Because of the poor exposures of this unit, the thickness of these soils is not known but may reach exceed 5 feet in some areas.

Alluvium (Map symbol:Qal): Alluvium, relatively loose stream deposited sediment is present in the bottom of most major drainages. These materials are typically composed of loose sands and clayey sands that may reach a thickness of 10 to 20 feet at the bottom of the small reservoir located in the southern portion of the site. Alluvium was reported to be removed from the north canyon bottom prior to filling.

Slope Wash (no map symbol): Most of the undisturbed canyon wall terrain is overlain with a thin veneer of natural ground slope wash. These materials typically range from approximately 1 to 3feet in thickness and consist primarily of dark reddish brown loose, silty sand with some gravel and cobble. The slope wash materials are not suitable to support proposed structures and improvements in their present loose condition and require removal and/or recompaction from areas to receive improvements.

Questionable Landslide (Map symbol: Qls?): A small possible or "questionable" landslide is located near the base of the canyon slope in the northwestern portion of the site. Because of the relatively small size of this feature and poor access, it was not verified by trenching or drilling.

Residual Soil (no map symbol): The below described bedrock materials are mantled with an intermittent layer of residual materials. The residuum ranges from about 1 to 5 feet in thickness and consists of dark brown, firm to stiff, sandy clay. The residual clays are very highly expansive and require specialized foundation recommendations if present near finish grade elevations.

Poway Group (Map symbols: Tp, Tpm,Tmv): Underling the surficial deposits are sedimentary bedrock formations of the Poway Group. These formations include the Stadium Conglomerate, the Mission Valley Formation, the Pomerado Conglomerate, and the Miramar Sandstone. The formational materials generally consist of massively or horizontally bedded, very dense, tan and light brown, silty and clayey sandstones conglomerate.

2.0 GENERAL GRADING RECOMMENDATIONS

Development of the subject property as proposed is considered feasible, from a geotechnical standpoint, provided that the conclusions and recommendations presented herein are incorporated into the design and construction of the project. Presented below are issues identified by this study or previous studies as possibly impacting site development. Recommendations to mitigate these issues and geotechnical recommendations for use in planning and design are presented in the following sections of this report.

2.1. Site Preparation and Removals/Overexcavation

Grading should be accomplished under the observation and testing of the project soils engineer and engineering geologist or their authorized representative in accordance with the recommendations contained herein, the current Municipal Code of the City of San Diego. Existing vegetation, trash, debris and other deleterious materials should be removed and wasted from the site prior to removal of unsuitable soils and placement of compacted fill. Artificial fill, topsoil, alluvium, colluvium, highly weathered terrace deposits and highly weathered Pomerado and Mission Valley formations should be removed in areas planned to receive fill or where exposed at final grade. The resulting undercuts should be replaced with engineered fill. Estimated depths of removals based upon the geologic unit are presented in Table 2.1, it should be noted that local variations can be expected requiring an increase in the depth of removal for unsuitable and weathered deposits. The extent of removals can best be determined in the field during grading when observation and evaluation can be performed by the soil engineer and/or engineering geologist. Removals should expose competent terrace deposits, Otay Formation, Tertiary Fanglomerate or Santiago Peak Volcanics and be observed and mapped by the engineering geologist prior to fill placement. In general, soils removed during remedial grading will be suitable for reuse in compacted fills provided they are properly moisture conditioned and do not contain deleterious materials.

The northwest-trending tunnels that currently contain the large-diameter aqueduct should be properly mitigated prior to improvement construction. Mitigation methods include excavation to expose the tunnel and then infill with engineered, compacted fill or infill with lightweight sand/cement grout. A combination of these methodologies may be employed depending upon the depth of the tunnel below the design ground surface.

TABLE 2.1
ESTIMATED DEPTH OF REMOVAL

Geologic Unit (Map Symbol)	Estimated Removal Depth
Undocumented Artificial Fill (af(u))	3-85 feet
Documented Artificial Fill (af(d))	3-5 feet
Topsoil (No Map Symbol)	2-5 feet
Alluvium (Qal)	4-15 feet
Weathered Pomerado/Mission Valley Formation (Tp/Tm)	3-6 feet

2.2. Overexcavation of Building Pads

It is recommended that overexcavation of "cut" lots in hard rock, well cemented sandstones and/or cemented conglomerate (Pomerado/Mission Valley Formation) be performed. The cut and any shallow fill portions of these lots should be overexcavated a minimum of three (3) feet and replaced to design grade with select compacted fill. The undercut should be excavated such that a gradient of at least one percent be maintained toward the front of the pad. Replacement fill should be eight inch minus in particle size and compacted to project specifications. Preliminarily, anticipated rock undercuts are indicated by a "circled R" (see legend, Plate 1). It is possible that relatively thin (i.e. less than one (1) foot) bentonitic claystone beds may be exposed at pad grade. Review of the data and design indicate that most of the recognized beds will not be exposed at pad grades. This includes the single-family lots and larger pads areas. Accordingly, no undercuts to mitigate the effects of claystone beds have been designated at this time; however should such beds occur in the near-surface, undercutting to depths of 5 to 10 feet and replacement with compacted fill may be warranted.

Where design or remedial grading activities create a cut/fill transition in areas of the Otay or other formations that do not require blasting, excavation of the cut or shallow fill portion should be performed such that at least three (3) feet of compacted fill exits over the pad. The undercut overexcavation should maintain a minimum one (1) percent gradient to the front of the lot. In addition, where steep cut/fill transitions are created, additional overexcavation and flattening of the transitions are recommended.

Undercuts for the larger sheet graded pads should be deferred until actual product types and finished grades are determined.

2.3. Overexcavation of Streets

Street undercuts in hard rock areas should be based on depth of utilities within "public right of way". The depth of undercut for streets should be at least one (1) feet below the deepest utility. Final determination of undercut depths should be dependent upon review of more detailed plans once they become available.

2.4 Slope Stability and Remediation

Typically, the Pomerado/Mission Valley Formation are grossly stable in cut and natural slopes owing to their induration. Local wedge-type failures are not likely, but should be assessed by geologic mapping during grading. The Otay Formation in many places possesses only moderate to weak shear strengths, particularly where bentonite beds are present. The wetting of the bentonite can lead to further reduction in shear strengths both along and across bedding. Review of the subsurface data and proposed design indicates that bentonitic claystone beds could possibly daylight on the face of proposed cut slopes. The Fanglomerate and terrace deposits are anticipated to be grossly and surficially stable in cut and natural slopes owing to their lack of defined bedding and the granular nature of these deposits.

2.6. Settlement Monitoring

Fills are subject to post-grading settlement. It is recommended that all fills greater than fifty (50) feet in thickness be monitored prior to release for construction. The monitoring can be accomplished by installation of surface monuments.

2.7. Subsurface Drainage

Six- (6) and eight- (8) inch canyon subdrains are recommended onsite in canyon areas that will receive compacted fill. The drains should be placed along the lowest alignment of canyon removals. Final determination of drain locations will be made in the field, based on exposed conditions. All drains should be constructed in accordance with the details shown on Detail 1 and 2 (Appendix A).

In some instances post-grading irrigation practices and rainfall patterns can create seepage in cut and fill slopes. This seepage is more prevalent in cut slopes excavated in Santiago Peak Volcanics or fill slopes constructed out of shot rock. Where nuisance seepage is observed, drains are typically installed to collect this water and outlet it into suitable surface or subsurface drainage devices. These drains, if required, should be installed on a case by case basis per the geotechnical consultant's recommendations.

The infiltration of standing water into all BMP's could potentially be detrimental to improvements such as slopes, foundations, utility trenches, retaining walls and pavement sections. Geotechnical review of grading plans should be performed when available to determine which storm drain infiltration devices may require mitigation such as collecting and discharging accumulated subsurface water away from improvements.

2.8. Excavation and Temporary Cut Slopes

All excavations should be shored or laid back in accordance with applicable Cal-OSHA standards. Formational materials can be considered a Type "A" soil. Fill can be considered Type "B" soil. Any temporary excavation greater than 5 feet in height should be laid back with a 3/4:1 (horizontal: vertical) gradient in formational material or 1:1 in fill soils. These excavations should not become saturated or allowed to dry out. Surcharge loads should not be permitted within a distance equal to the height of the excavation from the top of the excavation. The top of the excavation should be a minimum of 10 feet from the edge of existing improvements. Excavations steeper than those recommended or closer than 10 feet from an existing surface improvement should be temporarily shored in accordance with applicable OSHA codes and regulations.

2.9 Compaction Standards

New: All fills should be compacted at least 90 percent of the maximum dry density as determined by ASTM D1557. All loose and or deleterious soils should be removed to expose firm older alluvium or bedrock. Prior to the placement of fill, the upper 6 to 8 inches should be ripped, moisture conditioned to optimum moisture or slightly above optimum, and compacted to a minimum of 90 percent of the maximum dry density (ASTM D1557) or a minimum of 93 percent for fill deeper than fifty (50) feet from ultimate grade. Fill should be placed in thin (6 to 8-inch) lifts, moisture conditioned to optimum moisture or slightly above, and compacted to 90 (or 93 for fill deeper than 50 feet) percent of the maximum dry density (ASTM D1557) until the desired grade is achieved.

Care should be taken that the ultimate grade be considered when determining the compaction requirements for disposal fill and "super pad" areas. Compaction shall be achieved at slightly above the optimum moisture content, and as generally discussed in the attached Earthwork Specifications (Appendix B).

2.10 Benching

Where the natural slope is steeper than 5-horizontal to 1-vertical and where determined by the project Geotechnical Engineer or Engineering Geologist, compacted fill material shall be keyed and benched into competent materials.

2.11. Mixing and Moisture Control

In order to prevent layering of different soil types and/or different moisture contents, mixing and moisture control of materials may be necessary. The preparation of the earth materials through mixing and moisture control should be accomplished prior to and as part of the compaction of each fill lift. Water trucks or other water delivery means may be necessary for moisture control. Discing may be required when either excessively dry or wet materials are encountered.

2.12. Haul Roads

All haul roads, ramp fills, and tailing areas shall be removed prior to engineered fill placement.

2.13. Import Soils

Import soils, if required, should consist of clean, structural quality, compactable materials similar to the on-site soils and should be free of trash, debris or other objectionable materials. Import soils should be tested and approved by the geotechnical consultant prior to importing. At least three working days should be allowed in order for the geotechnical consultant to sample and test the potential import material.

2.14. Oversize Rock

Oversized rock material [i.e., rock fragments greater than eight (8) inches] will be produced during the excavation of the design cuts and undercuts. Provided that the procedure is acceptable to the developer and governing agency, this rock may be incorporated into the compacted fill section to within three (3) feet of finish grade within residential areas and to two (2) foot below the deepest utility in street and house utility connection areas. Maximum rock size in the upper portion of the hold-down zone is restricted to eight (8) inches. Disclosure of the above rock hold-down zone should be made to prospective homebuyers explaining that excavations to accommodate swimming pools, spas, and other appurtenances will likely encounter oversize rock [i.e., rocks greater than eight (8) inches] below three (3) feet. Rock disposal details are presented on Detail 10 Rocks in excess of eight (8) inches in maximum dimension may be placed within

the deeper fills, provided rock fills are handled in a manner described below. In order to separate oversized materials from the rock hold-down zones, the use of a rock rake may be necessary.

2.15 Rock Blankets

Rock blankets consisting of a mixture of gravel, sand and rock to a maximum dimension of two (2) feet may be constructed. The rocks should be placed on prepared grade, mixed with sand and gravel, watered and worked forward with bulldozers and pneumatic compaction equipment such that the resulting fill is comprised of a mixture of the various particle sizes, contains no significant voids, and forms a dense, compact, fill matrix.

Rock blankets may be extended to the slope face provided the following additional conditions are met: 1) no rocks greater than twelve (12) inches in diameter are allowed within six (6) horizontal feet of the slope face; 2) 50 percent (by volume) of the material is three-quarter- (3/4) inch minus; and 3) backrolling of the slope face is conducted at four- (4) foot vertical intervals and satisfies project compaction specifications.

2.16 Rock Windrows

Rocks to maximum dimension of four (4) feet may be placed in windrows in deeper fill areas in accordance with the details on Detail 10. The base of the windrow should be excavated an equipment-width into the compacted fill core with rocks placed in single file within the excavation. Sands and gravels should be added and thoroughly flooded and tracked until voids are filled. Windrows should be separated horizontally by at least fifteen (15) feet of compacted fill, be staggered vertically, and separated by at least four (4) vertical feet of compacted fill. Windrows should not be placed within ten (10) feet of finish grade, within two (2) vertical feet of the lowest buried utility conduit in structural fills, or within fifteen (15) feet of the finish slope surface unless specifically approved by the developer, geotechnical consultant, and governing agency.

2.17. Individual Rock Burial

Rocks in excess of four (4) feet, but no greater than eight (8) feet may be buried in the compacted fill mass on an individual basis. Rocks of this size may be buried separately within the compacted fill by excavating a trench and covering the rock with sand/gravel, and compacting the fines surrounding the rock. Distances from slope face, utilities, and building pad areas (i.e., hold-down depth) should be the same as windrows.

2.18. Rock Disposal Logistics

The grading contractor should consider the amount of available rock disposal volume afforded by the design when excavation techniques and grading logistics are formulated. Rock disposal techniques should be discussed and approved by the geotechnical consultant and developer prior to implementation.

2.19. Utility Trench Excavation and Backfill

All utility trenches should be shored or laid back in accordance with applicable Cal/OSHA standards. Excavations in bedrock areas should be made in consideration of underlying geologic structure. The geotechnical consultant should be consulted on these issues during construction.

Mainline and lateral utility trench backfill should be compacted to at least 90 percent of maximum dry density as determined by ASTM D 1557. Onsite soils will not be suitable for use as bedding material but will be suitable for use in backfill, provided oversized materials are removed. No surcharge loads should

be imposed above excavations. This includes spoil piles, lumber, concrete trucks or other construction materials and equipment. Drainage above excavations should be directed away from the banks. Care should be taken to avoid saturation of the soils.

Compaction should be accomplished by mechanical means. Jetting of native soils will not be acceptable.

To reduce moisture penetration beneath the slab-on-grade areas, shallow utility trenches should be backfilled with lean concrete or concrete slurry where they intercept the foundation perimeter. As an alternative, such excavations can be backfilled with native soils, moisture-conditioned to over optimum, and compacted to a minimum of 90 percent relative compaction.

Should you have questions or need additional information please contact the undersigned

Respectfully Submitted,
Advanced Geotechnical Solutions, Inc.





JEFFREY A. CHANEY, President
RCE 46544/GE 2314 Exp.6/30/21
Distribution: (2) Addressee
(2) Terra Development Inc. Att: Bob Greninger

Attachments:
APPENDIX A – SUBSURFACE LOGS
APPENDIX B – EARTHWORK SPECIFICATIONS
PLATE 1 – GEOLOGIC MAP AND EXPLORATION LOCATION PLAN

APPENDIX A
SUBSURFACE EXPLORATION

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GEOTECHNICAL BORING LOG

Project No. 1902-06
Project Name Scripps Cypress Canyon
Boring Designation B-1
Date Started 3/22/19
Ground Elev.
Logged By AB
Date Finished
GW. Depth
Drive Weights
Driller Baja Ex.
Drop
Type of Rig

DEPTH (ft)	SAMPLE (R, B, S)	BLOWS/ft	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION
				Asphalt pieces at surface
				Dark brown clayey sand with gravel
				@ 1' grades to light brown reddish rounded gravel asphalt and concrete fragments moist
5	S	12 15 8		same
10	S	3 3 3		same 2,3" inch rock in shoe, no sample
15				@ 15 dark gray silty sand, w organics, roots urea, ammonia smell
20	S	5 5 8		same dark gray to black, strong urea odor
				@ 22' metal pieces
25	S	10 11 11		same no metal

Attitudes: J-Joint, B-Bedding, F-Fault, S-Shear, RS-Rupture Surface

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1902-06 Scripps Cypress Canyon

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GEOTECHNICAL BORING LOG

Project No. 1902-06
Project Name Scripps Cypress Canyon
Boring Designation B-1
Date Started 3/22/19
Ground Elev.
Logged By AB
Date Finished
GW. Depth
Drive Weights
Driller Baja Ex.
Drop
Type of Rig

DEPTH (ft)	SAMPLE (R, B, S)	BLOWS/ft	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION
30	S	10 10 12		same
35				
40	S	50/0"		@40 grinding on obstruction concrete? Refusal at 40' No GW Backfilled with hydrated bentonite chips
45				
50				

Attitudes: J-Joint, B-Bedding, F-Fault, S-Shear, RS-Rupture Surface

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GEOTECHNICAL BORING LOG

Project No. 1902-06
Date Started 3/22/19
Date Finished
Driller Baja Ex.
Type of Rig

Project Name Scripps ~~Cypress~~ Canyon
Ground Elev.
GW. Depth
Drop

Boring Designation B-2
Logged By AB
Drive Weights

DEPTH (ft)	SAMPLE (R, B, S)	BLOWS/ft	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION
	B	0-5'		Asphalt fragments on surface Reddish brown clayey sand with abundant asphalt fragments
5				@ 5' coarse gravel to cobbly silty sand dry to damp orange brown no sample no recovery
10	R	8 8 8		
15	R	8 6 7		@ 12' clayey sand light reddish brown moist w/ gravel and cobbles no recovery @ 15' with brick fragments
20	R	6 7		same with concrete fragments
25	R	6 7 50/5"		same 3" concrete fragment abundant brick fragments

Attitudes: J-Joint, B-Bedding, F-Fault, S-Shear, RS-Rupture Surface

@ 27 Refusal grinding on concrete
No GW. Backfilled with hydrated bentonite chips.

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GEOTECHNICAL BORING LOG

Project No. 1902-06
Project Name Scripps Cypress Canyon
Boring Designation B-3
Date Started 3/22/19
Ground Elev.
Logged By AB
Date Finished
GW. Depth
Drive Weights
Driller Baja Ex.
Drop
Type of Rig CME-95

DEPTH (ft)	SAMPLE (R, B, S)	BLOWS/ft	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION
				Asphalt fragments on surface
				Light reddish brown clayey sand with gravel moist
5	R	15 15 17		same
10	R	17 10 20		same
15	R	9 12 18		abundant gravel 3"
20	R	28 50/3"		abundant gravel to 3"
	B 20-25'			@ 23½' organics grades to dark brown
25	R	13 11 25		abundant gravel

Attitudes: J-Joint, B-Bedding, F-Fault, S-Shear, RS-Rupture Surface

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GEOTECHNICAL BORING LOG

Project No. 1902-06 | Project Name Scripps Cypress Canyon | Boring Designation B-3
Date Started 3/22/19 | Ground Elev. | Logged By AB
Date Finished | GW. Depth | Drive Weights
Driller Baja Ex. | Drop
Type of Rig

DEPTH (ft)	SAMPLE (R, B, S)	BLOWS/ft	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION
	B	27'-32'		
30	R	38 16 Hb		abundant wood fragments
				Refusal @ 32' Grinding on cobble
				No GW.
35				Backfilled with hydrated bentonite chips.

Attitudes: J-Joint, B-Bedding, F-Fault, S-Shear, RS-Rupture Surface

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GEOTECHNICAL BORING LOG

Project No. 1902-06 | Project Name Scripps Cypress Canyon | Boring Designation B-4
Date Started 3/22/19 | Ground Elev. | Logged By AB
Date Finished | GW. Depth | Drive Weights
Driller Manny, Baja Ex. | Drop
Type of Rig CME-95

DEPTH (ft)	SAMPLE (R, B, S)	BLOWS/ft	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION
				Asphalt fragments on surface
	B	0'-5'		Light reddish brown clayey sand with gravel, moist
				some roots
		9		
5	S	5		Light gray silty sand micaceous moist
		5		
10	S	5		
		5		
		8		
				Light reddish brown silty sand brick fragments
				moist with gravel
15	R	12		
		9		
		9		
20	S	24		same no brick fragments with gravel
		15		
		28		
				@ 23 grinding on cobble, pulled steel fence piece
25	R	10		
		13		Yellowish brown clayey to silty sand moist
		23		w gravel

Attitudes: J-Joint, B-Bedding, F-Fault, S-Shear, RS-Rupture Surface

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GEOTECHNICAL BORING LOG

Project No. 1902-06 | Project Name Scripps Cypress Canyon | Boring Designation B-4
Date Started 3/22/19 | Ground Elev. | Logged By AB
Date Finished | GW. Depth | Drive Weights
Driller Baja Ex. | Drop
Type of Rig

DEPTH (ft)	SAMPLE (R, B, S)	BLOWS/ft	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION
30	R	16 16 20		same
	B	30'-35'		
35	S	14 8 8		Reddish brown clayey sand moist some gravel Brown to black silty sand in shoe
40	S	5 5 20		some oil or asphalt contamination reddish gravel fragments
				@ 44' grinding
45	S	14 16 20		silty clay with gravel moist grey
50	R	19 14 28		@ 50 grinding

Attitudes: J-Joint, B-Bedding, F-Fault, S-Shear, RS-Rupture Surface

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GEOTECHNICAL BORING LOG

Project No. 1902-06
Project Name Scripps Cypress Canyon
Boring Designation B-4
Date Started 3/22/19
Ground Elev.
Logged By AB
Date Finished
GW. Depth
Drive Weights
Driller Baja Ex.
Drop
Type of Rig

DEPTH (ft)	SAMPLE (R, B, S)	BLOWS/ft	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION
	B	50-5S		Added water to cool augers
5S	R	19 14 28		Clayey sand with gravel reddish gray
				Grinding at 58' Refusal at 58' No GW Backfilled with hydrated bentonite chips.

Attitudes: J-Joint, B-Bedding, F-Fault, S-Shear, RS-Rupture Surface

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GEOTECHNICAL BORING LOG

Project No. 1902-06 | Project Name Cypress Canyon | Boring Designation B-5

Date Started 11/14/19 | Ground Elev. | Logged By AB

Date Finished | GW. Depth | Drive Weights 140 lbs.

Driller Native / Gabriel | Drop 30" Cat and Rope

Type of Rig Tripod

DEPTH (ft)	SAMPLE (R, B, S)	BLOWS/ft	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION
0				Light brown to tan silty sand with gravel and cobbles to 4" moist
2.5	S	5/5/5		Light gray mottled red with iron oxide silty to clayey sand with gravel some red gravel pieces leaching red
5	S	5/5/8		grades to reddish brown clayey sand with gravel at bottom 6"
7.5	S	5/15/17		reddish brown clayey sand with 3" gravel lens near bottom
9	S	7/10/15		Light reddish brown to tan silty sand with gravel iron oxide stain, moist
				Auger bouncing on rock @ 9'
				Attempted B-12 40' North of B-5
				Drilled to 6' no sampling. Refusal on rock
				Attempted B-12R 10' East of B-12
				Drilled to 7.5' no sampling. Refusal on rock
				11/15/19 Attempted B-12RR 100' E of B-12R
				Drilled to 6' no sampling.

Attitudes: J-Joint, B-Bedding, F-Fault, S-Shear, RS-Rupture Surface

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GEOTECHNICAL BORING LOG

Project No. 1902-06 | Project Name _____ | Boring Designation B-6
Date Started 11/13/19 | Ground Elev. _____ | Logged By AS
Date Finished _____ | GW. Depth _____ | Drive Weights —
Driller Pacific (Miguel / Toby) | Drop 30" Auto trip
Type of Rig Mobile M10 - 6" augers

DEPTH (ft)	SAMPLE (R, B, S)	BLOWS/ft	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION
				1" AC fragments Fill
			SM	Light yellow brown silty sand with gravel, damp to moist
				1" clayey sand lens, rust stain
2.5	S	4/5/6		
5	S	9/7/5		Same, moist
7.5	S	9/8/7		1½" gravel fragment in shoe, partial recovery
				Sink to
10	S	8/9/8		Light reddish brown clayey sand, some gravel, damp to moist, iron oxide sandstone clast (2")
12.5	S	26/0"		No recovery
				Difficult drilling grinding on rock
15	S	29/50/4"		Light reddish brown silty to clayey sand, oxide stains, some gravel, damp
17.5	S	25/0"		Bouncing on rock - no recovery
20		45/35/ 50/4"		Light yellow gray, silty sandstone, highly weathered, friable 1" gravel on top, trace oxide
22.5		44/ 50/1"		Bouncing on rock. Flattened SPT shoe. No recovery
				TD = 23.1' No GW

Attitudes: J-Joint, B-Bedding, F-Fault, S-Shear, RS-Rupture Surface

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GEOTECHNICAL BORING LOG

Project No. 1982-06
Project Name Cypress Layout
Boring Designation B-7
Date Started 11/3/19
Ground Elev.
Logged By AB
Date Finished
GW. Depth
Drive Weights 140'
Driller Pacific Mobile
Drop 30" Auto Trip
Type of Rig Mobil B10

DEPTH (ft)	SAMPLE (R, B, S)	BLOWS/ft	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION
0				reddish brown silty sand with gravel and cobbles to 4"
				damp some clay
2.5		5/4/4		
5		4/4/6		same, no cobbles
7.5		46/50/1.4"		Gravel fragment in shoe
				Light tan silty sand with gravel, damp
10		32/50/2"		Light reddish brown to tan silty sand with abundant gravel, damp
12.5		50/5"		No recovery
15		12/47/50/4"		Light reddish brown clayey to silty sand top 6" transitions to yellowish brown clayey sand with gravel to light reddish brown sandstone at bottom, trace oxide stain
				TD = 16.3'

Attitudes: J-Joint, B-Bedding, F-Fault, S-Shear, RS-Rupture Surface

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GEOTECHNICAL BORING LOG

Project No. 1902-06
Project Name Cypress Canyon
Boring Designation B-8
Date Started 11/13/19
Ground Elev.
Logged By AS
Date Finished
GW. Depth
Drive Weights 140 lb
Driller Pacific Mugel
Drop 30"
Type of Rig MAXL M10

DEPTH (ft)	SAMPLE (R, B, S)	BLOWS/ft	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION
0				Light yellowish brown silty sand with gravel and cobbles to 4" size
2.5	S	6/9/8		Light reddish brown, some gravel
5	S	16/14/12		No recovery
7.5	S	6/8/7		6" layer of topsoil with roots, organic content 2" layer of reddish brown sandstone at bottom
10	S	8/10/11		Light reddish brown silty sandstone, iron oxide staining.
12.5	S	9/23/37		Light gray brown sandstone, micaceous, iron oxide staining, friable, yellow to red nodules (clay?)
				TD = 14'

Attitudes: J-Joint, B-Bedding, F-Fault, S-Shear, RS-Rupture Surface

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GEOTECHNICAL BORING LOG

Project No. 1902.06 | Project Name Cypress | Boring Designation B-9
Date Started 11/12/19 | Ground Elev. ~913 | Logged By AS
Date Finished | GW. Depth | Drive Weights —
Driller BC2 Marcos | Drop
Type of Rig Sonic

DEPTH (ft)	SAMPLE (R, B, S)	BLOWS/ft	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION
0				0-1' AC fragments
				1' silty to clayey sand reddish brown with gravel
				gray clayey sand pieces moist
				2' light yellow brown SC with rounded gravel
				up to 3" size
				6' same with 4" cobble
				9' same reddish brown
				10½' AC fragments
				11' SC reddish brown with gravel, 4" cobble
				some organic content
				12' grades to sandy clay dark reddish brown with gravel and
				organics moist to wet
				13½' grades to orange brown, SC/SM moist with gravel
				15½' red-brown with some organic content and
				brick, AC fragments
				17' more clay, SC, w brick and gravel
				19' wet soils, black, oil odor with gravel
				Core barrel hot, drilled to 25'
				20' dark gray to black, oil impregnated sand, some wood, abundant AC
				fragments & gravel
				21½' gray SM with gravel and cobbles to 4" oil odor
				23½' cobbles granitic rock difficult drilling to 25'
				hot rods and core, drilled to 30'
				@25' gray silty sand with cobbles
				27' dark gray silty sand with oil, wood gravel, AC fragments
				damp to wet (probably from upper organic layer - pulled

Attitudes: J-Joint, B-Bedding, F-Fault, S-Shear, RS-Rupture Surface

core out and dropped

30-31 dark gray silty sand with cobble fragments

TD = 31'

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AGS

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GEOTECHNICAL BORING LOG

Project No. 1902-06 | Project Name Cypress Canyon | Boring Designation B-10

Date Started 11/11/19 | Ground Elev. ~913 | Logged By

Date Finished | GW. Depth | Drive Weights

Driller | Drop

Type of Rig Sonic Rig

DEPTH (ft)	SAMPLE (R, B, S)	BLOWS/ft	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION
0				3" Asphalt debris
				Clayey sand with gravel, reddish brown moist
				@ 9" light gray clayey sand
				@ 12" reddish brown clayey sand
				@ 27" cobble layer (6" size)
				@ 3' dark reddish brown clayey sand with gravel and cobbles
				@ 5' reddish brown silty sand with gravel some asphalt fragments
				@ 6' gravel layer gray
				@ 7' 6" cobble
				@ 8' reddish brown silty sand, asphalt and concrete fragments
				@ 11' concrete debris up to 4" size, iron bolt
				@ 13' clayey sand layer
				@ 13½' concrete debris up to 6" size
				@ 15' brick fragments in clayey sand with rounded gravel yellowish brown moist
				@ 18½' concrete debris up to 6" size
				@ 20½ asphalt debris up to 4" size
				@ 22' concrete debris up to 6" size
				@ 25½' concrete debris in clayey sand
				@ 27' clayey sand reddish brown moist
				@ 28' asphalt debris up to 6" size in clayey sand
				@ 30' concrete and asphalt debris in silty sand, some plastic fragments
				@ 34' clayey sand gray wet with concrete fragments and rounded gravel

Attitudes: J-Joint, B-Bedding, F-Fault, S-Shear, RS-Rupture Surface

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GEOTECHNICAL BORING LOG

Project No. 1902-06 | Project Name Cypress Canyon | Boring Designation B-10
Date Started 11/1/19 | Ground Elev. ≈ 913 | Logged By
Date Finished | GW. Depth | Drive Weights
Driller B2C | Drop
Type of Rig Sonic

DEPTH (ft)	SAMPLE (R, B, S)	BLOWS/ft	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION
				@36' concrete and asphalt up to 6"
				@37' brick fragments in clayey sand
				@38' clayey sand with rounded gravel up to 3" some asphalt pieces
				@40' concrete, plastic and asphalt fragments in clayey sand up to 4"
				@45' granite cobbles up to 6" in silty sand/ concrete fragments
				@47' concrete fragments 10" long 6" diameter
				@48' clayey sand layer reddish brown
				@49' concrete fragments metal bolt
				@50' concrete, asphalt and brick fragments in silty sand/ gray brown
				@51½' concrete fragments
				@52½ reddish brown clayey sand with rounded gravel some concrete fragments
				@53' granite cobbles up to 8" length in silty sand
				@56' yellowish brown clayey sand with rounded gravel up to 3"
				@58' some organic content clayey sand yellow to gray
				@59' steel plate 4" in gray silty sand/ rounded gravel and cobbles to 4" silty clay at bottom gray
				@61' concrete fragments 6" core
				@62' dark brown clayey sand
				@62½ asphalt stabilized sand and gravel/ dark brown to black with clayey sand
				@64½' gray clayey sand with gravel

Attitudes: J-Joint, B-Bedding, F-Fault, S-Shear, RS-Rupture Surface

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GEOTECHNICAL BORING LOG

Project No. 1902-06 | Project Name Cypress Canyon | Boring Designation B-10
Date Started 11/11/19 | Ground Elev. 913 | Logged By AB
Date Finished | GW. Depth GW ~ 76' | Drive Weights
Driller SCZ | Drop
Type of Rig Sonic

DEPTH (ft)	SAMPLE (R, B, S)	BLOWS/ft	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION
				@ 66' dark gray clayey sand with brick and concrete fragments slight to no asphalt odor w/ rounded gravel
				@ 69' dark reddish gray clayey sand with concrete and brick fragments wood fragments
				@ 70 gray sandy clay, wet, w/ concrete and asphalt fragments some organic content
				@ 76' concrete fragments
				@ 78' yellowish gray clayey sand with concrete fragments with 6" cobbles
				@ 80 gray clayey sand w/ rounded gravel to 3" size asphalt fragments, moist to wet
				@ 85' asphalt fragments
				@ 87' gray clay sand with rounded gravel and 4" cobbles and brick fragments
				@ 89' some organic content
				@ 95' partial sample large cobble in bit, saturated gray clayey sand with rounded gravel and cobbles to 6"
				and wet at 79'-80'
				@ 98' - 100' Stadium Conglomerate: Rounded gravel and cobble in reddish brown clayey sand matrix
				@ 100' refusal
				11/12/19 Set bailer to 100'. No groundwater
				TD = 100'

Attitudes: J-Joint, B-Bedding, F-Fault, S-Shear, RS-Rupture Surface

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GEOTECHNICAL BORING LOG

Project No. 1902-06 | Project Name Cypress Canyon | Boring Designation B-11
Date Started 11/12/19 | Ground Elev. ~913 | Logged By
Date Finished | GW. Depth | Drive Weights
Driller BCZ | Drop
Type of Rig Sonic

DEPTH (ft)	SAMPLE (R, B, S)	BLOWS/ft	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION
				2" AC crushed
0				Light yellowish brown silty sand with rounded gravel and asphalt fragments
				@ 6" reddish brown silty sand with gravel moist
				@ 1 1/2" sand with brick fragments
				@ 2 1/2" light tan silty sand with gravel and cobbles to 4" size
				@ 4' clayey sand with gravel gray brown moist
				@ 6' same light red brown
				@ 7 1/2' dark reddish brown, some organic content, steel wire
				@ 9 1/2' light gray with cobbles to 6", trace brick
				@ 10' asphalt concrete fragments with gravel
				@ 11' light brown silty sand with brick fragments and gravel
				@ 11 1/2' dark brown silty sand with abundant roots and organic content, brick and rounded gravel, decomposed odor
				@ 13 1/2' concrete fragments up to 6" in silty sand light gray
				@ 14 1/2' sandy clays to clayey sand dark gray to olive
				@ 15' ~~dark~~ reddish brown silty sand with abundant roots
				@ 16 1/2' dark reddish brown no roots
				@ 17 1/2' cobbles and concrete fragments in silty sand light gray
				@ 18' dark gray brown clayey sand with asphalt sand (or oil) and rounded gravel
				@ 20' gray brown silty sand with rounded gravel, some concrete and asphalt fragments, cobbles to 6" size
				@ 22 1/2' dark brown SM with AC fragments and oil odor

Attitudes: J-Joint, B-Bedding, F-Fault, S-Shear, RS-Rupture Surface

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GEOTECHNICAL BORING LOG

Project No.	1952-06	Project Name	Cypress Comm	Boring Designation	B-11
Date Started	11/12/19	Ground Elev.		Logged By	
Date Finished		GW. Depth		Drive Weights	
Driller	BC2 Marcos	Drop			
Type of Rig	Geoprobe				

DEPTH (ft)	SAMPLE (R, B, S)	BLOWS/ft	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION
				@23' clayey sand with fr fragments and oil odor dark brown
				@ 24' same with brick and AC fragments red brown
				@ 26' concrete fragments with wire reinforcement up to 6" size
				@ 27½' dark r-b clayey sand with concrete fragments and AC pieces
				@ 29' gray SC with concrete damp to moist
				30'-40' partial recovery ~3' damp to dry concrete fragments to 6" with cobbles/light brown silty sand
				40'-50' same, recovery ~3'
				Switching to 4" core barrel Drilled to 60' core is hot steaming
				50-60' partial recovery ~1' Granite cobbles core barrel melted/destroyed
				Stadium conglomerate?
				TD = 60'

Attitudes: J-Joint, B-Bedding, F-Fault, S-Shear, RS-Rupture Surface

DRAFT

B-12, B-12R no boring log (similar to B-5)

AGS

Page 1 of 1

GEOTECHNICAL BORING LOG

Project No. 1902-06 | Project Name Grass Canyon | Boring Designation B-12R

Date Started 11/15/19 | Ground Elev. | Logged By AB

Date Finished | GW. Depth | Drive Weights 140 lb

Driller Native Exploration | Drop 30"

Type of Rig Tripod

DEPTH (ft)	SAMPLE (R, B, S)	BLOWS/ft	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION
0				Drilled to 10' no sample.
5				
10	S	30/50/4"		Brown clayey sand, partial sample, wet may have hit rock at bottom Grinding on rock TD = 11'

Attitudes: J-Joint, B-Bedding, F-Fault, S-Shear, RS-Rupture Surface

DRAFT

GEOPHYSICAL EVALUATION
11495 CYPRESS CANYON ROAD
SAN DIEGO, CALIFORNIA

PREPARED FOR:
Advanced Geotechnical Solutions, Inc.
485 Corporate Drive, Suite B
Escondido, California 92029

PREPARED BY:
Southwest Geophysics, LLC
6280 Riverdale Street, Suite 200
San Diego, CA 92120

March 28, 2019
Project No. 119139

SOUTHWEST GEOPHYSICS LLC
YOUR SUBSURFACE SOLUTION

March 28, 2019
Project No. 119139

Mr. Jeff Chaney
Advanced Geotechnical Solutions, Inc.
485 Corporate Drive, Suite B
Escondido, California 92029

Subject: Geophysical Evaluation
11495 Cypress Canyon Road
San Diego, California

Dear Mr. Chaney:

In accordance with your request, we have conducted geophysical services pertaining to the property located at 11495 Cypress Canyon Road in San Diego, California. The purpose of our study was to characterize the subsurface geologic conditions in the study area through the collection of high resolution electrical resistivity tomography (Sting) and seismic P-wave refraction data at preselected areas of the project site. This report presents the methodology, equipment used, analysis, and findings.

We appreciate the opportunity to be of service on this project. Should you have any questions related to this report, please contact the undersigned at your convenience.

Sincerely,
SOUTHWEST GEOPHYSICS, LLC

Aaron T. Puente
Project Geologist/Geophysicist

Patrick F. Lehrmann, P.G., P.Gp.
Principal Geologist/Geophysicist

REGISTERED GEOPHYSICIST
PATRICK F. LEHRMANN
No. 1043
Exp. 1/31/20
STATE OF CALIFORNIA

PFL/ATP/pfl
Distribution: Addressee (electronic)

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1. INTRODUCTION

In accordance with your request, we have conducted geophysical services pertaining to the property located at 11495 Cypress Canyon Road in San Diego, California (Figure 1). The purpose of our study was to characterize the subsurface geologic conditions in the study area through the collection of high-resolution electrical resistivity tomography (Sting) and seismic P-wave refraction data at preselected areas of the project site. This report presents the methodology, equipment used, analysis, and findings.

2. SCOPE OF SERVICES

Our scope of services included:

- Performance of two Sting profiles, STL-1 and STL-2.
- Performance of a seismic P-wave refraction profile, SL-1.
- Compilation and geophysical analysis of the data collected.
- Preparation of this report presenting our findings and conclusions.

3. SITE AND PROJECT DESCRIPTION

The project site is located at the northwest end of Cypress Canyon Road just west of Cypress Canyon Park in San Diego, California (Figure 1). In general, the study area is a vacant lot with mostly graded soil with a layer of unconsolidated crushed asphalt on the surface. Specifically, the Sting and seismic P-wave refraction lines were conducted in east to west and north to south directions across the site. Figures 2 and 3 illustrate the general site conditions and line locations.

Based on our discussions with you, it is our understanding that the site was once a landfill and that your office is conducting a geologic evaluation of the property. The results from our study are to aid in the characterization of the subsurface geologic conditions.

4. METHODOLOGY

Our evaluation included the performance of high resolution electrical resistivity (Sting) and seismic P-wave refraction surveys. The following is a brief description of the methods used.

4.1. Sting

An AGI Super Sting R8 resistivity meter was used to collect electrical resistivity measurements along two profiles, STL-1 and STL-2, at the project site. STL-1 crosses the site in an east-west direction and STL-2 crosses the site in a north-south direction (see Figure 2). The purpose of the Sting data collection was to characterize the electrical properties of the subsurface materials through the formulation of an apparent electrical resistivity model.

The Super Sting injects current into the ground through stainless steel electrodes and the electric potential difference between multiple electrodes is measured simultaneously. The spacing between the current and potential electrodes changes between readings to preprogrammed values. The measurements were collected using a Dipole-Dipole configuration.

Fifty-six electrodes were used for our study with electrode spacings of 8 feet for STL-1 and 5 feet for STL-2. This resulted in line lengths of 440 feet for STL-1 and 275 feet for STL-2, respectively. The locations of the lines and the general lengths (lineal coverage) were designated by you. The electrodes were driven into the soil approximately 6 to 12 inches, and the soil around the electrode was moistened with water.

Data processing and analysis was accomplished using EarthImager™, V2.4.4, a two-dimensional resistivity inversion software. The plot of the measured resistivity at each set of electrodes was recorded and displayed according to the dipole-dipole resistivity model. Resistivity values were calculated for the points beneath the Sting line and then integrated into a color resistivity model section.

4.2. Seismic P-Wave Refraction

A seismic P-wave (compression wave) refraction study was conducted in the study area along a traverse labeled SL-1 on Figure 2. The seismic line was generally parallel to and approximately 10 feet east of the Sting line STL-2. The purpose of the P-wave refraction study was to characterize the subsurface conditions through the development of a P-wave velocity model.

The seismic refraction method uses first-arrival times of refracted seismic waves to estimate the thicknesses and seismic velocities of subsurface layers. Seismic P-waves generated at the surface, using a 20-pound sledge hammer and plate, are refracted at boundaries separating materials of contrasting velocities. These refracted seismic waves are then detected by a series of surface vertical component 14-Hz geophones and recorded with a 24-channel Geometrics Geode seismograph. The travel times of the seismic P-waves are used in conjunction with the shot-to-geophone distances to obtain thickness and velocity information on the subsurface materials.

A geophone spacing of 12 feet was used for SL-1 resulting in a spread length of 288 feet (includes a 6-foot shot offset at each end of the spread). Shots were conducted at the ends, midpoint and intermediate points along the line.

The collected data were processed using SIPwin (Rimrock Geophysics, 2003), a seismic interpretation program, and analyzed using SIPwin and SeisOpt Pro (Optim, 2008). SeisOpt Pro uses first arrival picks and elevation data to produce subsurface velocity models through a nonlinear optimization technique called adaptive simulated annealing. The resulting velocity model provides a tomography image of the estimated geologic conditions. Both vertical and lateral velocity information is contained in the tomography model. Changes in layer velocity are revealed as gradients rather than discrete contacts, which typically are more representative of actual conditions.

5. FINDINGS AND CONCLUSIONS

As previously discussed, the purpose of our study was to characterize the subsurface conditions in the study area as part of your geologic evaluation of the property. Our evaluation included the collection of Sting and seismic P-wave refraction data. The Sting results are presented in Figures 4a and 4b and the P-wave refraction results are presented in Figure 5. In general, the quality of the Sting and P-wave data was very good.

The Sting results reveal the presence of a conductive layer near the surface overlying more resistive materials at depth. The contact between these two units is gradational with the most resistive material approximately 55 feet below the ground surface (bgs) and is illustrated on Figures 4a and 4b. The seismic P-wave results also reveal the presence of contacts or zones of significant changes in velocity (density). One of these contacts occurs roughly at 55 feet (bgs) and coincides with the more resistive contact detected in the Sting results. This electrical and density change could represent the landfill/native contact. As noted in the P-wave profiles a relatively substantial increase in P-wave velocity also occurs near the 4,000 feet per second contour line. It is possible this contact could be related to the presence of concrete or rock debris fill.

6. LIMITATIONS

The field evaluation and geophysical analyses presented in this report have been conducted in general accordance with current practice and the standard of care exercised by consultants performing similar tasks in the project area. No warranty, express or implied, is made regarding the conclusions and opinions presented in this report. There is no evaluation detailed enough to reveal every subsurface condition. Variations may exist and conditions not observed or described in this report may be present. Uncertainties relative to subsurface conditions can be reduced

through additional subsurface exploration. Additional subsurface evaluation will be performed upon request.

This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Southwest Geophysics, LLC should be contacted if the reader requires additional information or has questions regarding the content, interpretations presented, or completeness of this document. This report is intended exclusively for use by the client. Any use or reuse of the findings, conclusions, and/or recommendations of this report by parties other than the client is undertaken at said parties' sole risk.

7. SELECTED REFERENCES

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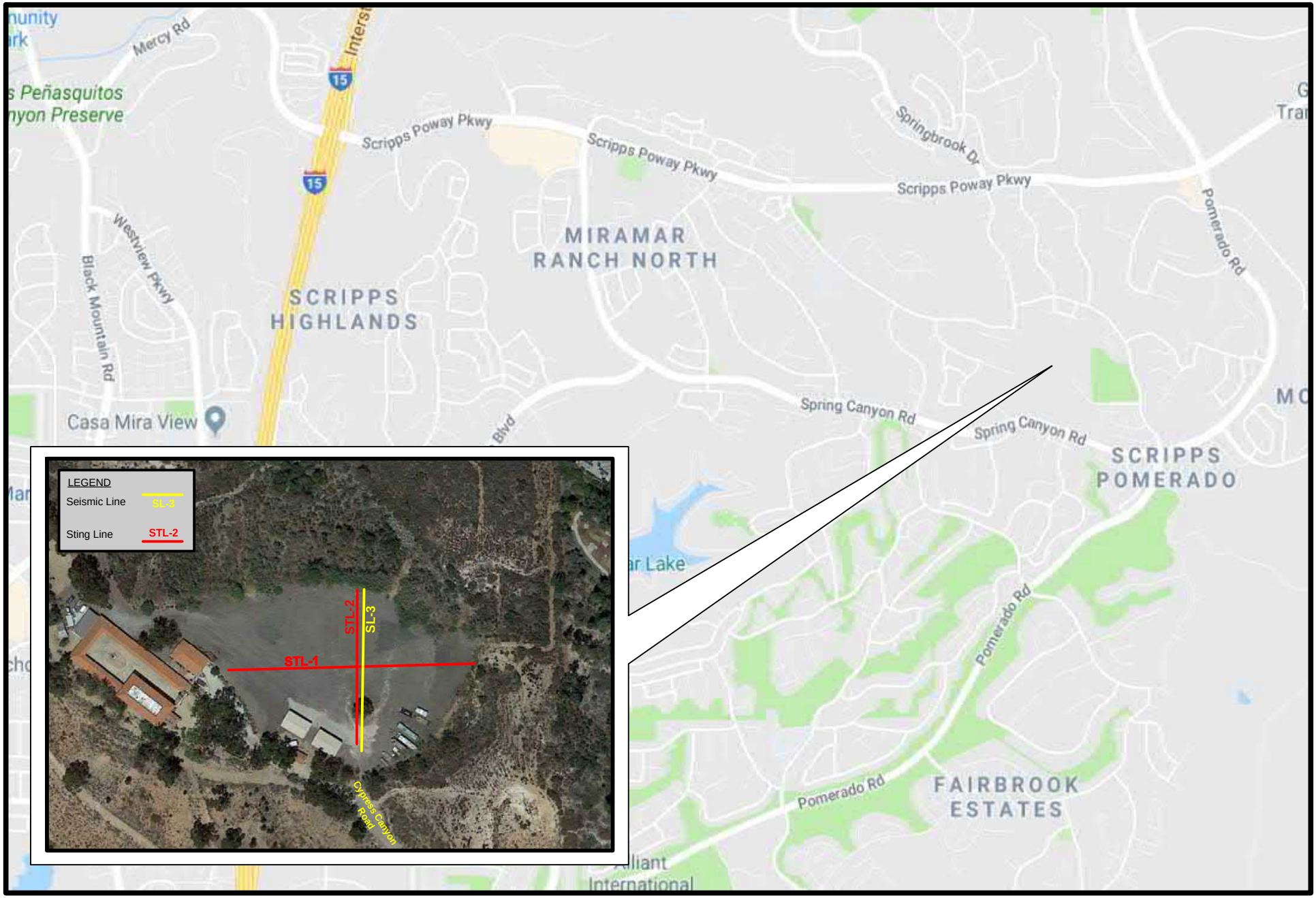
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SITE LOCATION MAP

N

11495 Cypress Canyon Road
San Diego, California

Project No.: 119139 | Date: 03/19

SOUTHWEST GEOPHYSICS

Figure 1



LINE LOCATION MAP

N

11495 Cypress Canyon Road
San Diego, California

Project No.: 119139 | Date: 03/19

SOUTHWEST GEOPHYSICS INC

Figure 2





SITE PHOTOGRAPHS

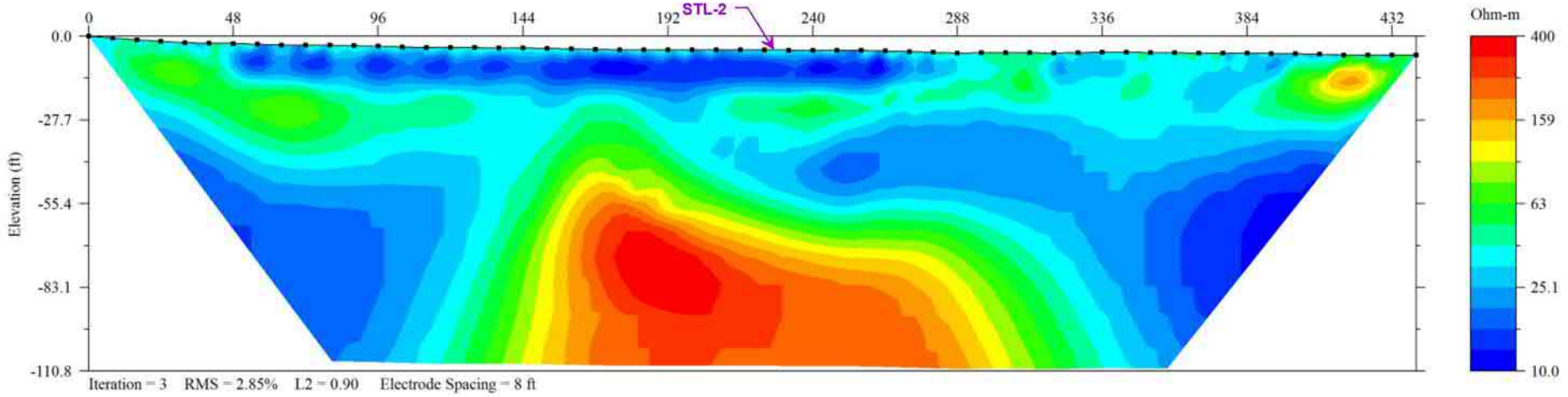
11495 Cypress Canyon Road
San Diego, California

Project No.: 119139 | Date: 03/19

SOUTHWEST GEOPHYSICS

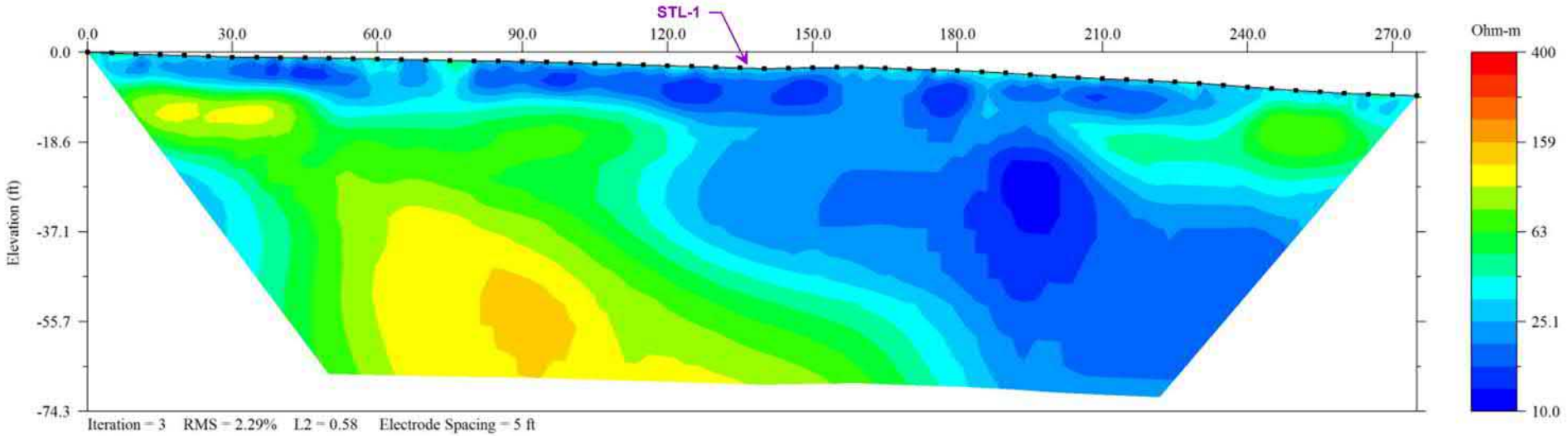
Figure 3

Inverted Resistivity Section
STL-1



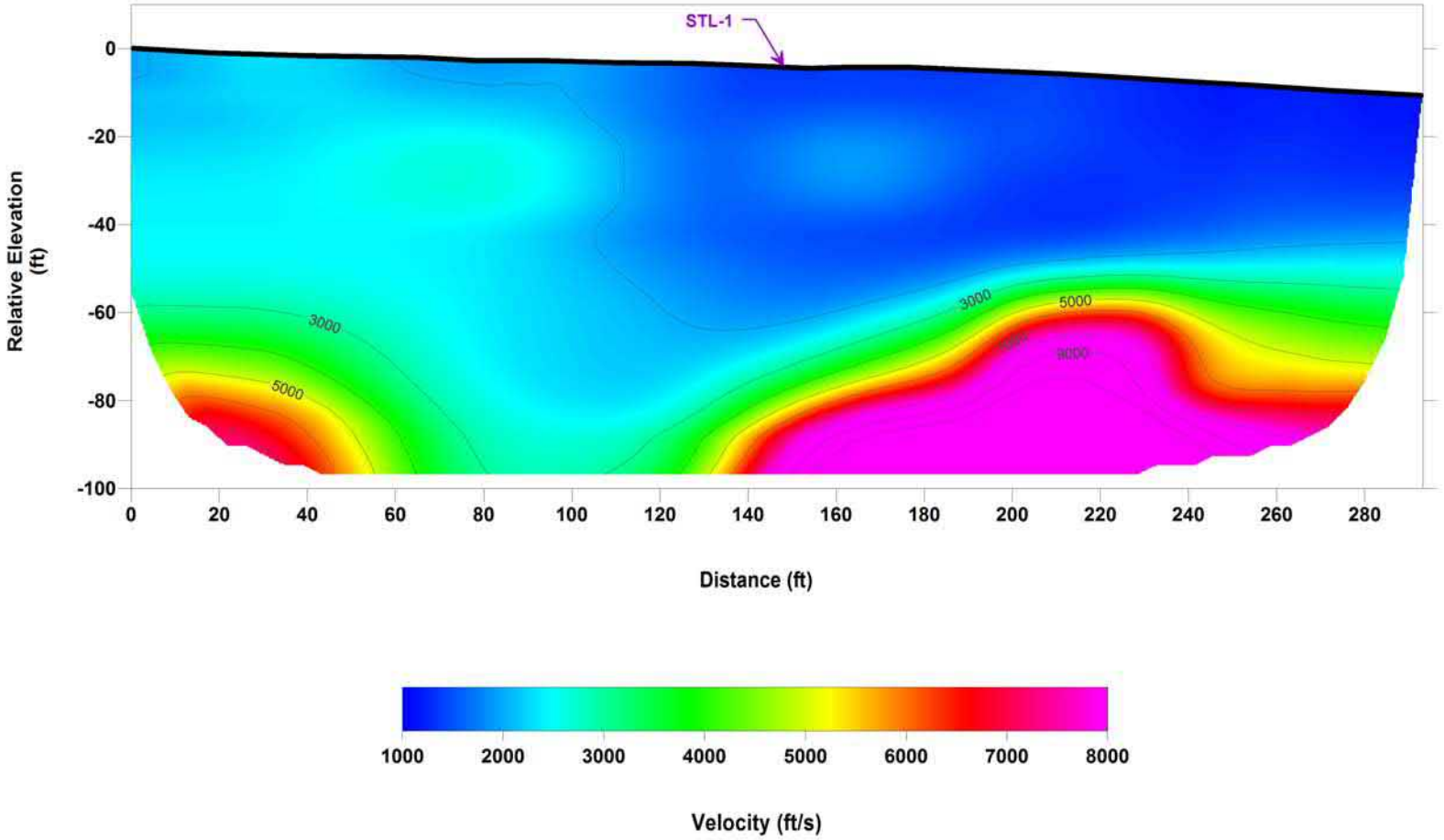
STING PROFILE **STL-1**	N	11495 Cypress Canyon Road San Diego, California	SOUTHWEST GEOPHYSICS INC Figure 4a
		Project No.: 119139 / Date: 03/19	

Inverted Resistivity Section
STL-2



STING PROFILE **STL-2**	N	11495 Cypress Canyon Road San Diego, California	SOUTHWEST GEOPHYSICS INC Figure 4b
		Project No.: 119139 | Date: 03/19	

TOMOGRAPHY MODEL



P-WAVE PROFILE
SL-1

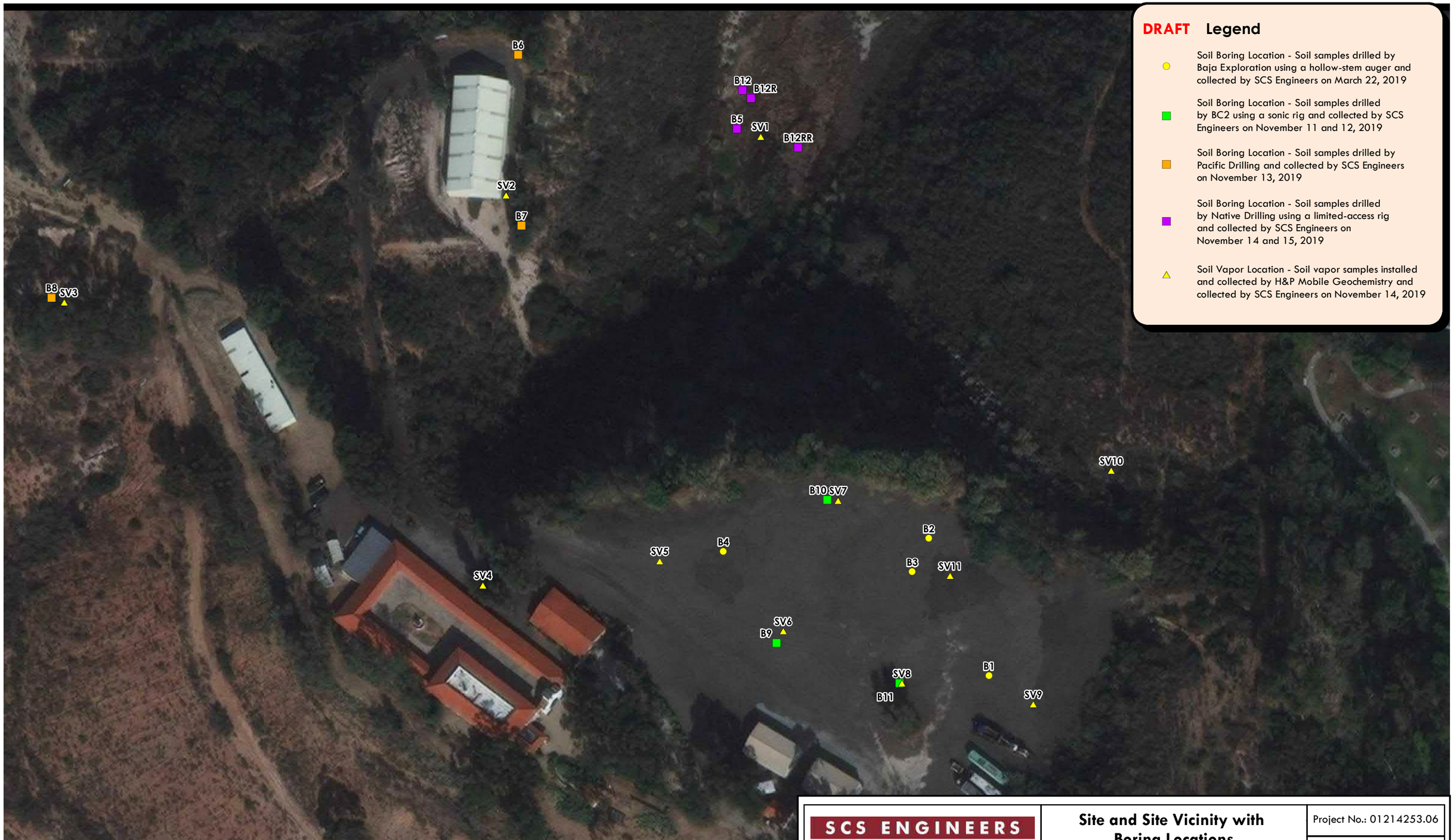
11495 Cypress Canyon Road
San Diego, California

Project No.: 119139 | Date: 03/19

SOUTHWEST GEOPHYSICS INC

Figure 5

Note: Contour Interval = 1,000 feet per second



DRAFT Legend

- Soil Boring Location - Soil samples drilled by Baja Exploration using a hollow-stem auger and collected by SCS Engineers on March 22, 2019
- Soil Boring Location - Soil samples drilled by BC2 using a sonic rig and collected by SCS Engineers on November 11 and 12, 2019
- Soil Boring Location - Soil samples drilled by Pacific Drilling and collected by SCS Engineers on November 13, 2019
- Soil Boring Location - Soil samples drilled by Native Drilling using a limited-access rig and collected by SCS Engineers on November 14 and 15, 2019
- Soil Vapor Location - Soil vapor samples installed and collected by H&P Mobile Geochemistry and collected by SCS Engineers on November 14, 2019

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics,

0 50 100 200 Feet

N

SCS ENGINEERS
Environmental Consultants
8799 Balboa Avenue, Suite 290
San Diego, California 92123

Site and Site Vicinity with Boring Locations
The Phair Company
11495 Cypress Canyon Road
San Diego, California

Project No.: 01214253.06

DRAFT Figure 2

Date Drafted: 11/20/2019

APPENDIX B
EARTHWORK SPECIFICATIONS

GENERAL EARTHWORK SPECIFICATIONS

I. General

A. General procedures and requirements for earthwork and grading are presented herein. The earthwork and grading recommendations provided in the geotechnical report are considered part of these specifications, and where the general specifications provided herein conflict with those provided in the geotechnical report, the recommendations in the geotechnical report shall govern. Recommendations provided herein and in the geotechnical report may need to be modified depending on the conditions encountered during grading.

B. The contractor is responsible for the satisfactory completion of all earthwork in accordance with the project plans, specifications, applicable building codes, and local governing agency requirements. Where these requirements conflict, the stricter requirements shall govern.

C. It is the contractor's responsibility to read and understand the guidelines presented herein and in the geotechnical report as well as the project plans and specifications. Information presented in the geotechnical report is subject to verification during grading. The information presented on the exploration logs depicts conditions at the particular time of excavation and at the location of the excavation. Subsurface conditions present at other locations may differ, and the passage of time may result in different subsurface conditions being encountered at the locations of the exploratory excavations. The contractor shall perform an independent investigation and evaluate the nature of the surface and subsurface conditions to be encountered and the procedures and equipment to be used in performing his work.

D. The contractor shall have the responsibility to provide adequate equipment and procedures to accomplish the earthwork in accordance with applicable requirements. When the quality of work is less than that required, the Geotechnical Consultant may reject the work and may recommend that the operations be suspended until the conditions are corrected.

E. Prior to the start of grading, a qualified Geotechnical Consultant should be employed to observe grading procedures and provide testing of the fills for conformance with the project specifications, approved grading plan, and guidelines presented herein. All remedial removals, clean-outs, removal bottoms, keyways, and subdrain installations should be observed and documented by the Geotechnical Consultant prior to placing fill. It is the contractor's responsibility to apprise the Geotechnical Consultant of their schedules and notify the Geotechnical Consultant when those areas are ready for observation.

F. The contractor is responsible for providing a safe environment for the Geotechnical Consultant to observe grading and conduct tests.

II. Site Preparation

A. Clearing and Grubbing: Excessive vegetation and other deleterious material shall be sufficiently removed as required by the Geotechnical Consultant, and such materials shall be properly disposed of offsite in a method acceptable to the owner and governing agencies. Where applicable, the contractor may obtain permission from the Geotechnical Consultant, owner, and governing agencies to dispose of vegetation and other deleterious materials in designated areas onsite.

B. Unsuitable Soils Removals: Earth materials that are deemed unsuitable for the support of fill shall be removed as necessary to the satisfaction of the Geotechnical Consultant.

C. Any underground structures such as cesspools, cisterns, mining shafts, tunnels, septic tanks, wells, pipelines, other utilities, or other structures located within the limits of grading shall be removed and/or abandoned in accordance with the requirements of the governing agency and to the satisfaction of the Geotechnical Consultant.

D. Preparation of Areas to Receive Fill: After removals are completed, the exposed surfaces shall be scarified to a depth of approximately 8 inches, watered or dried, as needed, to achieve a generally uniform moisture content that is at or near optimum moisture content. The scarified materials shall then be compacted to the project requirements and tested as specified.

E. All areas receiving fill shall be observed and approved by the Geotechnical Consultant prior to the placement of fill. A licensed surveyor shall provide survey control for determining elevations of processed areas and keyways.

III. Placement of Fill

A. Suitability of fill materials: Any materials, derived onsite or imported, may be utilized as fill provided that the materials have been determined to be suitable by the Geotechnical Consultant. Such materials shall be essentially free of organic matter and other deleterious materials, and be of a gradation, expansion potential, and/or strength that is acceptable to the Geotechnical Consultant. Fill materials shall be tested in a laboratory approved by the Geotechnical Consultant, and import materials shall be tested and approved prior to being imported.

B. Generally, different fill materials shall be thoroughly mixed to provide a relatively uniform blend of materials and prevent abrupt changes in material type. Fill materials derived from benching should be dispersed throughout the fill area instead of placing the materials within only an equipment-width from the cut/fill contact.

C. Oversize Materials: Rocks greater than 8 inches in largest dimension shall be disposed of offsite or be placed in accordance with the recommendations by the Geotechnical Consultant in the areas that are designated as suitable for oversize rock placement. Rocks that are smaller than 8 inches in largest dimension may be utilized in the fill provided that they are not nested and are their quantity and distribution are acceptable to the Geotechnical Consultant.

D. The fill materials shall be placed in thin, horizontal layers such that, when compacted, shall not exceed 6 inches. Each layer shall be spread evenly and shall be thoroughly mixed to obtain near uniform moisture content and uniform blend of materials.

E. Moisture Content: Fill materials shall be placed at or above the optimum moisture content or as recommended by the geotechnical report. Where the moisture content of the engineered fill is less than recommended, water shall be added, and the fill materials shall be blended so that near uniform moisture content is achieved. If the moisture content is above the limits specified by the Geotechnical Consultant, the fill materials shall be aerated by discing, blading, or other methods until the moisture content is acceptable.

F. Each layer of fill shall be compacted to the project standards in accordance to the project specifications and recommendations of the Geotechnical Consultant. Unless otherwise specified by the Geotechnical Consultant, the fill shall be compacted to a minimum of 90 percent of the maximum dry density as determined by ASTM Test Method: D1557-09.

G. Benching: Where placing fill on a slope exceeding a ratio of 5 to 1 (horizontal to vertical), the ground should be keyed or benched. The keyways and benches shall extend through all unsuitable materials into suitable materials such as firm materials or sound bedrock or as recommended by the Geotechnical Consultant. The minimum keyway width shall be 15 feet and extend into suitable materials, or as recommended by the geotechnical report and approved by the Geotechnical Consultant. The minimum keyway width for fill over cut slopes is also 15 feet, or as recommended by the geotechnical report and approved by the Geotechnical Consultant. As a general rule, unless otherwise recommended by the Geotechnical Consultant, the minimum width of the keyway shall be equal to 1/2 the height of the fill slope.

H. Slope Face: The specified minimum relative compaction shall be maintained out to the finish face of fill and stabilization fill slopes. Generally, this may be achieved by overbuilding the slope and cutting back to the compacted core. The actual amount of overbuilding may vary as field conditions dictate. Alternately, this may be achieved by back rolling the slope face with suitable equipment or other methods that produce the designated result. Loose soil should not be allowed to build up on the slope face. If present, loose soils shall be trimmed to expose the compacted slope face.

I. Slope Ratio: Unless otherwise approved by the Geotechnical Consultant and governing agencies, permanent fill slopes shall be designed and constructed no steeper than 2 to 1 (horizontal to vertical).

J. Natural Ground and Cut Areas: Design grades that are in natural ground or in cuts should be evaluated by the Geotechnical Consultant to determine whether scarification and processing of the ground and/or overexcavation is needed.

K. Fill materials shall not be placed, spread, or compacted during unfavorable weather conditions. When grading is interrupted by rain, filing operations shall not resume until the Geotechnical Consultant approves the moisture and density of the previously placed compacted fill.

IV. Cut Slopes

A. The Geotechnical Consultant shall inspect all cut slopes, including fill over cut slopes, and shall be notified by the contractor when cut slopes are started.

B. If adverse or potentially adverse conditions are encountered during grading; the Geotechnical Consultant shall investigate, evaluate, and make recommendations to mitigate the adverse conditions.

C. Unless otherwise stated in the geotechnical report, cut slopes shall not be excavated higher or steeper than the requirements of the local governing agencies. Short-term stability of the cut slopes and other excavations is the contractor's responsibility.

V. Drainage

A. Back drains and Subdrains: Back drains and subdrains shall be provided in fill as recommended by the Geotechnical Consultant and shall be constructed in accordance with the governing agency and/or recommendations of the Geotechnical Consultant. The location of subdrains, especially outlets, shall be surveyed and recorded by the Civil Engineer.

B. Top-of-slope Drainage: Positive drainage shall be established away from the top of slope. Site drainage shall not be permitted to flow over the tops of slopes.

C. Drainage terraces shall be constructed in compliance with the governing agency requirements and/or in accordance with the recommendations of the Geotechnical Consultant.

D. Non-erodible interceptor swales shall be placed at the top of cut slopes that face the same direction as the prevailing drainage.

VI. Erosion Control

A. All finish cut and fill slopes shall be protected from erosion and/or planted in accordance with the project specifications and/or landscape architect's recommendations. Such measures to protect the slope face shall be undertaken as soon as practical after completion of grading.

B. During construction, the contractor shall maintain proper drainage and prevent the ponding of water. The contractor shall take remedial measures to prevent the erosion of graded areas until permanent drainage and erosion control measures have been installed.

VII. Trench Excavation and Backfill

A. Safety: The contractor shall follow all OSHA requirements for safety of trench excavations. Knowing and following these requirements is the contractor's responsibility. All trench excavations or open cuts in excess of 5 feet in depth shall be shored or laid back. Trench excavations and open cuts exposing adverse geologic conditions may require further evaluation by the Geotechnical Consultant. If a contractor fails to provide safe access for compaction testing, backfill not tested due to safety concerns may be subject to removal.

B. Bedding: Bedding materials shall be non-expansive and have a Sand Equivalent greater than 30. Where permitted by the Geotechnical Consultant, the bedding materials can be densified by jetting.

C. Backfill: Jetting of backfill materials is generally not acceptable. Where permitted by the Geotechnical Consultant, the bedding materials can be densified by jetting provided the backfill materials are granular, free-draining and have a Sand Equivalent greater than 30.

VIII. Geotechnical Observation and Testing During Grading

A. Compaction Testing: Fill shall be tested by the Geotechnical Consultant for evaluation of general compliance with the recommended compaction and moisture conditions. The tests shall be taken in the compacted soils beneath the surface if the surficial materials are disturbed. The contractor shall assist the Geotechnical Consultant by excavating suitable test pits for testing of compacted fill.

B. Where tests indicate that the density of a layer of fill is less than required, or the moisture content not within specifications, the Geotechnical Consultant shall notify the contractor of the unsatisfactory conditions of the fill. The portions of the fill that are not within specifications shall be reworked until the required density and/or moisture content has been attained. No additional fill shall be placed until the last lift of fill is tested and found to meet the project specifications and approved by the Geotechnical Consultant.

C. If, in the opinion of the Geotechnical Consultant, unsatisfactory conditions, such as adverse weather, excessive rock or deleterious materials being placed in the fill, insufficient equipment, excessive rate of fill placement, results in a quality of work that is unacceptable, the consultant shall notify the contractor, and the contractor shall rectify the conditions, and if necessary, stop work until conditions are satisfactory.

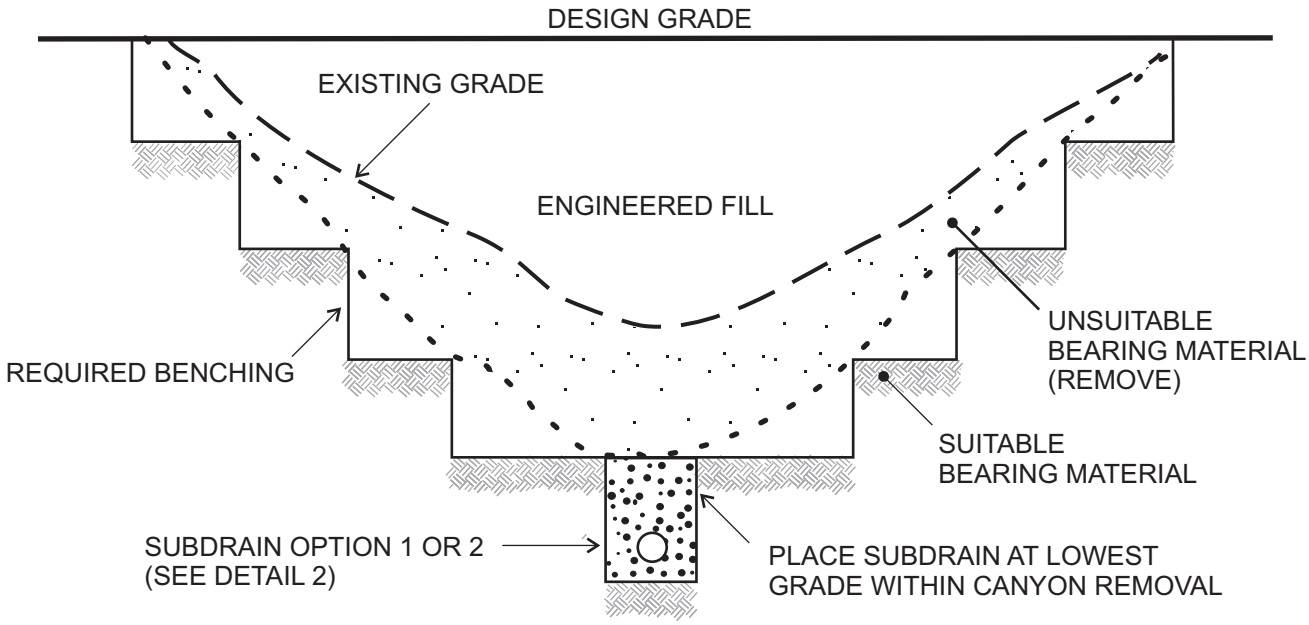
D. Frequency of Compaction Testing: The location and frequency of tests shall be at the Geotechnical Consultant's discretion. Generally, compaction tests shall be taken at intervals not exceeding two feet in fill height and 1,000 cubic yards of fill materials placed.

E. Compaction Test Locations: The Geotechnical Consultant shall document the approximate elevation and horizontal coordinates of the compaction test locations. The contractor shall coordinate with the surveyor to assure that sufficient grade stakes are established so that the Geotechnical Consultant can determine the test locations. Alternately, the test locations can be surveyed and the results provided to the Geotechnical Consultant.

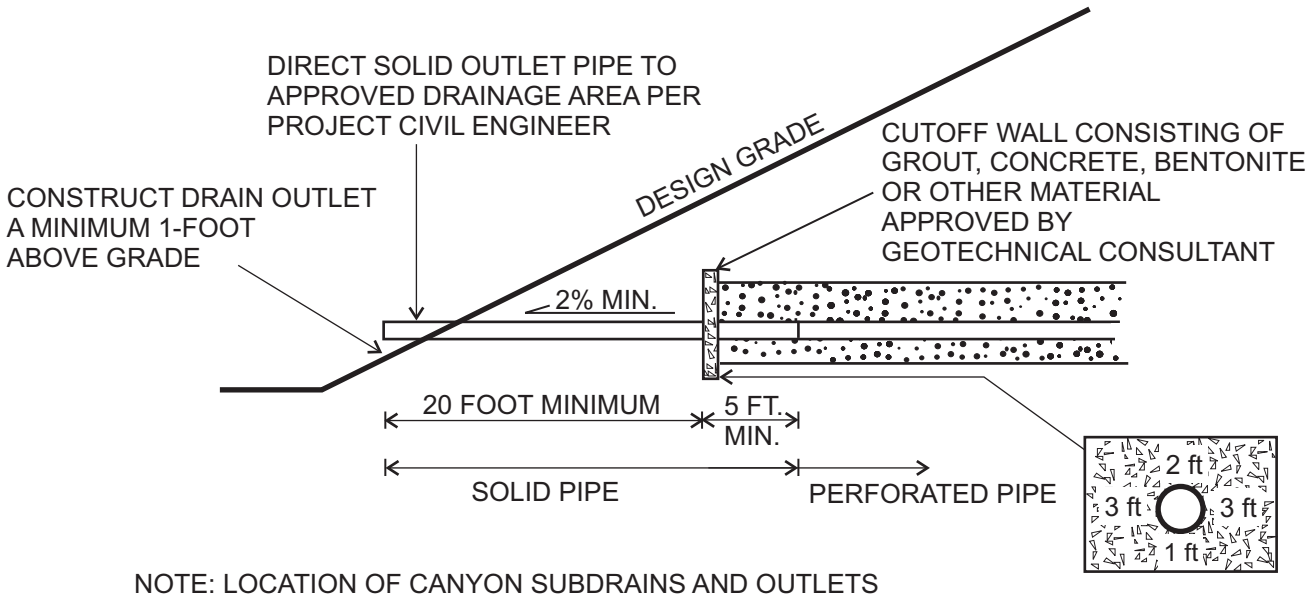
F. Areas of fill that have not been observed or tested by the Geotechnical Consultant may have to be removed and recompacted at the contractor's expense. The depth and extent of removals will be determined by the Geotechnical Consultant.

G. Observation and testing by the Geotechnical Consultant shall be conducted during grading in order for the Geotechnical Consultant to state that, in his opinion, grading has been completed in accordance with the approved geotechnical report and project specifications.

H. Reporting of Test Results: After completion of grading operations, the Geotechnical Consultant shall submit reports documenting their observations during construction and test results. These reports may be subject to review by the local governing agencies.



CANYON SUBDRAIN PROFILE



NOTE: LOCATION OF CANYON SUBDRAINS AND OUTLETS SHOULD BE DOCUMENTED BY PROJECT CIVIL ENGINEER. OUTLETS MUST BE KEPT UNOBSTRUCTED AT ALL TIMES.

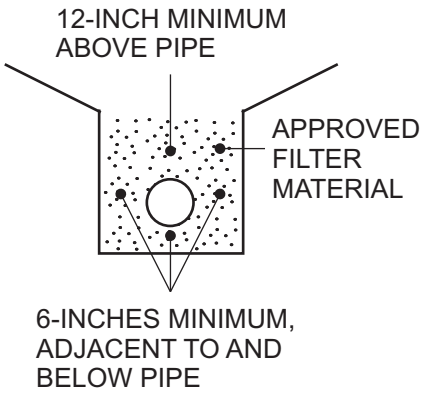
CUTOFF WALL DIMENSIONS

CANYON SUBDRAIN TERMINUS

VER 1.0

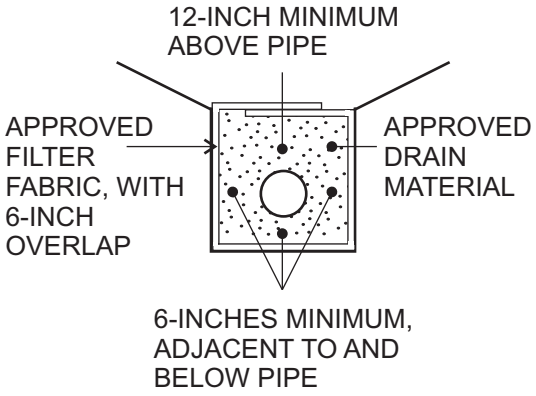
NTS

AGS ADVANCED GEOTECHNICAL SOLUTIONS	CANYON SUBDRAIN	DETAIL 1



OPTION 1

FILTER MATERIAL: MINIMUM VOLUME OF 9 CUBIC FEET PER LINEAL FOOT OF CALTRANS CLASS 2 PERMEABLE MATERIAL



OPTION 2

DRAIN MATERIAL: MINIMUM VOLUME OF 9 CUBIC FEET PER LINEAL FOOT OF 3/4-INCH MAX ROCK OR APPROVED EQUIVALENT SUBSTITUTE

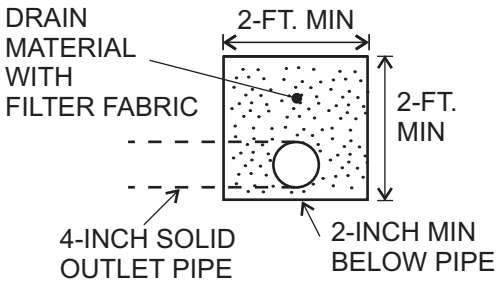
FILTER FABRIC: MIRAFI 140 FILTER FABRIC OR APPROVED EQUIVALENT SUBSTITUTE

PIPE: 6 OR 8-INCH ABS OR PVC PIPE OR APPROVED SUBSTITUTE WITH A MINIMUM OF 8 PERFORATIONS (1/4-INCH DIAMETER) PER LINEAL FOOT IN BOTTOM HALF OF PIPE

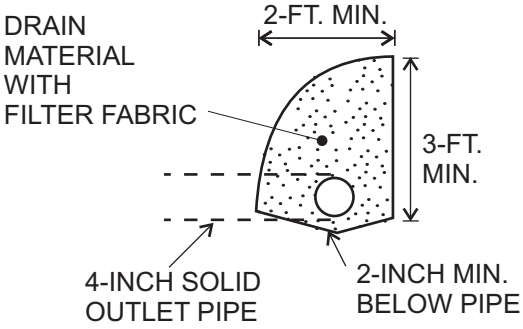
(ASTM D2751, SDR-35 OR ASTM D3034, SDR-35
ASTM D1527, SCHD. 40 OR ASTM D1785, SCHD. 40)

NOTE: CONTINUOUS RUN IN EXCESS OF 5OO FEET REQUIRES 8-INCH DIAMETER PIPE (ASTM D3034, SDR-35, OR ASTM D1785, SCHD. 40)

CANYON SUBDRAIN



OPTION 1



OPTION 2

DRAIN MATERIAL: GRAVEL TRENCH TO BE FILLED WITH 3/4-INCH MAX ROCK OR APPROVED EQUIVALENT SUBSTITUTE

FILTER FABRIC: MIRAFI 140 FILTER FABRIC OR EQUIVALENT SUBSTITUTE WITH A MINIMUM 6-INCH OVERLAP

PIPE: 4-INCH ABS OR PVC PIPE OR APPROVED EQUIVALENT SUBSTITUTE WITH A MINIMUM OF 8 PERFORATIONS (1/4-INCH DIAMETER) PER LINEAL FOOT IN BOTTOM HALF OF PIPE

(ASTM D2751, SDR-35 OR ASTM D3034, SDR-35
ASTM D1527, SCHD. 40 OR ASTM D1785, SCHD. 40)

BUTTRESS/STABILIZATION DRAIN

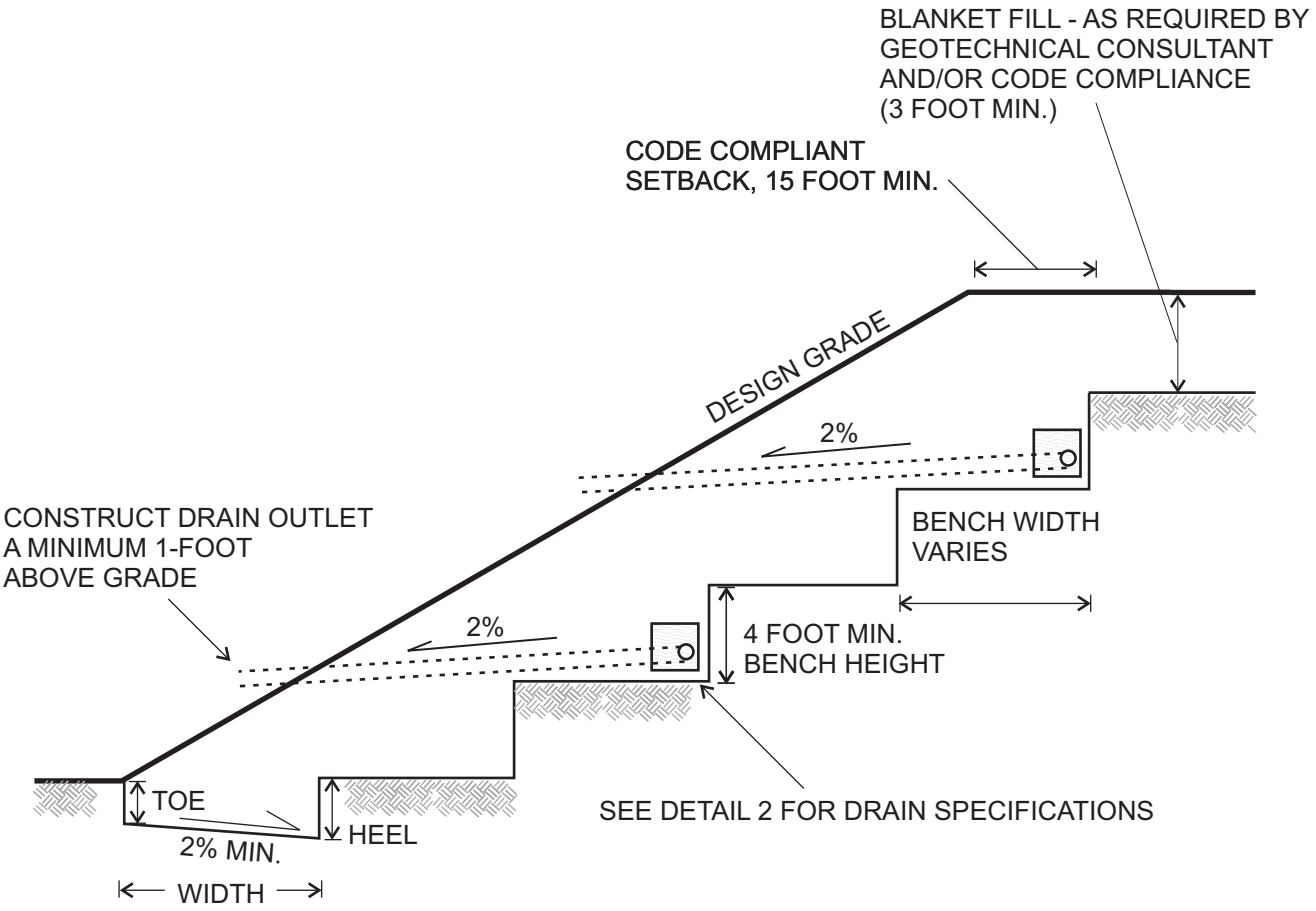
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ADVANCED GEOTECHNICAL SOLUTIONS

DRAIN SPECIFICATIONS

DETAIL 2



CODE COMPLIANT KEYWAY WITH MINIMUM DIMENSIONS:

TOE 2 FOOT MIN.
HEEL 3 FOOT MIN.
WIDTH 15 FOOT MIN.

NOTES:

1. DRAIN OUTLETS TO BE PROVIDED EVERY 100 FEET CONNECT TO PERFORATED DRAIN PIPE BY “L” OR “T” AT A MINIMUM 2% GRADIENT.
2. THE NECESSITY AND LOCATION OF ADDITIONAL DRAINS SHALL BE DETERMINED IN THE FIELD BY THE GEOTECHNICAL CONSULTANT. UPPER STAGE OUTLETS SHOULD BE EMPTIED ONTO CONCRETE TERRACE DRAINS.
3. DRAIN PIPE TO EXTEND FULL LENGTH OF STABILIZATION/BUTTRESS WITH A MINIMUM GRADIENT OF 2% TO SOLID OUTLET PIPES.
4. LOCATION OF DRAINS AND OUTLETS SHOULD BE DOCUMENTED BY PROJECT CIVIL ENGINEER. OUTLETS MUST BE KEPT UNOBSTRUCTED AT ALL TIMES.

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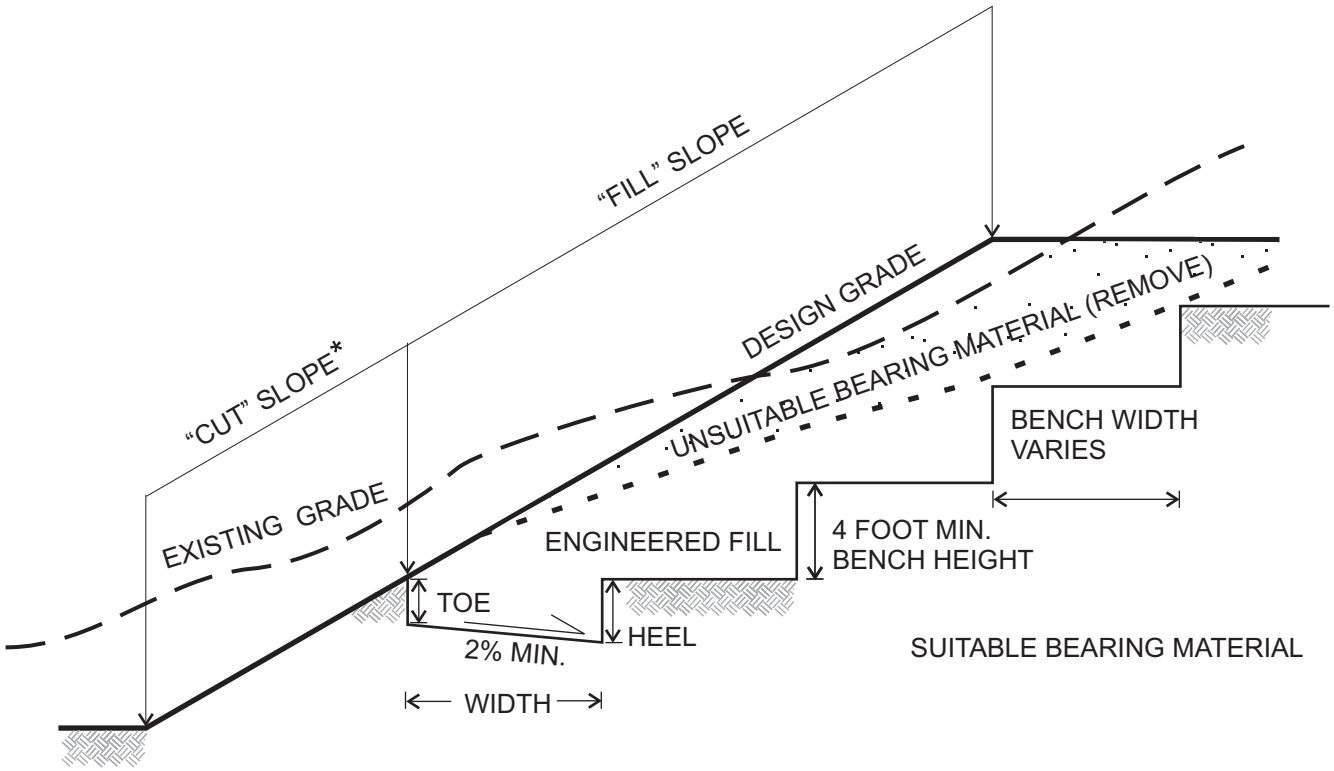
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STABILIZATION/BUTTRESS FILL

DETAIL 3

* THE “CUT” PORTION OF THE SLOPE SHALL BE EXCAVATED AND EVALUATED BY THE GEOTECHNICAL CONSULTANT PRIOR TO CONSTRUCTING THE “FILL” PORTION



CODE COMPLIANT KEYWAY
WITH MINIMUM DIMENSIONS:

TOE: 2 FOOT MIN.
HEEL: 3 FOOT MIN.
WIDTH: 15 FOOT MIN.

NOTES:

1. THE NECESSITY AND LOCATION OF DRAINS SHALL BE DETERMINED IN THE FIELD BY THE GEOTECHNICAL CONSULTANT

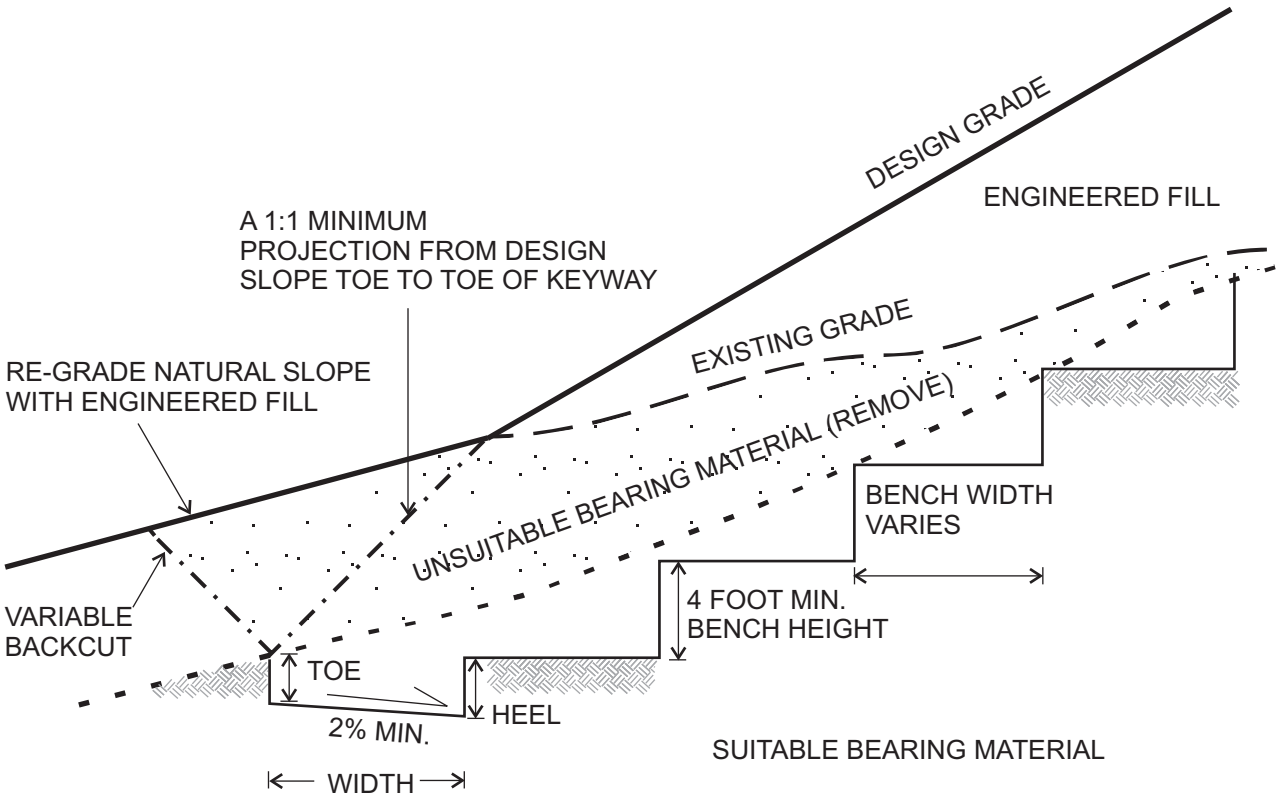
2. SEE DETAIL 2 FOR DRAIN SPECIFICATIONS

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ADVANCED GEOTECHNICAL SOLUTIONS

FILL OVER CUT SLOPE

DETAIL 4



CODE COMPLIANT KEYWAY
WITH MINIMUM DIMENSIONS:

TOE: 2 FOOT MIN.
HEEL: 3 FOOT MIN.
WIDTH: 15 FOOT MIN.

NOTES:

1. WHEN THE NATURAL SLOPE APPROACHES OR EXCEEDS THE DESIGN GRADE SLOPE RATIO, SPECIAL RECOMMENDATIONS ARE NECESSARY BY THE GEOTECHNICAL CONSULTANT

2. THE GEOTECHNICAL CONSULTANT WILL DETERMINE THE REQUIREMENT FOR AND LOCATION OF SUBSURFACE DRAINAGE SYSTEMS.

3. MAINTAIN MINIMUM 15 FOOT HORIZONTAL WIDTH FROM FACE OF SLOPE TO BENCH/BACKCUT

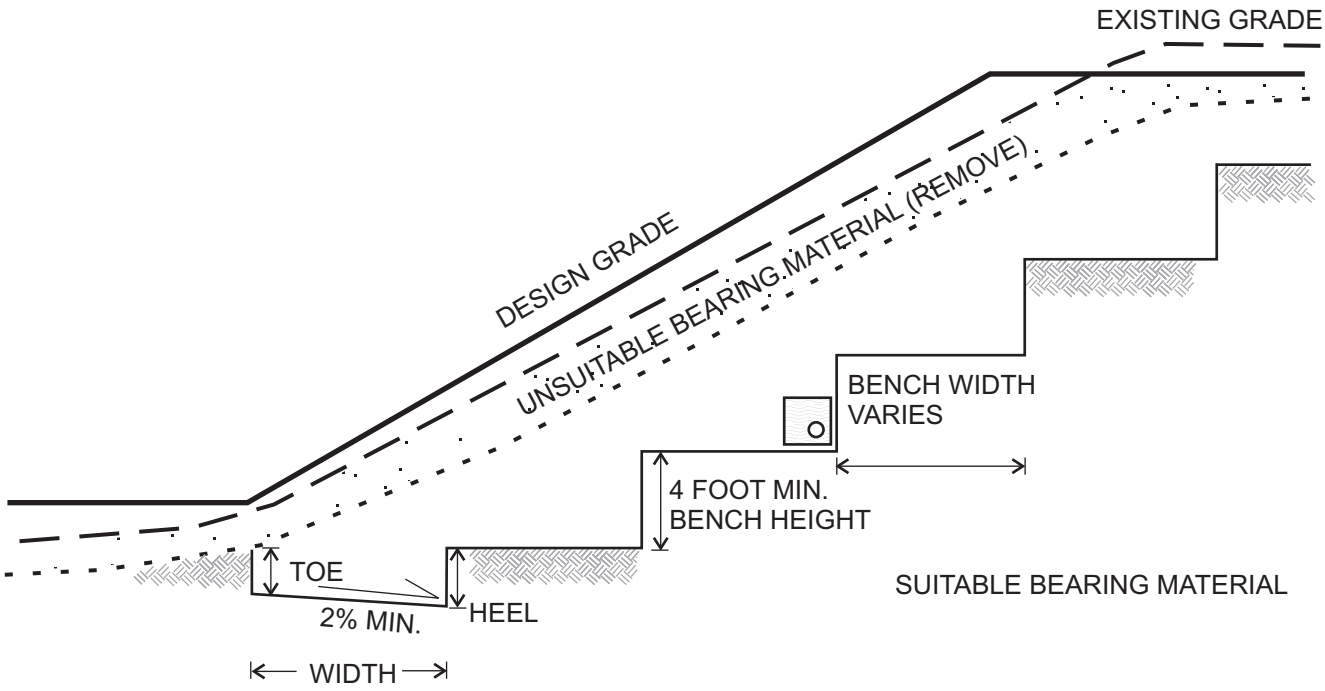
VER 1.0

NTS

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ADVANCED GEOTECHNICAL SOLUTIONS

FILL OVER NATURAL SLOPE

DETAIL 5



CODE COMPLIANT KEYWAY
WITH MINIMUM DIMENSIONS:

TOE: 2 FOOT MIN.
HEEL: 3 FOOT MIN.
WIDTH: 15 FOOT MIN.

NOTES:

1. MAINTAIN MINIMUM 15 FOOT HORIZONTAL WIDTH FROM FACE OF SLOPE TO BENCH/BACKCUT

2. SEE DETAIL 2 FOR DRAIN SPECIFICATIONS

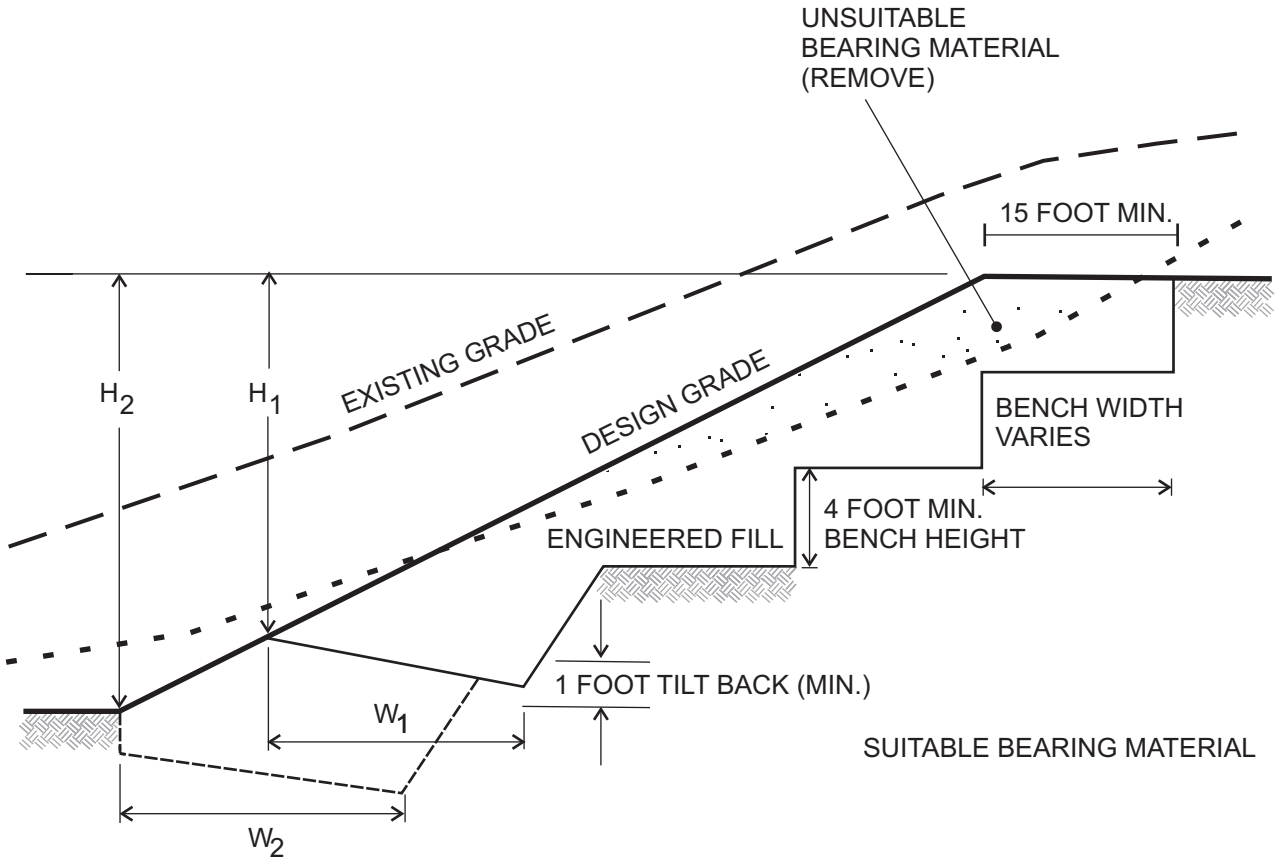
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ADVANCED GEOTECHNICAL SOLUTIONS

SKIN FILL CONDITION

DETAIL 6



NOTES:

1. IF RECOMMENDED BY THE GEOTECHNICAL CONSULTANT, THE REMAINING CUT PORTION OF THE SLOPE MAY REQUIRE REMOVAL AND REPLACEMENT WITH AN ENGINEERED FILL

2. "W" SHALL BE EQUIPMENT WIDTH (15 FEET) FOR SLOPE HEIGHT LESS THAN 25 FEET. FOR SLOPES GREATER THAN 25 FEET, "W" SHALL BE DETERMINED BY THE GEOTECHNICAL CONSULTANT. AT NO TIME SHALL "W" BE LESS THAN H/2

3. DRAINS WILL BE REQUIRED (SEE DETAIL 2)

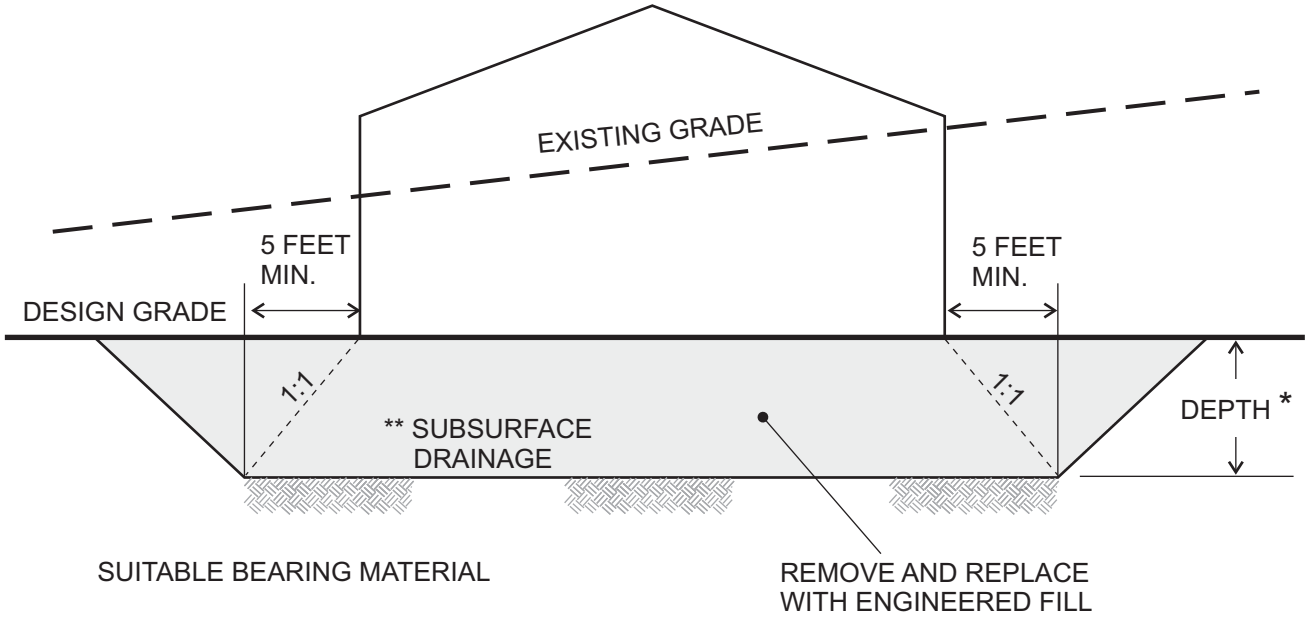
VER 1.0

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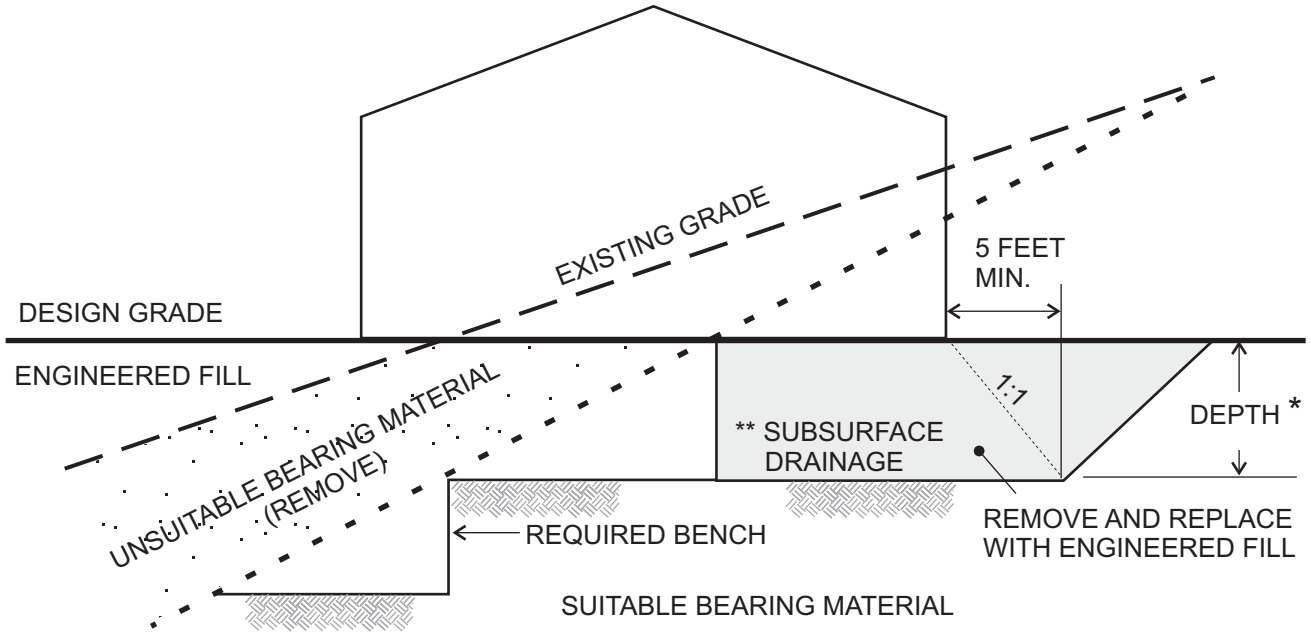
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ADVANCED GEOTECHNICAL SOLUTIONS

PARTIAL CUT SLOPE STABILIZATION

DETAIL 7



CUT LOT OVEREXCAVATION



CUT-FILL LOT OVEREXCAVATION

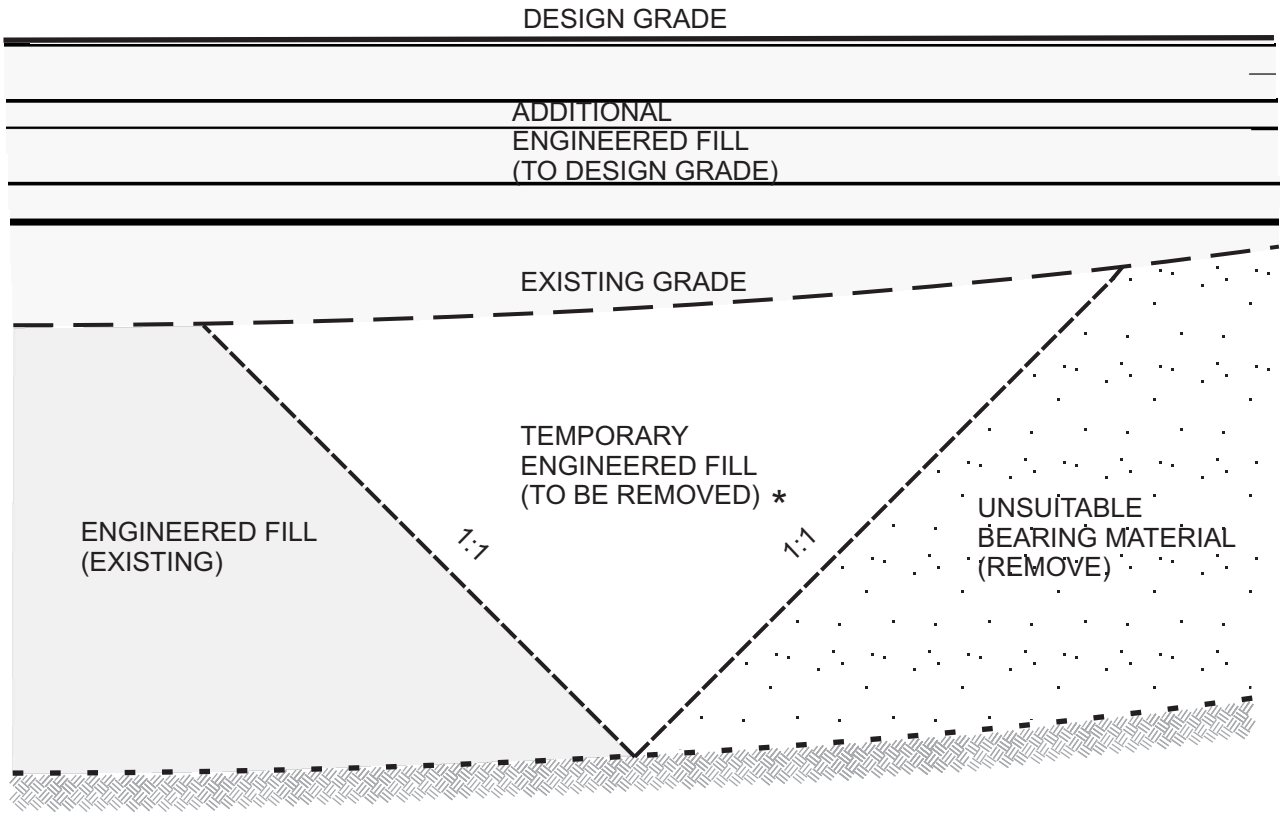
NOTES:

* SEE REPORT FOR RECOMMENDED DEPTHS, DEEPER OVEREXCAVATION MAY BE REQUIRED BY THE GEOTECHNICAL CONSULTANT BASED ON EXPOSED FIELD CONDITIONS

** CONSTRUCT EXCAVATION TO PROVIDE FOR POSITIVE DRAINAGE TOWARDS STREETS, DEEPER FILL AREAS OR APPROVED DRAINAGE DEVICES BASED ON FIELD CONDITIONS

VER 1.0 NTS

AGS ADVANCED GEOTECHNICAL SOLUTIONS	CUT & CUT-FILL LOT OVEREXCAVATION	DETAIL 8



* REMOVE BEFORE PLACING ADDITIONAL ENGINEERED FILL

TYPICAL UP-CANYON PROFILE

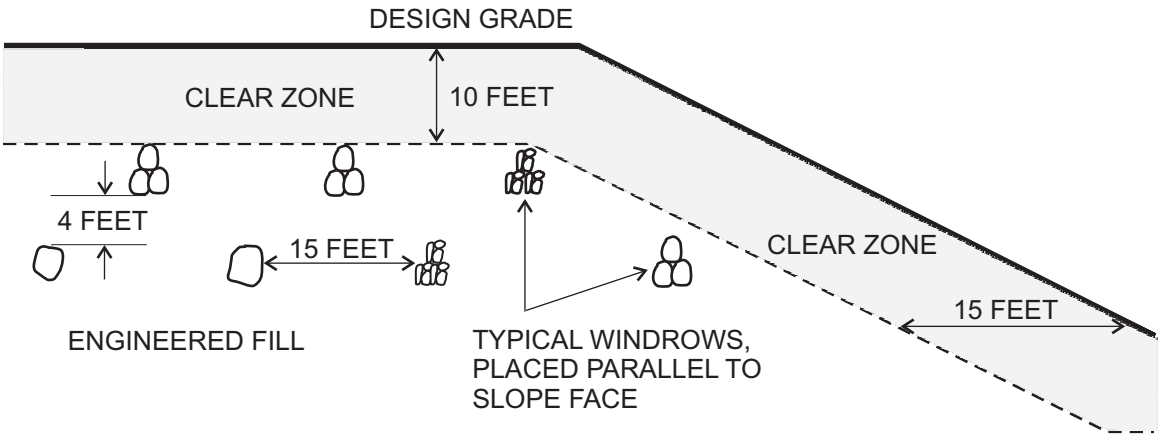
VER 1.0

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ADVANCED GEOTECHNICAL SOLUTIONS

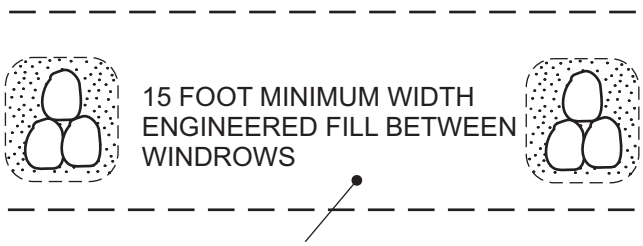
REMOVAL ADJACENT TO EXISTING FILL

DETAIL 9



CLEAR ZONE DIMENSIONS FOR REFERENCE ONLY, ACTUAL DEPTH, WIDTH, WINDROW LENGTH, ETC. TO BE BASED ON ELEVATIONS OF FOUNDATIONS, UTILITIES OR OTHER STRUCTURES PER THE GEOTECHNICAL CONSULTANT OR GOVERNING AGENCY APPROVAL

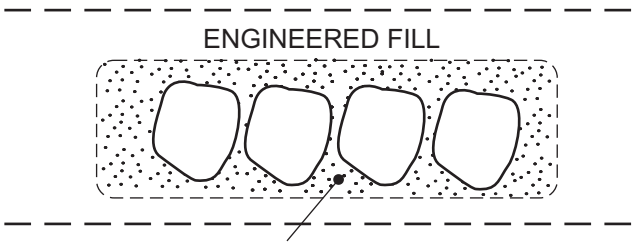
OVERSIZED MATERIAL DISPOSAL PROFILE



HORIZONTALLY PLACED ENGINEERED FILL, FREE OF OVERSIZED MATERIALS AND COMPACTED TO MINIMUM PROJECT STANDARDS

COMPACT ENGINEERED FILL ABOVE OVERSIZED MATERIALS TO FACILITATE "TRENCH" CONDITION PRIOR TO FLOODING GRANULAR MATERIALS

WINDROW CROSS-SECTION



WINDROW PROFILE

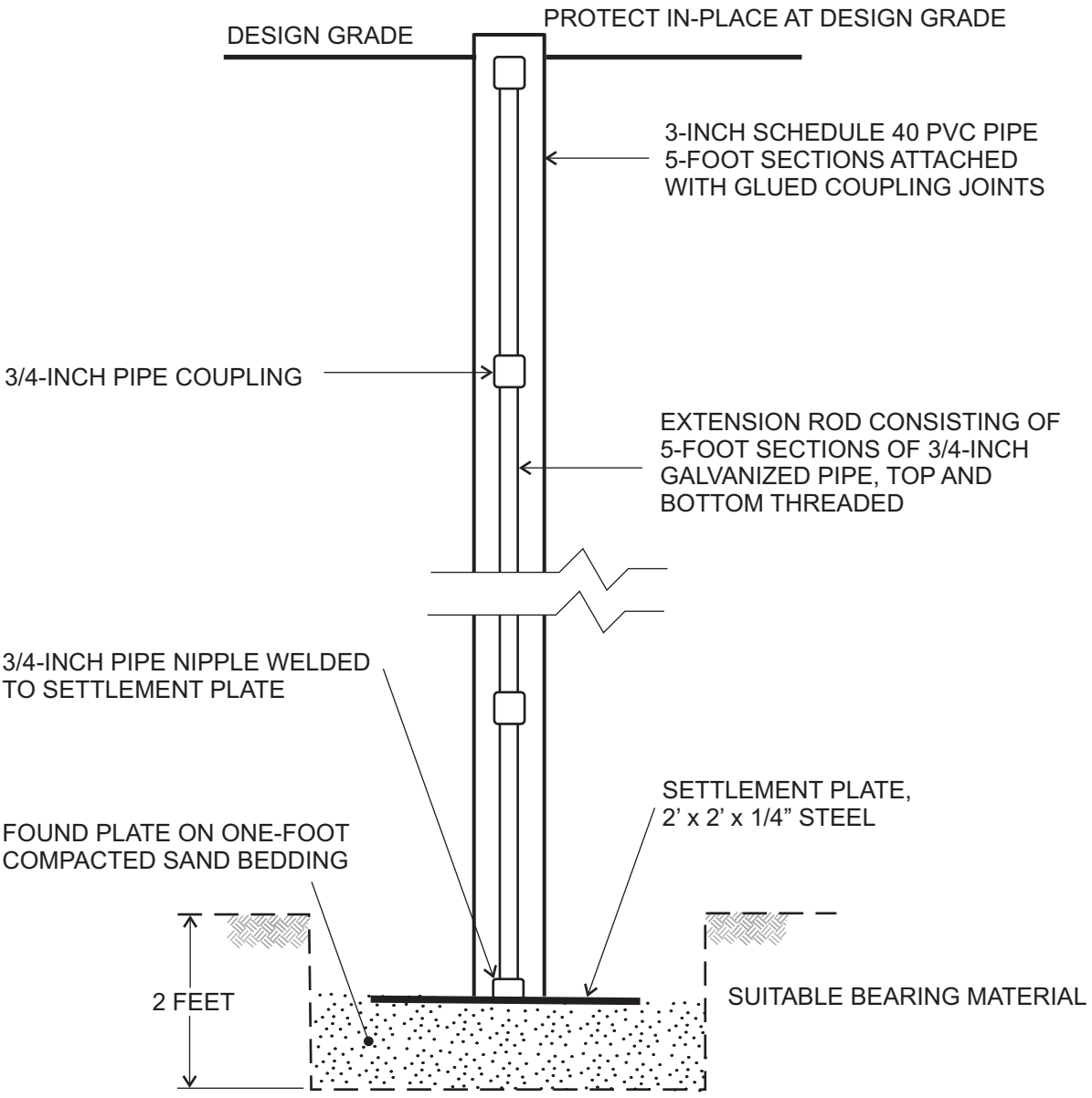
VER 1.0

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OVERSIZED MATERIAL DISPOSAL CRITERIA

DETAIL 10



NOTES:

1. SETTLEMENT PLATE LOCATIONS SHALL BE SUFFICIENTLY IDENTIFIED BY THE CONTRACTOR AND BE READILY VISIBLE TO EQUIPMENT OPERATORS.

2. CONTRACTOR SHALL MAINTAIN ADEQUATE HORIZONTAL CLEARANCE FOR EQUIPMENT OPERATION AND SHALL BE RESPONSIBLE FOR REPAIRING ANY DAMAGE TO SETTLEMENT PLATE DURING SITE CONSTRUCTION.

3. A MINIMUM 5-FOOT ZONE ADJACENT TO SETTLEMENT PLATE/EXTENSION RODS SHALL BE ESTABLISHED FOR HAND-HELD MECHANICAL COMPACTION OF ENGINEERED FILL. ENGINEERED FILL SHALL BE COMPACTED TO MINIMUM PROJECT STANDARD.

4. ELEVATIONS OF SETTLEMENT PLATE AND ALL EXTENSION ROD PLACEMENT SHALL BE DOCUMENTED BY PROJECT CIVIL ENGINEER OR SURVEYOR.

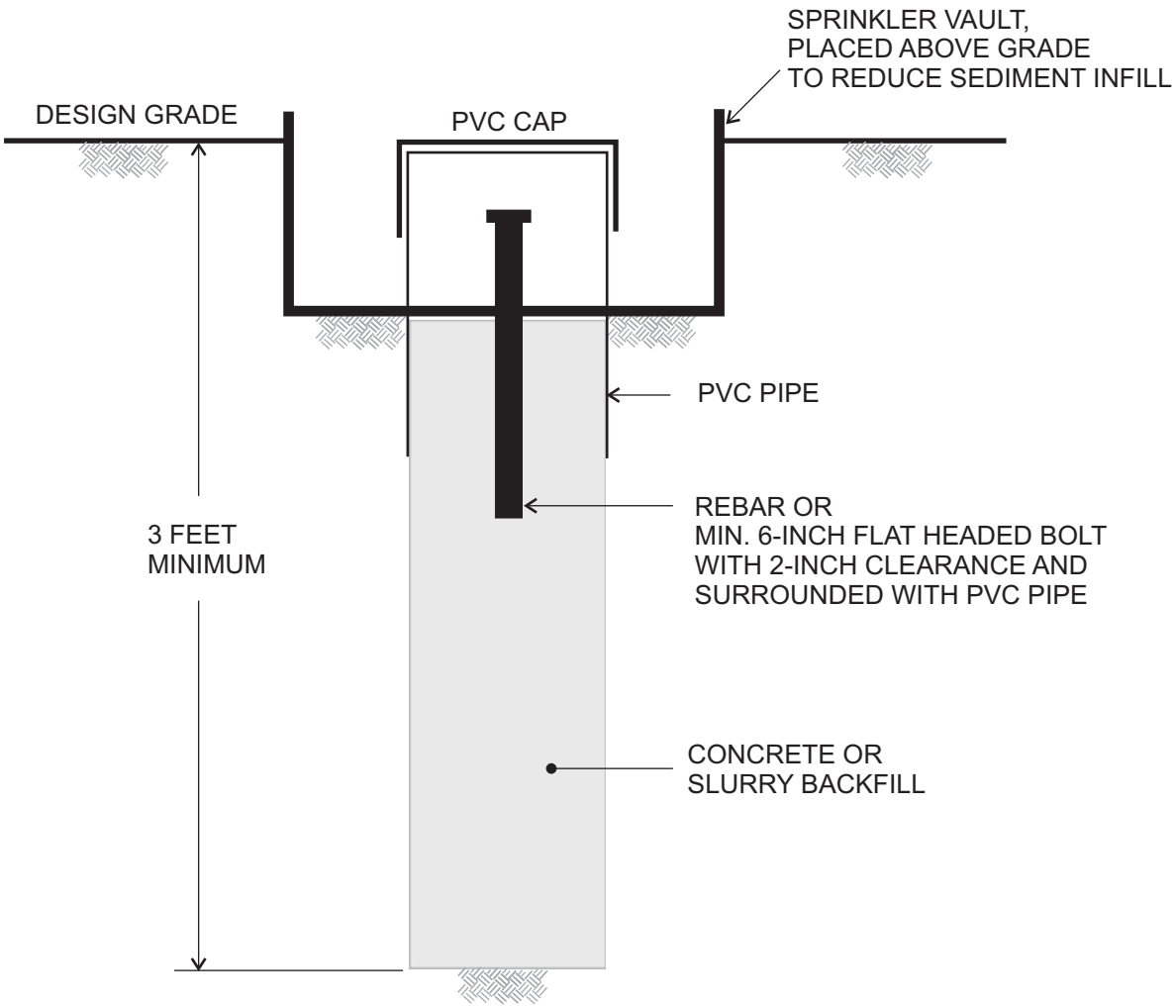
VER 1.0

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ADVANCED GEOTECHNICAL SOLUTIONS

SETTLEMENT PLATE

DETAIL 11



NOTES:

1. SETTLEMENT MONUMENT LOCATIONS SHALL BE SUFFICIENTLY IDENTIFIED AND BE READILY VISIBLE TO EQUIPMENT OPERATORS.

2. ELEVATIONS OF SURFACE MONUMENTS SHALL BE DOCUMENTED BY PROJECT CIVIL ENGINEER OR SURVEYOR.

VER 1.0

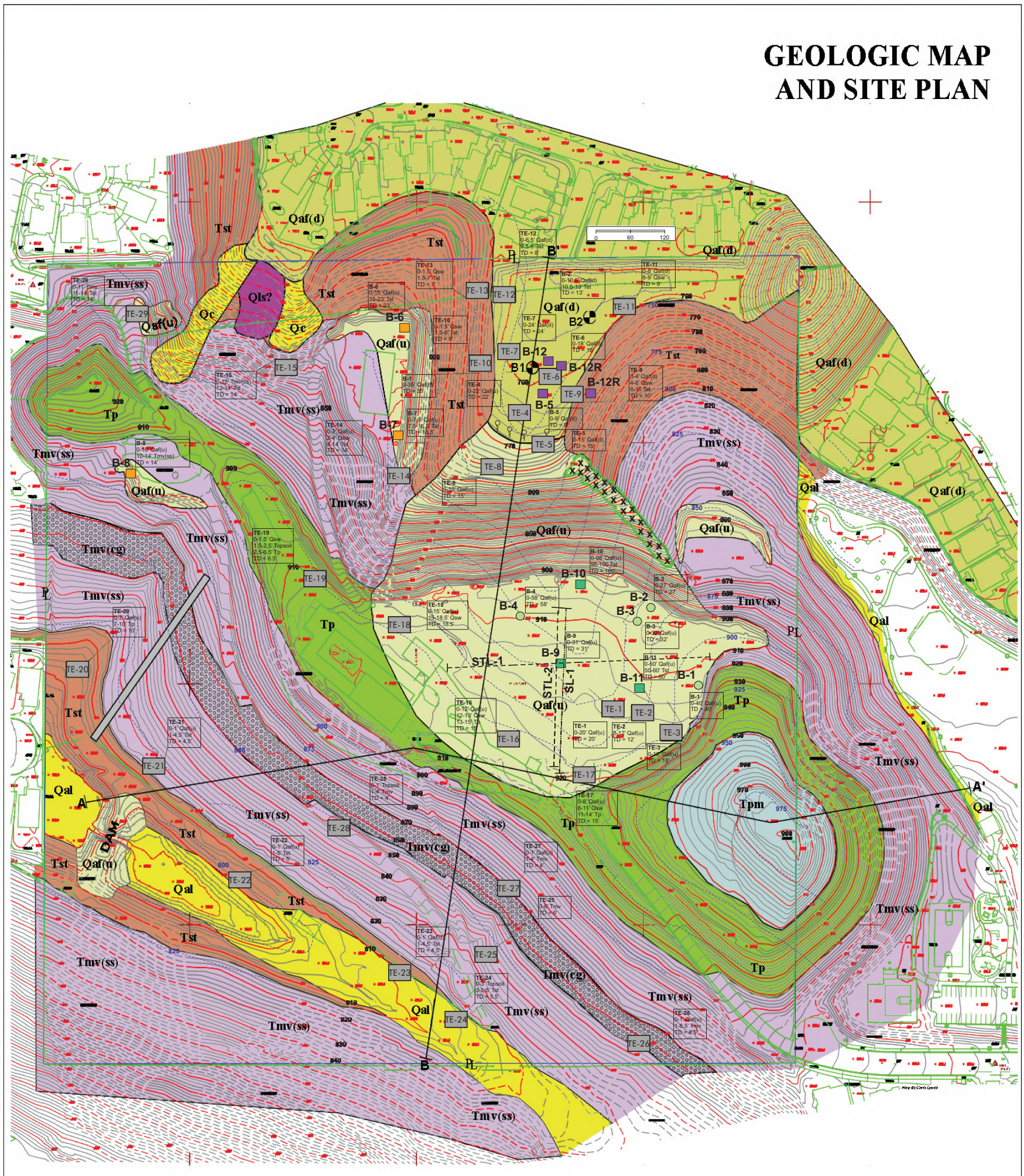
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SETTLEMENT MONUMENT

DETAIL 12

GEOLOGIC MAP AND SITE PLAN



LEGEND

Geologic Units (CWLM)

Qaf = Artificial Fill
(d) = Documented Fill
(u) = Undocumented Fill
(x) = Oversized rock 6'-8' diameter
Qal = Alluvium
Qc = Colluvium
Qls = Questionable Landlside

Tp = Pomarado Formation
Tpm = Miramar Sandstone member

Qls = Mission Valley Formation
(cg) = Conglomorate part
(ss) = Sandstone Part
Tst = Standstone Conglomerate
♀ = Seepage

Geologic Contact (All Contacts Approximate CWLM)

Approximate Location of Test Excavation (CWLM) — TE-26

Approximate Location of Test Boring (CWLM) — B1

Geologic Cross Section — A — A'

Approximate Location of Hollow Stem Boring (AGS) — HS-1

"Sting" Resistivity Line (AGS) — STL-2

Seismic Refraction Line (AGS) — SL-1

B-1 - B-4
Hollow-Stem boring (SCS 2019)

B-6 - B-8
Hollow-Stem boring(SCS 2019)

B-9 - B-11
Sonic boring (SCS 2019)

B-5, B-12
Tri-Pod boring (SCS 2019)

900 — Approximate location and elevation of original topography (excerpt from 1950's 200-scale topo map)

N

0 60 120
Scale: 1" = 60'
(Approximately)

PLATE 1
Geologic Map and Exploration Location Plan

AGS
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

Project:	Report:	Date:
P/W 1902-06		Jan. 2020